#  EV Charging Infrastructure Aff

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### 1AC Plan

**Plan: The United States federal government should substantially increase its investment in charging infrastructure for electric vehicles.**

### 1AC Inherency

#### Lack of charging outlets is the major barrier for EV market penetration - only 3,300 exist and they are unevenly distributed

Kemp, 5/25/12 – Senior Market Analyst and writer for Reuters specializing in commodities and energy (John, “Column- Will US Federal Fleet Help Alternative Fuel Switch?,” Reuters, http://www.reuters.com/article/2012/05/25/column-kemp-cars-idUSL5E8GP8YG20120525) // AMG

Federal law defines alternative fuel vehicles broadly to include both those running on alternative fuels such as compressed natural gas (CNG), liquefied natural gas (LNG), hydrogen and high blend ethanol (E85) as well as certain qualifying hybrid electric vehicles run on a combination of regular petroleum and electricity (42 USC 13211). In 2010, there were nearly 1 million vehicles running on alternative fuels in use across the United States, according to the Department of Energy's Alternative Fuels and Advanced Vehicles Data Center, up from less than 400,000 a decade earlier. In addition, more than 2 million hybrid electric vehicles had been sold over the same period. Alternative fuelled vehicles are still a tiny minority of vehicles on U.S. roads, but the number is increasingly rapidly. The problem is that few are actually filling up with alternatives to gasoline owing to the lack of outlets actually selling alternative fuels such as E85 or LNG. There were just 10,000 fuelling stations dispensing alternative fuels in 2011 (up from less than 7,000 in 2010). Of those, a little over 3,300 were supplying electricity (six times as many as in 2010 making this the fastest growing segment of the alternative fuel infrastructure). But less than 1,000 dispensed compressed natural gas, and just 45 dispensed LNG. Even E85 was available from fewer than 2,500 outlets. In contrast, there are almost 160,000 retail gasoline stations across the country, and many more private refuelling facilities owned by large fleet operators such as UPS, transit systems, and the federal government. Availability problems are compounded by the uneven distribution of alternative fuelling stations. There are lots in California, the nation's biggest vehicle market, and another concentration in the ethanol-producing states of the Midwest such as Illinois, Indiana and Minnesota, but not many in the rest of the country.

#### Expiration of charging infrastructure tax credits threatens the nascent industry

**Heron 11** – journalist, author, online community manager, etc., covering electric vehicles from Silicon Valley (David, “Electric Vehicle charging station tax credits a victim of US Govt budget battles”, Torque News, 29 Dec 2011, http://www.torquenews.com/1075/electric-vehicle-charging-station-tax-credits-victim-us-govt-budget-battles)//BI

The latest round of the U.S. Federal budget showdown was averted with the deal on the payroll tax cut, but there was collateral damage with dozens of tax credits that were not extended and are now expiring on Saturday, including three related to electric vehicles and several more related to biofuel production. The electric car charging infrastructure is a key to the chicken-and-egg quandary for electric vehicle adoption. The increasing number of electric cars on the road, means potential businesses and jobs will be created to install and maintain the charging infrastructure. That is, if the pattern of electric car adoption proceeds without hitch. The last few weeks has seen another of the divisive ugly budget showdowns in Washington DC. This time a package of tax credits, including EV Charging Infrastructure credits, got caught up in the battle and now those credits are expiring on Saturday, December 31, 2011, threatening the nascent EV infrastructure businesses. Every year sees a cluster of tax credits expire, and Congress routinely attaches tax credit extension provisions to bills they're working on to extend all or some of the expiring tax credits. This year is no different in that 65 individual tax credits were due to expire in 2011, the majority expiring on Saturday. One of those was the temporary payroll tax cut that got so much heat earlier this month. While that one got a two month extension, other provisions did not, and will expire in a couple days. The specific tax credits affecting electric vehicles are \* Alternative fuel vehicle refueling property (e.g. tax credit for installing EV chargers) \* Tax credit for EV conversions (Conversion credit for plug-in electric vehicles) \* Credit for electric drive motorcycles, three-wheeled vehicles, and low-speed vehicles The first applies to EV charging infrastructure and is the tax credit which helps pay for the charging station you have to buy along with the electric car.

### 1AC Economy

#### Economy is stalling - growth and jobs numbers prove

**Morici, 6/4/12** --- Professor of Economics at the Smith School of Business, University of Maryland (Peter, “Depressed by a US jobs stalemate,” <http://www.businessspectator.com.au/bs.nsf/Article/US-jobs-US-economic-recovery-US-unemployment-pd20120604-UWRHY?opendocument&src=rss>)

The US economy added only 69,000 jobs in May – only about half of what is needed to keep up with natural population growth. The unemployment rate rose to 8.2 per cent. In the weakest recovery since the Great Depression, nearly the entire reduction in unemployment since October 2009 has been accomplished through a significant drop in the percentage of adults working or looking for work. Some of these folks returned to the labour market in May; consequently, unemployment ticked up a tenth of a percentage point. Growth slowed to 1.9 per cent in the first quarter from 3 per cent the previous period, and was largely sustained by consumers taking on more car and student loans, business investments in equipment and software, and some inventory build. The housing market is improving and that should lift second quarter residential construction a bit but overall, the economy and jobs growth should remain too slower to genuinely dent unemployment. The May jobs report indicates growth could be even slower in the second quarter, and the economy is dangerously close to stalling and falling into recession. Manufacturing added 13,000 jobs. Other big gainers were health care, wholesale trade, and transportation and warehousing. Construction lost about 28,000 jobs, and other big losers were leisure and hospitality and state and local governments. In other sectors, jobs gains were weak or small numbers of jobs were lost.

**We isolate two internal links to the economy. First is clean energy.**

#### EV technology leadership can drive economic recovery by stimulating growth, manufacturing, and green jobs

Greenwald and Nigro, 12 – Judi Greenwald is the Project Director at the Center for Climate and Energy Solutions, and Nick Nigro is the Project Manager at the Center for Climate and Energy Solutions (“An Action Plan To Integrate Plug-in Electric Vehicles With The U.S. Electrical Grid”, Center for Climate Change and Energy Solutions, March, http://www.c2es.org/docUploads/PEV-action-plan.pdf)//AL

America’s reliance on imported oil leads to a U.S. trade deficit of hundreds of billions of dollars. Electricity for PEVs provides a suitable alternative that is typically less costly per vehicle mile traveled. Furthermore, as the world diversifies away from fossil fuels, the economic opportunity to lead in the clean energy industry is considerable. PEVs’ Effect on Economic Growth: The United States can lead the world in PEV technology including advanced vehicle batteries and the overall advanced vehicle market, which could stimulate economic growth. Market growth for alternative and fuel-efficient vehicles can help revitalize U.S. manufacturing and herald a new era of American leadership in the automobile industry. While the U.S. economy has struggled to recover fully from the global financial crisis of 2008, clean energy has been one driver of the recovery. The design and manufacture of new vehicles, including PEVs, has already created thousands of jobs in the United States.

Second is the auto industry.

#### **Auto industry is key to solid growth and produces a huge multiplier effect.**

Chandra and Homan 12 – reporters for Bloomberg News (Shobhana and Timothy R., “What’s Good for GM is Good for the Economy” Bloomberg BusinessWeek, May 17, 2012, http://www.businessweek.com/articles/2012-05-17/whats-good-for-gm-is-good-for-the-economy)//ctc

Now for the ripple effect. Government data show that motor-vehicle production contributed half of the first quarter’s annual pace of 2.2 percent economic growth. When an industry is expanding that fast, it lifts the fortunes of thousands of other companies. The auto resurgence—from assembly lines and dealerships to steelmakers, freight lines, and loan providers—signals the U.S. is headed for solid growth, says Joseph Carson, director of global economic research at AllianceBernstein (AB) in New York. “We’re starting to see the spark in the auto sector that was missing initially” during the recovery from the recession, says Carson, a former GM economist. “It tells you there’s a certain momentum. A whole host of areas could see the multiplier effect. We’re at the beginning of a very long and durable cycle.” Contributing to the auto sales revival are rising employment, an improvement in consumer confidence, and a thaw in lending. Chad Moutray, chief economist at the National Association of Manufacturers in Washington, D.C., estimates each dollar spent in the industry triggers an additional $2.02 for the economy. Apex Tool & Manufacturing is benefiting from the trickledown as the maker of tooling, fixtures, and gauges used to manufacture glass and other products has seen an increase in auto-related sales since the last quarter of 2011. Glass for vehicles “is the one part of our business that’s on the rise,” says Apex President Terry Babb. “Everything else is sort of diminishing.” Conglomerate 3M (MMM), which makes fuel-system tuneup kits, beat analysts’ first-quarter profit estimates as U.S. auto and industrial demand cushioned slowing growth abroad. Rising car sales are helping generate the most business for railroads in four years: Data from companies including Union Pacific (UNP) and Norfolk Southern (NSC) show motor-vehicle shipments for the final week of March hit their highest level since June 2008. Foreign companies also are responding to rising U.S. demand. Faurecia (EO), Europe’s largest maker of car interiors, said on May 3 that it will acquire an interior-components business in Saline, Mich. VW Credit, the U.S. finance arm of Germany’s Volkswagen (VOW), said in April it’s expanding its Libertyville, Ill., office and adding about 150 jobs through 2018. Toyota Motor (TM), the biggest seller of hybrid vehicles, said in early May that it wants to produce more Prius models as demand outpaces its U.S. target of more than 220,000 cars this year. Toyota has also announced it will spend about $30 million to lift production of four-cylinder engines at its Georgetown, Ky., plant by August 2013, adding about 80 jobs. All this boosts U.S. manufacturing, which grew in April at the fastest pace in almost a year, according to the Institute for Supply Management. One reason factories may remain a source of strength for the economy is low stockpiles, particularly of automobiles, says Conrad DeQuadros, senior economist and founding partner at RDQ Economics in New York. The inventory-to-sales ratio for motor vehicles—at 1.9 in March—is holding around last year’s average of 1.87 and is down from 2.39 in 2008, the peak since recordkeeping began in 1967, he says. “Given the combination of a low-inventory environment and the current selling rates, you could see continued solid growth in production,” DeQuadros says. There are caveats. The gains in auto sales depend on continued improvement in overall employment. The jobless rate has been above 8 percent for more than three years, and payrolls rose by 115,000 in April, the poorest showing in six months, after a 154,000 gain in March, adding to concerns the labor market may be faltering. And even if the industry’s rebound continues, sales haven’t returned to the pre-recession level of 16.1 million in 2007. The industry’s current share of gross domestic product, at 2.8 percent, is well below the record 4.8 percent in 1968. While the pickup in sales and its potential to filter through the economy is clear to investors, auto stocks underperform the market as a whole. Investors are leery of making risky bets on an industry that was on the brink not long ago. Still, a revival “obviously benefits everybody,” says NAM’s Moutray. “You’re not only helping outside the auto industry—the glass and steel and seat manufacturers—but you’re also helping the restaurant that’s on the corner next to all those facilities. It is going to continue to be a bright spot for manufacturing throughout this year and next.” The bottom line: With production accounting for a big share of GDP growth, the auto industry is spreading its wealth to suppliers and their employees.

#### Economic decline leads to nuclear war

**Harris and Burrows 9** - Matthew, PhD European History at Cambridge/Counselor in the National Intelligence Council (NIC), Jennifer, Member of NIC’s Long Range Analysis Unit (“Revisiting the Future: Geopolitical Effects of the Financial Crisis” <http://www.ciaonet.org/journals/twq/v32i2/f_0016178_13952.pdf>, AM)

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.

#### Growth eliminates the only rational incentives for war

**Gartzke 11** – Associate Professor of Political Science at the University of California, San Diego PhD from Iowa and B.A. from UCSF (Erik, "SECURITY IN AN INSECURE WORLD," [www.cato-unbound.org/2011/02/09/erik-gartzke/security-in-an-insecure-world/](http://www.cato-unbound.org/2011/02/09/erik-gartzke/security-in-an-insecure-world/))

Almost as informative as the decline in warfare has been where this decline is occurring. Traditionally, nations were constrained by opportunity. Most nations did not fight most others because they could not physically do so. Powerful nations, in contrast, tended to fight more often, and particularly to fight with other powerful states. Modern “zones of peace” are dominated by powerful, militarily capable countries. These countries could fight each other, but are not inclined to do so. At the same time, weaker developing nations that continue to exercise force in traditional ways are incapable of projecting power against the developed world, with the exception of unconventional methods, such as terrorism. The world is thus divided between those who could use force but prefer not to (at least not against each other) and those who would be willing to fight but lack the material means to fight far from home. Warfare in the modern world has thus become an activity involving weak (usually neighboring) nations, with intervention by powerful (geographically distant) states in a policing capacity. So, the riddle of peace boils down to why capable nations are not fighting each other. There are several explanations, as Mack has pointed out. The easiest, and I think the best, explanation has to do with an absence of motive. Modern states find little incentive to bicker over tangible property, since armies are expensive and the goods that can be looted are no longer of considerable value.Ironically, this is exactly the explanation that Norman Angell famously supplied before the World Wars. Yet, today the evidence is abundant that the most prosperous, capable nations prefer to buy rather than take. Decolonization, for example, divested European powers of territories that were increasingly expensive to administer and which contained tangible assets of limited value. Of comparable importance is the move to substantial consensus among powerful nations about how international affairs should be conducted. The great rivalries of the twentieth century were ideological rather than territorial. These have been substantially resolved, as Francis Fukuyama has pointed out. The fact that remaining differences are moderate, while the benefits of acting in concert are large (due to economic interdependence in particular) means that nations prefer to deliberate rather than fight. Differences remain, but for the most part the capable countries of the world have been in consensus, while the disgruntled developing world is incapable of acting on respective nations’ dissatisfaction. While this version of events explains the partial peace bestowed on the developed world, it also poses challenges in terms of the future. The rising nations of Asia in particular have not been equalbeneficiaries in the world political system. These nations have benefited from economic integration, and this has proved sufficient in the past to pacify them. The question for the future is whether the benefits of tangible resources through markets are sufficient to compensate the rising powers for their lack of influence in the policy sphere. The danger is that established powers may be slow to accommodate or give way to the demands of rising powers from Asia and elsewhere, leading to divisions over the intangible domain of policy and politics. Optimists argue that at the same time that these nations are rising in power, their domestic situations are evolving in a way that makes their interests more similar to the West. Consumerism, democracy, and a market orientation all help to draw the rising powers in as fellow travelers in an expanding zone of peace among the developed nations. Pessimists argue instead that capabilities among the rising powers are growing faster than their affinity for western values, or even that fundamental differences exist among the interests of first- and second-wave powers that cannot be bridged by the presence of market mechanisms or McDonald’s restaurants. If the peace observed among western, developed nations is to prove durable, it must be because warfare proves futile as nations transition to prosperity. Whether this will happen depends on the rate of change in interests and capabilities, a difficult thing to judge. We must hope that the optimistic view is correct, that what ended war in Europe can be exported globally. Prosperity has made war expensive, while the fruits of conflict, both in terms of tangible and intangible spoils have declined in value. These forces are not guaranteed to prevail indefinitely. Already, research on robotic warfare promises to lower the cost of conquest. If in addition, fundamental differences among capable communities arise, then warfare over ideology or policy can also be resurrected. We must all hope that the consolidating forces of prosperity prevail, that war becomes a durable anachronism.

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#### EVs are key to maintaining global competitiveness in the automobile industry – other countries are vying to take the lead

Smith ’11 – Writer for Market Urbanism, Forbes, Reason, and the National Review – specializes in the politics, economics, and history of urbanism (Stephen, “Obama’s Sprawl-Promoting Industrial Policy: Electric Cars,” Market Urbanism, August 27 2011, http://marketurbanism.com/2011/08/27/obamas-sprawl-promoting-industrial-policy-electric-cars/?utm\_source=feedburner&utm\_medium=feed&utm\_campaign=Feed%3A+MarketUrbanism+%28Market+Urbanism%29) // AMG

During the past few decades, “industrial policy” was an epithet, and you still won’t see Obama going around calling his “green jobs” projects industrial policy in speeches any time soon. But some think it’s time to shed the stigma, and the flagship Obama industrial policy seems to be electric vehicles – or more specifically, the batteries that power them: “It was a calculated risk — a lot of money, to be sure, but given the stakes, I think it was a pretty thoughtful bet,” says Ron Bloom, who recently served as an assistant to President Obama for manufacturing policy. “If vehicle electrification really does take off, as many, many people think it will, and we’re not part of it, then we could lose our leadership of the global automobile industry.” Which would be catastrophic. By some estimates, as much as 20 percent of all manufacturing jobs are directly or indirectly related to the automobile industry. Bloom points out that the United States is not the only country betting on batteries; a number of Asian countries have done so as well.

**We isolate two internal links to heg. First is the industrial base.**

#### Maintaining global auto competitiveness is key to our industrial base and technological leadership

**Ronis 06** STATEMENT OF DR. SHEILA RONIS, DIRECTOR MBA/MS PROGRAMS, WALSH COLLEGE; VICE PRESIDENT, NATIONAL DEFENSE UNIVERSITY FOUNDATION, TROY, MICHIGAN CHINA’S IMPACT ON THE U.S. AUTO AND AUTO PARTS INDUSTRIES HEARING BEFORE THE U.S.­CHINA ECONOMIC AND SECURITY REVIEW COMMISSION ONE HUNDRED NINTH CONGRESS SECOND SESSION \_\_\_\_\_\_\_\_\_ July 17, 2006 <http://www.uscc.gov/hearings/2006hearings/transcripts/july_17/06_07_17_trans.pdf>

What isn't understood is the reality that the auto industry affects DMSMS because the industrial infrastructure that supports the Department of Defense is shared by the auto industry. When a tier supplier to the auto industry goes under, whether it is a machine tool company or in microelectronics, it reduces DoD's ability to function whether we say so or not. I think we might as well say so. When government R&D investment in an industry deteriorates, it's only a matter of time before an industry is in trouble. Manufacturing R&D by the federal government has almost disappeared. Young people no longer view working in manufacturing as a possible career so we're losing our ability to train the next generation of scientists and engineers. We're losing critical to defense industries from shipbuilding to machine tools, high performance explosives and explosive components, cartridge and propellant actuated devices, welding and even the nuclear industry. All of these industries share the bottom of the base with the auto industry, and that is what has become a national security issue. We need to maintain a capability to be globally competitive in both product and process innovation. We must regain our manufacturing prowess and leadership. We need to reinvigorate the Manufacturing Extension Partnership Program at NIST. We need to prioritize those technologies that are critical to regaining and then maintaining leadership and competitive advantage in the overall industrial base so China does not become the world's leader in technologies we need to be a superpower. China is rapidly becoming the manufacturing capital of the world. For example, Chinese officials have very publicly stated that they want to become the foundry capital of the world and have a worldwide monopoly on cast parts. They have a plan to win. And we don't. We need to increase our investment in R&D to produce the leading edge knowledge, capabilities and patents the country must have to remain an economic, diplomatic and military superpower. We must increase funding to the national laboratories across the board, especially at the Departments of Energy, Commerce and Defense. We need to rethink our trade, offset and CFIUS policies to encourage the maintenance of high value­added jobs inside the country. And we need to reform those national systems that are keeping our industry uncompetitive including pension and health care particularly in the auto industry. The bankruptcy of Delphi is only the first of many dominoes to fall if nothing changes. CFIUS must be completely rethought. Having General Motors under the control of foreigners is not the answer. Many foreign entities buy U.S. assets, not to use them, but to dismantle them. Even Daimler's takeover of Chrysler removed serious capabilities to Germany, though, of course, no one will go on the record with specifics. Cooperation between government and industry is essential. Unless we look at the industrial base as a system, we don't even see the problem or the possible military implications. We're also not even asking whether or not a U.S.­owned industrial base matters, and we need to explore this issue as a nation.

**Second is electrical vehicles.**

#### Development of EVs and batteries is vital to communication and creating a small military footprint

Clark, ‘8 - retired Army general and former supreme allied commander of NATO, is a senior fellow at the Burkle Center for International Relations at the University of California at Los Angeles. (Wesley K., “What’s Good for G.M. Is Good for the Army”, New York Times, November 16, 2008, <http://www.nytimes.com/2008/11/16/opinion/16clark.html?_r=3>) //CH

AMERICA’S automobile industry is in desperate trouble. Financial instability, the credit squeeze and closed capital markets are hurting domestic automakers, while decades of competition from foreign producers have eroded market share and consumer loyalty. Some economists question the wisdom of Washington’s intervening to help the Big Three, arguing that the automakers should pay the price for their own mistakes or that the market will correct itself. But we must act: aiding the American automobile industry is not only an economic imperative, but also a national security imperative. When President Dwight Eisenhower observed that America’s greatest strength wasn’t its military, but its economy, he must have had companies like General Motors and Ford in mind. Sitting atop a vast pyramid of tool makers, steel producers, fabricators and component manufacturers, these companies not only produced the tanks and trucks that helped win World War II, but also lent their technology to aircraft and ship manufacturing. The United States truly became the arsenal of democracy. During the 1950s, advances in aviation, missiles, satellites and electronics made Detroit seem a little old-fashioned in dealing with the threat of the Soviet Union. The Army’s requests for new trucks and other basic transportation usually came out a loser in budget battles against missile technology and new modifications for the latest supersonic jet fighter. Not only were airplanes far sexier but they also counted as part of our military “tooth,” while much of the land forces’ needs were “tail.” And in those days, “more teeth, less tail” had become a key concept in military spending. But in 1991, the Persian Gulf War demonstrated the awesome utility of American land power, and the Humvee (and its civilian version, the Hummer) became a star. Likewise, the ubiquitous homemade bombs of the current Iraq insurgency have led to the development of innovative armor-protected wheeled vehicles for American forces, as well as improvements in our fleets of Humvees, tanks, armored fighting vehicles, trucks and cargo carriers. In a little more than a year, the Army has procured and fielded in Iraq more than a thousand so-called mine-resistant ambush-protected vehicles. The lives of hundreds of soldiers and marines have been saved, and their tasks made more achievable, by the efforts of the American automotive industry. And unlike in World War II, America didn’t have to divert much civilian capacity to meet these military needs. Without a vigorous automotive sector, those needs could not have been quickly met. More challenges lie ahead for our military, and to meet them we need a strong industrial base**.** For years the military has sought better sources of electric power in its vehicles — necessary to allow troops to monitor their radios with diesel engines off, to support increasingly high-powered communications technology, and eventually to support electric propulsion and innovative armaments like directed-energy weapons. In sum, this greater use of electricity will increase combat power while reducing our footprint. Much research and development spending has gone into these programs over the years, but nothing on the manufacturing scale we really need. Now, though, as Detroit moves to plug-in hybrids and electric-drive technology, the scale problem can be remedied. Automakers are developing innovative electric motors, many with permanent magnet technology, that will have immediate military use. And only the auto industry, with its vast purchasing power, is able to establish a domestic advanced battery industry. Likewise, domestic fuel cell production — which will undoubtedly have many critical military applications — depends on a vibrant car industry. To be sure, the public should demand transformation and new standards in the auto industry before paying to keep it alive. And we should insist that Detroit’s goals include putting America in first place in hybrid and electric automotive technology, reducing the emissions of the country’s transportation fleet, and strengthening our competitiveness abroad. This should be no giveaway. Instead, it is a historic opportunity to get it right in Detroit for the good of the country. But Americans must bear in mind that any federal assistance plan would not be just an economic measure. This is, fundamentally, about national security.

#### Hegemony solves all wars

**Kagan, 7 -** senior fellow at the Carnegie Endowment for International Peace (Robert, “End of Dreams, Return of History”, 7/19, http://www.realclearpolitics.com/articles/2007/07/end\_of\_dreams\_return\_of\_histor.html)

This is a good thing, and it should continue to be a primary goal of American foreign policy to perpetuate this relatively benign international configuration of power. The unipolar order with the United States as the predominant power is unavoidably riddled with flaws and contradictions. It inspires fears and jealousies. The United States is not immune to error, like all other nations, and because of its size and importance in the international system those errors are magnified and take on greater significance than the errors of less powerful nations. Compared to the ideal Kantian international order, in which all the world's powers would be peace-loving equals, conducting themselves wisely, prudently, and in strict obeisance to international law, the unipolar system is both dangerous and unjust. Compared to any plausible alternative in the real world, however, it is relatively stable and less likely to produce a major war between great powers. It is also comparatively benevolent, from a liberal perspective, for it is more conducive to the principles of economic and political liberalism that Americans and many others value. American predominance does not stand in the way of progress toward a better world, therefore. It stands in the way of regression toward a more dangerous world. The choice is not between an American-dominated order and a world that looks like the European Union. The future international order will be shaped by those who have the power to shape it. The leaders of a post-American world will not meet in Brussels but in Beijing, Moscow, and Washington. The return of great powers and great games If the world is marked by the persistence of unipolarity, it is nevertheless also being shaped by the reemergence of competitive national ambitions of the kind that have shaped human affairs from time immemorial. During the Cold War, this historical tendency of great powers to jostle with one another for status and influence as well as for wealth and power was largely suppressed by the two superpowers and their rigid bipolar order. Since the end of the Cold War, the United States has not been powerful enough, and probably could never be powerful enough, to suppress by itself the normal ambitions of nations. This does not mean the world has returned to multipolarity, since none of the large powers is in range of competing with the superpower for global influence. Nevertheless, several large powers are now competing for regional predominance, both with the United States and with each other. National ambition drives China's foreign policy today, and although it is tempered by prudence and the desire to appear as unthreatening as possible to the rest of the world, the Chinese are powerfully motivated to return their nation to what they regard as its traditional position as the preeminent power in East Asia. They do not share a European, postmodern view that power is passé; hence their now two-decades-long military buildup and modernization. Like the Americans, they believe power, including military power, is a good thing to have and that it is better to have more of it than less. Perhaps more significant is the Chinese perception, also shared by Americans, that status and honor, and not just wealth and security, are important for a nation. Japan, meanwhile, which in the past could have been counted as an aspiring postmodern power -- with its pacifist constitution and low defense spending -- now appears embarked on a more traditional national course. Partly this is in reaction to the rising power of China and concerns about North Korea 's nuclear weapons. But it is also driven by Japan's own national ambition to be a leader in East Asia or at least not to play second fiddle or "little brother" to China. China and Japan are now in a competitive quest with each trying to augment its own status and power and to prevent the other 's rise to predominance, and this competition has a military and strategic as well as an economic and political component. Their competition is such that a nation like South Korea, with a long unhappy history as a pawn between the two powers, is once again worrying both about a "greater China" and about the return of Japanese nationalism. As Aaron Friedberg commented, the East Asian future looks more like Europe's past than its present. But it also looks like Asia's past. Russian foreign policy, too, looks more like something from the nineteenth century. It is being driven by a typical, and typically Russian, blend of national resentment and ambition. A postmodern Russia simply seeking integration into the new European order, the Russia of Andrei Kozyrev, would not be troubled by the eastward enlargement of the EU and NATO, would not insist on predominant influence over its "near abroad," and would not use its natural resources as means of gaining geopolitical leverage and enhancing Russia 's international status in an attempt to regain the lost glories of the Soviet empire and Peter the Great. But Russia, like China and Japan, is moved by more traditional great-power considerations, including the pursuit of those valuable if intangible national interests: honor and respect. Although Russian leaders complain about threats to their security from NATO and the United States, the Russian sense of insecurity has more to do with resentment and national identity than with plausible external military threats. 16 Russia's complaint today is not with this or that weapons system. It is the entire post-Cold War settlement of the 1990s that Russia resents and wants to revise. But that does not make insecurity less a factor in Russia 's relations with the world; indeed, it makes finding compromise with the Russians all the more difficult. One could add others to this list of great powers with traditional rather than postmodern aspirations. India 's regional ambitions are more muted, or are focused most intently on Pakistan, but it is clearly engaged in competition with China for dominance in the Indian Ocean and sees itself, correctly, as an emerging great power on the world scene. In the Middle East there is Iran, which mingles religious fervor with a historical sense of superiority and leadership in its region. 17 Its nuclear program is as much about the desire for regional hegemony as about defending Iranian territory from attack by the United States. Even the European Union, in its way, expresses a pan-European national ambition to play a significant role in the world, and it has become the vehicle for channeling German, French, and British ambitions in what Europeans regard as a safe supranational direction. Europeans seek honor and respect, too, but of a postmodern variety. The honor they seek is to occupy the moral high ground in the world, to exercise moral authority, to wield political and economic influence as an antidote to militarism, to be the keeper of the global conscience, and to be recognized and admired by others for playing this role. Islam is not a nation, but many Muslims express a kind of religious nationalism, and the leaders of radical Islam, including al Qaeda, do seek to establish a theocratic nation or confederation of nations that would encompass a wide swath of the Middle East and beyond. Like national movements elsewhere, Islamists have a yearning for respect, including self-respect, and a desire for honor. Their national identity has been molded in defiance against stronger and often oppressive outside powers, and also by memories of ancient superiority over those same powers. China had its "century of humiliation." Islamists have more than a century of humiliation to look back on, a humiliation of which Israel has become the living symbol, which is partly why even Muslims who are neither radical nor fundamentalist proffer their sympathy and even their support to violent extremists who can turn the tables on the dominant liberal West, and particularly on a dominant America which implanted and still feeds the Israeli cancer in their midst. Finally, there is the United States itself. As a matter of national policy stretching back across numerous administrations, Democratic and Republican, liberal and conservative, Americans have insisted on preserving regional predominance in East Asia; the Middle East; the Western Hemisphere; until recently, Europe; and now, increasingly, Central Asia. This was its goal after the Second World War, and since the end of the Cold War, beginning with the first Bush administration and continuing through the Clinton years, the United States did not retract but expanded its influence eastward across Europe and into the Middle East, Central Asia, and the Caucasus. Even as it maintains its position as the predominant global power, it is also engaged in hegemonic competitions in these regions with China in East and Central Asia, with Iran in the Middle East and Central Asia, and with Russia in Eastern Europe, Central Asia, and the Caucasus. The United States, too, is more of a traditional than a postmodern power, and though Americans are loath to acknowledge it, they generally prefer their global place as "No. 1" and are equally loath to relinquish it. Once having entered a region, whether for practical or idealistic reasons, they are remarkably slow to withdraw from it until they believe they have substantially transformed it in their own image. They profess indifference to the world and claim they just want to be left alone even as they seek daily to shape the behavior of billions of people around the globe. The jostling for status and influence among these ambitious nations and would-be nations is a second defining feature of the new post-Cold War international system. Nationalism in all its forms is back, if it ever went away, and so is international competition for power, influence, honor, and status. American predominance prevents these rivalries from intensifying -- its regional as well as its global predominance. Were the United States to diminish its influence in the regions where it is currently the strongest power, the other nations would settle disputes as great and lesser powers have done in the past: sometimes through diplomacy and accommodation but often through confrontation and wars of varying scope, intensity, and destructiveness. One novel aspect of such a multipolar world is that most of these powers would possess nuclear weapons. That could make wars between them less likely, or it could simply make them more catastrophic. It is easy but also dangerous to underestimate the role the United States plays in providing a measure of stability in the world even as it also disrupts stability. For instance, the United States is the dominant naval power everywhere, such that other nations cannot compete with it even in their home waters. They either happily or grudgingly allow the United States Navy to be the guarantor of international waterways and trade routes, of international access to markets and raw materials such as oil. Even when the United States engages in a war, it is able to play its role as guardian of the waterways. In a more genuinely multipolar world, however, it would not. Nations would compete for naval dominance at least in their own regions and possibly beyond. Conflict between nations would involve struggles on the oceans as well as on land. Armed embargos, of the kind used in World War i and other major conflicts, would disrupt trade flows in a way that is now impossible. Such order as exists in the world rests not merely on the goodwill of peoples but on a foundation provided by American power. Even the European Union, that great geopolitical miracle, owes its founding to American power, for without it the European nations after World War ii would never have felt secure enough to reintegrate Germany. Most Europeans recoil at the thought, but even today Europe 's stability depends on the guarantee, however distant and one hopes unnecessary, that the United States could step in to check any dangerous development on the continent. In a genuinely multipolar world, that would not be possible without renewing the danger of **world war.** People who believe greater equality among nations would be preferable to the present American predominance often succumb to a basic logical fallacy. They believe the order the world enjoys today exists independently of American power. They imagine that in a world where American power was diminished, the aspects of international order that they like would remain in place. But that 's not the way it works. International order does not rest on ideas and institutions. It is shaped by configurations of power. The international order we know today reflects the distribution of power in the world since World War ii, and especially since the end of the Cold War. A different configuration of power, a multipolar world in which the poles were Russia, China, the United States, India, and Europe, would produce its own kind of order, with different rules and norms reflecting the interests of the powerful states that would have a hand in shaping it. Would that international order be an improvement? Perhaps for Beijing and Moscow it would. But it is doubtful that it would suit the tastes of enlightenment liberals in the United States and Europe. The current order, of course, is not only far from perfect but also offers no guarantee against major conflict among the world's great powers. Even under the umbrella of unipolarity, regional conflicts involving the large powers may erupt. War could erupt between China and Taiwan and draw in both the United States and Japan. War could erupt between Russia and Georgia, forcing the United States and its European allies to decide whether to intervene or suffer the consequences of a Russian victory. Conflict between India and Pakistan remains possible, as does conflict between Iran and Israel or other Middle Eastern states. These, too, could draw in other great powers, including the United States. Such conflicts may be unavoidable no matter what policies the United States pursues. But they are more likely to erupt if the United States weakens or withdraws from its positions of regional dominance. This is especially true in East Asia, where most nations agree that a reliable American power has a stabilizing and pacific effect on the region. That is certainly the view of most of China 's neighbors. But even China, which seeks gradually to supplant the United States as the dominant power in the region, faces the dilemma that an American withdrawal could unleash an ambitious, independent, nationalist Japan. In Europe, too, the departure of the United States from the scene -- even if it remained the world's most powerful nation -- could be destabilizing. It could tempt Russia to an even more overbearing and potentially forceful approach to unruly nations on its periphery. Although some realist theorists seem to imagine that the disappearance of the Soviet Union put an end to the possibility of confrontation between Russia and the West, and therefore to the need for a permanent American role in Europe, history suggests that conflicts in Europe involving Russia are possible even without Soviet communism. If the United States withdrew from Europe -- if it adopted what some call a strategy of "offshore balancing" -- this could in time increase the likelihood of conflict involving Russia and its near neighbors, which could in turn draw the United States back in under unfavorable circumstances. It is also optimistic to imagine that a retrenchment of the American position in the Middle East and the assumption of a more passive, "offshore" role would lead to greater stability there. The vital interest the United States has in access to oil and the role it plays in keeping access open to other nations in Europe and Asia make it unlikely that American leaders could or would stand back and hope for the best while the powers in the region battle it out. Nor would a more "even-handed" policy toward Israel, which some see as the magic key to unlocking peace, stability, and comity in the Middle East, obviate the need to come to Israel 's aid if its security became threatened. That commitment, paired with the American commitment to protect strategic oil supplies for most of the world, practically ensures a heavy American military presence in the region, both on the seas and on the ground. The subtraction of American power from any region would not end conflict but would simply change the equation. In the Middle East, competition for influence among powers both inside and outside the region has raged for at least two centuries. The rise of Islamic fundamentalism doesn't change this. It only adds a new and more threatening dimension to the competition, which neither a sudden end to the conflict between Israel and the Palestinians nor an immediate American withdrawal from Iraq would change. The alternative to American predominance in the region is not balance and peace. It is further competition. The region and the states within it remain relatively weak. A diminution of American influence would not be followed by a diminution of other external influences. One could expect deeper involvement by both China and Russia, if only to secure their interests. 18 And one could also expect the more powerful states of the region, particularly Iran, to expand and fill the vacuum. It is doubtful that any American administration would voluntarily take actions that could shift the balance of power in the Middle East further toward Russia, China, or Iran. The world hasn 't changed that much. An American withdrawal from Iraq will not return things to "normal" or to a new kind of stability in the region. It will produce a new instability, one likely to draw the United States back in again. The alternative to American regional predominance in the Middle East and elsewhere is not a new regional stability. In an era of burgeoning nationalism, the future is likely to be one of intensified competition among nations and nationalist movements. Difficult as it may be to extend American predominance into the future, no one should imagine that a reduction of American power or a retraction of American influence and global involvement will provide an easier path.

### 1AC Grid

#### **Grid’s vulnerability to terrorist attack is increasing – recent Congressional report and expert agree**

Berg & MacFarlane, 7/5/12 – Staff Writers (Steve and Scott, KMRG News, <http://www.krmg.com/news/news/local/lawmakers-worry-us-electrical-grid-vulnerable-atta/nPnK4/>)

**Washington, D.C. —** In the wake of devastating, mass power outages across the country, there are concerns the government isn't equipped to respond to a terror strike on America's electrical grid. A report from the U.S. House Energy Committee says the country’s electric utilities aren't properly protected from a cyber attack or a terror strike. Jim Lewis of the Center for Strategic and International Studies says terrorists are working on it. "Their capabilities are increasing,” Lewis said. “At some point, we're going to see people who have a grudge get the capability to attack our infrastructure."

