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**The aff is economic imperialism hidden by benevolence ---this encourages countervailing forces which turn the case.**

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Finding itself in the wake of a second world war as the dominant economic power in the «free world» the US strove assiduously to consolidate this power at the level of foreign policy. Under prevailing conditions that included the potential threat posed by the USSR and the fallout from a spreading and unstoppable decolonization movement in the economically backward areas of the world, United States (US) policymakers decided on, and actively pursued, a foreign policy with three pillars. One of these pillars was a strategy of economic reconstruction of an economically devastated Europe and the capitalist development of the economies and societies on the periphery of the system. A second pillar of the post–war order was what would become known as the «Bretton woods system», composed of three institutions (a Bank of Economic Reconstruction and Development—the World Bank today; the International Monetary fund; and a General Agreement on Tariffs and Trade that would morph into the WTO 50 years on) and the mechanism of the US dollar, based on a fixed gold standard, as the currency of international trade.1 The third pillar was would become the United Nations—a system of international organizations designed to provide the necessary conditions of (capitalist) development and collective security, a system of multilateral conflict resolution. The motivating force behind this foreign policy was clear enough: to advance the geopolitical and economic interests of the US as a world power, including considerations of profit and strategic security (to make the world save for US investments and to reactivate a capital accumulation process). It was to be an empire of free trade and capitalist development, plus democracy where possible, a system of capitalist democracies backed up by a system of international organizations **dominated by the US**, a military alliance (NATO) focused on Europe in the protection of US interests and collective security, and a more global network of military bases to provide logistical support for its global military apparatus. Within the institutional framework of this system and international order the US was particularly concerned to consolidate its power and influence in Latin America and the Caribbean, regarded by policymakers and many politicians as a legitimate sphere of undue influence—the exercise of state power in the «national interest». This chapter will elaborate on economic and political dynamics of the efforts pursued by the US to pursue these interests via the projection of state power—and the resulting «informal empire» constructed by default. US IMPERIALISM IN LATIN AMERICA—FORMS AND DYNAMICS The US has always been imperialistic in its approach to national development in Latin America, but in the wake of World War II the situation that it found itself in—commanding, it is estimated, half of the world’s industrial capacity and 80% of its financial resources; and already an occupying power of major proportions3—awakened in US policymaking circles and its foreign policy establishment its historic mission regarding the Americas and also the dream of world domination, provoking the quest to bring it about in the preferred form of an «informal empire». A key strategy to this purpose was to institute the rules for what would later be termed «global governance»—for securing its economic and geopolitical strategic intents in a world liberated from colonial rule (id est competing empires). The resulting world order, dubbed Bretton Woods I by some,4 provided an institutional framework for advancing the geopolitical strategic interests of the US in the context of a «cold war» waged against the emerging power of the USSR, and for advancing cooperation for international development, a policy designed to ensure that the economically backward countries seeking to liberate themselves from the yoke of European colonialism would not succumb to the siren of communism, that they would undertake a nation–building and development process on a capitalist path. This development project required the US to assume the lead but also share power with its major allies, strategic partners in a common enterprise organised as the OECD and a united Europe,6 with a system of United Nations institutions to provide a multilateral response to any security threats (and that prevented any one country for embarking on the path of world domination via unilateral action. This was the price that the US had to pay for national security under conditions of an emerging threat presented by the USSR—soviet communism backed up by what was feared to be a growing if not commanding state power. In this context the US began to construct its empire, and it did so on a foundation of six pillars: 1. Consolidation of the liberal capitalist world order, renovating it on neoliberal lines in the early 1980s when conditions allowed; 2. A system of military bases strategically across the world, to provide thereby the staging point and logistics for the projection of military power when needed, and rule by military force when circumstances would dictate; 3. A project of cooperation for international development, to provide **financial and technical assistance** to countries and regimes willing to sign on the project—to provide a safe haven for US economic interests and pave the way for the expansion of capitalism and democracy, the **bulwarks of US imperialism**; 4. Implementation of a neoliberal agenda of policy reforms—to adjust the macroeconomic and development policies to the requirements of a new world order in which the forces of freedom would be released from the constraints of the welfare–development state; 5. Regional integration—construction of regional free trade agreements to cooperate with, and not discriminate against, US economic interests regarding international trade; 6. Globalization—the integration of economies across the world into the global economy in a system designed to give maximum freedom to the operating units of the global empire. Each strategy not only served as a pillar of imperial policy but provided the focal point for the projection of state power in different forms as circumstances required or permitted. Together they constituted what might be termed imperialism. Each element of the system was, and is, dynamic in its operations but ultimately unstable because of the countervailing forces that they generated. Within ruling class circles in the US since at least 2000 there is an open acceptance that theirs is an imperial state and that the US should maintain or act to restore its dominant position in the 21st century by any means available, and certainly by force if need be. The whole tenor of the debate in the past two decades over US foreign policy, Mann (2007) notes, is framed in these terms. In this connection, Richard Hass, the current director of Policy Planning in e State Department, wrote an essay in November 2000 advocating that the US adopt an «imperial» feign policy. He defined this as «a foreign policy that attempts to organise the world along certain principles affecting relations between states and conditions within them». This would not be achieved through colonization or colonies but thorough what he termed «informal control» based on a «good neighbour policy» backed up by military force if and when necessary—harking back to the «informal empire» of a previous era (McLean, 1995; Roorda, 1998). Mechanisms such as international financial markets and structural reforms in macroeconomic policy, and agencies such as the World Bank, the WTO and the IMF, would work to ensure the dominance of US interests, with the military iron fist backing up the invisible hand of the market and any failure in multilateral security arrangements. This system of «economic imperialism», maintained by US hegemony as leader of the «free world» (representing the virtues of capitalist democracy), was in place and fully functioning from the 1950s throughout 1980s and the reign of Ronald Reagan. In the 1990s, with the disappearance of the threat of the Soviet Union and international communism, this system of economic imperialism, bed as it was on the hegemony of «democracy and freedom» as well multilateralism in international security arrangements, did not as much break down as it was eclipsed by the emergence of the «new imperialism» based on the unilateral projection of military force as a means of securing world domination in «the American century».7 This conception of a «new imperialism», a «raw imperialism» that would not «hesitate to use [coercive] force if, when and where necessary» (Cooper, 2000), based on «aggressive multilateralism» or the unilateral projection, and strategic use, of state power including emphatic military force, was advanced in neoconservative circles over years of largely internal debate, and put into practice by a succession of regimes, both democratic and republican. It achieved its consummate form in George W. Bush’s White House, in the Gang of Four (Donald Rumsfeld, Paul Wolfowitz, Condoleeza Rice, Dick Cheney),8 and its maximum expression in a policy of imperial war in the Middle east and the Gulf region. Although the US also projected its military power in other theatres of imperial war such Yugoslavia9 and Colombia (viz. the covert Colombia– centered class war «on subversives» against the FARC–EP’ overt regional «war on drugs») the policy of imperial war and the strategy of military force were primarily directed towards the Gulf region (see, inter alia, Petras and Veltmeyer, 2003). In the academic world the issue as to the specific or dominant form taken by imperialism has not been generally framed as a matter of when and under what circumstances military force might be needed or legitimately used (generlly seen as a «last resort» but as the necessary part of the arsenal of force available to the state, conceived of as the only legitimate repository of the use of violence in the «national interest»). Rather, the issue of armed force in the imperialist projection of military power has been framed in terms of an understanding, or the argument. That an imperial order cannot be maintained by force and coercion; it requires «hegemony», which is to say, acquiescence by the subalterns of imperial power achieved by a widespread belief in e legitimacy of that power generated by an overarching myth or dominant ideology—the idea of freedom in the post world war II context of the «cold war» against communism and the idea of globalization in the new imperial order established in the 1980s. Power relations of domination and subordination, even when backed up by coercive or armed force, **invariably give rise to resistance**, and are only sustainable if and when they are legitimated by an effective ideology—ideas of «democracy» and «freedom» in the case of the American empire or «globalization» in the case of the economic imperialism that came into play in the 1990s.

