### 1nc Irreversible

#### Warming’s irreversible

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Carbon dioxide, methane, nitrous oxide, and other greenhouse gases increased over the course of the 20th century due to human activities. The human-caused increases in these gases are the primary forcing that accounts for much of the global warming of the past fifty years, with carbon dioxide being the most important single radiative forcing agent (1). Recent studies have shown that the human-caused warming linked to carbon dioxide is nearly irreversible for more than 1,000 y, even if emissions of the gas were to cease entirely (2–5). The importance of the ocean in taking up heat and slowing the response of the climate system to radiative forcing changes has been noted in many studies (e.g., refs. 6 and 7). The key role of the ocean’s thermal lag has also been highlighted by recent approaches to proposed metrics for comparing the warming of different greenhouse gases (8, 9). Among the observations attesting to the importance of these effects are those showing that climate changes caused by transient volcanic aerosol loading persist for more than 5 y (7, 10), and a portion can be expected to last more than a century in the ocean (11–13); clearly these signals persist far longer than the radiative forcing decay timescale of about 12–18 mo for the volcanic aerosol (14, 15). Thus the observed climate response to volcanic events suggests that some persistence of climate change should be expected even for quite short-lived radiative forcing perturbations. It follows that the climate changes induced by short-lived anthropogenic greenhouse gases such as methane or hydrofluorocarbons (HFCs) may not decrease in concert with decreases in concentration if the anthropogenic emissions of those gases were to be eliminated. In this paper, our primary goal is to show how different processes and timescales contribute to determining how long the climate changes due to various greenhouse gases could be expected to remain if anthropogenic emissions were to cease. Advances in modeling have led to improved AtmosphereOcean General Circulation Models (AOGCMs) as well as to Earth Models of Intermediate Complexity (EMICs). Although a detailed representation of the climate system changes on regional scales can only be provided by AOGCMs, the simpler EMICs have been shown to be useful, particularly to examine phenomena on a global average basis. In this work, we use the Bern 2.5CC EMIC (see Materials and Methods and SI Text), which has been extensively intercompared to other EMICs and to complex AOGCMs (3, 4). It should be noted that, although the Bern 2.5CC EMIC includes a representation of the surface and deep ocean, it does not include processes such as ice sheet losses or changes in the Earth’s albedo linked to evolution of vegetation. However, it is noteworthy that this EMIC, although parameterized and simplified, includes 14 levels in the ocean; further, its global ocean heat uptake and climate sensitivity are near the mean of available complex models, and its computed timescales for uptake of tracers into the ocean have been shown to compare well to observations (16). A recent study (17) explored the response of one AOGCM to a sudden stop of all forcing, and the Bern 2.5CC EMIC shows broad similarities in computed warming to that study (see Fig. S1), although there are also differences in detail. The climate sensitivity (which characterizes the long-term absolute warming response to a doubling of atmospheric carbon dioxide concentrations) is 3 °C for the model used here. Our results should be considered illustrative and exploratory rather than fully quantitative given the limitations of the EMIC and the uncertainties in climate sensitivity. Results One Illustrative Scenario to 2050. In the absence of mitigation policy, concentrations of the three major greenhouse gases, carbon dioxide, methane, and nitrous oxide can be expected to increase in this century. If emissions were to cease, anthropogenic CO2 would be removed from the atmosphere by a series of processes operating at different timescales (18). Over timescales of decades, both the land and upper ocean are important sinks. Over centuries to millennia, deep oceanic processes become dominant and are controlled by relatively well-understood physics and chemistry that provide broad consistency across models (see, for example, Fig. S2 showing how the removal of a pulse of carbon compares across a range of models). About 20% of the emitted anthropogenic carbon **remains in the atmosphere for** many **thousands of years** (with a range across models including the Bern 2.5CC model being about 19 4% at year 1000 after a pulse emission; see ref. 19), until much slower weathering processes affect the carbonate balance in the ocean (e.g., ref. 18). Models with stronger carbon/climate feedbacks than the one considered here could display larger and more persistent warmings due to both CO2 and non-CO2 greenhouse gases, through reduced land and ocean uptake of carbon in a warmer world. Here our focus is not on the strength of carbon/climate feedbacks that can lead to differences in the carbon concentration decay, but rather on the factors that control the climate response to a given decay. The removal processes of other anthropogenic gases including methane and nitrous oxide are much more simply described by exponential decay constants of about 10 and 114 y, respectively (1), due mainly to known chemical reactions in the atmosphere. In this illustrative study, we do not include the feedback of changes in methane upon its own lifetime (20). We also do not account for potential interactions between CO2 and other gases, such as the production of carbon dioxide from methane oxidation (21), or changes to the carbon cycle through, e.g., methane/ozone chemistry (22). Fig. 1 shows the computed future global warming contributions for carbon dioxide, methane, and nitrous oxide for a midrange scenario (23) of projected future anthropogenic emissions of these gases to 2050. Radiative forcings for all three of these gases, and their spectral overlaps, are represented in this work using the expressions assessed in ref. 24. In 2050, the anthropogenic emissions are stopped entirely for illustration purposes. The figure shows nearly irreversible warming for at least 1,000 y due to the imposed carbon dioxide increases, as in previous work. **All published studies to date**, which use multiple EMICs and one AOGCM, show largely irreversible warming due to future carbon dioxide increases (to within about 0.5 °C) on a timescale of at least 1,000 y (3–5, 25, 26). Fig. 1 shows that the calculated future warmings due to anthropogenic CH4 and N2O also persist notably longer than the lifetimes of these gases. The figure illustrates that emissions of key non-CO2 greenhouse gases such as CH4 or N2O could lead to warming that both temporarily exceeds a given stabilization target (e.g., 2 °C as proposed by the G8 group of nations and in the Copenhagen goals) and remains present longer than the gas lifetimes even if emissions were to cease. A number of recent studies have underscored the important point that reductions of non-CO2 greenhouse gas emissions are an approach that can indeed reverse some past climate changes (e.g., ref. 27). Understanding how quickly such reversal could happen and why is an important policy and science question. Fig. 1 implies that the use of policy measures to reduce emissions of short-lived gases will be less effective as a rapid climate mitigation strategy than would be thought if based only upon the gas lifetime. Fig. 2 illustrates the factors influencing the warming contributions of each gas for the test case in Fig. 1 in more detail, by showing normalized values (relative to one at their peaks) of the warming along with the radiative forcings and concentrations of CO2 , N2O, and CH4 . For example, about two-thirds of the calculated warming due to N2O is still present 114 y (one atmospheric lifetime) after emissions are halted, despite the fact that its excess concentration and associated radiative forcing at that time has dropped to about one-third of the peak value.

