### Plan

#### The United States federal government should substantially increase its Solar Roadways solar panel transportation infrastructure investment in the United States. The solar panels should not be built with Jellyfish protein or cadmium.

### Contention One: Warming

#### Warming is an existential risk.

Deibel ’07—Prof IR @ National War College (Terry, “Foreign Affairs Strategy: Logic for American Statecraft,” Conclusion: American Foreign Affairs Strategy Today)

Finally, there is one major existential threat to American security (as well as

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United States, but potentially to the continued existence of life on this planet

#### Our science is best

Alley 10 – Professor of Geoscience @ Penn State

Richard, Professor of Geoscience @ Penn State, authored over 200 refereed scientific papers, which are "highly cited" according to a prominent indexing service, erved with distinguished national and international teams on major scientific assessment bodies, 11-17-2010, “CLIMATE CHANGE SCIENCE; COMMITTEE: HOUSE SCIENCE AND TECHNOLOGY;

SUBCOMMITTEE: ENERGY AND ENVIRONMENT,” CQ Congressional Testimony, Lexis

Background on Climate Change and Global Warming. Scientific assessments such as those of the

AND

Greenland ice sheet, and that sufficiently large warming has removed them entirely.

#### CO2 reduction solves.

Hansen et al 8 (James, Makiko Sato, PushkerKharecha, NASA/Goddard instutue for Space Studies, Columbia University Earth Institute. David Beerling, Department of Animal and Plant Sciences, University of Sheffield, Robert Berner, Mark Pagani, Department of Geology and Geophysics, Yale University, Valerie Masson-Delmotte, Lab Des Sciences du Climat et l'Enviornnement/Institut Pierre Simon Laplace, Maureen Raymo, Department of Earth Sciences, Boston University, Dana L. Royer, Department of Earth and Enviornmental Sciences, James C. Zachos, Earth and Planetary Sciences Dept., University of California, Santa Cruz, "Target Atmospheric CO2: Where Should Humanity Aim?", http://www.benthamscience.com/open/toascj/articles/V002/217TOASCJ.pdf)

Abstract: Paleoclimate data show that climate sensitivity is ~3°C for doubled

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is not brief, there is a possibility of seeding irreversible catastrophic effects.

#### Our studies account for a ride range of chemicals as well as the impact on clouds

NASA 10 (National Aeronautics and Space Administration, "Road Transportation Emerges as Key driver of Warming", Feb 18 2010, <http://www.giss.nasa.gov/research/news/20100218a/>. Noparstak)

For each sector of the economy, Unger's team analyzed the effects of a wide

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the International Panel on Climate Change, a significant amount of uncertainty remains."

#### Two internals

#### 1. Electric vehicles

#### Dependence on cars make warming inevitable.

Socolow et al 4 (Robert, Professor of Mechanical and Aerospace Engineering at Princeton University. His current research focuses on global carbon management and fossil-carbon sequestration, Roberta Hotinski, ecoscientist turned science communicator who has worked at U.S. News & World Report, the National Science Foundation, and most recently Princeton University. As the Information Officer for Princeton's Carbon Mitigation Initiative, Dr. Hotinski helped to develop the "stabilization wedge", Jefferey B. Greenblatt, Research Staff MemberPrinceton Environmental Institute, Stephen Pacala, Director, Princeton Environmental Institute Ecology and Evolutionary Biology, Solving The Climate Problem, December 2004, <http://cmi.princeton.edu/wedges/pdfs/climate_problem.pdf>. Noparstak)

For example, a conspicuous source of awedge is increased efficiency for the world’s light

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gallon average fuel economy(versus somewhat more than 20miles per gallon today).

#### 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

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more acceptable to the American car owner than we may have thought imaginable!

#### U.S. automobiles key

DeCicco and Fung 6 (John, Ph.D. Mechanical Engineering, Princeton University, Freda, senior policy analyst for ICCT, former automotive analyst at Environmental Defense Fund, "Global Warming on the Road: The Climate Impact Of America's Automobiles", 2006 <http://www.edf.org/sites/default/files/5301_Globalwarmingontheroad_0.pdf>. Noparstak)

The global warming pollution from all U.S. cars and light trucks amounted

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opportunities for reducing those aspects of total emissions that each can best influence.

#### Solar Roadways create convenient energy refuel stations--key barrier

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)

Since the Solar Roadway creates and carries clean renewable electricity, EVs can be recharged

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energy. The beginning of the end of our dependency upon fossil fuels?