#### Grid is an easy target for a nuclear attack that could shut down power key to critical DOD missions

Report of the Defense Science Board Task Force, 08, (February, “More Fight-Less Fuel,” <http://www.acq.osd.mil/dsb/reports/2008-02-ESTF.pdf>)

A third risk comes from sabotage or terrorist activity, whether local, trans-national, or state-sponsored, and including both conventional and nuclear attack. Nuclear attack could take place either directly or through the generation of a high altitude electromagnetic pulse (EMP). The grid is a relatively easy target for a terrorist. It is brittle, increasingly centralized, capacity-strained, and largely unprotected from physical attack, with little stockpiling of critical hardware. Although the system is designed to survive single points of failure, increasing demand on the system and increasing network constraints make multiple points of failure more likely. These are difficult to anticipate and more likely to result in cascading outages and catastrophic outages that cover large areas for long periods of time. Network Single Points of Failure (NSPF) are abundant. High voltage transformers, breakers, and other long-lead time items are particularly critical system elements. They can be easily targeted and destroyed. Grid sections could be taken down for months even if replacement transformers and breakers could be found; or for years if certain components need to be newly manufactured and transported. There are only limited backups located around the country—generally co-located with operating equipment. For some of the largest equipment, there is no domestic supply and only limited overseas production capacity which is fully booked years ahead. 32 For example, 765 kV transformers are manufactured only by one company in Canada. Armed with the right knowledge, a small number of people could shut down electricity over significant areas for an extended period of time, including power to critical DoD missions. The grid is not designed to withstand a coordinated multi-pronged or wide-area attack.33 The Task Force noted that attacks on the grid are one of the most common and effective tactics of insurgents in Iraq, and are increasingly seen in Afghanistan.

#### Nuclear terrorist attack leads to third world war that goes nuclear

Mohamed Sid-Ahmed, ’04 – Political Analyst (Al Ahram Weekly, "Extinction!" 8/26, no. 705, http://weekly.ahram.org.eg/2004/705/op5.htm)

What would be the consequences of a nuclear attack by terrorists? Even if it fails, it would further exacerbate the negative features of the new and frightening world in which we are now living. Societies would close in on themselves, police measures would be stepped up at the expense of human rights, tensions between civilisations and religions would rise and ethnic conflicts would proliferate. It would also speed up the arms race and develop the awareness that a different type of world order is imperative if humankind is to survive. But the still more critical scenario is if the attack succeeds. This could lead to a **third world war**, from which no one will emerge victorious. Unlike a conventional war which ends when one side triumphs over another, this war will be without winners and losers. When **nuclear pollution infects the whole planet, we will all be losers.**

#### EV market penetration will necessitate and encourage investment in grid upgrades – but will only occur if penetration is widespread

**Lee and Lovellette ’11** - Jassim M. Jaidah Family Director of the Environment and Natural Resources Program within the Belfer Center for Science and International Affairs at Harvard's John F. Kennedy School of Government, Faculty Co-Chair of the Center's Energy Technology Innovation Policy project, and a Senior Lecturer in Public Policy, Belfer Center for Science and International Affairs, Harvard Kennedy School, Harvard University (Henry and Grant, “Will Electric Cars Transform the U.S. Vehicle Market”, July 2011. http://belfercenter.ksg.harvard.edu/files/Lee%20Lovellette%20Electric%20Vehicles%20DP%202011%20web.pdf)//DHirsch

Recharging an EV will require an infrastructure that is readily available (including the recharging equipment and outlets), an upgraded electric distribution grid, and sufficient generation capacity to meet the additional demand. As with so many aspects of the electric car, the availability of this infrastructure depends on a number of uncertainties. How fast will electric vehicles penetrate the fleet? If slowly, then the market will not want to invest in charging equipment and wire upgrades that are subsequently stranded for many years. Will electric car sales be evenly distributed across the country, or disproportionately located in certain areas, such as the two coasts? Since the conditions of the grid and the adequacy of generating capacity depend on regional variables, one will need to look at this issue at least from a state perspective, if not from that of individual utility franchises. Finally, one has to ask, when will consumers be recharging their vehicles? There is a big difference between scenarios in which a high percentage of consumers charge their vehicles at 7:00 p.m. and ones in which a majority wait until midnight.

#### DOE is already researching how to upgrade the grid to incorporate EVs

**Kelly, 10 –** Assistant Secretary for DOE/Ph.D Physics from Harvard (Henry, February 23, Hearing Before a Subcommittee on the Committee on Appropriations, United States Senate, “Opportunities and Challenges Presented in Increasing the Number of Electric Vehicles in the Light Duty Automotive Sector,”

<http://www.gpo.gov/fdsys/pkg/CHRG-111shrg56643/pdf/CHRG-111shrg56643.pdf>, p. 75)

 To evaluate and anticipate the potential impacts of electric-drive vehicles on the U.S. electric grid, DOE is partnering with electric utilities through demonstration projects as part of the Transportation Electrification projects awarded as part of the American Recovery and Reinvestment Act. These demonstration activities will allow the Department and the utility industry to assess the true impact on the electric grid of large numbers of electric-drive vehicles in concentrated locations. This will in turn facilitate the development of plans to incorporate intelligently managed ve- hicle charging systems into the U.S. electric grid with minimal impact.

#### Smart technology will improve overall efficiency and reliability and prevent grid strain

SPEA 11 - School of Public and Environmental Affairs at Indiana University (“Plug-in Electric Vehicles: A Practical Plan for Progress”, written by an expert panel, February 2011, http://www.indiana.edu/~spea/pubs/TEP\_combined.pdf)//AL

Electricity distribution occurs through an electric grid, which is an interconnected network that delivers power from suppliers to consumers. There are some noted inefficiencies with electric distribution. The current form of the grid has contributed to brownouts and blackouts, most notoriously the blackout that occurred in the Northeast from overload during a heat wave in August 2003. One solution to these issues is a “smart grid,” which incorporates advanced transmission, distribution, metering, and consumer technologies. Although the phrase “smart grid” has no universal definition, it tends to encompass two-way communication between the user of electricity and the energy provider, enhanced second-by-second monitoring of electric loads, and the capability to manage two-way electricity flows that go from the provider to the user and from the user back to the provider. The pace of penetration of smart grid technologies is uncertain, but they are being deployed around the world today and seem inevitable in the long run. The current electric infrastructure is aging and will require substantial investment in upgrades and expansions in coming decades. 56 The need for smart grid management is growing due to the increasing role of intermittent renewable energy sources such as wind and solar power that depend on weather conditions and the growing number of independent power producers that own alternative energy systems that must be integrated into the grid. The smart grid, if designed and operated properly, can be expected to enhance both system efficiency and reliability. Before the concept of the smart grid, there were fears that widespread use of PEVs would strain the grid because PEV owners would drive home after work and plug their vehicles into the grid during the high-demand period from 4 p.m. to 7 p.m. on weekdays. Peak power demands determine how many new power plants must be built. Moreover, when a plant’s capacity is strained, disruptions and blackouts are more likely to occur. The deployment of smart grid technologies in coming decades may facilitate the commercialization of PEVs in several ways. Smart meters and recharging software will enable precise monitoring of electricity flows between batteries and the grid. Smart chargers can manage the power drawn by PEVs, helping to ensure battery recharging occurs outside high demand times. If utilities accompany smart grid technologies with innovative time-of-day pricing options, vehicle owners will have incentives to charge their batteries during the hours with lower demand for energy (usually overnight). Though not required for PEV commercialization, smart grid technologies could also provide the infrastructure—the distribution technologies, power conversion technologies, and consumer-utility interface systems—to help PEVs achieve higher rates of commercialization. At the least, smart grid technologies can enable the deployment of future electricity technologies that may prove useful in later stages of PEV commercialization, such as quick recharging technologies and two-way power flow.

### 1AC Oil

#### Evidence of peak oil is mounting –peak oil is already a reality in 61% of the oil-producing world

**Perl, ’10** – Director of Urban Studies Program at Simon Fraser University (Anthony, “Integrating HSR into North America’s Next Mobility Transition,” June 16, 2010, p. 13016, http://wagner.nyu.edu/rudincenter/publications/RCWP\_Perl.pdf) // SP

Despite an ongoing debate regarding the exact timing of a peak in global oil production, evidence is mounting that we are on the threshold of a substantive change in the ways by which future oil will be extracted**. As shown in Table 3,** the ‘low hanging fruit’ of cheap and easily accessible oil has largely been consumed. Ghanta **(2009)** concludes that: Only 14 out of 54 oil producing countries and regions in the world continue to increase production, while 30 are definitely past their production peak, and the remaining 10 appear to have flat or declining production. Put another way, peak oil is real in 61% of the oil producing world when weighted by production. Producing the world’s remaining oil reserves will be both more costly and more risky than obtaining past oil supplies. Tapping the world’s remaining oil reserves requires new, and substantially different, oil production infrastructure that can operate in extreme environments **(e.g., five miles below the seabed or in polar regions). Deploying this new energy infrastructure, and responsibly decommissioning established infrastructure that will no longer be used once conventional oil reserves become depleted will increase the price of transport fuels. Learning how to manage that infrastructure safely presents new risks and challenges, as illustrated by the ‘Deepwater Horizon’ disaster and subsequent ecological catastrophe in the Gulf of Mexico. (Perl, 2010)** There is thus considerable likelihood of future price increases in transport fuels derived from oil.

#### Oil wars lead to extinction

Stephen Lendman (Research Associate of the Centre for Research on Globalization) 2007 “Resource Wars - Can We Survive Them” http://www.rense.com/general76/resrouce.htm

With the world's energy supplies finite, the US heavily dependent on imports, and "peak oil" near or approaching, "security" for America means assuring a sustainable supply of what we can't do without. It includes waging wars to get it, protect it, and defend the maritime trade routes over which it travels. That means energy's partnered with predatory New World Order globalization, militarism, wars, ecological recklessness, and now an extremist US administration willing to risk Armageddon for world dominance. Central to its plan is first controlling essential resources everywhere, at any cost, starting with oil and where most of it is located in the Middle East and Central Asia. The New "Great Game" and Perils From It The new "Great Game's" begun, but this time the stakes are greater than ever as explained above. The old one lasted nearly 100 years pitting the British empire against Tsarist Russia when the issue wasn't oil. This time, it's the US with help from Israel, Britain, the West, and satellite states like Japan, South Korea and Taiwan challenging Russia and China with today's weapons and technology on both sides making earlier ones look like toys. At stake is more than oil. It's planet earth with survival of all life on it issue number one twice over. Resources and wars for them means militarism is increasing, peace declining, and the planet's ability to sustain life front and center, if anyone's paying attention. They'd better be because beyond the point of no return, there's no second chance the way Einstein explained after the atom was split. His famous quote on future wars was : "I know not with what weapons World War III will be fought, but World War IV will be fought with sticks and stones." Under a worst case scenario, it's more dire than that. There may be nothing left but resilient beetles and bacteria in the wake of a nuclear holocaust meaning even a new stone age is way in the future, if at all. The threat is real and once nearly happened during the Cuban Missile Crisis in October, 1962. We later learned a miracle saved us at the 40th anniversary October, 2002 summit meeting in Havana attended by the US and Russia along with host country Cuba. For the first time, we were told how close we came to nuclear Armageddon. Devastation was avoided only because Soviet submarine captain Vasily Arkhipov countermanded his order to fire nuclear-tipped torpedos when Russian submarines were attacked by US destroyers near Kennedy's "quarantine" line. Had he done it, only our imagination can speculate what might have followed and whether planet earth, or at least a big part of it, would have survived.

#### Expanding EVs is the single most effective way to reduce oil demand – Baker Institute study proves

**Rice ’10** – Rice University's Baker Institute for Public Policy (“Study: Electric cars hold greater promise for reducing emissions and lowering US oil imports”, 9/27/2010. http://www.eurekalert.org/pub\_releases/2010-09/ru-sec092710.php)//DHirsch

Electric cars hold greater promise for reducing emissions and lowering U.S. oil imports than a national renewable portfolio standard, according to research conducted by Rice University's Baker Institute for Public Policy. This assessment is among several contained in a new major policy study the Baker Institute Energy Forum will release at a Sept. 27-28 conference titled "Energy Market Consequences of an Emerging U.S. Carbon Management Policy." The study comprises several academic working papers on a variety of topics, such as carbon pricing, the wind industry, global U.S. carbon and energy strategies, and renewable energy R&D. "As the country moves forward to deliberate on energy and climate policy," the executive summary states, "consideration must be given to what policies would best accomplish the stated goals for U.S. policy — a reduction in the need for imported oil and in greenhouse gas emissions." The papers released at the conference seek to "clarify and debunk common myths that currently plague the U.S. energy- and climate-policy debate." For instance, the Baker Institute analysis found "the single most effective way to reduce U.S. oil demand and foreign imports would be an aggressive campaign to launch electric vehicles into the automotive fleet." In fact, mandating that 30 percent of all vehicles be electric by 2050 would both reduce U.S. oil use by 2.5 million barrels a day beyond the 3 million barrels-per-day savings already expected from new corporate average fuel efficiency standards, and also cut emissions by 7 percent, while the proposed national renewable portfolio standard (RPS) would cut them by only 4 percent over the same time.

#### EVs area the lynchpin to confronting oil dependence –electricity is the most diverse, domestic, stable, and scalable energy supply

**Smith, ’10 - FedEx CEO/Member of Electrification Coalition (**Frederick, February 23, Hearing Before a Subcommittee on the Committee on Appropriations, United States Senate, “Opportunities and Challenges Presented in Increasing the Number of Electric Vehicles in the Light Duty Automotive Sector,”

<http://www.gpo.gov/fdsys/pkg/CHRG-111shrg56643/pdf/CHRG-111shrg56643.pdf>, p. 18-20)

There is a solution. The lynchpin of any plan that is serious about confronting oil dependence must be a transportation system that today is almost entirely de- pendent on petroleum. The solution can be found in something that nearly every single one of you has either on your belt or on the table in front of you. The lithium ion batteries that power our cell phones and laptop computers can one day form the nucleus of an electrified transportation sector that is powered by a wide variety of domestic sources: natural gas, nuclear, coal, hydroelectric, wind, solar, and geo- thermal. No one fuel source—or producer—would be able to hold our transportation system and our economy hostage the way a single nation can disrupt the flow of petroleum today. Electricity represents a diverse, domestic, stable, fundamentally scalable energy supply whose fuel inputs are almost completely free of oil. It would have clear and widespread advantages over the current petroleum-based system: —Electricity is Diverse and Domestic.—Electricity is generated from a diverse set of largely domestic fuels. Among those fuels, the role of petroleum is negligible. In fact, just 1 percent of power generated in the United States in 2008 was de- rived from petroleum. An electricity-powered transportation system, therefore, is one in which an interruption of the supply of one fuel can be made up for by others. This ability to use different fuels as a source of power would increase the flexibility of an electrified light-duty vehicle fleet. As our national goals and resources change over time, we can shift transportation fuels without having to overhaul our transportation fleet again. In short, an electrified transport system would give us back the reins, offering much greater control over the fuels we use to support the transportation sector of our economy. Moreover, while oil supplies are subject to a wide range of geopolitical risks, the fuels that we use to generate electricity are generally sourced domestically. All renewable energy is generated using domestic resources. We are a net exporter of coal, which fuels about one-half of our electricity. Although we currently import approxi- mately 16 percent of the natural gas we consume, more than 90 percent of those imports were from North American sources (Canada and Mexico) in 2008. And in fact, recent advancements in the recovery of natural gas resources from un- conventional reservoirs like shale gas, coal bed methane, and tight gas sands have led to wide consensus that our domestic undiscovered technically recover- able reserves are well in excess of 1,000 trillion cubic feet. We do import a sub- stantial portion of the uranium we use for civilian nuclear power reactors. Forty-two percent of those imports, however, are from Canada and Australia. —Electricity Prices are Stable.—Electricity prices are significantly less volatile than oil or gasoline prices. Over the past 25 years, electricity prices have risen steadily but slowly. Since 1983, the average retail price of electricity delivered in the United States has risen by an average of less than 2 percent per year in nominal terms, and has actually fallen in real terms. Moreover, prices have risen by more than 5 percent per year only three times in that time period. This price stability, which is in sharp contrast to the price volatility of oil or gasoline, exists for at least two reasons. First, the retail price of electricity reflects a wide range of costs, only a small portion of which arise from the underlying cost of the fuel. The remaining costs are largely fixed. In most instances, the cost of fuel represents a smaller percentage of the overall cost of delivered electricity than the cost of crude oil represents as a percentage of the cost of retail gaso- line. Second, although real-time electricity prices are volatile (sometimes highly volatile on an hour-to-hour or day-to-day basis), they are nevertheless relatively stable over the medium and long term. Therefore, in setting retail rates, utili- ties or power marketers use formulas that will allow them to recover their costs, including the occasionally high real-time prices for electricity, but which effec- tively isolate the retail consumer from the hour-to-hour and day-to-day volatility of the real-time power markets. By isolating the consumer from the price vola- tility of the underlying fuel costs, electric utilities would be providing to drivers of GEVs the very stability that oil companies cannot provide to consumers of gasoline. The Power Sector has Substantial Spare Capacity.—Because large-scale storage of electricity has historically been impractical, the U.S. electric power sector is effectively designed as an ‘‘on-demand system.’’ In practical terms, this has meant that the system is constructed to be able to meet peak demand from ex- isting generation sources at any time. However, throughout most of a 24-hour day—particularly at night—consumers require significantly less electricity than the system is capable of delivering. Therefore, the U.S. electric power sector has substantial spare capacity that could be used to power electric vehicles without constructing additional power generation facilities, assuming charging patterns were appropriately managed. —The Network of Infrastructure Already Exists.—Unlike many proposed alter- natives to petroleum-based fuels, the Nation already has a ubiquitous network of electricity infrastructure. No doubt, electrification will require the deploy- ment of charging infrastructure, additional functionality, and increased invest- ment in grid reliability, but the power sector’s infrastructural backbone—gen- eration, transmission, and distribution—is already in place.

#### Eliminating foreign oil is unnecessary for independence - we need only reduce imports to where oil has little to no effect on economic or military policy

Benjamin K. Sovacool, ’07 - (an Assistant Professor at the Lee Kuan Yew School of Public Policy at the National University of Singapore. He is also a Research Fellow in the Energy Governance Program at the Centre on Asia and Globalization) 2007 “Oil Independence Possible for U.S. by 2030” http://scitizen.com/authors/Benjamin-K.-Sovacool-a-899\_s\_08b456d033fcee27acbc8caf208135e8.html

Oil independence is possible for the U.S. if comprehensive and aggressive energy policies are implemented aimed at reducing demand for oil, increasing supply, and promoting alternative fuels. Contrary to what most people might think, oil independence is possible for the United States by 2030. The news is especially important when one considers that, between 1970 and 2000, economists estimate that the costs of American dependence on foreign supplies of oil have ranged between $5 and $13 trillion dollars. That’s more than the cost of all wars fought by the U.S. (adjusted for inflation) going all the way back to the Revolutionary War. The trick is to start by thinking about oil independence a little differently. Oil independence should not be viewed as eliminating all imports of oil or reducing imports from hostile or unstable oil producing states. Instead, it should entail creating a world where the costs of the country’s dependence on oil would be so small that they would have little to no effect on our economic, military, or foreign policy. It means creating a world where the estimated total economic costs of oil dependence would be less than one percent of U.S. gross domestic product by 2030. Conceived in this way (and contrary to much political commentary these days), researchers at the Oak Ridge National Laboratory (ORNL) have calculated that if the country as a whole reduced their demand for oil by 7.22 million barrels per day (MBD) and increased supply by 3 MBD, oil independence would be achieved by 2030 with a 95 percent chance of success. By reducing demand for oil, increasing its price elasticity, and increasing the supply of conventional and unconventional petroleum products, ORNL researchers noted that the country would be virtually immune from oil price shocks and market uncertainty. If large oil producing states were to respond to the U.S. by cutting back production, their initial gains from higher prices would also reduce their market share, in turn further limiting their ability to influence the oil market in the future. So if decreasing American demand for oil by 7.22 MBD and increasing supply by 3 MBD would enable the U.S. to achieve oil independence in 2030, which combination of policies offers an optimal strategy? Policymakers, for instance, could lower demand for oil by making automobiles more efficient (by legislating more stringent fuel economy standards for light and heavy duty vehicles or lowering the interstate speed limit), promoting alternatives in mode choice (such as mass transit, light rail, and carpooling), or establishing telecommuting centers and incentives for commuters to work from home. They could also promote rigorous standards for tire inflation and reduce oil consumption in other sectors of the economy.

### 1AC Warming

#### Warming is real, fast, and causes extinction

**Morgan 09 –** Professor of Current Affairs @ Hankuk University of Foreign Studies, South Korea(Dennis Ray, “World on fire: two scenarios of the destruction of human civilization and possible extinction of the human race”, Futures, Volume 41, Issue 10, December 2009, Pages 683-693, ScienceDirect)

As horrifying as the scenario of human extinction by sudden, fast-burning nuclear fire may seem, the one consolation is that this future can be avoided within a relatively short period of time if responsible world leaders change Cold War thinking to move away from aggressive wars over natural resources and towards the eventual dismantlement of most if not all nuclear weapons. On the other hand, another scenario of human extinction by fire is one that may not so easily be reversed within a short period of time because it is not a fast-burning fire; rather, a slow burning fire is gradually heating up the planet as industrial civilization progresses and develops globally. This gradual process and course is long-lasting; thus it cannot easily be changed, even if responsible world leaders change their thinking about ‘‘progress’’ and industrial development based on the burning of fossil fuels. The way that global warming will impact humanity in the future has often been depicted through the analogy of the proverbial frog in a pot of water who does not realize that the temperature of the water is gradually rising. Instead of trying to escape, the frog tries to adjust to the gradual temperature change; finally, the heat of the water sneaks up on it until it is debilitated. Though it finally realizes its predicament and attempts to escape, it is too late; its feeble attempt is to no avail— **and the frog dies**. Whether this fable can actually be applied to frogs in heated water or not is irrelevant; it still serves as a comparable scenario of how the slow burning fire of global warming may eventually lead to a runaway condition and take humanity by surprise. Unfortunately, by the time the politicians finally all agree with the scientific consensus that global warming is indeed human caused, its development could be too advanced to arrest; the poor frog has become too weak and enfeebled to get himself out of hot water. The Intergovernmental Panel of Climate Change (IPCC) was established in 1988 by the WorldMeteorological Organization (WMO) and the United Nations Environmental Programme to ‘‘assess on a comprehensive, objective, open and transparent basis the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of humaninduced climate change, its potential impacts and options for adaptation and mitigation.’’[16]. Since then, it has given assessments and reports every six or seven years. Thus far, it has given four assessments.13 With all prior assessments came attacks fromsome parts of the scientific community, especially by industry scientists, to attempt to prove that the theory had no basis in planetary history and present-day reality; nevertheless, as more andmore research continually provided concrete and empirical evidence to confirm the global warming hypothesis, that it is indeed human-caused, mostly due to the burning of fossil fuels, the scientific consensus grew stronger that human induced global warming is verifiable. As a matter of fact, according to Bill McKibben [17], 12 years of ‘‘impressive scientific research’’ strongly confirms the 1995 report ‘‘that humans had grown so large in numbers and especially in appetite for energy that they were now damaging the most basic of the earth’s systems—the balance between incoming and outgoing solar energy’’; ‘‘. . . their findings have essentially been complementary to the 1995 report – a constant strengthening of the simple basic truth that humans were burning too much fossil fuel.’’ [17]. Indeed, 12 years later, the 2007 report not only confirms global warming, with a stronger scientific consensus that the slow burn is ‘‘very likely’’ human caused, but it also finds that the ‘‘amount of carbon in the atmosphere is now increasing at a faster rate even than before’’ and the temperature increases would be ‘‘considerably higher than they have been so far were it not for the blanket of soot and other pollution that is temporarily helping to cool the planet.’’ [17]. Furthermore, almost ‘‘everything frozen on earth is melting. Heavy rainfalls are becoming more common since the air is warmer and therefore holds more water than cold air, and ‘cold days, cold nights and frost have become less frequent, while hot days, hot nights, and heat waves have become more frequent.’’ [17]. Unless drastic action is taken soon, the average global temperature is predicted to rise about 5 degrees this century, but it could rise as much as 8 degrees. As has already been evidenced in recent years, the rise in global temperature is melting the Arctic sheets. This runaway polar melting will inflict great damage upon coastal areas, which could be much greater than what has been previously forecasted. However, what is missing in the IPCC report, as dire as it may seem, is sufficient emphasis on the less likely but still plausible worst case scenarios, which could prove to have the most devastating, catastrophic consequences for the long-term future of human civilization. In other words, the IPCC report places too much emphasis on a linear progression that does not take sufficient account of the dynamics of systems theory, which leads to a fundamentally different premise regarding the relationship between industrial civilization and nature. As a matter of fact, as early as the 1950s, Hannah Arendt [18] observed this radical shift of emphasis in the human-nature relationship, which starkly contrasts with previous times because the very distinction between nature and man as ‘‘Homo faber’’ has become blurred, as man no longer merely takes from nature what is needed for fabrication; instead, he now acts into nature to augment and transform natural processes, which are then directed into the evolution of human civilization itself such that we become a part of the very processes that we make. The more human civilization becomes an integral part of this dynamic system, the more difficult it becomes to extricate ourselves from it. As Arendt pointed out, this dynamism is dangerous because of its unpredictability. Acting into nature to transform natural processes brings about an . . . endless new change of happenings whose eventual outcome the actor is entirely incapable of knowing or controlling beforehand. The moment we started natural processes of our own - and the splitting of the atom is precisely such a man-made natural process -we not only increased our power over nature, or became more aggressive in our dealings with the given forces of the earth, but for the first time have taken nature into the human world as such and obliterated the defensive boundaries between natural elements and the human artifice by which all previous civilizations were hedged in’’ [18]. So, in as much as we act into nature, we carry our own unpredictability into our world; thus, Nature can no longer be thought of as having absolute or iron-clad laws. We no longer know what the laws of nature are because the unpredictability of Nature increases in proportion to the degree by which industrial civilization injects its own processes into it; through selfcreated, dynamic, transformative processes, we carry human unpredictability into the future with a precarious recklessness that may indeed end in human catastrophe or extinction, for elemental forces that we have yet to understand may be unleashed upon us by the very environment that we experiment with. Nature may yet have her revenge and the last word, as the Earth and its delicate ecosystems, environment, and atmosphere reach a tipping point, which could turn out to be a point of no return. This is exactly the conclusion reached by the scientist, inventor, and author, James Lovelock. The creator of the wellknown yet controversial Gaia Theory, Lovelock has recently written that it may be already too late for humanity to change course since climate centers around the world, . . . which are the equivalent of the pathology lab of a hospital, have reported the Earth’s physical condition, and the climate specialists see it as seriously ill, and soon to pass into a morbid fever that may last as long as 100,000 years. I have to tell you, as members of the Earth’s family and an intimate part of it, that you and especially civilisation are in grave danger. It was ill luck that we started polluting at a time when the sun is too hot for comfort. We have given Gaia a fever and soon her condition will worsen to a state like a coma. She has been there before and recovered, but it took more than 100,000 years. We are responsible and will suffer the consequences: as the century progresses, the temperature will rise 8 degrees centigrade in temperate regions and 5 degrees in the tropics. Much of the tropical land mass will become scrub and desert, and will no longer serve for regulation; this adds to the 40 per cent of the Earth’s surface we have depleted to feed ourselves. . . . Curiously, aerosol pollution of the northern hemisphere reduces global warming by reflecting sunlight back to space. This ‘global dimming’ is transient and could disappear in a few days like the smoke that it is, leaving us fully exposed to the heat of the global greenhouse. We are in a fool’s climate, accidentally kept cool by smoke, and before this century is over billions of us will die and the few breeding pairs of people that survive will be in the Arctic where the climate remains tolerable. [19] Moreover, Lovelock states that the task of trying to correct our course is hopelessly impossible, for we are not in charge. It is foolish and arrogant to think that we can regulate the atmosphere, oceans and land surface in order to maintain the conditions right for life. It is as impossible as trying to regulate your own temperature and the composition of your blood, for those with ‘‘failing kidneys know the never-ending daily difficulty of adjusting water, salt and protein intake. The technological fix of dialysis helps, but is no replacement for living healthy kidneys’’ [19]. Lovelock concludes his analysis on the fate of human civilization and Gaia by saying that we will do ‘‘our best to survive, but sadly I cannot see the United States or the emerging economies of China and India cutting back in time, and they are the main source of emissions. The worst will happen and survivors will have to adapt to a hell of a climate’’ [19]. Lovelock’s forecast for climate change is based on a systems dynamics analysis of the interaction between humancreated processes and natural processes. It is a multidimensional model that appropriately reflects the dynamism of industrial civilization responsible for climate change. For one thing, it takes into account positive feedback loops that lead to ‘‘runaway’’ conditions. This mode of analysis is consistent  with recent research on how ecosystems suddenly disappear. A 2001 article in Nature, based on a scientific study by an international consortium, reported that changes in ecosystems are not just gradual but are often sudden and catastrophic [20]. Thus, a scientific consensus is emerging (after repeated studies of ecological change) that ‘‘stressed ecosystems, given the right nudge, are capable of slipping rapidly from a seemingly steady state to something entirely different,’’ according to Stephen Carpenter, a limnologist at the University of Wisconsin-Madison (who is also a co-author of the report). Carpenter continues, ‘‘We realize that there is a common pattern we’re seeing in ecosystems around the world, . . . Gradual **changes in vulnerability accumulate and** eventually **you get a shock** to the system - a flood or a drought - and, boom, you’re over into another regime. It becomes a self-sustaining collapse.’’ [20].

If ecosystems are in fact mini-models of the system of the Earth, as Lovelock maintains, then we can expect the same kind of behavior. As Jonathon Foley, a UW-Madison climatologist and another co-author of the Nature report, puts it, ‘‘Nature isn’t linear. Sometimes you can push on a system and push on a system and, finally, you have the straw that breaks the camel’s back.’’ Also, once the ‘‘flip’’ occurs, as Foley maintains, then the catastrophic change is ‘‘irreversible.’’ [20]. When we expand this analysis of ecosystems to the Earth itself, it’s frightening. What could be the final push on a stressed system that could ‘‘break the camel’s back?’’ Recently, another factor has been discovered in some areas of the arctic regions, which will surely compound the problem of global ‘‘heating’’ (as Lovelock calls it) in unpredictable and perhaps catastrophic ways. This disturbing development, also reported in Nature, concerns the permafrost that has locked up who knows how many tons of the greenhouse gasses, methane and carbon dioxide. Scientists are particularly worried about permafrost because, as it thaws, it releases these gases into the atmosphere, thus, contributing and accelerating global heating. It is a vicious positive feedback loop that compounds the prognosis of global warming in ways that could very well prove to be the tipping point of no return. Seth Borenstein of the Associated Press describes this disturbing positive feedback loop of permafrost greenhouse gasses, as when warming ‘‘. already under way thaws permafrost, soil that has been continuously frozen for thousands of years. Thawed permafrost releases methane and carbon dioxide. Those gases reach the atmosphere and help trap heat on Earth in the greenhouse effect. The trapped heat thaws more permafrost and so on.’’ [21]. The significance and severity of this problem cannot be understated since scientists have discovered that ‘‘the amount of carbon trapped in this type of permafrost called ‘‘yedoma’’ is much more prevalent than originally thought and may be 100 times [my emphasis] the amount of carbon released into the air each year by the burning of fossil fuels’’ [21]. Of course, it won’t come out all at once, at least by time as we commonly reckon it, but in terms of geological time, the ‘‘several decades’’ that scientists say it will probably take to come out can just as well be considered ‘‘all at once.’’ Surely, within the next 100 years, much of the world we live in will be quite hot and may be unlivable, as Lovelock has predicted. Professor Ted Schuur, a professor of ecosystem ecology at the University of Florida and co-author of the study that appeared in Science, describes it as a ‘‘slow motion time bomb.’’ [21]. Permafrost under lakes will be released as methane while that which is under dry ground will be released as carbon dioxide. Scientists aren’t sure which is worse. Whereas methane is a much more powerful agent to trap heat, it only lasts for about 10 years before it dissipates into carbon dioxide or other chemicals. The less powerful heat-trapping agent, carbon dioxide, lasts for 100 years [21]. Both of the greenhouse gasses present in permafrost represent a global dilemma and challenge that compounds the effects of global warming and runaway climate change. The scary thing about it, as one researcher put it, is that there are ‘‘lots of mechanisms that tend to be self-perpetuating and relatively few that tend to shut it off’’ [21].14 In an accompanying AP article, Katey Walters of the University of Alaska at Fairbanks describes the effects as ‘‘huge’’ and, unless we have a ‘‘major cooling,’’ - unstoppable [22]. Also, there’s so much more that has not even been discovered yet, she writes: ‘‘It’s coming out a lot and there’s a lot more to come out.’’ [22]. 4. Is it the end of human civilization and possible extinction of humankind? What Jonathon Schell wrote concerning death by the fire of nuclear holocaust also applies to the slow burning death of global warming: Once we learn that a holocaust might lead to extinction**,** we have no right to gamble, because if we lose, the game will be over, and neither we nor anyone else will ever get another chance. Therefore, although, scientifically speaking, there is all the difference in the world between the mere possibility that a holocaust will bring about extinction and the certainty of it, morally they are the same, and we have no choice but to address the issue of nuclear weapons as though we knew for a certainty that their use would put an end to our species [23].15 When we consider that beyond the horror of nuclear war, another horror is set into motion to interact with the subsequent nuclear winter to produce a poisonous and super heated planet, the chances of human survival seem even smaller. Who knows, even if some small remnant does manage to survive, what the poisonous environmental conditions would have on human evolution in the future. A remnant of mutated, sub-human creatures might survive such harsh conditions, but for all purposes, human civilization has been destroyed, and the question concerning human extinction becomes moot. Thus, **we have** no other choice but **to consider the finality of it all**, as Schell does: ‘‘Death lies at the core of each person’s private existence, but part of death’s meaning is to be found in the fact that it occurs in a biological and social world that survives.’’ [23].16 But what if the world itself were to perish, Schell asks. Would not it bring about a sort of ‘‘second death’’ – the death of the species – a possibility that the vast majority of the human race is in denial about? Talbot writes in the review of Schell’s book that it is not only the ‘‘death of the species, not just of the earth’s population on doomsday, but of countless unborn generations. They would be spared literal death but would nonetheless be victims . . .’’ [23]. That is the ‘‘second death’’ of humanity – the horrifying, unthinkable prospect that there are no prospects – that there will be no future. In the second chapter of Schell’s book, he writes that since we have not made a positive decision to exterminate ourselves but instead have ‘‘chosen to live on the edge of extinction, periodically lunging toward the abyss only to draw back at the last second, our situation is one of uncertainty and nervous insecurity rather than of absolute hopelessness.’’ [23].17 In other words, the fate of the Earth and its inhabitants has not yet been determined. Yet time is not on our side. Will we relinquish the fire and our use of it to dominate the Earth and each other, or will we continue to gamble with our future at this game of Russian roulette while **time** increasingly **stacks the cards against** our chances of **survival**?