#### The impact is cultural extinction.

**Escobar 95** - Distinguished Professor of Anthropology, UNC-Chapel Hill (Arturo, “Encountering Development: The Making and Unmaking of the Third World,” pg. 52-54)//BB

The crucial threshold and transformation that took place in the early post– World War II period discussed in this chapter were the result not of a radical epistemological or political breakthrough but of the reorganization of a number of factors that allowed the Third World to display a new visibility and to irrupt into a new realm of language. This new space was carved out of the vast and dense surface of the Third World, placing it in a field of power. Underdevelopment became the subject of political technologies that sought to erase it from the face of the Earth but that ended up, instead, multiplying it to infinity.¶ Development fostered a way of conceiving of social life as a technical problem, as a matter of rational decision and management to be entrusted to that group of people—the development professionals—whose specialized knowledge allegedly qualified them for the task. Instead of seeing change as a process rooted in the interpretation of each society's history and cultural tradition—as a number of intellectuals in various parts of the Third World had attempted to do in the 1920s and 1930s (Gandhi being the best known of them)—these professionals sought to devise mechanisms and procedures to make societies fit a preexisting model that embodied the structures and functions of modernity. Like sorcerers' apprentices, the development professionals awakened once again the dream of reason that, in their hands, as in earlier instances, produced a troubling reality.¶ At times, development grew to be so important for Third World countries that it became acceptable for their rulers to subject their populations to an **infinite variety** of interventions, to more encompassing forms of power and **systems of control**; so important that First and Third World elites accepted the price of **massive impoverishment**, of selling Third World resources to the most convenient bidder, of **degrading their physical and human ecologies**, of **killing and torturing**, of condemning their indigenous populations to **near extinction**; so important that many in the Third World began to think of themselves as inferior, underdeveloped, and ignorant and to doubt the value of their own culture, deciding instead to pledge allegiance to the banners of reason and progress; so important, finally, that the achievement of development clouded the awareness of the impossibility of fulfilling the promises that development seemed to be making.¶ After four decades of this discourse, most forms of understanding and representing the Third World are still dictated by the same basic tenets. The forms of power that have appeared act not so much by repression but by normalization; not by ignorance but by controlled knowledge; not by humanitarian concern but by the bureaucratization of social action. As the conditions that gave rise to development became more pressing, it could only increase its hold, refine its methods, and extend its reach even further. That the materiality of these conditions is not conjured up by an “**objective” body of knowledge** but is charted out by the rational discourses of economists, **politicians, and development experts** of all types should already be clear. What has been achieved is a specific configuration of factors and forces in which the new language of development finds support. As a discourse, development is thus a very real historical formation, albeit articulated around an artificial construct (underdevelopment) and upon a certain materiality (the conditions baptized as underdevelopment), which must be conceptualized in different ways if the power of the development discourse is to be challenged or displaced.¶ To be sure, there is a situation of economic exploitation that must be recognized and dealt with. Power is too cynical at the level of exploitation and should be resisted on its own terms. There is also a certain materiality of life conditions that is extremely preoccupying and that requires great effort and attention. But those seeking to understand the Third World through development have long lost sight of this materiality by building upon it a reality that like a castle in the air has haunted us for decades. Understanding the history of the investment of the Third World by Western forms of knowledge and power is a way to shift the ground somewhat so that we can start to look at that materiality with different eyes and in different categories.¶ The coherence of effects that the development discourse achieved is the key to its success as a hegemonic form of representation: the construction of the poor and underdeveloped as universal, preconstituted subjects, based on the privilege of the representers; the exercise of power over the Third World made possible by this discursive homogenization (which entails the erasure of the complexity and diversity of Third World peoples, so that a squatter in Mexico City, a Nepalese peasant, and a Tuareg nomad become equivalent to each other as poor and underdeveloped); and the colonization and domination of the natural and human ecologies and economies of the Third World. [26](http://www.questia.com/reader/action/gotoDocId/103228006)¶ Development assumes a teleology to the extent that it proposes that the “natives” will sooner or later be reformed; at the same time, however, it reproduces endlessly the separation between reformers and those to be reformed by keeping alive the premise of the Third World as different and inferior, as having a limited humanity in relation to the accomplished European. Development relies on this perpetual recognition and disavowal of difference, a feature identified by Bhabha (1990) as inherent to discrimination. The signifiers of “poverty”, “illiteracy,” “hunger,” and so forth have already achieved a fixity as signifieds of “underdevelopment” which seems impossible to sunder. Perhaps no other factor has contributed to cementing the association of “poverty” with “underdevelopment” as the discourse of economists. To them I dedicate the coming chapter.

