# \*\*\*Carbon Pipelines Affirmative\*\*\*

## Things to consider

If you need to save time, you should take out (in this order):

--MIT evidence in warming advantage

--tangible impact to delay

--growth scenario in the economy advantage

Pipelines are not definitively topical. The best definitions that exclude pipelines define them as “energy infrastructure.” The affirmative should invest heavily in the argument that CCS is not transporting energy, and is regulated by the DoT.

## \*\*1ac

### 1ac Plan

#### The United States federal government should facilitate regulated pipeline transportation of captured carbon in the United States.

### 1ac Solvency

#### First – solvency

#### Carbon regulation is coming and CCS technology is advancing – facilitating regulated transportation infrastructure is key to jump-starting the commercial industry

Zarraby 12 - chemical engineer for the Federal Energy Regulatory Commission, JD expected from GWU in 2012

Cyrus, “Note: Regulating Carbon Capture and Sequestration: A Federal Regulatory Regime to Promote the Construction of a National Carbon Dioxide Pipeline Network,” 80 Geo. Wash. L. Rev. 950, Lexis

Rising food prices, 1 mass migration, 2 new endangered species, 3 severe droughts 4 - scientists have linked each of these harms to increased emissions of greenhouse gases, and if such harms persist, they will fundamentally change the way human beings live their lives. 5 To combat these harms, the Environmental Protection Agency ("EPA") recently announced that, for the first time, the United States will regulate the emissions of greenhouse gases from power plants under the Clean Air Act. 6 One of the largest emitters of greenhouse gases is coal-fired electricity. 7 Coal-fired power generation accounts for roughly one-third of all greenhouse gas emissions in the United States. 8 Despite its contribution to climate change, the United States' reliance on coal-fired power is increasing: the Energy Information Administration estimates that coal power will account for over forty percent of United States electricity generation in 2035. 9 Carbon Capture and Sequestration ("CCS") is one of the most promising technologies to curb greenhouse gas emissions from coal-fired electric generation. 10 [\*953] CCS is a process whereby carbon dioxide ("CO<2>") is separated from the power plant emissions and transported and stored in underground reservoirs. 11 CCS prevents the release of CO<2> into the atmosphere and effectively eliminates greenhouse gas emissions from the power plant operations. 12 Although the technology for capturing and storing CO<2> has been proven in operation, 13 the United States does not have adequate infrastructure to implement CCS on a national scale. Specifically, tens of thousands of miles of CO<2> pipelines must be constructed to transport the CO<2> from the power plants to underground reservoirs. 14 Currently, there is no comprehensive federal regulation of CO<2> pipelines and existing state regulations are limited. 15 The uncertainty of this regulatory framework will prevent the development of much-needed CO<2> pipelines. 16 Given the harms that will arise because of greenhouse gas emissions and the continued reliance on coal as a source of electricity, it is imperative that Congress pass legislation that promotes the construction of new CO<2> pipelines. 17

#### The *entire project* depends on a national network for pipeline infrastructure

IRGC 8

International Risk Governance Council, “Regulation of Carbon Capture and Storage,” http://www.irgc.org/IMG/pdf/Policy\_Brief\_CCS.pdf

Large-scale CCS deployment cannot proceed until extensive pipeline infrastructure is in place. Large volumes of CO2 – a 1,000 MW coal-ﬁred power plant produces 5 to 8 million tonnes of CO2 annually – will need to be transported from source to sink. Linkages are complex, and the business model for pipeline operators includes signiﬁcant risk, as their operations are subject to uncertainties beyond their control at both ends of the pipe. This risk puts upward pressure on pipeline costs, as do recent steel price increases. Transport infrastructure investment requires regional and sitespeciﬁc knowledge of geological storage prospects, as well as knowledge of current and future CO2 source locations, volumes, and characteristics. Pipeline transport of CO2 is successfully regulated for enhanced oil recovery in the US, but with a framework that does not necessarily translate to the industrial organisation of CCS. Regulation of risks related to pipeline transport is straightforward, but more complicated regulatory decisions will relate to funding, siting and construction of pipeline networks off-shore, onshore, and through urban zones, natural monopoly concerns, and issues of eminent domain. Different regulatory models for CO2 pipeline ownership, a privately owned, common carrier approach or a public utility approach could stimulate different levels of investment, potentially inﬂuencing the ultimate organisational structure of the CCS industry.

#### The federal government is key

-eminent domain, single regulator, encourages broader CCS investment and *guarantees* uniformity

Horne 10 – JD @ U of Utah

Jennifer, “Getting from Here to There: Devising an Optimal Regulatory Model for CO<2> Transport in a New Carbon Capture and Sequestration Industry,” 30 J. Land Resources & Envtl. L. 357, Lexis

Siting regulations affect companies' ability to build where pipelines are needed, or wanted. Unless CCS develops on a localized scale, some pipelines will necessarily cross state lines. Federal eminent domain authority thus will be key for CCS pipelines. This is because siting under the auspices of multiple layers of government will almost inevitably hinder rapid development of a pipeline network needed for commercial-scale CCS. Such a system would be more time-and resource-intensive, and would mean more uncertainty for pipeline developers. Federal eminent domain authority for interstate pipelines would give pipelines, with appropriate federal approvals, authority to cut through the red tape of multiple state and local land use requirements while still compensating landowners and protecting local ecosystems. A complex siting process that requires approval under multiple state and local regimes may slow the progress of the entire CCS industry. 108 The Congressional Research Service recently described the problem: As CO<2> pipelines get longer, the state-by-state siting approval process may become complex and protracted, and may face public opposition. Because CO<2> pipeline requirements in a CCS scheme are driven by the relative locations of CO<2> sources and sequestration sites, identification and validation of such sites must explicitly account for CO<2> pipeline costs if the economics of those sites are to be fully understood. 109 Consider the siting of a hypothetical interstate pipeline that traverses three separate states. Absent preemptive federal siting regulation, the pipeline developer would have to struggle through three separate sets of regulatory requirements, apply for approval to build along the chosen corridor in each state, and potentially face legal challenges in three separate jurisdictions. One reason that pipeline siting under a state-based model would be resource-intensive is the regulatory redundancy - and risk of conflicting decisions - that can occur when a pipeline corridor runs through multiple jurisdictions. This has proven to be a hindrance in other industries. For example, a state-based siting process continues to pose daunting challenges to interstate electric transmission siting. 110 It has contributed to the "very slow pace of transmission enhancements," 111 in the [\*374] face of increasing energy demands and an electric grid in need of expansion. 112 In general, pipeline projects adhere to rigid timelines. 113 Delays in securing necessary easements drive up costs and holdup projects. 114 The problem is only compounded when delays occur in multiple jurisdictions at once, or when one state erects a unilateral roadblock to a project even though other states have signed on. Even disapproval by a single locality can be a significant hindrance to project development. 115 Second, an approval process that involves multiple, potentially conflicting requirements is not just more resource-intensive, but also creates uncertainty. To begin with, the "lack of timing coordination" 116 among various entities may force pipelines to site one part of a pipeline corridor before the pipeline has siting approval for the rest of the corridor. 117 In addition, the generalized nature of the benefit brought by climate change mitigation makes localized siting decisions particularly vulnerable to not in my backyard (NIMBY) opposition. 118 CCS will serve generalized interests, but impose localized costs. It will provide a worldwide benefit - the reduction of greenhouse gas emissions - but do so at the immediate expense (in terms of landscape disruption and related environmental effects) to the local landowners where CCS pipelines are sited. Take, for example, the immediate risks from a sudden CO<2> pipeline leakage in a highly populated area. 119 Damage from such a release to human health and the environment would be borne by the immediate locality. 120 In addition to safety risks, the environmental and aesthetic impacts of pipeline construction are also felt most acutely on a localized level. The problem of public opposition to new pipelines is likely to be greater in CCS than it has been in EOR. EOR pipelines are located primarily in remote areas, and in states "accustomed to the presence of large energy infrastructure." 121 In CCS, many of the sources of CO<2> - power plants - are located in more populated [\*375] areas, "many with a history of public resistance to the siting of energy infrastructure." 122 Of course, this will not bear out everywhere. Some states are bound to be pro-CCS, even when the in-state proportion of the climate change benefit would seem too slight to justify action. 123 For example, important coal interests in Wyoming prompted the state to move early to establish a CCS regulatory model. 124 For such states heavily dependent on coal for revenue, a "push for new clean coal technologies" is understandable. 125 Given this, a climate like Wyoming's may be particularly friendly territory for siting of CCS pipelines. However, these particular states may not match where potential storage repositories are located. Other states and localities lack the sort of incentive that exists in states like Wyoming. Political pressure to pave the way for CCS pipeline siting will vary dramatically from one state to the next, as evidenced by the inconsistency in state action on CCS generally so far. 126 This lack of political uniformity points to a single conclusion: some states and localities will have stronger incentives to promote CCS than others. Professor Victor Flatt has aptly summarized the potential hindrance that may arise from this kind of multijurisdictional control of CCS pipeline siting: "Each entity that has jurisdiction over CCS may have a way to veto a CCS project for reasons unrelated to the original purpose of the legal regime being used." 127 Comprehensive federal regulation, however, could minimize such uncertainty by providing one set of requirements in lieu of multiple, varying, and even potentially conflicting sets of mandates. B. The Case for a Comprehensive Federal Approach The challenge of transitioning to a commercial-scale CCS industry calls for a well-coordinated, comprehensive approach to regulation. A national market will require a high degree of uniformity and certainty. The surest and most expedient [\*376] path to a market with those features is comprehensive federal regulation - for CCS generally, and transport specifically. Like natural gas and oil pipelines - both complex, enormous systems with national reach 128 - CCS will benefit from the sort of consistent regulation from one state to the next that a federal approach can provide, and that a piecemeal state-based approach cannot. 129 This is especially true if CCS is to become a national industry that helps to solve the climate change dilemma. As Delissa Hayano has argued: The costs and logistics of compressing, transporting, and sequestering CO<2> on the scale necessary to address [climate change] concerns requires a national interest parallel to that motivating the construction of equivalent-scale national infrastructure projects such as the interstate road system. 130 While state-based regulation can be effective for certain types of markets, it would be a less-than-ideal fit for CCS transport. State-based regulation would create too much inconsistency and complexity. 131 In another context, Professor Lincoln Davies has described a state-based approach to promoting renewable energy development as risking "crazy-quilt" regulation. 132 Specifically, the sheer variety of state-based Renewal Portfolio Standard (RPS) models that have sprung up in recent years have yielded widely varying standards from one state to the next. 133 The result is a fragmenting of renewable energy into multiple markets, not the creation of a single uniform national one. While the differentiation possible from state regulation long has been lauded as promoting innovations through laboratories of democracy, 134 to promote an industry that necessarily will be interstate in nature, such as CCS transport, federal models often are invoked. 135 The rationales typically offered for federal regulation include: (1) that uniform regulation is needed to ensure a well-functioning [\*377] market; 136 (2) that federal regulation is necessary to avoid state "races to the bottom;" 137 and (3) that such regulation is essential to avoid fragmentation across borders in creating a network system national or regional in scope. 138 As the Supreme Court has observed in the dormant Commerce Clause context, "This principle that our economic unit is the Nation ... has as its corollary that the states are not separable economic units." 139 For each of the different CCS transport regulatory design elements, these rationales apply, albeit to somewhat varying extents. Pipeline safety is regulated at the federal level, rather than state-by-state, for good reason. The PHMSA regulates design, construction, and on-going operations and testing for interstate pipelines in various industries. 140 A consistent set of standards provides consistent protection for the public and the environment no matter where the pipeline's location. Effects from an accident may be localized, 141 but the possible effects on global warming from CO<2> leakage reach far and wide. 142 Indeed, the need for uniform regulation often is invoked for industries where standards of performance or operation are more efficient if standardized. 143 They clearly apply for safety regulation in a network industry like CCS transport, where the need for safe operation does not change from one jurisdiction to the next and the risk of different safety requirements could unnecessarily increase construction costs, or worse, result in incompatible subsystems. For rate and access regulation, federal regulation may be somewhat less important than it is for safety or siting, but it will still facilitate consistency and avoid confusion in the transport market, particularly when it comes to access. Nondiscriminatory access requirements can come in different forms. For example, in natural gas, pipelines must offer nondiscriminatory access but operate as contract carriers. 144 That means that the pipeline owner contracts in advance with a customer to provide access to a set amount of its capacity. 145 In oil, pipelines operate under a system of prorationing. In this system, even when the pipeline capacity is fully utilized, if another customer requires transport service, the pipeline is obliged to accommodate the new customer and adjust the capacity available to other customers accordingly. 146 In CCS, if a pipeline runs through multiple states, and each state uses a different nondiscriminatory access model, [\*378] confusion and inefficiency would result. In such circumstances, a uniform set of requirements for access will be far more workable.

#### It’s reverse causal – federal *inaction* creates uncertainty that deters private investment in CCS

Zarraby 12 - chemical engineer for the Federal Energy Regulatory Commission, JD expected from GWU in 2012

Cyrus, “Note: Regulating Carbon Capture and Sequestration: A Federal Regulatory Regime to Promote the Construction of a National Carbon Dioxide Pipeline Network,” 80 Geo. Wash. L. Rev. 950, Lexis

C. Carbon Capture and Sequestration - Lowering Emissions While Still Utilizing the United States' Coal Resources CCS is a multistep process that involves separating CO<2> from the exhaust of a power plant, transporting the CO<2> via pipeline to an underground storage reservoir, and storing the CO<2> underground so that it is not released into the atmosphere. 48 CCS is considered one of the most promising technologies to combat global warming because it allows the United States to continue to rely on a fuel source that is abundantly available while virtually eliminating the greenhouse gas emissions associated with it. 49 Available CCS technology can reduce CO<2> emissions from each individual power plant by eighty to ninety percent. 50 The United States has already invested more than $ 5 billion in CCS to lower the amount of greenhouse gas emissions from coal-fired generation, in recognition of the United States' reliance on coal as a fuel source for electricity generation and the impact coal has on carbon emissions. 51 For example, in 2009, the Department of Energy ("DOE") provided $ 979 million of funding to spur the construction of three new CCS projects in West Virginia, Alabama, and Texas. 52 CO<2> could be removed from plant emissions using one of three technologies: postcombustion, precombustion, and oxyfuel. 53 Each of these technologies effectively removes CO<2> from the plant's emissions. Postcombustion carbon capture technologies typically use an organic solvent to remove CO<2> from the flue gas 54 produced by the power plant. 55 Precombustion technologies process the fuel prior to its use in the power plant. 56 Oxyfuel combustion uses oxygen instead [\*959] of air in the combustion process to produce a flue gas that has a high concentration of CO<2>. 57 Once the CO<2> is captured, the gas stream can be stored underground in geologic formations that would prevent the greenhouse gases from reaching the atmosphere. 58 The natural gas industry has been using many of the same technologies for geologic gas storage since as early as 1935. 59 Generally, so long as a cap rock - a rock with very low permeability that acts as a lid on the storage reservoir - confines the geologic formation, the CO<2> can be stored with little fear of being released into the atmosphere. 60 The National Energy Technology Laboratory ("NETL"), a division of the DOE, estimates that there is enough geologic storage in the southeastern Unites States alone to last more than 900 years at current CO<2> emission levels in that region. 61 One example of successful underground storage of carbon is at the Sleipner gas field in the North Sea, approximately 155 miles from the coast of Norway. 62 At Sleipner, Statoil, an oil and natural gas company, produces natural gas with high concentrations of CO<2> - concentrations that are too high for normal industrial use. 63 Rather than stripping the CO<2> from the natural gas and releasing the CO<2> to the atmosphere, Statoil removes the CO<2> from the natural gas and stores it in a geologic formation approximately 3000 feet underground. 64 By storing the CO<2> produced by Statoil underground, Norway has reduced [\*960] its total CO<2> emissions by approximately three percent since the Sleipner field began operating in 1996. 65 There are several CCS projects already operating in the United States. For example, the Weyburn-Midale project, launched in 2000, 66 sequesters approximately fifty percent of the CO<2> emissions from a coal gasification plant in North Dakota. 67 Once the plant captures the CO<2>, it is transported by pipeline approximately 205 miles north to an oil field in Southern Canada. 68 The oil field operator injects the CO<2> underground to facilitate enhanced oil recovery ("EOR"). 69 Additionally, Duke Energy is constructing the first full-scale coal-fired electric generation plant with CCS in Edwardsport, Indiana. 70 The Edwardsport plant is a new 618 megawatt coal-fired power plant that is capable of capturing carbon emissions. 71 Once completed, the plant will be "one of the cleanest and most efficient coal-fired power plants in the world." 72 Although the United States has made some progress in deploying CCS technology through direct government investment, these projects are relatively small compared to the total amount of coal-fired generation in the United States. For example, the three projects partially funded by the DOE 73 have a power generation capacity of 795 megawatts. 74 This represents only 0.25% of the total coal-fired generation in operation. 75 The full deployment of CCS technology will require significant private investment in not only the power plants themselves, but also in the related CO<2> transportation infrastructure. [\*961] D. Deploying Carbon Capture and Sequestration Nationwide - the Need for a CO<2> Pipeline Regulation As stated above, the technologies for CCS have been developed and are proven to be effective at reducing the amount of greenhouse gases emitted from power plants. Should the United State pass significant greenhouse gas emissions regulations, it would become necessary to develop policies that allow for the immediate deployment of CCS infrastructure. A major aspect of this deployment involves transportation pipelines for CO<2>. 76 Because the location of power plants and storage formation can be hundreds, if not thousands of miles apart, a network of CO<2> pipelines must be built to support the development of CCS. 77 For example, NETL estimates that Louisiana, Montana, Wyoming, and Texas have the four largest capacities for CO<2> storage. 78 However, in December 2010, the states with the four highest coal-fired electricity consumption were Texas, Indiana, Pennsylvania, and Ohio. 79 Transporting CO<2> from a power plant in Akron, Ohio, to a storage reservoir in Shreveport, Louisiana, requires the construction of a 1000-mile pipeline. Storing eighty percent of current CO<2> emissions from electric power production requires the transportation of approximately 1800 [\*962] million tons ("Mt") of CO<2> per year. 80 By comparison, the 300,000 miles of natural gas pipelines currently in existence transport the equivalent of only 450 Mt of CO<2> per year. 81 Although the exact size is difficult to determine, 82 even low-end estimates predict the need to construct approximately 20,000 miles of CO<2> pipelines. 83 Materials, labor, and property costs associated with constructing the pipeline system would require a capital investment of approximately seventy-billion dollars. 84 To ensure private capital investments in CO<2> pipelines, Congress must develop a regulatory framework that promotes the building of CO<2> pipelines. Indeed, CCSReg, a collaborative effort led by Carnegie Mellon University that examines regulations for CCS, 85 stated, "Large-scale, commercial implementation of CCS will ... require ... further delineation of a CO<2> pipeline transportation regulatory regime... to provide increased regulatory certainty for CO<2> pipeline infrastructure developers that will be necessary for widespread deployment of CCS." 86 Specifically, CCSReg notes that certainty in the regulatory regime would help facilitate project financing because project developers will be able to evaluate the regulatory risks. 87 As discussed below, the absence of federal regulation of CO<2> pipelines creates the very uncertainty that would limit private investment. 88

#### There is a tangible impact to any delay

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Cyrus, “Note: Regulating Carbon Capture and Sequestration: A Federal Regulatory Regime to Promote the Construction of a National Carbon Dioxide Pipeline Network,” 80 Geo. Wash. L. Rev. 950, Lexis

In order to mitigate the most drastic effects of climate change while continuing to utilize coal resources in the United States, CCS projects must be implemented immediately. However, regardless of how many power plants are capable of capturing greenhouse gas emissions, the benefits of CCS will not be realized without the construction of a vast network of CO<2> pipelines. The most effective way for Congress [\*989] to promote the construction of new CO<2> pipelines is through a regulatory regime that (1) allows CO<2> pipelines to charge market-based rates, (2) protects pipeline customers from abuses of the market-based rates authority, (3) grants eminent domain authority for constructing CO<2> pipelines, and (4) allows FERC to enforce the legislation. In so doing, Congress would encourage the development of a technology that fully takes advantage of the United States' natural resources while protecting against the environmental harms caused by climate change.

### 1ac Economy

#### Advantage 1 – economy

#### Carbon sequestration is key to averting negative economic consequences of carbon regulations

EPA 10 – US Environmental Protection Agency

“Report of the Interagency Task Force on Carbon Capture and Storage,” http://www.epa.gov/climatechange/downloads/CCS-Task-Force-Report-2010.pdf

While CCS can be applied to a variety of stationary sources of CO2 , its application to coal-fired power plant emissions offers the greatest potential for GHG reductions. Coal has served as an important domestic source of reliable, affordable energy for decades, and the coal industry has provided stable and quality high-paying jobs for American workers. At the same time, coal-fired power plants are the largest contributor to U.S. greenhouse gas (GHG) emissions, and coal combustion accounts for 40 percent of global carbon dioxide (CO2 ) emissions from the consumption of energy. EPA and Energy Information Administration (EIA) assessments of recent climate and energy legislative proposals show that, if available on a cost-effective basis, CCS can over time play a large role in reducing the overall cost of meeting domestic emissions reduction targets. By playing a leadership role in efforts to develop and deploy CCS technologies to reduce GHG emissions, the United States can preserve the option of using an affordable, abundant, and domestic energy resource, help improve national security, help to maximize production from existing oil fields through enhanced oil recovery (EOR), and assist in the creation of new technologies for export.

#### Having coal as a utility option is key – any alternative drastically increases consumer energy costs

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In the United States, coal-fired power generation accounts for approximately forty-five percent of all electricity consumed. 32 Coal-fired generation is the most prevalent form of electricity because coal is abundant and less expensive than alternative sources of energy. 33 Specifically, the United States' coal reserve accounts for approximately twenty-five percent of the total coal in the world. 34 This coal reserve represents more potential energy than the amount of oil worldwide. 35 Because coal is readily available, the cost of producing electricity from coal is significantly less than other technologies. For example, the fuel costs associated with coal-fired generation are approximately seventy-five percent less than natural gas electricity. 36 Because of the low costs, the amount of electricity generated from coal rose by 5.4% between 2009 and 2010, even though the total increase in electricity generation was only 4.3%. 37 Coal-fired generation also serves the essential purpose of baseload generation. Baseload power is electricity that is generated at a constant rate to continuously supply a given demand. 38 In contrast with solar and wind power, whose electricity generation varies depending on factors outside the control of the power plant, coal-fired generation produces electricity at a constant rate. 39 As a result, regardless of how many solar panels or windmills are put in operation, the United States will continue to need baseload power from reliable energy sources to counter the varying supply of clean energy output. 40 Other fuel sources, such as natural gas and nuclear power, are also [\*957] used in baseload generation, but have specific drawbacks that make coal a stronger alternative. Fuel costs associated with natural gas-fired electricity are seventy-five percent higher than that of coal, 41 and the United States must import natural gas from foreign sources to meet the current demand. 42 Therefore, creating an energy portfolio that relies heavily on natural gas would require the United States to further rely on foreign sources of energy and increase the costs associated with electricity generation.

#### This collapses all major sectors of the economy

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Adam and Dan, “The Economic Impacts of Coal Utilization and Displacement in the Continental United States, 2015,” http://www.americaspower.org/sites/all/themes/americaspower/images/pdf/penn-state-study.pdf

We performed our analysis with the aid of an interindustry, or input-output, model. Specifically, we analyzed how coal-based electric generation affects production (output), household income, and employment in other sectors of each state and the continental U.S. as a whole under three alternative displacement scenarios. Our results indicate that the combination “multiplier” and “price-differential” effects are sizeable, amounting to $1.05 trillion ($2005) in total 48-state economic output for the “existence” of coal as a relatively inexpensive fuel for electricity generation. The results illustrate that government policies and private industry decisions affecting coal-based electric generation potentially can affect every major aspect of the American economy. The methodology underlying the study is summarized in Section II below, as well as in Appendix A, which also presents major assumptions and some basic computations underlying the analysis. The results for the five regions analyzed are summarized in Section III, with tables of basic data presented in Appendix B and simulation results presented in Appendix C. We simulated cases where coal-based electricity generation is displaced at levels of 66% and 33% by alternative energy supplies, including natural gas, nuclear, and a 10% mix of renewables, reflecting potential Renewable Portfolio Standards (RPS) that could be in place by 2015. The results indicate that for the nation, and for nearly every state individually, this displacement -- even factoring in positive offsetting multiplier impacts of replacement fuels and technologies -- would have a net negative economic impact. We project that national gross output would decline by $371 billion for the 66% case, and by $166 billion for the 33% case. II. Methodology A. Measuring Economic Interdependence With a broad base and high level of technological advancement, the U.S. economy exhibits a great deal of interdependence. Each business enterprise relies on many others for inputs into its production process and provides inputs to them in return. This means that the coal and coal-based electric utility industries’ contributions to the nation's economy extend beyond their own production to include demand arising from a succession of "upstream" inputs from their suppliers and "downstream" deliveries to their customers. The economic value of these many rounds of derived demands and commodity allocations is some multiple of the value of direct production itself. Hence, the coal and coal-based electric utility industries generate "multiplier" effects throughout the U.S. economy.

#### Nuclear war

Harris and Burrows 9

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Increased Potential for Global Conflict

Of course, the report encompasses more than economics and indeed believes the future is likely to be the result of a number of intersecting and interlocking forces. With so many possible permutations of outcomes, each with ample Revisiting the Future opportunity for unintended consequences, there is a growing sense of insecurity. Even so, history may be more instructive than ever. While we continue to believe that the Great Depression is not likely to be repeated, the lessons to be drawn from that period include the harmful effects on fledgling democracies and multiethnic societies (think Central Europe in 1920s and 1930s) and on the sustainability of multilateral institutions (think League of Nations in the same period). There is no reason to think that this would not be true in the twenty-first as much as in the twentieth century. For that reason, the ways in which the potential for greater conflict could grow would seem to be even more apt in a constantly volatile economic environment as they would be if change would be steadier. In surveying those risks, the report stressed the likelihood that terrorism and nonproliferation will remain priorities even as resource issues move up on the international agenda. Terrorism’s appeal will decline if economic growth continues in the Middle East and youth unemployment is reduced. For those terrorist groups that remain active in 2025, however, the diffusion of technologies and scientific knowledge will place some of the world’s most dangerous capabilities within their reach. Terrorist groups in 2025 will likely be a combination of descendants of long established groups\_inheriting organizational structures, command and control processes, and training procedures necessary to conduct sophisticated attacks\_and newly emergent collections of the angry and disenfranchised that become self-radicalized, particularly in the absence of economic outlets that would become narrower in an economic downturn. The most dangerous casualty of any economically-induced drawdown of U.S. military presence would almost certainly be the Middle East. Although Iran’s acquisition of nuclear weapons is not inevitable, worries about a nuclear-armed Iran could lead states in the region to develop new security arrangements with external powers, acquire additional weapons, and consider pursuing their own nuclear ambitions. It is not clear that the type of stable deterrent relationship that existed between the great powers for most of the Cold War would emerge naturally in the Middle East with a nuclear Iran. Episodes of low intensity conflict and terrorism taking place under a nuclear umbrella could lead to an unintended escalation and broader conflict if clear red lines between those states involved are not well established. The close proximity of potential nuclear rivals combined with underdeveloped surveillance capabilities and mobile dual-capable Iranian missile systems also will produce inherent difficulties in achieving reliable indications and warning of an impending nuclear attack. The lack of strategic depth in neighboring states like Israel, short warning and missile flight times, and uncertainty of Iranian intentions may place more focus on preemption rather than defense, potentially leading to escalating crises. 36 Types of conflict that the world continues to experience, such as over resources, could reemerge, particularly if protectionism grows and there is a resort to neo-mercantilist practices. Perceptions of renewed energy scarcity will drive countries to take actions to assure their future access to energy supplies. In the worst case, this could result in interstate conflicts if government leaders deem assured access to energy resources, for example, to be essential for maintaining domestic stability and the survival of their regime. Even actions short of war, however, will have important geopolitical implications. Maritime security concerns are providing a rationale for naval buildups and modernization efforts, such as China’s and India’s development of blue water naval capabilities. If the fiscal stimulus focus for these countries indeed turns inward, one of the most obvious funding targets may be military. Buildup of regional naval capabilities could lead to increased tensions, rivalries, and counterbalancing moves, but it also will create opportunities for multinational cooperation in protecting critical sea lanes. With water also becoming scarcer in Asia and the Middle East, cooperation to manage changing water resources is likely to be increasingly difficult both within and between states in a more dog-eat-dog world.

#### Independently, the plan is a key fiscal stimulus

ACCCE 11

American Coalition for Clean Coal Energy, “American Coalition for Clean Coal Electricity,” http://www.compasscoal.com/blog/

The United States continues to be a world leader in advanced coal technologies not only because of the investments we make. Our leaders also recognize that advanced coal technologies need to be developed in order to continue to use of one of the world’s most abundant resources with as small of an environmental impact as possible. Just last week, Secretary of Energy Steven Chu said to the Senate Budget Committee: The world will continue to rely on coal-fired electrical generation to meet energy demand. It is imperative that the United States develop the technology to ensure that base-load electricity generation is as clean and reliable as possible. Plus, taxpayers reap the benefits of our investments into CCS projects. In a 2009 ACCCE-commissioned study, American taxpayers see a quick and significant return on federal investments in advanced coal technologies, gaining $13 in benefits for every dollar the government invests.

#### That’s key to faster growth

Applebaum 12 - \*PhD, Professor @ Rutgers, senior economist at the Center for Economic and Policy Research

Eileen, 4-27, “Blame Budget Austerity for Poor GDP Growth,” http://www.usnews.com/opinion/blogs/economic-intelligence/2012/04/27/blame-budget-austerity-for-poor-gdp-growth

As the Obama administration's 2009 stimulus continues to wind down, the effects on the US economy are showing up in the economic data. Coming out of a steep recession, the economy should be experiencing robust output, or GDP, growth. Output growth of 3 percent in the fourth quarter of 2011 helped bring the unemployment rate down. However, the government's announcement that output growth fell to 2.2 percent in the first quarter of 2012 should give policy makers pause. The economy needs to grow by at least 2.5 percent just to keep unemployment from rising. Thus this latest figure on GDP growth does not auger well for the job market, which has seen a steady rise over the last few weeks in initial unemployment claims. In the face of weaker demand, Investment spending by business is slowing. Cutbacks in government spending at the federal as well as state and local levels are already hurting GDP growth. In the absence of federal revenue sharing with the states--the first time the federal government has not had such a program when unemployment is above 7 percent--state and local government expenditures have fallen for seven consecutive quarters. [See a collection of political cartoons on the economy.] With the U.S. economy slowing and job growth still very weak, what should the government do? Continued calls for government belt tightening, fiscal consolidation, and austerity are out-of-step with economic realities. The argument for austerity is that drastic cuts in government spending will stave off inflation and provide businesses with the confidence to go out and invest. But these are empty arguments. Oil prices fluctuate widely, rising for reasons unrelated to government policy. Sustained inflation is only possible if wage and benefit costs are rising. Thursday's report on employer costs, however, shows that the year-over-year increase in employment costs is a very modest 2 percent and the increase in the latest quarter is even smaller. As for business confidence taking up the economic slack, the UK provides a stark reminder of just how wrong this argument is. The United Kingdom, like the United States and unlike Greece, has its own currency. The U.K., like the United States and unlike Greece, has its own central bank and control over its own monetary policy. There is no chance that the United States (or the United Kingdom) can end up like Greece. There is, however, the distinct possibility that the United States can end up like the United Kingdom. [Read: Government Economic Intervention Made America Great.] Almost two years ago the U.K. put in place a coalition government led by George Osborne that implemented an austerity program that cut government spending and public services and was supposed to give British businesses the confidence to invest and boost economic growth. The outcome has fallen far short of these expectations. The U.K. is experiencing the slowest growth in a century, with GDP still 4.3 percent below its peak reached four years ago. Output has grown just 0.4 percent in two years under the Osborne government, and now--with two back-to-back quarters of declining GDP--the British economy has officially slipped back into a double-dip recession. Confidence has not returned to U.K. businesses; indeed lending to businesses fell sharply in March despite the fact that banks had cash available to lend out. Meanwhile, the toll on the British people as government services are cut has become more severe. The charitable trust that operates a network of food banks in the United Kingdom reported that the number of people turning to food banks to feed themselves and their children doubled over the past 12 months. The wounds to the U.K. economy are self-imposed. Unlike Greece or Spain, the United Kingdom did not come under pressure from the E.U. Neither was there pressure from the bond markets; interest rates and borrowing costs were quite low. British politicians chose to slash spending and impose austerity on the British economy. The lesson should not be lost on America's political leaders. Like the United Kingdom, the United States has control over its economic policies. It should not choose austerity.

#### Even absent a recession, slow growth leads to global wars

Khalilzad 11 – PhD, Former Professor of Political Science @ Columbia, Former ambassador to Iraq and Afghanistan

Zalmay Khalilzad was the United States ambassador to Afghanistan, Iraq, and the United Nations during the presidency of George W. Bush and the director of policy planning at the Defense Department from 1990 to 1992. "The Economy and National Security" Feb 8 www.nationalreview.com/blogs/print/259024

Today, economic and fiscal trends pose the most severe long-term threat to the United States’ position as global leader. While the United States suffers from fiscal imbalances and low economic growth, the economies of rival powers are developing rapidly. The continuation of these two trends could lead to a shift from American primacy toward a multi-polar global system, leading in turn to increased geopolitical rivalry and even war among the great powers. The current recession is the result of a deep financial crisis, not a mere fluctuation in the business cycle. Recovery is likely to be protracted. The crisis was preceded by the buildup over two decades of enormous amounts of debt throughout the U.S. economy — ultimately totaling almost 350 percent of GDP — and the development of credit-fueled asset bubbles, particularly in the housing sector. When the bubbles burst, huge amounts of wealth were destroyed, and unemployment rose to over 10 percent. The decline of tax revenues and massive countercyclical spending put the U.S. government on an unsustainable fiscal path. Publicly held national debt rose from 38 to over 60 percent of GDP in three years. Without faster economic growth and actions to reduce deficits, publicly held national debt is projected to reach dangerous proportions. If interest rates were to rise significantly, annual interest payments — which already are larger than the defense budget — would crowd out other spending or require substantial tax increases that would undercut economic growth. Even worse, if unanticipated events trigger what economists call a “sudden stop” in credit markets for U.S. debt, the United States would be unable to roll over its outstanding obligations, precipitating a sovereign-debt crisis that would almost certainly compel a radical retrenchment of the United States internationally. Such scenarios would reshape the international order. It was the economic devastation of Britain and France during World War II, as well as the rise of other powers, that led both countries to relinquish their empires. In the late 1960s, British leaders concluded that they lacked the economic capacity to maintain a presence “east of Suez.” Soviet economic weakness, which crystallized under Gorbachev, contributed to their decisions to withdraw from Afghanistan, abandon Communist regimes in Eastern Europe, and allow the Soviet Union to fragment. If the U.S. debt problem goes critical, the United States would be compelled to retrench, reducing its military spending and shedding international commitments. We face this domestic challenge while other major powers are experiencing rapid economic growth. Even though countries such as China, India, and Brazil have profound political, social, demographic, and economic problems, their economies are growing faster than ours, and this could alter the global distribution of power. These trends could in the long term produce a multi-polar world. If U.S. policymakers fail to act and other powers continue to grow, it is not a question of whether but when a new international order will emerge. The closing of the gap between the United States and its rivals could intensify geopolitical competition among major powers, increase incentives for local powers to play major powers against one another, and undercut our will to preclude or respond to international crises because of the higher risk of escalation. The stakes are high. In modern history, the longest period of peace among the great powers has been the era of U.S. leadership. By contrast, multi-polar systems have been unstable, with their competitive dynamics resulting in frequent crises and major wars among the great powers. Failures of multi-polar international systems produced both world wars. American retrenchment could have devastating consequences. Without an American security blanket, regional powers could rearm in an attempt to balance against emerging threats. Under this scenario, there would be a heightened possibility of arms races, miscalculation, or other crises spiraling into all-out conflict. Alternatively, in seeking to accommodate the stronger powers, weaker powers may shift their geopolitical posture away from the United States. Either way, hostile states would be emboldened to make aggressive moves in their regions.

### 1ac Warming

#### Advantage 2 – warming

#### Global warming is real and human induced – top climate scientists agree

Anderegg et al 10 – PhD Candidate @ Stanford in Biology

William, “Expert credibility in climate change,” National Academy of Sciences, p. 12107-12109

Preliminary reviews of scientific literature and surveys of cli- mate scientists indicate striking agreement with the primary conclusions of the Intergovernmental Panel on Climate Change (IPCC): anthropogenic greenhouse gases have been responsible for “most” of the “unequivocal” warming of the Earth’s average global temperature over the second half of the 20th century (1–3). Nonetheless, substantial and growing public doubt remains about the anthropogenic cause and scientific agreement about the role of anthropogenic greenhouse gases in climate change (4, 5). A vocal minority of researchers and other critics contest the conclusions of the mainstream scientific assessment, frequently citing large numbers of scientists whom they believe support their claims (6–8). This group, often termed climate change skeptics, contrarians, or deniers, has received large amounts of media attention and wields significant influence in the societal debate about climate change impacts and policy (7, 9–14). An extensive literature examines what constitutes expertise or credibility in technical and policy-relevant scientific research (15). Though our aim is not to expand upon that literature here, we wish to draw upon several important observations from this literature in examining expert credibility in climate change. First, though the degree of contextual, political, epistemological, and cultural in- fluences in determining who counts as an expert and who is credible remains debated, many scholars acknowledge the need to identify credible experts and account for expert opinion in tech- nical (e.g., science-based) decision-making (15–19). Furthermore, delineating expertise and the relative credibility of claims is critical, especially in areas where it may be difficult for the majority of decision-makers and the lay public to evaluate the full complexities of a technical issue (12, 15). Ultimately, however, societal decisions regarding response to ACC must necessarily include input from many diverse and nonexpert stakeholders. Because the timeline of decision-making is often more rapid than scientific consensus, examining the landscape of expert opinion can greatly inform such decision-making (15, 19). Here, we examine a metric of climate-specific expertise and a metric of overall sci- entific prominence as two dimensions of expert credibility in two groups of researchers. We provide a broad assessment of the rel- ative credibility of researchers convinced by the evidence (CE) of ACC and those unconvinced by the evidence (UE) of ACC. Our consideration of UE researchers differs from previous work on climate change skeptics and contrarians in that we primarily focus on researchers that have published extensively in the climate field, although we consider all skeptics/contrarians that have signed pro- minent statements concerning ACC (6–8). Such expert analysis can illuminate public and policy discussions about ACC and the extent of consensus in the expert scientific community. We compiled a database of 1,372 climate researchers based on authorship of scientific assessment reports and membership on multisignatory statements about ACC (SI Materials and Methods). We tallied the number of climate-relevant publications authored or coauthored by each researcher (defined here as expertise) and counted the number of citations for each of the researcher’s four highest-cited papers (defined here as prominence) using Google Scholar. We then imposed an a priori criterion that a researcher must have authored a minimum of 20 climate publications to be considered a climate researcher, thus reducing the database to 908 researchers. Varying this minimum publication cutoff did not ma- terially alter results (Materials and Methods). We ranked researchers based on the total number of climate publications authored. Though our compiled researcher list is not comprehensive nor designed to be representative of the entire cli- mate science community, we have drawn researchers from the most high-profile reports and public statements about ACC. Therefore, we have likely compiled the strongest and most credentialed re- searchers in CE and UE groups. Citation and publication analyses must be treated with caution in inferring scientific credibility, but we suggest that our methods and our expertise and prominence criteria provide conservative, robust, and relevant indicators of relative credibility of CE and UE groups of climate researchers (Materials and Methods). Results and Discussion The UE [unconvinced by evidence] group comprises only 2% of the top 50 climate researchers as ranked by expertise (number of climate publications), 3% of researchers of the top 100, and 2.5% of the top 200, excluding researchers present in both groups (Materials and Methods). This result closely agrees with expert surveys, indicating that ≈97% of self-identified actively publishing climate scientists agree with the tenets of ACC (2). Furthermore, this finding complements direct polling of the climate researcher community, which yields quali- tative and self-reported researcher expertise (2). Our findings capture the added dimension of the distribution of researcher expertise, quantify agreement among the highest expertise climate researchers, and provide an independent assessment of level of scientific consensus concerning ACC. In addition to the striking difference in number of expert researchers between CE and UE groups, the distribution of expertise of the UE group is far below that of the CE group (Fig. 1). Mean expertise of the UE group was around half (60 publications) that of the CE group (119 pub- lications; Mann–Whitney U test: W = 57,020; P < 10−14), as was median expertise (UE = 34 publications; CE = 84 publications). Furthermore, researchers with fewer than 20 climate publications comprise ≈80% the UE group, as opposed to less than 10% of the CE group. This indicates that the bulk of UE researchers on the most prominent multisignatory statements about climate change have not published extensively in the peer-reviewed climate literature. We examined a subsample of the 50 most-published (highest- expertise) researchers from each group. Such subsampling facili- tates comparison of relative expertise between groups (normalizing differences between absolute numbers). This method reveals large differences in relative expertise between CE and UE groups (Fig. 2). Though the top-published researchers in the CE group have an average of 408 climate publications (median = 344), the top UE re- searchers average only 89 publications (median = 68; Mann– Whitney U test: W = 2,455; P < 10−15). Thus, this suggests that not all experts are equal, and top CE researchers have much stronger expertise in climate science than those in the top UE group. Finally, our prominence criterion provides an independent and approximate estimate of the relative scientific significance of CE and UE publications. Citation analysis complements publication analysis because it can, in general terms, capture the quality and impact of a researcher’s contribution—a critical component to overall scientific credibility—as opposed to measuring a research- er’s involvement in a field, or expertise (Materials and Methods). The citation analysis conducted here further complements the publication analysis because it does not examine solely climate- relevant publications and thus captures highly prominent re- searchers who may not be directly involved with the climate field. We examined the top four most-cited papers for each CE and UE researcher with 20 or more climate publications and found immense disparity in scientific prominence between CE and UE communities (Mann–Whitney U test: W = 50,710; P < 10−6; Fig. 3). CE researchers’ top papers were cited an average of 172 times, compared with 105 times for UE researchers. Because a single, highly cited paper does not establish a highly credible reputation but might instead reflect the controversial nature of that paper (often called the single-paper effect), we also considered the av- erage the citation count of the second through fourth most-highly cited papers of each researcher. Results were robust when only these papers were considered (CE mean: 133; UE mean: 84; Mann–Whitney U test: W = 50,492; P < 10−6). Results were ro- bust when all 1,372 researchers, including those with fewer than 20 climate publications, were considered (CE mean: 126; UE mean: 59; Mann–Whitney U test: W = 3.5 × 105; P < 10−15). Number of citations is an imperfect but useful benchmark for a group’s scientific prominence (Materials and Methods), and we show here that even considering all (e.g., climate and nonclimate) publications, the UE researcher group has substantially lower prominence than the CE group. We provide a large-scale quantitative assessment of the relative level of agreement, expertise, and prominence in the climate re- searcher community. We show that the expertise and prominence, two integral components of overall expert credibility, of climate researchers convinced by the evidence of ACC vastly overshadows that of the climate change skeptics and contrarians. This divide is even starker when considering the top researchers in each group. Despite media tendencies to present both sides in ACC debates (9), which can contribute to continued public misunderstanding re- garding ACC (7, 11, 12, 14), not all climate researchers are equal in scientific credibility and expertise in the climate system. This extensive analysis of the mainstream versus skeptical/contrarian researchers suggests a strong role for considering expert credibi- lity in the relative weight of and attention to these groups of re- searchers in future discussions in media, policy, and public forums regarding anthropogenic climate change.

#### Warming is an existential risk – *quickening* reductions is key to avoiding extinction

Mazo 10 – PhD in Paleoclimatology from UCLA

Jeffrey Mazo, Managing Editor, Survival and Research Fellow for Environmental Security and Science Policy at the International Institute for Strategic Studies in London, 3-2010, “Climate Conflict: How global warming threatens security and what to do about it,” pg. 122

The best estimates for global warming to the end of the century range from 2.5-4.~C above pre-industrial levels, depending on the scenario. Even in the best-case scenario, the low end of the likely range is 1.goC, and in the worst 'business as usual' projections, which actual emissions have been matching, the range of likely warming runs from 3.1--7.1°C. Even keeping emissions at constant 2000 levels (which have already been exceeded), global temperature would still be expected to reach 1.2°C (O'9""1.5°C)above pre-industrial levels by the end of the century." Without early and severe reductions in emissions, the effects of climate change in the second half of the twenty-first century are likely to be catastrophic for the stability and security of countries in the developing world - not to mention the associated human tragedy. Climate change could even undermine the strength and stability of emerging and advanced economies, beyond the knock-on effects on security of widespread state failure and collapse in developing countries.' And although they have been condemned as melodramatic and alarmist, many informed observers believe that unmitigated climate change beyond the end of the century could pose an existential threat to civilisation." What is certain is that there is no precedent in human experience for such rapid change or such climatic conditions, and even in the best case adaptation to these extremes would mean profound social, cultural and political changes.

#### Carbon sequestration is key

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Joel and Buck, “Making carbon dioxide sequestration feasible: Toward federal regulation of CO2 sequestration pipelines,” Energy Policy, http://lw.com/upload/pubContent/\_pdf/pub3385\_1.pdf

At present, approximately 50% of the United States’ base load electrical energy requirements are met by coal-ﬁred resources (ASME, 2005). While substantial expansion of renewable energy resources will eventually diminish reliance on coal resources, 1 coal-ﬁred power plants provide base load energy resources twenty-four hours per day, seven days a week, all year long. Base load power plants provide energy even when the wind is not blowing or the sun is not shining. While all power plants have the ability to generate a ﬁxed amount of full output, or ‘‘capacity,’’ expressed in megawatts, technologies vary as to the amount of their capacity which can be delivered over time, such as over a calendar year; this is also known as their ‘‘capacity factor.’’ Base load plants, such as coal-ﬁred, nuclear and many natural gas-ﬁred power plants, achieve very high capacity factors (nearly all of their capacity can be delivered over time subject to normal maintenance, scheduled outages or equipment failures). Some plants, such as certain natural gas-ﬁred power plants, can be ‘‘cycled’’ (i.e., turned on or off, or their output can be increased or decreased on short notice to match peaking loads), will have lower capacity factors but can be matched more precisely to the demands of energy consumers. Wind and solar plants, on the other hand, typically have much lower capacity factors (even if they have the same overall total ‘‘capacity’’), because their output cannot be load-matched and their energy output is dependent on environmental factors. As a result, a utility serving a load must blend base load, peaking and renewable resources to meet load requirements, and cannot meet its load requirements solely on the basis of current wind or solar technologies. 2 In many regional markets, both energy (a plant’s actual, delivered product) and capacity are tradeable commodities with an economic value, with the renewable energy facilities providing less value in the capacity markets. Indeed, electric utilities are generally required to maintain substantial capacity reserves to serve expected load, and renewable resources do not generally qualify to meet these capacity requirements As a result, and without regard to the relative merits of coal ﬁred power versus other sources of base load power (e.g., nuclear or natural gas-ﬁred power plants), considering (1) the United States’ large native coal resources, (2) the lower cost of coal fuel against other base load technologies, and (3) the substantial existing investment in coal-ﬁred power plants, it is likely that coal-ﬁred power plants will for many decades continue to comprise a substantial part of the United States’ energy generation portfolio. Indeed, the United States will have to make policy choices regarding which base load resources to pursue, as oil, coal, nuclear and natural gas fuels each have their own economic and environmental beneﬁts and drawbacks. 3 Against this backdrop, both the private and public sectors have begun to look closely at various technologies to address the high carbon footprint of traditional coal combustion technologies. In the United States, the average emission rate of CO2 from coal-ﬁred power generation is 2.095 pounds per kilowatt hour, nearly double the 1.321 pounds per kilowatt hour for natural gas (DOE, 2000). 4 Among the technologies receiving the most such attention to reduce CO2’s impacts is CO2 sequestration. CO2 sequestration involves removing the CO2 from the fuel, either before, during, or after combustion, and then doing something with it to avoid its release to the atmosphere. While other greenhouse gases (e.g., methane) are more potent in terms of global warming effects per unit of mass, the CO2 emissions of industrialized economies are so great as to dwarf the contributions from other gases in terms of overall impact on global warming. Hence the focus on CO2 sequestration technologies. The size and impact of this challenge is daunting—while coal resources provide approximately half of the energy generated annually in the United States, coal-ﬁred power plants emit almost 80% (1.8 billion metric tons per year) of the total CO2 emissions from power plants in the United States (DOE, 2000). The magnitude of this challenge cannot be underestimated. Using the above production ﬁgures, coal-ﬁred power plants in the United States emit approximately 900 billion cubic meters of CO2 annually. 5 The current CO2 pipeline system, though, handles only 45 million metric tons of CO2 per year over 3500 miles of pipe (Nordhaus and Pitlick, 2009). 6 Thus, to the extent that the United States has a policy goal of sequestering and transporting any appreciable fraction of CO2 emissions from coal-ﬁred power plants, the required infrastructure investment will require at least a 40-fold increase. 7 While such an undertaking presents obvious practical and economic challenges, it demonstrates that a new vision is required if the United States is going to develop a sequestration infrastructure to meet this challenge on any time frame that is reasonably coincident with reducing near- to medium-term impacts from global climate change. 8

#### CCS solves and immediate action is necessary

Rogers 7 - \*CEO of Duke Energy

James, “SENATE ENVIRONMENT AND PUBLIC WORKS COMMITTEE,” http://epw.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore\_id=96b0a903-32fc-47f8-9a36-b4ddd9805e2b

Carbon capture and storage (CCS) for coal-fired power plants is a critical technology if we are to achieve our environmental goals while continuing to use our abundant domestic coal resources. CCS captures the CO2 from the power plant and channels it underground for permanent storage in deep geological formations. However, this storage capacity is not available everywhere and, contrary to some statements I’ve seen recently, the technology itself is not fully developed and ready for deployment. We believe CCS ultimately will prove to be one of the least-cost ways to reduce CO2, and we are actively involved in projects to advance the research. Duke Energy is hosting a small-scale Phase II sequestration demonstration project at its East Bend power plant in Kentucky, which will involve injection of CO2 into deep saline reservoirs in the area, between 3,000 and 4,000 feet below the surface. If the site is determined to be suitable, about 10,000 tons of CO2 would be injected in 2008. The sequestration will be subject to monitoring, measurement and verification. Duke Energy’s commitment to CCS also includes membership in three DOE-funded carbon sequestration regional partnerships (the Midwest Regional Carbon Sequestration Partnership, the Midwest Geological Sequestration Consortium and the Southeast Regional Carbon Partnership) which are collecting, sharing and assessing data. DOE’s National Energy Technology Laboratory (NETL) manages a number of regional sequestration consortia, creating a nationwide network to help identify the best technologies, regulations and infrastructure needed for carbon capture and storage. These partnerships will support multiple small-scale projects that will provide invaluable information on siting, monitoring, evaluation and public acceptability of carbon sequestration. Expanded federal financial support will be necessary to continue the process of demonstrating geologic sequestration. USCAP has advocated that Congress fund at least three full-scale CO2 injection demonstration projects, each at a scale equivalent to the CO2 emissions produced by a large coal-fired power plant. 7 The MIT Future of Coal study calls for three to five demonstration projects at a projected cost of $500 million to $1 billion over eight years. 8 In addition to proving the technology and geology for sequestration, a number of critical regulatory and legal issues will need to be resolved. As USCAP has stated, “Congress should require the EPA to promulgate regulations promptly to permit long-term geologic sequestration of carbon dioxide from stationary sources.” 9 In addition to developing an appropriate regulatory system that will specify the ground rules for sequestration projects and enhance public acceptability, Congress should also provide appropriate protections against costly litigation and liability claims. The potential for significant liability claims and litigation defense costs, even when facility operators comply with all regulatory requirements, will be a significant damper on the commercial development of sequestration facilities. Given the speed with which we will need to put sequestration capacity into operation, we cannot simply wait to see if the common law in each state develops in a way that acceptably moderates these liability and litigation risks. Instead, I expect that the legal and liability issues must be settled before any company will feel comfortable moving forward with a large-scale CCS project. Finally, despite all the seeming activity described above, CCS development needs a much greater sense of urgency if we are truly to respond to the climate problem. To paraphrase an MIT economist who has looked at this problem – if CCS doesn’t work, we are in big, big trouble. I would characterize the current focus on CCS as something of a hobby. It should be an obsession, and receive a great deal more attention and resources.

#### CCS is a *critical bridge* to a broader portfolio of sustainable energy

Forbes et al 8 - senior associate at the World Resources Institute, former member of the National Energy Technology Laboratory

Sarah, CCS Guidelines: Guidelines for Carbon Dioxide Capture, Transport, and Storage, World Resources Institute, http://pdf.wri.org/ccs\_guidelines.pdf

Scenarios for stabilizing climate-forcing emissions suggest atmospheric CO2 stabilization can only be accomplished through the development and deployment of a robust portfolio of solutions, including significant increases in energy efficiency and conservation in the industrial, building, and transport sectors; increased reliance on renewable energy and potentially additional nuclear energy sources; and deployment of CCS. Slowing and stopping emissions growth from the energy sector will require transformational changes in the way the world generates and uses energy. CCS is a broad term that encompasses a number of technologies that can be used to capture CO2 from point sources, such as power plants and other industrial facilities; compress it; transport it mainly by pipeline to suitable locations; and inject it into deep subsurface geological formations for indefinite isolation from the atmosphere. CCS is a critical option in the portfolio of solutions available to combat climate change, because it allows for significant reductions in CO2 emissions from fossil-based systems, enabling it to be used as a bridge to a sustainable energy future.

#### Even if regulations aren’t likely now, the plan is key to convincing the world that emissions can be cut without economic cost

MIT 7

Interdisciplinary Study, The Future of Coal, http://web.mit.edu/coal/

Washington, DC – Leading academics from an interdisciplinary Massachusetts Institute of Technology (MIT) panel issued a report today that examines how the world can continue to use coal, an abundant and inexpensive fuel, in a way that mitigates, instead of worsens, the global warming crisis. The study, "The Future of Coal – Options for a Carbon Constrained World," advocates the U.S. assume global leadership on this issue through adoption of significant policy actions. Led by co-chairs Professor John Deutch, Institute Professor, Department of Chemistry, and Ernest J. Moniz, Cecil and Ida Green Professor of Physics and Engineering Systems, the report states that carbon capture and sequestration (CCS) is the critical enabling technology to help reduce CO2 emissions significantly while also allowing coal to meet the world's pressing energy needs. According to Dr. Deutch, "As the world's leading energy user and greenhouse gas emitter, the U.S. must take the lead in showing the world CCS can work. Demonstration of technical, economic, and institutional features of CCS at commercial scale coal combustion and conversion plants will give policymakers and the public confidence that a practical carbon mitigation control option exists, will reduce cost of CCS should carbon emission controls be adopted, and will maintain the low-cost coal option in an environmentally acceptable manner." Dr. Moniz added, "There are many opportunities for enhancing the performance of coal plants in a carbon-constrained world – higher efficiency generation, perhaps through new materials; novel approaches to gasification, CO2 capture, and oxygen separation; and advanced system concepts, perhaps guided by a new generation of simulation tools. An aggressive R&D effort in the near term will yield significant dividends down the road, and should be undertaken immediately to help meet this urgent scientific challenge." Key findings in this study: Coal is a low-cost, per BTU, mainstay of both the developed and developing world, and its use is projected to increase. Because of coal's high carbon content, increasing use will exacerbate the problem of climate change unless coal plants are deployed with very high efficiency and large scale CCS is implemented. CCS is the critical enabling technology because it allows significant reduction in CO2 emissions while allowing coal to meet future energy needs. A significant charge on carbon emissions is needed in the relatively near term to increase the economic attractiveness of new technologies that avoid carbon emissions and specifically to lead to large-scale CCS in the coming decades. We need large-scale demonstration projects of the technical, economic and environmental performance of an integrated CCS system. We should proceed with carbon sequestration projects as soon as possible. Several integrated large-scale demonstrations with appropriate measurement, monitoring and verification are needed in the United States over the next decade with government support. This is important for establishing public confidence for the very large-scale sequestration program anticipated in the future. The regulatory regime for large-scale commercial sequestration should be developed with a greater sense of urgency, with the Executive Office of the President leading an interagency process. The U.S. government should provide assistance only to coal projects with CO2 capture in order to demonstrate technical, economic and environmental performance. Today, IGCC appears to be the economic choice for new coal plants with CCS. However, this could change with further RD&D, so it is not appropriate to pick a single technology winner at this time, especially in light of the variability in coal type, access to sequestration sites, and other factors. The government should provide assistance to several "first of a kind" coal utilization demonstration plants, but only with carbon capture. Congress should remove any expectation that construction of new coal plants without CO2 capture will be "grandfathered" and granted emission allowances in the event of future regulation. This is a perverse incentive to build coal plants without CO2 capture today. Emissions will be stabilized only through global adherence to CO2 emission constraints. China and India are unlikely to adopt carbon constraints unless the U.S. does so and leads the way in the development of CCS technology. Key changes must be made to the current Department of Energy RD&D program to successfully promote CCS technologies. The program must provide for demonstration of CCS at scale; a wider range of technologies should be explored; and modeling and simulation of the comparative performance of integrated technology systems should be greatly enhanced.

#### Only the plan is modeled – BRIC countries won’t cut emissions unless they can avoid economic cost

Apt et al 7 – PhD in Physics @ MIT, Professor of Technology, Tepper School of Business and Engineering and Public Policy

Jay, “Incentives for Near-Term Carbon Dioxide Geological Sequestration,” Carnegie Mellon, http://wpweb2.tepper.cmu.edu/ceic/pdfs\_other/Incentives\_for\_Near-Term\_Carbon\_Dioxide\_Geological\_Sequestration.pdf

The Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report projects that if current greenhouse gas emissions trends continue, the average global temperatures in 2090-2099 will be 3.6 – 10 degrees Fahrenheit warmer than average temperatures in 1980-1999. 20 When past emissions are factored in, the United States is responsible for just over a quarter of all anthropogenic CO2 from fossil fuels currently in the atmosphere. Europe, China, and India are responsible for 19%, 9%, and 3% respectively. The EU has agreed to reduce emissions to 8% below 1990 levels by 2012; the United States has made no such commitments, although several states and groups of states have begun to make commitments. EU emissions are the same as in 1990; U.S. emissions have increased by 20%. And because a large fraction of CO2 emissions remain in the atmosphere for over a century, the largest single share of atmospheric CO2 will continue to belong to the United States for many decades, despite China’s growth. If no action is taken to reduce its emissions, the Energy Information Administration Annual Energy Outlook estimates that the US will emit approximately 8,000 million metric tonnes (8,800 million short tons) of CO2 by 2030, an increase over 2005 emission levels of more than 33 percent. 21 27 Since the United States has put the largest single share of CO2 into the air, it is under intense pressure to begin to take the lead in reducing it. In a few decades, China, India, Brazil, and other developing countries also will have to undertake serious controls. But they will not do so until the U.S. takes the lead and shows how it can be done in an efficient and affordable way. By seizing the opportunity provided by industrial coal gasification, the nation can get the experience required to reduce the technical and commercial unknowns of carbon dioxide capture and sequestration at commercial scale within the next decade. Coal combustion is responsible for 30% of the total U.S. greenhouse gas emissions; coal and petcoke together account for 32% of the total U.S. GHG emissions. The sources and sector uses of greenhouse gases in the 2005 U.S. economy are shown in figure 28 below.

## \*\*Case Mechanics

### Inherency – No CCS Now

#### No CCS now

Handwerk 12 – National Geographic Analyst

Brian, “Amid Economic Concerns, Carbon Capture Faces a Hazy Future,” http://news.nationalgeographic.com/news/energy/2012/05/120522-carbon-capture-and-storage-economic-hurdles/

For a world dependent on fossil fuels, carbon capture and storage (CCS) could be a key to controlling greenhouse gas emissions. But the technology meant to scrub carbon dioxide pollution from the air is experiencing stiff headwinds that have stalled many projects at the bottom line.t Many companies have determined that expensive CCS operations simply aren't worth the investment without government mandates or revenue from carbon prices set far higher than those currently found at the main operational market, the European Trading System, or other fledgling markets. According to a recent Worldwatch Institute report, only eight large-scale, fully integrated CCS projects are actually operational, and that number has not increased in three years. "In fact, from 2010 to 2011, the number of large-scale CCS plants operating, under construction, or being planned declined," said Matt Lucky, the report's author. Numerous projects in Europe and North America are being scrapped altogether, Lucky added. Last month, TransAlta, the Canadian electricity giant, abandoned plans for a CCS facility at an Alberta coal-burning plant because financial incentives were too weak to justify costly investment in CCS. "For a very small industry that's still in the developmental state, it's not a good sign when the number of planned projects is declining," Lucky said. "This is a period when it should be exploding, so this doesn't signal significant growth of the CCS industry in the near future."

#### Large scale-ups are on hold

Handwerk 12 – National Geographic Analyst

Brian, “Amid Economic Concerns, Carbon Capture Faces a Hazy Future,” http://news.nationalgeographic.com/news/energy/2012/05/120522-carbon-capture-and-storage-economic-hurdles/

Carbon capture and storage could reduce greenhouse gas emissions by capturing CO2 where it's produced and storing it permanently in various types of underground geological reservoirs. The International Energy Agency (IEA) believes CCS technology can dramatically reduce greenhouse gas emissions when implemented at dirty fossil fuel power plants and other industrial facilities that enlarge the world's CO2 footprint. The IEA would like to see more than 3,000 CCS-equipped plants come online by mid-century to achieve 20 percent of planned reductions in CO2 emissions. But no large-scale projects currently operate at power plants, and Howard Herzog, a CCS expert at Massachusetts Institute of Technology (MIT), said efforts to scale up the industry are largely on hold.

### Solvency – Investment Key

#### A substantial and certain federal investment is key to attract private investment in broader CCS technology

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Joel and Buck, “Making carbon dioxide sequestration feasible: Toward federal regulation of CO2 sequestration pipelines,” Energy Policy, http://lw.com/upload/pubContent/\_pdf/pub3385\_1.pdf

The United States is embarking for the ﬁrst time on examining and reducing CO2 emissions in order to reduce global climate change impacts. Given the large amounts of CO2 emissions from coal-ﬁred power plants, to the extent policymakers envision using geologic sequestration of CO2 to address any appreciable fraction of current and future CO2 emissions, the required infrastructure investment will be massive, and may be required over a limited period of time. In order for cost of CO2 sequestration pipelines to be borne efﬁciently by the private sector or utility ratepayers, and to accomplish these objectives in a timely fashion, the regulatory structures in place need to assure certainty, efﬁciency and predictability in the siting and regulatory process, in ratemaking requirements, and in the ability to obtain the necessary real property entitlement to construct such pipelines. The current system, while certainly functioning well over the existing pipeline network, is simply not structured to handle the development in a short period of time of perhaps 50,000 or 100,000 miles of these pipelines at a cost of many billions of dollars. The current system is not structured to attract private equity or debt capital investment, similar to the way the private sector has invested in our electric generation and natural gas pipeline infrastructure. A comprehensive federal program is ultimately what is required for this investment to be made on a timely basis and relying to the maximum extent on private sources of capital and the global capital markets. As the United States moves towards a reduced carbon footprint, the nation will have to deal with the CO2 emissions from our large ﬂeet of coal-ﬁred, base load power plants. Geologic sequestration is a technology that will likely be a major part of the solution to this problem, and in order for that to happen, the United States will have to invest substantially in a massive increase of its CO2 pipeline transportation capacity. The current regulatory regime, consisting of state utility commission oversight and very limited federal regulation over rate complaints and pipeline safety, is likely to prove inadequate to support the massive infrastructure development required to implement this objective in a timely and capital-efﬁcient manner. This article recommends that Congress adopt legislation to provide for preemptive, federal licensing, rate regulation and oversight of these pipelines in order to provide the certainty and clarity that will give the private sector the certainty, predictability and conﬁdence to invest in this very important part of our infrastructure.

### Solvency – Quick

#### Solves quickly – can begin capture immediately and sequestration is currently economical

Miller et al 9 – PhD, Associate Director, Energy Institute Senior Research Associate Energy Fuels

Bruce, “Eliminating CO2 Emissions from Coal-Fired Power Plants,” in Generating Electricity in a Carbon-Constrained World, Google Book

Underground injection of CO2 is feasible today at an affordable price. Thus, there is no obstacle to starting immediately. It appears likely that additional storage options need to be tapped to provide storage to match the scale of the fossil carbon resource. Mineral sequestration and the storage of CO2 under deep ocean floors, where CO2 is denser than the surrounding pore waters [48], offer large additional reservoirs, but these technologies are in their infancies and require further development. Existing power plants could collect at least some of their CO2 immediately. Even if retrofitting proves uneconomical in many instances, new power plants could be designed to capture all their CO2. Air capture technology, because it can be introduced without affecting the existing infrastructure, could offer an alternative, if it is developed to its full potential. Because units can be small, development could be quite fast; commercial applications could be ready in a matter of years rather than decades. Capture at new integrated power plants could essentially decarbonize the entire coal-fueled power plant sector. Though we did not discuss gas- or oilfired power plants, it is clear that these could also be decarbonized in a similar manner.

### Solvency – Delay Impact

#### Impact to delay

Zarraby 12 - chemical engineer for the Federal Energy Regulatory Commission, JD expected from GWU in 2012

Cyrus, “Note: Regulating Carbon Capture and Sequestration: A Federal Regulatory Regime to Promote the Construction of a National Carbon Dioxide Pipeline Network,” 80 Geo. Wash. L. Rev. 950, Lexis

The natural gas model, however, does not ideally fit the needs of CO<2> pipelines. First, requiring the pipeline to operate at a fixed rate of return limits immediate investment because pipelines cannot maximize their profits, particularly when the pipeline is first starting up. 208 Even if FERC can establish a rate of return that is high enough to spur investment, the most effective means to determine what the precise rate of return should be is through direct negotiation between pipelines and customers (CO<2> shippers). 209 Further, because CO<2> pipelines would be located throughout the country and would vary in length and size, a single, fixed rate of return for all pipelines may be inadequate for particular projects. 210 [\*977] Unlike the natural gas pipeline system, which has been built over many decades, 211 reduction in greenhouse gas emissions must occur in the very short term given EPA's recent commitment to regulate greenhouse gases under the Clean Air Act. 212 Limiting the return on investment with a cost-based rate will not promote the immediate investment in new CO<2> pipelines that is needed. 213 Second, the flexibility that FERC's regulations allow with respect to responding to different markets is not applicable to CO<2> pipelines. For CCS projects, prior to construction, transportation customers will know how much CO<2> will be transported and where it will be going because, unlike natural gas, the CO<2> shippers are not responding to changing market conditions. 214 The CO<2> shipper will be transporting a fixed amount of CO<2> every day to a particular sequestration reservoir. 215 Conversely, natural gas shippers often transport gas to various market areas depending on the demand and price of natural gas at a given location. 216 Regulatory rules that allow for short-term transportation contracts to respond to market demand would be burdensome and unnecessary.

### Solvency – Government Key

#### Substantial government investment is key – it’s a pre-requisite to private investment

Insight Economics 11

“Building Essential Infrastructure for Carbon Capture and Storage,” Report to the Global Carbon Capture and Storage Institute, http://cdn.globalccsinstitute.com/sites/default/files/publications/13361/development-carbon-capture-and-storage-infrastructure.pdf

Thirdly, one major issue for potential investors in CO2 pipelines is that substantial economies of scale exist, suggesting that it is desirable for pipelines initially to be oversized relative to current demand. Yet in this industry, which is far from being mature, there are a number of factors that militate against investing in excess capacity, including first mover disadvantage and the existence of some major risks, including the possibility of stranding a substantial part of the asset. In considering the preferred model for securing investment in an efficient pipeline network, the two alternative approaches recently raised in a discussion paper by DECC in the UK are considered. These are the decentralised model — effectively a market-driven approach — and a centralised model under which government plays a more active role. While economists generally favour the first option, largely, it must be said, on the basis of theoretical models, empirical studies undertaken by financial consultants suggest that, in the absence of government support, the private sector would be unwilling to invest in optimally sized pipeline infrastructure. This is partly the result of uncertainty in that CCS technologies are still at the demonstration phase and it is difficult to predict the circumstances in which they will be commercially deployed. This is essentially a timing issue. If and when CCS technologies become commercially attractive, there will be scope to move to a market driven model in the future. We cannot assume such an outcome in any particular timeframe, however, and in the meantime governments will need to play a significant role if investment in the industry is to occur and, particularly important for the purposes of this study, if efficiently sized pipeline infrastructure is to develop. A mixed funding model could involve government subsidies to private providers and could operate under either the decentralised or the centralised approach. Another important issue to be considered is the need for regulation to mandate terms and conditions for third party access to CO2 pipelines and storage infrastructure. Under the ‘new’ competition policy that has been developed in many countries over the past two decades, natural monopolies are often regulated so as to provide services to third parties on a basis that attempts to mimic what would have occurred under a theoretical competitive outcome. Because of the availability of economies of scale in CO2 pipelines, there are probably good grounds for classifying them as natural monopolies. In this context the EU Directive on CCS, issued in 2009, requires member countries to establish regulated third party access regimes for CO2 pipeline infrastructure and storage facilities. Whether or not storage sites constitute natural monopolies, however, is somewhat less clear. Much of the analysis underlying this approach is based on an analogy between natural gas and CO2 pipelines. Such a comparison, however, appears to be somewhat tenuous. Natural gas is a valuable commodity subject to intense competition between suppliers in wholesale and retail markets so that ownership and exclusive use of a pipeline could provide one player with a considerable competitive advantage. By contrast, with the minor exceptions of where it is used for EOR and to produce carbonated drinks, CO2 is a by-product that has no commercial value and is being transported solely for disposal although, with the introduction of a carbon price, the disposal of CO2 has a commercial value. In addition, while owners of gas pipelines may oversize them for their own use so as to give them a competitive advantage over rivals in an expanding market, CO2 pipelines in general transport a stable and consistent flow of carbon dioxide. Given the fact that CO2 has no value, together with the current state of the industry and the fact that, particularly in electricity generation, CCS will be subject to considerable competitive pressure from other technologies, it is questionable whether any significant benefit would accrue to an owner of CO2 infrastructure by denying access on reasonable terms to other players who may seek it. On the contrary, additional usage will reduce costs for every user including the owner. Investment in CO2 storage sites is currently impeded by issues concerning property rights and liability. They are often compared to waste disposal facilities. It is questionable whether they are natural monopolies or whether the public interest would be served by regulating access to them. In particular instances they may have a monopolistic position, however, in which case they would be subject to the provisions of regular competition (anti-trust) law. Conclusions This report has been prepared under the circumstances where the commercial viability of CCS has yet to be proven at a large scale. These conclusions reflect the fact that it is an infant industry. In part this is a timing issue. If and when the industry becomes commercial, with vigorous competition occurring between a number of players, then a stronger framework of economic regulation may be required. At this stage, however, the public interest case, in our view, is not proven and there is a possibility that mandatory third party access regulation of the nature of that employed for gas pipelines could discourage investment in this nascent industry. Community acceptance of the transport and storage of CO2 will be essential if the CCS industry is to meet its future potential. Government will have an important role to play in facilitating this, not just by providing information but also by working with the industry to develop a set of robust technical standards for CO2 pipelines. One approach to standard setting would be for an international agency to develop a recommended set of engineering protocols for CO2 pipelines which could then be examined by individual governments in consultation with industry and applied or modified as necessary. In evaluating the decentralised as opposed to the centralised model for facilitating the construction of an efficient network of CO2 pipelines, it is very difficult, at this stage of CCS development, to determine appropriate policy in what will be the large scale deployment stage of carbon capture and storage facilities in the future. This is because the technologies have yet to be successfully demonstrated commercially at scale. If the technologies are demonstrated to be commercially successful and if the necessary condition of an appropriate level of carbon prices is established then, in theory at least, there would seem to be little reason why the private sector would not invest in deploying CCS, including in the necessary pipeline infrastructure and storage facilities. On the other hand, there may well be ongoing risks and uncertainties for potential investors in CCS infrastructure. Indeed, while many of these will have been reduced by the end of the demonstration phase, it is unlikely that all of the risks and uncertainties will have been substantially reduced. Understanding these risks and uncertainties is particularly important in terms of setting the policy environment for building the future pipeline network that will be required for the large scale deployment of CCS. Financial analysis suggests that the private sector would be understandably unwilling to invest in the currently oversized pipelines that would provide more efficient transport in the longer term. A reasonable question then is why should taxpayers take on this risk if private investors will not? One answer is that there may well be public benefits in reducing the costs of CCS transportation, in terms perhaps of electricity prices and the carbon price being lower than otherwise, together with any social benefits that accrue from having a wider portfolio of emissions reduction technologies than may otherwise be the case. The conclusion from this analysis is that, at this stage at least, governments will probably need to play an important role in facilitating investment in CCS infrastructure for the foreseeable future. This may involve subsidising the construction of efficiently sized CO2 pipelines. Another option is for governments to develop CCS infrastructure itself and then sell it to the private sector when the risks are better understood and the uncertainties have been substantially reduced. Of these two options, the mixed funding approach has the advantage that it will be driven to a greater extent by market forces and could operate in the context of a decentralised approach.

#### Government trunk-line investment is key

Fritze 09 Research Assistant, Master of Environmental Management, Ph.D Student (Kevin W. Fritze, April 2009, “Modeling CO2 Storage Pipeline Routes in the United States,” <http://dukespace.lib.duke.edu/dspace/bitstream/handle/10161/985/Fritze_MP_Final_042409.pdf?sequence=1)//DR>. H

What is still needed is an examination of a nationwide CCS network. Modeling a nationwide network will facilitate understanding of the scale and cost of transporting captured CO2 on such a large scale. In addition, it will allow for the examination of potential government assistance in the construction and operation of a pipeline network. A government sponsored trunkline connecting several major storage basins can provide the storage network with redundancy in case of problems at some basins. It could also provide broad cost benefits to CO2 sources by the length of the pipeline needed to connect sources to the storage network.

#### USFG investment is key to trunk-line development – otherwise, point-to-point pipelines will become the norm

CCP 10

CO2 Capture Project and Environmental Resources Management, Carbon Capture Journal and World Pipelines Magazine, March/Feb

Large-scale Carbon Capture and Storage (CCS) will require large-scale infrastructure to move CO2 from capture facility to storage formation. Significant resources will have to be dedicated in order to construct and operate a pipeline system. Many of the design considerations and technologies in large-scale systems are already used by the oil and gas sector in existing hydrocarbon pipeline applications. Due to this experience, the oil and gas industry can play a crucial role in determining a way forward for transporting CO2 to make possible large-scale, commercial deployment of carbon capture and storage. Establishing a widespread CO2 transportation infrastructure requires a strategic approach that takes into account the magnitude of potential deployment scenarios for CCS as hundreds of megatonnes (Mt) of CO2 are transported every year through pipeline systems. Transporting CO2 by pipeline is not a new technology; in the US almost 4,000 miles of CO2 pipeline for enhanced oil recovery (EOR) are in operation. However, the infrastructure for mass CCS could be on the scale of the current gas transmission infrastructure for Europe or North America, and will require significant investment to construct and operate. The CO2 Capture Project (CCP) - a partnership of seven oil and gas majors to advance CCS - has been looking at the issues surrounding the economics of transportation of CO2 in common carrier network pipeline systems. The CCP commissioned a study to examine different approaches to infrastructure development. In the study two approaches have been evaluated. The first would see the development of a point-to-point system, the second the development of common carrier pipeline networks, including backbone pipeline systems. This study has helped our understanding of the challenges involved; shedding light on what would be the best scenario and how in practical terms CO2 infrastructure might evolve. The results of this study were presented in a paper - Assessing Issues of Financing a CO2 Transportation Pipeline Infrastructure which was commissioned by the CCP, and completed by ERM. Results of the Study The study confirmed that an integrated backbone pipeline network is likely to be the most efficient long-term option. It offers the lowest average cost on a per tonne basis for operators over the life of the projects, if sufficient capacity utilization is achieved relatively early in the life of the pipeline. Crucially, integrated pipelines reduce the barriers to entry and are more likely to lead to the faster development and deployment of carbon capture and storage. However, point-to-point pipelines offer lower costs for the first movers and do not have the same capacity utilization risk. It is clear that without government incentives for the development of optimized networks, project developers are likely to build point-to-point pipelines. Point-to-point pipelines offer lower costs for the first movers and do not have the same capacity utilization risk. Consequently, other forms of financial support may be needed which overcome commercial barriers and ensure optimized development of CO2 pipeline networks. The way forward? So what is the way forward? Guaranteed capacity utilization is essential for integrated backbone pipeline networks to become economically viable. Public policy is needed that provides some guarantees as to capacity utilization. Government incentives or loan guarantees are also needed to support a backbone infrastructure and encourage the development of optimized networks. Government support in the first years, when capacity is ramping up, will be essential for eventual commercial viability.

### Solvency – Government Key – EU Model Proves

#### Key to reduce investment risk – EU model proves

RCI 9

Rotterdam Climate Initiative, “Co2 capture, transport and storage in Rotterdam,” http://www.rotterdamclimateinitiative.nl/documents/RCI-English-CCS-report\_2009.pdf

It is obvious that emitters, transportation companies and offshore operators will have to join forces to make the first investments. Allocation of European and national subsidies will play a crucial role. Once operational, the CCS chain will attract more users and investors, facilitating efforts to upscale it. Infrastructure subsidies are also necessary to make it possible to start with a degree of overcapacity in the first years of development and to optimise capital expenditures in the longer term. However, financing is not the only obstacle for a quick start. Relevant legislation and regulations regarding liability, planning permission and procedures should be developed and enacted. In order to stimulate decision making: operators and transportation companies should have a clear view of the conditions for the transport and storage of CO2 . For this reason, we recommend that the government take the following legislation and measures to further reduce the investment risk for transport and storage: - the national government subsidises investments in the pipeline network infrastructure; - the national government ensures the development of a master plan with the associated legislation to ensure the timely availability of suitable reservoirs and pipelines in the Dutch continental shelf (with fields like Q8A, P18, P6, L10, K7 or suitable equivalents) to offer emitters the required storage capacity for their CO 2

### Solvency – Transportation First Key

#### A well-developed pipeline infrastructure is vital to CCS adoption

Monast 8 - \*PhD, Director of the Climate and Energy Program at Duke University’s Nicholas Institute for Environmental Policy Solutions

Jonas, “From Carbon Capture to Storage: Designing an Effective Regulatory Structure for CO2 Pipelines,” http://www.nicholas.duke.edu/ccpp/ccpp\_pdfs/co2\_pipeline.pdf

The large number of fossil fuel–fired power plants in operation, combined with the large reserves of domestic coal and concerns about energy security, suggest that efforts to reduce GHG emissions must focus not only on zero‐emitting energy resources such as wind, solar, and nuclear power, but also on addressing emissions from existing and new fossil fuel–fired power plants. For this reason, a set of emerging technologies that could allow power plants and manufacturing facilities to capture their CO2 emissions before they are released into the atmosphere and store them in geologic formations— collectively referred to as carbon capture and storage (CCS)—is receiving significant attention from policymakers and the private sector. Large‐scale adoption of CCS to mitigate CO2 emissions will depend on the construction of a CO2 pipeline network capable of transporting the captured emissions to sequestration sites. A nascent CO2 pipeline network already exists to provide the gas to oil fields, primarily in the Permian Basin in Texas, for enhanced oil recovery operations. A drastic expansion of this network will be necessary to accommodate wide‐spread use of CCS technologies.

#### Transportation is the missing link

PI 10 A division of Great Southern Press, Often focuses on Pipelines, Article assisted by Professor Martin Downie, Dr Julia Race of Newcastle University, and Patricia Seevam of BP (Pipelines International, March 2010, “Transport of CO2 for carbon capture and storage,” <http://pipelinesinternational.com/news/transport_of_co2_for_carbon_capture_and_storage/040204/#)//DR>. H

The subject of CO2 transportation by pipeline is of widespread and increasing importance as many governments and communities worldwide come to terms with the issues of carbon capture and storage for the mitigation of climate change. The transportation aspect is often looked upon as the ‘missing link’ in a concept that is already being widely embraced. Newcastle University, UK, in association with Tiratsoo Technical and Houston-based Clarion Technical Conferences, and supported by the UK-based Carbon Capture and Storage Association, is organising the first conference on the transportation of CO2 by pipeline on 1–2 July in Newcastle. This article, prepared with the assistance of Professor Martin Downie and Dr Julia Race of Newcastle University, and Patricia Seevam of BP, provides a brief overview of the subject, and an introduction to some of the technical issues involved. Carbon capture and storage (CCS) is perceived as a short to medium-term measure for closing the energy gap while robust carbon-neutral technologies are developed to provide power in a post-fossil fuel energy era. In recent years the capture technology has developed to the point of viability, and storage has been accepted to be safe and ecologically sound, however relatively little work has been carried out on CO2 transport. In the US, naturally occurring CO2 is routinely transported for considerable distances overland, although mostly through sparsely-populated regions, for the purpose of enhanced oil recovery (EOR). There is also some limited transport of captured, or ‘anthropogenic’, CO2.

#### All other components of CCS are currently accounted for – pipeline linkage is the lynchpin for getting the whole project off the ground

Folger and Parformak 7 (Paul W. Parfomak, Specialist in Energy and Infrastructure, Resources, Science, and Industry Divison, Peter Folger, Specialist in Energy Policy, Resources, Science, and Industry Divison, CRS Report for Congress, "Carbon Dioxide (CO2) Pipelines for CarbonSequestration: Emerging Policy Issues", April 19, 2007)

Congress is examining potential approaches to reducing manmade contributions to global warming from U.S. sources. One approach is carbon capture and sequestration (CCS) — capturing CO2 at its source (e.g., a power plant) and storing it indefinitely (e.g., underground) to avoid its release to the atmosphere. A common requirement among the various techniques for CCS is a dedicated pipeline network for transporting CO2 from capture sites to storage sites. In the 110 th Congress, a number of bills include aspects of CCS, but do not discuss in any detail proposals for pipeline infrastructure to transport captured CO2 from sources to storage sites. Many bills that mention some form of CCS focus on incentives for enhancing CO2 capture and/or on characterizing geologic reservoirs. Some bills, such as S. 962 and H.R. 931, include sections on promoting the development of technologies needed to separate and capture CO2 at its source, often as part of research and development provisions. Other bills, such as H.R. 1267 and S. 731, call for enhancing or expanding the national capability to assess potential U.S. capacity for safe and long-term CO2 storage in geologic reservoirs. That CCS and related legislation generally focuses on the capture and storage of CO2 , and not on its transportation, reflects the current perception that transporting CO2 via pipelines does not present a significant barrier to implementing large-scale CCS. Notwithstanding this perception, and even though regional CO2 pipeline networks already operate in the United States for enhanced oil recovery (EOR), developing a more expansive national CO2 pipeline network for CCS could pose numerous new regulatory and economic challenges. There are important unanswered questions about pipeline network requirements, economic regulation, utility cost recovery, regulatory classification of CO2 itself, and pipeline safety. Furthermore, because CO2 pipelines for EOR are already in use today, policy decisions affecting CO2 pipelines take on an urgency that is, perhaps, unrecognized by many. Federal classification of CO2 as both a commodity (by the Bureau of Land Management) and as a pollutant (by the Environmental Protection Agency) could potentially create an immediate conflict which may need to be addressed not only for the sake of future CCS implementation, but also to ensure consistency of future CCS with CO2 pipeline operations today. In addition to these issues, Congress may examine how CO2 pipelines fit into the nation’s overall strategies for energy supply and environmental protection. If policy makers encourage continued consumption of fossil fuels under CCS, then the need to foster the other energy options may be diminished — and vice versa. Thus decisions about CO2 pipeline infrastructure could have consequences for a broader array of energy and environmental policies.

#### Transportation is key to broader development of CCS

McCoy 9– PhD, Project Manager @ CCSReg

CCSReg Project manager at Carnegie Mellon, Department of Engineering and Public Policy, "Policy Brief: Regulating Carbon Dioxide Pipelines for the Purposeof Transporting Carbon Dioxide to Geologic Sequestration Sites", July 13, 2009, [www.ccsreg.org/pdf/PipelineTransport\_07013009.pdf](http://www.ccsreg.org/pdf/PipelineTransport_07013009.pdf))

The ability to transport very large volumes of CO2 via pipeline from source to sequestration site will be crucial to deployment of large scale CCS projects to reduce greenhouse gas (GHG) emissions in the United States. If CCS is successful, as much as 1,800 million tonnes (Mt) per year of CO2 could be injected into a variety of geological formations. 1 This paper outlines background information about CO2 transport, summarizes the current state of CO2 pipeline regulation under federal and state law, evaluates existing law in areas that may be important for a national CO2 pipeline system, discusses alternative regulatory frameworks that could be considered to support development and operation of a much larger CO2 pipeline network, and concludes with a recommendations for reform. The existing U.S. CO2 pipeline infrastructure transports approximately 45 Mt of CO2 per year over 3,500 miles of pipe for enhanced oil recovery (EOR). 2 For comparison, the existing U.S. natural gas pipeline network transports 455 Mt per year of natural gas over 300,000 miles of interstate and intrastate pipe. 3 The small existing CO2 pipeline infrastructure may eventually have to be expanded to be comparable in size to the country’s natural gas pipeline system.

#### Transportation first is key

Horne 10 – JD @ U of Utah

Jennifer, “Getting from Here to There: Devising an Optimal Regulatory Model for CO<2> Transport in a New Carbon Capture and Sequestration Industry,” 30 J. Land Resources & Envtl. L. 357, Lexis

Geographic realities will almost certainly require a pipeline network that reaches many more places than the existing EOR network. Estimates for how large [\*361] a pipeline network must be to accommodate the needs of a fully functional CCS industry vary widely. One conservative estimate is that CO<2> pipeline capacity will need to double to roughly 8,000 miles over the next fifteen years. 21 However, broad commercial deployment of CCS may demand a pipeline network roughly the size of the natural gas pipeline system 22 - approximately 300,000 miles of pipeline. 23 By either estimate, the build-out would be substantial.

#### All of the components of CCS have been proven – linking is key

IPCC **5** (Intergovernmental Panel on Climate Change, "Carbon Dioxide Capture and Storage" IPCC Special Report, Summary for Policymakers, A Special Report of Working Group III of the Intergovernmental Panel on Climate Change, www.ipcc.ch/pdf/special-reports/srccs/srccs\_summaryforpolicymakers.pdf)

Post-combustion capture of CO2 in power plants is economically feasible under specific conditions 5 . It is used to capture CO2 from part of the flue gases from a number of existing power plants. Separation of CO2 in the natural gas processing industry, which uses similar technology, operates in a mature market 6 . The technology required for pre-combustion capture is widely applied in fertilizer manufacturing and in hydrogen production. Although the initial fuel conversion steps of pre-combustion are more elaborate and costly, the higher concentrations of CO2 in the gas stream and the higher pressure make the separation easier. Oxyfuel combustion is in the demonstration phase 7 and uses high purity oxygen. This results in high CO2 concentrations in the gas stream and, hence, in easier separation of CO2 and in increased energy requirements in the separation of oxygen from air (Sections 3.3, 3.4, 3.5). 6. Pipelines are preferred for transporting large amounts of CO2 for distances up to around 1,000 km. For amounts smaller than a few million tonnes of CO2 per year or for larger distances overseas, the use of ships, where applicable, could be economically more attractive. Pipeline transport of CO2 operates as a mature market technology (in the USA, over 2,500 km of pipelines transport more than 40 MtCO2 per year). In most gas pipelines, compressors at the upstream end drive the flow, but some pipelines need intermediate compressor stations. Dry CO2 is not corrosive to pipelines, even if the CO2 contains contaminants. Where the CO2 contains moisture, it is removed from the CO2 stream to prevent corrosion and to avoid the costs of constructing pipelines of corrosion. Figure SPM.. Schematic representation of capture systems. Fuels and products are indicated for oxyfuel combustion, pre-combustion (including hydrogen and fertilizer production), post-combustion and industrial sources of CO2 (including natural gas processing facilities and steel and cement production) (based on Figure 3.1) (Courtesy CO2CRC). 5 “Economically feasible under specific conditions” means that the technology is well understood and used in selected commercial applications, such as in a favourable tax regime or a niche market, processing at least 0.1 MtCO2 yr -1 , with few (less than 5) replications of the technology. 6 “Mature market” means that the technology is now in operation with multiple replications of the commercial-scale technology worldwide. 7 “Demonstration phase” means that the technology has been built and operated at the scale of a pilot plant but that further development is required before the technology is ready for the design and construction of a full-scale system.6 Summary for Policymakers resistant material. Shipping of CO2 , analogous to shipping of liquefied petroleum gases, is economically feasible under specific conditions but is currently carried out on a small scale due to limited demand. CO2 can also be carried by rail and road tankers, but it is unlikely that these could be attractive options for large-scale CO2 transportation (Sections 4.2.1, 4.2.2, 4.3.2, Figure 4.5, 4.6). 7. Storage of CO2 in deep, onshore or offshore geological formations uses many of the same technologies that have been developed by the oil and gas industry and has been proven to be economically feasible under specific conditions for oil and gas fields and saline formations, but not yet for storage in unminable coal beds (see Figure SPM.4). If CO2 is injected into suitable saline formations or oil or gas fields, at depths below 800 m9 , various physical and geochemical trapping mechanisms would prevent it from migrating to the surface. In general, an essential physical trapping mechanism is the presence of a caprock 10 . Coal bed storage may take place at shallower depths and relies on the adsorption of CO2 on the coal, but the technical feasibility largely depends on the permeability of the coal bed. The combination of CO2 storage with Enhanced Oil Recovery (EOR11 ) or, potentially, Enhanced Coal Bed Methane recovery (ECBM) could lead to additional revenues from the oil or gas recovery. Well-drilling technology, injection technologty, computer simulation of storage reservoir performance and monitoring methods from existing applications are being Figure SPM.4. Overview of geological storage options (based on Figure 5.3) (Courtesy CO2CRC). 8 A coal bed that is unlikely to ever be mined – because it is too deep or too thin – may be potentially used for CO2 storage. If subsequently mined, the stored CO2 would be released. Enhanced Coal Bed Methane (ECBM) recovery could potentially increase methane production from coals while simultaneously storing CO2 . The produced methane would be used and not released to the atmosphere (Section 5.3.4). 9 At depths below 800–1,000 m, CO2 becomes supercritical and has a liquid-like density (about 500–800 kg m-3 ) that provides the potential for efficient utilization of underground storage space and improves storage security (Section 5.1.1). 10 Rock of very low permeability that acts as an upper seal to prevent fluid flow out of a reservoir. 11 For the purposes of this report, EOR means CO2 -driven Enhanced Oil Recovery.Summary for Policymakers 7 developed further for utilization in the design and operation of geological storage projects. Three industrial-scale 12 storage projects are in operation: the Sleipner project in an offshore saline formation in Norway, the Weyburn EOR project in Canada, and the In Salah project in a gas field in Algeria. Others are planned (Sections 5.1.1, 5.2.2, 5.3, 5.6, 5.9.4, Boxes 5.1, 5.2, 5.3). . Ocean storage potentially could be done in two ways: by injecting and dissolving CO2 into the water column (typically below 1,000 meters) via a fixed pipeline or a moving ship, or by depositing it via a fixed pipeline or an offshore platform onto the sea floor at depths below 3,000 m, where CO2 is denser than water and is expected to form a “lake” that would delay dissolution of CO2 into the surrounding environment (see Figure SPM.5). Ocean storage and its ecological impacts are still in the research phase 13 . The dissolved and dispersed CO2 would become part of the global carbon cycle and eventually equilibrate with the CO2 in the atmosphere. In laboratory experiments, small-scale ocean experiments and model simulations, the technologies and associated physical and chemical phenomena, which include, notably, increases in acidity (lower pH) and their effect on marine ecosystems, have been studied for a range of ocean storage options (Sections 6.1.2, 6.2.1, 6.5, 6.7). 9. The reaction of CO2 with metal oxides, which are abundant in silicate minerals and available in small quantities in waste streams, produces stable carbonates. The technology is currently in the research stage, but certain applications in using waste streams are in the demonstration phase. The natural reaction is very slow and has to be enhanced by pre-treatment of the minerals, which at present is very energy intensive (Sections 7.2.1, 7.2.3, 7.2.4, Box 7.1). Figure SPM.. Overview of ocean storage concepts. In “dissolution type” ocean storage, the CO2 rapidly dissolves in the ocean water, whereas in “lake type” ocean storage, the CO2 is initially a liquid on the sea floor (Courtesy CO2CRC). 12 “Industrial-scale” here means on the order of 1 MtCO2 per year. 13 “Research phase” means that while the basic science is understood, the technology is currently in the stage of conceptual design or testing at the laboratory or bench scale and has not been demonstrated in a pilot plant.8 Summary for Policymakers 10. Industrial uses 14 of captured CO2 as a gas or liquid or as a feedstock in chemical processes that produce valuable carbon-containing products are possible, but are not expected to contribute to significant abatement of CO2 emissions. The potential for industrial uses of CO2 is small, while the CO2 is generally retained for short periods (usually months or years). Processes using captured CO2 as feedstock instead of fossil hydrocarbons do not always achieve net lifecycle emission reductions (Sections 7.3.1, 7.3.4). 11. Components of CCS are in various stages of development (see Table SPM.2). Complete CCS systems can be assembled from existing technologies that are mature or economically feasible under specific conditions, although the state of development of the overall system may be less than some of its separate components. There is relatively little experience in combining CO2 capture, transport and storage into a fully integrated CCS system. The utilization of CCS for large-scale power plants (the potential application of major interest) still remains to be implemented (Sections 1.4.4, 3.8, 5.1).

### Solvency – Certainty

#### Certainty is key to overall project financing

Nordhaus and Pitlick 9 - \*JD, Faculty @ Georgetown Law, general council to FERC, \*\* Associate at Van Ness Feldman

Robert and Emily, “CARBON DIOXIDE PIPELINE REGULATION,” Energy Law Journal, http://www.felj.org/docs/elj301/85\_-\_nordhaus\_and\_pitlick.pdf

In addition, existing law governing access and rate regulation of CO2 pipelines is unclear at best. Greater certainty as to the extent of that regulation will help facilitate project financing. In order to obtain financing project developers (and their debt and equity investors) need to know what regulatory requirements–if any–will apply to the pipeline during its operational phase, so they evaluate potential regulatory risks. 115 Moreover, if Congress is asked to grant federal siting and eminent domain authority to such pipelines, it is likely to impose some form of ―common carrier‖ requirements, such as nondiscriminatory access and rate regulation–among other reasons, to avoid a multiplicity of small high unit-cost facilities.

### Solvency – Pipelines Key

#### Pipelines key

Morgan 12 – Professor of Energy and Public Policy @ Carnegie Mellon

Granger, “Carbon Capture and Sequestration: Removing the Legal and Regulatory Barriers,” Google Book

Pipeline, trucks, ships, and rail are all options for transporting compressed CO, from the location of capture to the sequestration site. The most practical and cost-effective method of transport depends on the locations of capture and storage, distance between the facility capturing CO, and the sequestration site, and the quantifies of CO2 to he transported. However, the quantity to be Transported is the dominant factor—as shown in fable 2.1. on the order of the to 3 Mt per of CO, would he produced from a single 51KI MW coal-fired power plant capturing CO,. As a result, pipeline is the only viable option tor overland transport from power plants.1, and is the only method of transport that is considered in this work.

### Solvency – CCS Viable

\*CCS investment high now

\*It’s technological viable

\*New actions are needed to reduce costs

#### CCS is technologically viable – plan is key

EPA 10

“Report of the Interagency Task Force on Carbon Capture and Storage,” http://www.epa.gov/climatechange/downloads/CCS-Task-Force-Report-2010.pdf

The Federal government is already pursuing a set of concrete initiatives to speed the commercial development of safe, affordable, and broadly deployable CCS technologies in the United States, including: RD&D of CCS technologies; the development of regulations that address the safety, efficacy, and environmental soundness of injecting and storing carbon dioxide underground; and the assessment of the country's geologic capacity to store carbon dioxide. All of this work builds on the firm scientific basis that now exists for the viability of CCS technology. Long-term integrated testing and validation programs are needed for technical, economic, and regulatory reasons. DOE is currently pursuing multiple demonstration projects using $3.4 billion of available budgetary resources from the American Recovery and Reinvestment Act 4 in addition to prior year appropriations. Various other incentives, such as tax credits and loan guarantees, are also available to many projects. Up to ten integrated CCS demonstration projects supported by DOE are intended to begin operation by 2016 in the United States. These demonstrations will integrate current CCS technologies with commercial-scale power and industrial plants to prove that they can be permitted and operated safely and reliably. New power plant applications will focus on integrating pre-combustion CO2 capture, transport, and storage with Integrated Gasification Combined Cycle (IGCC) technology. Power plant retrofit and industrial applications will demonstrate integrated post-combustion capture. These projects, plus others supported by Federal loan guarantees, tax incentives, and State-level drivers, cover a large group of potential CCS options. However, some proposed demonstration projects may not proceed for economic or other reasons. Looking toward long-term deployment, additional actions may be required to help overcome the uncertainty of evolving climate change policy and the high cost of applying currently available CCS technology, consistent with addressing market failures.

### Solvency – CCS Works

#### CCS is technologically proven

Handwerk 12 – National Geographic Analyst

Brian, “Amid Economic Concerns, Carbon Capture Faces a Hazy Future,” http://news.nationalgeographic.com/news/energy/2012/05/120522-carbon-capture-and-storage-economic-hurdles/

In fact, these and other research and development efforts by universities and organizations continue around the world in hopes of making scaled-up CCS cheaper and reducing its "energy penalty." (Norway just opened what it is calling the world's largest test lab for CCS technology.) In operating the technology that captures carbon, the power plant gobbles up about 20 to 30 percent more energy, so efficiency is typically lost. "We've proved under small-scale conditions that you can cut that energy penalty in half," Ciferno said. "That has improved greatly in ten years, though it's not yet ready for prime time." Some larger projects are still going forward, like Shell's Quest\* project in Alberta, which is supported with $865 million of Canadian provincial and federal funds. Shell CEO Peter Voser, at a briefing with news media May 16 at a business forum in Rotterdam, the Netherlands, said government support in Canada had made his company's investment in the Quest CCS project feasible, but it would be difficult to advance the technology without global commitment to cut carbon emissions. "I think if you want as a world to achieve climate goals, then CCS, like energy efficiency, needs to be part of the solution," Voser said. "In order to actually drive to CCS, we need pilot projects. We have the technology components, we know they work, and we need to pilot projects to scale up the technology.