#### Warming is anthropogenic – best evidence

**Fitzpatrick et al 06 *(***Melanie Fitzpatrick (Earth and Space Sciences and Atmospheric Sciences at the University of Washington and UCS consultant) prepared this summary with input from Brenda Ekwurzel (Union of Concerned Scientists) and reviews by Philip Mote (Climate Impacts Group at the University of Washington and Washington's state climatologist), Richard Gammon (Chemistry, Oceanography, and Atmospheric Sciences at the University of Washington) and Peter Frumhoff (Union of Concerned Scientists), “Human Fingerprints,” http://www.ucsusa.org/global\_warming/science\_and\_impacts/science/global-warming-human.html)

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Earth's surface has undergone unprecedented warming over the last century, particularly over the last two decades. Astonishingly, **every** single **year since** 19**92 is in the** current list of the **20 warmest years on record.**[1,2] The natural patterns of climate have been altered. Like detectives, science sleuths seek the answer to "Whodunnit?" — are humans part of the cause? To answer this question, patterns observed by meteorologists and oceanographers are compared with patterns developed using sophisticated models of Earth's atmosphere and ocean. By matching the observed and modeled patterns, scientists can now positively identify the "human fingerprints" associated with the changes. The fingerprints that humans have left on Earth's climate are turning up in a diverse range of records and can be seen in the ocean, in the atmosphere, and at the surface. In its 2001 report, the Intergovernmental Panel on Climate Change stated, "There is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities." [3] Carbon dioxide from fossil fuel burning and land clearing has been accumulating in the atmosphere, where it acts like a blanket keeping Earth warm and heating up the surface, ocean, and atmosphere. As a result, current **levels of carbon dioxide** in the atmosphere **are higher than at any time during the last 650,000 years.** [4,5,6] influenced by many factors, both natural and human. [7] Things that increase temperature, such as increases in heat-trapping emissions from cars and power plants or an increase in the amount of radiation the sun emits, are examples of "positive" forcings or drivers. Volcanic events and some types of human-made pollution, both of which inject sunlight-reflecting aerosols into the atmosphere, lower temperature and are examples of "negative" forcings or drivers. Natural climate drivers include the sun's energy output, aerosols from volcanic activity, and changes in snow and ice cover. Human climate drivers include heat-trapping emissions from cars and power plants, aerosols from pollution, and soot particles. Much as the Air Force develops computer programs to simulate aircraft flight under different conditions, climate scientists develop computer programs to simulate global climate changes under different conditions. These programs use our knowledge of physical, chemical, and biological processes that occur within Earth's atmosphere and oceans and on its land surfaces. Mathematical models allow scientists to simulate the behavior of complex systems such as climate and explore how these systems respond to natural and human factors. The world's oceans have absorbed about 20 times as much heat as the atmosphere over the past half-century, leading to higher temperatures not only in surface waters but also in water 1,500 feet below the surface. [8,9] The **measured increases in water temperature lie** well **outside** the **bounds of natural** climate **variation.** Recent research shows that human activities have lifted the boundary of Earth's lower atmosphere. Known as the troposphere (from the Greek tropos, which means "turning"), this lowest layer of the atmosphere contains Earth's weather. The stable layer above is called the stratosphere. The boundary that separates the two layers, the tropopause, is as high as nine miles above the equator and as low as five miles above the poles. In an astounding development, a 2003 study showed that this tropopause has shifted upward over the last two decades by more than 900 feet. [10] The rising tropopause marks another human fingerprint on Earth's climate. In their search for clues, scientists compared two natural drivers of climate (solar changes and volcanic aerosols) and three human drivers of climate (heat-trapping emissions, aerosol pollution, and ozone depletion), altering these one at a time in their sophisticated models. Changes in the sun during the twentieth century have warmed both the troposphere and stratosphere. But human activities have increased heat-trapping emissions and decreased stratospheric ozone. This has led to the troposphere warming more because the increase in heat-trapping emissions is trapping more of Earth's outgoing heat. The stratosphere has cooled more because there is less ozone to absorb incoming sunlight to heat up the stratosphere. Both these effects combine to shift the boundary upward. Over the period 1979-1999, astudy showsthat **human-induced changes** in heat-trapping emissions and ozone **account for more than 80 percent** of the risein tropopause height**.** [10] This is yet another example of how science detectives are quantifying the impact of human activities on climate. Measurements show that global average temperature has risen by 1.4 degrees Fahrenheit in the last 100 years, with most of that happening in the last three decades. [1,2] By comparing Earth's temperature over that last century with models comparing climate drivers, a study showed that, from 1950 to the present, most of the warming was caused by heat-trapping emissions from human activities [3]. In fact, heat-trapping emissions are driving the climate about three times more strongly now than they were in 1950. The spatial pattern of where this warming is occurring around the globe indicates human-induced causes. Even accounting for the occasional short-lived cooling from volcanic events and moderate levels of cooling from aerosol pollution as well as minor fluctuations in the sun's output in the last 30 years, heat-trapping **emissions far outweigh any other** current climate **driver**. Once again, our scientific fingerprinting identifies human activities as the main driver of our warming climate. The identification of humans as the main driver of global warming helps us understand how and why our climate is changing, and it clearly defines the problem as one that is within our power to address. Because of past emissions, we cannot avoid some level of warming from the heat-trapping emissions already present in the atmosphere, some of which (such as carbon dioxide and nitrous oxide) last for 100 years or more. However, with aggressive emission reductions as well as flexibility in adapting to those changes we cannot avoid, **we have a small window** inwhich **to avoid** truly **dangerous warming and provide** future **generations with a sustainable world.** This will require immediate and sustained action to reduce our heat-trapping emissions through increased energy efficiency, expanding our use of renewable energy, and slowing deforestation (among other solutions).

#### **EVs result in significant emission reduction even on the current power grid – multiple studies prove**

Kaplan et al., 10 – \*affiliated with Frontier Group, a think tank that issues issue experts, writers and analysts to produce ideas and research to promote a cleaner environment and a fairer and more democratic society, \*\*Brad Heavner, B.A. from the University of Michigan, Senior Policy Advisor for Environment America and State Director of Environment Maryland, AND \*\*\*Rob Sargent, graduate of the University of Vermont, Energy Program Director for Environment America and oversees policy and strategy development for energy and global warming campaigns throughout the U.S., more than two decades of experience leading a wide range of environmental and public interest campaigns (Siena, Charging Ahead: Curbing Oil Consumption with Plug-in Cars”, Environment Maryland Research & Policy Center, June 2010, http://www.environmentmaryland.org/sites/environment/files/reports/Charging-Ahead.pdf)//BI

Plug-in cars emit less global warming pollution than cars powered by gasoline when fueled from today’s electricity sources. This is largely because electric motors are vastly more efficient than the internal combustion engine, driving a car much farther on the same amount of energy.12 Many studies have compared global warming pollution from plug-ins versus that from conventional cars. There is a wide range of results, since there are a number of factors that differ from study to study—for example, the gas mileage of the conventional cars plug-ins are being compared against, and the amount of electricity the plug-in cars are assumed to use. However, over 40 recent studies have shown that plug-in cars produce less carbon dioxide than traditional gasoline-powered cars.13 An electric car powered by electricity from today’s electric grid will have lower global warming emissions than a conventional car. One study by the Pacific Northwest National Laboratory (PNNL) found that a car fueled by electricity from unused capacity in our current electric system would emit 27 percent less global warming pollution than a car fueled by gasoline.14

### **1AC Solvency**

#### EV price will no longer be a barrier – comparable to conventional cars by 2014 – and battery prices will only continue to fall

Kelly, 10 – Assistant Secretary of DOE/Ph.D Physics Harvard University

(Henry, February 23, Hearing Before a Subcommittee on the Committee on Appropriations, United States Senate, “Opportunities and Challenges Presented in Increasing the Number of Electric Vehicles in the Light Duty Automotive Sector,”

<http://www.gpo.gov/fdsys/pkg/CHRG-111shrg56643/pdf/CHRG-111shrg56643.pdf>, p. 13)

The promise of advanced lithium-ion batteries has had the most dramatic impact.

These batteries have the potential to be much lighter, smaller, safer, and less expen-

sive than their predecessors. Working with industry partners over the past decade,

DOE research has helped make steady gains in all of these characteristics. The most

important remaining challenge is to cut costs. One lithium-ion battery produced

today is projected to use 8 kilowatt-hours (kWh) of energy (of a total capacity of 16

kWh) and costs roughly $6,500–$8,000 ($800–$1,000/kWh of useable energy) when

produced in high volume.10 DOE and its research partners believe that the cost

could likely be reduced to $2,400 ($300/kWh of useable energy) by 2014 with a com-

bination of better materials, optimized battery designs, and improved manufac-

turing. At this price, the cost of driving a mile in an electric or plug-in hybrid elec-

tric vehicle would be roughly comparable to that of today’s conventional cars.11The

initial price of new vehicles would be higher, but the energy costs for driving would

be much lower. Additionally, it can be expected that the battery prices will continue

to fall while gasoline prices increase in the coming decades.12

Cost-reducing battery advances require a close partnership between government

and industry. These partnerships are clearly visible in the way industry converted

publicly-funded basic and applied research into commercial products and jobs. For

example, DOE supported the development of the first lithium-ion battery for a pro-

duction vehicle, which started manufacture in the summer of 2009. At the recent

Washington Auto Show, two major American manufacturers showcased cars that

utilize lithium-ion batteries. DOE supported the research and development (R&D)

that provided the basis for both of these batteries.

These commercial successes do not mean that the role DOE’s R&D role in battery

technologies is complete, but rather that the Department will need to address addi-

tional challenges in the sector. DOE’s fiscal year 2011 budget request includes $120

million to continue work focusing on a wide range of research barriers facing devel-

opers of hybrid and electric vehicles, including specific materials problems that limit

battery lifetimes, safety, charging rates, and production costs.13

DOE has already begun to address these barriers through investments in the next

generation of battery technologies. Lithium-ion batteries include a family of chem-

istries, each of which has advantages and disadvantages based on the cost of mate-

rials and safety. Other chemical systems, such as lithium metal polymer batteries

and lithium-sulfur batteries, remain in the research stage and have shown promise

in the laboratory. However, these will require significant additional work before

they can become viable products.

#### **Solving the refueling problem gets consumers on board – charging stations will be so profitable that they can subsidize EVs**

Thompson 09 – Contributing Editor NYT/Specializes in Technology (Clive, “Batteries Not Included”, New York Times, April 19, 2009, http://solar.gwu.edu/index\_files/Resources\_files/NYT\_BatteriesNotIncluded.pdf.)//HLR

The only way to get consumers to use electric cars, Agassi realized, was to solve the problem of refueling. That meant, to begin with, that some entrepreneur would have to build networks of recharging spots, going country by country. As he crunched the numbers, what really struck Agassi was how lucrative a business like this could be. Powering a car by electricity — even relatively expensive “clean” energy like wind or solar — costs far less than powering it by gasoline. The Tesla all-electric sedan, for example, uses about 1 cent of electricity per mile. A comparable gasoline car uses 16 cents of gasoline per mile. And with the United States market for automobile gas at roughly $275 billion, Agassi figured that a company controlling a world network of charging stations would become so profitable so quickly that it could subsidize its customers’ electric cars, much the way mobile companies give out free phones to people who sign two-year contracts. The electric-car business, in fact, could function like the mobile-phone industry: you could pay, say, $10 for 1,000 miles, $20 for 3,000 miles, or perhaps a few hundred a month for unlimited driving.

#### Fast-charging technology already exists - government investment is needed to develop the new market

Kaplan et al., 10 – \*affiliated with Frontier Group, a think tank that issues issue experts, writers and analysts to produce ideas and research to promote a cleaner environment and a fairer and more democratic society, \*\***Brad Heavner,** B.A. from the University of Michigan, Senior Policy Advisor for Environment America and State Director of Environment Maryland, AND \*\*\*Rob Sargent, graduate of the University of Vermont, Energy Program Director for Environment America and oversees policy and strategy development for energy and global warming campaigns throughout the U.S., more than two decades of experience leading a wide range of environmental and public interest campaigns (Siena, “Charging Ahead: Curbing Oil Consumption with Plug-in Cars,” Environment Maryland Research & Policy Center, June, [http://www.environmentmaryland.org/sites/environment/files/reports/Charging-Ahead.pdf)//BI](http://www.environmentmaryland.org/sites/environment/files/reports/Charging-Ahead.pdf%29//BI)

If a family is relying on an electric car as their primary vehicle and using it for long trips, they will need a way to recharge the car on the road. Electric cars today have a range of about 100-200 miles, although this may increase as battery technology develops. One option that would allow electric car owners to take their cars on long trips is to install fast chargers at gas stations or along highways, which would allow drivers to recharge their cars when they stop for a meal or at a rest stop. Extremely fast chargers already exist that can fully charge a battery with 100-mile range in under half an hour.49 Fast chargers have been installed in some places in the United States, such as Hawaii. Washington, D.C. has partnered with AeroVironment, a leading producer of charging stations, to install hundreds of fast chargers throughout the city.50 This network can be developed over time as an increasing number of drivers own plug-in cars. Another plan would change batteries instead of charging them for quick refueling. One company, Better Place, has a business plan in which the company would own batteries and lease them to owners of compatible electric cars. The batteries could be charged at charging stations around a city, or changed at battery changing stations along highways. This would make owning a fully electric car easier in a few ways—leasing batteries instead of owning them would bring down the initial sticker price of the car, and battery changing could happen even faster than with quick chargers, in under two minutes, eliminating concern about vehicle range.51 It would also eliminate concerns about battery lifetime, and enable consumers to have new and improved battery technology quickly, instead of waiting until they buy a new car. A company providing electricity to fuel a large network of cars may be better positioned to negotiate with utilities to deploy V2G charging, or to supply its own clean electricity through solar arrays or wind turbines at charging stations.52 On the other hand, electric car owners leasing batteries might not benefit from the lower fuel prices usually associated with electric cars, unless gas prices rise dramatically.53 Investments in infrastructure for alternative fuel vehicles often fall prey to a “chicken and egg” problem—investors are unwilling to invest in new infrastructure if there are not cars on the road to use it, while potential car buyers are unwilling to purchase an alternative fuel vehicle if there is nowhere to fuel it. Because many early drivers of plug-in cars will be able to recharge at home, the need for extensive charging infrastructure is less acute. However, government will still need to take action to encourage the development of charging or battery-swapping infrastructure while the plug-in vehicle market is developing.

#### P**ublic/private partnerships solve – DOE has successfully financed the expansion of ports through companies like Ecotality**

ECOtality, 3/22/12 leader (ECOtality, “ECOTALITY PARTNERS WITH REGENCY CENTERS AT 19 LOCATIONS NATIONWIDE”, Ecotality.com, <http://www.ecotality.com/featured/Regency-Centers-at-19-Locations-Nationwide/>)//EW

ECOtality, Inc. (NASDAQ:ECTY), a leader in clean electric transportation and storage technologies, announced today a partnership with Regency Centers (NYSE: REG) to install Blink® electric vehicle (EV) charging stations at 19 Regency locations nationwide. As the newest EV Project partner, ECOtality and Regency have worked together to identify the 19 sites and approximately 40 charging stations to be installed in EV Project markets in Arizona, California, Oregon, Tennessee, Texas and D.C. “Our goal has been to deploy a network of chargers that are conveniently placed where consumers work, shop and play—and aligning ourselves with major property owners is a key part of achieving that goal,” said Colin Read, VP of Corporate Development at ECOtality. “We are excited to work with a forward-thinking company like Regency to deploy chargers nationwide and understand the true business case and value of offering commercial EV charging access to their customers.” The Blink Network of charging stations provides EV drivers the freedom to travel as they choose and conveniently charge at Blink commercial locations along the way. By becoming Blink Members, consumers may also yield even greater advantages of the Blink Network, such as local incentive programs, reservation systems, and enhanced Blink Network capabilities. “The EV stations provide an added shopper convenience, demonstrate and encourage a commitment to the environment, and generate a potential future revenue stream,” said Scott Prigge, senior vice president of national property operations for Regency Centers. Regency’s sustainability program, greengenuity®, utilizes best practices in green building design, construction, operations and maintenance to reduce long-term operating costs and environmental impact of shopping centers. Current initiatives include smart irrigation, networked lighting, LED parking lot lights, solar power and innovative stormwater management systems. ECOtality is the project manager of The EV Project and will oversee the installation of commercial and residential charging stations in major cities and metropolitan areas. The project will provide an EV infrastructure to support the deployment of EVs in these key markets. The project is a public-private partnership, funded in part by the U.S. Department of Energy through a federal stimulus grant and made possible by the American Recovery and Reinvestment Act (ARRA).

#### Technology is already available – infrastructure support enables a whole new transportation system in just a few years

**Smith, ’10 - FedEx CEO/Member of Electrification Coalition (**Frederick, February 23, Hearing Before a Subcommittee on the Committee on Appropriations, United States Senate, “Opportunities and Challenges Presented in Increasing the Number of Electric Vehicles in the Light Duty Automotive Sector,”

<http://www.gpo.gov/fdsys/pkg/CHRG-111shrg56643/pdf/CHRG-111shrg56643.pdf>, p. 22-23)

This is not a question of technology. The technology is there. If anyone on this

subcommittee has been watching the Olympics, you’ve seen the commercials for the

Nissan Leaf. You know the Chevy Volt is just around the corner. You’re about to

hear from business leaders what they can already produce. But the technology is

not enough without the support needed to build infrastructure, encourage manufac-

turing and consumer acceptance—in short, to create in a few short years an entirely

new transportation system. This is not pie-in-the-sky. It’s simply a matter of organi-

zation, and—more importantly—a matter of will and a matter of execution.

## INHERENCY EXTENSIONS

#### More chargers are needed to service the significant number of EVS that will be hitting the market soon

Tweed, 7/3/12 Reporter at Greentech Media (Katherine, “No EV Charger, No Problem for Half of Americans”, Green Tech Grid, 7/3/12, <http://www.greentechmedia.com/articles/read/no-ev-charger-no-problem-for-half-of-americans/>)//EW

The latest Residential Energy Consumption survey offers some good news for the electric vehicle industry. Sixty percent of respondents in single-family homes report parking within 20 feet of an electrical outlet. The data is less rosy for apartment dwellers, who had far less access to outlets. In multi-family units, only 14 percent of respondents were near a plug. Of course, not having a standard outlet is not a problem if electric vehicle chargers are available, which can also cut the time of charging. All electric vehicle charging companies make a 240-volt Level II charger, which can slash charging time from about eight hours to four, and many are also selling Level III chargers, which cut charging time to less than an hour. The new data from the U.S. Energy Information Administration is good news for EV charging companies, which can provide the access to charging in buildings where none currently exists. For single-family homes, there was significant variation by region, with the Midwest having 20 percent more respondents that have access to an outlet compared to the Northeast. The EIA noted that for all-electric vehicles, which have a limited range, the charging situation could be a limitation for those who live in cities, since the majority of charging happens at home. But car companies and municipalities are aware of the problem, and many places are working on installing charging infrastructure. The public charging infrastructure is big business, big enough that ECOtality is suing California over its agreement with NRG to provide 200 eVgo charging stations in commercial and retail locations. The need for charging will not just be an issue in the U.S. In many European and Asian cities, there will also need to be significant charging infrastructure if people are going to own EVs or plug-in hybrids. Coulomb Technologies recently added Toyota Tsusho Corp., the trading arm of the Japanese auto giant, to its long list of investors. Coulomb is just one startup in a field that also counts General Electric and Schneider Electric as competitors. For many of the smaller companies, strategic partnerships are key, such as ECOtality’s licensing agreement with ABB, or Coulomb’s marketing agreement with Siemens, or AeroVironment's partnership with Nissan. Currently, charging is something of a chicken and egg problem, since sales of EVs are limited. But there are far more vehicles coming on the market, which means that the charging debate -- and competition -- is likely to heat up starting later this year.

#### Lack of chargers remains a barrier to EVs – DOE perceives ports as only a psychological issue

Finley, 6/24/12 staff writer for the Denver Post (Bruce, “Electric-vehicle drivers in Colorado to get a charge out of new law”, The Denver Post, 6/24/12, http://www.denverpost.com/recommended/ci\_20926269)//EW

For just $5,000, you too could own a filling station — selling not gas but electrons to anxious electric-vehicle drivers. A new law, effective in August, slashes state regulation so that anybody can resell electricity. Traditionally, only utilities could do that. Colorado Gov. John Hickenlooper backed the law as a way to spur entrepreneurs to install e-chargers at grocery stores, hotels, malls, cafes and other urban spots. It is part of a broadening "electric vehicle readiness" campaign aimed at cleaning metro Denver's ozone-prone air by shifting to battery-powered transport. Today, about 1,200 electric vehicles (and 35,000 hybrids) are registered to roll on Colorado roads out of 5.1 million vehicles The instrument panel in a Volt provides motorists with a reading of battery power available to the vehicle. The Chevy car can be charged from any standard household outlet. (Photos by Karl Gehring, The Denver Post) overall. The problem of "range anxiety" — EV drivers worrying that they'll run out of juice and be stranded — has emerged nationwide as a barrier. Not having easy options to charge up quickly repels potential converts, said Tom Franklin, a lawyer who bought one of the first Nissan Leafs. Franklin has been trying to persuade his wife to replace her ailing minivan with a Tesla Model S — instead of a gas sport utility vehicle. "She says not only 'No,' but she says, 'No way.' The way she describes her feelings about electric vehicles, she'd feel as though the gas light is always on," Franklin said. He sees her point. Flying back from California to Denver last fall, Franklin found he had General Motors employee Michael Strapazon, left, shows Colorado Conservation Trust board member Pete Leavell how to charge the Chevy Volt. (Karl Gehring, The Denver Post) improperly hooked his Leaf to a charger pump in the airport parking, so he was less than half-charged — right when he needed maximum range to race to Westminster for a work presentation and then back across Denver to his home in Arapahoe County. Running really low by the time he reached Westminster, Franklin bolted through a Walmart parking lot, hunting for outlets he thought the retailer offered for RVs. Then he trolled a central shopping area, peering around trees for planters where city workers sometimes tap outlets for lighting up holiday Christmas trees. The first outlet was dead, but the second one worked, giving Franklin's Leaf the charge he needed while he made his presentation. The hunt for power sometimes makes Franklin feel like "a scavenger." "There are outlets in planters near trees in many downtown parking areas," he said. "I've had to discover this." Colorado clean-technology industries sponsored the legislation aimed at enabling EV charging beyond homes. Auto dealers embraced it. Car dealers "would support any legislation that would more speedily advance the infrastructure to support those vehicles we sell today — and those in the pipelines for our showrooms," Colorado Automobile Dealers Association president Tim Jackson said. Salesmen at metro car lots compared Leafs and Chevy hybrid Volts (a fully electric Spark is in the works) with laptop computers and flat-screen TVs — items for which prices quickly dropped so that many people could afford them. Denver Mayor Michael Hancock is edging into the "readiness" initiative, launching a 10-year campaign to install free charging stations at a third of city facilities. Making Denver one of the nation's greenest cities "means bolstering our low-carbon transportation," Hancock said. "Supporting an electric-vehicle agenda is not only good for our public health and environment, but it helps to create a demand for jobs within Denver's growing clean-energy industry." Today, about 60 mostly free charging stations have been installed statewide, with 40 added this year at Walgreens pharmacies. The first was at East Colfax Avenue and Race Street in Denver, where EVs can be charged for free — at least for now. Every extra minute that an EV-driving customer idles in store aisles will pay off, store manager Shawn Horst said. For around $5,000, anybody with property and access to electricity can install an EV charging station, and a market for $1-an-hour battery charging probably will emerge soon, said Dave Altman, regional development and government sales chief for Eaton Corp., which designs and distributes charging stations. The latest "level 3" technology can fully charge a car in 45 minutes instead of 4 hours, Altman said. "It's a matter of putting them out in front of your business and saying: 'Here is the station!' It's got a credit-card reader on it — very simple — just like at the gas pump." But drivers would pay $4 instead of $40 or more for a tank of gas. Electric-vehicle advocates, including the U.S. Department of Energy, downplay charging challenges, saying the barriers are largely psychological because most commuters cover less than 50 miles a day. That's well within the range of most of the current vehicles. Yet Derek Passarelli — an early Leaf aficionado — has found emergency "tricks" are essential. He picked up guests recently at a hotel, went to a Rockies baseball game, returned them to the hotel and hit unwanted trouble. "I had only 7 miles (left) on my car. I had more than 7 miles to get home," he said. He relied on braking strategically to regenerate some charge. "And I coasted a little bit more," he said. A federally backed program — Fostering Electric Vehicle Expansion in the Rockies, or FEVER — includes focus-group studies and meetings this week aimed at faster implementation. Emergency first responders can be trained so that they "feel comfortable" approaching EVs, program manager Lauren Quillian said. The process of obtaining city permits — required in Denver to install 240-volt outlets at homes — can be streamlined, she said. And tax incentives (combined federal and state is $13,500) to entice EV buyers are up for review. "The more charging infrastructure, the better," said Carter Brown, who produces battery-powered delivery vans at a factory northwest of the city. His grandparents in the 1920s drove cross-country and hunkered over maps, planning where they would refuel, Brown said. "Now it's the same with electric vehicles, even if you're just going to Colorado Springs," he said. "If your electric vehicle doesn't have the range, you're going to have to figure out where to charge."

#### Charging infrastructure and grid upgrades will not happen as long as EV sales are slow

**Lee and Lovellette ’11** - Jassim M. Jaidah Family Director of the Environment and Natural Resources Program within the Belfer Center for Science and International Affairs at Harvard's John F. Kennedy School of Government, Faculty Co-Chair of the Center's Energy Technology Innovation Policy project, and a Senior Lecturer in Public Policy, Belfer Center for Science and International Affairs, Harvard Kennedy School, Harvard University (Henry and Grant, “Will Electric Cars Transform the U.S. Vehicle Market”, July 2011. http://belfercenter.ksg.harvard.edu/files/Lee%20Lovellette%20Electric%20Vehicles%20DP%202011%20web.pdf)//DHirsch

Recharging an EV will require an infrastructure that is readily available (including the recharging equipment and outlets), an upgraded electric distribution grid, and sufficient generation capacity to meet the additional demand. As with so many aspects of the electric car, the availability of this infrastructure depends on a number of uncertainties. How fast will electric vehicles penetrate the fleet? If slowly, then the market will not want to invest in charging equipment and wire upgrades that are subsequently stranded for many years. Will electric car sales be evenly distributed across the country, or disproportionately located in certain areas, such as the two coasts? Since the conditions of the grid and the adequacy of generating capacity depend on regional variables, one will need to look at this issue at least from a state perspective, if not from that of individual utility franchises. Finally, one has to ask, when will consumers be recharging their vehicles? There is a big difference between scenarios in which a high percentage of consumers charge their vehicles at 7:00 p.m. and ones in which a majority wait until midnight.

## ECONOMY EXTENSIONS

### Auto Industry Key to Growth

#### Auto industry is key to global recovery – multiplier effect

**AP, ’12** (4/3, http://www.ohio.com/business/u-s-automakers-post-best-monthly-sales-since-2007-1.291157)

If car sales stay at the same rate as March, they would end the year at 14.4 million, up from 12.8 million in 2011. While that’s still below the 17 million of the booming mid-2000s, it’s far higher than the industry’s downturn in 2009, when 10.6 million vehicles were sold. Jesse Toprak, vice president of industry analysis at car buying site TrueCar.com, expects continued strong sales this year, thanks to compelling new products, improvements in consumer confidence and the stock market and low interest rates. “The good news is that the recovery has legs,” he said. He expects total sales of 14.5 million in 2012. That would be a faster pace than many were predicting at the start of the year, and it builds on a strong performance in January and February. As recently as October, J.D. Power and Associates lowered its 2012 forecast from 14.1 million vehicles to 13.8 million because of high gas prices and continuing economic uncertainty. The auto sector’s recovery is helping the entire economy. “Auto is important because it creates so many other jobs,” said Sung Won Sohn, an economics professor at California State University. “Think about the things that go into an auto: glass, textiles, rubber. There’s a lot of financing activity. We are talking about a very significant portion of job creation.” Sohn said a lot of pent-up demand remains in the U.S., from people who couldn’t afford cars during the recession to those who waited for Japanese inventories to improve after last March’s earthquake. The average age of a vehicle on U.S. roads has reached 10.8 years, and many need to be replaced. GM’s U.S. sales chief, Don Johnson, says pent-up demand will continue to fuel sales well into next year. Sohn said high gas prices are actually helping persuade people to trade in older, less-efficient vehicles. High car prices don’t seem to be holding buyers back, either. TrueCar said the average vehicle price reached a new record of $30,748 in March, around $2,000 more than the same month last year. Even though drivers are switching to smaller cars, they’re appointing them with expensive luxuries such as leather seats and navigation systems, Toprak said.

#### Auto industry is the largest source of economic growth

**Baldwin, 11** (Claire, Reuters staff reporter, 10/1/11, http://www.huffingtonpost.com/2011/08/01/auto-industry-hiring-may-lead-recovery\_n\_914686.html, JD)

The auto industry could lead an economic recovery in the United States, according to a recent survey by audit, tax and advisory firm KPMG. Auto executives plan to do more hiring and more capital spending than executives in any other sector in the next year, according to the survey. Sixty-two percent of auto executives said they expect to hire people in the coming year, compared with an average of only 52 percent of executives across all sectors. Similarly, 71 percent of autos executives said they expect to increase their capital spending in the coming year compared with an average of 59 percent of all executives. Two years after the end of the U.S. recession, unemployment remains above 9 percent, U.S. consumer confidence hit a near two and a half-year low earlier this month and the U.S. government reached a last-minute deal late Sunday to avoid a U.S. debt crisis. All this has raised questions about the speed and strength of a U.S. recovery. The U.S. auto industry was hit hard during the financial crisis, which saw both General Motors Co (GM.N) and Chrysler seek bankruptcy protection and government bailouts. It was hit again in March when an earthquake, tsunami and nuclear crisis in Japan disrupted the supply chain. While the sector is improving -- U.S. July auto sales are expected to hit an annual rate of around 12 million vehicles, an improvement over May and June -- that figure still lags the 17 million-plus number sold in 2000. A full recovery could take years, but the next 12 months could see an improvement, according to the survey. Seventy-two percent of the autos executives surveyed said they expect their revenue to increase in the coming year. North America is still seen as the most important market, but more revenue is expected to come from other markets including China and South America. New models and products, acquisitions and joint ventures are also expected to add to revenue. Fifty-five percent of those surveyed expect to make an acquisition in the coming year; 5 percent expect to sell. Access to new markets, technologies and products is expected to drive the M&A activity. The auto sector survey, which included the responses of 100 autos executives, was conducted in June. KPMG is releasing the results of its other sector surveys separately.

### Auto Industry Key to Jobs

#### **Auto industry is key to the economy – supports 1 in 10 jobs**

Granholm 8 – governor of Michigan, on Obama’s transition economic recovery board (Jennifer, “Commentary: Save automakers to help economy and security” CNN Politics, November 13, 2008, http://www.cnn.com/2008/POLITICS/11/13/granholm.energy/)//ctc

U.S. automakers are in jeopardy. What seemed impossible just months ago is now a reality: One or more of the world's biggest automakers could go bankrupt before the year is out. New vehicle sales are at 30-year lows, financial reports are dismal and the credit crunch is preventing customers from being able to buy or lease. So why not just let General Motors, Chrysler and Ford go under? As the governor of Michigan, the home of the U.S. auto industry, it's a question I get asked every day. Letting the auto industry disappear will be devastating -- not just to Michigan, but to the entire nation. It will make our national economy even worse, eliminate our ability to achieve energy independence and weaken our national security. The auto industry supports one of every 10 jobs in the United States. A recent study estimated that 3 million jobs nationwide could be lost in one year if these companies are allowed to fail. The devastating impact would be felt in every state and by all kinds of employees. That's because U.S. automakers buy more U.S.-made steel, aluminum, iron, copper, plastics, rubber, electronics, and computer chips than almost any other company. They provide health care to nearly 2 million Americans and support 775,000 retirees or their survivors through pension benefits. Beyond the massive job loss, Congress and the Bush administration need to provide immediate assistance to the auto industry, because America's energy independence is dependent upon it. The U.S. auto industry is the sector that will lead the way to energy independence. How? The car you drive will soon be the storage unit for all your energy needs. Your home, your car, your appliances can all be powered through the advanced battery that will sit inside your plug-in electric vehicle. Today, most batteries come from Asia and most oil comes from the Middle East. Refusing to help the U.S. automakers compete in this critical race to develop new battery technology means we will forever be dependent on other countries to meet our energy needs. Abandoning efforts to create energy independence puts our national security at risk as well. The Department of Defense (DOD) Science Board Task Force has determined that reducing military fuel demand is a national defense priority. According to the DOD, our military's dependence on foreign oil increases risks, degrades operational capability, and compromises mission success. "Made in America" advanced battery technology and electric military vehicles would reduce fuel demand and cost, afford tactical flexibility, and decrease operational risks. It is a national-security, energy-security imperative to produce advanced batteries and next-generation biofuels here at home. Supporting the automotive industry through the current crisis and steering a clear transition to a low-carbon future will create millions of middle-class jobs that are vital to a strong economy while reinvigorating American technological superiority.

#### EVs will have net significant job creation – 250,000 jobs

**Becker ‘9** - Ph.D. candidate in economics with a specialization in international finance and environmental economics at the University of California, Berkeley. Worked as an economic and finance consultant for Cornerstone Research and has also worked for the MIT Industrial Performance Center. He has an undergraduate degree in economics from MIT, was a U.S. Fulbright Scholar to Germany, and is currently a visiting graduate scholar at Harvard University

 (Thomas, “Electric Vehicles in the United States A New Model with Forecasts to 2030”, 8/24/2009. http://cet.berkeley.edu/dl/CET\_Technical%20Brief\_EconomicModel2030\_f.pdf)//DHirsch

The deployment of electric cars will trade-off employment gains in new "green collar" industries with losses in industries involved in petroleum delivery and internal combustion engine maintenance. The net effect is significant job creation. The projections for employment gains are made for both the charging network and battery manufacturing industries, though as discussed in the previous section there will likely be additional job creation in the domestic electricity sector. We assume that the deployment of electric cars does not directly impact employment in automobile manufacturing and that the share of domestically produced light-vehicles remains stable (though not necessarily produced by American firms). We also assume that domestic petroleum production continues at full capacity, as determined by the price of oil and the federal and state regulations on oil extraction.

Exhibit 12 shows the projected employment gains and losses under each adoption scenario in 2030. Estimates for the employment in the charging infrastructure and automotive battery manufacturing industries are based on the annual revenue projections for each industry and the revenue-to-employee ratio of industries with similar characteristics. The employment gains under each adoption scenario are substantial, with between 130,000 and 250,000 net new jobs created. The largest source of job creation comes from the deployment of a nationwide charging infrastructure. These jobs include construction, electrical services, and service sector jobs associated with the deployment, operation, and maintenance of public charge spots and battery switching stations. Though the eventual market size of the high price and the operator-subsidized scenarios are the same, there is greater net job creation under the operator subsidized scenario due to the larger share of electric vehicles in the U.S. fleet under that scenario.

#### Auto industry has huge role in the economy, especially for jobs

Waldron 12 ( Travis Waldron, March 23, 2012 think progress, staff writer, http://thinkprogress.org/economy/2012/05/23/489024/auto-industry-add-jobs/?mobile=nc “Auto Industry Adds Thousands Of Jobs To Meet Growing Demand, Proving Auto Rescue’s Success Yet Again” KA)

The automobile industry has been a consistent bright spot in the American economy over the last several months, as automakers have added jobs to meet growing demand. And news from the industry is only getting better, as new estimates expect automakers to sell 14.3 million cars in the United States in 2012 — 1.5 million more than they sold last year. Factories for both foreign and domestic automakers are now working “at maximum capacity” and the industry is adding shifts and jobs to keep up with that rising demand, the USA Today reports: Some plants are adding third work shifts. Others are piling on worker overtime and six-day weeks. And Ford Motor and Chrysler Group are cutting out or reducing the annual two-week July shutdown at several plants this summer to add thousands of vehicles to their output. “We have many plants working at maximum capacity now,” says Ford spokeswoman Marcey Evans. “We’re building as many (cars) as we can.” Chrysler and General Motors, the major beneficiaries of the auto rescue, have both reported their best profits in more than a decade, and both were already planning to add jobs this year. With factories now struggling to meet demand, both foreign and domestic auto companies are planning to add even more jobs — and, as the Center for American Progress’ Adam Hersh and Jane Farrell noted in April, the industry has added more than 139,000 jobs in the last three years. The strength of the auto industry is yet another sign that letting it fail would have been a major mistake. Not only would it have cost more than a million jobs at a time when the economy was struggling, it would have prevented the current growth that is helping both the industry and the American economy recover.

### EVs Key to Industrial Base

#### U.S. needs to establish a global leadership position in EVs – key to revitalizing the U.S. manufacturing sector

Lane 11 (Bradley W., Assistant Professor, Institute for Policy and Economic Development, University of Texas at El Paso, “Plug-in Electric Vehicles: A Practical Plan for Progress”, SCHOOL OF PUBLIC AND

ENVIRONMENTAL AFFAIRS, February 2011, <http://works.bepress.com/cgi/viewcontent.cgi?article=1010&context=bradleywlane&sei-redir=1&referer=http%3A%2F%2Fscholar.google.com%2Fscholar%3Fas_ylo%3D2011%26q%3DElectric%2Bvehicles%2Bare%2Bkey%2Bto%2Benvironmental%2Bleadership%2B%26hl%3Den%26as_sdt%3D0%2C23#search=%22Electric%20vehicles%20key%20environmental%20leadership%22>, HLR)

The U.S. automotive, battery, and electric power industries, in collaboration with the U.S. government and universities, should seek to establish a global leadership position in electric mobility, especially in advanced energy storage technologies and production of batteries and related components. Constructive steps have already been taken toward fostering a U.S.-based supply chain for PEVs and expanding R&D into advanced batteries and other power train components. The track record of policies toward PEVs needs to be evaluated and, where necessary, refined as technology and market conditions change. Thus, the national demonstration and R&D program should be seen not just as a strategy to pursue worthy energy security and environmental goals, but also as a strategy to help revitalize the U.S. manufacturing sector.