#### The alternative is to vote negative --- rejecting imperialism in this round serves as a starting point to theorize anti-imperialism and break down hegemonic systems of knowledge.

**Morrissey 11 –** (John, Department of Geography, National University of Ireland, 2011, “Architects of Empire: The Military–Strategic Studies Complex and the Scripting of US National Security,” Antipode Vol. 43, (2):435-470, http://aran.library.nuigalway.ie/xmlui/handle/10379/2893)//a-berg

As an academic working in political geography, **a key starting point of resistance**for me is the careful detailing of the largely unseen inner workings of empire in our contemporary world, ultimately in order to be better able to resist it (which is what this paper has been about). That resistance can manifest itself in **counter-scriptings** in a variety of contexts, from lecture halls to town halls, from academic journals to online blogs. And in a variety of **public forums**, many geographers have played, and continue to play, important roles in critiquing the war on terror and advancing more nuanced, reasoned and humane geographies and histories of Islam and the Middle East (Gregory 2005). Such academic and public intellectual work can also crucially liaise with, learn from, and be transformed by grassroots activists in peace and social justice movements throughout the world.44 And linking to their work in our teaching especially has more power than perhaps we sometimes realise; especially given the multimedia teaching and learning tools available today.45 A recent Antipodespecial issue saw a number of insightful reflections on the possibilities of “practising public scholarship” [volume 40(3), 2008]. The contributors outline various ways in which critical geographies can support and enable political and social activism. In addition, Don Mitchell makes an important point in reminding us thatacademic “intellectual” and “bureaucratic” work are also “vital parts of any activism” (Mitchell 2008:448). Disrupting and countering the abstracted geopolitical scriptings of strategic studies can take on a variety of forms. But both inside and outside the academy, a **key intellectual task**, I think, **is theorizing anti-imperialism**— both historically and in our contemporary moment. Effective counterdiscourses for our time must surely incorporate the lessons learned from the anti-imperial/anti-colonial struggles of history—from Ireland to India, from Algeria to Vietnam. Appellations like “insurgents” do the same discursive work today as the historical preference “rebels” did in reductively demonizing whole populations and delegitimizing their right to resistance. But more importantly, perhaps, they serve too to disengage us from unpacking the discourses and practices of contemporary anti-imperialism. Yet **historical contexts of resistance**have much to offer if our endgame is articulating critical and humane geographies of our contemporary world. And this is a crucial challenge, given the sheer pervasiveness of strategic geopolitical discourses that negate human geographical realities. Such scriptings are not only intellectually unconvincing; they are dangerous and hugely consequential. In seeking to avoid dangerously reductive accounts of the world, geography for me has always had a particular responsibility and strength. In understanding conflict, past and present, discourse has perpetually played a troubled role. In reading the current proliferation of “geopolitical discourse”, it is useful to bear in mind history’smultiple reminders of the impossibilities of “colonial discourse” (Morrissey 2010). There is a need to spatialize and locate the material and corporeal geographies of war; not just its imaginative geographies. The **spaces and agency of resistance** or so-called “insurgency” in the war on terror, for example, are little theorized and frequently not even recognized; reflecting a power relations of knowledge familiar to any student of colonial history. This remains a key challenge for critical accounts of our contemporary geopolitical world. That said, however, **connecting**what James Sidaway calls the “banal geopolitics” of **militarism to its brutal consequences** will always be an urgent task too (Sidaway 2001, 2008). And the dots can be joined. The military–strategic studies complex in contemporary America is a powerful producer of banal geopolitics, patronized and prioritized geographical knowledge and ultimately actionable geostrategic intelligence. **Its experts and advocates are both architects of empire and apologists for its consequences.** Their dominant national security discourse is about positing legitimized, aggressive US military action against the threat of irrational terrorism emanating from the Middle East; it is about presenting the USA as the **guardian** of global economic health; and it is about imperial ambition too. This paper has sought to expose the military–strategic studies complex as playing **a central role**in support of that imperial ambition and in the advancement of its aggressive geopolitics. I hope it has signalled too the imperative of resistance. In the face of ubiquitous scriptings of insecurity, war and geopolitics in our contemporary world, the task of both exposing the geoeconomic stakes and insisting on real places with real people, with bodies and rights just like us, is as urgent as ever.

#### Rejecting the affirmative’s production of knowledge in THIS academic space sparks a language of critique that reclaims public spaces from the militarization of knowledge --- this is NOT about offense and defense or weighing the case --- this is a pass/fail gateway issue. If the 1AC has produced bad scholarship, you vote negative to send them home to write a better 1AC.