#### Tech has been used for decades

Ronca 8 [Debra Ronca, Contributing Writer at HSW Debra Ronca holds a B.A. in English from The College of New Jersey. 2008, “How Carbon Capture Works” \*Note: Date inferred through newest cited source.http://science.howstuffworks.com/environmental/green-science/carbon-capture.htm]

Carbon capture has actually been in use for years. The oil and gas industries have used carbon capture for decades as a way to enhance oil and gas recovery [source: CSS]. Only recently have we started thinking about capturing carbon for environmental reasons. Currently, most research focuses on carbon capture at fossil fuel-powered energy plants, the source of the majority of man-made CO2 emissions. Many of these power plants rely on coal to create energy, and the burning of coal emits CO2 into the atmosphere. Some researchers envision a future where all new power plants employ carbon capture.

### Solvency – AT: Ehligh-Economides and Economides

#### Nice try, but that analysis has serious flaws—sufficient storage capacity exists to last for decades

Peridas 10– Scientist at the Natural Resources Defense Council (NRDC) Climate Center, leader of NRDC's efforts in Carbon Capture & Sequestration technology, regulation, and policy (George, “Economides (x2) try their hand at CCS - and get it wrong” Switchboard, Natural Resources Defense Council Staff Blog, April 29 2010 <http://switchboard.nrdc.org/blogs/gperidas/economides_x2_try_their_hand_a.html>) MLR

It is obvious that neither of them are strangers to the oil industry and storing fluids in the subsurface. However, this time **they simply got it wrong.** Quick to rebut their claims were the European Technology Platform for Zero Emission Fossil Fuel Power Plants (ZEP), Pacific Northwest National Laboratory, Lawrence Berkeley National Laboratory, Edinburgh University, Imperial College and the American Petroleum Institute (links to rebuttal documents included). Here are some excerpts from these documents: "We consider this to be a serious misrepresentation of the scientific, engineering and operational facts surrounding CCS" [ZEP] "From this narrow analysis, the authors make sweeping conclusions that are not relevant to the general feasibility of CCS." [LBNL] "The conclusions asserted by the Ehlig-Economides and Economides paper are flawed and stand in stark contrast to the enormous body of literature and field experience on CO2 injection and storage in the subsurface." [PNNL] "This paper includes a number of mis-statements and erroneous base assumptions which could lead readers to arrive at inappropriate conclusions regarding the role that CCS can play in addressing CO2 emissions" [API] The rebuttal documents are united in pointing out the basic flaws of the Economides' analysis (WRI has also posted a response here): The availability of storage reservoirs is far greater than assumed (the authors, for example, rule out outcropping aquifers and "open" reservoirs, when both types are capable of secure storage); Many reservoirs are thicker that the authors assume; The assumed storage efficiency (or the % of pore space that the injected CO2 will occupy) is very low; Dissolution of CO2 is not as slow as is assumed. It also turns out that when more realistic assumptions are plugged into the Economides' calculations, the conclusions are very different, indicating that, for example, the Mt. Simon formation in the Illinois basin alone could store around 16 billion tons of CO2 - roughly double the amount of U.S. annual emissions today, and representative of some estimates for how much mitigation would come from CCS alone by 2050. The couple also go so far as to call into question the success of established CCS projects like Sleipner, with scant justification. Even though it is not the first time this happens, these claims are unjustified as I explain here. One has to wonder how they expected a paper as flawed as this this to withstand scientific scrutiny, or what the motivation behind its publication is. Once again, and as was the case for climate change, **the IPCC's conclusions stand intact: the world is likely to have sufficient storage capacity for decades to centuries worth of emissions.**

#### The study is based on flawed premises—overwhelming support for CCS exists in peer reviewed literature

Dooley and Davidson 10 – leader of the Joint Global Change Research Institute's and the Global Energy Technology Strategy Project's research related to carbon dioxide capture and storage and senior member of the Joint Global Change Research Institute's Integrated Assessment modeling team; Senior Research Scientist. Pacific Northwest National Laboratory, Richland, Washington (JJ and CL, “A Brief Technical Critique of Ehlig-

Economides and Economides 2010: ‘Sequestering Carbon Dioxide in a Closed

Underground Volume’” US Department of Energy April 2010 <http://www.pnl.gov/main/publications/external/technical_reports/PNNL-19249.pdf>) MLR

In their 2010 paper, “Sequestering Carbon Dioxide in a Closed Underground Volume,” authors Ehlig-Economides and Economides assert that “underground carbon dioxide sequestration via bulk CO2 injection is not feasible at any cost.” The authors base this conclusion on a number of assumptions that the peer reviewed technical literature and decades of carbon dioxide (CO2) injection experience have proven invalid. In particular, **the paper is built upon two flawed premises:** first, that effective CO2 storage requires the presence of complete structural closure bounded on all sides by impermeable media, and second, that any other storage system is guaranteed to leak. These two assumptions inform every aspect of the authors’ analyses, and without them, the paper fails to prove its conclusions. The assertion put forward by Ehlig-Economides and Economides that anthropogenic CO2 cannot be stored in deep geologic formations **is refuted by even the most cursory examination of** the **more than 25 years of accumulated commercial carbon dioxide capture and storage experience.**

#### And, even if CCS storage is limited it would still be cost competitive

Dooley and Davidson 10 – leader of the Joint Global Change Research Institute's and the Global Energy Technology Strategy Project's research related to carbon dioxide capture and storage and senior member of the Joint Global Change Research Institute's Integrated Assessment modeling team; Senior Research Scientist. Pacific Northwest National Laboratory, Richland, Washington (JJ and CL, “A Brief Technical Critique of Ehlig-

Economides and Economides 2010: ‘Sequestering Carbon Dioxide in a Closed

Underground Volume’” US Department of Energy April 2010 <http://www.pnl.gov/main/publications/external/technical_reports/PNNL-19249.pdf>) MLR

However, even if complete structural closure was required to store CO2 in the subsurface, the assertion by Ehlig-Economides and Economides that total storage volumes would be so small as to negate the value of doing CCS is misinformed. While we have not specifically examined the arbitrarily over-constrained case put forward by Ehlig-Economides and Economides, we have published research demonstrating that, if only a relatively small fraction of the estimated CO2 storage resource is actually achievable, the value of having CCS in society’s portfolio of responses to climate change is still on the order of trillions of dollars (Edmonds et al., 2007). Thus, even if the actual realizable CO2 storage potentials are orders of magnitude smaller than currently estimated, the relative cost of employing CCS as a means of addressing climate change could still be competitive with other large scale emissions mitigation measures. **The assertion that “CO2 storage is infeasible at any cost,” is pure hyperbole.**

#### Reject their ev—the study is flawed and unsupported in the literature

Dooley and Davidson 10 – leader of the Joint Global Change Research Institute's and the Global Energy Technology Strategy Project's research related to carbon dioxide capture and storage and senior member of the Joint Global Change Research Institute's Integrated Assessment modeling team; Senior Research Scientist. Pacific Northwest National Laboratory, Richland, Washington (JJ and CL, “A Brief Technical Critique of Ehlig-Economides and Economides 2010: ‘Sequestering Carbon Dioxide in a Closed Underground Volume’” US Department of Energy April 2010 <http://www.pnl.gov/main/publications/external/technical_reports/PNNL-19249.pdf>) MLR

The conclusions asserted by the Ehlig-Economides and Economides paper are flawed and stand in stark contrast to the enormous body of literature and field experience on CO2 injection and storage in the subsurface. The policy and regulatory communities must not rely on unsupported conclusions such as “underground carbon dioxide sequestration via bulk CO2 injection is not feasible at any cost” and that “geologic sequestration of CO2 [is] a profoundly non-feasible option for the management of CO2 emissions” because they are not based on good science or thoughtful analysis.

#### Their study assumes a rare sub-optimal storage system—doesn’t assume the majority of sequestration basins

Dooley and Davidson 10 – leader of the Joint Global Change Research Institute's and the Global Energy Technology Strategy Project's research related to carbon dioxide capture and storage and senior member of the Joint Global Change Research Institute's Integrated Assessment modeling team; Senior Research Scientist. Pacific Northwest National Laboratory, Richland, Washington (JJ and CL, “A Brief Technical Critique of Ehlig-

Economides and Economides 2010: ‘Sequestering Carbon Dioxide in a Closed

Underground Volume’” US Department of Energy April 2010 <http://www.pnl.gov/main/publications/external/technical_reports/PNNL-19249.pdf>) MLR

In the Ehlig-Economides and Economides article, a closed system is defined as a finite subsurface volume, structurally bounded on all sides by impermeable geologic media and that is fully or nearly saturated with formation fluids – some combination of oil, natural gas, and brine. Given that the geologic formation where the CO2 is to be stored and the associated formation fluids are largely incompressible, the assumption that the system is closed leads directly to the conclusion that the only volume available for CO2 storage is created by increasing the pressure in the system to a level below the fracture pressure of the caprock, resulting in a very small marginal potential storage volume. Under these assumptions, Ehlig-Economides and Economides argue that the deployment of carbon dioxide capture and storage (CCS) technologies at a large CO2 point source such as a base-load, coal-fired power plant would be extremely challenging because it would require an extraordinarily large storage field. The total number of suitable sites that would meet the highly arbitrary criteria set forth by the Ehlig-Economides and Economides paper while still satisfying the large capacity requirements to accommodate storage needs over a facility’s 30-50 year lifetime would likely be extremely limited. Thus, based on these assumptions, the authors conclude that, “[CCS] is not a practical means to provide any substantive reduction in CO2 emissions, although it has been repeatedly presented as such by others.” Given the impact of the authors’ assumptions on their analysis and final conclusions, it is important to understand whether these assumptions represent a typical or realistic base case for CO2 storage projects. Here, it is clear that **they** do not and instead **represent a case so nonoptimal that it is difficult to imagine a CO2 source faced with this storage option** to pursue it in the presence of other possibly less expensive mitigation options (e.g., transport to a more amenable site, fuel switching, purchasing CO2 offsets). Moreover, the case is not reflective of the majority of storage opportunities that could be encountered in the large, regional storage formations likely to serve as “baseload” storage capacity in the U.S. and elsewhere (Dahowski et al. 2010, Dooley et al. 2009, Wise et al. 2007, Dooley et al. 2006, Dahowski et al. 2005). Instead of describing a typical storage project similar to those being implemented at commercial and demonstration scales around the world, the assumptions employed by Ehlig-Economides and Economides essentially describe a subsurface vessel, with defined, impermeable boundaries on all sides, into which fluid is injected and where total injection volume is limited by the properties of the vessel itself. This combination of characteristics is geologically rare, as well as unnecessary and possibly counterproductive in terms of safely storing large quantities of anthropogenic CO2 in the deep subsurface.

### Solvency – Capture is Feasible

#### Carbon capture is feasible and cheap

Sweet 6-18 - WSJ Staff

Cassandra, “Carbon Capture, the Next Generation,” http://online.wsj.com/article/SB10001424052702303640104577436112097631118.html?mod=googlenews\_wsj

Here comes the next generation of carbon capture. With energy companies abandoning expensive projects to remove carbon dioxide from coal-fired power plants, attention is shifting toward newer technologies that scientists say will be better and cheaper. These systems under development have the potential to cut the cost of capturing carbon by more than half, experts say. Here is a look at some pilot projects that are in the works: Wet Scrubbing: Several groups are trying to improve on so-called wet scrubbing, in which power-plant emissions are mixed with chemical solvents called amines and heated to produce a pure CO2 that is then stored underground or shipped by pipeline to an oil field and used for enhanced oil recovery. Linde Group, Southern Co. and some other companies will use new amine chemicals to capture carbon emissions in a one-megawatt pilot project at the National Carbon Capture Center in Alabama. Southern has several other similar projects under way, including one that will use heat from plant emissions to boost the CO2 capture system. Dry Scrubbing: ADA-ES will inject materials called "solid sorbents" or "dry sorbents" into the power-plant exhaust as a powder, triggering a chemical reaction that will allow the CO2 to be separated from the gas as it is passed through a filter. Gas-Separation Membranes: Membrane Technology & Research Inc. will attach large metal tubes, called membranes, containing liquid salts to the exhaust pipe of a coal plant in a one-megawatt demonstration project. The membranes will filter carbon dioxide from plant emissions.

#### Most plants already have scrubbers available

Mathieu 12 (Stevie, June 25, “How Our State's Members Of Congress Voted Last Week”, <http://www.columbian.com/weblogs/political-beat/2012/jun/25/how-our-states-members-of-congress-voted-last-week/>)

CLEAN-AIR REGULATIONS: Voting 46 for and 53 against, the Senate on June 20 turned back a Republican bid (SJ Res 37) to nullify the Environmental Protection Agency’s first national regulations for curbing air pollution from coal- and oil-fired power plants. Twenty years in the making, the Mercury and Air Toxics Standards are set to take effect this year, with plants allowed at least three years to comply with them. More than half of U.S. power plants already have installed the scrubbers or other cleansing technology needed for compliance. The rules will limit discharges of particulate matter, gases such as hydrogen chloride and cyanide and metals such as mercury, arsenic and nickel. Critics argue the rules will cost tens or hundreds of thousands of jobs and drive up the cost of electricity. The EPA says they will greatly reduce the incidence of asthma attacks, mercury poisoning, heart disease, cancer and other ailments while generating tens of thousands of short-term construction jobs. Jon Kyl, R-Ariz., said the rules are “simply a bad regulation … refuted by the very science used to justify (their) promulgation. Moreover, (the) economic effects would be negative and far-reaching, while … estimated benefits would be minimal and hardly worth the significant costs.” Lamar Alexander, R-Tenn., said: “The Tennessee Valley Authority has already committed to install this equipment by 2018. But TVA alone can’t clean up Tennessee’s air, because dirty air blows in from other states.” He said the rules “will hasten the day when Memphis, Chattanooga and Knoxville are not three of the top-five-worst asthma cities … and Nashville is not competing to be in the top 10.”

#### No leaks – pilot projects prove

Tady 7 - national political reporter

Megan, “Carbon Capture: Miracle Cure for Global Warming, or Deadly Liability?,” Alternet, http://www.alternet.org/environment/68490/?page=4

But the letter from the NRDC and others said the success of three CCS pilot projects "give us a great deal of confidence that CO2 can remain permanently sequestered in geological reservoirs." The NRDC dismisses frightening visions of carbon dioxide seeping from underground, writing, "We ... caution strongly against scenarios that present leakage as inevitable, or even likely. Leakage is conceivable, but is unlikely in well-selected sites, is generally avoidable, predictable, can be detected and remedied promptly, and in any case is extremely unlikely to be of a magnitude that would endanger human health and the environment if performed under adequate regulatory oversight and according to best practices." In an interview last month on E&E TV's OnPoint, John Venezia, an associate with the World Resources Institute's Carbon Capture and Sequestration Project, detailed what could happen "if a project is not done properly."

#### CCS tech is feasible—huge upscale is key to make it commercially viable

Chaisson 4 **– Clean Air Task Force** (Joe, “CO2 Emission Reduction Options For Coal-fired Electrical Utility Boilers and Other Stationary Sources” North Carolina Department of Environment and Natural Resources Division of Air Quality, September 1 2004 <http://daq.state.nc.us/news/leg/co2_csa_int_09012004.pdf>) MLR

From a climate perspective, a significant advantage of IGCC is that technology exists to remove carbon from syngas at a reasonable cost. Once captured, carbon can be compressed and transported to an appropriate site for injection into a suitable geologic formation for indefinite sequestration from the atmosphere as discussed earlier. **All parts of this “carbon capture and sequestration” technology are in commercial practice today, but would need to be “up-scaled”** to meet the requirements for a commercial IGCC utility plant.

### Solvency – Storage Works

#### CO2 storage is proven and feasible—Sleipner Statoil proves

**Dooley and Davidson 10** – leader of the Joint Global Change Research Institute's and the Global Energy Technology Strategy Project's research related to carbon dioxide capture and storage and senior member of the Joint Global Change Research Institute's Integrated Assessment modeling team; Senior Research Scientist. Pacific Northwest National Laboratory, Richland, Washington (JJ and CL, “A Brief Technical Critique of Ehlig-Economides and Economides 2010: ‘Sequestering Carbon Dioxide in a Closed Underground Volume’” US Department of Energy April 2010 <http://www.pnl.gov/main/publications/external/technical_reports/PNNL-19249.pdf>) MLR

The technical feasibility of storing CO2 in deep geologic formations is entirely proven by the existence of the Statoil Sleipner project, which has been injecting approximately 1 MtCO2/year into a deep geologic formation below the North Sea for nearly a decade and a half. The fate of the CO2 injected at Sleipner has been monitored via an extensive and scientifically rigorous measurement, monitoring and verification (MMV) program. This MMV process continues to verify that CO2 injected into the storage formation remains isolated in the subsurface where it cannot contribute to anthropogenic climate change. The more than 25 years of cumulative experience and the significant scientific and technological knowledge gained from Sleipner and the other three large commercial end-to-end commercial CCS projects – Snøhvit, In Salah and Weyburn – are further proof that “**underground carbon dioxide sequestration via bulk CO2 injection” is feasible** and that the cost of doing so must not be infinite as asserted by Ehlig-Economides and Economides.3 The assertion that subsurface storage of large volumes of fluids is impossible is also inconsistent with the experience gained from CO2 injection pilot projects around the world and countless other fluid injection projects over the last several decades such as the injection of hundreds billions of gallons of waste fluid into the subsurface under the auspices of the U.S. EPA Underground Injection Control Program (EPA, 2002). Not only are these projects technically and economically viable, they are effectively managed, and safely regulated. The CCS policy and regulatory communities are in need of robust, well-founded science and engineering upon which to base their decisions regarding how to govern geologic CO2 storage. Innovative ideas that challenge the conventional wisdom on issues critical to the success of commercial-scale CO2 storage are and will continue to be welcomed by the technical 3 Dooley et al. (2009) provide an overview of the CO2 capture, storage and measurement, monitoring and verification technologies that have been successfully employed at Sleipner, Snøhvit, In Salah and Weyburn. PNNL-19249 community. While the Ehlig-Economides and Economides paper does highlight the need for continued research and field work to better understand how CCS will deploy in the real world, unfounded conclusions such as “underground carbon dioxide sequestration via bulk CO2 injection is not feasible at any cost” and “geologic sequestration of CO2 [is] a profoundly nonfeasible option for the management of CO2 emissions” do not withstand scientific scrutiny. **Unsupported opinions and hyperbole do not represent a constructive contribution to the ongoing technical, policy, or regulatory dialogues related to the potential benefits and challenges associated with CCS.**

#### Storage is feasible—many potential locations in the US prove

Newmark, Friedmann, and Carroll 10 – National Renewable Energy Laboratory, Lawrence Livermore National Laboratory, and Lawrence Livermore National Laboratory (Robin, Samuel, and Susan, “Water Challenges for Geologic Carbon Capture and Sequestration” Environmental Management 2010 <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2854354/pdf/267_2010_Article_9434.pdf>) MLR

Carbon dioxide can be stored in multiple geologic targets. Saline formations have the largest capacity of over 2,200 Gt for N. America alone (DOE-NETL 2008). Depleted oil and gas fields have the additional potential for CO2-enhanced oil and natural gas recovery. There is also potential to enhance gas recovery in conjunction with storage in unmineable coal seams. Injection as supercritical CO2 translates to storage depths generally in excess of 1000 m, commonly between 1000 and 5000 m. Enhanced oil recovery using available CO2 could dramatically increase U.S. oil production before going into permanent “storage”. Based on studies of EOR applied to the six major producing U.S. basins, about 43 billion barrels of U.S. oil is accessible using current EOR processes; an additional 41 billion barrels is technically recoverable using more advanced, “next generation” CO2-EOR methods (e.g., Ferguson and others 2008; Kuuskraa and Koperna 2006) (Fig. 1). These figures compare favorably with the 186 billion barrel cumulative production to date. The Earth’s crust is configured to trap large volumes of CO2 indefinitely. Multiple mechanisms work at different time and length scales, described in detail by others (e.g., Johnson and others 2004, Johnson and others 2005) (Fig. 2). A combination of physical and chemical processes serve to trap the CO2; over time, risk of unintended CO2 migration decreases and permanence increases. Initially, injected CO2 forms a plume that ascends towards the sealing unit (caprock) based on the density contrast between the CO2 and formation waters. Plume migration is constrained by the permeability structure of the storage formation by physical (structural and stratigraphic) trapping, in much the same manner that oil or gas are found in structural traps. The CO2 displaces formation fluids in the pore spaces, and some of the CO2 becomes bound by capillary forces; this is residual phase trapping. As the immiscible plume equilibrates with the formation waters, intra-plume aqueous CO2 concentrations increase to their solubility limit, while pH decreases; this is solubility trapping and represents the critical forerunner of the mineral-trapping mechanisms. Over the longest timeframe, CO2 precipitates as carbonate minerals; Johnson and others (2005) have described four distinct precipitation mechanisms that may occur in either formation or cap rock. Interestingly, their results indicate that mineral precipitation in cap rock may serve to decrease both porosity and permeability, thereby significantly improving cap rock integrity and improves hydrodynamic containment of immiscible and solubility-trapped CO2. The U.S. is well endowed with sequestration resources (Fig. 3). A wide range of oil and natural gas fields and coal beds exist where CO2-enhanced product recovery is potentially possible through EOR or enhanced coal bed methane (IPCC 2005a, b). Saline formations are present in most regions. Many such resources are located near major CO2 sources. Current efforts at both the state and federal level are refining estimates of sequestration resources (e.g., DOE-NETL 2008; CEC 2007). Ideally, sequestration would be located close to CO2 sources, thus minimizing the transportation costs; there are numerous opportunities for sequestration either co-located or nearby many of the primary CO2 sources (i.e., coal-fired power plants).

#### Geologic storage solves—backed by environmental groups

Anderson and Newell 3 – RFF (Soren and Richard, “Prospects for Carbon Capture and Storage Technologies” Resources for the Future, January 2003 <http://rff.org/rff/Documents/RFF-DP-02-68.pdf>) MLR

Storage of CO2 in geologic formations, particularly in depleted oil and gas reservoirs, represents the best near-term option for application of CCS technologies**.** Ignoring transportation, the cost of geologic storage is about $5/tC to $30/tC stored (Herzog, Drake, and Adams 1997). Costs, including transportation, are roughly comparable with ocean storage options, but storage of CO2 in geologic formations is considerably better understood than ocean storage. Further, the **environmental risks and uncertainties seem much lower** for geologic storage**.** Thus, although some environmental groups have become more receptive to carbon capture and geologic storage (including geologic storage under the ocean), they remain strongly against ocean storage.

#### Storage is viable—quality construction and maintenance solve leaks

Anderson and Newell 3 – RFF (Soren and Richard, “Prospects for Carbon Capture and Storage Technologies” Resources for the Future, January 2003 <http://rff.org/rff/Documents/RFF-DP-02-68.pdf>) MLR

There is an estimated 1 GtC of storage capacity in currently abandoned U.S. oil and gas fields, with an eventual capacity of about 25–30 GtC in the United States (Winter and Bergman 1996; Stevens, Kuuskraa, and Gale 2000). To get a rough sense of this magnitude, **if 100% of U.S. carbon emissions were captured and stored in these reservoirs,** this would imply that **about 15 to 20 years of emissions could be stored at the current U.S. emissions rate** of 1.6 GtC per year. Effective capacities could be lower, however, if water from other nearby formations has intruded into depleted reservoirs. Storage costs in these reservoirs could range from $5/tC to $70/tC stored, with a base case estimate of about $15/tC (Bock et al. 2002). Finally, current knowledge suggests that **storage of CO2 in depleted oil and gas reservoirs carries the least potential environmental risk.** These sites have already demonstrated their ability to store pressurized fluids for millions of years, and knowledge gained during exploration for oil and gas has led to a relatively good understanding of the formations. Environmental risks do exist, however, including potential leakage of CO2 through natural pathways or fractures caused by injection into geologic formations with possible contamination of groundwater. Leakage from surface installations and wells is also possible, though experience from EOR has demonstrated that these risks can be mitigated through quality construction, maintenance, operation, and control of storage facilities (Adams et al. 1994). The reservoir-monitoring project at the Weyburn EOR facility will provide further information regarding the long-term storage capacity and integrity of these locations (Brown et al. 2001).

### Solvency – Sufficient Storage Capacity

#### Tons of room for storage

EPA 10

“Report of the Interagency Task Force on Carbon Capture and Storage,” http://www.epa.gov/climatechange/downloads/CCS-Task-Force-Report-2010.pdf

CO2 storage potential is estimated to be large. Estimates based on DOE and International Energy Agency (IEA) studies indicate that areas of the United States with appropriate geology could theoretically provide storage potential for more than 3,000 billion tonnes of CO2—large enough to store the amount of CO2 emissions currently emitted from the entire coal fired electricity sector in the United States for over 1,000 years. 47

### Solvency – No Leakage

#### No leakage

Stephenson 8 - Director, Natural Resources and Environment @ GAO

“Federal Actions Will Greatly Affect the Viability of Carbon Capture and Storage As a Key Mitigation Option,” GAO, http://www.gao.gov/new.items/d081080.pdf

According to the preamble to EPA’s proposed rule, improperly operated injection activities or ineffective long-term storage could result in release of injected CO2 to the atmosphere, resulting in the potential to impact human health. EPA’s summaries of stakeholder workshops indicate that public health concerns have been expressed about such issues. One concern is the risk that improperly operated injections could result in the release of CO2 , and that at very high concentrations and with prolonged exposure, CO2 can lead to suffocation. Concerns have also been raised that improperly injected CO2 could raise the pressure in a geologic formation and, if it became too high, could cause otherwise dormant faults to trigger seismic events, such as earthquakes. The IPCC has noted, however, that 99 percent of the CO2 stored in appropriately selected and managed formations is very likely to be retained for over 100 years, 55 and EPA states in the preamble to its proposed rule that the risk of asphyxiation and other health effects from airborne exposure to CO2 resulting from injection activities is minimal.

#### No leaks or spikes

Reisinger 9 – JD, Attorney @ Ohio Environmental Council

Will, “RECONCILING KING COAL AND CLIMATE CHANGE: A REGULATORY FRAMEWORK FOR CARBON CAPTURE AND STORAGE,” Vermont Journal of Environmental Law, http://vjel.org/journal/pdf/VJEL10107.pdf

Because CO2 is toxic at high concentrations, some fear that escaping CO2 from a non-performing sequestration site could poison surrounding air supplies, potentially harming humans and animals. 93 The threat of catastrophic escape is often cited as an argument against CCS demonstration projects. The Lake Nyos disaster of 1986, in which volcanic activity led to a massive release of naturally occurring CO2 from beneath an African lake, is often mentioned. 94 The Lake Nyos incident was an earth science anomaly and not analogous to commercial CCS storage. At Lake Nyos, volcanic activity beneath the lake led to a buildup of pure CO2, which was sequestered in the deepest waters of the lake and eventually escaped in a large poisonous cloud. 95 By contrast, any atmospheric releases of CO2 at a non-performing CCS site would be small and incremental, not likely to result in harm like that at Lake Nyos. Captured CO2 is injected while in a supercritical state (with both gaseous and liquid characteristics) and is stored as it permeates porous rock. 96 Thus, the stored CO2 is not sequestered in vast underground reservoirs, and it is unlikely that a massive cloud of CO2 could escape.

#### No leakage from pipelines or storage

CTA 11

Carbon Tech Alliance, “Frequently Asked Questions,” http://www.carbontechalliance.org/welcome/frequently-asked-questions

What safety measures are in place if something goes wrong, is it a case of once it happens it's too late? There are over 3,600 miles of existing CO2 pipelines in the United States. There are existing rigorous safety requirements that must be met for the construction and operation of CO2 pipelines. These requirements include specification of pipeline materials, plans for routine inspection and maintenance, continuous monitoring of pipeline operations to insure safety, and emergency response plans that address specific actions that would be taken in response to postulated accidents. There are also deep monitoring wells associated with storage areas. These wells are designed to detect any leakage long before it could ever migrate to the surface.

#### Storage is safe and it won’t leak

CTA 11

Carbon Tech Alliance, “Frequently Asked Questions,” http://www.carbontechalliance.org/welcome/frequently-asked-questions

The CO2 storage process targets geological formations that have already trapped liquids (like saline water or oil) for tens of millions of years. Using state of the art seismic imagining techniques and conducting in-depth geological testing, engineers are able to the select the safest and most secure sites for CO2 injection. These sites are characterized by porous rock formations containing oil or water. Once injected, the CO2 mixes with these liquids, preventing it from leaking out in a gaseous form. By combining well-informed site selection with careful monitoring regimes, CCS engineers and scientists ensure the safety of this process.

#### Modern technology and well plugging solves leaks

Newmark, Friedmann, and Carroll 10 – National Renewable Energy Laboratory, Lawrence Livermore National Laboratory, and Lawrence Livermore National Laboratory (Robin, Samuel, and Susan, “Water Challenges for Geologic Carbon Capture and Sequestration” Environmental Management 2010 <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2854354/pdf/267_2010_Article_9434.pdf>) MLR

**There is excellent experience in leakage and mitigation from the natural gas storage and oil industries**. Lewicki and others (2007a) compiled a comprehensive study of leakage from both naturally occurring and industrial CO2 reservoirs. Most leaks occurred via either unsealed fault and fracture zones or through improperly constructed or abandoned wells. The leakage itself was quite variable, and while changes to groundwater chemistry were related to the CO2 leakage, **waters often remained potable.** In a study of leaks occurring in natural gas storage fields (Perry 2003; Kuuskraa 2007), half the cases were through wellbore and casing, and were corrected with wellbore remediation and well plugging. Of the remaining leaks that occurred through cap rock and seal, two were corrected with pressure control or gas capture and recycling**.** The remaining three fields were abandoned. Since most of these cases occurred pre-1970, it was suggested that **modern construction and operations would** likely **prevent such leaks from occurring.** In addition to leakage, CO2 well blowouts have occurred; in a recent study (Skinner 2003), four out of five cases occurred during remedial work. Recommendations were made for improved work procedures, training and diagnostics to prevent such events.

#### Studies prove no impact to CO2 leaks

Newmark, Friedmann, and Carroll 10 – National Renewable Energy Laboratory, Lawrence Livermore National Laboratory, and Lawrence Livermore National Laboratory (Robin, Samuel, and Susan, “Water Challenges for Geologic Carbon Capture and Sequestration” Environmental Management 2010 <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2854354/pdf/267_2010_Article_9434.pdf>) MLR

While there are numerous examples of CO2 leakage at various rates to the atmosphere from natural and industrial sources (e.g., Lewicki and others 2007a, b), there is less information on leakage to shallow aquifers. Concerns have been raised regarding the potential for CO2-bearing brine leakage leading to mobilization of toxic species from overlying drinking water supplies (e.g., Kharaka and others 2006). Recent studies have focused specifically on leakage from a storage reservoir into overlying formations. Carroll and others (2009) conducted a study of the chemical response of a CO2 leak into a carbonate aquifer with characteristics of the High Plains Aquifer in the U.S. mid-continent. Equilibrium calculations demonstrated the rapid decrease of pH along with increases in alkalinity as HCO3−, p CO2 and total dissolved carbon. Sensitivity studies using reactive transport modeling explored the behavior of the dissolved CO2 arising from different initial flux rates as it rose to the top of the formation and spread out**.** A downstream irrigation well continued to pump throughout the simulation, and the capture of CO2-rich fluids was modeled. In all cases, detection of leakage was possible at distance because pumping effectively transported the CO2-rich fluids to the monitoring well. **Changes in pH were** readily **measured and remained within the range for natural waters, even for a high flux case** (105 ton/year).

#### Government regulations and tests prevent contamination

Newmark, Friedmann, and Carroll 10 – National Renewable Energy Laboratory, Lawrence Livermore National Laboratory, and Lawrence Livermore National Laboratory (Robin, Samuel, and Susan, “Water Challenges for Geologic Carbon Capture and Sequestration” Environmental Management 2010 <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2854354/pdf/267_2010_Article_9434.pdf>) MLR

The primary concern of leakageof CO2-rich fluids leakinginto a groundwater resource is the potential mobilization of hazardous inorganic constituents due to the increased acidity these fluids generate. Birkholzer and others (2008) systematically evaluated the potential hydrochemical impacts of CO2 storage projects on U.S. drinking waters, utilizing water quality analyses from the USGS NWIS database. Thermodynamic equilibrium modeling revealed the aqueous concentration of various species in equilibrium with commonly-occurring minerals. The most problematic species include lead and arsenic, which could exceed maximum concentration limits (MCLs) under some conditions, depending such factors as CO2 injection rate, adsorption potential and the degree of buffering available in the host reservoir. Groundwater protection is the focus of the U.S. Environmental Protection Agency’s (EPA) Underground Injection Control (UIC) Program. The EPA has released a proposed rule stating the federal requirements under the UIC Program for CO2 geologic sequestration wells under the Safe Drinking Water Act(EPA 2008c). **Multiple organizations are developing guidelines and recommendations to inform the emerging regulatory frameworks**,including efforts by the Interstate Oil and Gas Compact Commission (IOGCC 2007) and non-governmental organizations(e.g., World Resources Institute 2008). Innovations are being made at the individual state level in terms of policy, legal and regulatory frameworks (e.g., Anderson 2008; California 2007; Kansas 2007; New Mexico 2007; Washington 2007; Wyoming 2008). Important features to be addressed include geologic characterization, fluid movement, area of review, well construction, operations, mechanical integrity testing, measurement, monitoring and verification (MMV), site closure, post-closure monitoring, risk assessment/management, financial responsibility and public acceptance. **The DOE’s Regional Carbon Sequestration Partnerships are addressing these issues on a regional basis** as they assess the sequestration resource in the region, conduct small Phase II scale field tests as part of the validation phase and prepare to conduct large volume Phase III CO2 storage tests.

#### Little to no risk of leakage, and even if it occurs, mitigation solves

Newmark et. al 10 (Robin L. Newmark, center director of the [Strategic Energy Analysis Center](http://www.nrel.gov/analysis/staff.html), Ph.D. in marine geophysics, Columbia University (1985), M.Phil in geophysics, Columbia University (1983), M.S. in earth sciences (marine geophysics), University of California, Santa Cruz (1980),B.S. in earth and planetary sciences, Massachusetts Institute of Technology (1978), Samuel J. Friedmann, Sam B.A. and B.S, Susan A. Carroll, PhD. Geochemistry - Northwestern University 1989  B.S. Geology - University of Kansas 1983, “Water Challenges for Geologic Carbon Capture and Sequestration,” springerlink.com/, February 3, 2010, University of Michigan Library, ADP

Risk is often defined as the product of the probability of an event and its consequence. Several recent efforts have discussed the risks associated with geologic storage (e.g., Price and others 2007; Wilson and others 2007; CEC 2007). There is abundant analog information about the leakage risks from related industries, including oil and gas explo- ration and production, natural gas storage, acid gas disposal, hazardous waste programs and natural and engineered analogs. There is general agreement that the operational risks for CCS would be no greater and likely less than the oil and gas equivalents because CO2 is not flammable or explosive (Benson and Heppel 2005a). It is generally not dangerous except in fairly high concentrations ([15,000 ppm). Physiological tolerance time for CO2 concentrations below 1% by volume (10,000 ppm) are listed as indefinite (EPA 2008b), although the NIOSH recommended 8-h exposure limit is 5,000 ppm (NIOSH 2008). There is long industrial experience with the tools and methodologies for handling gases in the field and preventing and mitigating leakage when it occurs. Moreover, leakage risks are expected to be small for a well-chosen and operated site. The actual fluxes are likely to be small; the health, safety and environmental consequences would be similarly small.

### Solvency – AT: Drinking Water Contamination

#### No risk

Neural Energy 12

“Carbon Transport & Sequestration,” http://www.neuralenergy.info/2011/09/carbon-sequestration.html

Based on a review of existing regulatory programs, EPA’s proposal concludes that the management of CO2 streams under the proposed conditions does not present a substantial risk to people’s health or the environment, provides regulatory certainty to industries considering the use of CCS technologies, and encourages the deployment of CCS technologies in a safe and environmentally protective manner.

### Solvency – AT: Mercury

#### Regs solve—prevent 90% of emissions from being released

**Bertossi 12** – Adjunct Assistant Professor at Northern Michigan University (Teresa, “EPA: Air Pollution Laws Good for Jobs, Public” Headwaters News, February 12 2012 <http://headwatersnews.net/feature/5712epaairpollution/>) MLR

Hedman discussed the new Cross State Air Pollution Rule (CSAPR), which will likely be implemented under the Clean Air Act. The rule – finalized in December, but now stalled in court – would reduce power plant emissions crossing state lines that contribute to ozone and fine particle pollution in other states. The rule would replace the EPA’s Clean Air Interstate Rule, adopted in 2005. Recently adopted Mercury and Air Toxics Standards (MATS) would further regulate mercury and other toxic emissions from power plants. In December a coalition representing 125,000 businesses in the United States wrote a letter urging President Obama to implement MATS. “We believe that failure to implement MATS would create significant uncertainty for the business community and delay investment,” the letter said. ”Our experience has shown that the Clean Air Act yields substantial benefits to the economy and to businesses, and that these benefits consistently outweigh the costs of pollution reductions.” “The goal of this very flexible rule is to allow electric generators to find the least burdensome and the least cost compliance option,” said Hedman. ”The laws allow power producers three years to upgrade coal plants, a step many have already taken. If three years isn’t enough, operators can request an additional one-year extension. According to Hedman, the CSAPR would prevent 90% of the mercury in coal burning power plants from being released into the air. This rule would also reduce other metals linked to neurological damage and sometimes cancer, reduce acidic gases by over 80%, as well as thousands of cases of lung cancer, asthma, and chronic respiratory diseases in primarily children and the elderly. According to an EPA fact sheet, the CSAPR, combined with MATS, will provide annual benefits of $150 to $380 billion, and prevent up to 46,000 premature deaths, 540,000 asthma attacks, 13,000 emergency room visits, and 2 million missed work or school days every year. The CSAPR would prevent as many as 34,000 premature deaths, 15,000 nonfatal heart attacks, 400,000 cases of aggravated asthma, 19,000 fewer cases of acute bronchitis, and 1.8 million sick days a year beginning in 2014, while saving Americans up to $280 billion, annually, on unnecessary healthcare costs.

#### Federal standards solve mercury emissions

Mooney 11 – CNN White House Producer (Alex, “EPA requires limit on mercury emissions from power plants” CNN, December 21, 2011 <http://www.cnn.com/2011/12/21/health/epa-mercury-rule/index.html>) MLR

The Environmental Protection Agency finalized new federal standards on toxic pollutants and mercury emissions from coal power plants Wednesday, a move being praised by environmentalists but criticized by others, who predict lost jobs and a strain on the nation's power grid. EPA Administrator Lisa Jackson, at an event at the Children's National Medical Center in Washington, announced that for the first time U.S. coal and oil-fired power plant operators must limit their emissions of mercury and other hazardous air pollutants. "I am glad to be here to mark the finalization of a clean air rule that has been 20 years in the making, and is now ready to start improving our health, protecting our children, and cleaning up our air," Jackson said. "Under the Clean Air Act these standards will require American power plants to put in place proven and widely available pollution control technologies to cut harmful emissions of mercury, arsenic, chromium, nickel and acid gases. In and of itself, this is a great victory for public health, especially for the health of our children." EPA rules in place since the 1990s target acid rain and smog-forming chemicals emitting from power plants, but not mercury, a neurotoxin known to damage developing fetuses and children. Despite federal limits on emissions of mercury from other sources, such as waste incinerators, there have been no limits on coal-fired power plants, which the EPA says constitute the single largest source of mercury emissions. "These standards rank among the three or four most significant environmental achievements in the EPA's history," said John Walke, clean air director of the National Resources Defense Council. "This rule making represents a generational achievement." The new regulations are among the most wide-reaching to come from the EPA during Barack Obama's administration. They include separate limits for mercury emissions, acid gasses, and other pollutants from several metals. Specifically, the EPA will impose numerical emission limits for all existing and future coal plants and propose a range of "widely available, technical and economically reasonable practices, technologies, and compliance strategies," to meet the new demands.

#### Mercury and Air Toxics Standards solves the impact

Rascoe and Gardner 11 – staff writer; Energy & Environment Correspondent (Ayesha and Timothy, “U.S. rolls out tough rules on coal plant pollution” Reuters, December 21, 2011 <http://www.reuters.com/article/2011/12/21/us-usa-coal-mercury-idUSTRE7BK1DI20111221>) MLR

The Obama administration on Wednesday unveiled the first-ever standards to slash mercury emissions from coal-fired plants, a move aimed at protecting public health that critics say will kill jobs as plants shut down. Facing fierce opposition from industry groups and lawmakers from coal-intensive states, the Environmental Protection Agency said the benefits of the Mercury and Air Toxics Standards, or MATS, will greatly outweigh the costs. EPA Administrator Lisa Jackson revealed the rules, which have been about 20 years in the making, at a Washington, D.C. children's hospital. Mercury can harm the nervous systems of developing fetuses and infants and can enter the food stream through contaminated fish. "By cutting emissions that are linked to developmental disorders and respiratory illnesses like asthma, these standards represent a major victory for clean air and public health," said Jackson, whose agency hopes to start enforcing the rules over the next several years. While the rule mostly adhered to the tough proposal on mercury, arsenic, chromium and other pollutants made earlier in the year, there were some differences. The rules will cost utilities about $9.6 billion annually, down more than $1 billion from the EPA's earlier estimate due to "flexibilities" that were added to the final regulation, the agency said. The EPA also said it will push permitting authorities in the states and cities to make "broadly available" a fourth year for polluters to invest in technology needed to cut the emissions. One of a raft of clean air standards the agency is launching, the mercury standards have divided the power industry. Companies including Exelon and NextEra that generate most of their power with "clean" fuel sources such as nuclear, natural gas and renewables have supported the mercury standards, while those that get most of their power from coal, including American Electric Power and Southern have vigorously fought them.

### Solvency – AT: Mining

#### Mine Safety and Health Act solves—mining deaths at record lows

Mine Safety News 12 (“MSHA Releases Preliminary Mining Fatality Data For 2011” Mine Safety News, January 7 2012 <http://mshasafety.wordpress.com/2012/01/07/msha-releases-preliminary-mining-fatality-data-for-2011/>) MLR

Preliminary data from the U.S. Department of Labor’s Mine Safety and Health Administration (MSHA) released yesterday reveals that 37 miners died in work-related accidents at the nation’s mines in 2011. There were 21 coal mining and 16 metal/nonmetal mining fatalities last year, compared with 48 and 23, respectively, in 2010, making 2011 the year with the second-lowest number of mining deaths since statistics were first recorded in 1910. Of the 37 fatalities reported, 12 occurred at surface coal mines, 11 at surface metal/nonmetal mines, nine at underground coal mines and five at underground metal/nonmetal mines. Nine workers died in accidents involving machinery — six in coal mines and three in metal/nonmetal mines — making it the leading cause of fatal mining accidents. Kentucky had the most mining deaths — eight — in 2011, followed by West Virginia with six and Ohio with three. All but one of those deaths occurred in coal mines. Several of the larger coal-producing states, including Alabama, Pennsylvania, Illinois and Utah, experienced zero mine fatalities last year. “Mining deaths are preventable,” said Joseph A. Main, assistant secretary of labor for mine safety and health. “The year that the Federal Mine Safety and Health Act of 1977 passed, 273 miners died and, since that time, fatality numbers have steadily declined. In order to prevent mine deaths, operators must have in place effective safety and health management programs that are constantly evaluated, find-and-fix programs to identify and eliminate mine hazards, and training for all mining personnel.” MSHA has undertaken a number of measures to prevent mining deaths: increased surveillance and strategic enforcement through impact inspections at mines with troubling compliance histories; enhanced pattern of violations actions; special initiatives such as “Rules to Live By,” which focuses attention on the most common causes of mining deaths; and outreach efforts such as “Safety Pro in a Box,” which provides guidance to the metal/nonmetal mining industry on best practices and compliance responsibilities. “It takes the entire mining community to continue to reach new milestones in health and safety,” said Main. “While fewer miners are dying on the job, we can never alter our focus because, as we know, things can change in a moment. Miners need the reassurance that they will return home safe and healthy after each shift.”

#### Safeguards ensure safety for miners—violations are down by 40%

Cassell 12 – chief analyst (Barry, “MSHA head outlines future coal mine safety plans” Generation Hub, February 2 2012 <http://generationhub.com/2012/02/02/msha-head-outlines-future-coal-mine-safety-plans>) MLR

"I believe the actions we have taken at MSHA, along with those of the mining industry, are making a difference and making mines safer for the nation's miners," said Main. "Enhanced enforcement and regulatory and administrative changes, along with increased compliance and responsibility from the industry, have resulted in gains for the cause of miner safety. But, I believe more can be done to ensure that the nation's miners can go to work, put in their shifts, and return home safe and healthy each day." This was a particularly prime audience for Main, since the symposium attracts not only top-level coal company executives, but also mine managers and supervisors that are literally dressed for the mine site and often show up at the symposium for part of the day and are at the mine for the rest of it. MSHA's special impact inspection program began in force in April 2010 following the explosion at the Upper Big Branch deep mine, located not far from Charleston. The blast killed 29 miners, the most fatalities in a single mine accident in the U.S. in many years. Since then, the agency has conducted 387 impact inspections and issued 7,655 citations, orders and safeguards. "Overall compliance is improving at mines receiving impact inspections," said Main. "Violations per inspection hour are down 11 percent after mines received an initial impact inspection. Significant and substantial violation rates are down 18 percent; 104(d) orders are down 38 percent. The total self-reported lost-time injury rate at these mines is down 18 percent." Changes to the pattern of violations (POV) process also are improving safety, Main said. POVs, up until recently a rarely-used enforcement program, are issued if the agency finds the company has a longstanding pattern of consistent mine safety violations. "Since November 2010, 28 potential pattern of violations [PPOV] notices have been issued at 26 mines,” said Main. “Two POV notices were issued, the first time any mine was successfully placed on POV and issued closure orders in the Mine Act's 33-year history. Since completing the PPOV process, the total violation rate among 14 mines that received PPOV notices in 2010 is down 21 percent, the total [significant and substantial] violation rate is down 38 percent, and the rate of 104(d) withdrawal orders is down 60 percent. The lost-time injury rate at these mines has dropped 39 percent."

#### MSHA checks accidents—improved supervisor training, regulations, and oversight

Cassell 12 – chief analyst (Barry, “MSHA head outlines future coal mine safety plans” Generation Hub, February 2 2012 <http://generationhub.com/2012/02/02/msha-head-outlines-future-coal-mine-safety-plans>) MLR

Thirty-seven miners died in work-related accidents last year, the second lowest since statistics have been recorded. Main noted that the first year the Federal Mine Safety and Health Act of 1977 was in effect, 273 miners died. "We've seen those numbers continue to fall since then, and the distance to zero is much shorter now than it was in 1977," he said. Main outlined other important initiatives implemented under his watch that have resulted in positive reform: Rules to Live By: This **multi-phase** initiative, in phase one, focused on the most common mining deaths and standards cited most often in mining death investigations. Phase two focused on preventing catastrophic accidents, and phase three, launched the week of Jan. 30, will highlight 14 safety standards chosen because violations related to each have been cited as contributing to at least five mining accidents and at least five deaths during a 10-year period. Pre-assessment conferencing process: Implemented in districts where resources permit, the pre-assessment conferencing process allows disputes to be resolved before they are contested and added to the backlog of contested cases. Backlog: Additional resources provided by Congress have enabled MSHA to lessen the total backlog of contested cases before the Federal Mine Safety and Health Review Commission from almost 89,000 citations in January 2011 to fewer than 67,000 in December 2011. Regulatory actions: MSHA's regulatory reforms have focused on ending black lung disease, using proximity detection devices to prevent deaths and crushing injuries from continuous mining machines used in deep mines, revising POV rules and increasing rock dust use to suppress explosions in deep mines. Consistency in mine inspections: MSHA improved oversight of the inspection program and consistency in the enforcement of the Mine Act with a new training program for all field office supervisors. To date, all supervisors have received the training and will receive re-training every two years. MSHA also is overhauling mine inspection handbooks, updating inspection procedures and policies, and addressing issues identified during agency audits and internal reviews.

#### Laundry list of legal checks on environmental impacts

Shortino 11 – journalist at the Philadelphia Inquirer (John, “Types of Coal Mining Restrictions” eHow.com, June 29 2011 <http://www.ehow.com/info_8665548_types-coal-mining-restrictions.html>) MLR

Surface Mining Control and Reclamation Act of 1977 The second major act that directly regulates coal mining is the Surface Mining Control and Reclamation Act of 1977. This act outlines environmental regulations for strip or open pit mining, and ultimately requires that land used for surface mining is restored to its original condition, or "reclaimed" after operations have ceased. This act also created the Office of Surface Mining, which oversees surface mines and ensures that the act is being enforced. Clean Water and Air Acts Other laws do not directly address coal mines, but they do affect how coal mines operate. The Clean Water Act, passed in 1972, prohibits the discharge of pollutants into waterways, which effectively restricts how coal mines deal with slurry: liquid waste generated by the mining process. The Clean Air Act, first passed in 1970, affects both the mining and burning of coal by restricting the amount of air pollution that industrial sources can create. Laws Tied to Location Other laws that affect the coal industry relate to the actual location of mines. These laws, which include the Antiquities Act and the National Historic Preservation Act, set aside pieces of land that cannot be used or developed by industry, including coal mining. In other areas, the Endangered Species Act restricts mining in locations where it could harm an endangered animal population.

#### Alternate factors check the impact

ERI 4 (“Mining Impacts, Risks and Regulations” Environmental Roadmapping Initiative

 August 10 2004 <http://ecm.ncms.org/ERI/new/IRRmining.htm>) MLR

The greatest wonder for our extraterrestrial observer might be that, with no one watching the store, the environmental impact of solid waste from mining is not worse than it is. There are several mitigating factors. First, although mining wastes are excluded from regulation under RCRA, water runoff from the wastes still falls under provisions of the NPDES system. Mine sites can still be declared Superfund sites under CERCLA. Mines that impact wetlands (including many phosphate mines) are still subject to regulation by the Army Corps of Engineers. And mine operators are mindful of potential liability from non-regulatory directions, including damage awards, citizen environmental lawsuits, unfavorable publicity, and the rest of the panoply of non-regulatory motivators.

#### DOI, EPA, and Army Corps regulations check impacts of mining

Glunz, Barkoff, Andy, and Pawlick 9 – CEQ; DOI; EPA; USACE (Christine, Kendra, Adora, and Gene, “Obama Administration Takes Unprecedented Steps to Reduce Environmental Impacts of Mountaintop Coal Mining, Announces Interagency Action Plan to Implement Reforms: Federal agencies take coordinated action to strengthen oversight and regulation, minimize adverse environmental consequences of mountaintop coal mining” EPA Newsroom, June 11 2009 [http://yosemite.epa.gov/opa/admpress.nsf/a883dc3da7094f97852572a00065d7d8/e7d3e5608bba2651852575d200590f23!OpenDocument](http://yosemite.epa.gov/opa/admpress.nsf/a883dc3da7094f97852572a00065d7d8/e7d3e5608bba2651852575d200590f23%21OpenDocument)) MLR

Obama Administration officials announced today that they are taking unprecedented steps to reduce the environmental impacts of mountaintop coal mining in the six Appalachian states of Kentucky, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia through a coordinated approach between the Environmental Protection Agency (EPA), Department of the Interior (DOI) and Army Corps of Engineers. Through a Memorandum of Understanding signed by Lisa P. Jackson, Administrator of the Environmental Protection Agency; Ken Salazar, Secretary of the Interior; and Terrence “Rock” Salt, Acting Assistant Secretary of the Army for Civil Works, the Administration will implement an Interagency Action Plan on mountaintop coal mining that will: - Minimize the adverse environmental consequences of mountaintop coal mining through short-term actions to be completed in 2009; - Undertake longer-term actions to tighten the regulation of mountaintop coal mining; - Ensure coordinated and stringent environmental reviews of permit applications under the Clean Water Act (CWA) and Surface Mining Control and Reclamation Act of 1997 (SMCRA); - Engage the public through outreach events in the Appalachian region to help inform the development of Federal policy; and - Federal Agencies will work in coordination with appropriate regional, state, and local entities to help diversify and strengthen the Appalachian regional economy and promote the health and welfare of Appalachian communities. “Mountaintop coal mining cannot be predicated on the assumption of minimal oversight of its environmental impacts, and its permanent degradation of water quality. Stronger reviews and protections will safeguard the health of local waters, and thousands of acres of watersheds in Appalachia,” said EPA Administrator Lisa P. Jackson. “Our announcement today reaffirms EPA's fundamental responsibility for protecting the water quality and environmental integrity of streams, rivers, and wetlands under the Clean Water Act. Getting this right is important to coalfield communities that count on a livable environment, both during mining and after coal companies move to other sites.” “The Army is pleased to support interagency efforts to increase environmental protection requirements and factual considerations for mountaintop coal mining activities in Appalachia,” said Terrence “Rock” Salt, Acting Assistant Secretary of the Army for Civil Works. “The initiative being announced today will allow us to move forward on a number of important permit applications while providing improved certainty and transparency to permit applicants and the public.” “The steps we are taking today are a firm departure from the previous Administration's approach to mountaintop coal mining, which failed to protect our communities, water, and wildlife in Appalachia,” said Secretary Salazar. “By toughening enforcement standards, by looking for common-sense improvements to our rules and regulations, and by coordinating our efforts with other agencies, we will immediately make progress toward reducing the environmental impacts of mountaintop coal mining.” “This agreement represents federal agencies working together to take the President’s message on mountaintop coal mining into action,” said Nancy Sutley, Chair of the White House Council on Environmental Quality. “We are committed to powering our country while protecting health and welfare in the Appalachian region, securing access to clean streams and safe drinking water, and honoring our clean water laws.” In close coordination, EPA, DOI, and the Corps will take several short-term actions to reform the regulation of mountaintop coal mining under the two primary environmental laws governing this mining practice. The Army Corps of Engineers and the Environmental Protection Agency will take immediate steps under the CWA to minimize environmental harm by taking the following actions in 2009: - Requiring more stringent environmental reviews for future permit applications for mountaintop coal mining; - Within 30 days of the date of the MOU, the Corps will issue a public notice (pursuant to 33 C.F.R. § 330.5) proposing to modify Nationwide Permit (NWP) 21 to preclude its use to authorize the discharge of fill material into streams for surface coal mining activities in the Appalachian region, and will seek public comment on the proposed action; - Strengthening permit reviews under CWA regulations (Section 404(b)(1)) to reduce the harmful direct and cumulative environmental impacts of mountaintop coal mining on streams and watersheds; - Strengthening EPA coordination with states on water pollution permits for discharges from valley fills and state water quality certifications for mountaintop coal mining operations; and - Improving stream mitigation projects to increase ecological performance and compensate for losses of these important waters of the United States. The Department of Interior will also take the following steps: - Reevaluate and determine how the Office of Surface Mining Reclamation and Enforcement (OSM) will more effectively conduct oversight of state permitting, state enforcement, and regulatory activities under SMCRA; - Ensure the protection of wildlife resources and endangered species by coordinating the development of CWA guidance with the U.S. Fish and Wildlife Service (FWS); and - If the U.S. District Court vacates the 2008 Stream Buffer Zone Rule, as requested by the Secretary of the Interior on April 27, 2009, Interior will issue guidance clarifying the application of stream buffer zone provisions in a preexisting 1983 SMCRA regulation to ensure mining activities will occur in a more environmentally protective way in or near Appalachian streams. Concurrent with these short-term actions, the three agencies will embark on a comprehensive, coordinated review of their existing respective regulations and procedures governing mountaintop coal mining under existing law. The agencies will also create an interagency working group to promote ongoing Federal collaboration and ensure the Action Plan achieves results. As these reforms are implemented, the agencies will seek to involve the public and guide Federal actions through robust public comment and outreach.

#### OSM protects the environment from mining impacts—regulations and inspections

DOI 6 (“Fiscal Year 2006 Annual Financial Report” Office of Surface Management 2006 <http://www.doi.gov/pfm/bur_annual_rpt/osm_2006_par.pdf>) MLR

OSM’s mission and vision is to carry out the requirements of the Surface Mining Control Act of 1977 (SMCRA) in cooperation with states and tribes (see Figure 1). The primary objectives are to ensure that coal mines are operated in a manner that protects citizens and the environment during mining, and that the land is restored to beneficial use following mining, and to mitigate the effects of past coal mining by aggressively pursuing reclamation of abandoned coal mines. In accordance with the Government Performance and Results Act of 1993 (GPRA) and associated Office of Management and Budget guidance, OSM prepares an annual performance plan as part of its “Budget Justifications and Performance Information” document. OSM’s annual performance plan and related performance measures have been revised to align with the Department’s “Strategic Plan for Fiscal Years 2003-2008” published on September 30, 2003. The Department’s plan can be found at www.doi.gov/ppp/strat\_plan\_fy2003\_2008.pdf. The primary goals of programs funded through OSM are to protect society and the environment from the adverse environmental effects of surface coal mining operations. Federal and state regulatory programs establish mining and reclamation requirements for current coal mining operations. Federal, state and tribal Abandoned Mine Land programs address public health, safety and environmental hazards at abandoned mines.

### Solvency – AT: Earthquakes

#### Qualified evidence concludes no earthquakes

Reisinger 9 – JD, Attorney @ Ohio Environmental Council

Will, “RECONCILING KING COAL AND CLIMATE CHANGE: A REGULATORY FRAMEWORK FOR CARBON CAPTURE AND STORAGE,” Vermont Journal of Environmental Law, http://vjel.org/journal/pdf/VJEL10107.pdf

Injecting large quantities of foreign substances deep underground, especially in earthquake-prone regions, could potentially trigger seismic activity. 101 Some fear that massive quantities of CO2 could expand within porous rock, increase pressure, and possibly lead to earthquakes. 102 Most geologists, however, have concluded that this type of harm is an improbable result of CCS injections. The risk of “induced seismicity” will not likely deter serious operators or investors, but is more likely to be used as a rallying cry by environmental groups and citizen activists who are opposed to CCS.

#### Doesn’t lead to spikes

CCP 08(CO2 Capture Project, 2008, “CO2 Capture Project - FAQs - About CCS: Storage, Monitoring and Verification,” [http://www.co2captureproject.org/faq\_storage.html)//DR](http://www.co2captureproject.org/faq_storage.html%29//DR). H

Storage formations, by their natural characteristics, both chosen and then engineered to be highly secure and every feasible measure to ensure the well is properly sealed. One aspect of CO2 to keep in mind, though, is that at supercritical stage, any potential leaks are gradual and can be quickly detected to prevent the escape of any further CO2. In essence, CO2, dispersed as it is in the pore spaces of the storage rock, is not a bubble of gas that can burst up to the surface. Therefore, once a leak is detected by the monitoring regime in place at any stage of the long-term storage process, there are many ways engineers can prevent further CO2 leakage**.**

### Solvency – AT: Earthquakes – Link Turn

#### Plan prevents fracking

Scientific American 12

Science Magazine, “Can Fracking and Carbon Sequestration Coexist,” 3/16/12, http://www.scientificamerican.com/article.cfm?id=can-fracking-and-carbon-sequestration-co-exist//SH

Natural gas production and carbon sequestration may be headed for an underground collision course. That is the message from a new study finding that many of the same shale rock formations where companies want to extract gas also happen to sit above optimal sites envisioned for storing carbon dioxide underground that is captured from power plants and industrial facilities. The problem with this overlap, the researchers found, is that shale-gas extraction involves fracturing rock that could be needed as an impenetrable cover to hold CO2 underground permanently and prevent it from leaking back into the atmosphere. "Shale gas production through hydraulic fracturing can compromise future use of the shale as a caprock formation in a CO2 storage operation," said Michael Celia, a civil and environmental engineering professor at Princeton University and a co-author of the study. "There is an obvious conflict between the two uses," the study says. Celia's work with colleague Thomas Elliot, a postdoctoral research associate, will be published in an upcoming paper version of Environmental Science & Technology. The two reported that 80 percent of the potential area to store CO2 underground in the United States could be restrained by shale and tight gas development. The numbers held when they examined potential CO2 storage sites close to the nation's largest greenhouse gas emitters, such as coal plants. Natural gas is extracted from shale via hydraulic fracturing, in which rock is cracked so that injected fluids can flow through the rock more easily to extract gas. The process is designed to increase permeability of the rock over a long distance. That cracking of the shale rock is what could make it inappropriate for use as a stable, impervious rock layer blocking upper migration of injected CO2, the researchers said.

#### Fracking exponentially increases the rate of earthquakes

Bloomberg, 4/12/12 (Mark Drajem, staff writer, "Fracking Tied To Unusual Rise In Earthquakes In U.S.", April 12, 2012, www.bloomberg.com/news/2012-04-12/earthquake-outbreak-in-central-u-s-tied-to-drilling-wastewater.html)

A spate of earthquakes across the middle of the U.S. is “almost certainly” man-made, and may be caused by wastewater from oil or gas drilling injected into the ground, U.S. government scientists said in a study. Researchers from the U.S. Geological Survey said that for the three decades until 2000, seismic events in the nation’s midsection averaged 21 a year. They jumped to 50 in 2009, 87 in 2010 and 134 in 2011. In northern California, engineers are drilling to great depths to force water into bedrock, a process that causes slippage and small earthquakes. Those statistics, included in the abstract of a research paper to be discussed at the Seismological Society of America conference next week in San Diego, will add pressure on an energy industry already confronting more regulation of the process of hydraulic fracturing. “Our scientists cite a series of examples for which an uptick in seismic activity is observed in areas where the disposal of wastewater through deep-well injection increased significantly,” David Hayes, the deputy secretary of the U.S. Department of Interior, said in a blog post yesterday, describing research by scientists at the U.S. Geological Survey. ‘Fairly Small’ Quakes The earthquakes were “fairly small,” and rarely caused damage, Hayes said. He said not all wastewater disposal wells induce earthquakes, and there is no way of knowing if a disposal well will cause a temblor. Last month, Ohio officials concluded that earthquakes there last year probably were caused by wastewater from hydraulic fracturing for natural gas injected into a disposal well. In hydraulic fracturing -- or fracking -- water, sand and chemicals are injected into deep shale formations to break apart underground rock and free natural gas trapped deep underground. Much of that water comes back up to the surface and must then be disposed of. There’s “a difference between disposal injection wells and hydraulically fractured wells,” Daniel Whitten, a spokesman for the America’s Natural Gas Alliance, which represents companies such as Chesapeake Energy Corp. (CHK) and Cabot Oil & Gas Corp. (COG), said in an e-mail. “There are over 140,000 disposal wells in America, with only a handful potentially linked to seismic activity.

#### Fracking leads to earthquakes

Bloomberg, 12 (Jim Efstathiou Jr., staff writer, April 20, 2012, "Fracking-Linked Earthquakes Spurring State Regulations", www.bloomberg.com/news/2012-04-20/fracking-linked-earthquakes-spurring-state-regulations.html)

(Bloomberg) -- U.S. government scientists are focusing on the disposal of wastewater from natural gas drilling as a possible cause for the increase in the number of earthquakes that have shaken the central part of the U.S. since 2000. The number of earthquakes in the central part of the U.S. rose to 134 in 2011, up from 50 in 2009. Megan Hughes reports on Bloomberg Television's "Bottom Line." (Source: Bloomberg) The demand for underground storage has increased with the proliferation of shale gas drilling, a technique that produces millions of gallons of wastewater per well. Researchers think an increase in wastewater injected into the ground by drilling operators may be the cause of a sixfold increase in the number of earthquakes that have shaken the central part of the U.S. from 2000 to 2011, according to a U.S. Geological Survey study. Links between disposal wells and earthquakes in Arkansas, Ohio and other states has raised public concern, according to Scott Anderson, senior policy adviser for the Environmental Defense Fund in Austin, Texas. The U.S. Environmental Protection Agency, which sets standards for wells under the Safe Drinking Water Act, said it is working with states to develop guidelines to manage seismic risk. “Basically, people need to be told not to locate their disposal wells in active seismic areas,” Anderson said in an interview. “But the total percentage of wells that would be impacted by those restrictions almost certainly would be small.” U.S. Geological Survey researchers found that, for three decades prior to 2000, seismic events in the nation’s midsection averaged 21 a year. They jumped to 50 in 2009, 87 in 2010 and 134 in 2011, according to the study, which was presented April 18 at the annual meeting of the Seismological Society of America. Hydraulic Fracturing The findings add to pressure on the industry over hydraulic fracturing, or fracking, a drilling technique in which millions of gallons of chemically treated water are forced underground to break up rock and free trapped gas. Most of the drilling fluid returns to the surface where it is either recycled or disposed of in underground wells. This week, the EPA released the first regulations to combat air pollution from gas wells. “In terms of public pressure, it’s part of a mosaic that is really challenging for the industry,” Benjamin Salisbury, a senior energy policy analyst at FBR Capital Markets Corp. in Arlington, Virginia, said in an interview. “None of these issues outweigh the massive societal benefits of hydraulic fracturing.” Fracking, which has opened vast new shale-gas deposits and helped push gas prices to the lowest level in a decade, is raising demand for disposal wells, according to Mark Boling, president of Southwestern Energy Co. (SWN)’s V+ Development Division. Arkansas Wells Shut “The necessity for having more water disposal capacity goes up in connection with hydraulic fracturing operations,” Boling said in an interview. “You’re seeing some situations that, just by chance, some wells are going into areas that were not previously known to be geologically active.” Last year, Arkansas regulators permanently shut four disposal wells in the Fayetteville Shale after an outbreak of earthquakes near the town of Guy, including one that measured 4.7 on the Richter scale. This year, the state Oil and Gas Commission adopted rules requiring drillers to provide information on the structural geology of well sites and to position wells away from known faults, according to Lawrence Bengal, commission director. “The circumstances under which these events occurred show there’s a very good relationship between these four disposal wells and the seismic activity,” Bengal said in an interview.

### Solvency – AT: Earthquakes – Inevitable

#### Earthquakes and Vulnerability are inevitable

Thomas 09ABC News Staff Writer (Garvin, “Earthquakes Are Inevitable; Destruction Is Not,” [http://www.nbclosangeles.com/news/local/Earthquakes-Are-Inevitable--Destruction-Is-Not-61265997.html)//DR](http://www.nbclosangeles.com/news/local/Earthquakes-Are-Inevitable--Destruction-Is-Not-61265997.html%29//DR). H

**It is likely that one or more severely damaging earthquakes**, which equal or exceed the 1994 Northridge earthquake in magnitude, **will strike the United States within the next decade.** Repeats of the 1906 San Francisco and the 1964 Alaska earthquakes loom somewhere in the future for California and Alaska. Although most people associate them with the nation's West **Coast, earthquakes pose a significant risk in at least 39 states.** The New Madrid, Missouri, earthquake of 1811 was as powerful as the 1906 San Francisco earthquake and was felt across the entire eastern United States. The National Research Council has estimated that a repeat of the 1811 New Madrid earthquake could result in hundreds to thousands of lives lost and over $100 billion dollars of damage in a 26-state area. In areas such as the Midwest that experience earthquakes infrequently, **the earthquake hazard awareness, vulnerability, and risk sensitivity of the residents is low. Even in areas that have frequent earthquakes, preparedness is often highly variable.**

#### Earthquakes inevitable

MTU 07(Michigan Tech University, April 3, 2007, “Where Do Earthquakes Happen?,” [http://www.geo.mtu.edu/UPSeis/where.html)//DR](http://www.geo.mtu.edu/UPSeis/where.html%29//DR). H

**Earthquakes occur all the time all over the world, both along plate edges and along faults.**

Along Plate Edges

**Most earthquakes occur along the edge of the oceanic and continental plates.** The earth's crust (the outer layer of the planet) is made up of several pieces, called plates. **The plates under the oceans are called oceanic plates and the rest are continental plates. The plates are moved around by the motion of a deeper part of the earth** (the mantle) **that lies underneath the crust. These plates are always bumping into each other, pulling away from each other, or past each other.** The plates usually move at about the same speed that your fingernails grow. **Earthquakes usually occur where two plates are running into each other or sliding past each other.**

### Solvency – AT: Earthquakes – No Impact

#### At worst Earthquakes don’t get near extinction

Ranker 11(March 11, 2011, “10 Things to Know About Earthquakes,” [http://www.ranker.com/list/10-things-to-know-about-earthquakes/analise.dubner)//DR](http://www.ranker.com/list/10-things-to-know-about-earthquakes/analise.dubner%29//DR). H

The strongest earthquakes that occur can result in ground rupture, causing damage to bridges, dams, roads, railroad tracks, and the foundations of buildings. They can also cause landslides and avalanches as a result of the shaking.

#### Natural disasters are also *key* to avert extinction

--this argument is obviously ludicrous, but it may be necessary to defeat Sid-Ahmed (equally stupid)

D’Souza 09President of The King's College and a former policy analyst for the Reagan White House (Dinesh, April 28, 2009, “Why We Need Earthquakes,” [http://www.christianitytoday.com/ct/2009/may/12.58.html)//DR](http://www.christianitytoday.com/ct/2009/may/12.58.html%29//DR). H

Ward and Brownlee ask: **Why do natural disasters such as earthquakes, seaquakes, and tsunamis occur? All three are the consequence of plate tectonics, the giant plates that move under the surface of the earth and the ocean floor. Apparently our planet is unique in having plate tectonics.** Ward and Brownlee show that without this geological feature, there would be no large mountain ranges or continents.

**While natural disasters occasionally wreak havoc, our planet needs plate tectonics to produce the biodiversity that enables complex life to flourish on earth. Without plate tectonics, earth's land would be submerged to a depth of several thousand feet. Fish might survive in such an environment, but not humans.**

**Plate tectonics also help regulate the earth's climate, preventing the onset of scorching or freezing temperatures that would make mammalian life impossible.** In sum, **plate tectonics are a necessary prerequisite to human survival on the only planet known to sustain life.**

#### Don’t hurt the economy

Theroux 11(David, March 17, 2011, “Larry Summers Claims Japanese Disaster Will Boost Economy,” <http://www.independent.org/newsroom/article.asp?id=3015)//DR>. H

Predictably, within days of the unmitigated disaster and massive loss of life (10,000 and counting) in Japan from the record 8.9-magnitude earthquake and tsunami, a **major Keynesian economist has gone on the record in defending the “broken window fallacy” in economics by claiming that the Japanese disaster will actually boost economic growth. The economist is none other than Larry Summers (former Harvard University President and now Charles W. Eliot University Professor at Harvard’s Kennedy School of Government, former Director of Obama’s National Economic Council, former Chief Economist at the World Bank, and former Secretary of the Treasury under Clinton).** In an interview on CNBC Summers actually **claims** that **the disaster will:**

“. . . **add complexity to Japan’s challenge of economic recovery. It may lead to some temporary increments ironically to GDP as a process of rebuilding takes place. In the wake of the earlier Kobe earthquake Japan actually gained some economic strength.”**

### Solvency – AT: Earthquakes – Alt Caus

#### Waterwaste is an alt cause to earthquakes

**Zoback and Gorelick 5/4/12**

[Mark D. Zoback Professor at the Department of Geophysics at Stanford University, and Steven M. Gorelick Professor of Environmental Earth System Sciences at Stanford University, “Earthquake triggering and large-scale geological storage of carbon dioxide” Found on the Proceedings of the National Academy of Sciences, May 4th, 2012 /SM]

Because of the critically stressed nature of the crust, ﬂuid injection in deep wells can trigger earthquakes when the injection increases pore pressure in the vicinity of preexisting potentially active faults. The increased pore pressure reduces the frictional resistance to fault slip, allowing elastic energy already stored in the surrounding rocks to be released in earthquakes that would occur someday as the result of natural geologic processes (8). This effect was first documented in the 1960s in Denver, Colorado when injection into a 3-km-deep well at the nearby Rocky Mountain Arsenal triggered earthquakes (9). Soon thereafter it was shown experimentally (10) at the Rangely oil field in western Colorado that earthquakes could be turned on and off by varying the rate at which water was injected and thus modulating reservoir pressure. In 2011 alone, a number of small to moderate earthquakes in the United States seem to have been triggered by injection of wastewater (11). These include earthquakes near Guy, Arkansas that occurred in February and March, where the largest earthquake was M 4.7. In the Trinidad/Raton area z

near the border of Colorado and New Mexico, injection of produced water associated with coalbed methane production seems to have triggered a number of earthquakes, the largest being a M 5.3 event that occurred in August. Earthquakes seem to have been triggered by wastewater injection near Youngstown, Ohio on Christmas Eve and New Year’s Eve, the largest of which was M 4.0. Although the risks associated with wastewater injection are minimal and can be reduced even further with proper planning (11), the situation would be far more problematic if similar-sized earthquakes were triggered in formations intended to sequester CO2 for hundreds to thousands of years.

#### Geothermal

Harmon 9

Katherine, “How Does Geothermal Drilling Trigger Earthquakes?,” Scientific American, http://www.scientificamerican.com/article.cfm?id=geothermal-drilling-earthquakes

Despite the promise of cheap, clean power, geothermal energy development may be on shaky ground. There have been rumblings from residents and scientists alike that drilling deep to tap naturally occurring heat could cause bigger earthquakes. Already on edge about temblors, northern California locals are eying an expansive new geothermal project proposed by a company called AltaRock that's going to be boring down more than two miles (3.2 kilometers). The area near the town of Anderson Springs—about 90 miles (150 kilometers) north of San Francisco—is home to natural geothermal vents (nicknamed The Geysers by early visitors who saw the steam vents there) and has been exploited for its natural energy-generating capacity for the better part of the last century. Starting in the 1970s, as technology improved, engineers started to crank up the production levels. Small earthquakes began shortly thereafter. Just a few years ago, a now-infamous geothermal project in Basel, Switzerland, which drilled three miles (4.8 kilometers) into Earth's crust, set off a magnitude 3.4 earthquake, rocking the town and shutting the operation down entirely, The New York Times recalled recently. Drilling has even been fingered as the cause of a massive 2006 mud volcano in Java, which displaced more than 30,000 people after a gas exploration project went awry. "We are more certain than ever that the Lusi mud volcano is an unnatural disaster," Richard Davies of the Center for Research into Earth Energy Systems at Durham University in England said in a statement after investigating the incident.

### Solvency – AT: Earthquakes – Long Time-Frame

#### Long timeframe before pressure reaches to a high level

**Zoback and Gorelick 5/4/12**

[[Mark D. Zoback Professor at the Department of Geophysics at Stanford University, and Steven M. Gorelick Professor of Environmental Earth System Sciences at Stanford University, “Earthquake triggering and large-scale geological storage of carbon dioxide” Found on the Proceedings of the National Academy of Sciences, May 4th, 2012 /SM]

Depleted oil and gas reservoirs are potentially suitable for CO2 storage for a variety of reasons—an infrastructure of wells and pipelines exist, and there is a great deal of geologic and subsurface property data available to characterize the subsurface from decades of study. In addition, from an earthquake-triggering perspective, depleted reservoirs are attractive because at the time injection of CO2 might start, the pore pressure would be below the value that existed before petroleum production. Thus, there could be significant injection of CO2 before pressures increase to preproduction values, thereby reducing the potential for triggering earthquakes.

### Solvency – AT: CCS Bad – Historically Proven / Others Worse

#### There are already 3,000 miles of carbon pipelines

Forbes et al 8 - senior associate at the World Resources Institute, former member of the National Energy Technology Laboratory

Sarah, CCS Guidelines: Guidelines for Carbon Dioxide Capture, Transport, and Storage, World Resources Institute, http://pdf.wri.org/ccs\_guidelines.pdf

Today, there are well over 3,000 miles of CO2 pipelines in operation in the United States. This operational experience provides a basis for the development of a CO2 pipeline infrastructure for CCS. The Guidelines build on this experience, and are intended to inform pipeline infrastructure development for widespread deployment of CCS. The transport element of the CCS Guidelines describes existing standards for CO2 pipeline design, operational, and regulatory practices, and identifies potential issues associated with more geographically diverse transportation of CO2 for the purpose of geologic storage.

#### They are less environmentally damaging than other pipelines

Forbes et al 8 - senior associate at the World Resources Institute, former member of the National Energy Technology Laboratory

Sarah, CCS Guidelines: Guidelines for Carbon Dioxide Capture, Transport, and Storage, World Resources Institute, http://pdf.wri.org/ccs\_guidelines.pdf

The risks posed by increasing CO2 pipelines should be manageable based on the extensive CO2 pipeline operating experience of industry. The DOT data suggest that the impacts from CO2 pipeline incidents are typically less than those from natural gas and hazardous liquid pipelines. As measured by the lack of fatalities and injuries, and significantly lower property damage, impacts from CO2 pipeline incidents are typically less than those from natural gas and hazardous liquid pipelines.

#### 20 year period of safety – others are worse

Horne 10 – JD @ U of Utah

Jennifer, “Getting from Here to There: Devising an Optimal Regulatory Model for CO<2> Transport in a New Carbon Capture and Sequestration Industry,” 30 J. Land Resources & Envtl. L. 357, Lexis

According to the Office of Pipeline Safety (OPS), in the twenty-year period from 1986 to 2006, just twelve CO<2> pipeline leaks were reported, none of which injured people. 67 This compares to 5,610 accidents from natural gas and hazardous liquids pipelines during the same time period, resulting in 107 fatalities and more than 500 injuries. 68 The safety discrepancy may well be based on the size differential and relative locations of the pipelines. Existing EOR pipelines make up less than 1 percent of total hazardous liquids pipelines, and traverse through mostly remote areas of the country. 69 In other words, the respective safety records are, to some degree, proportional to the size of the pipeline networks.

### Solvency – AT: Too Costly

#### The plan lowers costs

Svennson et al 5 – R and D analyst @ Vattenfall

Rickard, Transportation Infrastructure for CCS – experiences and expected development, http://uregina.ca/ghgt7/PDF/papers/poster/350.pdf

CO2 Capture and Storage (CCS), i.e. capture and storage of carbon dioxide (CO,) emitted from large point sources of emissions, has the potential of a significant and relatively quick response to climate change at reasonable cost. In order to reach widespread commercialization of CCS it is crucial to demonstrate the concept in large-scale projects, reduce costs, build infrastructures for transportation of C02, establish a legal framework and reach acceptance by the public. Most research on CCS deals with capture technologies and storage possibilities (e.g. in connection to Enhanced Oil Recovery (EOR) projects and in saline aquifers). This, since capture represents the highest cost and storage is critical with respect to long-time security and monitoring. Still, there is a need to identify and structure transportation alternatives in order to analyse and evaluate future paths comprising CCS. In a previous work on transportation of C02 [1] the costs and capacities have been investigated by means of analysing type scenarios for different means of transportation, i.e. truck, train, ship and pipeline. It was concluded that transportation by means of pipeline and ship gave feasible logistics and costs. Still, there were large variations in costs depending on the scenario studied (amount of CQ2 transported). The present paper continues the previous work with the aim to illustrate how a CCS transportation infrastructure can be developed applying pipeline and ship transportation. Pipeline transportation Previous Experiences CQ2 pipelines have been in use since the early 1970s in the linhanced Oil Recovery (EOR) industry. The first C02 pipeline construction was completed in 1972 when the Canyon Reef Carriers (CRQ built a 354 km C02 pipeline to the SACROC oilfield in Texas, USA. The largest existing CQ2 pipeline is the 808 km long Cortez pipeline from Cortez in Colorado to Denver City in Texas, which was put into operation in 1984. The Cortcz pipe line is made of API 5LX-65 carbon steel with a diameter of 762 mm [2], delivers about 20 Mt of C02 per year to the C02 hub in Denver and constitutes an important part of the C02 infrastructure that delivers C02 to the oilfields in Texas, Examples on other C02 pipelines in use arc the 330 km long Weybum pipeline, the 648-km long Sheep Mountain pipeline and the 338-km long Bravo pipeline. Design of a C02 pipeline Existing large-scale C02 pipelines are all designed for dense phase/supercritical conditions, i.e. a O02 pressure above 7.38 MPa. This gives a high density compared to gas transmission and material requirements for cryogenic conditions and frost heave arc avoided. When using C02 forliORthe miscibility pressure of O02in oil becomes important. The miscibility pressure of C02 in oil is usually above 8.3 MPa and often as high as 16-20 MPa and the delivery pressure of the C02 at the injection site is therefore often set at a relatively high level, i.e. a C02 pressure above 10 MPa. To maintain the O02 at this condition, typical operational intervals for temperature and pressure of the C02 are 15-30\*0 and 10-15 MPa, respectively [3], However, due to the special properties of CQ2 it is not easy to maintain the C02 within such intervals. Pipelines suffer from pressure drops and to maintain the pressure between 10-15 MPa, recompression stations must be installed along the route, further, the compressibility and density of O02 show strong, nonlinear dependence on the pressure and temperature, which make it difficult to fully predict the C02 flow. At the critical point of C02 (738 MPa and 31"C) a small change in temperature or pressure yields a large change in density, e.g. the density doubles with a change in temperature from 47 to 37\*0 at a constant pressure of 9.0 MPa. Thus, due to that the flow behaviour for C02 is complicated to predict, the calculations of the hydraulic characteristics for pipeline transportation of C02 is important Small amounts of impurities also affect the properties of C02, e.g. small additions of methane (CH4) affect the vapour pressure of C02 [5]. Other impurities which normally occur arc H2S, C2, N2 and water (H20), which all change the 002 properties and therefore need to be reduced to levels that can be handled. Among these impurities, water is most critical since C02 in equilibrium with liquid water form an acid gas that causes so called sweet corrosion, and that C02 in presence of water form hydrates (solid ice-like crystals), which can plug equipment and flow lines, fouling heat exchangers etc [6]. These problems make it necessary to dehydrate the C02 to low water contents. The maximum allowable water content in the C02 flow is typically 0.4x10-3 kg'm3n [5], although this figure depends on the amount of other impurities. Thus, it is recommended that the allowable water content at the proposed operating conditions is determined experimentally [6]. If possible, a common standard for levels of impurities in the C02 fluid should be established. The other main impurity that must be considered in EOR projects is H2S. This, since H2S is dangerous to life at concentrations as low as 300 ppm. In existing C02 pipelines, the H2S concentration has been limited to less than 100 ppm in the CQ2 flow [4]. Ship transportation Experiences Transportation of commodities by ship has always been very cost-effective due to the large loading capacity. Experiences of large-scale ship transportation of C02 are limited with previous applications mainly found in the food and brewery industry with amounts transported in the range of some 100,000 tons of CO, annually, i.e. much smaller quantities than the amounts associated with CCS [1]. Since the transportation conditions for C02 showr similarities with Liquefied Petroleum Gas (LPG) [8], which is transported by ship at a relatively large scale, experiences and design criterion for LPG shipping can be used in the establishment of a large-scale C02-transportation infrastructure. Ship transportation Experiences Transportation of commodities by ship has always been very cost-effective due to the large loading capacity. Experiences of large-scale ship transportation of C02 arc limited with previous applications mainly found in the food and brewery industry with amounts transported in the range of some 100,000 tons of CO, annually, i.e. much smaller quantities than the amounts associated with CCS [1]. Since the transportation conditions for C02 show similarities with Liquefied Pelroleum Gas (LPG) [8], which is transported by ship at a relatively large scale, experiences and design criterion for LPG shipping can be used in the establishment of a large-scale C02-transportation infrastructure. Ship transportation Existing 002 ships are designed for transporting 002 in the liquid phase at a pressure between 1.4 to 1.7 MPa and at a temperature interval of -25°Cto -30°C[9], The liquid phase gives a high density of the C02, i.e. 1100 kg/m3, but due to the high pressure, the tanker size and thereby the capacity for existing CQ2 ships is relatively low, i.e. between 850-1,400 tons of C02. This capacity is too small to effectively transport the amounts of C02 that is associated with CCS. Lor LPG, there are three types of ship design: low temperature type, which is designed to keep LPG liquid at a low temperature and atmospheric pressure, the pressure type which is designed against the boiling point of LPG maintaining the LPG liquid at ambient temperature and, the scmi-ref type which is a combination of both, i.e. the ship is both pressurised and cooled. Seen from a bulk-transportation perspective, the low temperature type is preferable due to that this design does not require pressurised tankers. Existing low temperature ships have a capacity of up to 80,000 m3 [10]. This option is, however, not possible for 002 ships due to that 002 at atmospheric pressure only can exist in gaseous or solid phase, but not as a liquid. The best option for CQ2 for bulk transportation is the semi-ref type design, A standard semi-ref LPG ship has a capacity of 22,000 m3, i.e. 24,000 ton C02, and is designed for a pressure of 0.7 MPa and a temperature of -50°C. Such a ship should be suitable for C02 transportation. Since ship transportation does not allow a continuous flow from source to storage location, the logistics must include appropriate intermediate storage facilities to handle reloading of C02 (e.g. in harbours). There are two main technologies for intermediate storage of LPG, either underground in great rock and salt caverns, or in large steel tanks above ground. At present only the steel tank technology is used for C02, but also storage in cavern can be applied. Existing rock caverns for LPG have storage capacities of up to around 500,000 m3 LPG [11], which approximately correspond to 500,000 tons of C02. Steel tanks have storage capacities up to 3,000 tons of CQ2 [9]. Transportation scenarios Based on the technical criterions for C02 transportation by pipeline and ship, briefly outlined above, and the scenarios employed in the previous study [1], three scenarios have been further evaluated with respect to costs, capacity, distance, and means of transportation. The scenarios correspond to a small-scale "start-up" case of 1 Mt/y of C02 (Sl-1, Sl-2 and Sl-3), a large-scale single-source case of 10 Mt'y of C02 (S2-1, S2-2 and S3-2), and a fully developed and coordinated infrastructure with a capacity of 40 Mt'y (S3-1). Table 1 lists the different scenarios with respect to combinations of transportation modules, transportation distance and capacity. The cost calculations have assumed a depreciation time of 25 years at 5% interest rate. The resulting costs obtained from the scenario calculations are given in Figure 1. Discussion Commercialization of CCS will mean that a transportation infrastructure must be developed and built over time. Such a development will, however, mainly depend on the transportation cost, which in turn depends on transportation distance between source and storage site and if coordinated networks are possible to establish. Prom Kgurel it can be seen that from a cost perspective a short distance is obviously the best option for both large and relatively small power plants (-1 Mt/y of C02). Short distances may of course not always be an option. In addition. relocation of fossil-fuelled (especially lignite) power plants in order to achieve short transportation distances will probably not occur. Power plants are situated near the fuel reserves and/or electricity consumers in order to minimise freight and transmission costs and it is likely that also new power plants have to be located at such already developed sites. Still, if CCS is employed, there will be three commodities to be considered; C02, electricity and fuel. The complexity and cost of a C02 infrastructure arc lower than the infrastructure cost of solid-fuel and of electricity transmission. This, since C02 can be transported at steady-state flow in a pipeline whereas solid-fuel transportation is mostly carried out by railway and electricity transmission suffers from losses. Tor a large power station located far from the disposal site, a single pipeline from source to sink could be used. A single network is, however, believed to have an upper capacity limit This is not because of technical limitations but due to that single storage regions will have upper limits in receiving rate. If several power stations can use a coordinated network, the transportation costs are lowered. l;rom a European perspective, such networks will probably be established offshore to take advantage of early LX)R opportunities. A future large-scale vision of 300 Mt/y of CG2 will therefore be built up of several coordinated networks from suitable areas to neighbouring disposal sites, with capacity and infrastructure similar the case represented by scenario S3-1. This also means that the transportation cost per ton of C02 is expected to be similar to that of S3-1, i.e. about 2 €/ton. Such a coordinated network could also include ship transportation. Ships are more flexible than pipelines when it comes to adaptability of capacity and transportation route, and a transportation system including both ships and pipeline will therefore make the infrastructure more adaptable to variations in the infrastructure of the storage location. CoDclusions The development of an infrastructure for C02 transportation is expected to start with a small-scale demonstration plant. Tor such a case onshore disposal near the CQ2 source is the least expensive transportation alternative, with a cost of around l&ton of C02 (Sl-1). However, onshore storage may not be an option for a first demonstration project of this size and if so, the present analysis shows that the transportation costs to an offshore storage site would be 7€/ton of CQ2 when transported by ship (Sl-2). Obviously, coordinated networks must be established in order to bring down the transportation costs to the figures normally mentioned for CCS, i.e. to a cost of around 2€/ton as obtained in this study for the coordinated network (S3-1). The latter figure should also be valid for a large large-scale vision of 300 Mt/y of C02, and can be compared with the target of 20€7ton of C02 avoided, as set by the European Climate Change Programme (LCCP) [12].

### Solvency – AT: Tech Immature

#### CCS technology is building momentum

CTA 11

Carbon Tech Alliance, “Frequently Asked Questions,” http://www.carbontechalliance.org/welcome/frequently-asked-questions

With multiple CCS projects coming online around the globe and continued R&D investment from governments and private enterprises in the energy industry, CCS technology is building the momentum required for broad implementation. In 2003 the US federal government established seven regional partnerships to explore carbon capture and storage. The American Recovery and Reinvestment Act of 2009 allotted $3.4 billion in further research funding with hopes of further developing the technology and reducing operational costs. In September 2010, DOE signed a $553 million cooperative agreement with the FutureGen Alliance to design, build, and operate a regional CCS center in Illinois. This CCS center is associated with the first large-scale oxy-combustion repowering project and is supported by a $1 billion commitment in federal funding from the ARRA. Continued investment in research, training and public education about CCS technology will be critical to its acceptance as a necessary component of modern industry, particularly energy production.

### Solvency – AT: Sequestration Uncertainty

#### No uncertainty with sequestration

Katzer 7 – PhD in Chemical Engineering, member of the National Academy of Engineering, Professor @ MIT

James, “The Future of Coal,” http://web.mit.edu/coal/The\_Future\_of\_Coal.pdf

Carbon sequestration is the long term isolation of carbon dioxide from the atmosphere through physical, chemical, biological, or engineered processes. Th e largest potential reservoirs for storing carbon are the deep oceans and geological reservoirs in the earth’s upper crust. h is chapter focuses on geological sequestration because it appears to be the most promising large-scale approach for the 2050 timeframe. It does not discuss ocean or terrestrial sequestration1,2 . In order to achieve substantial GHG reductions, geological storage needs to be deployed at a large scale. 3,4 For example, 1 Gt C/yr (3.6 Gt CO2 /yr) abatement, requires carbon capture and storage (CCS) from 600 large pulverized coal plants (~1000 MW each) or 3600 injection projects at the scale of Statoil’s Sleipner project. 5 At present, global carbon emissions from coal approximate 2.5 Gt C. However, given reasonable economic and demand growth projections in a business-as-usual context, global coal emissions could account for 9 Gt C (see table 2.7). h ese volumes highlight the need to develop rapidly an understanding of typical crustal response to such large projects, and the magnitude of the ef ort prompts certain concerns regarding implementation, ei ciency, and risk of the enterprise. h e key questions of subsurface engineering and surface safety associated with carbon sequestration are: Subsurface issues: Is there enough capacity to store CO2 where needed? Do we understand storage mechanisms well enough? Could we establish a process to certify injection sites with our current level of understanding? Once injected, can we monitor and verify the movement of subsurface CO2 ? Near surface issues: How might the siting of new coal plants be inl uenced by the distribution of storage sites? What is the probability of CO2 escaping from injection sites? What are the attendant risks? Can we detect leakage if it occurs? Will surface leakage negate or reduce the benefits of CCS? Importantly, there do not appear to be unresolvable open technical issues underlying these questions. Of equal importance, the hurdles to answering these technical questions well appear manageable and surmountable. As such, it appears that geological carbon sequestration is likely to be safe, effective, and competitive with many other options on an economic basis. This chapter explains the technical basis for these statements, and makes recommendations about ways of achieving early resolution of these broad concerns.

## \*\*Economy Advantage

### Reverse Causal Link

#### It’s reverse causal

Eugene 7 – JD and MPA @ UT-Austin

Derrick, “Carbon Capture and Storage and Federal Legislative Proposals,” http://txccsa.org/publications/darrick/Eugene\_12-07.pdf

CCS is important to the economy and the environment. For the foreseeable future, the U.S. will continue to rely heavily on fossil fuels for energy and transportation needs. The United States has significant coal reserves, enough to satisfy current demand for over 200 years, and coal provides the fuel for 51 percent of U.S. electricity generation. 2 Under GHG limits, CCS allows the continued use of coal as a vital energy feedstock while mitigating emissions of CO2. Moreover, through use for enhanced recovery in depleted oil and gas reservoirs, CO2 can contribute to energy security by decreasing the nation’s need for imported oil. Furthermore, not implementing CCS could cause domestic economic decline. Without deployment of CCS capabilities, the U.S. could see a projected decline in GDP of $400 to $800 million in a carbon-constrained world.

### CCS Key to Coal

#### CCS is key to the coal industry

Romm 8 – Senior Fellow at American Progress (10-21-08, Joseph, "High Hopes for Clean Coal?," http://www.pbs.org/wgbh/pages/frontline/heat/themes/cleancoal.html)//JK

There are only two futures for the coal industry: Massive introduction of carbon capture and storage and burying the carbon in permanent repositories, or no use of coal. There's no third alternative. I see all these ads on TV that are nonsense. The coal industry's been one of the driving forces behind inaction. They've been trying to live in the past as long as possible with this imaginary third option that they can keep building coal plants. From my perspective, they've been scrambling to build dirty power plants for years knowing that they're going to be seeing regulations. … China is also living in a similar delusion that they should just build coal plants as fast as they can until someone stops them. Or, my guess is until someone pays them to stop doing it. It's going to require a lot of effort by a lot of industries, of which the coal industry and the automobile industry are the two most important.

### Link – Coal Key to Economy

#### Coal is key to the economy

Rose and Wei 6 - \* Professor of Energy, Environmental and Regional Economics, \*\*Graduate Assistant in the Department of Geography at the Pennsylvania State University

Adam and Dan, “The Economic Impacts of Coal Utilization and Displacement in the Continental United States, 2015,” http://www.americaspower.org/sites/all/themes/americaspower/images/pdf/penn-state-study.pdf

Our analysis shows that, in 2015, U.S. coal production, transportation and consumption for electric power generation will contribute more than $1 trillion (2005 $) of gross output directly and indirectly to the economy of the lower-48 United States. Based on an average of two energy price scenarios summarized below, we calculate that $362 billion of household income and 6.8 million U.S. jobs will be attributable to the production, transportation and use of domestic coal to meet the nation’s electric generation needs. The United States relies heavily on coal to produce electric power. Domestic coal production has expanded from 560 million tons in 1950 to 1.13 billion tons in 2005, while coal consumption for electric generation has increased from 92 million tons to 1.04 billion tons in this period. Historically, coal has provided the lowest cost source of fossil energy in the U.S. Electricity is one of the most prominent commodities traded in the United States, second only to food in annual sales volume. We based our analysis on state-specific “IMPLAN” input-output tables -- a widely utilized source of data on the composition of state economic activity -- to estimate the basic direct and indirect “multiplier” effects of coal utilization for electric generation. These multiplier effects include the economic impacts of coal mining and of government spending of taxes paid by coal mining for electricity generation, by companies that transport coal, and by coal-fueled electricity generation companies. We calculated results at the state level and compiled regional summaries by dividing the nation into five geographic regions (see Figure S1, below). The study first presents estimates of the positive economic output, household income, and jobs attributable to projected levels of coal production and utilization in 2015. We used a 2015 base case because electric generation and other projections for this year were readily available from U.S. DOE and U.S. EPA. These estimates measure the “existence” value of coal as the key fuel input into U.S. electricity generation. The analysis includes estimates of the impact of higher electricity rates on individual state economies if utilities were required to utilize fuel sources and generating technologies more costly than coal-based electricity. Two Basic Scenarios Our first scenario includes backward linkage, or demand-side multiplier, effects for coalfueled electricity generation. Tax payments from coal production, utilization, and transportation subsequently result in government expenditures, which also generate multiplier effects. The analysis also includes the impacts of the favorable price differential attributable to coal-based electricity. This calculation measures the economic activity attributable to relatively cheaper coal in contrast to more expensive alternatives at upper-range (“high”) prices for alternative generation sources. Our second scenario is the same as the first in terms of backward linkages, but we calculated the price differential effects on the basis of lower-range estimates of the prices of alternative fuels and technologies. The study relied on U.S. DOE Energy Information Administration (DOE/EIA) and other projections of electric generation and delivered coal prices to estimate the impact on energy prices of replacing 100% of projected coal-fueled electricity generation. We estimated the impact of higher energy prices on state economies using a price elasticity estimate of 0.10, meaning that a 10% change in energy costs would induce a 1.0% change in state economic output. Regional results of the basic “Coal Existence” scenarios are summarized in Table S1 below. Assigning equal weight to each of the two energy price scenarios, we estimate that U.S. coal-fueled electric generation in 2015 will contribute: • $1.05 trillion (2005 $) in gross economic output; • $362 billion in annual household incomes, and • 6.8 million jobs. We also estimated the prospective net economic impacts of the “displacement” of coalfueled electricity generation at assumed levels of 66% and 33% from a projected 2015 base. These levels of displacement are consistent with some of the potential impacts of major environmental policy initiatives in climate change or other areas. In these cases, we again calculated backward linkage and price differential effects to determine potential negative impacts on each state’s economy. Additionally, we calculated potential positive economic benefits due to the operation of replacement electricity generation of various types. In all states, the net effect of displacing coal-based electricity was negative for the “high-price” scenarios, and in nearly all states, the net effect was negative for the “low-price” scenarios.

#### Coal has a key stimulus effect

Rose and Wei 6 - \* Professor of Energy, Environmental and Regional Economics, \*\*Graduate Assistant in the Department of Geography at the Pennsylvania State University

Adam and Dan, “The Economic Impacts of Coal Utilization and Displacement in the Continental United States, 2015,” http://www.americaspower.org/sites/all/themes/americaspower/images/pdf/penn-state-study.pdf

Coal-based electricity generation provides a significant stimulus to the U.S. economy by increasing output, income, and employment in all sectors through direct and indirect (multiplier) effects. It also increases the purchasing power of the consumer, and enhances the competitiveness of U.S. exports, by avoiding increased reliance on higher-priced fuels and electricity-generating technologies. Even when we take into account the positive economic effects of capital investments and operation of alternative energy generation sources, the replacement of coal-based electricity by relatively more expensive fuels or generating technologies would have a net negative economic impact on every region and on nearly every state. In general, these results reflect the large economic benefits associated with coal’s favorable price differential effect relative to alternative fuels.