### Exts – Irreversible

#### Triggers their impacts

**ANI 10** 3-2010, citing Charles H. Greene, Cornell professor of Earth and atmospheric science <http://news.oneindia.in/2010/03/20/ipcchas-underestimated-climate-change-impacts-sayscientis.html>

According to Charles H. Greene, Cornell professor of Earth and atmospheric science, "Even if all man-made greenhouse gas emissions were stopped tomorrow and carbon-dioxide levels stabilized at today's concentration, by the end of this century, the global average temperature would increase by about 4.3 degrees Fahrenheit, or about 2.4 degrees centigrade above pre-industrial levels, which is significantly **above** the level which scientists and policy makers agree is a threshold for dangerous climate change." "Of course, greenhouse gas emissions will not stop tomorrow, so the actual temperature increase will likely be significantly larger, resulting in potentially catastrophic impacts to society unless other steps are taken to reduce the Earth's temperature," he added. "Furthermore, while the oceans have slowed the amount of warming we would otherwise have seen for the level of greenhouse gases in the atmosphere, the ocean's thermal inertia will also slow the cooling we experience once we finally reduce our greenhouse gas emissions," he said. This means that the temperature rise we see this century will be largely irreversible for the next thousand years. "Reducing greenhouse gas emissions alone is unlikely to mitigate the risks of dangerous climate change," said Green.

#### **We are past the tipping points**

**Duarte 2/6**/12 Carlos, Director of Oceans Institute at the University of Western Australia, “Teetering on a tipping point” <http://theconversation.edu.au/teetering-on-a-tipping-point-dangerous-climate-change-in-the-arctic-5156>

We are seeing the first signs of dangerous climate change in the Arctic. This is our warning that humanity is facing a dire future. The Arctic region is fast approaching a series of “tipping points” that could trigger an abrupt domino effect of large-scale climate change across the entire planet. The region contains arguably the greatest concentration of potential tipping elements. If set in motion, these can generate profound alterations which will place the Arctic not at the periphery, but at the core of the Earth system. There is evidence that **these chain reactions have begun**. This has major consequences not just for “nature”, but for the future of humankind as the changes progress. Research shows that the Arctic is now warming at three times the global average. The loss of Arctic summer sea-ice forecast over the next four decades – if not before – is expected to have abrupt knock-on effects in northern mid-latitudes, including Beijing, Tokyo, London, Moscow, Berlin and New York. The loss of sea ice – which melted faster in summer than predicted – is linked tentatively to recent extreme cold winters in Europe. Arctic records show unambiguously that sea ice volume has declined dramatically over the past two decades. In the next 10 years, summer sea ice could be largely confined to north of coastal Greenland and Ellesmere Island, and is likely to disappear entirely by mid-century. Some environmental and biological elements, including weakening of the oceanic biological carbon pump and the thermohaline circulation, melting of the Greenland ice cap, thawing of Arctic permafrost and methane hydrate deposit, the decline of forest and peat fires in the boreal region, may be linked in a domino effect of tipping points that cascade rapidly once this summer sea ice is lost. Despite this danger, semantic confusion masquerading as scientific debate – although providing excellent media fodder – had delayed an urgent need to start managing the reality of dangerous climate change in the Arctic.