**Giroux 12** (Henry, Global TV Network Chair in English and Cultural Studies at [McMaster University](http://en.wikipedia.org/wiki/McMaster_University) in [Hamilton, Ontario](http://en.wikipedia.org/wiki/Hamilton%2C_Ontario), “Against the Militarized Academy”, 7.4.12,<http://nnomy.org/index.php?option=com_flexicontent&view=items&cid=290%3Amilitarism-a-war&id=545%3Aagainst-the-militarized-academy&Itemid=821&lang=en>, [CL])

While there is an ongoing discussion about what shape the military-industrial complex will take under an Obama presidency, what is often left out of this analysis is the intrusion of the military into higher education. One example of the increasingly intensified and expansive symbiosis between the military-industrial complex and academia was on full display when Robert Gates, the secretary of defense, announced the creation of what he calls a new "Minerva Consortium," ironically named after the goddess of wisdom, whose purpose is to fund various universities to "carry out social-sciences research relevant to national security."([1](http://archive.truthout.org/112008J#1)) Gates's desire to turn universities into **militarized knowledge factories** producing knowledge, research and personnel in the **interest of** the Homeland (In)Security State should be of **special concern** for intellectuals, artists, academics and others who believe that the university should oppose such interests and alignments. At the very least, the emergence of the Minerva Consortium raises a larger set of concerns about the ongoing militarization of higher education in the United States. In a post-9/11 world, with its all-embracing war on terror and a culture of fear, the increasing spread of the discourse and values of militarization throughout the social order is intensifying the shift from the promise of a liberal democracy to the reality of a militarized society. Militarization suggests more than simply a militaristic ideal - with its celebration of war as the truest measure of the health of the nation and the soldier-warrior as the most noble expression of the merging of masculinity and unquestioning patriotism - but an intensification and expansion of the underlying values, practices, ideologies, social relations and cultural representations associated with military culture. What appears new about the amplified militarization of the post-9/11 world is that it has become **normalized**, serving as a powerful educational force that shapes our lives, memories and daily experiences. As an **educational force**, military power produces identities, goods, institutions, knowledge, **modes of communication** and affective investments - in short, it now bears down on all aspects of social life and the social order. As Michael Geyer points out, what is distinctive about the militarization of the social order is that civil society not only "organizes itself **for the production of violence**,"([2](http://archive.truthout.org/112008J#2)) but increasingly spurs a gradual **erosion of civil liberties**. **Military power and policies are expanded** to address not only matters of defense and security, but also problems associated with the entire health and social life of the nation, which are now measured by military spending, discipline and loyalty, as well as hierarchical modes of authority. As citizens increasingly assume the roles of informer, soldier and consumer willing to enlist in or be conscripted by the totalizing war on terror, we see the very idea of the university as a site of critical thinking, public service and socially responsible research being usurped by a **manic jingoism** and a market-driven fundamentalism that enshrine the entrepreneurial spirit and military aggression as means to dominate and control society. This should not surprise us, since, as William G. Martin, a professor of sociology at Binghamton University, indicates, "universities, colleges and schools have been targeted precisely because they are charged with both socializing youth and producing knowledge of peoples and cultures beyond the borders of Anglo-America."([3](http://archive.truthout.org/112008J#3)) But rather than be lulled into complacency by the insidious spread of corporate and military power, we need to be prepared to **reclaim institutions** such as the university that have historically served as **vital democratic spheres**protecting and serving the interests of social justice and equality. What I want to suggest is that such a struggle is not only political, but also pedagogical in nature. Over 17 **million s**tudents pass through the hallowed halls of academe, and it is crucial that they be educated in ways that enable them to recognize creeping militarization and its effects throughout American society, particularly in terms of how these effects threaten "democratic government at home just as they menace the independence and sovereignty of other countries."([4](http://archive.truthout.org/112008J#4)) But students must also recognize how such anti-democratic forces work in attempting to dismantle the university itself as a place to learn how to think critically and participate in public debate and civic engagement.([5](http://archive.truthout.org/112008J#5)) In part, this means giving them the tools to fight for the **demilitarization of knowledge on college campuses** - to resist complicity with the production of knowledge, information and technologies in classrooms and research labs that contribute to militarized goals and violence. Even so, there is more at stake than simply educating students to be alert to the dangers of militarization and the way in which it is redefining the very mission of higher education. Chalmers Johnson, in his continuing critique of the threat that the politics of empire presents to democracy at home and abroad, argues that if the United States is not to degenerate into a military dictatorship, in spite of Obama's election, a grass-roots movement will have to occupy center stage in opposing militarization, government secrecy and imperial power, while reclaiming the basic principles of democracy.([6](http://archive.truthout.org/112008J#6)) Such a task may seem daunting, but there is a crucial need for faculty, students, administrators and concerned citizens to develop alliances for long-term organizations and social movements to resist the growing ties among higher education, on the one hand, and the armed forces, intelligence agencies and war industries on the other - ties that play a crucial role in reproducing militarized knowledge. Opposing militarization as part of a broader pedagogical strategy in and out of the classroom also raises the question of what kinds of competencies, skills and knowledge might be crucial to such a task. One possibility is to develop critical educational theories and practices that define the space of learning not only through the critical consumption of knowledge but also through its production for peaceful and socially just ends. In the fight against militarization and "armed intellectuals," educators need **a language of critique**, but they also need a language that embraces a sense of hope and collective struggle.This means elaborating the meaning of politics through a concerted effort to expand the space of politics by **reclaiming "the public character of spaces**, relations, and institutions regarded as private" on the other.([7](http://archive.truthout.org/112008J#7)) We live at a time when matters of life and death are central to political governance.While registering the shift in power toward the large-scale production of death, disposability and exclusion, a new understanding of the meaning and purpose of higher education must also point to notions of agency, power and responsibility that operate in the service of life, democratic struggles and the expansion of human rights. Finally, if higher education is to come to grips with the multilayered pathologies produced by militarization, it will have to rethink not merely the space of the university as a democratic public sphere, but also the global space in which intellectuals, educators, students, artists, labor unions and other social actors and movements can form transnational alliances to oppose the death-dealing ideology of militarization and its effects on the world - including violence, pollution, massive poverty, racism, the arms trade, growth of privatized armies, civil conflict, child slavery and the ongoing wars in Iraq and Afghanistan. As the Bush regime comes to an end, it is time for educators and students to take a stand and develop global organizations that can be mobilized in the effort to supplant a culture of war with a culture of peace, whose elemental principles must be grounded in relations of economic, political, cultural and social democracy and the desire to sustain human life.