#### Coal is key to the economy

Gates 10 (Steve, B.S. in Poli Sci from Saint Vincent College, M.A. in public commncaitons from American University, ACCCE’s national communcations director, February 03, “Clean coal can create new jobs, preserve existing ones”, <http://behindtheplug.americaspower.org/2010/02/clean-coal-can-create-new-jobs-preserve-existing-ones.html>)

As President Obama mentioned in his [State of the Union address](http://behindtheplug.americaspower.org/2010/01/state-of-the-union-and-clean-coal-technology.html%22%20%5Ct%20%22_blank) last week, sources of electricity production like wind, solar, natural gas and renewable and clean coal are inexorable parts of this country’s energy future as a way to create green jobs. For the United States to achieve energy independence and to lead the global marketplace in clean energy jobs, all of our energy resources must be part of the solution. By investing in energy innovations such as clean coal technology, we can preserve the good jobs we already have and expand the American workforce for decades to come. According to a study by [Pennsylvania State University](http://www.americaspower.org/news/study-details-impact-domestic-coal-american-economy), if coal production was to disappear completely,more than $1 trillion of gross output – including 6.8 million jobs – would be lost directly and indirectly from the economy of the contiguous United States in 2015. Compare that to the landscape with the deployment of clean coal technologies like carbon capture and sequestration (CCS) on a commercial scale. Constructing 100 power plants equipped with CCS could generate up to $1 trillion of economic output and create between 5 and 7 million man-years of employment and a quarter of a million permanent jobs, as reported by [BBC Research and Consulting](http://www.americaspower.org/news/economic-benefits-advanced-coal-electric-generation-0%22%20%5Ct%20%22_blank) in a 2009 study. As you can see, keeping coal in our nation’s energy mix allows for economic growth helps to protect the environment all while ensuring the many valuable American jobs that coal already has provided.

### Coal Regulations Now

#### Regulations are already in place and more are likely – they threaten the viability of the coal industry

McCown 12

Debra, 5-22, “Coal Leaders Looking Toward Presidential Election,” Hispanic Business, http://www.hispanicbusiness.com/news/newsbyid.asp?idx=284541&page=1&cat=&more=

"I would submit to you that the current administration has no intention of easing up in its war on coal and fossil fuels," said U.S. Rep. Morgan Griffith, R-9th, pointing to a 2008 statement by President Barack Obama as the official "declaration of war." In the often-quoted comment to the San Francisco Chronicle, Obama explained that he wants to cap carbon dioxide emissions, forcing industries and power plants to retrofit their operations to comply, driving up the price of electricity and making it financially impractical to build coal-fired power generation in the future. "Things are not looking good with the current administration and the current administrator of the EPA [Environmental Protection Agency], Lisa Jackson,"Griffithsaid. "My bigger fear is [if Obama is re-elected] we're taking those regulations ... that currently only apply to future [coal] plants and ... apply them to all plants." The coal industry has felt increasingly under attack as the Obama administration has increased environmental regulations that not only affect power plants that burn coal, but directly impact surface and underground mining, particularly in the Appalachian region. So great is Obama disliked in the coal-dependent state of West Virginia that in this month's Democratic primary, 41 percent of voters chose a federal prison inmate over the president, said U.S. Rep. Shelley Moore-Capito, R-2nd. "Actually, the president lost eight counties inWest Virginia," Moore-Capito said. "I've actually talked to folks who were business folks, friends of mine, who are registered Democrats who voted for this guy. They had no idea who he was; they just knew he wasn't President Obama." She said pro-coal members of the House continue to fight with proposed legislation in support of the proposed Keystone XL oil pipeline, the continued use of coal ash in construction supplies, and the need for congressional review of any new regulation with a price tag greater than $100 million. 'Scared to Death' Bill Kovacs, senior vice president of the U.S. Chamber of Commerce, said the coal industry has become a "poster child" for the detrimental effects of new regulations -- 170,000 of which he said have been added by the federal government since 1976. "We're in a position right now where every single one of those pages, if you don't comply with every single requirement on every single one of those 43,000 pages [of environmental regulations], you're in a position where you're in violation of the law," he said, "so if the agency wants to get you, they're going to get you. ... There's no way to comply." He said the Obama administration has added more than 200 major regulations, defined as those with a price tag to industry of more than $100 million. "The costs are absolutely staggering," he said. "We're in the tens of billions of dollars for some of the regulations," he said.

#### Multiple levels of regulations are certain

Hinkle 11 - Vice President, Policy and Research @ American Clean Skies Foundation

Jerome, “Can CCS Bring Gas from Bridge to Destination?,” http://www.cleanskies.org/wp-content/uploads/2011/06/CCS\_for\_Gas\_interim.pdf

The State of California has strong legislation in place to regulate GHGs. Several other states have adopted companion legislation, and the Regional Greenhouse Gas Initiative (RGGI, includes 9 Northeast and Mid-Atlantic states with New Jersey’s recent withdrawal) has been underway since 2008. California has convened a substantial review of CCS, even though CA has the least regional CI from powerplants in the US, while the Midwest Governor’s Association, along with the Great Plains Institute, has underway a carbon capture and EOR initiative (18). Although the 112th Congress has no appetite for climate legislation, EPA, acting under Federal court orders, is on its way toward requiring a national inventory in preparation to regulate GHGs through the Clean Air Act. Powerplants will be early targets. Meanwhile, EPA is preparing to more stringently regulate coal plants (an excellent summary is at (6)). Many analyses have shown that gas is a cheap, far cleaner and more abundant fuel for replacing coal, notably the DBCCA analysis cited above (4).

#### EPA regulations are coming and will multiply

MSNBC.com 12 (March 27, “End of coal power plants? EPA proposes new rules”, <http://usnews.msnbc.msn.com/_news/2012/03/27/10886373-end-of-coal-power-plants-epa-proposes-new-rules?lite>)

While [the proposed rules](http://epa.gov/carbonpollutionstandard/) do not dictate which fuels a plant can burn, they would require any new coal plants essentially to halve carbon dioxide emissions to match those of plants fired by natural gas. The proposed standards have divided the power industry between companies that have moved toward natural gas, such as Exelon and NextEra, and those that generate most of their power from coal, such as Southern Co. and American Electric Power. Record low prices for natural gas and the looming air rules already have pushed many companies to put older coal plants into retirement. "There are areas where they could have made it a lot worse," said Scott Segal, director of the Electric Reliability Coordinating Council, a coalition of power companies. Still, "the numerical limit allows progress for natural gas and places compliance out of reach for coal-fired plants" not planning to capture and sequester carbon dioxide, the chief greenhouse gas. Steve Miller, CEO and President of the American Coalition for Clean Coal Electricity, a group of coal-burning electricity producers, took a more dismal view, saying it "will make it impossible to build any new coal-fueled power plants and could cause the premature closure of many more coal-fueled power plants operating today." Other opponents of the long-delayed EPA proposal say it will limit sources for electricity by making coal prohibitively expensive. "This rule is part of the Obama administration's aggressive plan to change America's energy portfolio and eliminate coal as a source of affordable, reliable electricity generation," said Rep. Fred Upton, R-Mich., who as chairman of the House Energy and Commerce Committee has led the charge against environmental regulations. "EPA continues to overstep its authority and ram through a series of overreaching regulations in it attacks on America's power sector." Republicans in Congress and on the campaign trail have claimed that Obama-era rules affecting power plants in recent years could cause blackouts. Numerous studies and an Associated Press survey of power plant operators have shown that is not the case. Environmentalists were quick to welcome the proposals, which will be finalized after an undetermined period that will include public comments. Frances Beinecke, president of the Natural Resources Defense Council, called it a "historic step ... toward protecting the most vulnerable among us — including the elderly and our children — from smog worsened by carbon-fueled climate change." The American Lung Association agreed. "Scientists warn that the buildup of carbon pollution will create warmer temperatures which will increase the risk of unhealthful smog levels," said board chairman Albert Rizzo. "More smog means more childhood asthma attacks and complications for those with lung disease." The proposed rules would affect only new plants, not existing plants, which was a concession to industry. In addition, they would not apply to units that will start construction within the next 12 months. Still, **the proposals could set the stage for the EPA to regulate existing plants in the coming years. The EPA is moving forward on the climate rules, which do not need approval by Congress**, after a wide-ranging climate bill died in the Senate in 2010.

#### EPA action percolates – leads to new regulations

Lemonick 3-27-Science/Environment TIME writer (Michael, “EPA To Regulate Coal Plants, Greenhouse Gas Emissions”, Climate Central, 3/27/2012, http://www.climatecentral.org/blogs/epa-takes-aim-at-coal-plants-and-greenhouse-gas-emissions/)

Climate skeptics sometimes insist that putting carbon dioxide into the atmosphere can’t be pollution because CO2 is necessary to life. It’s a seriously bizarre argument: water is also necessary to life, but you can die if you drink too much of it. Decades of research by hundreds of scientists have made it absolutely clear that carbon dioxide generated by fossil-fuel burning traps excess heat, with disruptive effects we’ve already begun to see. That’s why the Environmental Protection Agency ruled in 2009 that carbon dioxide and other greenhouse gases such as methane and nitrous oxide “threaten the public welfare of current and future generations,” and that the agency could therefore regulate them under the Clean Air Act. That ruling was upheld by the Supreme Court and reaffirmed last year, but despite its authority to do so, the EPA hasn’t actually come out with any limits on heat-trapping gases. That's about to change. Tuesday, the EPA released new regulations that will require new power plants to emit no more than 1,000 lb. of carbon dioxide for each megawatt of electricity they generate — the first such regulations ever imposed. Existing or already-approved plants are exempt, but since coal-fired power plants generate around 1,800 lbs. of CO2 per megawatt, this pretty much means that no more coal plants will be built unless they use some form of carbon capture and storage. Since that technology won’t be commercially available for years, though, and since it’s likely to be costly, that doesn’t change matters. Natural-gas plants, by contrast, come in at under 1,000, so they won’t be affected. The companies that dig up coal for profit are naturally not happy. “The rule from our standpoint is a big mistake,” Luke Popovich, a spokesman for the National Mining Association, told the New York Times. “It is virtually calculated to drive coal, a very, very affordable generator of electricity, out of the U.S. electricity market.” So to paraphrase a line from one of the greatest gangster movies of all time, is this the end of coal? Not really, given that the approximately 300 coal-fired plants that already exist can keep chugging merrily along. Since coal accounts for some 40 percent of U.S. carbon emissions, you’d think this would be a big victory for the environment, but environmental activists aren’t falling all over themselves to celebrate their triumph. The reason, as Matthew Yglesias puts it in Slate: “This is both a historic event and in many ways not that big a deal . . . even before the EPA got in the game, new coal was basically dead in the United States. Cheap gas, the falling price of solar, community activism, and the risk of CO2 regulation had already created the situation where no new post-2012 conventional coal was in the pipeline anyway.” Beyond that, as a recent study showed, the shift away from coal to natural gas isn’t going to help all that much with global warming, anyway. Nevertheless, the ruling is still important. By itself, it’s not going to alter the course of climate change significantly. But having established its authority to regulate greenhouse gases, and now having issued the first rules under that authority, the EPA has shown that it’s willing to take action. And that lays the groundwork for future action that could be a lot more stringent.

#### Public push proves

Zabarenko 12 (Deborah, April, “U.S. voters favor regulating carbon dioxide: survey”, <http://articles.chicagotribune.com/2012-04-26/business/sns-rt-us-climate-energy-usabre83p0zj-20120426_1_tax-swap-independents-favor-carbon-dioxide>)

WASHINGTON (Reuters) - Three out of four U.S. voters favor regulating carbon dioxide as a greenhouse-gas pollutant, and a majority think [global warming](http://articles.chicagotribune.com/2012-04-26/business/sns-rt-us-climate-energy-usabre83p0zj-20120426_1_tax-swap-independents-favor-carbon-dioxide) should be a priority for the president and Congress, a survey of American attitudes on climate and energy reported on Thursday. The survey was released one day after Rolling Stone magazine published an interview with President Barack Obama in which he suggested that climate change would become a campaign issue this year.  In results often at odds with the political debate in Washington, the survey conducted for Yale and George Mason University also found most Americans would vote for a candidate who raised [taxes](http://articles.chicagotribune.com/2012-04-26/business/sns-rt-us-climate-energy-usabre83p0zj-20120426_1_tax-swap-independents-favor-carbon-dioxide) on coal, oil and natural gas - fossil fuels that emit climate-warming carbon dioxide when burned - while cutting income tax, in a revenue-neutral "tax swap." This maneuver, which would not add to federal revenues but would change where they came from, has long been discussed by such disparate political actors as former Vice President Al Gore, a Democrat, and Bob Inglis, a Republican former congressman. Sixty-one percent of Americans surveyed said they would be more likely to vote for a candidate who supported the tax swap, while 20 percent said they would be less likely. In 2010, Democrats took a different approach, pushing legislation through the House of Representatives that aimed to lower carbon emissions by raising the price of fossil fuels. But the effort died in the Senate amid strong Republican opposition. While Democrats are frequently perceived as being "greener" than Republicans and independents, the survey found sizable majorities of all three groups favored the tax swap and other environmentally friendly policies, said Anthony Leiserowitz of the Yale Project on Climate Change [Communication](http://articles.chicagotribune.com/2012-04-26/business/sns-rt-us-climate-energy-usabre83p0zj-20120426_1_tax-swap-independents-favor-carbon-dioxide). For example, the survey found 75 percent of respondents support regulating carbon dioxide as a[greenhouse gas](http://articles.chicagotribune.com/2012-04-26/business/sns-rt-us-climate-energy-usabre83p0zj-20120426_1_tax-swap-independents-favor-carbon-dioxide) pollutant, which the Supreme Court ruled legal in 2007 and the U.S. Environmental Protection Agency has advocated. But looking at the political breakdown on this question, 84 percent of Democrats, 67 percent of Republicans and 77 percent of independents favor this regulation. A GAP BETWEEN VOTERS AND CONGRESS While there is a wide gap between Republicans and Democrats, Republican voters still favored this move by a solid two-thirds majority, while most congressional Republicans have opposed it, Leiserowitz said. "You do have to draw a distinction between the members of Congress and the broad public ... The two parties have now become more and more ideologically pure ... and that is not true among the public at large," he said in a telephone interview. The nationally representative survey of 1,008 U.S. adults, with a margin of error of plus or minus 3 percent, found 72 percent of Americans think global warming should be a very high, high or medium priority for the president and Congress. Among registered voters, 84 percent of Democrats, 68 percent of independents and 52 percent of Republicans agreed.

### Coal Regulations Now – States

#### The *absence* of federal regulations leads to state regulations

DeShazo & Freeman, 7 (J.R., Professor and Director of the Lewis Center, UCLA School of Public Affairs, and Jody, Professor of Law and Director of the Environmental Law Program, Harvard Law School, “Timing and Form of Federal Regulation: The Case of Climate Change”, University of Pennsylvania Law Review, http://www.pennumbra.com/issues/pdfs/155-6/DeShazo-Freeman.pdf, pgs 1503-1506)//AMV

Although the environmental federalism literature is primarily concerned with the normative question of the optimal level of regula-tion (state or federal), it also offers an implicit positive account of at least two conditions under which we would expect to see states driving interest group demand for federal minimum standards. First, the threat of an interstate deregulatory competition—the so-called race to the bottom—could motivate environmentalists and state and local of-ficials to seek federal minimums. Second, the migration of pollution from one state to another—that is, ISEs—might move state and local officials to seek a federal solution to a problem they cannot overcome on their own. In both cases, state activity helps to create a demand for federal minimum standards in order to pull laggard states up. These two rationales for federal minimums help to explain the genesis of early federal environmental regulation. For example, state and local governments in highly polluted states led the charge for federal minimum air quality standards because they felt pressure to respond to voter demand for air pollution regulation, yet feared a race to the bottom.6 Although neither the RBT nor the ISE rationale can fully account for why environmental regulation emerged at the federal level in the early 1970s,7 they shed some light on how state be-havior can influence the demand for federal standards. States can also induce industry demand for federal regulation. Over twenty years ago, Elliott, Ackerman, and Millian noted that in-consistent state regulation could prompt industry to lobby for uniform federal regulation.8 To support this claim, the authors cited the first significant federal air pollution laws, which, they argued, were partly the result of the automobile and soft coal industries seeking uniform preemptive federal standards when faced with the threat of inconsis-tent and increasingly rigorous state laws.9 Elliott and his coauthors made this point in the context of a larger argument that sought to debunk prevailing myths about the origins of federal statutes, namely that they are either the product of a well-intentioned Congress seeking to solve policy problems, or the result of conventional interest group politics in which environmentalists suc-cessfully pressure the national government for legislation.10 To prop-erly understand federal statutes, the authors argued, one must recog-nize that they are the product of organizational and political exigencies11 (a position that we, of course, embrace). Under this “evo-lutionary” model of federal statutes, state-level legislative successes by environmental groups tend to be countered by federal legislative suc-cesses by industry groups.12 This insight was the genesis of DPT. Since then, others have identified additional examples of this phe-nomenon, although no one has elaborated on it in any depth.13 The Elliott et al. account of industry demand for federal legisla-tion provides an important piece of the puzzle of how federal statutes take shape. First, it disabuses us of the notion that industry will always resist regulation. Indeed, industry groups sometimes provide the im-petus for regulation, in both domestic and international settings.14 Although industry may lead the charge for federal legislation only infre-quently, industry support for federal regulation undoubtedly has a powerful effect on the prospect of its passage.15 Yet what will industry demand from Congress? It will demand a federal standard that preempts inconsistent state regulation and eliminates regulatory uncertainty. Uniformity is not enough, however. Industry will also try to undercut the most aggressive state standards by seeking a lower federal ceiling.16 States thus establish the boundaries within which the federal negotiation over standards takes place—the more stringently states regulate at the outset, the more leverage they create for a compromise in the end. If the federal standard turns out to be weaker than the most aggressive state standard, and if preemp-tion prevents any deviation, then industry achieves a double win.17

#### Federal inaction leads to state regulation

**Adler 6** – Professor of Law

Jonathan H., Professor of Law and Co-Director, Center for Business Law and Regulation, Case Western Reserve University School of Law, “When is Two a Crowd? The Impact of Federal Action on State Environmental Regulation”, Harvard Environmental Law, May 16th, 2006, pgs 91-92 <http://www.law.harvard.edu/students/orgs/elr/vol31_1/adler.pdf>

A combination of federal action and inaction has also increased the salience of climate change as an environmental policy concern. Various federal agencies have sponsored research and published reports on the potential impact of anthropogenic emissions of carbon dioxide and other greenhouse gases on climate change.108 Such actions, combined with the efforts of international organizations and environmental NGOs, have increased the profile of “global warming” as a policy issue. At the same time, the federal government has not adopted any regulatory policies to control emissions of carbon dioxide and other gases linked to climate change. To the contrary, both Congress and the Executive have, at times, explicitly refused to adopt such measures.109 This combination of enhancing climate change’s profile on the public policy agenda and failing to act created an opportunity for states. Over the past decade, numerous states have adopted measures to address climate change concerns.110 Although these measures are more aggressive than those adopted by the federal government, most of the state measures are exceedingly modest, and few involve direct regulatory controls.111 California, however, has sought to adopt prescriptive regulatory controls. In July 2002, California adopted legislation requiring the California Air Resources Board to “develop and adopt regulations that achieve the maximum feasible and cost-effective reduction of greenhouse gas emissions from motor vehicles.”112 Even though the federal government has not sought to regulate greenhouse gases, federal actions—ranging from scientific reports to explicit refusals to regulate—have almost certainly increased the demand for climate policies at the state level.113

#### New York and Mid-Atlantic states

Cassel 6/17 (Barry, “New York Dismisses Case Aimed at Greenhouse Gas Emissions”, renewabelsbiz.com, 6/17/2012, http://www.renewablesbiz.com/article/12/06/new-york-dismisses-case-aimed-greenhouse-gas-emissions-0)

In 2005, New York and a group of Northeastern and Mid-Atlantic states signed a memorandum of understanding covering a program to regulate CO2 emissions from fossil fuel-fired power plants. After a three-year process, in 2008, the state of New York adopted regulations implementing a program in New York. These regulations establish a market-based system to reduce the overall emission of CO2 by 10% by 2018. Power plants that burn coal and other fossil fuels are major contributors of climate change pollution, and in New York they emit roughly one-fifth of all the CO2 generated in the state, said a June 13 statement from the Attorney General’s office. Under New York's RGGI regulations, emissions of CO2 by electric-generating power plants of 25 MW and larger operating in the state are capped. Power companies must obtain sufficient CO2 allowances to cover their plant emissions, with most obtaining their allowances through public auctions held by the state. Proceeds from the auctions support renewable energy, energy efficiency, and other greenhouse gas reduction and climate protection efforts. A recent study conducted by the independent economic consulting firm Analysis Group concluded that RGGI added $1.6bn to the economies, and 16,000 new jobs, in the participating states. The study also projected that RGGI will provide consumers in these states with $1.3bn in savings on their electric bills over the next decade through energy efficiency measures using funds generated by the initiative.

#### Washington proves

Cauvel and Graff 11 (Kimberly and Marianne, June 23, “Washington eschews coal for power, but lines up to be king of shipping coal to China”, <http://www.invw.org/content/washington-eschews-coal-for-power-but-lines-up-to-be-king-of-shipping-coal-to-china>)

BELLINGHAM – Coal has fueled American electricity for more than 100 years, but on April 29, Gov. Chris Gregoire signed [legislation](http://www.governor.wa.gov/billaction/2011/default.asp) to end coal-powered electricity in Washington. In an effort to reduce air pollution and greenhouse-gas emissions that contribute to climate change, Washington’s only coal-fired power plant, in Centralia, is obligated to [stop burning coal by 2025](http://www.governor.wa.gov/billaction/2011/default.asp).

### Coal Regulations Now – Inconsistency

#### This leads to wild inconsistency

Evans et al, 11 (Lisa, Senior Administrative Counsel for Earthjustice, Michael Becher, Appalachian Mountain Advocates, and Bridget Lee, Attorney for Earthjustice, “State of Failure: How States Fail to Protect Our Health and Drinking Water from Toxic Coal Ash,” Earthjustice, [http://earthjustice.org/sites/default/files/StateofFailure.pdf)//AMV](http://earthjustice.org/sites/default/files/StateofFailure.pdf%29//AMV)

State regulations governing coal ash are often wildly inconsistent with each other as well as internally inconsistent. These inconsistencies lead to the unequal protection of American communities from toxic waste. Fairness requires that federal waste regulations establish a floor of mandatory safeguards to ensure that all citizens, no matter where they live, are protected from coal ash. Inconsistent state regulations lead to cross-border dumping. For example, lack of regulations in Alabama has made that state a coal-ash dumping ground. In fact, the Arrowhead landfill in Perry County, Alabama, which has received about 5 million tons of coal ash from Tennessee since 2009, is licensed to receive ash from no less that 33 states. 16 Inconsistent state regulations also result in environmental injustice-- the states with the most lax coal ash regulations are the states where coal ash dumps are most likely to disproportionately impact low-income communities and communities of color. Internally, states also leave their citizens unprotected. For example, Wisconsin’s regulation of wet ash disposal lacks many of the protections afforded to dry disposal in the state. Despite the existence of 18 coal-ash impoundments in Wisconsin, these dams are not included within the scope of the state’s dam safety program.17 This means that there are no structural safety or dam integrity regulations applying to coal-ash dams in the state. Likewise state regulators do not monitor the construction or operation of Wisconsin coal-ash dams. As a result, state regulators have inspected only one of the state’s 18 dams within the last five years.

### Coal Regulations Coming

#### New regulations are coming

Zarraby 12 - chemical engineer for the Federal Energy Regulatory Commission, JD expected from GWU in 2012

Cyrus, “Note: Regulating Carbon Capture and Sequestration: A Federal Regulatory Regime to Promote the Construction of a National Carbon Dioxide Pipeline Network,” 80 Geo. Wash. L. Rev. 950, Lexis

Although the United States has yet to pass comprehensive climate change legislation, regulation of greenhouse gas emissions is likely. In December 2010, EPA issued a plan for establishing greenhouse gas pollution standards under the Clean Air Act. 26 The plan allows EPA to propose emission limits for all new power generation, including coal-fired generation, as early as July 2011. 27 Although some lawmakers have attempted to prevent EPA from moving forward, any attempt to curb EPA's power is likely to fail. 28 Additionally, in his 2011 State of the Union Address, President Obama set a goal of using clean energy sources to produce eighty percent of the electricity used in the United States 29 by 2035. 30 Finally, in 2010, Congress took significant steps to regulate greenhouse gas emissions when the House of Representatives passed climate change legislation and the Senate proposed a climate change bill. 31 Although there is no current regulation of greenhouse gases, regulation is further along and more likely to happen than ever before.

### Coal Regulations Coming – AT: No Regs

#### Plan makes regulations palatable – statements by the fossil fuel industry prove

Garten Rothkopf 10

[International Advisory Firm that specializes in energy policy analysis, “Assessing CCS Risk and Liability Issues,” 4/15/10, http://www.gartenrothkopf.com/gr-energy-climate-briefs/assessing-ccs-risk-and-liability-issues.html]//SH

The political debate in Washington this week illustrates the central position the CCS question holds in the negotiations over climate legislation. At a hearing this week on Capitol Hill, where coal mining executives were pressed to support climate legislation,they said that a price for their support of such legislation would be greater federal funding of CCS. The Waxman-Markey American Clean Energy and Security bill that passed the House last year includes $10 billion for CCS research and development plus $50 in bonus allowances for CCS installed before 2025. The bill also would provide deep concessions for coal-using industries, such as utilities, in the form of free carbon emission allowances and a ban on EPA regulation of carbon emissions under the Clean Air Act. The Senate’s version, which could finally be unveiled by Sen. John Kerry (D-MA), Sen. Joe Lieberman (I-CT), and Sen. Lindsey Graham (R-SC) next week, is expected to support fossil fuels even more strongly than the House’s. The coal industry wants KGL to include funding levels for CCS at least equal to those proposed by Waxman-Markey and to maintain the ban on EPA regulations, while shielding the coal sector from federal emissions reduction requirements until CCS technology is fully deployable. Recently, this debate has centered on the Rockefeller-Voinovich language to boost government funding for CCS, which is now being offered as a bargaining chip for KGL. But, that debate shows that the level of continued government support for CCS is contingent on a wide range of factors, particularly how the ongoing negotiations over climate legislation will play out.

### Coal Regulations Coming – AT: No Regulatory Body

#### CERC solves

Deccan Herald 12 (April 5, “CERC can regulate coal sector in absence of permanent body”, <http://www.deccanherald.com/content/239895/cerc-can-regulate-coal-sector.html>)

Power sector regulator Central Electricity Regulatory Commission can also take up the job of coal sector watchdog till a permanent body for the same is formed, a top official said today. "We have said that in the absence of a coal regulator, CERC can do the job ... as a 'stop-gap' arrangement," Power Secretary Uma Shankar said. Power Minister Sushilkumar Shinde, last month, had written a letter to Coal Minister Sriprakash Jaiswal asking him to seek Law Ministry's approval for the same. The proposal to have a coal regulator has been doing the rounds for a long time but nothing concrete has come up till date. The proposed coal regulator would work towards facilitating transparent regulatory framework, standardised operational norms, establishing benchmarks in safety standards and performance, higher productivity by adopting best mining practices etc. In 2008, power sector planning body Central Electricity Authority had suggested that CERC should be given more powers to regulate the coal sector instead of putting in place a separate coal regulator. CEA had also suggested that an additional member (coal) having experience in technical activities related to the coal sector may be inducted in CERC. Facing heat over a draft report of CAG over allocation of coal blocks, the Coal Ministry last month had said that it will soon come out with a Coal Regulatory Bill, which among other things, seeks setting up of a regulator for the sector.

### Regulations Increase Costs

#### \*\*This card is helpful against the “transition to natural gas now” argument

#### There’s no economic alternative to coal and utilities won’t switch – increases consumer costs

Doom 6-4

Justin, “Utilities More Concerned About Carbon Emissions: Survey,” Bloomberg, http://www.bloomberg.com/news/2012-06-04/utilities-more-concerned-about-carbon-emissions-survey.html

Concern about carbon emissions increased last year among U.S. utility executives, who also expressed apprehension that customers won’t tolerate higher rates for power generated from renewable sources, according to a report. Carbon emissions increased to third from sixth among the top environmental concerns of 543 managers and engineers, said Black & Veatch Corp. The Overland Park, Kansas-based engineering and consulting firm conducted the survey from Feb. 22 through March 23 and posted the results on its website today. Utilities produced 42 percent of their electricity from burning coal last year, the industry’s top source of carbon emissions, and the need to reduce production of greenhouse gases is outstripping their ability to cut the amount of power they get from coal. “There’s still a significant investment in coal assets, and it’s not economically reasonable to assume you could just jump off of that into a new technology,” Dean Oskvig, president of the company’s Black & Veatch Energy unit, said in a telephone interview. More than 52 percent of respondents said complying with regulatory and environmental mandates to reduce emissions will require them to “significantly” raise customer rates, while 40 percent expected rates to increase “slightly,” according to the report.

#### Collapses the economy

Cover, 11 – senior staff writer for CNS News, Washington D.C.-based newsgroup, winner of the Media Research Center's Outstanding Journalism Award, neutral newsgroup that does not accept federal tax money, (Matt, “EPA Global Warming Regulations Could Send Economy Back Into Recession, Report Says”, CNS News, http://cnsnews.com/news/article/epa-global-warming-regulations-could-send-economy-back-recession-report-says)//JK

(CNSNews.com) – Regulation of greenhouse gasses by the Environmental Protection Agency (EPA) could reverse the very modest economic recovery and even send it back into a recession, a report from the National Center for Public Policy Research finds. “These regulations,” author Dana Joel Gattuso wrote, “will have a more severe impact on energy costs, U.S. jobs, household income, and economic growth than cap-and-trade legislation would have had. Furthermore, the regulations could reverse the economy's direction toward recovery and push us back into an economic slump.” EPA has considered regulating the emission of carbon dioxide and other greenhouse gasses under the Clean Air Act, which the Supreme Court gave the agency the power to regulate greenhouse gasses in the name of fighting air pollution. EPA has not yet enacted the types of greenhouse gas regulations Gattuso’s paper warns of, but the agency has announced that it plans to do so in the near future. “EPA will propose standards for power plants in July 2011 and for refineries in December 2011 and will issue final standards in May 2012 and November 2012, respectively,” EPA said in a December 2010 press release. Gattuso also reported that GHG regulations would cost the economy jobs, worsening an already bad employment situation. Particularly hard hit would be African-Americans, who would bear a disproportionate share of the job losses caused by the EPA’s anti-global warming regulations. “The U.S. economy will also stand to lose millions of jobs as energy prices soar and industry is forced to cut back or invest overseas,” the report said. “Furthermore, the rules will have an unjust and disproportionately large impact on minorities, increasing the number of African Americans in poverty by 20 percent,” it added. The report also analyzes Republican and Democratic legislation that would attempt to stop the EPA from issuing GHG regulations during a period of economic hardship and a fragile recovery. The first bill Gattuso reviews is the joint effort from Sen. James Inhofe (R-Okla.) and Rep. Fred Upton (R-Mich.) that would bar the EPA from using its newfound authority under the Clean Air Act to regulate GHGs. “Many members of Congress — Democrats as well as Republicans — are supporting legislation to prevent Obama from expanding the Clean Air Act and imposing more economic costs on Americans,” Gattuso reported. “Among the Democrat co-sponsors of the legislation are Representatives Dan Boren (D-OK), Collin Peterson (D-MN), Nick Rahall (D-WV) and Senator Joe Manchin (D-WV).” The Inhofe-Upton bill would completely prevent the EPA from ever using its Clean Air Act authority to regulate greenhouse gasses. Manchin said such an approach was necessary because Congress declined to pass a separate regulatory scheme for greenhouse gasses in 2010. “It's time that the EPA realizes it cannot regulate what has not been legislated. Our government was designed so that elected representatives are in charge of making important decisions, not bureaucrats,” Manchin said in a statement March 4. “The simple fact is that the EPA is trying to seize more power than it should have, and must be stopped,” he added. Gattuso also examined competing legislation offered by Sen. Jay Rockefeller (D-W.Va.) that would delay EPA’s power to regulate by two years, calling it an exercise in kicking the can down the road. “The problem with this ‘kick the can down the road’ approach is that it impedes job creation and economic growth by furthering regulatory uncertainty. Also, it does nothing to stop the EPA from imposing regulations without voter approval. Americans emphatically said no to cap-and-trade legislation,” Gattuso said. “Telling the EPA to wait two years before it overrides the will of voters is not acceptable and would invite EPA over-reach and encroachment on congressional authority in the future,” he added. Gattuso concluded that the Inhofe-Upton effort was the only legislation that would successfully prevent the EPA from enacting economically damaging regulations. “The Energy Tax Prevention Act would rein in the EPA, put Congress back in control, and steer our economy toward a complete and healthy recovery — not for two years but permanently.”

### Internal – Jobs Key to Economy

#### Employment key to the economy—recent data proves

**Rugaber 6/25** AP economics writer(Christopher, June 25, 2012, “Weak job growth sours economy,” [http://theadvocate.com/news/business/3159434-123/weak-job-growth-sours-economy)//DR](http://theadvocate.com/news/business/3159434-123/weak-job-growth-sours-economy%29//DR). H

WASHINGTON — **The sluggish job market is weighing on the U.S. economy three years after the Great Recession ended. And the signs suggest hiring may not strengthen any time soon.**

**A measure of the number of people applying for unemployment benefits over the past month has reached a six-month high**, the government said Thursday. The increase suggests that **layoffs are rising** and June will be another tepid month for hiring.

**Sales of previously occupied homes fell in May. And manufacturing activity in the Philadelphia region contracted for the second straight month**

#### Unemployment hinders home sales

**Rugaber 6/25** AP economics writer(Christopher, June 25, 2012, “Weak job growth sours economy,” [http://theadvocate.com/news/business/3159434-123/weak-job-growth-sours-economy)//DR](http://theadvocate.com/news/business/3159434-123/weak-job-growth-sours-economy%29//DR). H

**“It appears the slow-growth expansion will be slower,”** said John Silvia, chief economist at Wells Fargo Securities, in a note to clients.

The generally gloomy economic data echoed a more pessimistic outlook from the Federal Reserve issued Wednesday.

Thursday’s raft of economic reports showed:

**Applications for unemployment benefits dipped last week to 387,000**, from an upwardly revised 389,000 the previous week, the Labor Department said. The four-week average, a less volatile measure, rose to 386,250. That is the highest level since December. When applications for unemployment benefits top 375,000, hiring generally remains too weak to rapidly lower the unemployment rate.

Home sales fell 1.5 percent in May from April to a seasonally adjusted annual rate of 4.55 million, the National Association of Realtors said. Sales are up 9.6 percent from a year ago. That suggests that the housing market is slowly improving. But the annual sales rate is well below the 6 million that economists consider healthy.

The Philadelphia Federal Reserve Bank said its index of regional manufacturing activity fell sharply to -16.6 from -5.8. That’s the lowest level in nearly a year. A reading below zero indicates contraction. Measures of new orders and shipments also plummeted.

**The generally bleak news came a day after the Fed downgraded its outlook for growth and took another step to try and jolt the economy.**

The Fed now expects growth of just 1.9 percent to 2.4 percent for the year. That’s half a percentage point lower than its previous estimate in April. And it thinks the unemployment rate, now 8.2 percent, won’t fall much further in 2012.

**To try to boost growth and hiring, the Fed said it would extend a program intended to drive down long-term U.S. interest rates.** Fed Chairman Ben Bernanke hopes that will encourage more borrowing and spending.

**Hiring slowed sharply in April and May, raising concerns about the strength of the recovery. Employers have added an average of only 73,000 jobs a month in April and May. That’s much lower than the average of 226,000** added in the first three months of this year.

**Some economists warned that the weaker job market may have started to affect home sales**, which until recently had been showing modest improvement.

**Purchases made by first-time buyers, who are critical to a housing recovery, slipped** in May. And **sales fell in every region** except the Midwest.

“Not a surprise that existing home sales took a step back in May,” said Jennifer Lee, an economist at BMO Capital Markets. “**Softening job growth could slow the housing recovery.”**

One positive sign in the report: The supply of homes for sale remains low. The inventory of unsold homes in May was just 2.49 million, roughly the same as in April. It would take only about six months to exhaust the supply at the current sales pace. Not since 2006, when the housing market was booming, has the supply been so low relative to the pace of home sales.

**A low supply typically encourages more people to put homes up for sale. That generally improves the overall quality of the homes on the market, which drives prices higher.**

#### Unemployment disappoints hopes for economic growth

**Wiseman 6/1** Associated Press (Paul, June 1, 2012, “Danger sign for US economy: Job growth disappoints,” [http://www.businessweek.com/ap/2012-06/D9V4NBEG3.htm)//DR](http://www.businessweek.com/ap/2012-06/D9V4NBEG3.htm%29//DR). H

**The American economy is in trouble again.**

**Employers in the United States added only 69,000 jobs in May, the fewest in a year** and not even close to what economists expected. For the first time since last June, **the unemployment rate rose, to 8.2 percent** from 8.1 percent.

**It was the third month in a row of weak job growth and further evidence that**, just as in 2010 and 2011, **a winter of hope for the economy has turned to a spring of disappointment.**

**"This is horrible,"** said Ian Shepherdson, chief economist at High Frequency Economics, a consulting firm.

**The job figures**, released Friday morning by the Labor Department, **dealt a strong blow to** President Barack **Obama at the start of a general election campaign that will turn on the economy.**

#### Economic growth and Jobs correlate

**Sands 6/1** Staff Writer for the Hill (Geneva, June 1, 2012, “Obama adviser: 'No doubt we need faster job growth',” [http://thehill.com/video/administration/230509-white-house-economic-adviser-clear-we-need-faster-job-growth-)//DR](http://thehill.com/video/administration/230509-white-house-economic-adviser-clear-we-need-faster-job-growth-%29//DR). H

**"Given the hole in the economy** when the president came to office, **given the jobs deficit** that the nation faced when the president came to office, and that was even worsened by the recession, I think **it's clear we need faster job growth**, but we welcome any increase in jobs. **We just should taken the steps that we can to hasten the pace of job growth,"** Krueger added.

**Krueger called on Congress to carry out the president's proposals for infrastructure investment** and providing funding to state and local governments in order to encourage job creation.

"**Those are the areas where government can act right now to help strengthen the recovery,"** he added.

**Republicans quickly seized on the bleak employment numbers, blaming Obama for** ineffective policies and what they believe are **broken promises.**

"Today's extremely troubling jobs report proves yet again that President **Obama**'s policies simply are not working and that he has failed to live up to the promise of his presidency. In early 2009, he p**romised to fix the economy in three years, and he promised the unemployment rate would be below six percent by now,"** said RNC Chairman Reince Priebus in a statement.

#### Unemployment offsets consumer spending

**Morison 6/26** The Globe and Mail (Ora, June 26, 2012, “Consumers show lack of faith in economy, job growth,” [http://www.theglobeandmail.com/report-on-business/economy/economy-lab/consumers-show-lack-of-faith-in-economy-job-growth/article4370850/)//DR](http://www.theglobeandmail.com/report-on-business/economy/economy-lab/consumers-show-lack-of-faith-in-economy-job-growth/article4370850/%29//DR). H

**Lack of job growth in North America looks set to slow consumer spending in Canada and the U.S.**

The latest consumer confidence report from the Conference Board of Canada, based on a survey conducted between June 7 and 18, shows **confidence has dropped in all regions** of the country, while data released in the **U.S. shows confidence in that country has hit a five-month low.**

“**Concerns over future job creation factored prominently into this month’s decline,”** said Todd Crawford, an economist at the Conference Board of Canada. “**But growing worries about consumers’ finances were also apparent,”** he added.

In the **U.S. a slowdown in hiring and income growth was also blamed for Americans’ lack of confidence in their economy.** Consumer confidence had risen in Canada over the first quarter of 2012, but has since wobbled back into negative territory.

### Natural Gas Switch Increases Costs

#### \*\*\*Keeping Coal here is key to prevent export, which triggers both the economy (consumer costs) and the warming impact

#### Coal is key – other sources will introduce volatility that makes price spikes inevitable

Fanning 6-8 – Southern Company CEO

Tom, “Tom Fanning: The Natural Gas Skeptic; 'Nobody can sit here and tell me that it's going to be safe forever, safe in terms of economics and reliability,' says the Southern Company CEO,” Wall Street Journal, Factiva

Even as natural gas booms and coal-fired power falls dramatically, Southern is building new coal plants, in Kemper County, Miss. Outside Waynesboro, Ga., work is under way on the islands and cooling tower of what by 2016 will become the first new U.S. nuclear unit since the Jimmy Carter era. In Nacogdoches, Texas, Southern is building one of the country's largest commercial renewable-power stations, which will convert trash from lumber making and other forms of waste biomass into electricity. For Mr. Fanning, this is common sense. He likens it to diversifying an investment portfolio: "You don't pick one stock." He may be right that "all of the above" is a sensible approach, but it isn't common—either in politics or in the electric industry. Mr. Fanning has emerged as one of the most trenchant (in fact, one of the only) critics of the transformative switch to gas from coal. Mr. Fanning explains, "It just doubles down your risk into one segment that looks promising today but nobody can sit here and tell me that it's going to be safe forever, safe in terms of economics and reliability." In that sense, Southern's "genetic conservatism"—Mr. Fanning's term—may also be Exhibit A for the growing left-right coalition that wants to "make business boring again" in the too-big-to-fail era. They favor a return to something like the postwar business model that prevailed until the deregulation wave of the 1980s—safer but less competitive, more stable but also less entrepreneurial. Boring is the wrong word for someone as effusive and iconoclastic as Mr. Fanning, but he does belong to a corporate culture that rejects barbarians-at-the-gate capitalism. He likes to invoke "Beta," the financial measure of the volatility of an asset in relation to the overall market. "Last year," he says proudly, "among the S&P 500, we had the second-lowest Beta. The only company that beat us was . . . Hormel. They make Spam! Southern may not be exciting, but we're dependable and we work like crazy to be dependable." To those who favor a business world with less risk and fewer vampire squids, Mr. Fanning is your guy. \*\*\* Mr. Fanning sat down with the Journal editorial board recently amid "an historic shift" in the electric industry. King Coal is in twilight. For decades it was the engine of the U.S. power system, delivering nearly 60% of net generation by the 1980s. Southern illustrates the new reality; the share of its generation mix from coal has plunged to 35% in 2012 from 70% only five years ago. Meanwhile, gas has climbed to 47% from 16%. One major reason, both at Southern and industry-wide, is the Environmental Protection Agency, which has been regulating against carbon like crazy. The EPA has effectively banned new coal and other rules are grinding down the existing fleet. Mr. Fanning views the EPA's campaign as a special kind of recklessness. "It's terribly unwise in my view to create a regulatory regime that bans one of the nation's most plentiful resources. We own 28% of the world's coal reserves—we have a blessing of wealth. It should be brought to bear here in America. If not, due to regulatory policy, it will be burned for the benefit of the citizens of China or India or elsewhere." He's right: Exports have nearly doubled since 2007. On the other hand, markets are demolishing coal more effectively than government. Since 1990, power companies have selected coal for merely 6% of new generation. Gas was the fuel for 77%, even as coal has been far more competitive than it is today. Now gas enjoys a huge price advantage, driven by the hydraulic-fracturing techno-revolution and the vast shale reserves of the greater Midwest. When gas is trading at $6 per million British thermal units, it is 50% cheaper than coal over the life of a power plant. Today, gas is trading near $2. Mr. Fanning isn't so sure. "When you think about the kind of time horizon that a business like ours is in, where you put capital-intensive assets in the ground with a 30- or 40-year economic life, you need to think long term," he says. So here's the skeptic's case. "Nationwide, I think we're going to be consuming over 50% more gas going forward than we currently do," Mr. Fanning notes, "or at least there's a good potential for that." Demand for gas is growing not merely for baseload electricity but in manufacturing, chemicals, transportation, other industries. Consumption is also lagging below trend given the weak economy. Even with many more wells and increased production, Mr. Fanning thinks gas prices will return to their historic oscillations and eventually spike. "Gas has traditionally been way more volatile certainly than coal and nuclear," he says. "So you're buying a more volatile product. You're creating a higher-Beta energy policy." As coal recedes, Mr. Fanning warns that customers may be forced to rely on sources that are less productive and more expensive because there's nothing to pick up the slack. "If conventional coal is not going to get done, and there's only a few people who can do nuclear—this ain't a job for beginners—you're left with gas and, heaven forbid, renewables?" He cautions: "Now I'm as excited about renewables as anybody. But they're a niche play."

### Overseas Shift Extension

#### Any alternative to coal pushes US production overseas

Lipton 12

Eric, “Even in coal country, the fight for an industry,” Herald Tribune, http://www.heraldtribune.com/article/20120530/ARTICLE/120539988?p=1&tc=pg

The decline is largely because new pollution rules have made coal plants more costly, while a surge in production of natural gas through the process of hydraulic fracturing, known as fracking, has sent gas prices plummeting. Together, the economics of coal have been transformed after a century of dominance in Washington, state capitals and the board rooms of electric utilities. “The math screams at you to do gas,” said Mr. Morris, whose company is the nation’s largest consumer of coal. Environmental groups, after years of targeting coal plants as leading sources of air pollution, have moved in for the kill. “We never thought we would get to a place where coal plants are falling so fast,” said Bruce Nilles, the director of the Sierra Club’s Beyond Coal initiative. It has been aided by $50 million from Mr. Bloomberg, who views the campaign as part of a public health effort, and $26 million from an odd bedfellow: the top official of a natural gas company. The environmentalists figure that if they can shut down a third of the nation’s coal burning plants by 2020, emissions of greenhouse gases in the United States could be cut at least as much as they would have under a landmark 2009 climate bill that died in Congress. But the coal industry is mustering all the weapons it can: lobbying, legislation, litigation and a multimillion-dollar advertising campaign trumpeting the benefits of “clean coal.” The fight has even become an issue in the presidential campaign, with the industry blaming President Obama and the Environmental Protection Agency for the onslaught, and Mitt Romney, the presumptive Republican nominee, hinting that he would roll back some of the rules. Here in Kentucky, the intervention by Mr. Adkins and other coal industry advocates has saved coal at Big Sandy, at least temporarily. American Electric Power, which is based in Columbus, Ohio, is proposing a $1 billion retrofit to allow the plant to continue burning coal and has asked Kentucky regulators to approve a 30 percent increase in electricity rates to pay for the work. But that request, which will come up for a vote by the state’s utility commission within the next week, has inspired resistance from some residents, large industrial companies that consume much of Kentucky’s electricity and even the state attorney general’s office. Pressured on the domestic front, some giant American coal producers, like Arch Coal and Peabody Energy, are shifting their attention to markets overseas, where coal-fired power plants are being built faster than they are being abandoned in the United States.

### Inevitability Trick – Infrastructure First Key

#### Caps make CCS inevitable – having infrastructure in place *first* is key to avert economic cost

EPA 10

“Report of the Interagency Task Force on Carbon Capture and Storage,” http://www.epa.gov/climatechange/downloads/CCS-Task-Force-Report-2010.pdf

The timing and scale of CCS deployment are dependent on a carbon price and any other financial incentives for low-carbon technology, as well as the costs of CCS relative to other technologies. Figure II-1 shows carbon prices in the modeling of legislation with emissions targets that are largely consistent with the Administration’s climate change goals. 34,35 In the base case, allowance prices in 2020 are $24 and $31 per tonne CO2 equivalent 36 (CO2 e) for the U.S. Environmental Protection Agency (EPA) and the U.S. Energy Information Administration (EIA) analyses, respectively. If international offsets are unavailable or not allowed in the program, carbon prices are higher, at $52 per tonne CO2 e for both the EPA and EIA analyses. Finally, if international offsets are unavailable, nuclear and dedicated biomass electricity generation are unavailable beyond business-as-usual levels, and CCS deployments are limited 37 , allowance prices rise to $59 - $89 per tonne CO2 e in 2020 (EPA 2010; EIA 2010). These results reinforce the concept that availability of mitigation options (whether offsets or more cost-effective technologies) lowers the price of allowances, and thus the overall economic cost of averting climate change The policy shown above refers to a discussion draft (not yet introduced) of Senate legislation that includes bonus allowances to promote CCS deployment above and beyond what the market would support in response to a price on GHG emissions. To understand the effect of these bonus allowances, 38 EPA ran a comparison scenario without them. As Figure II-2 below shows, the bonus allowances are projected to shift CCS deployment 15–20 years ahead of when it would deploy in their absence. However, it is necessary to understand the broader implications of using additional financial incentives, such as bonus allowances, to promote earlier CCS deployment. The bonus allowances encourage firms to invest in CCS even though there are less costly means of achieving emissions reductions that do not receive bonus allowances. To the extent that such additional financial incentives distort the efficiency of the market, the overall economic cost of meeting the carbon target would be expected to rise. As with any technology, the increase in overall economic cost due to early deployment incentives would be reduced to the extent that early deployment lowers technical and commercial risk and enables CCS technology improvements that lower the cost of later widescale deployment. Figure II-3 shows the projected deployment of CCS as a result of the legislation under several different scenarios that were modeled by EPA and EIA. Consistent with the previous discussion, the bonus allowance provisions would drive deployment through 2030 in the cases where CCS technology is not delayed. The availability of international offsets does not significantly change the impact of bonus allowances on CCS deployment. However, by 2050, CCS deploys economically and in greater quantities in the “no international offset” scenarios due to higher allowance prices (i.e., more reductions must occur domestically and these have higher costs associated with them than opportunities available internationally). These scenarios provide reasonable bounds on the expected range of CCS deployment under a climate policy that caps emissions. These modeling exercises show that CCS may play an important role in helping the United States meet carbon reduction targets. The key to broad, cost-effective, commercial deployment of CCS is a climate policy that provides the right incentives to produce low-carbon energy, along with policies to promote RD&D in CCS and other potential low-carbon technologies. However, even with appropriate market signals from comprehensive energy and climate policy, non-economic barriers could prevent projected CCS deployment. To the extent that legal, regulatory, social, and economic barriers hinder the availability of CCS as a mitigation option, they would raise the overall cost of meeting the Administration’s climate goals. Thus, the Administration is committed to addressing these barriers to deployment.

#### CCS is inevitable after caps – preparing for it is key

Bidlack 10 - \*JD @ Michigan State University

Chris, “REGULATING THE INEVITABLE: UNDERSTANDING THE LEGAL CONSEQUENCES OF AND PROVIDING FOR THE REGULATION OF THE GEOLOGIC SEQUESTRATION OF CARBON DIOXIDE,” http://epubs.utah.edu/index.php/jlrel/article/view/281/237

As the world has entered the 21st century, discussions about alternative energy and climate change have become a leading topic in both scientific and political discourse. The issue of climate change, in particular, has come to the forefront. That our climate is changing dramatically because of our actions has become all too clear. Internationally and more recently nationally 1 there has been real governmental recognition of the reality of climate change. Along with this recognition comes a growing need for mitigation options. One such method that will play a significant role in the immediate future is Carbon Capture and Sequestration/Storage 2 (CCS). CCS is the process of separating carbon dioxide (CO2) from power generation, industrial, or other source, transporting it to a location, and storing it permanently. 3 CCS refers to the storage of CO2 in a variety of locations: geologic formations, oceans, and industrial fixation sites. 4 This Note examines the geologic sequestration of CO2 because it is the method most likely to be used on a large scale in the United States and, importantly, is currently unregulated. Geologic sequestration is the process of injecting CO2 in geologic formations, such as oil and gas fields, deep saline formations 5 or unmineable coal seams, 6 in order to remove the CO2 from the atmosphere and reduce climate change. To protect both the environment and the nation, a comprehensive system of regulation, composed of general federal regulation and specific state-based regulation, should be created. CCS is expected to be utilized on a large scale in the near future as a consequence of carbon emissions regulations that will soon be implemented through federal policies or through international agreement. 7 CCS technology is approaching maturity, and it is one of the few means of reducing carbon that allows continued use of coal without major alteration to the existing infrastructure. 8 Due to the large coal-based infrastructure in the United States, a “wedge” of mitigation that allows for the continued use of coal will likely be pushed strongly by the power industry as a practical necessity. While the wisdom of CCS may be questioned, it will be implemented in the near future in some form. 9 Thus, it is imperative to prepare for CCS. This Note avoids the value judgments about CCS or questions about its wisdom. Rather, this Note recognizes that CCS will be implemented and that regulation will be necessary. Because of the complexity and the potential danger of CCS, failing to establish comprehensive regulation could lead to disastrous results. This Note seeks to create a framework with a strong balance of state and federal regulation. The division of the regulation between the states and federal governments allows for the most effective means of regulation while allowing technological innovation. This Note looks at the process of CCS and the legal ramifications likely to arise from its use. The Note then argues that for the importance of implementing a regulatory scheme for CCS now, before the process becomes commonplace. That scheme should foster cooperation between the federal government and the states, building on previous federal environmental regulation but also recognizing the inherently state-based aspects of CCS. To explore CCS and the way it should be regulated, this Note first examines the science and technology involved in the process. This in-depth look at sequestration is followed by an exploration of the foreseeable legal consequences of CCS. This Note concludes with a CCS regulatory proposal with a combination of federal oversight and strong state-based programs.

### AT: Switching to Natural Gas Now – Not Switching

#### Regulated utilities producers aren’t switching to natural gas

Pickrell 6-7

Emily, “Public utilities expected to make a slower shift to natural gas,” http://fuelfix.com/blog/2012/06/07/public-utilities-expected-to-make-a-slower-shift-to-natural-gas/

While low natural gas prices and tighter harmful emissions standards are making it the preferred fuel for generating electricity, public utilities are expected to slowly shift to natural gas, because of the cost of building new plants and pressure to ensure a reliable supply, according to a Moody’s report released today. Regulated and public power utilities may be slower than the unregulated power companies and merchant power projects to make the actual shift because of their mandate to ensure a continued electricity supply, according to the report. “We see the regulated and public power utilities as less willing to make quick switching decisions, because they tend to be focused on longer-term reliability issues than the unregulated power companies, which tend to be more focused on near-term economics,” the report stated. Shifts towards natural gas and renewable energy are expected to reduce reliance on coal for electricity generation by 40 percent by 2020, because of the low natural gas prices and an increased focus on lower harmful emissions increase interest in natural gas and renewable energy. Utilities’ current commitments to coal deliveries could also slow the transition to natural gas.

### AT: Switching to Natural Gas Now – Plan Solves

#### CCS solves demand for natural gas

Frank et al 9 - research associate in the CSIS Energy and National Security Program

Matthew, “Crossing the Natural Gas Bridge,” CSIS, http://csis.org/files/attachments/090624\_Crossing\_Bridge.pdf

An EIA analysis of one legislative proposal, the Climate Security Act of 2007, illustrates how a carbon cap could increase demand for natural gas. The analysis projects that when clean power generation technologies (renewables, nuclear, and carbon capture and storage) progress quickly and are deployed on a fairly aggressive timeframe (before 2030), total natural gas consumption decreases. 24 However, the analysts conclude that “if new nuclear, renewable, and fossil plants with carbon capture and storage (CCS) are not developed and deployed in a timeframe consistent with the emissions reduction requirements, covered entities are projected to turn to increased natural gas use to offset reductions in coal generation, resulting in markedly higher delivered prices of natural gas”. The analysis projects that gas consumption for electricity generation would increase above the reference case by 21 to 72 percent by 2020, and 96 to 142 percent by 2030, if advanced technology and alternative compliance options were not available. 25, 26 In these cases, prices rise and total natural gas demand increases by up to 2.5 trillion cubic feet (tcf) per year (11 percent) in 2020 and by 2.7-4.3 tcf per year (12 to 19 percent) in 2030.

#### Reverse causal – CCS collapses natural gas demand

Frank et al 9 - research associate in the CSIS Energy and National Security Program

Matthew, “Crossing the Natural Gas Bridge,” CSIS, http://csis.org/files/attachments/090624\_Crossing\_Bridge.pdf

These conclusions are supported by a model of economy-wide emissions developed by the Department of Energy’s Pacific Northwest National Laboratory (PNNL). The model’s scenarios depict several different combinations of technologies and fuels that could meet energy demand while also emitting less CO2, thereby stabilizing atmospheric CO2 concentrations at 450 ppm. 64 In all scenarios, natural gas continues to make up a portion of the energy mix out to the end of the century, mainly due to its feedstock and non-electricity uses (ranging from 7 to 17 percent in 2100 compared to 22 percent currently). In scenarios where carbon capture and storage (CCS) technology becomes widely available at reasonable cost, natural gas with CCS provides a share of low-emissions electricity out to 2095 (between 2 and 13 percent of the electricity mix depending on other technology assumptions). 65 Under scenarios without deployment of CCS, the electricity sector’s use of gas would peak around 2035, and then provide a decreasing share of the nation’s electricity, disappearing from the sector between 2050 and 2065. These scenarios also show a much greater reliance on other sources of energy (nuclear and renewables) and significant demand reduction. While emissions modeling through the end of the century is always imprecise, these results suggest that to meet emissions goals, use of natural gas without CCS will need to start declining in the next 25 years. This implies that policymakers should look beyond the short term, and provide a long-term price signal that is stringent enough to encourage alternatives to natural gas without CCS, while finding ways to manage the costs of the transition.

### AT: Switching to Natural Gas Now – Doesn’t Solve Warming

#### Doesn’t solve warming

Freudenthal 7 - \*Governor of Wyoming

House Committee on Energy Independence and Global Warming, http://globalwarming.markey.house.gov/tools/assets/files/0015.pdf

It is clear the public attitude is changing with respect to greenhouse gas management and as proof you need look no further than the ads surrounding the Sunday morning talk shows. Company advertising now talks about how green they are, not how efficient they are, or how much growth they enjoy. Other advertisements publicly shame films which make money off of projects or companies which do not meet the "green" test. And much of the public conversation is about increased consumption of natural gas in lieu of coal. But even the current shirt to natural gas is not without carbon implications. Burning natural gas has fewer C02 emissions per unit of electricity produced but still has carbon emissions and if one considers the upstream footprint of exploration and production natural gas is an answer, but not a perfect answer. For example, in my state, natural gas processing plants emitted 6.9 million metric tons of C02 equivalent in 2005. representing nearly 25% of our net carbon footprint. One of the two largest plants operated by ExxonMobil has a large well field and plant that produces natural gas. helium and 002 for the enhanced oil recovery industry. However much of the C02 is currently vented to the atmosphere. In fact, for every million cubic feet of natural gas produced, nearly two million cubic feet of C02 is produced and a majority of it is vented to the atmosphere. My friends in California where much of the natural gas ends up don't always take this into account when they do their carbon footprint analysis.

### AT: Green Jobs

#### Coal outweighs

Silverstein 6-12

Ken, “Utilities are Bailing on Coal,” Energy Biz, http://www.energybiz.com/article/12/06/utilities-are-bailing-coal

“Certainly regulations that require improved emissions at coal-fired power plants will create temporary jobs for those installing the equipment and those merchants who benefit secondarily from their commerce,” says Sterling Burnett, an analyst with National Center for Policy Analysis. “But a great many of the power plants affected by the regulations will simply be shuttered, putting thousands of workers, who have been in a relatively high-paying field, out of work.” Burnett, who spoke with this reporter, also says that EPA tends to overstate both the economic and health benefits associated with switching away from coal. Generally, he says that as communities and countries prosper, they are then in a better position to enact more environmental safeguards and to improve health.

**Green jobs are worse for the economy and trade**

**Kotkin 09** Presidential fellow in urban futures at Chapman University, Executive editor of newgeography.com, Writes the weekly New Geographer column for Forbes(Joel, August 4, 2009, “Green Jobs Can't Save The Economy,” [http://www.forbes.com/2009/08/03/green-jobs-economic-growth-opinions-columnists-joel-kotkin.html)//DR](http://www.forbes.com/2009/08/03/green-jobs-economic-growth-opinions-columnists-joel-kotkin.html%29//DR). H

**Nothing is perhaps more pathetic than the exertions of economic developers and politicians grasping at straws, particularly during hard times.** Over the past decade, we have turned from one panacea to another, from the onset of the information age to the creative class to the boom in biotech, nanotech and **now the "green economy."**

**This latest economic fad is supported by an enormous industry comprising nonprofits, investment banks, venture capitalists and their cheerleaders in the media. Their song: that "green" jobs will rescue our still weak economy** while saving the planet. Ironically, **what they all fail to recognize is that the thing that would spur green jobs most is economic growth.**

All told, **green jobs constitute barely 700,000 positions across the country--less than 0.5% of total employment. That's about how many jobs the economy lost in January** this year. **Indeed a recent study** by Sam Sherraden at the center-left New America Foundation **finds that**, for the most part, **green jobs constitute a negligible factor in employment--and will continue to do so** for the foreseeable future. **Policymakers**, he warns, **should avoid "overpromising about the jobs and investment we can expect from government spending to support the green economy."**

This is true even in **California**, where green-job hype has become something of a fetish among self-styled "progressives." One recent study found that the state **was creating some 10,000 green jobs annually** before recession. To put this into context, **the total state economy has lost over 700,000 jobs over the past year** (more than 200,000 in Los Angeles County alone). **Any net growth in green jobs has barely made a dent in any economic category; only education and health services have shown job gains over this period.**

More worrisome, in **terms of national competitiveness, the green sector seems to be going in the wrong direction. The U.S.'s overall "green" trade balance has moved from a $14.4 billion surplus in 1997 to a nearly $9 billion deficit last year.** As **the country** has pushed green energy, ostensibly to free itself from foreign energy, it **has become ever more dependent on countries such as China, Japan and Germany for critical technology. Some of this is directly attributable to the often massive subsidies these countries offer to green-tech companies.** But as New America's Sherraden puts it, **this "does not augur well for the future of the green trade balance."**

Nor are we making it any easier for American workers to gain from green-related manufacturing. **Some of America's "greenest" regions are inhospitable for placing environmentally oriented manufacturing facilities.** For example, **high taxes and regulatory climate have succeeded in intimidating solar cell makers from coming to green-friendly California**; a manufacturer from China told the Milken Institute's Ross DeVol that **the** **state's "green" laws precluded making green products there.**

**Attempts to put windmills** in Nantucket, Mass., the Catskills and Jones Beach in New York and other scenic areas **have also been blocked by environmentalist groups. Transmission lines, necessary to take "renewable" energy from distant locales to energy-hungry cities, often face similar hurdles. Solar farms** in the Mojave desert **might help meet renewable energy quotas but, as wildlife groups have noted, may not be so good for local fauna.**

And then there is the impact of green policies on the overall economy. **Green power is expensive and depends on massive subsidization, with government support levels at roughly 20 times or more per megawatt hour than** relatively clean and abundant **natural gas.** Lavishing breaks for Wall Street investors and favored **green companies also may be harmful to the rest of the economy.** A recent study on renewable energy subsidies on the Spanish economy found that **for every "green" job created more than two were lost** in the non-subsidized economy.

**Green economy kills job growth**

**Brooks 11** New York Times Op-Ed columnist, Senior Editor at The Weekly Standard, Contributing editor at Newsweek and the Atlantic Monthly (David, September 9, 2011, “Where the Jobs Aren’t,” <http://www.nytimes.com/2011/09/06/opinion/brooks-where-the-jobs-arent.html?_r=2&ref=opinion)//DR>. H

**With the economy stagnating and unemployment high, where are the jobs of the future going to come from? A few years ago, it seemed** as though **the Green Economy could be a big part of the answer.**

**New clean-energy sources could address environmental, economic and national security problems all at once.** In his 2008 convention speech, Barack Obama promised to create five million green economy jobs. The U.S. Conference of Mayors estimated in April 2009 that green jobs could account for 10 percent of new job growth over the next 30 years.

**Alas, it was not to be. The gigantic public investments in green energy** may be stimulating innovation and helping the environment. But they **are not evidence that the government knows how to create private-sector jobs.**

Recently, Aaron Glantz reported in The Times on some of the disappointments. California was awarded $186 million in federal stimulus money to weatherize homes. So far, the program has created the equivalent of only 538 full-time jobs. A $59 million effort to train people for green jobs in **California produced only 719 job placements.**

SolFocus designs solar panels in the United States, but the bulk of its employment is in China where the panels are actually made. As the company spokesman told Glantz, “Taxes and labor rates” are cheaper there.

There’s a wealth of other evidence to suggest that **the green economy will not be a short-term jobs machine.** According to Investor’s Business Daily, **executives at Johnson Controls turned $300 million in green technology grants into 150 jobs — that’s $2 million per job.**

Sunil Sharan, a former director of The Smart Grid Initiative at General Electric, wrote in The Washington Post that **the Smart Grid, while efficient and environmentally beneficial, will be a net job destroyer.** For example, **28,000 meter-reading jobs will be replaced by the Smart Grid’s automatic transmitters.**

A study by McKinsey suggests that cle**an energy may produce jobs for highly skilled engineers, but it will not produce many jobs for U.S. manufacturing workers.** Gordon **Hughes**, formerly of the World Bank and now an economist at the University of Edinburgh, surveyed the landscape and **concluded: “There are no sound economic arguments to support an assertion that green energy policies will increase the total level of employment in the medium or longer term** when we hold macroeconomic conditions constant.”

Many of the most celebrated green tech companies are foundering despite lavish public support. Evergreen Solar, the recipient of tens of millions of dollars in state support, moved its manufacturing facility to China before filing for bankruptcy protection.

The U.S. Department of Energy poured $535 million in loans into Solyndra, a solar panel maker backed by George Kaiser, a major Democratic donor.

The Government Accountability Office discovered that Solyndra had been permitted to bypass required steps in the government loan guarantee process. The Energy Department’s inspector general criticized the department for not maintaining e-mails that discussed how the loan guarantee winners were chosen.

Late last month, **Solyndra announced that it was** ceasing operations, **laying off its 1,100 employees.** The Department of Energy placed the wrong bet, **potentially losing the taxpayers half-a-billion dollars.**

All of this is not to say that the government shouldn’t be doing what it can to promote clean energy. It is to say that **the government isn’t very good when it tries to directly create private-sector jobs.**

In 2009, Josh Lerner of Harvard Business School published a useful book called “Boulevard of Broken Dreams.” **He found that for each instance in which the government has successfully promoted entrepreneurial activity, there is a pile of instances in which it failed.**

**Lerner** details case after case where public investments produced little or nothing. But he also **makes an important distinction between government efforts to set the table for entrepreneurial activity and government efforts to create jobs directly.** Setting the table means building an underlying context for innovation: funding academic research, establishing clear laws, improving immigration policies, building infrastructure and keeping capital gains tax rates low. Lerner notes that one of the most important government initiatives to encourage innovation was the Bayh-Dole Act of 1980, which gave universities automatic title to research paid by the federal government.

These table-setting efforts work. **The problem is the results are indirect, the jobs take a long time to emerge and the market may end up favoring old-energy sources instead of shiny new ones. So politicians** invariably go for the instant rush. They **try to use taxpayer money to create private jobs now. But they end up wasting billions.**

**Their evidence is flawed**

**McNeal 6/7** Forbes Contributor (Greg, June 7, 2012, “Rep. Issa Exposes the Obama Administration's Green Jobs Scam,” [http://www.forbes.com/sites/gregorymcneal/2012/06/07/rep-issa-exposes-the-obama-administration-green-jobs-scam/)//DR](http://www.forbes.com/sites/gregorymcneal/2012/06/07/rep-issa-exposes-the-obama-administration-green-jobs-scam/%29//DR). H

**Myth 2: Creating green jobs will boost productive employment.**

**Fact 2: Green jobs estimates in these oft-quoted studies include huge numbers of clerical, bureaucratic, and administrative positions that do not produce goods and services for consumption.**

**Myth 3: Green jobs forecasts are reliable.**

**Fact 3: The green jobs studies made estimates using poor economic models based on dubious assumptions.**

## \*\*Warming Advantage

### Coal Use Set to Increase

#### Global coal use is set to expand

Hezir and Kenderdine 9 - \*MS in Public Policy, \*\*Executive Director @ MIT Energy

Joe and Melanie, Federal Research Management for Carbon Mitigation for Existing Coal Plants, http://web.mit.edu/mitei/docs/reports/hezir-kenderdine.pdf

There are currently 645 conventional coal plants in operation in the US, which collectively comprise the single largest source of CO2 emissions (32%). The current conventional coal plant fleet supplies around 50% of U.S. electricity and represents over one trillion dollars in infrastructure investment. Also, while there appears to be a de facto moratorium on the construction of new coal fired generation in the U.S. the deployment of coal‐fired generation is growing rapidly on a global basis. The significant growth of the economies of China and India, coupled with their large coal reserves and reliance on conventional coal fired‐power generation, 1 substantially increases CO2 emissions into the atmosphere. The imperatives of climate change and coal consumption in the US, China and other countries suggest a strong public interest in mitigating CO2 emissions from existing coal plants. The development, demonstration and rapid deployment of cost effective CCS retrofit technologies would return significant benefits under a future cap and trade program. The benefits have been estimated in several different ways, but in all cases they are substantial. For example: • The National Academy of Sciences conservatively estimated the net present value of economic benefits of $4‐7 billion for federal investment in carbon capture technology, and $2‐4 billion for investments in carbon sequestration technology. 2 • A recent study for Pew Center stated that “…with the experience gained from 30 demonstrations of CCS, the capital costs of wide‐scale implementation of CCS in coal‐ fueled plants could be $80 to $100 billion lower than otherwise.” 3 • Achieving the 14% reduction in greenhouse gas emissions in 2020, as proposed in President Obama’s FY 2010 budget, could be accomplished at an annual savings of $5‐7 billion, beginning in 2020, for every $1 per ton reduction in the marginal price of carbon dioxide allowances resulting from more cost effective control technologies.

### Link

#### CCS solves warming

CTA 11

Carbon Tech Alliance, “Frequently Asked Questions,” http://www.carbontechalliance.org/welcome/frequently-asked-questions

CCS is critical to addressing the global phenomenon of rising levels of atmospheric GHG’s because it is a mitigation strategy that can be implemented immediately and work in conjunction with efforts to develop sustainable, GHG-free energy sources. It is the most viable, immediately available solution for addressing point sources of CO2. Until more comprehensive, clean energy solutions become available, CCS technology will play a critical role in reducing CO2 emissions.

#### It’s key to solve warming and can meet projected energy demand increases – goes global

Stevenson 8 - Director, Natural Resources and Environment @ GAO

“Federal Actions Will Greatly Affect the Viability of Carbon Capture and Storage As a Key Mitigation Option,” GAO, http://www.gao.gov/assets/290/282253.pdf

Key scientific assessments have underscored the urgency of reducing emissions of carbon dioxide (CO2 ), the most significant greenhouse gas, to help mitigate the negative effects of climate change. Given the United States’ heavy reliance on coal-burning power plants that emit significant quantities of CO2 , many have cited carbon capture and storage (CCS) as an essential technology because it can greatly reduce CO2 emissions from these facilities, while allowing for projected increases in electric power demand. 1 CCS is a process of separating CO2 from other gases produced in fuel combustion and other industrial processes, transporting the CO2 via pipeline to an underground storage location, and injecting and storing it long-term in underground geologic formations. While other climate mitigation options exist—such as energy efficiency improvements, a switch to less carbon-intensive fuels, nuclear power, and renewable energy sources—CCS is considered by many to be a crucial component of any U.S. approach or strategy for addressing the climate change problem, particularly given the United States’ current reliance on coal for almost half of its electricity production. Moreover, there is a large potential role for CCS in rapidly developing countries, such as China and India, which will be relying increasingly on coal to meet their energy needs. In fact, as of 2007, Chinese CO2 emissions likely exceeded those of the United States, according to the International Energy Agency (IEA). 2 The IEA projects continued growth in CO2 emissions from China and other developing economies.

#### Substantial scale up solves warming

Apt et al 7 – PhD in Physics @ MIT, Professor of Technology, Tepper School of Business and Engineering and Public Policy

Jay, “Incentives for Near-Term Carbon Dioxide Geological Sequestration,” Carnegie Mellon, http://wpweb2.tepper.cmu.edu/ceic/pdfs\_other/Incentives\_for\_Near-Term\_Carbon\_Dioxide\_Geological\_Sequestration.pdf

Many technologies are under development for CO2 capture at fossil fuel facilities, including gasification technologies. Carbon capture and deep geological sequestration (geologic sequestration) holds the promise to make deep carbon emission reductions possible. After separating carbon dioxide from coal, disposal of concentrated carbon dioxide (generally as a liquid-like “supercritical fluid”) can be achieved by injecting it into appropriate geological formations, such as saline aquifers, where geologists believe the CO2 can be safely sequestered for a very long time. 24 Geologic sequestration appears to be the only currently viable option for large-scale CO2 storage. While the technologies required for CO2 transport and deep geological sequestration are presently in use at modest commercial scale, a very large scale up from current practice is required if this technology is to be applied to reducing CO2 emissions from coal on a large scale. A reasonably large coal plant producing either electricity or fuels would produce around 4 million tons (Mt) of CO2 per year. Except for enhanced oil recovery (EOR), the largest current CO2 sequestration project injects only about 1 Mt per year into deep geological formations. To give an idea of the scale-up required, capture of 80% of the carbon dioxide used in generating electricity from fossil fuels in the U.S. would produce a CO2 stream of approximately 2,000 Mt per year injected into a variety of geological formations.

#### Solves warming

EPA 12 (Environmental Protection Agency, “Carbon Dioxide Capture and Sequestration”, last updated on Thursday, June 14th, 2012, http://www.epa.gov/climatechange/ccs/index.html)//AMV

What is carbon dioxide capture and sequestration? EPA's Proposed Carbon Pollution Standards for New Power Plants On March 27, 2012, the Environmental Protection Agency (EPA) proposed Carbon Pollution Standards for New Power Plants. This common-sense step under the Clean Air Act would, for the first time, limit the amount of carbon pollution that new power plants can emit and ensure that new facilities take advantage of clean technologies. **Carbon capture and sequestration is one of the technologies new power plants can employ to meet the standard.** Learn more about the proposed standards. Carbon dioxide (CO2) capture and sequestration (CCS), also known as carbon capture and storage, is a set of technologies that can greatly reduce CO2 emissions from new and existing coal- and gas-fired power plants, industrial processes, and other stationary sources of CO2. CCS is a three-step process that includes: Capture of CO2 from power plants or industrial sources Transport of the captured and compressed CO2 (usually in pipelines) Underground injection and geologic sequestration, or permanent storage, of the CO2 in rock formations that contain tiny openings - or pores - that trap and hold the CO2 Another important part of CCS is monitoring to verify that the CO2 remains permanently underground. Why is it important? Carbon dioxide (CO2) capture and sequestration (CCS) offers a way for the United States and other countries to capture and store emissions of CO2 from large stationary sources such as power plants **and to reduce the risks associated with severe climate change**. The U.S. Department of Energy estimates suggest that as much as 3,600 billion tons of CO2 could be stored underground in the United States and Canada combined. For reference, large stationary sources worldwide emit approximately 13 billion tons of CO2 per year. Considering the large storage capacity in the United States, **CCS has the potential to be a** key technology **for achieving domestic greenhouse gas emission reductions**. For more information, see the National Carbon Sequestration Database and Geographic Information System (NATCARB), Link to EPA's External Link Disclaimer a geographic information system-based tool developed to provide a view of CCS potential. Is it safe? Current scientific and technical knowledge, coupled with ongoing project experience, indicates that well-selected, well-designed, and well-managed geologic sequestration sites can be a safe way to permanently store carbon dioxide (CO2). While CO2 capture and sequestration (CCS) can be conducted safely, EPA recognizes the need to protect against potential risks associated with geologic sequestration, such as leakage of CO2 and changes in subsurface pressures that could impact drinking water, human health, and ecosystems.

#### It’s reverse causal – can’t solve warming without it

Peridas 8 (George, Ph.D., Science Fellow, Climate Center, Natural Resource Defense Council, written testimony submitted to the Natural Resources Committee, Subcommittee on Energy and Mineral Reserves in the House of Representatives, “Spinning Straw Into Black Gold: Enhanced Oil Recovery

Using Carbon Dioxide”, June 12th, 2008, http://docs.nrdc.org/globalWarming/files/glo\_08062001a.pdf)

Given the world’s and the nation’s dependence on fossil fuels, it is essential to have in place a technology and a strategy to reduce greenhouse gas emissions from large industrial facilities that burn these fuels, even though their complete phase-out through energy efficiency improvements and a transition to renewable fuel sources might be technically and theoretically possible. Using all available tools is a wise and necessary hedging strategy in the face of the steep emission cuts that are needed. Projections differ as to the exact portion of reductions that will be delivered by different technologies, but from a strategic point of view, **CCS provides a much needed answer for fossil fuel use – which is inevitable.** Coal by itself, the most carbon-intensive of fossil fuels presents the biggest climate challenge. Since the dawn of the industrial age, human use of coal has released about 150 billion metric tons of carbon into the atmosphere – about half the total carbon emissions due to fossil fuel use in human history. Another 4 trillion metric tons of carbon are contained in the remaining global coal resources. That is a carbon pool nearly seven times greater than the amount in our pre-industrial atmosphere. Using that coal without capturing and disposing of its carbon means a climate catastrophe. **And the** die is being cast **for that catastrophe** today**, not decades from now**. According to the International Energy Agency, over 1800 GW of new coal plants will be built between now and 2030, a capacity equivalent to 3000 large coal plants, or an average of ten new coal plants every month for the next quarter century. This new capacity amounts to 1.5 times the total of all the coal plants operating in the world today. **Continuing with the use of coal without capturing and sequestering is** fundamentally incompatible **with climate stabilization**. NRDC believes that CCS technology is available to us today to begin deployment. Research on CCS has been ongoing for many years now, with major international conferences taking place since the early 1990s. Since then, knowledge on the subject has greatly expanded, to the extent that the Intergovernmental Panel on Climate Change (“IPCC”) issued a special report on CCS in 2005. An extensive Massachusetts Institute of Technology (“MIT”) study on the Future of Coal in 2007 also examined CCS in depth. There is a substantial body of evidence, knowledge, and peer-reviewed literature on CCS.

### Link – Modeling

#### US-driven CCS is key to global modeling

Roberts, 04 – Contributor to Harper's Magazine, frequent speaker on National Public Radio and member of The New York Review, (Paul, “The End of Oil: on the Edge of a Perilous New World”, pg. 232-4, USC Libraries)//JK

Even as U.S. policies were undermining the existing energy order, they would be encouraging the development of a more sustainable one. A U.S. initiative to develop clean-coal technology, for example, would dramatically change the significance of the Asian economy powered by coal. If American companies can bring down the costs of IGCC and carbon capture technology sufficiently, China and India might find themselves able to burn their coal without dooming the climate to catastrophic warming. In fact, many experts believe that the United States should not wait until the Chinese and indians can afford clean-coal technology but should offer the technology as soon as it becomes available and should even subsidize the purchase, simply to avoid the catastrophe of an Asian energy economy based on dirty coal. Such energy Charity would not be cheap, by one estimate, subsidies of that kind could run the United States at least ten billion dollars for the first hundred plants - a cost that conservative policymakers would oppose. But advocates of such clean-technology exports counter with three points. First, because China and India have little choice but to burn coal, if the United States hopes to avoid climate change it has little choice but to help the Chinese and Indians adopt clean-coal technology. As one climate expert put it: "America is going to pay for climate, one way or another. It can either pay now to try to mitigate some of the effects, or it can pay later, when droughts and floods start to decimate the developing world." Second, advocates say that the United States could attach strings to technology, making the offer contingent, for example, on a promise from Beijing to stop undercutting U.S. currency or dumping products on the U.S. market. Third, China and India will not only be the only market for U.S. built clean-coal technology: many experts believe that the technology once costs have been driven down, could give rise to a lucrative American export business - and reverse a depressing trend in which the United States lost the lead in wind technology to the Danes and in solar technology to Japanese. "We have to start looking at this less as a climate policy than as an economic stimulus for the U.S. industrial sector," argues Detchon. "We should be approaching this at scale, not as one-off R&D projects, but in a way that will make these units competitive overseas, where the bulk of the growth is. This is going to be a growth market, and the United States needs to build up a real manufacturing strength."

### Link – Comparative

#### Only CCS solves

McGuire Woods 12 (major U.S. law firm with more than 900 attorneys in 19 offices in the United States and Europe, “Carbon Capture and Sequestration (CCS)”, http://www.mcguirewoods.com/practices/climate\_change\_ccs.asp)//AMV

Carbon fuels account for 80% of the world’s global energy supply. Coal accounts for 25% of this supply and is expected to continue to play a significant role in power generation, but managing the carbon dioxide emissions from coal combustion is going to change. The capture and geologic sequestration of carbon dioxide (CCS) is one of the most, if not the most, critical technology **needed for the transition to the carbon-constrained world where coal burning sources will soon be operating**. The premise of clean coal relies in large part on the ability to successfully capture and sequester carbon dioxide. A convergence of forces – cap-and-trade legislation, federal and state tax incentives, increased research and development and global energy growth – should accelerate the deployment of CCS. Capturing CO2 emissions from new energy or industrial operations fueled by coal will be essential for the development of successful projects. The technology for CCS already exists but it has not yet been deployed on a large scale. **Scaling up CCS activities is** the key **for a successful solution to greenhouse gas control.**

#### It’s the best solution

ASME 9 (“Technology and Policy Recommondations and Goals for Reducing Carbon Dioxide Emissions in the Energy Sector”, pgs. 9-10, http://files.asme.org/asmeorg/NewsPublicPolicy/GovRelations/PositionStatements/17971.pdf)//AMV

Sequestration Carbon capture and storage (CCS) involves capturing CO2 streams in power plants and injecting them at high pressures into deep geologic formations, for permanent storage. Natural analogues from oil and gas fields indicate that CO2 can remain trapped for millions of years (Metz 2005**). CCS can be feasibly integrated into all new, large, CO2 -producing power plant systems to reduce carbon emissions by 90 percent or more**. Implementing CCS inevitably increases the cost of coal-fueled electricity. Currently, supercritical PC plants without CCS are the least cost option. The cost of electricity (COE) of an IGCC plant without CCS is 20 percent higher than the comparable supercritical plant without CCS. However, if CCS is incorporated, the COE is 65 percent higher in an IGCC plant and rises to 80 percent higher in a supercritical PC plant relative to the comparable supercritical plant (NETL 2007). Technologies under development have the potential to reduce the incremental increase in COE for CCS applied to either PC or IGCC plants to 25 percent above the base case without capture (EPRI ETAC 2007). Since neither IGCC nor PC plants have demonstrated CCS, further development of these technologies is warranted. If, as expected, coal maintains a major role in U.S. electric power production, applying CCS technologies to nearly all new coal-based power plants entering service after 2020 5 **would make the** largest single contribution **towards reducing future U.S. electric sector CO2 emissions.**

#### It’s the only available solution to mitigate climate change

Haszeldine 9 – PhD in Geology

R. Stuart, “Carbon capture and storage: how green can black be?”, 25 September, 2009, jstor

Power plant capture of CO2 can technically be enacted now, but with low efficiency and many energy losses. Current R&D on capture holds very good promise of 20 to 60% improvements in energy efficiency and cost and also of adapted or entirely new capture processes. Transport of CO2 by pipeline can also be undertaken now. Costs can be reduced if clusters of power plants feed CO2 into shared transport pipelines. Injection into hydrocarbon fields or aquifers uses established methods and can commence immediately, although the total storage capacity in aquifers is highly uncertain. Worldwide, demonstration projects must use diverse types of storage to test capacity predictions. Public acceptance is also an issue: Opposition has halted several feasible test sites for CCS in Europe. Governments must require heart-and-mind action from developers, several years ahead of applications. Climate change predictions show that CO2 reduction must be operating by 2020. Mainstream economic assessments state that CCS is a medium-term, low-cost option that needs to be prepared now (34) and that even a 10-year delay in tackling climate change will be economically serious (35). Yet there is a lack of policies or funds worldwide to support profitable operation of demonstration plants. In the future, industry needs to see and believe in secure, long-term underpinning revenue from low carbon fossil energy, similar to the way that renewable energies have been helped to emerge. On the 10-year time scale, it is not technology, but legal permission, business development, and public opinion that will determine whether CCS experiments and demonstration plants are built sufficiently rapidly for CCS to be deployed in 2020. On the 20-year time scale, these initial demonstrations must enable a new CCS industry to be born. Low-cost reliable capture at clusters of CCS power plants must emerge, and national pipe networks must be developed, delivering to aquifer storage capacity that must have been validated. CCS also needs to be built and operated in developing economies with high national but low per capita emissions. If CCS is difficult to afford now in Western economies, then it is even more so in India and China. Additional payments for CCS demonstrations will accelerate the above-mentioned actions. Simply pricing carbon in a market is not enough to encourage CCS or to enforce decarbonization. During peak demand, venting of CO2 will be commercially beneficial. If the price of carbon is set very high to avoid such effects, that taxes the whole economy, not just dirty electricity. Additional policy levers will be needed to enforce CCS operation. Lessons from previous clean-up technologies applied to power plants—such as SOx and NOx removal from flue gases—show that voluntary codes do not work, but clearly signed and enforced rule changes do. New power plants can now be built “capture ready,” to be converted when CCS is established. This is the death-or-glory test of governments, as there is industry pressure to build new coal and gas plants now, increasing CO2 emissions, and perhaps convert to CCS later. Substantial difficulties can be anticipated in government-enforced plant-by-plant conversion. Another regulatory route is the introduction of emissions performance standards, expressed as amount of CO2 per kilowatt-hour of electricity produced. These standards are conceptually simple and directly address the issue. Care will be needed to avoid unintentionally incentivizing gas-fuelled plants, which are not fitted with CCS but lock-in CO2 emissions. A permitted emission amount decreases through time, enforcing innovation. A key difficulty is that firm rules and dates cannot be applied to technologies that do not yet exist. Coal and gas combustion can become more sustainable. To change black fuel into green energy, the acceleration and scale-up of CCS is required, from tens of power plants within 5 years, to hundreds of large plants by 2025, and then to thousands of small power plants by 2035. This progression can defer climate change problems and buy time. To do this, bold policies of clear vision to include CCS emissions reductions must be explicit. CCS may bethe single most effectiveand direct climate action available. It is not yet too late, but good words need to be matched by hard actions and good money; the present level of committed funds is too low and needs a 4- to 10-fold increase in order for this climate mitigation to be successful.

### Link – Not Just Coal

#### It’s not just coal – CCS makes all electricity clean

Walkinshaw 6-12

Mike, “Guest Post: CO2 Separation Technologies,” Green Tech Media, http://www.greentechmedia.com/articles/read/guest-post-co2-separation-technologies/

As we move toward the extraction of more shale gas and heavier oil production, the need to separate CO2 increases daily. Infrastructure is being added by the largest natural gas producers and processors as a result of higher CO2 content in some shale gases that are being processed. For example, in British Columbia, a leading region for natural gas deposits, CO2 content in conventional natural gas fields has historically been between 2 percent and 4 percent, leading to the need to separate the CO2 in order to meet the pipeline specification of less than 2 percent. However, the new Horn River Basin resource in western Canada has a 12 percent CO2 content, requiring a substantial increase in CO2 separation needs at processing plants. Legislation and Regulation Are Moving Ahead -- Slowly and With Broad Exclusions The EPA has regulations in process that will substantially affect the emission of CO2 from coal-fired power plants and other large emitters. The survival of these regulations depends heavily on the upcoming U.S. presidential election. However, other jurisdictions also have carbon policies in place. Alberta and British Columbia both have minimal carbon taxes, while California is moving toward its own cap-and-trade structure. All of these and more are having a positive impact on corporate decisions regarding the adoption of carbon saving technologies. Up-and-Coming Technologies That Convert CO2 to Valuable End Products Need Purified CO2 Streams Thermochemical, biological, and electrochemical means of converting CO2 to chemicals and fuels are currently being developed in venture-backed companies. The high price of oil is providing a much-needed tailwind in these technological areas. The purity of the incoming CO2 is a key issue for many of these companies. Therefore, a cheap means of purifying CO2 will be vital to the success of many of these promising technologies. Needless to say, economical CO2 separation will be a core requirement for the expansion of today’s natural gas reserves and for future technologies that deal with the planet’s CO2 emissions issues. That means investing in CO2 separation innovators like Akermin -- where it’s about reducing capital expense while providing greater operational flexibility -- makes sense. Although there may not be a significant price on carbon emissions today, that doesn’t mean there should be an absence of investments in technologies that stand to provide national energy security and reduced global warming along with the significant financial returns that will be required when you’re staring at a process gas market exceeding $10 billion a year.

### Link – Solves Economically / Export

#### CCS solves warming without collapsing the economy

Reisinger 9 – JD, Attorney @ Ohio Environmental Council

Will, “RECONCILING KING COAL AND CLIMATE CHANGE: A REGULATORY FRAMEWORK FOR CARBON CAPTURE AND STORAGE,” Vermont Journal of Environmental Law, http://vjel.org/journal/pdf/VJEL10107.pdf

Our article presupposes that coal will continue to provide a primary fuel for power generation for years to come. Accepting the reality of coal-based electricity, we examine an emerging technology referred to as carbon capture and storage or carbon capture and geologic sequestration (in either case, CCS). CCS may become an important strategy to combat climate change because it can minimize CO2 emissions from fossil-fuel-powered sources. 4 CCS involves removing or “capturing” the CO2 emissions that are a by-product of all fossil-fuel combustion, compressing that gas, and ultimately injecting the CO2 deep underground where it cannot escape into the atmosphere as a climate change agent. 5 CCS is hailed as a “bridge technology,” a technology that will allow us to minimize global CO2 emissions from fossil fuels such as coal or natural gas while cleaner, more renewable, energy resources are developed. With widespread use in the generation sector, it is possible that as much as ninety percent of CO2 emissions from coal-fired power plants could be captured and safely sequestered using CCS. 6 The conventional wisdom is that either Congress or the Environmental Protection Agency (EPA) will exact a charge on GHG emissions in the near future, in the form of a cap-and-trade or carbon tax system, or through rulemaking under the Clean Air Act. 7 A charge on GHG emissions would have the effect of making power generation more expensive, which would prompt power generating companies to seek ways, such as CCS, to reduce their CO2 emissions and save money. 8 In light of the looming prospect of federal regulation, CCS is a promising technology that could allow our economy’s industrial base to continue functioning. Geologists are optimistic that CCS, utilized broadly in conjunction with new or existing power plants and industrial emitters, can safely and effectively sequester colossal volumes of CO2. 9 CO2 injection has been used successfully for decades to assist in oil recovery operations, though not for the primary purpose of permanent storage. 10 Large-scale injection and storage would allow industry to sequester CO2 in the short term, while “greener,” more sustainable power sources are developed for long-term use. Additionally, CCS technology, once fully developed, can be exported to large emitters such as China and India—nations that must be partners in our efforts to curb the global release of GHGs.

### Link – Bridge

#### CCS is the key bridge to a clean future

WRI 8

World Resources Institute, “CCS Overview: What Is CCS?,” http://www.wri.org/project/carbon-dioxide-capture-storage/ccs-basics

CCS is a broad term that encompasses a number of technologies that can be used to capture carbon dioxide from point sources, such as power plants and other industrial facilities; compress it; transport it mainly by pipeline to suitable locations; and inject it into deep subsurface geological formations for indefinite isolation from the atmosphere.This technology is a critical option in the portfolio of solutions available to combat climate change, because it allows for significant reductions in CO2 emissions from fossil-based systems, enabling it to be used it as a bridge to a sustainable energy future. CCS: Frequently Asked Questions Why is Carbon Capture and Storage critical to Addressing Climate Change? The world’s leading scientists agree that we need to reduce current greenhouse gas emissions by 60-80% in a relatively short amount of time to avoid the more serious impacts of global climate change. To meet the climate challenge, Congress will need to use every option on the table. A market-based cap and trade system, the expansion of renewable energy capacity, and aggressive energy efficiency and conservation measures are all essential parts of the climate change solution, but in the near term these can only partially supplant our dependence on coal. Coal currently provides 50% of U.S. electricity, is the most carbon-intensive fossil fuel and a major source of greenhouse gas emissions. In order to transition to a low-carbon economy, we must also invest in carbon capture and storage as a bridging technology to reduce today’s carbon dioxide (CO2) emissions. CCS involves the capture of CO2 from power plants and other large industrial sources, its transportation to suitable locations, and injection into deep underground geological formations for long-term storage. CCS offers a way to greatly reduce carbon emissions from electricity generation as we simultaneously expand renewable energy capacity and increase energy efficiency. How can CCS help meet U.S. climate and energy goals? The U.S.’s reliance on coal to meet half of our electricity needs presents a major challenge to dramatically reducing U.S. greenhouse gas emissions. While it is clear that “business as usual” will lock the U.S. into an unsustainable and increasingly risky and costly climate future, coal is cheap and abundant and is expected to constitute a substantial portion of the U.S. electricity mix in the near-term. Indeed, existing coal-fired power plants will operate for decades to come and new coal plants are currently being constructed or planned. Without CCS, these plants will emit billions of tons of CO2 over their lifetimes. CCS provides a bridge between our coal-based energy present and a low-carbon energy future. The widespread adoption of CCS technologies will reduce CO2 emissions significantly and help the U.S. meet near-term energy demand until alternatives can provide sufficient and reliable electricity.

### Link – Air Capture

#### Air capture solves warming

Keith 9 (David W., “Why Capture CO2 from the Atmosphere?”, September 25th, 2009, http://www.sciencemag.org/content/325/5948/1654.short)

Even if we could halt human carbon emissions today, the climate risks they pose would persist for millennia—assuming that we must rely only on natural processes to dissipate our carbon cycle perturbation and the resulting climate changes (1). The impact of carbon emissions persists longer than that of nuclear waste (2), the archetypical long-lived waste product. An immediate emissions halt is essentially impossible, however, and simple extrapolations of emission trends suggest that even with strenuous efforts to limit emissions, CO2 concentrations in the atmosphere will rise beyond 450 parts per million before mid-century, passing the level commonly invoked as a ceiling above which the risk of dangerous climate change becomes unacceptably high. Moreover, the climatic response to elevated CO2 concentration is uncertain, so a small risk of catastrophic impacts exists even at today’s concentration, and that risk grows monotonically as emissions continue to drive up the atmospheric CO2 burden. Technologies for decarbonizing the energy system, from solar power to the capture of CO2 from the flue gases of coal-fired power plants, can cut emissions but they cannot reduce the climate risk posed by the carbon we have already added to the air. It may be possible to increase Earth’s reflectivity, engineering a cooling that counteracts the CO2-driven warming (3, 4). Although climate engineering may be important for managing climate risk, it cannot eliminate the long-term climate and geochemical risks posed by elevated CO2. It is therefore in our interest to have a means to reduce atmospheric CO2 concentrations in order to manage the long-run risks of climate change. Unless we can remove CO2 from the air faster than nature does, we will consign Earth to a warmer future for millennia or commit ourselves to a sustained program of climate engineering. **Air capture is an industrial process that captures CO2 from ambient air,** producing a pure CO2 stream for use or disposal (5, 6). It is one of an emerging set of technologies for removing CO2 from the atmosphere that includes biomass energy with CO2 capture, along with various means of accelerating geochemical weathering (7, 8). **Over the long run, the ability to remove CO2 from the air should be viewed as an** essential tool **in our kit for managing carbon-climate risks. We therefore need,** at the minimum**, a serious longterm exploratory research effort to develop air capture** along with other direct methods **for removing CO2 from the atmosphere.**

### Link – Climate Leadership

#### Key to climate leadership

EPA 10

“Report of the Interagency Task Force on Carbon Capture and Storage,” http://www.epa.gov/climatechange/downloads/CCS-Task-Force-Report-2010.pdf

CCS can play an important role in domestic GHG emissions reductions while preserving the option of using abundant domestic fossil energy resources. However, barriers hamper nearterm and long-term demonstration and deployment of CCS technology. While the largest of these barriers is the absence of a Federal policy to reduce GHG emissions, the Task Force has outlined specific actions the Federal government could take under existing authority and resources to address these barriers. For widespread cost-effective deployment of CCS, additional action may be needed to address specific barriers, such as long-term liability and stewardship. Timely development of cost-effective CCS could reduce the costs of achieving our Nation’s climate change goals. CCS can also play a major role in reducing GHG emissions globally. Continued leadership to develop and deploy CCS technologies as one option to address global climate change will position the United States as a leader in climate change technologies and markets. However, widespread cost-effective deployment of CCS will occur only if the technology is commercially available at economically competitive prices and supportive national policy frameworks are in place.

#### Key to leadership

EPA 10

“Report of the Interagency Task Force on Carbon Capture and Storage,” http://www.epa.gov/climatechange/downloads/CCS-Task-Force-Report-2010.pdf

Globally, CCS can play a major role in reducing GHG emissions, with 20–40 percent of global CO2 emissions in 2050 projected to be suitable for capture—including 30–60 percent of all emissions from electric power (IPCC, 2005). The early development of a robust domestic industry in advanced CCS technology would further the Administration’s goals for continued leadership in the global market for innovation. American firms could become leading exporters of advanced CCS technology. However, widespread cost-effective deployment of CCS will occur only if the technology is commercially available and a supportive national policy framework is in place. Global partnerships are now working to address these challenges.

### Climate Leadership Key to Modeling

#### Connecting global warming to *economical* and *efficient* policies are key to spur global action

Jeffrey Marlow 6/3/2009 – staff writer for the New York Times environment section (“E.U. Looks to U.S. for Climate Leadership”, New York Times, <http://green.blogs.nytimes.com/2009/06/03/eu-looks-to-us-for-climate-leadership/>) EA

European policy makers are increasingly looking to the United States for leadership on climate change, according to Anthony Giddens, the prominent British sociologist whose centrist “third way” political philosophy counts Tony Blair and Bill Clinton among its followers. Mr. Giddens has recently turned his attention to the politics of climate change, and in a recent interview, he praised President Obama’s vision while lamenting the challenges of a fragmented Europe. “One thing I do like about Obama’s approach to climate change is that he does have a bit of a vision about it,” he said, citing Mr. Obama’s “inspirational approach and optimistic messaging.” Positive messages, like the connection between alternative energy and energy security or economic growth, are crucial if the public is to be inspired to make a real difference, Mr. Giddens said. The European Union, on the other hand, has emphasized the regulations, restrictions and costs associated with its flagship climate change legislation, the Emission Trading System, or E.T.S. “It’s obscure,” Mr. Giddens complained, “and citizens don’t really understand what the E.T.S. is.” In fact, the E.T.S. – the largest emission-trading system in the world – has been the most visible sign of Europe’s leadership in the global quest to limit greenhouse-gas emissions. But the system has experienced its share of growing pains as officials have struggled to set an effective cap on emissions and distribute the carbon-cutting burden equitably across member states. “The U.S. will be able to assume a leadership position because the E.U. hasn’t really been able to do so,” said Mr. Giddens. “It’s extraordinarily difficult to get Europe to speak with a single voice.” While Mr. Giddens is excited about the potential for American leadership, he’s less optimistic about the specific proposals on the table, particularly the increasingly diluted Waxman-Markey climate change bill. “The more it’s watered down, the more difficult it is for the U.S. to say it’s taking a global leadership role,” he noted. “But on the other hand, any package is better than nothing.”