#### Positive Feedbacks

**Stern ’07** Nicholas Stern—Head of the British Government Economic Service—2007 (Former Head Economist for the World Bank, I.G. Patel Chair at the London School of Economics and Political Science, “The Economics of Climate Change: The Stern Review”, The report of a team commissioned by the British Government to study the economics of climate change led by Siobhan Peters, Head of G8 and International Climate Change Policy Unit, Cambridge University Press, p. 11-13.

Additional warming is already in the pipeline due to past and present emissions. The full warming effect of past emissions is yet to be realised. Observations show that the oceans have taken up around 84% of the total heating of the Earth’s system over the last 40 years36. If global emissions were stopped today, some of this heat would be exchanged with the atmosphere as the system came back into equilibrium, causing an additional warming. Climate models project that the world is committed to a further warming of 0.5° - 1°C over several decades due to past emissions37. This warming is smaller than the warming expected if concentrations were stabilised at 430 ppm CO2e, because atmospheric aerosols mask a proportion of the current warming effect of greenhouse gases. Aerosols remain in the atmosphere for only a few weeks and are not expected to be present in significant levels at stabilisation38. If annual emissions continued at today’s levels, greenhouse gas levels would be close to double pre-industrial levels by the middle of the century. If this concentration were sustained, temperatures are projected to eventually rise by 2 – 5ºC or even higher. Projections of future warming depend on projections of global emissions (discussed in chapter 7). If annual emissions were to remain at today’s levels, greenhouse gas levels would reach close to 550 ppm CO2e by 205039. Using the lower and upper 90% confidence bounds based on the IPCC TAR range and recent research from the Hadley Centre, this would commit the world to a warming of around 2 – 5°C (Table 1.1). As demonstrated in Box 1.2, these two climate sensitivity distributions lie close to the centre of recent projections and are used throughout this Review to give illustrative temperature projections. Positive feedbacks, such as methane emissions from permafrost, could drive temperatures even higher. Near the middle of this range of warming (around 2 – 3°C above today), the Earth would reach a temperature not seen since the middle Pliocene around 3 million years ago40. This level of warming on a global scale is far outside the experience of human civilisation. However, these are conservative estimates of the expected warming, because in the absence of an effective climate policy, changes in land use and the growth in population and energy consumption around the world will drive greenhouse gas emissions far higher than today. This would lead greenhouse gas levels to attain higher levels than suggested above. The IPCC projects that without interventiongreenhouse gas levels will rise to 550 – 700 ppm CO2e by 2050 and 650 – 1200 ppm CO2e by 210041. These projections and others are discussed in Chapter 7, which concludes that, without mitigation, greenhouse gas levels are likely to be towards the upper end of these ranges. If greenhouse gas levels were to reach 1000 ppm, more than treble pre-industrial levels, the Earth would be committed to around a 3 – 10°C of warming or more, even without considering the risk of positive feedbacks (Table 1.1).

#### Too late to solve warming—too much CO2

**Garnet ’10** (Andre Garnet, Senior Analyst at Investology, Inc. 8/14/10 , the energy collective, “Slowing CO2 emissions cannot end global warming, but removing CO2 from the atmosphere will”, http://theenergycollective.com/andre-garnet/41653/slowing-co2-emissions-cannot-end-global-warming-removing-co2-atmosphere-will)