### Slow Growth Impacts

#### Slow growth makes the US uncooperative and desperate – leads to hegemonic wars

**Goldstein 7** - Professor of Global Politics and International Relations @ University of Pennsylvania, Avery Goldstein (“Power transitions, institutions, and China's rise in East Asia: Theoretical expectations and evidence,” [Journal of Strategic Studies](http://www.informaworld.com/smpp/title~db%3Dall~content%3Dt713636064), Volume[30](http://www.informaworld.com/smpp/title~db%3Dall~content%3Dt713636064~tab%3Dissueslist~branches%3D30#v30), Issue [4 & 5](http://www.informaworld.com/smpp/title~db%3Dall~content%3Dg780703608)August 2007, pages 639 – 82)

Two closely related, though distinct, theoretical arguments focus explicitly on the consequences for international politics of a shift in power between a dominant state and a rising power. In War and Change in World Politics, Robert Gilpin suggested that peace prevails when a dominant state’s capabilities enable it to ‘govern’ an international order that it has shaped. Over time, however, as economic and technological diffusion proceeds during eras of peace and development, other states are empowered. Moreover, the burdens of international governance drain and distract the reigning hegemon, and challengers eventually emerge who seek to rewrite the rules of governance. As the power advantage of the erstwhile hegemon ebbs, it may become desperate enough to resort to theultima ratio of international politics, force, to forestall the increasingly urgent demands of a rising challenger. Or as the power of the challenger rises, it may be tempted to press its case with threats to use force. It is the rise and fall of the great powers that creates the circumstances under which major wars, what Gilpin labels ‘hegemonic wars’, break out.13 Gilpin’s argument logically encourages pessimism about the implications of a rising China. It leads to the expectation that international trade, investment, and technology transfer will result in a steady diffusion of American economic power, benefiting the rapidly developing states of the world, including China. As **the US** simultaneously scurries to put out the many brushfires that threaten its far-flung global interests (i.e., the classic problem of overextension), it **will be unable to devote sufficient resources to maintain or restore** its former advantage over emerging competitors like China. While the erosion of the once clear American advantage plays itself out, the US will find it ever more difficult to preserve the order in Asia that it created during its era of preponderance**.**The expectation is an increase in the likelihood for the use of force – either by a Chinese challenger able to field a stronger military in support of its demands for greater influence over international arrangements in Asia, or by a besieged American hegemon desperate to head off further decline. Among the trends that alarm those who would look at Asia through the lens of Gilpin’s theory are China’s expanding share of world trade and wealth(much of it resulting from the gains made possible by the international economic order a dominant US established); its acquisition of technology in key sectors that have both civilian and military applications (e.g., information, communications, and electronics linked with to forestall, and the challenger becomes increasingly determined to realize the transition to a new international order whose contours it will define. the ‘revolution in military affairs’); and an expanding military burden for the US (as it copes with the challenges of its global war on terrorism and especially its struggle in Iraq) that limits the resources it can devote to preserving its interests in East Asia.14 Although similar to Gilpin’s work insofar as it emphasizes the importance of shifts in the capabilities of a dominant state and a rising challenger, the power-transition theory A. F. K. Organski and Jacek Kugler present in The War Ledger focuses more closely on the allegedly dangerous phenomenon of ‘crossover’– the point at which a dissatisfied challenger is about to overtake the established leading state.15 In such cases, when the power gap narrows, the dominant state becomes increasingly desperate. Though suggesting why a rising China may ultimately present grave dangers for international peace when its capabilities make it a peer competitor of America, Organski and Kugler’s power-transition theory is less clear about the dangers while a potential challenger still lags far behind and faces a difficult struggle to catch up. This clarification is important in thinking about the theory’s relevance to interpreting China’s rise because a broad consensus prevails among analysts that Chinese military capabilities are at a minimum two decades from putting it in a league with the US in Asia.16 Their theory, then, points with alarm to trends in China’s growing wealth and power relative to the United States, but especially looks ahead to what it sees as the period of maximum danger – that time when a dissatisfied China could be in a position to overtake the US on dimensions believed crucial for assessing power. Reports beginning in the mid-1990s that offered extrapolations suggesting China’s growth would give it the world’s largest gross domestic product (GDP aggregate, not per capita) sometime in the first few decades of the twentieth century fed these sorts of concerns about a potentially dangerous challenge to American leadership in Asia.17 The huge gap between Chinese and American military capabilities (especially in terms of technological sophistication) has so far discouraged prediction of comparably disquieting trends on this dimension, but inklings of similar concerns may be reflected in occasionally alarmist reports about purchases of advanced Russian air and naval equipment, as well as concern that Chinese espionage may have undermined the American advantage in nuclear and missile technology, and speculation about the potential military purposes of China’s manned space program.18 Moreover, because a dominant state may react to the prospect of a crossover and believe that it is wiser to embrace the logic of preventive war and act early to delay a transition while the task is more manageable, Organski and Kugler’s power-transition theory also provides grounds for concern about the period prior to the possible crossover.19 pg. 647-650

## HEG EXTENSIONS

### U.S. Leader Now in EVs

#### U.S. is currently the leader in EV technology – but this position is ours to lose

Higginson, 10 – Chairman Rasers Technology, Inc. (Kraig, February 23, Hearing Before a Subcommittee on the Committee on Approprioations, United States Senate, “Opportunities and Challenges Presented in Increasing the Number of Electric Vehicles in the Light Duty Automotive Sector,”

<http://www.gpo.gov/fdsys/pkg/CHRG-111shrg56643/pdf/CHRG-111shrg56643.pdf>, p. 70)

But, I think that the key right now is, if we can get the critical

mass that Mary Ann talked about, relative to the battery manufac-

turing, fill the facilities up that we have now invested in here in

the United States, doing that through fleet purchases is going to

be a real kick-start. Then we’re going to see happen what happened

in the LCD world and, hopefully, without the end result of that

world. That technology was developed here in the United States.

Great technology displaced the picture tube itself. And, in fact, that

technology developed here is now, 90 percent of it, being manufac-

tured in Korea.

And I think, in the world of the vehicle and plug-in series hybrid

vehicles and the electrification of transportation, our country sits

in the leadership position today, and it really is ours to lose. It’s

not something we’ve got to chase; it’s in our hands, and it’s ours

to lose.

### EVs Key to Auto Industry

#### **EVs reinvigorate the auto industry**

Fairley 11 – freelance science writer (Peter, “Will Electric Vehicles Finally Succeed?” Technology Review, January/February 2011, http://www.technologyreview.com/featured-story/422133/will-electric-vehicles-finally-succeed/)//ctc

At the end of 2010, GM and Nissan each began selling cars that run on electricity most or all the time. The Volt and the Leaf are only the first of dozens of new electric vehicles and plug-in hybrids to come: every major automaker has promised to start selling such cars over the next few years. Toyota, which has led the world in its development of gas-electric hybrid technology, plans next year to introduce a new version of its Prius that will be able to run on electricity alone for short distances. Meanwhile, startups such as Coda Automotive are trying to break into the auto industry with plug-in hybrids and all-electric cars—following the lead of Tesla Motors, whose electric sports car may have helped set the new wave in motion when it was introduced in 2006. If these cars become popular with buyers, it will mark the beginning of the biggest shift the auto industry has seen for decades: a shift away from an almost exclusive reliance on petroleum and the internal-combustion engine. GM, just emerging from bankruptcy, is counting on the Volt to change its image from purveyor of the Hummer and other large SUVs to leader in innovation and energy efficiency. For its part, Nissan is staking much of its future on electric vehicles; over the next few years it plans to ramp up production to sell hundreds of thousands of them annually, far more than any other automaker. The new cars are a departure from conventional hybrids, which use batteries mainly to supplement the gasoline engine and store energy recovered from braking. In those cars, the batteries are recharged by a generator that draws its energy not from a wall outlet but from either the gas engine or the regenerative brakes. Battery power alone can take them only short distances at low speeds. In contrast, the new generation of electric cars can run at least tens of miles without gas, and they can be recharged by plugging them in. Some, such as the Leaf, are totally dependent on the battery. Others, such as the Volt, use a combination of batteries and a gasoline engine. Each configuration has its own benefits and problems, but all are limited, ultimately, by one thing: despite many technological advances in recent years, the batteries remain expensive. The fate of the new electric cars will depend above all on automakers' ability to bring down battery cost, or find ways to engineer around it.

### Auto Industry Key to Industrial Base

#### Auto industry fuels the industrial base that supplies the military

**Ronis, 06** – Ph.D, Large social system behavior, Distinguished Fellow and Vision Working Group leader of the Congressionally mandated Project on National Security Reform (PNSR), President of The University Group, Inc., a management consulting firm and think tank specializing in strategic management, visioning, national security, and public policy. (Shelia R., “Erosion of the U.S. Industrial Base and its National Security Implications”, July 17, 2006, http://www.uscc.gov/hearings/2006hearings/written\_testimonies/06\_07\_17wrts/ronis\_statement.pdf)//CH

Offshoring the auto industry could make the U.S. military industrial base in the United States completely unable to comply with American preference legislation because the erosion of the auto industrial base also erodes defense. General Motors, Ford, Delphi, Northrop-Grumman, Boeing, Lockheed Martin – they all share the bottom of the industrial base. The United States cannot sustain the kind of growth it has enjoyed for the last several decades if the industrial base continues to steadily erode. Increasingly, a number of U.S. companies in specific industries find it impossible to compete in world markets. This is of particular concern for the industrial base that supplies the U.S. military, automotive and aerospace. According to Alan Tonelson of the U.S. Business and Industry Council, import penetration rate data is a critical metric that the U.S. Government needs to track, but does not. According to Tonelson and Peter Kim in a *Washington Times* article, “in recent years most industries producing goods in the United States have been steadily losing their home market – the world’s biggest, most important and most competitive – to products from overseas. In other words, numerous U.S. industries are facing the kind of import tide that has pushed General Motors and Ford dangerously close to receivership. Moreover, this weakness shows up in so-called smokestack and high-tech industries alike. Unless this rising import penetration is reversed, the nation’s long-time global industrial leadership and all the benefits it has generated will be irretrievably lost.”

#### **Manufacturing sector is crucial to maintaining a tax base and in turn a strong military**

Gold 8 – journalist for NPR (Jenny, “Automakers' National Security Claims Questioned” NPR, December 4, 2008, http://www.npr.org/templates/story/story.php?storyId=97843617)//ctc

Another reason cited by supporters of an auto industry bailout is engineers. Many defense industry engineers started out in auto manufacturing, and a Big Three bankruptcy could create a shortage of skilled labor — making a rapid ramp-up in military manufacturing difficult. Hellman counters this argument by pointing to the foreign auto industry taking root in the U.S. There are still plenty of engineers in training, he says, but they may come from Honda, Toyota and Subaru instead of GM, Ford and Chrysler. Manufacturing needs aside, the loss of yet another American industry would be a big blow to national security, Thompson says. "The U.S. has exited commercial shipbuilding and electronics — that's what historians refer to as a decline," he says. "It's not a bright future; it's a bright past slipping away." Thompson notes that the manufacturing sectors are major contributors to the nation's economy, and particularly to the tax base that is crucial to maintaining a strong military.

#### Auto industry sustains fuel cell projects that are vital to warfighting capability

**ONR 09** –Executive branch agency within the Department of Defense, the Office of Naval Research (ONR) supports the President's budget. ONR provides technical advice to the Chief of Naval Operations and the Secretary of the Navy. (Office of Naval Research, “ONR Partners with Car Industry to Test Energy-Efficient Vehicles”, March 18, 2009, http://www.navy.mil/submit/display.asp?story\_id=43502)//CH

ARLINGTON (NNS) -- The Office of Naval Research (ONR) teamed up with an automobile industry leader to explore energy-efficient, environmentally-friendly viable transportation alternatives; a cutting-edge General Motors (GM) Chevrolet Equinox fuel cell vehicle (FCV) is the result of the partnership. As the global automobile industry considers alternative energy sources to replace the traditional internal combustion engine, Jessie Pacheco, a mail clerk at Camp Pendleton, makes his rounds in the FCVs. The Office of Naval Research (ONR) has sponsored the GM FCVs at Camp Pendleton since 2006; two more scheduled to arrive later this year. "These vehicles are the future," said Pacheco. "It's great to see people drive by me, giving me the thumb's up, and asking 'Where can I get one?'" "Fuel cell vehicle research is clearly a case where the Navy and Marine Corps needs are propelling advanced technology that also has potential benefit to the public," said Rear Adm. Nevin Carr, chief of naval research. Within the Navy-Marine Corps Team, ONR has researched power and energy technology for decades. Often the improvements to power generation and fuel efficiency for ships, aircraft, vehicles and installations have direct civil application for public benefit. "There is not a drop of oil in it," explained Shad Balch, a GM representative at Camp Pendleton. "The electric motor provides maximum instant torque right from the get go." The efficiency of a hydrogen-powered fuel cell may prove to be twice that of an internal combustion engine, if not greater, added Balch. From an operational perspective, the fuel cell vehicle is quiet yet powerful, emits only water vapor, uses fewer moving parts compared to a combustion engine and offers an alternative to the logistics chain associated with current military vehicles. The addition of fuel cell vehicles to Camp Pendleton provides a glimpse into the future of advanced transportation technology that reduces reliance on petroleum and affords environmental stewardship benefits such as reduced air pollution and a smaller carbon footprint for Navy and Marine Corps bases. "Partnering with the military gives us critical feedback from a truly unique application. This will help us as we engineer our next generation of fuel cell vehicles," Balch[, a GM representative,] noted. Technology underwrites the solutions to both national and naval energy needs. As an ONR program officer in the 1990s, Richard Carlin, Ph.D., recognized the potential of alternative fuel research to help meet the energy challenges of the future. Today, as ONR's director of power and energy research, Carlin is pleased to see the positive reaction to the fuel cell vehicle research program. "This is an example of where the value of investment in science and technology can really pay off," said Carlin. "Besides the potential energy savings and increased power potential of fuel cell technology, the research and testing we are doing will address challenges like hydrogen production and delivery, durability and reliability, on board hydrogen storage and overall cost." For example, through its testing ONR has made advances in the storage necessary for achieving greater range in fuel cell automobiles. Dave Shifler, the program officer managing the alternative fuels initiatives at ONR, emphasizes that partnerships are essential when bringing a new technology forward. "With the right partnerships, you can accomplish almost anything," stressed Shifler. "We have teamed with the Army from the beginning on this research, sharing technical support, contracting support and usage of the GM fuel cell vehicle." ONR fuel cell research has not been limited to vehicles and spans the operational spectrum: from ground vehicles to unmanned aerial vehicles (UAVs), to man-portable power for Marines and afloat. Hydrogen powered fuel cell technology is one of many programs at ONR in the power and energy research field that is helping the Navy meet the energy needs of both the warfighter and the public. ONR's partnerships in fuel cell vehicle research include: Headquarters Marine Corps; the Marine Corps Garrison Mobile Equipment office; Southwest Region Force Transportation; Naval Facilities Engineering Services Center, Port Hueneme; Department of Energy (Energy Efficiency and Renewable Energy), South Coast Air Quality Management District; California Air Resources Board; California Fuel Cell Partnership; Defense Energy Support Center, General Motors; Naval Surface Warfare Center Carderock Division; U.S. Fuel Cell Council; U.S. Army TARDEC/NAC, and Deputy Assistant Secretary of the Navy for Environment. ONR provides the science and technology (S&T) necessary to maintain the Navy and Marine Corps' technological warfighting dominance. Through its affiliates, ONR is a leader in S&T with engagement in 50 states, 70 countries, 1035 institutions of higher learning, and 914 industry partners. ONR employs approximately 1400 people, comprised of uniformed, civilian and contract personnel.

### Auto Industry Key to Electric Motors/Batteries

#### Auto industry is key to innovative electric motors, advanced batteries, and fuel cells

**Clark, 08** - retired Army general and former supreme allied commander of NATO, is a senior fellow at the Burkle Center for International Relations at the University of California at Los Angeles. (Wesley K., “What’s Good for G.M. Is Good for the Army”, New York Times, November 16, 2008, <http://www.nytimes.com/2008/11/16/opinion/16clark.html?_r=3>) //CH

Now, though, as Detroit moves to plug-in hybrids and electric-drive technology, the scale problem can be remedied. Automakers are developing innovative electric motors, many with permanent magnet technology, that will have immediate military use. And only the auto industry, with its vast purchasing power, is able to establish a domestic advanced battery industry. Likewise, domestic fuel cell production — which will undoubtedly have many critical military applications — depends on a vibrant car industry. To be sure, the public should demand transformation and new standards in the auto industry before paying to keep it alive. And we should insist that Detroit’s goals include putting America in first place in hybrid and electric automotive technology, reducing the emissions of the country’s transportation fleet, and strengthening our competitiveness abroad. This should be no giveaway. Instead, it is a historic opportunity to get it right in Detroit for the good of the country. But Americans must bear in mind that any federal assistance plan would not be just an economic measure. This is, fundamentally, about national security.

### Auto Industry Key to Readiness

#### **Auto assembly lines are key to readiness**

Thoma 9 – professor of economics at the University of Oregon (Mark, “National Defense Interests” New York Times, April 30 2009, http://roomfordebate.blogs.nytimes.com/2009/04/30/does-the-us-need-an-auto-industry/)//ctc

Does America need an auto industry? I believe that specialization and trade generally makes us all better off, so there is no reason to oppose industry moving outside our borders. But the costs and benefits of specialization sometimes hit different groups of people, so there can be winners and losers. People losing jobs in the auto industry generally do worse when they find new jobs, and that has been a big reason for the opposition to letting manufacturing of autos and other goods go into decline. But there is another rationale for policies preserving certain kinds of production: protecting industries vital to national defense. If you are an island nation vulnerable to blockades or trade embargoes intended to prevent food and other goods from being imported, it may be in your interest to protect domestic agriculture, for example. Automobile assembly lines cannot be constructed in an instant, so losing this industry would make us more vulnerable. The question is the degree to which a country can outsource the manufacturing of goods needed for national defense. If we do not have the capacity to produce engines, cars, tractors, and other goods that can be quickly converted to building military vehicles and aircraft, and war breaks out and those supplies are cut off, where does that leave us? Some goods can be safely outsourced since they aren’t vital to national defense, or because the barriers to restarting production are small. But assembly lines used to produce automobiles cannot be constructed in an instant, so losing this industry would make us more vulnerable. (Foreign ownership of factories located here is not a problem, since we could easily take those over if necessary, so we should be happy with the announcement of the alliance of Chrysler with Fiat.)

#### **Auto industry is crucial to ramping up our military during war– key to every major power over the past 200 years**

Gold 8 – journalist for NPR (Jenny, “Automakers' National Security Claims Questioned” NPR, December 4, 2008, http://www.npr.org/templates/story/story.php?storyId=97843617)//ctc

Even if the U.S. auto industry isn't a major player in defense manufacturing, it's needed as an insurance policy in case the nation needs to quickly ramp up its military for a major global conflict, says Dr. Loren Thompson, a defense analyst at the Lexington Institute think tank, which specializes in military matters. "We don't have a big enough defense industry," Thompson says. "If there was an emergency and we had to surge production of military vehicles, we would have to turn to Detroit to do it." Thompson also warns that losing the automakers would put manufacturing sectors like steel, chemicals and the already weakened electronics industry at risk, because they depend on purchases from the auto industry. "There is no country in the last 200 years that has managed to be a major power that did not have a strong manufacturing sector," he says. "The argument that the world has changed forever and we don't need a manufacturing base is naive. I hope we don't follow through on this logic and end up losing a war." Bailout proponents say that even if Detroit isn't directly involved with defense production, the automakers constitute the bulk of sales for small factories that supply parts for military vehicles. So if the Big Three went under, these factories might in turn shut down, and the parts would no longer be available to the defense industry.

### China is Seeking EV Dominance

#### China is aiming to leapfrog into a leadership position in EVs – it is already standardizing charging equipment

Kimble 11 - owner of Kimble Charting Solutions (Chris, “Leapfrogging to electric vehicles: patterns andscenarios for China’s automobile industry” Int. J. Automotive Technology and Management, Vol. 11, No. 4, 2011, <http://euromed-management.academia.edu/ChrisKimble/Papers/1095263/Leapfrogging_to_electric_vehicles_patterns_and_scenarios_for_Chinas_automobile_industry> pg 317-319)//ctc

There is no doubt that China would like to leapfrog into a position of leadership in EVs(Zhao, 2006). China now has the highest level of automobile production and sales in the world, overtaking the USA in 2009. Having achieved this position the Chinese government must now consider the future prospects for the industry, which is seen as one of the pillars of China’s continuing industrialisation. Two issues have been identified as critical for the sustainable growth of the automobile industry in China: dependency on imported fossil fuels and the reduction of pollution caused by automobiles (Fang andZeng, 2007; Nordqvist, 2007). EVs seem to offer a solution to both. Although China began its research and development of EVs in the 1990s, it is only recently that a national strategy has begun to emerge. Current plans are that ‘New Energy Vehicles’ (a classification that includes pure electric, electric hybrid and other alternative energy vehicles) should account for around 5% of annual new car sales. If this objective were reached, China would become one of the top five countries producing alternative energy vehicles. All of this begs just one question: can China’s automobile industry leapfrog to new vehicle technologies and compete internationally? In the following sections, we will examine whether China has all of the pieces of the puzzle it needs to achieve this ambition: in terms of the technology for EVs, for batteries and for charging stations. First, however, we will look at some broader social factors: the role played by national and regional government and some features of the indigenous Chinese market that might influence the development of EVs. 3.1 The role of central and local governments Central government has given increasing importance to the development of EVs since the early 1990s. In the eighth period of five-year planning (1991–1995), technology andresearch work on EVs started as part of the national development project. During the period of the tenth five-year plan (2000–2005), the EV became one of the ‘ 863 Projects ’,a status given to high-tech development projects by the state that signals that they are national priorities. The changes in industrial policy towards the automobile industry over the last two decades reveal a shift in national strategy. The first Industrial Policy for the Automobile was published in 1994: EVs were not mentioned. The objective of industrial policy in that period was to develop and consolidate China’s indigenous gasoline automobile industry. The second version of the policy published in 2004 stated that the automobile industry should begin to research and develop both EVs and batteries. More recently, Planning for Restructuring and Revitalization of the Auto Industry was published in January 2009, which set targets for new energy vehicles to account for 5%of annual new car sales between 2009 and 2011. If this target were reached, China would become one of the top five countries producing alternative energy vehicles. There are also a number of new policy directives in the pipeline that deal with the development of new energy vehicles. By the end of 2010, a specific policy, named Development Planning of New Energy Vehicles is expected to be published together with the third version of Industrial Policy for the Automobile Industry . The 12th 5-Year Planning and Objective of Automobile Industry (2011–2015) is now also under discussion and should be published in late in 2010.The standardisation of batteries and recharging equipment is a critical issue for the future development of EVs where central government has a role to play. Two options for recharging EVs exist: the ‘plug-in’ and the ‘battery-remove’ system. For the ‘plug-in’ system, the length of time the vehicle needs to be connected to the charging station is critical in determining its commercial viability. For the ‘battery remove’ model, the removal and replacement of the battery is quick and easy but necessitates a large stock of batteries that need to be recharged. The top ten Chinese carmakers favour the ‘plug-in’ system and have established an Electric Vehicle Industry Alliance , whose main objective is standardisation of components for pure, hybrid and fuel cell EVs. Another alliance, named Alliance on the Stimulation of Industrialization of China Pure Electric Vehicle , was established by smaller carmakers and the electricity companies that favour the ‘battery remove’ system. Its aims are to bring together key stakeholders in fields of vehicles and batteries and the provision of recharging stations. The Chinese government has already established some standards for the development of EVs. For example, in June 2009, it published the Access Regulations for New Energy Vehicle Manufacturers and Products which contained a roadmap for the development of the battery industry. Additional roadmaps and standards are expected to be published in 2010; these include National Standard for Electric Vehicles , Technical Conditions for Pure Electric Passenger Cars and Specification and Dimension of Traction Batteries for Electric Vehicles .Both central and local government has a further role in overcoming the ‘Catch 22’ problem of costs and production volume: while production volumes are small, costs remain high, and while costs are high, the market remains small. The absence of a plan to encourage consumers to acquire EVs in China has been a long-standing criticism of government policy. After making significant efforts on the production side, the government has finally outlined a stimulation plan for consumption in 2009.To stimulate the usage of clean mass-transport vehicles in the public transport system, the Ministry of Finance announced Energy-Saving and New Energy Vehicle Demonstration and Extension of Financial Assistance Fund Management Interim Measures in February 2009. These will be applied in pilot cities that belong to the first batch of the 1,000 New Energy Vehicles in 10 Cities project. One-off fixed grants of between 4,000¥ (400€, 584$) and 600,000¥ (60,000€, 88,000$) will be made available, linked to the different types of battery technology and vehicle. In addition to the larger vehicles used for public transport, smaller new energy vehicles, such as cars, will also be integrated into the government vehicle-purchase system. Finally, as well as the actions taken by central government, regional governments have also taken initiatives to stimulate consumption, with at least seven provinces announcing the establishment of regional Alliances of New Energy Vehicles . Most of those alliances have strong regional visions of industrial development and key carmakers, component producers, universities and research institutes are gathered under the jurisdiction of regional governments. Regional governments have strong financial motivation to participate in the commercialisation of EVs. Under the project 1,000 New Energy Cars in 10 Cities , ten pilot cities will be selected each year to receive funding from the Ministry of Science and Technology and Ministry of Finance to put 1,000 new energy cars on the road. In return, cities are expected to guarantee the necessary infrastructure, in particular the recharging stations.

### Economic Competitiveness Impacts

#### Economic primacy prevents all conflict escalation

**Freidberg & Schonfeld, 8** --- \*Professor of Politics and IR at Princeton’s Woodrow Wilson School, AND \*\*senior editor of Commentary and a visiting scholar at the Witherspoon Institute in Princeton (10/21/2008, Aaron and Gabriel, “The Dangers of a Diminished America”, Wall Street Journal, http://online.wsj.com/article/SB122455074012352571.html?mod=googlenews\_wsj)

With the global financial system in serious trouble, is America's geostrategic dominance likely to diminish? If so, what would that mean? One immediate implication of the crisis that began on Wall Street and spread across the world is that the primary instruments of U.S. foreign policy will be crimped. The next president will face an entirely new and adverse fiscal position. Estimates of this year's federal budget deficit already show that it has jumped $237 billion from last year, to $407 billion. With families and businesses hurting, there will be calls for various and expensive domestic relief programs. In the face of this onrushing river of red ink, both Barack Obama and John McCain have been reluctant to lay out what portions of their programmatic wish list they might defer or delete. Only Joe Biden has suggested a possible reduction -- foreign aid. This would be one of the few popular cuts, but in budgetary terms it is a mere grain of sand. Still, Sen. Biden's comment hints at where we may be headed: toward a major reduction in America's world role, and perhaps even a new era of financially-induced isolationism. Pressures to cut defense spending, and to dodge the cost of waging two wars, already intense before this crisis, are likely to mount. Despite the success of the surge, the war in Iraq remains deeply unpopular. Precipitous withdrawal -- attractive to a sizable swath of the electorate before the financial implosion -- might well become even more popular with annual war bills running in the hundreds of billions. Protectionist sentiments are sure to grow stronger as jobs disappear in the coming slowdown. Even before our current woes, calls to save jobs by restricting imports had begun to gather support among many Democrats and some Republicans. In a prolonged recession, gale-force winds of protectionism will blow. Then there are the dolorous consequences of a potential collapse of the world's financial architecture. For decades now, Americans have enjoyed the advantages of being at the center of that system. The worldwide use of the dollar, and the stability of our economy, among other things, made it easier for us to run huge budget deficits, as we counted on foreigners to pick up the tab by buying dollar-denominated assets as a safe haven. Will this be possible in the future? Meanwhile, traditional foreign-policy challenges are multiplying. The threat from al Qaeda and Islamic terrorist affiliates has not been extinguished. Iran and North Korea are continuing on their bellicose paths, while Pakistan and Afghanistan are progressing smartly down the road to chaos. Russia's new militancy and China's seemingly relentless rise also give cause for concern. If America now tries to pull back from the world stage, it will leave a dangerous power vacuum. The stabilizing effects of our presence in Asia, our continuing commitment to Europe, and our position as defender of last resort for Middle East energy sources and supply lines could all be placed at risk. In such a scenario there are shades of the 1930s, when global trade and finance ground nearly to a halt, the peaceful democracies failed to cooperate, and aggressive powers led by the remorseless fanatics who rose up on the crest of economic disaster exploited their divisions. Today we run the risk that rogue states may choose to become ever more reckless with their nuclear toys, just at our moment of maximum vulnerability. The aftershocks of the financial crisis will almost certainly rock our principal strategic competitors even harder than they will rock us. The dramatic free fall of the Russian stock market has demonstrated the fragility of a state whose economic performance hinges on high oil prices, now driven down by the global slowdown. China is perhaps even more fragile, its economic growth depending heavily on foreign investment and access to foreign markets. Both will now be constricted, inflicting economic pain and perhaps even sparking unrest in a country where political legitimacy rests on progress in the long march to prosperity. None of this is good news if the authoritarian leaders of these countries seek to divert attention from internal travails with external adventures. As for our democratic friends, the present crisis comes when many European nations are struggling to deal with decades of anemic growth, sclerotic governance and an impending demographic crisis. Despite its past dynamism, Japan faces similar challenges. India is still in the early stages of its emergence as a world economic and geopolitical power. What does this all mean? There is no substitute for America on the world stage. The choice we have before us is between the potentially disastrous effects of disengagement and the stiff price tag of continued American leadership.

#### Competitiveness prevents great power nuclear war

Khalilzad, ’11 (Zalmay, 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”, 2-8-11, <http://www.nationalreview.com/articles/print/259024>)

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. As rival powers rise, Asia in particular is likely to emerge as a zone of great-power competition. Beijing’s economic rise has enabled a dramatic military buildup focused on acquisitions of naval, cruise, and ballistic missiles, long-range stealth aircraft, and anti-satellite capabilities. China’s strategic modernization is aimed, ultimately, at denying the United States access to the seas around China. Even as cooperative economic ties in the region have grown, China’s expansive territorial claims — and provocative statements and actions following crises in Korea and incidents at sea — have roiled its relations with South Korea, Japan, India, and Southeast Asian states. Still, the United States is the most significant barrier facing Chinese hegemony and aggression. Given the risks, the United States must focus on restoring its economic and fiscal condition while checking and managing the rise of potential adversarial regional powers such as China. While we face significant challenges, the U.S. economy still accounts for over 20 percent of the world’s GDP. American institutions — particularly those providing enforceable rule of law — set it apart from all the rising powers. Social cohesion underwrites political stability. U.S. demographic trends are healthier than those of any other developed country. A culture of innovation, excellent institutions of higher education, and a vital sector of small and medium-sized enterprises propel the U.S. economy in ways difficult to quantify. Historically, Americans have responded pragmatically, and sometimes through trial and error, to work our way through the kind of crisis that we face today.

## OIL EXTENSIONS

### EVs Decrease Oil

#### **EVs would dramatically decrease warming and reduce oil by at least one-third**

Business Wire ‘10– leading source for full-text breaking news and press releases, multimedia and regulatory filings for companies and groups throughout the world (“Plug-in Electric Cars Can Lower Global Warming Emissions, Oil Consumption and Unhealthy Air Pollution”, 20 January 2010, http://www.businesswire.com/news/home/20100120006249/en/Plug-in-Electric-Cars-Global-Warming-Emissions-Oil)//BI

Increasing America's use of plug-in electric and plug in hybrid cars would dramatically reduce emissions that cause global warming and air pollution and would curb our dependence on oil, according to a new white paper released today by Environment Texas. "America's current fleet of gasoline-powered cars and trucks leaves us dependent on oil, contributes to air pollution problems that threaten our health and produces large amounts of global warming pollution," said Texas State Representative Rafael Anchia. A "plug-in" car is one that can be recharged from the electric grid. Some plug-in cars run on electricity alone, while others are paired with small gasoline engines to create plug-in hybrids. Many plug-in hybrids can get over 100 miles per gallon, while plug-in electric vehicles consume no gasoline at all. Plug-in vehicles produce no direct tailpipe pollution when operating on electricity and there is already a vast electric power infrastructure to fuel them. As renewable energy sources, like wind and solar, meet a larger share of our electricity needs, electric car could contribute to little or no air pollution. Utilities and retailers are gearing up for plug-in vehicles so they will be ready to provide the necessary services to their customers when cars start arriving later this year. "We're on the cusp of an historic shift in the way we use energy for transportation," said Jim Burke, CEO, TXU Energy. "Increasing the use of electric vehicles is vitally important for Texas, for our community, and for our customers - so it's vitally important to us as well. We are working to help lead this shift, including developing time-of-use rates that will help our customers benefit from cheaper night time charging." "The current electric system has the capacity to fuel up to 73 percent of American vehicles without building another power plant by charging vehicles at night or using solar panels by day," said McCall Johnson, Clean Energy Advocate, Environment Texas. "However, the nation will need to clean up its electric grid to reap the full environmental potential benefits of plug-in cars." "Plug-in hybrid electric vehicles offer a way to utilize our state's natural resources and minimize gas consumption and cost," said Phil Wilson, Luminant's Senior Vice President for Public Affairs. "They are great for Texas, reduce mobile point source emissions and are truly one more step toward energy independence," Wilson added. The technology needed to build workable plug-in vehicles exists today, and plug-ins have several advantages over gasoline-powered cars including the fact that they require far less regular maintenance and no oil changes. "I think that electric vehicles are the future of neighborhood and commuter transportation. Electric vehicles are green, quiet, and eliminate trips to gas station," said David Oberlander, a current electric vehicle driver. "Best of all, they are fun to drive." Air quality is of particular concern in the DFW area, and "the North Central Texas Council of Governments (NCTCOG) is supportive of advanced fuels and technology to improve air quality in the Dallas-Fort Worth region," said Jenny Danieau of NCTCOG. Plug-in Cars: Powering America Toward a Cleaner Future answers many questions about plug-in vehicles and lays out a strategy for how to increase the number of electric vehicles on the road. It highlights data from existing research to show that electric vehicles can help to improve Americans' standards of living. The key points of the paper include the following: -- Powering a car on electricity would result in 93 percent less smog-forming volatile organic compounds and 31 percent less nitrogen oxide emissions than powering a car on gasoline.[1] -- If half of the light vehicles in the United States were electric vehicles powered by completely clean electricity in 2030, total fleet emissions would be reduced by 62 percent. [2] -- If three-fourths of American vehicles, including cars, pick-up trucks, SUVs and vans, were electric, oil use would be reduced by about one-third.[3]

#### Electric vehicles solve oil dependence, economic downturns, and the trade deficit

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 (Thomas, “Electric Vehicles in the United States A New Model with Forecasts to 2030”, 8/24/2009. http://cet.berkeley.edu/dl/CET\_Technical%20Brief\_EconomicModel2030\_f.pdf)//DHirsch

The most direct impact of the electrification of the U.S. light-vehicle fleet will be to decrease the economy’s consumption of petroleum. In 2008 the United States spent nearly $600 billion dollars on oil, over two thirds of which was imported. Depending on its price, oil has accounted for between 30% and 59% of the U.S. trade deficit over the last decade. Approximately 70% of petroleum is used for transportation and over 40% of oil is used for light-vehicle transportation. Each of the electric vehicle deployment scenarios modeled in our analysis lead to significantly lower oil consumption and a correspondingly lower trade deficit.

The amount of oil imported by the United States makes it challenging to imagine how the U.S. could close its trade deficit or current account deficit without decreasing its oil consumption. Exhibit shows how increases in monthly oil imports have coincided with a gradual 1.8% decline in domestic oil production over the past two decades. Its reliance on imported oil exposes the U.S. economy to unemployment and economic downturns stemming from foreign oil supply interruptions, can lead to suboptimal monetary policy to control oil-induced price inflation, and imposes a high military cost to secure foreign oil supplies. Economists have also shown the financial flows associated with petrodollars to be a primary contributor to global financial imbalances. The deployment of electric cars will significantly reduce the transportation sector’s reliance on petroleum-based fuels and thereby diminish the problems associated with the oil dependency of the U.S. economy.

### AT Finite Resource/Supply Problems

#### No risk of supply problems – lithium is recyclable and electricity relies on a diverse fuels

**Smith, ’10 - FedEx CEO/Member of Electrification Coalition (**Frederick, February 23, Hearing Before a Subcommittee on the Committee on Appropriations, United States Senate, “Opportunities and Challenges Presented in Increasing the Number of Electric Vehicles in the Light Duty Automotive Sector,”

<http://www.gpo.gov/fdsys/pkg/CHRG-111shrg56643/pdf/CHRG-111shrg56643.pdf>, p. 20)

We also recognize that there may be unforeseen challenges to an entirely new transportation system. For example, some have raised concerns about the supply of lithium, which is crucial for the batteries that will drive the cars and trucks of the future. We have examined this issue and found that, because the vast majority of material in lithium ion batteries is recyclable, the increased use of grid-enabled ve- hicles does not present the United States with additional resource dependency. Par- ticularly when recycling is assumed, global lithium reserves are adequate to support even the most bullish GEV deployment scenarios. Moreover, at a structural level, dependence on lithium is unlike dependence on oil. Vehicles do not deplete batteries as we drive; they deplete the energy stored within them. In other words, batteries are like the engines in conventional vehicles of today; though their life span is finite, they last for many years. Coupled with the fuel diversity of the electric power sector, grid-enabled vehicles generally insulate consumers from volatile commodity mar- kets.