#### It’s reverse causal – inaction by the US deters any international action

Donald A Brown 2/28/2011 - Associate Professor for Environmental Ethics, Science, and Law at Penn State (“The World Waits In Vain For US Ethical Climate Change Leadership As the World Warms”., Climate Ethics, Pennsylvania State University, <http://rockblogs.psu.edu/climate/2011/02/the-world-waits-in-vain-for-us-ethical-climate-change-leadership.html>)

Although some progress was made on a number of procedural issues and voluntary emissions reductions commitments at the conclusion of the 16th Conference of the Parties (COP-16) to the United Nations Framework Convention on Climate Change (UNFCCC) meeting in December, the international community had failed for the 20th year in a row to agree to a meaningful global approach to climate change. That is, Cancun failed to produce binding and equitable national greenhouse gas emissions reduction targets necessary to prevent dangerous climate change nor dedicated and predictable funding needed for adaptation by vulnerable developing nations. In fact, the voluntary emissions reduction commitments agreed to in Cancun, even if fully complied with, virtually guarantee that rising global temperatures will exceed dangerous levels. Although there are several countries that have frequently failed to respond to what justice would require of them to reduce the threat of climate change, the United States, more than any other country, has consistently failed to respond to its ethical duties to reduce its emissions to the its fair share of safe global emissions during the over two decades that world has been seeking a global agreement on how to respond to climate change. In fact, as we shall see, the United States among the developed countries is the only nation to make no binding commitments on climate change. Because the United States is such a vital player in any global solution to climate change, the United States response to its obligations to reduce the global threat of climate change has been an immense impediment to an urgently needed global climate change solution. And so the world continues to wait for ethical leadership from the United States on climate change as significant damages from human-induced climate change now are becoming more visible around the world. And so, as the world is running out of time to prevent significant climate change, the United States is ignoring its global obligations. Even though the election of President Obama was widely seen as a basis for hope in the international community that the United States would for the first time accept its international responsibilities on climate change, it would appear that at least for his first term President Obama will not be able to deliver on his promise to make the United States a responsible participant in solving climate change. Because the United States recently elected a Congress that shows no interest in developing national climate change policies and there are reasons to believe that the Obama administration will not be able to make meaningful reductions through administrative action under existing law, the international community is becoming increasingly pessimistic that it will be able to achieve a global deal on climate change in the continuing absence of US leadership. The international community needs the United States to commit to reduce its emissions not only because of the relative size of the US emissions as a percentage of global emissions (over 21%), but because other countries have signaled that they will not act without the United States greenhouse gas reduction commitments. This post reviews: (a) the state of international climate change cooperation in light of COP-16 in Cancun, (b) the unfortunate and tragic history of the failed US response to climate change, (c) the political domestic opposition to climate change policies, and (d) the need of the United States to respond to its ethical duties to reduce the threat of climate change.

#### Successful technology is key – the US must prove that emissions reductions are achievable without economic cost

Richard 12 - reports on science issues for NPR's newsmagazines Morning Edition, All Things Considered, and Weekend Edition. Recipient of USC’s Alumni Achievement Award – the school's highest honor, a 1995 Peabody Award for investigative reporting on NPR about the tobacco industry (Ahead Of Climate Talks, U.S. Leadership In Question, NPR, http://www.npr.org/2011/11/28/142714839/ahead-of-climate-talks-u-s-leadership-in-question)

Part of the problem is this: Even Congress members who accept the science of climate change are concerned that if the United States dramatically slashes its emissions, that could harm economic competitiveness. And by itself, U.S. action won't do much to slow global warming. Meaningful action requires an agreement that extends far beyond our national borders. Nowhere else in the world do you see a political debate about whether climate science is real, whether or not the climate is actually changing. That political climate makes it very difficult to move forward in a comprehensive way. - Kevin Kennedy, director, U.S. Climate Initiative, World Resources Institute And that brings us back to the climate talks in South Africa. Alden Meyer at the Union of Concerned Scientists says the weak actions domestically mean the U.S. doesn't have much leverage in the international talks. "The U.S. is not able to show its partners how we are going to meet the 17 percent reduction President Obama committed to," Meyer says. Also we are struggling to come up with our fair share of the financing for developing nation action on technology, on adaptation, on preserving forests. So we're not bringing a lot to the table." For years, Europe has taken the lead at the international talks. But the EU hasn't gotten others to follow. Scott Barrett at Columbia University holds out hope that things would be better if the United States led the way. "If you look at lots of global issues in the past, where we've had success in the past, we've had U.S. leadership. On this issue we have not had proper U.S. leadership," Barrett says. The great challenge is to identify actions that every major player is willing to take — actions that can make a difference to the climate without upsetting economic competitiveness around the world. What's politically possible may not be as much as scientists say we need to accomplish to stabilize the planet's atmosphere, but Barrett says we need to start somewhere. "I'm not unrealistic about what we're able to achieve," Barrett says, "but I'm very confident we can achieve more than we have done so far, which is basically zero." And, he adds, climate change is the hardest problem the world has ever tried to address collectively.

#### Concrete action is key

Doughton and Heim 10/29/2009 – reporters for the Seattle Times (“U.N. leader: Global climate change is up to the U.S.,” The Seattle Times, http://seattletimes.nwsource.com/html/politics/2010136513\_ban26m.html)

Global warming will never be reined in unless the United States leads the way, United Nations Secretary-General Ban Ki-moon said Sunday at the start of a two-day visit to Seattle. Ban praised the city for setting an example with policies to reduce greenhouse-gas emissions, and said such local initiatives help build momentum for national policies. "All the world is now looking to the leadership of the United States and President Obama," Ban said in an interview. Since taking the top job at the United Nations in 2007, Ban has made climate change a priority and has been pressing nations to commit to firm emission limits when they meet in December in Copenhagen to negotiate a successor agreement to the Kyoto climate accords. The former South Korean foreign minister is also on a mission to improve relations with an American public often ambivalent — and occasionally hostile — to the international body. "Having a strong partnership between the U.S. and the U.N., as well as getting ... the appreciation of the American public for the work the U.N. is doing, is very important," he said. The fact that Seattle is the hometown of one particular, wealthy American philanthropist is also a factor in Ban's visit. He will join Microsoft co-founder Bill Gates and his wife, Melinda, for breakfast today at their Medina mansion, to discuss ways to reduce maternal death rates around the world. A woman dies every minute from preventable complications of pregnancy or childbirth, Ban said. "This is what we have to stop," he said. "Government support is crucial, but so, too, is private funding. That is why I'm going to discuss this matter with Bill Gates." The Gates Foundation and the U.N. have collaborated on development and food programs, including an effort called Purchase for Progress (P4P). The project aims to turn hundreds of thousands of small farmers in Africa and Latin America into suppliers for the U.N.'s World Food Programme, which provides food for 90 million people in 80 countries and has a budget of nearly $3 billion this year. Climate change complicates many other problems the U.N. is working to solve, Ban said, such as poverty and famine and the ensuing political instability. In 2000 the U.N. set a series of targets called Millennium Development Goals for improving health and reducing poverty by 2015, but the food crisis and global economic downturn have stymied progress. No country in sub-Saharan Africa is currently on track to meet those goals, Ban said. Ban said he is creating an advocacy group for a renewed push to achieve the Millennium Development Goals, and will ask Bill Gates to join it. The Henry M. Jackson School of International Studies at the University of Washington initiated Ban's visit by asking him to help celebrate the school's centennial, said director Anand Yang. Ban will receive an honorary degree, meet with business leaders at the Greater Seattle Chamber of Commerce, and participate in a discussion with representatives from civic groups, charities and others at a forum sponsored by the World Affairs Council. After nearly three years on the job, reviews of Ban have been mixed. Some critics say he's failed to speak out forcefully enough to exercise the U.N.'s moral leadership role in public. But Ban strongly defended the U.N.'s performance. With little real power, diplomacy and a bully pulpit are the secretary-general's main tools, and Ban said it's important to use each judiciously. While some may view the U.N. as ineffective, situations such as the ethnic conflict in Darfur would be far worse without its presence, he said. Ban added that he has been able to deploy 90 percent of the 26,000 peacekeepers authorized to the region, which is more peacekeepers than the U.N. had deployed around the world a decade ago. The Darfur efforts have saved half a million lives, he said. He also acknowledged that the U.N. faces an unprecedented number of global issues at the same time. "Have you ever seen in our history when the ... international community has been hit all at once by all these crises: climate change, economic crisis, food security, energy crisis, pandemic?" Ban said his commitment to climate change was partly inspired by travels to Antarctica, Bangladesh, Brazil and the Arctic, where melting ice, floods and ecosystem disruptions are already under way. He said he's hopeful that after more than a decade of resistance, the U.S. Senate will soon adopt legislation to limit carbon emissions. President Obama has committed to action, but it's time for concrete steps, Ban said. If the U.S. fails to act soon, India and China may bail out of climate negotiations and erase any progress with their rapidly rising greenhouse- gas emissions, he warned.

### Modeling is Key

#### Can’t ignore China – need an economically efficient policy to encourage modeling

Fernando 8 - Senior Associate in the Markets and Enterprise Program at the World Resources Institute

Hiranya, “Capturing King Coal: Deploying Carbon Capture and Storage Systems in the U.S. at Scale,” http://pdf.wri.org/capturing\_king\_coal.pdf

No discussion on coal can take place without addressing China. China obtains 80 percent of its electricity from coal-ﬁred power plants and accounts for 33 percent of global coal demand. 18 With a new coal plant being built almost every week in the country, China may need to consider clean coal burning technologies sooner rather than later. However, tensions between economic growth and environmental protection goals are particularly acute for large developing countries such as China. At the center of the debate are unaffordable cost premiums on clean technologies and gaps in technical capability. China, as well as India, and other developing countries argue that clean technology transfer from the United States and Europe is crucial to achieving their policy goals.

#### CCS is key to solve emissions increases outside of the US

Reisinger 9 – JD, Attorney @ Ohio Environmental Council

Will, “RECONCILING KING COAL AND CLIMATE CHANGE: A REGULATORY FRAMEWORK FOR CARBON CAPTURE AND STORAGE,” Vermont Journal of Environmental Law, http://vjel.org/journal/pdf/VJEL10107.pdf

Another factor that is rarely considered is coal’s prevalence as a fuel source in China, India, and the unindustrialized world. These nations, which account for three-fourths of global GHG emissions, will likely remain dependant on coal even while the U.S. is transitioning to carbonneutral technology. During the transition period, advanced coal and capture technology must be fully developed and utilized in developing nations to mitigate their significant contribution to climate change.

### Climate Leadership Solves Soft Power

#### Governmental leadership on climate is key to reverse negative perceptions of the US

Joseph S. Nye, Jr 2004 - Dean of the John F. Kennedy School of Government, former Assistant Secretary of Defense for International Security Affairs, Chair of the National Intelligence Council, and Deputy Assistant Secretary of State for Security Assistance, Science and Technology (“Soft Power and American Foreign Policy,” Political Science Quarterly, http://www.pols.boun.edu.tr/uploads%5Cfiles%5C1104.pdf)

Some domestic policies, such as capital punishment and the absence of gun controls, reduce the attractiveness of the United States to other countries but are the results of differences in values that may persist for some time. Other policies, such as the refusal to limit gas-guzzling vehicles, damage the American reputation because they appear self-indulgent and demonstrate an unwillingness to consider the effects we are having on global climate change and other countries. Similarly, domestic agricultural subsidies that are structured in a way that protects wealthy farmers while we preach the virtue of free markets to poor countries appear hypocritical in the eyes of others. In a democracy, the “dog” of domestic politics is often too large to be wagged by the tail of foreign policy, but when we ignore the connections, our apparent hypocrisy is costly to our soft power. The government can do most to recover the recent American loss of soft power in the near term by adjusting the style and substance of its foreign policy. Obviously there are times when foreign policies serve fundamental American interests and cannot and should not be changed. But tactics can often be adjusted without giving up basic interests. Style may be the easiest part. For one thing, the administration could go back to the wisdom about humility and warnings about arrogance that George W. Bush expressed in his 2000 campaign. There is no need to take pleasure in embarrassing allies or to have a secretary of defense insulting them while a secretary of state is trying to woo them. As a British columnist wrote in the Financial Times, “I have a soft spot for Donald Rumsfeld. But as an ambassador for the American values so admired around the world, I can think of no one worse.” Prime Minister Tony Blair put it well in his 2003 address to the American Congress, when he said that the real challenge for the United States now “is to show that this is a partnership built on persuasion, not command.”

#### Action on climate reverses the negative perception of US hard power

Joseph S. Nye, Jr 2009 - Dean of the John F. Kennedy School of Government, former Assistant Secretary of Defense for International Security Affairs, Chair of the National Intelligence Council, and Deputy Assistant Secretary of State for Security Assistance, Science and Technology (Los Angeles Times, bhhsnormans.net)

The Pentagon is the best resourced arm of the government, but there are limits to what hard power can achieve on its own. Promoting democracy, human rights and the development of civil society are not best handled with the barrel of a gun. The effects of the 9/11 terrorist attacks threw America off course. Terrorism is a real threat, but over-responding to the provocations of extremists does us more damage than the terrorists ever could. Success in the struggle against terrorism means finding a new central premise for U.S. foreign policy to replace the "war on terror." A commitment to providing for the global good can provide that premise. America can become a smart America -- a smart power -- by again investing in global public goods, providing things people and governments of the world want but have not been able to get in the absence of leadership by the strongest country. Development, public health and coping with climate change are good examples. By complementing U.S. military and economic might with greater investments in soft power, and focusing on global public goods, the U.S. can rebuild the framework that it needs to tackle tough global challenges. Style also matters. In 2001, columnist Charles Krauthammer argued for what he called "a new unilateralism," which recognized that the United States was the only superpower and was so strong that it could decide what was right and expect others to follow because they had little choice. But this style turned out to be counterproductive. Insensitivity to style and the perception of others can undercut soft-power efforts. Obama faces a difficult international environment, but previous presidents have managed to employ hard, soft and smart power in equally difficult contexts. In 1970, during the Vietnam War, America was viewed as unattractive in many parts of the world, but with changed policies and the passage of time, the United States managed to recover its soft power. It can happen again.

#### Climate is the proximate cause of the decline in soft power

Princeton Task Force on Anti-Americanism 12/1/2008 - This report aims to provide creative input on how to strategically address the challenges of global anti-Americanism. (“Dealing with Anti-Americanism, A Report to the New Administration,” Woodrow Wilson School of Public and International Affairs, Princeton University, <http://www.princeton.edu/~smeunier/AA%20Task%20force%20report%20final.pdf>)

In the past eight years, anti-Americanism has increased worldwide. Though top causes vary region by region, the U.S.’s behavior towards curbing climate change is the most shared and widespread concern. In a 2008 Pew survey of 48 nations, 58% of respondents blamed the U.S. for global environmental problems and its lack of leadership. In September and October of this year, 43% of respondents across 11 countries ranked climate change as an issue of higher concern than the financial crisis. Climate change offers an opportunity to reduce systemic anti-American resentments among allies in developed and developing countries, and appropriate policies can support energy security, which could weaken the influence of the countries with the highest anti-American sentiments, most of which are large oil-producing states. KEY PROBLEMS: 1) Countries blame the U.S. for failing to act against climate change and for being the world’s greatest polluter. When the Bush Administration flatly rejected the Kyoto Agreement, it fueled impressions of American stubbornness, callousness, unilateralism and disrespectful nature. According to Senator John Kerry, the Administration’s policy on Kyoto was to “aim and fire, and the target they hit was [the U.S.] international reputation.” Though most signatory nations are not meeting emissions targets, America is routinely singled out for failing to curb greenhouse gas emissions. The British Council reports that Americans at the 2007 UN Climate Change Conference “found themselves isolated and friendless, followed by a cacophony of decidedly undiplomatic catcalls and boos.

#### The plan *rescues* US leadership

Barry Buzan, November 2007 - Professor of International Relations at the London School of Economics, (“A Leader Without Followers? The United States in World Politics after Bush”, The Global Policy Institute, http://www.gpilondon.com/fileadmin/user\_upload/GPI/Short\_Policy\_Docs/PP2.pdf)

Environmental issues are the wild card of international relations. They could generate crises in many different forms (climate change; sea level change; the rapid spread of fatal or disabling diseases; the poisoning effects of the man-made chemical bath in which we now all live; rocks from space crashing into the planet; and suchlike). These crises might arrive tomorrow, or ten or a hundred years from now, or (less likely) they might never arrive, so it is hard to tell when (if) they will make their impact. They represent the ‘events’ problem for prediction in spades. When (if) they do arise, they could easily dominate the international agenda, radically changing political priorities and pushing more traditional problems into the background. On some of these issues, the US would, because of its strong technological position, be an obvious leader. That seems likely to be true if the news was that a large asteroid or comet was going to collide with Earth in a few decades time, and perhaps also if disease control was the issue. On global warming, however, the American commitment to a high consumption lifestyle, and its resistance to pollution controls, has, in the eyes of many, already defined the US more as part of the problem than as the solution. The impact of the environmental wild card on the question of US leadership is thus extremely difficult to predict. Certain kinds of developments could rescue US leadership and put it back into the driving seat. Others, most obviously pollution and global warming, could add to the disaffection with the US that is already eroding its leadership standing. Yet even here one cannot underestimate the capacity of the US for reinventing itself. Odd combinations of religious take-up of environmental stewardship, corporate interests in eco-profits, and local politics generating innovative approaches to environmental management could yet counterbalance the current inertia and denial in Washington about climate change.

### Soft Power Impact

#### Soft power solves a laundry list of extinction threats

Jervis 9 – Professor of International Politics @ Columbia

Robert, professor of international politics at Columbia University, Unipolarity: A Structural Perspective, World Politics, Muse

To say that the system is **unipolar** is not to argue that the unipole can get everything it wants or that it has no need for others. American power is very great, but it is still subject to two familiar limitations: it is harder to build than to destroy, and success usually **depends on others’** decisions. This is particularly true of the current system because of what the U.S. wants. If Hitler had won World War II, he might have been able to maintain his system for some period of time with little cooperation from others because “all” he wanted was to establish the supremacy of the Aryan race. The U.S. wants not only to prevent the rise of a peer competitor but also to stamp out terrorism, maintain an open international economic system, spread democracy throughout the world, and establish a high degree of cooperation among countries that remain juridically equal. Even in the military arena, the U.S. cannot act completely alone. **Bases and overflight** rights are always needed, and support from allies, especially Great Britain, is important to validate military action in the eyes of the American public. When one matches American forces, not against those of an adversary but against the tasks at hand, they often fall short.[54](http://muse.jhu.edu/journals/world_politics/v061/61.1.jervis.html#f54) Against terrorism, force is ineffective without excellent intelligence. Given the international nature of the threat and the difficulties of gaining information about it, **international cooperation is the only route to success**. The maintenance of international prosperity also requires joint efforts, even leaving aside the danger that other countries could trigger a run on the dollar by cashing in their holdings. Despite its lack of political unity, Europe is in many respects an economic unit, and one with a greater gdp than that of the U.S. Especially because of the growing Chinese economy, economic power is spread around the world much more equally than is military power, and the open economic system [End Page 210] could easily disintegrate **despite continued unipolarity**. In parallel, on a whole host of problems such as aids, poverty, and international crime (even leaving aside climate change), the unipole can lead and exert pressure but cannot dictate. **Joint actions may be necessary** to apply sanctions to various unpleasant and recalcitrant regimes; proliferation can be stopped only if all the major states (and many minor ones) work to this end; unipolarity did not automatically enable the U.S. to maintain the coalition against Iraq after the first Gulf War; close ties within the West are needed to reduce the ability of China, Russia, and other states to play one Western country off against the others. But in comparison with the cold war era, there are fewer incentives today for allies to cooperate with the U.S. During the earlier period unity and close coordination not only permitted military efficiencies but, more importantly, gave credibility to the American nuclear umbrella that protected the allies. Serious splits were dangerous because they entailed the risk that the Soviet Union would be emboldened. This reason for avoiding squabbles disappeared along with the USSR, and the point is likely to generalize to other unipolar systems if they involve a decrease of threats that call for maintaining good relations with the superpower. This does not mean that even in this particular unipolar system the superpower is like Gulliver tied down by the Lilliputians. In some areas opposition can be self-defeating. Thus for any country to undermine American leadership of the international economy would be to put its own economy at risk, even if the U.S. did not retaliate, and for a country to sell a large proportion of its dollar holding would be to depress the value of the dollar, thereby diminishing the worth of the country’s remaining stock of this currency. Furthermore, cooperation often follows strong and essentially unilateral action. Without the war in Iraq it is not likely that we would have seen the degree of cooperation that the U.S. obtained from Europe in combating the Iranian nuclear program and from Japan and the PRC in containing North Korea. Nevertheless, many of the American goals depend on **persuading others, not coercing them**. Although incentives and even force are not irrelevant to spreading democracy and the free market, at bottom this requires people to embrace a set of institutions and values. Building the world that the U.S. seeks is a political, social, and even psychological task for which unilateral measures are likely to be unsuited and for which American military and economic strength can at best play a supporting role. Success requires that others share the American vision and **believe that its leadership is benign**. [End Page 211

### Yes Warming – Cuts Key

#### Warming is real, on the brink, and will have negative effects—CO2 emissions cuts vital—multiple warrants

Chen et al 10 Chen, Qian, Peridas, Qiu, Ho: Natural Resources Defense Council, Friedmann: Lawrence Livermore National Laboratory, Li, Wei: Institute of Rock and Soil Mechanics, Chinese Academy of Sciences, Sung, Fowler: Clean Air Task Force, Seligsohn, Liu, Forbes:

World Resources Institute, Zhang: China Tsinghua University, Zhao: Institute of Engineering Thermophysics, Chinese

Academy of Sciences (Jason Chen, Jingjing Qian, George Peridas, Yueming Qiu, Bruce Ho, Julio Friedmann, Xiaochun Li, Ning Wei, S. Ming Sung, Mike Fowler, Deborah Seligsohn, Yue Liu, Sarah Forbes, Dongjie Zhang, Lifeng Zhao, December 2010, “Identifying Near-Term Opportunities For Carbon Capture and Sequestration (CCS) in China,” [http://docs.nrdc.org/international/files/int\_10121001a.pdf)//DR](http://docs.nrdc.org/international/files/int_10121001a.pdf%29//DR). H

Scientific evidence has established that warming of the Earth’s climate system is unequivocal.2 The average atmospheric temperature near the surface has risen much faster over the past 150 years than during the thousands of years before, and over the last 50 years this warming trend has accelerated. During the last decade, the world experienced some of the highest average global temperatures in recorded history (see Table 1.1).3 **[table omitted]** Without a clean energy transformation away from coal and other fossil fuels, the detrimental effects of global warming will only intensify over the coming decades. These negative trends will include rising sea levels, more extreme weather patterns, rapidly-melting glaciers, damage to ecosystems, and the resurgence and spread of diseases. Scientific models warn that a 2°C to 4°C increase in global average temperatures would likely trigger sudden and irreversible effects, including the submersion of large areas of coastline due to significant sea level rises, abrupt shifts in global ocean circulation patterns causing large-scale climate change, and the potential extinction of 40 to 70 percent of species worldwide.4 Without significant global action, we may soon reach a tipping point upon which global warming begins to reinforce itself in hard-to-stop positive feedback cycles. For example, melting permafrost could unlock previously frozen greenhouse gases, which would accelerate and fuel the warming trend.5 To avoid the worst effects of this warming, the world must reduce emissions of CO2 and other greenhouse gases by drastically reducing its reliance on fossil fuels. To this end, governments around the world are moving toward a consensus that we must not allow global average temperatures to rise by more than 2°C above pre-industrial levels. This limit implies that the world as a whole must cut CO2 emissions in half by 2050 compared to 1990 levels.6

### Yes Warming – Real, Human Induced, Cuts Key

#### Warming is real and human induced – drastic emissions reductions are key to avoid dangerous climate disruptions

-now is key

-AR4 = IPCC

Somerville 11 – Professor of Oceanography @ UCSD

Richard Somerville, Distinguished Professor Emeritus and Research Professor at Scripps Institution of Oceanography at the University of California, San Diego, Coordinating Lead Author in Working Group I for the 2007 Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 3-8-2011, “CLIMATE SCIENCE AND EPA'S GREENHOUSE GAS REGULATIONS,” CQ Congressional Testimony, Lexis

1n early 2007, at the time of the publication of WG1 of AR4, the mainstream global community of climate scientists already understood from the most recent research that the latest observations of climate change were disquieting. In the words of a research paper published at the same time as the release of AR4 WG1, a paper for which I am a co-author, "observational data underscore the concerns about global climate change. Previous projections, as summarized by IPCC, have **not exaggerated** but may in some respects even have **underestimated the change**" (Rahmstorf et al. 2007). Now, in 2011, more recent research and newer observations have demonstrated that climate change continues to occur, and in several aspects the magnitude and rapidity of observed changes frequently **exceed the estimates of earlier projections**, including those of AR4. In addition, the case for attributing much observed recent climate change to human activities is **even stronger now** than at the time of AR4. Several recent examples, drawn from many aspects of climate science, but especially emphasizing atmospheric phenomena, support this conclusion. These include temperature, atmospheric moisture content, precipitation, and other aspects of the hydrological cycle. Motivated by the rapid progress in research, a recent scientific synthesis, The Copenhagen Diagnosis (Allison et al. 2009), has assessed recent climate research findings, including: -- Measurements show that the Greenland and Antarctic ice-sheets are losing mass and contributing to sea level rise. -- Arctic sea-ice has melted far beyond the expectations of climate models. -- Global sea level rise may attain or exceed 1 meter by 2100, with a rise of up to 2 meters considered possible. -- In 2008, global carbon dioxide emissions from fossil fuels were about 40% higher than those in 1990. -- At today's global emissions rates, if these rates were to be sustained unchanged, after only about 20 more years, the world will no **longer have a reasonable chance** of **limiting warming** to less than 2 degrees Celsius, or 3.6 degrees Fahrenheit, above 19th-century pre-industrial temperature levels, This is a much- discussed goal for a maximum allowable degree of climate change, and this aspirational target has now been formally adopted by the European Union and is supported by many other countries, as expressed, for example, in statements by both the G-8 and G-20 groups of nations. The Copenhagen Diagnosis also cites research supporting the position that, in order to have a reasonable likelihood of avoiding the risk of **dangerous climate disruption**, defined by this 2 degree Celsius (or 3.6 degree Fahrenheit) limit, global emissions of greenhouse gases such as carbon dioxide must peak and then start to **decline rapidly** within the next five to ten years, reaching near zero well within this century.

### Yes Warming – Human Induced

#### Warming is real and human induced – consensus is on our side – numerous studies prove

Rahmstorf 8 – Professor of Physics of the Oceans

Richard, of Physics of the Oceans at Potsdam University, Global Warming: Looking Beyond Kyoto, Edited by Ernesto Zedillo, “Anthropogenic Climate Change?,” pg. 42-4

It is time to turn to statement B: human activities are altering the climate. This can be broken into two parts. The first is as follows: global climate is warming. This is by now a generally undisputed point (except by novelist Michael Crichton), so we deal with it only briefly. The two leading compilations of data measured with thermometers are shown in figure 3-3, that of the National Aeronautics and Space Administration (NASA) and that of the British Hadley Centre for Climate Change. Although they differ in the details, due to the inclusion of different data sets and use of different spatial averaging and quality control procedures, they both show a consistent picture, with a global mean warming of 0.8°C since the late nineteenth century. Temperatures over the past ten years clearly were the warmest since measured records have been available. The year 1998 sticks out well above the longterm trend due to the occurrence of a major El Nino event that year (the last El Nino so far and one of the strongest on record). These events are examples of the largest natural climate variations on multiyear time scales and, by releasing heat from the ocean, generally cause positive anomalies in global mean temperature. It is remarkable that the year 2005 rivaled the heat of 1998 even though no El Nino event occurred that year. (A bizarre curiosity, perhaps worth mentioning, is that several prominent "climate skeptics" recently used the extreme year 1998 to claim in the media that global warming had ended. In Lindzen's words, "Indeed, the absence of any record breakers during the past seven years is statistical evidence that temperatures are not increasing.")33 In addition to the surface measurements, the more recent portion of the global warming trend (since 1979) is also documented by satellite data. It is not straightforward to derive a reliable surface temperature trend from satellites, as they measure radiation coming from throughout the atmosphere (not just near the surface), including the stratosphere, which has strongly cooled, and the records are not homogeneous' due to the short life span of individual satellites, the problem of orbital decay, observations at different times of day, and drifts in instrument calibration.' Current analyses of these satellite data show trends that are fully consistent with surface measurements and model simulations." If no reliable temperature measurements existed, could we be sure that the climate is warming? The "canaries in the coal mine" of climate change (as glaciologist Lonnie Thompson puts it) ~are mountain glaciers. We know, both from old photographs and from the position of the terminal moraines heaped up by the flowing ice, that mountain glaciers have been in retreat all over the world during the past century. There are precious few exceptions, and they are associated with a strong increase in precipitation or local cooling.36 I have inspected examples of shrinking glaciers myself in field trips to Switzerland, Norway, and New Zealand. As glaciers respond sensitively to temperature changes, data on the extent of glaciers have been used to reconstruct a history of Northern Hemisphere temperature over the past four centuries (see figure 3-4). Cores drilled in tropical glaciers show signs of recent melting that is unprecedented at least throughout the Holocene-the past 10,000 years. Another powerful sign of warming, visible clearly from satellites, is the shrinking Arctic sea ice cover (figure 3-5), which has declined 20 percent since satellite observations began in 1979. While climate clearly became warmer in the twentieth century, much discussion particularly in the popular media has focused on the question of how "unusual" this warming is in a longer-term context. While this is an interesting question, it has often been mixed incorrectly with the question of causation. Scientifically, how unusual recent warming is-say, compared to the past millennium-in itself contains little information about its cause. Even a highly unusual warming could have a natural cause (for example, an exceptional increase in solar activity). And even a warming within the bounds of past natural variations could have a predominantly anthropogenic cause. I come to the question of causation shortly, after briefly visiting the evidence for past natural climate variations. Records from the time before systematic temperature measurements were collected are based on "proxy data," coming from tree rings, ice cores, corals, and other sources. These proxy data are generally linked to local temperatures in some way, but they may be influenced by other parameters as well (for example, precipitation), they may have a seasonal bias (for example, the growth season for tree rings), and high-quality long records are difficult to obtain and therefore few in number and geographic coverage. Therefore, there is still substantial uncertainty in the evolution of past global or hemispheric temperatures. (Comparing only local or regional temperature; as in Europe, is of limited value for our purposes,' as regional variations can be much larger than global ones and can have many regional causes, unrelated to global-scale forcing and climate change.) The first quantitative reconstruction for the Northern Hemisphere temperature of the past millennium, including an error estimation, was presented by Mann, Bradley, and Hughes and rightly highlighted in the 2001 IPCC report as one of the major new findings since its 1995 report; it is shown in figure 3\_6.39 The analysis suggests that, despite the large error bars, twentieth-century warming is indeed highly unusual and probably was unprecedented during the past millennium. This result, presumably because of its symbolic power, has attracted much criticism, to some extent in scientific journals, but even more so in the popular media. The hockey stick-shaped curve became a symbol for the IPCC, .and criticizing this particular data analysis became an avenue for some to question the credibility of the IPCC. Three important things have been overlooked in much of the media coverage. First, even if the scientific critics had been right, this would not have called into question the very cautious conclusion drawn by the IPCC from the reconstruction by Mann, Bradley, and Hughes: "New analyses of proxy data for the Northern Hemisphere indicate that the increase in temperature in the twentieth century is likely to have been the largest of any century during the past 1,000 years." This conclusion has since been supported further by every single one of close to a dozen new reconstructions (two of which are shown in figure 3-6).Second, by far the most serious scientific criticism raised against Mann, Hughes, and Bradley was simply based on a mistake. 40 The prominent paper of von Storch and others, which claimed (based on a model test) that the method of Mann, Bradley, and Hughes systematically underestimated variability, "was [itself] based on incorrect implementation of the reconstruction procedure."41 With correct implementation, climate field reconstruction procedures such as the one used by Mann, Bradley, and Hughes have been shown to perform well in similar model tests. Third, whether their reconstruction is accurate or not has no bearing on policy. If their analysis underestimated past natural climate variability, this would certainly not argue for a smaller climate sensitivity and thus a lesser concern about the consequences of our emissions. Some have argued that, in contrast, it would point to a larger climate sensitivity. While this is a valid point in principle, it does not apply in practice to the climate sensitivity estimates discussed herein or to the range given by IPCC, since these did not use the reconstruction of Mann, Hughes, and Bradley or any other proxy records of the past millennium. Media claims that "a pillar of the Kyoto Protocol" had been called into question were therefore misinformed. As an aside, the protocol was agreed in 1997, before the reconstruction in question even existed. The overheated public debate on this topic has, at least, helped to attract more researchers and funding to this area of paleoclimatology; its methodology has advanced significantly, and a number of new reconstructions have been presented in recent years. While the science has moved forward, the first seminal reconstruction by Mann, Hughes, and Bradley has held up remarkably well, with its main features reproduced by more recent work. Further progress probably will require substantial amounts of new proxy data, rather than further refinement of the statistical techniques pioneered by Mann, Hughes, and Bradley. Developing these data sets will require time and substantial effort. It is time to address the final statement: most of the observed warming over the past fifty years is anthropogenic. A large number of studies exist that have taken different approaches to analyze this issue, which is generally called the "attribution problem." I do not discuss the exact share of the anthropogenic contribution (although this is an interesting question). By "most" I imply mean "more than 50 percent.”The first and crucial piece of evidence is, of course, that the magnitude of the warming is what is expected from the anthropogenic perturbation of the radiation balance, so anthropogenic forcing is able to explain all of the temperature rise. As discussed here, the rise in greenhouse gases alone corresponds to 2.6 W/tn2 of forcing. This by itself, after subtraction of the observed 0'.6 W/m2 of ocean heat uptake, would Cause 1.6°C of warming since preindustrial times for medium climate sensitivity (3"C). With a current "best guess'; aerosol forcing of 1 W/m2, the expected warming is O.8°c. The point here is not that it is possible to obtain the 'exact observed number-this is fortuitous because the amount of aerosol' forcing is still very' uncertain-but that the expected magnitude is roughly right. There can be little doubt that the anthropogenic forcing is large enough to explain most of the warming. Depending on aerosol forcing and climate sensitivity, it could explain a large fraction of the warming, or all of it, or even more warming than has been observed (leaving room for natural processes to counteract some of the warming). The second important piece of evidence is clear: there is no viable alternative explanation. In the scientific literature, no serious alternative hypothesis has been proposed to explain the observed global warming. Other possible causes, such as solar activity, volcanic activity, cosmic rays, or orbital cycles, are well observed, but they do not show trends capable of explaining the observed warming. Since 1978, solar irradiance has been measured directly from satellites and shows the well-known eleven-year solar cycle, but no trend. There are various estimates of solar variability before this time, based on sunspot numbers, solar cycle length, the geomagnetic AA index, neutron monitor data, and, carbon-14 data. These indicate that solar activity probably increased somewhat up to 1940. While there is disagreement about the variation in previous centuries, different authors agree that solar activity did not significantly increase during the last sixty-five years. Therefore, this cannot explain the warming, and neither can any of the other factors mentioned. Models driven by natural factors only, leaving the anthropogenic forcing aside, show a cooling in the second half of the twentieth century (for an example, See figure 2-2, panel a, in chapter 2 of this volume). The trend in the sum of natural forcings is downward.The only way out would be either some as yet undiscovered unknown forcing or a warming trend that arises by chance from an unforced internal variability in the climate system. The latter cannot be completely ruled out, but has to be considered highly unlikely. No evidence in the observed record, proxy data, or current models suggest that such internal variability could cause a sustained trend of global warming of the observed magnitude. As discussed, twentieth century warming is unprecedented over the past 1,000 years (or even 2,000 years, as the few longer reconstructions available now suggest), which does not 'support the idea of large internal fluctuations. Also, those past variations correlate well with past forcing (solar variability, volcanic activity) and thus appear to be largely forced rather than due to unforced internal variability." And indeed, it would be difficult for a large and sustained unforced variability to satisfy the fundamental physical law of energy conservation. Natural internal variability generally shifts heat around different parts of the climate system-for example, the large El Nino event of 1998, which warmed, the atmosphere by releasing heat stored in the ocean. This mechanism implies that the ocean heat content drops as the atmosphere warms. For past decades, as discussed, we observed the atmosphere warming and the ocean heat content increasing, which rules out heat release from the ocean as a cause of surface warming. The heat content of the whole climate system is increasing, and there is no plausible source of this heat other than the heat trapped by greenhouse gases. ' A completely different approach to attribution is to analyze the spatial patterns of climate change. This is done in so-called fingerprint studies, which associate particular patterns or "fingerprints" with different forcings. It is plausible that the pattern of a solar-forced climate change differs from the pattern of a change caused by greenhouse gases. For example, a characteristic of greenhouse gases is that heat is trapped closer to the Earth's surface and that, unlike solar variability, greenhouse gases tend to warm more in winter, and at night. Such studies have used different data sets and have been performed by different groups of researchers with different statistical methods. They consistently conclude that the observed spatial pattern of warming can only be explained by greenhouse gases.49 Overall, it has to be considered, highly likely' that the observed warming is indeed predominantly due to the human-caused increase in greenhouse gases. ' This paper discussed the evidence for the anthropogenic increase in atmospheric CO2 concentration and the effect of CO2 on climate, finding that this anthropogenic increase is proven beyond reasonable doubt and that a mass of evidence points to a CO2 effect on climate of 3C ± 1.59C global-warming for a doubling of concentration. (This is, the classic IPCC range; my personal assessment is that, in-the light of new studies since the IPCC Third Assessment Report, the uncertainty range can now be narrowed somewhat to 3°C ± 1.0C) This is based on consistent results from theory, models, and data analysis, and, even in the absence-of any computer models, the same result would still hold based on physics and on data from climate history alone. Considering the plethora of consistent evidence, the chance that these conclusions are wrong has to be considered minute. If the preceding is accepted, then it follows logically and incontrovertibly that a further increase in CO2 concentration will lead to further warming. The magnitude of our emissions depends on human behavior, but the climatic response to various emissions scenarios can be computed from the information presented here. The result is the famous range of future global temperature scenarios shown in figure 3\_6.50 Two additional steps are involved in these computations: the consideration of anthropogenic forcings other than CO2 (for example, other greenhouse gases and aerosols) and the computation of concentrations from the emissions. Other gases are not discussed here, although they are important to get quantitatively accurate results. CO2 is the largest and most important forcing. Concerning concentrations, the scenarios shown basically assume that ocean and biosphere take up a similar share of our emitted CO2 as in the past. This could turn out to be an optimistic assumption; some models indicate the possibility of a positive feedback, with the biosphere turning into a carbon source rather than a sink under growing climatic stress. It is clear that even in the more optimistic of the shown (non-mitigation) scenarios, global temperature would rise by 2-3°C above its preindustrial level by the end of this century. Even for a paleoclimatologist like myself, this is an extraordinarily high temperature, which is very likely unprecedented in at least the past 100,000 years. As far as the data show, we would have to go back about 3 million years, to the Pliocene, for comparable temperatures. The rate of this warming (which is important for the ability of ecosystems to cope) is also highly unusual and unprecedented probably for an even longer time. The last major global warming trend occurred when the last great Ice Age ended between 15,000 and 10,000 years ago: this was a warming of about 5°C over 5,000 years, that is, a rate of only 0.1 °C per century. 52 The expected magnitude and rate of planetary warming is highly likely to come with major risk and impacts in terms of sea level rise (Pliocene sea level was 25-35 meters higher than now due to smaller Greenland and Antarctic ice sheets), extreme events (for example, hurricane activity is expected to increase in a warmer climate), and ecosystem loss. The second part of this paper examined the evidence for the current warming of the planet and discussed what is known about its causes. This part showed that global warming is already a measured and-well-established fact, not a theory. Many different lines of evidence consistently show that most of the observed warming of the past fifty years was caused by human activity. Above all, this warming is exactly what would be expected given the anthropogenic rise in greenhouse gases, and no viable alternative explanation for this warming has been proposed in the scientific literature. Taken together., the very strong evidence accumulated from thousands of independent studies, has over the past decades convinced virtually every climatologist around the world (many of whom were initially quite skeptical, including myself) that anthropogenic global warming is a reality with which we need to deal.

#### There is no other viable explanation

Rahmstorf 8 – Professor of Physics of the Oceans

Richard, of Physics of the Oceans at Potsdam University, Global Warming: Looking Beyond Kyoto. Edited by Ernesto Zedillo. “Anthropogenic Climate Change?” pg. 47

The first and crucial piece of evidence is, of course, that the magnitude of the warming is what is expected from the anthropogenic perturbation of the radiation balance, so anthropogenic forcing is able to explain all of the temperature rise. As discussed here, the rise in greenhouse gases alone corresponds to 2.6 W/m of forcing. This by itself, after subtraction of the observed 0.6 W/nr of ocean heat uptake, would cause 1.6°C of warming since preinduslrial times for medium climate sensitivity (3°C). With a current "best guess" aerosol forcing of 1 W/m\ the expected warming is 0.8°C. The point here is not that it is possible to obtain the exact observed number—this is fortuitous because the amount of aerosol forcing is still very uncertain—but that the expected magnitude is roughly right. There can be **little doubt** that the anthropogenic forcing is large enough to explain most of the warming. Depending on aerosol forcing and climate sensitivity, it could explain a large fraction of the warming, or all of it, or even more warming than has been observed (leaving room for natural processes to counteract some of the warming). The second important piece of evidence is clear: **there is no viable alternative explanation**. In the scientific literature, **no serious alternative hypothesis** has been proposed to explain the observed global warming. Other possible causes, such as solar activity, volcanic activity, cosmic rays, or orbital cycles, arc well observed, but they do not show trends capable of explaining the observed warming. Since 1978, solar irradiance has been measured directly from satellites and shows the well-known eleven-year solar cycle, but no trend.44 There arc various estimates of solar variability before this time, based on sunspot numbers, solar cycle length, the geomagnetic AA index, neutron monitor data, and carbon- 1 A data. These indicate that solar activity probably increased somewhat up to 1940. While there is disagreement about the variation in previous centuries, different authors agree that solar activity did not significantly increase during the last sixty-five years.''11 Therefore, this cannot explain the warming, and neither can any of the other factors mentioned. Models driven by natural factors only, leaving the anthropogenic forcing aside, show a cooling in the second half of the twentieth century (for an example, see figure 2-2, panel a, in chapter 2 of this volume). The trend in the sum of natural forcings is downward.

### Yes Warming – Human Induced

#### Warming is human induced

Zweirs 11 – Professor of Mathematics and Statistics @ Victoria

Francis Zweirs, Professor of Math and Statistics, Chief of the Canadian Centre for Climate Modelling and Analysis, Atmospheric Environment Service, Victoria, 3-8-2011, “CLIMATE SCIENCE AND EPA'S GREENHOUSE GAS REGULATIONS,” CQ Congressional Testimony, Lexis

The effect of **greenhouse gas induced warming is** modulated to some extent by other influences on the climate system, including that of aerosols, volcanic activity, and solar activity (Hegerl et al., 1997; Tett et al., 1999; Huntingford et al., 2006; Hegerl et al., 2007) as well as natural internal variability. It is acknowledged that there have likely also been influences from regionally important forcing agents, such as land use change (Portmann et al., 2009) and some types of aerosols (including black carbon - soot; Jones et al., 2011); some of which may have regional cooling influences, but the science has not yet been able to quantify the extent to which these factors have affected regional temperatures. Against this backdrop of natural variability and possible regional influences, it is not surprising that warming should be less evident at some times than others, or that it should be less evident in some regions, such as in the US "warming hole" (Kunkel et al., 2006; Portmann et al., 2009; Christidis et al., 2010). That there should be a warming effect is **an unassailable fact of science**. Human use of fossil fuels and the land surface have lead to an increase in the atmospheric concentration of CO2 from about 280 ppmv prior to industrialization to approximately 390 ppmv today (GAW, 2010). Concentrations continue to rise at a rate of about 2 ppmv per year. CO2 is a gas that is transparent to sunlight, and thus its presence in the atmosphere does not impede the flow of energy into the Earth system. Sunlight, which powers the Earth system, is either reflected back to space (by clouds, reflective aerosols, or the Earth's surface), or absorbed and converted to heat. In order to maintain a constant temperature, the Earth must, in turn, radiate the heat that is produced from sunlight back to space. However, higher levels of CO2 and other greenhouse gases in the atmospheric make it more difficult for heat to exit the system because these gases not fully transparent to infrared (heat) radiation. This inevitably leads to a warming, the magnitude of which depends upon various "feedback" processes. Science has been aware of this warming effect, which is now well evident in observations, since the 19th century (Fourier, 1824; Arrhenius, 1896; Harries et al., 2001).

#### Human induced – human impact is much greater than natural forcing

Hansen 9 – Professor of Environmental Science @ Columbia

James, director of NASA Goddard Institute for Space Studies and professor in the Department of Earth and Environmental Sciences @ Columbia University. “Storms of my Grandchildren: The Truth About the Coming Climate Catastrophe and our Last Chance to Save Humanity” pg. 9

What is clear is that human-made climate forcings added in just the past several decades already dwarf the natural forcing associated with the Little ice Age. Carbon dioxide increased from 280 parts per million (ppm; thus 0.028 percent atmospheric molecules) in 1750 to 370 ppm in 2000 (and to 287 ppm in 2009). The impact of this Co2 change on Earth’s radiation balance can be calculated accurately, with an uncertainty of less than 15 percent. The climate forcing due to the 1750-2000 CO2 increase is about 1.5 watts. Other human-caused changes, such as adding methane, nitrous oxygen, chlorofluorocarbons (CFCs), and ozone to the atmosphere, make the total greenhouse gas forcing about 3 watts.

### Co2 Key

#### Co2 is key

UCS 09 (Union of Concerned Scientists, “Global Warming FAQ,” Union of Concerned Scientists, 7/14/2009, <http://www.ucsusa.org/global_warming/science_and_impacts/science/global-warming-faq.html>, ADP)

Global warming is primarily a problem of too much carbon dioxide in the atmosphere.  This carbon overload is caused mainly when we burn fossil fuels like coal, oil and gas or cut down and burn forests. There are many heat-trapping gases (from methane to water vapor), but CO2 puts us at the greatest risk of irreversible changes if it continues to accumulate unabated in the atmosphere. There are two key reasons why. CO2 has caused most of the warming and its influence is expected to continue. CO2, more than any other climate driver, has contributed the most to climate change between 1750 and 2005.[1, 2, 3] The Intergovernmental Panel on Climate Change (IPCC) issued a global climate assessment in 2007 that compared the relative influence exerted by key heat-trapping gases, tiny particles known as aerosols, and land use change of human origin on our climate between 1750 and 2005.[3] By measuring the abundance of heat-trapping gases in ice cores, the atmosphere, and other climate drivers along with models, the IPCC calculated the “radiative forcing” (RF) of each climate driver—in other words, the net increase (or decrease) in the amount of energy reaching Earth’s surface attributable to that climate driver. Positive RF values represent average surface warming and negative values represent average surface cooling. CO2 has the highest positive RF (see Figure 1) of all the human-influenced climate drivers compared by the IPCC. Other gases have more potent heat-trapping ability molecule per molecule than CO2 (e.g. methane), but are simply far less abundant in the atmosphere and being added more slowly.

### Must Act Now

#### Must act now – solves risky and expensive solutions in crisis

Carnesale 11 – Professor of Engineering @ UCLA

Albert, PhD in Nuclear Engineering, UCLA Chancellor Emeritus, Professor of Public Policy and Mechanical and Aerospace Engineering, 3-2011, “America’s Climate Choices,” http://americasclimatechoices.org/ACC\_Final\_Report\_Brief04.pdf

In the judgment of this report’s authoring committee, the environmental, economic, and humanitarian risks posed by climate change indicate a pressing need for substantial action to limit the magnitude of climate change and to prepare for adapting to its impacts. There are many reasons why it is imprudent to delay such actions, for instance: • The sooner that serious efforts to reduce greenhouse gas emissions proceed, the lower the risks posed by climate change, and the less pressure there will be to make larger, more rapid, and potentially more expensive reductions later. • Some climate change impacts, once manifested, will persist for hundreds or even thousands of years, and will be difficult or impossible to “undo.” In contrast, many actions taken to respond to climate change could be reversed or scaled back, if they some how prove to be more stringent than actually needed.

#### Only action now solves future catastrophe

Antholis and Talbott 10 – Director and President @ Brookings

William Antholis, managing director of the Brookings Institution and a senior fellow in Governance Studies, former director of studies at the German Marshall Fund of the United States, and Strobe Talbott, president of the Brookings Institution, deputy Sec. of State under Clinton, “The Global Warming Tipping Point,” The Globalist, http://www.theglobalist.com/storyid.aspx?StoryId=8523

Moreover, we need to start reductions now in order to slow temperature rise later. Even if we could flip a switch and shut down all emissions, gases that are already in the atmosphere will continue to trap heat for some time to come. Once emitted into the atmosphere, a molecule of carbon dioxide, or CO2, lingers for decades. So gases emitted today are added to ones that have been around for 50 years or more. The current concentration of CO2 in the atmosphere is about 385 parts per million (ppm) and growing by two ppm each year. If we continue with current warming trends, the globe could keep warming for millennia. Even if the human species is biologically resilient enough to survive for centuries, the human enterprise may well be hard to maintain in anything like its current form. Today, humanity is cumulatively emitting, on a yearly basis, around 30 gigatons of CO2. A gigaton is a billion tons. Thirty gigatons is about the weight of 8,000 Empire State Buildings, which, if stacked one on top of another, would reach almost 2,000 miles into space. Of those 30 gigatons of CO2 that will be emitted this year, just under six gigatons are from the United States. To keep CO2 concentrations below 400 ppm and thereby keep temperature rise below 3.6°F, we should use the next four decades to cut the current output of 30 gigatons a year approximately in half. Thirty gigatons is about the weight of 8,000 Empire State Buildings, which, if stacked one on top of another, would reach almost 2,000 miles into space. So that is another target for mitigation: a staged process that would bring the global annual output down to 15 gigatons a year by 2050. To reach that goal, we have to build a new worldwide system for generating and using energy. We have to begin quickly in order to achieve the bulk of the necessary cuts between 2020 and 2035 so that there is some hope that, by 2050, emissions will have come down to 15 gigatons, concentrations will have stabilized below the 400 ppm level — and temperature rise will have flattened out before hitting the 3.6°F mark. At the heart of this mammoth undertaking is a transition from a high-carbon to a low-carbon global economy — that is, one that is powered as much as possible by forms of energy that do not burn fossil fuels and therefore do not pump CO2 into the atmosphere.

#### Acting now is key to avoiding tipping points

Strom 7 – Professor of Planetary Science @ U of Arizona

Robert Strom, studied climate change for 15 years, the former Director of the Space Imagery Center, Professor of planetary sciences @ U of Arizona, "Hot House", SpringerLink, p. 123

 We do not have time to spare. We must act now. Delaying action will require a much greater effort later to achieve the same temperature target. Even a 5-year delay is significant, given the current increase in C02 emissions. If action is delayed 20 years, rates of emission reduction will need to be 3 to 7 times greater to meet the same temperature target (Schellnhuber et al., 2006). In the absence of urgent and strenuous reduction in greenhouse gas emissions, the world will be committed to at least a 0.5 to 2 °C rise by 2050, and it could be considerably more because of the factors mentioned earlier. None of the greenhouse gas or temperature projections take into account the possibility of crossing a threshold that leads to an abrupt climate warming by the catastrophic release of natural greenhouse gases or some other cause. Although this is considered unlikely, we do not know in detail how these abrupt changes are triggered. Could the rise of atmospheric greenhouse gases and the complex interactions of other warming conditions set one of these events into motion? We do not know, but if it happened we would be in the **worst trouble imaginable**.

### Brink of Runaway Warming

#### Tipping points now – on the brink of runaway warming

Speth 8 – Dean of Yale school of Forestry

James, dean of the Yale School of Forestry and Environmental Studies at Yale University, New Haven, Connecticut. Currently he serves the school as the Carl W. Knobloch, Jr. Dean and Sara Shallenberger Brown Professor in the Practice of Environmental Policy, The Bridge @ the Edge of the World, pg. 26

The possibility of abrupt climate change is linked to what may be the most problematic possibility of all—"positive" feedback effects where the initial warming has effects that generate more warming. Several of these feedbacks are possible. First, the land's ability to store carbon could weaken. Soils and forests can dry out or burn and release carbon; less plant growth can occur, thus reducing nature's ability to remove carbon from the air. Second, carbon sinks in the oceans could also be reduced due to ocean warming and other factors. Third, the potent greenhouse gas methane could be released from peat bogs, wetlands, and thawing permafrost, and even from the methane hydrates in the oceans, as the planet warms and changes. Finally, the earth's albedo, the reflectivity of the earth's surface, is slated to be reduced as large areas now covered by ice and snow diminish or are covered by meltwater. All these effects would tend to **make warming self-reinforcing**, possibly leading to a greatly amplified greenhouse effect. The real possibility of these amplifying feedbacks has alarmed some of our top scientists. James Hansen, the courageous NASA climate scientist, is becoming increasingly outspoken as his investigations lead him to more and more disturbing conclusions. He offered the following assessment in 2007: "Our home planet is now **dangerously near a 'tipping point**.' Human-made greenhouse gases are near a level such that important climate changes may proceed mostly under the climate system's own momentum. Impacts would include **extermination of a large fraction of species on the planet**, shifting of climatic zones due to an intensified hydrologic cycle with effects on freshwater availability and human health, and repeated worldwide coastal tragedies associated with storms and a continuously rising sea level. .. . "Civilization developed during the Holocene, a period of relatively tranquil climate now almost 12,000 years in duration. The planet has been warm enough to keep ice sheets off North America and Europe, but cool enough for ice sheets on Greenland and Antarctica to be stable. Now, with rapid warming of o.6°C in the past 30 years, global temperature is at its warmest level in the Holocene. "This warming has brought us to the precipice of a great 'tipping point” If we go over the edge, it will be a transition to 'a different planet,' an environment far outside the range that has been experienced by humanity. There **will be no return** within the lifetime of any generation that can be imagined, and the trip will **exterminate a large fraction of species on the planet.**

### Brink of Biodiversity Loss

#### On the brink of massive biodiversity loss

Speth 8 – Dean of Yale school of Forestry

James, dean of the Yale School of Forestry and Environmental Studies at Yale University, New Haven, Connecticut. Currently he serves the school as the Carl W. Knobloch, Jr. Dean and Sara Shallenberger Brown Professor in the Practice of Environmental Policy, The Bridge @ the Edge of the World, pg. 37

The cumulative effect of all the factors is that species loss today is estimated to be about a thousand times the natural or normal rate that species go extinct.65 Many scientists believe we are on the **brink of the sixth great wave of species** **loss** on earth, the only one caused by humans. The World Conservation Union, which keeps the books on species, estimates that two of every five recognized species on the planet risk extinction, including one in eight birds, one in four mammals, and one in three amphibians.66 Almost 95 percent of the leather-back turtles in the Pacific have disappeared in the past twenty years;67 at least nine and perhaps 122 amphibian species have gone extinct since 1980;68 tigers are on the verge of extinction in the wild 69 populations of nearly half the world's waterbird species are in decline, and populations of twenty common American meadow birds like the bobwhite and the meadowlark have lost more than half their populations in forty years.

### Side Constraint / Precautionary Principle

#### Catastrophic climate change should be measured as the highest priority – do not discount the unpredictable impact it will have on future generations. This is distinctly different from impacts that do not threaten human survival

Scorse 8 – Professor of International Studies

Jason, Assistant Professor @ Monterey Institute of International Studies @ Middlebury College, What Environmentalists Need to Know About Economics, Online Book

Even though the science now confirms that human activity is contributing to global warming and that this warming is likely to continue if we do not dramatically reduce our greenhouse gas emissions, we are still highly uncertain as to what the end results of this warming will be (Parry et al, 2007). We can be sure about a few things-less Arctic ice, more storms, sea level rise-but the range of possibilities still includes some not-so-catastrophic outcomes along with some potentially cataclysmic scenarios; e.g. major new storm activity, sever draught, major species extinction, and the major inundation of coastal areas. Weitzman argues that a **small probability** of catastrophic damage may be enough to force us to err on the side of action over inaction, even if the most likely average future benefits of action do not merit such a response. Putting a high premium on worst-case scenarios tilts us in the direction of a zero discount rate not because we actually value benefits to people 100 years from now as much as we value benefits today (as many environmentalists and the authors of the Stern Review would like us to believe), but because when our actions pose a reasonably significant risk of making the **world much less livable** in the future then we have an obligation to go out of our way to reduce that risk. This rationale is not operative when assessing the benefits of most types of environmental investments because they do not pose such dire scenarios. For example, cleaning up a waterway or expanding open space, while perhaps in society's interests, will not greatly impact humanity's chance for survival or greatly affect overall living standards to anywhere near the degree that climate change might. When posed with these more common scenarios we should revert back to the basic arguments for choosing the proper discount rate.

#### Because climate change is irreversible we must err on the side of preventing it even if the scientific evidence is debatable

Sunstein 7 – Professor of Political Science

Cass R., Professor in the Department of Political Science and at the Law School of the University of Chicago, 2007, “Worst-Case Scenarios”, Harvard University Press

Most worst-case scenarios appear to have an element of irreversibility. Once a species is lost, it is lost forever. The special concern for endangered species stems from the permanence of their loss (outside of Jurassic Park). One of the most serious fears associated with genetically modified organisms is that they might lead to irreversible ecological harm. Because some greenhouse gases stay in the atmosphere for centuries, the problem of climate change may be irreversible, at least for all practical purposes. Transgenic crops can impose irreversible losses too, because they can make pests more resistant to pesticides. If we invest significant wealth in one source of energy and neglect others, we may be effectively stuck forever, or at least for a long time. One objection to capital punishment is that errors cannot be reversed. In ordinary life, our judgments about worst-case scenarios have everything to do with irreversibility. Of course an action may be hard but not impossible to undo, and so there may be a continuum of cases, with different degrees of difficulty in reversing. A marriage can be reversed, but divorce is rarely easy; having a child is very close to irreversible; moving from New York to Paris is reversible, but moving back may be difficult. People often take steps to avoid courses of action that are burdensome rather than literally impossible to reverse. In this light, we might identify an Irreversible Harm Precautionary Principle, applicable to a subset of risks.' As a rough first approximation, the principle says this: Special steps should be taken to avoid irreversible harms, through precautions that go well beyond those that would be taken if irreversibility were not a problem. The general attitude here is "act, then learn," as opposed to the tempting alternative of "wait and learn." In the case of climate change, some people believe that research should be our first line of defense. In their view, we should refuse to commit substantial resources to the problem until evidence of serious harm is unmistakably clear.' But even assuming that the evidence is not so clear, research without action allows greenhouse gas emissions to continue, which might produce risks that are irreversible, or at best difficult and expensive to reverse. For this reason, the best course of action might well be to take precautions now as a way of preserving flexibility for future generations. In the environmental context in general, this principle suggests that regulators should proceed with far more aggressive measures than would otherwise seem justified.

#### Policymakers cannot take the risk based on simple uncertainty over the science

Cerutti 7 – Professor of Political Philosophy

Furio Cerutti, Professor of Political Philosophy at the University of Florence, “Global Challenges for Leviathan: A Political Philosophy of Nuclear Weapons and Global Warming.” Lexington Books. p. 31

The second feature of the impasse is irreversibility, which is peculiar to the worst outcomes of global challenges and to some more ordinary issues of environmental policy as well, for example, the extinction of a species. We cannot completely undo the hole in the ozone layer (it will take decades to re­cover, even if we totally and immediately stop using chlorofluorocarbons); nor can we be confident that, after a large nuclear war, we would be able to reconstruct world society as we did after World War II. Not addressing the global challenges is not a risk that can be taken in the expectation that, if something goes wrong, we pay the price owed and go back to business as usual, or nearly as usual, as happened after Hiroshima and Chemobyl. The difference is-and this is the third aspect of the impasse-even greater, at least with regard to nuclear weapons: if something goes wrong, it could be not just "something," but everything and everyone that is doomed. Among the casualties there would probably be the very actor (humanity as a civilized species) who calculated and decided to take the risk (even if the calculation and decision were actually made by few leading members of our kind, a fact whose relevance we will soon assess). This is a circumstance that is not considered in any theory or philosophy of risk and is rather likely to outmaneuver this altogether. Whoever would counter this argument with reference to an established game like Russian roulette, should bear in mind that in this game 1. the player has something to gain, if s/he wins and does not lose her/his life (money, self-esteem, or social esteem because of her/his "courage"); 2. if s/he kills himself, s/he only kills her/himself and not others (a collective version of the game has not been proposed); 3. others (family, group) could even reap benefit from the money or the fame s/he may leave behind. None of these circumstances or opportunities apply to our risky game with lethal weapons. If we want to preserve our modem ability to rationally take risks, we should not deal with global and ultimate menaces as if they were risks to be taken. There is nothing to be gained by taking them. The unprecedented severity of the possible losses and the uncertainty in which these issues are enveloped request a different approach, which will be looked into in the last three chapters.

#### The aff solves – climate change is an internal link to ethics

Donald A Brown 2002 – Associate Professor of Environmental Ethics, Science, and Law at Penn State University (American Heat: Ethical Problems with the United States’ Response to Global Warming, Rowman and Littlefield publishers, inc.)

Yet there is little evidence that awareness of the urgency of the climate change problems is being felt at a gut level in the United States. There is even less evidence that Americans see the gross ethical failure entailed by the U.S. response to global warming that will be examined in this book. There are several reasons why there is as yet no moral outcry in the United States on climate change. Unlike the brutal television images of dogs and police attacking defenseless civil rights marchers that galvanized the public in the early 1960s, there is little direct visible evidence that demonstrates how human suffering is being caused in the rest of the world by the use of sports utility vehicles in the United States. To understand the climate change problem well enough to trigger distress at the unethical behavior of those who are causing it, one must understand things that are not immediately evident to the naked eye, such as the burning of fossil fuels in the United States may affect people who are separated by great time and distance. Most ethical systems and our intuitive ethical sensitivity are focused on one’s responsibilities to people who are close by and who can be directly affected by one’s actions. The technical power that humans now have to adversely affect people separated by time and space is a great new challenge to ethical reasoning. Yet because human-induced climate change will most hurt the poorest in the planet, seriously reduce the quality of life for future generations, and threaten plants and animals, around the world, climate change and other emerging global environmental problems must be understood to raise very serious ethical issues. In addition to these difficulties in seeing our ethical obligations caused by our separation from the impacts in time and space, this failure to see the ethical dimensions entailed by the climate change problem has at least several additional causes. First, as is discussed throughout this book, representatives of the fossil fuel industry and some heavy industry in the United States have successfully controlled the articulation of climate change issues in ways that have deflected our attention away from the ethical dimensions of the global warming problem. That is, these economically interested parties have successfully made certain issues the central focus of debate in the United States on climate change, issues that appear on their surface to be “value-neutral” disputes about scientific and economic “facts.” These issues include questions of scientific uncertainty of climate change impacts, whether cost-benefit analyses justify government action to reduce greenhouse gases, and other issues that tend to deflect public scrutiny from the ethical questions entailed by human-induced global warming. Like the magician who tricks his audience to pay attention to someplace other than where the rabbit is being put into the hat, this book demonstrates how these economic interests have over and over again deflected public attention from an ethical framing of human-induced climate change issues.

#### Developed countries are morally and ethically obligated to address climate change

Donald A Brown 1/3/2012 – Associate Professor of Environmental Ethics, Science, and Law at Penn State (Ethical Analysis of the Climate Change Disinformation Campaign: Introduction to A Series, Rock Ethic Institute, <http://rockblogs.psu.edu/climate/2012/01/ethical-analysis-of-the-climate-change-disinformation-campaign-introduction-to-a-series.html>)

Climate change must be understood to be at its core an ethical problem because: (a) it is a problem caused by some people in one part of the world who are threatening poor people who are often far away in time and space, (b) the harms to these victims are potentially catastrophic, and (c) the victims can't protect themselves by petitioning their governments who have no jurisdiction over those causing the problem. The victims must hope that those causing the problem will see that their ethical duties to the vulnerable require them to lower their greenhouse gas emissions. Because climate change is an ethical problem, those causing the problem may not use self-interest alone as justification for policy responses; they must fulfill responsibilities, obligations and duties to others. Because climate change is a moral problem, those who are putting others at risk through no fault of their own have a special duty to be precautious about scientific uncertainty. If anything, the need for care in considering harms from powerful technology recognized by Jonas is even more salient in the case of a problem like climate change because it is a problem that is caused by some that are putting others at great risk that have not consented to be threatened. This series should not be construed to discourage scientific skepticism. Skepticism is both the oxygen and catalyst of science. Climate science continues to need skeptical approaches to current understandings of how human activities may affect the climate to help scientists understand what we don't know about human impacts on the climate system. However, a review of the tactics used by the scientific disinformation campaign will reveal that these tactics can't be construed as the application of reasonable scientific skepticism, but, as we shall see, often constitute malicious, morally reprehensible disinformation. Yet these tactics provide important lessons about norms that should guide reasonable skepticism.

### Human Extinction

#### Warming leads to extinction

Burkett 8 – Professor of Law

Maxine Burkett, Associate Professor, University of Colorado Law School, 2008, “Just Solutions to Climate Change: A Climate Justice Proposal for a Domestic Clean Development Mechanism,” 56 Buffalo L. Rev. 169, Lexis

The unparalleled scale of impact the climate crisis has had, and will continue to have, on the globe has been forecasted for almost a century. 3 Most recently, the Intergovernmental Panel on Climate Change (IPCC) has concluded that the warming of the climate system is "unequivocal." 4 With this warming comes the threat of more [\*174] extreme weather, including more intense and longer droughts than have already been observed, 5 heavy precipitation including increased intensity of tropical cyclones, 6 and hot extremes and heat waves. 7 While these changes sound merely inconvenient and perhaps costly, they have been described by the IPCC Chairman, without hyperbole, as dangers that risk "**the ability of the human race to survive**." 8 In the short term, these extremes will risk the survival of communities that are ill-equipped to adapt to warming as they struggle to moderate and cope with its consequences.

#### Tipping points coming soon – risk extinction

Hamilton 10 – Professor of Public Ethics @ ANU

Clive Hamilton, Professor of Public Ethics in Australia, 2010, “Requiem for a Species: Why We Resist the Truth About Climate Change,” pg. 1-2

One of the most striking features of the global warming debate has been how, with each advance in climate science, the news keeps getting worse. Although temporarily slowed by the effects of the 2008 global financial crisis, the world's greenhouse gas emissions have been growing much faster than predicted in the 1990s. In addition, since 2005 a number of scientific papers have described the likelihood of the climate system passing significant 'tipping points' beyond which the warming process is reinforced by positive feedback mechanisms—small perturbations that cause large changes.1 This new understanding has upset the comforting idea of a 'dose—response' relationship between the amount of greenhouse gases we put into the atmosphere and the amount of global warming that follows. That idea has allowed us to believe that, although we may be slow to respond, once we decide to act we will be able to rescue the situation. In truth, it is likely that in the next decade or so, beginning with the melting of the Arctic's summer sea-ice, the Earth's climate will shift onto a new trajectory driven by 'natural' processes that will **take millenniums** to work themselves out. The paleoclimate record shows the Earth's climate often changing abruptly, flipping from one state to another, sometimes **within a few years**.2 It now seems almost certain that, if it has not occurred already, within the next several years enough warming will be locked in to the system to set in train feedback processes that will **overwhelm any attempts** we make to cut back on our carbon emissions. We will be powerless to stop the jump to a new climate on Earth, one much less sympathetic to life. The kind of climate that has allowed civilisation to flourish will be gone and humans will enter a **long struggle just to survive**.

#### Global warming will reach a tipping point within the decade – positive feedbacks would raise sea levels, threaten food security, collapse states, and end civilization

Brown 8 – Professor @ CAS

Lester E. Brown, Director and Founder of the global institute of Environment in the U.S., “Plan B 3.0: Mobilizing to Save Civilization,” Factiva

In 2004, Stephen Pacala and Robert Socolow at Princeton Uni­versity published an article in *Science* that showed how annual carbon emissions from fossil fuels could be held at 7 billion tons instead of rising to 14 billion tons over the next 50 years, as would occur with business as usual. The goal of Pacala, an ecol­ogist, and Socolow, an engineer, was to prevent atmospheric CO2 concentrations, then near 375 ppm, from rising above 500 ppm. I They described *IS* ways, all using proven technologies, that by *20S4* could each cut carbon emissions by 1 billion tons per year. Any seven of these options could be used together to pre­vent an increase in carbon emissions through 2054. Pacala and Socolow further theorize that advancing technology would allow for annual carbon emissions to be cut to 2 billion tons by 2104, a level that can be absorbed by natural carbon sinks in land and oceans. The Pacala/Socolow conceptualization has been extraordi­narily useful in helping to think about how to cut carbon emis­sions. During the three years since the article was written, the urgency of acting quickly and on a much larger scale has become obvious. We also need now to go beyond the conceptu­al approach that treats all potential methods of reducing carbon emissions equally and concentrate on those that are most prom­ising. Researchers such as James Hansen, a leading climate scien­tist at NASA, believe that global warming is accelerating and may be approaching a tipping point, a point at which climate change acquires a momentum that makes it irreversible. They think we may have a decade to turn the situation around before this threshold is crossed. I agree.?3 We often hear descriptions of what we need to do in the decades ahead or by 2050 to avoid "dangerous climate change," but we are already facing this. Two thirds of the glaciers that feed the Yellow and Yangtze rivers of China will disappear by 2060 if even the current 7 percent annual rate of melting con­tinues. Glaciologists report that the Gangotri glacier, which supplies 70 percent of the ice melt that feeds the Ganges River during the dry season, could disappear entirely in a matter of decades.74 What could threaten world food security more than the melt­ing of the glaciers that feed the major rivers of Asia during the dry season, the rivers that irrigate the region's rice and wheat fields? In a region with half the world's people, this potential loss of water during the dry season could lead not just to hunger but to starvation on an unimaginable scale. Asian food security would take a second hit because its rice­-growing river deltas and floodplains would be under water. The World Bank tells us that a sea level rise of only 1 meter would inundate half of the riceland in Bangladesh. While a 1-meter rise in sea level will not happen overnight, what is worrisome is that if ice melting continues at today's rates, at some point such a rise in sea level will no longer be preventable. The melting that would cause this is not just what may happen if the earth's tem­perature rises further; this is something that is starting to hap­pen right now with the current temperature. As summer neared an end in 2007, reports from Greenland indicated that the flow of glaciers into the sea had accelerated beyond anything glaciologists had thought possible. Huge chunks of ice weighing several billion tons each were breaking off and sliding into the sea, causing minor earthquakes as they did so.!6 With melt-water lubricating the surface between the glaciers and the rocks on which they rested, ice flows were accelerating, flowing into the ocean at a pace of 2 meters an hour. This accel­erated flow, along with the earthquakes, shows the potential for the entire ice sheet to break up and collapse?? Beyond what is already happening, the world faces a risk that some of the feedback mechanisms will begin to kick in, fur­ther accelerating the warming process. Scientists who once thought that the Arctic Ocean could be free of ice during the summer by 2100 now see it occurring by 2030. Even this could turn out to be a conservative estimate.78 This is of particular concern to scientists because of the albedo effect, where the replacement of highly reflective sea ice with darker open water greatly increases heat absorbed from sunlight. This, of course, has the potential to further accelerate the melting of the Greenland ice sheet. A second feedback loop of concern is the melting of per­mafrost. This would release billions of tons of carbon, some as methane, a potent greenhouse gas with a global warming effect per ton 25 times that of carbon dioxide.79 The risk facing humanity is that climate change could spiral out of control and it will no longer be possible to arrest trends such as ice melting and rising sea level. At this point, the future of civilization would be at risk. This combination of melting glaciers, rising seas, and their effects on food security and low-lying coastal cities could over­whelm the capacity of governments to cope. Today it is largely weak states that begin to deteriorate under the pressures of mounting environmental stresses. But the changes just described could overwhelm even the strongest of states. Civilization itself could begin to unravel under these extreme stresses.

#### 5 degrees risks billions – 6 leads to extinction

Lynas 7 – Associate @ Oxford’s School of the environment

Mark, advisor on climate change to the President of the Maldives, Educational focus on Politics and History, Six Degrees, pg. 236-237

A **drastic reduction in human populations** is unambiguously the most likely outcome of a rise in global temperatures toward five degrees—what James Lovelock unhappily terms "the cull." Even at present numbers, the planet will have trouble supporting human society indefinitely, as we already see in a myriad of ways from overfishing to soil erosion. But with human population growth projected to add still further to our ballooning numbers, the overall situation will become steadily more precarious as the world warms up. I find it difficult to avoid the conclusion that millions, and later billions, of people will die in such a scenario. In Gaian terms, I suppose, the planet would be trying to restore a balance. It goes almost without saying that this is scant consolation for all the individual human tragedies that would inevitably accompany such a grim future. As a father, I certainly don't find it comforting. Unbelievably, perhaps, this still isn't quite the worst-case scenario. The next chapter will show how **humanity's survival**, even as a species, could be threatened by the ultimate apocalypse—six degrees of global warming.

#### Leads to extinction

Berger 1 – PhD in Ecology from UC Davis

John J., consultant with a Ph.D. in ecology from UC Davis, Beating the Heat, 2000, p. 10-11

Although unable to make exact predictions, scientists believe that our atmosphere’s carbon dioxide level is likely to double over the next hundred years. With that doubling, the world’s average tem­perature is likely to increase 2-6 degrees F. Then again, without corrective action, carbon dioxide levels might even triple by the year 2100. That could raise the world’s tem­perature by 8 or 90F. While that may not sound like much—after all, temperature can easily swing 300F in a day—an average world tem­perature change of 90F is all that separates today’s benign climate from an Ice Age, when the place you now live may have been buried under two miles of ice. Even if our production of airborne carbon is significantly re­duced between now and 2100, global warming will not halt on Janu­ary 1, 2101. Once disrupted, climate processes remain disturbed for hundreds of years. The oceans, for example, take centuries to release accumulated heat, and carbon we put in the air today remains there for up to 200 years, continuing to warm the planet. As the Earth’s temperature rises, its living systems will inevitably be disrupted. If you are not sure why we should care if a few more species go extinct, remember that nature is an interconnected fabric. Poke enough holes in it, tear it, yank on it hard enough, and it will rip. Once in ruins, it is very difficult and costly to mend, and the services it was unobtrusively providing are suddenly in jeopardy or gone. These include services like purifying our air, cleaning our wa­ter, maintaining our soil, keeping pests in check, pollinating our crops, and providing us with the biodiversity from which medicines come. Of course, nature also offers us knowledge and insights about our­selves as an integral part of creation. If we destroy nature, we even­tually destroy ourselves.

#### Leads to a Mars-like Earth

Brandenburg and Paxon 99 – Rocket Scientist and NASA tech advisor

John E. Brandenburg and Monica Rix Paxon, physicist rocket scientist, Mars expert, investigator on MET project, NASA technical advisor, former member of space transport subcommittee ; writer and scientific editor, Dead Mars, Dying Earth, 1999, p.232 - 233

The world goes on its merry way and fossil fuel use continues to power it. Rather than making painful or politically difficult choices such as inventing in fusion or enacting a rigorous plan of conserving, the industrial world chooses to muddle through the temperature climb. Let’s imagine that America and Europe are too worried about economic dislocation to change course. The ozone hole expands, driven by a monstrous synergy with global warming that puts more catalytic ice crystals into the stratosphere, but this affects the far north and south and not the major nations’ heartlands. The seas rise, the tropics roast but the media networks no longer cover it. The Amazon rainforest becomes the Amazon desert. Oxygen levels fall, but profits rise for those who can provide it in bottles. An equatorial high pressure zone forms, forcing drought in central Africa and Brazil, the Nile dries up and the monsoons fall. Then inevitably, at some unlucky point in time, a major unexpected event occurs—a major volcanic eruption, a sudden and dramatic shift in ocean circulation or a large asteroid impact (those who think freakish accidents do not occur have paid little attention to life on Mars), or a nuclear war that starts between Pakistan and India and escalates to involve China and Russia… Suddenly, the gradual climb in global temperatures goes on a mad excursion as the oceans warm and release large amounts of dissolved carbon dioxide from their lower depths into the atmosphere. Oxygen levels go down as oxygen replaces lost oceanic carbon dioxide. Asthma cases double and then double again. Now a third of the world fears breathing. As the oceans dump carbon dioxide, the greenhouse effect increases, which further warms the oceans, causing them to dump even more carbon. Because of the heat, plants die and burn in enormous fires which release more carbon dioxide, and the oceans evaporate, adding more water vapor to the greenhouse. Soon, we are in what is termed a runaway greenhouse effect, as happened to Venus eons ago. The last two surviving scientists inevitably argue, one telling the other, “See, I told you the missing sink was in the ocean!” Earth, as we know it, dies. After this Venusian excursion in temperatures, the oxygen disappears into the soil, the oceans evaporate and are lost and the dead Earth loses its ozone layer completely. Earth is too far from the Sun for it to be a second Venus for long. Its atmosphere is slowly lost – as is its water—because of the ultraviolet bombardment breaking up all the molecules apart from carbon dioxide. As the atmosphere becomes thin, the Earth becomes colder. For a short while temperatures are nearly normal, but the ultraviolet sears any life that tries to make a comeback. The carbon dioxide thins out to form a thin veneer with a few wispy clouds and dust devils. Earth becomes the second Mars – red, desolate, with perhaps a **few** hardy **microbes surviving.**

#### Warming leads to fast climate shifts – leads to extinction

Dyer 3 – PhD in Military History

Gwynne, PhD in military and Middle Eastern history from the University of London, 7-4-2003, Spectator, Factiva

The problem is that global warming was the first aspect of climate change to catch the public's attention and, for the vast majority of people, it remains the only threat - if indeed it is a threat. After all, warmer isn't necessarily worse, and anyway, it's a gradual process and we'll all probably be safely dead before it gets too serious. Climate researchers have known this is untrue for about 20 years, since the evidence of the Greenland ice-cores became available, but it has still not affected the public debate. Those cores go down two miles into the ice-cap and bring up evidence of weather from up to 250,000 years ago. What shocked researchers realised when they examined the cores is climate change - real climate change - is not gradual at all. It's a threshold phenomenon, a sudden flip into a radically different state, that may then persist for a very long time. The real danger we face is that gradual warming of the sort we are experiencing now will trigger a sudden cooling that could drop average global temperatures by 5C (41F) in 10 years. The sudden cooling, and the accompanying droughts, would destroy most of the agriculture that now sustains six billion of us, and at least 90 per cent of the human race would be killed by famine and war in a matter of a decade or so. These abrupt climate changes could herald the beginning of the next Ice Age - but climatic flips like this can also occur for lengthy periods - even in the midst of warm-and-wet interglacial periods like the present. WE do still live in the Ice Age, of course. For the past three million years, ever since continental drift closed the channel between North America to South America and changed the ocean currents, glaciers have covered more than a third of the planet's surface, almost 90 per cent of the time. The recent pattern has been around 100,000 years of freeze, followed by a much shorter warm period. The previous interglacial era, which ended 117,000 years ago, was only 13,000 years long, so at 15,000 years we're already into overtime on this one - but we don't even need a major Ice Age to do the damage. The process by which the climate flips is now fairly well understood. The trigger is a phase of gradual warming that, either through glacial melting or just more rainfall, increases the amount of fresh water on the ocean surface between Labrador, Greenland and Norway. This critical part of the North Atlantic is where the Gulf Stream's water, having become salty and dense, sinks to the bottom and flows back south - but, if it is diluted by too much fresh water on the surface, it doesn't sink and the circuit is broken. The whole global climate suddenly flips into a cool, dry phase that can last for many centuries before warmer conditions return: There have been two such episodes, at 12,500 years ago and 8,500 years ago, even since the end of the last Ice Age. Or the cool, dry phase could last for 100,000 years if other conditions, like the shape of the earth's orbit and the tilt of its axis, have already put us on the brink of a new Ice Age**.** The flips of the past were caused by natural warming of one kind or another but, by adding man-made warming to the problem, we are making it far more dangerous. We have built entire human civilisations, and increased our population a thousandfold since the last cool, dry episode. All of that is at risk if the climate flips, and yet the public debate is still about gradual change.

#### Warming leads to extinction

Pearce 7 – New Scientist Magazine Consultant

Fred, With Speed and Violence, environment and development consultant, pg. 240-241

Fifteen years on, the urgency of the climate crisis is much clearer, even if the story has grown a little more complicated. But we are showing no signs yet of acting on the scale necessary. The technology is still straight-forward, and the economics is only easier, but we can't get the politics right. Even at this late hour, I do believe we have it in our power to set Spaceship Earth back in the right course. But time is short. The ship is already starting to spin out of control. We may lose all chance of grabbing the wheel. Humanity faces a genuinely new situation. It is not an environmental crisis in the accepted sense. It is a crisis for the **entire life support system** of our civilization and our species. During the past 10,000 years, since the close of the last ice age, human civilizations have plundered and destroyed their local environments, wrecking the natural fecundity of sizable areas of the planet. Nevertheless, the planet's life-support system as a whole has until now remained stable. As one civilization fell, another rose. But the rules of the game have changed. In the Anthropocene, human influences on planetary systems are global and pervasive. In the past, if we got things wrong and wrecked our environment, we could pack up and move somewhere else. Migration has always been one of our species great survival strategies. Now we have nowhere else to go. No new frontier. We have only one atmosphere, **only one planet**.

### AT: Warming Inevitable – Too Much Co2

#### Not inevitable – cuts solve

Somerville 11 – Professor of Oceanography @ UCSD

Richard Somerville, Distinguished Professor Emeritus and Research Professor at Scripps Institution of Oceanography at the University of California, San Diego, Coordinating Lead Author in Working Group I for the 2007 Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 3-8-2011, “CLIMATE SCIENCE AND EPA'S GREENHOUSE GAS REGULATIONS,” CQ Congressional Testimony, Lexis

Thus, atmospheric CO2 concentrations are already at levels predicted to lead to global warming of between 2.0 and 2.4C. The conclusion from both the IPCC and subsequent analyses is blunt and stark - **immediate and dramatic emission reductions** of all greenhouse gases are urgently needed if the 2 deg C (or 3.6 deg F) limit is to be respected. This scientific conclusion illustrates a key point, which is that it will be governments that will decide, by actions or inactions, what level of climate change they regard as tolerable. This choice by governments may be affected by risk tolerance, priorities, economics, and other considerations, but in the end it is a choice that humanity as a whole, acting through national governments, will make. Science and scientists will not and should not make that choice. After governments have set a tolerable limit of climate change, however, climate science can then provide valuable information about what steps will be required to keep climate change within that limit.

#### Not inevitable – even if temporarily over the tipping point, can be brought back down

Dyer 9 – PhD in ME History

Gwynne, MA in Military History and PhD in Middle Eastern History former @ [Senior Lecturer](file://localhost/wiki/Senior_Lecturer) in War Studies at the [Royal Military Academy Sandhurst](file://localhost/wiki/Royal_Military_Academy_Sandhurst), Climate Wars

There is no need to despair. The slow-feedback effects take a long time to work their way through the climate system, and if we could manage to get the carbon dioxide concentration back down to a safe level before they have run their course, they might be stopped in their tracks. As Hansen et al. put it in their paper: A point of no return **can be avoided**, even if the tipping level [which puts us on course for an ice-free world] is **temporarily exceeded**. Ocean and ice-sheet inertia permit overshoot, provided the [concentration of carbon dioxide] is returned below the tipping level before initiating irre­versible dynamic change .... However, if overshoot is in place for centuries, the thermal perturbation will so pen­etrate the ocean that recovery without dramatic effects, such as ice-sheet disintegration, becomes unlikely. The real, long-term target is 350 parts per million or lower, if we want the Holocene to last into the indefinite future, but for the remainder of this book I am going to revert to the 450 parts per million ceiling that has become common currency among most of those who are involved in climate change issues. If we manage to stop the rise in the carbon dioxide concentration at or not far beyond that figure, then we must **immediately begin** the equally urgent and arduous task of getting it back down to a much lower level that is safe for the long term, but one step at a time will have to suffice. I suspect that few now alive will see the day when we seriously start work on bringing the concen­tration back down to 350, so let us focus here on how to stop it rising past 450.

#### Very little margin for error

Dyer 9 – PhD in ME History

Gwynne, MA in Military History and PhD in Middle Eastern History former @ [Senior Lecturer](file://localhost/wiki/Senior_Lecturer) in War Studies at the [Royal Military Academy Sandhurst](file://localhost/wiki/Royal_Military_Academy_Sandhurst), Climate Wars

Clearly, we have **very little margin left to play with**, and if global emissions are not radically reduced within about twenty years, then we will have little chance of stopping short of 550 parts per million carbon dioxide equivalent. Fifty or sixty or even eighty percent cuts in emissions by 2050, which is the target that has won the hearts of most contemporary politicians who take climate change seriously, gets us to 550 parts per million at about the same time. Average global temperature might still only rise to two degrees Celsius warmer by 2030, or even less if the feedbacks are slow to kick in, because there is a very long lag between the arrival of a given amount of carbon dioxide in the atmosphere and the consequent change in the planet's average surface temperature. But once the carbon dioxide is in the air, it stays there on average for about two centuries, so the final out­come has become **almost** inevitable. A concentration of 550 parts per million carbon dioxide equivalent in the atmosphere takes us to a world that is between three and four degrees Celsius hotter by the end of the century, not counting any feed­back effects. But, by three degrees Celsius hotter, the major feedbacks surely will have begun to operate, and our goose will be well and truly cooked.

#### Cuts now allow adaptation

Walker and King 8 – PhD in Chemistry

Gabrielle, PhD in Chemistry, Sir David, Director of the Smith School of Enterprise and the Environment at the University of Oxford, and a senior scientific adviser to UBS, The Hot Topic, pg. 90

For all of these reasons, we believe the only choice we have is to keep greenhouse gases at the lowest level possible. In other words, we have to aim for 450 ppm C02eq. This is the number to look for in every policy statement and every climate agreement. We'll talk about the political implications of this in part 3. For now, the message to hold on to is this: Although dangerous climate change is already with us, we **still have a good chance** of being able to cope with it if we stay below 450 ppm C02eq. Any higher, and the risk of catastrophic climate change becomes **just too great**.

### AT: Adaptation – Can’t Adapt

#### Can’t adapt – climate changes will be too quick

Walker and King 8 – PhD in Chemistry and Professor @ Oxford

Gabrielle, PhD in Chemistry, Sir David, Director of the Smith School of Enterprise and the Environment at the University of Oxford, and a senior scientific adviser to UBS, The Hot Topic, pg. 62-63

Some climate changes might **overwhelm our capacity to adapt**. If your land is in one place and your experience lies with the crops you have traditionally grown there, it may not be easy to switch to something different. Social, economic, political, and cultural barriers all stand between the world we have now and the one that we will soon have as climate takes its toll. And in some cases, such as for people living on the lowest-lying atolls threatened by rising sea levels, the only recourse might be to move.

#### Warming is too unpredictable to adapt

Walker and King 8 – PhD in Chemistry and Professor @ Oxford

Gabrielle, PhD in Chemistry, Sir David, Director of the Smith School of Enterprise and the Environment at the University of Oxford, and a senior scientific adviser to UBS, The Hot Topic, pg. 75-76

It might sound facetious, but the biggest dangers could come from a disaster scenario that nobody has yet noticed. The climate records written in ice and rocks suggest that our atmosphere is supremely temperamental, capable of tipping over a dramatic edge into a new state in a **very short** amount of time. For instance, at the end of the last ice age the sudden melting of vast amounts of ice shut off the ocean circulation, which caused an abrupt refreezing. Though it's still not clear exactly how global the event was, Greenland's temperature dropped by 27T, and northern Europe's by 9°F. The freeze happened over several centuries, and at first scientists studying ice cores thought the thaw had taken equally long. But as new, more detailed ice cores were drilled, researchers discovered to their astonishment that the shift back to warm temperatures at the end of this deep freeze probably happened within a decade. (As one researcher put it, dryly, the climate shift took place within a "congressional lifetime.") What's more, similar abrupt lurches from cold to warm and back to cold again seem to have happened throughout the ice age itself, and in spite of intense research nobody is yet sure exactly why. And then there's the time, around fifty-five million years ago, when some unknown event apparently triggered the release of massive amounts of carbon, which in turn raised global temperatures abruptly by some 14T. In this context, it's alarming to think that, thanks to our human burning of fossil fuels, carbon dioxide levels are higher today than they have been for at least 650,000 years and probably much longer. Renowned climate scientist Wally Broecker from Lamont Doherty Earth Observatory has likened the climate to an angry beast that we are now poking with a stick. If we keep on poking, we don't know what will happen next. But we do know that it could **happen swiftly** enough to take us **completely by surprise**.

#### Non-linear impacts prevent adaptation

Mazo 10 – PhD in Paleoclimatology from UCLA

Jeffrey Mazo, Managing Editor, Survival and Research Fellow for Environmental Security and Science Policy at the International Institute for Strategic Studies in London, 3-2010, “Climate Conflict: How global warming threatens security and what to do about it,” pg. 29

This latter aspect, the rate of change, is a critical factor in terms of adapting to climate change. Although some states and societies will be better able to adapt to change than others, regardless of how resilient a given society is there will always be some point at which its efforts would be **overwhelmed** by the **pace of change**. Changes in climate - long-term wind and rainfall patterns, daily and seasonal temperature variations, and so on - will produce physical effects such as droughts, floods and increasing severity of typhoons and hurricanes, and ecological effects such as changes in the geographical range of species (including disease-causing organisms, domesticated crops and crop pests). These physical changes in turn may lead to effects such as disruption of water resources, declining crop yields and food stocks, wildfires, severe disease outbreaks, and an increase in numbers of refugees and internally displaced persons.4

#### Adaptation is a myth – only works for rich countries, assumes linear climate change and ignores biodiversity loss

Hamilton 10 – Professor of Public Ethics @ ANU

Clive Hamilton, Professor of Public Ethics in Australia, 2010, “Requiem for a Species: Why We Resist the Truth About Climate Change,” pg 29-30

Underlying the discussion of adaptation is an unspoken belief that one way or another we (in rich countries) will be able to adapt in a way that broadly preserves our way of life because global warming will change things slowly, predictably and manageably. Wealthy countries can easily afford to build flood defences to shield roads and shopping centres from storm surges, and we can 'climate-proof homes against the effects of frequent heatwaves. Yet if our belief in our ability to stabilise the Earth's climate is misconceived then so is our belief in our ability to adapt easily to climate change. If instead of a smooth transition to a new, albeit less pleasant, climate warming sets off a runaway process, adaptation will be a never-ending labour. If warming rises above three or four degrees the chances of severe and abrupt change become high. A harsh and prolonged drought can wipe out an entire regions food production. Fertile plains can turn to dust bowls. A week of temperatures above 40°C can kill tens of thousands of people. Of course, for people in poor countries adaptation means something entirely different. The effects of warming will be more cruel and their ability to adapt is much more limited. The melting of Himalayan glaciers would stop water flowing to vast areas for the length of a dry season, leading to famine. Adaptation strategies then become severely circumscribed: the choice becomes migrate or die. The governments of low-lying island states such as Tuvalu and Maldives are already planning to shift their entire populations. All of these have implications for national security, as waves of environmental refugees seek new places to live.75 Of course, all of the above takes an anthropocentric stance: humans may be able to adapt to significant climate change, but other species and ecosystems will have a much harder time of it. This is a huge topic, and here is not the place to canvass it. Suffice to say that across a broad range of ecosystems certain species will prevail (including feral animals and weeds), while others will be driven out and die. In the type of scenario I have described, **mass extinctions are likely**.

### AT: Co2 Ag – Control Uniqueness

#### We control uniqueness – ag collapsing now

Gillis 11

Justin Gillis, Editor @ NYT, 6-11-2011, “A Warming Planet Struggles to Feed Itself,” Factiva

Sitting with a group of his fellow wheat farmers, Francisco Javier Ramos Bours voiced a suspicion. Water shortages had already arrived in recent years for growers in his region, the Yaqui Valley, which sits in the Sonoran Desert of northwestern Mexico. In his view, global climate change could well be responsible. “All the world is talking about it,” Mr. Ramos said as the other farmers nodded. Farmers everywhere face rising difficulties: **water shortages as well as flash floods**. Their **crops are afflicted** by emerging pests and diseases and by blasts of heat beyond anything they remember. In a recent interview on the far side of the world, in northeastern India, a rice farmer named Ram Khatri Yadav offered his own complaint about the changing climate. “It will not rain in the rainy season, but it will rain in the nonrainy season,” he said. “The cold season is also shrinking.”

### AT: Co2 Ag – Doesn’t Solve

#### Co2 doesn’t boost yields – any evidence of growth is short-term and hypothetical

Jackson 9 – Research molecular biologist @ USDA

Eric, 2009, “The international food system and the climate crisis,” The Panama News, Lexis

A major weakness in the forecasts of the IPCC and others when it comes to agriculture is that their predictions accept a theory of “carbon fertilization,” which argues that higher levels CO2 in the atmosphere will enhance photosynthesis in many key crops, and boost their yields. Recent studies show **that this is a mirage.** Not only does any initial acceleration in growth slow down significantly after a few days or weeks, but the increase in CO2 reduces nitrogen and protein in the leaves by more than 12 percent. This means that, with climate change, there will be less protein for humans in major cereals such as wheat and rice. There will also be less nitrogen in the leaves for bugs, which means that bugs will eat more leaf, leading to important reductions in yield.

#### Warming leads to weather disasters – this is comparatively worse for agriculture than the benefits of co2 fertilization

-top ag experts agree

Gillis 11

Justin Gillis, Editor @ NYT, 6-11-2011, “A Warming Planet Struggles to Feed Itself,” Factiva

Now, the latest scientific research suggests that a previously discounted factor is helping to destabilize the food system: climate change. Many of the failed harvests of the past decade were a consequence of weather disasters, like floods in the United States, drought in Australia and blistering heat waves in Europe and Russia. Scientists believe some, though not all, of those events were caused or worsened by human-induced global warming. Temperatures are rising rapidly during the growing season in some of the most important agricultural countries, and a paper published several weeks ago found that this had shaved **several percentage points off potential yields**, adding to the price gyrations. For nearly two decades, scientists had predicted that climate change would be relatively manageable for agriculture, suggesting that even under worst-case assumptions, it would probably take until 2080 for food prices to double. In part, they were counting on a counterintuitive ace in the hole: that rising carbon dioxide levels, the primary contributor to global warming, would act as a powerful plant fertilizer and offset many of the ill effects of climate change. Until a few years ago, these assumptions went largely unchallenged. But lately, the destabilization of the food system and the soaring prices have **rattled many leading scientists**. “The success of agriculture has been astounding,” said Cynthia Rosenzweig, a researcher at NASA who helped pioneer the study of climate change and agriculture. “But I think there’s starting to be premonitions that it may not continue forever.” A scramble is on to figure out whether climate science has been too sanguine about the risks. Some researchers, analyzing computer forecasts that are used to advise governments on future crop prospects, are pointing out what they consider to be gaping holes. These include a failure to consider the effects of extreme weather, like the floods and the heat waves that are increasing as the earth warms. A rising unease about the future of the world’s food supply came through during interviews this year with more than 50 agricultural experts working in nine countries.

### AT: Co2 Ag – No Yield Increase

#### Turn – pollution leads to ozone – tanks ag – outweighs any benefit from CO2

Monbiot 7 – Professor @ Oxford

George, Professor @ Oxford Brookes University, Heat: How to Stop the Planet from Burning, pg. 7

But now, I am sorry to say, it seems that I might have been right, though for the wrong reasons. In late 2005, a study published in the Philosophical Transactions of the Royal Society alleged that the yield predictions for temperate countries were 'over optimistic'. The authors had blown carbon dioxide and ozone, in concentrations roughly equivalent to those expected later this century, over crops in the open air. They discovered that the plants didn't respond as they were supposed to: the extra carbon dioxide did not fertilize them as much as the researchers predicted, and the **ozone reduced their yields** by 20 per cent." Ozone levels are rising in the rich nations by between 1 and 2 per cent a year, as a result of sunlight interacting with pollution from cars, planes and power stations. The levels happen to be highest in the places where crop yields were expected to rise: western Europe, the midwest and eastern US and eastern China. The expected ozone increase in China will cause maize, rice and soybean production to fall by over 30 per cent by 2020, These reductions in yield, if real, arc enough to **cancel out the effects** of both higher temperatures and higher carbon dioxide concentrations.