Scarcely a day goes by without some announcement as to yet another effort to limit CO2 emissions, here or there, for the purpose of fighting global warming. Yet, all such attempts are futile given that so much CO2 has already accumulated in the atmosphere that even if we ended all CO2 emissions today, global warming would probably continue to increase unabated. However, as explained below, we do have the technology to extract CO2 from the atmosphere and it is due to inept thinking on the part of United Nations scientists that we are not applying it. Before going into details, it might be useful to frame the problem: It is since the advent of the industrial revolution circa 1,850 that factories and transportation caused a large and enduring increase in the amount of CO2 emissions. This phenomenon has been compounded by the rapid increase in the population given that humans emit CO2 as they breathe. As a result, an enormous quantity of CO2 has accumulated in the atmosphere given that we emitted more than could be absorbed by plants and by the sea. So much so, that the amount of new CO2 that we emit nowadays is a drop in the bucket compared to the quantity of CO2 that has already accumulated in the atmosphere since around 1,850 as the atmospheric concentration of CO2 increased by about 30%. It is this enormous quantity of atmospheric CO2 that traps the heat from the Sun, thus causing about 30% of global warming. The point is that, if we are to stop or reverse global warming, we need to extract from the atmosphere more CO2 than we emit. However, all we are currently attempting is to limit emissions of CO2. This is too little, too late and totally useless inasmuch it could reduce our CO2 emissions by only 5% at best, while achieving nothing in terms of diminishing the amount of atmospheric CO2. Rather than wasting precious time on attempts to LIMIT our CO2 emission, we should focus on EXTRACTING from the atmosphere more CO2 than we are emitting. We have a proven method for this that couldn't be simpler, more effective and inexpensive, so what are we waiting for? More specifically, it has been shown that atmospheric CO2 has been perhaps twice higher than now in the not too distant past (some 250,000 years ago.) So what caused it to drop to as low as it was around 1,850? It was primarily due to the plankton that grows on the surface of the sea where it absorbs CO2 that it converts to biomass before dying and sinking to the bottom of the sea where it eventually becomes trapped in sedimentary rock where it turns to oil or gas. There simply isn't enough biomass on the 30% of Earth's surface that is land (as opposed to sea) for this biomass to grow fast enough to soak up the excess atmospheric CO2 that we have to contend with. Plankton, on the other hand, can grow on the 70% of Earth that is covered by the sea where it absorbs atmospheric CO2 much faster, in greater quantities and sequesters it for thousands of years in the form of oil and gas. Growing plankton is thus an extremely efficient, yet simple and inexpensive process for removing the already accumulated CO2 from the atmosphere. All we need to do is to dust the surface of the ocean with rust (i.e. iron oxides) that serves as a fertilizer that causes plankton to grow. The resulting plankton grows and blooms over several days, absorbing CO2 as it does, and then about 90% of it that isn't eaten by fish sinks to the bottom of the sea. The expert Russ George calculated that if all ocean-going vessels participated in such an effort worldwide, we could return atmospheric CO2 concentration to its 1,850 level within 30 years. It's very inexpensive and easy to do, wouldn't interfere with the ships' normal activities and would, in fact, earn them carbon credits that CO2 emitters would be required to buy. Moreover it is the ONLY approach available for addressing global warming on the global scale that is necessary. By contrast, efforts to limit CO2 emissions by means of CO2 sequestration could address only about 5% of NEW CO2 generated by power plants. So even while causing our electricity costs to treble or quadruple, such efforts wouldn't remove any of the massive amount of CO2 already accumulated in the atmosphere. In fact, the climatologist James Hansen believes that even if we could stop all CO2 emissions as of today, it may already be too late to avert run-away, global warming as there is enough CO2 in the atmosphere for global warming to keep increasing in what he fears is becoming an irreversible process. In other words, atmospheric CO2 is trapping more heat than Earth can dissipate which causes temperature

### 2NC Efficiency Link Run

#### The plan destroys efficiency tech:

#### a.) Funding – investment in nuclear energy takes funding away from energy efficiency measures that are comparatively more beneficial – limited resources means that the two are an opportunity cost to one another

#### b.) Focus – nuclear tech distracts policymakers and creates the false belief that they don’t need to take other measures

#### c.) Private Investment – the plan diverts the private sector’s desire to invest in efficiency

**Roche\* 7 – \***Site editor, no direct author given, but N02 Nuclear Power.org is a site created and run by Pete Roche who is an energy consultant based in Edinburgh and policy adviser to the Scottish Nuclear Free Local Authorities, and the National Steering Committee of [UK NFLA](http://nfznsc.gn.apc.org/). Pete was co-founder of the Scottish Campaign to Resist the Atomic Menace (SCRAM), he has represented Greenpeace at international meetings and is active in several other areas relating to environmental protection and nuclear power [http://www.no2nuclearpower.org.uk/reports/Opportunity\_Costs\_Nuclear.pdf, January 2007 “Opportunity Costs of Nuclear Power]