#### They also solve military emissions.

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/military.shtml. Noparstak)

Imagine being able to put “eyes and ears” on the ground anywhere in

AND

over, the Solar Road Panels are loaded back up and deployed elsewhere.

#### Ending military dependence alone could solve warming.

Hynes 11 (H Patricia, ofessor of Environmental Health at Boston University School of Public Health where she is Director of the Urban Environmental Health Initiative and works on issues of urban environmental health, environmental justice and feminism, "The Military Assault on Global Climate", Sep 8 2011, <http://truth-out.org/index.php?option=com_k2&view=item&id=3181:the-military-assault-on-global-climate>. Noparstak)

Correspondingly, militarism is the most oil-exhaustive activity on the planet, growing

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Department of Defense (DoD) is easier than getting fuel usage data.

#### Reliance also hampers readiness and overstretches forces.

Erwin, 2006(Sandra I., “Energy Conservation Plans Overlook Military Realities,” National Defense Magazine, September,

<http://www.nationaldefensemagazine.org/issues/2006/September/DefenseWatch.htm>, accessed 7/7, JDC)

Are skyrocketing oil prices just a temporary drain on the U.S. economy

AND

the gasoline sold in the United States is mixed with corn-derived ethanol

#### That kills heg.

Haass, 2005(Richard N, “The Case for "Integration”, The national interest,

[http://www.nationalinterest.org/ME2/dirmod.asp?sid=&nm=&type=Publishing&mod=Publications%3A%3AArticle&mid=1ABA92EFCD 8348688A4EBEB3D69D33EF&tier=4&id=A561B96740654978B3472EFEEB14C84F)](http://www.nationalinterest.org/ME2/dirmod.asp?sid=&nm=&type=Publishing&mod=Publications%3A%3AArticle&mid=1ABA92EFCD8348688A4EBEB3D69D33EF&tier=4&id=A561B96740654978B3472EFEEB14C84F)

The second question is whether there will be sufficient capacity to carry out a foreign

AND

able and willing to devote the requisite resources to the many tasks at hand

#### Heg is good.

Thayer 6 (Bradley Thayer, professor of security studies at Missouri State, November/December 2006 “In Defense of Primacy,”)

A grand strategy based on American primacy means ensuring the United States stays the world’s

AND

robustness of the United States'’ conventional and strategic deterrent capabilities is increased.’

### Contention Two: The Grid

#### Power grid vulnerable now—terrorists see it as a target for a cyber attack

Serrano 11 (Richard A., staff writer for the Washington bureau, "U.S. power grid a terrorist target", Feb 11 2011, <http://www.spokesman.com/stories/2011/feb/11/us-power-grid-a-terrorist-target/>. Noparstak)

WASHINGTON – A major cyber attack somewhere in the United States is becoming increasingly possible

AND

secure. And that’s probably all we should say about that in public.”

#### Countries and terrorist organizations have already infiltrated our grid system and can shut it off during a time of war

Gorman 9 (Siobhan, writer for the Wall Street Journal, "Electricity Grid in U.S. Penetrated By Spies", April 8 2009, <http://online.wsj.com/article/SB123914805204099085.html>. Noparstak)

WASHINGTON -- Cyberspies have penetrated the U.S. electrical grid and left behind

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China, can disrupt elements of the U.S. information infrastructure."

#### Even simple hacking could cause a chain reaction of nuclear meltdowns

GEI 10 (Galving Electricity Initiative, founded by CEO Robert Galvin, pushing for electric grid reform for a secure, sustainable, energy future, "The Electric Power System Is Insecure", http://galvinpower.org/resources/library/fact-sheets-faqs/electric-power-system-insecure

There is evidence that terrorist organizations are considering an attack on the power grid.

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allow them to remain operational independent of the failure of main power lines.