## WARMING EXTENSIONS

### EVs Solve Warming

#### EVs are the only way to meet domestic and international timetables for GHGs reduction

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 (Thomas, “Electric Vehicles in the United States A New Model with Forecasts to 2030”, 8/24/2009. http://cet.berkeley.edu/dl/CET\_Technical%20Brief\_EconomicModel2030\_f.pdf)//DHirsch

Achieving the significant reductions in the greenhouse gas emissions called for by both domestic and international timetables is only possible by reducing transportation-related emissions. The transportation sector currently accounts for nearly 30 percent of the United States energy usage and motor gasoline accounts for 20 percent of the economy’s greenhouse gas emissions. By 2030 the fleet of electric cars is estimated to require between 190 and 350 million Megawatt hours of electricity per year. Each of the adoption scenarios in this paper results in substantial reductions in greenhouse gas emissions, but the magnitude of reduction is more than doubled by using non-polluting sources of electricity generation to charge electric cars.

Exhibit 14 shows the greenhouse gas impact of each electric vehicle adoption scenario in excess of the proposed increases to fuel efficiency standards. The right figure shows the emissions reductions associated with using electricity from non-carbon sources (renewables, nuclear, or hydroelectric) to power the forecasted fleet of electric cars. The new CAFE standards mandate auto manufacturers to produce new vehicles with a fuel efficiency of 35.5 miles per gallon by 2016, but a car with this fuel economy still emits four metric tons of greenhouse gases per year. If the electricity to power electric cars is produced by non-carbon sources the range of greenhouse gas reductions across the scenarios is between 25% and 62%. This is equal to a twenty percent reduction in light-transportation emissions below their 2005 levels in the baseline scenario. The operator-subsidized scenario reduces light-vehicle transportation emissions nearly 70 percent below their 2005 levels.

These reductions in greenhouse gas emissions are lower if the electricity to power these vehicles is produced using the carbon intensity of the 2007 U.S. electricity grid, as shown in the left figure. The range of reductions under the different adoption scenarios is between 11% and 26%. The lower reduction in light-vehicle emissions under this scenario highlights the advantage of an electric vehicle charging system relying on network operators. By centralizing the purchase of electricity in these network operators, the additional generating capacity can be purchased wholesale from non-carbon sources.

#### EVS will create a sea change in transportation that solves oil dependence and substantially reduces GHGs

Hunt, 11 – president of Community Renewable Solutions LLC, a company focused on community-scale wind and solar energy, lecturer on climate change law and policy and renewable energy law and policy at UC Santa Barbara’s Bren School of Environmental Science & Management (Tam, “Why Electric Vehicles Will Reduce Greenhouse Gas Emissions”, RenewableEnergyWorld.com, 11 January 2011, http://www.renewableenergyworld.com/rea/news/article/2011/01/why-electric-vehicles-will-significantly-reduce-greenhouse-gas-emissions)

A recent article by John Peterson argued that electric vehicles will take us backward in our efforts to reduce greenhouse gas emissions and that today's hybrid cars are more effective in reducing GHGs. Peterson's commentary rests on recent research by Carnegie Mellon University regarding life-cycle emissions of various vehicle types. I believe Peterson's highly negative view of electric vehicles is unwarranted and inaccurate due to a number of reasons that I describe below. I have some familiarity with these issues in that I represent the Green Power Institute (a non-profit policy outfit based in the Bay Area) at the California Public Utilities Commission in the electric vehicle proceeding R. 09-08-009. This proceeding is considering numerous issues related to utility rate design for electric vehicles and state policies for integrating potentially large numbers of electric vehicles into the grid in coming years. Our comments in this proceeding can be found here. I also was the lead author of the Community Environmental Council’s 2007 report, A New Energy Direction: A Blueprint for Santa Barbara County, which examined in detail how Santa Barbara County could wean itself from fossil fuels and save substantial money at the same time. I wrote the report not only as a detailed blueprint for one county, but also as a template for other counties and regions contemplating similar goals. I wrote in that report that alternatives to driving, driving smaller vehicles, and relying on hybrid vehicles were the best short-term options for reducing fossil fuel use. However, in the longer term, electrification of our transportation infrastructure was the most promising path: "To wean our region off fossil fuels, we will need additional options beyond driving smaller cars and hybrid vehicles, or using biofuels such as ethanol and biodiesel. The next generation of vehicles will provide a sea change in how we transport ourselves and goods by allowing electricity to become the primary transportation energy instead of petroleum. The idea is to “electrify” the transportation sector by actively transitioning to vehicles that run on electricity. This is advantageous even if we remain with today’s sources of electricity, because vehicles that use electricity as a fuel are two to three times more efficient than those that run on petroleum. However, the end goal is to change our electricity mix to all, or almost all, renewable electricity. We realize that converting our primary supply of transportation fuel from oil to electricity may seem to be a radical program, but it is a tremendously promising path. If we follow this path nationally, we could reduce or [even] eliminate our dependence on foreign oil in just two or three decades and dramatically cut back on our greenhouse gas emissions." I stick by these conclusions for the following reasons.

### **Next Decade Key**

#### **Switching to EVs in next decade is crucial to solve the worst effects of global warming—increased port infrastructure is key**

Anair & Mahmassani 12 – \*bachelor's and master's degrees in electrical engineering from Cornell University, senior analyst and engineer in the California office of the Union of Concerned Scientists' Clean Vehicles Program AND \*\*degree in Electrical Engineering from the University of Maryland, College Park and degree in Transportation Technology and Policy from the University of California, Davis, Vehicles Analyst/Engineer with UCS (“State of Charge: Electric Vehicles’ Global Warming Emissions and Fuel-Cost Savings across the United States”, Union of Concerned Scientists, April 2012, http://www.ucsusa.org/assets/documents/clean\_vehicles/electric-car-global-warming-emissions-report.pdf)//BI

To meet the challenge of climate change and reduce our nation’s dependence on oil, continuing to run our cars and trucks predominantly on oil-based fuels is not an option. On the other hand, electric vehicles—coupled with clean and sustainable electricity—are important parts of the solution. Driving on electricity is a reality; it provides global warming benefits today and throughout the United States. Nearly half of Americans live in regions where driving an electric vehicle means lower global warming emissions than driving even the best hybrid gasoline vehicle available. Over the lifetime of an EV, the owner can save more than 6,000 gallons of gasoline—a significant contribution to U.S. energy security. But our nation’s reliance on coal-powered electricity limits electric vehicles from delivering their full potential. Only by making improvements to our electricity grid—by decreasing the use of coal and increasing the use of clean and renewable sources of electricity—will electric vehicles deliver their greatest global warming and air pollution benefits. Initiatives to clean up the electricity grid are occurring around the country, but additional efforts are needed both at the state and national level to ensure continued progress. Of course, cleaning up the nation’s electricity production won’t deliver large reductions in the transportation sector’s emissions and oil consumption unless electric vehicles become a market success. While they are now coming onto the market in a much bigger way than ever before, EVs still face many hurdles, including higher up-front costs than gasoline vehicles. Lower fueling costs for EVs, however, provide an important incentive for purchasing them, and our cost analysis of 50 cities across the country shows that EV owners can start saving money immediately on fuel costs by using electricity in place of gasoline. Meanwhile, utilities’ leaders and government policy makers have important roles to play: they must ensure electricity rate plans motivate EV ownership, and they must encourage charging behavior that supports lower emissions and a robust electricity grid. To prevent the worst consequences of global warming, the automotive industry must deliver viable alternatives to the oil-fueled internal-combustion engine— i.e., vehicles boasting zero or near-zero emissions. Such alternative technologies must become market successes in the next 10 to 15 years if they are to comprise the majority of vehicles on the road by 2050—a critical element to reaching an 80 percent reduction in global warming emissions by that year. EVs promise to be one of those technologies, but their success is not assured. To turn the nascent EV market into a mainstream phenomenon over the coming years, continued investments are needed for improving EVs’ performance and costs, incentivizing consumers and manufacturers, expanding accessible charging infrastructure, and reducing barriers to low-cost home charging.

### AT EVs Increase CO2

#### **Electricity is vastly superior to oil—even the dirtiest sources are cleaner and reduce warming – scientific study proves**

Worthington, 12 – contributing energy editor to SmartPlanet, an online magazine that covers clean technology and information technology as it relates to science, transportation, corporate sustainability, and more, degree from Temple University (David, “Electric vehicles cleaner than gasoline, anywhere”, SmartPlanet, 16 April 2012, http://www.smartplanet.com/blog/intelligent-energy/electric-vehicles-cleaner-than-gasoline-anywhere/15002)//BI

Scientists have analyzed how emissions generated from charging electric vehicles compare to gasoline-powered vehicles in the United States. The conclusion: even coal-fueled electricity is a cleaner alternative. The report, “State of Charge: Electric Vehicles’ Global Warming Emissions and Fuel Cost Savings Across the United States,” was published today by the Union of Concerned Scientists (UCS). It breaks down how regional differences in how electricity is made affect reducing global warming emissions and fuel savings. A key finding was that an EV would be a greener choice than most conventional automobiles even in areas where power plants are dependent upon fossil fuels. The worst case was emissions equivalent to a 33-MPG compact car. USC uncovered that nearly half of Americans live in the most ideal regions where grid conditions make EVs even more efficient than even gasoline hybrids. EVs in those areas have lower global warming emissions than a 50-MPG hybrid. “This report shows drivers should feel confident that owning an electric vehicle is a good choice for reducing global warming pollution, cutting fuel costs, and slashing oil consumption,” said Don Anair, the report’s author and senior engineer for UCS’s Clean Vehicles Program. UCS was founded in in 1969 by a group of scientists and students at the Massachusetts Institute of Technology to promote the use of science for public interest. It is strongly opposed to any political interference in scientific research. Dr. James McCarthy, a biological oceanography professor at Harvard University, is current chairperson of UCS. The group has supported a moratorium on new coal power plants, and advocates for the development of new technologies to combat climate change.

#### Even if electricity comes from dirty sources, it is vastly more efficient

Kaplan et al., 10 – \*affiliated with Frontier Group, a think tank that issues issue experts, writers and analysts to produce ideas and research to promote a cleaner environment and a fairer and more democratic society, \*\*Brad Heavner**,** B.A. from the University of Michigan, Senior Policy Advisor for Environment America and State Director of Environment Maryland, AND \*\*\*Rob Sargent, graduate of the University of Vermont, Energy Program Director for Environment America and oversees policy and strategy development for energy and global warming campaigns throughout the U.S., more than two decades of experience leading a wide range of environmental and public interest campaigns (Siena, Charging Ahead: Curbing Oil Consumption with Plug-in Cars”, Environment Maryland Research & Policy Center, June 2010, http://www.environmentmaryland.org/sites/environment/files/reports/Charging-Ahead.pdf)//BI

Electricity is an attractive option for fueling cars because of its potential to reduce global warming emissions and other pollution, and because, in contrast to other types of alternative fueled vehicles, such as hydrogen, the technology can be applied today. Electricity has been used to power transportation since the early 1900s, and the infrastructure for delivering electricity to cars largely already exists. Indeed, limited numbers of fully electric vehicles have traveled America’s roads for two decades. In the 1990s, the General Motors EV1 and Honda EV-Plus were sold in California. While they were expensive and had limited range, they drew rave reviews from their owners due to their quiet operation, quick acceleration, easy maintenance and environmental friendliness. In the early 2000s, Toyota sold the RAV4-EV in California, with a range of about 100 miles and a price tag of $42,000.8 Electric cars have lower global warming emissions and produce less air pollution than conventional cars. Electric motors are vastly more efficient than internal combustion engines. Out of all of the energy produced when a car burns gasoline, only 13 percent actually goes towards moving the car forward.9 An electric car is about twice as efficient, with about 24 percent of the energy in the fuels consumed at a power plant actually going toward powering the car.10 Therefore, even if the electricity used to power a vehicle comes from relatively dirty sources, electric cars still produce less global warming and air pollution than conventional cars. With the very dirtiest electricity, electric cars are about equivalent to today’s conventional cars in terms of global warming pollution.11 With cleaner electricity, such as that produced by wind or solar power, the difference in pollution emissions is far greater. (See page 11 for more detail).

###  AT Peterson

Peterson is wrong – cited study concludes aff and relies on misleading national emissions data

Hunt, 11 – president of Community Renewable Solutions LLC, a company focused on community-scale wind and solar energy, lecturer on climate change law and policy and renewable energy law and policy at UC Santa Barbara’s Bren School of Environmental Science & Management (Tam, “Why Electric Vehicles Will Reduce Greenhouse Gas Emissions”, RenewableEnergyWorld.com, 11 January 2011, http://www.renewableenergyworld.com/rea/news/article/2011/01/why-electric-vehicles-will-significantly-reduce-greenhouse-gas-emissions)

Peterson relies on a 2008 report by Carnegie Mellon University researchers Constantine Samaras and Kyle Meisterling. It is a little ironic that the slide that Peterson shows in his article, with similar data to Figure 1 below, is entitled “Electrified transportation has large GHG benefits with low-carbon electricity,” and yet Peterson states immediately after showing this slide: “the graph suggests that there is no meaningful air quality advantage to plug-in vehicles.” The report does indeed conclude that electric vehicles yield modest improvements over hybrid vehicles with the current U.S. national electricity average emissions. However, Samaras and Meisterling recognize that the future may yield significant improvements in average emissions – as the title of the slide Peterson uses states. Figure 1 below shows that under the posited “low carbon scenario” of 200 g/CO2 in the electricity sector, electric vehicles would produce about half the emissions of hybrid cars. “PHEV 90” represents a plug-in electric vehicle that can run 90 miles on batteries alone, which, while not possible today, will very likely become possible in a few years as battery technology improves. CV refers to conventional vehicles and HEV to hybrid vehicles. Samaras and Keisterling state (p. 3173): “Under the low-carbon scenario, large life cycle GHG reductions (51–63% and 30–47%, compared to CVs and HEVs, respectively) are possible with PHEVs.” The Shift To Renewables and Natural Gas The key to this debate, then, is how electricity sector GHG intensity will change over time. Are emissions going up or down? The Energy Information Administration stated in a very encouraging report from early 2010: "The fuel mix and associated carbon intensity of most sectors have tended to be very stable over time. However, in 2009, the carbon intensity of the electric power sector decreased by nearly 4.3 percent, primarily due to fuel switching as the price of coal rose 6.8 percent from 2008 to 2009 while the comparable price of natural gas fell 48 percent on a per Btu basis. The carbon content of natural gas is about 45 percent lower than the carbon content of coal and modern natural gas generation plants that can compete to supply base load electricity often use significantly less energy input to produce a kilowatt-hour of electricity than a typical coal-fired generation plant. For both of these reasons, increased use of natural gas in place of coal caused the sector’s carbon intensity to decrease." The accompanying chart tells us even more (note that the electric power sector emissions started dipping in 2006): The takeaway point here is that the United States is at the start of a long-term shift away from coal toward renewable energy and natural gas, with nuclear power probably slowly diminishing also. I’ve written recently about the very encouraging decade-long growth trend of wind and solar power in the U.S. Wind and solar power have grown 30-40% annually in recent years and solar grew 100% in 2010 – despite a still-weak economy (wind power growth dropped substantially, unfortunately). Perhaps as importantly, we have seen a significant drop in natural gas prices in the last couple of years driven in part by increased supplies from oil shale. I personally don’t support the use of more natural gas as a sustainable long-term solution, particularly not from oil shale, for various environmental and economic concerns. But I do recognize, as the EIA wrote in the passage quoted above, that there has been a significant shift away from coal and toward natural gas for many power plants that can switch fuel when economically advantageous to do so. And this trend also looks to continue for some years. As a result of these and other similar trends, the U.S. economy has seen a massive 41% reduction in greenhouse gas emissions intensity in recent years (Figure 3). GHG “intensity” refers to the amount of emissions per dollar of GDP and is a measure of the efficiency of an economy. Electricity sector emissions haven’t seen as large a reduction, as the previous figure showed, but we can reasonably expect to see much larger reductions over the longer term if the trend witnessed in the last few years continues. Regional Versus National Averages An even more important mistake in Peterson’s critique is his reliance on average national emissions from the electricity sector. In fairness, the Samaras and Meisterling report makes this assumption also, but it is a very poor assumption when considering the real world policy implications of the issues they analyze. It is very clear, based on adoption rates for hybrid cars and other high-efficiency vehicles in recent decades, that electric vehicle adoption will be far higher in states that have far lower electricity sector emissions than other parts of the country. A student of mine, Christian Del Maestro, completed an excellent paper in 2009, still unpublished, that examined the regional impacts of electric vehicle adoption. His conclusions regarding the national average are congruent with those from the Carnegie Mellon study, but he also looked at state-level emissions. He found that all but a few states yield significant GHG benefits when compared to HEVs and CVs. And some of the most populous states, like California and New York, will result in electric vehicle emissions less than half of those for the 2009 Prius because of the relatively clean electricity mix in these states. Clearly we can’t ignore geographic adoption patterns when considering the real world results of electric vehicle adoption and related energy policy considerations.

## GRID EXTENSIONS

### EVs Lead to Smart Grid/Upgrades

#### Smart systems are already being developed and are critical to EVs communicating with the grid

**PG&E Corporation’s Prepared Statement, ’10 - (**February 23, Hearing Before a Subcommittee on the Committee on Appropriations, United States Senate, “Opportunities and Challenges Presented in Increasing the Number of Electric Vehicles in the Light Duty Automotive Sector,”

<http://www.gpo.gov/fdsys/pkg/CHRG-111shrg56643/pdf/CHRG-111shrg56643.pdf>, p. 83-4)

PG&E has also partnered with Smith Electric Vehicles for 12 medium duty bat- tery electric trucks in 3 configurations to support our field work, including boom, flat bed, and service trucks. In addition, with pick-up trucks being the most common vehicle in PG&E’s fleet, PG&E has partnered with General Motors to take delivery of more than 100 of their hybrid units. PG&E has also partnered with Raser Tech- nologies for six plug-in hybrid pick-up trucks. Through field tests of these vehicles, we are helping to demonstrate the increased efficiency of electric vehicles. We are also helping to understand the impact on the grid of charging electric vehicles—and the need for a robust ‘‘smart charging’’ infra- structure to enable vehicles to recharge batteries automatically when ample electric supply is available. PG&E’s current deployment of nearly 10 million smart meters, the largest roll-out in the country, provides a critical foundational technology that will help ensure as more electric vehicles are commercially introduced, PG&E can ensure they are safely and reliably integrated with the grid. To support the development of a smart charging infrastructure, PG&E is actively engaged with the Electric Power Research Institute (EPRI) and the Society of Auto- motive Engineers to develop and revise the important codes and standards related to charging of EVs and the protocols needed to allow EVs to communicate with the grid. Beginning in Q2 of 2010, PG&E will embark on a large pilot project with EPRI to test various electrical chargers and load management systems to minimize the effects of EVs on the electrical grid while maximizing customer convenience at var- ious EV rates. This project will enable PG&E to develop critical knowledge and ex- pertise to safely and reliably begin supporting electric vehicle customers as the broad rollout of EVs begins in late 2010. In addition to the important testing and deployment work that PG&E is con- ducting in CA, the company actively supports Federal policy aimed at expediting the successful market development of electric vehicles. PG&E has long been an active member with board representation at the Electric Drive Transportation Association.

#### EVs lead to green jobs and smart grid technology

**Lee and Lovellette ’11** - Jassim M. Jaidah Family Director of the Environment and Natural Resources Program within the Belfer Center for Science and International Affairs at Harvard's John F. Kennedy School of Government, Faculty Co-Chair of the Center's Energy Technology Innovation Policy project, and a Senior Lecturer in Public Policy, Belfer Center for Science and International Affairs, Harvard Kennedy School, Harvard University (Henry and Grant, “Will Electric Cars Transform the U.S. Vehicle Market”, July 2011. http://belfercenter.ksg.harvard.edu/files/Lee%20Lovellette%20Electric%20Vehicles%20DP%202011%20web.pdf)//DHirsch

Proponents tout electric vehicles as a potential solution to many problems. To those worried about the United States’ continued reliance on imported oil, the electric car promises to reduce oil consumption and enhance U.S. energy security. To those worried about climate change, electric cars, especially in a grid powered increasingly by renewable energy, could reduce greenhouse gas emissions. To those worried about the United States’ competitive position in a world seeking green technologies, electric vehicles could stimulate jobs in industries ranging from batteries to smart grids to the vehicles themselves. Finally, to states and municipalities that are struggling to meet ever more stringent standards for conventional air emissions, such as small particles and nitrogen dioxide, electrifying the transport sector may enable their communities to meet new, tougher emissions standards. These combined interests may form a potent constituency pushing for greater electrification.

After careful analysis, each of these perceptions may seem optimistic, but several trends exist that cannot be ignored.

#### Electrification Roadmap will enable EVs to be fully integrated into the network

**PG&E Corporation’s Prepared Statement, ’10 - (**February 23, Hearing Before a Subcommittee on the Committee on Appropriations, United States Senate, “Opportunities and Challenges Presented in Increasing the Number of Electric Vehicles in the Light Duty Automotive Sector,”

<http://www.gpo.gov/fdsys/pkg/CHRG-111shrg56643/pdf/CHRG-111shrg56643.pdf>, p. 83-4)

In 2009, PG&E joined the Electrification Coalition which is committed to pro- moting policies that expedite the deployment of grid-enabled vehicles and infrastruc- ture on a mass scale, moving electrification beyond a niche concept into a compelling and widely available alternative to the current transportation system. In November 2009, the Electrification Coalition released its Electrification Roadmap, a sweeping report outlining a vision for the deployment of a fully integrated electric drive net- work. The Electrification Roadmap outlines critical policy recommendations, such as promoting the inclusion of electric vehicle related investments in utility rate base and adjusting utility rate structures to facilitate EV deployment, both necessary to successfully establish Electrification Ecosystems around the country and drive the economies of scale needed to sustain and grow the electric vehicle market. As global demand for oil increases from the emergence of economies such as China and India, along with our Nation’s increased dependence on foreign supplies of oil, we face an uncertain energy future. The time is now to establish bold policy commitments that will chart a different future for our Nation’s energy supply and transportation infrastructure. PG&E recognizes the strong commitment of the Con- gress to adopt Federal policies aimed at creating a market for electric transpor- tation, such as those in the American Recovery and Reinvestment Act and the House passed Advanced Vehicle Technology Act of 2009. Our hope is that Congress will recognize and act to implement the bold and necessary policies outlined in the Electrification Roadmap.

#### Expansion of charging infrastructure will necessitate modernization of the electric grid

Chandler, ’11 (David, January 24, “Electrifying Transportation: Devil is in the Details, ”http://web.mit.edu/mitei/news/spotlights/electrify-transport.html)

One key enabling technology involves modernization of the nation’s electric grid, enabling more real-time monitoring and dynamic control down to the level of individual buildings, because patterns of usage could change significantly if the recharging of electric vehicles grows at a rapid pace. At the same time, the batteries in electric or plug-in hybrid vehicles could be used as an extra short-term backup system, storing energy from the grid when there is an excess and delivering it back when needed, in order to flatten peaks in electricity use. This could eliminate the need for construction of some new power plants, but only if changes are made to the grid infrastructure to enable such uses, said Marija Ilic, a visiting professor in the MIT Engineering Systems Division.

Even a partial shift to electricity will necessitate modernization of the electricity grid

TEP 11 – The Transport Electrification Panel consists of Gurminder Bedi (Ford Motor Company) Michael Brylawski (Bright Automotive) John German (International Council on Clean Transportation) Dr. Sara Hajiamiri (Pardee RAND Graduate School) Dr. Donald Hillebrand (Argonne National Laboratory) Dr. Kara Kockelman (University of Texas at Austin) Michael Ligett (North Carolina State University) Dr. Virginia Mcconnell (Resources for the Future) Paul Mitchell (Energy Systems Network) Nick Nigro (Pew Center on Global Climate Change) Brett Smith (Center for Automotive Research) Michael Tinskey (Ford Motor Company) Dr. Thomas Walton (Defour Group) Dr. John D. Graham (School of Public and Environmental Affairs at Indiana University) Dr. Wanya Carley (Assistant Professor, School of Public and Environmental Affairs, Indiana University) Chris Crookham (MPA Student, School of Public and Environmental Affairs, Indiana University) Devin Hartman (MPA and MS Student, School of Public and Environmental Affairs, Indiana University) Dr. Bradley Lane (Assistant Professor, Institute for Policy and Economic Development, University of Texas at El Paso) Natalie Messer (MPA Student, School of Public and Environmental Affairs, Indiana University) (Transportation Electrification Panel, “Plug-in Electric Vehicles:

A Practical Plan for Progress” School of Public and Environmental Affairs, Indiana University, February 2011, http://www.indiana.edu/~spea/pubs/TEP\_combined.pdf)//ctc

Modernizing the Electric Power System. Even a partial shift from petroleum to electricity as a transportation fuel will have ramifications for the operation and growth of the electric power system. Detailed knowledge of the power grid is required to ensure that outages are avoided. To optimize the benefits of electrification, public policies should be adopted to: • accelerate “smart grid” research, standards, and implementation; • expand the availability of lower electricity prices during off-peak periods to enhance consumers’ willingness to charge their vehicles at night, and include continuous time-of-use pricing adjustments where acceptable; • increase the availability of metering, recharging, and vehicle technologies that will enable these time-of-use adjustments to electricity prices; and • encourage or require enhanced efficiency and the movement toward a cleaner power generation system in order to reduce upstream emissions associated with PEVs in the form of greenhouse gases and conventional pollutants. 8. Long-Term R&D Commitments. Lithium-ion batteries may never have adequate energy density to independently power a household’s primary multi-purpose vehicle. Although there have been significant improvements in battery technology since the 1990s, policymakers should consider a large increase in federal R&D investments into innovative battery chemistries, prototyping, and manufacturing processes. A broader selection of R&D grantees, with even more vigorous competition, is appropriate compared to past practices. Sustained investment in R&D, including both public and private funds, is crucial as the United States seeks to establish a leadership position in the growing global market for advanced battery technologies and related components. The potential spillover benefits in the economy from R&D and manufacturing leadership deserve serious consideration by policymakers, even though public R&D decisions will be made in a troubled federal fiscal situation. In order to determine the appropriate scale of R&D expansion, the expected payoffs from long-term R&D investments in energy storage techniques should be compared to the anticipated payoffs from R&D investments in other advanced fuels and propulsion systems. Countries around the world are jockeying for position in the emerging PEV industry. The time for the United States to secure a leadership position in the global market for PEVs is now. This report provides an expert panel’s view of how the United States can secure this role in a cost-effective manner.

### AT EVs Cause Outages

#### A buffered ultrafast EV charging station solves – tech already exists

Hõimoja et al, 12 - Swiss Federal Institute of Technology Lausanne, Lausanne, Switzerland (H. Hõimoja, A. Rufer, G. Dziechciaruk, and A. Vezzini, “An Ultrafast EV Charging Station Demonstrator”, 2012, International Symposium on Power Electronics, Electrical Drives, Automation and Motion, <http://infoscience.epfl.ch/record/178430/files/REV0073.pdf> | JJ)

Throughout this paper, ultrafast charging issues of an EV were studied and a step-by-step design methodology for a buffered ultrafast EV charging proposed. The research yielded following main results: 1. With ultrafast charging, the EV average speed in long distance driving is improved thanks to less time spent at charging stops. 2. The load, imposed to the grid by ultrafast charging, can be leveled by decoupling the vehicle from the mains by the application of energy buffers. 3. With buffering, the EV can be charged from a 400 V, 32 A low voltage outlet, allowing a charging interval of one EV in less than an hour. 4. If more autonomy should be provided in given time and grid power restrictions, buffer capacity and HPC rating must be increased, which means longer buffering times and charging intervals. 5. The partial use of buffer capacity gives a possibility to exploit the battery more effectively at smaller charging and discharging rates, e.g. for grid support (buffer-to-grid applications). However in this variant, the converters and battery must be designed to operate in wider voltage range. 6. With cost, mass and volume restrictions, the buffer is optimally based on lithium iron phosphate cells. Electrochemical storage, however, is related to additional losses thanks to poorer roundtrip efficiency than i.e. ultracapacitors. The proposed design procedure will be soon implemented on a working demonstrator.

#### Smart charging stations will be used to limit charging to off-peak hours

**Lowenthal, ’10 - CEO Coulomb Technologies (**Richard**,** February 23, Hearing Before a Subcommittee on the Committee on Appropriations, United States Senate, “Opportunities and Challenges Presented in Increasing the Number of Electric Vehicles in the Light Duty Automotive Sector,” <http://www.gpo.gov/fdsys/pkg/CHRG-111shrg56643/pdf/CHRG-111shrg56643.pdf>, p. 83-4) http://www.gpo.gov/fdsys/pkg/CHRG-111shrg56643/pdf/CHRG-111shrg56643.pdf

Question. Will public or other charging stations that are used during peak hours be a problem? Answer. The answer is no, and the reason is simply that it won’t happen enough to matter. First, the vast majority of shared and other charging stations will be Level II (charging at 220 Volts). The power draw from these stations will be man- ageable for the generation and distribution assets in most of the Nation. More im- portantly, however, most people will charge their vehicles at night and when they first get to work. From a systems standpoint, it is also important to note that smart charging sta- tions will have mechanisms that limit charging to off-peak hours. If utilities are able to offer pricing incentives to charge off-peak, very little charging will take place on- peak form shared or private Level II chargers.

#### Current electrical grid has the capacity for ¾ of autos without adding a single plant

Kaplan et al., 10 – \*affiliated with Frontier Group, a think tank that issues issue experts, writers and analysts to produce ideas and research to promote a cleaner environment and a fairer and more democratic society, \*\***Brad Heavner,** B.A. from the University of Michigan, Senior Policy Advisor for Environment America and State Director of Environment Maryland, AND \*\*\*Rob Sargent, graduate of the University of Vermont, Energy Program Director for Environment America and oversees policy and strategy development for energy and global warming campaigns throughout the U.S., more than two decades of experience leading a wide range of environmental and public interest campaigns (Siena, Charging Ahead: Curbing Oil Consumption with Plug-in Cars”, Environment Maryland Research & Policy Center, June 2010, http://www.environmentmaryland.org/sites/environment/files/reports/Charging-Ahead.pdf)//BI

The current electric grid could handle a significant portion of U.S. cars running on electricity, especially if they’re charged at times of the day when electricity demand is low. Even if cars are charged during times of high demand, the gradual introduction of plug-in cars will not put a large strain on our electric system. America’s electric system is designed to supply reliable power under all conditions. That means that the nation must have enough power plants and transmission wires to provide power for the few hours each year—usually during summer heat waves—when electricity consumption peaks. Most of the time, however, there are vast amounts of unused capacity in the system. This extra capacity is enough to fuel 73 percent of the cars, SUVs, pickup trucks and vans in the United States as plug-in hybrids without adding a single additional power plant.25 The times when there is the most extra capacity in the electric system also happen to be the times when most Americans will charge their plug-in vehicles—at night. Utilities could encourage nighttime charging by providing lower, off-peak electric rates during those hours, as some utilities already do. Drivers could also use a controller for their home charger—a “smart charger”—that would start charging the car at the time that rates drop, so they wouldn’t have to worry about what time they plug the car in.26 Lower electric rates would add to the cost savings of electricity versus gasoline as a vehicle fuel.

#### A buffered ultrafast EV charging station solves problems with the grid impact

Hõimoja and Rufer, 12 - Swiss Federal Institute of Technology Lausanne, Lausanne, Switzerland (H. Hõimoja, A. Rufer, “INFRASTRUCTURE ISSUES REGARDING THE ULTRAFAST CHARGING OF ELECTRIC VEHICLES”, 2012, <http://infoscience.epfl.ch/record/175699/files/Hoimoja%20Hardi%20_Infrastructure%20Issues_EPFL_IAMF2012.pdf> | JJ)

The state-of-the-art electric vehicle (EV) charging is limited to the rated current and voltage of conventional household sockets. For continental Europe, where 230 V/400 V phase-to-neutral and phase-to-phase voltages are used with 16 A sockets as standard, recharging an average EV battery takes at least 6 hours from one-phase connection and 2.5 hours if a three-phase connection is available 1 . There exists already a quick-charging method promoted by the CHAdeMO consortium, allowing recharging an EV battery to 80 % of its rated capacity within 20…30 minutes and based on the IEC 61851-23 standard 2,3 On a highway, this yields driving/charging time ratio in the range of 3:1, which is far away from making EV a serious alternative for long distance driving. Transferring energy to an electric vehicle traction battery in as short timeframe as possible requires high power, determined not only by the battery’s capacity and charging time, but also by the inherent losses due to the electrochemistry. From the grid operator’s viewpoint such peaks are undesirable, because they necessitate overdimensioning of cables, power transformers, protection devices etc. The situation becomes even more aggravated if multiple vehicles are charging simultaneously, which brings along the need for a medium voltage connection 4 . A possibility to alleviate the grid impact of the ultrafast charging lies in decoupling load from the grid. This can be done with the implementation of energy storage elements, which act as a buffer between the grid and the charging terminal 5 . A similar approach has been recently implemented in the fast charge of compressed air propelled vehicles 6 . Several energy storage media are further evaluated in terms of performance and costs and an optimal solution proposed. Finally, a buffered ultrafast EV charging station structure is proposed. Such a station is composed of several modules, comprising in connection ports for the utility grid, EV, storage medium and a common power bus. The modular architecture ensures extensibility if the station’s utilisation grows, i.e. the EV market share increases.

#### **EVs will not cause grid outages – utilities are prepared**

Motavalli, 7/8 – Journalist and book author focused on the environment, writer for The New York Times, the Mother Nature Network, The Daily Green, senior writer and past editor of E: the Environmental Magazine, member of the Society for Environmental Journalists (Jim, “Will Electric Cars Cause More Summer Power Outages?,” New York Times, July 8 2012, http://wheels.blogs.nytimes.com/2010/07/08/will-electric-cars-cause-more-summer-power-outages/) // AMG

Phil Gott, managing director of automotive consulting for IHS Automotive and the author of reports on E.V. adoption, said it’s likely that utilities will “see the added load coming and will add capacity where necessary.” But, he added, “If they elect not to take it seriously, then yes, we’ll have issues.” Con Ed, which has called some New York customers during the heat wave and asked them to voluntarily turn off nonessential appliances, says it’s not worried about the coming E.V. load. “We don’t foresee a problem because of the small number of vehicles expected over the next few years,” said Sara Banda, a Con Ed spokeswoman. Ms. Banda noted that 3,535 Con Ed customers (of over three million) in the five boroughs and Westchester County were without power early on Wednesday afternoon. She said the company has pilot programs under way to “better understand how charging patterns will impact our system in the future.” She pointed to an 18-month program in Queens that was, among other things, evaluating E.V. chargers and said that Con Edison re-evaluated its estimate of electric load annually.

#### EVs will not harm the grid – even dumb grids can prevent overcharging

Motavalli, 7/8 – Journalist and book author focused on the environment, writer for The New York Times, the Mother Nature Network, The Daily Green, senior writer and past editor of E: the Environmental Magazine, member of the Society for Environmental Journalists (Jim, “Will Electric Cars Cause More Summer Power Outages?,” New York Times, July 8 2012, http://wheels.blogs.nytimes.com/2010/07/08/will-electric-cars-cause-more-summer-power-outages/) // AMG

A January 2010 report for Mayor Michael Bloomberg’s PlaNYC estimates that New York could have tens of thousands of electric vehicles (including plug-in hybrids) by 2015. These include the electric drive Smart and the Chevrolet Volt, both of which have recently announced that New York will be among their early markets. The PlaNYC report concludes that the expected adoption rate “should not threaten the stability of the electric grid as long as most chargers are ‘smart,” allowing charging to take place during off-peak hours.” That’s by no means assured, however, because high-tech smart grids are still embryonic in many areas. One solution, proposed by energy companies, such as DTE Energy in southeastern Michigan, is to encourage electric car owners to charge at night. Scott Simons, a spokesman for DTE Energy, said the utility was developing an incentive to offer one-third price reduction during off-peak hours. Branko Terzic, a former commissioner at the Federal Energy Regulatory Commission who is regulatory policy leader in energy and resources at Deloitte, said that such time-of-day rates can be put into effect even with “a dumb grid.” He said that some utilities had delayed making smart grid improvements because they were a capital cost with benefits in the future.

### EVs Stabilize/Generate Grid Power

#### EVs also independently help stabilize the peak-and-valley cycles that utilities face

**Kelly, ’10 – Dr.** (Henry, February 23, Hearing Before a Subcommittee on the Committee on Approprioations, United States Senate, “Opportunities and Challenges Presented in Increasing the Number of Electric Vehicles in the Light Duty Automotive Sector,”

<http://www.gpo.gov/fdsys/pkg/CHRG-111shrg56643/pdf/CHRG-111shrg56643.pdf>, p. 76)

INTEGRATIONINTOTHEELECTRICGRID

Question. There is general agreement that the existing power grid could accommo-

date a large number of electric vehicles. Utilities would only need to proceed with

planned updates to the grid, which are not specific to the vehicles. Additional de-

mand by electric vehicles could help to stabilize the peak-and-valley cycles that utili-

ties face. This assumes, however, that electric vehicles are charged at night and not

when demand for electricity peaks.

