# Notes

#### First, you should use the warming core on the SDI PaDs for extensions and more warming defense.

#### Second, there is NO ALTERNATIVE TO JELLYFISH OR CADMIUM – all of the affirmative solvency evidence is specific to those materials and they do not have a SINGLE PIECE of evidence advocating an alternative material. This means the plan is delayed until a usable alternative can be developed, the plan doesn’t solve or the plan links to the two disadvantages. Use CX to figure out which option the affirmative wants to roll with.

#### Third, I separated the case frontlines by impact and link because there are a lot of moving parts of this affirmative – each 2N should go through all the frontlines and collapse them down for the 1NC – or go hard on case and use them as they are.

#### Fourth, States CP solves + JV net benefit is a pretty credible negative strategy right now. The terrorism reps link to security. It’s 2:13 am and I’m desperately searching for negative strategies. Oh, oh, oh the Oil Dependence Good DA! Okay the possible 1NC positions are the following:

* A lot of case
* Jellyfish DA
* Cadmium DA
* Jackson Vanik DA
* Elections DA (The link in this file is pretty good)
* States CP (There is NO federal government key warrant)
* Oil Dependence DA (me likey)
* Air Pollution DA (There are highway construction links in the Environment DA)
* Security K

#### The best strategy is forsuresies Elections + States CP, but the Oil DA is also a good option.

# Case Answers

## Warming

### 1NC—Warming

#### Icebergs are a negative feedback – none of their evidence takes this into account

Macfarlane, 09 (Jo, The Daily Mail Online. “Amazing discovery of green algae which could save the world from global warming” http://www.dailymail.co.uk/sciencetech/article-1104772/Amazing-discovery-green-algae-save-world-global-warming.html?ITO=1490#)

Melting icebergs, so long the iconic image of global warming, are triggering a natural process that could delay or even end climate change, British scientists have found. A team working on board the Royal Navy’s HMS Endurance off the coast of Antarctica have discovered tiny particles of iron are released into the sea as the ice melts. The iron feeds algae, which blooms and sucks up damaging carbon dioxide (CO2), then sinks, locking away the harmful greenhouse gas for hundreds of years. The team think the process could hold the key to staving off globally rising temperatures. Lead researcher Professor Rob Raiswell, from Leeds University, said: ‘The Earth itself seems to want to save us.’ As a result of the findings, a ground-breaking experiment will be held this month off the British island of South Georgia, 800 miles south east of the Falklands. It will see if the phenomenon could be harnessed to contain rising carbon emissions. Researchers will use several tons of iron sulphate to create an artificial bloom of algae. The patch will be so large it will be visible from space. Scientists already knew that releasing iron into the sea stimulates the growth of algae. But environmentalists had warned that to do so artificially might damage the planet’s fragile ecosystem. Last year, the UN banned iron fertilisation in the Great Southern Ocean. However, the new findings show the mechanism has actually been operating naturally for millions of years within the isolated southern waters. And it has led to the researchers being granted permission by the UN to move ahead with the experiment. The scientist who will lead the next stage of the study, Professor Victor Smetacek, said: ‘The gas is sure to be out of the Earth’s atmosphere for several hundred years.’ The aim is to discover whether artificially fertilising the area will create more algae in the Great Southern Ocean. That ocean is an untapped resource for soaking up CO2 because it doesn’t have much iron, unlike other seas. It covers 20million square miles, and scientists say that if this could all be treated with iron, the resulting algae would remove three-and-a-half gigatons of carbon dioxide. This is equivalent to one eighth of all emissions annually created by burning fossil fuels such as oil, gas and coal. It would also be equal to removing all carbon dioxide emitted from every power plant, chimney and car exhaust in the rapidly expanding industries of India and Japan. However, the experts warn it is too early to say whether it will work. The team from ice patrol ship HMS Endurance used sledgehammers to chip deep into the interior of a 33ft-long mass of polar ice from half-a-dozen house-sized icebergs that had blown ashore in Antarctica. Once back in the UK, they used a special microscope to analyse the samples, which revealed what they had been looking for – tiny iron particles, only a few millionths of a millimetre wide, embedded deep within the ice. Until now, it was thought that the only source of iron in the Southern Ocean was wind blowing in metal compounds from the deserts of nearby continents like Australia. But the research has disproved this. Prof Raiswell said: ‘These particles measure only a fraction of a millimetre, but they have great importance for the global climate.’ Rising global temperatures, particularly over the past 50 years, have increased the rate at which polar ice melts, causing sea levels to rise. Ten of the warmest years on record have been since 1991, with experts predicting that 2009 could be the hottest year yet. The climate-change effect is set to substantially increase over the coming decades, as developing industrial nations pump out more CO2. Temperatures along the Antarctic Peninsula alone have increased by 2.5C over the past 50 years. But for every percentage point increase in the amount of ice that breaks off, Prof Raiswell calculates that a further 26million tons of CO2 is removed from the atmosphere.

#### Newest studies prove that CO2 is not anthropogenic – emissions from fossil fuels only stay in the atmosphere for five years and natural forcings are more important

Marohasy 9 (Jennifer, senior fellow at the Australian think tank the Institute of Public Affairs, PhD in biology from the University of Queensland. Cites research from Robert H. Essenhigh, Department of Mechanical Engineering at Ohio State University, “Carbon Dioxide in Atmosphere 5-15 Years Only” 4-17-09. http://jennifermarohasy.com/blog/2009/04/carbon-dioxide-in-atmosphere-5-15-years-only/)

If carbon dioxide emissions from fossil fuels only stayed in the atmosphere a few years, say five years, then there may not be quite the urgency currently associated with anthropogenic global warming. Indeed it might be argued that the problem of elevated levels of atmospheric carbon dioxide could be easily reversed as soon as alternative fuel sources where found and/or just before a tipping point was reached. The general consensus, however, is not five years, but rather more in the range of 50 to 200 years. But in a new technical paper to be published in the journal ‘Energy and Fuels’, Robert Essenhigh from Ohio State University, throws doubt on this consensus. Using the combustion/chemical-engineering Perfectly Stirred Reactor (PSR) mixing structure, or 0-D Box, as the basis of a model for residence time in the atmosphere, he explains that carbon dioxide emissions from fossil fuels are likely to have a residence time of between 5 and 15 years. He further concludes that the current trend of rising atmospheric carbon dioxide concentrations is not from anthropogenic sources, but due to natural factors. Here’s the abstract: The driver for this study is the wide-ranging published values of the CO2 atmospheric residence time (RT), , with the values differing by more than an order of magnitude, where the significance of the difference relates to decisions on whether: (1) to attempt control of combustion-sourced (anthropogenic) CO2 emissions, if >100 years; or (2) not to attempt control, if ~10 years. This given difference is particularly evident in the IPCC First (1990) Climate Change Report where, in the opening Policymakers Summary of the Report, the RT is stated to be in the range 50 to 200 years; and, (largely) based on that, it was also concluded in the Report and from subsequent related studies that the current rising level of CO2 was due to combustion of fossil fuels, thus carrying the, now widely-accepted, rider that CO2 emissions from combustion should therefore be curbed. However, the actual data in the text of the IPCC Report separately states a value of 4 years. The differential of these two times is then clearly identified in the relevant supporting-documents of the report as being, separately: (1) a long-term (~100 years) adjustment or response time to accommodate imbalance increases in CO2 emissions from all sources; and, (2) the actual RT in the atmosphere, of ~4 years.

As check on that differentiation, and its alternative outcome, the definition and determination of RT thus defined the need for and focus of this study. In this study, using the combustion/chemical-engineering Perfectly Stirred Reactor (PSR) mixing structure, or 0-D Box, for the model-basis, as alternative to the more-commonly used Global Circulation Models (GCM’s), to define and determine the RT in the atmosphere, then, using data from the IPCC and other sources for model validation and numerical determination, the data: (1) support the validity of the PSR model-application in this context; and (2) from the analysis, provide (quasi-equilibrium) residence times for CO2 of: ~5 years carrying C12; and of ~16 years carrying C14, with both values essentially in agreement with the IPCC short-term (4-year) value, separately, in agreement with most other data sources and notably a (1998) listing by Segalstad of 36 other published values, also in the range 5 to 15 years. Additionally, the analytical results then also support the IPCC analysis and data on the longer “adjustment time” (~100 years) governing the long-term rising “quasi-equilibrium” concentration of CO2 in the atmosphere. For principal verification of the adopted PSR model, the data source used was outcome of the injection of excess 14CO2 into the atmosphere during the A-bomb tests in the 1950’s/60’s which generated an initial increase of approximately 1000% above the normal value, and which then declined substantially exponentially with time, with = 16 years, in accordance with the (unsteady-state) prediction from, and jointly providing validation for, the PSR analysis. With the short (5-15 year) RT results shown to be in quasi-equilibrium, this then supports the (independently-based) conclusion that the long-term (~100-year) rising atmospheric CO2 concentration is not from anthropogenic sources but, in accordance with conclusions from other studies, is most probably the outcome of the rising atmospheric temperature which is due to other natural factors. This further supports the conclusion that global warming is not anthropogenically driven as outcome of combustion. The economic and political significance of that conclusion will be self-evident.

#### Climate predictions fail – our modeling software is empirically flawed and can’t predict future climate – they fail to distinguish between feedback and forcing

Spencer and Braswell 11 (Roy Spencer, Former Senior Scientist for Climate Studies at NASA, and Danny Braswell, Team leader for NASA’s qua satellite, Principal Research Scientists at the Earth System Science Center at the University of Alabama, 7/25/11 “On the Misdiagnosis of Surface Temperature Feedbacks from Variations in Earth’s Radiant Energy Balance”, Remote Sensing vol 3, og 1603-1613 \*This study was funded entirely by the U.S. Department of Energy, not an oil company)

Abstract:The sensitivity of the climate system to an imposed radiative imbalance remains the largest source of uncertainty in projections of future anthropogenic climate change. Here we present further evidence that this uncertainty from an observational perspective is largely due to the masking of the radiative feedback signal by internal radiative forcing, probably due to natural cloud variations. That these internal radiative forcings exist and likely corrupt feedback diagnosis is demonstrated with lag regression analysis of satellite and coupled climate model data, interpreted with a simple forcing-feedback model. While the satellite-based metrics for the period 2000–2010 depart substantially in the direction of lower climate sensitivity from those similarly computed from coupled climate models, we find that, with traditional methods, it is not possible to accurately quantify this discrepancy in terms of the feedbacks which determine climate sensitivity. It is concluded that 1, due primarily to the inability to distinguish between radiative forcing and radiative feedback in satellite radiative budget observations.The magnitude of the surface temperature response of the climate system to an imposed radiative energy imbalance remains just as uncertain today as it was decades ago [1]. Over 20 coupled ocean-atmosphere climate models tracked by the Intergovernmental Panel on Climate Change (IPCC) produce a wide range of warming estimates in response to the infrared radiative forcing theoretically expected from anthropogenic greenhouse gas emissions [2]. From a modeling standpoint, this lack of progress is evidence of the complexity of the myriad atmospheric processes that combine to determine the sign and magnitude of feedbacks. It is also due to our inability to quantify feedbacks in the real climate system, a contentious issue with a wide range of published feedback diagnoses [1] and disagreements over the ability of existing methods to diagnose feedback [3,4]. Spencer and Braswell ([5] hereafter SB10) discussed what they believed to be the primary difficulty in diagnosing feedback from variations in the Earth’s radiative energy balance between absorbed shortwave (SW) solar radiation and thermally emitted longwave (LW) infrared (IR) radiation. SB10 attributed the difficulty to the contamination of the feedback signature by unknown levels of time-varying, internally generated radiative forcing; for example, ‘unforced’ natural variations in cloud cover. In simple terms, radiative changes resulting fromtemperature change (feedback) cannot be easily disentangled from those causing a temperature change (forcing). Much can be learned about the interaction between radiative forcing and feedback through a simple time dependent forcing-feedback model of temperature variations away from a state of energy equilibrium, *Cp d*Δ*T/dt = S(t) + N(t)* − λΔ*T* (1) Equation (1) states that time-varying sources of non-radiative forcing *S* and radiative forcing *N* cause a climate system with bulk heat capacity *Cp* to undergo a temperature change with time away from its equilibrium state (*d*Δ*T/dt*), but with a net radiative feedback ‘restoring force’ (−λΔ*T*) acting to stabilize the system. For the interannual temperature climate variability we will address here, the heat capacity *Cp* in Equation (1) is assumed to represent the oceanic mixed layer. (Note that if *Cp* is put inside the time differential term, the equation then becomes one for changes in the heat content of the system with time. While it is possible that feedback can be more accurately diagnosed by analyzing changes in the heat content of the ocean over time [6], our intent here is to examine the problems inherent in diagnosing feedback based upon surface temperature changes.) Radiative forcings (N) of temperature change could arise, for example, from natural fluctuations in cloud cover which are not the direct or indirect result of a temperature change (that is, not due to feedback) [7]. Examples of non-radiative forcing (S) would be fluctuations in the heat exchange between the mixed layer and deep ocean, or between the mixed layer and the overlying atmosphere. Importantly, satellite radiative budget instruments measure the combined influence of radiative forcing (*N*) and radiative feedback (−λΔ*T*) in unknown proportions. Although not usually considered a feedback *per se*, the most fundamental component of the net feedback parameter λ is the direct dependence of the rate of IR emission on temperature, estimated to be about 3.3 W m−2 K−1 in the global average [8]. This ‘Planck’ or ‘Stefan-Boltzmann’ response stabilizes the climate system against runaway temperature changes, and represents a baseline from which feedbacks are traditionally referenced. Positive feedbacks in the climate system reduce the net feedback parameter below 3.3, while negative feedbacks increase it above 3.3. Here we will deal with the net feedback parameter exclusively, as it includes the combined influence of all climate feedbacks, as well as the Planck effect. The larger the net feedback parameter λ, the smaller the temperature response to an imposed energy imbalance *N* will be; the smaller λ is, the greater the temperature response will be. A negative value for λ would indicate a climate system whose temperature is unstable to radiative forcing. The coupled ocean-atmosphere climate models tracked by the IPCC have diagnosed long-term net feedback parameters ranging from λ = 0.89 for the most sensitive model, MIROC-Hires, to λ = 1.89 for the least sensitive model, FGOALS [8]. Since this range is below the Planck response of 3.3 W m−2 K−1, all of the IPCC models therefore exhibit net positive feedbacks. Also, since all climate models have net feedback parameters greater than zero, none of the climate models are inherently unstable to perturbations. It is worth reiterating that satellite radiative budget instruments measure the combined effect of the radiative terms on the RHS of Equation (1), that is, the radiative forcing term *N* and the feedback term (− λΔ*T*). That the presence of *N* can have a profound impact on feedback diagnosis is easily demonstrated with a simple time dependent model based upon Equation (1). If we assume *Cp* consistent with a 25 m deep oceanic mixed layer, a net feedback parameter λ = 3, and a sinusoidal forcing with period of one year, the temperature response shown in Figure 1 will result. Figure 1.Simple forcing-feedback model demonstration that satellite radiative budget instrument measurements of Net radiative flux (forcing + feedback) are very different from what is needed to diagnose the net feedback parameter (feedback only). In response to radiative forcing, the model ocean warms, which in turn causes a net radiative feedback response. Significant to our goal of diagnosing feedback, the net feedback response to a temperature change is always smaller than the radiative forcing which caused it, owing to the heat capacity of the system, until radiative equilibrium is once again restored. At that point the radiative feedback equals the radiative forcing. Unfortunately, in the real climate system radiative forcings are continually changing, which means the feedback response will in general be smaller than the radiative forcing. The presence of this radiative forcing tends to confound the accurate determination of feedback. If the only source of radiative variability was feedback, then regression of the time series (−λΔ*T*) against the temperature time series (Δ*T*) in Figure 1 would yield an accurate feedback diagnosis with the regression slope λ = 3 W m−2 K−1. But the presence of time varying radiative forcing in Figure 1 has a very different signature than that of feedback, yet it is the sum of the two which the satellite measures. As shown by SB10, the presence of any time-varying radiative forcing decorrelates the co-variations between radiative flux and temperature. Low correlations lead to regression-diagnosed feedback parameters biased toward zero, which corresponds to a borderline unstable climate system. We believe that the low correlations associated with previous feedback diagnoses with satellite data are themselves *prima facie* evidence of the presence of radiative forcing in the data. In the real climate system, it is likely there is almost always a time-varying radiative forcing present, as various internally-generated changes in clouds and water vapor oscillate between positive and negative values faster than the resulting temperature changes can restore the system to radiative equilibrium. This means that feedback diagnosis will, in general, be contaminated by an unknown amount of time-varying internal radiative forcing *N*. If those forcings were known, they could have been subtracted from the measured radiative flux variations before diagnosing feedback, e.g., as has been done for the feedback response of the coupled climate models to transient carbon dioxide forcing [8]. Central to the difficulty of feedback diagnosis is the very different time-dependent relationships which exist between forcing and temperature, versus between feedback and temperature. While there is a substantial *time lag* between forcing and the temperature response due to the heat capacity of the ocean, the radiative feedback response to temperature is *nearly simultaneous* with the temperature change. This near-simultaneity is due to a combination of the instantaneous temperature effect on the LW portion of λ (the Planck response of 3.3 W m−2 K−1), and the relatively rapid convective coupling of the surface to the atmosphere, which causes surface temperature-dependent changes in water vapor, clouds, and the vertical profile of temperature. While SB10 provided evidence that such radiatively-induced temperature changes do exist, and in general lead to an underestimate of the net feedback parameter, this view has been challenged ([9] hereafter D10) with estimated cloud feedback from satellite observed variations in Earth’s radiative energy balance during 2000–2010. D10 used the usual regression approach. Further, D10 assumed that the temperature changes during 2000–2010 were not radiatively forced by the atmosphere, but non-radiatively forced through changes in ocean circulation associated with the El Niño/Southern Oscillation (ENSO) [10] phenomenon. If D10 is correct that radiative forcing can be neglected (*N(t)* ≈ 0), then satellite observed radiative variations would be dominated by feedback rather than forcing, and one should be able to diagnose feedback through regression of radiative variations against temperature variations. Here we will provide evidence that those temperature changes instead had a strong component of radiative forcing, with radiative accumulation preceding, and radiative loss following temperature maxima. While SB10 used phase space analysis to demonstrate the presence of radiative forcing, here we will use lag regression analysis. By examining regression coefficients between temperature and radiative flux at a variety of leads and lags, rather than at just zero time lag, we can identify behaviors of the climate system that otherwise cannot be discerned.

#### Global Warming theories incorrect- Climate satellite data proves

National Review 7/30/11 (<http://www.nationalreview.com/planet-gore/273239/nasa-study-shatters-climate-alarmists-assumptions-mario-loyola> “NASA Study Shatters Climate Alarmists’ Assumptions”)

Still, I assumed that at least the climate scientists had some firm idea of how much heat a certain amount of carbon dioxide would trap directly and indirectly through increased humidity and cloud cover. Well now it turns out that even on this most essential assumption of all their claims, they didn’t know what they were talking about. An explosive study based on NASA satellite data collected over the past decade shows that the planet’s atmosphere traps far less heat than any of the most frequently cited models presumed. The study, by Dr. Roy Spencer and Dr. William Braswell of the University of Alabama, was published in the peer-reviewed journal Remote Sensing. This is from the press release: “The satellite observations suggest there is much more energy lost to space during and after warming than the climate models show,” Spencer said. “There is a huge discrepancy between the data and the forecasts that is especially big over the oceans.” Not only does the atmosphere release more energy than previously thought, it starts releasing it earlier in a warming cycle. The models forecast that the climate should continue to absorb solar energy until a warming event peaks. Instead, the satellite data shows the climate system starting to shed energy more than three months before the typical warming event reaches its peak. “At the peak, satellites show energy being lost while climate models show energy still being gained,” Spencer said. This is the first time scientists have looked at radiative balances during the months before and after these transient temperature peaks. Applied to long-term climate change, the research might indicate that the climate is less sensitive to warming due to increased carbon dioxide concentrations in the atmosphere than climate modelers have theorized. A major underpinning of global warming theory is that the slight warming caused by enhanced greenhouse gases should change cloud cover in ways that cause additional warming, which would be a positive feedback cycle.