### AT: Ice Age – Link Turn – Volcanoes

#### Warming increases volcanic activity

Thompson 7 - MA from GA Tech

Andrea Thompson, Graduate from Georgia Tech with a B.S. in Earth and Atmospheric Sciences in 2004 and a Master's in the same subject in 2006. 2007, http://www.livescience.com/environment/070830\_gw\_quakes.html

Earthquakes, volcanic eruptions, tsunamis and landslides are some of the additional catastrophes that climate change and its rising sea levels and melting glaciers could bring, a geologist says. The impact of human-induced global warming on Earth's ice and oceans is [already noticeable](http://www.livescience.com/php/multimedia/imagegallery/igviewer.php?imgid=626&gid=42&index=0): Greenland's glaciers are melting at an increasing rate, and sea level rose by a little more than half a foot (0.17 meters) globally in the 20th century**,** according to the Intergovernmental Panel on Climate Change. With these trends in ice cover and sea level only expected to continue and likely worsen if atmospheric carbon dioxide levels continue to rise, they could alter the stresses and forces fighting for balance in the ground under our feet—changes that are well-documented in studies of past climate change, but which are just beginning to be studied as possible consequences of the current state of global warming. "Although they've described it in the past, nobody's thought about it in terms of future effects of climate change," said Bill McGuire of the University College London's Hazard Research Center. McGuire's speculations of increased geological activity have not yet been published in a journal, but he has written an article about them published in the Guardian Unlimited. Rebounding crust One particular feature that can change the balance of forces in Earth's crust is ice, in the form of glaciers and ice sheets that cover much of the area around Earth's poles plus mountains at all latitudes. The weight of ice depresses the crust on which it sits. As the ice melts, the crust below no longer has anything sitting on top of it, and so can rebound fairly rapidly (by geological standards). (This rebounding is actually occurring now as a result of the end of the last Ice Age: The retreat of massive ice sheets from the northern United States and Canada has allowed the crust in these areas to bounce back.) Areas of rebounding crust could change the stresses acting on [earthquake faults](http://www.livescience.com/php/trivia/?quiz=quake) and volcanoes in the crust. "In places like Iceland, for example, where you have the Eyjafjallajökull ice sheet, which wouldn't survive [global warming], and you've got lots of volcanoes under that, the unloading effect can trigger eruptions," McGuire said.

Causes an ice age

NASA 98

[http://www.gsfc.nasa.gov/gsfc/service/gallery/fact\_sheets/earthsci/eos/volcanoes.pdf] Volcanoes and Global Climate Change, Earth Science Enterprise Series/ May

The eruption of a super volcano "sooner or later" will chill the planet and threaten human civilization, British scientists warned Tuesday. And now the bad news: There's not much anyone can do about it.Several volcanoes around the world are capable of gigantic eruptions unlike anything witnessed in recorded history, based on geologic evidence of past events, the scientists said. Such eruptions would dwarf those of Mount St. Helens, Krakatoa, Pinatubo and anything else going back dozens of millennia. "Super eruptions are up to hundreds of times larger than these," said Stephen Self of Britain's Open University. "An area the size of North America can be devastated, and pronounced deterioration of global climate would be expected for a few years following the eruption," Self said. "They could result in the devastation of world agriculture, severe disruption of food supplies, and mass starvation. These effects could be sufficiently severe to threaten the fabric of civilization." Self and his colleagues at the Geological Society of London presented their report to the British government's Natural Hazard Working Group. "Although very rare, these events are inevitable, and at some point in the future humans will be faced with dealing with and surviving a super eruption," Stephen Sparks of the University of Bristol told LiveScience in advance of Tuesday's announcement. Supporting evidence The warning is not new. Geologists in the United States detailed a similar scenario in 2001, when they found evidence suggesting volcanic activity in Yellowstone National Park will eventually lead to a colossal eruption. Half the United States will be covered in ash up to 3 feet (1 meter) deep, according to a study published in the journal Earth and Planetary Science Letters. Explosions of this magnitude "happen about every 600,000 years at Yellowstone," says Chuck Wicks of the U.S. Geological Survey, who has studied the possibilities in separate work. "And it's been about 620,000 years since the last super explosive eruption there." Past volcanic catastrophes at Yellowstone and elsewhere remain evident as giant collapsed basins called calderas. A super eruption is a scaled up version of a typical volcanic outburst, Sparks explained. Each is caused by a rising and growing chamber of hot molten rock known as magma. "In super eruptions the magma chamber is huge," Sparks said. The eruption is rapid, occurring in a matter of days. "When the magma erupts the overlying rocks collapse into the chamber, which has reduced its pressure due to the eruption. The collapse forms the huge crater." The eruption pumps dust and chemicals into the atmosphere for years, screening the Sun and cooling the planet some models predict, causing many plant and animal species to disappear forever. "The whole of a continent might be covered by ash, which might take many years — possibly decades — to erode away and for vegetation to recover," Sparks said. Yellowstone may be winding down geologically, experts say. But they believe it harbors at least one final punch. Globally, there are still plenty of possibilities for super volcano eruptions, even as Earth quiets down over the long haul of its 4.5-billion-year existence. "The earth is of course losing energy, but at a very slow rate, and the effects are only really noticeable over billions rather than millions of years," Sparks said.

### AT: Ice Age – Link Turn – Warming Leads to Cooling

#### Link turn – warming leads to ice age

Calvin 98 – theoretical neurophysicist @ U of W

William H. Calvin, Theoretical Neurophysicist at the University of Washington in Seattle, "The great climate flip-flop," The Atlantic Monthly 281:47-64

There are a few obvious precursors to flushing failure. One is diminished wind chill, when winds aren't as strong as usual, or as cold, or as dry — as is the case in the Labrador Sea during the North Atlantic Oscillation. This El Niño-like shift in the atmospheric-circulation pattern over the North Atlantic, from the Azores to Greenland, often lasts a decade. At the same time that the Labrador Sea gets a lessening of the strong winds that aid salt sinking, Europe gets particularly cold winters. It's happening right now: a North Atlantic Oscillation started in 1996. Another precursor is more floating ice than usual, which reduces the amount of ocean surface exposed to the winds, in turn reducing evaporation. Retained heat eventually melts the ice, in a cycle that recurs about every five years. Yet another precursor, as Henry Stommel suggested in 1961, would be the addition of fresh water to the ocean surface, diluting the salt-heavy surface waters before they became unstable enough to start sinking. More rain falling in the northern oceans — exactly what is predicted as a result of global warming — could stop salt flushing. So could ice carried south out of the Arctic Ocean. There is also a great deal of unsalted water in Greenland's glaciers, just uphill from the major salt sinks. The last time an abrupt cooling occurred was in the midst of global warming. Many ice sheets had already half melted, dumping a lot of fresh water into the ocean. A brief, large flood of fresh water might nudge us toward an abrupt cooling even if the dilution were insignificant when averaged over time. The fjords of Greenland offer some dramatic examples of the possibilities for freshwater floods. Fjords are long, narrow canyons, little arms of the sea reaching many miles inland; they were carved by great glaciers when the sea level was lower. Greenland's east coast has a profusion of fjords between 70°N and 80°N, including one that is the world's biggest. If blocked by ice dams, fjords make perfect reservoirs for meltwater. Glaciers pushing out into the ocean usually break off in chunks. Whole sections of a glacier, lifted up by the tides, may snap off at the "hinge" and become icebergs. But sometimes a glacial surge will act like an avalanche that blocks a road, as happened when Alaska's Hubbard glacier surged into the Russell fjord in May of 1986. Its snout ran into the opposite side, blocking the fjord with an ice dam. Any meltwater coming in behind the dam stayed there. A lake formed, rising higher and higher — up to the height of an eight-story building. Eventually such ice dams break, with spectacular results. Once the dam is breached, the rushing waters erode an ever wider and deeper path. Thus the entire lake can empty quickly. Five months after the ice dam at the Russell fjord formed, it broke, dumping a cubic mile of fresh water in only twenty-four hours. The Great Salinity Anomaly, a pool of semi-salty water derived from about 500 times as much unsalted water as that released by Russell Lake, was tracked from 1968 to 1982 as it moved south from Greenland's east coast. In 1970 it arrived in the Labrador Sea, where it prevented the usual salt sinking. By 1971-1972 the semi-salty blob was off Newfoundland. It then crossed the Atlantic and passed near the Shetland Islands around 1976. From there it was carried northward by the warm Norwegian Current, whereupon some of it swung west again to arrive off Greenland's east coast — where it had started its inch-per-second journey. So freshwater blobs drift, sometimes causing major trouble, and Greenland floods thus have the potential to stop the enormous heat transfer that keeps the North Atlantic Current going strong.

### AT: Ice Age – Link Turn – Calvin 1ar

#### Extend our Calvin evidence – indicates warming leads to thc shut-down – historically true – and prefer our evidence - Theoretical Neurophysicist at University of Washington

#### Qualified studies on our side:

#### First – Ocean Studies Board 2

OSB , Ocean Studies Board, 2002, http://www.nap.edu/openbook.php?record\_id=10136&page=11

Ice sheets are linked to abrupt climate change because melting of Greenland or the West Antarctic ice sheet would add directly to global sea level rise and to possible changes in the thermohaline circulation (Manabe and Stouffer, 1997). Much attention has been focused on the possibility of a rapid collapse of the West Antarctic ice sheet. Recent geological and glaciological evidence points to a stable but net decay since the last ice age (Conway et al., 1999), but with considerable uncertainty about future trends and the possibility of rapid dynamic response to future warming. The Greenland ice sheet has the potential for rapid surface melting and perhaps enhanced ice flow with continued greenhouse warming. Laser-altimeter surveys in the 1990s indicated an overall negative mass balance for Greenland ice that results in a 0.13 mm per year sea level rise (Krabill et al., 2000). Since the late 1800s the margin of the Greenland ice sheet has retreated 2 km in some places (Funder and Weidick, 1991) indicating that Greenland ice is responding to twentieth century warming. The influence of the Greenland ice sheet system on potential abrupt climate change appears to be linear except for the possibility of threshold changes in ocean circulation, but the existence of dynamically controlled ice streaming at least suggests the possibility of dynamical changes (Fahnestock et al., 1993).

#### Second – School of Ocean and Earth Science 2

[Jochem Marotzke](http://www.pnas.org/search?author1=Jochem+Marotzke&sortspec=date&submit=Submit), School of Ocean and Earth Science, University of Southampton, 2/15/00, http://www.pnas.org/content/97/4/1347.full

Abrupt climate change may not have been merely a feature of the past but may be induced by the buildup of CO2 in the atmosphere. Coupled model studies ([23](http://www.pnas.org/content/97/4/1347.full#ref-23)) have shown that global warming can lead to a collapse of the North Atlantic THC: Higher atmospheric temperatures lead to a generally wetter atmosphere and hence increased moisture transport from low to high latitudes. The increased precipitation in the North Atlantic leads to reduced surface salinity and density, interrupting deep convection and bringing the Atlantic THC to a halt. As a consequence, northern Europe might cool even under global warming and, more alarming, this cooling might occur much more rapidly than the gradual global warming, thus making adaptation far more difficult. The critical question is, How close to a transition is the real climate system?

#### Third – professor of atmospheric physics @ Oxford 5

John Houghton, cochair of the IPCC, Professor in [atmospheric physics](http://en.wikipedia.org/wiki/Atmospheric_physics) at the [University of Oxford](http://en.wikipedia.org/wiki/University_of_Oxford), former Chief Executive at the [Met Office](http://en.wikipedia.org/wiki/Met_Office) and founder of the [Hadley Centre](http://en.wikipedia.org/wiki/Hadley_Centre) 4 May 2005 “Global warming” INSTITUTE OF PHYSICS PUBLISHING REPORTS ON PROGRESS IN PHYSICS 1343–1403

The second concerns possible changes in the ocean’s thermohaline circulation (THC). This is a current that circulates in the deep ocean (figure 23) driven to a large degree by the descent of water in the Greenland sea and Labrador sea areas of the north Atlantic ocean. Water that has originated in the tropics and moved north in the Atlantic, undergoing a lot of evaporation, is both salty and cold—hence it is unusually dense and readily sinks. With global warming, there is additional fresh water input at high latitudes because of increased precipitation and ice melt. As a result, the THC will weaken and less heat will flow northward from tropical regions to the north Atlantic. All coupled ocean–atmosphere GCMs show this occurring, although in varying degrees, resulting in less warming in the region of the north Atlantic (including north-west Europe)—although none show actual cooling occurring in this region during the 21st century. There is also evidence that large changes in the THC have occurred in the past [83]. In the longer term, some models show the THC actually cutting off completely after two or three centuries of increasing greenhouse gases. Intense research is being pursued—both observations and modelling—to elucidate further likely changes in the thermohaline circulation and their possible impact.

#### The impact is fast

Calvin 98 – theoretical neurophysicist @ U of W

William H. Calvin, Theoretical Neurophysicist at the University of Washington in Seattle, "The great climate flip-flop," The Atlantic Monthly 281:47-64

I hope never to see a failure of the northernmost loop of the North Atlantic Current, because the result would be a population crash that would take much of civilization with it, all within a decade. Ways to postpone such a climatic shift are conceivable, however — old-fashioned dam-and-ditch construction in critical locations might even work. Although we can't do much about everyday weather, we may nonetheless be able to stabilize the climate enough to prevent an abrupt cooling.

### AT: Ice Age – Link Turn

#### Warming flips the North Atlantic Current – leads to ice age

Pearce 5

Fred, Environment and Development Consultant, Failing Ocean Current raises fears of mini ice age, newscientist.com

The ocean current that gives western Europe its relatively balmy climate is stuttering, raising fears that it might fail entirely and plunge the continent into a mini ice age. The dramatic finding comes from a study of ocean circulation in the North Atlantic, which found a 30% reduction in the warm currents that carry water north from the Gulf Stream. The slow-down, which has long been predicted as a possible consequence of global warming, will give renewed urgency to intergovernmental talks in Montreal, Canada, this week on a successor to the Kyoto Protocol.   Harry Bryden at the National Oceanography Centre in Southampton, UK, whose group carried out the analysis, says he is not yet sure if the change is temporary or signals a long-term trend. "We don’t want to say the circulation will shut down," he told New Scientist. "But we are nervous about our findings. They have come as quite a surprise." No one-off The North Atlantic is dominated by the Gulf Stream – currents that bring warm water north from the tropics. At around 40° north – the latitude of Portugal and New York – the current divides. Some water heads southwards in a surface current known as the subtropical gyre, while the rest continues north, leading to warming winds that raise European temperatures by 5°C to 10°C. But when Bryden’s team measured north-south heat flow last year, using a set of instruments strung across the Atlantic from the Canary Islands to the Bahamas, they found that the division of the waters appeared to have changed since previous surveys in 1957, 1981 and 1992. From the amount of water in the subtropical gyre and the flow southwards at depth, they calculate that the quantity of warm water flowing north had fallen by around 30%. When Bryden added previously unanalysed data – collected in the same region by the US government’s National Oceanic and Atmospheric Administration – he found a similar pattern. This suggests that his 2004 measurements are not a one-off, and that most of the slow-down happened between 1992 and 1998. The changes are too big to be explained by chance, co-author Stuart Cunningham told New Scientist from a research ship off the Canary Islands, where he is collecting more data. "We think the findings are robust."

#### Warming leads to cooling – fast flip

Dyer 3 – PhD in Military History

Gwynne, PhD in military and Middle Eastern history from the University of London, 7-4-2003, Spectator, Factiva

The problem is that global warming was the first aspect of climate change to catch the public's attention and, for the vast majority of people, it remains the only threat - if indeed it is a threat. After all, warmer isn't necessarily worse, and anyway, it's a gradual process and we'll all probably be safely dead before it gets too serious. Climate researchers have known this is untrue for about 20 years, since the evidence of the Greenland ice-cores became available, but it has still not affected the public debate. Those cores go down two miles into the ice-cap and bring up evidence of weather from up to 250,000 years ago. What shocked researchers realised when they examined the cores is climate change - real climate change - is not gradual at all. It's a threshold phenomenon, a sudden flip into a radically different state, that may then persist for a very long time. The real danger we face is that gradual warming of the sort we are experiencing now will trigger a sudden cooling that could drop average global temperatures by 5C (41F) in 10 years. The sudden cooling, and the accompanying droughts, would destroy most of the agriculture that now sustains six billion of us, and at least 90 per cent of the human race would be killed by famine and war in a matter of a decade or so. These abrupt climate changes could herald the beginning of the next Ice Age - but climatic flips like this can also occur for lengthy periods - even in the midst of warm-and-wet interglacial periods like the present. WE do still live in the Ice Age, of course. For the past three million years, ever since continental drift closed the channel between North America to South America and changed the ocean currents, glaciers have covered more than a third of the planet's surface, almost 90 per cent of the time. The recent pattern has been around 100,000 years of freeze, followed by a much shorter warm period. The previous interglacial era, which ended 117,000 years ago, was only 13,000 years long, so at 15,000 years we're already into overtime on this one - but we don't even need a major Ice Age to do the damage. The process by which the climate flips is now fairly well understood. The trigger is a phase of gradual warming that, either through glacial melting or just more rainfall, increases the amount of fresh water on the ocean surface between Labrador, Greenland and Norway. This critical part of the North Atlantic is where the Gulf Stream's water, having become salty and dense, sinks to the bottom and flows back south - but, if it is diluted by too much fresh water on the surface, it doesn't sink and the circuit is broken. The whole global climate suddenly flips into a cool, dry phase that can last for many centuries before warmer conditions return: There have been two such episodes, at 12,500 years ago and 8,500 years ago, even since the end of the last Ice Age. Or the cool, dry phase could last for 100,000 years if other conditions, like the shape of the earth's orbit and the tilt of its axis, have already put us on the brink of a new Ice Age**.** The flips of the past were caused by natural warming of one kind or another but, by adding man-made warming to the problem, we are making it far more dangerous. We have built entire human civilisations, and increased our population a thousandfold since the last cool, dry episode. All of that is at risk if the climate flips, and yet the public debate is still about gradual change.

#### Warming leads to ice age

Gagosian 3 – PhD in Oceanography

Dr. Robert B. Gagosian President and Director of Woods Hole Oceanographic Institution Jan 27th 2003 Abrupt Climate Change should we be worried, Prepared for a panel at the world economic forum http://www.whoi.edu/home/about/whatsnew\_abruptclimate.html

Global warming could actually lead to a big chill in some parts of the world. If the atmosphere continues to warm, it could soon trigger a dramatic and abrupt cooling throughout the North Atlantic region -- where, not incidentally, some 60 percent of the world's economy is based. When I say "dramatic," I mean: Average winter temperatures could drop by 5 degrees Fahrenheit over much of the United States, and by 10 degrees in the northeastern United States and in Europe. That's enough to send mountain glaciers advancing down from the Alps. To freeze rivers and harbors and bind North Atlantic shipping lanes in ice. To disrupt the operation of ground and air transportation. To cause energy needs to soar exponentially. To force wholesale changes in agricultural practices and fisheries. To change the way we feed our populations. In short, the world, and the world economy, would be drastically different. And when I say "abrupt," I mean: These changes could happen within a decade, and they could persist for hundreds of years. You could see the changes in your lifetime, and your grandchildren's grandchildren will still be confronting them. And when I say "soon," I mean: In just the past year, we have seen ominous signs that we may be headed toward a potentially dangerous threshold. If we cross it, Earth's climate could switch gears and jump very rapidly -- not gradually -- into a completely different mode of operation.

#### Current models ignore this effect

Joyce and Kelgwin 11 – Scientists @ WHOI

Terrence Joyce, Senior Scientist, Physical Oceanography and, Lloyd Keigwin, Senior Scientist, Geology & Geophysics, Last Updated 4-2011, “Are We on the Brink of a 'New Little Ice Age?',” Woods Hole Oceanographic Institution, http://www.whoi.edu/page.do?pid=12455&tid=282&cid=10046

Thinking is centered around slow changes to our climate and how they will affect humans and the habitability of our planet. Yet this thinking is flawed: It ignores the well-established fact that Earth’s climate has changed rapidly in the past and could change rapidly in the future. The issue centers around the paradox that **global warming could instigate a new Little Ice Age** in the northern hemisphere. Evidence for abrupt climate change is readily apparent in ice cores taken from Greenland and Antarctica. One sees clear indications of long-term changes discussed above, with CO² and proxy temperature changes associated with the last ice age and its transition into our present interglacial period of warmth. But, in addition, there is a strong chaotic variation of properties with a quasi-period of around 1500 years. We say chaotic because these millennial shifts look like anything but regular oscillations. Rather, they look like rapid, decade-long transitions between cold and warm climates followed by long interludes in one of the two states. The best known example of these events is the Younger Dryas cooling of about 12,000 years ago, named for arctic wildflower remains identified in northern European sediments. This event began and ended within a decade and for its 1000 year duration the North Atlantic region was about 5°C colder. The lack of periodicity and the present failure to isolate a stable forcing mechanism À la Milankovitch, has prompted much scientific debate about the cause of the Younger Dryas and other millennial scale events. Indeed, the Younger Dryas occurred at a time when orbital forcing should have continued to drive climate to the present warm state. A whole volume that reviews the evidence for abrupt climate change and speculates on its mechanisms was published recently by an expert group commissioned by the National Academy of Sciences in the US. This very readable compilation contains a breadth and depth of discussion that we cannot hope to match here. [ “Abrupt Climage Change,” National Academy Press, 2002]. Presently, there is only one viable mechanism identified in the report that may play a major role in determining the stable states of our climate and what causes transitions between them: It involves ocean dynamics. In order to balance the excess heating near the equator and cooling at the poles of the earth, both atmosphere and ocean transport heat from low to high latitudes. Warmer surface water is cooled at high latitudes, releasing heat to the atmosphere, which is then radiated away to space. This heat engine operates to reduce equator-to-pole temperature differences and is a prime moderating mechanism for climate on Earth. Warmer ocean surface temperatures at low latitudes also release water vapor through an excess of evaporation over precipitation to the atmosphere, and this water vapor is transported poleward in the atmosphere along with a portion of the excess heat. At high latitudes where the atmosphere cools, this water vapor falls out as an excess of precipitation over evaporation. This is part of a second important component of our climate system: the hydrologic cycle. As the ocean waters are cooled in their poleward journey, they become denser. If sufficiently cooled, they can sink to form cold dense flows that spread equatorward at great depths, thus perpetuating the circulation system that transports warm surface flows toward high latitude oceans. The cycle is completed by oceanic mixing, which slowly converts the cold deep waters to warm surface waters. Thus, surface forcing and internal mixing are two major players in this overturning circulation, called the great ocean conveyor. The waters moving poleward are relatively salty due to more evaporation at low latitudes, which increases surface salinity. At higher latitudes surface waters become fresher as a consequence of the dominance of precipitation over evaporation at high latitudes. The freshening tendency makes the surface water more buoyant, thus opposing the cooling tendency. If the freshening is sufficiently large, the surface waters may not be dense enough to sink to great depths in the ocean, thus inhibiting the action of the ocean conveyor and upsetting one important part of the earth’s heating system. This system of regulation does not operate the same in all oceans. The Asian continent limits the northern extent of the Indian Ocean to the tropics, and deep water does not presently form in the North Pacific, because surface waters are just too fresh. Our present climate promotes cold deep water formation around Antarctica and in the northern North Atlantic Ocean. The conveyor circulation increases the northward transport of warmer waters in the Gulf Stream at mid-latitudes by about 50% over what wind-driven transport alone would do. Our limited knowledge of ocean climate on long time scales, extracted from the analysis of sediment cores taken around the world ocean, has generally implicated the North Atlantic as the most unstable member of the conveyor: During millennial periods of cold climate, North Atlantic Deep Water (NADW) formation either stopped or was seriously reduced. And this has generally followed periods of large freshwater discharge into the northern N. Atlantic caused by rapid melting of glacial or multi-year ice in the Arctic Basin. It is thought that these fresh waters, which have been transported into the regions of deep water formation, have interrupted the conveyor by overcoming the high latitude cooling effect with excessive freshening. The ocean conveyor need not stop entirely when the NADW formation is curtailed. It can continue at shallower depths in the N. Atlantic and persist in the Southern Ocean where Antarctic Bottom Water formation continues or is even accelerated. Yet a disruption of the northern limb of the overturning circulation will affect the heat balance of the northern hemisphere and could affect both the oceanic and atmospheric climate. Model calculations indicate the potential for cooling of 3 to 5 degree Celsius in the ocean and atmosphere should a total disruption occur. This is a third to a half the temperature change experienced during major ice ages. These changes are twice as large as those experienced in the worst winters of the past century in the eastern US, and are likely to persist for decades to centuries after a climate transition occurs. They are of a magnitude comparable to the Little Ice Age, which had profound effects on human settlements in Europe and North America during the 16th through 18th centuries. Their geographic extent is in doubt; it might be limited to regions bounding the N. Atlantic Ocean. High latitude temperature changes in the ocean are much less capable of affecting the global atmosphere than low latitude ones, such as those produced by El Niño. Whether the pathway for propagation of climate change is atmospheric or oceanic, or whether changes in oceanic and terrestrial sequestration of carbon may globalize effects of climate change, as suspected for glacial/inter-glacial climate changes, are open questions. Yet we begin to approach how the paradox mentioned above can happen: Global warming can induce a colder climate for many of us. Consider first some observations of oceanic change over the modern instrumental record going back 40 years. During this time interval, we have observed a rise in mean global temperature. Because of its large heat capacity, the ocean has registered small but significant changes in temperature. The largest temperature increases are in the near surface waters, but warming has been measurable to depths as great as 3000 meters in the N. Atlantic. Superimposed on this long-term increase are interannual and decadal changes that often obscure these trends, causing regional variability and cooling in some regions, and warming in others. In addition, recent evidence shows that the high latitude oceans have freshened while the subtropics and tropics have become saltier. These possible changes in the hydrological cycle have not been limited to the North Atlantic, but have been seen in all major oceans. Yet it is the N. Atlantic where these changes can act to disrupt the overturning circulation and cause a rapid climate transition. A 3-4 meter, high latitude buildup of fresh water over this time period has decreased water column salinities throughout the subpolar N. Atlantic as deep as 2000m. At the same time, subtropical and northern tropical salinities have increased. The degree to which the two effects balance out in terms of fresh water is important for climate change. If the net effect is a lowering of salinity, then fresh water must have been added from other sources: river runoff, melting of multi-year arctic ice, or glaciers. A flooding of the northern Atlantic with fresh water from these various sources has the potential to reduce or even disrupt the overturning circulation. Whether or not the latter will happen is the nexus of the problem, and one that is hard to predict with confidence. At present we do not even have a system in place for monitoring the overturning circulation. Models of the overturning circulation are very sensitive to how internal mixing is parameterized. Recall that internal mixing of heat and salt is an integral part of overturning circulation. One recent study shows that for a model with constant vertical mixing, which is commonly used in coupled ocean-atmosphere climate runs, there is only one stable climate state: our present one with substantial sinking and dense water formation in the northern N. Atlantic. With a slightly different formulation, more consistent with some recent measurements of oceanic mixing rates that are small near the surface and become larger over rough bottom topography, a second stable state emerges with little or no deep-water production in the northern N. Atlantic. The existence of a second stable state is crucial to understanding when and if abrupt climate change occurs. When it occurs in model runs and in geological data, it is invariably linked to rapid addition of fresh water at high northern latitudes. And now perhaps you begin to see the scope of the problem. In addition to incorporating a terrestrial biosphere and polar ice, which both play a large role in the reflectivity of solar radiation, one has to accurately parameterize mixing that occurs on centimeter to tens of centimeter scales in the ocean. And one has to produce long coupled global climate runs of many centuries! This is a daunting task but is necessary before we can confidently rely on models to predict future climate change. Besides needing believable models that can accurately predict climate change, we also need data that can properly initialize them. Errors in initial data can lead to poor atmospheric predictions in several days. So one sure pathway to better weather predictions is better initial data. For the ocean, our data coverage is wholly inadequate. We can’t say now what the overturning circulation looks like with any confidence and are faced with the task of predicting what it may be like in 10 years! Efforts are now underway to remedy this. Global coverage of upper ocean temperature and salinity measurements with autonomous floats is well within our capability within the next decade as are surface measures of wind stress and ocean circulation from satellites. The measurement of deep flows is more difficult, but knowledge about the locations of critical avenues of dense water flows exists, and efforts are underway to measure them in some key locations with moored arrays. Our knowledge about past climate change is limited as well. There are only a handful of high-resolution ice core climate records of the past 100,000 years, and even fewer ocean records of comparable resolution. Better definition of past climate states is needed not only in and of itself, but for use by modelers to test their best climate models in reproducing what we know happened in the past before believing model projections about the future. We are not there yet, and progress needs to be made on both better data and improved models before we can begin to answer some critical questions about future climate change. Researchers always tell you that more research funding is needed, and we are not any different. Our main message is not just that, however. It is that global climate is moving in a direction that makes abrupt climate change more probable, that these dynamics lie beyond the capability of many of the models used in IPCC reports, and the consequences of ignoring this may be large. For those of us living around the edge of the N. Atlantic Ocean, we may be planning for climate scenarios of global warming that are **opposite to what might actually occur**.

### AT: Reforestation

**Doesn’t solve warming**

**CBC News 11** (June 20, “Replacing crops with trees barely slows warming”, <http://www.cbc.ca/news/technology/story/2011/06/20/science-afforestation-montenegro.html>)

A key climate change reduction strategy recommended by the United Nations won't have much effect on global temperatures, according to a couple of Canadian scientists. **Afforestation involves planting trees** over croplands that aren't very productive **in order to absorb more carbon dioxide from the air.** High emissions of carbon dioxide have been linked to climate change, especially rising average global temperatures. **But even if 100 per cent of the area planted with crops now was gradually replaced with forests, wherever possible, over the next 50 years, warming would only be reduced 0.45 degrees Celsius between 2081 and 2100, said a study by Vivek Arora,** an Environment Canada researcher based **at the Canadian Centre for Climate Modelling and Analysis** in Victoria, B.C., **and Alvaro Montenegro, an earth sciences professor at St. Francis Xavier University** in Antigonish, N.S. **If 50 per cent of the area was afforested, warming would be reduced by just 0.25 degrees. "That says a lot about the smaller efforts**," Montenegro said on Monday, a day after the research was published in Nature Geoscience. The United Nations lists afforestation as one way developing countries can earn emission reduction credits that can be sold to industrialized countries to meet their obligations under the Kyoto Protocol, an international agreement to reduce greenhouse gas emissions by 5.2 per cent from 1990 levels by 2008 to 2012. **Arora and Montenegro used a mathematical model of the Earth's climate, land surface and oceans to calculate the effect of replacing cropland with trees where trees could naturally grow**. For example, they excluded areas like the Canadian prairies that are naturally grasslands. They found that **while forests do absorb large amounts of carbon dioxide, they are darker than crops, so they absorb more sunlight. That results in net warming, especially in areas further away from the equator.**

**Counterplan can’t solve – multiple warrants**

**BioCarbon Fund 12** (March 15, “Insights from afforestation and reforestation clean development mechanism projects”, <http://wbcarbonfinance.org/docs/57853_ExecSumm_Final.pdf>, pdf) [Box 2 between paragraphs omitted]

Regulatory Issues: The Challenge of Pursuing Forest Carbon Credits with Environmental Integrity, Efficiency, and Effectiveness ■ **Designing a project and developing a PDD can be a time-intensive and costly task.** Projects developed by highly motivated entities with good managerial capacity in countries with a strong forestry sector have been the most effective in project preparation and PDD development. **Developing a forest carbon project**–including writing the PDD– **requires a wide range of technical and managerial expertise** (e.g., forestry, forest carbon, financing, land-use change, economics, institutional and legal, coordination). **Gathering such multidisciplinary teams in rural areas of developing countries is a challenging task. Reliance on external consultants remains high, increasing projects’ transaction costs. Lack of host countries’ forestry sector information** for additionality **has proven to be a major challenge** for timely completion of PDDs. ■ DnAs can have an effect on the time projects spend on validation. **DNAs** must play a supportive role and focus on the analysis of the project’s contribution to the national sustainable development objectives. In some countries, these entities **have at times delayed the issuance of documentation required by projects at validation. This is** sometimes **due to the DNA’s lack of understanding of its role in contributing to the project success for registration and overall** project **feasibility**. It is important to recognize, however, that DNAs are also on a learning curve; in some countries this challenge has already been overcome. ■ validation is often delayed because **many project developers do not fully grasp the rules for ghg accounting or lack the capacity to track the changes in rules, methodology versions, and required documents forms**. Increased experience in PDD preparation and the development of tools to facilitate GHG accounting have partially addressed these challenges. The CDM EB continues consolidating methodologies and presenting rule changes in a more consistent manner. Still, additional efforts are needed in this direction. In countries with minimal capacity this remains a problem. Also, **project developers have serious difficulties tracking the latest versions of CDM EB guidance to update their PDDs, and this is a major source of delay in validation**. Because of this, **developers continue to rely on external consultants for validation, which prevents total ownership of the project and has serious implications for effective implementation of later stages of the project cycle** (e.g., monitoring). ■ Delays at registration and issuance are expected to be significant in A/R projects due to the stringent scrutiny by the CDM eb. At registration, **project documentation undergoes a “completeness check” process. Projects frequently fail this check as developers get overwhelmed with complying with the validation process and disregard the importance of presenting the required documentation in a comprehensive and accurate manner**. The difficulties in tracking CDM EB decisions are also reflected in this poor performance. Moreover, additional technical review may be required if at least three members of the CDM EB or a party involved in the proposed project activity request it. As stated in the World Bank report 10 Years of Experience in Carbon Finance, 5 this review was frequent in the past. Although the CDM EB has made important improvements to revert this trend, some A/R projects have been reviewed at registration. Extra examinations at registration and issuance may put A/R projects at risk of not getting credit issuance before the end of the first commitment period of the Kyoto Protocol because the queue of projects requesting registration and credit issuance is increasing as 2012 approaches. ■ **the verification process can be delayed when PDDs are not strictly followed. Project developers and field teams often disregard the importance of strictly following the PDD at implementation.** This is compounded by the live nature of such projects and, sometimes, the fact that project developers and field teams are not involved in the preparation of the PDD. Also, the **monitoring of A/R projects has its own complexities as it requires developers to assess many variables**. Significant **deviation from the PDD at project implementation will increase the number of formal processes** since a revised monitoring plan must be approved by the CDM EB; **this** consequently **will delay credit issuance**. To overcome this challenge, it is important to further simplify the monitoring rules and increase local capacity. The A/R CDM Land-related Rules: Challenges and Opportunities ■ **Complying with the land eligibility and project boundary rules is a challenging task for project developers. It demands both human and technical capacity to interpret satellite imagery and resources to invest in technologies**. Also, **developers have struggled with tracking the many changes that the CDM EB has introduced to the land eligibility rule. These changes have created ambiguity and generated different interpretation of the rules by validators and project developers.** Since consultants that are external to the project have usually been in charge of doing the eligibility assessment, the **stakeholders involved in projects become increasingly frustrated as the process of selecting eligible lands has to be repeated**. ■ **Project developers in tropical agriculture lands struggle with identifying eligible lands; this especially affects projects involving multiple farmers.** Tropical vegetation may regenerate quickly, reaching the forest definition; if this coincides with validation, auditors may judge these lands as ineligible (even though these lands may be only temporarily stocked with carbon). **Developers find it difficult to demonstrate the temporary nature of land regeneration as this would require undertaking broader and more complex studies on land-use patterns and ecology. Often developers have to redo the land eligibility analysis until finding enough eligible lands to ensure project viability, delaying project implementation**. Such **delays affect eligible farmers’ willingness to participate in the project as they lose their confidence in the potential benefits of committing their land and investing labor and time in the project.** The CDM EB simplified this rule by allowing project developers to present evidence of control over the land for two-thirds of the project area at validation, but they still have to present the delineation of the total project boundary. ■ **the “1990 rule” excludes areas with significant potential for A/R and results in scattered planting plots**. Many **areas in developing countries were deforested and degraded in the 1990s and are therefore ineligible for A/R** CDM projects. In some cases, areas neighboring the projects are excluded from participating because of the same rule. **This leads to “patchwork forests” negatively affecting the social, ecological, and financial aspects of projects.**

**Reforestation fails—studies prove**

**Thompson 7** – Managing Editor, OurAmazingPlanet, Masters degree in Earth and Atmospheric Sciences (Andrea, “Trees Won't Fix Global Warming” Live Science, August 8, 2007 <http://www.livescience.com/1754-trees-won-fix-global-warming.html>) MLR

**The plan to use trees** as a way **to suck up and store** the extra **carbon dioxide** emitted into Earth's atmosphere **to combat global warming isn't such a hot idea**, new research indicates. **Scientists at Duke University bathed** plots of **North Carolina pine trees in extra carbon dioxide every day for 10 years and found that while the trees grew more tissue, only the trees that received the most water and nutrients stored enough carbon dioxide to offset the effects of global warming.** The Department of Energy-funded project, called **the Free Air Carbon Enrichment** (FACE) **experiment, compared four pine forest plots that received daily doses of carbon dioxide 1.5 times current levels** of the greenhouse gas in Earth's atmosphere **to four** matched **plots that didn't receive any extra gas.** The treated trees produced about 20 percent more biomass on average, butsince water and nutrient availability differed across the plots,averages don't tell the whole story**,** the researchers noted. "In some areas, the growth is maybe five to 10 percent more, and in other areas it's 40 percent more," said FACE project director Ram Oren of Duke University. "So **in sites that are poor in nutrients and water we see very little response. In sites that are rich in both, we see a large response.**" These differences are key since **the weather isn't always cooperative with human needs—if a drought takes hold, trees won't be able to do much in the way of carbon storage**. "**If water availability decreases at the same time that carbon dioxide increases, then we might not have a net gain in carbon sequestration**," Oren said. **Fertilizing forests to spur more carbon dioxide uptake is impractical,** Oren added, **because of the ramifications to the local environment and water supply.**

**Afforestation fails- only decreases temperatures by a small amount**

**Arora & Montenegro, 11** (Vivek K., Alvaro. Canadian Centre for Climate Modelling and Analysis, Environment Canada, Environmental Sciences Research Centre, Department of Earth Sciences, St Francis Xavier University, “Small temperature benefits provided by realistic afforestation efforts.” Nature Geoscience. June, 19)

Afforestation has been considered as a viable climate-change mitigation strategy. Our simulations suggest that, although this is true, **the temperature benefits provided by afforestation are marginal. Afforesting 50% of the existing crop area, everywhere on the globe** (an area much larger than the Amazon River basin), **yields a warming reduction of 0.25 °C in the last two decades of the twenty-first century relative to the ~3.0 °C temperature increase over the 1850–2100 period** obtained using CanESM1 (for the A2 emission scenario). Temperature benefits of any realistic afforestation efforts, with afforested area less than that in the 50%-afforestation scenario, are expected to be even lower, suggesting that **afforestation is not a substitute for reduced greenhouse-gas emissions**. Moreover, **in all afforestation simulations the temperature benefits are not realized until late in the twenty-first century**. However, afforestation does provide several other benefits and ecosystem services, including wildlife habitat, provision of timber, pulp and paper, prevention of soil erosion and, through its sequestration of atmospheric CO2, reduced acidification of the oceans. When interpreted on the basis of warming reduction per unit afforested area, the model simulations suggest avoided deforestation and continued afforestation in the tropics as more effective forest management strategies. Quantitative results presented here are subject to uncertainties, in particular those associated with the difference in the albedo of forests and croplands, climate sensitivity and the strength of the CO2 fertilization effect, the latter two of which vary widely between models14, 15. Biogeophysical and biogeochemical processes are influenced by all of these factors, so both the sign and magnitude of the net temperature response to afforestation are expected to vary between models. The climate sensitivity of CanESM1 is similar to that of most Coupled Climate Carbon Cycle Model Intercomparison Project models16 (Supplementary Fig. S4) although its CO2 fertilization effect is somewhat stronger15. Our finding, however, **that the net temperature effect of any realistic afforestation efforts is an order of magnitude less than the warming realized over the 1850–2100 period is probably robust.**

**Afforestation results in my warming- at best it only reduces temperatures by a small amount.**

**Phys.org 11**(staff writer, “Afforestation will hardly dent warming problem: study” June 19. http://phys.org/news/2011-06-afforestation-dent-problem.html)

**Schemes to convert croplands or marginal lands to forests will make almost no inroads against global warming this century**, a scientific study published on Sunday said. Afforestation is being encouraged under the UN's Kyoto Protocol climate-change treaty under the theory that forests are "sinks" that soak up carbon dioxide (CO2) from the air through photosynthesis. But **environmental researchers, in a new probe, said that even massive conversion of land to forestry would have only a slender benefit against the greenhouse-gas problem. This is partly because forests take decades to mature and CO2 is a long-lasting molecule**, able to lurk for centuries in the atmosphere. But another reason is that **forests**, even as they absorb greenhouse gas, **are darker than croplands and thus absorb more solar heat -- and in high latitudes, this may even result in net warming**. Vivek Arora of the University of Victoria in British Columbia and Alvaro Montenegro of St. Francis Xavier University in Nova Scotia modelled five scenarios in which afforestation was carried out over 50 years, from 2011 to 2060. They used a Canadian programme called CanESM1 that simulated the impacts on land, sea and air if Earth's surface temperature rose by some 3.0 degrees Celsius (5.4 degrees Fahrenheit) by 2100 compared to 1850. **Even if all the cropland in the world were afforested, this would reduce the warming by only 0.45 C** (0.81 F) by a timescale of 2081-2100, according to the study, which appears in the journal Nature Geoscience. **Fifty-percent afforestation would brake it by an even tinier 0.25 C** (0.45 F). **Both scenarios are, of course, wildly unrealistic because of the need to grow food.** Fifty-percent afforestation would require at least a doubling in crop yield to feed the human population because half of the crop area would be taken out of use. The other three scenarios found that afforestation in the tropics was three times more efficient at "avoided warming" than in northerly latitudes and temperate regions. The study said that afforestation does have other benefits, for the economy and the ecoystem. "There's nothing wrong with afforestation, it is positive, but **our findings say that it's not a response to temperature control if we are going to be emitting (greenhouse gases) this way,"** Montenegro told AFP. The study said bluntly, "**Afforestation is not a substitute for reduced greenhouse-gas emissions."**

**It’s a false solution that allows polluters to continue producing emissions**

**Climate and Capitalism** 6/17/**12** (“NO REDD+! – Decolonize the Earth and the Sky!” Climate and Capitalism, June 17 2012, <http://climateandcapitalism.com/2012/06/17/no-redd-ecolonize-the-earth-and-the-sky/>) MLR

Just as historically the Doctrine of Discovery was used to justify the first wave of colonialism by alleging that Indigenous Peoples did not have souls, and that our territories were “terra nullius,” land of nobody, now **the Green Economy and REDD+ are inventing** similarly **dishonest premises to justify** this new wave of **colonialization and privatization of nature**. Indigenous Peoples and peasants are being killed, forcibly relocated, criminalized, and blamed for climate change. Our **land is** being **labeled “unused,” “degraded” or in need of “conservation” and “reforestation,” to justify massive land grabs for REDD+,** carbon offset projects and biopiracy. But what exactly is the Green Economy and REDD+? **The Green Economy is nothing more than capitalism of nature; a perverse attempt by corporations, extractive industries and governments to cash in on Creation by privatizing, commodifying, and selling off** the Sacred and **all forms of life and the sky, including the air we breathe, the water we drink and all the genes, plants, traditional seeds, trees, animals, fish, biological and cultural diversity, ecosystems and traditional knowledge that make life on Earth possible** and enjoyable. The Green Economy is the umbrella for all kinds of ways to sell nature including REDD+, the Clean Development Mechanism, carbon trading, PES (Payment for Environmental Services), the financialization of nature, the International Regime on Access to Genetic Resources, patents on life, TEEB (The Economics of Ecosystems and Biodiversity), natural capital, green bonds, species banking and state and business “partnerships” with indigenous peoples. Under the Green Economy, **even the rain, the beauty of a waterfall or a honey bee’s pollen will be reduced to a barcode price tag and sold to the highest bidder.** At the same time, **the Green Economy promotes and greenwashes environmentally and socially devastating extractive industries like logging, mining and oil drilling as “sustainable development.”** Nothing could be further from the truth. **REDD+**, like carbon trading and the Clean Development Mechanism**, is a false solution to climate change** promoted by the United Nations, the World Bank and climate criminals such as Shell and Rio Tinto, **which allows polluters to continue to burn fossil fuels and not reduce their emissions at source.** Officially, REDD+ stands for Reducing Emissions from Deforestation and forest Degradation. But, REDD+ really means Reaping profits from Evictions, land grabs, Deforestation and Destruction of biodiversity. REDD+ constitutes a worldwide land grab and gigantesque carbon offset scam.

###  Nitrogen

**Reforestation is futile—insufficient nitrogen supply**

**Brahic 6** (Catherine, “Planting trees 'will not cancel out climate change'” The Science and Development Network, awarded “best science journalism on the world wide web” by association of British Science Writers, April 13 2006 <http://www.scidev.net/en/news/planting-trees-will-not-cancel-out-climate-change.html>) MLR

**Attempts to limit climate change by planting trees to absorb carbon dioxide from the atmosphere could be futile, according to two studies** published this week. It had previously been suggested that rising concentrations of the gas would boost plant growth and, with it, the amount of carbon dioxide plants absorb. But **two US-based teams — led by Johan Six of the University of California at Davis and Peter Reich at the University of Minnesota — say** this is a false hope. **Insufficient amounts of nitrogen gas**, they say, **will limit plant growth regardless of how much extra carbon dioxide is available.** **Nitrogen levels**, also essential for plant growth, **are not rising as fast as those of carbon dioxide**. This means **there is a limit to how fast plants can grow, and therefore how much carbon dioxide they can absorb**, say the researchers. Reich's team undertook one of the longest -ever studies of how plants respond to different levels of nitrogen. **Over the course of six-years, they found** that **the amount of nitrogen** naturally **available to plants** gradually **limited plant growth. Adding nitrogen to the soil reversed this trend.** For their part, Six and colleagues used data from 80 previous studies to see how nitrogen levels affect the way carbon is stored in soil. **Carbon dioxide that plants absorb from the atmosphere ends up in the soil they grow i**n, for instance when dead leaves and branches drop to the ground and decompose. Six's team concluded that **high levels of atmospheric carbon dioxide only leads to an accumulation of carbon in soil if nitrogen is added "at rates well above typical atmospheric inputs**". Six told SciDev.Net that **because his study looked at data from a range of ecosystems, its results reflect general trends.** The scientists also found that eve**n when nitrogen was not the limiting factor, other nutrients that were in short supply had the same restrictive effect. The bottom line**, says Six, **is that we "cannot rely on nature to clean up" industrial carbon dioxide emissions.**

**No solvency—low availability of nitrogen**

**Reich et al. 5** – Department of Forest Resources, University of Minnesota (Peter B., “Nitrogen limitation constrains sustainability of ecosystem response to CO2” Nature.com, November 29 2005, <http://www.scidev.net/uploads/File//pdffiles/nature/nature04486.pdf>) MLR

Enhanced plant biomass accumulation in response to elevated atmospheric CO2 concentration could dampen the future rate of increase inCO2 levels and associated climate warming. However, **it is unknown whether CO2-induced stimulation of plant growth and biomass accumulation will be sustained** or whether **limited nitrogen (N) availability constrains greater plant growth in a CO2-enriched world1**–9.Here we show, after **a six-year field study** of perennial grassland species grown under ambient and elevated levels of CO2 and N, that **low availability of N progressively suppresses the positive response of plant biomass to elevated CO2.** Initially, the stimulation of total plant biomass by elevated CO2 was no greater at enriched than at ambient N supply. **After four to six years**, however, **elevated CO2 stimulated plant biomass much less under ambient than enriched N supply**. This response was consistent with the temporally divergent effects of elevated CO2 on soil and plant N dynamics at differing levels of N supply. Our results indicate that **variability in availability of soil N and deposition of atmospheric N** are **both** likely to **influence the response of plant biomass accumulation to elevated atmospheric CO2. Given** that **limitations to productivity resulting from the insufficient availability of N** are widespread **in both unmanaged and managed vegetation**5,7–9, **soil N supply is** probably **an important constraint on global terrestrial responses to elevated CO2.**

### Leakage

**Market and activity leakage undermine the benefits of reforestation**

**Schwarze, Niles, and Olander 2** – visiting professor at the Institute of Public Finance at the University of Innsbruck, in the German delegation for the first China-Germany Forum for Climate and Energy Board; Director of the Tropical Forest Group and a visiting scholar and lecturer at the University of California, San Diego; Director, Katoomba Group Ecosystem Services Incubator (Reimund, John, and Jacob, “The Forest Leakage Problem” The Nature Conservancy and The Royal Society, 2002, <http://forestindustries.eu/content/forest-leakage-problem>) MLR

Activities that increase forest cover or decrease deforestation can help reduce atmospheric carbon dioxide levels. **Concerns have been expressed**, however, **that land use, land-use change and forestry** (LULUCF) **projects may only produce greenhouse gas benefits that are illusory due to** a phenomenon known as “**leakage**”. **Leakage is the unanticipated decrease or increase in greenhouse gas benefits outside of a project’s accounting boundary resulting from the project’s activities. Leakage can** potentially **be significant compared to the scale of planned GHG changes** in mitigation projects. Thus, **leakage constitutes a key challenge to sound climate change policy formulation**. In this paper we review the literature on leakage and pay special attention to LULUCF projects in developing countries. Leakage is complex and poorly understood Leakage is an intricate and diverse phenomenon. **Market impacts, people moving from place to place, ecological feedbacks and product life cycle changes are some of the ways leakage can be manifested.** To illustrate: **an avoided deforestation project may cause activity-shifting leakage (people leaving a project area to go cut trees elsewhere) or market leakage (less timber available due to the project, more pressure to cut elsewhere). These** two **types of leakage are the most common**ly cited, **and are often perceived as negative (resulting in more emissions or less sequestration – that is, more atmospheric greenhouse gases). Both of these processes are intricate, difficult to monitor and complicated by many outside influences.**

### Reforestation Turns Warming

**Reforestation is susceptible to fires and insects that release the CO2 back into the atmosphere**

**Canadell and Rapauch 8** – Ph.D. Biology and Executive Director Global Carbon Project and CSIRO Research Scientist; Chief Research Scientist in the CSIRO Land and Water Landscape Systems Research Directorate in Australia (Josep G. and Michael R., “Managing Forests for Climate Change Mitigation” Science Journal, Vol. 320 no. 5882 pp. 1456-1457, June 13 2008, <http://www.sciencemag.org.proxy.lib.umich.edu/content/320/5882/1456.full>) MLR

**Climate mitigation through forestry carries the risk that carbon stores may return to the atmosphere by disturbances such as fire and insect outbreaks, exacerbated by climate extremes and climate change. A recent increase in areas affected by wildfires and insect outbreaks has driven Canadian forests from a CO2 sink** (before 2000) **to a source expected to continue for** at least the next two to three **decades** (16). Similarly, **increased forest biomass in the** western **U**nited **S**tates **caused by fire suppression and reduced harvesting rates** over the past century **is** now **threatened by a** factor of 4 **increase in fire frequency due to longer and hotter dry seasons** (17). **These new patterns of disturbances are reshaping the view** held in the past **that vast forest resources anywhere would always play a major role in climate mitigation.**

**Turn—reforestation accelerates CO2 emissions**

**Kirby 99** – BBC Environment Correspondent(Alex, “More trees nice but not the answer” BBC News, October 20 1999, http://news.bbc.co.uk/2/hi/science/nature/480339.stm) MLR

**The** Intergovernmental Panel on Climate Change (**IPCC**) **said that massive tree-planting to absorb carbon dioxide will at best only buy time and, at worst, accelerate global warming**. It claimed that **the new trees would soon be saturated with CO2 and start returning most of it to the atmosphere. Although trees absorb carbon dioxide** through photosynthesis, **they also release it** back into the air **when their plant matter breaks down the sugars they have made. This is called ‘respiration’, and respiration increases in response to temperature rises, which are triggered by rises in CO2 levels.** Scientists fear that **recent rises in temperatures may cause respiration to accelerate, turning forests from ‘carbon sinks’ into carbon** (dioxide) **sources**. Scientists had not spotted this possibility before because, although CO2 take up is instantaneous, the warming which triggers respiration has a built-in delay of around 50 years due to the slow warming of the oceans. **Planting trees**, therefore, **may buy a little time now but cause very serious problems downstream.**

### REDD+ Fails

**REDD+ fails—delays and funding issues**

**Nogrady 6/25/**12 – freelance science and medical writer, author of The Sixth Wave, a book on how to succeed in a resource-limited world, gives talks on innovation and sustainability (Bianca, “Uncertain future for international forest scheme” ABC Environment, June 19 2012, <http://www.abc.net.au/environment/articles/2012/06/19/3527644.htm>) MLR

However **after** such **promising beginnings, many REDD+ projects around the world are floundering.** Professor Arild Angelsen, editor of Analysing REDD+ and senior associate at CIFOR , says **REDD+ has progressed much slower than was first hoped.** "In 2007, when REDD+ was launched, some of us expected that it would take some years before we saw results but a lot of things have been slower. For example, to start the projects on the ground, to implement national policy reforms," says Angelsen, Professor of Economics at the Norwegian University of Life Sciences. **One major sticking point has been the question of who gets paid, and for what. A key component of most REDD+ projects is the provision of alternative livelihoods for local people who would normally earn their keep cutting down forests for timber or agriculture. These alternatives might include tree planting, forest conservation activities or sustainable agriculture. However the question of what exactly is being bought or paid for by REDD+ funding is contentious**. "You're paying for emissions reduction, and establishing such a system is not only hard in practice, it's also hard in theory," Angelsen says. For example, do you pay everyone with a standing forest a flat rate per hectare of forest, or do you only pay those who keep deforestation below a certain amount, such as one per cent deforestation from a pre-established baseline? **There's** also **the risk that, by paying people not to deforest, the system might** inadvertently **encouraging people to falsely declare their intentions to cut down trees.** "You do that and of course, **everybody would have an incentive to say, 'I'm going to deforest next year so please pay me',"** says Angelsen. In terms of the 'who' question, many **projects have struggled to identify exactly who is entitled to payment, particularly in areas where land ownership or territorial boundaries are in dispute. There is also the question of how the benefits of REDD+ should be shared amongst individual landowners, communities, local, regional and national governments**, says Angelsen. "If you're only paying those at the local levels, what about all the governments at the various levels, the project proponents, those implementing the projects?" he says.

**Time for a reality check—REDD+ faces massive challenges**

**Mongabay 6/20**/12 (“Challenges mount as forest carbon payment approaches move from theory to practice” June 20 2012 <http://www.forestcarbonportal.com/news/challenges-mount-forest-carbon-payment-approaches-move-theory-practice>) MLR

**The concept of paying tropical countries to reduce destruction of their forests is** succeeding as an idea but **suffering from implementation challenges**, argues a new review by the Center for International Forestry Research (CIFOR). Reducing Emissions from Deforestation and Degradation (**REDD+**), as the U.N.-backed initiative is known, **gained momentum as a climate change mitigation approach** in the mid-2000s. **The concept was widely championed by a variety of stakeholders. But as REDD+ has moved from theory to real-world projects, complications have grown while enthusiasm has waned.** The new book from CIFOR examines this transformation, analyzing REDD+ design and early implementation. It identifies a **number of challenges** that **need to be overcome to ensure REDD+ is equitable, cost effective, and actually reduces greenhouse gas emissions. “It’s a reality check on what is happening on the ground,” says** CIFOR's **Arild Angelsen, an environmental economist and professor** at the Norwegian University of Life Sciences who was the book's main editor. "**REDD+ as an idea is a success story,**" Angelsen continued. "It was something genuinely new, and the new key element was that it was based on payments for performance or results. And it was also accompanied by big money.” “We compare it to ‘sustainable development’ – a nice catch phrase and promising to do a lot. Both ideas have been inspirational for policy makers and practitioners, **but results so far are not what many hoped for**." The book notes that **REDD+ is facing huge challenges, including powerful interests pushing business-as-usual approaches to forest use, difficulties in coordinating between different levels of government, concerns about activities that could jeopardize local people and wildlife, lack of land rights, benefits distribution local communities, sources of finance at a time of economic uncertainty, corruption, reliable monitoring, and credible processes for establishing reference levels. "If you have a system of payments you could in theory make everybody winners – but in practice there are two challenges: firstly, we don’t have enough financing to change the fundamental equation** and thereby make everyone winners, **and secondly it’s very difficult to design a system that will make sure everyone wins**,” Angelsen said. “There are a lot of practical challenges, but this book shows there are workable, technical solutions to these, so the main problems are really the political ones."

### AT Reforestation CP

### Water DA

**Reforestation causes massive water shortages**

**Thompson 7 – Managing Editor, OurAmazingPlanet, Masters in Earth and Atmospheric Sciences** (Andrea, “Trees Won't Fix Global Warming” Live Science, August 8, 2007 <http://www.livescience.com/1754-trees-won-fix-global-warming.html>) MLR

"In order **to actually have an effect on** the atmospheric concentration of **CO2**, the **results suggest a future need to fertilize vast areas**," Oren said. "And **the impact on water quality of fertilizing large areas will be intolerable to society. Water is already a scarce resource**." The **results of the study**, presented yesterday at a national meeting of the Ecological Society of America, also **noted that only a few parts of a tree will store carbon for long periods of time.** "**Carbon that's in foliage is going to last a lot shorter** time than carbon in the wood, **because leaves decay quickly**," said Duke graduate student and project member Heather McCarthy. "So **elevated CO2** could significantly increase the production of foliage, but this **would lead to only a very small increase in ecosystem carbon storage**."

**Water shortages lead to nuclear war and extinction**

**NASCA 4** (“Water shortages - Only a matter of time,” National Association for Scientific and Cultural Appreciation, 2004, <http://www.nasca.org.uk/Strange_relics_/water/water.html>) MLR

Water Shortage According to the latest estimates nearly 70% of the Earth’s population will struggle to find an adequate water supply by the year 2025. Many authorities now believe that **tension over water consumption will be the major catalyst for the wars of the future**. Water shortage. It’s just around the corner. Water is one of the prime essentials for life as we know it. **The plain fact is - no water, no life!** This becomes all the more worrying when we realise that the worlds supply of drinkable water will soon diminish quite rapidly. In fact a recent report commissioned by the United Nations has emphasised that by the year 2025 at least 66% of the worlds population will be without an adequate water supply. Incalculable damage. **As a disaster in the making water shortage ranks in the top category.** **Without water we** **are finished,** **and** **it is thus imperative that we protect** the mechanism through which we derive **our supply of this life giving fluid**. Unfortunately the exact opposite is the case. **We are doing incalculable damage to the planets capacity to generate water and this will have far ranging consequences for the not too distant future.** Bleak future The United Nations has warned that burning of fossil fuels is the prime cause of water shortage. While there may be other reasons such as increased solar activity it is clear that this is a situation over which we can exert a great deal of control. If not then the future will be very bleak indeed! Already the warning signs are there. Drought conditions. The last year has seen devastating heatwaves in many parts of the world including the USA where the state of Texas experienced its worst drought on record. Elsewhere in the United States forest fires raged out of control, while other regions of the globe experienced drought conditions that were even more severe. Parts of Iran, Afgahnistan, China and other neighbouring countries experienced their worst droughts on record. These conditions also extended throughout many parts of Africa and it is clear that if circumstances remain unchanged we are facing a disaster of epic proportions. Moreover it will be one for which there is no easy answer. Dangers. **The spectre of a world water shortage evokes a truly frightening scenario.** In fact **the United Nations warns that disputes over water will become the prime source of conflict in the not too distant future. Where these shortages become ever more acute it could forseeably lead to the brink of nuclear conflict**. On a lesser scale water, and the price of it, will acquire an importance somewhat like the current value placed on oil. The difference of course is that while oil is not vital for life, water most certainly is! Power shift. It seems clear then that **in future years countries rich in water will enjoy an importance that perhaps they do not have today. In these circumstances power shifts are inevitable, and this will undoubtedly create its own strife and tension.** Nightmare situation. In the long term the implications do not look encouraging. It is a two edged sword. First the shortage of water, and then the increased stresses this will impose upon an already stressed world of politics. It means that answers need to be found immediately. Answers that will both ameliorate the damage to the environment, and also find new sources of water for future consumption. **If** not, and **the problem is left unresolved there will eventually come the day when we shall find ourselves with a nightmare situation for which there will be no obvious answer.**

### Food Shortages DA

**Reforestation exacerbates soil acidity**

**Jackson et al. 5 – Professor, Duke Department of Biology** (Robert B., “Trading Water for Carbon with Biological Carbon Sequestration” Science Journal Vol. 310 no. 5756 pp. 1944-1947, December 23 3005 <http://www.sciencemag.org/content/310/5756/1944.full>) MLR

**Tree plantations feature prominently among tools for carbon sequestration** (1–8). **Plantations** typically **combine higher productivity and biomass with greater annual transpiration and rainfall interception**, particularly for evergreen species such as pines and eucalypts (9–12). In addition to influencing water budgets, plantations require additional base locations and other nutrients to balance the stoichiometry of their extra biomass. In consequence, **trade-offs of sequestration with water yield and soil fertility, including nutrient depletion and increased acidity, are likely**. The goal of our research was to account for the trade-offs and benefits of carbon sequestration, identifying potential problems and management needs for a sustainable sequestration policy. **We examined changes in hydrology and biogeochemistry with afforestation, using global synthesis data, fieldwork, and regional modeling. We evaluated the extent to which plantations altered water yield, soil chemistry, and acidity** at plot (ha), catchment (ha to km2), and regional (>104 km2) scales, **comparing environmental benefits of carbon sequestration with effects on other environmental services** (13). Our global analysis of 504 annual catchment observations shows that **afforestation dramatically decreased stream flow within a few years of planting** (Fig. 1, A and C) (P < 0.0001). Across all ages in the database**, afforestation of grasslands, shrublands, or croplands decreased stream flow by 180 mm year**–1 **and 38% on average** (Fig. 1) (P < 0.001). After slight initial increases in some cases (Fig. 1), substantial annual decreases of 155 mm and 42% were observed on average for years 6 to 10, and average losses for 10- to 20-year-old plantations were even greater, 227 mm year–1 and 52% of stream flow (Fig. 1, A and C). Perhaps most important**, 13% of streams dried up completely** for at least 1 year (Fig. 1C), with eucalypts more likely to dry up streams than pines. **Afforestation in drier regions** [<1000 mm mean annual precipitation (MAP)] **was** more **likely to eliminate stream flow completely** than in wetter regions. Mean annual renewable water (percentage of annual precipitation lost as runoff) decreased ∼20% with afforestation (Fig. 1D) (P < 0.0001). **For** many **nations with total annual renewable freshwater <30% of precipitation** (Fig. 1B), **afforestation is likely to have large impacts on water resources.**

**Soil acidification collapses agriculture**

**Gazey 9** – Department of Agriculture and Food, Western Australia (Chris, “Soil acidity needs your attention” Department of Agriculture Services, Australia, 2009 <http://www.kondiningroup.com.au/web_multimedia/nw16_soil%20acidity_lr.pdf>) MLR

**Soil acidification** is a natural process, which is accelerated by productive agriculture. Yield reductions in wheat can be up to 20 – 30 per cent and the choice of crops may be restricted to acid tolerant species and varieties. In pastures grown on acidic soil some legume species may fail to persist. Wider impacts **Reduced plant growth increases the susceptibility of the land to wind and water erosion, resulting in loss of nutrients and soil organic matter. When eroded soil and nutrients enter waterways long-term degradation can result. Insufficient water usage can occur** when deep-rooted species fail to thrive, **increasing the risk of dryland salinity.** **Reduced nutrient uptake by crops, and pastures grown on acidic soil, can result in more nutrients being leached and potential ground water pollution.** How acidic soils affect plants Topsoil **In very acid soils, all the major plant nutrients** including nitrogen (N), phosphorous (P), potassium (K) and also the trace element molybdenum (Mo) **may be unavailable**, or only available in insufficient quantities. **Acid topsoils affect microbial activity,** most notably **reducing nitrogen-fixing rhizobia bacteria**, which form a symbiosis with crop and pasture legumes in favourable conditions. In acid soils, **reduced rhizobia populations may be unable to successfully ‘nodulate’ roots**; legumes may be deficient in nitrogen and **pastures may become grass dominated**. Sub–surface soil The major impacts of acidity occur in the sub–surface soil. **When soils acidify, aluminium in the soil becomes solubl**e. In this form, **aluminium retards root growth, restricting access to nutrients and water deeper in the soil profile. Poor crop and pasture growth, yield reduction and smaller grain size occur as a result of inadequate water and nutrition.** The effect of aluminium toxicity on crops is usually most noticeable in seasons with a dry finish, as plants have restricted access to stored subsoil water for grain filling.

**Mass starvations make global war inevitable**

**Brown 9** – Founder of Worldwatch and EPI

Lester R, founder of the Worldwatch Institute and the Earth Policy Institute “Can Food Shortages Bring Down Civilization?” Scientific American, May

**The biggest threat to global stability** is the potential for food crises in poor countries to cause government collapse. Those crises are brought on by ever worsening environmental degradation One of the toughest things for people to do is to anticipate sudden change. Typically we project the future by extrapolating from trends in the past. Much of the time this approach works well. But sometimes it fails spectacularly, and people are simply blindsided by events such as today's economic crisis. For most of us, the idea that civilization itself could disintegrate probably seems preposterous. Who would not find it hard to think seriously about such a complete departure from what we expect of ordinary life? What evidence could make us heed a warning so dire--and how would we go about responding to it? We are so inured to a long list of highly unlikely catastrophes that we are virtually programmed to dismiss them all with a wave of the hand: Sure, our civilization might devolve into chaos--and Earth might collide with an asteroid, too! For many years I have studied global agricultural, population, environmental and economic trends and their interactions. The combined effects of those trends and the political tensions they generate point to the breakdown of governments and societies. Yet I, too, have resisted the idea that food shortages could bring down not only individual governments but also our global civilization. I can no longer ignore that risk. Our continuing failure to deal with the environmental declines that are undermining the world food economy--most important, falling water tables, eroding soils and rising temperatures--forces me to conclude that **such a collapse is possible.** The Problem of Failed States   Even a cursory look at the vital signs of our current world order lends unwelcome support to my conclusion. And those of us in the environmental field are well into our third decade of charting trends of environmental decline without seeing any significant effort to reverse a single one. In six of the past nine years world grain production has fallen short of consumption, forcing a steady drawdown in stocks. When the 2008 harvest began, world carryover stocks of grain (the amount in the bin when the new harvest begins) were at 62 days of consumption, a near record low. In response, world grain prices in the spring and summer of last year climbed to the highest level ever.As demand for food rises faster than supplies are growing, the resulting food-price inflation puts severe stress on the governments of countries already teetering on the edge of chaos. Unable to buy grain or grow their own, hungry people take to the streets. Indeed, even before the steep climb in grain prices in 2008, the number of failing states was expanding [see sidebar at left]. Many of their problem's stem from a failure to slow the growth of their populations. But if the food situation continues to deteriorate, entire nations will break down at an ever increasing rate. We have entered a new era in geopolitics. In the 20th century the main threat to international security was superpower conflict; today it is failing states. It is not the concentration of power but its absence that puts us at risk.States fail when national governments can no longer provide personal security, food security and basic social services such as education and health care. They often lose control of part or all of their territory. When governments lose their monopoly on power, law and order begin to disintegrate. After a point, countries can become so dangerous that food relief workers are no longer safe and their programs are halted; in Somalia and Afghanistan, deteriorating conditions have already put such programs in jeopardy.Failing states are of international concern because they are a source of terrorists, drugs, weapons and refugees, threatening political stability everywhere. Somalia, number one on the 2008 list of failing states, has become a base for piracy. Iraq, number five, is a hotbed for terrorist training. Afghanistan, number seven, is the world's leading supplier of heroin. Following the massive genocide of 1994 in Rwanda, refugees from that troubled state, thousands of armed soldiers among them, helped to destabilize neighboring Democratic Republic of the Congo (number six).Our global civilization depends on a functioning network of politically healthy nation-states to control the spread of infectious disease, to manage the international monetary system, to control international terrorism and to reach scores of other common goals. If the system for controlling infectious diseases--such as polio, SARS or avian flu--breaks down, humanity will be in trouble. Once states fail, no one assumes responsibility for their debt to outside lenders. If enough states disintegrate, their fall will threaten the **stability of global civilization** itself.

### Ext—Soil Acidity

**Reforestation sites acidify soil**

**Jackson et al. 5 – Professor, Duke Department of Biology** (Robert B., “Trading Water for Carbon with Biological Carbon Sequestration” Science Journal Vol. 310 no. 5756 pp. 1944-1947, December 23 3005 <http://www.sciencemag.org/content/310/5756/1944.full>) MLR

**Carbon sequestration strategies highlight tree plantations without considering their full environmental consequences.** We combined **field research**, synthesis of more than 600 **observations, and** climate and economic **modeling** to **document substantial losses in stream flow, and increased soil salinization and acidification, with afforestation. Plantations decreased stream flow by 227 millimeters per year globally** (52%), **with 13% of streams drying completely** for at least 1 year. Regional modeling of U.S. plantation scenarios suggests that **climate feedbacks are unlikely to offset such water losses and could exacerbate them. Plantations** can help control groundwater recharge and upwelling but **reduce stream flow and salinize and acidify** some **soils**.

**Studies prove forestry plantations alter soil chemistry and exacerbate acidity**

**Jackson et al. 5 – Professor, Duke Department of Biology** (Robert B., “Trading Water for Carbon with Biological Carbon Sequestration” Science Journal Vol. 310 no. 5756 pp. 1944-1947, December 23 3005 <http://www.sciencemag.org/content/310/5756/1944.full>) MLR

On the basis of simulations **for the U**nited **S**tates, the **higher water use of plantations and decreased stream flow is unlikely to be offset by atmospheric feedbacks** operating at larger scales (Fig. 2). Climate simulations showed that **plantations** typically **increased summer evapotranspiration** (ET) by >0.3 mm day–1 **and decreased both summer surface air temperature** by as much as 0.3°C **and precipitation** by as much as 30 mm per month in the most densely afforested areas, **compared with the crop and pasture lands they replaced** (Fig. 2) (P < 0.10 for each). No evidence for increased rainfall from local convection was observed with afforestation except in northern Florida and southern Georgia (Fig. 2). Increased ET did not generate more rain because, unlike in the tropics (17, 20), the temperate regions modeled here did not have sufficient energy to lift the additional atmospheric moisture high enough to condense and form clouds. Furthermore, **the lack of sensible heating over plantations reduced the energy available for convection, reducing rainfall** in general and the convective component in particular (Fig. 2F). **Plantations not only have greater water demands** than grasslands, shrublands, or croplands, **they** typically **have increased nutrient demands as well. These demands change soil chemistry in ways that affect fertility and sustainability.** Global synthesis data show that **the afforestation of grasslands or shrublands** significantly **increased Na concentrations,** **exchangeable sodium percentage** (ESP), **and soil acidity and decreased base saturation, suggesting potential soil salinization and sodicity** in some cases (Fig. 3). Saturation of the soil exchange complex with bases decreased by one-quarter on average for 26 paired observations globally (from 59% to 45%; P = 0.002) (Fig. 3). Declines in exchangeable Ca, Mg, and K caused this result, because exchangeable Na doubled across 42 paired observations (P = 0.007) (Fig. 3). In addition, exchangeable sodium percentage more than doubled for 36 pairs, increasing on average from 3.4% to 7.8% in plantations (P = 0.001). ESP increased in 29 of 36 pairs globally, in four cases crossing the severe sodic threshold of 15% associated with physical degradation of soils. Differences in nutrient cycling, root depth distributions, and water consumption between plantations and native vegetation (9–12, 21, 22) likely explained these patterns, with Ca, Mg, and K redistributed from soil to biomass pools and Na excluded by roots and concentrated in the soil (22). **In addition to redistributing and excluding soil nutrients, plantations produce acidic litter, canopy leachates, and decomposition products.** Globally, **plantation soils were more acidic in 98 of 114 cases**, with afforestation resulting in a median decrease of 0.3 pH units (P < 0.0001) (Fig. 3). Declines of 0.5 to 1.6 pH units were observed in a quarter of observations (Fig. 3). Plantations that did not acidify soils tended to grow on highly buffered parent material such as limestone.

**DA turns solvency**

**CES 9** – Commissioner Environmental Sustainability (“Soil Acidification: The unseen threat to soil health and productivity” Fact Sheet No. 7, February 2009, [www.ces.vic.gov.au](http://www.ces.vic.gov.au)) MLR

**Soil acidification is** a **naturally occurring** soil chemical process. This process occurs very gradually in undisturbed ecosystems **but can be accelerated** by agriculture. **Soil acidification** is an environmental issue because it **can: • reduce plant growth and productivity; • decrease the availability of essential plant nutrients and increase the impact of toxic elements; • restrict soil biological activity; and • increase risks of soil structure decline, erosion and salinity.** Productivity losses due to accelerated soil acidification are estimated to cost Victoria $470 million per year. **Lost agricultural productivity also means that less land is available for other purposes, such as revegetation. Prolonged acidification can** also **cause irreversible damage to soil structure. Acidification is** also **linked to erosion, salinity, and loss of soil biodiversity.** Bacteria, earthworms and other **soil organisms** are generally sensitive to soil pH and tend to **decline as soils become more acidic.**

### Ext—Collapses Ag

**Reforestation collapses food security and biodiversity**

Not the best because of un-underlined part…

**Canadell and Rapauch 8** – Ph.D. Biology and Executive Director Global Carbon Project and CSIRO Research Scientist; Chief Research Scientist in the CSIRO Land and Water Landscape Systems Research Directorate in Australia (Josep G. and Michael R., “Managing Forests for Climate Change Mitigation” Science Journal, Vol. 320 no. 5882 pp. 1456-1457, June 13 2008, <http://www.sciencemag.org.proxy.lib.umich.edu/content/320/5882/1456.full>) MLR

Forestry, and **reforestation** in particular—**like any large-scale transformation of land use patterns—can lead to unintended environmental and socioeconomic impacts** that could jeopardize the overall value of carbon mitigation projects. **Concerns include decreased food security, reduced stream flows, and loss of biodiversity and local incomes** (24). However, well-directed carbon sequestration projects, along with the provision of sustainably produced timber, fiber, and energy, will yield numerous benefits, including additional income for rural development, prospects for conservation and other environmental services, and support for indigenous communities (10, 25**). Principles of sustainability must govern the resolution of trade-offs** that may arise **from ancillary effects** in order **to** simultaneously **maximize climate change protection and sustainable development.**

### Ext—Impact

**Statistical analysis proves food shortages leads to conflict**

**Messer 1** – Professor of Nutrition Science and Policy at Tufts University

Ellen Messer, Marc J. Cohen, Special Assistant to the Director General at the International Food Policy Research Institute & Thomas Marchione, Nutrition Advisor at the Bureau for Humanitarian Response, U.S. Agency for International Development , “CONFLICT: A CAUSE AND EFFECT OF HUNGER,” ECSP REPORT · ISSUE 7

**Econometric studies provide additional empirical evidence of a link between food insecurity and violent conflict. These studies find a strong relationship between indicators of deprivation** (such as low per capita income, economic stagnation and decline, high income inequality, and slow growth in food production per capita) **and violent civil strife** (Nafziger & Auvinen, 1997; Collier & Hoeffler, 1998). Mathematical models developed for a U.S. government study identified high infant mortality—the variable that most efficiently reflects a country's overall quality of material life—as the single most efficient variable for explaining conflicts between 1955 and 1994. Along with trade openness and regime type, infant mortality was one of three variables best correlated with the historical cases studied. It often interacts with lack of trade openness and repressive regimes to trigger state failure (Esty et al., 1995; 1998). In sum, **political and institutional factors in interaction with environmental factors (**such as drought and deforestation) **are key indicators of potential conflict in Africa**: well-being is affected not just by natural disasters, but also by how effectively a regime responds to them. Ineffective responses include inappropriate policies, such as those used by some Sahelian countries in the 1960s and 1970s: they both neglected agriculture and subjected it to disproportionate taxation relative to the allocation of public expenditure received. These policies greatly intensified the impact of the severe 1972-75 drought in the region (Christensen et al., 1981). Other ineffective responses include unwillingness to respond to disaster, as in Ethiopia in 1974 or Rwanda in 1993 (J. Clay et al., 1988; Uvin, 1996b), and deliberate use of food and hunger as weapons, as in the Horn of Africa in the 1980s and 1990s (Messer, Cohen, & D'Costa, 1998). These examples demonstrate that famine is a result of political choices as well as capabilities (Drèze & Sen, 1989). Ethnic and Political Rivalries, Hunger, and Conflict **There is a high correlation between a country's involvement in conflict and its classification by FAO as a “low-income food deficit” country. Such countries have high proportions of food-insecure households**. And, as already noted, conflict is also highly correlated with high rates of child mortality (see Figure 2), which is a common index for food insecurity. Nevertheless, a number of analysts have challenged the notion that food insecurity is a causal factor in conflict. Paarlberg, for instance, argues that environmental scarcities such as land shortage, land degradation, and rapid population growth—what he refers to as “eco-Malthusian emiseration”—are not generally a factor in African conflicts. Rather, Paarlberg notes, the level of conflict in Africa has been relatively stable since the end of the colonial era. In his view, “[a] far more convincing explanation for violent conflict in sub-Saharan Africa starts with the serious geographical mismatch, long noticed on the continent, between post-colonial national boundaries and ethnic boundaries.” (Paarlberg, 1999, page 1). More generally, Gleditsch (1998) has pointed out that most conflicts can be sufficiently explained as a result of political, economic, and cultural factors, without reference to environmental scarcities. In fact, neither viewpoint precludes a food-security connection. Even Homer-Dixon (1999), a leading figure in the environmental security field, concedes that environmental scarcity alone does not inevitably result in conflict. Instead, he stresses that **resource constraints can have a profound influence on the social factors that eventually lead to conflict—as when elites monopolize control over scarce resources (such as water, cropland, or forests) and non-elites perceive themselves as unfairly deprived**. As an example of how this works in practice, Uvin (1996b) argues persuasively that environmental factors in general—and **food insecurity** in particular—**critically contributed to triggering the 1994 genocide in Rwanda**. Per capita food production and availability had declined dramatically in Rwanda over the preceding decade. The collapse of the world price of coffee in 1985 greatly reduced local and national government revenues and sapped rural households' purchasing power, even as urban job opportunities grew scarce and food prices rose. **Deteriorating living conditions made many Rwandans into a ready audience for government appeals to ethnic hatred.**

## \*\*2ac’s

### AT: States (Possible 1ac)

#### Doesn’t solve without federally regulated pipelines

Zarraby 12 - chemical engineer for the Federal Energy Regulatory Commission, JD expected from GWU in 2012

Cyrus, “Note: Regulating Carbon Capture and Sequestration: A Federal Regulatory Regime to Promote the Construction of a National Carbon Dioxide Pipeline Network,” 80 Geo. Wash. L. Rev. 950, Lexis

The current lack of a federal regulatory regime coupled with inconsistent state regulations creates three distinct problems that will limit the construction of CO<2> pipelines and hinder the development of CCS technology: (1) uncertainty in the regulations of CO<2> pipelines, 147 (2) a single state's ability to prevent the construction of a pipeline due to the uncertainty of eminent domain issues, 148 and (3) a single landowner's ability to either require a pipeline to incur a substantial cost or prevent the construction of the pipeline altogether because of the lack of universal eminent domain authority. 149 First, the current state of regulation provides complete uncertainty regarding the regulation of CO<2> pipelines. Because no federal policy currently exists for CO<2> pipeline regulation, states have the [\*969] complete responsibility to determine how a pipeline should operate and the adequate rate of return for the pipeline. As discussed above, states differ in their regulation of CO<2> pipelines, with some requiring a just and reasonable rate, others imposing common carrier requirements, and still others having no current regulation at all. 150 This disparity could create a situation where a pipeline that transports CO<2> from a power plant in West Virginia to a storage reservoir in Texas would be subject to the regulations of at least six different states and have to adjust its rates and services in six different ways. 151 Given this disparity in regulation, it is not clear how long-term capacity guaranteed under a just and reasonable system would be affected by an adjoining state requiring common carrier shippers to reduce their capacity when the pipeline is oversubscribed. For example, if a power plant has a long-term contract for capacity in West Virginia, but is subject to common carrier regulations in Ohio, there might be instances where the entire amount of CO<2> cannot be transported along the entire pipeline. This is because the common carrier restrictions would require the power plant to reduce the volume of CO<2> shipped when the pipeline in Ohio is oversubscribed. This reduction in CO<2> volume downstream, in Ohio, would lead to the underutilization of capacity upstream, in West Virginia, because, although the power plant has contracted for the necessary volume, Ohio's regulations would prevent that full volume from reaching the end point. The ultimate result is a pipeline system that is inadequate to meet the power plant's needs for CCS. CO<2> sequestration fairs no better in states without regulation: long-term regulation of the project would be uncertain because the state could pass regulation after the pipeline is already placed into service. Additionally, pipeline customers would have no oversight agency to prevent the pipeline from taking advantage of the regulatory gap. 152 For example, if a customer did not have a long-term contract with the pipeline, the pipeline could threaten to stop operating in order to drive up the customer's rate. In total, this lack of consistent regulation of CO<2> pipelines creates uncertainty for both pipelines and their customers. Pipelines will be unwilling to invest the large amount of capital necessary to build the [\*970] needed infrastructure without clarity relating to regulations, 153 and customers will be unwilling to commit to long-term CCS projects without reliable information concerning the total future CO<2> transportation costs. 154

### AT: States CP – Federal Lands

#### USFG is key for federal lands

Pitlick and Nordhaus 09 Pitlick: Associate at Van Ness Feldman, Nordhaus: Member of the Washington, D.C. law firm, Van Ness Feldman, P.C., serves on the adjunct faculty at George Washington University Law School, Served as General Counsel of the Department of Energy and of the Federal Energy Regulatory Commission (Robert R. Nordhaus, Emily Pitlick, 2009, “CARBON DIOXIDE PIPELINE REGULATION,” [http://felj.org/docs/elj301/85\_-\_nordhaus\_and\_pitlick.pdf)//DR](http://felj.org/docs/elj301/85_-_nordhaus_and_pitlick.pdf%29//DR). H

Federal agencies have authority to grant rights-of-way (ROW) across federal lands. The statutes governing ROW are important both because they establish the ground rules for siting pipelines across federal lands, and because they may establish access and rate conditions for service provided on pipelines that cross federal lands. The Bureau of Land Management has responsibility for administering ROW on federal lands managed by the Department of the Interior. The Mineral Leasing Act (MLA) provides that: Rights-of-way through any Federal lands may be granted by the Secretary of the Interior or appropriate agency head for pipeline purposes for the transportation of oil, natural gas, synthetic liquid or gaseous fuels, or any refined product produced therefrom. . . .63

#### Utilizing federal lands is key to accelerate deployment of CCS

Grant 9 - Physical Scientist Office of Systems, Analyses, and Planning @ DoE

Tim, “Storage of Captured Carbon Dioxide Beneath Federal Lands,” Dept of Energy, http://www.netl.doe.gov/energy-analyses/pubs/Fed%20Land\_403.01.02\_050809.pdf

A global effort is underway to assess storage potential for captured carbon dioxide (CO2). In North America, the Carbon Sequestration Atlas of the United States and Canada provided an initial assessment. The analysis presented in this report was done to assess the storage potential beneath Federal lands and further the effort undertaken in the atlas by defining a resource potential beneath a specific category of land. Also considered in this analysis was the location of potential CO2 point sources that might utilize Federal lands for storage, pipeline Right-Of-Way (ROW), and wells located on or near Federal land. Relevant laws, regulations, and legislation at the Federal and State level are also summarized. A significant portion of Federal land is unavailable for leasing due to administrative, statutory, and executive orders. Examples include national parks and lands owned by the Department of Defense (DOD), the Department of Justice (DOJ), and other agencies. These limitations render 44 percent of all Federal acreage unavailable for lease. Remaining Federal lands, totaling 400,730,534 acres, are available for lease (Figure ES-1). The Bureau of Land Management (BLM) controls 59 percent of this acreage and the U.S. Forest Service (FS) controls another 40 percent with the balance managed by the Department of Energy (DOE) and the Bureau of Reclamation (BOR). All of the BLM acreage and 80 percent of FS acreage is west of the Mississippi. The storage resource beneath Federal lands ranges between 126 and 375 billion metric tons (Table ES-1). Since the vast majority of Federal lands are west of the Mississippi, it follows that the majority of storage potential beneath these lands are also located in the western half of the Nation. Of the estimated storage potential beneath Federal land in the United States, 68 percent can be found in the stratigraphy of Montana, Wyoming, and the Dakotas. Conversely, the majority of CO2 point sources in the United States are found east of the Mississippi. Federal lands are not as contiguous in the east as they are in the west; however, there is some storage potential available for consideration, the majority of which is found in the stratigraphy of the Gulf Coast states and Arkansas. Saline formations account for between 71 and 90 percent of the total carbon storage potential beneath Federal lands. Oil and gas reservoirs provide between 9 and 25 percent of Federal land storage potential. Unmineable coal seams provide a further 1 to 3 percent. Whereas saline formations and unmineable coal seam resource estimates present a low and high range of potential, the storage potential estimate for oil and gas reservoirs is a single quantity: 32 billion metric tons. This reflects the higher level of knowledge operators have about these reservoirs due to oil and gas activity. It also represents a good opportunity for additional recovery of an important energy resource through Enhanced Oil Recovery (EOR) operations. In the interest of furthering Carbon Capture and Sequestration (CCS) efforts, Federal lands present a unique advantage over those that are privately owned: single ownership of large, continuous acreage tracts. Negotiating with a single landowner to secure the rights to extensive continuous parcels of land can provide cost and project timeline advantages, not only for potential future operations but also for early large-scale demonstration projects that will help accelerate commercial deployment of CCS technology.

#### Federal lands are key

Grant 9 - Physical Scientist Office of Systems, Analyses, and Planning @ DoE

Tim, “Storage of Captured Carbon Dioxide Beneath Federal Lands,” Dept of Energy, http://www.netl.doe.gov/energy-analyses/pubs/Fed%20Land\_403.01.02\_050809.pdf

An important initial step in developing a CO2 storage field is to acquire control of surface acreage that also provides control of the subsurface geologic sink. In assembling an acreage block, Federal lands present two unique advantages, single ownership, and large tracts of land. Trying to secure leases from multiple landowners who may have various opinions and expectations regarding CO2 storage operations may be quite a challenge. Negotiating with a single landowner to secure the rights to large tracks of land can provide an advantage here, not only for potential future operations but also for early large-scale demonstration projects that will help accelerate commercial deployment of CCS technology. Clear ownership of the storage reservoir pore space is critical to a successful CO2 storage project. Surface access for injection facilities and field pipelines as well as for MVA activities is equally important. The area of a CO2 plume in the subsurface will expand with time and continued injection. Upon cessation of injection, the natural flows of formation waters in saline reservoirs will impart an influence on the plume. These physical attributes must be taken into account when assembling an acreage block many decades before field operations are closed down. Clear ownership of the surface and subsurface establishes the ability to transfer rights for access to a potential storage field operator. This is one advantage Federal lands present to the CCS industry. To facilitate transportation of captured CO2, EPACT05 required BLM to perform preliminary work in the area of designating energy corridors on Federal lands for subsurface pipelines. This work includes the preparation of a preliminary EIS. These designated energy corridors will allow placement of CO2 pipelines and save time and costs for such projects. The timeliness of pipeline projects will be enhanced by the designation of ROW [right of way] corridors as required by EPACT05 Section 368 and their subsequent inclusion in Federal and state land management plans. The development of CO2 pipelines will be adversely impacted by a lack of designated ROW corridors or the absence of ROW needs in State and Federal land-use plans. The ROW permitting process is of concern to getting demonstration and early commercial CCS projects underway because it often requires years to complete and results in high costs. As stated earlier, Federal lands have two strong advantages, a single owner combined with the availability of large tracts of land, but they come with their own conditions, stipulations, covenants, restrictions, and other obligations. The NEPA requirement is a critical factor in leasing Federal lands. Of the four filing categories under NEPA, an EIS is the most thorough analysis of the proposed situation. Gaining a pipeline ROW through Federal lands requires an EIS and this may become the situation in utilizing a Federal lease for carbon dioxide storage. A National Petroleum Council analysis on the impacts of EIS related surveys on exploration and development drilling activity found that they can add between 1 and 22 months and cost $15,000 to $250,000 for a project. 85 In addition to EIS, Federal leases may carry seasonal access restrictions due to the effort to protect wildlife and habitat. These restrictions could range from no lease to a time restriction of 3–9 months during which the operator is not allowed access. Furthermore, Federal land leases simply might not be available due to statutory, executive, or administrative actions. Each department or agency might restrict access to all of its managed land or only specific tracts, and therefore the lease for a Federal land parcel would be unavailable. Federal lands are held for the benefit of the public and leases are available to the public for resource development. For an annual fee, Federal land leases are awarded to the high bidder at a competitive oral auction and Federal land not acquired at the competitive oral auction becomes available afterwards for lease by noncompetitive bidding. Most of these leases convey surface and subsurface rights but in some situations, these rights are severed. Stipulations for use of the land are included in the lease terms and conditions. Use of the Federal land under the lease will involve compliance with applicable Federal, State, and local regulations that are intended to protect the environment and human health. These stipulations may place additional restrictions on access, further reducing net storage potential. Another barrier that impairs the use of Federal land for CCS activities is the location of major emissions in comparison to the majority of Federal land. Most CO2 point sources are located east of the Mississippi River, whereas the majority of storage potential beneath Federal land is located west of the Mississippi River. Because no CCS projects have been permitted on Federal land, no current lease terms and conditions address the ownership of the pore space and storage of CO2 on the Federal lands. Because Federal land is held in fee simple (except for split estate), the United States owns the surface, subsurface, and any minerals found in either location, including the pore space within which those minerals reside. Federal leases are designed for mineral extraction. Oil and gas leases provide for production of hydrocarbons that occupy the subsurface pore space. Injecting CO2 for EOR is one method of production. This will also be the situation for non-Federal leases. Sequestration of CO2, although similar in many respects to oil and gas operations, is not a production process. Leases that will be used for CCS projects will need to address ownership of the injected CO2 occupying the subsurface pore space. This is especially important with respect to long-term liability. The EPA is currently working on CO2 injection regulations for sequestration. These regulations are currently in draft, and are projected to be in final form in 2011. The rules currently provide an idea of what an operator will be responsible for during injection and post-injection; however certain issues, such as long-term liability, are yet to be addressed and most likely need to be addressed through other regulations. Currently there are no CO2 storage laws for Federal land. Existing laws and regulations have analogous requirements for projects, such as those for natural gas, but they require modificatio and/or additions to accommodate CO2 projects. Large-scale demonstration projects are necessary to provide additional information and data for development of CO2 laws and regulations. States have performed studies to review the effect of modifying analogous laws and regulations to encompass CCS. Studies have also reviewed the effect of new CCS laws and regulations on existing analogous laws and regulations. Currently, states are at different levels when addressing CCS legislation. Some are further along than others, such as Washington and Wyoming. The long-term storage of CO2 will pose challenges that are new and have uncertainty. In addition to the laws and regulations, short-term and long-term liabilities must be clearly defined before permanent CO2 storage beneath Federal lands can be broadly deployed. Shortterm liabilities occur during site characterization, construction, injection, closure, and postclosure monitoring and verification phases. The storage field operator (the lessee) would be responsible for operational and environmental liabilities that occur during this period of time. These liabilities are essentially the same as those of oil and gas field operations; however, a major difference will be the level of scrutiny and regulatory oversight. The purpose of storing captured CO2 is to permanently prevent it from entering the atmosphere, a goal that represents a very long period of time. Long-term, post-injection liabilities involve leakage and/or migration, which may occur many years or decades (centuries) after cessation of the injection. This issue is tied to the long-term stability of the sequestered CO2 plume or, as noted earlier, the EPA would define this as a state of non-endangerment. Perhaps even more important here is determining who will be responsible for long-term liability, an intergenerational challenge. A resolution for long-term liability has yet to be agreed upon, although there are several models available from other industries to draw upon. Regardless, either State or Federal involvement is likely. Some options include financial guarantees of performance via surety bonds, collateral bonds, and government- or industry-funded bond pools. Without a transfer of liability upon conclusion of active injection operations, prior to long-term storage, many believe that potential operators will not be willing to enter into a situation from which there is no release. Long-term storage of CO2 beneath Federal lands will require long-term monitoring for potential subsurface and surface leakage. Various methods may be utilized for a monitoring system that could be designed for a range of detection levels at a predetermined number of monitoring locations. Currently, no laws or regulations exist to detail these requirements. Without this regulatory framework for long-term monitoring, a CCS project developer would have difficulty in developing proper specifications to ensure long-term injection well integrity and a reliable monitoring system. This also adds to the difficulty of estimating the maintenance and monitoring costs that will need to be provided for in the overall project planning and implementation stages. Without definition of the long-term monitoring requirements, this area of uncertainty raises concern for a prospective CCS project developer. The long-term MVA may have to endure a time range of hundreds to thousands of years. The absence of regulations governing CO2 storage operations is the primary obstacle in utilizing the storage potential beneath Federal land. Once regulations are established, the single owner aspect of Federal land will provide an incentive to develop the storage potential beneath these lands. The presence of significant storage potential in Wyoming, Montana and the western Dakotas, in conjunction with a CO2 pipeline network provides two significant links of the CCS chain. Oil and gas reservoir storage potential in these states represent about 30 percent of the onshore capacity in the Untied States, providing opportunity for CO2-EOR projects. There are plenty of sources in this area, the third link in the CCS chain, that can utilize this storage potential. Also present is significant coal, oil and natural gas resource potential. Local utilization of these resources, either for electric power generation, CTL/CBTL or natural gas processing can in turn take advantage of the potential storage capacity found in this area. Prudent use of Federal land in this area of the United States can provide coal base load power generation and CTL/CBTL plants, crude oil for refining, natural gas for home and industry and in turn storage of captured CO2 from these operations. But much sooner, once regulations are sorted out, Federal land can provide the necessary acreage and associated storage potential for early deployment of CCS technology.

#### Proves it links to politics – federal involvement is inevitable

Wolfe 10 Holland and Hart Law Firm, Over 400 Lawyers (Lawrence J. Wolfe, September 30, 2010, “TRANSPORTING CO2 – ACCELERATING PIPELINE INFRASTRUCTURE DEVELOPMENT,” http://www.hollandhart.com/articles/Wolfe\_CCSPPT\_SummitWashDC.pdf)//DR. H

If pipeline crosses Federal land, permits from the Federal agencies will need to be acquired, and NEPA compliance undertaken, either an EA or EIS.

### AT: States – Environmental Regulations

#### Federal environmental regulations are key – states are lax and non-uniform

Mack and Endemann 10 - \* partner in the Houston office and global Chair of the Environmental Transactional Support Practice, provides over 25 years of experience advising on the transactional, environmental and regulatory issues associated with all sectors of the oil and gas industry, power (including both fossil and renewable energy), mining and chemical industries in the United States and abroad, in addition to the development, financing and entitlements for telecommunications and other industrial and public infrastructure facilities in the United States and offshore, \*\*JD, Faculty @ USD Law, provides comprehensive environmental counseling on energy and infrastructure projects, and represents clients in related litigation

Joel and Buck, “Making carbon dioxide sequestration feasible: Toward federal regulation of CO2 sequestration pipelines,” Energy Policy, http://lw.com/upload/pubContent/\_pdf/pub3385\_1.pdf

Under federal law, any ‘‘major federal action’’ requires compliance with the National Environmental Policy Act (‘‘NEPA’’). 53 Under NEPA, before any federal agency can approve a project, it must ﬁrst conduct an environmental assessment and, if necessary, prepare an environmental impact statement (‘‘EIS’’) to determine what the signiﬁcant effects would be from the project and assess potential mitigation measures. 54 This analysis would be documented in the federal agency’s ofﬁcial record of decision, and would then be subject to review in federal court. Although many states have a state version of NEPA (US Department of Energy, 2009), 55 many other states do not—including many states in the Midwest and Gulf Coast, which would be charged with siting and regulating new CO2 pipelines. 56 Potentially, a pipeline could be routed through states that, if all lacked any form of state NEPA, would result in such a facility being constructed without a comprehensive assessment of its environmental impact. Even though these facilities would be helping to reduce our carbon footprint, the pipelines themselves have the potential for environmental impacts that warrant study and consideration in the permitting process. If a pipeline were routed through several states, one of that had a state NEPA and others that did not, the process could itself result in differing conditions of approval, route alteration, and similar effects that could increase the cost and complexity of building and operating the pipeline. Many state NEPAs do not, for example, routinely permit the state to consider extra-territorial effects, 57 but even if they did, they may not be able to enforce conditions of approval requiring mitigation measures outside their jurisdictional boundaries. Requiring such projects to be reviewed under NEPA (even as compared to state NEPA analogues) confers potentially substantial environmental beneﬁts from federal agency coordination. For example, if a project may have an impact on a species that is listed as endangered or threatened under the federal Endangered Species Act (‘‘ESA’’), a federal agency can conduct a consultation under Section 7 of the ESA to assess and mitigate impacts to the species, which is then reﬂected in the EIS and ROD. 58 In the absence of federal review, the project proponent would be required to obtain an incidental take permit under Section 10 of the ESA, which is a much more complex and time-consuming process. 59 As a result, project proponents do receive incidental beneﬁts when subject to a federal permitting program.