How important is it that PHEVs are charged at night?

### AT Morrisey

#### Morrisey is wrong – EVs help in grid outages by providing backup power supply

Oremus, 7/2 – Slate Magazine Staff Writer (Will, “Are Power Outages an Argument Against Electric Cars?,” Slate, July 2 2012, http://www.slate.com/blogs/future\_tense/2012/07/02/power\_outages\_an\_argument\_against\_electric\_cars\_.html) // AMG

I’m not sure where Morrissey is getting his numbers on how far an electric car will take you on a single charge. The Nissan Leaf’s range is estimated at 73 miles, not 30, and some versions of Tesla’s new Model S are advertised at 300 miles—about the same as a tank of gas. Those quibbles aside, Morrissey has a point—sort of. He’s right that today’s electric cars won’t get you as far as gasoline-powered vehicles if the power goes out. And he’s right, in a very broad sense, that energy diversity is a good thing in case of emergencies. But he ignores one obvious fact and overlooks another, less obvious one. In arguing against an electric-car hegemony, he ignores the plain fact that plug-in electric cars make up less than one-tenth of 1 percent of today’s total U.S. market. Multiply that figure by 100 and you’ll have more energy diversity, not less. Among those few households that already have an electric car, it’s a safe bet that most have a hybrid or gas-powered car as well. If Morrissey or anyone else can point me to a single, non-hypothetical household that has only electric vehicles and is now marooned in the outage area, I will gladly post an update here. The less obvious point that Morrissey misses is that electric cars may have their own virtues in an electrical outage. Nissan has introduced a device in Japan that can actually turn the Leaf into a short-term backup power supply for your home. The Leaf reportedly stores enough power to supply an average Japanese home for about two days. While the average American home would surely drain the car a lot faster, electric vehicle owners could at least keep the lights on longer than their neighbors.

## SOLVENCY EXTENSIONS

### Charging Infrastructure/Range Anxiety Key

#### Charging infrastructure is key to addressing EV’s chicken-and-egg problem – federal incentive needs to not only be extended but improved

**Lowenthal, ’10 – CEO Coulomb Technologies (**February 23, Hearing Before a Subcommittee on the Committee on Appropriations, United States Senate, “Opportunities and Challenges Presented in Increasing the Number of Electric Vehicles in the Light Duty Automotive Sector,”

<http://www.gpo.gov/fdsys/pkg/CHRG-111shrg56643/pdf/CHRG-111shrg56643.pdf>, p. 33)

Our company has faced the classic chicken-and-egg problem.

Consumers will not adopt electric drive technology if they’re not

confident in their ability to refuel. At the same time, there is little

incentive for companies to install charging infrastructure before

cars arrive.

The Federal Government can, and is, playing an important role

as it considers stimulus spending and other financial incentives to

assist this nascent market for electric vehicle charging infrastruc-

ture. And so, I recommend that—public investment in EV infra-

structure that creates jobs and addresses this chicken-and-egg

problem.

Next, currently there’s a 50-percent tax credit available for

charging-infrastructure installations, which expires at the end of

this year. We would like to see that extended. The time—the vehi-

cles have not rolled out yet, and it would be very helpful for that

to be extended, and, in addition, for it to be improved.

#### **Charging infrastructure, not battery costs, is the major challenge to EVs – MIT panel concludes**

Behr, ‘11 (Peter, Scientific American, January 11, “MIT Panel Says Charging Infrastructure May Be a Bigger Roadblock for Electric Vehicles than Technology,” <http://www.scientificamerican.com/article.cfm?id=mit-panel-electric-vehicles&page=2>)

A Massachusetts Institute of Technology report, issued yesterday, concludes that creating a nationwide infrastructure for electric vehicles appears to be a bigger challenge than producing affordable batteries to power the cars.

The report, authored by professors Ernest Moniz and John Deutch, summarizes an MIT symposium last year on the electric vehicle.

Symposium participants generally agreed that a comprehensive federal policy to limit carbon emissions would be the most effective boost for electric vehicle development, stimulating steadily growing consumer purchases and moving the United States toward low-carbon or carbon-free generation of electricity to charge the cars.

But the summary pessimistically concludes: "The prospect for such a policy at the national level is remote. More likely, is a hodge-podge of state and federal regulation and targeted subsidies for favored technologies."

Leaving the matter to separate states "is sheer lunacy," but that is where the matter is headed, Deutch said.

"We need to continue aggressive R&D on these areas," he said. There was consensus on that point, as well, at the symposium, although the participants differed on how much government support should go to pure research versus manufacturing operations with current technologies.

Moniz said he came away from the study more hopeful about the prospects of research breakthroughs that could lower battery costs significantly. "The infrastructure issues were far more complex that I realized," he added. He and Deutch said that the summary released yesterday reflected their own conclusions and was not offered as a consensus view of the symposium participants.

**Seeking a magic combination of gas prices and research dollars**

The infrastructure challenges include installing tens of millions of charging stations at residences and commercial sites, strengthening the grid to handle electricity demand by plug-in vehicles, and changing utility regulations to promote nighttime recharging. Looming over these issues are the unsettled questions of who pays for the new infrastructure and who decides who pays, panel members said.

The summary takes a cautious view of the prospects for advanced batteries that would bring electric vehicle costs in line with internal combustion engines. It concludes that a "rough rule of thumb" is that battery costs must drop from $600 to about $300 per kilowatt-hour to compete against an internal combustion-engine vehicle burning gasoline at $3.50 a gallon.

"It is worth noting that there has been considerable support for battery research and development (R&D) by industry and government both in the U.S. and elsewhere for many years without the kind of major advance that would make EVs economically competitive," the summary says.

Yet-Ming Chiang, one of the MIT professors presenting the report, said the outlook is not so grim. Predicted prices and performance measures for electric vehicle batteries are improving faster than predicted a few years ago. The number of scientists working on the technology has tripled in a decade, he added. "I saw more grounds for optimism about future progress in battery technology," he said.

#### Range anxiety hinders EVs – research proves ports solve

**Lowenthal, ’10 – CEO Coulomb Technologies (**February 23, Hearing Before a Subcommittee on the Committee on Appropriations, United States Senate, “Opportunities and Challenges Presented in Increasing the Number of Electric Vehicles in the Light Duty Automotive Sector,”

<http://www.gpo.gov/fdsys/pkg/CHRG-111shrg56643/pdf/CHRG-111shrg56643.pdf>, p. 32)

Drivers are accustomed to being able to fill up using the ubiquitous

gasoline infrastructure developed over the last 100 years. Insuffi-

cient public charging opportunities will generate hesitancy and

could hinder the adoption of electric vehicles. Studies show that 80

percent of EV owners will want to charge the cars more than once

a day.

Range anxiety on the part of consumers remains a substantial

challenge for EV adoption. People are afraid that their vehicle will

be incapable of traveling the long distances required or that they

will be unable to get the necessary recharge along the way. Despite

the fact that data on consumer habits shows that drivers rarely

travel long distances, when asked their opinions, they express

unease over range. Early research supports the conclusion that re-

liable access to public charging infrastructure diminishes this anx-

iety.

The first mass-produced, fully-electric vehicles in the U.S. mar-

kets will have an all-electric range of approximately 100 miles.

With these vehicles, when the battery is depleted, it must be re-

charged before the vehicle can be driven again. Consumers are un-

likely to purchase a vehicle unless they have confidence that it can

be conveniently refueled.

#### Range anxiety is the major barrier to EV market penetration

**Lee and Lovellette ’11** - Jassim M. Jaidah Family Director of the Environment and Natural Resources Program within the Belfer Center for Science and International Affairs at Harvard's John F. Kennedy School of Government, Faculty Co-Chair of the Center's Energy Technology Innovation Policy project, and a Senior Lecturer in Public Policy, Belfer Center for Science and International Affairs, Harvard Kennedy School, Harvard University (Henry and Grant, “Will Electric Cars Transform the U.S. Vehicle Market”, July 2011. http://belfercenter.ksg.harvard.edu/files/Lee%20Lovellette%20Electric%20Vehicles%20DP%202011%20web.pdf)//DHirsch

Consumers purchase cars based on how they value multiple attributes. They care about performance, aesthetics, reliability, and many other features. Cost is an important consideration, but not the only one. Electric vehicle manufacturers have worked hard to ensure that electric cars are comparable over a wide range of attributes, but BEVs are plagued by limited range (the number of miles they can be driven before they need to be recharged), and consumers remain worried about the reliability of both BEVs and PHEVs relative to conventional vehicles. The latter problem will gradually disappear as motorists become more accustomed to electric cars, but range anxiety is likely to remain until battery technology improves. One can argue that such anxiety is irrational, since urban drivers, on average, drive less than 20 miles per day, but no one has ever asserted that consumers base their car purchases solely on rational calculations. One might contend that the value of greater range is (approximately) the $4,000 price premium consumers will pay for a PHEV over a BEV, according to our model. Regardless, the bottom line is that the range issue will significantly affect consumer choice and is a major barrier to the penetration of electric vehicles.

#### Expanding EV infrastructure solves the chicken-and-egg problem

**Heron 11** – journalist, author, online community manager, etc., covering electric vehicles from Silicon Valley (David, “Electric Vehicle charging station tax credits a victim of US Govt budget battles”, Torque News, 29 Dec 2011, http://www.torquenews.com/1075/electric-vehicle-charging-station-tax-credits-victim-us-govt-budget-battles)//BI

Electric cars are at a disadvantage versus gasoline cars, because the gasoline recharging infrastructure is already in place. That business, the gasoline recharging infrastructure, is mature and as ubiquitous as the corner gas station. Electric cars need a similar infrastructure to be built and there is a long-recognized chicken-and-egg sort of situation. On the one hand prospective EV infrastructure owners want to see customers before investing in charging stations, and on the other hand prospective EV owners want to see charging stations or else they might feel anxious about their driving range. Who blinks first, do prospective EV owners buy cars trusting the infrastructure will be built first, or do the prospective business owners invest in a charging infrastructure that may go unused? The EV charger tax credit is a way to seed some charging stations into cities giving prospective EV owners places to charge. It costs a couple hundred dollars per electric car that's sold, plus a couple hundred dollars for each additional installed EVSE. The total cost is barely an asterisk on a blip in the Federal Budget. The tax credit for EV conversions has gone to support both 3rd party Plug-in Prius conversions, and 3rd party electric car conversions. The number of these conversions are small, but the EV conversion market in part kept the dream of electric vehicles alive in the U.S. In particular the Plug-in Hybrid concept was popularized by activists who developed open source plans for the Plug-in Prius conversion, and then paraded their Plug-in Prius conversions in front of any political leader or news outlet they could find. The totals here are also small, in the asterisk on a blip category. The last tax credit covers purchases of two- and three- wheeled electric vehicles, as well as the Neighborhood Electric Vehicles. The electric three-wheeler market lost two companies in 2011 (Aptera and Green Vehicles) but there are several other companies still planning to sell electric three-wheelers, including ZAP and Arcimoto. The worldwide electric motorcycle market is expanding rapidly. The two biggest electric motorcycle manufacturers worldwide are American companies, Brammo and Zero Motorcycles, each with domestic and world-wide sales organizations. In part each of these credits represents new jobs and businesses which could exist, as well as supporting electric vehicle adoption. There are businesses involved with each of these areas whose future will be affected by the existence of these tax credits. Among the documents we obtained while researching this issue is a December 7 letter from a couple dozen Senators to the Senate leadership, concerning the tax extenders package. This letter included a story relating what happened in 2010 when the biodiesel production tax credit expired. Even though that tax credit was reinstated (retroactively) a few months later, biofuel production dropped radically and dozens of companies went out of business putting thousands of people out of work. With the tax credit in place again biodiesel production more than doubled, supported more than 31,000 jobs and generated at least $3 billion in GDP economic activity, resulting in $628 million in federal, state, and local tax revenues. For what it's worth, there are both biodiesel and ethanol tax credits also expiring on Saturday. A widespread EV charging infrastructure makes electric cars more useful and valuable making them more likely to be purchased. Think of all the parking lots where charging stations could be installed, and this starts to explain the scale of the businesses waiting to be birthed as electric vehicles become commonplace in the coming years. The battle is now on to get these tax credits reinstated with the deadline being the two month extension granted to the payroll tax cut.

### Charging Stations Solve Range Anxiety

#### 1 to 1.4 stations per 100 EVs solves range anxiety – studies prove

Ralston and Nigro, 11 - Center for Climate and Energy Solutions (Monica and Nick, “PLUG-IN ELECTRIC VEHICLES: LITERATURE REVIEW”, Center for Climate and Energy Solutions, July 2011, <http://www.c2es.orgwww.c2es.org/docUploads/PEV-Literature-Review.pdf> | JJ)

The installation of public charging infrastructure can also help reduce range concerns and spur BEV sales. The amount of public charging infrastructure needed, however, is still unknown. A trial program by the Tokyo Electric Power Company (TEPCO) suggests that even with minimal fast-charging infrastructure, BEV drivers become more comfortable driving further and approaching their maximum range (Aoki 2010). Some public and private stakeholders believe a thorough network of public charging infrastructure is necessary to overcome range anxiety while one study predicts that as few as one public charging station per 100 PEVs would be sufficient. In that case, the majority of PEV charging would take place at private residences (Benecchi, et al. 2010). In a different study, General Electric estimates that 1.4 public and private charging stations are desirable for each PEV (General Electric 2011).

### EV Chargers Lead to Market Penetration

#### Expanding the availability of EV chargers is key to encouraging automakers to embrace EV technology

**Grove ‘8** – Senior Advisor of Intel Corporation (Andy, “Our Electric Future”, The American, July/August 2008. http://www.american.com/archive/2008/july-august-magazine-contents/our-electric-future)// DHirsch

This conversion will not be easy. It requires substantial growth in generation capacity as well as in the capacity and reach of the transmission infrastructure. Most importantly, it requires that vehicles be able to run on electric power.

This is a very difficult technical task. With the size and weight of ordinary automobiles, current technology allows electric cars to run only 100 miles or so before their batteries need to be recharged—the way we recharge our laptop computers or cell phones, by plugging them into the national electric grid. Many drivers can live with this limitation most of the time, but few will find the condition satisfactory all of the time. Still, the capabilities that we have today can get us off to a good start.

New technology often shows up in this manner: it is not completely satisfactory in the beginning, but good enough to get going. The first personal computers, for example, were little more than toys. They fascinated cognoscenti and hobbyists, but compared to the mainframe computers that were the workhorses of that time, they were limited. PCs quickly grew in capability and eventually reached parity with mainframes and then surpassed them in efficiency and computing power. Such approaches, of starting low and moving up, have been named “disruptive technologies.”

The automobile industry, in the main, has not embraced disruptive technology. It has been waiting instead for batteries to improve until they can allow electric cars to enter the marketplace with the same driving range as gasoline-fueled cars. Battery developers, in turn, have been waiting for demand from the automobile industry to develop before fully committing the resources required to do the job. The generation and transmission infrastructures have not been built up to service the potentially explosive demand from transportation. The wait has gone on for some time.

#### Deploying charging infrastructure is key to EV market penetration

MIT Energy Initiative Symposium, ’10 (April 8, “Electrification of the Transportation System,” <http://web.mit.edu/mitei/docs/reports/electrification-transportation-system.pdf>, p. 4)

Infrastructure and consumer acceptance. All participants agreed that successful penetration of EVs into the transportation market requires consumer acceptance and infrastructure change as well as achieving competitive cost. Important insight into consumer acceptance will come from the market reaction to EVs that are now or soon to be introduced: the PHEV Chevy Volt, the BEV Nissan LEAF, and the BEV Tesla roadster. Consumer reaction to cost, charging time, and range will help point the way forward. Successful EV market penetration also requires adaption by the electricity system in three ways: (1) assuring there is adequate generation capacity to meet new demand for transportation and understanding the carbon emission characteristics of the incremental generation capacity, (2) enabling the transmission and distribution system to adjust to changes in demand from the transportation system, e.g., by charging EVs using off-peak electricity generation, and (3) developing and deploying an accessible charging infrastructure. Deploying a charging infrastructure and associated electric vehicle supply equipment (EVSE) is perhaps the most important consideration because of the large number of issues that need to be addressed: the distribution, extent, and standardization of charging stations, setting limits for charging time and access rules, as well as regulatory procedures and policies for commercial firms in the distribution market. Evidently, deciding who pays for the charging infrastructure — the public, utilities, or EV users — and regulating the price for charging vehicles at residences or central stations is key. The role of various jurisdictions — municipalities, state public utility commissions, and the federal government — needs to be defined as well as how state department of motor vehicles (DMVs) will inspect EVs.

### Fast-Charging Infrastructure Coming

#### R&D will create fast-charging technology – federal funds have already made significant gains with batteries

US DOE Website, 3/7/12 (“President Obama Launches EV-Everywhere Challenge as Part of Energy Department’s Clean Energy Grand Challenges”, ENERGY.GOV, 3/7/2012, http://energy.gov/articles/president-obama-launches-ev-everywhere-challenge-part-energy-department-s-clean-energy)//EW

Mt. Holly, N.C. – At an event today at the Daimler Truck factory in Mt. Holly, N.C., President Obama launched EV-Everywhere, the second in a series of Energy Department “Clean Energy Grand Challenges” aimed at addressing the most pressing energy challenges of our time. The EV Everywhere Challenge will bring together America’s best and brightest scientists, engineers, and businesses to work collaboratively to make electric vehicles more affordable and convenient to own and drive than today’s gasoline-powered vehicles within the next 10 years. Today’s announcement is part of President Obama’s all-of-the-above approach energy strategy to protect American consumers from high gas prices over the long-term by offering consumers cost-effective alternatives to gasoline-powered vehicles and helping to reduce the country’s dependence on foreign oil. “The Energy Department’s Clean Energy Grand Challenges will engage America’s scientists, engineers and young people to solve some of the nation’s biggest energy challenges and make clean energy technologies affordable and accessible to the vast majority of American families and businesses,” said Secretary Chu. “The EV-Everywhere Challenge is focused on advancing electric vehicle technologies and continuing to reduce costs, so that a decade from now, electric vehicles will be more affordable and convenient to own than today’s gasoline-powered vehicles.” Electric vehicles can offer consumers significant advantages over gasoline-powered vehicles, including savings on fuel costs, added convenience, and reduced maintenance costs. Electricity is cheaper than gasoline to power a vehicle – generally equivalent to less than $1 per gallon – and consumers are able to conveniently fuel up at home. Electric vehicles can also be more reliable, require less maintenance, and offer the same or better driving performance compared to today’s gasoline-powered vehicles. And winning the EV-Everywhere Challenge will put the U.S. in the lead to manufacture and export the next generation of advanced electric vehicles and electric vehicle components, creating good paying manufacturing jobs and stimulating the American economy. American automakers and automotive suppliers are currently pioneering the way forward in getting the first wave of electric vehicles into the hands of a significant number of U.S. drivers. But today, the prices of these cars are still out of reach for the majority of American families. This Department-wide initiative, which will bring together DOE’s Office of Energy Efficiency & Renewable Energy’s Vehicle Technologies Program, the Office of Science, and ARPA-E, will aim to make electric vehicles affordable to the average American family by specifically targeting dramatic technological and cost improvements in batteries, electric motors, power electronics, light-weight structures, and fast charging technology. The aggressive goal of this initiative is, by the year 2022, to enable companies in the United States to be the first in the world to produce a 5-passenger affordable American electric vehicle with a payback time of less than 5 years and sufficient range and fast-charging ability to enable average Americans everywhere to meet their daily transportation needs more conveniently and at lower cost. The Challenge will involve working with industry, universities, our national laboratories and government partners to set technical goals for cutting costs for the batteries and electric drivetrain systems, including motors and power electronics, reducing the vehicle weights while maintaining safety, and increasing fast-charge rates. As part of this process and to inspire and recruit the best and brightest American scientists, engineers, and businesses to tackle this electric vehicle grand challenge Secretary Chu and the Department of Energy will be organizing a series of EV-EVerywhere Challenge workshops across the country over the next few months. With support from the Energy Department, private industry and DOE’s national laboratories have already achieved significant advances in electric vehicle and advanced battery technologies, reducing costs and improving performance significantly from even a few years before. For example, one of the Department’s grantees, Envia Systems, announced last week at the ARPA-E Energy Innovation Summit that they have achieved a major breakthrough in battery R&D: doubling the energy density for lithium-ion batteries and setting the world record for energy density in rechargeable lithium-ion batteries. The breakthrough could result in a 50 percent reduction in the price of the battery on a 300-mile range electric vehicle, and came several years ahead of initial projections. The EV-Everywhere Challenge is the second of the Energy Department’s Grand Challenges, following the model of the $1/watt SunShot Challenge, which seeks to make solar power directly cost-competitive with electricity from fossil fuels by the end of the decade. Over the next few months, the Department of Energy will announce a series of additional Grand Challenges, each focused on pursuing technical innovations and reductions in cost that will enable clean energy technologies to compete directly, without subsidies, with the energy technologies that are currently in wide use today.

### Cost Competitive/Consumers Will Buy

#### Consumers will buy EVs – just a matter of prices coming down with mass production

**Smith, ’10 - FedEx CEO/Member of Electrification Coalition (**Frederick, February 23, Hearing Before a Subcommittee on the Committee on Appropriations, United States Senate, “Opportunities and Challenges Presented in Increasing the Number of Electric Vehicles in the Light Duty Automotive Sector,”

<http://www.gpo.gov/fdsys/pkg/CHRG-111shrg56643/pdf/CHRG-111shrg56643.pdf>, p. 24)

Mr. SMITH. Well, Senator, we operate over 70,000 vehicles, so we have a keen appreciation for the exact point that you’re making. That’s why, in my summary of my testimony, I tried to focus on the productivity improvements inherent in electrification. Your chart, that showed the significant percentage of U.S. automotive trips being less than 40 miles, mean that this concern about run- ning out of electrical power should not be the case for the vast ma- jority of people in the vast majority of instances. And I don’t think that you’ll see the country convert completely to electric vehicles, any more than aviation has done away with turbo props in the era of the Jet Age. But, when you start talking about productivity numbers of per-mile cost with a grid-enabled ve- hicles of 21⁄2 cents a mile versus 10 cents a mile for an internal combustion powerplant over the course of the lifetime of that vehi- cle, that’s about a $10,000 savings. So, really the issue, I think, is getting the charging stations out. And people, I don’t think, should be intimidated by that. Fifteen years ago, I don’t think many of us were equipped with one of these devices, which has, obviously, electrical power. We monitor it with a little gauge up here. We clearly know when we have to plug it in to stay in communication, and so forth. And I think this whole psychology of electrical power has been not only held by the lith- ium-ion battery development because of telecommunications and information technology, it’s also been a psychological thing where people feel pretty comfortable with electrical power because it pow- ers so much of our life. So, I think if you can get these things into scale production where the costs come down, I believe consumers will adopt them, you know, for a lot of their utilization, contrary to a lot of the naysayers. I don’t think that today that’s a problem.

#### Consumers will use EVs – empirically beat a path to a technological door with advantages – cell phone use proves

**Smith, ’10 - FedEx CEO/Member of Electrification Coalition (**Frederick, February 23, Hearing Before a Subcommittee on the Committee on Appropriations, United States Senate, “Opportunities and Challenges Presented in Increasing the Number of Electric Vehicles in the Light Duty Automotive Sector,” <http://www.gpo.gov/fdsys/pkg/CHRG-111shrg56643/pdf/CHRG-111shrg56643.pdf>, p. 24)

Senator DORGAN. Well, a couple of things. No. 1, I think con- sumers will beat a path to the door behind which they believe are advantages. So, the cell phone you held up, you know, 15 years ago I think there were some cell phones, but they were the size of a small shoe box, and heavier. And I think the point you made ear- lier about ramping up from $38 to $147 in day trading, with the price of oil run by speculators who have made money on the way up and money on the way down, leaves consumers very uneasy. I think once we have a circumstance with the product, the infra- structure, and understanding that there’s an inherent advantage for consumers and for the country, my guess is that this country is going to move very quickly to it. The new technologies have persuaded consumers to move very quickly when they think it’s in their advantage or when they think it offers something to them that is new and better.

#### Lowering charging costs will make EVs more cost competitive

Bailey et al 11 (Rick Bailey, Brenda Howell, Zachary Stanko, “Electric Cars as a Widespread Means of Transportation”

Humboldt State University, 2011, <http://eaton.math.rpi.edu/Faculty/Kramer/MCM/2011mcmsolutions.pdf#page=76>, HLR)

The cost of fuel (gasoline and electricity) can be represented in the growth model via the competition parameters. If gasoline prices rise, electric cars become more competitive; if the cost of electricity rises, gasoline cars become more competitive. A larger investment in charging or battery swap stations, charging ports in public parking facilities, and research to improve technology should result in a greater inﬂux of BEVs. Battery technology has been improving rapidly. Prices, life cycles,range, and efﬁciencies of batteries will dictate the strength of the BEV population.

#### **Federal investment in EV chargers increases commercial feasibility and decreases consumer cost**

Rubenstein 12 (Dana, Staff Writer, “With State-funded Charging Stations, Cuomo Gives Electric Cars a Modest Push Toward Critical Mass”, Capital, <http://www.capitalnewyork.com/article/politics/2012/06/6007375/state-funded-charging-stations-cuomo-gives-electric-cars-modest-pus>, LCS)

Governor Andrew Cuomo and the federal government [recently took a small step toward making electric-car ownership in New York less frightening](http://www.governor.ny.gov/press/06062012Charging-Stations), and more feasible, with the funding of 325 new electric-vehicle charging stations statewide. That’s not a huge number. California has more than 1,200, according to the San-Francisco-based charger manufacturer ECOtality. So does [Paris](http://www.guardian.co.uk/environment/2011/dec/07/electric-car-rental-paris-autolib). Nor, at an initial outlay of $4.4 million, is it a particularly large public commitment. But it does represent the sort of infrastructure investment that’s going to be necessary to popularize electric cars, or at least make them more commercially feasible for manufacturers and, in turn, cheaper for consumers. That's particularly true in the northeast, where electric cars have been slower to catch on than in what Colin Read, ECOtality's vice president for corporate development, calls the "Birkenstock Belt," from Oregon down the west coast to California, and then east through Texas to Florida. ECOtality won more than $100 million in federal grants to manage [the EV Project,](http://www.theevproject.com/overview.php) which is deploying more than 12,000 chargers nationwide, none planned for New York."The more chargers you put out there, the more comfortable people are with driving their vehicles longer range," said Read. But, he also said, "In reality we need cars on the road to justify putting chargers out there." Today, most electric cars come with home charging stations. But their range is, obviously, limited, and most require more than six hours to recharge.

#### EVs can be cost competitive – grid and vehicle tech needs to come to fruition at the same time

**Smith, ’10 - FedEx CEO/Member of Electrification Coalition (**Frederick, February 23, Hearing Before a Subcommittee on the Committee on Appropriations, United States Senate, “Opportunities and Challenges Presented in Increasing the Number of Electric Vehicles in the Light Duty Automotive Sector,”

<http://www.gpo.gov/fdsys/pkg/CHRG-111shrg56643/pdf/CHRG-111shrg56643.pdf>, p. 29-30)

So, the issue is not that these vehicles can’t be cost effective; it’s not like wind power, where we just don’t know how to make wind power that is competitive with coal power, nuclear power, natural gas power, hydroelectric power. This technology is cheaper than the technology it replaces on an operating basis. So, it’s the upfront capital costs. And so, the number-one thing is to drive the economies of scale. And our recommendations in that report is to concentrate the ef- forts in a few areas so that you have the vehicle technology and the grid technology coming to fruition at the same time—that’s one thing—and to continue to demonstrate the benefits of the tech- nology by deploying a lot of these vehicles in a few locations, where it becomes obvious to people that these economics are correct. And I believe, based on my experience in—and again—I hate to keep going back to aviation, because—but it’s very similar, in many ways. There were so many things that, when they first came out, the production cost of them, relative to the technology that they re- placed, was very, very high. But, after they began to be adopted, they became quite cheap. And in aviation, as you know, the Gov- ernment subsidized aviation for many years through airmail con- tracts, because there simply was no airplane that could earn its own way. And then Donald Douglas built the DC–3, and the DC– 3 was the first airplane that could make money carrying pas- sengers and a little bit of air express. And World War II came along, and they produced thousands of them, and we were literally off to the races, in terms of modern aviation standing on its own. So, this technology has a return on investment right now. It’s simply that people—unlike a business, if the car costs more to buy, they don’t look at the net present value of that $10,000 of savings. So, you’ve got to drive the production costs down so they can have their cake and eat it, too. They can have comparable acquisition costs and less operating costs, both.

#### Surveys show the public is willing to consider buying EVs

Ralston and Nigro, 11 - Center for Climate and Energy Solutions (Monica and Nick, “PLUG-IN ELECTRIC VEHICLES: LITERATURE REVIEW”, Center for Climate and Energy Solutions, July 2011, <http://www.c2es.orgwww.c2es.org/docUploads/PEV-Literature-Review.pdf> | JJ)

A recent survey conducted by Deloitte Global Services found there is considerable interest in PEVs from consumers, as 12 percent of respondents in the United States identified themselves as “potential first movers,” and another 42 percent as “might be willing to consider.” Further, a recent survey by Accenture found 57 percent of Americans would consider purchasing a PEV for their next vehicle (Accenture 2011). However, potential consumers also have high expectations regarding price, range, and charging time, which are not met by PEVs on the market today (Deloitte 2011).

### Charger R&D Solvency

#### More federal funding is needed to accelerate R&D in plug-in technology

Kaplan et al., 10 – \*affiliated with Frontier Group, a think tank that issues issue experts, writers and analysts to produce ideas and research to promote a cleaner environment and a fairer and more democratic society, \*\***Brad Heavner,** B.A. from the University of Michigan, Senior Policy Advisor for Environment America and State Director of Environment Maryland, AND \*\*\*Rob Sargent, graduate of the University of Vermont, Energy Program Director for Environment America and oversees policy and strategy development for energy and global warming campaigns throughout the U.S., more than two decades of experience leading a wide range of environmental and public interest campaigns (Siena, Charging Ahead: Curbing Oil Consumption with Plug-in Cars”, Environment Maryland Research & Policy Center, June 2010, http://www.environmentmaryland.org/sites/environment/files/reports/Charging-Ahead.pdf)//BI

States and the federal government should encourage research and development for plug-in cars, while making sure that these incentives are tied to achieving the goal of getting plug-in cars on the road. Recent years have seen tremendous improvement in battery technology, but further research on advanced batteries is needed. The American Recovery and Reinvestment Bill included $2 billion in funding for advanced battery research for plug-in vehicles, and $400 million to encourage electric vehicle development.71 This funding will accelerate improvements in plug-in technology, but there are still other areas of battery research that are underfunded, such as more basic battery research on new battery materials.72 States and the federal government should continue to support battery and other plug-in vehicle technology development. At the same time, any direct government subsidies to the automobile industry should be tied to the achievement of specific benchmarks to ensure that funding is used to bring environmentally preferable vehicles to consumers.

### AT Companies Won’t Build

#### Many companies are interested in developing charging stations – networking and innovation opportunities

Ralston and Nigro, 11 - Center for Climate and Energy Solutions (Monica and Nick, “PLUG-IN ELECTRIC VEHICLES: LITERATURE REVIEW”, Center for Climate and Energy Solutions, July 2011, <http://www.c2es.orgwww.c2es.org/docUploads/PEV-Literature-Review.pdf> | JJ)

Several private sector companies are turning the obstacles facing PEV integration into opportunities, by developing new business models and forming strategic partnerships. These stakeholders are aiming to capture the emerging market, and include auto manufacturers, charging infrastructure providers, power companies, utilities, and third-party investors. Many of these efforts focus on creating a network of accessible charging stations and making charging simple and inexpensive for consumers. One of greatest opportunities in the PEV market is the provision of charging infrastructure. The supply chain for charging infrastructure is vast, including hardware (e.g., PEV supply equipment), software to manage PEV charging, and support services (e.g., electrical grid infrastructure maintenance) (Narich et al. 2011). This mingling of new and traditional businesses is a great opportunity for innovation, similar to the opportunities the Internet provided a decade ago, if at a smaller scale. Companies are currently implementing different business models involving charging networks and/or battery-switch stations. 19 Together, they have raised hundreds of millions of dollars in private capital to realize those visions. In some cases, companies have proposed owning the battery inside the PEV, 20 and in others, the company will install the charging station in a customer’s home at no cost, but may charge the customer for the electricity.

#### Big and large companies are jumping on the charging installation bandwagon

**Rubio ’12** – writer for Digital Journal (R. Francis, Digital Journal, “Charging stations increase in U.S. as electric car sales struggle”, 5/27/2012. http://digitaljournal.com/article/321927)//DHirsch

Meanwhile elsewhere across the United States, [The Wall Street Journal reports](http://online.wsj.com/article/SB10001424052970203405504576599060894172004.html) that many other companies are getting into the act.

Car Charging Group Inc. based out of Miami is beginning to assemble their own nationwide network of charging facilities with plans to install stations in retail-store lots and parking garages around the country.

The Miami based company wants to strike fast in hopes to lock up prime locations while the pickings are still ripe.

"The business that we're in today is a land grab*,"* says CEO Michael Farkas

Other companies such as Walgreen's and Cracker Barrel are also jumping on the bandwagon. Walgreen's already has stations at four of its Texas stores with plans to install even more in San Francisco, Orlando, FL and Washington D.C. and Cracker Barrel is expecting to upgrade some of its Tennessee restaurants within months.

Also, it's not just the big boys trying to catch the worm. The WSJ interviewed a McDonald's franchisee owner by the name of Tom Wolf. Mr. Wolf recently installed two chargers at his newest restaurant in Huntington, W. Virginia.

### AT Battery Costs High

#### Battery costs have already been significantly reduced and additional R&D will bring down costs even further

SPEA 11 - School of Public and Environmental Affairs at Indiana University (“Plug-in Electric Vehicles: A Practical Plan for Progress”, written by an expert panel, February 2011, http://www.indiana.edu/~spea/pubs/TEP\_combined.pdf)//AL

There are promising prospects for advancements in battery technology that improve performance and reduce costs, and breakthroughs in advanced battery chemistries remain a distinct possibility. Significant cost reductions in battery technology have already been achieved. Additional battery R&D may achieve even greater cost reductions, perhaps more significant than the cost reductions expected through economies of scale and “learning by doing” in the production process. While refinements of lithium-ion battery technology may prove sufficient for mass commercialization of PHEVs, a new type of energy storage will likely be required so that BEVs can satisfy the cost and range preferences of mainstream consumers.

#### Battery price will drop with mass production – below $200 kWh for EVs

Ralston and Nigro, 11 – Monica, Project Development Associate at SolarCity Past Innovative Solutions Intern at Pew Center on Global Climate Change and Nick Nigro is the Project Manager at the Center for Climate and Energy Solutions (“PLUG-IN ELECTRIC VEHICLES: LITERATURE REVIEW”, Center for Climate and Energy Solutions, July 2011, [http://www.c2es.org/docUploads/PEV-Literature-Review.pdf)//AL](http://www.c2es.org/docUploads/PEV-Literature-Review.pdf%29//AL)

As production volume increases, the cost of batteries will decrease due to economies of scale. Through the American Reinvestment and Recovery Act (the Recovery Act), the U.S. Department of Energy (DOE) has funded efforts to increase production rates so battery manufacturers can benefit from economies of scale. DOE estimates that if a battery plant expands production from 10,000 units per year to 100,000 units per year, it can reduce battery costs by 30 to 40 percent (DOE 2010). In addition to economies of scale, the price of PEV batteries is expected to drop due to learning curve improvements such as decreased cost of battery materials, increased manufacturing expertise, and advancements in battery design (BCG 2010). However, about 25 percent of the battery cost, mainly standard parts and raw materials, will remain independent of scale, limiting the potential for overall cost reduction (BCG 2010). As lithium-ion chemistries are developed, improved, and produced on a large scale (100,000 battery packs per year), the cost per kWh to manufacture batteries could drop significantly. Importantly, almost half the cost of manufacturing a battery pack is expenses is not related to manufacturing or materials, so advancements will need to go beyond battery chemistry (see Figure 1). If broad improvements are achieved, costs could reach below $300 for PHEVs, and below $200 for BEVs, as seen in Table 1 (Santini, Gallagher and Nelson 2010).