#### Warming isn’t due to CO2– tree rings records prove

NIPCC 12 (The Nongovernmental International Panel on Climate Change, “Global Warming and Extreme Weather Events”, http://www.nipccreport.org/articles/2012/feb/21feb2012a3.html, 2/21/2012, Accessed 7/12/12)

In the present analysis, Routson et al. used a new tree-ring record derived from living and remnant bristlecone pine wood from the headwaters region of the Rio Grande River in Colorado (USA), along with other regional records, to evaluate what they describe as "periods of unusually severe drought over the past two millennia (268 BC to AD 2009)." Results indicated, according to the three researchers, that the record they derived "reveals two periods of enhanced drought frequency and severity relative to the rest of the record," and that "the later period, AD ~1050-1330, corresponds with medieval aridity well documented in other records," while "the earlier period is more persistent (AD ~1-400), and includes the most pronounced event in the ... chronology: a multi-decadal-length drought during the 2nd century," which "includes the unsmoothed record's driest 25-year interval (AD 148-173) as well as a longer 51-year period, AD 122-172, that has only two years with ring width slightly above the long-term mean," and where "the smoothed chronology shows the periods AD 77-282 and AD 301-400 are the longest (206 and 100 years, respectively, below the long-term average) droughts of the entire 2276-year record." And they note that this 2nd-century drought "impacted a region that extends from southern New Mexico north and west into Idaho." Noting that "reconstructed Colorado Plateau temperature suggests warmer than average temperature could have influenced both 2nd century and medieval drought severity," and that "available data also suggest that the Northern Hemisphere may have been warm during both intervals," Routson et al. go on to suggest that the southwestern United States could well experience similar or even more severe megadroughts in the future, as they suspect it will continue to warm in response to continued anthropogenic CO2 emissions. However, it should be duly noted that studies from all around the globe - which depict both a Medieval Warm Period and a Roman Warm Period that were equally as warm or even warmer than the Current Warm Period has been to date, and at times when there was way less CO2 in the atmosphere than there is today (see both of these items in our Topical Archive) - suggest that there is nothing unusual, unnatural or unprecedented about Earth's current level of warmth, and, in fact, that it must be significantly cooler now than it was during those two prior multi-century warm periods, since we have not yet experienced droughts of anywhere near the severity or duration of those that were experienced in the Roman and Medieval Warm Periods, which further suggests that the planet's current level of warmth is likely not a result of historical anthropogenic CO2 emissions, but rather a result of a milder expression of whatever was the cause of those two earlier stellar warm periods.

### Ext—Warming

#### The line between natural and man-made emissions is fuzzy and yearly CO2 levels are monitored

Joannenova, 11 ( joannenova.com, The article cites Professor Murry Salby who has worked at Macquarie University, the Australian Bureau of Meteorology. Princeton, the University of Colorado, and the US National Center for Atmospheric Research, along with various other institutions. He also wrote “Physics of the Atmosphere and Climate” and “Fundamentals of Atmospheric Physics”. “Blockbuster: Planetary temperature controls CO2 levels — not humans”, <http://joannenova.com.au/2011/08/blockbuster-planetary-temperature-controls-co2-levels-not-humans/>, 8/5/11, Accessed 7/11/11)

Judging by the speech Murry Salby gave at the Sydney Institute, there’s a blockbuster paper coming soon. Professor Murry Salby is Chair of Climate Science at Macquarie University. He’s been a visiting professorships at Paris, Stockholm, Jerusalem, and Kyoto, and he’s spent time at the Bureau of Meterology in Australia. Over the last two years he has been looking at C12 and C13 ratios and CO2 levels around the world, and has come to the conclusion that man-made emissions have only a small effect on global CO2 levels. It’s not just that man-made emissions don’t control the climate, they don’t even control global CO2 levels. The higher levels of CO2 in recent decades appear to be mostly due to natural sources. He presented this research at the [IUGG](http://www.iugg.org/) conference in Melbourne recently, causing great discussion and shocking a few people. Word reached the Sydney Institute, which rushed to arrange for him to speak, given the importance of this work in the current Australian political climate. The ratio of C13 to C12 (two isotopes of carbon) in our atmosphere has been declining, which is usually viewed as a signature of man-made CO2 emissions. C12 makes up 99% of carbon in the atmosphere (nearly all atmospheric carbon is in the form of CO2). C13 is much rarer — about 1%. Plants don’t like the rarer C13 type as much; photosynthesis works best on the C12 -type -of-CO2 and not the C13-type when absorbing CO2 from the air. Prof Salby points out that while fossil fuels are richer in C12 than the atmosphere, so too is plant life on Earth, and there isn’t a lot of difference (just 2.6%) in the ratios of C13 to C12 in plants versus fossil fuels. (Fossil fuels are, after all, made in theory from plants, so it’s not surprising that it’s hard to tell their “signatures” apart). So if the C13 to C12 ratio is falling (as more C12 rich carbon is put into the air by burning fossil fuels) then we can’t know if it’s due to man-made CO2 or natural CO2 from plants. Essentially we can measure man-made emissions reasonably well, but we can’t measure the natural emissions and sequestrations of CO2 at all precisely — the error bars are huge. Humans emits 5Gt or so per annum, but the oceans emit about 90Gt and the land-plants [emit] about 60Gt, for a total of maybe 150Gt. Many scientists have assumed that the net flows of carbon to and from natural sinks and sources of CO2 cancel each other out, but there is no real data to confirm this and it’s just a convenient assumption. The problem is that even small fractional changes in natural emissions or sequestrations swamp the human emissions. “It is often asserted that we can measure the human contribution of CO2 to the air by looking at the ratio of C12 to C13. The theory is that plants absorb more C12 than C13 (by about 2%, not a big signature), so we can look at the air and know which came from plants and which came from volcanos and which came from fossil fuels, via us. Plants are ‘deficient’ in C13, and so, then, ought to be our fossil fuel derived CO2. The implication is that since coal and oil were from plants, that “plant signature” means “human via fossil fuels”. But it just isn’t that simple. Take a look at the above chart. We are 5.5 and plants are putting 121.6 into the air each year (not counting ocean plants). There is a lot of carbon slopping back and forth between sinks and sources. Exactly how closely do we know the rate of soil evolution of CO2, for example?” Chiefio also found some interesting quotes pointing out that corn (a C4 plant) absorbs more C13, and our mass fields of corn might just muck up the stats… (it’s a good post). Suspiciously, when satellites record atmospheric CO2 levels around the globe they find that the sources don’t appear to be concentrated in the places we’d expect — industry or population concentrations like western Europe, the Ohio Valley, or China. Instead the sources appear to be in places like the Amazon Basin, southeast Asia, and tropical Africa — not so much the places with large human emissions of CO2! But CO2 is a well mixed gas so it’s not possible to definitively sort out the sources or sinks with CO2 measurements around the globe. The differences are only of the order of 5%. Instead the way to unravel the puzzle is to look at the one long recording we have (at Mauna Loa, in Hawaii, going back to 1959) and graph the changes in CO2 and in C13 from year to year. Some years from January to January there may be a rise of 0 ppmv (ie no change), some years up to 3 ppmv. If those changes were due to man-made CO2 then we should see more of those rapid increases in recent times as man-made emissions increased faster. The largest increases year-to-year occurred when the world warmed fastest due to El Nino conditions. The smallest increases correlated with volcanoes which pump dust up into the atmosphere and keep the world cooler for a while. In other words, temperature controls CO2 levels on a yearly time-scale, and according to Salby, man-made emissions have little effect. The climate models assume that most of the rise in CO2 (from 280 ppmv in1780 to 392 ppmv today) was due to industrialization and fossil fuel use. But the globe has been warming during that period (in fact since the depths of the Little Ice Age around 1680), so warmer conditions could be the reason that CO2 has been rising. Salby does not dispute that some of the rise in CO2 levels is due to man-made emissions, but found that temperature alone explains about 80% of the variation in CO2 levels. The up and coming paper with all the graphs will be released in about six weeks. It has passed peer review, and sounds like it has been a long time coming. Salby says he sat on the results for six months wondering if there was any other interpretation he could arrive at, and then, when he invited scientists he trusted and admired to comment on the paper, they also sat on it for half a year. His speech created waves at the IUGG conference, and word is spreading.

### 1NC—Hegemony

#### Heg unsustainable – multiple constraints ensure collapse

Christopher Layne, Chair in National Security at the School of Government and Public Service at Texas A&M University, 09 [“The Waning of U.S. Hegemony—Myth or Reality?: A Review Essay,” International Security, Vol. 34, No. 1, Summer 2009]

For an overview of trends that could affect international politics over the next two decades, a good starting point is the National Intelligence Council’s (NIC’s) Global Trends 2025: A Transformed World.[15](http://muse.jhu.edu.proxy.lib.umich.edu/journals/international_security/v034/34.1.layne.html" \l "f15) Global Trends 2025 is not light reading, but it is significantly more insightful and intellectually courageous than typical government reports. Its key geopolitical conclusion is that the U.S.-dominated unipolar world will give way to multipolarity during the next two decades spurred by two causal mechanisms: the emergence of new great powers (and potentially important regional powers); and economic, financial, and domestic political constraints that may erode U.S. capabilities. China, India, and possibly Russia are emerging great powers.[16](http://muse.jhu.edu.proxy.lib.umich.edu/journals/international_security/v034/34.1.layne.html" \l "f16) As Global Trends 2025 points out, the rise of China and India to great power status will restore each to “the positions they held two centuries ago when China produced approximately 30 percent and India 15 percent of the world’s wealth” (p. 7). Their ascent is being propelled by “the global shift in relative wealth and economic power” from North America and the Euro-Atlantic world to Asia—a shift “without precedent in modern history” (ibid.). By 2025, China figures to have the world’s second-largest economy (measured by gross domestic product [GDP]) and will be a first-rank military power (p. 30). India, buoyed by its strong economic growth rate, will “strive for a multipolar system with New Delhi as one of the poles” (ibid.). Although both states could encounter speed bumps that might slow—or even derail—their ascents to great power status, the NIC believes that the “chances are good that China and India will continue to rise” (p. 29).[17](http://muse.jhu.edu.proxy.lib.umich.edu/journals/international_security/v034/34.1.layne.html" \l "f17)**]** Because of uncertainties about economics, energy prices, domestic governance issues, and especially demography, Russia’s great power trajectory is more problematic than China’s or India’s (pp. 31–32).[18](http://muse.jhu.edu.proxy.lib.umich.edu/journals/international_security/v034/34.1.layne.html" \l "f18) Between 2009 and 2025, Russia’s population is forecast to drop from 141 million to below 130 million, affecting the availability of manpower for both the military and the labor pools (pp. 23–24, 30). If Russia overcomes its demographic challenge and continues its revival as a great power, however, the NIC believes it “will be a leading force in opposition to U.S. global dominance” (p. 32). Because its great power status is closely tied to its ability to control both the energy resources and pipelines of Central Asia and the Caucasus, Russia will also seek to reestablish its sphere of influence in the “near abroad” (pp. 32, 82). According to the NIC, in addition to relative decline, the United States will confront other constraints on its international role. U.S. military supremacy will no longer be as dominant as it has been since the Cold War’s end (p. 93). The United States’ soft power may diminish as its liberal model of political and economic development is challenged by authoritarian/statist alternatives (pp. 3, 8–9, 13–14). At home, economic and political constraints may undermine U.S. hegemony. Global Trends 2025 was published just before the full scope of the global financial and economic crisis became apparent. Nevertheless, the NIC did have an inkling of the meltdown’s potential long-term implications for U.S. power. In particular, Global Trends predicts that over the next two decades, the dollar’s role as the international economy’s preeminent reserve currency will erode. Although at the time this issue went to press, the dollar remained strong and will continue to be the reserve currency for some time to come, China’s spring 2009 call to replace the dollar with a new reserve currency signals that the NIC’s long-term worries may be justified.[19](http://muse.jhu.edu.proxy.lib.umich.edu/journals/international_security/v034/34.1.layne.html" \l "f19) **[End Page 153]** As the NIC observes, the financial privileges conferred on the United States by the dollar’s unchallenged reserve currency status have underpinned the preeminent role of the United States in international politics since the end of World War II. Thus, “the dollar’s decline may force the United States into difficult tradeoffs between achieving ambitious foreign policy goals and the high domestic costs of supporting those objectives” (pp. 12, 94, 97). Moreover, the growing dependence of the United States on foreign capital inflows “may curtail U.S. freedom of action in unanticipated ways” (p. 97). The NIC concludes that America’s “interest and willingness to play a leadership role may be more constrained as the economic, military, and opportunity costs of being the world’s leader are reassessed by American voters” (p. 93). Ultimately, although the United States will probably be primus inter pares in a multipolar international system twenty years from now, it will have less power—and foreign policy options—than it has been accustomed to having since 1945 (ibid.).

#### No challengers to competitiveness dominance

Qian 08—reporter of Yale Global [Jiang, February 29th, Is the Sun Setting on US Dominance? – Part II, http://yaleglobal.yale.edu/display.article?id=10435

The proponents of such a "multipolar worldview" often confuse the immense potential of their favored giants with their actual influences. They often overlook the immense internal difficulties these rising giants must overcome to realize their potential. Most importantly, they do not take full account of the strategic interactions between these giants during their simultaneous rise and the strategic opportunities that such interactions present for the US. Among the rising powers, the European Union boasts by far the largest economy, with a strong currency and a comparatively large and prosperous population. However, after a long drive of expansion, Europe faces a serious cohesion problem. It still suffers from a weak security framework that's dependent on NATO and a legalistic rather than executive center in Brussels. Although the EU does chase strategic interests in its proximities such as the central Asia and North Africa, it does so, not for any overreaching vision to compete globally, but mostly for parochial economic reasons. Europe is not yet competing in any "Great Game," for the simple reason that Europe is not yet unified. Recent rejections of the EU constitution show that serious resistance remains towards further integration. After recent stabilization of its economy, a resurgent Russia is often mentioned as a future global power. However, Russia faces severe long-term internal challenges. Its population is declining and aging, its vast Siberia territories hollowing out after the end of Soviet subsidies. Extractive industries such as hydrocarbon, mining and timber account for 80 percent of Russia's exports and 30 percent of its government revenue, whereas its manufacturing industries are mostly outdated and uncompetitive.Russia therefore will have serious issues with its self-image as a major world power, finding it hard to forge an assessment of its global role commensurate with its long-term demographic and economic realities. Japan has a similar problem of updating its self-image as the most "advanced" nation in Asia for more than 100 years. Today Japan faces the harsh reality that, after its neighbors catch up, Japan will again find itself a geographically small, resource-poor island nation dependent on trade, living uneasily among large, populous continental neighbors. It has a largely pacifist, prosperous population in a neighborhood still rife with nationalism.Unlike Europe, East Asia has yet to extinguish historical grievances, border disputes and a taste for raw national powers. As Japan itself proved, economic rises, once initiated, can be rapid indeed, so its current economic strength does not guarantee its future influence. Furthermore, barring a rapid re-militarization, Japan's growth in national strengths is bound to be slower than that of its still maturing neighbors, therefore its relative strategic position in East Asia will only grow weaker. Either re-militarization or an erosion of its self-perceived leadership in the region is likely to require a profound reassessment of Japan's postwar consensus of national purposes. India sees itself as an up-and-coming power, proud to be a democracy yet simultaneously aspiring to more traditional "hard" powers. As a diverse and still poor country, it faces immense internal challenges. Its manufacturing base and infrastructure need major overhaul. Beyond these, India is limited by its geographical constraint in the South Asia and the thorn in its side that’s Pakistan. Sandwiched between Pakistan, Burma and the Himalayas, India’s ambition beyond the subcontinent could not blossom until its geographical perimeter is secured. China borders three of the ambitious giants – India, Russia and Japan. China's neighborhood is far tougher than that of either Europe or the US. Like India, China is a large, poor country rife with internal tensions. Unlike Europe or America, its current form of government does not enjoy wide ideological appeal. Compared with Russia’s or even Japan’s, its military is still modernizing. It has recently become fashionable in America and Europe to describe Chinese "expansions" in Africa and South America. But the evidence is mostly economic deals over raw materials. This is not expansionism, but mercantilism. China is indeed playing an active geopolitical game in its immediate environment: Southeast Asia, Central Asia and Korea Peninsula. But this only serves to show that China is still mired in local complexities.

#### And, Heg collapse doesn’t cause global nuclear war

Richard Haas (president of the Council on Foreign Relations, former director of policy planning for the Department of State, former vice president and director of foreign policy studies at the Brookings Institution, the Sol M. Linowitz visiting professor of international studies at Hamilton College, a senior associate at the Carnegie Endowment for International Peace, a lecturer in public policy at Harvard University’s John F. Kennedy School of Government, and a research associate at the International Institute for Strategic Studies) April 2008 “Ask the Expert: What Comes After Unipolarity?” <http://www.cfr.org/publication/16063/ask_the_expert.html>

Does a non polar world increase or reduce the chances of another world war? Will nuclear deterrence continue to prevent a large scale conflict? Sivananda Rajaram, UK Richard Haass: I believe the chance of a world war, i.e., one involving the major powers of the day, is remote and likely to stay that way. This reflects more than anything else the absence of disputes or goals that could lead to such a conflict. Nuclear deterrence might be a contributing factor in the sense that no conceivable dispute among the major powers would justify any use of nuclear weapons, but again, I believe the fundamental reason great power relations are relatively good is that all hold a stake in sustaining an international order that supports trade and financial flows and avoids large-scale conflict. The danger in a nonpolar world is not global conflict as we feared during the Cold War but smaller but still highly costly conflicts involving terrorist groups, militias, rogue states, etc.

### Ext—Hegemony

#### America is too awesome – Other countries can’t even eat on the same plate

The Economist 08 (“What crisis? Innovation” June 14, 2008, U.S. Edition. Lexis)

Worries that America is losing its edge in science and technology are overblown "THE wolves have not encircled us yet," the Denver Post opined in an article in 2006 entitled "Signs America's Scientific Edge is Slipping", "but there's no denying the sounds of scratching at the door."This was a pithy summary of a mountain of reports from congressional committees, scientific panels and business groups. But a new report from the RAND Corporation's National Defence Research Institute, "US Competitiveness in Science and Technology", suggests that the panic is overblown. The report demonstrates that America is still the world's science and technology powerhouse. It accounts for 40% of total world spending on research and development, and produces 63% of the most frequently cited publications. It is home to 30 of the world's leading 40 universities, and employs 70% of the world's living Nobel laureates. America produces 38% of patented new technologies in the OECD and employs 37% of the OECD's researchers. There is little evidence that America is resting on its laurels, according to RAND. Developing countries such as China and India may be boosting their science and technology muscle faster than America. But they are starting from a low base. America is outperforming Europe and Japan on many performance measures: in 1993-2003 America's growth rate in patents averaged 6.6% a year compared with 5.1% for the European Union and 4.1% for Japan. One reason for America's angst was that the growth of federal spending on R&D slowed significantly with the end of the cold war. It only grew by 2.5% a year in 1994-2004 compared with a long-term average of 3.5% since 1953. The trouble with this statistic is that America has lots of sources of R&D spending: federal money accounted for only $86 billion of the $288 billion that it spent on R&D in 2004. Spending on the life sciences is increasing rapidly, a reasonable bet on the future. Others worry that non-US citizens now account for 41% of science and engineering PhDs. But this is arguably a sign of America's continuing world domination: the world's brightest people are gravitating to the world's best opportunities. A higher proportion than ever of these paragons want to make their homes in the United States.