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#### Interpretation and violation --- economic engagement requires trade promotion --- the plan is an economic inducement

**Celik, 11** – master’s student at Uppsala University (Department of Peace and Conflict Research) (Arda, Economic Sanctions and Engagement Policies <http://www.grin.com/en/e-book/175204/economic-sanctions-and-engagement-policies>)

Literature of liberal school points out that economic engagement policies are significantly effective tools for sender and target countries. The effectiveness leans on mutual economic and political benefits for both parties.(Garzke et al,2001).Ecenomic engagement operates with **trade mechanisms** where sender and target country establish intensified trade thus increase the economic interaction over time. This strategy decreases the potential hostilities and provides mutual gains. Paulson Jr (2008) states that this mechanism is **highly different** from carrots (inducements). Carrots work quid pro quo in short terms and for narrow goals. Economic engagement intends to develop the target country and wants her to be aware of the long term benefits of shared economic goals. Sender does not want to contain nor prevent the target country with different policies. Conversely; sender works deliberately to improve the target countries’ Gdp, trade potential, export-import ratios and national income. Sender acts in purpose to reach important goals. First it establishes strong economic ties because economic integration has the capacity to change the political choices and behaviour of target country. Sender state believes in that economic linkages have political transformation potential.(Kroll,1993)

#### C. Voting issue –

#### 1. limits – broad interpretations of engagement include anything that effects the economy, which means everything

#### 2. negative ground – trade promotion is vital for a stable mechanism for disad links and counterplan ground

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**Prices rising now --- will remain above $100 --- best and most predictive evidence**

**AllAfrica News 7-30** (“High Oil Prices - Boom to Some, Doom to Others”, 2013, http://m.allafrica.com/stories/201307301218.html/, Deech)

Oil prices have remained **consistently high** and volatile over the past few years. According to estimates, they may remain this way at least until 2014. The Brent crude spot price, which averaged 112 dollars a barrel in 2012, is **projected** to remain **above 100 dollars** a barrel. This is at an average of 108 dollars and 101 dollars per barrel, in 2013 and 2014, respectively. High oil prices may dampen the global economy, which is still struggling to recover from the 2008 financial crisis. High oil prices above 100 dollars can be explained by many factors and they may affect economies in an uneven way, with an unclear outcome for the global economy as a whole. According to estimates by the International Monetary Fund (IMF), a 50pc increase in oil prices, due to a supply shock, would lead to a one to 1.5pc decrease in output, in many regions of the world. Rising oil prices will affect African economies differently depending on whether they are net exporters or net importers of the commodity. For oil-importing economies, high oil prices could translate into high import bills with adverse effects on inflation, production and employment. In contrast, oil-exporting economies could benefit from high oil prices, because an increase in oil revenues improves their balance of payments. In addition, price volatility may harm both importers and exporters of oil. It lowers, for instance, the predictability of marginal costs of production for companies. The uncertainty regarding their cash flows may induce companies to reduce their investments and limit job creation, which can consequently harm economic growth. Oil prices have increased since 2003, from less than 40 dollars to more than 100 dollars per barrel today. Oil prices fell sharply in 2008, before recovering steadily since then. Prices were volatile during 2011 and 2012, mainly because of the Arab Spring and events in Libya, in addition to conflict between Sudan and South Sudan. Many uncertain and conflicting factors on both supply and demand sides have contributed to the persistent high oil prices in recent years. Geopolitical factors are the main causes that drove up oil prices in producing countries. In the past decade, wars in Iraq and political tensions in the Middle East and North Africa have affected the oil market. More recently, disagreements between Western nations and Iran - one of the largest oil producers and exporters in the world - have fuelled risks of sharp disruptions in oil supplies globally. This, in turn, had a significant impact on prices of the commodity. In contrast, major oil producing countries, mainly Saudi Arabia, may not be able to boost production and instead have to cover losses elsewhere, as their capacities are reaching their limit. The decline in aggregate oil inventories and high costs of oil extraction and production are other supply-side factors affecting oil prices. Increasing demand from major emerging economies, such as China and India, has also played an important role in keeping oil prices **persistently high** over the past years. The Asian continent surpassed the US and is now the largest consumer of oil in the world. Despite the slowdown in economic growth in China and India, demand will **remain higher**. This will keep oil prices at high levels. Furthermore, as growth is resuming in the US and as the crisis in the euro area seems to be easing, global demand for oil may increase.

**The plan triggers an OPEC flood --- even if they don’t displace the transportation sector --- drops the price below $100**

**Schelmetic 11** (Tracey E., Contributor – TMC, “Saudi Prince Frets that High Oil Prices will Spur Drive to Alternative Energy”, TMC, 6-1, http://green.tmcnet.com/channels/renewable-energy/articles/181084-saudi-prince-frets-that-high-oil-prices-will.htm, Deech)

What do you do when you're a theocratic ruler of an oil-rich nation and you see the insidious creep of **alternative energy** technologies coming to end your party? You worry, apparently. Saudi Arabian prince Alwaleed bin Talal recently told CNN that his country wants to see oil prices **come down** to between **$70** and $80 a barrel. The reason? The Saudi rulers are **apprehensive** that high oil prices are spurring Western countries to seek replacement energy sources. The prince is concerned that if oil prices remain at high current levels, countries that use a lot of petroleum products – like the U.S. and Western European nations – will be encouraged to invest in alternative energy sources such as **solar**, **wind power**, **geothermal heat**, **hydropower** and **other technologies** – all of which would be **detrimental** to the oil-rich nation.