### AT: States – Unitary Siting Authority

#### A unitary siting authority is a *pre-requisite* to private CCS investment

Horne 10 – JD @ U of Utah

Jennifer, “Getting from Here to There: Devising an Optimal Regulatory Model for CO<2> Transport in a New Carbon Capture and Sequestration Industry,” 30 J. Land Resources & Envtl. L. 357, Lexis

For oil pipelines, entry and exit are unregulated at the federal level. This leaves siting, construction, and later, abandonment, up to individual states to regulate, and leaves pipelines without the benefit of federal eminent domain authority. 284 This sets up a challenge even for a mature system like oil, and would be too great an impediment for the nascent CCS industry. Oil pipelines are subject to a "patchwork quilt of differing state laws" that grant eminent domain authority to all pipelines, only to public utilities or to crude pipelines, or to none at all. 285 For the reasons discussed supra Part III, an effective CCS regulatory system will provide eminent domain authority. V. A Recommended Regulatory Model The recommended regulatory model outlined in this section uses the foregoing analysis of CCS's unique needs, and the three extant models, as a basis for policy recommendations in each major category - safety, rates and access, and siting. A. A Comprehensive, Well-Coordinated Approach For CCS, Congress should take a page from the natural gas playbook: establish a single regulating entity to oversee rates and access, and virtually all aspects of pipeline siting, from pre-construction to abandonment. This would facilitate efficient infrastructure build-out and subsequent pipeline operations. Giving broad jurisdiction over CCS pipelines to a single, empowered federal entity will provide a good start toward establishing much needed uniformity for the industry. The specific recommendations in each of the three categories can also promote this objective. [\*395] B. Safety Safety regulation under the PHSMA has worked well for EOR-based pipelines, 286 and no compelling reason has emerged so far for changing the manner in which CO<2> pipelines are regulated for safety. However, regulators should not take CO<2>'s relatively good track record for granted, because it has come from what probably will prove to be a significantly smaller system. The projected difference in size and scope calls for inquiry into whether the current safety standards and oversight processes need to be adjusted for a scale much larger than the existing CO<2> pipeline network. Of course, PHSMA's experience overseeing larger pipeline networks, like natural gas, 287 bodes well for its ability to effectively regulate CO<2> pipelines for CCS. In addition, Congress should provide clarification on three outstanding liability questions. Resolving these issues will go a long way to diminish the sort of uncertainty that discourages private investment in CCS. 288 First, clarification of post-capture CO<2> ownership will be helpful to the job of crafting sound safety regulation in multiple ways. Importantly, it will provide a starting point for determining the sort of financial assurance that pipeline operators should be required to provide in order to cover their own potential liability for accidental leakage. Second, Congress and regulators should address the incentive gap that exists with regard to careful CO<2> containment during transport. To help build in incentives for vigilant CO<2> containment, two key players with the most direct ability to prevent damage from leakage during transport - power plant and pipeline operators - should be accountable. Power plants should be explicitly liable to the government (in the way of fines or other penalties) for any damage caused by impurities in the CO<2> when it escapes during transport. 289 Pipelines, as the entity with the most direct means of preventing leakage, should not be allowed to contract away their liability to a power plant or storage operator. Finally, because it may be difficult in many cases to prove causation when leaked CO<2> causes damage, 290 weakening the usual deterrence that tort liability can provide, Congress should give regulators authority to levy fines or other penalties on a strict liability basis when leakage occurs. 291 [\*396] Third, Congress should consider exempting CCS pipeline operators from liability for contributing to global warming 292 in the event of significant CO<2> leakage, unless gross negligence is shown. This may encourage private investment in CCS by helping to clarify the limits of liability exposure for at least one segment of the industry. It also avoids the irony of subjecting companies to liability for climate change based on their climate change mitigation activities. That said, lack of care in CO<2> containment could significantly undermine climate change mitigation. Congress should institute a strong regulatory deterrent for negligence in CO<2> containment, in the form of a fine or other penalty. This serves a dual purpose. It cabins in the financial liability so that companies may have certainty: if they abide by a reasonable standard of care for the industry, liability should not arise. It gives more assurance that negligent pipeline owners will be held accountable when their actions contribute to climate change, in the face of very little legal precedent. 293 C. Rates and Access As the CCS industry grows and the volume of CO<2> transported through pipelines increases, it is likely that direct oversight of rates and access, akin to the natural gas model pipeline, will be needed. Rates should be regulated for reasonableness, similar to FERC's regulation of natural gas transport rates. However, Congress should explicitly provide an option to justify a market-based rate that exceeds the established ceiling in certain limited cases, like what has followed after the decision in Farmers Union Central Exchange for oil pipelines. 294 This will help incentivize pipeline construction. Direct regulation should also come with a built in mechanism for advance approval of rates and tariffs before construction of a pipeline commences. This will ensure the limited degree of certainty that advance approval provides. Second, CCS pipelines should be subject to non-discrimination requirements like those that apply to natural gas, 295 but should remain a contract carrier. The requirement for prorationing that common carrier status imposes on oil pipelines 296 would not serve CCS well because it would effectively penalize first-comers in favor of late-comers. A secondary market for unneeded capacity, in which power plants could sell capacity they have contracted for but do not need at up to market rates, is a more efficient and effective solution for CCS. It keeps the integrity of transport contracts in place, giving both parties (power plant and pipeline) the benefit of certainty, while still giving late-comers an option to acquire needed capacity. [\*397] Third, any nondiscrimination requirements should include provisions that allow pipeline owners to refuse access if CO<2> purity is sub-standard. The purity standard in the EPA's proposed rules under the SDWA for underground injection of CO<2>, if enacted, is the logical choice for transport. That standard dictates purity of CO<2> for storage purposes. 297 Since that standard applies to the end-of-pipeline destination, it should apply also in transport. D. Siting For all the reasons stated earlier, CCS pipelines should have the benefit of federal eminent domain authority. The authority should be like eminent domain authority under the NGA in some key ways. As occurs in the natural gas model, the regulatory agency should hold public hearings 298 and should use other workable means of collaboration with local authorities so that siting decisions do the least harm possible in light of the needs of the pipeline. In addition, just as with natural gas pipelines, a CCS pipeline should not be able to deviate from the approved route. This will avoid blindsiding local communities, and allow more meaningful local participation in the process before a final site is approved. However, unlike the NGA, eminent domain authority for CCS should include the right of immediate possession once FERC has issued a certificate of public necessity and convenience, and the condemnation action has been commenced, the pipeline developer should be explicitly authorized to take immediate possession of the site, rather than facing delays at any given point along the approved route for the specific reason that the pipeline and the property owner cannot quickly agree on just compensation. Conclusion If CCS is to become a broad-scale commercial industry in time to meet the need for climate change mitigation, the United States must adopt a regulatory model that will allow for efficient construction of critical infrastructure. A well-crafted regulatory framework gives private would-be CCS operators information on which to build business models and make decisions about whether to invest resources in CCS. In this way, sound regulation can facilitate industry development while protecting other important public interests. The scale and complexity of a commercial CCS industry demand a comprehensive, coordinated approach to CCS regulation. A strong federal role probably is the most workable and efficient means of doing so, given the unique regulatory needs and policy considerations of CCS. Certainly, the nascent state 299 [\*398] of CCS technology means that a learning curve is inevitable for project operators and regulators, and it is not yet clear just what the CCS landscape will look like. It may change radically over time, from a series of localized, self-contained projects to a vast, interconnected network dotted with new and retrofitted plants. 300 Regulation of CO<2> transport should be adaptable enough to account for this learning curve, leaving regulated entities with room enough for necessary experimentation and adjustment as they identify best practices. The regulatory model for transport described in this Note highlights some of the important transport issues that should be considered in that effort.

#### Developers will demand federal action before starting multi-state projects

Nordhaus and Pitlick 9 - \*JD, Faculty @ Georgetown Law, general council to FERC, \*\* Associate at Van Ness Feldman

Robert and Emily, “CARBON DIOXIDE PIPELINE REGULATION,” Energy Law Journal, http://www.felj.org/docs/elj301/85\_-\_nordhaus\_and\_pitlick.pdf

The massive build out of CO2 pipeline infrastructure that will be required for large scale commercial deployment of CCS will likely require substantial change in CO2 pipeline regulation. In particular, it is not clear whether reliance on state-by-state siting processes and eminent domain authority will be sufficient to support construction–over a period of one or two decades–of a network of interstate CO2 pipelines that may be equivalent in size to the current natural gas pipeline system. As a result, some developers will likely need access to a federal siting process and federal eminent domain authority to enable construction of this national CO2 pipeline system. This authority is likely to be particularly needed for multi-state projects and for projects in states that do not provide CO2 pipelines with eminent domain authority.

### AT: States – Expertise

#### States don’t have siting expertise

EPA 10

“Report of the Interagency Task Force on Carbon Capture and Storage,” http://www.epa.gov/climatechange/downloads/CCS-Task-Force-Report-2010.pdf

Enhanced coordination on legal and regulatory issues will be needed between Federal agencies as well as between the Federal government and the States. Stakeholders noted that State UIC programs have faced resource limitations in implementing the SDWA UIC Program. Significant increases in permit applications could overwhelm the capacity of both EPA and primacy States. While some States may be able to take on many of these challenges, others may have difficulties in certain areas such as reviewing and validating the results of complex computational models. As can be expected in a nascent industry, regulatory agencies will be challenged to gain the expertise needed to ensure they have capacity to adequately implement the program, and avoid lengthy delays in permitting. Permitting and regulatory authorities may face challenges in terms of training and workforce capacity. CO2 pipeline infrastructure deployment would be aided through training and designated resources to assist Federal, State, and local agencies with permitting, compliance, and public outreach, as well as for training first responders. For sequestration, stakeholders have expressed concern that States may not have sufficient technical resources in very specialized areas related to CO2 sequestration that will be critical in the review of permit applications, such as new site characterization technologies, specialized CO2 -compatible well construction techniques, computational modeling, geochemistry, injection formation dynamics, and financial responsibility. States may not have sufficient staff to review a large number of Class VI permit applications, write permits, and review and enforce those permits. Several challenges need to be addressed for onshore Federal lands to be fully used in an efficient and effective manner for CO2 sequestration. First, the BLM and the U.S. Forest Service (USFS) currently lack clear authority for long-term CO2 sequestration. Second, the authority that may be applicable does not address issues of long-term liability, stewardship, ownership of pore space, and the appropriate rent for the use of Federal pore space. As discussed in Section IV.C, CO2 sequestration presents unique challenges related to long-term liability and stewardship, since it is contemplated that the CO2 will remain stored indefinitely, perhaps for hundreds or even thousands of years. BLM and USFS current authorities do not deal with these unique issues. Third, sequestration on split estate lands also presents complications due to ownership of pore space and limitations that may need to be placed on surface and subsurface uses to ensure integrity of sequestration.

### AT: States – Federal Eminent Domain

#### Even if fiat guarantees uniformity, pre-emptive federal action is necessary because investors fear future regulation

Zarraby 12 - chemical engineer for the Federal Energy Regulatory Commission, JD expected from GWU in 2012

Cyrus, “Note: Regulating Carbon Capture and Sequestration: A Federal Regulatory Regime to Promote the Construction of a National Carbon Dioxide Pipeline Network,” 80 Geo. Wash. L. Rev. 950, Lexis

The current lack of a federal regulatory regime coupled with inconsistent state regulations creates three distinct problems that will limit the construction of CO<2> pipelines and hinder the development of CCS technology: (1) uncertainty in the regulations of CO<2> pipelines, 147 (2) a single state's ability to prevent the construction of a pipeline due to the uncertainty of eminent domain issues, 148 and (3) a single landowner's ability to either require a pipeline to incur a substantial cost or prevent the construction of the pipeline altogether because of the lack of universal eminent domain authority. 149 First, the current state of regulation provides complete uncertainty regarding the regulation of CO<2> pipelines. Because no federal policy currently exists for CO<2> pipeline regulation, states have the [\*969] complete responsibility to determine how a pipeline should operate and the adequate rate of return for the pipeline. As discussed above, states differ in their regulation of CO<2> pipelines, with some requiring a just and reasonable rate, others imposing common carrier requirements, and still others having no current regulation at all. 150 This disparity could create a situation where a pipeline that transports CO<2> from a power plant in West Virginia to a storage reservoir in Texas would be subject to the regulations of at least six different states and have to adjust its rates and services in six different ways. 151 Given this disparity in regulation, it is not clear how long-term capacity guaranteed under a just and reasonable system would be affected by an adjoining state requiring common carrier shippers to reduce their capacity when the pipeline is oversubscribed. For example, if a power plant has a long-term contract for capacity in West Virginia, but is subject to common carrier regulations in Ohio, there might be instances where the entire amount of CO<2> cannot be transported along the entire pipeline. This is because the common carrier restrictions would require the power plant to reduce the volume of CO<2> shipped when the pipeline in Ohio is oversubscribed. This reduction in CO<2> volume downstream, in Ohio, would lead to the underutilization of capacity upstream, in West Virginia, because, although the power plant has contracted for the necessary volume, Ohio's regulations would prevent that full volume from reaching the end point. The ultimate result is a pipeline system that is inadequate to meet the power plant's needs for CCS. CO<2> sequestration fairs no better in states without regulation: long-term regulation of the project would be uncertain because the state could pass regulation after the pipeline is already placed into service. Additionally, pipeline customers would have no oversight agency to prevent the pipeline from taking advantage of the regulatory gap. 152 For example, if a customer did not have a long-term contract with the pipeline, the pipeline could threaten to stop operating in order to drive up the customer's rate. In total, this lack of consistent regulation of CO<2> pipelines creates uncertainty for both pipelines and their customers. Pipelines will be unwilling to invest the large amount of capital necessary to build the [\*970] needed infrastructure without clarity relating to regulations, 153 and customers will be unwilling to commit to long-term CCS projects without reliable information concerning the total future CO<2> transportation costs. 154

#### Federal eminent domain is key – states won’t use it for fear of public backlash

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Cyrus, “Note: Regulating Carbon Capture and Sequestration: A Federal Regulatory Regime to Promote the Construction of a National Carbon Dioxide Pipeline Network,” 80 Geo. Wash. L. Rev. 950, Lexis

The third major problem with the current regulatory environment is that, without nationwide eminent domain authority, a single landowner could cause a pipeline to incur additional expenses by rerouting the pipeline or preventing it from being built altogether. 159 Because the current regime allows each state to grant or deny eminent domain authority, there is no guarantee that a pipeline will receive the property [\*971] rights necessary to build an entire project. 160 Further, states may find it politically difficult to claim a public use justification if the interstate pipeline does not directly benefit that particular state. 161 For example, as stated above, Mississippi ties its eminent domain authorization for CO<2> pipelines to the development of oil resources within the state. 162 Thus, if the CO<2> pipeline transported emissions from power plants in Ohio to reservoirs in Texas, the CO<2> pipeline would merely pass through Mississippi without directly providing the state with any benefits. Accordingly, the state may not grant eminent domain authority. 163 Eminent domain is important to the promotion of new pipeline construction because it ensures that the property rights necessary to build the project will be obtainable. Without eminent domain, the pipeline project must negotiate individually with each landowner across the entire pipeline path. Although the company may be able to reroute its pipeline around recalcitrant landowners who own small parcels of land, the entire project may be stopped or the pipeline may no longer find it economically feasible to continue if an industrial landowner with thousands of acres refuses to negotiate. 164 In such cases, a federal regime with the ability to grant eminent domain in the federal interest is necessary to ensure the construction of CO<2> pipelines.

#### Only a pre-emptive federal regime *ensures* certainty

Zarraby 12 - chemical engineer for the Federal Energy Regulatory Commission, JD expected from GWU in 2012

Cyrus, “Note: Regulating Carbon Capture and Sequestration: A Federal Regulatory Regime to Promote the Construction of a National Carbon Dioxide Pipeline Network,” 80 Geo. Wash. L. Rev. 950, Lexis

Additionally, as the CO<2> pipeline network expands, there may be instances where a shipper uses multiple pipelines to get their CO<2> emissions to a storage reservoir. If each of the pipelines used by the shipper is subject to multiple regulatory regimes (because they are located in different states and subject to different state regulations or if some pipelines opt in and others do not), the shipper could face the same problems as under the current system regarding multiple regulations of rates and services. The only way to ensure that a pipeline is subject to, and the shipper is protected by, a uniform system of rules and regulations is through a federal regulatory regime that preempts all state pipeline regulations.

#### That’s because there is legally no way a state could object

Zarraby 12 - chemical engineer for the Federal Energy Regulatory Commission, JD expected from GWU in 2012

Cyrus, “Note: Regulating Carbon Capture and Sequestration: A Federal Regulatory Regime to Promote the Construction of a National Carbon Dioxide Pipeline Network,” 80 Geo. Wash. L. Rev. 950, Lexis

Granting pipelines a right to eminent domain would effectively prevent two of the major problems with the lack of comprehensive federal regulation. First, eminent domain applies to not only individual landowners, but states as well. Therefore, once FERC approves a project under the federal regulation, neither a state nor a landowner could hold out and prevent the pipeline from being built. Rather, the pipeline would institute a state court proceeding to gain title to the land that is necessary for construction.

#### States that don’t perceive a benefit won’t use eminent domain

Zarraby 12 - chemical engineer for the Federal Energy Regulatory Commission, JD expected from GWU in 2012

Cyrus, “Note: Regulating Carbon Capture and Sequestration: A Federal Regulatory Regime to Promote the Construction of a National Carbon Dioxide Pipeline Network,” 80 Geo. Wash. L. Rev. 950, Lexis

Finally, as with oil pipelines, a lack of federal eminent domain authority might prevent the immediate development of a CO<2> pipeline network. For example, Illinois's decision to deny eminent domain authority to an oil pipeline resulted in the termination of the proposed project. 244 Although the pipeline may not have given any specific public [\*981] use to the citizens of Illinois, an increase in the available oil supplies would have benefited the country as a whole. This case is analogous to a CO<2> pipeline that is transporting CO<2> through a state, but not necessarily providing that particular state a direct benefit. Preventing the construction of these projects would severely hinder the development of a CO<2> pipeline network.

#### Leads to cancellation of the whole CCS project

EPA 10

“Report of the Interagency Task Force on Carbon Capture and Storage,” http://www.epa.gov/climatechange/downloads/CCS-Task-Force-Report-2010.pdf

However, if an extensive network of long-line interstate pipelines is needed for transporting CO2 , the State siting approach could prove to be complex and expensive. The differing siting and permitting requirements among the various States could lead to coordination difficulties— and potential delays—when siting interstate facilities. Construction in populated and environmentally sensitive areas poses significant challenges. It may be difficult for project sponsors to obtain rights-of-way (ROWs), and it is unclear whether and to what extent the States will convey eminent domain to CO2 projects. The lack of State eminent domain rights can necessitate the costly rerouting of pipelines, potentially leading to the cancellation of a project for economic reasons. A given State or locality may not recognize the value or service provided by a proposed facility to customers outside of its own State, or deny a project due to concerns about the State’s customers bearing the costs which benefit multiple States. Problems such as these have impeded the development of electric transmission infrastructure.

#### Key to overcome public opposition

Horne 10 – JD @ U of Utah

Jennifer, “Getting from Here to There: Devising an Optimal Regulatory Model for CO<2> Transport in a New Carbon Capture and Sequestration Industry,” 30 J. Land Resources & Envtl. L. 357, Lexis

While it will bring important benefits, federal eminent domain authority is unlikely to be a panacea for CCS pipeline siting. Public opposition can hinder the progress of a pipeline project even under a single, federal regime. For example, natural gas pipelines have eminent domain authority under the Natural Gas Act. 152 Despite this, the Millennium Pipeline project, originally proposed in 1997, and built to transport natural gas from Canada to New York, was stalled for nine years 153 due in great part to community opposition to the pipeline route. 154 Public input is an important part of the process for siting of any pipeline, and some delays [\*379] that result from it are a necessary cost in a democratic society. On balance, however, the public opposition issue has not prevented significant new pipeline construction. In 2007, more than fifty natural gas pipeline projects totaling roughly 1,700 miles of pipeline were completed. 155 Federal eminent domain authority certainly will not remove all hindrances to new CCS pipeline construction, but what it will do for interstate pipeline siting will be very useful.

#### Electric transmission infrastructure proves

EPA 10

“Report of the Interagency Task Force on Carbon Capture and Storage,” http://www.epa.gov/climatechange/downloads/CCS-Task-Force-Report-2010.pdf

Experience with State siting for oil pipelines and electric transmission lines may be instructive. The Interstate Commerce Act gives the Federal Energy Regulatory Commission (FERC) authority to regulate the transportation rates and practices of oil pipelines, but does not authorize FERC to site oil pipelines. 101 That authority rests with the applicable State and local governments. An extensive network of oil pipelines has been constructed under this regulatory scheme. The majority of crude trunk lines transport oil from Canadian sources or sources in the Gulf Coast to Midwest markets, particularly around Chicago. Major oil pipeline projects are currently under construction to serve the Chicago regional market from Canadian sources, and other parts of the Midwest and Rocky Mountain States. However, the GAO issued a report finding that the U. S. petroleum product distribution system is constrained in key areas and will likely become more so without timely investments (GAO, 2007). The report cites statements by Department of Transportation officials that restrictions in the nation’s petroleum pipeline infrastructure are becoming more apparent, and that the current regulatory mechanisms may not lead to appropriate reinvestment in the industry. The report noted that building interstate natural gas pipelines in the United States is easier than building oil pipelines, because FERC has been designated lead Federal agency for the construction of natural gas pipelines and Federal eminent domain is conveyed. 102 The report recommends that various agencies explore whether a lead Federal agency could be assigned to coordinate infrastructure construction permitting for oil pipelines, and provide for eminent domain authority in order to streamline the process for siting oil and petroleum product pipelines. The recent problems in siting oil pipelines are no doubt reflective of the increasing difficulties in siting energy infrastructure in this country in general, due to heightened public opposition—particularly in more densely populated or environmentally sensitive areas. The siting of interstate electric transmission lines on a State-by-State basis has been less successful. It is well documented that the growth rate in transmission mileage is not keeping pace with the expected growth in consumer demand for electricity over the next two decades. 103 The lack of Federal siting authority has been cited as one factor contributing to this underinvestment in electric transmission lines. This prompted Congress to provide for Federal backstop siting authority in the Energy Policy Act of 2005.

#### Federal eminent domain is key to a predictable investment climate

Horne 10 – JD @ U of Utah

Jennifer, “Getting from Here to There: Devising an Optimal Regulatory Model for CO<2> Transport in a New Carbon Capture and Sequestration Industry,” 30 J. Land Resources & Envtl. L. 357, Lexis

FERC oversees siting of interstate natural gas pipelines, including construction and abandonment. 229 Unlike in EOR pipeline siting, FERC can extend federal eminent domain authority to a natural gas pipeline. 230 That allows the pipeline to obtain property rights for construction of natural gas pipelines or related storage facilities that traverse state boundaries, so long as the pipeline will be "in the public interest." 231 To condemn property under the NGA, a natural gas pipeline company must show: (a) that FERC has issued the company a certificate of public necessity and [\*388] convenience for the project; (b) that the land is necessary to the project; and (c) that the property owners and the company have not been able to agree on a price for the property. 232 A natural gas pipeline company must obtain a certificate of public necessity and convenience before it can either construct or operate a pipeline in interstate commerce. The application process for a certificate is no simple matter. It involves public hearings, re-hearings, and the possibility of review by the federal appeals court. 233 Once the certificate is issued, the pipeline route is fixed; it cannot deviate from the approved route. 234 This constraint provides some measure of protection for localities along the pipeline route. Public hearings and court review give localities, property owners and other members of the public means to challenge a given proposed route, without risk of being blindsided by lack of transparency or last-minute re-routing. Once issued, the Certificate, along with federal eminent domain authority, 235 provides the pipeline company with substantial certainty about the route. This helps to reduce the chances that companies will be in a position to invest resources in a project when some portions of the route may still be in question, as they might be if the company was working under multiple state regimes. This balance of benefits for pipelines on one hand and localities on the other, makes a system like this a good potential fit for CCS.

#### No state experience

Horne 10 – JD @ U of Utah

Jennifer, “Getting from Here to There: Devising an Optimal Regulatory Model for CO<2> Transport in a New Carbon Capture and Sequestration Industry,” 30 J. Land Resources & Envtl. L. 357, Lexis

Siting regulation in the EOR model is insufficient for CCS because it does not provide federal eminent domain power. Even if it turns out that CCS requires a pipeline network only twice the size of the existing EOR-based network 195 - a conservative estimate - the build-out will be a massive undertaking. A siting process that varies from state to state would add too much complexity. Furthermore, given the locations of the EOR-based pipelines, only a handful of states have significant experience with CO<2> pipelines, 196 and none have experience with commercial-scale CCS. 197 That may not bode well for a smooth siting process in inexperienced states.

### AT: States – Uniform Eminent Domain

#### Federal eminent domain is key

Forbes et al 8 - senior associate at the World Resources Institute, former member of the National Energy Technology Laboratory

Sarah, CCS Guidelines: Guidelines for Carbon Dioxide Capture, Transport, and Storage, World Resources Institute, http://pdf.wri.org/ccs\_guidelines.pdf

The U.S. Department of the Interior’s Bureau of Land Management (BLM) regulates the siting of CO2 pipelines for EOR on BLM managed lands. The Federal Land Policy and Management Act of 1976 (FLPMA) and the Mineral Leasing Act of 1920 as amended (MLA) contain provisions for granting rights of way for siting pipelines on federal lands managed by BLM (U.S. DOI/BLM/OS 2001; USCa). The FLPMA allows BLM to grant rights of way for pipelines transporting “liquids and gases, other than water and other than oil, natural gas, synthetic liquid or gaseous fuels, or any refined product produced therewith.” Under the MLA, BLM can permit oil and natural gas pipelines. A significant difference between the MLA and the FLPMA is that the MLA imposes a common carrier requirement, while the FLPMA does not. Recent BLM practice has been to consider CO2 as a “natural gas” (as CO2 is mainly obtained from natural sources), and thus to grant rights of way under the MLA, which could make CO2 pipelines eligible for the common carrier requirement. For CCS, older and well-established natural gas pipeline corridors may in some cases allow additional pipelines for CO2 to be laid using the same right of way by negotiating an agreement with the existing right-of-way owner, which may facilitate siting of CO2 pipelines. However, the availability of this option will depend on the particular wording of the existing right-of-way agreement or perhaps on the terms under which a particular parcel of land was originally acquired (whether through negotiation or through a condemnation proceeding). Public and private landowners may seek additional compensation for construction of an additional pipeline, and their right to do so is likely to vary, depending on the applicable law and the particular facts of the situation. Thus, the extent to which new CO2 pipelines will be able to take advantage of current state condemnation statutes and regulations that will grant the power of eminent domain will vary state by state. For the construction of new pipelines on a scale required for large-scale deployment of CCS, some form of federal eminent domain may be appropriate under which CO2 pipelines might be considered a public utility or a common carrier. Obtaining a certificate of public convenience and necessity (such as the one required for interstate natural gas pipelines to obtain eminent domain from FERC) may help development of a CO2 pipeline, as it would mean that the pipeline is being treated as a public utility, giving a pipeline developer authority to condemn a right of way.

#### Patchwork bad

Monast et al 11 - \*PhD, Director of the Climate and Energy Program at Duke University’s Nicholas Institute for Environmental Policy Solutions

Jonas, “A Cooperative Federalism Framework for CCS Regulation,” Scholar

The inconsistency of state regulations could prove to be costly and inefficient for industry. An example can be seen in the differentiation in treatment of property rights issues by the states. Montana, Wyoming, and North Dakota all address ownership of the open spaces in the subsurfaces unoccupied by solid structures—called “pore space”—through legislation, but all three take a different approach. Although all three provide for the dominance of the mineral estate over the surface estate and vest subsurface pore space ownership to the surface owner, each handles the severance of pore space from the surface estate differently.59 In the absence of federal regulation, this type of difference in geographically clustered states has the potential to greatly increase the transaction costs of sequestration for project operators. Another example of inconsistency can be seen with the issue of long-term stewardship and liability. Of the seven states that have passed legislation on this topic, four states have accepted responsibility for site management only and have declined to accept responsibility for compensatory damages arising from harm or injury during long-term stewardship. In those states, liability for compensatory damages remains with the operator. Two states, Montana and North Dakota will accept responsibility for both site management and compensatory damages, but in Montana this occurs 30 years after injection ceases and in North Dakota it occurs 10 years after injection ceases. Both states require certain criteria be met before transfer.

#### These costs are passed on to the consumer – substantially raise electricity prices

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Jonas, “A Cooperative Federalism Framework for CCS Regulation,” Scholar

In other ways, federal regulation of CCS could be more effective than state regulation. Comprehensive federal regulation could provide consistency in how sequestration sites are selected and managed. Also, compliance with one federal regulation could result in a lower transaction cost for industry than compliance with several state regulations. Situations may arise in which carbon is captured at a power plant in one state, transported via pipelines across several other states to reach a sequestration facility in a fourth or fifth state. If the regulation of CCS differs in each state, this could add to the overall cost of a CCS system that would likely result in higher prices for electricity and consumer goods. Finally, there are some issues that states have thus far, for the most part, been unwilling or unable to tackle, such as long-term financial liability. Federal regulation would allow the federal government to address these complicated environmental and legal issues.

### AT: States – Federal Key to Certainty

#### Federal key to certainty

Horne 10 – JD @ U of Utah

Jennifer, “Getting from Here to There: Devising an Optimal Regulatory Model for CO<2> Transport in a New Carbon Capture and Sequestration Industry,” 30 J. Land Resources & Envtl. L. 357, Lexis

The middle phase of CCS - CO<2> transport - is the subject of this Note. Realizing the vision for a CCS industry will require a well-functioning, appropriately regulated CO<2> pipeline network large enough to accommodate the needs of a full-scale CCS industry. That will necessitate a build-out of both physical and regulatory infrastructure. This Note considers the regulatory needs for CO<2> transport in CCS, compares the benefits and deficiencies of three existing pipeline models currently used in other contexts, and recommends an approach for CCS. The three pipeline models include (1) the enhanced oil recovery ("EOR") model that today transports CO<2> for use in oil and gas fields; (2) the natural gas model; and (3) the oil pipeline model. Each of the three models has strengths and weaknesses. At first blush, the EOR regulatory model, utilized in CO<2> transport for decades, could be extended to new pipelines built for commercial-scale CCS. But differences in geographic realities and operational objectives make the EOR model an imperfect fit. CCS will be best served by comprehensive, preemptive federal oversight of transport by a single agency with jurisdiction over rates and access and virtually all aspects of siting. Regulation of rates and access should be lighter-handed than in oil and gas models, at least early on, and pipelines should benefit from federal eminent domain power for siting. This sort of coordinated approach will promote uniformity for a national market, regulatory certainty that encourages investment, and adaptability to accommodate the learning curve of a complex new industry.

#### Federal is key to private sector certainty – encourages investment in CCS

Horne 10 – JD @ U of Utah

Jennifer, “Getting from Here to There: Devising an Optimal Regulatory Model for CO<2> Transport in a New Carbon Capture and Sequestration Industry,” 30 J. Land Resources & Envtl. L. 357, Lexis

Thus, on multiple levels, inconsistent state-based regulation could interfere with a national transport market, particularly where an individual project can span the borders of multiple states, and requires long-term capital investments. 156 When companies are required to conform to different sets of state regulatory requirements for a single project, the project is likely to be more expensive and complex, and that does little to encourage private investment. 157 Certainly, some arguments for state-based regulation of CCS pipelines are compelling. The Interstate Oil and Gas Compact Commission (IOGCC) argues that "the jurisdiction, experience, and expertise of states and provinces in the regulation of oil and natural gas storage" makes the states "the most logical and experienced regulators" of CCS. 158 Like the federal government, 159 some states have substantial expertise in regulating pipelines. 160 Where states have greater relevant expertise and a stake in the outcome, Congress and federal agencies should follow the states' [\*380] lead. However, many states have taken no steps toward developing CCS regulation to date, 161 and only a handful of them have substantial experience with CO<2> pipelines. 162 Federal regulation will provide greater uniformity and certainty - two important features for a national CCS market - than a state-based approach. It is especially fitting in an arena like climate change mitigation, where, without a national climate change policy, the degree of political momentum that drives CCS may vary considerably from state to state. Greater uniformity and certainty could benefit all three primary categories of regulatory needs, albeit to differing degrees for each category.

### AT: States – Delay

#### Feds avoid delay and environmental harm

EPA 10

“Report of the Interagency Task Force on Carbon Capture and Storage,” http://www.epa.gov/climatechange/downloads/CCS-Task-Force-Report-2010.pdf

Model 3: Exclusive Federal Siting with Eminent Domain (the Natural Gas Pipeline Approach) or Without Eminent Domain (the LNG Import Terminal Approach). This approach would vest exclusive authority for the siting of interstate CO2 pipelines in a single Federal agency. 106 That Federal agency would conduct the necessary environmental review pursuant to NEPA, and coordinate the timing of issuance of other necessary Federal permits. Having one Federal agency responsible for the siting of an interstate project would be less burdensome and more efficient than the State-by-State permitting process. In addition, a Federal agency would be in a better position than individual States to take into consideration the broad national interests that might underlie a proposal to build CO2 infrastructure.

#### State-by-state approach introduces significant uncertainty – prevents CCS investment

Parfomak and Folger 8 - Resources, Science, and Industry Division @ CRS

“Pipelines for Carbon Dioxide (CO2 ) Control: Network Needs and Cost Uncertainties,” Congressional Research Service, http://www.policyarchive.org/handle/10207/bitstreams/19122.pdf

As CO2 pipelines get longer, the state-by-state siting approval process may become complex and protracted, and may face public opposition. Because CO2 pipeline requirements in a CCS scheme are driven by the relative locations of CO2 sources and sequestration sites, identification and validation of such sites must explicitly account for CO2 pipeline costs if the economics of those sites are to be fully understood. Since transporting CO2 to distant locations can impose significant additional costs to a facility’s carbon control infrastructure, facility owners may seek regulatory approval for as many sequestration sites as possible and near to as many facilities as possible. If CCS moves to widespread implementation, government agencies and private companies may face challenges in identifying, permitting, developing, and monitoring the large number of localized sequestration reservoirs that may be proposed. However, even as viable sequestration reservoirs are being identified, it is unclear which CO2 source facilities will have access to them, under what time frame, and under what conditions. Given the potential size of a national CO2 pipelines network, many billions of dollars of capital investment may be affected by policy decisions made today.

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Congress is considering policies to reduce U.S. emissions of greenhouse gases. Prominent among these policies are those promoting the capture and direct sequestration of carbon dioxide (CO2 ) from manmade sources such as electric power plants and manufacturing facilities. Carbon capture and sequestration is of great interest because potentially large amounts of CO2 produced by the industrial burning of fossil fuels could be sequestered. Although they are still under development, carbon capture technologies may be able to remove up to 95% of CO2 emitted from an electric power plant or other industrial source. Carbon capture and sequestration (CCS) is a three-part process involving a CO2 source facility, a long-term CO2 sequestration site, and an intermediate mode of CO2 transportation — typically pipelines. Some studies have been optimistic about pipeline requirements for CO2 sequestration. They conclude that the pipeline technology is mature, and that most major CO2 sources in the United States are, or will be, located near likely sequestration sites, so that large investments in CO2 pipeline infrastructure will probably not be needed. 1 Other studies express greater uncertainty about the required size and configuration of CCS pipeline networks. 2 A handful of regionally-focused studies have concluded that CO2 pipeline requirements for CO2 sources could be substantial, and thus present a greater challenge for CCS than is commonly presumed, at least in parts of the United States. 3 Divergent views on CO2 pipeline requirements introduce significant uncertainty into overall CCS cost estimates and may complicate the federal role, if any, in CO2 pipeline regulation. They are also a concern because uncertainty about CO2 pipeline requirements may impede near-term capital investment in electricity generation, with important implications for power plant owners seeking to reduce their CO2 emissions.

#### An interstate pipeline requires federal investment

Parfomak and Folger 8 - Resources, Science, and Industry Division @ CRS

“Pipelines for Carbon Dioxide (CO2 ) Control: Network Needs and Cost Uncertainties,” Congressional Research Service, http://www.policyarchive.org/handle/10207/bitstreams/19122.pdf

Any company seeking to construct a CO2 pipeline must secure siting approval from the relevant regulatory authorities and must subsequently secure rights of way from landowners. There is no federal authority over CO2 pipeline siting, so it is regulated to varying degrees by the states (as is the case for oil pipelines). The stateby-state siting approval process for CO2 pipelines may be complex and protracted, and may face public opposition, especially in populated or environmentally sensitive areas. 30 Securing rights of way along existing easements for other infrastructure (e.g., gas pipelines), as the scenarios in this report assume, may be one way to facilitate the siting of new CO2 pipelines. However, questions arise as to the right of easement holders to install CO2 pipelines, compensation for use of such easements, and whether existing easements can be sold or leased to CO2 pipeline companies. 31 Although these siting issues may arise for any CO2 pipeline, they become more challenging as pipeline systems become larger and more interconnected, and cross state lines. If a widespread, interstate CO2 pipeline network is required to support CCS, the ability to site these pipelines may become an issue requiring new federal Initiatives.

### AT: States – Streamlining

#### A single regulatory program is key for streamlining

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Joel and Buck, “Making carbon dioxide sequestration feasible: Toward federal regulation of CO2 sequestration pipelines,” Energy Policy, http://lw.com/upload/pubContent/\_pdf/pub3385\_1.pdf

3. The solution: preemptive federal regulation of CO2 sequestration pipelines As discussed above, there are very substantial challenges presented by the current regulatory structures for CO2 sequestration pipelines that will greatly complicate our ability to scale up such a pipeline system should the United States choose to make a substantial investment in CO2 removal from its ﬂeet of coal-ﬁred power plants. A regulatory structure like that in effect for natural gas pipelines would solve the majority of these concerns while creating few additional problems for the industry. Such a program would consist of the following elements: (1) vesting exclusive siting jurisdiction in an appropriate federal agency (similar to the FERC’s siting for natural gas pipelines), (2) continuing Ofﬁce of Pipeline Safety management over safety and technical issues, (3) providing for condemnation authority for such pipelines (whether they have single or multiple customers), consistent with the existing scope of condemnation authority granted to natural gas pipelines, (4) rate regulation with appropriate access and tariff protections, (5) clarifying the treatment of CO2 as a waste gas or commodity gas, including clarifying the scope of other statutes such as the Clean Air Act and Safe rinking Water Act with respect to such facilities, and (6) and co-location authorization for CO2 pipelines within the rights-of-way of existing or future federally regulated natural gas pipelines or transmission facilities, in order to reduce cost and mitigate environmental impacts. Such a program could be assigned either to the STB (which has similar authority respecting railways) or to the FERC (with its expertise in natural gas pipeline regulation). Either agency would have the capability and expertise for such a program If adopted, this kind of program would have the following advantages: (1) it would provide for a one-stop entitlement process at the federal level, thereby streamlining the entitlement process (particularly for single-customer pipelines), (2) the pipelines would be subject to NEPA (and if appropriate, would be able to take advantage of the Section 3 consultation requirements of the ESA and similar federal agency coordination processes designed to mitigate environmental impacts), (3) there would be consistency in rates, avoiding ‘‘pancaking’’ and other ﬁnancial risks arising from multiple jurisdictions with ﬁnancial regulatory authority over such pipelines, (4) colocation of facilities would be more likely and would result in overall lower development and construction cost, less impact to local communities and lower environmental impacts, and (5) the uniﬁed regulatory structure would facilitate efﬁcient access to the capital markets and the efﬁcient allocation of resources in private project ﬁnance transactions because of the certainty provided by a single regulatory oversight program.

#### Counterplan leads to higher costs – deters development

Mack and Endemann 10 - \* partner in the Houston office and global Chair of the Environmental Transactional Support Practice, provides over 25 years of experience advising on the transactional, environmental and regulatory issues associated with all sectors of the oil and gas industry, power (including both fossil and renewable energy), mining and chemical industries in the United States and abroad, in addition to the development, financing and entitlements for telecommunications and other industrial and public infrastructure facilities in the United States and offshore, \*\*JD, Faculty @ USD Law, provides comprehensive environmental counseling on energy and infrastructure projects, and represents clients in related litigation

Joel and Buck, “Making carbon dioxide sequestration feasible: Toward federal regulation of CO2 sequestration pipelines,” Energy Policy, http://lw.com/upload/pubContent/\_pdf/pub3385\_1.pdf

As another supporting argument, one should consider the costs associated with such a pipeline program. The Congressional Research Service estimated the costs of such an expansion program to be substantial. For example, building a CO2 trunk line from North Carolina to the Gulf Coast and Appalachia, even if using existing rights of way, would cost approximately $5 billion dollars. Rising labor and materials costs are estimated to be at least $800,000 per mile of installed pipeline (Parfomak and Folger, 2008). In the absence of a coordinated, preemptive federal effort, competing state programs could drive the development costs (including the cost of raw materials and pipe stock) even higher, further impeding any national program to reduce carbon impacts and ultimately increasing the cost to the American public to achieve such objectives.

#### Complexity of state-by-state linkage tanks investment

Parfomak and Folger 08Parfomak: Specialist in Energy and Infrastructure Policy, Folger: Specialist in Energy and Natural Resources Policy (Paul W. Parfomak, Peter Folger, January 17, 2008, “Carbon Dioxide (CO2) Pipelines for Carbon Sequestration: Emerging Policy Issues,” [http://www.marstonlaw.com/index\_files/Emerging%20Policy%20issues%20for%20CO2%20pipelines%202008%20CORRECTED%20(2008-01-17%20(No%20RL33971).pdf)](http://www.marstonlaw.com/index_files/Emerging%20Policy%20issues%20for%20CO2%20pipelines%202008%20CORRECTED%20%282008-01-17%20%28No%20RL33971%29.pdf%29)//DR. H

Two complications arise with respect to pipeline cost recovery. First, because utility regulation varies from state to state (e.g., some states allow for competition in electricity generation, others do not),54 differences among states in the economic regulation of CO2 pipelines could create economic inefficiencies and affect the attractiveness of CO2 pipelines for capital investment. Second, if CO2 transportation infrastructure is intended to evolve from shorter, stand-alone, intrastate pipelines into a network of interconnected interstate pipelines, pipeline operators wishing to link CO2 pipelines across state lines may face a regulatory environment of daunting complexity. Without a coherent system of economic regulation for CO2 pipelines, whether as a commodity, pollutant, or some other classification, developers of interstate CO2 pipelines may need to negotiate or litigate repeatedly issues such as siting, pipeline access, terms of service, and rate “pancaking” (the accumulation of transportation charges assessed by contiguous pipeline operators along a particular transportation route). It is just these kinds of issues which have complicated and impeded the integration of individual utility electric transmission systems into larger regional transmission networks.55

#### State-by-state siting imposes new risks and substantial delay

Mack and Endemann 09Latham & Watkins, international law firm (Joel Mack, Buck B. Endemann, October 2, 2009, “Making carbon dioxide sequestration feasible: Toward federal regulation of CO2 sequestration pipelines,” [http://lw.com/upload/pubContent/\_pdf/pub3385\_1.pdf)//DR](http://lw.com/upload/pubContent/_pdf/pub3385_1.pdf%29//DR). H

Given the paucity of federal legislation, the potential problems with a patchwork of state regulations are self-evident. If a company were to attempt to develop a new CO2 pipeline from Illinois or Indiana to a Gulf Coast salt dome storage facility, for example, that company would have to obtain state and local approvals in four or five different states (depending on the route and destination), with potentially differing and conflicting siting standards, rate regulation, different scopes and methods of condemnation authority, and other conditions of approval. As the supply of CO2 starts to outpace its valuable uses (i.e., when CO2 changes from a commodity to a waste material), states with less developed statutory regimes may find it difficult to address CO2 pipelines under their existing laws. In order for such pipelines to have common requirements, numerous states would have to modify their existing regulatory programs to harmonize them with other states, and many states that do not presently have any regulatory structure for such pipelines would have to pass legislation and promulgate regulations in order to do so. In this environment, constructing such pipelines would, by definition, take longer and pose more development risks than a single federal approval process that preempted state siting.

#### Federal approach avoids delay

Stephenson 8 - Director, Natural Resources and Environment @ GAO

“Federal Actions Will Greatly Affect the Viability of Carbon Capture and Storage As a Key Mitigation Option,” GAO, http://www.gao.gov/new.items/d081080.pdf

Nationally-recognized studies and GAO’s contacts with a diverse group of industry representatives, nongovernmental organizations, and academic researchers show that key barriers to CCS deployment include (1) underdeveloped and costly CO2 capture technology and (2) regulatory and legal uncertainties over CO2 capture, injection, and storage. Key technological barriers include a lack of experience in capturing significant amounts of CO2 from commercial-scale power plants and the significant cost of retrofitting existing plants that are the single largest source of CO2 emissions in the United States. Regulatory and legal uncertainties include questions about liability concerning CO2 leakage and ownership of CO2 once injected. According to the National Academy of Sciences and other knowledgeable authorities, another barrier is the absence of a national strategy to control CO2 emissions (emissions trading plan, CO2 emissions tax, or other mandatory control of CO2 emissions), without which the electric utility industry has little incentive to capture and store its CO2 emissions. Moreover, according to key agency officials, the absence of a national strategy to control CO2 emissions has also deterred their agencies from resolving other important practical issues, such as how sequestered CO2 will be transported from power plants to appropriate storage locations and how stored CO2 would be treated in a future CO2 emissions trading plan. Federal agencies have begun to address some CCS barriers but have yet to comprehensively address the full range of issues that would require resolution for large-scale CCS deployment: • DOE’s research strategy has, until recently, devoted relatively few resources to lowering the cost of CO2 capture from existing coal-fired power plants, focusing instead on innovative technologies applicable to new plants. In recent years, however, the agency has begun to place greater emphasis on CCS technologies applicable to existing facilities. • EPA issued in July 2008 a proposed rule to guide the permitting of large volume, or commercial-scale, CO2 injections. It addressed at least some of the key issues under the Safe Drinking Water Act but left other issues related to EPA’s implementation of its air, hazardous waste and substance statutes unresolved. • Other agencies, such as Interior and Transportation, have jurisdiction over a number of interdisciplinary issues that could delay CCS deployment if unaddressed, but which have thus far received little attention. These include, among others, a legal and regulatory regime for a national CO2 pipeline infrastructure and a plan for addressing CO2 emissions reductions from CCS in a future emissions trading plan. In addition, unless the effects of CCS deployment are clearly explained, public opposition could delay future CCS projects.

#### Federal eminent domain is key to streamlining

Kent et al 10 – PhD, Professor of Business @ Marshall

Calvin, “Carbon Capture and Storage: Issues and Policies in Appalachia,” Center for Business and Economic Research Marshall University, http://www.marshall.edu/cber/research/Carbon-Capture-Storage.pdf

Transportation Recommendations regarding pipelines have been advanced by several groups. The Midwest Governors Association advocated a more effective method of installing transportation routes along with extended eminent domain authority to facilitate pipeline construction. 70 They called for continued state regulation. The WRI has a different view, “As CO2 pipelines are developed at the scale required for CCS legislation imposing federal siting and economic regulation...could be warranted…the jurisdiction of these pipelines could fall under the purview of the Federal Energy Regulatory Commission.” 71 Using FERC instead of state regulation deals with several problems as FERC has the power of eminent domain for those interstate pipelines which are common carriers and have a certificate of public convenience and necessity. For intrastate transport states should follow the example of those states which have granted eminent domain power to common carriers and public utilities. 72 A similar tact was taken in a report by Carnegie Mellon University. 73 Under their proposal pipeline operators would have an “op-in” available where they would be able to enter under FERC regulation. If they chose they could remain under the current regime on state siting and economic regulation. This option would exist only for new pipelines and would not be available for existing ones. They also recommended that the permitting process for sites on federal land be streamlined and the existing pipeline safety regulatory framework should continue to be utilized.

### AT: States – No Capacity

#### States lack the administrative capacity for siting

Parfomak and Folger 08Parfomak: Specialist in Energy and Infrastructure Policy, Folger: Specialist in Energy and Natural Resources Policy (Paul W. Parfomak, Peter Folger, January 17, 2008, “Carbon Dioxide (CO2) Pipelines for Carbon Sequestration: Emerging Policy Issues,” [http://www.marstonlaw.com/index\_files/Emerging%20Policy%20issues%20for%20CO2%20pipelines%202008%20CORRECTED%20(2008-01-17%20(No%20RL33971).pdf)](http://www.marstonlaw.com/index_files/Emerging%20Policy%20issues%20for%20CO2%20pipelines%202008%20CORRECTED%20%282008-01-17%20%28No%20RL33971%29.pdf%29)//DR. H

Policy Implications for Rate Regulation.If CCS technology develops to the point where interstate CO2 pipelines become more common, and if FERC and the STB continue to disclaim jurisdiction over CO2 pipelines, then the absence of federal regulation described above may pose policy challenges. In particular, with many more pipeline users and interconnections than exist today, complex common carrier issues might arise.35 One potential concern, for example, is whether rates should be set separately for existing pipelines carrying CO2 as a valuable commercial commodity (e.g., for EOR), versus new pipelines carrying CO2 as industrial pollution for disposal. Furthermore, if rates are not reviewed prior to pipeline construction, it might be difficult for regulators to ensure the reasonableness of CO2 pipeline rates until after the pipelines were already in service. If CO2 pipeline connections become mandatory under future regulations, such arrangements might expose pipeline users to abuses of potential market power in CO2 pipeline services, at least until rate cases could be heard. Presiding over a large number of CO2 rate cases of varying complexity in a relatively short time frame might also be administratively overwhelming for state agencies, which may have limited resources available for pipeline regulatory activities.

### AT: States – International

#### Only the USFG can account for international linkages

Mack and Endemann 09Latham & Watkins, international law firm (Joel Mack, Buck B. Endemann, October 2, 2009, “Making carbon dioxide sequestration feasible: Toward federal regulation of CO2 sequestration pipelines,” [http://lw.com/upload/pubContent/\_pdf/pub3385\_1.pdf)//DR](http://lw.com/upload/pubContent/_pdf/pub3385_1.pdf%29//DR). H

Regulation of geologically sequestered CO2 also creates potential international environmental concerns. For example, North Dakota’s Great Plains Gasification Plant produces CO2 that is shipped across the border to Canada for use in EOR (Basin Electric Power Cooperative, 2009). Assuming the U**nited** S**tates** or Canada enters a treaty that caps carbon emissions at a certain level, the current international agreements do not contemplate how cross-border CO2 transportation for pure geologic sequestration (not associated with EOR) would affect each country’s carbon budget. Congress and the executive branch will have to confront the implications of such transportation and potentially modify or draft new treaties or bilateral agreements to ensure regulations are not unnecessarily restrictive or open to abuse.

### AT: States – Uniform Regulation

#### Uniformity jump-starts private CCS investment

Horne 10 – JD @ U of Utah

Jennifer, “Getting from Here to There: Devising an Optimal Regulatory Model for CO<2> Transport in a New Carbon Capture and Sequestration Industry,” 30 J. Land Resources & Envtl. L. 357, Lexis

However, the regulatory needs of CCS would not be so well served by state-based regulation. The EOR model may work well for CCS early on, when the landscape is likely to be comprised mainly of self-contained projects utilizing single-source pipelines, where rates and access are non-issues. However, a mature CCS industry may well be comprised of separately owned and operated power plants, pipelines, and storage facilities, in which case pipelines likely will serve multiple customers. 180 In that scenario, the potential for rate and access disputes, for example, is greater. Federal regulation of rates and access would bring uniformity in the form of a consistent set of rules for all CCS transport (excluding single-source) across all states. That would simplify CCS operations that cross state boundaries. It would, in other words, create a more uniform and liquid market for CO<2> storage - a necessary precursor to a broad-scale CCS industry.

### AT: States – Unpredictability Impact

#### Unpredictability at the state level deters CCS investment

Monast et al 11 - \*PhD, Director of the Climate and Energy Program at Duke University’s Nicholas Institute for Environmental Policy Solutions

Jonas, “A Cooperative Federalism Framework for CCS Regulation,” Scholar

Many geologic basins containing formations suitable for geologic sequestration underlie more than one state, as such it is likely some large-scale CCS projects will cross state borders.143 For example, the Vermillion Basin spans the borders of Wyoming and Colorado. It could serve as a CO2 storage space once the oil and gas wells have been depleted. The Mount Simon Sandstone, a deep geologic saline formation spanning much of the Midwestern United States, is another example of a storage site that would cross state borders.144 Although some states have taken action to clarify property-rights issues— including access to and ownership of pore space, and interaction between mineral and surface rights—property rights issues currently vary widely from state to state.145 Developers of sequestration projects crossing state borders may face various state-level rules and requirements. Without comprehensive and predictable permitting rules, these project developers may not be willing to invest the time and capital required to build large- scale CCS projects.146 Disputes would likely arise between states if one was receiving all of the economic benefits of a sequestration project while another was housing migrated CO2 from that project. Finally, it is not clear who would accept liability for injected CO2 crossing into a state that does not have a liability structure in place for CCS. The nature of the issue implies some role for the federal government, as more than one state is necessarily implicated, though the extent of federal involvement is open to discussion. The federal role could be as involved as allowing for eminent domain in cases where cross-border landowners cannot agree to terms, or as removed as providing dispute resolution when states or landowners disagree. Other options for the federal government include: (1) providing a model rule tailored to interstate sequestration for the states to follow, or (2) providing federal funds to compensate states with interstate sequestration facilities that are not on the injection side and are therefore not reaping the economic benefits of the sequestration project. Policy makers may need to create a regional coordination mechanism, such as an interstate or interagency compact or a memorandum of understanding (MOU) for CCS projects that cross state borders.147 This could be done at the federal level by amending the SDWA UIC Class VI well rule, or at the state level by amending existing state level permitting programs or writing a regional coordination mechanism into new state legislation. These amended or new rules could expressly authorize the negotiation and development of regional coordination mechanisms among all state- and federal-level UIC regulators who have permitting and regulatory authority over geologic sequestration projects.148 A regional coordination mechanism would serve to establish obligations with respect to permitting, monitoring, and enforcement responsibilities. This approach could apply to sequestration projects involving tribal lands, where a contract between the Tribal UIC permitting authorities and the federal government could be established, expressly stating responsibilities for all permitting, monitoring, and enforcement activities.

### AT: States – Links More to Politics

#### Counterplan links more to politics

Klass and Wilson 8 - \*Professor of Law @ Minnesota, \*\*Professor of Public Policy @ Minnesota

Alexandra and Elizabeth, “CLIMATE CHANGE AND CARBON SEQUESTRATION: ASSESSING A LIABILITY REGIME FOR LONG-TERM STORAGE OF CARBON DIOXIDE,” http://www.law.emory.edu/fileadmin/journals/elj/58/58.1/Klass\_Wilson.pdf

Second, the tension between state law and federal preemption is a constant theme in cases involving the Price-Anderson Act. 295 For CCS, where potential damages occur in domains with strong state laws governing groundwater protection, mineral rights, or surface rights, it is easy to imagine the potential tension between state interests and Congress. As CCS projects are likely to be large, and given that water and mineral resources are fundamental to other state interests (agriculture, urban development, industry, tax revenues, and others), CCS operators will strongly lobby Congress (and later argue in the courts) that federal law should preempt state law claims for damages and perhaps federal environmental laws. For the reasons stated in Part III, the existing state and federal liability framework provides important safeguards for potential harm associated with CCS. 296 Thus, federal legislation should include clear language to preserve state and federal bases for liability and instead focus on limiting operator liability by utilizing pooled funding, bonding, insurance, and other methods of assuring solvency in case of claims.

### AT: Interstate Compact – Court Strikedown

#### Compacts will be reviewed by the Supreme Court

Pincus 09(Mathew, April 22, 2009, “When Should Interstate Compacts Require Congressional Consent?” Columbia Journal of Law and Social Problems, [http://www.columbia.edu/cu/jlsp/pdf/Summer2009/02Pincus.42.4.pdf)//DR](http://www.columbia.edu/cu/jlsp/pdf/Summer2009/02Pincus.42.4.pdf%29//DR). H

Whether the NPV compact will be passed into law by enough states for it to come into effect remains unclear. If enacted, however, any compact that attempts to accomplish far-reaching national goals will inevitably be subject to judicial challenges. Such a challenge will necessarily put pressure on courts to revisit the Compact Clause. If the Supreme Court**,** as has been predicted, chooses to revise its holding in U.S. Steel,165 it will need to decide whether to heed Justice White’s criticism that the current regime allows the Clause “no independent meaning.”166 Below its surface, U.S. Steel argues that the Compact Clause is redundant, serving simply to mark the fact that states cannot do together what they cannot do separately. Going forward, the Court will have to decide whether this reading of the clause is correct.

#### Recent decisions prove it will be struck down

Hendrickson 12

JC, “Court of Appeals Ruling Could Weaken Interstate Compact Power,” Knowledge Center, http://knowledgecenter.csg.org/drupal/content/court-appeals-ruling-could-weaken-interstate-compact-power

On Monday, the U.S. Court of Appeals for the First Circuit issued a decision in United States v. Pleau, siding with the federal government. Considering the case’s broad implications on the federal-state relationship, The Council of State Governments had partnered with the National Governors Association in signing onto an amicus curiae brief opposing the federal government’s position. The issue in the case is whether the federal government can compel state compliance when requesting a prisoner custody transfer under an interstate compact. Jason Wayne Pleau was charged with robbing and murdering a gas station owner in Rhode Island who was on his way to cash in the day’s receipts. While in custody, Pleau reached a plea deal with the state, agreeing to plead guilty in exchange for the maximum sentence of life in prison without parole. However, the federal government also filed charges against Pleau, noting that he was eligible for the death penalty under federal law. The federal government initially asked for custody of the prisoner, citing the Interstate Agreement on Detainers, a compact first championed by CSG in 1957 and subsequently joined by 46 states, as the legal justification. The Governor of Rhode Island, Lincoln Chafee, denied the transfer request under his authority in the same interstate compact. The federal government then filed a writ of habeas corpus to prosecute in federal district court, which was granted by the court and appealed by Pleau and the governor. The U.S. Court of Appeals for the First Circuit Court then voted to hear the case. In their 11 page opinion, the court sided 3-2 with the federal government, citing the Supremacy Clause of the Constitution and insisting that if the state’s argument were upheld “Instead of a place of confinement, the state prison system would become a refuge against federal charges.” However, in a strongly-worded dissent, two circuit court judges sided with the governor and CSG’s argument. The judges state that “the majority fails to follow the express terms of the [interstate compact], snubs the rules applicable to the enforcement of interstate compacts as reiterated most recently by the Supreme Court, and compounds these errors by misconstruing [precedent].” The dissenting judges also stated that they did not believe the Supremacy Clause is implicated here. Governor Chafee has already announced his intention to appeal the ruling to the Supreme Court. Given that states are increasingly turning to interstate compacts to solve problems and foster cooperation both among states and with their federal counterparts the results of this case, and any future appeal, may have implications for decades to come.

#### Here’s Roberts-court specific evidence

Greve 11 - Scholar at AEI

Michael, “Enforcing the Compact Clause,” AEI, http://www.aei.org/article/politics-and-public-opinion/judicial/constitutional/enforcing-the-compact-clause/

No circuit split exists on either question. However, the Roberts Court has shown a commendable willingness to recover long-ignored and seemingly marginal constitutional clauses. Two years ago, for example, the justices unearthed the Compact Clause's immediate constitutional neighbor—the Tonnage Clause, last adjudicated in 1935. In Polar Tankers v. City of Valdez, the justices read the prohibition against "any [state] Duty of Tonnage" without the consent of the Congress "in light of its purpose" and invalidated a state duty that, while nominally declared a "property tax," operated as a de facto tax on the privilege of entering a port. The ruling in the case—yanked up without a circuit split—reflects the conviction, which still commands near-universal assent, that every clause of the Constitution must retain some independent force and meaning. The tobacco agreement provides a pristine test of that same bedrock principle. If the MSA does not require congressional consent, no state compact can violate the Compact Clause unless it is already unlawful for some other, independent reason.

### AT: Interstate Compact – Congressional consent

#### Not uniform without Congressional consent – leads to uncertainty

Masters 9 - Special Counsel, Council of State Governments,

Rick, “THE INTERSECTION OF INTERSTATE COMPACTS & STATE LAW,” http://www.aphsa.org/Policy/ICPC-REWRITE/Understanding%20Interstate%20Compacts/COMPACTS%20INTERSECTION%20WITH%20STATE%20LAW.pdf

Compacts have standing as both binding state law and a contract between the party states such that no one state can unilaterally act in conflict with the terms of the compact. Any state law in contradiction or conflict with the compact is unconstitutional, absent reserve of power to the party states in the compact itself. The terms of the compact take precedence over state law even to the extent that a compact can trump a state constitutional provision (McComb v. Wambaugh, 934 F.2 nd 474, 479 (3d Cir. 1991 ; Wash. Metro Area Transit Auth. v. One Parcel of Land, 706 F.2d 1312, 1319 (4 th Cir. 1983)). The contractual nature of a compact controls over unilateral action by a state; no state being allowed to adopt any laws “impairing the obligation of contracts” (U.S. Const., Art. I, Sec. 10, Clause 1). However, unlike its congressionally sanctioned counterpart, a compact without the consent of Congress does not “express federal law” and as a result “must be construed as state law.” As a result, a compact without congressional consent is inherently subject to conflicting interpretations by the courts of the states which are signatories to the compact. See, McComb, supra. Unlike a compact sanctioned by Congress, neither interpretation nor enforcement is subject to the uniform effect of the Supremacy Clause of the U.S. Constitution and is not limited to the review of the federal judiciary. The fact that interpretation of a compact raises a federal question makes proceedings in federal courts as well as state courts possible. Where states retain authority to unilaterally alter a reciprocal agreement, the agreement will generally not rise to the level of a compact enforceable as a contract between states (Northeast Bancorp v. Bd. of Governors of Fed. Reserve Sys., 472 U.S. 159, 175 (1985).

#### This is particularly true in the context of transportation

LaRock 11 President of the 1789 Project, member of the Loudoun County Republican Committee (David LaRock, September 2, 2011, “Decentralize Government With Interstate Compacts,” [http://www.the1789project.com/2011/09/do-it-yourself-federalism/)//DR](http://www.the1789project.com/2011/09/do-it-yourself-federalism/%29//DR). H

An interstate compact is an agreement between two or more states of the United States of America. Article I, Section 10 of the United States Constitution provides that “no state shall enter into an agreement or compact with another state” without the consent of Congress. Frequently, these agreements create a new governmental agency which is responsible for administering or improving some shared resource such as a seaport or public transportation infrastructure. In some cases, a compact serves simply as a coordination mechanism between independent authorities in the member states.

### AT: Interstate Compact – Links to Politics

#### Links to politics – the government will be forced to respond if left out of the compact

Pincus 09(Mathew, April 22, 2009, “When Should Interstate Compacts Require Congressional Consent?” Columbia Journal of Law and Social Problems, [http://www.columbia.edu/cu/jlsp/pdf/Summer2009/02Pincus.42.4.pdf)//DR](http://www.columbia.edu/cu/jlsp/pdf/Summer2009/02Pincus.42.4.pdf%29//DR). H

While the way in which externalities created by interstate compacts can harm non-participating states has been noted widely, a different problem with the U.S. Steel test is not easily understood in terms of horizontal federalism: interstate compacts can upend the normal workings of legislative inertia on the federal level. Allowing compacts to go into effect without congressional approval can enable the enactment of legislation having national impact through an alternative mechanism. This alternative mechanism, however, reverses the usual workings of what has been called “legislative inertia.”111

### AT: States – Spending Tradeoff DA

#### Any new spending would trade off with other programs – balanced budget necessary by end of fiscal year

**Lambert 6-12** “US State Revenues Recover But Budgets Are Still Tight” http://www.reuters.com/article/2012/06/12/us-usa-states-budgets-idUSBRE85B1DW20120612

For fiscal 2013, which for most states begins on July 1, state revenues will likely be $10 billion greater than in fiscal 2008, the last year before state revenues collapsed under the combined pressures of the housing downturn, financial crisis and recession, according to the report.When their revenues cratered, states had to slash spending, hike taxes and turn to the federal government for help. Meanwhile, newly unemployed citizens turned to states for help with healthcare or education. All statesexcept Vermontare required to end their fiscal years with balanced budgets,which means that, unlike the federal government they cannot operate at a deficit.

#### State parks are on the chopping block

Merchant 6-7

Brian, “State Parks on the Chopping Block Across the Nation,” http://www.treehugger.com/corporate-responsibility/state-parks-on-the-chopping-block-across-the-nation.html

That should be something of a blow to the gut. State parks, and the preserved wilderness they encompass, are crucial to the American cultural identity -- they're part of our heritage, our way of life. That we're watching as they're put up on the chopping block for some quick cash to feed ballooning budgets is disgraceful -- and it exemplifies the creeping corporatization of the nation. Permanently closing state parks offers only a quick fix in terms of budgetary impact -- operating parks are relatively inexpensive in contrast to other state functions, and selling them off will generate comparatively tiny sums that will evaporate before the next budget shortfall rolls around. So what we're seeing here is apermanent lossof lands once intended for all of the public touse -- now access to parks is becoming too expensive for the poor, or those parks are on their way to being sold off to corporate interests altogether. I'm well aware that California and other states are facing difficult times, and are strapped for cash **--** but closing up national treasures like protected wilderness and selling them off is as ugly a solution as I can imagine**.**

#### State parks key to combatting obesity

Business Wire 10 “America’s State Parks Alliance Launched to Advocate for Healthful and Economic Benefits Provided by the 50 States” Enhanced Online News; http://eon.businesswire.com/news/eon/20100216005782/en/cause-related-marketing/corporate-social-responsibility/environmentalists

State parks also play a pivotal role in helping combat obesity, one of the nation’s most pressing health issues. First Lady Michelle

Obama, along with doctors and public health officials, are citing the need for more activity among children. “Simple outdoor activities such as hiking, biking, and camping on public lands and waters can serve as a gateway to a healthier lifestyle,” says former White House Fellow Michael Suk, MD who served with the Department of the Interior and is Professor of Orthopaedic Surgery at the University of Florida. **“**Most state parks draw the majority of their visitors from surrounding communities and they see repeat visitation. They serve as an important asset that links recreation and public health.”

#### Obesity undermines the military by decreasing the pool of recruits, decreasing retention, and increasing health care spending

ALMOND et al 2008 (LCDR Nathaniel Almond, MC USN, NEPMU Five, Naval Station San Diego; Leila Kahwati, MD MPH VA National Center for Health Promotion and Disease Prevention; Linda Kinsinger, MD MPH VA National Center for Health Promotion and Disease Prevention; Deborah Porterfield, MD MPH Department of Social Medicine, School of Medicine, University of North Carolina at Chapel Hill, Military Medicine, July 15, [http://www.redorbit.com/news/health/1478028/the\_prevalence\_of\_overweight\_and\_obesity\_among\_us\_military\_veterans/](http://www.redorbit.com/news/health/1478028/the_prevalence_of_overweight_and_obesity_among_us_military_veterans/%22%20%5Ct%20%22_blank))

The epidemic of obesity significantly affects the military. First, the potential pool of recruits is decreased due to the increasing proportion of young adults who do not meet military entry standards for weight, estimated at 13 to 18% of U.S. men and 17 to 43% of U.S. women in the general population.12 Retention of active military personnel is also decreased secondary to the disease burden, with 1,419 personnel discharged in 2002 due to failing the body weight standard.13 Lastly, overweight and obesity add to health care costs for the Department of Defense, whose total health care budget is currently estimated at $36 billion with projected costs in 5 years to be $61 billion annually.

#### Low troop levels collapse deterrence of regional aggression and hinder U.S. power worldwide

Perry and Flournoy 06
(William, professor of management science and engineering at Stanford University, was U.S. secretary of defense from 1994 to 1997, Michele, senior advisor at the Center for Strategic and International Studies, was principal deputy assistant secretary of defense for strategy and threat reduction, National Defense, May)

The all-volunteer force is now in historically uncharted waters — fighting a protracted conflict with volunteers rather than draftees. What will happen if the current surge for Iraq becomes the steady state, and the Army and Marines are not resourced with the people, units and equipment they need for a long-term fight? When will the dedication and sacrifice of our troops run up against the needs of families and communities? Will they vote with their feet? Most of our active duty military has chosen to stay in the force after one or even two tours, but it is reasonable to fear that after a third year-long deployment in a compressed period, many will choose to leave the force. Many senior military officers who lived through the Vietnam era and its aftermath believe that if significant numbers of senior non-commissioned officers and field grade commanders begin to leave the force, this could set off a mass exodus and lead to a “hollowing out” of the Army. Meanwhile, the United States has only limited ground forces ready to respond to contingencies outside the Afghan and Iraqi theaters. As a global power with global interests, the United States must be able to deal with challenges in multiple regions of the world simultaneously. If the Army were ordered to send significant forces to another crisis today, its only option would be to deploy units at readiness levels far below what operational plans would require. As stated rather blandly in one Defense Department presentation, the Army “continues to accept risk” in its ability to respond to crises on the Korean Peninsula and elsewhere. The absence of a credible, sizable strategic reserve increases the risk that potential adversaries will be tempted to challenge the United States. Although the United States can still deploy air, naval, and other more specialized assets to deter or respond to aggression, the visible overextension of our ground forces could weaken our ability to deter aggression.

#### Military power key to heg – without hardpower overall U.S. influence would collapse

Army Headquarter 01

(Headquarters of the Army, Field Manual #1, “The Army,” June 14, [http://www.globalsecurity.org/military/library/policy/army/fm/1/index.html](http://www.globalsecurity.org/military/library/policy/army/fm/1/index.html%22%20%5Ct%20%22_blank))

America is a strong Nation. It has abundant resources and a dynamic and productive population. It wields enormous political power and has the world's strongest economy. But without a strong military to protect its enduring interests, America's strength would soon wither. Since the end of the Cold War, the world has been in a state of significant transition. This transition is marked by increased uncertainty and potential vulnerability. The strategic environment is less stable than in the past, and threats to American interests are less predictable. National power remains relative and dynamic, and as such, the military must provide the National Command Authorities with flexible forces that can operate across the range of military operations and spectrum of conflict to achieve national security objectives. The Army operates as part of the joint force, and The Army constitutes the preponderance of the land component of that force. Acting as part of joint and multinational teams, The Army provides sustained land power capabilities to combatant commanders for engagement, crisis response, and warfighting in support of our national interests.

### State Parks Internal – Chopping Block

#### State Parks are on the chopping block

#### a) Illinois

Bentley 6-22

Budget-starved DNR May Close Some State Parks, http://chicagoist.com/2012/06/22/budget-starved\_dnr\_may\_close\_some\_s.php

Never mind climate change— budget woes are the biggest threat to Illinois’ state parks. [Less than one percent](http://www.saukvalley.com/2011/11/17/group-seeks-to-expand-park/ad0zy9s/%22%20%5Co%20%22Opens%20in%20a%20new%20window%22%20%5Ct%20%22_blank) of the Prairie State remains natural prairie land, and that sliver is composed of more than 300 parks, forests and natural areas. Now just three years after he reopened seven state parks closed by Gov. Rod Blagojevich, Gov. Pat Quinn faces a similar situation as his predecessor. The state Department of Natural Resources gets its money mainly from state general revenue. Lawmakers slashed that funding from $106 million in 2002 to just $45.4 million under the plan sent to Quinn last month. That’s a drop in the well, given DNR’s estimated $750 million in deferred maintenance projects. Those projects are a tall order for an understaffed agency. DNR has seen its workforce drop from 2,400 employees in 2002 to about 1,100 today, as a result of a decade-long hiring freeze. And looming pension reforms have some of them looking to bow out — more than 200 employees are eligible for retirement this year.

#### b) New York

**Shackford 09** (Stacey, Communications Specialist, College of Agriculture and Life Sciences at [Cornell University](http://www.linkedin.com/company/cornell-university?trk=ppro_cprof), and free lance reporter in Ithaca, New York, “Official: Budget cuts threaten state parks,” *The Ithaca Journal*, Octobor 06, 2009, *lexisnexis,* ADP)

The dramatic plunges and cascading falls that have become the iconic symbols of the Finger Lakes area may be in jeopardy, a state parks commissioner has warned. David Banfield, regional chairperson of the New York State Council of Parks, Recreation and Historic Preservation, said the closure of some parks is all but inevitable if Gov. David Paterson continues to chip away at the state parks budget. "It's never come to this -- this is unprecedented," Banfield said. "But if the parks are asked to take any further additional budget reductions or cuts, it will almost certainly require the closing of some state parks and a reduction or elimination of services such as swimming, camping and hiking in others." Banfield said he was unable to name specific parks at risk, but said park staff will likely consider the amount of use each park attains, the revenue generated and the cost of maintaining its services. For instance, it is much cheaper to offer swimming at Cayuga Lake than at Buttermilk Falls, where the swimming hole has to be dredged and maintained every year, he said. Tim Joseph, parks director for the Finger Lakes region, said he and his staff have compiled a list of possible scenarios and their estimated cost savings. It has been submitted to officials in Albany, and Joseph is waiting for their directive. He declined to give details of any of the scenarios, but said, "I can tell you that they will involve closing things." He is also awaiting word from Albany about whether the regional parks will be expected to shoulder the 11 percent cuts to the current budget Paterson ordered on Tuesday. Joseph said he has no idea how he would achieve them, considering the season is pretty much over and most of this year's budget has already been spent. Banfield, an insurance executive by trade, said options are limited and he sees no alternative. "We are not doing normal maintenance now, so what else are we going to do? We have cut back as far as we can from a safety standpoint," he said. He is wary of increasing entrance fees any further, because it would hurt those who have the most to gain from affordable access, and could adversely impact the region at large through decreased tourism. Even if the parks were to increase fees, there would be no guarantee that it would provide a direct boost to their budget, as all revenues go into the state's general fund, to be used at the discretion of the governor. As a result of reductions of 20 percent for the last two years, staff has already been slashed and services have been severely curtailed. Mown fields have turned into meadows, and trail maintenance has fallen by the wayside. Banfield said there have been concerns about safety, as rock faces in the gorges go unscaled and swimmers seek solace from summer heat in unsupervised, unsafe areas elsewhere in the parks. Enforcement is limited as park police, whose numbers are also down, are stretched too thin, he said. Luckily, cool and wet weather this summer meant most visitors didn't notice the delayed start to the season or the lack of weekday swimming in some parks, Joseph said. But they have been commenting on the cleanliness of restrooms and the deterioration of facilities, as years of deferred maintenance, staff cutbacks and inability to buy supplies begin to take their toll, Banfield said "People can see the condition that a lot of the park infrastructure is in and it's not likely to improve," Joseph added. "I think that next year they will start seeing closed facilities." Despite the weather, parks in the Finger Lakes region were among the few in the state to see increases in attendance this year. Banfield attributed this to their natural beauty, which attracted visitors from afar, and affordability, which enticed local budget-conscience vacationers to stay close to home. He said this helps boost the local economy, with an estimated benefit to cost ratio of 5-1. For every $1 spent, $5 is generated, with approximately $1.9 billion in sales for private businesses statewide each year. The 3 million visitors to Finger Lakes parks last year helped employ 1,776 people and generate $141 million, he said. For the first time in its history, the Finger Lakes parks may have to start looking for private investment. A Friends of the Finger Lakes Parks organization could be set up to collect individual or corporate contributions to fund capital projects, such as a $1.8 million overhaul of the Taughannock Falls overlook, to make it sheltered, serviced with restroom facilities and fully accessible to wheelchairs. Banfield said such initiatives have proven successful in other regions, and he is willing to try it here, but admits it may be difficult to drum up support for state services already funded through taxes. In the meantime, he is urging people to contact their legislators and write to state officials to express their support for continued funding for state parks. "We need public support to prevent this from happening," he said.

#### c) California

**Brennan 11** (Pat, Science and Environmental Editor for the Orange County Register, Budget Cuts may Close State Parks,” *Orange County Register*, January 18, 2011, *Proquest*, ADP)

Some state parks could be closed to reach an $11 million target for cuts proposed in Gov. Jerry Brown's budget. Those with low attendance or revenue are the likely targets, state finance officials said. They and state parks officials will be working quickly to develop a list of parks that could be partially or fully closed, said H.D. Palmer, spokesman for the state Department of Finance. "The governor is talking about having reductions approved by March," Palmer said. "We'll have some type of list within the next month or so." Palmer said he did not yet know even roughly how many parks might be considered for closure. But in two years' time, the closures could result in $22 million in reductions, he said. Last week, Brown proposed $12.5 billion in cuts and $12 billion in revenue, some from tax-increase extensions if voters approve, to close the state's budget deficit. The Department of Parks and Recreation is not starting from scratch. Officials spoke in 2009 of closing as many as 100 parks, but the closures were averted after cuts in hours, services and staffing. "A lot of research, a lot of work was done in prior years, when the potential for closures would come up," Palmer said. The goal won't be a set number of parks, he said, but "whatever mix of partial and complete closures" allows parks to hit the $11 million goal.

#### d) Texas

**Tompkins 11** (Shannon, overs outdoor recreation and natural resource issues for the Chronicle,” EXAS STATE PARKS;NO-FUND ZONES;Deep budget cuts and drought-related revenue shortfalls are threatening the state parks system;,” The Houston Chronicle , December 8, 2011, Lexisnexis, ADP)

Even in the best of times, Texas' perpetually underfunded state parks system walks a fiscal razor's edge. Now, after being tripped by a series of legislative moves and natural events, the parks system finds itself teetering on that edge and facing the unpleasant consequences of a fall - a fall that stands to negatively impact the millions of Texans who see state parks as gateways to outdoor recreation they consider crucial to their quality of life. Wobbled by the Texas Legislature's cut to its already bare-bones appropriations and further saddled with what now appear overly optimistic projections for self-generated revenue from park visitation, the state parks system faces a multimillion-dollar budget deficit that could force further reductions in staff, park services, hours of operation and, perhaps, even temporary closure of some of the system's 94 sites. Scott Boruff, deputy executive director of the Texas Parks and Wildlife Department, earlier this week said no state parks are slated to be closed but added that if the budget deficit isn't reduced, "all options are on the table." Double-edged sword The funding problems facing state parks are a result of a convergence of a tough economic climate and even tougher weather. The Texas Legislature earlier this year cut TPWD's 2011-12 and 2012-13 budgets by 21 percent, with the state parks division seeing an 8 percent cut - this on top of budget cuts ordered during the 2010-11 fiscal year. Those parks funding cuts were made from state general sales tax revenues that account for about half of the parks division's $69 million annual appropriation. The other half of the parks division funding comes from revenue the parks generate through entry fees, campsite fees and other fees paid by park visitors.

The Legislature included language in the appropriations bill that would allow TPWD to annually spend as much as $3 million above its parks division appropriation if the agency collects more park fees than the state comptroller projected. But if parks don't generate revenue in excess of projections, the agency stands to lose as many as 60 parks division staff positions and make other cuts in park operations.

### Warming Impact

#### State parks are key to the environment – solve endangered species, carbon sequestration, and pollution runoff and support educational programs to ensure long-term sustainability

**Combs 8**

Susan, Texas Comptroller, The Value of State Parks, http://www.window.state.tx.us/specialrpt/parks/value.html

Parks provide social amenities because of their aesthetic appeal. They also provide remedies to environmental problems such as storm water runoff and pollution. Trees and shrubs intercept rain as it falls to the ground, allowing water to evaporate or be absorbed. Also, the pervious groundcover of soil and vegetation mitigates runoff through rainwater absorption. Trees, shrubs and other vegetation also provide air quality benefits by removing from the atmosphere pollutants such as nitrogen dioxide, carbon monoxide and sulfur dioxide. These problems of storm water runoff and pollution lead to production losses from flooding damage and health care costs associated with treatment of pollution-related diseases and can diminish economic activity.[14](http://www.window.state.tx.us/specialrpt/parks/value.html#14) The economic consequences of these problems are more pronounced in metropolitan areas, where pollution can be more severe and runoff is accelerated by impervious surfaces such as buildings and roads. The prevention and remediation of storm water runoff and pollution entails costs to state and local governments and taxpayers. By minimizing these problems, parkland provides a real economic benefit**;** by minimizing abatement costs parks make tax dollars available for other purposes. To estimate this economic impact, Comptroller staff estimated the cost of storm water and pollution control that would be necessary in the absence of state parks. This analysis included state parkland located in metropolitan areas, since that is where storm water runoff and pollution represent a significant public cost. The costs associated with storm water and pollution control in Texas metropolitan areas were incorporated into an economic modeling program to determine the economic activity generated by savings on these expenditures. Direct expenditures associated with storm water management and air pollution removal were obtained from an analysis of San Antonio’s urban ecosystem by the organization American Forests.[15](http://www.window.state.tx.us/specialrpt/parks/value.html#15) While American Forests has conducted several urban ecosystem analyses for several cities in Texas, the costs associated with air pollution removal and constructing a storm water management system for San Antonio was chosen as a proxy for all metropolitan state parks in Texas.[16](http://www.window.state.tx.us/specialrpt/parks/value.html#16) Ecologically, San Antonio represents a middle-point between the humid and rainy Houston region and the more arid regions of West Texas. San Antonio also represents a middle point between the major metropolitan regions with significant air quality issues and less populated metropolitan regions with fewer of such problems.[17](http://www.window.state.tx.us/specialrpt/parks/value.html#17) To estimate the value of environmental savings at the state level, the sum of the costs associated with air pollution removal and the construction of a storm water system was divided by the total tree cover acreage in the San Antonio region. This would generate a per acre value of approximately $1,963. This is then multiplied by the number of acres in Texas state parks in metropolitan counties.[18](http://www.window.state.tx.us/specialrpt/parks/value.html#18) On the basis of this acreage (81,181 acres), the estimated monetary value to the state of remediation associated with metropolitan state parks in Texas is more than $159 million annually. Incorporating these savings into an economic model for Texas translates into more than $233 million of goods and services produced by businesses in the state. This level of economic activity generates almost $154 million in total personal income and slightly more than 3,900 jobs statewide (Exhibit 11). State parks provide many environmental benefits. They preserve the state’s biodiversity and provide a vital home for varied plant and animal life. Many parks collaborate with the U.S. Fish and Wildlife Service by providing habitat for threatened and endangered species designated under the federal Endangered Species Act. Among these species to be found in Texas state parks are the ocelot (a medium-sized spotted cat), the jaguarundi (a small, slender-bodied cat), the golden-cheeked warbler, the peregrine falcon, the Houston toad and several species of desert spring fish. The chain of state parks in South Texas called the World Birding Center provides seasonal homes to about 500 species of migrating birds. As urban and exurban areas expand in Texas, parks become increasingly important because they prevent the development of open space. Preserving the aesthetic beauty of Texas’ rural and undeveloped areas is vital to ensure that Texas remains a place where families desire to live and work. As noted above, parks also provide important health benefits by improving the environment. Trees, shrubs and other plants remove carbon dioxide, nitrogen oxide and sulfur dioxide from the atmosphere. Parks, particularly those located in or near urban areas, can improve air quality by preserving and cultivating plant life. In addition, their open spaces provide important water quality benefits such as storm water mitigation, water quality improvement, in-stream environmental flow enhancement and groundwater recharge. Many state parks, such as Caddo Lake State Park in deep east Texas and Garner State Park in southwestern Texas, are vital to the preservation of naturally flowing rivers, creeks and streams, allowing nature to cleanse waters for downstream use. These properties enhance the quality and quantity of Texas’ precious water resources. Some of these factors can be quantified, based on existing research. Finally, parks facilitate a respect for nature among those who come to visit them. To develop the next generation of environmental stewards, Texas parks employees work hard to teach visitors about low-impact camping, respect for wildlife, protection of plant life, litter prevention and other outdoor ethical questions. Through their exposure to these unique natural places, Texans from all walks of life will recognize that these assets must be treasured and protected.

#### Biodiversity loss leads to extinction

Diner gender paraphrased 94

Military Law Review Winter 1994 143 Mil. L. Rev. 161 LENGTH: 30655 words ARTICLE: THE ARMY AND THE ENDANGERED SPECIES ACT: WHO'S ENDANGERING WHOM? NAME: MAJOR DAVID N. DINER BIO: Judge Advocate General's Corps, United States Army.

Biologically diverse ecosystems are characterized by a large number of specialist species, filling narrow ecological niches. These ecosystems inherently are more stable than less diverse systems. "The more complex the ecosystem, the more successfully it can resist a stress. . . . [l]ike a net, in which each knot is connected to others by several strands, such a fabric can resist collapse better than a simple, unbranched circle of threads -- which if cut anywhere breaks down as a whole." n79  By causing widespread extinctions, humans have artificially simplified many ecosystems. As biologic simplicity increases, so does the risk of ecosystem failure. The spreading Sahara Desert in Africa, and the dustbowl conditions of the 1930s in the United States are relatively mild examples of what might be expected if this trend continues. Theoretically, each new animal or plant extinction, with all its dimly perceived and intertwined affects, could cause total ecosystem collapse and human extinction. Each new extinction increases the risk of disaster. Like a mechanic removing, one by one, the rivets from an aircraft's wings, n80 [hu]mankind may be edging closer to the abyss.

#### If necessary – refer to 1ac warming impact cards

### Econ Impact

#### State parks create jobs and boost the economy

Business Wire 10 “America’s State Parks Alliance Launched to Advocate for Healthful and Economic Benefits Provided by the 50 States” Enhanced Online News; http://eon.businesswire.com/news/eon/20100216005782/en/cause-related-marketing/corporate-social-responsibility/environmentalists

“Building state parks creates jobs and operating state parks stimulates outdoor recreation and tourism spending. That translates to a huge boon to our local economies,” said NASPD President Joe Elton, Director of Virginia State Parks. Elton further stated that, “In 2009 visitors to state parks across America helped create a $20 billion economic impact, which is an incredible return on investment given that the overall budget expenditure nationwide is less than $2.3 billion.”

#### State parks key to the economy

Cekada 12 “Study: State Parks Beneficial for Economy” http://www.heraldstandard.com/gcm/news/local\_news/study-state-parks-beneficial-for-economy/article\_9920aead-0466-5ea8-8f07-6cf8ccededbe.html

A Pennsylvania State University study showed that state parks prove beneficial for the economy by providing jobs and bringing in both an increase in visitors and money for the state. The information was released Monday at a public information meeting at Ryerson Station State Park. The study was conducted in 2008 and again in 2010 to compare statistics, said Alan Johnson, Ryerson park manager. In 2008, Pennsylvania state parks were the home to 33.6 million visitors. In 2010, parks statewide brought in 37.9 million visitors. Last year, there were 117 parks across the state, Johnson said. Only one year later, three more parks have been opened. “This increase in parks was due to conservation areas becoming classified as parks,” Johnson said. In 2008, $738 million was brought in from parks, along with more than 10,000 jobs. Just two years later, state parks were bringing in an average of $859 million, along with more than 12,000 jobs. According to the study, state parks also have seen an increase in out-of-state visitor spending. In 2008, $167 million was brought in from out-of-state visitors, and in 2010 that number jumped to $201 million.

### Obesity Extension

#### Obesity will kill more people than AIDS and malaria combined

THE TORONTO STAR 2-4-2008 (Obesity Becoming World Crisis, <http://www.thestar.com/columnists/article/300138--obesity-becoming-world-crisis>)

It's already being called the next deadly global pandemic. Projected to be a bigger threat to life than AIDS and malaria combined, obesity is quickly becoming the world's most severe health-care crisis. As waistlines grow alarmingly, so do concerns over the impact an unhealthy population could have on everything from medicine to the economy. The numbers paint a disturbing picture. The United Nations says there are now more overweight people in the world than starving people. Cardiovascular disease – commonly caused by obesity – kills 17 million people every year. Type II diabetes fatalities are expected to grow by 50 per cent in the next decade. Obesity is not new, but what's surprising is that it now plagues the developing world, too. Obesity is on a dramatic rise in poor states, as impoverished locals are increasingly introduced to mass-produced imported food that's often cheaper than their local fare. "It's a huge problem," says Erin Blanding, a development expert and head of Life in Action, a Toronto-based health and lifestyle program. "Eating unhealthy food is what you do when you are poor." Processed food is becoming a staple in the diets of many developing countries, much of it coming from Western factories. Visit a local market in places like Ecuador or Malawi and you're just as likely to see imported sugary cereals and juices as local produce. Outside, Big Macs are taking the place of traditionally prepared plantains and sweet potato biscuits. Food high in fat and low in nutrients is cheaply made and easily shipped, which undercuts local prices. But shoppers who cannot afford anything else buy it. Even rural farmers with access to their own healthy livestock or produce commonly trade what they can for larger quantities of processed food, just to ensure their families have enough to eat. With this cycle, Blanding explains, "We aren't giving people the choice to create better and healthier lives for themselves." Obesity once was a symbol of Western abundance and indulgence. Today, just as many people are overweight because they are filling their stomachs with whatever they can afford – and what they can afford is making them obese. By 2030, obesity will be the Number 1 killer of poor people around the world, the World Health Organization says. This will be an enormous burden on countries struggling to escape poverty. As health-care costs skyrocket and the size of healthy workforces shrink, their hard-fought progress toward development will be in jeopardy.

### AT: Private CP – Experience

#### Federal funding *jump-starts* the private industry

Klass and Wilson 8 - \*Professor of Law @ Minnesota, \*\*Professor of Public Policy @ Minnesota

Alexandra and Elizabeth, “CLIMATE CHANGE AND CARBON SEQUESTRATION: ASSESSING A LIABILITY REGIME FOR LONG-TERM STORAGE OF CARBON DIOXIDE,” http://www.law.emory.edu/fileadmin/journals/elj/58/58.1/Klass\_Wilson.pdf

What is unique about CCS, however, is the scale of projects and necessary deployment. A lowered liability cap within a strict liability federal fund for the first dozen or so full-sized CCS projects could help industry to gain the confidence and experience for the transition to a full commercial CCS deployment. Such a cap would let first movers manage the financial risk of new CCS technologies and serve to more rapidly transition from demonstration projects to commercial deployment. Although claimants could still resort to tort or environmental law to obtain compensation for those claims not covered by the strict liability fund, if the total fund amounts are high enough, and the in-fund liability caps low enough, this may help encourage operator development of initial projects. Care should be taken, however, to ensure that such a cap does not become permanent as—in addition to removing normal incentives for responsible operator behavior—it may create a negative public backlash toward CCS, which may adversely affect future project siting.

### AT: Private CP – Sequencing

#### The federal government must facilitate *certain* transportation to ensure commercial investment

Apt et al 7 – PhD in Physics @ MIT, Professor of Technology, Tepper School of Business and Engineering and Public Policy

Jay, “Incentives for Near-Term Carbon Dioxide Geological Sequestration,” Carnegie Mellon, http://wpweb2.tepper.cmu.edu/ceic/pdfs\_other/Incentives\_for\_Near-Term\_Carbon\_Dioxide\_Geological\_Sequestration.pdf

While all the technologies required for CO2 transport and deep geological sequestration are presently in use at modest commercial scale , a very large scale up from current practice is required to meet energy needs. To give an idea of the scale required, plausible required capture rates of the carbon dioxide from fossil fuels in the U.S. today would produce a CO2 stream of approximately 2,000 million tons (Mt) per year injected into a variety of geological formations. This amount is 40 times larger than current CO2 injection. However, while 2,000 Mt is a large number, total underground injections of all fluids in the U.S. is over twice that amount. 3 Current experience with CO2 injection is limited. The total CO2 injected for enhanced oil recovery in the U.S. is under 50 Mt per year, while the upcoming Department of Energy Regional Sequestration Partnerships plan to inject approximately 1 Mt per year at 7 sites for three years. A reasonably large coal plant producing either electricity or other products would produce 3 to 4 Mt of CO2 per year. In addition to gaining experience with large scale geologic sequestration across a range of geological formations, experience is required with CO2 pipelines used to transport carbon dioxide to sequestration sites at scales required for U.S. energy production. The CO2 pipelines required for effective control of carbon dioxide emissions will be 10 to 40 times larger than the existing network of CO2 pipelines, and could be almost of the same scale as the present natural gas pipeline infrastructure. Carbon capture and sequestration (CCS) from gasification facilities with high capture volumes can provide early experience with CO2 transport and deep geologic sequestration at commercial scale within the next few years. Significant uncertainties exist in cost, the best operational and technical choices, and the appropriate character of the regulatory environment for both transport and storage of CO2 at the 4 scales required for commercial adoption that will substantially lower CO2 emissions from coal facilities. These uncertainties make it difficult to profitably deploy commercial scale low carbon energy projects at present. Deployment of large-scale pilot projects is crucial for proving the economic and technical efficacy of geologic sequestration, gaining the experience to assure a high level of reliability in operations, and for accruing the data necessary to craft a science-based regulatory regime sufficient to assure safety and to foster public acceptance. Such a regime is necessary to provide a stable platform for commercial investment, to ensure regulatory cohesion and consistency, and to help build public confidence in geologic sequestration. Imposition of a requirement to capture a set percentage of the CO2 from coal or petcoke facilities prior to gaining such large scale experience, will at best be much more costly than it needs to be, and at worse may lead to stagnation of technology.

#### Sequencing – private industry won’t invest before a carbon price

Insight Economics 11

“Building Essential Infrastructure for Carbon Capture and Storage,” Report to the Global Carbon Capture and Storage Institute, http://cdn.globalccsinstitute.com/sites/default/files/publications/13361/development-carbon-capture-and-storage-infrastructure.pdf

If the private sector is to invest in CCS on a commercial basis, therefore, one necessary condition is the existence of a significant carbon price signal and market confidence that the carbon price will continue to be present, at an adequate level, at least during the payback period of the investment (which may be up to two decades). Until that is the case, it seems very unlikely that the decentralised model is capable of delivering private investment in CCS including the pipeline infrastructure. This may also reflect a more general problem, namely that while some countries (including the UK) have committed to very ambitious GHG reduction targets by 2020, it is unclear in the near future that they will increase the level of the carbon price to what is required to deliver the necessary abatement. Particularly in the current situation where CCS is still at the stage of being demonstrated at scale, it seems doubtful that the carbon price will be elevated to a level that would enable the technology to be deployed in time to contribute to meeting emissions targets in 2020.

#### Investment is key to bridge R and D to widespread deployment

WCI 9

[World Coal Institute, international organization that represents the global coal industry, "SECURING THE FUTURE INANCING CARBON CAPTURE & STORAGE IN A POST-2012 WORLD," 2009, http://www.worldcoal.org/bin/pdf/original\_pdf\_file/securing\_the\_future\_ccs\_financing(12\_11\_2009).pdf]//SH

CCS can be deployed now using support mechanisms equivalent to those provided to other low carbon electricity generation options. The cost of electricity generation including CCS already compares favourably to the cost of electricity generated from renewable sources. However, deployment of CCS cannot be left to the market. The substantial experience with designing and implementing renewable energy technology support schemes (in around 60 countries4) is directly relevant in determining how to best incentivise development and deployment of commercial-scale CCS. This indicates that government action and investment is essential to bridge the gap between the research and demonstration phase and the widespread deployment of a technology family.

#### Government must be a first mover

WCI 9

[World Coal Institute, international organization that represents the global coal industry, "SECURING THE FUTURE FINANCING CARBON CAPTURE & STORAGE IN A POST-2012 WORLD," 2009, http://www.worldcoal.org/bin/pdf/original\_pdf\_file/securing\_the\_future\_ccs\_financing(12\_11\_2009).pdf]//SH

There are a litany of factors often cited as barriers to the widespread deployment of CCS, but the real barriers are political and financial. Costs for initial commercial-scale CCS demonstration projects will be too high to be supported by expected CO2 prices in the period to 2020. The private sector cannot therefore proceed with this deployment programme on its own. The widespread deployment of CCS will require government–industry partnerships to develop the technology, share costs and risks, and address firstmover barriers. In the past, government support has been critical for the successful development and deployment of almost all new energy technologies25. Stern found that developers deploying a new technology experience a range of first-mover barriers, unique to firstof- a-kind projects, increasing the risk that they will fail. First mover barriers are not experienced by subsequent CCS developers as a result of spill-over effects26. Currently, the first mover barriers for CCS project developers are so large that they prevent projects from proceeding to construction and operation without assistance from governments.

### AT: Private CP – Economies of Scale

#### Only government-built pipelines adequately create economies of scale and avoid risk

Insight Economics 11

“Building Essential Infrastructure for Carbon Capture and Storage,” Report to the Global Carbon Capture and Storage Institute, http://cdn.globalccsinstitute.com/sites/default/files/publications/13361/development-carbon-capture-and-storage-infrastructure.pdf

The difficulties in these areas are magnified by the existence of significant levels of risk and uncertainty in regard to the development of the CCS industry. In discussing the nature and extent of these risks, it needs to be remembered that the pipeline business is traditionally seen as a low risk/relatively low return operation. Much of the literature on CO2 pipelines appears to pursue an analogy with natural gas pipelines, where investors generally can rely on a steady if unexciting rate of return. The nature of the risks facing investors in CO2 pipelines, however, as well as the issue of building oversized pipelines initially so as to benefit from scale economies down the track, fundamentally challenges these assumptions. While in theory it may be supposed that pipeline businesses (and regulators) are capable of recalibrating their rate of return assumptions in the face of higher risks, in practice this may be rather more difficult to the extent that there may be a lack of interest from specialised pipeline businesses in investing in risky assets in which they have no experience. Certainly at this point in time, when CCS is still in the phase of being demonstrated at scale, potential investors in CCS projects face a number of significant risks with associated uncertainties. In the absence of government intervention, these can act as a powerful deterrent to investment. This is also likely to be an issue in the pipeline business where, although the technologies are mature, there is little experience in (and perhaps little appetite for) managing high risks

#### Private industry views CCS infrastructure as too risky – government support jump-starts the broader industry

Insight Economics 11

“Building Essential Infrastructure for Carbon Capture and Storage,” Report to the Global Carbon Capture and Storage Institute, http://cdn.globalccsinstitute.com/sites/default/files/publications/13361/development-carbon-capture-and-storage-infrastructure.pdf

This has ramifications for investment in CCS infrastructure. It is not clear, for example, that private investors are willing to provide storage facilities for CO2 in onshore locations because the nature and extent of contingent liabilities are insufficiently understood. There may be a concern over building CO2 pipelines near areas of high population density. If the construction of efficient CCS infrastructure is deemed to produce significant public benefits, government intervention, perhaps in terms of assuming the liability at least for a period of time, may well be justified. A detailed study of the appetite of the private sector to invest in CCS facilities, undertaken by BCG for the Global CCS Institute, found that: “Funding, finance and commercial models for full-scale, integrated CCS projects are at an early stage of development. High risks and uncertain returns for early projects mean significant and immediate government support through grants or equity investments are likely to be needed to engage the private sector.” 21 While this conclusion reflects the investment status of a technology that is still in the stage where it is being demonstrated at commercial scale, it may still be some time before the market can be relied upon to deliver private investment in CCS, including the associated infrastructure. If investment is to take place, it is likely to be on the basis of the mixed funding model incorporating a substantial contribution from the public sector.

#### Private development leads to point-to-point pipelines

Insight Economics 11

“Building Essential Infrastructure for Carbon Capture and Storage,” Report to the Global Carbon Capture and Storage Institute, http://cdn.globalccsinstitute.com/sites/default/files/publications/13361/development-carbon-capture-and-storage-infrastructure.pdf

In this context, some governments (such as the UK) are have undertaken a basic energy plan to suggest where the future supplies of decarbonised electricity will come from. Within this context, it would not be difficult to extend the detail of this process to designing an illustrative maps of a future network of CO2 pipelines. This would need to occur sometime in the future when there was more information available on likely investment in CCS facilities more generally. Without some coordination, however, a pipeline network may develop in a piecemeal fashion if left to the private sector. Against this is the possibility of the government being less well-informed than the private sector and the potential for it to be held accountable if it encouraged private investors to invest in assets that became stranded

#### That’s key to create backbone pipelines that avoid costs

Insight Economics 11

“Building Essential Infrastructure for Carbon Capture and Storage,” Report to the Global Carbon Capture and Storage Institute, http://cdn.globalccsinstitute.com/sites/default/files/publications/13361/development-carbon-capture-and-storage-infrastructure.pdf

The ERM case study summarised in Box 4.1 above shows that while significant cost savings are available in shipping CO2 in optimally sized pipelines, there are also substantial first mover costs compounded by considerable risks that together make it unlikely that the private sector would invest in them. The conclusion was that while backbone pipeline networks may be the most efficient long term option, they will need a guarantee of capacity utilisation to be financially viable or, in other words, if backbone pipelines are to be bankable propositions, they will need government financial support.