#### Decline is inevitable – heg is economically unsustainable

Layne, 09 – Mary Julia and George R. Jordan Professor of International Affairs at Texas A&M's George Bush School of Government and Public Service, Ph.D. in Political Science from the University of California, LL.M. in International Law from Virginia Law, J.D. from USC, and Research Fellow with the Center on Peace and Liberty at The Independent Institute (Christopher, "The Waning of U.S. Hegemony—Myth or Reality? A Review Essay", International Security, Vol. 34, No. 1, Summer 2009, July 6th 2010, Galileo, p. 21-23) PDF

The publications reviewed in this essay examine whether the United States is in (or is headed for) relative decline.74 Brooks and Wohlforth purport to deny the possibility that America is in relative decline, but a growing number of analysts disagree.75 The long-term impact of the current economic crisis largely will determine who is right (and to be fair, Brooks and Wohlforth wrote their book before its effects became evident). Yet, even before the meltdown, longterm structural weaknesses that have been accumulating for more than three decades were causing U.S. economic power to wane.76 The warning signs with respect to U.S. decline are a looming fiscal crisis and doubts about the future of the dollar as the reserve currency, both of which are linked to the fear that after recovery, the United States will face a serious inflationary threat.77 Optimists contend that once the United States recovers, fears of a fiscal crisis will fade: the country faced a larger debt to GDP ratio after World War II, and yet embarked on a sustained era of growth. The postwar era, however, was a golden age of U.S. industrial and financial dominance, trade surpluses, and sustained high growth rates. The United States of 2009 is far different from the United States of 1945, however, which is why many economists believe that even in the best case, it will emerge from the current crisis with serious macroeconomic handicaps.78 Chief among these handicaps are the increase in the money supply (caused by the massive amount of dollars the Federal Reserve and Treasury have pumped into circulation to rescue the economy), and the $1 trillion plus budget deficits that the Brookings Institution and the Congressional Budget Office (CBO) project the United States will incur for at least a decade.79 When the projected deficits are bundled with the persistent U.S. current account deficit, the entitlements overhang, and the cost of two ongoing wars, there is reason to worry about the United States’ longterm fiscal stability.80 The CBO states, “Even if the recovery occurs as projected and the stimulus bill is allowed to expire, the country will face the highest debt/GDP ratio in 50 years and an increasingly urgent and unsustainable fiscal problem.”81 If the Congressional Budget Office is right, it spells trouble ahead for the dollar. As Jonathan Kirshner noted on the eve of the meltdown, the dollar’s vulnerability “presents potentially significant and underappreciated restraints upon contemporary American political and military predominance.”82 The dollar’s loss of reserve currency status would undermine U.S. dominance, and recent events have magnified concerns that predated the financial and economic crisis. 83 First, the other big players in the international economy now are either military rivals (China) or ambiguous “allies” (Europe) that have their own ambitions and no longer require U.S. protection from the Soviet threat. Second, the dollar faces an uncertain future because of concerns that its value will diminish over time. Because of these two factors, as Eric Helleiner notes, if the dollar experiences dramatic depreciation in the future, there is a “risk of defections generating a herd-like momentum” away from it.84

#### U.S hegemony is unsustainable

Snyder PhD, Professor of Public Policy at the University of Maryland 2010 – [Quddus Z. Snyder, “Systermic theory in an era of declining US hegemony,” <http://www.bsos.umd.edu/gvpt/irworkshop/papers_fall09/snyder.pdf>]

At the turn of the century it appeared as if we were living through a ‘hegemonic age.’ But recent developments might justify a reevaluation of this conclusion. With its armed forces over-extended, and resources stretched, the US appears much weaker today than it did five years ago. The classic Gilpinian dilemma provides insight into the present predicament the US finds itself in: This three-way struggle over priorities (protection, consumption, and investment) produces a profound dilemma for society. If it suppresses consumption, the consequence can be severe internal social tensions and class conflict…If the society neglects to pay the costs of defense, external weakness will inevitably lead to its defeat by rising powers. If the society fails to save and reinvest a sufficient fraction of its surplus wealth in industry and agriculture, the economic basis of the society and its capacity to sustain either consumption or protection will decline. Thus far the US has maintained a massive defense budget while consumption and investment have been sustained by deficit spending. It is unclear how long this formula will work. The problem does not only stem from fact that the US is bogged down in two wars, it is also in the throes of a serious economic downturn. Of course, everyone is getting hit. Because all are suffering, the US is still a giant in terms of relative power differentials. Relative power is important, but so is the hegemon’s ability to actually do things. It is unlikely that the US will have either the political will or capability to take on major international undertakings. It is unclear when the US will fully withdraw from Iraq and Afghanistan; however, these projects will gobble up massive amounts of resources and treasure at a time when America’s own recovery is being partly bankrolled by foreign powers like China**.**43 The point is simply that America’s unilateral assertiveness on the international scene is changing. US security guarantees may prove less credible than they once were, leading allies to enhance their own military capabilities. The US may still be a giant, but one that, for now at least, seems more bound.

#### Hegemony doesn’t prevent war

Christopher Layne (Associate Professor in the Bush School of Government and Public Service at Texas A&M University) 2006 “The Peace of Illusions” p 176-7

A second contention advanced by proponents of American hegemony is that the United States cannot withdraw from Eurasia because a great power war there could shape the post conflict international system in ways harmful to U.S. interests. Hence, the United States "could suffer few economic losses during a war, or even benefit somewhat, and still find the postwar environment quite costly to its own trade and investment."sa This really is not an economic argument but rather an argument about the consequences of Eurasia's political and ideological, as well as economic, closure. Proponents of hegemony fear that if great power wars in Eurasia occur, they could bring to power militaristic or totalitarian regimes. Mere, several points need to be made. First, proponents of American hegemony overestimate the amount of influence that the United States has on the international system. There are numerous possible geopolitical rivalries in Eurasia. Most of these will not culminate in war, but it's a good bet that some will. But regardless of whether Eurasian great powers remain at peace, the outcomes are going to be caused more by those states' calculations of their interests than by the presence of U.S. forces in Eurasia. The United States has only limited power to affect the amount of war and peace in the international system, and whatever influence it does have is being eroded by the creeping multipolarization under way in Eurasia. Second, the possible benefits of "environment shaping" have to be weighed against the possible costs of U.S. involvement in a big Eurasian war. Finally, distilled to its essence, this argument is a restatement of the fear that U.S. security and interests inevitably will be jeopardized by a Eurasian hegemon. This threat is easily exaggerated, and manipulated, to disguise ulterior motives for U.S. military intervention in Eurasia.

### 1NC—Electric Cars

#### First, Turn—Electric Cars make warming worse

#### A. Electric cars increase carbon emissions – studies prove

Moore 10 (Margery, “Electric car use may increase carbon emissions”, 6/23/10, http://www.energyboom.com/transportation/electric-car-use-may-increase-carbon-emmissions, Accessed 7/11/12)

New reports suggest that increased use of electric cars may in some areas of the US actually increase carbon emissions. Just when you thought we were on to something that might actually help! Earlier this year, Business Ethics piblished the article, 'Will More Electric Cars Increase Reliance on Coal?' In the article, they report that "upwards of half of all the electricity in the U.S. is derived from coal." The implications of this are clear, **plugging in your electric car will mean it will more than likely be charged by electricity from coal.** And as more electric cars come on the market, maybe more coal will be needed. Similarly, a very interesting article, with great graphics, appreared in a recent issue of Scientific America; it is entitled, "The Coal Truth: Will the Coming Generation of Electric Cars Just Be Coal-Burners, Once Removed?" The article has a map of the USA that clearly illustrates exactly where increase in electric car use could result in higher carbon emissions. The article also indicates that unless we start to source significant amounts of electricity from renewables (solar, wind, etc.), coal-fired plants will not only continue but may actually increase their discharges of mercury, carbon dioxide and other toxins due to greater numbers of electric cars on the road. And we know that many car makers are investing in electric cars. From Ford's all-electric Focus to Nissan's Leaf, to Chevy's Volt, and that does not even include electric vehicle startups like Tesla, Coda, and Fisker. So, that begs the question, where can we buy a solar powered car, right now? Best I could find, in 2006, the Venturi Eclectic was presented at the Paris Auto Show and uses solar and wind energy, but it can only travel up to 30 miles per hour. Probably won't cut it for most North Americans.

#### B. Electric car use is a key contributor to the acceleration of global warming

Ecoworld 11 ( “Electric Cars Would Cause Added CO2 Emissions in Certain Countries”, httpy://www.ecoworld.com/global-warming/electric-cars-would-cause-added-co2-emissions-in-certain-countries.html, 1/6/11)

Electric cars are commonly hailed as eco-friendly alternatives to harmful gasoline-burning vehicles, but a study by Oxford University’s Reed Doucette and Malcolm McCulloch suggests that **the adoption of electric cars may actually accelerate global climate change**. The results of the modeling exercise, which were published in Energy Policy last Fall, indicate that developing countries would emit more, not less, CO2 if electric cars were to eclipse gas-based vehicles. Researchers assessed the emissions of battery electric vehicles (BEVs) and internal combustion engines (ICEs) in various countries. They found that countries with high CO2 intensities – like China and India – failed to see a decrease in heat-trapping gases from the adoption of BEVs. **China and India rely on dirty power supplies, so the generation of energy for BEVs would still be environmentally harmful,** and could actually lead to higher CO2 emissions. “Given the state of their power generation mixes in 2010, the case for widespread adoption of [electric vehicles] in both China and India solely on the basis of potential CO2 emissions reductions is not too compelling, especially when the generally higher capital cost of [electric vehicles] relative to [gasoline]-based vehicles is considered,” Doucette and Malcolm McCulloch concluded.

#### Second, No electric car use for 12 years

Mother Jones 8 [Independent American news organization, “The 7 myths about Energy Independence,” http://motherjones.com/politics/2008/05/seven-myths-energy-independence, May/June 2008)

Given America's reliance on imported oil, it seems safe to assume that if we succeeded in getting such dramatic reductions, whatever sacrifices we'd made would be more than compensated for by our new immunity to the nastiness of world oil markets. Let Saudi Arabia cut its production. Let Hugo Chávez sell his oil to China. Such maneuvers no longer matter to Fortress America. And yet, no country can really hope to improve its energy security by acting alone. True, cutting our own oil use would bring great things here at home, everything from cleaner air and water to lower noise pollution. But we'd be surprised by how little our domestic reductions changed the rest of the world--or improved our overall energy security. The first problem, once again, is the small-planet nature of energy. America may be the biggest user of oil, but the price we pay is determined by global demand, and demand is being driven largely by booming Asia, which is only too happy to bum any barrel we manage to conserve or replace. Second, any shift to alternatives or better efficiency will take years and perhaps decades to implement. The U.S. car fleet, for example, turns over at a rate of just eight percent a year. That's as fast as consumers can afford to buy new cars and manufacturers can afford to make them, which means that—even in a fantasy scenario where the cars were already designed, the factories retooled, and the workers retrained--it would still take 12 years to deploy a greener fleet.

#### Third, People won’t buy electric cars

Forbes 11 [American media/publishing company, “Electric Cars are An Extraordinarily Bad Idea,” http://www.forbes.com/sites/louiswoodhill/2011/09/14/electric-cars-are-an-extraordinarily-bad-idea/, 9/14/11,)

Unfortunately, electric cars are about to do a barrier crash into economic reality, and all the airbags in the world won’t be able to save them. The taxpayers’ $2.4 billion is destined to join Obama’s $535 million investment in solar-panel manufacturer Solyndra at the bottom of the crony-capitalism “stimulus” rat hole. The Nissan Leaf is the first mass-produced “battery electric vehicle” (BEV). It uses state-of-the-art lithium batteries. Despite this, the Leaf makes no sense at all. It costs more than twice as much ($35,430 vs. $17,250) as a comparable Nissan Versa, but it is much less capable. The Leaf accelerates more slowly than a Versa and has only about 25% of the range. At $0.11/KWH for electricity and $4.00/gallon for gasoline, you would have to drive the Leaf 164,000 miles to recover its additional purchase cost. Counting interest, the miles to payback is 197,000 miles. Because it is almost impossible to drive a Leaf more than 60 miles a day, the payback with interest would take more than nine years. However, cost is not the biggest problem with BEVs. On Wednesday, Jan. 26 a major snowstorm hit Washington D.C. Ten-mile homeward commutes took four hours. If there had been a million electric cars on American roads at the time, every single one of them in the DC area would have ended up stranded on the side of the road, dead. And, before they ran out of power, their drivers would have been forced to turn off the heat and the headlights in a desperate effort to eek out a few more miles of range. This illustrates the biggest drawback of BEVs, which is not range, but refueling time. A few minutes spent at a gas station will give a conventional car 300 to 400 miles of range. In contrast, it takes 20 hours to completely recharge a Nissan Leaf from 110V house current. An extra-cost 240V charger shortens this time to 8 hours. There are expensive 480V chargers that can cut this time to 4 hours, but Nissan cautions that using them very often will shorten the life of the car’s batteries. No doubt some conventional cars ran out of gas while trapped in the massive traffic jams that occurred in and around the nation’s capital the night of January 26. However, a two-gallon can of gasoline can get a stalled conventional car moving again in a few minutes. In contrast, every dead BEV would have had to be loaded on flatbed tow truck and taken somewhere for many hours of recharging before it could be driven again. Nissan claims that the range of a Leaf is about 100 miles. However, in their three-month extended road test, Car and Driver magazine obtained an average range from a full charge of 58 miles. Cold weather and fast driving can shorten this to as little as 30 miles. The short and highly variable range of a BEV, coupled with its very long recharging time, creates the phenomenon of “range anxiety”. The car takes over your life. You are forced to plan every trip carefully, and to forgo impromptu errands in order to conserve precious electrons. And, when you are driving your BEV, you are constantly studying the readouts worrying about whether you are going to make it through the day. Reviews of the Leaf are filled with accounts of drivers turning off the A/C in the summer and the heat in the winter. Some drivers even decided that they couldn’t risk charging their cell phones, using the radio, or turning on the windshield wipers. Between subsidies and fuel economy mandates, the federal government may be able to force auto companies to manufacture 1,000,000 electric cars by 2015. However, it won’t be able to force people to buy them. As the economics and operating characteristics of BEVs become more widely understood, interest in BEVs will wane

#### Fourth, Electric cars are expensive and impractical – no shift

Scientific American 11

[science magazine, "Why electric cars will fail and have already triumphed," 5/20/11, http://blogs.scientificamerican.com/observations/2011/05/20/why-electric-cars-will-fail-and-have-already-triumphed

Such efficiency is a key selling point for electric cars like the Tesla—one buyer in Tesla’s New York City showroom was there to upgrade from a Prius. But electric cars face an extremely difficult simple physics problem: a lithium ion battery can hold 0.72 megajoule per kilogram, which is why the Roadster packs nearly 7,000 lithium ion cells into its battery pack. A kilogram of gasoline holds 35 megajoules. And plenty of expensive oil remains around the globe to feed our internal combustion machines for years to come. Pair that with the vast distances often traversed by the average American motorist—a tank of gas will take you from St. Louis to Chicago, for example, while a cost-effective battery that’s also small enough and light enough to perform a similar trip does not yet exist—and it becomes more clear why electric cars have been killed, again and again, starting in the late 1800s. The Roadster also demonstrates another major hurdle facing electric cars—price. At more than $100,000, the Roadster is a car only for those who can otherwise afford a Ferrari or some other high-end sports car. Hence the fact that roughly 1,700 of them are in private hands in 44 states and 30 countries around the world. Tesla is currently developing its Model S, which will join the Nissan LEAF and Chevy Volt as the family friendly electric cars on the road next year. Yet, all of them cost more than $30,000` per car without any incentives.

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#### Electric cars fail- battery life, distance, and cost

Woodhill 11 (Louis Woodhill, Contributor to Forbes, "Electric Cars Are An Extraordinarily Bad Idea", www.forbes.com/sites/louiswoodhill/2011/09/14/electric-cars-are-an-extraordinarily-bad-idea/, 9/14/11, Accessed 7/17/12, KW)

Unfortunately, electric cars are about to do a barrier crash into economic reality, and all the airbags in the world won’t be able to save them. The taxpayers’ $2.4 billion is destined to join Obama’s $535 million investment in solar-panel manufacturer Solyndra at the bottom of the crony-capitalism “stimulus” rat hole. The Nissan Leaf is the first mass-produced “battery electric vehicle” (BEV). It uses state-of-the-art lithium batteries. Despite this, the Leaf makes no sense at all. It costs more than twice as much ($35,430 vs. $17,250) as a comparable Nissan Versa, but it is much less capable. The Leaf accelerates more slowly than a Versa and has only about 25% of the range. At $0.11/KWH for electricity and $4.00/gallon for gasoline, you would have to drive the Leaf 164,000 miles to recover its additional purchase cost. Counting interest, the miles to payback is 197,000 miles. Because it is almost impossible to drive a Leaf more than 60 miles a day, the payback with interest would take more than nine years. However, cost is not the biggest problem with BEVs. On Wednesday, Jan. 26 a major snowstorm hit Washington D.C. Ten-mile homeward commutes took four hours. If there had been a million electric cars on American roads at the time, every single one of them in the DC area would have ended up stranded on the side of the road, dead. And, before they ran out of power, their drivers would have been forced to turn off the heat and the headlights in a desperate effort to eek out a few more miles of range. This illustrates the biggest drawback of BEVs, which is not range, but refueling time. A few minutes spent at a gas station will give a conventional car 300 to 400 miles of range. In contrast, it takes 20 hours to completely recharge a Nissan Leaf from 110V house current. An extra-cost 240V charger shortens this time to 8 hours. There are expensive 480V chargers that can cut this time to 4 hours, but Nissan cautions that using them very often will shorten the life of the car’s batteries. No doubt some conventional cars ran out of gas while trapped in the massive traffic jams that occurred in and around the nation’s capital the night of January 26. However, a two-gallon can of gasoline can get a stalled conventional car moving again in a few minutes. In contrast, every dead BEV would have had to be loaded on flatbed tow truck and taken somewhere for many hours of recharging before it could be driven again. Nissan claims that the range of a Leaf is about 100 miles. However, in their three-month extended road test, Car and Driver magazine obtained an average range from a full charge of 58 miles. Cold weather and fast driving can shorten this to as little as 30 miles.

**CO2 emissions generated during battery manufacturing outweighs that of gas cars- means the *aff* specifically hurts warming**

Webster 11 (Ben Webster, consultant for Toyota at Hothouse Interactive, "Electric cars may not be so green after all, says British study", www.theaustralian.com.au/news/health-science/electric-cars-may-not-be-so-green-after-all-says-british-study/story-e6frg8y6-1226073103576, 6/10/11, Accessed 7/20/12, KW)

ELECTRIC cars could produce higher emissions over their lifetimes than petrol equivalents because of the energy consumed in making their batteries, a study has found. An electric car owner would have to drive at least 129,000km before producing a net saving in CO2. Many electric cars will not travel that far in their lifetime because they typically have a range of less than 145km on a single charge and are unsuitable for long trips. Even those driven 160,000km would save only about a tonne of CO2 over their lifetimes. The British study, which is the first analysis of the full lifetime emissions of electric cars covering manufacturing, driving and disposal, undermines the case for tackling climate change by the rapid introduction of electric cars. The Committee on Climate Change, the UK government watchdog, has called for the number of electric cars on Britain's roads to increase from a few hundred now to 1.7 million by 2020. Britain's Department for Transport is spending $66 million over the next year giving up to 8,600 buyers of electric cars a grant of $7700 towards the purchase price. Ministers are considering extending the scheme. The study was commissioned by the Low Carbon Vehicle Partnership, which is jointly funded by the British government and the car industry. It found that a mid-size electric car would produce 23.1 tonnes of CO2 over its lifetime, compared with 24 tonnes for a similar petrol car. Emissions from manufacturing electric cars are at least 50 per cent higher because batteries are made from materials such as lithium, copper and refined silicon, which require much energy to be processed. Many electric cars are expected to need a replacement battery after a few years. Once the emissions from producing the second battery are added in, the total CO2 from producing an electric car rises to 12.6 tonnes, compared with 5.6 tonnes for a petrol car. Disposal also produces double the emissions because of the energy consumed in recovering and recycling metals in the battery. The study also took into account carbon emitted to generate the grid electricity consumed. Greg Archer, director of Low CVP, said the industry should state the full lifecycle emissions of cars rather than just tailpipe emissions, to avoid misleading consumers. He said that drivers wanting to minimise emissions could be better off buying a small, efficient petrol or diesel car. “People have to match the technology to their particular needs,” he said.