**Any sustained drop below $100 per barrel causes Russian collapse --- that’s the key benchmark**

**Whitmore 13** (Brian, Senior Russia Correspondent – Radio Free Europe, “After The Storm: Trends To Watch In Russia In 2013”, Radio Free Europe, 1-2, The Power Vertical)

It began with a roar and it ended with a whimper. As 2012 wound down in Russia, the soaring expectations for change that accompanied the civic awakening and mass protests at the year’s dawn had clearly faded. But the social, economic, and political forces that spawned them will continue to shape the landscape well into the new year. A fledgling middle class remains hungry for political change, splits still plague the ruling elite over the way forward, and a fractious opposition movement continues to struggle to find its voice. With the Kremlin unable to decisively squelch the mounting dissent and the opposition unable to topple President Vladimir Putin, Russia has entered an uneasy **holding pattern** that has the feel of an interlude between two epochs. "I don't think we are at the end of the Putin era, but we are at the beginning of the end," says longtime Russia-watcher Edward Lucas, international editor of the British weekly "The Economist" and author of the recently published book "Deception." With economic headwinds on the horizon, generational conflict brewing, and new political forces developing, Russian society is changing -- and changing rapidly. But the political system remains **ossified**. So what can we expect in 2013? Below are several trends and issues to keep an eye on in the coming year. The Oil Curse: Energy Prices And The Creaking Welfare State If 2012 was all about politics, 2013 will also be about **economics**. The Russian economy, the cliche goes, **rests on** two pillars -- oil and gas. And both will come under increasing pressure as the year unfolds. World oil prices, currently hovering between $90 and **$100 per barrel**, are expected to be volatile for the foreseeable future. And any sharp drop could prove **catastrophic** for the Russian economy. Energy experts and economists say Russia's budget will **only** stay balanced if oil prices remain **between $100 and $110** per barrel. Five years ago, the figure needed for a balanced budget was $50 to $55.

**The impact is extinction.**

**Filger 9** (Sheldon, Author – Huffington Post, “Russian Economy Faces Disastrous Free Fall Contraction”, http://www.globaleconomiccrisis.com/blog/archives/356)

**In Russia**, historically, **economic** health **and** political **stability are intertwined** to a degree that is rarely encountered in other major industrialized economies. It was the economic stagnation of the former Soviet Union that led to its political downfall. Similarly, Medvedev and Putin, both intimately acquainted with their nation's history, are unquestionably alarmed at the prospect that Russia's economic crisis will endanger the nation's political stability, achieved at great cost after years of chaos following the demise of the Soviet Union. Already, strikes and protests are occurring among rank and file workers facing unemployment or non-payment of their salaries. Recent polling demonstrates that the once supreme popularity ratings of Putin and Medvedev are eroding rapidly. Beyond the political elites are the financial oligarchs, who have been forced to deleverage, even unloading their yachts and executive jets in a desperate attempt to raise cash. Should the Russian economy deteriorate to the point where economic collapse is not out of the question, the impact will go far beyond the obvious accelerant such an outcome would be for the Global Economic Crisis. There is a geopolitical dimension that is even more relevant then the economic context. Despite its economic vulnerabilities and perceived decline from superpower status, Russia remains one of only two nations on earth with a nuclear arsenal of sufficient scope and capability to destroy the world as we know it. For that reason, it is not only President Medvedev and Prime Minister Putin who will be lying awake at nights over the prospect that a national economic crisis can transform itself into a virulent and destabilizing social and political upheaval. It just may be possible that U.S. President Barack Obama's national security team has already briefed him about the consequences of a major economic meltdown in Russia for the peace of the world. After all, the most recent national intelligence estimates put out by the U.S. intelligence community have already concluded that the Global Economic Crisis represents the greatest national security threat to the United States, due to its facilitating political instability in the world. During the years Boris Yeltsin ruled Russia, security forces responsible for guarding the nation's nuclear arsenal went without pay for months at a time, leading to fears that **desperate personnel would** illicitly **sell nuclear weapons to terrorist organizations**. If the current economic crisis in Russia were to deteriorate much further, how secure would the Russian nuclear arsenal remain? It may be that the financial impact of the Global Economic Crisis is its least dangerous consequence.

### 1nc cp

#### Text: The United States federal government should make organic charcoal eligible for greenhouse gas reduction incentives and ensure a substantial increase in the production and deployment of organic charcoal.

#### That solves warming.

**CNN 9** (3/30, Azadeh Ansari, CNNTech, “Can ‘biochar’ save the planet?” http://articles.cnn.com/2009-03-30/tech/biochar.warming.energy\_1\_carbon-co2-organic?\_s=PM:TECH)