So it is important that our capacity to implement other carbon abatement measures is not damaged by a decision to go ahead with the construction of new reactors. Warwick Business School (UK) (WBS) argues that, far from complementing the necessary shift to a low carbon economy, the scale of the financial and institutional arrangements needed for new nuclear stations means they would fatally undermine the implementation of low carbon technologies and measures such as demand management, and therefore will ultimately undermine the shift to a true low carbon economy. (12) The SDC says a new nuclear programme would give out the wrong signal to consumers and businesses, implying that a major technological fix is all that’s required, weakening the urgent action needed on energy efficiency. The Commission says a decision to proceed with a new reactor programme will require “a substantial slice of political leadership … political attention would shift, and in all likelihood undermine efforts to pursue a strategy based on energy efficiency, renewables and more CHP.” (13) Sir Jonathon Porritt, chair of the Commission, says nuclear power is seriously diverting attention from the hard decisions required to solve the UK's energy challenges. (14) There needs to be sufficient development of renewable energy and energy efficiency to start switching the 97.5% of world energy consumption to a low carbon system. At best a decision to promote new reactors might replace existing nuclear capacity, but have no impact on how the other 97.5% of energy consumption is supplied. At worst the decision might not even result in existing stations being replaced because of construction delays or public opposition, but the development of a low carbon energy system is stalled, because resources have been drained from the alternatives, as the Environment Agency (of England and Wales) warns could happen. (15)

#### Empirics vote neg

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The Finnish experience Very soon after the Finnish Parliament voted in 2002 to build a new reactor, Olkiluoto 3, many people – industry and trade union leaders - who had argued that because of Finland’s Kyoto commitments a new nuclear power station was necessary, started to say that the Kyoto agreement was a big mistake, unfair to Finland, and far too costly. After falling in 2001 and 2002, Finland’s carbon emissions are now rising. Measures promised in the climate report of 2001 have not been implemented, for example, energy taxation. The tone in Finland is now that Kyoto is in practice, impossible. (16) According to Finland's former environment minister, Satu Hassi MEP, once the decision was made, the country lost interest in alternative energy sources. (17) Under the Kyoto Protocol, Finland has agreed to keep its greenhouse gas emissions at 1990 levels during the 2008-2012 target period. Emissions were around 9% above 1990 levels in 2002. Measures will have to be implemented to address this issue given that business-as-usual projections by the government indicate further increases in greenhouse gases, reaching 15% above 1990 levels during the first target window. The International Energy Agency highlights the risk to Finland of relying on carbon dioxide reductions coming from the operation of the new reactor. It says this may inhibit Finland’s ability to meet its greenhouse gas reduction targets under Kyoto, if the operation of the plant is in any way delayed. (18) In fact construction of Olkiluoto 3 has now fallen eighteen months behind schedule. (19) It’s original target date for completion was 2009, so there is a danger that it will not be available in time to contribute to meeting Finland’s target.

### a/t: No Link

#### And transition to nuclear power would lock us in to a centralized wasteful energy system – efficiency and nuclear power are not compatible

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Centralised vs decentralised energy The developed world is currently dominated by centralised electricity generating systems, which are the embodiment of technological inertia, performing little better today than in the 1970s. This centralised system is hugely wasteful and environmentally damaging. Technological advances over the past 30 years suggest an optimum model of electricity supply and distribution, which is entirely different. Around two thirds of the energy in the fuels used is thrown away as waste heat, and in the electricity transmission wires. So 65% of the energy is lost before it even reaches consumers. If we could make use of this waste heat it would make a very large contribution to tackling climate change and improving security of supply. Within the 25 (pre-2007) European Union nations, for example, the electricity sector is responsible for releasing more than 1.2 billion tonnes of carbon dioxide (CO2) and over 2600 tonnes of dangerous radioactive waste every year. At the same time more than half of Europe’s power plants are more than 20 years old, and will need to be replaced over the next decade or so, offering an opportunity to move towards a more sustainable system which protects the climate and provides future generations with secure energy. (20) Nuclear power stations are the epitome of centralised generation. In contrast, renewable generation and combined heat and power stations lend themselves towards a more decentralised system and a greater use of demand management. Projects tend to be smaller and sited closer to the point of demand, with greater flexibility. Customer involvement - a key aspect to behavioural change is easier to achieve. The question for policy makers is whether support for nuclear power, which will bolster the centralised model of electricity distribution, will also damage efforts to shift to a more sustainable, low carbon, model which maximizes use of renewables and demand management. Warwick Business School concludes that support for new reactors is more likely to strengthen the momentum of the conventional energy system than enable a decentralised energy system to develop. This is because it would: • Reduce the pressure for appropriate network infrastructure development; • Reduce the pressure for policy measures to ensure the removal of barriers within economic regulation for small-scale technologies; • Reduce the pressure for policy measures to ensure greater links within an energy system between supply and demand reduction, for example a move to a service culture or a push for metering reform, and • Reduce the pressure for behavioural change. If governments are serious about wishing to combat climate change and moving towards a low carbon energy system, then they must choose between a centralised energy system and a decentralised one. A low carbon energy system would be a decentralised energy system. Governments need to implement policies which all work in the same direction, and ensure that the broader political and institutional support, socio-cultural attitudes and trends are all in line. Cherry picking, say nuclear power, from a centralised system and trying to get it to work in concert with a decentralised sustainable system will not work. A portfolio of least-cost investments in efficiency and decentralized generation will be cheaper, than nuclear power and faster to implement. According to Lovins, this isn’t hypothetical; it’s what today’s marketplace is proving decisively. Nuclear power has already died of an incurable attack of market forces, with no credible prospect of revival. Current efforts to deny this reality will only waste money, further distort markets, and reduce and retard carbon dioxide displacement. Cheaper, faster, abundant decentralized alternatives are now being bought an order of magnitude faster, and offer far greater ultimate potential. (21) Investing in new nuclear power stations would have a huge opportunity cost – the opportunity to kick-start a new approach to energy, in which every building and community contributes to generating the power they need. The closure of nuclear, as well as fossil fuel plant across the world over the next twenty years provides us all with an exciting opportunity to develop a decentralised low-carbon energy system more compatible with the needs of the post Kyoto world. (22)