**Lithium crunch means electric car battery production will shortfall by 2017**

Morrissey 11 (Ed Morrissey is an American conservative blogger, columnist, motivational speaker, and talk show host. His opinion articles have appeared in the New York Sun, the New York Post, and the Daily Standard. "Electric cars not so green after all?", hotair.com/archives/2011/06/13/electric-cars-not-so-green-after-all/, 6/13/11, Accessed 7/20/12, KW)

Where do we plan to put all of the dead batteries that will necessarily have to be discarded? Some (but not all) components can be recycled, and those elements which must be disposed are not terribly eco-friendly, depending on the kind of batteries made. Lithium ion seems to be the direction most car manufacturers are heading, which poses fewer disposal risks to the environment — but still poses risks in mining and manufacturing, especially to groundwater. Lithium also poses another blow to the argument for the electric car — its domestic availability. Eighty-five percent of the known reserves are inBolivia, Chile, and China, and lithium is not the only element needed for large-scale production of car battery systems. Large flake graphite is also needed, and China controls 80 percent of the market, along with other “rare earth” elements. Far from ending our dependence on foreign resources, we will merely exchange our dependence from the Middle East to China, which is not exactly an encouraging thought for our future. Even if we did have these elements in abundance, we would need to mine and drill for them. Those are precisely the activities that environmentalists and short-sighted government policies have been blocking for decades in coal, oil, shale, and natural gas. Besides, “peak lithium” may arrive long before “peak oil,” as the Argonne National Laboratory estimates that we only have enough lithium available to manufacture car batteries through 2050 — less than 40 years from now. A lithium “crunch” could occur by 2017 — which also hardly lends confidence to the reliability of the electric car as a long-term solution. We would have to do extensive mining somewhere to get the materials necessary to manufacture the batteries, most likely overseas, which makes us more dependent on foreign energy, not less so. Instead of putting us even further at the mercy of foreign countries for our transportation and energy needs, why not just convert to natural gas? The technology for natural-gas vehicles has been around for decades, and it burns cleanly while giving drivers a normal range for their cars. Natural gas is an abundant resource in the US, which would require less work to extract than the metals needed for a massive expansion of battery manufacturing, and would make the US much more self-reliant for energy. It also requires much less effort to transform into consumer-ready energy than either lithium (which still requires electrical charging and recharging) or gasoline, which requires heavy refining, with its own environmental issues. If we want the most “green” solution for mass-produced energy in personal transportation, the answer is natural gas, not electric vehicles. That wouldn’t need overwhelming federal subsidies for decades to give the illusion of competitiveness, either.

### 1NC—Military Use

#### No link – no evidence that the military would use solar highways – only evidence is an engineer who says solar roadways COULD be used for military purposes, not that they would be – the affirmative can’t solve for military emissions

#### The Brusaw evidence is terrible – military wont use solar highways and certainly wont switch over 100% -- doesn’t solve

#### Alt Causes to Warming -- Fixing all transportation emissions only solves for 3.4% of global emissions – Military emissions are only a subset of that

## The Grid

### 1NC—The Grid

#### No impact to terrorists or solar storms- The GRID Act is already securing our grid from these threats

Schewe 10 (Phillip Schewe, ISNS, Phys.org, "Plans to Secure Power Grid From Terrorists, Solar Storms", phys.org/news195752582.html, 6/14/10, Accessed 7/18/12, KW)

Electricity is all around us. It lifts elevators, pumps gas, lights rooms, cooks food, and even powers a growing fleet of cars. We generally take the vast electric grid for granted until it turns off. Only then do we realize how important it is. Blackouts owing to technical foul-ups are bad enough, but new hazards, some malicious and some from nature, threaten to create electrical disturbances on an unprecedented scale. New legislation, passed June 9 by the U.S. House of Representatives and referred to the Senate's Energy and Natural Resources committee, hopes to strengthen the grid’s robustness against attacks of many kinds. The immediate aim of the Grid Reliability and Infrastructure Defense Act is to direct the Federal Energy Regulatory Commission, the main federal agency responsible for electricity matters, to establish security rules for utilities and other energy companies. The GRID Act amends the old power law by recognizing several threats to the grid. One of these is an attack that tampers with grid computer control systems. Some utilities report fending off thousands of such cyber-attacks per day. Another is infrequent but potent geomagnetic storms, which can happen when eruptions of material from the sun send cascades of particles into Earth's atmosphere. These particles can cause beautiful auroral displays ("northern lights"), but can burn out the wiring in orbiting satellites and induce short-lived but large voltage surges in grid equipment on the ground. Past such storms have burned out expensive equipment and left millions in the dark. A carefully detonated nuclear bomb could emit radiation pulses that could do some of the same damage. "The electric grid's vulnerability to cyber and other attacks is one of the single greatest threats to our national security," said Rep. Edward Markey, D-Mass., chairman of the Energy and Environment subcommittee and one of the sponsors of the bill. "Every one of our nation’s critical systems -- defense, water, healthcare, telecommunications, transportation, law enforcement, and financial services -- depends on the grid. This bipartisan legislation is critical to protecting the United States against this emerging threat." One of the chief fears addressed by the GRID Act is that a major power outage might be long-lasting, especially if critical components were affected. Even "a small disruption in the power supply can wreak havoc on our economy, while an extended blackout of months would be catastrophic," said Rep. Fred Upton, R- Mich., another sponsor of the bill. The GRID Act stipulates that energy companies take more precautions to guard against the highlighted threats. This would include having more spare parts on hand to deal with breakdowns. Transformers, the bulky devices that change electricity from one voltage to another, are particularly vulnerable to disturbances. Companies might pool their resources, and if necessary pass along the cost of extra equipment directly to consumers. The act also creates a category of "protected" technology security information that is exempt from the Freedom of Information Act, the better to foil those who would plan terror attacks on the grid.

#### Nearly impossible to black out the power grid- hurricanes, physics prove

Brown 10 )Joshua E. Brown, staff writer at the University of Vermont, “Study: It's Hard to Bring Down the Electric Grid”, http://www.uvm.edu/~uvmpr/?Page=News&storyID=17119, 10/8/10, Accessed 7/14/12)

An important implication of Hines's work, funded by the National Science Foundation, is that electric grid is probably more secure that many people realize -- because it is so unpredictable. This, of course, makes it hard to improve its reliability (in another line of research, Hines has explored why the rate of blackouts in the United States hasn't improved in decades), but the up-side of this fact is that it would be hard for a terrorist to bring large parts of the grid down by attacking just one small part. "Our system is quite robust to small things failing -- which is very good," he says, "Even hurricanes have trouble taking out power systems. Hurricanes do cause power system failures, but they don't often take out the whole system." Blumsack agrees. "Our paper confirms that it would be possible for somebody who wanted to do something disruptive to the power grid to do so," he says. "A lot of the infrastructure is out in the open," which does create vulnerability to planned attack. "But if you wanted to black out half of the U.S., it will be much more difficult than some of these earlier models imply," he says. "If you were a bad guy, there is no obvious thing to do to take out the power system," Hines says. "What we learned from doing the simulations is that if you take out the biggest substation, with the most flow, you get the biggest failure on average. But there were also a number of cases where, even if you took out the biggest one, you don't get much of a blackout." "It takes an incredible amount of information," he says, "to really figure out how to make the grid fail."

#### Impacts to solar flares are empirically denied

Huffington Post 9-7 (Huffington Post, “Solar Flare Unlikely to Cause Problems, National Weather Service Says,” <http://www.huffingtonpost.com/2011/09/07/solar-flare-national-weather-service_n_952946.html>)

WASHINGTON -- Forecasters say a new solar flare should provide only a glancing blow on Earth on Friday and is unlikely to cause any problems. The National Weather Service's Space Weather Prediction Center says northern lights may be slightly more visible, but there should be no radio, satellite or electrical grid disruptions. They say the flare that erupted from a sunspot Tuesday is fairly big, but most of it will miss Earth, going far above the planet. Senior forecaster Norm Cohen said the flare should arrive around 1:30 p.m. EDT Friday, but is nothing to worry about.

#### The coming storm won’t be large and status quo measures solve

Gary 10 (Stuart “Solar max claims 'overstated': expert,” <http://www.abc.net.au/science/articles/2010/08/27/2995543.htm>)

Australia's leading body responsible for monitoring space weather has dismissed claims that a massive solar storm could "wipe out the Earth's entire power grid". One report quotes an Australian astronomer as saying "the storm is likely to come sooner rather than later". But Dr Phil Wilkinson, assistant director with the Australian Bureau of Meteorology's Ionospheric Prediction Service, says claims that this coming solar maximum will be the most violent in 100 years are not factual. "All this talk about gloom and doom has selling power, but I'm certain it's overstated," says Wilkinson. "[It's] going far beyond what's realistic and could be worrying or concerning for people who don't really understand the underlying science behind it all." "The real message should be that the coming solar maximum period could be equally as hazardous as any other solar maximum." 11-year cycle The Sun goes through an 11-year solar cycle moving from a period of low activity called solar minimum to a time of heightened activity called solar maximum. During solar maximum there's an increase in sun spot activity, which are dark patches on the Sun's surface caused by magnetic field lines breaking through from deep below. Because the Sun isn't a solid object like the Earth, different parts of the Sun rotate at different speeds, which cause these field lines to twist and stretch, eventually snapping like elastic bands. When they snap they produce an eruption of electromagnetic energy called a solar flare, which can be accompanied by a coronal mass ejection (CME). If directed at Earth, charged particles within the CME slam into the magnetosphere, resulting in the northern and southern auroral lights. Previous CME events have damaged spacecraft, interfered with communications systems and overloaded ground-based power grids. Aware of the problems Despite the potential threat, Wilkinson says authorities are aware of issues and are taking precautions. "We monitor solar activity and give out warnings if something is heading our way," says Wilkinson. "That will be at least a few hours [in advance], enough time to prepare." He says while some satellites could be damaged by a future CME, others could be protected by being placed in 'safe mode'. Wilkinson adds the impact on power grids would be minimal. "At worst, it's a regional thing, not a global thing as these reports imply." He says high frequency communications may also be affected, but it would be temporary. Low maximum According to Wilkinson, the Sun has been through a long solar minimum and appears to be heading into a low solar maximum. Previous observations have shown this could result in high spikes of CME activity. "It means we could see auroral activity over all of Australia rather than just the higher latitudes," says Wilkinson. "It's unusual, but not unprecedented**.** James Cook made mention of just such an event off Timor."

#### Prefer our evidence – studies prove

Andrew 7-25 (“Are Solar Flares Easing Up?" <http://www.offthegridnews.com/2011/07/25/are-solar-flares-easing-up/>)

This dire warning has been discounted by many other scientists. They state that the reduction in sunspot activity is a clear indicator that the cycle is winding down, and that fears of a massive flare in 2013 are unwarranted. Although they argue that a massive flare is unlikely, they have provided some data on past flares to demonstrate that even a large flare would have minimal impact on the world. After reviewing case studies on historical solar flare activity, this team of researchers advised that at worst, only small communications or electricity interruptions would occur if a massive flare erupted toward Earth. Although the interruptions may be minor, the team stated that the power grid should be outfitted with monitoring equipment to help address any potential disruptions caused by solar flare activity. The equipment, referred to as residual current devices (RCDs), act as trip switches on electricity transmission lines. RCDs break the connection when there’s a sudden increase in voltage. This would cause a temporary disruption in power, but the transformers would be protected from surges. The devices are used in domestic wiring systems and could be thought of as surge protectors for power lines.

#### No threat to power grids- their studies don’t take into account the laws of physics

Toor 10 (Amar Toor, “Don't Worry, Terrorists Won't Bring Down the U.S. Power Grid, Researchers Say”, http://www.switched.com/2010/10/14/dont-worry-terrorists-wont-bring-down-the-u-s-power-grid-re/, 10/14/10, Accessed 7/13/12, WITASZEK)

Over the past few months, many politicians and national security experts have grown increasingly worried about what might happen if the U.S. power grid were ever to fall prey to a terrorist attack. Concerns first arose last March, when a scientific study published in the journal Safety Science suggested that even an attack on a small corner of the electrical network could unleash a domino effect across the country, effectively shutting down the entire grid. A subsequent paper published in the journal Nature legitimized these concerns, demonstrating that a similar cascade took down the Italian national power grid in 2003. Now, however, a new study has soundly refuted these claims, which the authors dismiss as "a bunch of hooey." Authored by University of Vermont power grid expert Paul Hines and Penn State's Seth Blumsack, this latest study questions the mathematical model underpinning the apocalyptic scenarios outlined in both the Safety Science and Nature articles. These so-called topological models, Science Daily explains, are essentially graphs of interconnected networks, which are often used to map the flow of river networks, highway traffic and supply chains. According to this model, whenever one node in the network fails or changes, the next will fail, as well -- hence the aforementioned domino effect that many fear. Hines and Blumsack, though, argue that these topological models don't account for the unique laws of physics that govern the flow of electricity. In their article, which was published in the journal Chaos, the researchers point out that the most susceptible parts of the grid are only those which see the most electricity flow, like major connectors or power generating stations. Given the complexity of the U.S. power grid, moreover, it's a bit simplistic, Hines argues, to conceive of the network as a series of dominoes. "Some modelers have gotten so fascinated with these abstract networks that they've ignored the physics of how things actually work -- like electricity infrastructure," Hines says, "and this can lead you grossly astray." The ultimate takeaway, then, is that our power grid is probably more secure than we think, and perhaps too complex for terrorists to bring down in a single blow. And, if lawmakers buy Hines's and Blumsack's approach, they may end up saving a lot of money. "If the government takes these topological models seriously," Hines says, "and changes their investment strategy to put walls around the substations that have the least amount of flow -- it would be a massive waste of resources."

### Ext—The Grid

#### Bloom energy will solve any potential power grid problems

GDCN 12 (Doug Mohney, Expert in ICT and he has served at Editor in Chief of the Telecom and Digital Media Group at an online media publisher and Editor-in-Chief at VON Magazine, Green Data Center News, “Bloom Energy tacks to mission critical practices, fear -- and a second factory”, http://www.greendatacenternews.org/articles/402442/bloom-energy-tacks-to-mission-critical-practices-f/, 3/21/12, Accessed 7/14/12)

Bloom's announcement was made last week and it seems to have been interpreted as a tighter focus by the company on data center sales -- a point that is true, but Bloom has been pitching for data center business pretty much from day one as a more reliably source of electricity than being plugged into the grid. Joining the company in the announcement of Mission Critical-ness is Peter Gross, co-founder and CEO of EYP Mission Critical Facilities and formerly VP and managing partner for global consulting at HP.

Going half way down the press release, you come to the following: "Because Bloom Energy Servers are located on- site with the customer, they are not vulnerable to disruptions to the power grid caused by human intervention or natural disaster."  It's an interesting half-truth, because it assumes the source and means of delivery for gas -- either natural gas or biogas of some sort -- wouldn't be disrupted by a local earthquake or more nefarious means.

 Yes, "the grid" is vulnerable and you are more secure generating power in your back yard, but it's not necessarily a clean fix by substituting a dependency on natural gas for grid power.

"Bloom Energy will now fill a critical need in the data center industry," says Gross in the release.. "By providing a reliable, clean and stable energy source that is immune to disruptions to the grid, Bloom will help its customers reduce their security risks considerably, while at the same time improving efficiency and cutting greenhouse gas emissions."

If you recall, Bloom's original premise was to deliver a solid oxide fuel cell technology with anywhere from a 40 to 100 percent reduction in carbon emissions than traditionally produced power without any sulfur dioxide or nitrogen oxide emissions.  There was also supposed to be a lot of ramped up production and dramatically lowering of price points, but on the first go-round everyone except larger corporations seemed to be put off at the large capital expenditures.  This lead to a second offering where Bloom Energy also offers a service model.

#### Solar Flares are overhyped- empirically proven- even if power grid is affected, no extinction-level impacts

O’Neill 8, (Ian O’Neill, founder/editor of Astroengine, “2012: No Killer Solar Flare”, http://www.universetoday.com/14645/2012-no-killer-solar-flare/, 6/21/08, Accessed 7/14/12)

“Killer” solar flares have been observed on other stars. In 2006, NASA’s Swift observatory saw the largest stellar flare ever observed 135 light-years away. Estimated to have unleashed an energy of 50 million trillion atomic bombs, the II Pegasi flare will have wiped out most life on Earth if our Sun fired X-rays from a flare of that energy at us. However, our Sun is not II Pegasi. II Pegasi is a violent red giant star with a binary partner in a very close orbit. It is believed the gravitational interaction with its binary partner and the fact II Pegasi is a red giant is the root cause behind this energetic flare event. Doomsayers point to the Sun as a possible Earth-killer source, but the fact remains that our Sun is a very stable star. It does not have a binary partner (like II Pegasi), it has a predictable cycle (of approximately 11 years) and there is no evidence that our Sun contributed to any mass extinction event in the past via a huge Earth-directed flare. Very large solar flares have been observed (such as the 1859 Carrington white light flare)… but we are still here. In an added twist, solar physicists are surprised by the lack of solar activity at the start of this 24th solar cycle, leading to some scientists to speculate we might be on the verge of another Maunder minimum and “Little Ice Age”. This is in stark contrast to NASA solar physicist’s 2006 prediction that this cycle will be a “doozy”. This leads me to conclude that we still have a long way to go when predicting solar flare events. Although space weather prediction is improving, it will be a few years yet until we can read the Sun accurately enough to say with any certainty just how active a solar cycle is going to be. So, regardless of prophecy, prediction or myth, there is no physical way to say that the Earth will be hit by any flare, let alone a big one in 2012. **Even if a big flare did hit us, it will not be an extinction event.** Yes, satellites may be damaged, causing secondary problems such as a GPS loss (which might disrupt air traffic control for example) or national power grids may be overwhelmed by auroral electrojets, but nothing more extreme than that.