#### Absent government action, the private industry will build point-to-point pipelines

Mack and Endemann 09 Latham & Watkins, international law firm (Joel Mack, Buck B. Endemann, October 2, 2009, “Making carbon dioxide sequestration feasible: Toward federal regulation of CO2 sequestration pipelines,” [http://lw.com/upload/pubContent/\_pdf/pub3385\_1.pdf)//DR](http://lw.com/upload/pubContent/_pdf/pub3385_1.pdf%29//DR). H

A related issue arises when examining how such pipelines might come into commercial existence. Unless the government chooses to get involved in the pipeline business, the infrastructure development required for CO2 pipelines will be undertaken by private enterprise. Particularly in the early stages of development in the industry, some pipelines might be dedicated to the use of one customer. As a hypothetical, suppose a power generation company in the Midwest decides to install post-combustion carbon extraction technology at several of its existing coal plants. The generation company, not wanting to get into the pipeline business, then contracts with a company to develop a CO2 pipeline to carry the CO2 to a salt dome facility along the Gulf Coast, with which the power company contracts separately for storage or disposal services. As part of the contractual arrangements and in order to insure adequate pipeline capacity, the generation company requires the pipeline to be sized appropriately and dedicated to its exclusive use, or at least makes any subsequent or additional use subject to capacity availability and possibly its consent. The pipeline company is then a single-customer pipeline, and as such, also may not qualify for common carrier classification under state law, as state laws normally require the carrier to serve the ‘‘public’’ (as has been historically interpreted to be the case when transporting CO2 coincides with EOR). Detached from natural resource development, courts may take a longer look at whether a single-customer pipeline in fact serves a public use. Such a company would have many of the same issues as the ‘‘waste disposal’’ company discussed above, in terms of local permitting jurisdiction and possibly the absence of condemnation authority.

### AT: Warming advantage CP

#### Perm do both

#### Doing both is best – makes consumption increases carbon-neutral, and warming is a linear impact

Mills 11 - \*MSc in Geological Sciences @ Cambridge

Robin, “Capturing Carbon: The New Weapon in the War Against Climate Change,” Google Book

Part of this fallacy is to say that carbon capture (or nuclear, or some other energy option) is not required because the author's favourite plan is already 'enough'. This assumes, firstly, that energy demand is a fixed quantum. In reality, of course, if we had abundant, cheap, green energy, we would find ways to use more—and that is not a bad thing, since it would enhance human welfare. Secondly, such talk gives the impression that 2°C of global tempera-ture rise (or 3°C, or 450 ppm atmospheric (X)2, whatever our climate target is), is a magic number: below it, nothing bad happens; above it, hell is unleashed. In fact, if keeping the temperature rise below 2°C is a good thing, limiting it (at reasonable cost) to less than 1.8°C, or 1.6°C, would be even better (it is only at very low levels of warming that we might argue there is a net global benefit). And there is only a hazy knowledge of how much carbon dioxide will cause 2°C warming (and, indeed, how much carbon dioxide a given plan will really emit over the next half-century)—so every tonne of carbon dioxide saved reduces the risk of rapid, catastrophic climate change. In short, any plan that rules out ab initio some valid options is bound to be sub-optimal.

#### Each fraction of warming is key

Fallows 10 - national correspondent for The Atlantic

James, “Dirty Coal, Clean Future,” The Atlantic, http://www.theatlantic.com/magazine/archive/2010/12/dirty-coal-clean-future/8307/

“The reality of it is that in many cases, there may not be any fixed threshold for ‘irreversible’ change,” Michael Mann told me. “What we have with rising CO2 levels in general is a dramatically increasing probability of serious and deleterious change in our climate.” He went down the list: more frequent, severe, and sustained heat waves, like those that affected Russia and the United States this summer; more frequent and destructive hurricanes and floods; more frequent droughts, like the “thousand-year drought” that has devastated Australian agriculture; and altered patterns of the El Niño phenomenon, which will change rainfall patterns in the Americas. In other cases, he said, there could be important thresholds. For example, the possibility of dramatic rises in ocean levels, which could affect the habitability of New York, London, Shanghai, Miami, the entire Netherlands, and many other modern conurbations, along with coastal areas in India, Bangladesh, and elsewhere. “It would be nice to know where such thresholds are so we can avoid crossing them,” Mann said. “We can’t know that. What we do know for certain is that with each fraction of a degree of warming, the probability of such potentially catastrophic outcomes goes up.”

### AT: Process CP

#### Perm do both – plan *isn’t* immediate because every USFG action requires limited delay

Mack and Endemann 09Latham & Watkins, international law firm (Joel Mack, Buck B. Endemann, October 2, 2009, “Making carbon dioxide sequestration feasible: Toward federal regulation of CO2 sequestration pipelines,” [http://lw.com/upload/pubContent/\_pdf/pub3385\_1.pdf)//DR](http://lw.com/upload/pubContent/_pdf/pub3385_1.pdf%29//DR). H

Under federal law, any ‘‘major federal action’’ requires compliance with the National Environmental Policy Act (‘‘NEPA’’).53 Under NEPA, before any federal agency can approve a project, it must first conduct an environmental assessment and, if necessary, prepare an environmental impact statement (‘‘EIS’’) to determine what the significant effects would be from the project and assess potential mitigation measures.54 This analysis would be documented in the federal agency’s official record of decision, and would then be subject to review in federal court. Although many states have a state version of NEPA (US Department of Energy, 2009),55 many other states do not—including many states in the Midwest and Gulf Coast, which would be charged with siting and regulating new CO2 pipelines.56 Potentially, a pipeline could be routed through states that, if all lacked any form of state NEPA, would result in such a facility being constructed without a comprehensive assessment of its environmental impact. Even though these facilities would be helping to reduce our carbon footprint, the pipelines themselves have the potential for environmental impacts that warrant study and consideration in the permitting process.

### No DAs

#### No disads – Obama recently increased funding for capture and storage of carbon

ENP 6-8

ENP Newswire, “-Energy Department - Obama Administration Announces Clean Coal Research Awards for Universities across the Country,” http://www.power-eng.com/news/2012/06/08/energy-department-obama-administration-announces-clean-coal-research-awards-for-universities-across.html

As part of President Obama's all-of-the-above approach to American energy, the Energy Department announced that nine universities have won awards for research projects that will continue to support innovation and development of clean coal technologies. The awards, which will leverage student-led teams across the country as they continue research and development of new technologies and materials that will advance clean coal energy production, are part of the Administration's focus on ensuring we can rely on a broad range of energy sources as we move towards a clean energy economy. 'Advancing the development of clean coal technologies is an important part of President Obama's strategy to develop every source of American energy and ensure the United States leads the world in the global clean energy race and continues to take advantage of domestic resources here at home,' said U.S. Energy Secretary Steven Chu. 'These university research projects will help build on extensive progressive made by this Administration to promote innovative technologies that help make coal-fired energy cleaner and more cost-competitive, while training the next generation of scientists and engineers in cutting-edge clean coal technologies.' The projects announced today at the nine universities will each receive approximately $ 300,000 to spur the next generation of trained scientists and engineers from universities across the nation to focus on the development of high-temperature, high-pressure corrosion-resistant alloys, protective coatings, and structural materials for advanced coal-fired power plants and gas turbines. Research projects will also develop new processes and computational design methods to develop these materials, improve efficiency and reduce the costs of cleaner power generation systems. The Energy Department's $ 2.7 million investment will be leveraged with additional funds from the universities to support $ 3.1 million in total projects. Today's awards are part of a more than $ 5 billion investment strategy by the Obama Administration in clean coal technologies and R&D. This strategy, which has attracted over $ 10 billion in additional private capital investment, is designed to accelerate commercial deployment of clean coal technologies - particularly carbon capture and storage (CCS) - and to position the United States as a leader in the global clean energy race.

#### Empirically denied by the last 15 years

--doesn’t take out the aff because transportation is key

Miller 10 - PhD, Associate Director, Energy Institute Senior Research Associate Energy Fuels

Bruce, Clean Coal Engineering Technology, p. 568-569

DOE’s Carbon Sequestration Program was launched in 1997 as a small-scale research effort to determine the technical viability of CCS [80]. The Carbon Sequestration Program has grown into a multifaceted research, development, and deployment initiative, with the objective to provide the means by which fossil fuels can continue to be used in a carbon-constrained world. The Carbon Sequestration Program is helping to develop technologies to capture, separate, and store CO2 in order to reduce greenhouse gas emissions without adversely affecting energy use or hindering economic growth [81]. DOE envisions having a portfolio of capture, storage, and mitigation technologies that are safe, cost-effective, and available for commercial deployment in 2020. The U.S. DOE’s primary research and development (R&D) objectives are lowering the cost and energy penalty associated with CO2 capture from large point sources and improving the understanding of factors affecting CO2 storage permanence, capacity, and safety in geologic formations and terrestrial ecosystems [81]. Once these objectives are met, new and existing power plants worldwide will have the potential to be retrofitted with CO2 capture technologies. The Carbon Sequestration Program encompasses three main elements: Core R&D, Infrastructure, and Global Collaborations. These are depicted in Figure 11.28 and culminate in the demonstration and commercialization of CCS including such programs as FutureGen [80, 81].

### Politics Link Turn – Fossil Fuel Lobby

#### Fossil fuel lobby loves the plan

Stephens 6 (Jennie C., Environmental Science and Policy, Department of International Development, Community, and Environment at Clark University, “Growing Interest in Carbon Capture and Storage (CCS) for climate change mitigation”, proquest)//AMV

Interest and investment in CCS has been growing in the fossil-fuel industry, particularly oil and gas companies. During the 1980s and much of the 1990s, many corporate managers, frightened by what climate change could mean to the future of their companies, publicly denied the problem and actively supported research and public campaigns that highlighted uncertainties and weaknesses in the theory of anthropogenic climate change (Levy & Rothenberg, 1999; Kolk & Levy, 2001; Gelbspan, 2004). As the scientific case strengthened during the mid to late 1990s, some firms shifted their strategy away from denial (Kolk & Levy, 2001). This shift was stronger and occurred earlier in European-based multinational companies than it did in United States-based firms (Levy & Newell, 2000; Rowlands, 2000). With this change in corporate strategy, an expansion of interest and investment in R&D of carbon-storage options has occurred. Many companies realized that the possibility of CCS weakened the link between fossil fuels and CO2 driven climate change. The prospect of CCS reduced the threat of climate change mitigation efforts to fossil-fuel industries and made it possible to consider a fossil-based global economy throughout the next century even if controls on CO2 emissions were instituted (Keith & Parson, 2000). **The concept of CCS has**, therefore, **helped the fossil-fuel industries**, as well as nations rich in coal, oil, and natural gas, to **accept and agree to confront climate change** because it allows them to perceive a future that reconciles continued use of fossil fuels in a carbon-constrained world. Oil and gas companies, in particular, have become very interested in geologic carbon storage because they are familiar with the technologies for dealing with underground reservoirs and CO2 injection, a well-established industry technique for enhanced oil recovery (EOR) (Hill, 2005). In mature wells with declining oil production CO2 injection loosens up residual oil for extraction (van Bergen et al. 2003). Oil companies are therefore already knowledgeable about many critical technologies associated with underground carbon storage. Combining EOR with geologic carbon storage provides low-cost early deployment opportunities for gaining experience with CCS (Holtz et al. 2001; Stevens et al. 2001; van Bergen et al. 2003; Metz et al. 2005). The Norwegian national oil company Statoil was the first petroleum producer to inject CO2 underground for storage. The firm has been injecting CO2 into a geologic formation under the North Sea since 1996. Managers were motivated to store rather than emit the CO2 extracted from a natural gas stream by a Norwegian tax on the release of CO2 into the atmosphere (Torp & Brown, 2002). The other currently operating large-scale geologic storage projects are at Weyburn in the Canadian province of Saskatchewan, where CO2 has been injected underground since 2000 for the dual purpose of enhancing oil recovery and storage, and In Salah (Algeria) where the first large-scale injection of CO2 into a gas reservoir began in 2004 (Metz et al. 2005). The In Salah project is a joint venture involving Sonatrach (the national oil company of Algeria), BP, and Statoil. In addition to the In Salah initiative, BP is currently planning, and has begun investing in, at least two other CO2 storage projects—one off the coast of Scotland and another in California**. BP stands out among oil companies through investing heavily in the development and demonstration of geologic CO2 storage**. Interestingly, these BP carbon-storage projects are not economically justifiable in the short term. The company has chosen to fund these initiatives to advance the technology without any direct and immediate economic benefits, but clearly it is aiming to position itself as an industry leader in this area.

### Politics Link Turn – Coal

#### Plan is *extremely* popular with a large group of Senators

Reisinger 9 – JD, Attorney @ Ohio Environmental Council

Will, “RECONCILING KING COAL AND CLIMATE CHANGE: A REGULATORY FRAMEWORK FOR CARBON CAPTURE AND STORAGE,” Vermont Journal of Environmental Law, http://vjel.org/journal/pdf/VJEL10107.pdf

Princeton’s dispassionate assessment leads us to the conclusion that coal will not disappear as an energy source in the immediate future. Coal produces such a large percentage of electricity generation that other sources alone cannot meet the country’s demands in the short term. Coal-burning power plants currently provide half of the electricity produced in the U.S. and are responsible for one-fourth of global carbon emissions. 25 Cleaner, carbon-neutral sources such as wind and solar energy, or the more controversial expansion of nuclear power generation, have the potential to replace most or all coal-generated power in the future. But at present, the U.S. is not able to meet its base load power needs solely with renewable or carbon-neutral options. 26 The nation simply does not have the infrastructure to allow renewable energy sources such as wind and solar to replace fossil-fuel power generation in the near term. The expansion of nuclear generation faces still greater opposition across the political spectrum due to concerns over public health and national security. Coal has strong political support throughout the country as America’s only abundant domestic fossil energy resource. The coal industry is responsible for more than 80,000 jobs nationwide, contributing billions to the economies of coal-producing states. 27 Legislators from these regions will fight vigorously to ensure the continued viability of the coal industry. As Mike Morris, Chief Executive Officer of American Electric Power, has stated, “We have 25 ‘coal states.’ That’s 50 Senators whose states depend on this economy.” 28

#### Coal lobby pushing CCS

Tady 7 - national political reporter

Megan, “Carbon Capture: Miracle Cure for Global Warming, or Deadly Liability?,” Alternet, http://www.alternet.org/environment/68490/?page=4

"We have to figure out a way to sequester the carbon emissions coming from those plants, or we need to close them down," Morris said. "While people are looking to have a moratorium on new coal-fired power plants, and I agree with that, it's the existing ones that one has to deal with in terms of sequestration." But to others, CCS is a bridge that should never be built because of where it could lead. Matt Leonard, a campaigner with the Rainforest Action Network, a group calling for a coal moratorium, said CCS is a public relations scheme to pave the way for new coal-fired power plants. "The coal industry is grasping at straws trying to find some way to convince the public that they have a place in our future energy policy," Leonard said. "And carbon sequestration is their attempt to brand some kind of PR campaign to have clean coal be a possibility."

#### The plan appeases the coal lobby, key to agenda

Manuel Quinones 11/13/2011 – writer for Greenwire and New York Times Energy and Environment section (“Coal Industry Deploys Donations, Lobbying as Its Issues Gain Prominence,” New York Times, <http://www.nytimes.com/gwire/2011/10/13/13greenwire-coal-industry-deploys-donations-lobbying-as-it-45582.html?pagewanted=all>)

With numerous pieces of legislation and administration proposals that could affect electric generation and coal mining, industry has spent handsomely to stay in touch with policymakers. This year mining interests have spent $16.5 million in lobbying and electric utilities $74.8 million, according to the CRP. The NMA reported spending $2.2 million in the first half of 2011, compared to $1.4 million spent in the same period last year, when Democrats still controlled both houses of Congress. Some coal companies also spent more on lobbying. Consol Energy Inc. reported spending at least $1.97 million for the first two quarters of this year, compared to $1.7 million for the same period last year. January through June spending by Peabody Investments Corp., a unit of Peabody Energy Corp., went up from $2.4 million to $2.7 million. Alpha, which recently bought Massey Energy Co., is on track to match or exceed last year's total lobbying expenditures, having spent $373,014 in the first six months of 2011. Alpha said it focused its efforts on appropriations bills or continuing resolutions "that promote or dissuade investments in coal-fired plants or other coal-related infrastructure domestically or overseas" or affect regulatory efforts by U.S. EPA and the Interior Department. The Edison Electric Institute has spent $6.9 million in lobbying so far this year, while AEP has spent $4.75 million. Both numbers are slightly lower compared to the groups' expenditures for the first two quarters of last year. Disclosure documents show Edison lobbying on numerous pieces of legislation, many of them GOP attempts to roll back the Obama administration clean air agenda. AEP said it lobbied for, among numerous proposals, "Clean air legislation generally including draft legislation that hasn't been yet introduced." "I would describe the sector as very active and very concerned," said Segal, who represents energy interests and directs the Electric Reliability Coordinating Council. "There are very fundamental questions raised by EPA regulations that deal directly with prospects for economic recovery for communities served by coal fired plants, reliability of electricity in those communities and the price paid by consumers."

### Politics Link Turn – Coal Industry

#### The coal industry wants the plan – they view it as necessary to overcome negative impacts of regulations

Garten Rothkopf 10

[International Advisory Firm that specializes in energy policy analysis, “Assessing CCS Risk and Liability Issues,” 4/15/10, http://www.gartenrothkopf.com/gr-energy-climate-briefs/assessing-ccs-risk-and-liability-issues.html]//SH

The political debate in Washington this week illustrates the central position the CCS question holds in the negotiations over climate legislation. At a hearing this week on Capitol Hill, where coal mining executives were pressed to support climate legislation,they said that a price for their support of such legislation would be greater federal funding of CCS. The Waxman-Markey American Clean Energy and Security bill that passed the House last year includes $10 billion for CCS research and development plus $50 in bonus allowances for CCS installed before 2025. The bill also would provide deep concessions for coal-using industries, such as utilities, in the form of free carbon emission allowances and a ban on EPA regulation of carbon emissions under the Clean Air Act. The Senate’s version, which could finally be unveiled by Sen. John Kerry (D-MA), Sen. Joe Lieberman (I-CT), and Sen. Lindsey Graham (R-SC) next week, is expected to support fossil fuels even more strongly than the House’s. The coal industry wants KGL to include funding levels for CCS at least equal to those proposed by Waxman-Markey and to maintain the ban on EPA regulations, while shielding the coal sector from federal emissions reduction requirements until CCS technology is fully deployable. Recently, this debate has centered on the Rockefeller-Voinovich language to boost government funding for CCS, which is now being offered as a bargaining chip for KGL. But, that debate shows that the level of continued government support for CCS is contingent on a wide range of factors, particularly how the ongoing negotiations over climate legislation will play out.

#### Industry is pushing the plan

Inside Climate News 10

 [non-profit, non-partisan news organization, "Coal Barons Urge Capitol Hill: No Carbon Regulation Until CCS Is in Place," 4/14/10, http://insideclimatenews.org/news/20100414/coal-barons-urge-capitol-hill-no-carbon-regulation-until-ccs-place?page=2]//SH

The industry wants the money being proposed for CCS and it wants the ban on EPA regulations, but without any federal requirements that limit its greenhouse gas emissions until the technology is fully deployable. “Peabody will support the right kinds of legislation,” Peabody CEO Greg Boyce told the committee. Boyce and Arch Coal CEO Steven Leer both pitched greater government-supported deployment of CCS as a way to reinvigorate the U.S. economy. Leer noted a National Coal Council finding that CCS through 2050 could create 800,000 permanent jobs. But, Boyce said, "More funding is needed to bring this technology to commercial scale.”

#### Coal industry is key to the agenda

Coal industry has a lot of political influence – large capital investment

Silverstein 12

 [Kevin, editor-in-chief for Energy Central, “Will Congress Save Coal after EPA Carbon Ruling?,” 4/2/12, <http://www.forbes.com/sites/kensilverstein/2012/04/02/will-congress-save-coal-after-epa-carbon-ruling/>]//SH

<http://www.forbes.com/sites/kensilverstein/2012/04/02/will-congress-save-coal-after-epa-carbon-ruling/>

The coal sector has always been a political heavyweight. The industry, of course, has been the principle supplier for electric utilities. It’s been cheap, reliable — and, in fact, has developed this country into a global powerhouse. Times are different. New technologies can make it cleaner. The question before coal-fired utilities is whether to gear up or shut ‘em down — a dilemma made less problematic because of cheap natural prices. That does not mean that coal has gone down without a fight. Indeed, the industry has spent about $15 million to $18 million lobbying Congress in each of the last three years, says the [Center for Responsive](http://www.opensecrets.org/lobby/induscode.php?id=E1210&year=2009" \o "responsive politics" \t "_blank) [Politics](http://www.forbes.com/politics/). Three-quarters of that went to Republicans who think EPA is a job-killer while the balance went to friendly Democrats in coal-producing states. But even the strongest allies of the coal sector realize that free market forces are even more compelling.

### Politics Link Turn – Powerful Groups

#### The plan would be pushed by powerful constituents

Greenglass et al 07 Nicholas Institute for Environmental Policy Solutions, Center on Global Change Duke University (Nora Greenglass, Eric Williams, Rebecca Royals, March 8, 2007, “Carbon Capture, Pipeline and Storage: A Viable Option for North Carolina Utilities?,” [http://www.nicholas.duke.edu/cgc/news/carboncapture.pdf)//DR](http://www.nicholas.duke.edu/cgc/news/carboncapture.pdf%29//DR). H

Viewed through a political lens, IGCC holds great promise. The United States will use the reserves of its most abundant fuel resource – coal – to decrease its dependence on foreign sources of energy. IGCC is a technology that can command the political support of stakeholders seeking to protect the environment and those seeking to protect the environment and those seeking to secure an economic future for coal – a powerful political combination.

### Politics Link Turn – Bipartisan

#### Bipartisan consensus to save coal

CDP 6/12 (Congressional Documents and Publications ,“Bipartisan Support Growing For Effort to Stop Obama War on Coal,” Inhofe Exposes Environmental Playbook, June 12, Proquest, ADP)

Washington, D.C. - Senator James Inhofe (R-OK), Ranking Member of the Senate Committee on Environment and Public Works, spoke on the Senate floor today about the growing bipartisan momentum to stop the Obama-Environmental Protection Agency's (EPA) war on coal. Senator Inhofe welcomed the strong support of groups representing business and labor, as well as a growing number of elected officials working across the aisle to save coal. In fact, the momentum for Senator Inhofe's efforts has grown so much that Senators Lamar Alexander (TN) and Mark Pryor (AR) found it necessary to introduce a cover bill for those Senators who need to appear to be reining in the EPA for their constituents back home, but in reality are allowing President Obama to continue to kill coal. Senators Alexander and Pryor are expected to introduce their cover bill as soon as tomorrow, but it is unlikely that it would pass. While Senator Inhofe's resolution would require a simple majority of the members present, the cover bill by Senators Alexander and Pryor would require 60 votes to pass.

#### Stimulus spending proves the direction of the link turn

Folger 09 Specialist in Energy and Natural Resources Policy (Peter, June 19, 2009, “Carbon Capture and Sequestration (CCS),” Congressional Research Service, [http://www.fas.org/sgp/crs/misc/RL33801.pdf)//DR](http://www.fas.org/sgp/crs/misc/RL33801.pdf%29//DR). H

Congressional interest has grown in CCS as part of legislative strategies to address climate change. On February 13, 2009, Congress passed the American Recovery and Reinvestment Act of 2009 (ARRA, P.L. 111-5), which included $3.4 billion for projects and programs related to CCS. Of that amount, $1.52 billion would be made available for a competitive solicitation for industrial carbon capture and energy efficiency improvement projects, $1 billion for the renewal of FutureGen, and $800 million for U.S. Department of Energy Clean Coal Power Initiative Round III solicitations, which specifically target coal-based systems that capture and sequester, or reuse, CO2 emissions. The $3.4 billion contained in ARRA greatly exceeds the federal government’s cumulative outlays for CCS research and development since 1997.

### Politics Link Turn – Reverse Causal

#### Voting negative is political suicide

The Economist, 9 (“Trouble in Store”, The Economist, March 5, 2009, http://www.economist.com/node/13226661)//JK

CCS particularly appeals to politicians reluctant to limit the use of coal. Coal is the dirtiest of fossil fuels, and burning it releases roughly twice as much carbon dioxide as burning natural gas. The world will struggle to cut greenhouse-gas emissions dramatically if it continues to burn coal as it does today. Yet burning coal is one of the cheapest ways to generate power. In America, Australia, China, Germany and India coal provides half or more of the power supply and lots of jobs (see chart). Rejecting cheap, indigenous fuel for job cuts and international energy markets is seen, naturally enough, as political suicide. CCS offers a way out of this impasse.

#### Inaction continues the “war on coal” narrative – costs PC

Kemp 12 (John, March 28, “COLUMN-EPA emission regulations shut door on coal: John Kemp”, <http://www.reuters.com/article/2012/03/28/column-epa-coal-fired-power-idUSL6E8ES90R20120328>)

CONGRESSIONAL REACTION EPA's decision to tilt the market against coal is sure to draw a furious reaction from miners, coal state senators and congressional Republicans, who are already incensed by the EPA's tendency to push through rules requiring substantial economic shifts as part of its regulatory process. Rather than trying to build bridges with a restive Congress, EPA appears intent on raising the stakes in the poker game. In this instance, EPA is picking a fight with coal-state Democrats. But the administration is already embroiled in a fight with oil-state and conservative Democrats as well as congressional Republicans over routing for the Keystone XL pipeline. The agency's aggressive push to control emissions through the regulatory process, despite the demise of cap and trade, is multiplying its congressional enemies and inviting a backlash from angry legislators.

### Politics Link Turn - Shimkus

#### Shimkus supports the plan

Bloomberg 11

[News Site, business and financial market news, “Solyndra Critics Sought US Aid for Coal,” 10/31/11, http://www.bloomberg.com/news/2011-10-31/solyndra-critics-sought-u-s-aid-for-coal.html]//SH

The technology backed by Shimkus, known as carbon sequestration, sends emissions from coal plants through pipelines for underground storage in geologic formations. A task force established by Obama said in an August 2010 report that the high cost of such carbon capture remained a barrier to its widespread deployment. The lack of climate-change legislation to cap carbon-dioxide emissions means “there is no stable framework for investment,” the report found.

#### He’s key to the agenda – experience and clout

Townsquare Media 12

[News Organization, 5/8/12, http://hosted.ap.org/dynamic/external/pre-election/bios/1285.html?SITE=WKXWFMELN&SECTION=PREELECTION&TEMPLATE=DEFAULT]//SH

Shimkus has focused on energy issues during his time in Congress, becoming a leading conservative voice on global warming, drilling policy and alternative fuels. He supports lifting the ban on offshore drilling, allowing oil exploration in the Arctic National Wildlife Refuge, building the Keystone XL pipeline between Canada and the U.S. and developing oil shale in the Rocky Mountains. Shimkus supported legislation in 2011 that gives the states the power to regulate coal ash from power plants as if it were municipal garbage, pre-empting pending federal regulations from the Environmental Protection Agency that could be much tougher. "The results of EPA's regulations would have been devastating on the effects of jobs, higher utility rates at home, and cripple a very successful emerging biproducts industry," he said at the time. Long an opponent of those who believe in global warming, Shimkus protested the Environmental Protection Agency's 2009 classification of carbon dioxide and other greenhouse gases as air pollutants, asking, "Does EPA propose we stop breathing?" Shimkus has also questioned the need for action on global warming on the grounds that the Bible says God promised Noah the earth would not be destroyed by a second flood. He worked successfully to qualify the soybean-based diesel fuel blend B-20 for an alternative fuels program, and he voted with the House majority to approve a plan to store the nation's nuclear waste at one place, Nevada's Yucca Mountain. He also opposed including parts of the Illinois River in the American Heritage Rivers program, leading the program to reject the entire river. When he was elected in 1996, Shimkus promised to serve only six terms. But when the time came for him to step aside, he decided to run again. He was elected to his eighth term in 2010. Shimkus joined five of his Illinois GOP colleagues in spring 2010 in asking the Illinois attorney general to file a lawsuit to block implementation of the federal health care reform bill, saying it is unconstitutional and that the state cannot afford expanded Medicaid payments. Attorney General Lisa Madigan declined. Shimkus was head of the board that oversees the congressional page program on Capitol Hill when a scandal unfolded in 2006 involving then-Rep. Mark Foley, who sent sexually suggestive e-mails to young men involved in the program. The House Ethics Committee said it found no evidence members of Congress other than Foley had violated rules. But the committee noted that Shimkus had told another page program board member that he withheld information about Foley's messages out of fear that "it would be blown out of proportion." Foley resigned in September 2006. Shimkus has worked to oppose abortion and to limit minors' access to inappropriate material on the Internet. His opposition to so-called partial-birth abortions has helped him solidify support and given him increased clout to fight for other issues.

### 1ar Shimkus

#### Shimkus key to energy agenda – previous legislation proves

Lambretch 11

[Bill, National affairs correspondents and Washington bureau chief of the St. Louis Post-Dispatch, “Rep. Shimkus opens drive to require autos running on nonpetroleum fuels,” 6/2/11, http://www.stltoday.com/news/local/govt-and-politics/political-fix/article\_b4385f2a-8d5b-11e0-8adc-001a4bcf6878.html]//SH

As chairman of an Energy subcommittee in the new GOP-held House, Rep. John Shimkus has the clout to assist the ethanol industry and to promote new technologies. New legislation that he announced today would do just that, imposing a government mandate requiring that 50 percent of new cars be capable of operating on nonpetroleum fuels by 2014. In 2016, 80 percent of new autos would be required to run on fuels other than those petroleum-based and in 2017, that percentage would rise to 95 percent. "Imagine a world in which you no longer drive up to a gas station, you drive up to a refilling station," Shimkus said at a news conference this afternoon on the U.S. Capitol lawn. Shimkus's legislation would mean that a fast-increasing percentage of new autos would be warranted by automakers to operate on ethanol, natural gas, hydrogen, biodiesel, plug-in-electric drive and perhaps other technologies.

### Politics Link Turn – Industries

#### Auto and mining industries support CCS

Montague 12

[Peter, historian and journalist, 2/15/12, “A Plan to Save Us from Global Warming Industry’s Colossal Experiment With the Future of Civilization at Stake,” http://www.alternet.org/story/154106/a\_plan\_to\_save\_us\_from\_global\_warming\_industry's\_colossal\_experiment\_with\_the\_future\_of\_civilization\_at\_stake?page=2]//SH

Of course the fossil corporations don't want efficiency -- they want to sell product. They favor creative ways to mine and burn oil, gas and coal, burying the hazardous waste CO2 below ground. In supporting CCS the fossil corporations are joined by major fossil users -- car companies, electric utilities, the mining and mining-services industries, and the railroads. Together they form a potent political force with essentially limitless funds with which to buy elections. So, yes, Barack Obama favors offshore oil, coal, fracking, and CCS. So long as we allow big money to influence our democratic institutions (legislatures, courts, and elections) any president will have to fall in line.

#### Mining industry has a lot of political power

Eggen 10

 [Washington post staff writer, “Mining interests are heavily invested in Capitol Hill,” 4/8/10, http://www.washingtonpost.com/wp-dyn/content/article/2010/04/07/AR2010040704707.html]//SH

The mining industry, which finds itself under renewed scrutiny this week after dozens of fatalities at a West Virginia coal mine, wields major political clout in Washington thanks to hefty campaign contributions to GOP lawmakers and expensive lobbying efforts aimed at blunting the impact of environment- and safety-related legislation. Mining companies and related trade groups have sharply increased their lobbying efforts in recent years, tripling their spending from $10.2 million in 2004 to nearly $31 million in 2008, according to a review of lobbying disclosures by the Center for Responsive Politics (CRP), a watchdog group. The investment in Washington dropped only slightly last year, to $26 million, as mining and energy companies worked to defeat cap-and-trade legislation. The legislation passed the House but stalled in the Senate, in large part because of strong opposition by senators in top coal-producing states. Leading spenders included Peabody Energy ($5.8 million), Consol Energy ($3.4 million), Arch Coal ($2 million) and the National Mining Association, the industry's main trade group, which spent $2.8 million on lobbying, records show. Mining firms and their employees have also donated more than $13 million to federal lawmakers since 2005; 74 percent of that money went to GOP candidates and about half came from industry political action committees. The United Mine Workers of America, by contrast, donated less than $1 million to federal candidates during the same time period, according to CRP data. All but 1 percent of that went to Democrats.

#### Auto Industry has a lot of political influence – More PAC’s are being formed

Rogers 12

 [Christina, writer for Automobile News, “Alliance aims to boost election-year clout with PAC,” 3/17/12, http://www.autonews.com/article/20120317/BLOG06/120319902]//SH

The Alliance of Automobile Manufacturers is bulking up on political muscle just in time for the 2012 general election. The trade group, which represents 12 automakers including the Detroit 3, Volkswagen and Toyota, is setting up a political action committee, spokeswoman Gloria Bergquist said. The alliance's board voted this week to establish the PAC, which will collect donations from staff members and employees of member automakers and distribute the money to political campaigns. Contributions to the PAC are limited to $5,000 per person. Next, the alliance must file the appropriate paperwork, which can take as long as a month, Bergquist said. The alliance hopes to have the PAC finalized by May. The alliance already plays a big role in influencing auto industry-related policy decisions in Washington. But Bergquist said the PAC will amplify the group's political voice. Many other transportation-related groups have PACs, she said. Alliance CEO Mitch Bainwol, formerly of head of the Recording Industry Association of America, suggested the group have its own PAC and the board agreed, Bergquist said. "PACs are another way of participating in the democratic process," she said. Bergquist said the PAC will be up and running before the election in November, but as of now, the group hasn't discussed which candidates -- presidential or otherwise -- it plans to support. Other auto industry groups, such as the National Automobile Dealers Association, aren't afraid to wield political clout through PACs. In the 2012 election cycle, NADA's PAC has doled out close to $1 million to federal candidates, according to the Center for Responsive Politics, a watchdog nonprofit that tracks campaign contributions. Of that money, about 72 percent went to Republicans, the nonprofit's Web site, opensecrets.org, reported. General Motors and Ford Motor Co. also have PACs and are considered "heavy hitters" by the Center for Responsive Politics, meaning they're among the 140 biggest donors overall to federal election campaigns. NADA, which represents 16,000 new-car and truck dealers, also carries the "heavy hitter" distinction, according to opensecrets.org. Needless to say, a lot of auto industry money is being funneled into Washington. What's a little bit more?

#### Railroads support the plan

AAR 12

 [Association of American Railroads, “Railroads and Coal,” June 2012, http://www.aar.org/~/media/aar/Background-Papers/Railroads-and-Coal.ashx]//SH

In addition to reasonable EPA regulations, railroads support the development of advanced carbon capture and storage as well as other clean coal technologies. As Secretary of Energy Steven Chu has said, “Charting a path toward clean coal is essential to achieving our goals of providing clean energy, creating American jobs, and reducing greenhouse gas emissions. It will also help position the United States as a leader in the global clean energy race.” By developing and implementing cost-effective clean coal technologies, America would continue to produce affordable electricity from its abundant domestic coal; energy independence would be promoted; and the environment would be protected. It represents a win-win-win situation for all parties involved.

#### Railroads influence agenda – regulation legislation proves

McClatchy 11

 [leading news source (3rd biggest in the US), " How railroads came back from the brink and got ahead," 10/31/11, http://www.mcclatchydc.com/2011/10/31/128794/how-railroads-came-back-from-the.html]//SH

Bob Szabo, a Washington lobbyist, has been pushing lawmakers to introduce more competition in rail service for the so-called "captive" shippers who have no alternatives to rail service, and sometimes no other railroad. He also wants to see Congress repeal the antitrust exemptions that apply to railroads. "Monopolies work," said Szabo, who's executive director of Consumers United for Rail Equity in Washington, a coalition of freight rail customers working on the legislation. "We don't call competition re-regulation, but they seem to." Szabo said that railroads charge his clients exorbitant rates just because they can. Szabo has found a sympathetic ear among some Senate Democrats, but proposals to crack down on the railroad industry haven't gotten much traction. "They feel like they have the political power to stop any changes from being made," Szabo said of rail companies. "Don't cry any tears for them. They're doing quite well."

### AT: Politics Link Turns Case

#### Politics link doesn’t turn case – eminent domain solves

Horne 10 – JD @ U of Utah

Jennifer, “Getting from Here to There: Devising an Optimal Regulatory Model for CO<2> Transport in a New Carbon Capture and Sequestration Industry,” 30 J. Land Resources & Envtl. L. 357, Lexis

While it will bring important benefits, federal eminent domain authority is unlikely to be a panacea for CCS pipeline siting. Public opposition can hinder the progress of a pipeline project even under a single, federal regime. For example, natural gas pipelines have eminent domain authority under the Natural Gas Act. 152 Despite this, the Millennium Pipeline project, originally proposed in 1997, and built to transport natural gas from Canada to New York, was stalled for nine years 153 due in great part to community opposition to the pipeline route. 154 Public input is an important part of the process for siting of any pipeline, and some delays [\*379] that result from it are a necessary cost in a democratic society. On balance, however, the public opposition issue has not prevented significant new pipeline construction. In 2007, more than fifty natural gas pipeline projects totaling roughly 1,700 miles of pipeline were completed. 155 Federal eminent domain authority certainly will not remove all hindrances to new CCS pipeline construction, but what it will do for interstate pipeline siting will be very useful.

### Elections Link Turn – Action on Climate Key

#### Climate action key to Obama

O’Konski 6-13

“Campaign 2012: Climate Change and Energy,” Climate Science Watch, http://www.climatesciencewatch.org/2012/06/13/campaign-2012-climate-change-and-energy/

On this point I note an interesting recent post at Daily Kos. The article addresses climate change as a weapon for the upcoming election: “The public already is awake to the realities of climate change, and the Republicans deny and lie about those realities. By elevating the profile of climate change as a political issue, the Democrats can devastate the Republicans politically. And by politically devastating the greatest enemies of responsible action on climate change, the Democrats can thus make it not only politically possible but politically imminent for responsible action on climate change to happen.” The Daily Kos post suggests that we “elevate the profile of climate change as a political issue.” Yet Obama has thus far avoided talking about climate change because he clearly doesn’t see it as a vote-winning opportunity – the criterion that now appears to be driving everything he does. The Obama re-election campign website doesn’t even mention climate change on its “The President’s Record on Energy and the Environment” page. Even the thus-far successful grassroots effort to delay the approval of the Keystone XL tar sands pipeline is used as a GOP weapon against the President, without a significant response from the White House beyond Obama's 'all of the above' energy stance. It is true that the opposition to progressive climate policy, which has adherents in both parties, has thrown up obstacle after obstacle to effective policy action. But a large part of why so little has been accomplished is that Obama and the Democrats have failed to articulate communication on climate change in such a way as to make it a political winner. Unless a combination of pressure from the climate movement and high-level leadership can change that, climate change will not be a significant issue in this year’s election – or maybe even the next.

### Elections Link Turn – Ohio

#### Price volatility tanks Obama in Ohio – key swing state

Peek 6-11 – Columnist @ Fiscal Times

Liz, “Obama’s riskiest jobs-killer,” http://www.nypost.com/p/news/opinion/opedcolumnists/obama\_riskiest\_jobs\_killer\_jcCc1GTNgDfeOPAx4oJlVN

The lost capacity will be replaced mainly by cheaper natural-gas plants, but the shift will require costly improvements to transmission facilities, expected to run more than a billion dollars in Ohio alone. Projected electric-rate hikes alarmed Ohio small businesses, which protested to the state’s Public Utility Commission. Those concerns seem justified, based on the results of a recent auction conducted by regional-grid manager PJM, which annually contracts for excess capacity three years out. Thanks to the plant closings, the auction prices in northern Ohio soared to $357 per megawatt, versus $136 per megawatt in PJM’s total area. These auction quotes don’t translate directly into retail prices, but they foretell the direction. Nor was the November rule the EPA’s only assault on coal. The agency also recently imposed carbon-dioxide emission standards that could effectively prohibit any new coal-plant construction. That ruling almost guarantees the nation will continue to shift electricity production from coal to natural gas. The current low price of gas is already tilting demand. In the first quarter, only 36 percent of our electricity production came from coal, down from 45 percent last year, with gas taking up most of the slack. This determination to kill coal is short-sighted. There’s no guarantee that natural-gas prices will stay at today’s 10-year low. The shale boom has pushed them down, but soaring demand could eventually push prices higher. The appetite for natural gas as a transportation fuel for large truck fleets or for export, for example, is just getting rolling. And (surprise!), now that natural gas is cheap, the same environmental groups behind the “war on coal” are now suddenly finding all sorts of (scientifically dubious) reasons to block natural-gas production. America has a 250-year reserve of inexpensive coal — in energy terms, roughly the equivalent of the Saudis’ oil reserves. With the nation seeking to reassert itself as a manufacturing powerhouse, why deny access to cheap power? The assault on coal is also risky for Obama. Ohio is a must-win for the president. State GOP chairman Bob Bennett notes that, for Vice President Joe Biden’s recent visit to the state, angry miners turned out spontaneously to protest the White House’s anti-coal policies — and “The GOP had nothing to do with that.” With the EPA’s rulings likely to cost the state jobs and hike electric bills, he says, “Obama gives people more reasons to vote for [Mitt] Romney every day.”

### Elections Link Turn – Appalachia

#### Turn – Obama can renew enthusiasm in Appalachian swing states by taking a pro-coal strategy

Power Engineering 5/22/2012 – contributions from Daris Dixon and Capitol News Company (GOP looks to bury Obama on coal, Power Engineering, <http://www.power-eng.com/news/2012/05/22/gop-looks-to-bury-obama-on-coal.html>, EA)

Anger over coal helped an imprisoned felon defeat President Barack Obama this month in several West Virginia counties. Now Republicans hope Mitt Romney can squeeze an electoral diamond out of coal country in battleground states such as Ohio, Virginia and Pennsylvania. The GOP has stoked the fires by accusing Obama's Environmental Protection Agency of making it more difficult to mine or burn coal, and Republicans made hay when a "clean coal" section quietly turned up on the president's campaign website after the West Virginia drubbing. During Vice President Joe Biden's visit to Ohio last week, Republicans made sure coal turned up seemingly everywhere in protests, GOP email blasts, Web videos and even a chance restaurant encounter with a Romney campaign flack. This isn't a new playbook for Republicans: A similar strategy in 2010 torpedoed more than two dozen Hill lawmakers who had voted for the cap-and-trade climate bill, helping flip control of the House to the GOP. And coal country stretches across states that are crucial to Obama's hopes for reelection. One of the fallen Democrats from 2010, former 14-term Virginia Rep. Rick Boucher, said the president's campaign team has reason to worry about how coal-minded voters will react. "I think it is a perilous issue politically," Boucher said, adding that Obama needs to present a "positive" response to concerns about lost mining jobs and rising energy costs resulting from EPA's actions. "There is real concern in our coal-producing communities. The concern is well founded." Boucher said Obama is no enemy of coal and, in fact, championed policies that would have helped fund a new generation of carbon-capturing "clean coal" power plants. Boucher played a big role in spreading a similar message to voters in 2008. The Obama camp also delights in pointing out Romney's own vulnerabilities on the issue - for example, a 2003 speech in which he said an aging coal-burning plant in Massachusetts "kills people." But the GOP is doing all it can to make the "war on coal" message stick against Obama. "This is a president and an administration that has shown disdain towards coal and coal jobs," said Romney spokesman Ryan Williams. He cited a 2007 television appearance in which Biden - at the time, a rival to Obama in the primaries - called coal-driven air pollution a deadlier danger to average Americans than terrorism. Williams ran into Biden in an Italian restaurant in Steubenville, Ohio, last week and seized on the occasion to quiz the veep about the administration's coal policies. The media complained that Biden's staff had moved journalists away from the rope line at one stop after a Columbus Dispatch reporter tried to ask him about coal. Coal was a major theme in Republican National Committee video and email blasts that greeted the vice president's Ohio visit, reviving footage of a much-debated 2008 exchange in which Biden said, "No coal plants here in America."

#### Nullifying the effect of EPA regulations removes a vital GoP argument

Andrew Restuccia 5/20/2012 – staff writer at the hill (“House Republicans, Romney take aim at Obama’s stance on coal industry,” The Hill, <http://thehill.com/blogs/e2-wire/e2-wire/228455-gop-takes-aim-at-obamas-stance-on-coal>, EA)

Republicans have declared war on what they call President Obama’s “war on coal.” House Natural Resources Committee Republicans on Friday escalated their year-long investigation into the Obama administration’s planned rewrite of coal-mining regulations imposed by President George W. Bush. Committee Chairman Doc Hastings (R-Wash.) released internal Interior Department documents that he said showed the toll the planned regulations will take on the economy. “Thousands of jobs, American energy production and the economic livelihoods of communities across the country will be impact by this regulation,” Hastings said Friday during a press conference in the Capitol. “The stakes are extremely high.” The committee investigation is just one example of a broader Republican campaign to paint Obama as the enemy of the coal industry – a push that Democrats say is intended to score political points going into the election. The Republican National Committee organized a conference call this week to counter Vice President Biden’s trip to coal country in Ohio. While Biden touted Obama’s help for a resurgent U.S. auto industry, Republicans on the call labeled the White House energy policy “an assault on coal.” Republicans have zeroed in on proposed Environmental Protection Agency regulations, unveiled late last month, to limit greenhouse gas emissions from new power plants. The regulations, they say, deal a death knell to the coal industry because coal-fired power plants can only comply with the rules if they install technology that is not yet available on a commercial scale. But many plans for new coal plants had been scuttled even before the rules were proposed because of competition from inexpensive natural gas.

#### The plan ends the perception of Obama’s war on coal

International Business Times 5/22

 [online global business newspaper, “Coal Issue Catches Fire In Presidential Campaign,” 5/22/12, http://votesmart.org/public-statement/696018/international-business-times-coal-issue-catches-fire]//SH

The Obama administration is increasingly under fire for its policy on coal. At a conference hosted by the Eastern Coal Council on Monday in Kingsport, Tenn., speakers said President Barack Obama's Environmental Protection Agency is "at war with the coal industry." Energy will likely become one of the main topics of the presidential election, and the president's stance on coal could very well cost him votes in key coal mining areas like Pennsylvania, Kentucky, West Virginia, Virginia and Ohio. The coal industry especially reviles the allegedly burdensome regulations that it says are hurting its growth. "For years, President Obama and the EPA have actively engaged in a war on coal," said Rep. Morgan Griffith, a Republican from Virginia, a state with a long history of coal mining. Griffith was speaking at the conference, hosted by an industry group. Griffith's comments came as PJM Interconnection, a Pennsylvania-based power grid operator, locked in higher utility rates on Monday -- because, Griffith said, of added regulations from the federal government. Bill Kovacs, senior vice president of the U.S. Chamber of Commerce, a pro-industry lobbying group, told the Kingsport Times-News the EPA has 154,538 pages of regulations on the coal industry, and since March 2010, 350 coal energy projects have not been able to get EPA permits. Those regulations impeded the creation of 1.9 million jobs with a total economic impact of $570 billion, the Times-News said. The complaints are part of Republican attacks on the Obama administration's so-called "all of the above" energy plan, which emphasizes "clean" and renewable energy sources to satisfy the nation's demand for energy. It is a policy that front-runner Republican candidate Mit Romney and oil industry groups say does not go far enough to meet the country's immediate demand for energy. Obama has been repeatedly criticized on his stance on the Keystone XL pipeline, and energy in gerneral, and coal groups are joining in. On the campaign trail in 2008, Obama was a supporter of the technology known as "clean coal," but since then, the president's attention to coal has waned, said critics. The American Coalition for Clean Coal Electricity released attack ads this week against the EPA. "America has centuries of a coal - a proven energy source - yet the EPA has spent the past three years enacting heavy-handed regulations that are attacking the coal industry, destroying jobs and increasing the cost of electricity for millions of American families and businesses," said Evan Tracey, a spokesman for the coal group. The EPA has indeed enacted tougher regulations on coal-fired power plants, especially with respect to their emission standards, but most have been adopted pursuant to court orders, reported Politico. The coal industry in general is facing tougher times. With a booming natural gas sector and falling prices for natural gas, power companies find it cheaper to build natural gas-powered plants, or convert coal-fired plants to gas. Environmental groups have also been effective in attacking the coal industry's environmental record. As a result, coal is losing market share. The U.S. Energy Information Administration reported coal-powered electricity is expected to decline by roughly 15 percent in 2012 while natural gas electric generation will increase by 24 percent.

#### Jump-starting the coal industry is key to Obama victory

Investor’s Business Daily 5/23

[national newspaper in the United States , “Obama’s War on Coal Affects Election,” 5/23/12, http://news.investors.com/article/612511/201205231905/obamas-war-on-coal-affects-election.htm]

Energy: As coal use drops, job losses rise and electricity prices skyrocket, an electoral map of the 16 top coal-mining states does not bode well for an administration whose energy policy consists of algae and exploding electric cars. Earlier this year, Houston-based GenOn Energy Inc. announced plans to close five of its older coal-fired power plants in Pennsylvania over the next four years, saying that tough new environmental rules make it unprofitable to operate the plants, which generate a total of 3,140 megawatts of electricity. The plants are in Portland, Shawville, Titus, New Castle and Elrama. Two plants in Ohio and one in New Jersey will also be closed. Based on current polls, Ohio is once again a battleground state and even Pennsylvania, full of bitter people clinging to their Bibles and guns, may also be in play. Rising energy prices and lack of jobs will play heavily on the administration's fortunes in November, both affected by the administration's war on fossil fuels, particularly coal, being waged via regulations by what has become the fourth branch of government — the Environmental Protection Agency. The good folks at RedState.com have put together a map showing the top 16 coal-producing states and their place on the electoral stage. Together they contain 182 electoral votes. Of the top coal-producers Obama carried Colorado, New Mexico, Illinois, Indiana, Ohio, Pennsylvania and Virginia. Illinois and possibly New Mexico are likely to remain in the Obama camp. The rest are arguably already gone, like Indiana, or seriously in play, comprising some 71 electoral votes. The political landscape in these states has already begun to change due to failure of Obama's economic and energy policies. Since Obama took office the state governments and legislatures of Ohio, Pennsylvania and Virginia have all been taken over by Republicans. And Republicans captured the House of Representatives in Colorado and the governorship in New Mexico.

### Elections Link Turn – Ohio and Virginia

#### Plan appeases key swing states – Ohio, Pennsylvania, Virginia

Feldmann 6/21

 [Linda, Staff writer for the Christian Science Monitor, “Four gambits Obama could try to boost election prospects,” 6/21/12, http://www.csmonitor.com/USA/Elections/2012/0621/Four-gambits-Obama-could-try-to-boost-election-prospects/Ease-up-on-coal-regulations]//SH

Easing up Environmental Protection Agency regulation of coal-fired power plants would not be as grabby a maneuver as approving the Keystone XL pipeline or embracing the Simpson-Bowles deficit reduction plan. But if Obama were to make moves to ease new regulations on coal-fired plants, it could curry favor in parts of key battleground states – Ohio, Pennsylvania, and Virginia. Advocates of reduced regulation argue that new federal mandates governing emissions from coal- and oil-fired plants will hurt the US economy as they cause energy prices to rise. Last December, the EPA unveiled standards to limit mercury and other toxic emissions from the power plants. Supporters of the regulations say that the health benefits reduced air pollution. Opponents say that the rules could force the closure of some plants and threaten the reliability of the nation’s power grid. On June 20, a Republican-led effort in the Senate failed to gather enough votes to scuttle the new regulations. Obama has touted the new rules, while promising flexibility to protect industry. But if Obama wanted to ease some of the opposition he faces in coal country, he could take steps to dial back the regulations. That would likely be seen as a desperation move, after billing himself as the “green president.” But if it spells the difference between victory and defeat in Ohio and Virginia, it might be tempting.

#### Ohio key to Obama's reelection

Balz 6/20

 [Writer for the Washington Post, "Ohio again at center of presidential election," 6/20/12, From the Journal Gazette, http://www.journalgazette.net/article/20120620/NEWS11/306209959/1044/LOCAL08]//SH

Mitt Romney’s campaign bus neared the end of a five-day tour of six potential battleground states Tuesday. Most could be competitive in November, but none looms larger on the Electoral College chessboard than the place where he stumped on Sunday: Ohio. Barack Obama won all of the states on Romney’s itinerary in 2008. One, Wisconsin, hasn’t gone Republican since 1984. Two others, Michigan and Pennsylvania, have been in the Democrats’ column for five consecutive elections. Two others, Iowa and New Hampshire, have gone back and forth over the past 10 years. But of the six, Ohio remains the bellwether. It has been at the center of presidential politics in the past three elections and is once again destined to play a pivotal role this year. If Obama can win Ohio, then he almost certainly will be re-elected. No Republican has won the White House without Ohio. If Romney is hoping to convert some of the other, bluer battlegrounds, his progress in Ohio could be an indicator of how things could break elsewhere in the industrial heartland. Romney’s bus tour is a way to test the viability of some of these more difficult states. A few months ago, Michigan appeared to be leaning strongly toward Obama. That was in the middle of the Republican nomination contest, when Romney scrambled to win the primary in Michigan, his home state, against a surging but ultimately sagging Rick Santorum. Wisconsin also looked challenging as Romney sought, successfully, to finish off Santorum in a presidential primary that was overshadowed by a roiling recall campaign against Republican Gov. Scott Walker that deeply divided the state. At the time, some Democrats thought Wisconsin would be secure for President Obama no matter the outcome of the recall effort. Democrats’ confidence was based on the fact that Obama carried Michigan and Wisconsin by double-digits four years ago. Recent polls show both states a lot tighter than that, although by how much isn’t quite clear. Among the other states on Romney’s tour this week, Iowa is a true battleground. It was the state that launched Obama toward the presidency in early 2008, but Democrats acknowledge that the pounding he took during the Republican nomination battle has left him weakened. Symbolically, Iowa will be hugely important to the president, but it’s clear that he’ll have to fight to hold on to the state. If Obama hopes to get a boost from Iowa’s proximity to his home state of Illinois, Romney hopes that his tenure as governor of Massachusetts will make him truly competitive in New Hampshire. That’s where he began his bus tour on Friday, at the same picturesque farm where he formally started his campaign a year ago. Of the six states on Romney’s tour, Pennsylvania remains the most difficult for him. Republicans had a good year there in 2010, and GOP strategists think Romney can do better than some past nominees in the Philadelphia suburbs. He has yet to prove that. That brings the focus back to Ohio, a state whose 18 electoral votes are a crucial part of the calculus for both campaigns. Obama’s strategy always has been to avoid being trapped in a campaign whose outcome depends on Ohio and Florida. He has other routes to victory, but Florida looks more challenging for him this year. Investing more in Ohio and less in Florida could make sense, although the president’s campaign is likely to spend heavily in both. Ohio aligns closely to the nation in presidential races, with a slight tilt to the Republicans. In the past three elections, the Democratic nominees have been about two percentage points short of their national percentage twice (2000 and 2008) and less than one point above once (2004). Ohio also offers a laboratory for a debate that will play out this week in several other states on Romney’s tour, and that is how voters should assess the economy. Ohio, Wisconsin and Michigan are seeing signs of economic improvement. Ohio’s geography, located in the center of a group of potential battlegrounds, and its history through recent campaigns, gives it once again the special prominence it has had before.

#### Virginia’s key to elections

Los Angeles Times 5/7

 [Newspaper, “Ohio, Virginia key in 2012 electoral battleground map,” 5/7/12, [http://articles.latimes.com/2012/may/07/news/la-pn-obama-ohio-virginia-battleground-map-20120507]

It is of course no coincidence that President Obama's first two campaign rallies were in Ohio and Virginia this past weekend. In Ohio, you have the quadrennial bellwether, one of the most fiercely contested states in recent presidential history, and one that has voted for the winning candidate in every election since 1964. And in Virginia, you have what could be the decisive state in 2012, one that had been a traditional Republican stronghold until Obama turned it blue in 2008. Ohio is accustomed to its role in the presidential spotlight, but for Virginia, this is all new. As one Democratic strategist put it last week, Ohio has been on a pendulum — swinging from one party to the other — but Virginia is now solidly purple and will likely stay that way for the foreseeable future. A senior Obama campaign official believes Virginia will be the epicenter of presidential campaigning possibly for the next two decades. It's been noted often of late that since 1960, no presidential candidate has won the White House without winning two of the following three – Pennsylvania, Ohio and Florida. Which is why the race in Virginia could be pivotal. Senior Romney campaign aides told the Washington Post last week that their path to victory relies on winning three traditional red states that Obama turned blue last election – Indiana, North Carolina and Virginia. Of those three, Virginia seems most favorable to Obama this time around. Should the president indeed carry Virginia again while losing those other two, it leaves open a number of paths to victory for him elsewhere while significantly narrowing Romney’s. It allows him to lose Florida and Pennsylvania, for instance, while otherwise holding on to his other 2008 pickups. If Ohio stays in the fold, too, Romney has to win back western states such as Nevada, Colorado and New Mexico to have a chance. Want to test these theories out? Take a look at the Los Angeles Times’ new interactive electoral map, which lets you forecast the result based on calling winners in what are for the moment the nine states most likely to decide the race. A new USA Today/Gallup poll conducted in these 2012 battlegrounds has a tight race overall. Obama leads Romney 47% to 45%, with 7% undecided.

### Appalachia Mechanics

#### Obama is lagging in coal-heavy swing states

David W. Thornton 6/20/2012 - graduate of Emmanuel College and the University of Georgia (“New state polls are bad news for Democrats,” The Examiner, http://www.examiner.com/elections-2012-in-atlanta/david-w-thornton)

In the crucial swing state of Ohio, Romney has taken the lead. Although the RCP average still shows Obama with a slight lead, the two most recent polls both favor Mitt Romney. The most recent poll is from Purple Strategies and gives Romney a three point edge. Days before that poll was taken, a Rasmussen poll found a two point lead for Romney. Both polls sampled likely voters while older polls favoring Obama were of registered voters. Other details of the Purple poll should be even more alarming to Democrats. Voters in Virginia, Ohio and Florida disapprove of the president. In Colorado, the president’s approval rating is tied at 48-48 percent. Nevertheless, voters in all four states believe the country is on the wrong track by margins of almost 2-1. A strong majority of swing state voters who feel that the country is moving in the wrong direction does not bode well for the party in power.

#### Pennsylvania key swing state in 2012 election

Donald Lambro 6/20/2012 - chief political correspondent for The Washington Times, won the 1995 Warren Brookes Award for Excellence in Journalism (The Outcome Of The 2012 Election Is In The State-By-State Jobless Numbers, Townhall, http://townhall.com/columnists/donaldlambro/2012/06/20/the\_outcome\_of\_the\_2012\_election\_is\_in\_the\_statebystate\_jobless\_numbers)

While that could well be enough to shift this state into the GOP's column and significantly tighten the electoral battle, Pennsylvania's potential could be decisive. It is usually considered a swing state, even though the Democrats have carried it in the last five elections. Obama won there by an overwhelming 11 percent margin. But unemployment is high there, 7.4 percent, with the real jobless rate closer to 9 percent if you count workers who have stopped looking for a job or are forced to work fewer hours, or take temporary jobs or low paying counter work. BLS reports that the state lost nearly 10,000 jobs, an ominous sign of Pennsylvania's weakening job market as well as the economy's overall continuing decline. Mitt Romney's focus on job losses and the economy has made this state a tossup. A Quinnipiac state poll last week showed Obama declining to just a 6 point lead over his Republican challenger, with a huge undecided vote.

#### Virginia key swing state in 2012

Charles Riley 6/20/2012 – staff writer for CNN Money (7 key swing state economies, <http://money.cnn.com/galleries/2012/news/economy/1206/gallery.swing-state-election/index.html>)

Virginia voters are one of the most sought-after prizes of the general election. In 2008, President Barack Obama carried the state in one of the cycle's biggest surprises. Before that, Virginia had gone to the Republicans in every presidential contest since 1964. The state's unemployment rate ranks 9th best in the nation at 5.6%. While some rural counties are still struggling to recover from the recession, the suburbs that surround the Washington, D.C. area are flourishing from their proximity to the federal government.

### AT: Consumption K – Production-Focus Key

#### Coal use is inevitable – can’t wish it away – a pragmatic approach to emissions is key to avoid the worst impacts of climate change

Reisinger 9 – JD, Attorney @ Ohio Environmental Council

Will, “RECONCILING KING COAL AND CLIMATE CHANGE: A REGULATORY FRAMEWORK FOR CARBON CAPTURE AND STORAGE,” Vermont Journal of Environmental Law, http://vjel.org/journal/pdf/VJEL10107.pdf

In the United States and around the world, coal-generated electricity is the single largest source of GHG emissions. There is now a general agreement within the industry and across the political spectrum that stopping or slowing the effects of climate change will require vast reductions in the amount of CO2 that coal-powered generation emits. Yet there remains significant debate over how to achieve these reductions. Some advocates suggest abandoning the ugly legacy of coal altogether, instead focusing solely on the development of renewable power generation. They argue that promoting advanced coal technology only deepens the world’s dependence on a harmful commodity. There is no doubt that coal mining is a destructive process. Mining for power generation eviscerates mountaintops and poisons whole streams, while coal combustion fouls the air and warms the planet. The environmental and economic scars that coal mining has inflicted upon Appalachia alone will take generations to heal. But, as we argued Part I, it is unlikely that we can replace the full amount of power generated by coal in the short term. Coal will almost certainly provide a significant percentage of the world’s electricity for years to come. Global climate change, therefore, requires a new pragmatism. We do not have the luxury to hope that the world will abandon coal as an energy source in the near term; instead, we must promote the immediate, widespread deployment of the technologies that allow for cleaner, carbonneutral coal combustion. Carbon capture technology represents the potential to reduce CO2 emissions and mitigate the harmful effects of the greatest contributors to climate change. Scientists and geologists are confident that deep geologic formations can safely and permanently store colossal quantities of CO2. What is needed now is an appropriate legal framework to govern CCS. Our recommendations focus on what we view as the most important components of such a framework: clear, consistent definitions of property rights and a liability-limiting system whereby private operators can undertake storage operations with confidence. Cleaner, carbon-neutral coal-fired generation will be an important first step in solving the global climate crisis. By addressing the regulatory void surrounding CCS through legislation and rulemaking, we can allow this promising technology to flourish in the United States and ultimately enable CCS to reduce GHG emissions worldwide.

#### Consumption-only focus fails – ignores production-oriented environmental degradation

Holmes 7 (Dave, “A socialist view of global warming: change the system, not the climate!”, Google Books, accessed: 6/26/12)//AMV

Such views among genuine environmental activists reflect a well-meaning but ultimately utopian belief that if only enough of us decide to drastically reduce our demand on the world’s resources — via greatly reduced personal consumption, purchasing from firms with sustainable production techniques and non-polluting technologies — big business and governments will respond to “market signals” and accept and adapt to a slow-growth or no-growth economy. Of course, we should not dismiss the importance of environmental consciousness and radicalisation, which is often expressed in attempts to live in ways consistent with sustainability. It is a good thing if people try to organise their lives so that they live more ecologically. But we have to be clear that that alone will not be enough to halt the crisis. It certainly cannot be the main strategy of the mass environment movement, as it will let the real culprits off the hook and divert precious activist energy away from the underlying systemic dynamic that is driving ecological degradation. As Marxist ecologist John Bellamy Foster explained in a very useful and accessible article published in the Monthly Review magazine in February 1995,6 behind most appeals for individual “ecological morality”, “there lies the presumption that we live in a society where the morality of the individual is the key to the morality of society. If people as individuals could simply change their moral stance with respect to nature and alter their behaviour in areas such as propagation, consumption, and the conduct of business, all would be well.” However, Foster continues: “What is all too often overlooked in such calls for moral transformation is the central institutional fact of our [capitalist] society: what might be called the global ‘treadmill of production’.”

### AT: Consumption K – Developing Countries

#### Developing countries won’t limit consumption – clean coal is key

Fallows 10 - national correspondent for The Atlantic

James, “Dirty Coal, Clean Future,” The Atlantic, http://www.theatlantic.com/magazine/archive/2010/12/dirty-coal-clean-future/8307/

Mohler’s point was less about abstract equity than practical reality. People in rural China, in my experience, don’t really care that people somewhere else—Los Angeles or Houston, even Shanghai or Tianjin—are using more electricity and gasoline than they are. They just want to use more themselves! I assume the same to be true of their counterparts from Nigeria to India to North Korea. “You go in the countryside in China, and people don’t have any power to pump their water,” Mohler said. “Of course they’re going to want those powered pumps. Anyone would.” And hot water for their baths, and refrigerators for their kitchens, and air-conditioners for their bedrooms—and cars. Thus the bind. The atmosphere needs to absorb dramatically less carbon dioxide, while people around the world are certain to want dramatically more of the products and comforts whose creation and operation send carbon dioxide and other gases into the sky. Isn’t “clean energy” the answer? Of course—because everything is the answer. The people I spoke with and reports I read differed in emphasis, sometimes significantly. Some urged greater stress on efficiency and conservation; some, a faster move toward nuclear power or natural gas; some, an all-out push for solar power and other renewable sources; others, immediate preparation for “geoengineering” or “abatement” projects to offset the effects of climate disruption once they occur. But in a sense they were all in harmony, because everything on all the lists works toward the same end. The best-known illustration of the need for an all-fronts approach is the “carbon wedge” analysis from the Carbon Mitigation Initiative at Princeton. Its premise is that to keep the carbon-dioxide level from going into the 500s, or twice its pre-industrial-age level, over the next 50 years, the world collectively will need to reduce its carbon-dioxide emissions by a total of about 26 billion tons per year. (Technically, CMI measures its goals in billions of tons of carbon contained within the carbon dioxide. For clarity, I’ve converted the figures.) To reach that total, CMI proposes seven “stabilization wedges” of a little less than 4 billion tons of carbon dioxide each. A 4-billion-ton “wedge” through efficiency efforts of all kinds; another wedge of that size through renewable power; another through avoiding deforestation and changing agricultural practices. Eventually it adds up. “There are many good options,” Julio Friedmann, a geologist at Lawrence Livermore National Laboratory, told me soon afterI first met him in Beijing two years ago. “But there are no unlimited options. Each is limited by cost, limited by scale, limited by physics and chemistry, limited by thermodynamics. For example, there’s nothing wrong with switchgrass as a biofuel”—one of George W. Bush’s novel proposals—“but there’s not a lot of energy in it.” We’ll hear from Friedmann again. This emphasis on limits is what begins pointing us back to coal. “Emotionally, we would all like to think that wind, solar, and conservation will solve the problem for us,” David Mohler of Duke Energy told me. “Nothing will change, our comfort and convenience will be the same, and we can avoid that nasty coal. Unfortunately, the math doesn’t work that way.” The math he has in mind starts with the role that coal now plays around the world, and especially for the two biggest energy consumers, America and China. Overall, coal-burning power plants provide nearly half (about 46 percent this year) of the electricity consumed in the United States. For the record: natural gas supplies another 23 percent, nuclear power about 20 percent, hydroelectric power about 7 percent, and everything else the remaining 4 or 5 percent. The small size of the “everything else” total is worth noting; even if it doubles or triples, the solutions we often hear the most about won’t come close to meeting total demand. In China, coal-fired plants supply an even larger share of much fastergrowing total electric demand: at least 70 percent, with the Three Gorges Dam and similar hydroelectric projects providing about 20 percent, and (in order) natural gas, nuclear power, wind, and solar energy making up the small remainder. For the world as a whole, coal-fired plants provide about half the total electric supply. On average, every American uses the electricity produced by 7,500 pounds of coal each year. Precisely because coal already plays such a major role in world power supplies, basic math means that it will inescapably do so for a very long time. For instance: through the past decade, the United States has talked about, passed regulations in favor of, and made technological breakthroughs in all fields of renewable energy. Between 1995 and 2008, the amount of electricity coming from solar power rose by two-thirds in the United States, and wind-generated electricity went up more than 15-fold. Yet over those same years, the amount of electricity generated by coal went up much faster, in absolute terms, than electricity generated from any other source. The journalist Robert Bryce has drawn on U.S. government figures to show that between 1995 and 2008, “the absolute increase in total electricity produced by coal was about 5.8 times as great as the increase from wind and 823 times as great as the increase from solar”—and this during the dawn of the green-energy era in America. Power generated by the wind and sun increased significantly in America last year; but power generated by coal increased more than seven times as much. As Americans have read many times, Chinese companies are the world’s leaders in manufacturing solar panels, often using technology originally developed in the United States. Many of the panels are used inside China for its own rapidly growing solar-power system; still, solar energy accounts for about 1 percent of its total power supply. In his book PowerHungry, Bryce describes a visit to a single coal mine, the Cardinal Mine in western Kentucky, whose daily output supports three-quarters as much electricity generation as all the solar and wind facilities in the United States combined. David MacKay, of the physics department at Cambridge University in England, has compiled an encyclopedia of such energy-related comparisons, which isavailable for free download (under the misleadingly lowbrow title Sustainable Energy—Without the Hot Air). For instance: he calculates that if the windiest 10 percent of the entire British landmass were completely covered with wind turbines, they would produce power roughly equivalent to half of what Britons expend merely by driving each day.

### AT: Consumption K – Won’t Limit Consumption

#### Limiting consumption fails – we can make current consumption practices ecologically sustainable

Martens and Spaargaren 5 - \* Researcher at the Environmental Policy Group at Wageningen University, \*\*Professor of Environmental Policy @ Wageningen

Martens, S. & Spaargaren, G. 2005. The politics of sustainable consumption: the case of the Netherlands. Sustainability: Science, Practice, & Policy 1(1):29-42. Proquest

We argue that policymakers should not confront the issue of consumption from a one-sided perspective informed exclusively by environmental scientists and commitments to limit aggregate consumption. In this sense, we do not endorse efforts to “tame the treadmill of consumption” as a narrow objective (see also Princen et al. 2002). Policy programs that aim to lessen the environmental consequences of consumption by reducing (or radically restructuring) consumption will likely lead to questionable social and economic outcomes. These so-called de-modernization strategies tend to underestimate the potential to improve the environmental consequences of contemporary consumption by promoting more ecologically rational practices. Without taking a strong position on the desirability of limiting consumption in the absolute sense, we maintain the need to embed consumption in policy objectives developed by democratic environmental reform processes over the last several decades.

### AT: Consumption K – Regressive Solutions

#### Focus on individual consumption leads to socially regressive solutions – re-inscribe inequality

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Martens, S. & Spaargaren, G. 2005. The politics of sustainable consumption: the case of the Netherlands. Sustainability: Science, Practice, & Policy 1(1):29-42. Proquest

We begin with a discussion of the possible weaknesses inherent in more consumption-oriented environmental policies, and consider the “individualization” of politics and political responsibilities as developed by Bauman (1993) and Princen et al. (2002). Many environmental problems are ultimately rooted in the conduct of institutional actors, such as companies and governments. Under these circumstances, there is little merit imposing obligations on citizen-consumers, who not only lack the power to influence the organization of production and consumption, but also cannot—and arguably should not—be held responsible for issues that arise out of the “treadmill of production and consumption” (Schnaiberg, 1980). It is likely to be unproductive, and above all illegitimate, to burden citizen-consumers with remedying such problems. If policy initiatives only advance individual solutions—and ignore institutional actors—socially regressive and environmentally ineffectual outcomes will be the result.

### AT: Consumption K – Perm

#### Permutation do both – solves better and the aff is a net-benefit

Bryant and Goodman 4 - \* PhD in Politics from the School of Oriental and African Studies, \*\*Professor of Communication Studies

Raymond and Michael, “Consuming Narratives: The Political Ecology of 'Alternative' Consumption,” Transactions of the Institute of British Geographers, New Series, Vol. 29, No. 3

The consumption practices of the conservation- and solidarity-seeking commodity cultures described here offer one alternative to the call for a politics of redistribution. In the end, these cultures offer a privileged notion of transnational 'commun- ity' given the relatively high cost of purchasing commodities such as organic cereal and fair trade coffee. True, commodities that 'speak' to 'altern- ative' consumers can possibly make them more aware of what is happening to tropical environ- ments and small-scale producers. And yet, only those that can afford to pay the economic premium can take part in this form of 'resistance'. Thus, 'moral' commodities may become 'alternative' in the larger sense by eschewing more progressive re- constructions of 'moral economy'. The creation of niche markets gives the North, albeit in geographi- cally variable ways, the ability to 'tune in but drop out' of both conventional global economies and more demanding forms of resistance to social injus- tice and environmental degradation. A field of political ecology oriented towards the conceptual- ization of production and consumption dynamics is uniquely situated to explore the ambiguities of North/South connections evinced by alternative consumption-related politics. Third, this paper builds on work that challenges dualistic thinking that has bedevilled human geo- graphy for some time. Examples of these schisms (and authors that challenge them) include those of nature/society (e.g. Murdoch 1997; Whatmore 2002), discursive/material (e.g. Cook and Crang 1996) and cultural/economic (e.g. Jackson 2002b; Sayer 2001). Considering together consumption and the commoditization of political ecology narrat- ives further complicates the 'hybrid' or 'mutant' notions of landscape change and development (Escobar 1999; Arce and Long 2000; Bebbington 2000). Breaking down the dualisms of production and consumption thus should provide critical space from which to examine the political ecologies of (alternative) development.9 In some ways, starting from processes of commoditization and associated narratives of development allows the researcher to go 'forward' into the processes and meanings of consumption as well as 'backwards' along the powerful socio-economic and ecological networks of production and development.

### AT: Consumption K – Production Focus Better

#### The alternative isn’t feasible – production-focus is net-better

Winter 3 – PhD in Psychology, Professor @ Whitman

Deborah, “The Psychology of Environmental Problems,” Google Book

Giving up comforts and conveniences may be more than we can fathom, and reverting to preindustrial culture is probably impossible anyway. Even if we could scale down consumption to preindustrial levels, most people would not want to. However, many preindustrial cultures have sustained themselves for centuries, demonstrating that sustainable culture is possible. While copying preindustrial cultures may not be feasible, selecting certain features might be useful. In addition, sustainable cultures may offer some benefits to human psychological needs that are not well provided for by industrialized cultures. The modern Western tradition of emphasizing the individual has given us both unsustainable technology and increasing social alienation. Embedded in the modern Western worldview, we try to use the former to mitigate the latter. It may not even be necessary to "give anything up" in order to ac-complish a reduction or reversal of environmental degradation. Improving efficiency or productivity is typically much more effective than significantly reducing overall use, and much relevant technology is already available. For example, it would be far easier to find an automobile with twice the fuel efficiency of our present cars than to cut our driving in half, and buying an efficient water heater is a lot easier than reducing our use of hot water (Stern, 2000).

### AT: Consumption K – Growth Turn

#### Limiting coal consumption collapses the economy

Sullivan 10 – Professor of Economics @ National Defense University

Paul, “CCT is a medium term global solution,” http://energy.nationaljournal.com/2010/08/how-viable-is-clean-coal.php#1616515

Given the importance of coal to electricity, steel, cement and more it is of the utmost importance that the CSS code be cracked. It is also important in the longer run to move from carbon intensive fuels to a new energy future. But, reasonably, we are not ready for that yet, and it could take decades to get it done. We need to be reasonable and find solutions for today’s problems and the nearer term future problems in order to have a better, more secure and more stable energy future. For those who want to stop coal altogether and fast, please give me an alternative that can be set up quickly, effectively, and will lend to economic growth at the same time. My ears and eyes are open, but I have yet to see a systematic solution to this problem that can be accomplished in the time periods that some would like these changes to happen. I am all for change, but for reasonable change that looks into the systems within systems connections that can be found with energy sources such as coal.

### AT: Renewables Tradeoff DA – Non-Unique

#### Renewables low now

McCann 5/30CivSource (Bailey, May 30, 2012, “States struggle with renewable energy investments,” [http://civsourceonline.com/2012/05/30/states-struggle-with-renewable-energy-investments/)//DR](http://civsourceonline.com/2012/05/30/states-struggle-with-renewable-energy-investments/%29//DR). H

Investment in clean energy in 2012 has dropped to its lowest levels since 2009, according to the latest renewable energy data from Ernst & Young. Several states are struggling to get wind energy projects off the ground and it is likely that a key federal tax incentive for wind projects will expire before next election. Renewable energy projects of all types are facing headwinds, China recently alleged that five US states are violating free-trade rules with their renewables projects ratcheting up a looming trade war between the two countries. Can renewables survive? In the private sector, more businesses are implementing energy mixing strategies in order to cut rising energy costs. However, as wind and solar projects are sometimes cost-prohibitive to build and maintain, that energy mix may not be as beneficial as originally thought. Currently china leads the world in wind capacity additions. Data from a recent Worldwatch Climate and Energy report shows that the country has increased its wind capacity 40% since 2010. Whereas by the end of 2011, the US accounted for a mere 17% of global wind power capacity additions. Wind power itself accounts for less than 3% of total US power generation. Right now, the growth of wind power in the US relies heavily on the federal Production Tax Credit (PTC), the tax credit finances renewables projects by reducing corporate income tax by 2.2 for every kilowatt-hour produced. This tax credit is expected to expire at the end of the year.

#### Investment in renewables are at a 3 year low and are going to get lower – expiring subsidies and waning support

Alex Morales 4/12/2012 – staff writer for Bloomberg.com (“Renewable-Energy Investment Plunges in Quarter to Three-Year Low,” Bloomberg, <http://www.bloomberg.com/news/2012-04-12/renewable-energy-investment-plunges-in-quarter-to-three-year-low.html>)

Global investment in clean energy dropped to its lowest since the depths of the financial crisis three years ago as the U.S. and European nations cut support for wind and solar projects, Bloomberg New Energy Finance said. Spending on new wind farms, solar parks and other renewable projects fell to $27 billion in the first quarter, a 28 percent slump from the last three months of 2011 and a 22 percent drop from the same quarter a year earlier, New Energy Finance said today in a statement. That’s the lowest quarterly total since the $20 billion recorded in the first three months of 2009. The quarterly decline follows a record year in which an estimated $263 billion was poured into renewable energy, according to the London-based research company. The clean-energy industry has been hurt by subsidy cuts in European nations including Spain, Germany and the U.K., and expiring tax credits in the U.S., the biggest market in 2011 for renewables. “The weak first-quarter number reflects the destabilizing uncertainty over future clean-energy support in both the European Union, driven by the financial crisis, and the U.S., driven by the expiry of stimulus programs,” New Energy Finance Chief Executive Officer Michael Liebreich said in the statement. “There is no sign of a rapid turnaround in either of these regions.” Spain suspended subsidies to new renewable-energy projects in January, while Germany and Britain have curtailed support to solar power. In the U.S., a Treasury grant program offering as much as 30 percent of development and construction costs for renewable-energy plants expired on Dec. 31, while the Production Tax Credit, which grants an incentive worth 2.2 cents a kilowatt-hour of wind power, is due to end this December. Expiring U.S. Credits The last time the Production Tax Credit was allowed to expire, at the end of 2003, U.S. annual wind installations declined to 397 megawatts in 2004 from 1,670 megawatts the previous year, according to data from the American Wind Energy Association. “With the expiration of the Production Tax Credit at the end of this year, there’s really been no new wind commissioned for 2014,” Phyllis Cuttino, clean energy director at the Washington-based Pew Charitable Trusts, said by telephone. Asset-financing of utility-scale renewables projects accounted for $24.2 billion of global spending, the bulk of first-quarter investments. Venture capital and private-equity investments totaled $1.9 billion, and $601 million was raised on equity markets, New Energy Finance said. The quarterly data exclude spending on small-scale projects and corporate and government research and development, which the research company reports on annually.

#### Investment slowing now

Bloomberg 12 (Frankfurt School of Finance and Management, Bloomberg Economics, “Global Trends in Renewable Energy Investment 2012,” [http://fs-unep-centre.org/sites/default/files/media/globaltrendsreport2012\_3.pdf)//DR](http://fs-unep-centre.org/sites/default/files/media/globaltrendsreport2012_3.pdf%29//DR). H

Investment in renewable energy was subdued in the first three months of 2012, in the face of uncertainty over future policy support in Europe and the US. Although there were, by May, a few signs that governments were trying to clarify specific issues for investors, there was not yet any evidence that investment levels would accelerate in the rest of the year.

#### That is preventing a broader shift

Bloomberg 12 (Frankfurt School of Finance and Management, Bloomberg Economics, “Global Trends in Renewable Energy Investment 2012,” [http://fs-unep-centre.org/sites/default/files/media/globaltrendsreport2012\_3.pdf)//DR](http://fs-unep-centre.org/sites/default/files/media/globaltrendsreport2012_3.pdf%29//DR). H

The danger however is that **hastilymade cuts in support might make a serious dent in investment in developed economies in 2012-14 – before wind and solar can reach that goal of competitiveness. That would be a damaging blow not just for businesses in those industries but also for hope of limiting carbon emissions and climate change, and for those working in the emerging “green economy”.**

### AT: Renewables Tradeoff DA – Losing Race Now

#### US is behind in the Clean tech race—Germany and China show the strongest job growth

**Foster 11** Executive Director of the BlueGreen Alliance, a partnership of unions and environmental organizations(David, September 8, 2011, “Jobs in a Green Economy,” [http://www.nytimes.com/2011/09/14/opinion/jobs-in-a-green-economy.html)//DR](http://www.nytimes.com/2011/09/14/opinion/jobs-in-a-green-economy.html%29//DR). H

**Our toughest competitors, Germany and China, have shown remarkable job growth as a result of investments and regulations promoting the use and development of clean-energy technologies, services and equipment manufacture. China’s clean-energy sector has one million jobs. Germany’s has 250,000.**

**The failures of Solyndra and Evergreen Solar demonstrate that we are losing the competition to Germany and China. To win the jobs race of the 21st century, we need thoughtful, long-term policy support for clean energy** and tough enforcement of our trade laws.

#### The US lags behind China and European countries in renewable investment

Mark Halper 7/12/11 – contributing editor for smartplanet, has written for TIME, Fortune, Financial Times, the UK's Independent on Sunday, Forbes, New York Times, Wired, Variety and The Guardian. http://www.smartplanet.com/blog/intelligent-energy/china-leads-the-world-in-renewables-un-says/7590)

China, the world’s biggest polluter, has once again topped a list of the world’s leading renewable energy countries. A report from the United Nations Environment Programme (UNEP) notes that in 2010, China led all nations investing in renewable energy, with $49.8 billion in funds. Most of China’s investments - $41.4 billion - went into wind farms, and the balance was split evenly between solar and biomass/waste-to-energy (wte), the report notes. The $49.8 billion was nearly a quarter of the $211 billion invested worldwide, and led a 32% rise in global investing from the previous year according to the report, prepared for the UN by London-based Bloomberg New Energy Finance. Germany ranked second, with $41 billion in investments, doubling its expenditures over the previous year. Most of the $41 billion went into rooftop solar, which falls into the UNEP’s “small-scale distributed capacity” category. The report notes that Germany’s feed-in tariff policies helped encourage investment in that area, as did declining solar prices. In sharp contrast, less than $1 billion of China’s $49.8 went into “small scale” projects, as investors ploughed $48.9 billion into utility scale, “financial new investment in renewables.” The report claims that Germany’s investments in small-scale projects helped make up for a 22% decline in Europe’s utility-scale investments, to $35.2 billion. The U.S. ranked third among countries, with $29.6 billion. Of that, $24.9 billion fit the utility scale category. Two thirds of that, $16.1 billion, went into wind. Solar received $5.5 billion, and biofuels, biomass/wte and geothermal split the remainder. The UN also noted that “For the first time, developing economies overtook developed ones” in new investments in utility-scale renewable energy projects. South and Central America rose 39% to $13.1 billion; Middle East and Africa more than doubled to $5 billion; India grew 25% to US$3.8 billion, and “Asian developing countries excluding China and India” climbed up 31% to $4 billion. On the down side, corporate research, development and deployment dropped 12% to $3.3 billion “as companies retrenched in the face of economic hard times,” the report notes. Private equity funds also set aside 1% less for renewable energy expansion capital, the report states.

#### China is ahead of the US in renewable energies – Chinese policy is focusing on emerging markets

Melanie Hart 8/24/2011 - policy Analyst for Chinese Energy and Climate Policy at the Center for American Progress (“China Eyes Competitive Edge in Renewable Energy,” Center for American Progress, http://www.americanprogress.org/issues/2011/08/china\_energy\_competitiveness.html/)

China’s State Council (the national cabinet) is currently reviewing a set of massive funding proposals for seven key “strategic emerging industries”: environmentally friendly and energy-efficient technologies, next-generation IT, biotechnology, high-end equipment manufacturing, alternative energy, alternative materials, and alternative-energy vehicles. The Chinese identify these industries as the most optimum market environments for their indigenous innovation program, and the State Council is expected to approve and release the official package next month, including an overall 2011-2015 development plan for strategic emerging industries and individual funding and policy support plans for each industry.[1] This package is designed to address China’s competitive disadvantages in technology innovation particularly with the United States. U.S. policymakers should pay close attention because if the Chinese succeed this will be a game-changer especially in the energy sector. This new plan aims to address the fact that in many current market sectors the technology gap between Chinese firms and the current market leaders is so large that it’s almost impossible for the Chinese to compete. Either they manage to leap frog ahead on the technology side (often through assimilation and “re-innovation” rather than real bottom-up innovation) but then falter at the operational level (as in high-speed rail) or they simply cannot catch up at all. The information and communication technology, or ICT, market is one example. Despite China’s impressive ICT market growth the United States still has a solid lead in ICT expenditures and installed capacity. That forces China to play technology catch-up, and those efforts have resulted in one embarrassment after another. In mobile telecom, China’s home-grown 3G standard was so problematic that Chinese telecom operators passed the standard around like a hot potato and tried every political trick in the book to avoid being stuck with it. China’s homegrown internet filtering software was another embarrassment. It contained so many security vulnerabilities and intellectual property rights liabilities (from pirated codes) that most PC manufacturers refused to install it on their machines. China’s homegrown computer chip initially appeared to be a major success, but it turned into a major scandal when whistle-blowers revealed that it was actually a Motorola chip with the original brand name scratched off. These innovation stumbles give foreign investors and foreign governments the impression that Chinese technology is still many years away from posing a serious market challenge. In the United States in particular, many assume that as long as we can force the Chinese to give us a level playing field—as long as we can keep them from stealing our own core technology and from blocking our access to their domestic market—our firms will dominate not only globally but also within China. But it’s important to recognize that the competitive dynamics we are used to seeing in these current technology markets like ICT only apply when the United States already has a strong market lead. Now the Chinese have figured that out, and they are changing their strategy. Instead of trying to beat the United States at its own game they are looking forward to the next round and shifting focus to direct their technology efforts toward the critical emerging market sectors where the United States is not yet dominant—the seven key “strategic emerging industries” mentioned above. Among the seven, green energy is a recurring theme, not only because the Chinese are facing some major energy bottlenecks at home but also because that’s where the United States is really lagging behind. Chinese leaders see green energy as a critical strategic opportunity. According to Chinese Vice Premier Li Keqiang, it is a major focus in China’s 2011-2015 development plan (the 12th five-year plan) because:[2] Green economy, low carbon technology, etc. are emerging, and the global competition to seize the high ground in the future development of these sectors is getting more and more fierce every day. In some of these sectors, the gap between the emerging economies and the developed nations is relatively small. In that environment, all we need to do is to take advantage of these [market] trends; if we respond appropriately we can seize this opportunity, gain the upper hand, and push forward a new breakthrough in development. Otherwise, if we miss out on our opportunity, it will be harder to overtake [the developed countries], and we may lose the initiative and even fall behind. The central government’s latest economic development policies all echo this assessment. Recent State Council legislation calls for an economywide focus on green energy and other strategic emerging industries and states that the relatively narrow gap in these sectors gives China a “historic opportunity” to finally take the top spot as the next global technology leader.[3] China’s green push is already reshaping global energy markets. China surpassed the United States as the top country in the Ernst and Young indices for renewable energy investment attractiveness in August 2010—a position the United States had held since 2006. The Chinese brought in $48.9 billion in renewable energy investments in 2010, almost double the U.S. total. China also leads in installed renewable energy capacity (including wind, solar, small-hydro, biomass, waste-to-energy, geothermal, and marine) with 103 gigawatts in 2010—again, almost double the U.S. total. At least some of China’s renewable capacity is overexpansion. Some wind assets, for example, are not yet connected to the grid. Chinese leaders, however, are already adjusting their policy programs to balance out those investment incentives, and China’s State Grid Corporation is already adding new grid connections to fill the gap. U.S. enterprises are also making great strides in renewable energy, and the United States is actually leading in corporate R&D and venture capital investments. But whereas the Chinese use feed-in tariffs, renewable power generation targets, preferential tax rates, and other policies to create a stable and predictable investment environment across the entire renewable energy value chain, U.S. government policy support is still geared toward fossil fuels rather than renewables. Due to that imbalance, renewable energy deployment is seen as much riskier in the U.S. market, and financing is much more expensive and much harder to get. As a result, for many U.S. firms the only viable option is to license or sell their technologies to the Chinese. For the moment, strong Chinese demand offers a great opportunity for U.S. renewable energy innovators. China’s end goal, however, is to develop their own core technology so that they can increase their profit margins and keep IPR revenues in-country. That is what China’s indigenous innovation and strategic emerging industry policies are all about: shifting the Chinese economy from low-cost manufacturing to higher-value-added technology innovation. If they succeed on renewable energy it could shut U.S. firms out of the China market—either via protectionist industrial policy, more competitive Chinese technology, or a combination of the two. And if the United States doesn’t develop its own domestic renewables market, U.S. firms may find themselves shut out of this sector completely.

#### All renewables investment is pivoting to Asia – US green energy isn’t attracting investment

Nico P. Arboleda 6/26/2012 – staff writer for ecoseed.org (“Asia shift: R.E. investments look beyond U.S., E.U”, ecoseed.org, <http://www.ecoseed.org/business/asia/14911-asia-shift-r-e-investments-look-beyond-u-s-e-u>)

Venture capital firms and other investors are racking up investments in renewable energy projects in Asia as government incentives, the rising demand for electricity, and the region's energy potential sweeten the promise of renewables while Europe and the United States experience problems. China and India continue to be the leading destinations for renewable energy investors. But interest has been growing in countries in South and Southeast Asia as well. A Reuters report says the governments in these nations are setting their targets for renewable industry expansion and extending subsidies and tax breaks. The U.S. and Europe, meanwhile, are cutting back on subsidies. Slowdown in E.U., U.S. Global investments in renewable energy went down 22 percent in the first quarter of 2012 compared with the same quarter of the previous year. This was the lowest the industry reached in terms of investment since the 2008-2009 financial crisis, following a record year where an estimated $263 billion was poured into renewable energy, according to Bloomberg New Energy Finance. This result is said to attributable partly to subsidy cuts in Spain, Germany, and Britain, plus tax credits uncertainty in the U.S. The European sovereign debt crisis also caused affected countries to decrease renewable energy investment. The already two-year crisis has caused cuts in the region's credit rating, including the region's bailout fund, the European Financial Stability Facility. The U.S., though not as troubled as Europe, has seen its fair share of reduced government spending and investments, as the government tax credits and grants continued to face the question of whether they would be extended or not. This is even if the Brookings Institution warned that not extending the tax credits and grants would put more clean technology companies either bankrupt or consolidated. "People are shying away from cleantech, and it's clearly slowed down," Pierre Lamond, a partner at venture capital firm Khosla Ventures, was quoted in a MercuryNews.com article as saying. "In 2007, anything that was green, or claimed to be green, got investment. Now everyone is looking for the next Facebook." He says solar and wind startups are "dead," and that venture capitalists see more money in social media. hift to developing markets China led renewable energy investments globally last year, with 17 a percent increase toward $52 billion in 2011. Even though its lead over second placer U.S. shrunk to just $1 billion, together with other developing countries China has aggressively increased investment in renewables. A 2011 report from Pew Environment Group says Asia will be the "center of gravity" for clean energy investment due to its "growth" and "dynamism." "The bottom line is the focus on fundamentals: don't rely on uncertain government subsidies, instead focus on those with the need and the means to pay," blog Commercial Climate said. Companies from Europe and the U.S. have expressed their interests in Asia as well. A Forbes report said several European clean technology firms have made more projects outside their respective countries than locally, under the given circumstances. Spanish firms Abengoa and Isofoton are examples, with the former having 90 percent of its expenditures abroad, and the latter receiving a $300 million investment from a Chinese company for a deal to develop solar power plants in Asia.

### AT: Renewables Tradeoff DA – No Link

#### Turn – plan leads to more investment in renewables and only trades off with marginal projects

Mills 11 - \*MSc in Geological Sciences @ Cambridge

Robin, “Capturing Carbon: The New Weapon in the War Against Climate Change,” Google Book

There is an idea that investing in carbon capture will take money away from renewable energy projects. But, except at the margin, this appears unlikely. $100 billion was invested in renewable energy R&D and manufacturing during 2007,2 which hardly suggests a shortage of finance. The economic crisis is being tackled with heavy government-led spending focused on 'green energy'. Adding more realistic options for tackling climate change will, if anything, increase the finance flowing to the sector; for one thing, it would open up the participation of cash-rich petroleum and utility companies. Only the more marginal and costly renewable energy projects are likely to be displaced by CCS.

#### Clean coal is key and doesn’t compete with other green approaches

Fallows 10 - national correspondent for The Atlantic

James, “Dirty Coal, Clean Future,” The Atlantic, http://www.theatlantic.com/magazine/archive/2010/12/dirty-coal-clean-future/8307/

The proposition that coal could constitute any kind of “hope” or solution, or that a major environmentalist action plan could be called “Coal Without Carbon,” as one I will describe is indeed named—this goes beyond seeming interestingly contrarian to seeming simply wrong. For the coal industry, the term “clean coal” is an advertising slogan; for many in the environmental movement, it is an insulting oxymoron. But two ideas that underlie the term are taken with complete seriousness by businesses, scientists, and government officials in China and America, and are the basis of the most extensive cooperation now under way between the countries on climate issues. One is that coal can be used in less damaging, more sustainable ways than it is now. The other is that it must be used in those ways, because there is no plausible other way to meet what will be, absent an economic or social cataclysm, the world’s unavoidable energy demands. This is not an argument against all-out effort on all other fronts, from conservation and efficiency to improved battery technology to wind- and solar-power systems to improved nuclear facilities. AmoryLovins, of the Rocky Mountain Institute, has argued for years that designing buildings and transportation systems to waste less energy from the start is by far the cheapest way to reduce damaging emissions (a position reinforced by influential studies from McKinsey & Company). “Good ideas about climate change are not in competition with one another,” Roger Aines, a climate scientist at Lawrence Livermore National Laboratory, told me when I visited this summer. “We need every possible solution, and then we need more.”

### AT: Renewables Tradeoff DA – CCS Key

#### Renewables alone fail without CCS

Future Timeline 12

“A way to reverse global warming – study finds room to store CO2 underground,” http://futuretimeline.wordpress.com/2012/03/21/a-way-to-reverse-global-warming-study-finds-room-to-store-co2-underground/

A new study by researchers at MIT shows that there is enough capacity in deep saline aquifers in the USA to store at least a century’s worth of carbon dioxide emissions from the nation’s coal-fired powerplants. Though questions remain about the economics of systems to capture and store such gases, this study addresses a major issue that has overshadowed such proposals. Coal-burning powerplants account for about 40 percent of global carbon emissions, so climate change “will not be addressed unless we address CO2 emissions from coal plants,” says Ruben Juanes, the ARCO Associate Professor in Energy Studies in the Department of Civil and Environmental Engineering. “We should do many different things” such as developing new and cleaner alternatives, he says, “but one thing that’s not going away is coal,” because it’s such a cheap and widely available source of power. Efforts to curb greenhouse gases have largely focused on the search for practical, economical sources of clean energy, such as wind or solar power. But human CO2 emissions are now so vast that many analysts think it’s unlikely that these technologies alone can solve the problem. Some have proposed methods for capturing fossil fuel emissions, then compressing and storing them in deep geological formations. This approach is known as carbon capture and storage, or CCS. One of the most promising places to store the gas is in deep saline aquifers: those more than half a mile underground, far below the freshwater sources used for human consumption and agriculture. But estimates of the capacity of such formations in the USA have ranged from enough to store just a few years’ worth of emissions up to many thousands of years’ worth. The reason for this huge disparity in estimates is two-fold. Firstly, because deep saline aquifers have no commercial value, there has been little exploration to determine their extent. Secondly, the fluid dynamics of how concentrated, liquefied carbon dioxide would spread through such formations is very complex and hard to model. Most analyses have simply estimated the overall volume of the formations, without considering the dynamics of how the CO2 would infiltrate them. The MIT team modelled how the carbon dioxide would percolate through the rock – accounting not only for the ultimate capacity of the formations, but the rate of injection that could be sustained over time. “The key is capturing the essential physics of the problem,” says graduate student Michael Szulczewski, “but simplifying it enough so it could be applied to the entire country.” That meant looking at trapping mechanisms in the porous rock at a scale of microns, then applying that knowledge to formations spanning hundreds of miles. When liquefied CO2 is dissolved in salty water, the resulting fluid is denser than either of the constituents, so it naturally sinks. It’s a slow process, but “once the carbon dioxide is dissolved, you’ve won the game,” Juanes says, because the dense, heavy mixture would never escape back into the atmosphere. While this study did not address the cost of CCS systems, many analysts have concluded that they could add 15 to 30 percent to the cost of coal-generated electricity, and would not be viable unless a carbon tax or a limit on carbon emissions was put in place. While uncertainties remain, “I really think CCS has a role to play,” Juanes says. “It’s not an ultimate salvation – it’s a bridge – but it may be essential because it can really address the emissions from coal and natural gas.”