#### Battery advancement is failing now because of low EV sales - plan solves

IER, 6/5/12 not-for-profit organization that conducts intensive research and analysis on the functions, operations, and government regulation of global energy markets. (Institute for Energy Research, “Obama’s Goal: One Million Electric Vehicles By 2015—A Pipe Dream”, Canada Free Press, 6/5/12, <http://www.canadafreepress.com/index.php/article/47139>)//EW

The Electric Battery Market In anticipation of electric vehicle sales, the Department of Energy has awarded more than $1 billion to companies to make advanced batteries since 2009. The money, which funded nine battery plants scattered across the United States from Michigan to Pennsylvania and Florida, are operating well below capacity. The mismatch between electric car sales and battery production has caused problems for the battery suppliers. A123 Systems Inc.‘s matching grant of $249 million required it to build facilities that could make at least 500 megawatt-hours of lithium-ion battery capacity a year by this November. That amount of capacity would supply the equivalent of 21,000 Nissan Leaf electric-cars, but only about 12,000 Leafs have sold in the United States since the end of 2010. The company’s grant from the Department of Energy set out a specific sequence for the hiring of engineers and ordering of equipment. The company is now trying to raise new money to stabilize its finances. Johnson Controls Inc. built a battery plant in Holland, Michigan, using Government grants, but the facility is nearly idled now due to the bankruptcy of its primary customer. Korea’s LG Chem built a plant in Michigan to supply General Motors, but that plant has not yet started production. Ener1 Inc., a battery maker that built a plant in Indianapolis using $54.9 million of a $118 million government grant, filed for bankruptcy earlier this year. Its plant is operating with 250 workers, short of the 1,700 originally envisioned in 2009. Because of low electric vehicle sales, battery makers are having a difficult time despite the $1.26 billion they received in matching grants from the federal government. It was expected that more than 6,400 jobs would be created, but to date, about two-thirds of the total funds have been spent and only about 2,000 workers have been hired. Here are some of the explanations from analysts following the electric vehicle market: “The goals that were tied to the grants said you have to ramp up this quickly, and those goals were overly optimistic,” said John Gartner, an analyst who follows the electric-vehicle market for Boulder, Colo.-based Pike Research. “The market was never going to develop it as quickly as the DOE expected. It’s kind of out of alignment with reality**.** The whole goal of 1 million electric vehicles [by 2015], there is just no way that is going to happen.”Carter Driscoll, an analyst who specializes in researching alternative energy companies for CapStone Investments, blames the administration’s insistence on quickly **se**tting up and staffing these operations for the current troubles. “It was about making jobs in certain areas. It wasn’t market driven. There is going to be a [jobs] fallback,” said Mr. Driscoll.[viii] Battery manufacturing is substantionally overbuilt because there is little demand for electric vehicles. The automobile battery industry is finding that out right now. The government, which has a poor track record of chosing winners and losers, is trying to get even more involved by dictating exactly how expansion should occur. They should learn from Solydra and the experience of other countries that subsidies come at a high cost.

#### Battery technology is improving faster than expected – costs steadily dropping

Chandler, ’11 (David, January 24, “Electrifying Transportation: Devil is in the Details, ”http://web.mit.edu/mitei/news/spotlights/electrify-transport.html

Yet-Ming Chiang, the Kyocera Professor of Ceramics at MIT and co-founder of battery company A123 Systems, said that battery technology has been improving faster than expected, as shown by the fact that projections of future battery costs have been dropping steadily. In addition, he said that automotive use is far more demanding than other applications, so even when batteries are no longer suitable for use in a car they could still have value for other applications such as backup power supplies for homes — potentially easing the cost further by providing a secondary market. “There will still be value after it’s ended its automotive life,” he said.

#### USFG is already massively investing in batteries and the technology is within our reach

MIT Energy Initiative Symposium, ’10 (April 8, “Electrification of the Transportation System,” <http://web.mit.edu/mitei/docs/reports/electrification-transportation-system.pdf>, p. 7)

The cost of the battery is one of the main reasons why electric

vehicles are much more expensive than their internal combustion

engine counterparts at this point. But we have sunk a massive

amount of money into new battery technology. We now have new

companies that are opening plants in this country to produce bat-

teries. We’re making significant strides in new battery technology.

And we want to lead the world in battery technology.

We see the Chevy Volt, and the Nissan Leaf, which I saw adver-

tised on the Olympics last evening. The technology needed to

produce commercial electric cars is well within our grasp. The elec-

tricity to power those cars in this country can come from many dif-

ferent sources, which makes us, as I said, much less dependent on

foreign oil.

#### Battery development is outstripping EV demand – expanding market demand is critical in the next few years

**Wright, ’10 - VP Business Accelerator Project, Leading Supplier of Battery Systems for EVs and Hybrids (**Mary Ann, February 23, Hearing Before a Subcommittee on the Committee on Appropriations, United States Senate, “Opportunities and Challenges Presented in Increasing the Number of Electric Vehicles in the Light Duty Automotive Sector,”

<http://www.gpo.gov/fdsys/pkg/CHRG-111shrg56643/pdf/CHRG-111shrg56643.pdf>, p. 63)

Congress has shown vision and determination in appropriating $2 billion in ARRA

funding to support the development of a U.S. manufacturing industry for advanced

batteries and for electric drive components. However, the sustained success of this

investment will depend ultimately upon creating demand for electric drive vehicles.

We run the risk of creating more capacity to build batteries and critical components

for new electric drive vehicles than what the market will demand, particularly dur-

ing the early stage of commercialization. Of concern is the near-term, i.e., 2010

through 2015 when market demand, if left uncatalyzed will lag manufacturing ca-

pacity. The bar chart shown below underscores the challenge—we estimate that by

2015 domestic capacity in vehicle unmillion units, a gap of 62 percent.

#### NA study is wrong – battery prices will fall dramatically

**Kelly, ’10 - Assistant Secretary of DOE/Ph.D Physics Harvard University (**Henry, February 23, Hearing Before a Subcommittee on the Committee on Appropriations, United States Senate, “Opportunities and Challenges Presented in Increasing the Number of Electric Vehicles in the Light Duty Automotive Sector,”

<http://www.gpo.gov/fdsys/pkg/CHRG-111shrg56643/pdf/CHRG-111shrg56643.pdf>, p. 28)

One of the dilemmas we have with the National Academy study

was I think that they were very pessimistic about driving down the

cost of batteries. And I think that their estimates are going to be

proven untrue by what’s going to actually be in the market in the

next few years. So, we’re looking forward to sitting down with them

and finding out whether we can work through the differences, be-

cause I think that we have a very compelling case that dramatic

reductions in battery prices and increases in performance are very

plausible.

### AT Automakers Won’t Manufacture EVs

#### **Automakers have changed direction and are now mass producing EVs**

Harron 6-11-12, a green technology and transportation advocate (David, “Could Tesla Motors revolutionize the auto industry, again?” Torque News, June 11, 2012, [http://www.torquenews.com/1075/could-tesla-motors-revolutionize-auto-industry-again)//ctc](http://www.torquenews.com/1075/could-tesla-motors-revolutionize-auto-industry-again%29//ctc)

Ten years ago all electric vehicles like the EV1, EV Plus, RAV4 EV, and others were relegated to the back burner when the automakers successfully fought the CARB ZEV mandate, and got CARB redirected to support hydrogen fuel cell research while the automakers went full bore into SUV sales. Some game changing events occurred a few years ago changing the direction of the automakers enough that there are now several electric vehicles on the market, in mass production by major automakers, on sale around the world. One significant event was the development of Plug-in Prius conversion kits by activists who launched a cottage industry of Prius conversions, keeping the "plug-in vehicle" on the table. The second, and more important, was the rise of Tesla Motors and the success of the Tesla Roadster. Because the success of Tesla made the major automakers EV programs look so bad, the company is credited with having given justification for major automakers to re-enter the electric vehicle market. Tesla Motors, with the Model S/X, appears poised to revolutionize the auto industry, again. One may look at the total sales of Tesla Roadsters, 2500, and curiously ask how that can be called a success. That car competed in a narrow niche market of upscale high end sports cars, where 2500 sales is a significant number. Especially for an expensive electric car. Those 2500 Tesla Roadsters were, according to Revenge of the Electric Car, what enabled Bob Lutz (then Vice-Chairman of General Motors) and Carlos Gohsn (CEO of Nissan/Renault) to re-awaken electric vehicle programs within their own companies. It's not just GM and Nissan, but Ford, Daimler, BMW and others, who re-awoke their sleeping EV programs when the Roadster came on the scene. To be fair it wasn't just the rise of Tesla Motors, because there's also rising concern over environmental pollution, greenhouse gases, and oil supply crunches, that are causing governments around the world to change the regulations to favor efficiency and a move away from fossil fuels. Tesla's role in this is to design and manufacture no-compromise all electric vehicles, ones that demonstrate electric vehicles can be fun, beautiful, and powerful. Tesla's founders knew the Roadster would have to blow up and demolish the negative stereotypes around electric vehicles, that they can only be slow boring ugly golf carts. To do so the Roadster was designed with top end acceleration and top speed, built on a chassis provided by Lotus Engineering, and equipped with a huge battery pack allowing way more electric driving than is rationally needed. The company is continuing, with the Model S/X, the same line of thinking, but taking it to the next level. Where the Roadster had a 240 mile electric driving range, the Model S/X has a 300 mile electric driving range. Where the Roadster had a 16.8 kilowatt charging system for relatively fast recharging, the Model S/X has a 90 kilowatt charging system providing 160 miles of driving range in a half hour. Where the Roadster has a 0-60 time under 4 seconds, the Roadster isn't quite that fast, but offers three rows of seating, and enormous cargo capacity between the rear and front trunks. Where the Roadster sold 2500 total cars, and was based on another manufacturers chassis, the Model S/X will sell twice that number this year alone, and is a ground-up design developed by Tesla engineers. The Model S/X more effectively snubs the noses of the major automakers than the Roadster did. Where electric cars from the major automakers have a 100ish mile range, the Model S/X have a 300 mile range. Where the main electric cars (Leaf, Volt, i-Miev, Focus Electric) have 3.3 or 6.6 kilowatt charging, the Model S/X has 10 or 20 kilowatt charging, and it is high speed charging that governs the total daily driving range of an electric car. To the extent that the Tesla Roadster pushed the auto industry back to electric vehicles, one wonders what the effect of the Model S/X will be in a few years. The capabilities of the Model S/X are way beyond what the major automakers are offering. If Elon Musk is to be believed, that Tesla has orders on hand for 10,000+ Model S's, and projects sales of 10-25,000 Model S's by the end of 2013, the company could be single handedly responsible for a large percentage of all electric vehicles on the road. That is, at a minimum Tesla has orders in hand, right now, for 10,000 Model S's, and the company's official projection is 25,000 Model S's sold by the end of 2013, along with several thousand Model X's. If this scenario pans out, it could keep Tesla Motors in the leading position in the electric automobile industry.

### AT Consumer Information Barrier

#### Federal government is already solving the information barrier by helping consumers identify charging center locations

Ralston and Nigro, 11 - Center for Climate and Energy Solutions (Monica and Nick, “PLUG-IN ELECTRIC VEHICLES: LITERATURE REVIEW”, Center for Climate and Energy Solutions, July 2011, <http://www.c2es.orgwww.c2es.org/docUploads/PEV-Literature-Review.pdf> | JJ)

To facilitate the installation and use of public charging infrastructure, several projects are being executed as public-private partnerships to leverage private funding, including programs such as ECOtality’s EV Project and Coulomb Technologies’ ChargePoint Network (CAR 2011). In April 2011, the DOE announced $5 million in PEV funding to be distributed to local governments and private companies through an application process. At the same time, DOE announced a partnership with Google and over 80 PEV stakeholders on a project that will help consumers identify charging center locations (DOE 2011c).

## ADD-ONS

### Air Pollution

#### A transition to EVs solves air pollution

**Becker ‘9** - Ph.D. candidate in economics with a specialization in international finance and environmental economics at the University of California, Berkeley. Worked as an economic and finance consultant for Cornerstone Research and has also worked for the MIT Industrial Performance Center. He has an undergraduate degree in economics from MIT, was a U.S. Fulbright Scholar to Germany, and is currently a visiting graduate scholar at Harvard University

 (Thomas, “Electric Vehicles in the United States A New Model with Forecasts to 2030”, 8/24/2009. http://cet.berkeley.edu/dl/CET\_Technical%20Brief\_EconomicModel2030\_f.pdf)//DHirsch

The health and environmental effects of transportation-related pollutants are significant. The pollutants associated with emissions from light-vehicle transportation include airborne emissions (sulfur dioxide, nitrous dioxide, particulate matter, and volatile organic compounds) as well as runoff pollutants (heavy metals, oils, and grease). The airborne pollutants, all monitored by the Environmental Protection Agency under the Clean Air Act, are known to cause respiratory disease, aggravate existing heart disease, and are known carcinogens. These pollutants are also the leading causes of smog and acid rain. We use the estimates of the health care costs associated with each type of pollutant from the U.S. Department of Transportation to estimate the health impacts of electric vehicle deployment.

As electric vehicles grow to be a larger proportion of the U.S. light-vehicle fleet, the airborne pollution stemming from motor vehicle operation declines significantly. Exhibit 13 shows the net present value of the health care costs savings associated with each forecast of electric vehicle deployment between 2009 and 2030. The top panel includes the emissions from the electricity production from the 2007 energy mix of the entire U.S. grid. The bottom panel shows a scenario where the additional electricity to power electric cars is produced exclusively by non-polluting power sources (renewables, nuclear, and hydroelectric). The health benefits of electric vehicle deployment are nearly twenty times larger when vehicles are charged using non-polluting sources of electricity. Much of this difference stems from the negative health impacts of increasing the sulfur dioxide emissions from the existing stock of coal-fired power plants. This difference in health outcomes as a function of the electricity source highlights another advantage of electric vehicle network operators: centralizing the purchasing power of electric car drivers into a few network operators will allow them to source their electricity from the wholesale market.

Though Exhibit 13 contains the monetary value of measurable health cost savings, a transition to a fleet of electric cars also promises a number of positive health and environmental impacts that are not as easily directly measured. The runoff pollutants associated with petroleum powered vehicles contaminate fresh water supplies and cause significant damage to fish stocks. Electric cars are also less noisy than their internal combustion powered counterparts, an environmental benefit that the residents of dense urban areas can certainly appreciate.

#### Air pollution makes life unsustainable and leads to extinction

Driesen, 03 - Associate Professor of Law, Syracuse University (David, Buffalo Environmental Law Journal, “"LEARING SUSTAINABILITY": SYMPOSIUM ARTICLES: SYMPOSIUM HELD AT THE UNIVERSITY AT BUFFALO LAW SCHOOL, OCTOBER 13, 2001: Sustainable Development and Air Quality: The Need to Replace Basic Technologies with Cleaner Alternatives”, Fall 02-Spring 03, 10 Buff. Envt'l. L.J. 25, L/)

Air pollution can make life unsustainable by harming the ecosystem upon which all life depends and harming the health of both future and present generations. The Rio Declaration articulates six key principles that are relevant to air pollution. These principles can also be understood as goals, because they describe a state of affairs [\*27] that is worth achieving. Agenda 21, in turn, states a program of action for realizing those goals. Between them, they aid understanding of sustainable development's meaning for air quality. The first principle is that "human beings. . . are entitled to a healthy and productive life in harmony with nature", because they are "at the center of concerns for sustainable development." n3 While the Rio Declaration refers to human health, its reference to life "in harmony with nature" also reflects a concern about the natural environment. n4 Since air pollution damages both human health and the environment, air quality implicates both of these concerns. n5

##  DA ANSWERS

### Politics

#### Policies to fast track EVs are empirically bipartisan

Berman, 11 – leading writer and researcher about electric cars and green transportation, regularly contributes driving reviews and technology articles to The New York Times, KQED Public Media, Reuters, Mother Earth News and other publications (Brad, “Bi-Partisan Representatives Introduce New Act to Promote Electric Cars”, PluginCars.com, 3 May 2011, http://www.plugincars.com/bi-partisan-representatives-introduce-new-act-promote-electric-cars-107125.html)//BI

There aren’t many initiatives that Republicans and Democrats can quickly agree upon, but deployment of electric cars is one of them. Both sides of the aisle support a strong EV future in the United States, as a strategy for job creation and reducing dependence on oil. Today, U.S. Representative Judy Biggert (R-IL) joined Reps. Edward J. Markey (D-MA), Jerry McNerney (D-CA), and Anna Eshoo (D-CA) to introduce the Electric Drive Vehicle Deployment Act—legislation designed to fast track the deployment of energy-saving electric vehicle and plug-in hybrid technologies. “In my home district, researchers at Argonne National Laboratory are leading the charge on advanced vehicle battery technology, and their work is already paying dividends in terms of energy savings, American jobs, and U.S. competitiveness,” said Biggert, referring to a recent manufacturing agreement between Argonne, LG, and General Motors for the Chevy Volt. “I’m glad to work with my colleague on a bipartisan effort to help advance the widespread use of electric vehicles,” said McNerney, who serves alongside Biggert on the Science, Space, and Technology Committee. “At a time of high unemployment, there’s great potential for job creation in this field and it’s critical that we lay the groundwork now for these new opportunities.” The bill authorizes the U.S. Secretary of Energy to award up to $300 million to each of 10 different deployment communities around the country. These communities will then serve as domestic hubs for EV manufacturing and deployment, as well as proving grounds for best practices. The Electric Drive Vehicle Deployment Act guarantees these consumer benefits: At least $2,000 (beyond existing tax credits or other federal and local incentives) for the first 50,000 EV consumers within each deployment community An extension of 2014 federal tax credits for the purchase and installation of electric vehicle charging equipment for individuals (up to $2,000) or businesses (up to $50,000 for multiple equipment purchases). The bill also authorizes additional development, deployment and manufacturing incentives for EV technologies, including bond authority and a limited number of smaller grants for municipalities not selected as deployment communities. “As America experiences the rise and fall of gas prices alongside the rise and fall of al Qaeda leadership and other Middle Eastern despots, it is time to tell the oil sheiks funding terror networks that America needs their oil as much as we need their sand,” said Markey, Ranking Member on the House Natural Resources Committee and senior member of the House Energy and Commerce Committee. “It’s time for America to start driving toward a clean, safe energy future, and electric vehicles can help power the way.”

#### EVs have broad bipartisan support – empirically proven

McDonald 10 – writer from New York City, has covered alternative fuel vehicles, politics and energy policy for HybridCars.com and PluginCars.com (Zach, “The Electric Car's Powerful Republican Allies”, PluginCars.com, 2010, http://www.plugincars.com/electric-cars-powerful-republican-allies-69589.html)//BI

Rush Limbaugh may have some mean things to say about the Chevy Volt, but when it comes down to it, plug-in cars have enjoyed a surprising level of support from the Right in recent years. Today, Businessweek reported on a speech given by Republican Senator Lamar Alexander at the Tennessee Valley Authority forum in support of electric vehicles and the government programs that will help to bring them to American roads faster. **Plug-in vehicle funding marks one of the rare instances in which Democrats have been successful in teasing out votes from the other side of the aisle**. "I'm glad to support and applaud the president when he does things that I agree with and that I think are good for the country," said the Senator. "And he's doing it on electric cars." Alexander was a co-sponsor of the Promoting Electric Vehicles Act of 2010, which is currently being considered as part of a broader energy bill in the Senate. Whether that bill passes or not depends on a variety of factors, but if the Senate were to vote on the EV language alone, there's a possibility that the bill could pass on its own merits. When PEVA was approved by the Senate Energy Committee it enjoyed the support of six Republicans. That same day, the committee passed a solar energy bill with no Republicans votes. Tennessee's other Republican Senator, Bob Corker, is also a proud electric vehicle supporter and was one of the Energy Committee members who voted for PEVA. New York Times columnist Paul Krugman once called Corker "the Senator from Nissan," which leads us to a pretty good guess as to why two of the more right-wing Republicans in the Senate both support funding for electric vehicles—they happen to hail from the state that will soon build Nissan LEAFs for the entire North American market. Motives aside, the fact that EVs have fairly broad political support makes them less likely to suffer if Democrats lose control of Congress in November—and that's a very good thing. One of the reasons that the United States is projected to be among the global leaders in electric vehicle adoption is the government's demonstrated commitment to encouraging the technology. If that support were to disappear, the future for plug-ins would be a lot less bright, and that's why Republicans like Alexander and Corker can be counted among the electric car's most important friends.

#### EV tax credits empirically have strong bipartisan support

Lehmann 11(Evan, Climate Writer, “Republican Sees Electric Car Bill as a Climate ‘Step’”, Ney York Times, <http://www.nytimes.com/cwire/2011/05/26/26climatewire-republican-sees-electric-car-bill-as-a-clima-79979.html?pagewanted=all>)//LCS

A separate effort is under way in the House to expand the use of natural gas in trucks. The bill, H.R. 1380, or the "NAT GAS Act," was offered by Rep. John Sullivan (R-Okla.) and other lawmakers from both parties. It would expand tax credits to provide between $7,500 and $64,000 for the conversion of trucks to compressed natural gas. It would also increase a property tax credit for companies that build refueling stations, providing up to $100,000 per station. The bill has attracted a diverse array of supporters. About 185 co-sponsors have signed on, drawing an arc across the political spectrum to include liberals like Rep. Peter DeFazio (D-Ore.) and conservatives like Rep. Steve Scalise (R-La.). Industry giants are also orbiting the bill. T. Boone Pickens, the natural gas mogul, is pushing hard for its passage, while Koch Industries, an energy conglomerate owned by libertarians Charles and David Koch, warns of potential market distortions. In the meantime, the House Energy and Commerce Subcommittee on Energy and Power doesn't have any immediate plans to advance the bill, said Rep. Ed Whitfield (R-Ky.), the panel's chairman. The measure has strong bipartisan support, but not a majority.

#### Republicans empirically support government incentives for EVs – seen as a way to move away form gasoline

Lehmann 11(Evan, Climate Writer, “Republican Sees Electric Car Bill as a Climate ‘Step’”, Ney York Times, <http://www.nytimes.com/cwire/2011/05/26/26climatewire-republican-sees-electric-car-bill-as-a-clima-79979.html?pagewanted=all>)//LCS

Sen. Lamar Alexander, a Tennessee Republican, expressed confidence yesterday that the promise of increasing America's energy independence at a time of high gas prices could drive the bickering Congress to cooperate on an electric car bill he introduced with Sen. Jeff Merkley, an Oregon Democrat. But Alexander also embraced climate change as a man-made problem that the government has a responsibility to correct. That counters a host of statements by Republicans who expressed skepticism, or denial, about the impacts of society's emissions while campaigning last year. "My view on climate change is of course it's occurring. Anyone can see that," Alexander said at an event hosted by *National Journal* yesterday. "The big argument is what you do about it. ... I think what you do about it is take steps." The question now is whether that go-slow approach will be adopted by Congress, which has been feuding over partisan symbols like expanded oil drilling and repealing oil company tax deductions. Yet behind the campaign-style maneuvering are a handful of energy bills that are grasping for traction before presidential electioneering and political theater overtake serious legislating. They seek to steer the country's transportation system away from gasoline, which accounted for 33 percent of carbon dioxide emissions in 2009, by promoting the use of natural gas in trucks, advancing electric cars and renewable energy, and saving power. That could have an impact on transportation emissions, 65 percent of which come from personal car use. Now is the time, in some people's view, to provide government incentives for the purchase of alternatively fueled cars. That would dovetail with high pump prices and spark consumers to buy more efficient and cleaner cars, supporters say.

#### EVs are a rare area of bipartisan agreement – while alternative energy is generally controversial, EVs are seen as uniquely feasible

Chargingstations.com 2/08/12(“Would a Republican President Be a Setback for Electric Vehicles?”, Ferbruary 8, 2012, <http://www.chargingstations.com/news/would-a-republican-president-be-a-setback-for-electric-vehicles/>)//LCS

For example, Senator Lamar Alexander of Tennessee was one of the six Republican supporters of the Promoting Electric Vehicles Act of 2010, legislation promoted by the President and many Democrats. In supporting this bill, the committee was able to show a rare instance of bipartisan support for an eco-friendly alternative to gasoline engine cars. By comparison, no Republicans supported the simultaneous bill designed to fund more solar-powered energy. The reason for this seeming disparity may lie in the perceived feasibility of each type of power. Because electric cars have been used for years in a limited manner, and while automakers are finally beginning more mass production of these cars, legislators may see the possibilities in a true conversion over the next decade to a new form of transportation which is realistic and whose expenses can be met. Moreover, the form of tax rebates and incentives appeals to the right, who, at least nominally, want to cut taxes anyway. On the other hand, the benefits of installing solar power may be perceived as being outweighed in terms of overall cost and efficiency, making legislators hesitant to back it in on a large scale.

#### Notwithstanding fiscal concerns, Republicans empirically support EVs – want the U.S. to be the leader in EVs

Lehmann 11(Evan, Climate Writer, “Republican Sees Electric Car Bill as a Climate ‘Step’”, Ney York Times, <http://www.nytimes.com/cwire/2011/05/26/26climatewire-republican-sees-electric-car-bill-as-a-clima-79979.html?pagewanted=all>)//LCS

"I want the U.S. to lead the world on electric cars," said Sen. Marco Rubio (R-Fla.), a conservative freshman. "How we accomplish that, I'm open to debate on it." Rubio wouldn't comment directly on Alexander's bill, but he questioned whether the government should be promoting one technology over another. The electric car support effort comes as the Republican Party emphasizes its role as a fiscal watchman. GOP leaders in the House are currently negotiating hundreds of billions, if not trillions, in spending cuts in return for raising the national debt limit this summer. "I'm not gonna support any kind of direct payment subsidy or incentive," said Rep. Jeff Duncan, a Republican from South Carolina who was elected in the conservative wave last November. "I don't subscribe to the whole man-made global warming and carbon emissions affecting the climate, anyway." Yet like other first-year Republicans interviewed, he supports the concept of vehicles being fueled by electricity and natural gas. Duncan said he might support tax breaks for those purchases if they're funded through royalties from new oil drilling.

#### Political support for EVs – warming, energy security, gas prices

**Broder ’12** – reporter with the New York Times (John, “The Electric Car, Unplugged”, 3/25/2012. http://www.nytimes.com/2012/03/25/sunday-review/the-electric-car-unplugged.html?pagewanted=all)//DHirsch

“There is much more political support for it today, for a variety of reasons,” he said. “Global warming, energy security, petroleum prices, all these vectors are aligned to support the electrification of the automobile, whether it’s hybrid, plug-in, extended-range hybrid or full battery-electric.”

But he added that the Volt was an incredibly complicated device in the early stages of development. “When you push the start button, you’ve got 10 million lines of software running. On an F-15, it’s about eight million lines of code. You’re really driving a modern data center, and a lot can go wrong.”

He noted that the current Volt was the first generation and predicted that its third version, which will come between 2020 and 2025, will gain wide acceptance, as long as G.M. does not end the project and the government backs a nationwide infrastructure of charging stations.

#### Nonunique – Obama is already pushing green DOD fleet

Alexander, Cornwell, and Rampton, 7/6 – Correspondent, Journalist, and Correspondent for Reuters (David, Susan, and Roberta, “Navy Moves Ahead on Biofuels Despite Congressional Ire,” Reuters, July 6 2012, http://www.reuters.com/article/2012/07/06/us-usa-greenfleet-idUSBRE86513S20120706) // AMG

Obama's opponents see the military's green energy push as another attempt by the White House to promote alternative fuels even if they don't make economic sense, as in the case of the government-funded solar panel maker Solyndra, which went bankrupt last year. President Obama is "pressing forward with his plan to force the DoD (Department of Defense) to spend $30 million on its so-called green fleet, all while he's gutting our military," Inhofe said in a statement provided to Reuters.

#### Nonunique – Congress is already backlashing against Obama’s military green energy agenda

Alexander, Cornwell, and Rampton, 7/6 – Correspondent, Journalist, and Correspondent for Reuters (David, Susan, and Roberta, “Navy Moves Ahead on Biofuels Despite Congressional Ire,” Reuters, July 6 2012, http://www.reuters.com/article/2012/07/06/us-usa-greenfleet-idUSBRE86513S20120706) // AMG

The Navy purchased 450,000 gallons of biofuels for $12 million, or nearly $27 a gallon for the exercises. The fuel was then mixed with 450,000 gallons of petroleum to achieve a 50-50 blend that cost about $15 a gallon. The Navy expected the jet and marine biofuels to last about a day during the exercises. CONGRESSIONAL BACKLASH The cost of the biofuels for the exercises has produced an angry backlash in Congress. Republican lawmakers denounced the spending at a time of Pentagon budget cuts and are working to halt the purchase of biofuels that are not competitively priced. Obama's opponents see the military's green energy push as another attempt by the White House to promote alternative fuels even if they don't make economic sense, as in the case of the government-funded solar panel maker Solyndra, which went bankrupt last year.

#### **Nonunique – Congress is already criticizing Obama’s green energy proposals for economic reasons**

Alexander, 7/2 – Correspondent for Reuters (David, “’Green Fleet’ Sals, Meets Stiff Headwinds in Congress,” Chicago Tribune, July 2 2012, http://articles.chicagotribune.com/2012-07-02/news/sns-rt-us-usa-navy-greenfleetbre86106x-20120701\_1\_fuel-depot-alternative-fuels-biofuels) // AMG

Some Republican lawmakers have seized on the fuel's $26-a-gallon price, compared to $3.60 for conventional fuel. They paint the program as a waste of precious funds at a time when the U.S. government's budget remains severely strained, the Pentagon is facing cuts and energy companies are finding big quantities of oil and gas in the United States. Navy Secretary Ray Mabus, the program's biggest public booster, calls it vital for the military's energy security. But to President Barack Obama's critics, it is an opportunity to accuse the U.S. leader of pushing green energy policies even if they don't make economic sense. The bankruptcy of government-funded solar panel maker Solyndra last year was a previous example of that, they say.

### Auto Lobby

#### Automakers realize their future lies with the clean-car revolution – empirically proven by endorsement of California’s strict auto rules

Rogers 12 – A contributor to Yale’s Environment 360 (Paul, “California’s ‘Clean Car’ Rules

Help Remake U.S. Auto Industry” Environment 360, February 8, 2012, http://e360.yale.edu/feature/californias\_clean\_car\_rules\_help\_remake\_us\_auto\_industry/2492/)//ctc

*\*Mary Nichols is the Chairman of the California Air Resources Board*

In an interview with Yale Environment 360 contributor Paul Rogers, Nichols — who has headed the board since 2007 — explains why California has consistently led the U.S. in passing the toughest air pollution and vehicle mileage standards, why Detroit automakers have decided to endorse California’s new rules, and why U.S. and international car makers are on the verge of a clean-car revolution. “Auto manufacturers have finally come to the conclusion that their future lies in very efficient, very clean vehicles,” says Nichols. Yale Environment 360: Why did California pass these rules? Mary Nichols: California has been working on these rules for decades. Really, this is just the latest version of a program that has been in effect since the 1960s, which began because we were the first place to discover smog and to begin to take action to deal with the problem of pollution caused by motor vehicles. But this most recent round of standards is one that reflects a real change in viewpoint about what the future of our transportation system is going to look like. Basically we have concluded that when you look at the rates of growth in travel and the even greater problems of energy use, dependence on imported petroleum, as well as global warming and our contribution to it, we’re going to need a fleet of vehicles that is not primarily running on conventional fuels. And so we’re looking for ways to help speed up the transition to a fleet of vehicles that are extremely clean and efficient. And we’re setting standards for their design that help use the power of the California marketplace to do that. e360: And what impact do you think these rules will have on the entire auto industry in the United States? Nichols: Well, California buys about 10 percent of all the new cars that are sold every year. But we have even more influence than that over the design of future vehicles because every car manufacturer from the largest to the most innovative start-ups uses us as a design laboratory because they know that Californians know cars and they really like them. The term “love affair with the car” might be an exaggeration, but not too much. e360: So you see these rules as changing the way all Americans drive, not just Californians? Nichols: Yes, clearly cars that are manufactured for the California marketplace also get sold outside of California. But we also have 13 states that followed California’s lead automatically. They’ve signed up for the California car program. Those states include all the states in the Northeast plus Oregon and New Mexico. They are going to be requiring that all the cars sold in their states meet California’s standards. e360: The standards that the air board passed are pretty far reaching. They require 15 percent of all new vehicles by 2025 to have zero emissions, which as a practical matter means all electrical, hydrogen fuel cell, or plug-in electric. Why do you think the auto industry generally supported them, when in the past it has filed lawsuits to block laws California has previously passed? Nichols: I think that the auto manufacturers have finally — maybe a bit belatedly — come to the conclusion that their future lies in very efficient, very clean vehicles. If they are going to be able to continue to provide cars for places where the demand is really growing, like Asia and other developing parts of the world, they’re going to have to compete in an arena where gasoline is extremely expensive and, in some cases, almost impossible to obtain. They’ve also got to recognize that gasoline prices are going up and that there is a need for extremely clean fuels that can meet other demands, as well, in some of the most polluted areas on the planet, including India and China. Alternative fuel vehicles are going to be hot sellers as soon as there are enough cars available and the fuel suppliers come along and fill the demand for whatever the future fuel is going to be. The demand in the parts of the world where people are becoming more prosperous is almost insatiable for vehicles. The first thing that people buy when they get to the point where they have a little disposable income — people want mobility. First, electric bicycles, then motorcycles, then a car — that seems to be an almost iron rule at this point. The car companies are going to have to have cars that meet that customer demand.

### Picking Winners Bad DA

#### Ports do not subsidize winners but rather spur vehicle electrification – even technology agnostics would support the plan

MIT Energy Initiative Symposium, ’10 (April 8, “Electrification of the Transportation System,” <http://web.mit.edu/mitei/docs/reports/electrification-transportation-system.pdf>, p. 5)

These issues will not be resolved quickly. The Department of Energy (DoE) is supporting some activities that bear on these questions, and states are undertaking activities that could yield additional insights if the data is disseminated and analyzed properly. The message here is that the pace of investment and deployment depends on establishing a clear policy and regulatory frame- work for EVs. Sophisticated simulation and systems dynamics tools can be an important guide to an implementation strategy (technology, policy, regulation, economics) that avoids a “bridge tonowhere.” A random approach to experiments could ultimately delay implementation of a robust and reliable infrastructure.

Policy options. Participants generally agreed that electrification of the LDV transportation

sector was desirable because of the potential for CO2 emissions reduction, lessened oil

dependence, and perhaps even lower cost. However, while vehicle electrification was viewed as a desirable objective, there was much greater difference over the policy instruments that should be invoked. Technology advocates generally favor rapid, direct intervention to over- come the technical, cost, infrastructure, and consumer acceptance barriers. Technology agnostics avoid picking technology winners and prefer policies that internalize external cost and establish a level playing field among technologies.

Accordingly, there was wider agreement on measures intended to spur vehicle electrification

enabling technology development and demonstration than on measures intended to subsidize early deployment of EVs.

#### Nonunique – DOE already provides subsidies to EVs – tax rebates, manufacturing subsidies, battery research

**Carley, Messer Betts, and Graham ‘11**– Assistant Professor at Indiana University School of Public and Environmental Affairs; City of Austin Economic Development Specialist; dean of Indiana University School of Public and Environmental Affairs (Sanya, Natalie, and John D., “Innovation in the Auto Industry: the Role of the U.S. Environmental Protection Agency,” Duke Environmental Law and Policy Forum Volume 21, Spring 2011, http://scholarship.law.duke.edu/cgi/viewcontent.cgi?article=1034&context=delpf&sei-redir=1&referer=http%3A%2F%2Fscholar.google.com%2Fscholar%3Fstart%3D20%26q%3Delectric%2Bvehicle%2Bautomotive%2Bindustry%26hl%3Den%26as\_sdt%3D1%2C23%26as\_ylo%3D2008%26as\_vis%3D1#search=%22electric%20vehicle%20automotive%20industry%22) // AMG

The federal stimulus package of 2009 provided DOE $2.4 billion to establish electric vehicle and battery manufacturing plants. 105 Pursuant to the stimulus package, DOE also works with the IRS to determine the “eligibility and merit” of applications for the Advanced Energy Manufacturing Tax Credit. 106 In addition to stimulus programs, DOE provides loans to manufacturers of PEVs and PEV components through the Advanced Vehicle Technology Manufacturing Loan Program. 107 DOE also funds significant research and development in PEV technology through its Vehicle Technologies Program and by awarding Advanced Research Projects Agency-Energy (ARPA-E) grants. 108 In 2010, DOE issued guidance on federal fleet management in accordance with Executive Order 13415, which included recommendations to acquire PEVs in geographical areas where electricity generation has low carbon intensity. 109 DOE’s role in PEV policy will grow if Congress grants President Obama’s 2012 budget request for DOE. The 2012 request includes increased funding for R&D investments in electric drive and battery technology, as well as a new competitive grant program to reward communities that improve PEV recharging opportunities. 110 More minor players in PEV policy at the federal level are the IRS and DOT. In addition to its role in the Advanced Energy Manufacturing Tax Credit mentioned above, the IRS oversees the implementation of the tax breaks available for purchasing electric vehicles and installing recharging infrastructure. 111 DOT has become involved in PEV policy through the Pedestrian Safety Enhancement Act of 2010, which calls for NHTSA to require that PEVs—which make very little noise while operating, especially at low speeds— make some noise to alert pedestrians of their presence. 112

#### Clean energy innovation alone fails to bring down prices enough – government incentives are key

**Levi et al ’10** - David M. Rubenstein senior fellow for energy and environment at the Council on Foreign Relations, bachelor's degree in mathematical physics from [Queen's University](http://en.wikipedia.org/wiki/Queen%27s_University), an M.A. degree in physics from [Princeton University](http://en.wikipedia.org/wiki/Princeton_University), and a Ph.D. degree in war studies from King’s College (Michael, Elizabeth Economy, Senior Fellow for Asian Studies at CFR, Shannon O’Neil, Fellow for Latin American Studies at CFR, Adam Segal, Senior Fellow for Counterterrorism and National Security Studies at CFR, “Globalizing the Energy Revolution: How to Really Win the Clean-Energy Race”, Foreign Affairs, November/December 2010. http://www.foreignaffairs.com/articles/66864/michael-levi-elizabeth-c-economy-shannon-k-oneil-and-adam-segal/globalizing-the-energy-revolution)//DHirsch

To be sure, clean-energy innovation alone will not deliver the energy transformation the world needs. It can drive down the cost of clean energy and narrow the price gap between clean and dirty sources, but it is unlikely to make clean energy consistently cheaper than fossil fuels anytime soon. Government policies will still need to tip the balance, through regulations and incentives that promote the adoption of alternatives to fossil fuels.