#### Solar Flares are overhyped by a minimum factor of 10

O’Neill 10 (Ian O’Neill, founder/editor of AstroEngine, “Warning: Over-Hyped Title Alert: But It’s A Frackin’ SUPERNOVA!”, http://astroengine.com/2010/01/11/but-its-a-frackin-supernova/, 1/11/10, Accessed 7/13/12)

I’m not kidding, last week was a huge mess of a supernova doomsday circus. It was like whispering “there’s a bomb under your chair” to the person next to you in a crowded theater and then watching the resulting flood of people slam into the fire escape. It was internet chaos. And there was no stopping it. I am of course talking about the first, great doomsday scare of 2010: T Pyxidis. Luckily for me, the first headline I saw was in the UK’s Telegraph that read “Earth ‘to be wiped out’ by supernova explosion.” Uh oh, that title sounds rather definite. Immediately, the bullshit sensor in my brain was tripped so I stopped flicking through the embarrassing excuse for a UK newspaper and had a read. According to the article, some star (that I can’t pronounce) was “set to self-destruct” (as a big hairy supernova), a little over 3,000 light years away. Global chaos will therefore ensue. The ozone layer will be stripped away… and the Earth will be “wiped out.” (I still can’t work out how the Earth will be “wiped out.”) I’m only picking on the Telegraph.co.uk as my skepticism knives were already sharpened after a series of idiotic woo-fueled articles (here, here and here) the website has played host to in recent months, but they weren’t the only news outlet to go batshit crazy with the “WE’RE ALL GONNA DIE” angle. But who was really to blame for this mess? After all, the media was just the messenger, they must have gotten their lead from somewhere. Ah yes, the scientists… what did those guys really say? You can find out how I got to the bottom of the science behind the hype in my Discovery News article “Will Earth ‘Be Wiped Out’ by a Supernova?” but cutting to the chase, it turns out that the scientists may have been a little hasty in their attempt to make international headlines. As my mate Phil Plait mentions in his excellent write up (about my write up) of the T Pyxidis debacle on Bad Astronomy, this isn’t just a simple case of media hype, a lot of the blame should lay with Edward Sion et al. from Villanova University in Philadelphia. Sure, some of the numbers didn’t add up (mistakes happen), but issuing a press release with a huge wad of inaccurate doom wrapped inside is pretty irresponsible. Have a read for yourself: An interesting, if a bit scary, speculative sidelight is that if a Type Ia supernova explosion occurs within [that distance] of Earth, then the gamma radiation emitted by the supernova would fry the Earth, dumping as much gamma radiation (~100,000 erg/square centimeter) into our planet [sic], which is equivalent to the gamma ray input of 1000 solar flares simultaneously. –Excerpt from the Villanova press release, “THE LONG OVERDUE RECURRENT NOVA T PYXIDIS: SOON TO BE A TYPE Ia SUPERNOVA?” “…fry the Earth”? Come on, that’s not even an accurate scientific term about what would happen if we were hit by a surge of gamma-rays. What’s wrong with saying “…the Earth would be at the receiving end of a Death Ray”? If you’re going to do the job of the tabloid press, hyping up your own research before the tabloid press has even read the release, you may as well be accurate. And speaking of accuracy, my colleague Ray Villard was at the AAS and confirmed that Sion’s numbers were out by a factor of 10. “A supernova would have to be 10 times closer [to Earth] to do the damage described,” Ray said. Although I was tough on the Telegraph in my Discovery News article (let’s face it, with an inaccurate and inflammatory title like that, they had it coming), in this case I think the main issue lies with Sion and co. Why over-hype your research to get attention, when the research was interesting enough without declaring doomsday? By me even writing about the subject again, I think I just answered my own question. But on a plus point, at least everyone knows what T Pyxidis is now…

#### Predictions and NASA reports about solar flares are overstated

Hudson No Date (Bill Hudson, astronomer at Fremont Peak Observatory, “Solar Flares”, http://www.2012hoax.org/solar-flares, Accesed 7/11/12)

NCAR Prediction in June 2006 In 2006, the National Center for Atmospheric Research issued a press release[4] indicating that the next solar cycle would be stronger than normal, as much as 30 to 50% stronger than the 2001 solar max. So far, we have a lousy record of predicting the intensity of solar maximum, and this report was no exception. It was based on a 'conveyer belt model' of the sun, and based its predictions on observations of sunspots in the previous cycle. NASA prediction in May 2009 However, the sun is behaving oddly, and nearly three years after the NCAR report, in May 2009, NASA released a new report[3] that says that "Solar Cycle 24 will peak, they say, in May 2013 with a below-average number of sunspots." Even if the original prediction was still valid, we still have this question: What relevance is it to us? The authors of the NCAR paper said that cycle 24 may be stronger than usual, and perhaps as strong as the 1956 solar max. Did we all die in 1956, or 1859 for that matter? No Killer Solar Flare Specifically, there is no prediction of a massive life-killing solar flare in 2012. Even more specifically, there is no evidence that our sun can produce a ‘Knowing’ type solar flare anytime soon. We know what stars like our sun are capable of by looking at other sun-like stars. If these stars were churning out massive CMEs like the movie ‘Knowing’ depicted, then we would see that in other stars… and we don’t. Bad Science We question the terminology used by the proponents of a strong solar flare in 2012. The sun is unpredictable, and it can send a massive coronal mass ejection in our direction at any point in time, regardless of the sunspot cycle. Specifically we question the clear implication that the sun is going to send a stronger solar flare at solar max than it would at the solar minimum. The "maximum" is the maximum amount of sunspots and other magnetic solar activity. It does not mean that the sun only sends out solar flares during solar max. In fact, the biggest geomagnetic storm ever recorded happened during a solar minimum. In addition, as Tony Darnell points out in this video the "Halloween Storms" of 2003 occurred 3 years after solar max. Likewise, the sun is perfectly capable of not generating a lot of solar flares or CMEs, even during solar max. Activity tends to be more frequent during solar max, but not necessarily stronger. Here is a nice graphic from the New York Times describing the SDO satellite. This is a good thing, it is always important to improve our knowledge of potential hazards. This does not mean that NASA is "worried about massive solar flares in 2012". Some people try to imply that wherever NASA puts missions it is 'worried' or 'concerned' about some threat. We see this frequently from various sources. **As mentioned by Ian O'Neill** in the comments, the annual threat from solar events is miniscule, and the worst that can generally happen is a disruption in power or communications. Conclusion In Conclusion, we have shown that predictions of a stronger than normal solar cycle are massively overstated.

#### No impact to solar storms- past storms prove

Washington Post 7/13/12 ("Weekend forecast: Solar storm headed to Earth but few power grid problems expected", http://www.washingtonpost.com/national/health-science/weekend-forecast-solar-storm-headed-to-earth-but-few-power-grid-problems-expected/2012/07/13/gJQAgle6hW\_story.html, 7/13/12, Accessed 7/18/12, KW)

The space weather forecast for Earth looks a bit stormy this weekend, but scientists said not to worry. A solar storm was due to arrive Saturday morning and last through Sunday, slamming into Earth’s magnetic field. Scientists said it will be a minor event and they have notified power grid operators, airlines and other potentially affected parties. “This isn’t the mother of all anything,” said forecaster Joe Kunches at the government’s Space Weather Prediction Center in Boulder, Colo. “We don’t see any ill effects to any systems.” The storm began Thursday when the sun unleashed a massive flare that hurled a cloud of highly charged particles racing toward Earth at 3 million mph. It was the sixth time this year that such a powerful solar outburst has occurred; none of the previous storms caused major problems.

### 1NC—Nuclear Meltdowns

#### Their ev only references a radioactive leak from one US power plant – radiation is not bad for you at low levels

Schulz ‘7 (Matthais, Der Spiegel, “Nuclear Exaggeration”, 11-22, http://wissen.spiegel.de/wissen/dokument/dokument.html?titel=Is+Atomic+Radiation+as+Dangerous+as+We+Thought%3F&id=54059068&top=SPIEGEL&suchbegriff=Hiroshima&quellen=)

The more recent meltdown at the reactor in Chernobyl in 1986 reminded the world of the dangers of the atom. The incident was referred to as "nuclear genocide," and the press wrote of "forests stained red" and of deformed insects. The public was bombarded with images of Soviet cleanup crews wearing protective suits, bald-headed children with cancer and the members of cement crews who lost their lives in an attempt to seal off the cracked reactor with a concrete plug. Fifteen years after the reactor accident, the German newsmagazine Focus concluded that Chernobyl was responsible for "500,000" deaths. Was all this just doomsday folklore? There is no doubt that large sections of the countryside were contaminated by the accident in the Ukraine. In the ensuing decades, up to 4,000 cleanup workers and residents of the more highly contaminated areas died of the long-term consequences of radiation exposure. But the six-figure death counts that opponents of nuclear power once cited are simply nonsense. In most cases, they were derived from vague "extrapolations" based on the hearsay reported by Russian dissidents. But such horror stories have remained part of the nuclear narrative to this day. In fact, contemporaries who reported on the Chernobyl incident should have known better. Even in the 1980s, radiobiologists and radiation physicists considered the media's doomsday reports to be exaggerated. And their suspicions have become a virtual certainty today. Groups of researchers have set up shop at all of the sites of nuclear accidents or major nuclear contamination. They work at Hanford (where the United States began producing plutonium in 1944), they conduct studies in the English town of Sellafield (where a contaminated cloud escaped from the chimney in 1957), and they study the fates of former East German uranium mineworkers in the states of Saxony and Thuringia. New mortality rates have now been compiled for all of these groups of individuals at risk. Surprisingly, the highest mortality rates were found among the East German mineworkers. In Hiroshima, on the other hand, radioactivity claimed surprisingly few human lives. Experts now know exactly what happened in the first hours, days and weeks after the devastating atomic explosion. Almost all of Hiroshima's 140,000 victims died quickly. Either they were crushed immediately by the shock wave, or they died within the next few days of acute burns. But the notorious radiation sickness -- a gradual ailment that leads to certain death for anyone exposed to radiation levels of 6 Gray or higher -- was rare. The reason is that Little Boy simply did not produce enough radioactivity. But what about the long-term consequences? Didn't the radiation work like a time bomb in the body? To answer these questions, the Japanese and the Americans launched a giant epidemiological study after the war. The study included all residents of Hiroshima and Nagasaki who had survived the atomic explosion within a 10-kilometer (6.2-mile) radius. Investigators questioned the residents to obtain their precise locations when the bomb exploded, and used this information to calculate a personal radiation dose for each resident. Data was collected for 86,572 people. Today, 60 years later, the study's results are clear. More than 700 people eventually died as a result of radiation received from the atomic attack: 87 died of leukemia; 440 died of tumors; and 250 died of radiation-induced heart attacks. In addition, 30 fetuses developed mental disabilities after they were born. Such statistics have attracted little notice so far. The numbers cited in schoolbooks are much higher. According to Wikipedia, the online encyclopedia, 105,000 people died of the "long-term consequences of radiation." "For commendable reasons, many critics have greatly exaggerated the health risks of radioactivity," says Albrecht Kellerer, a Munich radiation biologist. "But contrary to widespread opinion, the number of victims is by no means in the tens of thousands." Especially surprising, though, is that the stories of birth defects in newborns are also pure fantasy. The press has repeatedly embellished photos of a destroyed Hiroshima with those of deformed children, children without eyes or with three arms. In reality, there hasn't been a single study that provides evidence of an elevated rate of birth defects. A final attempt to establish a connection is currently underway in Japan. The study includes 3,600 people who were unborn fetuses in their mothers' wombs on that horrific day in August 1945. But it too has failed to furnish any evidence of elevated chromosomal abnormality. In Germany, where nuclear fears have coalesced with the fear of dying forests and mad cow disease into a general psychosis of threat, the degree of concern over nuclear radiation remains high. To this day, some are so fearful about the long-term effects of fallout from Chernobyl that they refuse to eat mushrooms from Bavaria. Even 20 years ago such behavior would not have made sense.

#### Tons of evidence proves hormetic responses to low-level radiation. It improves health and longevity.

Parsons ‘3 (Peter, La Trobe U., Biogerontology, “Energy, stress and the invalid linear no-threshold premise: a generalization illustrated by ionizing radiation”, 4: 227-231, Springer)

These various agents occur in our environment, so that evolutionary adaptation to them should give hormesis. For many agents present throughout geological time, such as the heavy metals mercury, lead and uranium, hormetic maxima occur close to the origin because they are exceedingly toxic at high exposures. Similarly, ionizing radiation should give a hormetic zone with the maximum close to the origin since all life on earth is exposed to low levels of background ionizing radiation mainly less than 10 mSv y−1. Therefore the LNT premise for ionizing radiation is conceptually impossible on evolutionary grounds since background radiation is universal, so that the hormetic zone should reflect the radiation exposure to which organisms are normally exposed in their habitats (Parsons 2000). Radiation hormesis has been documented in experimental organisms ranging from protozoans to mammals. In some early experiments with the insect Drosophila melanogaster, longevity was reduced in a lead shielding device compared with background exposures (Planel and Giess 1973; Giess and Planel 1973). This was followed by experiments on protozoans, where lower fitness was found close to zero radiation in a lead shielding device than at somewhat higher exposure levels including background (Planel et al. 1987). Furthermore, this hormetic effect can be induced artificially within the lead shielding device by adding appropriate radionuclides. A few additional suggestive examples incorporating exposures below background appear in Luckey (1991). Human demographic data are insufficiently precise to detect effects at such low exposures, hence the LNT premise is often assumed partly because of simplistic expectations for radiation protection criteria. On the other hand, there are many examples consistent with radiation hormesis at exposures greater than background to levels that are substantially above exposures from geological outliers (where no radiation-linked deleterious effects have been detected). In addition, a recent study of the life span of mice measured the survival time for 50% of mouse populations, which was 22.6% higher than the controls following trials with exposures of 70 and 140 mSv y−1 of radiation (Caratero et al. 1998). These exposures are at the lower end of the range of intense experimental exposures of up to 800 mSv found to increase fitness measured by longevity in mice, rats and guinea pigs often by more than 20% (Luckey 1991; Calabrese and Baldwin 2000). Can hormesis at these apparently stressful exposures be explained? At the time Parsons (1990) was published there were plenty of observations consistent with this conclusion, but acceptance of it was hindered by a lack of underlying models to explain it a nd which could be tested empirically. The energy approach suggests a model to explain radiation hormesis to exposures beyond background. Assume that metabolic reserves, in particular heat shock proteins, hsps, are built up to counter the energy costs of the wide array of stresses including temperature extremes to which all organisms are exposed, of which radiation is normally a minor component. That is, the hormetic response becomes part of a general stress response involving hsps adaptations across stress levels and environmental agents (Minois 2000; Le Bourg et al. 2001). Therefore hsps should underlie cross-protection among various environmental agents. For example, in adapting to extreme temperatures, cross-protection could occur with respect to other agents, including radiation. The expectation is a form of radiation hormesis which depends upon the energy consequences of the totality of all environmental stresses of natural habitats, of which background radiation is a minor component compared with temperature extremes. I define this to be stress-derived radiation hormesis (Parsons 1999, 2000). Based upon the universality of stressful environments, radiation hormesis appears therefore to have two components. The smaller component is background radiation hormesis from the direct adaptation of organisms to ionizing radiation in their habitats, and the larger is stress-derived radiation hormesis which derives from metabolic reserves evolving from and maintained as an adaptation of organisms to the extremes of the totality of environmental stresses through evolutionary time.

## Space

### 1NC—Space

#### No risk to hegemony – terrestrial back-up systems are providing the same benefits as satellites

Morgan, 10 – (defense policy researcher working in RAND Corporation's Pittsburgh Office, prior to joining RAND in January 2003, Dr. Morgan served a 27-year career in the U.S. Air Force (Forrest, “Deterrence and First-Strike Stability in Space,” http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA522541&Location=U2&doc=GetTRDoc.pdf)

Another approach to reducing an adversary’s benefits in attacking space systems would be to provide redundant capabilities using terrestrial backups. Indeed, such solutions are currently being pursued. Undersea cables and other terrestrial links already provide reach-back communication from well-established forward areas of operation, although they are vulnerable to sophisticated attackers (or accidents, such as the recent Mediterranean fiber cut). High-altitude lighter-than-air craft and long-endurance unmanned aircraft systems offer possibilities to supplement space-based platforms for some ISR and communication missions. The type of assets currently being developed would not be survivable in areas where an adversary could challenge friendly control of the airspace, but long-endurance aerial surveillance could, to some extent, supplement space capabilities on the periphery of an area of operations, and platforms flown in secure airspace could be used to relay some links inside the battlespace, thereby reducing the payoff an aggressor might yield in attacking satellites supporting parallel missions. Such options merit further exploration and development.

#### Space deterrence fails – too many conflicting strategic actors and possible competitors

Rendleman, 10 – (Colonel, U.S. Air Force [James, Astropolitics, 8:220–255, 2010, “A Strategy for Space Assurance,” Ebsco Political Science)

The 11 January 2007 test of a Chinese ground-based, direct-ascent anti-satellite (ASAT) kinetic-kill interceptor against one of their own defunct weather satellites generated considerable angst across the United States space community. The 2007 test demonstrated that the importance of space capabilities is also their Achilles heel, that is, their deadly weakness in spite of overall strength; it is far too easy to neutralize space systems and their power. In the broad strategic context, space capabilities have their own set of unique, inherent vulnerabilities, which are largely the result of orbital mechanics. This invites destruction, damage, and even just mischief delivered by even the least significant adversary. However, other nations may seek to deny U.S. advantages in space through a variety of negation and prevention actions. Negation Threats Satellite systems consist not only of spacecraft, each with their own payload and bus, but also a supporting infrastructure—ground control stations, tracking and control links, commonly referred to as the tracking, telemetry, and control (TT&C) links, data links, launch facilities, and an industrial base. Each of these components is at risk to threats of physical and cyber attack, and sabotage, and can be negated, simultaneously or each in detail. The satellite payload, bus, links, and infrastructure can be negated by using a variety of permanent or reversible means to achieve one of the five possible effects, known as the ‘‘five Ds’’—deception, disruption, denial, degradation, and destruction.5 Space-based threats proliferate as a result of the ever-growing global availability of technology and access to the space domain. There are huge incentives for states to invest in and use space, and the spread of space technologies has occurred. States with sufficient resources can now reach out to space and ‘‘touch’’ satellites through a variety of means, and achieve one and even more of the five Ds. Spacecraft are vulnerable to direct ascent weapons as demonstrated by the Chinese ASAT test, and to a variety of other groundbased, airborne, and space-based ASAT technologies. Direct-ascent launched, or orbit-based nuclear devices, can be detonated, generating radiation and other lethal effects to destroy unshielded electronics over a wide lethal range. Co-orbital ASATs could be employed, comparable to the old Soviet system that was tested extensively in the 1970s and early 80s. In a less likely scenario, space-borne mines can also be deployed in close proximity to spacecraft, or exploded to generate debris clouds that destructively engage whole classes of satellites in the same orbital plane or in crossing orbits. Ground, space-based, or airborne lasers could be used by adversaries to wreak havoc. Blinding operations could be executed and inflict effects ranging from temporary ‘‘dazzling’’ to permanent burnout of optical or other sensors with intense energy bursts. Ground systems, supporting communications, and their nodes, are vulnerable to diverse land, sea, or air kinetic attacks, including sabotage. Unprotected systems are also susceptible to electronic attack through jamming and electromagnetic deception techniques. Jammers emit signals that mask or prevent reception of desired signals; these methods can disrupt uplinks, downlinks, and even cross-links. By disabling the means of command and control, and data communications, jammers render satellites inoperable or unavailable. Electromagnetic deception techniques can be employed to confuse systems; this could include sending false, but deceptively plausible, commands that cause spacecraft to perform damaging or wasteful maneuvers, modify databases or execute configuration changes, or otherwise destroy it. Similarly, supporting terrestrial ground stations, computer networks, and links are vulnerable to information operation and cyber attacks. These attacks could involve directing global denial of service tasks, injecting fake commands, malicious software and viruses into the space system, performing unauthorized monitoring and disclosure of sensitive information (data interception), and causing unauthorized modification or deliberate corruption of network information, services, and databases. In sum, there is a wide span of kinetic and other types of attacks an adversary could consider and employ. There is potential that even non-state actors can access some of these technologies and space systems, and achieve several of the five Ds; however, it is unlikely they can obtain and then employ a full-spectrum of these means and achieve all of these effects. Conducting an attack within the space domain involves a rather substantial investment to develop, acquire, operate, and sustain needed shooter, sensor, and command and control systems. Given the scope and commitment needed to affect such a move, an on-orbit attack would probably be made only in the context of a larger strategic struggle, perhaps as a prelude to or part of early combat operations. On the other hand, inexpensive jamming technology is available to even the poorest potential adversaries. As such, jamming poses the most used and growing threat to space systems. Some argue that jamming also carries with it implicit political and legal sanctions since no major space power has moved to ban or make even temporary and reversible jamming illegal. This may change now that a number of nations have banned together to object to recent Iranian satellite jamming.6 Cyber adversaries and criminals are also beginning to hone their craft. They present an evolving threat to space systems; and like jamming, cyber threats can be developed and deployed for only modest investments. Prevention Threats Prevention actions generally involve economic, political, informational, and diplomatic instruments of national power. For example, an extremely large creditor nation could employ its considerable economic clout and leverage in an attempt to compel or blackmail the United States to not license or permit imaging of its territory, preventing its use, and reducing its exposure to such observation. The creditor nation could seek to accomplish its objective by destabilizing the world market place. It could refuse to purchase treasury offerings that underpin the burgeoning U.S. fiscal and trade deficits, perhaps arguing that remote sensing, especially commercial remote sensing, of its territory infringes on its territorial and sovereign rights, or that it constitutes ‘‘unlawful’’ industrial espionage, and is thus, an unfair trade practice.7 Commercial remote sensing systems are nowan important resource for the United States Government and its national security needs. U.S. Government orders help sustain and stabilize the remote sensing industry,8 and any limitations on activities, whether for U.S. Government customers or commercial ones, imposed in response to external economic threats could evolve to cause problems. In an alternative scenario, a state, acting through political allies and proxies, could exert considerable influence and dominance to affect a change in U.S. law. This change could restrict licensing of commercial remote sensing imagery, restricting the market place and impacting business models for producers.9 As a diplomatic prevention example, adversaries could attempt to use international forums and treaties to deny frequency rights needed by U.S. military or intelligence satellites by making spurious ‘‘paper satellite’’ filings with the International Telecommunications Union (ITU). ‘‘Paper satellites’’ involve ITU applications for satellite orbital slots, many for ‘‘speculative’’ systems that will never leave Earth. These filings can block access to scarce spectrum and orbital resources.10 The ability to place communications and other satellites in geosynchronous orbit (GEO) positions could be held at risk. Some characterize some of these types of actions as a form of ‘‘lawfare.’’ ‘‘The term lawfare describes the growing use of international law claims, usually factually or legally meritless, as a tool of war. The goal is to gain a moral advantage over your enemy in the court of world opinion, and potentially a legal advantage in national and international tribunals.’’11 Prevention actions taken to hobble U.S. space systems are not armed attacks. As is discussed later, the use of force is only authorized under the United Nations (UN) Charter in response to an armed attack, or upon authorization of the UN Security Council. As such, using armed force to deter and defeat prevention actions involving political or diplomatic subterfuge or intrigue may be unlawful under international law. Creative alternative solutions must therefore be found to assure access to space when facing these types of threats. Implications for U.S. Space Strategy The wide span of threats poses profound implications for U.S. space strategy and its execution. First, unlike the Cold War era, the United States now confronts a wide array of global actors, all operating with different motivations and incentives, some of which could become potential adversaries who can attack or threaten space capabilities. These state and non-state adversaries exhibit a wide array of political, economic, technical, and social differences. Having many potential adversaries makes each of them harder to understand. This complicates efforts to understand motivations and to influence perceptions for deterrence purposes. These differences, in turn, increase the likelihood of misperception, undercutting strategies to protect access to space capabilities. When one’s attention is divided, deterrent measures that are appropriate for one target may not be useful, or even counterproductive, for another. This requires tailored intelligence efforts, information operations, and transparency efforts in order to avoid or minimize disputes and prevent problems. Second, the broad array of adversaries exhibit widely varying risk-taking behaviors. Risk-taking behavior can strongly influence an adversary’s perception of a situation. Understanding this phenomenon can lead to better ways of influencing those perceptions. Unfortunately, potential adversaries may not care that space systems offer tremendous value and capabilities to all nations, or care whether conflict in space could create space debris that could cost all nations access to the domain. A strategy to assure continuing access to space assets must therefore be sufficiently flexible to address both risk-averse and risk-taking adversaries. Indeed, potential adversaries may shift from risk-taking to risk-adverse over a relatively short period of time. China may fit in this category. Within a decade or two, it will have its own extensive space-based communications, navigation, and intelligence, surveillance, and reconnaissance satellite constellations, all of which will be integrated into its military operations. No doubt, China will embrace that evolution and become very reliant on space capabilities; this will shift it from an asymmetric competitor to one similar to the United States or Russia. Third, with the demise of the Soviet Union, some political commentators and critics described the United States as a ‘‘hyperpower’’ not just a ‘‘superpower.’’ 12 Though buffeted by recent events involving Iraq, Afghanistan, the Global War on Terror, and the 2008 global financial meltdown, U.S. military supremacy continues. But, that supremacy does not make or guarantee a successful space strategy. Adversaries may believe they have a higher stake than the United States in the outcome of a particular crisis or conflict. Alternatively, the United States stake in the crisis may not be commensurate with the possible cost of involvement by the United States military and the rest of its national security apparatus. The first alternative may encourage mischief by adversaries; the second discourages U.S. action. As a result, adversaries may find threats of U.S. action in response to hostile acts affecting U.S. access to space systems to be non-credible. Fourth, while the United States has produced superlative space capabilities, it has not produced enough systems ready to survive the new kinetic, exotic, jamming, and cyber threat environment. The vulnerability exists because the spacecraft developed and deployed today are in many ways the same as those originally fielded during the Cold War. During that epic struggle, there was a tacit and then explicit understanding that each superpower would not attack and overwhelm the other’s space systems, except in the direst of circumstances, perhaps during the throes of a nuclear conflagration. Indeed, a number of agreements between the superpowers adopted the understanding and ruled out interference with national technical means, including space assets. This belief in the superiority of space systems and power blinds the United States to the inherent strategic weaknesses and vulnerabilities in these systems. This, predictably, can now be exploited by potential adversaries, such as China, who, with their recent ASAT test, appear more willing to fully explore the technologies needed to expand the limits of conventional war to include the space domain. Consequently, by historically and diplomatically reducing the threat, engineering of some satellite threat detection, attack avoidance, and other defense subsystems have not matured enough so that they are sophisticated, nimble, and robust enough to counter new 21st Century adversary attack capabilities.