Over the railroad tracks, near Agriculture Drive on the University of Georgia campus, sits a unique machine that may hold one of the solutions to big environmental problems like energy, food production and even global climate change. "This machine right here is our baby," said UGA research engineer Brian Bibens, who is one of a handful of researchers around the world working on alternative ways to recycle carbon. Bibens' specialty is "biochar," a highly porous charcoal made from organic waste. The raw material can be any forest, agricultural or animal waste. Some examples are woodchips, corn husks, peanut shells, even chicken manure. *Bibens feeds the waste -- called "biomass" -- into an octagonally shaped metal barrel where it is cooked under intense heat, sometimes above 1,000 degrees Fahrenheit, the organic matter is cooked through a thermochemical process called "pyrolysis". In a few hours, organic trash is transformed into charcoal-like pellets farmers can turn into fertilize*r. Gasses given off during the process can be harnesed to fuel vehicles or power electric generators. Biochar is considered by many scientists to be the "black gold" for agriculture. Its high carbon content and porous nature can help soil retain water, nutrients, protect soil microbes and ultimately increase crop yields while acting as natural carbon sink - sequestering CO2 and locking it into the ground. Biochar helps clean the air two ways: by preventing rotting biomass from releasing harmful CO2 into the atmosphere, and by allowing plants to safely store CO2 they pull out of the air during photosynthesis. "Soil acts as an enormous carbon pool, increasing this carbon pool could significantly contribute to the reduction of CO2 in the atmosphere," said Christoph Steiner, one of the leading research scientist studying biochar. "It gives us a chance to produce carbon negative energy." Worldwide use of biochar could cut CO2 levels by 8 parts per million within 50 years, according to NASA scientist James Hansen. Global carbon levels in the air have been steadily increasing at an alarming rate since the 1980s, according to NOAA. Since 2000, increases of 2 parts per million of CO2 have been common, according to NOAA. During the 1980s rates increased by 1.5 ppm per year. The process of making biochar can also lead to other valuable products. Some of the gases given off during the process can be converted to electricity, others can be condensed and converted to gasoline, and there are also some pharmaceutical applications for the by-products, said Danny Day President and CEO of Eprida, a private firm in Athens, Georgia currently exploring industry applications for the biochar process. Although scientists look to biochar to improve the future, its origin lies in the past. For centuries indigenous South Americans living in the Amazon Basin used a combination of charred animal waste and wood to make "terra preta," which means black earth, in Portuguese. Thousands of years later, the terra preta soil remains fertile without need for any added fertilizer, experts say. "These terra preta soils are older than 500 years and they are still black soil and very rich in carbon," said Steiner, a professor at the University of Georgia. Reducing the need for deforestation to create more cropland. By using biochar concepts, terra preta soils have been proven to remain fertile for thousands of years, preventing further harmful deforestation for agricultural purposes. But still more large-scale tests need to be conducted before biochar technology can be rolled out on a global scale. Day says biomass -- that otherwise would be thrown away --could be developed into entirely new markets for biofuels, electricity, biomass extracts and pharmaceutical applications, in addition to biochar. "We have 3 billion people out there who are at risk for climate change and they can be making money solving our global problem," said Day. Industries can now begin to look at farmers around the world and pay them for their agricultural wastes, said Day. "They can become the new affluent."

## solvency

#### Lol @ structural alt causes to the aff

Wood et. al., 1ac author, 2012, fellow @ Woodrow Wilson International Center for Scholars, Department of International Affairs, Instituto Tecnológico Autónomo de México Senior Advisor, Mexico Institute Renewable Energy Initiative(Duncan Wood, July 2012, “Solar Energy Potential in Mexico’s Northern Border States”, [http://www.wilsoncenter.org/sites/default/files/Border\_Solar\_Romero\_0.pdf)//Holmes](http://www.wilsoncenter.org/sites/default/files/Border_Solar_Romero_0.pdf%29//Holmes)

Barriers to Solar Development in Mexico Institutional There are no specific targets for increased solar capacity by the government. Although there are significant subsidies for conventional energy, the tax incentives for investment in solar energy are not sufficient to promote market growth. In addition, environmental externalities are not considered in the economic analysis of energy projects. Financial In general knowledge, there is little understanding of the life cycle of a solar project. It is not clear how a project can be developed, for it does not follow any established local pattern of construction or investment. The development steps are taken according to the situations that the project is currently in; steps, that have specific financial parameters. From the beginning to the conclusion of a project, it is uncertain how much it will cost. Flow analyses are not exact, adding to this, that the number and capacity of government and private financing programs are very limited. There are no mechanisms for “soft” loans or feed in tariffs to promote the use of solar systems in Mexico despite their successful application in other nations. Technical According to several installers consulted within ANES; in autonomous off-the-grid PV systems, lack of maintenance has caused failures to the PV systems after just a few years of operation. There is a need to train technicians to install and maintain systems and provide greater customer satisfaction, furthering development of the market. Finally, low level legislation (operating procedures) is needed to have minimum standards of quality and performance of photovoltaic products and solar projects. An important barrier to the development of the solar industry in Mexico with regards to manufacturing solar panels is that solar panel manufacturers in Mexico currently have to source most of their inputs from abroad. According to the manufacturers, the Mexican industry does not have the sufficient know-how or technology to meet the specific quality requirements and characteristics used in solar panel manufacturing. Some of the unmet requirements include low panel efficiency outputs, low cover glass quality with low useful life expectancy, and inadequate design and dimensions of the panel frames. Social The lack of knowledge and information about PV Solar Energy in Mexico means that many rural consumers do not understand its potential benefits. With respect to energy consumption and costs, households rarely take a long- term perspective and consequently fail to identify the potential savings small- scale solar system would in some cases provide. Moreover, the rural community remembers the failures of the Solidaridad program, which was developed by the administration of former Mexican president Carlos Salinas de Gortari in the late 1980s. The program’s objective was poverty alleviation, and one of the proposals was to install PV Solar Panels in rural communities. The program failed, partially because the solar systems were using car batteries that died just after a few months and were rarely replaced. Still remembered by the rural population, this experience left many rural residents with the impression that PV and other solar solutions are useless and with a strong preference for a grid connection. Political Unfortunately, decision makers are often uninformed about solar energy as well. This has greater consequences because policymakers have made decisions and declarations that have restricted the development and growth of solar energy in the country and given it a negative public image. For instance, when the electric taxi fleet for Mexico City was first announced, the government stated that the energy for recharging the cars would come from solar panels installed in the recharging stations, clearly an overstatement since the stations have an area of only 100 m2. As a result of public policy blunders and a lack of effective educational campaigns, most of the population is not aware that, when properly applied, solar systems can generate substantial financial and energy savings.