#### They make it impossible to overcome

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Nuclear power undermines rather than complements other low carbon technologies. Support for a nuclear programme will not address the real problem of the UK’s climate change emissions or the government’s other energy policy goals, but will ultimately strengthen the characteristics and problems of the ‘old’ energy system, thereby making that energy system even harder to dislodge.

### Internal link

#### And, manufacturing capabilities key to technology necessary for U.S. deterrence

**O’Hanlon et al 12** (Mackenzie Eaglen, American Enterprise Institute Rebecca Grant, IRIS Research Robert P. Haffa, Haffa Defense Consulting Michael O'Hanlon, The Brookings Institution Peter W. Singer, The Brookings Institution Martin Sullivan, Commonwealth Consulting Barry Watts, Center for Strategic and Budgetary Assessments “The Arsenal of Democracy and How to Preserve It: Key Issues in Defense Industrial Policy January 2012,” pg online @ <http://www.brookings.edu/~/media/research/files/papers/2012/1/26%20defense%20industrial%20base/0126_defense_industrial_base_ohanlon> //um-ef)

The current wave of defense cuts is also different than past defense budget reductions in their likely industrial impact, as **the U.S. defense industrial base is in a much different place than it was in the past**. Defense industrial issues are too often viewed through the lens of jobs and pet projects to protect in congressional districts. **But the overall health of the firms that supply the technologies our armed forces utilize does have national security resonance**. Qualitative superiority in weaponry and other key military technology has become an essential element of American military power in the modern era—**not only for winning wars but for deterring them**. **That requires world-class** scientific and **manufacturing capabilities—**which in turn can also generate civilian and military export opportunities for the United States in a globalized marketplace.

### 2NC Grid CP Solvency

#### Empirically proven

PWC 12 (July 2012, The Future of Microgrids, <http://www.pwc.com/en_US/us/technology/publications/cleantech-perspectives/pdfs/pwc-cleantech-the-future-of-microgrids.pdf>, RBatra)

This benefit is illustrated by the performance of the Sendai microgrid at Tohoku Fukushi University. While the overall electrical grid was compromised during the devastating 2011 earthquake and tsunami, the microgrid, using distributed generators and batteries, continued to provide power to a variety of facilities.

Microgrids can meet the needs of a wide range of applications in commercial, industrial, and institutional settings. Larger microgrid applications include communities ranging from neighborhoods to small towns to military bases. Another largely untapped application is the “offgrid” area of the world where one billion-plus people live without regular access to electricity. These “off-grid” areas are currently served (if at all) by diesel generators or similar small scale electricity generating equipment.

Overall, the microgrid's structure makes it a viable platform for large entities to reduce energy costs and generate revenue through the sale of energy during periods of peak demand. Additionally, microgrids can efficiently and effectively provide "off-grid" areas with regular access to electricity as well as "keep the lights on" in times of crisis for critical applications like a hospital.

#### Solves energy backup and shortages – comparatively better than renewables

Spiegel 12 (Jan, 1/30/12, Microgrids offer potential for greater energy reliability, <http://www.ctmirror.org/story/15148/microgrids-offer-potential-greater-energy-reliability>, RBatra)

A jargony techno-term, a microgrid is a small electric grid with its own generation source. It normally operates linked to the main electric grid, but when that suffers widespread interruptions, as Connecticut's did during Tropical Storm Irene and the October snowstorm, **a microgrid can automatically isolate itself and keep running.**

"All the pieces have been tried that we need to put together," said Dan Esty, commissioner of the state Department of Energy and Environmental Protection. "Just not at the scale we're talking about." The department has been ordered by Gov. Dannel P. Malloy to explore how the state would create microgrids to be better prepared in an emergency.

The scale the administration wants is to keep obvious critical facilities -- hospitals, police and fire stations, water and waste water systems and prisons -- running. But it also wants microgrids to address other problems that were acutely apparent in both storms. Folks without power often had nowhere to go to replace rotten food, buy water, fill their cars with gas or get additional medication because commercial areas also went dark. And businesses, especially manufacturers, who were forced to shut lost thousands of dollars.