#### No internal link – somehow solar highways predict or solve a solar flare which takes out the most important US satellite base, which doesn’t have any back-up generators, but controls every US satellite ever – this scenario is stupid

## Solvency

### 1NC—Solvency

#### Costs outweigh the benefits- no return in the short-term

Raikar 11 (Sudhir, EcoFriend, “The good, the bad and the ugly: Harnessing solar energy on highways”, http://www.ecofriend.com/entry/the-good-the-bad-and-the-ugly-harnessing-solar-energy-on-highways/, June 16, 2011, Accessed 7/9/12, WITASZEK)

Too difficult and costly to implement For all its benefits, the solar panel highways are a costly proposition. While the manufacturing cost of a single panel is about $7,000, the plan of laying them on the highway expanse would mean a financial loss of billions. Apart from the installation cost, implementation training, and maintenance would create major cost chunks. It would easily take several years before the return on investments would cover the costs incurred. Precisely, this is the reason why the company is hinting at small-scale projects to start with. Can this be avoided? It's clear that repairs and maintenance of these solar panels is much higher as compared to fixing on normal asphalt roads. The company argues that the use of a self-cleaning glass would keep the surface dirt-proof thereby minimizing dirt and grime but the claim is yet to be proved.

#### No Solvency—cost, strength, repair and reliability

Science Channel 11 (from the website “Curiosity?”, an online educational site sponsored by the Discovery Channel, <http://curiosity.discovery.com/question/drawbacks-using-highway-solar-panels>. Noparstak)

A U.S. company called Solar Roadways has designed a model for highways that are themselves made of solar panels. Some wonder whether is it feasible to use the highways to produce solar energy. The following are some major concerns: Cost - - **Each solar panel costs almost $7,000 to build, and the plan would require billions of solar panels to cover the world's highways** [source: [The Telegraph](http://www.telegraph.co.uk/earth/energy/solarpower/6155110/Solar-panel-roads-could-solve-energy-crisis.html)]. In the current situation, **the expense makes the plan impractical**. **Strength** - - The proposed solar panels would be built to withstand the weight of heavy vehicles, but **we do not understand the full extent of their durability. If the solar panels get damaged, the traffic signals could fail, thereby compromising our safety**. **Repair** - - It **is much more expensive** to repair and upkeep solar panels **than standard asphalt**. Reliability - - **Solar energy becomes unreliable when the weather is cloudy or dark.**

#### Clouds prevent energy conversion

Raikar 11 (Sudhir, EcoFriend, “The good, the bad and the ugly: Harnessing solar energy on highways”, http://www.ecofriend.com/entry/the-good-the-bad-and-the-ugly-harnessing-solar-energy-on-highways/, June 16, 2011, Accessed 7/9/12, WITASZEK)

The Ugly: Cloudy days Obviously, the topmost hurdle in the way of solar energy and, hence, solar panels is cloud on a rainy day. The current solar power technology is not efficient to tackle the cloud cover. In fact, most solar panels manage to convert only about 14 percent of available energy into electricity. Why are we so critical? When sunlight comes at a premium, especially in winters, power generation would face a big challenge. That is why solar energy is still considered as only of the many sources of renewable energy, not the sole source. As sunlight is not around throughout the year, so is the case with solar power.

#### Solar panels will fail- inefficiency means that millions of acres will be needed

George 9 (Patrick E.George, “How Solar Panel Highways Work”, 18 November 2009.  HowStuffWorks.com. <http://science.howstuffworks.com/environmental/energy/solar-panel-highway.htm>  11 July 2012.)

Solar power does suffer environmental shortcomings similar to wind power. Insolation (not to be confused with insulation) refers to the concentration of solar energy available per unit of area. It’s usually measured in terms of watts per square meter. Rutgers University Solar Data shows that the upper atmosphere of Earth is bathed in sunlight concentrations of about 1.37KW/m2 (1,370 Watts, or 1.37 Kilowatts per square meter). But the energy output of a solar collector will be far less. Before reaching a solar collector on the ground, sunlight is filtered through our atmosphere and loses part of its energy. Solar collector output is also affected by angle to the sun and latitude; the greater the angle to the sun, the less efficient the collector. For stationary collectors, the angle of the sun is constantly changing as the Earth turns. The only time a stationary collector operates at peak efficiency is at midday. And no solar collector converts 100% of sunlight into useful energy (either thermal or electrical). The end result of these energy losses is that energy supplies of 1,370 Watts per square meter will result in average solar collector energy output in the United States of less than 100 Watts per square meter. Because of that low power density, solar collectors covering millions of acres would be required to replace a large portion of the energy generated by existing power plants. Some environmentalists are concerned about permanently covering huge land masses with solar collectors.

#### Clouds prevent conversation

Gromicko et al, No Date (Nick Gromicko, American entrepreneur, philanthropist, and founder of InterNACHI, the nonprofit International Association of Certified Home Inspectors (InterNACHI), the international trade association of the inspection industry and has operations in about 60 countries. He is also the founder of the International Association of Certified Indoor Air Consultants (IAC2). Was a research analyst at U. Pitt’s Nuclear Physics Department. “Disadvantages of Solar Energy”, http://www.nachi.org/disadvantages-solar-energy.htm, Accessed 7/11/12 )

While the considerable advantages offered by solar energy move some proponents to ignore the budding technology’s comparatively minor flaws, these imperfections must be acknowledged, lest their resolutions be stalled. We should take an honest look at the system’s disadvantages and seek to refine solar energy systems into a truly environmentally friendly alternative. The most significant complaints with solar energy are: lack of consistency and reliability. Solar systems rely on the steady absorption of sunlight -- particularly, subatomic particles called photons -- which can be easily deterred. The following factors limit the availability of sunlight: latitude. Although solar power is an option almost anywhere on the planet in at least some capacity, efficacy falls sharply as distance from the equator increases. Residents of Vancouver, Canada, and St. Petersburg, Russia, for instance, are at a significant solar disadvantage. clouds. Clouds diminish the power of solar panels, especially in habitually foggy or overcast regions. According to the National Renewable Energy Laboratory, "[T]he solar resource during foggy or low-cloud conditions is approximately 10% of the value under clear-sky conditions." Solar arrays in Denver, Colorado, would rarely be obscured by clouds, as that city experiences only 30 to 40 overcast days per year. Hilo, Hawaii, despite its proximity to the equator, receives rain an average of 277 days per year, which might make it a poor choice for solar-power generation. night. The Earth itself is a rather large obstruction, and it acts nightly to disturb the flow of photons to helplessly immobile solar arrays.

#### High cost estimates and no reason why highways key

Alter 9 (Lloyd Alter, Infrastructurist on Solar Roadway: FAIL,

http://www.treehugger.com/renewable-energy/infrastructurist-on-solar-roadway-fail.html, 9/22/09, Accessed 7/13/12, KW)

Solar Roadways is engineering PV panels to withstand 40-ton vehicles going 80 miles an hour over them day and night for decades. How much more does it cost to make solar panels-already a bit pricey-totally indestructible? We're guessing a lot. And this all so we can avoid putting them someplace sensible, like on all those empty rooftops in America's sunnier climes, where cars and trucks don't drive and where there also happens to be an existing electrical grid for them to hook into.

# Off-Case Materials

Solar energy production uses toxic cadmium  
Flux Energy 11 (Flux Energy, Solar Industry, 06-08, [http://sundial365.co...Myths\_final.pdf](http://sundial365.com/pdfs/EnvironmentalMyths_final.pdf), accessed 6-26-11, JG)  
Operators of solar installations are currently under fire to find ways to reverse the negative environmental   impact their systems deliver. One issue of great concern is the production of PV panels utilizing the newer thin-film technology. Thinfilm technology reduces the amount of material required in creating a solar cell. Thus, it is quickly becoming a preferred manufacturing process due to cost, flexibility, lighter weight and ease of integration compared to wafer silicon cells. The thin-layer production of panels, however, involves the mining of rare earth minerals such as cadmium and selenium. These minerals are so rare that the yield per truckload of ore is very small, implying that many truckloads are required to feed the global need for these elements. As more and more solar installation operators elect to center their production on thin-layer PV elements, the industry will respond. As with many rare elements, when demand goes up, price goes up. These minerals also possess a level of toxicity that can be dangerous to the environment as well as to humans. They are considered hazardous materials. Assuming a 30- to 40-year life for most PV panels, there are grave concerns over the proper disposal of thin-film panels to keep these minerals from leaking into waste and water streams. Additionally, the mining processes for these elements are very invasive and pollutive. China is the primary global producer due to the lower standards for invasive mining. The mining of cadmium and other toxic elements is allowed in the U.S. as a by-product of other mining efforts such as the extraction of zinc. However, following in the standards set by the European Union to ban the use of some of these elements from all products, regulations and cleanup mandates continue to limit the production of cadmium and other minerals in the U.S. The manufacturers of solar panels and other energy industry lobbyists continue to push for more relaxed regulations. While the production and disposal of thin-film PV panels is certainly one issue attracting a lot of environmentalist opposition in the industry, there are many others.

## Cadmium Disadvantage

### 1NC—Cadmium DA

#### Solar panel recycling increases risk of deadly chemical leakage

Natural News 10 (David Gutierrez, “Solar panels to become future source of toxic e-waste”, http://www.naturalnews.com/030696\_e-waste\_solar\_panels.html, December 11, 2010, Accessed 7/11/12)

(NaturalNews) Scientists are calling upon solar panel manufacturers to set up a recycling infrastructure for their products now, before the supposedly green industry becomes the next major source of toxic e-waste. Already electronics from televisions to cell phones and computers have become notorious for producing large quantities of toxic waste, including metals such as cadmium, selenium and silicon tetrachloride, and the greenhouse gas sulfur hexafluoride. "Electronic waste is emerging as one of the central challenges of our era," writes Mark Schapiro in the book Exposed: The Toxic Chemistry of Everyday Products and What's at Stake for American Power. Researcher Dustin Mulvaney of the University of California-Berkeley recently conducted a analysis of all solar panels on the market, and found major toxics concerns with every variety. The oldest and most prevalent type of panel, crystalline photovoltaic, is made with lead. Newer thin film panels, holding 21 percent of the market share, contain cadmium, which has been linked to lung and kidney damage and can be fatal in large quantities. "It's gene toxic and a mutagen, so it has the ability to affect DNA, meaning it could affect reproduction and future generations' DNA," Mulvaney said. Amorphous silicon panels, holding 16 percent of the market share, and copper indium gallium selenide (CIGS) panels, holding 6 percent, are both made with indium tin oxide, another hazardous substance. CIGS panels also contain cadmium. Solar panels are designed to last 20 years, so manufacturers are giving little thought to the end of their product's life cycle, yet transport breakage and factory scrap are already producing waste. With U.S. solar demand projected to increase 50 percent per year for the next two years, photovoltaic waste is a potential disaster in the making. "If you don't look at the recycling when you're designing the product, then it's really, really difficult to recycle," said Sheila Davis, executive director of the Silicon Valley Toxics Coalition. "But if you know you're going to have to pay for the recycling at the end of life, you might make the necessary design changes in your product now to reduce that cost."

That turns warming  
Pinkham 93 (Sandra, Doctor @ Columbus, [http://www.bodycente...nts/Scan\_2a.pdf](http://www.bodycenteredtherapies.com/pinkhammedical/documents/Scan_2a.pdf), accessed 6-26, JG)  
According to ''the precautionary principle,'' it is better to accept as true what cannot be perfectly proved, even though it might be wrong, if doing so can lead to actions which will protect our ecosystem. This paper uses this guideline to assess the effects of cadmium exposure and its toxicity. This highly toxic metal is apparently used by the cell in the stress response to get rid of damaged, virus-infected, and cancerous cells. Indiscriminant exposure to global cadmium air pollution alters the cellular content of free cadmium ions and the minerals that antagonize its effects, affecting the response of cells, organs, and individuals to all other stimuli. Cadmium's effects at low dose are thus influenced by many factors, not just dose. These factors include age, gender, species, genetic factors, prior nutritional history and exposure to cadmium and other stressors, and current nutritional history and exposure to other stressors. Other toxic metals, organic compounds, biological pathogens and emotional stresses interact with cadmium to produce effects. Stress effects at a cellular level appear linked with current global problems affecting the environment, such as global warming, and human health effects, like the increase in disabling fatigue and infectious disease.

Manufacturing Solar-Powered Cells leads to the emission of greenhouse gases- causes warming  
Decker ’08[Kris de Decker, creater of low-tech magazine, freelance journalist, 3-20-2008, “The Ugly Side of Solar Panels”, [http://www.lowtechma...ly-side-o.html]](http://www.lowtechmagazine.com/2008/03/the-ugly-side-o.html%5D)  
Solar panels don’t come falling out of the sky – they have to be manufactured. Similar to computer chips, this is a dirty and energy-intensive process. First, raw materials have to be mined: quartz sand for silicon cells, metal ore for thin film cells. Next, these materials have to be treated, following different steps (in the case of silicon cells these are purification, crystallization and wafering). Finally, these upgraded materials have to be manufactured into solar cells, and assembled into modules. All these processes produce air pollution and heavy metal emissions, and they consume energy - which brings about more air pollution, heavy metal emissions and also greenhouse gases.

#### Cadmium causes serious environmental damage

Gromicko et al, No Date (Nick Gromicko, American entrepreneur, philanthropist, and founder of InterNACHI, the nonprofit International Association of Certified Home Inspectors (InterNACHI), the international trade association of the inspection industry and has operations in about 60 countries. He is also the founder of the International Association of Certified Indoor Air Consultants (IAC2). Was a research analyst at U. Pitt’s Nuclear Physics Department. “Disadvantages of Solar Energy”, http://www.nachi.org/disadvantages-solar-energy.htm, Accessed 7/11/12 )

environmental pollutants. A few of the more notorious substances contained in panels and associated equipment include: cadmium. When sealed inside solar panels, cadmium is harmless. If leaked from the panel, cadmium can inflict serious  environmental damage. Panels must be disposed of with extreme care in order to keep this carcinogenic substance from leeching into soil and water. lead. Batteries, specifically deep-cycle, lead-acid batteries, are required by solar arrays to ensure a constant supply of electricity. They contain lead and sulfuric acid, which are both highly toxic, especially to marine creatures. Lead has been found to cause a number of impairments in children, including developmental disabilities. However, most of the material in dead batteries is recoverable if the batteries are recycled, as long as consumers make the effort.

#### Cadmium exposure leads to health risks—kidney and liver problems lead to death

Energy Matters 11 (Energy Matters, “Safety Of Cadmium Based Solar Panels Questioned Again”, http://www.energymatters.com.au/index.php?main\_page=news\_article&article\_id=1469, 4/21/11, Accessed 7/11/12)

The debate over the toxic potential of thin film solar panels based on cadmium compounds has been reignited. Cadmium Telluride (CdTe) is a commonly used material in thin film solar modules. Cadmium is a heavy metal and extremely dangerous. Cadmium fumes may cause flu like symptoms and more severe respiratory problems. Cadmium dust is even more toxic, leading to respiratory, liver and kidney problems that can be fatal. Some compounds containing cadmium are thought to be carcinogenic. Cadmium telluride, while considered less dangerous in relation to acute exposure, is toxic if ingested, improperly handled or the dust inhaled. In relation to solar panels, the CdTe is safe while encapsulated in the module, but if the panel is damaged and exposed to water, the cadmium telluride could leach into the water. Aside from this contaminated water entering the wider environment through stormwater runoff, this issue raises concerns particularly where rainwater is harvested from a rooftop for use within the building. In an interview on CleanEnergyAuthority, Vice President of Technology for solar panel manufacturer REC, Trond Westgaard, said since cadmium telluride based panels are not officially considered a dangerous product, there is also a risk of them being mixed with other waste after being damaged or at the end of their serviceable life. While even silicon based solar panels have their own problematic element - lead - Mr. Westgaard says tests have shown lead leaching potential of approximately 4 grams of lead per kilowatt installed compared to approximately 23 grams of cadmium per kilowatt installed for CdTe panels. Additionally, he said cadmium is considered 10 times more hazardous than lead.