Clean energy is almost always more expensive than energy from fossil fuels, and often by a big margin. A recent International Energy Agency (IEA) study found that in the United States, electricity from new nuclear power plants is 15-30 percent more expensive than electricity from new coal-fired plants, offshore wind power is more than double the price of coal, and solar power costs about five times as much. An even more pronounced pattern prevails in China, where nuclear energy costs 15-70 percent more than coal, onshore wind costs between two and four times as much as coal, and solar power is more than five times the price.

Clean energy for transportation fares just as badly in terms of cost. In most countries, ethanol and biodiesel are considerably more expensive than conventional fuels. Cars that run on electricity, meanwhile, suffer from high battery costs that can easily cancel out those cars' lower fuel bills. Compounding the problem, the cost of clean energy is often highly uncertain: the cost of nuclear power, for example, depends strongly on the availability of financing on reasonable terms.

Nor is cost the only problem that demands technological progress. Nuclear power, for example, remains vulnerable to nuclear proliferation and uncertainties over the safety of waste storage. The sun and wind produce electricity intermittently, and battery and grid technologies are not yet able to smooth over the gaps in their delivery of power. No one has even tried to build and operate a commercial coal plant that captures and stores its greenhouse gas emissions.

#### Nonunique/no link – Federal government support for EVs exists now and is justified by environmental externalities

Ralston and Nigro, 11 - Center for Climate and Energy Solutions (Monica and Nick, “PLUG-IN ELECTRIC VEHICLES: LITERATURE REVIEW”, Center for Climate and Energy Solutions, July 2011, <http://www.c2es.orgwww.c2es.org/docUploads/PEV-Literature-Review.pdf> | JJ)

There are several barriers to the deployment and mass commercialization of PEVs, as well as their integration with the electrical grid. Without government support, the PEV industry could struggle to become competitive with conventional vehicles. While government involvement is not warranted for all technologies facing market challenges, PEVs mitigate several negative externalities associated with conventional vehicles, which justifies government support. These externalities include tailpipe emissions that contribute to local air pollution and climate change, as well as the transportation sector´s reliance on oil, which affects the United States´ energy security. Public policy to support fuel-efficient vehicles, such as PEVs, will help internalize these externalities (Center for Climate and Energy Solutions 2011). The extent of government involvement will be influential in integrating PEVs into the electrical grid, as integration presents many high-risk opportunities that the private sector may not take on its own. Recent policies provide evidence that government has already started to address these obstacles in cooperation with the private sector. Most PEV deployment and grid integration projects are public-private partnerships thus far. These partnerships use government support to leverage private capital for investments that may be too high-risk for the private sector alone. The projects aim to encourage innovation in the areas of technology and new business models, so the PEV industry will grow and eventually be self-sustaining. In order to maximize the growth of the PEV market, government support is needed at the federal, state, and local levels (see Table 5). However, as technology costs decline, incentives that favor PEVs, especially financial incentives, should diminish and eventually be retired (California PEV Collaborative 2010).

#### **Network externalities justify government support of nascent EV industry**

TEP 11 – The Transport Electrification Panel consists of Gurminder Bedi (Ford Motor Company) Michael Brylawski (Bright Automotive) John German (International Council on Clean Transportation) Dr. Sara Hajiamiri (Pardee RAND Graduate School) Dr. Donald Hillebrand (Argonne National Laboratory) Dr. Kara Kockelman (University of Texas at Austin) Michael Ligett (North Carolina State University) Dr. Virginia Mcconnell (Resources for the Future) Paul Mitchell (Energy Systems Network) Nick Nigro (Pew Center on Global Climate Change) Brett Smith (Center for Automotive Research) Michael Tinskey (Ford Motor Company) Dr. Thomas Walton (Defour Group) Dr. John D. Graham (School of Public and Environmental Affairs at Indiana University) Dr. Wanya Carley (Assistant Professor, School of Public and Environmental Affairs, Indiana University) Chris Crookham (MPA Student, School of Public and Environmental Affairs, Indiana University) Devin Hartman (MPA and MS Student, School of Public and Environmental Affairs, Indiana University) Dr. Bradley Lane (Assistant Professor, Institute for Policy and Economic Development, University of Texas at El Paso) Natalie Messer (MPA Student, School of Public and Environmental Affairs, Indiana University) (Transportation Electrification Panel, “Plug-in Electric Vehicles:

A Practical Plan for Progress” School of Public and Environmental Affairs, Indiana University, February 2011, http://www.indiana.edu/~spea/pubs/TEP\_combined.pdf)//ctc

There are many obstacles facing the mass commercialization of PEVs, but the fact that a product may struggle commercially is not sufficient grounds for government intervention on the product’s behalf. In the case of PEVs, some government action is warranted due to the negative environmental and security impacts of conventional vehicles, as well as the private sector’s consistent underinvestment in R&D caused by the inability of firms to capture all the benefits generated by their R&D efforts. The energy and vehicle markets fail to allocate resources efficiently because costs are imposed on third parties without their consent or compensation, a so-called “negative externality.”\* For example, tailpipe emissions and energy security costs from petroleum use impose external costs on individuals not involved in the purchase, sale, or use of the vehicle. Public policy offers a potential mechanism of “internalizing” such external costs (e.g., through fees on emissions of pollution). R&D generates “positive externalities” because there are “spillover” benefits on external parties that are not accounted for in the market. Under the condition of a positive externality, suppliers and manufacturers will likely under-invest in innovative initiatives to offer PEVs because they are undercompensated for their efforts; benefits to other entities will occur since the information from innovation is readily used or adopted by others. 211 Intellectual property laws are designed to reduce positive externalities, but they are recognized to be an imperfect instrument, even in countries that have well enforced property laws. Considering technical knowledge as a public good,\*\* an efficient allocation of public funds is achieved through expenditures that achieve the greatest positive externalities from innovation. 212 Private underinvestment in R&D is the primary justification for public policy designed to stimulate private R&D through instruments such as low volume production grants and loan guarantees, tax incentives, and public-private partnerships. A similar rationale is used for taxpayer support of governmental R&D programs. 213 Another positive externality arises as the net value of a PEV increases with increased commercialization, also known as a “network effect.”\*\*\* This occurs via direct and indirect positive externalities.\*\*\*\* The PEV market has a network externality because PEVs require a recharging infrastructure. 214 Additional purchases of PEVs give rise to more accompanying infrastructure, which in turn increases the net value of a PEV by improving the availability, performance, and affordability of such infrastructure. The indirect effect occurs as increases in the number of PEVs sold presumably leads to increased production, thereby lowering the unit price of PEVs. This effect is premised on the assumption that economies of scale in the PEV supply chain lower unit production costs. Economies of scale have been documented repeatedly in the manufacturing sector, especially at relatively low production volumes. Under these circumstances, firms have an incentive to “free ride” on the efforts of their competitors to attract demand for an innovative vehicle. The inevitability of some network externalities suggests a role for public policy in the early stages of PEV commercialization when infrastructure development is nascent, production volume is low, and unit production costs are highest.

#### Government investment is key to infrastructure – otherwise firms will only focus on improving existing research streams

**The Economist ’12** (“Government and the electric car”, 4/20/2012. http://www.economist.com/blogs/freeexchange/2012/04/innovation)//DHirsch

Many economists will be tempted to leave matters there, but I suspect there's room for government to do more. Appropriate infrastructure investment is one possibility; over the course of decades, the government has invested quite heavily in infrastructure complementary to fossil-fuel technologies. That infrastructure provides scale benefits to fossil-fuel-based technologies that represents a barrier to entry for alternatives, and so the government should look at what sort of new investments might pass cost-benefit tests; upgraded grids seems like a good place to start.

New economics research is also [revealing](http://www.economics.harvard.edu/faculty/aghion/files/Environment%20and%20Directed.pdf) that there is path dependence in commercial research and development. Profit-maximising firms are much more likely to direct research-and-development funding toward improving existing research streams rather than embarking on new lines of research, for which they may have no initial advantage over new market entrants. As a result, the market will produce much more in the way of refinement of conventional engines, for instance, than in truly new research streams like EV powertrains. A carbon tax helps deal with this market failure, but economists are increasingly open to the idea that research subsidies might also be justified.

One simple way to go about that is to increase government funding for basic research in streams that could potentially have broad applications—like battery technology. There are likely to be significant knowledge spillovers from whatever is learned in such research, and there is less risk of creating and perpetuating white elephant programmes.

## COUNTERPLAN ANSWERS

### States CP

#### **No jurisdiction – FERC is responsible for grid deployment and integration of EVs**

GlobalAutomakers ‘11 ([**http://www.globalautomakers.org/resources**](http://www.globalautomakers.org/resources))

[U.S. Federal Energy Regulatory Commission (FERC)](http://www.globalautomakers.org/www.ferc.gov) FERC oversees the advancement of the nation’s electric or “smart” grid.  FERC is responsible for ensuring the functionality and interoperability of the smart grid, including deployment and integration of plug-in electric and hybrid electrical vehicles.

#### States lack jurisdiction – FERC oversees the grid and determines whether to upgrade it

Tracy, 5/14/12 - Staff Writer (Ryan, Wall Street Journal, Here Comes the Sunstorm, <http://online.wsj.com/article/SB10001424052702303505504577404360076098508.html>)

The Federal Energy Regulatory Commission, which oversees the grid, has begun to look into possible new rules. Chairman Jon Wellinghoff said the four-member commission might require upgrades if it found "the threat was high and the cost was low." Regulators could require the industry to install blocking devices on transformers, for example, or raise the construction standards for high-voltage gear. Or they might take less intrusive action, like ordering more monitoring devices and additional threat assessment. An April 30 conference organized by the commission saw vigorous debate on how quickly the grid needs upgrading.

#### Federal action is key to streamlining the permitting process for EVSE

**Lowenthal, ’10 - CEO Coulumb Technologies (**Richard, February 23, Hearing Before a Subcommittee on the Committee on Appropriations, United States Senate, “Opportunities and Challenges Presented in Increasing the Number of Electric Vehicles in the Light Duty Automotive Sector,”

<http://www.gpo.gov/fdsys/pkg/CHRG-111shrg56643/pdf/CHRG-111shrg56643.pdf>, p. 32-33)

So, I have some policy recommendations. Permitting electrical work is a local issue, typically the responsibility of a city or a coun- ty government, and rules vary widely between jurisdictions. The process of requiring an electrician to obtain a permit and schedule an inspection can stretch an otherwise short and simple electrical upgrade into a burdensome, several-weeklong process, a concern that was confirmed by several participants in the recent project conducted by BMW in Los Angeles, New York, and New Jersey. So, first, policy, we need streamlined permitting processes na- tionwide for the installation of EVSE in order to get those times to reasonable levels. Second, today there are roughly 54 million private garages for the 247 million light-duty vehicles that we have in the United States. For consumers who park in parking lots or curbside at night, overnight charging requires shared stations. By treating electricity as a transportation fuel, regulators can foster competi- tion in the nascent EV infrastructure marketplace and help to fa- cilitate a rapid deployment of public charging infrastructure. The California Public Utilities Commission recently indicated that it is not inclined to regulate electricity for sale for EVs. None- theless, the decision is not yet finalized and represents the opinion of only a single PUC. In many cases, current regulations require a seller of electricity to be treated as a regulated utility. In other words, if an apartment building, shopping center, or fast food restaurant has been—has charging stations, it could be subject to the full range of regulatory compliance mechanisms that affect utilities. This level of regulation would likely present—prevent even minimal deployment of charg- ing infrastructure in the public, in private garages, in condomin- iums, apartments, and the workplace. Rather than depending on the Nation’s public utilities commis- sions to rule on this, we would ask that the Federal Energy Regu- latory Commission ensure that electric vehicle charging is a com- petitive marketplace with market-based pricing.

#### Federal R&D is key to transportation innovation- state and private research doesn’t include high-risk and long-term projects.

Giuliano, ’12 **-** Professor at University of South Carolina, Senior Associate Dean for Research and Technology, Director of METRANS transportation center, Ph.D. in Social Sciences, expertise in transportation policy, metropolitan special structure, travel demand, and urban transportation (Genevieve, “Why We Need University Transportation Research,” Eno: Center for Transportation, May 2012, http://www.enotrans.org/eno-brief/why-we-need-university-transportation-research) // AMG

Universities are where basic science ideas find real-world applications

I will begin with the type of research that happens almost exclusively in universities and government research laboratories: long-term, high-risk basic research. Because payoffs are uncertain, basic research is not conducted within the R&D departments of private firms, or by states, or by most federal mission agencies (e.g. U.S. Department of Transportation and U.S. Department of Agriculture). The major source of funding for basic research is the federal government (most notably via the National Science Foundation and the National Institutes of Health); this federal role is justified by the benefits to the economy and society that a robust basic research program generates. Without the support of federal funding, little basic research would take place, eventually affecting U.S. global competitiveness. Transportation is generally perceived as an applied field. Is there an argument for long term, high-risk research in transportation? Transportation is often the beneficiary of basic research in science fields. Some of the best-known examples come from civil engineering, the traditional home of transportation research. Civil engineers developed bridge technology, tunneling technology and other advances that contributed to the transportation revolution of the nineteenth century. Indeed, David Billington (1985, Princeton University) argues that bridge technology was a critical element in the settlement patterns of the U.S. One example of using basic research is provided by pavement research. Using wave theory first developed by Joseph Boussinesq (French Academy of Sciences) in 1872, and the theory of elasticity and plasticity developed by H. M. Westergaard (University of Illinois) in 1926, Yoder (1959, Purdue University) and others began development of pavement design principles. These principles were first tested in the late 1950s, and eventually led to pavement design standards that have evolved ever since (Sinha et al, 2002).

#### Battery R&D is key to EV commercialization and economic competitiveness – National laboratories network is critical to development

**Wright, ’10 - VP Business Accelerator Project, Leading Supplier of Battery Systems for EVs and Hybrids (**Mary Ann, February 23, Hearing Before a Subcommittee on the Committee on Appropriations, United States Senate, “Opportunities and Challenges Presented in Increasing the Number of Electric Vehicles in the Light Duty Automotive Sector,”

<http://www.gpo.gov/fdsys/pkg/CHRG-111shrg56643/pdf/CHRG-111shrg56643.pdf>, p. 64-5)

As we execute our plan to create an advanced battery manufacturing industry we cannot ignore the future. The nature of technology is that there is always something better on the horizon. For the United States to achieve global product and manufac- turing leadership in this technology is just the first step; we must sustain it with continuing and robust Federal R&D funding. In the same manner that lithium-ion is now supplanting nickel metal-hydride as the technology of choice for electric drive vehicles, the next game-changing chemistry is already being pursued by our global competitors in partnership with their governments. Japan has set a national tech- nology goal for a seven times improvement in specific energy coupled with a 94 per- cent cost reduction for electric drive vehicle batteries by 2030. Commercialization of these technologies will depend on not only fundamental chemistry and materials breakthroughs, but also substantial innovations in manufacturing processes and equipment. Technology R&D on this scale is risky and costly, requiring more resources, both capital and intellectual, than what is available in the private sector alone. Con- tinuing Federal support through the DOE and its national laboratory network is critical to ensuring that the technology of the future is made here at home. The near collapse of U.S. financial markets over the last 2 years has made it painfully clear that our eroded manufacturing base must be rebuilt and returned to its time-tested position as the cornerstone of a healthy economy. We need to develop next generation lithium-ion batteries by improving electro- chemistries, as well as the battery systems which support and extend cell life. We must discover and develop the successor electrochemistry to lithium-ion. There are several technologies under consideration as the next transformation in battery tech- nology. Equally important is the rest of the battery system, which includes sensors and thermal management components. Federal R&D support must be maintained in these areas in order for our domestic industry to remain competitive. We need to foster a collaborative relationship with the national labs and private industry to enable technology ideas to go from the labs to commercial success in the market place.

### Privatization CP

#### Clean energy innovation alone fails to bring down prices enough – government incentives are key

**Levi et al ’10** - David M. Rubenstein senior fellow for energy and environment at the Council on Foreign Relations, bachelor's degree in mathematical physics from [Queen's University](http://en.wikipedia.org/wiki/Queen%27s_University), an M.A. degree in physics from [Princeton University](http://en.wikipedia.org/wiki/Princeton_University), and a Ph.D. degree in war studies from King’s College (Michael, Elizabeth Economy, Senior Fellow for Asian Studies at CFR, Shannon O’Neil, Fellow for Latin American Studies at CFR, Adam Segal, Senior Fellow for Counterterrorism and National Security Studies at CFR, “Globalizing the Energy Revolution: How to Really Win the Clean-Energy Race”, Foreign Affairs, November/December 2010. http://www.foreignaffairs.com/articles/66864/michael-levi-elizabeth-c-economy-shannon-k-oneil-and-adam-segal/globalizing-the-energy-revolution)//DHirsch

To be sure, clean-energy innovation alone will not deliver the energy transformation the world needs. It can drive down the cost of clean energy and narrow the price gap between clean and dirty sources, but it is unlikely to make clean energy consistently cheaper than fossil fuels anytime soon. Government policies will still need to tip the balance, through regulations and incentives that promote the adoption of alternatives to fossil fuels. Clean energy is almost always more expensive than energy from fossil fuels, and often by a big margin. A recent International Energy Agency (IEA) study found that in the United States, electricity from new nuclear power plants is 15-30 percent more expensive than electricity from new coal-fired plants, offshore wind power is more than double the price of coal, and solar power costs about five times as much. An even more pronounced pattern prevails in China, where nuclear energy costs 15-70 percent more than coal, onshore wind costs between two and four times as much as coal, and solar power is more than five times the price. Clean energy for transportation fares just as badly in terms of cost. In most countries, ethanol and biodiesel are considerably more expensive than conventional fuels. Cars that run on electricity, meanwhile, suffer from high battery costs that can easily cancel out those cars' lower fuel bills. Compounding the problem, the cost of clean energy is often highly uncertain: the cost of nuclear power, for example, depends strongly on the availability of financing on reasonable terms. Nor is cost the only problem that demands technological progress. Nuclear power, for example, remains vulnerable to nuclear proliferation and uncertainties over the safety of waste storage. The sun and wind produce electricity intermittently, and battery and grid technologies are not yet able to smooth over the gaps in their delivery of power. No one has even tried to build and operate a commercial coal plant that captures and stores its greenhouse gas emissions.

#### Federal investment is key to getting electric charging networks off the ground

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Thompson 09 – Contributing Editor NYT/Specializes Technology Writing (Clive, “Batteries Not Included”, New York Times, April 19, 2009, [http://solar.gwu.edu/index\_files/Resources\_files/NYT\_BatteriesNotIncluded.pdf)///HLR](http://solar.gwu.edu/index_files/Resources_files/NYT_BatteriesNotIncluded.pdf%29///HLR)

The problem is ultimately political. Everyone agrees that the government will have to spend a lot to create enough demand for alternative-fuel cars. Automakers want subsidies to offset the cost of developing them; consumers want subsidies to buy them; and people who are building electric charging networks — like Lowenthal and Agassi — are straightforward about the fact that they, too, need government money. “I don’t need a government handout forever,” Agassi says. “But we do need something for, say, two years, until there are enough electric cars on the road to make a viable market.”

#### **Federal investment in EV chargers increases commercial feasibility – ECOtality proves**

Rubenstein 12 (Dana, Staff Writer, “With State-funded Charging Stations, Cuomo Gives Electric Cars a Modest Push Toward Critical Mass”, Capital, <http://www.capitalnewyork.com/article/politics/2012/06/6007375/state-funded-charging-stations-cuomo-gives-electric-cars-modest-pus>, LCS)

Governor Andrew Cuomo and the federal government [recently took a small step toward making electric-car ownership in New York less frightening](http://www.governor.ny.gov/press/06062012Charging-Stations), and more feasible, with the funding of 325 new electric-vehicle charging stations statewide. That’s not a huge number. California has more than 1,200, according to the San-Francisco-based charger manufacturer ECOtality. So does [Paris](http://www.guardian.co.uk/environment/2011/dec/07/electric-car-rental-paris-autolib). Nor, at an initial outlay of $4.4 million, is it a particularly large public commitment. But it does represent the sort of infrastructure investment that’s going to be necessary to popularize electric cars, or at least make them more commercially feasible for manufacturers and, in turn, cheaper for consumers. That's particularly true in the northeast, where electric cars have been slower to catch on than in what Colin Read, ECOtality's vice president for corporate development, calls the "Birkenstock Belt," from Oregon down the west coast to California, and then east through Texas to Florida. ECOtality won more than $100 million in federal grants to manage [the EV Project,](http://www.theevproject.com/overview.php) which is deploying more than 12,000 chargers nationwide, none planned for New York."The more chargers you put out there, the more comfortable people are with driving their vehicles longer range," said Read. But, he also said, "In reality we need cars on the road to justify putting chargers out there." Today, most electric cars come with home charging stations. But their range is, obviously, limited, and most require more than six hours to recharge.

#### Federal investment is key to self-sustaining private investment and growth of the EV market

Ralston and Nigro, 11 - Center for Climate and Energy Solutions (Monica and Nick, “PLUG-IN ELECTRIC VEHICLES: LITERATURE REVIEW”, Center for Climate and Energy Solutions, July 2011, <http://www.c2es.orgwww.c2es.org/docUploads/PEV-Literature-Review.pdf> | JJ)

The extent of government involvement will be influential in integrating PEVs into the electrical grid, as integration presents many high-risk opportunities that the private sector may not take on its own. Recent policies provide evidence that government has already started to address these obstacles in cooperation with the private sector. Most PEV deployment and grid integration projects are public-private partnerships thus far. These partnerships use government support to leverage private capital for investments that may be too high-risk for the private sector alone. The projects aim to encourage innovation in the areas of technology and new business models, so the PEV industry will grow and eventually be self-sustaining. In order to maximize the growth of the PEV market, government support is needed at the federal, state, and local levels (see Table 5). However, as technology costs decline, incentives that favor PEVs, especially financial incentives, should diminish and eventually be retired (California PEV Collaborative 2010).

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#### Government loan guarantees are key to commercializing the clean energy – empirically proven

**Victor ’11 -** Ph.D., MIT, political science, and A.B., Harvard University, (history and science, cum laude), Professor at the School of International Relations and Pacific Studies, director of the Program on Energy and Sustainable Development at Stanford University where he was also a professor at Stanford Law School and Kassia Yanosek, holds a joint MBA/MPA from Stanford Business School and the Harvard Kennedy School, a joint degree program she pioneered between the two schools, and a BA with Distinction from the University of Virginia. She is a term member of the Council on Foreign Relations (David,“The Crisis in Clean Energy: Stark Realities of the Renewables Craze”, July/August 2011. <http://www.foreignaffairs.com/articles/67903/david-g-victor-and-kassia-yanosek/the-crisis-in-clean-energy>) //DHirsch

A federal standard should also be designed to encourage a shift away from mature renewable-energy technologies and toward the next generation of more innovative technologies that could ultimately scale up without the help of subsidies. Broadening the definition of clean energy and forcing technologies to compete on performance would make for a more competitive industry overall. These measures would also put the industry on firmer political footing by emancipating it from subsidies that are prone to disappear when they get too big to escape the notice of budget hawks. And they would broaden political support for moving away from more polluting and less secure conventional forms of energy, raising the odds that a clean-energy revolution might eventually succeed.

Second, the U.S. government must focus the scarce fiscal resources it devotes to clean energy on smarter subsidies that can close the funding gaps in technology and commercialization. (Pull strategies cannot do all the work alone; the push effect of subsidies must be shifted from mature technologies to a wider array of earlier-stage technologies that need government funding.) Washington can address the technology gap by backing more fundamental research in universities and government labs across a wide array of topics. More than half of all research-and-development money in clean energy comes from the government -- proof that private investors are unlikely to fill this gap on their own. (Keeping political support for this funding is particularly important in this era of tight government budgets.) It can also support early stage technologies that private investors will not adequately fund, expanding mechanisms such as the U.S. Department of Energy's new Advanced Research Project Agency-Energy (ARPA-E). Such programs have been controversial with analysts who fear that the government might back the wrong horse. ARPA-E reduces this danger by funding a variety of competing technologies while leaving the private sector to pick the winners. Indeed, ARPA-E was modeled on effective schemes at the Pentagon that back risky, novel technologies. Secret budgets at the Department of Defense have made it possible for bureaucrats there to take risks that are harder to sustain in, say, the Department of Energy, where budgets are more transparent and less secure. Adding a layer of insulation between the Department of Energy's main budget and ARPA-E would give the agency freer rein to invest in only the most innovative technologies that private investors are less willing to support. Improving ARPA-E will require steady funds -- its budget has been on the chopping block -- and allowing it to forge long-term partnerships with private firms, which are important for pilot testing and deployments.

To help close the commercialization gap, the U.S. government should help lower the financial risks of developing new technologies. It can do so in a variety of ways, including by improving and expanding loan guarantee programs for innovative technologies and working with state regulators to allow electric utilities to recover more reliably the money they spend on clean-energy innovation through customers' bills. For example, loan guarantees have already proved essential to promising large-scale solar power projects and to firms that test new technologies designed to burn coal much more cleanly. The existing programs have been fraught with administrative difficulties, however, partly because they formally sit within the Department of Energy and must comply with budget rules that discourage the risk taking that is essential to innovation. Making these programs more effective will require putting them at arm's length from the bureaucracy. A proposal for a new independent federal financing entity, the Clean Energy Deployment Administration, would do just this by providing loan guarantees and other financial tools. But CEDA has not been approved or funded. The one-time $10 billion capitalization needed for this program has made budget hawks balk, even though extending Section 1603 through 2011 will cost at least as much. Creating CEDA, which is long overdue, would be one way of allowing the government to provide more nimble support for testing and deploying technologies, such as enhanced geothermal energy and next-generation nuclear energy, that the private sector cannot, or will not, invest in on its own.

### Alternative Fuels CPs

#### Other alternative fuels fail as a long-term solution—only electricity has built-in production and distribution

Kaplan et al., 10 – \*affiliated with Frontier Group, a think tank that issues issue experts, writers and analysts to produce ideas and research to promote a cleaner environment and a fairer and more democratic society, \*\***Brad Heavner,** B.A. from the University of Michigan, Senior Policy Advisor for Environment America and State Director of Environment Maryland, AND \*\*\*Rob Sargent, graduate of the University of Vermont, Energy Program Director for Environment America and oversees policy and strategy development for energy and global warming campaigns throughout the U.S., more than two decades of experience leading a wide range of environmental and public interest campaigns (Siena, Charging Ahead: Curbing Oil Consumption with Plug-in Cars”, Environment Maryland Research & Policy Center, June 2010, http://www.environmentmaryland.org/sites/environment/files/reports/Charging-Ahead.pdf)//BI

Another advantage to electricity—especially when compared to fuels such as hydrogen or biofuels—is that we have already built a system for production and distribution of the fuel. Even the most remote areas of the United States have access to a power line—and those few that do not still have the ability to generate electricity from solar power or other local renewable sources. Other alternative fuels fail to match the promise of electricity as a long-term solution—either for technological or environmental reasons. Hydrogen fuel, while it too can be created from renewable sources, faces many of the same energy storage challenges as electricity—and would require the construction of a vast new network of production facilities and filling stations. Biofuels such as ethanol and biodiesel can be used in existing internal combustion engines, but have mixed impacts on the environment, are unlikely to be produced in enough quantity to fuel the nation’s vehicles by themselves, and require their own new investments in infrastructure. Natural gas is lower emitting than gasoline, but still contributes to global warming and, again, requires the construction of new fueling infrastructure to become a practical, everyday alternative. Electricity can also be used in tandem with other alternative fuels to maximize their benefits. Plug-in hybrids operating on low-emission biofuels, for example, could displace vast amounts of gasoline consumption while reducing the amount of biofuels that must be produced.

### Carbon Tax

#### Carbon tax increases U.S. dependence on foreign oil – Baker Study proves

**Rice ’10** – Rice University's Baker Institute for Public Policy (“Study: Electric cars hold greater promise for reducing emissions and lowering US oil imports”, 9/27/2010. http://www.eurekalert.org/pub\_releases/2010-09/ru-sec092710.php)//DHirsch

Moreover, the researchers found that "business-as-usual market-related trends might propel the United States toward greater oil and natural gas self-sufficiency over the next 20 years while scenarios specifically focused on strict carbon caps and pricing or a high carbon tax of $60 a tonne or more could lead to a significant increase in U.S. reliance on oil imports between now and 2025. A carbon tax of $30 a tonne would also increase U.S. dependence on imports of foreign liquefied natural gas (LNG) by 2025."

The Baker Institute researchers foresee natural gas -- reinforced by recent discoveries of vast reserves of shale gas -- playing "a very important role in the U.S. energy mix for decades to come." Under a business-as-usual approach, the United States won't have to import any LNG for decades. And the growth of natural gas will help the environment by lowering the demand for coal.

### Hybrids

#### EVs are more cost competitive than hybrids – simpler to build and no liquid fuel

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In the future, this cost balance may change. If one assumes that over the next 10 to 20 years battery costs will decrease while gasoline prices increase, BEVs will be significantly less expensive than conventional cars ($1,155 to $7,181 cheaper). Even when the authors use very high consumer discount rates, BEVs will be less expensive, than conventional vehicles although the cost difference decreases. PHEVs, however, will be more expensive than BEVs in almost all comparison scenarios, and only less expensive than conventional cars in a world with very low battery costs and high gasoline prices. BEVs are simpler to build and do not use liquid fuel, while PHEVs have more complicated drive trains and still have gasoline-powered engines.

#### Hybrids are merely a stepping stone – EVs are key to a sustainable future and reducing warming

Humboldt State University, 2011, **(**<http://eaton.math.rpi.edu/Faculty/Kramer/MCM/2011mcmsolutions.pdf#page=76>)//HLR

Believe it or not, the electric car is nothing new. The electric car was developed over 100 years ago, but lost the competition for dominance to the internal combustion engine. As the world becomes more aware about the causes of global warming, people are looking for ways to reduce our impacts on the environment. The electric car is a critical part of the solution to global warming. The internal combustion engine that drives all our vehicles today uses technology that was developed a century ago. It is simply an explosion that drives a piston, fueled by gasoline or diesel. The output is not only power, but also greenhouse gas emissions in the form of carbon dioxide. These greenhouse gasses are driving an increase in global warming. To tackle global warming, we must change the way we travel. We cannot continue to generate the vast amounts of carbon dioxide, and to make that change, we must move away from oil and gas. The solution is the electric car (combined with renewable energy). Hybrid vehicles have been gaining popularity in the marketplace due to their fuel efficiency. This fuel efficiency is gained by either and electric motor assisting the engine or providing all the power at low speeds with the internal combustion automatically turned off (full hybrid). Mild hybrid cars are less fuel efficient than full hybrid cars. The full hybrid is more fuel efficient as the internal combustion engine no longer idols when stopped. While hybrid vehicles are becoming more popular, it is really a stepping stone on the path to the electric car. The electric car is not outside our reach. Today, conversion kits are available to transform a Toyota Prius, which is a gas and electric hybrid, into a plug-in electric car. This allows the car to travel over 100 kilometers on a charge, without using a drop of fuel. To build a sustainable future, we must transition to the electric car to reduce our effects on global warming.

### Tax Subsidies

#### Tax rebates and similar incentives fail – effectively create dealers subsides and require too much of lazy consumers

Business Wire 09 – Business Wire is the leading source for full-text breaking news and press releases, multimedia and regulatory filings for companies and groups throughout the nation (“Electric Vehicles International Builds Momentum for Its U.S. Launch as It Brings the Company's "Road Ready" Commercial EV to California”, Business Wire, 3/23/09, http://search.proquest.com.proxy.lib.umich.edu/docview/444190889/137C2253FB8108AA8CF/8?accountid=14667)//AL

While several of the variables in the analysis – monetary incentives, gas prices and vehicle miles traveled – have a direct impact on total ownership cost of a hybrid, the results of the regression suggest that consumers react to each of these factors in different ways. The significance of gas prices was expected, but the magnitude of their affect was much larger than I anticipated. In fact, the large annual elasticties of market share with respect to gas prices (indicated by the magnitudes of the regression coefficients) suggest that consumer reaction is not necessarily based on rational economic analysis of how variations in gas prices affect the overall ownership costs of the vehicle. Instead, consumers may think of an HEV purchase as a “hedge” or insurance against higher gas prices in the future. The weak relationship between monetary incentive values and state market share may be due to a number of reasons, and has significant policy implications. One plausible explanation for this finding is that dealers factor state incentives into their pricing structure and charge consumers more for the vehicles. If this is the case, then the monetary incentives effectively serve as a subsidy to automobile dealers without significantly increasing HEV adoption, which almost certainly runs contrary to policymakers’ objectives. Another possible explanation is a lack of consumer information coupled with the delay in receiving the incentive payment in some states. While consumers can obtain detailed information on federal incentives from a variety of national news sources, information on state-specific incentives may be less widely advertised. In compiling the data for the state incentive values, I encountered several instances of conflicting information from national-level sources, and had to contact representatives from some states directly to verify specific information on incentives. Also, many monetary incentives are in the form of tax credits and rebates, which require action by the consumer following the purchase of the car. In the case of tax credits, consumers could conceivably have to wait an entire year to realize the credit on their next tax refund. Even sales and excise tax waivers, which apply to the final purchase price of the car, may not be part of the initial negotiations on the purchase price, and are usually calculated after the purchase price is set. In constructing the table of incentive values for this analysis, it was often difficult to determine the exact value of the incentive. Claiming the most lucrative incentive – West Virginia’s incremental tax credit of up to $3750 – actually required residents to determine the incremental value from a table maintained by the State of Colorado (Hybrid Incentives and Rebates -- Region by Region 2007; State and Federal Incentives and Laws 2007). Other incentives for reduced registration and inspection fees are paid out as a value stream over many years and they are likely highly discounted by consumers in their personal cost calculations. The up-front value of these incentives to the consumer is minimal.

#### Clean energy subsidies fail – risk of expiration creates market booms and busts

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In the United States, tax credits and depreciation benefits account for more than half the after-tax returns of conventional wind farms, for instance. Investors in solar energy projects depend on U.S. government subsidies for at least two-thirds of their returns. And the U.S. government lavishes on producers of corn-derived ethanol between $1 and $1.50 per gallon of ethanol produced -- just about the costs of production -- despite the fact that almost no one considers corn-derived ethanol to be an economically viable fuel that can protect the environment or reduce dependence on oil.
In the United States, most clean-energy subsidies come from the federal government, which makes them especially volatile. Every few years, key federal subsidies for most sources of clean energy expire. Investment freezes until, usually in the final hours of budget negotiations, Congress finds the money to renew the incentives -- and investors rush in again. As a result, most investors favor low-risk conventional clean-energy technologies that can be built quickly, before the next bust. Historically, most incentives have come as tax credits. During the recent financial crisis, when investors (mainly large banks) lost much of their taxable earnings, investment plummeted and sent the clean-energy market into a tailspin. An emergency scheme called Section 1603, adopted as part of the government's fiscal stimulus plan in early 2009, offered one-year direct cash grants. These were structured to cover a percentage of the costs of shovel-ready projects, which gave beneficiaries few incentives to cut costs so as to make these technologies more competitive for the long haul. Section 1603 pumped over $2.7 billion into the U.S. wind, geothermal, and solar markets in 2010 alone. With hard cash proving more attractive than tax credits, the industry successfully lobbied to extend the scheme through the end of 2011.

### CAFÉ Standards

**CAFÉ standards cannot solve – takes a decade or more to alter the fleet**

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Mandates for non-gasoline fueled vehicles only apply to new vehicles; thus, it would take a decade or more to alter the vehicle fleet. If people started buying significant numbers of non- gasoline-fueled vehicles in 2016, the country would not see the full result until after 2030. Even this scenario may be optimistic, since not all consumers will purchase the electric car or even the more efficient ICE, if they are significantly more expensive than an older used car. Instead, they may hold onto their less efficient cars, hoping to extend their useful life.

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