#### Statistical risk analysis proves that the United States must act to protect against the increasing risk to our power grid

Simonoff et al 4 (Jeffrey, professor of statistics at New York University, Carlos Restrepo, Rae Zimmerman, New York University professors, "Risk Management and Risk Analysis-Based Decision Tools for Attacks on Electric Power, October 1 2004, <http://research.create.usc.edu/cgi/viewcontent.cgi?article=1158&context=nonpublished_reports&sei-redir=1&referer=http%3A%2F%2Fwww.google.com%2Furl%3Fsa%3Dt%26rct%3Dj%26q%3Dterrorist%2520attempt%2520power%2520grid%2520attack%2520potential%26source%3Dweb%26cd%3D4%26ved%3D0CFkQFjAD%26url%3Dhttp%253A%252F%252Fresearch.create.usc.edu%252Fcgi%252Fviewcontent.cgi%253Farticle%253D1158%2526context%253Dnonpublished_reports%26ei%3DJ7j5T-auLcGZqAHT7_mLCQ%26usg%3DAFQjCNG2O8M2NnxCfW2bmwDn0PV2NIoLAA#search=%22terrorist%20attempt%20power%20grid%20attack%20potential%22>. Noparstak)

A critical need exists to develop the means to provide decision tools to estimate the

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protection, equipment failure, human error and crime have the highest impact.

#### Power grid failure collapses military forces—key to heg

Snider 12 (Annie, E&E reporter, "Pentagon still can't define 'energy security', much less achieve it", Jan 16 2012, http://www.eenews.net/public/Greenwire/2012/01/16/1

Hurricane Katrina humbled U.S. military bases in 2005, cutting power at

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it is also likely to send waves through civilian energy and technology industries.

#### Solar Flares shutdown the power grid—the flare-up in March was a minor storm. Larger impacts are likely in the near future

Khan 12 (Amina, staff writer for the Los Angeles Times, interview with Mike Hapgood, a space weather scientist at the Rutherford Appleton Laboratory near Oxford, England, "How a solar flare could send us back to the Stone Age", May 9 2012, <http://www.csmonitor.com/Science/2012/0509/How-a-solar-flare-could-send-us-back-to-the-Stone-Age>. Noparstak)

Q: Is that the biggest geomagnetic storm on record?A: We always

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wolf situation. That's something that is a concern to me, personally.

#### 1-in-8 chance that a solar storm large enough to cause a power grid failure will occur by 2020

Huffington Post 12 (Solar Flare Big Enough To Cause Catastrophe On Earth Called Surprisingly Likely, March 1 2012, <http://www.huffingtonpost.com/2012/03/01/solar-flare-big-enough-to-disrupt_n_1313136.html>. Noparstak)

An aurora borealis may be beautiful, but can there be too much of a

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a.m., thinking the sun had risen on a cloudy day."

#### New observations prove the current Solar Cycle will produce large solar flares

Wall 12 (Mike, writer for Space.com, Monster sunspot threatens to unleash powerful solar flares, May 8 2012, <http://www.foxnews.com/scitech/2012/05/08/monster-sunspot-threatens-to-unleash-powerful-solar-flares/>. Noparstak

An enormous sunspot group has taken shape on the surface of the sun, hinting

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the current one — known as Solar Cycle 24 — will peak in 2013

#### Solar Roadways prevent a power grid blackout—it can’t be shut down.

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/smart.shtml. Noparstak)

Our current power grid is based on centralized power stations. Distribution of power is

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provides a decentralized, secure, intelligent, self-healing power grid.

#### Collapse of the power grid causes nuclear meltdown—collapses - causes extinction. International Business Times 11(Solar Flare Could Unleash Nuclear Holocaust Across Planet Earth, Forcing Hundreds of Nuclear Power Plants Into Total Meltdowns, <http://au.ibtimes.com/articles/213249/20110914/solar-flare-could-unleash-nuclear-holocaust-across-planet-earth-forcing-hundreds-of-nuclear-power-pl.htm>. Noparstak)