#### Cadmium exposure leads to cancer

Sebelius 11 (Kathleen Sebelius, **U.S. Department of Health and Human Services Secretary, “**Report on Carcinogens, Twelfth Edition  (2011): Cadmium and Cadmium Compounds

CAS No. 7440-43-9 (Cadmium)”, http://ntp.niehs.nih.gov/?objectid=03C9AF75-E1BF-FF40-DBA9EC0928DF8B15, June 10, 2011, Accessed 7/11/12)

Cancer Studies in Humans Several epidemiological cohort studies of workers found that exposure to various cadmium compounds increased the risk of death from lung cancer (IARC 1993). Although other factors that could increase the risk of cancer, such as co-exposure to arsenic, were present in several of these studies, it is unlikely that the increased risk of lung cancer was due entirely to confounding factors. Follow-up analysis of some of these cohorts has not definitively eliminated arsenic exposure as a possibly confounding factor, but has confirmed that cadmium exposure is associated with elevated lung-cancer risk under some industrial circumstances (Sorahan et al. 1995, Sorahan and Lancashire 1997). Some early cohort studies found an increased risk of death from prostate cancer among cadmium-exposed workers, but later cohort studies have not confirmed this observation. Additional epidemiological evidence (including case-control studies and geographic-distribution studies) suggests an association between cadmium exposure and cancer of the prostate (Bako et al. 1982, Shigematsu et al. 1982, Garcia Sanchez et al. 1992, van der Gulden et al. 1995), kidney (Kolonel 1976, Mandel et al. 1995), and urinary-bladder (Siemiatycki et al. 1994). The International Agency for Research on Cancer reevaluated the evidence for carcinogenicity of cadmium in 2009 and reaffirmed its earlier conclusion that there was sufficient evidence of cadium’s carcinogenicity in humans. The evidence was classified as sufficent for lung cancer and limited for prostate and kidney cancer (Straif et al. 2009).

#### The short life-span of solar panels ensure cadmium will seep into the environement

Mullins 8 (Robert Mullins, The Cleantech Group- a company that supports the development and marketability of clean technologies. The Cleantech Group provides members of its Cleantech network access to capital, investors, research and promotional opportunities. The group also *provides advisory services for large corporations and governments.* “Cadmium: The Dark Side of Thin-Film?”, http://gigaom.com/cleantech/cadmium-the-dark-side-of-thin-film/, Sep. 25, 2008, Accessed 7/11/12)

The future of the solar power industry may be bright, but solar also has a dark side — the panels being built today have an estimated lifespan of 30 to 40 years and then are largely discarded. The problem with that is that some thin-film photovoltaic solar cells contain hazardous substances like cadmium that can pose a health risk if the solar panel is simply thrown out after it’s done soaking up the sun. The issue is important enough that in late October, the Silicon Valley Toxics Coalition (SVTC), which lobbies to keep old computer parts from being dumped, plans to release a report raising concerns about cadmium in solar panels and urging manufacturers to reclaim old panels to keep cadmium out of the waste stream. Only about 1 percent of electrical generation globally comes from solar today, but that is expected to grow to 20 or 40 percent by 2020, according to McKinsey & Co. SVTC cites forecasts such as that to argue that the solar industry should develop best practices now to ensure solar panel makers take responsibility for the product lifecycle. “The writing is pretty much on the wall that solar panels have materials in them that need to be recovered because some of them are hazardous,” said Shelia Davis, executive director of the SVTC. Although relatively few solar panels have reached end of life, she’s concerned that when more of them are retired, they could end up with other construction debris in landfills. Cadmium, a byproduct of copper, lead and zinc mining, can be really bad for humans and the ecosystem. It’s a toxic metal that can cause kidney and breathing problems, according to the U.S. Labor Department. The European Union has also banned cadmium from being used in batteries and electronics.

### AT: No Cadmium

#### Solar panels use cadmium

Melcher 11 (Joan Melcher, “Imagining a better road”, http://www.planetprofitreport.com/index.php/articles/imagining-a-better-road/, March 12, 2011, Accessed 7/11/12)

Today, Brusaw, who works from a lab near his home in Sagle, Idaho, is preparing for receipt of a $750,000 contract from FHA for the second phase of his work. He plans to build a 12x by 36x strip of road to determine how warm the surface needs to be to prevent freezing, assess how the glass surface works, and test efficiencies of three different solar PV technologies — crystalline silicon, amorphous silicon and thin-film cadmium. Sure, roads made of solar panels sounds like a great idea and one that could possibly get this country truly running on solar power; however, just how feasible is this plan? For one, it would be quite costly. Each panel costs about $7,000 to build, and the plan calls for billions of them to cover the roadways [source: Telegraph.co.uk]. Installation would take huge amounts of time and money, and so would training crews to maintain them properly. Most likely, it would take several years before the electricity generated by the panels would recoup their own cost. For this reason, the company suggests smaller-scale projects are the best place to start. Then there's the big problem with solar energy: cloudy days. Current solar power technology is very inefficient -- in fact, most solar panels only convert about 14 percent of available energy into electricity [source: Northwestern University]. And on days when sunlight isn't readily available, like during the long winters in many parts of the country, you have to wonder where the power would come from. This is why solar energy is considered to be only one type of renewable energy source rather than the sole source of power -- it's difficult to rely on.

## Jellyfish Disadvantage

### 1NC—Jellyfish DA

#### Jellyfish protein will be utilized in large scale solar cell production—plan causes a mass extinction

Neild 10 (Barry, reporter for CNN, has also been employed at BBC, the Guardian, the Daily Telegraph, Agence France-Presse, Jellyfish smoothies offer solar solutions, Oct 4 2010, <http://www.cnn.com/2010/TECH/innovation/09/27/jellyfish.solar.power/index.html>. Noparstak)

(CNN) -- Putting thousands of **jellyfish in a blender** to make a smoothie sounds like the start of bad joke. In fact, it's one way to source ingredients for a new generation of solar power solutions that could aid medical science and offer cheap energy. Scientists say **by liquidizing the** humble Aequorea victoria -- a glow-in-the-dark **jellyfish** commonly found off the western coast of North America -- **they can use the** green fluorescent **protein** (GFP) **it contains to create miniature fuel cells**. These, say their creators, could be used to power microscopic "nanodevices" that could operate independently inside the human body, helping reverse blindness or fight tumors. Nanotechnology -- the manipulation of matter at an atomic scale (one nanometer is equivalent to one billionth of a meter) -- is seen by many as the future of medicine, but the science of powering nano-machinery is still in its infancy. Which is where the jellyfish come in. Zackary Chiragwandi at Chalmers University of Technology in Gothenburg, Sweden told CNN he has developed a method of generating power at a nano-level by administration a droplet of jellyfish-type GFP onto aluminum electrodes and exposing it to ultraviolet light. **The technique**, he says, **is more foolproof than existing light-powered cells, doing away with the need for expensive and tricky titanium elements** found in "Gratzel cells" -- acclaimed solar-power fuel cells that mimic plant photosynthesis. Chiragwandi says his cell can even utilize enzymes from fireflies and Renilla reniformis sea pansies to create its own light source, making it completely self-contained. In Chiragwandi's "biophotovoltaic nanodevice," electrons flow through a circuit when light hits the green fluorescent protein. He says this generates a current measuring "tens of nano amperes." The amount may seem negligible, but if scaled up would appear to offer a more efficient power supply than existing solar cells. "The output characteristics of the biophotovoltaic nanodevice are comparable with those of earlier reported high efficiency solar cells," says Chiragwandi, adding that the power cells could be deployed within one or two years. "The biological fuels may be a means to independently power nanotechnology embedded in a living organism, such as diagnostic, medical or even communication devices residing within a living organism without need for an external electrical power source," he says.

#### **Jellyfish are essential—global warming and overfishing only increase their population without dominating other fish species. Intervening actors solving their aff in the future means you should avoid short term impacts first—we can survive increases in temperature with jellyfish**

Kinver 10(Mark, science nd environment reporter, BBC News, Jellyfish 'may benefit from ecosystem instability', Oct 29 2010, http://www.bbc.co.uk/news/science-environment-11644500

A team of researchers have been trying to identify how jellyfish may benefit from marine ecosystems destabilised by climate change and overfishing. There is concern that a rise in jellyfish numbers could prevent depleted commercially important fish stocks recovering to historical levels. However, a study by European scientists says more data is needed to understand what is happening beneath the waves. [The findings are set to be published](http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2486.2010.02352.x/abstract) in the journal Global Change Biology. Researchers from the UK and Ireland said samples collected from the Irish Sea since 1970 have recorded an increase in material from cnidarians (the division of the animal kingdom that includes jellyfish and coral), "with a period of frequent outbreaks between 1982 and 1991". "There does appear to have been an increase in abundance since 1994 for the Irish Sea," said co-author Christopher Lynam, a researcher at the Centre for Environment Fisheries and Aquaculture Science (Cefas). The team added that previous studies had recorded changes to marine ecosystems as a result of various factors, such as the removal of top predators, and changes to the distribution and characteristics of plankton. These changes have led to a growing concern that the oceans may become increasingly dominated by **jellyfish** because "many gelatinous zooplankton **species are able to increase in abundance rapidly and adapt to new conditions**". Vast blooms of certain jellyfish can cause havoc in affected areas In recent years, there have been a number of examples of sudden blooms of jellyfish in European waters - including the Irish, Mediterranean and Black seas - which have killed fish and closed beaches. In 2007, an invasion of mauve stingers (Pelagia noctiluca) wiped out Northern Ireland's only salmon farm, killing more than 100,000 fish. However, Dr Lynam was keen to point out that the team's study was dominated by the common moon jellyfish (Aurelia aurita), which was not responsible for wiping out the salmon. The main concern, the team wrote, was the establishment of a "never-ending jellyfish joyride" in which the creatures become so established that it makes it almost impossible for commercial fish stocks to return to historical levels. But Dr Lynam told BBC News: "**I don't think that the hypothesis that jellyfish will come into an area and dominate, not allowing anything to come back again, is really supported**. "Such a nightmare scenario does not seem to be the case, when you consider the data and studies that have been carried out." Complicated picture He explained that **the team looked at whether factors such as changes to the climate and overfishing were responsible for the increase in jellyfish abundance**. "It is quite a complicated set of possible linkages that need to be drawn, which we really only have a vague insight at the moment. "For the recent period where we have good data, **it appears as if sea surface temperature is the most important variable**. "This does not necessarily prove it of course, but **it does appear to be benefiting jellyfish**." The team, using data provided by the UK Met Office, commented: "The regional seas of the northeast Atlantic have been warming for the past 15 years at a rate not experienced in recent centuries." **Overfishing has also been linked to the rise of jellyfish populations**. Research suggests that commercial fishing during the 20th Century had resulted in a change in the Irish Sea's ecosystem. The researchers wrote: "The overexploitation of herring during the late 1970s was followed by a period of ecosystem instability in the 1980s in which the frequency of occurrence of cnidarian material... rose to high levels, indicating outbreaks of jellyfish." Dr Lynam added: "**If you take out a lot of the plankton feeders, there could be more food for jellyfish so they might become more abundant**. There may be feedback mechanisms that we are not aware of, so there does need to be further study." But he cited examples in the North Sea and Black Sea where fish species had declined, leading to an increase in jellyfish abundance, but the introduction of measures such as limits on catches had resulted in a recovery of fish stocks. The team urged for the monitoring of jellyfish to continue, and concluded: "The move to ecosystem-based fisheries management requires extensive ecological knowledge and an understanding of the risks posed by any indirect effects... of our utilisation of the sea's resources."

### Solar Panels=Jellyfish

#### **Scientists use jellyfish to produce solar panels because it’s inexpensive and there is a large supply of jellyfish now**

Dillow 10 (Clay, writer and editor for POPSCI, Swedish Researchers Harness Green Goo to Create Solar Cells from Jellyfish, Sept 7 2010, <http://www.popsci.com/science/article/2010-09/swedish-researchers-look-jellyfish-create-solar-cells-green-goo>. Noparstak)

A group of Swedish researchers are looking beyond plants for living models upon which to base their solar harvesting tech, turning instead to the photovoltaic prowess of the jellyfish. Tapping a protein in the jellyfish Aequorea victoria known as green fluorescent protein (GFP), the team has assembled a device that converts ultraviolet light into free electrons using a [drop of green goo](http://www.newscientist.com/article/dn19416-green-machine-squeezing-solar-juice-from-jellyfish.html). The team assembled its cell from two simple aluminum electrodes separated by a small gap atop a silicon dioxide substrate. The GFP is placed between the two electrodes where it assembles itself into strands connecting the electrodes. When introduced to UV light, the GFP gobbles up photons, producing electrons that enter the circuit as electricity. Why GFP? For one, it’s inexpensive. It doesn’t require expensive additives or costly processing, but can go directly onto the substrate where it starts cranking out juice. Further, it can be integrated into a self-contained fuel cell that requires no outside light source. Photons would instead be generated within the fuel cell by enzymes like the ones found in natural light-producers, like fireflies or sea pansies. Such a power source could be miniaturized to power tiny nano-devices. Not to mention, jellyfish are in great supply. Populations are booming in some areas, leading inexplicably to [massive jellyfish swarms](http://www.popsci.com/environment/article/2008-06/jellyfish-invasion) (the Gulf oil disaster could lead to a [spike](http://www.the-scientist.com/blog/display/57448/) in jellyfish numbers in those waters). If researchers can harvest something good from all that extra GFP in the water, more power to them.

#### Jellyfish protein is used to create solar panels.

Scott 10 (Cameron, freelance writer and editor and the author of the blog, The Thin Green Line, Solar Cells Made From Bioluminescent Jellyfish, August 8 2010, <http://inhabitat.com/solar-cells-made-from-bioluminescent-jellyfish/>. Noparstak)

Swedish researchers have devised a way to **turn** bioluminescent **jellyfish into** [solar cells](http://inhabitat.com/solar-power/). It works like this: **the** green fluorescent **protein** (GFP) that makes the Aequorea victoria glow **is** simply **dripped onto a silicon dioxide substrate between two electrodes**. The protein works itself into strands between the electrodes. **When** [ultraviolet light](http://inhabitat.com/2010/06/30/lab-unveils-3-layered-solar-panel-that-catches-full-solar-spectrum/" \t "new) **is shined** on the circuit, voila, **the GFP absorbs photons and emits electrons, generating a current**. As much as Inhabitat is skeptical about using animals as raw materials, this is an intriguing discovery because [jellyfish](http://inhabitat.com/2008/03/15/crochet-coral-reef/" \t "new) are increasingly overpopulating the oceans as the waters become too toxic and acidified for more delicate species to bear. Using them to create carbon-neutral energy could potentially help restore the oceans to balance. The GFP-powered cells work like [dye-sensitized solar cells](http://inhabitat.com/2010/04/22/canadian-researchers-move-closer-to-affordable-efficient-solar-power/" \t "new), but don’t require expensive materials such as [titanium dioxide](http://inhabitat.com/2010/06/21/new-quantum-dot-solar-cells-could-double-efficiency/" \t "new).

### **AT: Artifical Jellyfish**

This gets kind of scientifical so bear with me because I’m not very good at science.

#### First, this card is about a one-time experiment that was concluded a week ago and took months – does not indicate the ability to mass produce jellyfish on any level

#### Second, and this is slayer, the artificial jellyfish is not a jellyfish. It is an organism made from rat cells to be in the shape of a jellyfish and pulse like a jellyfish but has not a single jellyfish cell in it – it does not contain and cannot reproduce the glow-in-the-dark protein necessary to make solar cells.

### **2NC Impact—Europe**

#### Jellyfish will be the only seafood option for Europe in the coming decades due to fishing quotas

Gray 8 (Louise, environment correspondent for The Telegraph, Jellyfish on the menu as edible fish stocks become extinct, Dec 15 2008, <http://www.telegraph.co.uk/earth/3776788/Jellyfish-on-the-menu-as-edible-fish-stocks-become-extinct.html>. Noparstak)

Fish stocks around Britain have been reduced to 10 per cent of what they were 100 years ago due to overfishing. Common skate and angel fish are already extinct while favourites like cod are in danger of being wiped out. The European Union has been trying to help fish stocks recover by introducing quotas for every country under the Common Fisheries Policy. However scientists have said that **unless the system is completely overhauled fish stocks will continue to deplete to the point of extinction by 2048, leaving consumers little option but to eat jellyfish** or the small bony species left behind at the bottom of the ocean. **New fishing quotas** are to be **set this week by Europe**. Callum Roberts, professor of marine conservation at the University of York, said the system is failing to work because ministers haev not heeded the advice of scientists. He said that quotas are **consistently around a quarter higher than scientists advise, meaning fish stocks are unable to recover**. "It's a waste of taxpayers' money to develop fisheries advice and science across Europe and then ignore it at the decision-making stage," he said. Prof Roberts said that in the 1970s three-quarters of Europe's fish were in a healthy or slightly at risk state, but today more than half the EU's stocks were in danger. Another reason the quota system is not working is the problem of discard. An estimated one million tons of fish is dumped in the North Sea every year because it is over quota, the wrong species or too small. He said that unless the system is improved, **fish stocks in UK waters could dwindle to the point of extinction within decades.** "If we do not change our ways we will have less and less to catch... so jelly fish could end up on the menu as opposed to cod in our fish and chips," he said. "We could be eating very small, bony fish that live on the ocean floor like sculpin, thornyheads and gurnards. David Agnew of Imperial College London, said **there was "no question of running out of fish**". But he said EU fisheries were not in a very good state, with the cod recovery plan put in place by the EU failing to reduce fishing pressure on the species enough to allow stocks to recover. Mike Kaiser, Professor of Marine Conservation Ecology at the University of Bangor, said it was not just the UK that needs to improve its act but the whole of the EU. "We've got to the point now in the UK where we realise that things have got to change," he said. "The problem is that's only one nation. If we are rowing against the tide as a nation it'll have very little impact. "The European Commission has to get hold of this issue right across the member states. It's absolutely imperative other nations play their part in this difficult job that needs to be undertaken."