Pilot project plans are at their earliest stages, but Esty said the state already has identified about 300 sites -- 120 critical facilities and about 180 town centers and commercial hubs. He expects to have several projects in place in 2013, if not earlier.

"I have already had a half a dozen mayors call and say that they'd like to be microgrid guinea pigs," Esty said.

Bristol Mayor Arthur Ward, whose city of 61,000 got "slammed," in Ward's words, in both storms was among them. "I'd love to," he said. "Absolutely. I think it's something that everybody should take a clear look at."

Aside from keeping the juice flowing during the next Irene, there are multiple layers of benefits state officials think microgrids can achieve, though there are also multiple challenges.

On the benefits side, the way Esty and many others envision it, a microgrid could finally make that link officials have long sought between cleaner, more sustainable energy and Connecticut's key stationary fuel cell builders -- Fuel Cell Energy in Danbury and UTC Power in South Windsor. Fuel cells are considered low emission, typically using non-renewable natural gas to create the hydrogen needed to produce power.

While there are many fuel cells scattered around the state powering schools, manufacturing and commercial facilities and government buildings, more than 90 percent of both companies' business is not just out of state, but out of the country, often in huge grid generation fuel cell plants in places like South Korea.

Esty and the experts he is drawing on from the University of Connecticut School of Engineering and the Connecticut Center for Advanced Technology think fuel cells and/or natural gas turbines would be ideal for microgrids in the state. They are reliable -- unlike solar that only operates during the day. And their relatively small physical footprints are suited to a crowded state like Connecticut.

Both generation options offer the economic bonuses of design and construction jobs. Fuel cells also mean massive production ramp-ups that would result in more tax revenue as business grows.

### AT: Korea Add On

#### No War

#### No motivation

**Kelly 11**—Assistant Professor Department of Political Science & Diplomacy Pusan National University (Robert E., 17 Janaury 2011, 2011 Asia Predictions (1): East Asia, http://asiansecurityblog.wordpress.com/2011/01/17/2011-asia-predictions-1-east-asia/)

2. **North Korea won’t pull any big stunts this year.**

Why: Last year NK pulled some of its most foolish, dangerous tricks in years. And it got what it wanted. The whole world is once again paying attention to its noxious tin-pot dictatorship. China gave it cover, twice!, and more cash. It once again made SK look weak, vulnerable, and confused, right after the nice G-20 raised SK’s global profile. (What better way to play the spoiler of an event that made Korea look modern and normal?) Intelligent western analysts went on record saying stupid things that sound awfully close to appeasement. SK caved and once again called for the 6 Party Talks; this opens the door, yet again, for the North to play the other 5 parties off each other for gain. Not bad for a broke, dysfunctional gangster-state. So there isn’t much more to be gotten from raising the temperature further, and the costs for them are rising. **The DPRK doesn’t really want to provoke a war, and SK attitudes seem to be hardening on responses**. NK gimmicked its way into most of what it wants, so I anticipate calm for a while – at least until some other regime crisis (famine, currency collapse, Kim Jong-Il’s death) pushes another KPA outburst for attention and money.

#### Deterrence Solves

**Tetsuya 2** (Umemoto, Professor @ Shizuoka-Kenritsu University, “Japan-US Cooperation in Ballistic Missile Defense,” March 27-28, http://cns.miis.edu/archive/cns/programs/dc/track2/2nd/tet.pdf,)

By way of summary, Japanese ballistic missile defense (BMD) systems including upper-tier interceptors on several Aegis ships, a capability that Tokyo might begin deploying in ten to fifteen years, would not be without strategic significance. Such defenses might have the capacity to engage reliably at most some tens of enemy theater ballistic missiles and much fewer longrange missiles launched by accident or without authorization. They could not therefore effectively protect the Japanese territory against a full-scale ballistic missile attack by Russia, China, or perhaps even North Korea. In combination with U.S. extended nuclear deterrence, however, Japan’s anti-missile systems would help provide reassurance to the Japanese public about deterrence and defense against a Chinese and North Korean strike with theater ballistic missiles. A small-scale assault would be dealt with by the defenses, while a larger-scale salvo would be deterred by U.S. retaliatory threats. The defensive systems would accordingly enable Tokyo to minimize the effect of a Chinese threat of missile strike to dissuade it from giving assistance to U.S. forces during a confrontation over Taiwan or a similar North Korean threat in a Korean contingency. Some reassurance about defense against an accidental and unauthorized launch of Russian long-range ballistic missiles would also be possible. It could make the Japanese better able to cope with further deterioration of the control of ballistic missiles and nuclear weapons in the former Soviet Union.