#### Renewables alone fail

Van Engelen 9 [Angelique van Engelen, Freelance writer, BA in Journalism “Carbon Capture And Storage: Solution or Boondoggle – The Pros And Cons.” July 16th, 2009 http://globalwarmingisreal.com/2009/07/16/carbon-capture-and-storage-the-pros-and-cons/]

Washington Times journalist Amanda DeBard recently wrote an alarming article warning that the new US government is potentially wasting lots of money on projects to capture carbon from coal fired power plants. The paper suggests there’s no proof that the new technology and the changes to the fuel industry will make even the slightest difference in the time frame envisaged. The author casts serious doubts on the viability of the US government’s $3.4 billion investment in carbon capturing and storage (CCS) technology. Expensive, small-scale pilot projects are under way [to] capture carbon dioxide before it is released into the air from coal-burning power plants. But these prototypes have not been proved at levels that would make even a dent in the U.S. appetite for fossil fuels, casting doubt on the viability of the president’s plans. Still, the administration continues to promote policies that assume that these pilot programs will soon become large-scale projects and is seeking funds to bring that day closer,” the newspaper reports. Experts are quoted saying that true costs are involved that no one nows as yet and that this is extremely risky. It’s promoting a vision that no one knows what the true cost will be and [whether] these technologies will succeed on a large scale,” the newspaper quoted Bryan K. Mignone as saying, who is a climate and energy analyst at the Brookings Institution. So what to make of these allegations? Let’s focus on the carbon capturing and storage part. Is CCS a waste of money that will never make it in time? DeBard apparently made little effort to find out exactly what prototype plants are already out there and what the strengths and weaknesses of CCS really boil down to. The article focuses on the political side of things and in my view is totally disconnected with what’s going on on the ground. Before asserting that there might be negative effects associated (the “true cost”) with carbon capturing technology, the writer might have done best to seek out the factors determining these “true costs”. A few quick facts about CCS: The International Energy Agency (IEA) estimates that globally, over 200 power plants need CCS technology in the next twenty years (by 2030), in order to prevent temperature rises of over 3°C. As we previously reported, research from the Massachusetts Institute of Technology (MIT) suggests that carbon sequestering can reduce human generated CO2 to 80% of 1990 levels by 2050. Only four power plants and/or carbon storage projects utilize CCS as yet: Canada’s Weyburn-Midale CO2 Project is currently the world’s largest geologic carbon storage project, located in southeastern Saskatchewan and started in 2000. ExxonMobil/Statoil’s Sleipner plant in Norway is the world’s oldest project. It stores carbon injects carbon 1,000 meters below the seabed into a sandstone aquifer. It has been operational since 1995. The 30 megawatt pilot plant at Schwarze Pumpe in Germany, opened last year. The trial plant is operated by Swedish utility Vattenfall and burns its fuel at 42% efficiency with a target to increase that to as high as 50-55%. Another Statoil project in the Snøhvit gas field, in the Barents Sea, stores 700,000 tonnes per year, equivalent to 330,000 cars with average CO2 emissions of 160g/km and annual driving distance of 15,000 kms. The main problem preventing large scale CCS adoption by power plants is that the technology is very expensive and largely unproven. Lobbyists say that ultimately the costs will as a matter of course decrease as we get experience, but the lack of precedent is again a deterrent to true belief. All this leads to something of a “chicken or egg argument” in political and policy circles. The costs of CCS arise mainly because the process of capturing the carbon and compressing it requires a lot of extra power. Engineers estimate that power plants require up to 25% more power when they are fitted with CCS. They also need considerably more facility space. Using the carbon dioxide rather than compressing it in energy intensive ways and burying it underground makes a lot of environmental sense. It also circumvents the danger that the carbon might leak and make its way back into the atmosphere. The International Panel on Climate Change (IPCC) estimates that risks are comparable to those associated with current hydrocarbon activity. CO2 could be trapped for millions of years, the IPCC believes, with retention rates of over 99% over 1000 years. Greenpeace objects, however, that if 1 percent of the carbon leaks, the next 100 years would see the evaporation of 63% of the stored carbon dioxide into the atmosphere. It also highlights the dangers of the carbon permeating the storage shelter over time. The US is spending $3.4 billion on the technology. The California Public Utilities Commission recently endorsed a feasibility study by South California Edison into building a utility-scale base-load power plant. The plan is to power the plant with hydrogen derived through gasification of petroleum coke, coal and possibly biomass. In the US, oil companies could be a big part of the CCS solution. They tend to use carbon dioxide for oil and gas exploration. For instance, Exxon Mobil’s La Barge, Wyoming facility is the world’s biggest CCS operation. Rather than storing the carbon, it transports the carbon dioxide 3,600 miles (5,800 kms) to gas and oil exploration sites. The world’s biggest CCS enabled power plant, the Dakota Gasification Company plant in Beulah, North Dakota captures its CO2 for use in advanced oil field recovery in Weyburn Canada. The company produces methane from coal and has a track record of more than 30 years. Further plans are to use around 1.5 million tonnes of CO2 from Weyburn every year for oil recovery. Duke Energy is currently constructing a plant in Indiana based on coal-gasification that promises to reduce emissions by 75% compared to the conventional coal plant it replaces. ”It’s an example of one of the clean coal technologies favoured by the incoming Obama administration”, says Eugene Bukoveczky, a stock analyst at Forbes Investopedia. However, the construction costs were almost double the original estimates, at $2.35 billion. Bukoveczky believes that future federal carbon regulations are another major deterrent for the time being for companies to execute similar plans. The European Union government in Brussels ordered all its member countries last year to invent their own rules for CCS within the next two years. Individual countries must select storage sites and come up with standards for monitoring, safety and finance structures. At the moment, nine European countries ( Norway, Germany, France, Switzerland, the Netherlands, Hungary. Poland, Croatia and Denmark) are investing €81 million (about $105 million US) in building fifteen research laboratories for CO2 capture and storage. A major weak point for CCS globally is that Kyoto does not recognize it. That means that poor countries wanting to submit CCS plans in order to participate in the carbon trading scheme can not do so. However, some effort went underway last April to change this. No matter what the risks are of future leakages and the costs involved in CCS, I believe that so long as it is possible to capture carbon from power plants running on coal, we should do this as best we can. Even if it means partial solutions are deployed. The only way to end the world’s worst pollution drama right now is to try to end it with all means available. There is no way that alternative energy such as wind or solar power is going to be adopted to such an extent that ordinary power plants will be closing down in the near future. Meanwhile, every day the smoke stacks emit carbon dioxide is one too many. The interim measures at power plants themselves might be simply non-existent, but already smaller inventors are producing a host of commercial applications for CO2 based products, ranging from cement to algae, to plastics. Even if we capture the carbon for transport at a later date, that justifies the start of CCS (with the storage part simply left out or turned into a commercial/financing opportunity). The economic incentive for power plants to quit coal altogether is only strong if the economy thrives. Before the first half of 2008, the price of coal doubled due to massive international demand. Now that the economy is in the doldrums, there’s less of a reason to quit coal in the minds of the energy barons. Prices have returned to “normal levels” which reflect the “abundance of coal” myth. In the future, coal prices might not only climb up again but analysts also expect coal to become more expensive as cap and trade laws or a carbon tax are passed. So yes, the true cost of CCS is still an unknown variable. But one that is pretty much dependent on something we’ve known for a while; continuing as usual is a risk we certainly can’t afford. And there are alternatives whether you like it or not!

### AT: Renewables Tradeoff DA – Energy Boomerang

#### Renewables lead to increased consumption – leads to coal fill-in

--only the plan solves

Zehner 6/12Visiting scholar at the University of California, MS in Science and Technology Studies)(Ozzie Zehner, June 12, 2012, “Solar Cells and Wind Turbines Don't Offset Fossil Fuel Use, According to New Book, Green Illusions,” The Wall Street Journal, [http://www.marketwatch.com/story/solar-cells-and-wind-turbines-dont-offset-fossil-fuel-use-according-to-new-book-green-illusions-2012-06-12)//DR](http://www.marketwatch.com/story/solar-cells-and-wind-turbines-dont-offset-fossil-fuel-use-according-to-new-book-green-illusions-2012-06-12%29//DR). H

BERKELEY, Calif., June 12, 2012 /PRNewswire via COMTEX/ -- Renewable energy technologies do not offset fossil fuel use in the United States according to a new environmental book, Green Illusions (June 2012, University of Nebraska Press), by University of California - Berkeley visiting scholar Ozzie Zehner. In fact, building more solar cells and wind turbines could actually accelerate fossil fuel use unless nations take other steps to avoid a rebound effect. Many renewable energy researchers assume that building solar cells and wind farms will displace coal use and lower carbon dioxide levels. However, Zehner explains that subsidizing renewable energy merely expands energy supplies, which exerts a downward pressure on prices. Energy demand subsequently increases. "This brings us right back to where we started: high demand and so-called insufficient supply," says Zehner. "Historically, we've filled that added demand by building more coal-fired power plants, not fewer." "We create an energy boomerang," Zehner remarked during a recent PBS interview. "The harder we throw energy into the grid, the harder demand comes back to hit us on the head. More efficient solar cells, taller wind turbines, and advanced biofuels are all just ways of throwing harder."

### AT: Renewables Tradeoff DA – China

#### Renewables can’t solve in China

Holmes 11 – Chief Executive and Chief Investment Officer at U.S. Global Investors, (Frank, “Coal Use Shine’s Light on China's Economic Growth”, Market Oracle 5-3, http://www.marketoracle.co.uk/Article27899.html, 7-5-11)//JK

The Chinese government made it clear that it wants to wean the country’s power grid from coal. That’s proven to be a difficult task. China’s 12th Five Year Plan calls for big improvements in energy efficiency and the development of additional sources including natural gas. Massive projects such as the Three Gorges Dam have sought to increase capacity of alternatives, but hydroelectric, nuclear and other renewables combined make up only 10 percent of total power. In addition, low water levels due to a drought in Southern China have reduced current hydroelectric capacity. The ongoing disaster at the Fukushima nuclear plant in Japan has delayed but not squashed China’s nuclear ambitions. The country has plans to build more than two dozen plants by 2020, accounting for 40 percent of new nuclear facilities around the globe. Only time will tell if the effort will be successful. The EIA forecasts that China’s power generation from coal will increase by 2035 but will only account for 62 percent of total power generation at that time. However, the EIA says that absolute coal consumption will nearly double as the economy continues to grow and electricity demand remains strong.

### AT: Renewables Tradeoff DA – Plan => CT Leadership

#### Plan solves clean tech leadership

Harder 10 - energy and environment reporter, National Journal

Amy, “'Clean Coal' Is Essential To U.S.,” http://energy.nationaljournal.com/2010/08/how-viable-is-clean-coal.php#1616515

Clean coal technology is not only viable, it is essential if the United States is going to meet growing energy demands, decrease emissions of greenhouse gases, and hold down consumer costs, while protecting American jobs and our economy. Coal—America’s most abundant domestically-produced energy resource according to the United States Energy Information Administration (EIA) —has long been the dominant fuel to generate electricity in our nation, and advanced clean coal technologies (CCT) will allow coal to be “America’s fuel” for decades to come. First, what do we mean by “clean coal technology?” The term refers to many different technologies that have been developed, or are being developed, by industry—typically in partnership with the U.S. Department of Energy and sometimes the EPA and state agencies—since the 1980s to reduce air emissions from coal-fueled power plants. These emissions include sulfur dioxide, nitrogen oxides, particulate matter, mercury, and carbon dioxide. All of these technologies have achieved – or are expected to achieve – substantial emission reductions, often in excess of 90%. Second, has CCT worked? Absolutely—to the benefit of the environment, electricity consumers, and taxpayers. Over the past thirty years, America’s coal-based electricity providers have invested over $90 billion in technologies to reduce emissions of major air pollutants, while providing affordable, reliable electricity. EPA’s latest analysis shows that sulfur dioxide emissions are 56% lower than in 1980, while nitrogen dioxide emissions are 46% lower during this period—even as the use of coal to generate electricity has almost tripled. Clean coal technologies have played a critical role in these reductions, and investments in CCT to meet new regulations will cut emissions significantly more in the years ahead. Third, can clean coal technologies help address climate concerns? Yes—carbon capture and storage technologies (CCS) will do that. Last week, the President’s Interagency Task Force on Carbon Capture and Storage found “there are no insurmountable technological, legal, institutional, regulatory or other barriers that prevent CCS from playing a role in reducing greenhouse gas emissions.” The task force noted that CO2 has been removed from industrial gas streams for more than sixty years and that we have transported CO2 in pipelines for almost forty years. Further, it is well documented that American businesses have safely stored CO2 underground to extract otherwise unrecoverable oil deposits for more than twenty years. Independent analysis shows that higher costs will be incurred if we are not able to count on CCS. For example, EPA analysis of the Kerry-Lieberman bill concluded that allowance prices would be 34% higher if CCS is delayed. The EIA determined that allowance prices could be 100% higher if enabling technologies – including CCS – turn out to be more expensive than expected. Additionally,the International Energy Agency projected that, without CCS, overall costs to reduce greenhouse gas emissions to 2005 levels by 2050 would increase by 70%. Fourth, can investments in CCT help create new jobs? Yes. Recent analysis by BBC Research & Consulting for four major labor organizations and ACCCE showed that investments in carbon capture and storage technologies could create five to seven million “man-years” of employment during construction and add about 250,000 permanent jobs during operation. Investing in CCS and other clean coal technologies will allow the U.S. to exert global leadership in making the environment cleaner, as well as making America more competitive.

### AT: Electric Cars

#### Electric cars *increase* carbon emissions – studies prove

Moore 10 (Margery, “Electric car use may increase carbon emissions”, 6/23/10, http://www.energyboom.com/transportation/electric-car-use-may-increase-carbon-emmissions)//AMV

New reports suggest that increased use of electric cars may in some areas of the US actually increase carbon emissions. Just when you thought we were on to something that might actually help! Earlier this year, Business Ethics piblished the article, 'Will More Electric Cars Increase Reliance on Coal?' In the article, they report that "upwards of half of all the electricity in the U.S. is derived from coal." The implications of this are clear, **plugging in your electric car will mean it will more than likely be charged by electricity from coal.** And as more electric cars come on the market, maybe more coal will be needed. Similarly, a very interesting article, with great graphics, appreared in a recent issue of Scientific America; it is entitled, "The Coal Truth: Will the Coming Generation of Electric Cars Just Be Coal-Burners, Once Removed?" The article has a map of the USA that clearly illustrates exactly where increase in electric car use could result in higher carbon emissions. The article also indicates that unless we start to source significant amounts of electricity from renewables (solar, wind, etc.), coal-fired plants will not only continue but may actually increase their discharges of mercury, carbon dioxide and other toxins due to greater numbers of electric cars on the road. And we know that many car makers are investing in electric cars. From Ford's all-electric Focus to Nissan's Leaf, to Chevy's Volt, and that does not even include electric vehicle startups like Tesla, Coda, and Fisker. So, that begs the question, where can we buy a solar powered car, right now? Best I could find, in 2006, the Venturi Eclectic was presented at the Paris Auto Show and uses solar and wind energy, but it can only travel up to 30 miles per hour. Probably won't cut it for most North Americans.

#### Electric car use accelerates global warming

Ecoworld 11 (Reporting on issues affecting nature and technology, “Electric Cars Would Cause Added CO2 Emissions in Certain Countries”, 6 Jan 2011, http://www.ecoworld.com/global-warming/electric-cars-would-cause-added-co2-emissions-in-certain-countries.html)//AMV

Electric cars are commonly hailed as eco-friendly alternatives to harmful gasoline-burning vehicles, but a study by Oxford University’s Reed Doucette and Malcolm McCulloch suggests that **the adoption of electric cars may actually accelerate global climate change**. The results of the modeling exercise, which were published in Energy Policy last Fall, indicate that developing countries would emit more, not less, CO2 if electric cars were to eclipse gas-based vehicles. Researchers assessed the emissions of battery electric vehicles (BEVs) and internal combustion engines (ICEs) in various countries. They found that countries with high CO2 intensities – like China and India – failed to see a decrease in heat-trapping gases from the adoption of BEVs. **China and India rely on dirty power supplies, so the generation of energy for BEVs would still be environmentally harmful,** and could actually lead to higher CO2 emissions. “Given the state of their power generation mixes in 2010, the case for widespread adoption of [electric vehicles] in both China and India solely on the basis of potential CO2 emissions reductions is not too compelling, especially when the generally higher capital cost of [electric vehicles] relative to [gasoline]-based vehicles is considered,” Doucette and Malcolm McCulloch concluded.

### AT: Electric Cars

#### No electric cars for 12 years at minimum

Mother Jones 8

[American independent news organization, featuring investigative and breaking news reporting on politics, the environment, human rights, and culture, “the 7 myths about energy independence,” May/June 2008, http://motherjones.com/politics/2008/05/seven-myths-energy-independence?page=2]//SH

Given America's reliance on imported oil, it seems safe to assume that if we succeeded in getting such dramatic reductions, whatever sacrifices we'd made would be more than compensated for by our new immunity to the nastiness of world oil markets. Let Saudi Arabia cut its production. Let Hugo Chávez sell his oil to China. Such maneuvers no longer matter to Fortress America. And yet, no country can really hope to improve its energy security by acting alone. True, cutting our own oil use would bring great things here at home, everything from cleaner air and water to lower noise pollution. But we'd be surprised by how little our domestic reductions changed the rest of the world--or improved our overall energy security. The first problem, once again, is the small-planet nature of energy. America may be the biggest user of oil, but the price we pay is determined by global demand, and demand is being driven largely by booming Asia, which is only too happy to bum any barrel we manage to conserve or replace. Second, any shift to alternatives or better efficiency will take years and perhaps decades to implement. The U.S. car fleet, for example, turns over at a rate of just eight percent a year. That's as fast as consumers can afford to buy new cars and manufacturers can afford to make them, which means that—even in a fantasy scenario where the cars were already designed, the factories retooled, and the workers retrained--it would still take 12 years to deploy a greener fleet.

#### People won’t buy electric cars

Forbes 11

 [American publishing and media company, “Electric Cars are An Extraordinarily Bad Idea,” 9/14/11, http://www.forbes.com/sites/louiswoodhill/2011/09/14/electric-cars-are-an-extraordinarily-bad-idea/2/]//SH

Unfortunately, electric cars are about to do a barrier crash into economic reality, and all the airbags in the world won’t be able to save them. The taxpayers’ $2.4 billion is destined to join Obama’s $535 million investment in solar-panel manufacturer Solyndra at the bottom of the crony-capitalism “stimulus” rat hole. The Nissan Leaf is the first mass-produced “battery electric vehicle” (BEV). It uses state-of-the-art lithium batteries. Despite this, the Leaf makes no sense at all. It costs more than twice as much ($35,430 vs. $17,250) as a comparable Nissan Versa, but it is much less capable. The Leaf accelerates more slowly than a Versa and has only about 25% of the range. At $0.11/KWH for electricity and $4.00/gallon for gasoline, you would have to drive the Leaf 164,000 miles to recover its additional purchase cost. Counting interest, the miles to payback is 197,000 miles. Because it is almost impossible to drive a Leaf more than 60 miles a day, the payback with interest would take more than nine years. However, cost is not the biggest problem with BEVs. On Wednesday, Jan. 26 a major snowstorm hit Washington D.C. Ten-mile homeward commutes took four hours. If there had been a million electric cars on American roads at the time, every single one of them in the DC area would have ended up stranded on the side of the road, dead. And, before they ran out of power, their drivers would have been forced to turn off the heat and the headlights in a desperate effort to eek out a few more miles of range. This illustrates the biggest drawback of BEVs, which is not range, but refueling time. A few minutes spent at a gas station will give a conventional car 300 to 400 miles of range. In contrast, it takes 20 hours to completely recharge a Nissan Leaf from 110V house current. An extra-cost 240V charger shortens this time to 8 hours. There are expensive 480V chargers that can cut this time to 4 hours, but Nissan cautions that using them very often will shorten the life of the car’s batteries. No doubt some conventional cars ran out of gas while trapped in the massive traffic jams that occurred in and around the nation’s capital the night of January 26. However, a two-gallon can of gasoline can get a stalled conventional car moving again in a few minutes. In contrast, every dead BEV would have had to be loaded on flatbed tow truck and taken somewhere for many hours of recharging before it could be driven again. Nissan claims that the range of a Leaf is about 100 miles. However, in their three-month extended road test, Car and Driver magazine obtained an average range from a full charge of 58 miles. Cold weather and fast driving can shorten this to as little as 30 miles. The short and highly variable range of a BEV, coupled with its very long recharging time, creates the phenomenon of “range anxiety”. The car takes over your life. You are forced to plan every trip carefully, and to forgo impromptu errands in order to conserve precious electrons. And, when you are driving your BEV, you are constantly studying the readouts worrying about whether you are going to make it through the day. Reviews of the Leaf are filled with accounts of drivers turning off the A/C in the summer and the heat in the winter. Some drivers even decided that they couldn’t risk charging their cell phones, using the radio, or turning on the windshield wipers. Between subsidies and fuel economy mandates, the federal government may be able to force auto companies to manufacture 1,000,000 electric cars by 2015. However, it won’t be able to force people to buy them. As the economics and operating characteristics of BEVs become more widely understood, interest in BEVs will wane.

### AT: Electric Cars – 1AR Extension

#### Electric cars are prohibitively expensive and impractical – can’t shift

Scientific American 11

 [science magazine, "Why electric cars will fail and have already triumphed," 5/20/11, http://blogs.scientificamerican.com/observations/2011/05/20/why-electric-cars-will-fail-and-have-already-triumphed/]//SH

Such efficiency is a key selling point for electric cars like the Tesla—one buyer in Tesla’s New York City showroom was there to upgrade from a Prius. But electric cars face an extremely difficult simple physics problem: a lithium ion battery can hold 0.72 megajoule per kilogram, which is why the Roadster packs nearly 7,000 lithium ion cells into its battery pack. A kilogram of gasoline holds 35 megajoules. And plenty of expensive oil remains around the globe to feed our internal combustion machines for years to come. Pair that with the vast distances often traversed by the average American motorist—a tank of gas will take you from St. Louis to Chicago, for example, while a cost-effective battery that’s also small enough and light enough to perform a similar trip does not yet exist—and it becomes more clear why electric cars have been killed, again and again, starting in the late 1800s. The Roadster also demonstrates another major hurdle facing electric cars—price. At more than $100,000, the Roadster is a car only for those who can otherwise afford a Ferrari or some other high-end sports car. Hence the fact that roughly 1,700 of them are in private hands in 44 states and 30 countries around the world. Tesla is currently developing its Model S, which will join the Nissan LEAF and Chevy Volt as the family friendly electric cars on the road next year. Yet, all of them cost more than $30,000` per car without any incentives.

### AT: Wind

#### Optimistic projections and massive investment only solves 6 percent of demand

Snead 8 – MS in Aerospace Engineering

Mike Snead, MS in Aerospace Engineering from Air Force Institute of Technology, Past Chair of American Institute of Aeronautics and Astronautics, Former director of Science & Technology, HQ Air Force Materiel Command, Awarded Outstanding Achievement for Excellence in Research @ USAF, 11-19-2008, “The End of Easy Energy and What to Do About It,” http://mikesnead.net/resources/spacefaring/white\_paper\_the\_end\_of\_easy\_energy\_and\_what\_to\_do\_about\_it.pdf

Assuming that the economic life of the wind turbines is 30 years and the construction of the wind farms would be completed by 2050, the annual scale of construction operations for building these wind farms can be estimated. From 2020-2050, an average of about 36 ,000 wind turbines and associated electrical power transmission infrastructure would need to be installed in the United States each year. 72 Once this initial construction is completed, a like number of wind turbines and associated power infrastructure would need to be rebuilt or replaced each year starting in 2051. Estimates for the worldwide potential of wind-generated electricity are extrapolated from these estimates for the United States. This extrapolation assumes that the world potential is 10X that of the United States. Hence, the **optimistic projection** of the worldwide, dispatchable, wind-generated electrical power generation capacity would be 1 ,012 GWe, providing **about 6%** of the needed world 2100 total. The annual hydrogen fuel production from wind-generated electricity would be about 89 Q-BTU or about 9% of the annual need in 2100. The total area 100% covered would be about 1 .74 million sq. mi. and involve the installation of about 11,000,000 wind turbines. The impacted land area would total about 7 million sq. mi., while offshore wind farms would stretch along nearly 100,000 miles of the world’s seashore. The annual number of wind turbines needed to be installed from 2020-2050 would be approximately 360 ,000 per year, with a comparable number replaced each year starting in 2051.

### AT: Nuclear

#### Even massive nuclear expansion only solves 10 percent of energy demand

Snead 8 – MS in Aerospace Engineering

Mike Snead, MS in Aerospace Engineering from Air Force Institute of Technology, Past Chair of American Institute of Aeronautics and Astronautics, Former director of Science & Technology, HQ Air Force Materiel Command, Awarded Outstanding Achievement for Excellence in Research @ USAF, 11-19-2008, “The End of Easy Energy and What to Do About It,” http://mikesnead.net/resources/spacefaring/white\_paper\_the\_end\_of\_easy\_energy\_and\_what\_to\_do\_about\_it.pdf

Nuclear fission is assumed to continue to provide a primary source of dispatchable electrical power. However, constraints on fuel production, fuel reprocessing, waste disposal, and plant siting **will limit** the expansion of nuclear energy. From the current 352 GWe of installed capacity, it is assumed that nuclear fission will expand worldwide by a factor of about 5 to 1 ,754 GWe, such that nuclear energy **would provide 10%** of the world’s 2100 dispatchable generation capacity. In the United States, nuclear energy is assumed to expand from the current 101 GWe to 175 GWe so that it will also provide 10% of the U.S. 2100 dispatchable electrical power generation capacity. World land resources of uranium, based on World Energy Council estimates, could sustain this level of nuclear power for about 116 years without significant fuel reprocessing. This would provide sufficient time for follow on improved nuclear reactor designs; fuel cycles; fuel reprocessing; waste disposal; and, even, nuclear fusion to be developed, fully demonstrated, and safely implemented. Even this modest commitment to the expansion of nuclear energy will entail significant nuclear power plant construction. From 2021-2080, an average of 33 new 1-GWe reactors would need to be made operational worldwide each year. With a 7-year build cycle, about 230 nuclear plants would be under construction each year through 2080 when the initial round of expansion and replacement of current reactors would be completed. Starting in 2081, when the expected 60-year life of these new plants would end, a comparable number of replacement units would then be needed each year through 2140

#### Doesn’t solve warming

**Sovacool\* & Cooper\*\* 8**

Benjamin K.,\* Adjunct Assistant Professor at the Virginia Polytechnic Institute and State University, Research Fellow in the Energy governance program and a former advisor of the US Department of Energy’s climate Technology Program & Christopher\*\*, former Executive Director of the Network for New Energy Choices.

Nuclear Nonsense: Why Nuclear power is no Answer to Climate Change and the World’s Post-Kyoto Energy Challenges,” Scholar

From a climate-change standpoint, nuclear power is not much of an improvement over conventional coal-burning power plants, despite recent claims by the Nuclear Energy Institute that nuclear power is the “Clean Air Energy.”424 Reprocessing and enriching uranium requires a substantial amount of electricity, often generated from fossil fuel-fired power plants, and uranium milling, mining, leeching, plant construction, and decommissioning all produce substantial amounts of greenhouse gas.425 In order to enrich natural uranium, for example, it is converted to uranium hexafluoride, UF6, and then diffused through permeable barriers. 426 “In 2002, the Paducah [uranium] enrichment plant [in Kentucky] released over 197.3 metric tons of Freon[, a greenhouse gas far more potent than carbon dioxide,] through leaking pipes and other equipment.”427 Data collected from one uranium enrichment company revealed that it takes a 100 MW power plant running for 550 hours to produce the amount of enriched uranium needed to fuel a 1000 MW reactor, of the most efficient design currently available, for just one year.428 According to the Washington Post, “[t]wo of the nation’s most polluting coal plants, in Ohio and Indiana, produce electricity primarily for uranium enrichment.”429 When one takes into account the carbon-equivalent emissions associated with the entire nuclear lifecycle, nuclear plants contribute significantly to climate change and will contribute even more as stockpiles of high-grade uranium are depleted. An assessment of 103 lifecycle studies of greenhouse gas equivalent emissions for nuclear power plants found that the average CO2 emissions over the typical lifetime of a plant are around sixty-six grams for every kWh, or the equivalent of some 183 million metric tons of CO2 in 2005.430 If the global nuclear industry were taxed at a rate of $24 per ton for the carbon equivalent emissions associated with its lifecycle, the cost of nuclear power would increase by about $4.4 billion per year.431 The carbon equivalent emissions of the nuclear lifecycle will only get worse, not better, because, over time, reprocessed fuel is depleted necessitating a shift to fresh ore, and reactors must utilize lower quality ores as higher quality ones are depleted.432 The Oxford Research Group projects that because of this inevitable eventual shift to lower quality uranium ore, if the percentage of world nuclear capacity remains what it is today, by 2050 nuclear power would generate as much carbon dioxide per kWh as comparable gas-fired power stations.433 This bears repeating: at current levels of generation, by 2050 nuclear plants will be producing as much greenhouse gas as some fossil fuel plants.

### AT: Biofuels – Uniqueness / Food Prices

**Biofuel development now, and plans for it in the future are minor**

**Timilsina et al. 10.**

Govinda R., Senior Economist at the World bank. John C. Beghin is a Professor of International Agricultural Economics at Iowa State University. Dominique van der Mensbrugghe is a lead economist at the World Bank and Simon Mevel is a research analyst at the World Bank. “The Impact of Biofuel Targets on Land-Use Change and Food Supply: A Global CGE Assessment” December 2010.) World Bank

Considering the size and complexity of the model, we could not exactly incorporate all policy parameters which might affect the quantitative results, particularly in the enhanced scenario. For example, the United States will not subsidize ethanol production after 2015 although several bills have been introduced to extend these subsidies. The current policy in South Africa is to discourage ethanol from corn. In our model the subsidies are provided to biofuels and are not differentiated across feedstocks. Incorporating this policy would reduce the use of corn for ethanol and therefore could lower corn production and land-use for corn. Moreover, we have not accounted for existing distortions in sugar and energy markets. For example, the removal of current subsidies to fossil fuels might provide a level playing to biofuels. Even if we were able to precisely reflect these realities, the key message of the study would not have changed. There are many other similar issues which are beyond the scope of this study but could be interesting topic for further research.

**Expansion of Biofuel increases food prices**

**Timilsina et al. 10**

Govinda R., Senior Economist at the World bank. John C. Beghin is a Professor of International Agricultural Economics at Iowa State University. Dominique van der Mensbrugghe is a lead economist at the World Bank and Simon Mevel is a research analyst at the World Bank. “The Impact of Biofuel Targets on Land-Use Change and Food Supply: A Global CGE Assessment” December 2010.) World Bank

Similarly, there are many questions relating to the long-term impacts of increased biofuels production—how does the expansion affect food availability and prices in the long run? Who would gain and lose from potentially higher commodity and food prices, especially among the heterogeneous poor depending on their net buying or selling status (Winters et al. (2004))? Will biofuel production generate income and reduce poverty despite higher food prices? What are the land supply responses? Our paper examines some of these long-term issues using a global dynamic computable general equilibrium (GDCGE) model augmented with an explicit land allocation module and detailed biofuel production sectors. The GDCGE model is developed in ways to account for the competition between biofuel and food industries for agricultural commodities. The major biofuel feedstock is composed of corn, sugarcane, soybean oil, palm oil, and other vegetable oils and their backward linkages to oilseeds. We do not include second generation or cellulosic biofuels in the study due to limitations in data and their unknown profitability. The approach pays particular attention to productivity gains through increases in yield and to changes in land allocation between various uses between forest land and agriculture and within agricultural uses. Yield assumptions have been contentious in the biofuel literature because of their implications for land expansion (Searchinger et al., 2008; and Keeney and Hertel, 2008). An **expansion of biofuels** would result in diversion of land used for other agricultural commodities towards production of biofuel feedstock. Grassland and forest land could be converted to agricultural land to produce biofuel feedstock. Yield responses to higher prices mitigate these land diversions and reallocations although the exact magnitude of these responses remains uncertain. This uncertainty is an important caveat qualifying our results. We emphasize as well that our results represent estimates of long-term impacts and do not shed light on the potential for and causes of short-term food price crises, such as the one that occurred in 2008.

#### Future investments in biofuel technology will make the problem worse—intervening actors won’t solve

**Bahel\*, Marrouch\*\* and Gaudet\*\*\* 11** (Eric A.\*, Department of Economics @Virginia Tech, Walid\*\*, Business professor @Lebanese American University and CIRANO and Gerard\*\*\*, Department of economics at University of Montreal. “The Economics of Oil, Biofuel and Food Commmodities. February 6th 2011.) <http://ideas.repec.org/p/vpi/wpaper/e07-26.html>

Although the effect on the price path of food of introducing competition for land between food and biofuel productions is clear, it is not so clear whether investing in productivity enhancing measures in the agricultural food sector, as advocated by the UN secretary general during the 2008 food summit, would alleviate the effect of biofuel production on food prices. What the effect of such productivity measures might be turns out to depend in a complex manner on the various parameters involved in the competition for land between the food and biofuel sectors and in the competition on the energy market between the biofuel and fossil fuel sectors: it may or may not alleviate the pressure on food prices, as it may alleviate it in the short term but not in the long term, or vice-versa. Hence the matter remains an entirely empirical one, but an empirical one which certainly deserves further investigation **given its importance** for the so-called “food security" issue.

### AT: Biofuels – Food Prices DA

#### Expansion of Biofuel increases food prices

**Timilsina et al. 10**

Govinda R., Senior Economist at the World bank. John C. Beghin is a Professor of International Agricultural Economics at Iowa State University. Dominique van der Mensbrugghe is a lead economist at the World Bank and Simon Mevel is a research analyst at the World Bank. “The Impact of Biofuel Targets on Land-Use Change and Food Supply: A Global CGE Assessment” December 2010.) World Bank

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 **Increases in biofuel production cause spikes in food prices—empirically proven**

**Bahel\*, Marrouch\*\* and Gaudet\*\*\* 11** (Eric A.\*, Department of Economics @Virginia Tech, Walid\*\*, Business professor @Lebanese American University and CIRANO and Gerard\*\*\*, Department of economics at University of Montreal. “The Economics of Oil, Biofuel and Food Commmodities. February 6th 2011.) <http://ideas.repec.org/p/vpi/wpaper/e07-26.html>

The recent food crisis has become a major concern for world leaders. In June 2008, the World Food Summit organized by the United Nations that took place in Rome raised many questions about the causes of this crisis and what to do about it. Indeed, since the year 2000, major food crop prices have increased for the first time since the 1970s. The prices of corn, rice, wheat as well as other crops reached record highs. According to a recent article by the Economist magazine,1 food accounts in Botswana and South Africa for a fifth of the consumer price index; in Sri Lanka and Bangladesh it accounts for two-thirds. This might explain the violent clashes that took place in several developing countries (Haiti, Cameroon and Egypt, among others) in the wake of the sharp increase in crop prices that occurred in 2007 and 2008. Against this backdrop, a number of explanations for this crisis have been proposed. First, a line of argument attributes the increase in major crop prices to the rising world demand for food, which has not been followed by adequate investments in the agricultural sector. The proponents of this view, namely the UN secretary general, declared that global food output must increase by 50% by 2030 in order to maintain `food security'. However, such an argument suffers from a drawback. While the lack of investments in agriculture has been a long-term structural problem ever since the end of the first green revolution' of the 1960s and 70s, it is the case that the recent rise in crop prices has been sharp and dramatic. An alternative view considers that the recent development of the biofuel industry has a lot to do with the food crisis. Advocates of this view include a number of specialized NGOs and renowned international research organizations, like the International Food Policy Research Institute (IFPRI). According to the IFPRI, biofuels account for up to 30% of the increase in the price of agricultural commodities. From 1999 until the summer of 2008, both global energy demand and fossil fuels prices have been steadily rising.2 This has caused pressure for the development of biofuels as an alternative source of energy.3 This was not the case during the 1990s, when the fossil fuel price was too low to allow for the economic viability of this renewable resource. This increase in the demand for biofuels has generated a `crowding-out effect' in the agricultural sector. Many argue that scarce agricultural resources are being diverted away from food production towards the production of biofuels, which results in a reduction in global crop supplies. The fact that the prices of oil and food commodities have both tumbled during a period of time following the last quarter of 2008 also suggests that, during the current decade, both prices have become highly positively correlated. In this paper we investigate, within a reasonably tractable model, the mechanisms through which these two markets are linked and how the development of the biofuel industry has affected the correlation between energy and food prices. The model also allows us to look at the possible impacts on food and energy prices of improving land use in either food or biofuel production. As we will show, those impacts are complex and difficult to predict without some careful empirical analyses.

**Biofuel production raises food prices**

**Bahel\*, Marrouch\*\* and Gaudet\*\*\* 11** (Eric A.\*, Department of Economics @Virginia Tech, Walid\*\*, Business professor @Lebanese American University and CIRANO and Gerard\*\*\*, Department of economics at University of Montreal. “The Economics of Oil, Biofuel and Food Commmodities. February 6th 2011.) <http://ideas.repec.org/p/vpi/wpaper/e07-26.html>

The object of this paper has been the study of the effects on the food sector of the recent development of biofuels as a substitute for fossil fuel in the supply of energy. We have shown how competition for the finite land resource, which takes place between biofuel and food production, explicitly defines a relationship between the energy price and the food price. The rate of depletion of the oil stock may at first increase if population is growing, but it will eventually decrease to zero as the stock gets exhausted. The price of energy will however increase continuously while the stock of oil is being depleted, due to the decline of the remaining per capita stock of oil, and this whether population is growing or constant. If population is growing, it will keep increasing after biofuel becomes the only source of energy. As for the food price, it is also increasing. Two effects account for this growth in the price of food. Firstly, the increase in the energy price raises the opportunity cost of the use of land for food production, creating an incentive for farmers to reallocate their land in favor of biofuel production. Secondly, population growth increases the demand for food, thus pushing upwards the equilibrium price in the food market.

**Multiple statistical models prove that an increase in biofuels decreases food supply thus increasing prices**

**Timilsina et al. 10**. (Govinda R., Senior Economist at the World bank. John C. Beghin is a Professor of International Agricultural Economics at Iowa State University. Dominique van der Mensbrugghe is a lead economist at the World Bank and Simon Mevel is a research analyst at the World Bank. “The Impact of Biofuel Targets on Land-Use Change and Food Supply: A Global CGE Assessment” December 2010.) World Bank

Food supply includes direct consumption of crops, fruits and vegetables, and livestock, and processed food. The composition of the food supply changes however, since the shares of livestock products, sugar, and some grains decrease the most. This global effect does not exclude stronger localized effects when feedstock and food use directly compete locally and with costly transportation. Nevertheless regional trade within a country should help dampen these potential effects. If biofuels are produced locally, trade costs must have been reduced for all commodities and arbitrage in food markets would take place if local commodity prices rise significantly. In 2020, under the ET scenario, world food supply decreases by $14.1 billion or 0.2% from the corresponding food supply in the baseline. Under the AT scenario, the reduction in food supply is about half as large (see figure 11). Note that the percentage reduction in food supply is estimated to be negligible, particularly in a dynamic context. This is due to a large base as we include the entire food sector, including cereals, processed food and livestock. Considering only cereals, Fischer et al. (2009) show that expansion of biofuels to meet the existing targets would cause a reduction in a range of 8-29 million tons of reduction in food supply in 2020 relative to their reference case. In the reference case, they projected that the total consumption of cereals in year 2020 to be 2,775 million tons. This implies that the reduction of food supply would be 0.29% to 1.05% relative to the base case. There are several reasons for the different results. The most important among them is that Fischer et al. fixed the penetration biofuels in year 2020 at the level of 2008 in the reference case, whereas our model allows the penetration of biofuels to increase in reference case due to existing fiscal incentives.

### AT: Biofuels – Deforestation DA

#### Biofuels lead to massive deforestation

Timilsina et al. 10. (Govinda R., Senior Economist at the World bank. John C. Beghin is a Professor of International Agricultural Economics at Iowa State University. Dominique van der Mensbrugghe is a lead economist at the World Bank and Simon Mevel is a research analyst at the World Bank. “The Impact of Biofuel Targets on Land-Use Change and Food Supply: A Global CGE Assessment” December 2010.) World Bank

Our study shows that land use allocation between forest, pasture and crops, would be significantly altered, and leads to considerable forest and pasture destruction in several countries, especially under enhanced targets. Vast expansion of biofuel does lead to global forest losses of about 26.3 million hectares in 2020 under enhanced targets. Once targets are reached, technical progress eventually would reduce the reliance on land to expand agricultural output and forest land could be regained in the longer run. Within the expanded crop land uses, we obtain large effects in several countries implementing large biofuel targets. The general tendency is to expand land devoted to feedstock crops (sugar crops, coarse grains and, low quality grains for ethanol; oilseeds for vegetable oil for biodiesel). Again, these effects are large in 2020, because they correspond with the expansion phase of the targets. In the longer run, one would expect that the land expansion would recede and productivity gains would reduce the long term use of land induced in the medium term and the short term constraint on food supply would be reduced. Sugar crops and oilseeds expand the most.

#### Extinction

**Prance ’91** (Ghillean, Former Director of the Royal Botanical Gardens, Climatic Change, “A COMMENTARY ON: TROPICAL FORESTS: PRESENT STATUS AND FUTURE OUTLOOK”, 19:33-35, Springer)

If what we read here is true, and there is no reason to think otherwise, then the future of tropical forests is poor and should be a major concern of all students of climate change. If deforestation continues at the rate predicted, it will continue to be a major contributor to the net increase of atmospheric carbon dioxide, and therefore to climate change. Alterations to the boundaries between tropical forests and savanna should be a good way of monitoring the effects of climatic change upon vegetation. Historic data from palynology (e.g., Van der Hammen, 1974; Livingstone, 1982) have shown that during the Pleistocene and Holocene, small changes in temperature and rainfall greatly altered the distribution of tropical forests and savanna and of treeline level in the Andes. Climate change could also be an added factor in the reduction and distribution of tropical forest. It is a pity that deforestation is likely to obscure the boundaries and to render the study of changes in forest/ savanna margins less useful as a monitoring device for the effect of climate change. As a biologist, I am most concerned with the genetic implications of the loss of tropical rainforest. The loss of so many species will certainly weaken the possibilities of human survival on the planet. With the loss of species, we lose the wild relatives of many species of proven economic value such as rubber, coffee, mahogany or cacau upon which the future of the crop may depend. We also lose species which have not yet been used but which certainly have economic potential as medicines, foods, fibres and other useful products. The erosion of our genetic heritage should be of as much concern as the climate change aspect of deforestation. Myers correctly stresses in several places in his paper the prime cause of deforestation, the increase in world population beyond sustainable limits As populations increase, the importance of the preservation of genetic diversity also increases because we will depend upon it more to feed the hungry and to avert epidemics of disease by discovering a diversity of new medicines. However, the increase in population and the maintenance of species diversity appear to be incompatible. It would surely be prudent to get to the root of the problem quickly and work harder on population planning.

### AT: Steel DA – Prices High

#### Steel prices are rising now – that destroys infrastructure and halts all steel construction

WSJ, 08 – Wall Street Journal, (“Fast-Rising Steel Prices Set Back Big Projects”, Wall Street Journal, May 15, 2008, http://online.wsj.com/article/SB121080981399493567.html?mod=hpp\_us\_whats\_news)//JK

Relentless increases in the price of steel are halting or slowing major construction projects world-wide and investments in shipbuilding and oil-and-gas exploration, setting the stage for a potential backlash against steelmakers. In Turkey, a construction association said this week it will begin a 15-day strike in eight cities Thursday to press steelmakers to cut their prices, which have more than doubled locally since late last year. In New Delhi, India, an ambitious bridge project has been put on hold because of steel-related cost overruns, and contractors are postponing or reining in construction of much-needed housing for the poor, prompting the Indian government to freeze steel prices for the next three months. Venezuela, aiming to control prices, renationalized its largest steelmaker and is limiting exports. Oil executives in the U.S., meanwhile, say costly steel is threatening their energy exploration efforts. Globally, steel prices are up 40 percent to 50 percent since December, and industry executives say they haven't hit their peak. On Wednesday, ArcelorMittal, the world's largest steelmaker by volume, boosted prices by 120 euros ($186), or 20 percent, a metric ton in Europe, citing increases in its own costs from iron ore to energy and transportation. "We have not yet seen that prices have peaked, what we have seen is the costs increasing every month," said ArcelorMittal Chief Executive Lakshmi Mittal on a conference call with reporters. Iron-ore prices have risen 71 percent this year. Two other crucial steelmaking ingredients, coking coal and scrap steel, have doubled in price. The run-ups are part of a broader surge in raw-materials prices amid tight supplies and soaring global demand, fueled in part by the rapid industrialization of China, India and other developing nations. ArcelorMittal said Wednesday that its earnings grew 5.4 percent to $2.37 billion in the first quarter from $2.25 billion a year earlier. Both sales and shipments grew sharply as the Luxembourg-based company sold more steel in emerging markets. The world's voracious appetite for steel shows little sign of easing. In Turkey, a new shipyard, once completed, will need 100,000 tons of steel a year. And demand in the U.S. is rising, despite a sluggish economy. While still in a position of pricing power, steelmakers are concerned that over time, their high prices will affect sales. "There will be impact on demand, and that is not a good development for the steel industry," said Aditya Mittal, chief financial officer of ArcelorMittal, on a separate conference call. As a result, steelmakers are taking steps to cut their costs. To shield themselves from higher raw-material prices, more of them are acquiring their own iron-ore and coal mines or deposits, as well as producers of scrap steel. Nippon Steel Corp. and other Japanese steelmakers announced this month that they would accelerate cost-cutting efforts, which could include layoffs and developing cheaper steel substitutes. The industry is also consolidating, which should allow producers to become more efficient and gain economies of scale that could ultimately result in more pricing stability and fewer, larger players. In recent months, India's Tata Steel Ltd. and Essar Steel Holdings Ltd. have made major acquisitions, as have Russia's Evraz Group SA and Sweden's SSAB Svenskt Stoal AB. Even so, the world's top-five steelmakers still account for just 18 percent of the world's steel supplies. Some steelmakers also are experimenting with ways to make their products less expensive, in an effort to keep customers from switching to less-expensive substitutes like aluminum or high-strength plastics. Finnish stainless-steel maker Outokumpu Oyj, which makes steel for appliances, has come up with a way to reduce the nickel content of its stainless steel to make it cheaper. But until such changes take hold, steel prices will likley continue to increase. Builders recently warned officials in Turkey, which rests in an earthquake zone, that rising steel prices have prompted some contractors to use cheaper, inferior-grade steel, threatening the quality of their buildings. Some nations, meanwhile, are hoarding steel by erecting export barriers. Last week, India imposed a 15 percent duty on exported steel. Countries that don't make enough of the metal are slashing import taxes in an effort to attract more. Last month, Iran announced it was lowering its import tax on rebar steel, used in new buildings and roads, to 9 percent from 20 percent. The impact of high steel prices is rippling through industries from shipbuilding to energy exploration. Shipbuilders, who buy vast quantities of high-end plate steel are getting hammered, and analysts say steel-supply problems are slowing the pace of construction, especially at smaller shipyards like South Korea's Daewoo Shipbuilding & Marine Engineering Co. In April, an executive of Royal Dutch Shell PLC told a House committee that steel, which is needed to make drilling equipment and pipelines, and other raw-material costs were hampering efforts to find new energy sources. These costs "are a major challenge for oil and gas companies and are contributing to the delays and postponements of many projects," according to Cambridge Energy Research Associates, a leading energy-research company. Cellphone users could eventually feel the pinch. Eric Steinmann, development manager at wireless carrier NTCH Inc., which operates under the Clear Talk brand, says steel costs for each of the about 100 cellphone tower poles his company builds annually doubled to about $30,000 last year. Robert Griggs, owner of Missouri-based Trinity Products Inc., a maker of steel pipes, tubes and rebar for bridges, said he tells his customers he can only guarantee prices for two weeks. Last year, it took six months for steel prices to rise $100 a ton, he said. Now, prices are moving that much in a month. Shifting to lower cost materials isn't an easy option for steel buyers, either. It takes years to retool auto and appliance stamping and dye machines, currently engineered for steel products. Also the cost of alternatives, such as aluminum and certain plastics, is increasing.

### AT: Steel DA – Link Turn

#### Turn – low energy prices are *key* to the steel industry

Hawa, 06 – columnist for the Journal of Agroalimentary Processes and Technologies, B.A. in engineering from the University of Virginia, (Balat, “Role of coal in sustainable Energy Development, “Energy Exploration & Exploitation”, International Energy Agency, 2006, http://www.iea.org/work/2006/gb/papers/ChinaCoal.pdf)//JK

Coal is the one fossil energy source that can play a substantial role as a transi- tional energy source as one moves from the petroleum and natural gas based economic system to the future economic system based on nondepletable or renewable energy systems. For coal to remain competitive with other sources of energy in the industrialized countries of the world, continuing technological improvements in all aspects of coal extraction have been necessary. Coal has many important uses, but most significantly in electricity generation, steel and cement manufacture, and industrial process heating. Despite the long-term importance of oil and gas use, coal will remain a major pillar of the world’s energy supply. Developing countries use about 55% of the world’s coal today; this share is expected to grow to 65% over the next 15 years. The main objective of the present study is to investigate the contribution of coal to global energy demand and its share in global energy sources by presenting its historical development. In addition, this paper describes and summarizes environmental impacts of coal consumption and present status of several clean coal technologies. Energy demand forecasting is one of the most important policy tools used by the decision makers all over the world [1]. Coal is the one fossil energy source that can play a substantial role as a transitional energy source as one moves from the petroleum and natural gas based economic system to the future economic system based on non- depletable or renewable energy systems [2]. Coal is divided into four classes: lignite, sub-bituminous, bituminous, and anthracite. Coal has many important uses, but most significantly in electricity generation, steel and cement manufacture, and industrial process heating. In the developing world, the use of coal in the household, for heating and cooking, is important [3]. Table 1. The world recoverable coal reserves at end 2005 (million tons) Subbituminous Anthracite Country and lignite and bituminous USA 135,305 111,338 Total 246,643 227,254 114,500 92,445 78,500 48,750 100,972 909,064 Share of total (%) 27.1 25.0 12.6 10.2 8.6 5.4 11.1 100.0 FSU 132,741 China 52,300 India 2,360 Australia 39,900 94,513 62,200 90,085 38,600 48,750 33,285 430,293 South Africa Rest of world Total world *Source:* Ref. [5] - 67,687 478,771 Coal seems to continue its indispensable position among the other energy sources for many years because of its production in more than 50 countries, the least effect it has from the price fluctuation and its usage lifespan of more than 200 years. The countries that are aware of it have investments in mining fields in the countries rich in coal reserves, and they continue investing considerable amounts of money [4]. As shown in Table 1, total recoverable reserves of coal around the world are estimated at 909 billion tons [5]. Recoverable reserves are those quantities of coal which geological and engineering information indicates with reasonable certainty can be extracted in the future under existing economic and operating conditions [3]. Coal deposits are widely distributed, 64.7% of the world’s recoverable reserves are located in three countries: the United States (27.1%), FSU (25%), and China (12.6%). Another three countries - India, Australia, and South Africa - account for an additional 24.2% (see Table 1).

### AT: T – “Substantial”

#### We meet

Mack and Endemann 10 - \* partner in the Houston office and global Chair of the Environmental Transactional Support Practice, provides over 25 years of experience advising on the transactional, environmental and regulatory issues associated with all sectors of the oil and gas industry, power (including both fossil and renewable energy), mining and chemical industries in the United States and abroad, in addition to the development, financing and entitlements for telecommunications and other industrial and public infrastructure facilities in the United States and offshore, \*\*JD, Faculty @ USD Law, provides comprehensive environmental counseling on energy and infrastructure projects, and represents clients in related litigation

Joel and Buck, “Making carbon dioxide sequestration feasible: Toward federal regulation of CO2 sequestration pipelines,” Energy Policy, http://lw.com/upload/pubContent/\_pdf/pub3385\_1.pdf

As another supporting argument, one should consider the costs associated with such a pipeline program. The Congressional Research Service estimated the costs of such an expansion program to be substantial. For example, building a CO2 trunk line from North Carolina to the Gulf Coast and Appalachia, even if using existing rights of way, would cost approximately $5 billion dollars. Rising labor and materials costs are estimated to be at least $800,000 per mile of installed pipeline (Parfomak and Folger, 2008). In the absence of a coordinated, preemptive federal effort, competing state programs could drive the development costs (including the cost of raw materials and pipe stock) even higher, further impeding any national program to reduce carbon impacts and ultimately increasing the cost to the American public to achieve such objectives.

#### Contextual evidence

Mack and Endemann 09Latham & Watkins, international law firm (Joel Mack, Buck B. Endemann, October 2, 2009, “Making carbon dioxide sequestration feasible: Toward federal regulation of CO2 sequestration pipelines,” [http://lw.com/upload/pubContent/\_pdf/pub3385\_1.pdf)//DR](http://lw.com/upload/pubContent/_pdf/pub3385_1.pdf%29//DR). H

As the United States moves closer to a national climate change policy, it will have to focus on a variety of factors affecting the manner in which the country moves toward a future with a substantially lower carbon footprint. In addition to encouraging renewable energy, smart grid, clean fuels and other technologies, the United States will need to make substantial infrastructure investments in a variety of industries. Among the significant contributors to the current carbon footprint in the United States is the use of coal as a major fuel for the generation of electricity. One of the most important technologies that the United States can employ to reduce its carbon footprint is to sequester the carbon dioxide (‘‘CO2’’) from coal-fired power plants. This article focuses on the legal and policy issues surrounding a critical piece of the necessary sequestration infrastructure: CO2 pipelines that will carry CO2 from where it is removed from fuel or waste gas streams to where it will be sequestered. Ultimately, this article recommends developing a federally regulated CO2 pipeline program to foster the implementation of carbon sequestration technology.

#### More evidence

Horne 10 – JD @ U of Utah

Jennifer, “Getting from Here to There: Devising an Optimal Regulatory Model for CO<2> Transport in a New Carbon Capture and Sequestration Industry,” 30 J. Land Resources & Envtl. L. 357, Lexis

Geographic realities will almost certainly require a pipeline network that reaches many more places than the existing EOR network. Estimates for how large [\*361] a pipeline network must be to accommodate the needs of a fully functional CCS industry vary widely. One conservative estimate is that CO<2> pipeline capacity will need to double to roughly 8,000 miles over the next fifteen years. 21 However, broad commercial deployment of CCS may demand a pipeline network roughly the size of the natural gas pipeline system 22 - approximately 300,000 miles of pipeline. 23 By either estimate, the build-out would be substantial.

#### It’s substantial

Parfomak and Folger 8

Parfomak: Specialist in Energy and Infrastructure Policy, Folger: Specialist in Energy and Natural Resources Policy (Paul W. Parfomak, Peter Folger, January 17, 2008, “Carbon Dioxide (CO2) Pipelines for Carbon Sequestration: Emerging Policy Issues,” [http://www.marstonlaw.com/index\_files/Emerging%20Policy%20issues%20for%20CO2%20pipelines%202008%20CORRECTED%20(2008-01-17%20(No%20RL33971).pdf)](http://www.marstonlaw.com/index_files/Emerging%20Policy%20issues%20for%20CO2%20pipelines%202008%20CORRECTED%20%282008-01-17%20%28No%20RL33971%29.pdf%29)//DR. H

In the 110th Congress, there has been considerable debate on the capture and sequestration aspects of carbon sequestration, while there has been relatively less focus on transportation. Nonetheless, there is increasing understanding in Congress that a national CCS program could require the construction of a substantial network of interstate CO2 pipelines. The Carbon Dioxide Pipeline Study Act of 2007 (S. 2144), introduced by Senator Coleman and nine cosponsors on October 4, 2007, would require the Secretary of Energy to study the feasibility of constructing and operating such a network of CO2 pipelines. The America’s Climate Security Act of 2007 (S. 2191), introduced by Senator Lieberman and nine cosponsors on October 18, 2007, and reported out of the Senate Environment and Public Works Committee in amended form on December 5, 2007, contains similar provisions (Sec. 8003). The Carbon Capture and Storage Technology Act of 2007 (S. 2323), introduced by Senator Kerry and one cosponsor on November 7, 2007, would require carbon sequestration projects authorized by the act to evaluate the most cost-efficient ways to integrate CO2 sequestration, capture, and transportation (Sec. 3(b)(5)). The Coal Fuels and Industrial Gasification Demonstration and Development Act of 2007 (S.2149) introduced by Senator Dorgan on October 4, 2007, would allow accelerated depreciation for certain new CO2 pipelines. The Energy Independence and Security Act of 2007 (P.L. 110-140) signed by President Bush, as amended, on December 19, 2007, requires the Secretary of the Interior to recommend legislation to clarify the appropriate framework for issuing CO2 pipeline rights-of-way on public land (Sec. 714(7)).

#### It’s a “very large” investment – 14 billion

Fritze 9 – MA, PhD Candidate

Kevin, “Modeling CO2 Storage Pipeline Routes in the United States,” http://dukespace.lib.duke.edu/dspace/bitstream/handle/10161/985/Fritze\_MP\_Final\_042409.pdf?sequence=1

As figure 15 indicates, if the cost per mile of pipeline is the same, building a trunkline does reduce the cost to individual plants of connecting to the storage network. However, more money would be spent building the trunkline than would be saved by individual plants. The trunkline’s additional benefits besides cost savings to individual plants might justify this expenditure though. Network flexibility and redundancy could provide cost savings in case of an emergency or if a storage basin reaches capacity and cant accept new CO2 sources. The cost of the trunkline, assuming all pipelines are the same diameter, accounts for approximately 10% of the total cost of each pipeline network. The shortest network, if totally constructed of 20 inch diameter pipe, would cost approximately $14,489,718,900 to build. This is a very large infrastructure investment, and all of the other pipeline networks examined in this analysis are more costly than this network. This figure is likely a low estimate because some pipeline segments will have larger diameter pipes to accommodate high flow volumes and thus be more costly to build The pipeline modeling results indicate that building a trunkline increases the overall length of the network but decreases the length of pipelines that need to be built by individual plants. The costs of building a trunkline seems to outweigh the cost savings for individual plants, but the costs are difficult to accurately compare because all the pipelines are assumed to be the same diameter, which is not likely to be the case in reality. The trunkline may need to be multiple parallel pipes of large diameter, and many of the connections from individual plants to the trunkline would likely be multiple pipes or larger diameter to accommodate the captured emissions from upstream plants. Information about the diameter of individual pipeline segments is needed to obtain more accurate cost estimates. Regardless of whether a trunkline is built or not, a nationwide CO2 pipeline network will be a huge undertaking. A very large amount of CO2 will be captured and stored, and the investment needed to construct the transportation network for that carbon will be enormous. The cost estimates presented in this analysis are most likely a significant underestimate of the actual cost of such a network. Policy makers need to appreciate the potential economic impacts of building such a large network when they are debating carbon and CCS related legislation.

### AT: T – “TI”

#### Interpretation: topical affirmatives must invest in road, rail, air, pipelines or terminals under Department of Transportation jurisdiction

Church 3 – Professor @ UCSB, Board of Directors @ WSRA

et al – Professor Rick Church of UC Santa Barbara and has just been elected to the Board of Directors of the Western Regional Science Association (WRSA). Founded in 1961, the WRSA is an international multidisciplinary group of university scholars and government and private-sector practitioners dedicated to the scientific analysis of regions. The rest of the CTI panel includes: Bruce Ralston, University of Tennessee; Jeff Western, Director of Infrastructure Security, Wisconsin DOT; Benjamin Zhan, Texas State University-San Marcosl Meetings — CTI 2003 – Critical Transportation Infrastructure – Specialist Meeting, 2003 December 1-2 – http://www.ncgia.ucsb.edu/ncrst/meetings/20031201SBA-CTI2003/first.html

There are many classes of infrastructure — a background page on CIP enumerates these. Our focus is on transportation infrastructure, recognizing that algorithmically, methods developed for one class of infrastructure may be adaptable to another. There is also a focus on spatial attributes of the transportation system, i.e. geographic and topological characteristics of the transportation links and the places (nodes) served by them, and an emphasis on spatial technologies such as remote sensing and GIS. Transportation infrastructure includes for our purposes

road, rail, air and waterway infrastructure

pipelines

terminals, intermodal facilities and warehouses delivery systems

control systems infrastructure provisions to serve needs of critical hazardous/non-hazardous materials in transit

This meeting brings together a small group (about 35) of public/private sector experts and academics. Over two days of presentations, demonstrations and discussions, we shall explore a variety of perspectives, with the aims of (a) broadening participants' appreciation of the many facets of the issue, (b) stimulating cross-cutting research, and (c) synthesizing problem/research approaches into a framework. Following the meeting we will publish a web-based and/or printed compilation of papers. Three speakers will be selected for a special CTI-CIP session of the Transportation Research Board (TRB) annual meeting in Washington DC, 2004 January 11-15.

#### The DoT is a key brightline – they establish transportation policy

USA Gov 12

http://www.usa.gov/Agencies/Federal/Executive/Transportation.shtml

The Department of Transportation establishes the nation's transportation policy. It oversees highways, mass transit, railroads, aviation, ports, pipelines, and more.

#### We meet – the plan facilitates pipelines under DoT jurisdiction

Nordhaus and Pitlick 9 - \*JD, Faculty @ Georgetown Law, general council to FERC, \*\* Associate at Van Ness Feldman

Robert and Emily, “CARBON DIOXIDE PIPELINE REGULATION,” Energy Law Journal, http://www.felj.org/docs/elj301/85\_-\_nordhaus\_and\_pitlick.pdf

Safety regulation of CO2 pipelines is clearly established and does not suffer from the same uncertainties as economic regulation of those pipelines. The U.S. Department of Transportation‘s Pipeline and Hazardous Materials Safety Administration (PHMSA) has primary authority to regulate interstate CO2 pipelines under the Hazardous Liquid Pipeline Act of 1979. 75 Within the PHMSA, the Office of Pipeline Safety (OPS) regulates the design, construction, operation, maintenance, and spill response planning for regulated pipelines. 76 The PHMSA establishes minimum safety standards for interstate pipelines, and has largely preempted states from establishing their own standards for interstate pipelines. 77

#### This is distinct from *energy* infrastructure

Monast 8 - \*PhD, Director of the Climate and Energy Program at Duke University’s Nicholas Institute for Environmental Policy Solutions

Jonas, “From Carbon Capture to Storage: Designing an Effective Regulatory Structure for CO2 Pipelines,” http://www.nicholas.duke.edu/ccpp/ccpp\_pdfs/co2\_pipeline.pdf

The Surface Transportation Board (STB) and the Federal Energy Regulatory Commission (FERC) are responsible for pipeline regulation on the federal level for issues other than pipeline safety. The STB has limited authority over interstate pipelines transporting “a commodity other than water, gas, or oil.” The FERC has authority over interstate pipelines carrying natural gas or oil, although the specific regulatory powers differ for the two types of pipelines. In each circumstance, post‐construction pipeline safety is governed by the Department of Transportation’s Office of Pipeline Safety (OPS). The OPS has specific jurisdiction over CO2 pipelines. Regulation of pipeline construction, transportation rates, and operation of CO2 pipelines—especially CO2 piped as a waste product destined for storage— falls into a gray area at the federal level. It is generally accepted that the STB has jurisdiction over CO2 pipelines, but that authority has not been tested. Furthermore, the limited regulatory regime covering CO2 pipelines occurred by default and not as a result of a deliberate congressional or administrative decision. Instead, the legal framework that granted jurisdiction over oil and natural gas pipelines to the FERC and jurisdiction over other pipelines carrying other commodities to the STB was established long before the concept of CCS existed. Given the rapid expansion of CO2 pipelines expected in the coming years as industry begins deploying CCS technologies to reduce GHG emissions, it is prudent for regulators to take a fresh look at the appropriate regulatory structure(s) to govern CO2 pipelines.

Here’s contextual evidence

#### Reasons to prefer:

#### a) brightline that excludes military and energy

#### b) contextual evidence

Svennson et al 5 – R and D analyst @ Vattenfall

Rickard, Transportation Infrastructure for CCS – experiences and expected development, http://uregina.ca/ghgt7/PDF/papers/poster/350.pdf

Introduction

CO2 Capture and Storage (CCS), i.e. capture and storage of carbon dioxide (CO,) emitted from large point sources of emissions, has the potential of a significant and relatively quick response to climate change at reasonable cost. In order to reach widespread commercialization of CCS it is crucial to demonstrate the concept in large-scale projects, reduce costs, build infrastructures for transportation of C02, establish a legal framework and reach acceptance by the public. Most research on CCS deals with capture technologies and storage possibilities (e.g. in connection to Enhanced Oil Recovery (EOR) projects and in saline aquifers). This, since capture represents the highest cost and storage is critical with respect to long-time security and monitoring. Still, there is a need to identify and structure transportation alternatives in order to analyse and evaluate future paths comprising CCS. In a previous work on transportation of C02 [1] the costs and capacities have been investigated by means of analysing type scenarios for different means of transportation, i.e. truck, train, ship and pipeline. It was concluded that transportation by means of pipeline and ship gave feasible logistics and costs. Still, there were large variations in costs depending on the scenario studied (amount of CQ2 transported). The present paper continues the previous work with the aim to illustrate how a CCS transportation infrastructure can be developed applying pipeline and ship transportation. Pipeline transportation Previous Experiences CQ2 pipelines have been in use since the early 1970s in the linhanced Oil Recovery (EOR) industry. The first C02 pipeline construction was completed in 1972 when the Canyon Reef Carriers (CRQ built a 354 km C02 pipeline to the SACROC oilfield in Texas, USA. The largest existing CQ2 pipeline is the 808 km long Cortez pipeline from Cortez in Colorado to Denver City in Texas, which was put into operation in 1984. The Cortcz pipe line is made of API 5LX-65 carbon steel with a diameter of 762 mm [2], delivers about 20 Mt of C02 per year to the C02 hub in Denver and constitutes an important part of the C02 infrastructure that delivers C02 to the oilfields in Texas, Examples on other C02 pipelines in use arc the 330 km long Weybum pipeline, the 648-km long Sheep Mountain pipeline and the 338-km long Bravo pipeline. Design of a C02 pipeline Existing large-scale C02 pipelines are all designed for dense phase/supercritical conditions, i.e. a O02 pressure above 7.38 MPa. This gives a high density compared to gas transmission and material requirements for cryogenic conditions and frost heave arc avoided. When using C02 forliORthe miscibility pressure of O02in oil becomes important. The miscibility pressure of C02 in oil is usually above 8.3 MPa and often as high as 16-20 MPa and the delivery pressure of the C02 at the injection site is therefore often set at a relatively high level, i.e. a C02 pressure above 10 MPa. To maintain the O02 at this condition, typical operational intervals for temperature and pressure of the C02 are 15-30\*0 and 10-15 MPa, respectively [3], However, due to the special properties of CQ2 it is not easy to maintain the C02 within such intervals. Pipelines suffer from pressure drops and to maintain the pressure between 10-15 MPa, recompression stations must be installed along the route, further, the compressibility and density of O02 show strong, nonlinear dependence on the pressure and temperature, which make it difficult to fully predict the C02 flow. At the critical point of C02 (738 MPa and 31"C) a small change in temperature or pressure yields a large change in density, e.g. the density doubles with a change in temperature from 47 to 37\*0 at a constant pressure of 9.0 MPa. Thus, due to that the flow behaviour for C02 is complicated to predict, the calculations of the hydraulic characteristics for pipeline transportation of C02 is important Small amounts of impurities also affect the properties of C02, e.g. small additions of methane (CH4) affect the vapour pressure of C02 [5]. Other impurities which normally occur arc H2S, C2, N2 and water (H20), which all change the 002 properties and therefore need to be reduced to levels that can be handled. Among these impurities, water is most critical since C02 in equilibrium with liquid water form an acid gas that causes so called sweet corrosion, and that C02 in presence of water form hydrates (solid ice-like crystals), which can plug equipment and flow lines, fouling heat exchangers etc [6]. These problems make it necessary to dehydrate the C02 to low water contents. The maximum allowable water content in the C02 flow is typically 0.4x10-3 kg'm3n [5], although this figure depends on the amount of other impurities. Thus, it is recommended that the allowable water content at the proposed operating conditions is determined experimentally [6]. If possible, a common standard for levels of impurities in the C02 fluid should be established. The other main impurity that must be considered in EOR projects is H2S. This, since H2S is dangerous to life at concentrations as low as 300 ppm. In existing C02 pipelines, the H2S concentration has been limited to less than 100 ppm in the CQ2 flow [4]. Ship transportation Experiences Transportation of commodities by ship has always been very cost-effective due to the large loading capacity. Experiences of large-scale ship transportation of C02 are limited with previous applications mainly found in the food and brewery industry with amounts transported in the range of some 100,000 tons of CO, annually, i.e. much smaller quantities than the amounts associated with CCS [1]. Since the transportation conditions for C02 showr similarities with Liquefied Petroleum Gas (LPG) [8], which is transported by ship at a relatively large scale, experiences and design criterion for LPG shipping can be used in the establishment of a large-scale C02-transportation infrastructure. Ship transportation Experiences Transportation of commodities by ship has always been very cost-effective due to the large loading capacity. Experiences of large-scale ship transportation of C02 arc limited with previous applications mainly found in the food and brewery industry with amounts transported in the range of some 100,000 tons of CO, annually, i.e. much smaller quantities than the amounts associated with CCS [1]. Since the transportation conditions for C02 show similarities with Liquefied Pelroleum Gas (LPG) [8], which is transported by ship at a relatively large scale, experiences and design criterion for LPG shipping can be used in the establishment of a large-scale C02-transportation infrastructure. Ship transportation Existing 002 ships are designed for transporting 002 in the liquid phase at a pressure between 1.4 to 1.7 MPa and at a temperature interval of -25°Cto -30°C[9], The liquid phase gives a high density of the C02, i.e. 1100 kg/m3, but due to the high pressure, the tanker size and thereby the capacity for existing CQ2 ships is relatively low, i.e. between 850-1,400 tons of C02. This capacity is too small to effectively transport the amounts of C02 that is associated with CCS. Lor LPG, there are three types of ship design: low temperature type, which is designed to keep LPG liquid at a low temperature and atmospheric pressure, the pressure type which is designed against the boiling point of LPG maintaining the LPG liquid at ambient temperature and, the scmi-ref type which is a combination of both, i.e. the ship is both pressurised and cooled. Seen from a bulk-transportation perspective, the low temperature type is preferable due to that this design does not require pressurised tankers. Existing low temperature ships have a capacity of up to 80,000 m3 [10]. This option is, however, not possible for 002 ships due to that 002 at atmospheric pressure only can exist in gaseous or solid phase, but not as a liquid. The best option for CQ2 for bulk transportation is the semi-ref type design, A standard semi-ref LPG ship has a capacity of 22,000 m3, i.e. 24,000 ton C02, and is designed for a pressure of 0.7 MPa and a temperature of -50°C. Such a ship should be suitable for C02 transportation. Since ship transportation does not allow a continuous flow from source to storage location, the logistics must include appropriate intermediate storage facilities to handle reloading of C02 (e.g. in harbours). There are two main technologies for intermediate storage of LPG, either underground in great rock and salt caverns, or in large steel tanks above ground. At present only the steel tank technology is used for C02, but also storage in cavern can be applied. Existing rock caverns for LPG have storage capacities of up to around 500,000 m3 LPG [11], which approximately correspond to 500,000 tons of C02. Steel tanks have storage capacities up to 3,000 tons of CQ2 [9]. Transportation scenarios Based on the technical criterions for C02 transportation by pipeline and ship, briefly outlined above, and the scenarios employed in the previous study [1], three scenarios have been further evaluated with respect to costs, capacity, distance, and means of transportation. The scenarios correspond to a small-scale "start-up" case of 1 Mt/y of C02 (Sl-1, Sl-2 and Sl-3), a large-scale single-source case of 10 Mt'y of C02 (S2-1, S2-2 and S3-2), and a fully developed and coordinated infrastructure with a capacity of 40 Mt'y (S3-1). Table 1 lists the different scenarios with respect to combinations of transportation modules, transportation distance and capacity. The cost calculations have assumed a depreciation time of 25 years at 5% interest rate. The resulting costs obtained from the scenario calculations are given in Figure 1. Discussion Commercialization of CCS will mean that a transportation infrastructure must be developed and built over time. Such a development will, however, mainly depend on the transportation cost, which in turn depends on transportation distance between source and storage site and if coordinated networks are possible to establish. Prom Kgurel it can be seen that from a cost perspective a short distance is obviously the best option for both large and relatively small power plants (-1 Mt/y of C02). Short distances may of course not always be an option. In addition. relocation of fossil-fuelled (especially lignite) power plants in order to achieve short transportation distances will probably not occur. Power plants are situated near the fuel reserves and/or electricity consumers in order to minimise freight and transmission costs and it is likely that also new power plants have to be located at such already developed sites. Still, if CCS is employed, there will be three commodities to be considered; C02, electricity and fuel. The complexity and cost of a C02 infrastructure arc lower than the infrastructure cost of solid-fuel and of electricity transmission. This, since C02 can be transported at steady-state flow in a pipeline whereas solid-fuel transportation is mostly carried out by railway and electricity transmission suffers from losses. Tor a large power station located far from the disposal site, a single pipeline from source to sink could be used. A single network is, however, believed to have an upper capacity limit This is not because of technical limitations but due to that single storage regions will have upper limits in receiving rate. If several power stations can use a coordinated network, the transportation costs are lowered. l;rom a European perspective, such networks will probably be established offshore to take advantage of early LX)R opportunities. A future large-scale vision of 300 Mt/y of CG2 will therefore be built up of several coordinated networks from suitable areas to neighbouring disposal sites, with capacity and infrastructure similar the case represented by scenario S3-1. This also means that the transportation cost per ton of C02 is expected to be similar to that of S3-1, i.e. about 2 €/ton. Such a coordinated network could also include ship transportation. Ships are more flexible than pipelines when it comes to adaptability of capacity and transportation route, and a transportation system including both ships and pipeline will therefore make the infrastructure more adaptable to variations in the infrastructure of the storage location. CoDclusions The development of an infrastructure for C02 transportation is expected to start with a small-scale demonstration plant. Tor such a case onshore disposal near the CQ2 source is the least expensive transportation alternative, with a cost of around l&ton of C02 (Sl-1). However, onshore storage may not be an option for a first demonstration project of this size and if so, the present analysis shows that the transportation costs to an offshore storage site would be 7€/ton of CQ2 when transported by ship (Sl-2). Obviously, coordinated networks must be established in order to bring down the transportation costs to the figures normally mentioned for CCS, i.e. to a cost of around 2€/ton as obtained in this study for the coordinated network (S3-1). The latter figure should also be valid for a large large-scale vision of 300 Mt/y of C02, and can be compared with the target of 20€7ton of C02 avoided, as set by the European Climate Change Programme (LCCP) [12].

#### c) Vital aff ground

API 12

Energy: American Petroleum Institute, http://oilsandsfactcheck.org/wp-content/uploads/2012/05/API-Pipeline-Overview.pdf

America depends on the roughly 174,000 miles of liquid pipelines to move energy and raw materials our country relies on. From the food and medicine we require to the cars we drive to the plastics that improve our lives – pipelines make it possible. Pipelines are a vital part of our country’s infrastructure and have been quietly serving the nation for decades. Pipelines are the safest, most reliable, economical and environmentally favorable way to transport oil and petroleum products, and other energy liquids, throughout the U.S.

#### Good is good enough – only vote negative if the aff interpretation makes debate impossible, not just more difficult

### 1ar TI includes pipelines

#### Includes pipelines

Goodchild et. al 2 – director of University of California, Santa Barbara’s Center for Spatial Studies

Richard L. Church, and Val Noronha, Spatial Information Technologies in Critical Infrastructure Protection, National Consortium on Remote Sensing in Transportation, p. 2

Examples of Critical Transportation Infrastructure (CTI) 1. Major arterial highways and bridges comprising the National Highway System (NHS), including the Strategic Highway Network (STRAHNET) and National Intermodal Connectors. 2. International marine harbors, ports and airports. 3. Major railroads, including depots, terminals and stations. 4. Oil and natural gas pipelines. 5. Transportation Control Systems (e.g., air traffic control centers, national rail control centers) [Everett].

#### Transportation infrastructure includes pipelines

NDU Report 11

National Defense University Fort McNair, Washington, D. C. – The Industrial College of the Armed Forces – Final Report: Transportation Industry – Spring 2011 – panelists include: Mrs. Stacy Cummings, Department of the Navy. Seminar Leader LtCol Anthony Barnes. U.S. Marine Coips Mr. William Boden, Computer Sciences Corporation, (CSC) LtCol Mike Brantley, U.S. Air Force Mr. Michael Breslin, Department of Homeland Security (DHS) Mr. Charles E. Brown, Defense Logistics Agency (DLA) Mr. Bart Merkley, Department of Homeland Security (DHS) – http://www.ndu.edu/icaf/programs/academic/industry/reports/2011/pdf/icaf-is-report-transportation-2011.pdf

The United States has the largest transportation system in the world with an extensive physical infrastructure that moves both people and freight. As an industry it consists of five modes: aviation, highway, maritime, pipeline and rail. In 2009, transportation related goods and services contributed $1.2 trillion to the U.S. Gross Domestic Product and employed over 3.5 million people.3 The U.S. transportation infrastructure includes 4 million miles of public roads, 160,000 miles of railroad track, 25,000 miles of navigable waterways, 9,800 coastal and inland waterway facilities, nearly 400,000 miles of oil and fuel pipelines, and 5,200 public-use airports.5 The aviation industry provides for the movement of passengers and freight by both large and small air providers. In 2010, over 785 million passengers traveled by air.6 The economic downtiin had a significant impact on the airline industry; passenger miles are still down from their total of 81 million in 2008.7 In 2009. 27 percent of international freight, both imports and exports, moved by air.8 The U.S. National Highway System is made up of the Interstate Highway System, arterial roads that support commerce and trade, and the Strategic Highway Network (STRAHNET), which are highways important to military mobilization, and roads that connect inteimodal facilities.9 It handles a tremendous amount of vehicular traffic to include heavy equipment. The total vehicle miles traveled on all U.S. public roads increased from about 1.5 trillion miles in 1980 to more than 2.5 trillion miles in 2009. Based on current and historical trends, traffic congestion in metropolitan areas is expected to increase, due to population growth, urbanization, increasing freight traffic, and roadway maintenance activities.10 The U.S. water transportation industry serves the needs of both foreign and domestic commerce and includes companies that cany freight or passengers on the open seas or inland waterways, offer towing services, charter vessels, and operate canals and terminals. In 2009, U.S. water trades (foreign and domestic) amounted to 2.0 billion metric tons. In 2009, container trade accounted for 17 percent of U.S. waterbome foreign trade, up from 14 percent five years before. Ir 2009, 44 percent of U.S. foreign trade by value was moved by vessel, up from 42 percent five yean earlier. In 2009. 6,996 oceangoing vessels made 55,560 calls at U.S. ports. The pipeline infrastructure, comprised of over 168,000 miles of liquid pipelines and 217,000 miles of gas pipeline, carries over 71 percent of petroleum transported in the United States and is one of the most strategically important parts of the transportation network relative to energy distribution.13 Typically the oil or gas production company owns a significant share of the transportation pipeline system which is operated commercially. They transport oil and natural gas to and from refineries and for distribution to homes and businesses around the country.

#### Includes pipelines

Encyclopedia of the Nations 12

Encyclopedia of the Nations; Europe; Estonia – http://www.nationsencyclopedia.com/economies/Europe/Estonia-INFRASTRUCTURE-POWER-AND-COMMUNICATIONS.html

The transportation infrastructure includes 1,018 kilometers (634 miles) of railroads but only 132 kilometers (82 miles) of electrified rail lines. There are 10,935 kilometers (6,835 miles) of paved roads, including 75 kilometers (47 miles) of expressways. Estonia had 320 kilometers (200 miles) of navigable waterways and 420 kilometers (263 miles) of natural gas pipelines in 1992. All international flights use the Tallinn Airport, and there are several ports on the Baltic Sea, the port of Tallinn being the third largest in the Baltic Sea. A two-thirds stake in the state-run Eesti Raudtee railroad company was expected to be sold in a tender (possibly to RailAmerica) and the second-largest city, Tartu, was also expected to sell its public transportation company AS Liikor to a private investor in 2000.

#### Includes pipelines

Encyclo Center 9

Encyclocenter is a new Article Directory site and is pleased to provide original and authoritative articles written by experts in their respective fields of expertise. March 31 – http://www.encyclocenter.com/Transportation-Transport-24131.html

Transportation is the movement of people and goods from one place to another. Transportation infrastructure includes the transport networks like roads, railways, airways, waterways, canals, pipelines and the nodes or terminals, such as airports, railway stations, bus stations and seaports.

#### More evidence

Lowenberg 5

et al; TIMOTHY J. LOWENBERG; Major General, The Adjutant General Director, Washington Military Department Washington Homeland Security Advisor – The Washington Statewide Homeland Security Strategic Plan – 2/22/2005 – http://okanogandem.org/documents/Washington/HLS%20Strategic%20Plan.pdf

Transportation – The state transportation infrastructure includes aviation, maritime, rail, bridges, highways, trucking, pipelines, and mass transit systems. There is a robust transportation system in Washington State, built upon a network of 81,300 miles of federal, state, and local roads. Washington State has the nation’s largest fleet of ferries. The state is also served by approximately 2,075 route miles of Class I railroad track and 1,115 miles of track operated by 17 short-line railroads, and two Amtrak Cascade trains. Washington State has 76 public port districts. The combined ports of Seattle and Tacoma are the second-largest container load centers in the United States. Agricultural commodities and other goods are also transported throughout the Puget Sound and river systems. We have 127 public airports, three seaplane bases, Seattle-Tacoma and Spokane International Airports, and a number of regional transportation airports.

### 1ar Contextual T

#### Contextual evidence

Chrysostomidis et al 9 - Masters in Environmental Management and Sustainability from IIT Stuart Graduate School of Business

Ioannis, Assessing issues of financing a CO2 transportation pipeline infrastructure, January, http://www.co2captureproject.org/viewresult.php?downid=152

For carbon dioxide capture and geologic storage to be deployed commercially and in a widespread manner will require well thought out approaches for transporting the CO2 in a pipeline system from the capture facility to the injection site. Establishing a widespread CO2 transportation infrastructure will require strategic long-term planning, taking into account the potential magnitude of future deployment scenarios for CCS, up to a scale of infrastructure that could be comparable to the scale of oil & gas infrastructure. This paper outlines the results of a study, commissioned by the CO2 Capture Project (CCP) and completed by Environmental Resources Management (ERM) that evaluated the benefits and risks of two approaches to developing CO2 pipeline systems. The two basic approaches are described in the paper as: On a point-to-point basis, which matches a specific source to a specific storage location; or Via the development of pipeline networks, including backbone pipeline systems, which allow for common carriage of CO2 from multiple sources to multiple sinks.

#### CO2 pipelines are TI

ERM 10

Business group that asses different environmental policy options and then publishes papers about them, “The Economics of Transportation of CO2 in Common Carrier Network Pipeline Systems,” 4/9/12, http://www.erm.com/Analysis-and-Insight/ERM-Publications/Publications-Archive-2009---2010/The-Economics-of-Transportation-of-CO2-in-Common-Carrier-Network-Pipeline-Systems/]//SH

Establishing a widespread CO2 transportation infrastructure requires a strategic approach that takes into account the magnitude of potential deployment scenarios for CCS as hundreds of megatonnes (Mt) of CO2 are transported every year through pipeline systems. Transporting CO2 by pipeline is not a new technology; in the US almost 4,000 miles of CO2 pipeline for enhanced oil recovery (EOR) are in operation. However, the infrastructure for mass CCS could be on the scale of the current gas transmission infrastructure for Europe or North America, and will require significant investment to construct and operate.

### AT: Pipelines = Energy Infrastructure

#### Their evidence is describing natural gas and oil pipelines – not CCS. CCS is not energy, it is a byproduct – it’s regulated under the DoT – 2ac Monast evidence

#### Tons of non-energy goods are transported by pipeline:

#### Water and milk

Willigers 1

J, Environmental Impacts of Underground Goods, http://www.rivm.nl/bibliotheek/rapporten/773002020.pdf

Underground freight transport can be divided into three categories. The first category consists of the traditional and extra-traditional pipelines. Traditional pipelines are pipelines carrying fluids and gasses that are already commonly transported by pipelines. These are for example natural gas, crude oil and petrochemical products. Also the transportation of drinking water by water pipes can be regarded as a form of traditional pipeline transportation. Extra-traditional pipelines are pipelines carrying substances that are not yet or scarcely transported by pipeline but that are suitable or can be made suitable for pipeline transportation. Examples of this kind of pipeline transportation are the transportation of milk by pipeline from Ameland to Friesland and the pipeline transportation of coal slurries.

#### Beer

Upton 12 – Editor of Broken Secrets

Chad, There is a Beer Pipeline, http://brokensecrets.com/2012/04/26/there-is-a-beer-pipeline/

Today, some of our most valuable resources are carried by pipeline: water, oil, natural gas, and even beer. Yes, there is a beer pipeline. Actually, there are at least two beer pipelines.

#### Manure

MnDOT No Date

Minnesota Dept of Transportation, “ANIMAL WASTE PIPELINE (DRAG LINE) SPECIAL PROVISIONS,” http://www.dot.state.mn.us/utility/files/pdf/permits/animal-waste-pipeline.pdf

This permit authorizes the applicant to place a pressurized manure/waste pipeline from right of way line to right of way line through a centerline culvert crossing the Trunk Highway. The applicant is limited to only performing these operations in the area(s) indicated within this permit. The limits or scope of these operations shall not be revised without prior approval from Mn/DOT.

#### Salt

AA No Date

Austrian Attraction, “Salt Pipeline,” http://www.anaustriaattraction.com/austria-attractions-ah/salt-pipeline.htm

The Soleleitung, dating from the early 17th century, is the oldest industrial pipeline in the world. During construction, from 1597 to 1607, 13,000 spruce and fir tree trunks were used form a 40 kilometre long pipeline to convey brine from the salt works Hallstatt to Ebensee where it was refined and taken by barge to Gmunden. This method of conveyance superseded the excavation of salt rock and transport overland. The pipeline starts at the Rudolfsturm and the walk along its route takes in some of the most spectacular views of the Salzkammergut.

### AT: “Transit”

Trimbath 9 – Professor of Economics @ Bellvue

Dr. Susanne, Senior Research Economist in Capital Market Studies at Milken Institute, Senior Advisor – United States Chamber of Commerce, and Professor of Economics and Accounting – Bellvue University, “Transportation Infrastructure: Paving the Way”, <http://www.uschamber.com/sites/default/files/issues/infrastructur> e/files/2009TPI\_Update\_Economics\_White\_Paper\_110712.pdf

V. Paving the Way Forward

The strategy applied by the US Chamber of Commerce for the infrastructure performance index project presents a model for developing the way forward. A stakeholder-centric approach allows you to measure the right things, communicate to the people in a language they understand and get to ACTION faster. The process, detailed in the Technical Report last summer (US Chamber 2010), is basically this:

1. Clearly define “transportation infrastructure” as the underlying structures that support the delivery of inputs to places of production, goods and services to customers, and customers to marketplaces. The structures are:

- Transit

- Highways

- Airports

- Railways

- Waterways (Ports)

- Intermodal Links

#### Transit is the system used to convey persons or things

Merriam-Webster 12

http://www.merriam-webster.com/dictionary/transit

Transit: c (1) : conveyance of persons or things from one place to another (2) : usu. local transportation especially of people by public conveyance; also : vehicles or a system engaged in such transportation.

#### We meet

CEDRE 12

Centre of Documentation, Research and Experimentation on Accidental Water Pollution, http://www.cedre.fr/en/glossary.php

Pipeline: a large pipe or tube used to transport certain liquids over a long distance, especially liquid fuels such as hydrocarbons, natural gas etc.

#### We meet “transit”

GDF 6

Gaz de France, “GAZ DE FRANCE COMMENTS ON JUNE 2006 ERGEG DOCUMENT,” EU Energy Regulators, http://www.energy-regulators.eu/portal/page/portal/EER\_HOME/EER\_CONSULT/CLOSED%20PUBLIC%20CONSULTATIONS/GAS/Transmission%20Pricing/RR/E06-PC-14-03\_Gaz%20de%20France.pdf

Definition of transit : “The term transit means transportation of gas from one boundary of the network and/or entry/exit zone to another boundary, potentially the transport of large volumes over long distances” The term “boundary” is in this definition ambiguous. Does it apply to a TSO sector limit and not only to a national border ?

### AT: “Mass Transit”

#### Mass transit includes pipelines

Dexter 90 – former executive @ Chemical & Specialties Management Council

Fred, “Mass Transit System,” USPTO, Current U.S. Classification: 198/324; 104/21; 104/25, International Classification: B65G 1500, US Patent, http://www.google.com/patents/US4964496

The mass transit system comprises at least two train stations. Each station has at least one revolving platform whose upper surface defines a curvilinear track. Stationary tracks are positioned between the platforms. An endless flexible member is driven by the revolving platforms at a constant speed. The flexible member carries cars which together form an endless train. The cars are driven by the flexible member and ride over the stationary tracks and over the curvilinear tracks. Inventor: Fred F. Dexter, Jr. Current U.S. Classification: 198/324; 104/21; 104/25 International Classification: B65G 1500 View patent at USPTO Search USPTO Assignment Database Citations Cited Patent Filing date Issue date Original Assignee Title US474657 Jul 20, 1891 May 10, 1892 PASSENGER-RAILWAY SYSTEM US780268 Mar 30, 1904 Jan 17, 1905 CURTISS US786117 Oct 18, 1904 Mar 28, 1905 HAGEN US807565 Apr 10, 1905 Dec 19, 1905 CONVEYER US896098 Dec 22, 1905 Aug 18, 1908 ESCALATOE LANDING US1437550 May 23, 1922 Dec 5, 1922 PUTETAM US1597959 Aug 6, 1925 Aug 31, 1926 SAFETY MEANS EOR ALIGHTING FROM AHD ENTERING EAST-HCOVING CAES AND THE US3339494 Apr 5, 1965 Sep 5, 1967 RAILROAD STATION LOADING ARRANGEMENT US3727558 Oct 5, 1970 Apr 1, 1973 TRANSPORT SYSTEM WITH MOVING- PLATFORM TERMINAL FIELD OF THE IN VENTION US3865039 Nov 9, 1972 Feb 1, 1975 TRANSPORTATION SYSTEM US4828099 Aug 6, 1986 May 9, 1989 Friction-propelled mass transit system Referenced by Citing Patent Filing date Issue date Original Assignee Title US5558198 Sep 18, 1995 Sep 24, 1996 Band transportation system Claims 1. A mass transit system, comprising: at least two train stations, each having at least one platform revolving about its center; each revolving platform having a curvilinear track, a center hole, a curvilinear outer edge, and a cylindrical outer wall; said curvilinear track extending radially inwardly from said curvilinear outer edge; stationary track means positioned between said platforms; an endless flexible member driven by said revolving platforms at a substantially constant speed and being maintained under tension around said cylindrical outer walls of said revolving platforms so as to have substantially zero velocity relative to said outer walls of said revolving platforms; a plurality of cars carried by said flexible member, and said cars together forming an endless train driven by said flexible member at said substantially constant speed; and said train riding over said stationary track means and over said curvilinear tracks on said platforms. 2. A mass transit system according to claim 1, wherein each car has a deck which in its trajectory rides over said stationary tracks means and over said curvilinear tracks. 3. A mass transit system according to claim 2, wherein said stationary track means includes a pipeline. 4. A mass transit system according to claim 2, wherein said stationary track means includes a pipeline and a rail on the bottom of said pipeline; and said car decks ride over said rail. 5. A mass transit system according to claim 2, wherein said stationary track means includes a pipeline having a longitudinal slit extending all along the bottom thereof; a keel projects downwardly from each car deck and extends through said slit; and each keel is secured to said flexible member. 6. A mass transit system comprising: at least two stations, each station including a circular platform revolvable about its center axis, said platform having an entrance hole concentric with said axis, an upper surface, a lower surface, an outer curvilinear edge, and a circumferential outer wall; propulsion means for continuously revolving each platform at a predetermined angular velocity; a tensioned, endless, flexible member frictionally engaging consecutive portions of said outer walls of said platforms when in contact therewith; a plurality of cars carried by said flexible member to form therewith an endless train moving at an angular velocity through said stations which is substantially equal to said angular velocity of said revolving platforms; stationary track means between said revolving platforms; each car riding over said stationary track means and over the upper surface of said revolving platforms; and said revolving platforms permitting passenger ingress to and egress from each car during a condition of zero relative motion between said revolving platforms and said cars on said flexible member. 7. A mass transit system according to claim 6, wherein said upper surface of said revolving platform defines a curvilinear track extending radially inwardly from said curvilinear outer edge; and each car has a deck which rides over said stationary tracks means and over said curvilinear tracks. 8. A mass transit system according to claim 7, wherein said stationary track means includes a pipeline. 9. A mass transit system according to claim 7, wherein said stationary track means includes a pipeline and a rail on the bottom of said pipeline; and said car deck rides over said rail. 10. A mass transit system according to claim 7, wherein said stationary track means includes a pipeline having a longitudinal slit extending all along the bottom of said pipeline; a keel extends downwardly from each car deck and is secured to said flexible member; and said keel rides within said slit. 11. A mass transit system according to claim 10, wherein each car deck rides over said pipeline and over said curvilinear track on said revolving platform. 12. The transit system according to claim 6, wherein said pipeline has a longitudinal slit all along the bottom thereof; each car has a deck and a keel extending downwardly therefrom; said keel is fixedly attached to said flexible member; said car deck rides over said pipeline; and said keel rides within said slit.

### AT: T – “Infrastructure”

#### Co2 pipelines are infrastructure

Parfomak and Folger 8 - Resources, Science, and Industry Division @ CRS

“Pipelines for Carbon Dioxide (CO2 ) Control: Network Needs and Cost Uncertainties,” Congressional Research Service, http://www.policyarchive.org/handle/10207/bitstreams/19122.pdf

The socially and economically efficient development of the nation’s public infrastructure is an important consideration for policymakers. In the context of a national program for CCS, CO2 pipelines may be a major addition to this infrastructure. Yet there are many uncertainties about the cost and configuration of CO2 pipelines that would be needed to meet environmental goals within an emerging regulatory framework. Exactly who will pay for CO2 pipelines, and how, is beyond the scope of this report, but understanding ways to minimize the cost and environmental impact of this infrastructure may be of benefit to all.

### AT: T – “Can’t be waste”

#### It’s a “good”

Forbes et al 8 - senior associate at the World Resources Institute, former member of the National Energy Technology Laboratory

Sarah, CCS Guidelines: Guidelines for Carbon Dioxide Capture, Transport, and Storage, World Resources Institute, http://pdf.wri.org/ccs\_guidelines.pdf

CO2 used for carbon dioxide capture and storage is typically in the supercritical stage, where the density resembles a liquid but it expands to fill space like a gas. Supercritical CO2 is purchased, as a commodity, for use in many industrial processes. In the climate change context CO2 is most often classified as an important greenhouse gas, an emission, or—in some countries—a waste. There is concern that the classification of CO2 under various U.S. regulatory programs (e.g., air, waste, drinking water protection) may trigger unintended requirements that impose increased cost without increasing project performance or safety.

### AT: “Regulated is Extra-T”

#### All pipelines are regulated – it’s a natural component of infrastructure

AOPL 12

Association of Oil Pipelines, http://www.aopl.org/pipelineSafety/?fa=regulations

Regulations and Standards

Regulation of America's oil pipelines falls into two basic categories - regulations that help the industry ensure the safety of communities and the environment, and regulation of transportation charges. In addition, the industry has established or participates in a number of engineering and scientific committees that help set widely accepted technical standards for construction and operation of pipelines.

Safety and the Environment

 The safe operation of oil pipelines is assured by extensive federal and state regulation. The primary jurisdiction is that of the U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA), which regulates interstate hazardous liquids pipelines pursuant to the Pipeline Safety Act of 1979 as amended. PHMSA regulates transmission and gathering lines, and some low-stress pipelines.

Most hazardous liquids pipelines cross state lines and are called 'interstate' pipelines. PHMSA regulates interstate pipelines but can delegate certain authorities to state regulators. PHMSA has agreements with several states to act as inspection agents. PHMSA retains enforcement authority over interstate lines, even if a state regulator is an inspection agent.

Pipelines that exist solely within a state are called intrastate pipelines. PHMSA has authority regulate intrastate pipelines, but can delegate to certified states the authority to regulate intrastate pipelines. Almost all intrastate hazardous liquid pipelines are now regulated by a state. States follow the Federal safety regulations in 49 CFR Part 195, and state safety rules must be no less stringent than the Federal rules. Some states only inspect intrastate pipelines without having enforcement authority, while some states conduct both inspections and enforcement. This chart shows each state's level of authority.

Federal grants provide incentives to states to improve and take on more responsibility for their pipeline safety programs. Funding is determined, among other factors, by whether the state has adopted all federal requirements.

The National Transportation Safety Board investigates pipeline accidents and makes recommendations for improvements in operations.

Pipeline operations are also subject to regulations of the Environmental Protection Agency; the Occupation Safety and Health Administration; the U.S. Army Corps of Engineers; and various state public service or public utility commissions and other state agencies. Offshore pipelines are subject to regulation by the U.S. Department of Interior's Minerals Management Service.

The U.S. Coast Guard regulates facilities that are capable of transferring oil or hazardous materials in bulk to or from a vessel, where the vessel has a total capacity of 250 barrels or more. Pipelines are subject to safety regulations relative to preparedness and response to spills on navigable waters.

Technical Standards

The pipeline industry adheres to many different technical standards, developed by consensus with input from leading experts, practitioners, and affected stakeholders. Consensus standards are critical to safety. Historically, they have been shown to be an important complement to government regulation and oversight.

Voluntary consensus standards are developed by task forces or work groups of individuals with expertise in the issues being addressed, and reflect the best practices in the industry. Standards are reviewed by bodies with expertise in the areas they address and are subject to balloting by those bodies for approval.

When crafting regulations, agencies often choose to incorporate these consensus standards by reference, as a way to tap into the expertise that goes into developing existing standards and recommended practices.

Notices of actions to develop new or revise existing standards are published through several means, including publication in the Federal Register through NIST, on SDO's websites and publications, and via ANSI's publications. Standards are subject to public comment and substantive comments must be reviewed and, where found persuasive and relevant, addressed by the task force resulting in further revision to the standard.

Industry has every incentive to meet tough standards of practice that ensure safe operations because accidents are ultimately more costly than conforming to the requirements of such standards.

Pipeline Rates

In addition to safety and environmental protection regulations and standards, there is a regulatory structure for pricing of pipeline rates. The Federal Energy Regulatory Commission regulates tariffs on interstate pipelines that are subject to its jurisdiction.

Most oil pipelines are designated as "common carriers" by federal law under the Hepburn Act of 1906. They are thus regulated by the federal government in ways that resemble regulations for other utilities and public interest infrastructure such as electrical utilities, telephone companies or radio stations. Tell me more about economic regulation of pipelines.