#### European fishing industry key to the global economy, international food distribution, and aquaculture

EU 12 (European Unioin, Maritime affairs and fisheries, May 21 2012, <http://europa.eu/pol/fish/index_en.htm>. Noparstak)

The livelihoods of many EU citizens depend on the sea and its resources – fish of course, but also energy from offshore oil and gas fields. The EU's merchant fleet depends on the world's oceans for trade. Coastal areas are magnets for tourists - another big industry. With so much at stake we must be responsible in our use of the seas' resources, preventing over-fishing and ensuring that oil and gas extraction does not harm the marine or coastal environment.﻿ **The EU fishing industry is the fourth largest in the world. It provides some 6.4 million tonnes of fish each year. Fishing and fish processing provide jobs for more than 350,000 people.** The priority for the EU fisheries policy is to make sure that fisheries are sustainable: the needs of today's fishing industry should be met as long as they do not jeopardise fish stocks for future generations. Related objectives include maintaining healthy ecosystems and ensuring the fishing industry provides fair standards of living for people who depend on it. Consumers' interests must also be taken into account. Over the period 2007-2013, the European Fisheries Fund has €4.3 billion to support the restructuring of the fishing sector and help EU countries implement the 2002 reform of the Common Fisheries Policy (CFP). Money can be used for sustainable development of fisheries, aquaculture businesses, the processing and marketing sectors, and for economic diversification in fishing communities. **Helping to preserve fish stocks for the future – a major objective for the EU's fisheries policy.** **The EU has fisheries partnership agreements with non-EU countries and negotiates within regional and international fisheries organisations** to ensure that waters all over the world are managed within a regulated, transparent and sustainable framework and are not over-fished. These **agreements also give EU fishermen access to fish in distant waters, and so help to keep the EU market supplied** – in return for a financial contribution whereby non-EU countries, **including developing countries, can invest in their fisheries industries and in building up their fish stocks**. The oil industry is an important source of jobs in the maritime economy. Worldwide, demand for fish and other aquatic products is increasing: EU aquaculture can help meet this demand. Today, a quarter of the tonnage of fish and seafood produced in the EU already comes from fish farms and other forms of aquaculture. In terms of volume, mussels, rainbow trout and Atlantic salmon are the most important EU aquaculture species followed by oysters, sea bream, common carp, clam and sea bass. Globally, **aquaculture is an important and growing food production industry**, with an average annual growth rate of over 5% worldwide (2006-08). However, aquaculture in the EU as a whole is static. The European Commission is therefore supporting and promoting this EU industry. **The EU has the world’s largest maritime area (1200 ports) and the world's largest merchant fleet. 90% of foreign trade and 40% of internal trade is seaborne**. The EU's fisheries policy has always taken environmental aspects into account. Recently, though, maritime policy has taken an even broader approach, looking at all uses of our maritime space. The goal is to build on Europe's assets and tradition in the field of marine research, technology and innovation, and contribute to the Europe 2020 strategy for smart, sustainable and inclusive growth. The integrated maritime policy encompasses maritime transport, the competitiveness of maritime businesses, employment, scientific research, fisheries and the protection of the marine environment. The overarching objective is to ensure economic development while safeguarding environmental sustainability. To highlight the importance of the seas as an essential component of our society and economy, the EU celebrates "European Maritime Day" each year on 20 May.

#### Preventing starvation outweighs extinction

LaFollette 3 (Hugh, majored in psychology at Belmont University, former reporter for the Metropolitan Nashville government, PhD from University of Alabama-Birmingham, Chair in Ethics at the University of South Florida St. Petersburg, "World Hunger", edited by Ray Frey and Christopher Heath Wellman, <http://www.hughlafollette.com/papers/World.Hunger.htm>. Noparstak)

The claim that we have a strong obligation to assist the starving takes two broad forms, reflecting one’s general theoretical framework. The first claims that we have a positive obligation to ease suffering and promote happiness; hence, we should assist the starving (Singer 1977/1972: 28). The second claims people have a right to food, and that right undergirds our obligation to assist them. Of course rights, absent compelling obligations or duties, are effectively empty (Pogge 2000). That is why even those who claim that people have rights to food will claim that the relatively affluent have a strong correlative positive obligation to assist those in need. Hence, although the distinction between these two positions is theoretically intriguing, and could well have some practical significance, for present purposes I will collapse them and simply talk about the strong obligation to assist the starving. Those who claim the relatively affluent have this strong obligation must, among other things, show why Hardin's projections are either morally irrelevant or mistaken. A hearty few take the former tack: they claim **we have a strong obligation to aid the starving even if we would eventually become malnourished**. On this view, **to survive on lifeboat earth, knowing that others were tossed overboard into the sea of starvation, would signify an indignity and callousness worse than extinction** (Watson 1977). **It would be morally preferable to die struggling to create a decent life for all than to continue to live at the expense of the starving**. However, most who think we ought to feed the starving will claim, or imply, that if feeding the starving had the terrible consequences Hardin predicts, then we should not feed them (Singer 1977/1972: 34). Therefore, most who reject Hardin’s neo-Malthusianism must show that the projected consequences are at least implausible, if not demonstrably wrong. To set the stage for showing that Hardin’s views are wrong, I must first describe the developmental alternative.

### Internal link—Seafood

#### Access to seafood is key to poverty, food security, and the economy

Ayoola 10 (Ayuub, bachelors degree in Food Science and Technology from the Federal University of Agriculture Abeokuta, Nigeria, worked briefly in a food manufacturing company, this card is an excerpt from his thesis submitted to the Graduate Faculty of North Carolina State University to get his Degree of Master of Science, approved by Peter Ferket, PhD, and Jonathan Allen, PhD, "Replacement of Fishmean with Alternative Protein Sources in Aquaculture Diets", <http://repository.lib.ncsu.edu/ir/bitstream/1840.16/6546/1/etd.pdf>. Noparstak)

“Food security” is the term that is used to express the accessibility of people to sufficient, safe and nutritious food to maintain a healthy and active life (WHO, 2010). Food security is achieved when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO, 2002; Seligman et al., 2010). Therefore, **improved food security is a necessary precursor for global initiative towards reduction of hunger and poverty, and for economic development**. One aim of the UN Millennium Development Goals is to reduce by half the proportion of people suffering from hunger by 2015 (UN, 2010). However, the **continuing population and consumption growth will mean that the global demand for food will continue to increase**. Presently, over 820 million people are affected by hunger in developing countries and these numbers are not decreasing rapidly enough, particularly in Africa and Southern Asia (FAO, 2006). Lack of quality food is still the main cause of under-nutrition among children, which is very common in developing areas (UN, 2010). 1.1 IMPORTANCE OF FISH AND AQUACULTURE TO ALEVIATE POVERTY AND MALNUTRITION Fisheries have always played a very significant socio-economic role in many countries and communities. As a subsistence produce, **fish is a vital resource towards poverty 3 reduction and food security for most poor households** (Cinner et al., 2009). In the Philippines, 84 % of people involved in aquaculture are locals (Bergquist, 2007**). Income generated from the fisheries sector or through fish trade is the most important indirect contribution to food security**. In sub-Sahara Africa, fishing and fish related employment provides both part-time and full-time jobs to 6 and 9 million people , respectively. There are about 43.5 million fishers in the world, and there are at least four other people associated with each fisher in fish-related jobs, including processors, traders and small-scale operators (FAO, 2002). Thus, **the fishing industry supports over 170 million people with income**. Taking into account their families and dependents, one can therefore estimate a total of **520 million people or nearly 8 percent of the total world population directly relies on income from fisheries** (FAO, 2009). This contributes greatly to their purchasing power to achieve greater food security, providing people with an important source of income with which to buy food. (Simon et al. ,2009). Fish has always been a source of “rich food for poor people” and played an important role in improving a developing country’s food security and nutrition for its people. **Fish is a major source of high-quality dietary protein, essential vitamins, minerals, and other micronutrients for about 1 billion people**, many isolated in rural communities of developing and low income countries (FAO, 2003; Stephen et al., 2010). For example, more than 200 million Africans eat fish regularly (Stephen et al., 2010). Globally, **fish contributes about 15-16% of the total animal protein consumed by 2.9 billion people**, including the low-income 4 and food-deficient countries (LIFDCs) (FAO, 2009; Heck et al., 2007). The proportion fish can exceed 50% of animal protein in the poorest countries, especially where other sources of animal protein are scarce or expensive (John, 2009**). A few hundred grams of fish, consumed at a subsistence level, can make the difference between adequate and inadequate nutrition**, between recovered health and prolonged illness, or between food security and starvation. Furthermore, fish is often the most accessible and affordable source of protein in many poor neighborhoods of urban communities in developed countries. Fish-based food products also contribute to local and national economic sustainability through trade and exports.

### Impact—Europe Econ

#### Further European crisis brings down the world market—our evidence assumes the current state of the global economy

Hanieh 7/12 (Adam, teaches development studies at the School of Oriental and African Studies, University of London, "With Europe in crisis, Egypt must reverse course", Egypt Independent, July 9 2012, <http://www.egyptindependent.com/opinion/europe-crisis-egypt-must-reverse-course>. Noparstak)

Teetering on the brink of debt default, the **eurozone economies have once again moved center-stage in the ongoing global economic turmoil**. On 25 June, the German magazine Der Spiegelreported that **a euro collapse**, perhaps **precipitated by Greek withdrawal** from the single currency **or a bank run** in one of the southern European economies, **would likely see a 12 percent drop in the output of the eurozone**. Such an eventuality, described by the magazine as both “very likely” and “horrific,” would be **equivalent to a loss of more than 1 trillion euros.** A predictable chain of consequences would quickly ensue: **an immediate paralysis of world trade, an unprecedented contraction of financial flows and a mass bankruptcy of businesses**. Of course, for millions of people, much of the likely pain of such a dire scenario is already being felt. Official unemployment rates are well over 20 percent in Spain and Greece, with youth unemployment double this figure. Across the continent as a whole, the mantra of permanent austerity has cut deep into the living standards of the European population. Yet, much like media coverage of the 2008 US financial crash, **the popular framing of Europe’s unraveling has largely sidelined its global implications.** This can lead to a serious misreading of the crisis and its effects. **The contemporary global economy operates as a single organism, and sickness in the core countries of North America and Europe can never be confined within state borders**. Indeed, the immediate roots of this crisis are largely found in the enormous imbalances that characterized the era of ‘globalization’ and the deeply unequal manner in **which** virtually all nations **were integrated into the world market.** The dominant storyline of the last few years confirms the importance of taking this global standpoint, with the worst effects of crisis continually being pushed onto the weakest zones of the world economy.

#### Economic decline increases the risk of war—*strong statistical support*.

Royal 10 — Jedidiah Royal, Director of Cooperative Threat Reduction at the U.S. Department of Defense, M.Phil. Candidate at the University of New South Wales, 2010 (“Economic Integration, Economic Signalling and the Problem of Economic Crises,” *Economics of War and Peace: Economic, Legal and Political Perspectives*, Edited by Ben Goldsmith and JurgenBrauer, Published by Emerald Group Publishing, ISBN 0857240048, p. 213-215)

Less intuitive is how periods of economic decline may increase the likelihood of external conflict. Political science literature has contributed a moderate degree of attention to the impact of economic decline and the security and defencebehaviour of interdependent states. Research in this vein has been considered at systemic, dyadic and national levels. Several notable contributions follow.First, on the systemic level, Pollins (2008) advances Modelski and Thompson's (1996) work on leadership cycle theory, finding that rhythms in the global economy are associated with the rise and fall of a pre-eminent power and the often bloody transition from one pre-eminent leader to the next. As such, exogenous shocks such as economic crises could usher in a redistribution of relative power (see also Gilpin. 1981) that leads to uncertainty about power balances, increasing the risk of miscalculation (Feaver, 1995). Alternatively, even a relatively certain redistribution of power could lead to a permissive environment for conflict as a rising power may seek to challenge a declining power (Werner. 1999). Separately, Pollins (1996) also shows that global economic cycles combined with parallel leadership cycles impact the likelihood of conflict among major, medium and small powers, although he suggests that the causes and connections between global economic conditions and security conditions remain unknown.Second, on a dyadic level, Copeland's (1996, 2000) theory of trade expectations suggests that 'future expectation of trade' is a significant variable in understanding economic conditions and security behaviour of states. He argues that interdependent states are likely to gain pacific benefits from trade so long as they have an optimistic view of future trade relations. However, if the expectations of future trade decline, particularly for difficult [end page 213] to replace items such as energy resources, the likelihood for conflict increases, as states will be inclined to use force to gain access to those resources. Crises could potentially be the trigger for decreased trade expectations either on its own or because it triggers protectionist moves by interdependent states.4Third, others have considered the link between economic decline and external armed conflict at a national level. Blomberg and Hess (2002) find a strong correlation between internal conflict and external conflict, particularly during periods of economic downturn. They write,Thelinkages between internal and external conflict and prosperity are strong and mutually reinforcing. Economic conflict tends to spawn internal conflict, which in turn returns the favour. Moreover, the presence of a recession tends to amplify the extent to which international and external conflicts self-reinforce each other. (Blomberg& Hess, 2002. p. 89)Economic decline has also been linked with an increase in the likelihood of terrorism (Blomberg, Hess, &Weerapana, 2004), which has the capacity to spill across borders and lead to external tensions.Furthermore, crises generally reduce the popularity of a sitting government. “Diversionary theory" suggests that, when facing unpopularity arising from economic decline,sitting governments have increased incentives to fabricate external military conflicts to create a 'rally around the flag' effect. Wang (1996), DeRouen (1995). andBlomberg, Hess, and Thacker (2006) find supporting evidence showing that economic decline and use of force are at least indirectly correlated. Gelpi (1997), Miller (1999), and Kisangani and Pickering (2009) suggest that the tendency towards diversionary tactics are greater for democratic states than autocratic states, due to the fact that democratic leaders are generally more susceptible to being removed from office due to lack of domestic support. DeRouen (2000) has provided evidence showing that periods of weak economic performance in the United States, and thus weak Presidential popularity, are statistically linked to an increase in the use of force.In summary, recent economic scholarship positively correlates economic integration with an increase in the frequency of economic crises, whereas political science scholarship links economic decline with external conflict at systemic, dyadic and national levels.5 This implied connection between integration, crises and armed conflict has not featured prominently in the economic-security debate and deserves more attention.This observation is not contradictory to other perspectives that link economic interdependence with a decrease in the likelihood of external conflict, such as those mentioned in the first paragraph of this chapter. [end page 214] Those studies tend to focus on dyadic interdependence instead of global interdependence and do not specifically consider the occurrence of and conditions created by economic crises. As such, the view presented here should be considered ancillary to those views.

## Agenda Disadvantage

### PC Link

#### Plan requires political capital—Congress and Obama push

Solar Roadways 12 ("Climate Change", solarroadways.com/climate.shtml, 2012, Accessed 7/18/12)

The Solar Roadways™ can be implemented as our roads need repairing (no point in replacing good roads immediately - just wait until they wear out) in the U.S., but it is going to require the cooperation of our government: in particular, the DOE, EPA, DOT, and Homeland Security. It will require legislation and bills that can pass through Congress, the Senate, and the White House. It will take a great amount of cooperation between our political parties.

## Obama Bad DA

### Links

#### Recent polls found that solar power initiatives have overwhelming support among likely voters

Greenshine New Energy, 2012 (“Scale Solar Industry is Ready To Explode”, Available online at <http://www.streetlamp-solar.com/scale-solar-industry-is-ready-to-explode.html>, Accessed 07/30/2012, ZR)

Scale Solar Industry is Ready To Explode

According to the new national polling data released recently, solar industry is developing rapidly both in quantity and quality. It is predicted by some experts that the progress of development won't slow down in a while. In other words,

The utility-scale solar industry is ready for what one executive today called "explosive growth". It is reflected by the data that 75 percent of those surveyed support the development of solar energy plants on public lands.

“We’ve already known that, and the polling data we are releasing recently just confirms it." Solar Energy Industries Association president and CEO Rhone told reporters on a conference call. "The public overwhelming supports the development of solar energy industry."

The survey of 500 adults over the age of 18 conducted from February 24 through February 26 by Gotham Research Group found that solar power was the top choice (38 percent) as the best use of public land. Respondents also selected solar farms and wind power (21 percent each) as the top energy sources that the government should prioritize for support, beating out natural gas (16 percent), nuclear (16 percent), oil (11 percent) and coal (4 percent).

"It is time for our officials to respond to this high public demand and enact policies that allow solar to compete with other energy sources on a level playing field," said Roth.

## Oil Dependence Good DA

### Links

#### \*\*\*Their 1AC evidence—Shifting to electric solves car-related oil dependence.

Brusaw 12 (Scott, an electrical engineer with over 20 years of industry experience, including Director of Research and Development at a manufacturing facility in Ohio, and a voting member of NEMA, “Solar Roadways: A Real Solution”, http://www.solarroadways.com/vehicles.shtml. Noparstak)

Driving is part of the American way of life. While we represent 5 percent of the world's population, Americans use more than 33 percent of all oil consumed for road transportation. And as other countries adopt our lifestyle of freedom and mobility, the demand for oil is increasing.³ In the early 70's, over half of the globe essentially didn't use any oil. Today, everyone is hooked on trying to create a society that looks like ours. Other people want to live like us: they want cars and a nice house, air conditioning and refrigeration. And why shouldn't they? Daily use of petroleum worldwide: 53 million barrels a day for transportation overall 29 million barrels a day for land transport for people 19 million barrels a day for land transport for freight 5 million barrels a day for air transport for people and freight² So **what will happen when the world runs out of oil?We're told that we've got about another 50 years before this happens, but** there are many reasons to believe otherwise. There's a lot of speculation and disagreement on the topic "peak oil", but one fact is not debatable: oil has a very finite supply. The United States was the biggest producer of oil for over 100 years and no one thought we'd ever peak. Suburbia is already in trouble. The whole concept behind suburban life is that you commute to work 30, 40, 50 miles. That's only viable if you have cheap gas. The massive farms that feed the world are worked by internal combustion vehicles. In the absence of fossil fuel, how many people can the world support? Many people believe 1.5 to 2 billion people. Our planet's current population is now approaching 7 billion people. So again, what will happen when the world runs out of oil? The reality is that **no single solution that has been proposed will lead to a decrease in U.S. gasoline consumption or achieve U.S. energy independence.Eliminating 12 million barrels a day of oil imports from our daily lives is not plausible.³** Until now**: by replacing our deterioration highway infrastructure and crumbling power grid with the Solar RoadwaysT, we'd create a system that will support the recharging of all-electric vehicles. Using all-electric vehicles will eliminate the need for internal combustion engines. The removal of internal combustion engines eliminates our need for oil.Electric cars have** actually been around for a long time. They've just **never been very practical, due to the fact that they have to be recharged and there has never been an infrastructure for that**. **The Solar RoadwaysTallow electric cars to recharge at any rest stop or business** that has a parking lot made up of Solar Road PanelsT. Drivers can recharge their vehicles while eating at a restaurant or shopping at a mall. And with what we're currently paying at the gas pump, I think the conversion may be more acceptable to the American car owner than we may have thought imaginable!

#### Solar Roadways eliminates the need for oil

Brusaw 12 (Scott, an electrical engineer with over 20 years of industry experience, including Director of Research and Development at a manufacturing facility in Ohio, and a voting member of NEMA, “Oil Independence”, <http://solarroadways.com/oil.shtml>, Accessed 07/30/2012, ZR)

The reality is that no single solution that has been proposed will lead to a decrease in U.S. gasoline consumption or achieve U.S. energy independence. Eliminating 12 million barrels a day of oil imports from our daily lives is not plausible.³ Until now: by replacing our deterioration highway infrastructure and crumbling power grid with the Solar Roadways, we'd create a system that will support the recharging of all-electric vehicles. Using all-electric vehicles will eliminate the need for internal combustion engines. The removal of internal combustion engines eliminates our need for oil. Electric cars have actually been around for a long time. They've just never been very practical, due to the fact that they have to be recharged and there has never been an infrastructure for that. The Solar RoadwaysT allow electric cars to recharge at any rest stop or business that has a parking lot made up of Solar Road PanelsT. Drivers can recharge their vehicles while eating at a restaurant or shopping at a mall. And with what we're currently paying at the gas pump, I think the conversion may be more acceptable to the American car owner than we may have thought imaginable! Summary: we can't wait any longer to find a replacement for oil, which is rapidly disappearing. Our dependency on oil has long been a matter of national security and we don't want to wait until it's gone to decide what to do next. We have the technology to solve this problem in a relatively short period of time, which may be all we have left.

#### Solar roadways would end oil dependency

Jessica Leber, No Date – (Conservation Magazine, “Taking Solar to the Streets”, Available online at <http://www.conservationmagazine.org/2010/12/taking-solar-to-the-streets/>, Accessed 07/30/2012, ZR)

Idaho entrepreneur Scott Brusaw started Solar Roadways, a company working to develop durable, shatter-proof solar panels that could one day replace asphalt roadway, driveway, and parking-lot surfaces.

Oh, and his big idea could also end our oil dependency. Solar roadways would not only generate significant power for the nation’s grid, they could also act as electric superhighways that would distribute the renewable electrons. Other imaginable perks? Driveways that melt their own ice and snow—or parking lots that, through electric-vehicle charging stations, actually power cars while their owners shop.

Of course, even aside from a list of technical challenges, there are other reasons why some call Brusaw’s dream sky-high. His thus far largely theoretical panels could cost about $4.4 million per mile, four times more than traditional asphalt paving. But he hopes the panels could pay themselves off in 20 years by producing enough power for 428 homes and lasting longer than traditional paving.