#### Neither North Korea or South Korea would want a war

**Zhebin 11**—Ph.D. Political Science, head of the Korean Studies Center, RAS IFES (Alexander, *Far Eastern Affairs*, No. 1, 2011, “The Korean Peninsula: Approaching The Danger Line,” http://www.eastviewpress.com/Files/FEA\_FROM%20THE%20CURRENT%20ISSUE\_No.%201\_2011\_small.pdf,)

The myth of the alleged aggressiveness inherent in the DPRK and its readiness to attack its southern neighbor at any moment prevents to reach this. Meanwhile, serious experts who are well aware of the real correlation of forces on the peninsula and around it agree that **the DPRK would hardly dare undertake large-scale offensive operations**. First, in contrast to the Korean War, there are no big powers at present which would support such action. Russia and China have always come out for resolving all problems on the peninsula by peaceful diplomatic means. At the same time the United States officially declares that in case of aggression it will help its ally. The international situation of the DPRK is complicated by the sanctions imposed on it by the UN Security Council. Their broad interpretation by the United States and its allies and the introduction of additional unilateral sanctions by them have resulted in that even legal foreign trade and foreign economic activity of North Korea meets with serious obstacles. Secondly, western experts and South Korean military officers themselves know full well that South Korea surpasses the DPRK in conventional arms and the armed forces. It should also be taken into account that North Korea has not enough fuel, spare parts and other strategic reserves necessary for large-scale offensive operations. And last but not least: the DPRK has been in a quite complex socio-economic situation for the past 15 years and is faced with an acute food problem. Admittedly, **the** **North Korean leadership is well aware of all these factors**, takes them into account, and will not be the first to begin such action. As to South Korea, it can also hardly begin a full-scale war due to other reasons. First, most **South Koreans do not want to put to risk their economic achievements**, which have been gained at a high price, and their standard of living, which is one of Asia’s highest. Secondly, South Koreans cannot start any major conflict, all the more so, invasion of the North without Washington’s permission. From the time of the Korean War there has been an agreement between the United States and the Republic of Korea according to which the South Korean armed forces, in an event of a large-scale conflict on the peninsula, are placed under the supervision of the American general commanding the U.S. military contingent deployed in the Republic of Korea. Moreover, he automatically receives this right when the third degree of battle readiness is announced.

#### They want survival

Pollom 12-1 (Drew, The Gonzaga Bulletin, “War in Korea unlikely,” 2010, http://www.gonzagabulletin.com/war-in-korea-unlikely-1.1815018,)

Suddenly we are transported back to the 1950s. The recent aggressive activity by North Korea, the last real remnant of the Cold War, has once again put the U.S. and Asia on the brink of war. While the North has always taken grandiose actions in an attempt to gain attention, the last six months have truly been deadly. First, there was the sinking of the South Korean warship by a North Korean torpedo. Now there is the shelling on Yeonpyeong by North Korea resulting in the death of two civilians. Seoul demands vengeance. The U.S. conducts war games. Americans prepare themselves for war in Korea. Before you make that tin foil hat to protect you from the nuclear radiation, you have to first see if war with North Korea will actually happen. Beyond the black and white situation of responding to North Korean aggression is a complex world of Asian politics, particularly involving the U.S. and China. At the end of the day, while I still believe we are not going to war with North Korea, we are getting close. North Korea has always been an enigma. Described as a Stalinist regime, given its cult-like reverence for its leaders, this isolated country is known for having a huge bark. Since the 1990s, North Korea has leveraged its nuclear weapons against the world in exchange for an erratic list of demands. People often view the North as dangerous and unstable, both of which are very true if you look at its behavior at face value. However, beneath everything North Korea has ever done, there has been one all-consuming goal: survival. The regime will do and say anything that will ensure its continued hold on power. North Korea would pretty much lose that hold if it went to war. Despite its numbers in the military, it cannot keep up with the well-fed and technologically superior South. Even its nuclear arsenal can be neutralized by the tactical strikes of the U.S. Air Force. Even in its grandest delusion, North Korea knows that a war with the U.S. will end in disaster for it. Based on that, I believe that the latest aggression is another act of desperation to be important on the global stage. At the same time, the U.S. isn't exactly rushing to go to war. The war games conducted last week are an important act to show the world that the U.S. and South Korea won't be bullied by the North. The reality is any war effort will most likely be hamstrung from the start. There is, of course, the obvious fact that most of the troops are still dedicated in Iraq and Afghanistan. With the current economic recession and large budget deficits, we may not want to plug another huge chunk of money in another invasion. Instead, we are more likely to seek a diplomatic solution to the situation before it gets out of hand. In the end, whatever we end up doing, South Korea will most likely follow