What happens when there's no electricity? Imagine a world without electricity. Even for just a week. Imagine [New York](http://au.ibtimes.com/topics/detail/456/new-york/) City with no electricity, or Los Angeles, or Sao Paulo. Within 72 hours, most cities around the world will devolve into total chaos, complete with looting, violent crime, and runaway fires. But that's not even the bad news. Even if all the major cities of the world burned to the ground for some other reason, humanity could still recover because it has the farmlands: the soils, the seeds, and the potential to recover, right? And yet the real crisis here stems from the realization that once there is no power grid, all the nuclear power plants of the world suddenly go into "emergency mode" and are forced to rely on their on-site emergency power backupsto circulate coolants and prevent nuclear meltdowns from occurring. And yet, as we've already established, these facilities typically have only a few hours of battery power available, followed by perhaps a few days worth of diesel fuel to run their generators (or propane, in some cases). Did I also mention that half the people who work at nuclear power facilities have no idea what they're doing in the first place? Most of the veterans who really know the facilities inside and out have been forced into retirement due to reaching their **lifetime limits** of on-the-job radiation exposure, so most of the workers at nuclear facilities right now are newbies who really have no clue what they're doing. There are 440 nuclear power plants operating across 30 countries around the world today. There are an additional 250 so-called "research reactors" in existence, making a total of roughly 700 nuclear reactors to be dealt with ([http://www.world-nuclear.org/info/i...](http://www.world-nuclear.org/info/inf01.html)). Now imagine the scenario: You've got a massive solar flare that knocks out the world power grid and destroys the majority of the power grid transformers, thrusting the world into darkness. Cities collapse into chaos and rioting, martial law is quickly declared (but it hardly matters), and every nation in the world is on full emergency. But that doesn't solve the really big problem, which is that you've got700 nuclear reactors **that can't feed power into the grid** (because all the transformers are blown up) **and yet simultaneously have to be fed a steady stream of emergency fuels to run the generators the keep the coolant pumps functioning**. How long does the coolant need to circulate in these facilities to cool the nuclear fuel? **Months.** This is also the lesson of Fukushima: You can't cool nuclear fuel in mere hours or days. It takes months to bring these nuclear facilities to a state of cold shutdown. And that means **in order to avoid a multitude of Fukushima-style meltdowns from occurring around the world, you need to truck diesel fuel, generator parts and nuclear plant workers to every nuclear facility on the planet, ON TIME, every time, without fail, for months on end**. Now remember, **this must be done in the middle of the total chaos** breakdown of modern civilization**, where there is no power**, where law enforcement and emergency services are totally overrun, where people are starving because food deliveries have been disrupted, and when looting and violent crime runs rampant in the streets of every major city in the world. Somehow, despite all this, you have to run these diesel fuel caravans to the nuclear power plants and keep the pumps running. Except there's a problem in all this, even if you assume you can somehow work a logistical miracle and actually deliver the diesel fuel to the backup generators on time (which you probably can't). The problem is this: Where do you get diesel fuel? Why refineries will be shut down, too from petroleum refineries. Most people don't realize it, but petroleum refineries run on electricity. Without the power grid, the refineries don't produce a drop of diesel. With no diesel, there are no generators keeping the coolant running in the nuclear power facilities. But wait, you say: Maybe we could just acquire diesel from all the gas stations in the world. Pump it out of the ground, load it into trucks and use that to power the generators, right? Except there are other problems here: How do you pump all that fuel without electricity? How do you acquire all the tires and spare parts needed to keep trucks running if there's no electricity to keep the supply businesses running? How do you maintain a truck delivery infrastructure when the electrical infrastructure is totally wiped out? Some countries might be able to pull it off with some degree of success. With military escorts and the total government control over all fuel supplies, a few nations will be able to keep a few nuclear power facilities from melting down. But here's the real issue: There are 700 nuclear power facilities in the world, remember? Let's suppose that in the aftermath of a massive solar flare, the nations of the world are somehow able to control half of those facilities and nurse them into cold shutdown status. That still leaves roughly 350 nuclear facilities at risk. Now let's suppose half of those are somehow luckily offline and not even functioning when the solar flare hits, so they need no special attention. This is a very optimistic assumption, but that still leaves 175 nuclear power plants where all attempts fail. Let's be outrageously optimistic and suppose that a third of those somehow don't go into a total meltdown by some miracle of God, or some bizarre twist in the laws of physics. So we're still left with **115 nuclear power plants** that "go Chernobyl." Fukushima was one power plant. **Imagine the devastation of 100+ nuclear power plants, all going into meltdown all at once across the planet**. It's not the loss of electricity that's the real problem; it's the **global tidal wave of invisible radiation** that blankets the planet, permeates the topsoil, irradiates everything that breathes and delivers the final crushing blow to human civilization as we know it today. Because if you have **100 simultaneous global nuclear meltdowns**, the tidal wave of radiation will make farming nearly impossible for years. That means no food production for several years in a row. And that, in turn, means anear-totalcollapse of the human population on our planet. How many people can survive an entire year with no food from the farms? Not one in a hundred people. Even beyond that, how many people can essentially **live underground** and be safe enough from the radiation that they can have viable children and repopulate the planet? It's a very, very small fraction of the total population.

#### State regulated requirements fail, only standardization through a single system soles power crashes and interferences

Moersdorf 12 (Gerry, employed at ACScout, company that designs AC monitoring devices for special applications, "Measuring the Quality and Reliability of Electric Service", http://www.acscout.com/servlet/Page?template=reliabilityofelectricserviceIt isn’t easy.

State regulatory bodies set distribution reliability requirements. And since every state has developed different

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other damage from variation in service voltage that are allowable under this rule.”

### Contention Three—Space

#### The Los Angeles Air Force Base depends on the power grid—it’s the US military’s only space operations center and is critical to success

Miller 11 (Andrew, vice president, external communications, Integral Systems Inc., "Orbital Sciences Corporation Awards Integral Systems Contract", April 20 2011, <http://www.integ.com/Press/2011/4-20-2011OrbitalSciencesCorporationAwardsIntegralSystemsContract.pdf>. Noparstak)

Space and Missile Systems Center Sponsored Study to Address the Feasibility of Expanding the Use

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El Segundo, Calif., four miles south of Los Angeles International Airport.

#### Space is key to every aspect of hegemony

Fernandez 4 (Adolfo, National Defense Fellow, foreign affairs, defense, and trade division, "Military Role in Space Control: A Primer", Sept 23 2004, <http://www.fas.org/man/crs/RL32602.pdf>. Noparstak)

Military space control seeks to preserve the military advantage the U.S. military

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and civil sectors to satisfy a portion of its space service requirements.11

#### Specifically communication to military operations in the Middle East—there is no alternative

TS2 No Date (Worldwide satellite communications, ttp://www.ts2.pl/en/Order-form-for-soldiers-in-Iraq. Noparstak)

It would never be possible to carry out military operations without communications. Hence,

AND

poor telecommunications infrastructure, there is practically no alternative to the satellite communications.

#### Military operations in the Middle East are critical to containing inevitable spillover—three reasons

Terrill 8 (Andrew, Professor of National Security Affairs, served as a Middle East nonproliferation analyst for the International Assessments Division of the LLNL, retired U.S. Army Reserve lieutenant colonel and Foreign Area Officer in the Middle East, published in numerous academic journals on topics including nuclear proliferation, the Iran-Iraq War, Operation Desert Storm, he holds a B.A. from California State Polytechnic University and an M.A. from the University of California, Riverside, both in Political Science, also holds a PhD in International Relations from Claremont Graduate University, "Regional Spillover Effects Of The Iraq War", December 2008, <http://www.dtic.mil/dtic/tr/fulltext/u2/a492485.pdf>. Noparstak)

It is inevitable that civil unrest and other problems in Iraq would have spillover effects

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the price that the Syrians want for such cooperation is not unacceptably high.

#### Uncontained spillover leads to nuclear war—cold war theory doesn’t apply to the Middle East

Contrarian 12 (Glenn, retired Navy member and common contributer to BC Politics, an online magazine covering many things including politics, all submitted work is peer reviewed and edited for content, "Nuclear War Is Becoming Increasingly Likely in the Middle East", March 5 2012, <http://blogcritics.org/politics/article/nuclear-war-is-becoming-increasingly-likely/page-2/>. Noparstak)

I don't like to be an alarmist, but pieces are starting to fall together

AND

-learned lesson of the wisdom of the separation of Church and State.

### Contention Four: Solvency

#### DOE already funded the project’s upstart, but the aff needs more funding to cause nationwide implementation—non-uniques DAs

Covert 9(Adrian, writer for for POPSCI, "Solar Panels Built Into Roads Could Be the Future of Energy", Aug 27 2009, <http://www.popsci.com/scitech/article/2009-08/solar-panels-built-roads-could-be-future-energy/>. Noparstak)

The Department of Energy just gave $100,000 to upstart company Solar Roadways

AND

has yet to be built. But we can be excited, right?

#### Solar panels have already been created, are competitive with asphalt, and provide enough energy to power the entire world

McKendrick 10 (Joe, an independent analyst who tracks the impact of information technology on management and markets. He is the author of the SOA Manifesto and has written for Forbes, ZDNet and Database Trends & Applications, "Pave this: replace asphalt on roads with solar panels, power the nation", Aug 6 2010, <http://www.smartplanet.com/blog/business-brains/pave-this-replace-asphalt-on-roads-with-solar-panels-power-the-nation/9178>. Noparstak)

Here’s an idea that could provide the United States with all the solar power it

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the same traction as asphalt,” as well as be shatterproof and glareproof.