## at: no war

#### Yes great power war

Mearsheimer 99 (John , February 25 1999, Whitney H. Shepardson Fellow, Council on Foreign Relations; R. Wendell Harrison Distinguished Service Professor of Political Science, University of Chicago Council on Foreign Relations Great Debate Series, “Is Major War Obsolete?” [http://www.ciaonet.org/conf/cfr10](http://www.ciaonet.org/conf/cfr10/))

Now I think the central claim that’s on the table is wrong-headed, and let me tell you why. First of all, there are a number of good reasons why great powers in the system will think seriously about going to war in the future, and I’ll give you three of them and try and illustrate some cases. First, states oftentimes compete for economic resources. Is it hard to imagine a situation where a reconstituted Russia gets into a war with the United States and the Persian Gulf over Gulf oil? I don’t think that’s implausible. Is it hard to imagine Japan and China getting into a war in the South China Sea over economic resources? I don’t find that hard to imagine. A second reason that states go to war which, of course, is dear to the heart of realists like me, and that’s to enhance their security. Take the United States out of Europe, put the Germans on their own; you got the Germans on one side and te Russians on the other, and in between a huge buffer zone called eastern or central Europe. Call it what you want. Is it impossible to imagine the Russians and the Germans getting into a fight over control of that vacuum? Highly likely, no, but feasible, for sure. Is it hard to imagine Japan and China getting into a war over the South China Sea, not for resource reasons but because Japanese sea-lines of communication run through there and a huge Chinese navy may threaten it? I don’t think it’s impossible to imagine that. What about nationalism, a third reason? China, fighting in the United States over Taiwan? You think that’s impossible? I don’t think that’s impossible. That’s a scenario that makes me very nervous. I can figure out all sorts of ways, none of which are highly likely, that the Chinese and the Americans end up shooting at each other. It doesn’t necessarily have to be World War III, but it is great-power war. Chinese and Russians fighting each other over Siberia? As many of you know, there are huge numbers of Chinese going into Siberia. You start mixing ethnic populations in most areas of the world outside the United States and it’s usually a prescription for big trouble. Again, not highly likely, but possible. I could go on and on, positing a lot of scenarios where great powers have good reasons to go to war against other great powers. Second reason: There is no question that in the twentieth century, certainly with nuclear weapons but even before nuclear weapons, the costs of going to war are very high. But that doesn’t mean that war is ruled out. The presence of nuclear weapons alone does not make war obsolescent. I will remind you that from 1945 to 1990, we lived in a world where there were thousands of nuclear weapons on both sides, and there was nobody running around saying, “ War is obsolescent.” So you can’t make the argument that the mere presence of nuclear weapons creates peace. India and Pakistan are both going down the nuclear road. You don’t hear many people running around saying, “ That’s going to produce peace.” And, furthermore, if you believe nuclear weapons were a great cause of peace, you ought to be in favor of nuclear proliferation. What we need is everybody to have a nuclear weapon in their back pocket. You don’t hear many people saying that’s going to produce peace, do you? Conventional war? Michael’s right; conventional war was very deadly before nuclear weapons came along, but we still had wars. And the reason we did is because states come up with clever strategies. States are always looking for clever strategies to avoid fighting lengthy and bloody and costly wars of attrition. And they sometimes find them, and they sometimes go to war for those reasons. So there’s no question in my mind that the costs of war are very high, and deterrence is not that difficult to achieve in lots of great-power security situations. But on the other hand, to argue that war is obsolescent-I wouldn’t make that argument. My third and final point here is, the fact of the matter is, that there’s hardly anybody in the national security establishment-and I bet this is true of Michael-who believes that war is obsolescent.

#### Causes extinction

**Toon and Robock 10**, Toon: chair of the Dept of Atmospheric and Oceanic Sciences and a member of the Laboratory for Atmospheric and Space Physics at the University of Colorado @ Boulder. Robock is a Proff of atmospheric science at Rutgers University in New Brunswick, New Jersey Local Nuclear War, Global Suffering; January 2010; Scientific American Magazine; 8 Page(s), http://www.sciamdigital.com/index.cfm?fa=Products.ViewIssuePreview&ISSUEID\_CHAR=944156A6-237D-9F22-E8E572150DCA8E65&ARTICLEID\_CHAR=97CA0A88-237D-9F22-E861FD76EBEE2611)

Twenty-five years ago international teams of scientists showed that a nuclear war between the U.S. and the Soviet Union could produce a “nuclear winter.” The smoke from vast fires started by bombs dropped on cities and industrial areas would envelop the planet and absorb so much sunlight that the earth’s surface would get cold, dark and dry, killing plants worldwide and eliminating our food supply. Surface temperatures would reach winter values in the summer. International discussion about this prediction, fueled largely by astronomer Carl Sagan, forced the leaders of the two superpowers to confront the possibility that their arms race endangered not just themselves but the entire human race. Countries large and small demanded disarmament. Nuclear winter became an important factor in ending the nuclear arms race. Looking back later, in 2000, former Soviet Union leader Mikhail S. Gorbachev observed, “Models made by Russian and American scientists showed that a nuclear war would result in a nuclear winter that would be extremely destructive to all life on earth; the knowledge of that was a great stimulus to us, to people of honor and morality, to act.” Why discuss this topic now that the cold war has ended? Because as other nations continue to acquire nuclear weapons, smaller, regional nuclear wars could create a similar global catastrophe. New analyses reveal that a conflict between India and Pakistan, for example, in which 100 nuclear bombs were dropped on cities and industrial areas--only 0.4 percent of the world's more than 25,000 warheads--would produce enough smoke to cripple global agriculture. A regional war could cause widespread loss of life even in countries far away from the conflict. Regional War Threatens the World By deploying modern computers and modern climate models, the two of us and our colleagues have shown that not only were the ideas of the 1980s correct but the effects would last for at least 10 years, much longer than previously thought. And by doing calculations that assess decades of time, only now possible with fast, current computers, and by including in our calculations the oceans and the entire atmosphere--also only now possible--we have found that the smoke from even a regional war would be heated and lofted by the sun and remain suspended in the upper atmosphere for years, continuing to block sunlight and to cool the earth.

## warming

### 1nc disease

#### Virulent diseases cannot cause extinction because of burnout theory

**Gerber 5** (Leah R. Gerber, PhD. Associate Professor of Ecology, Evolution, and Environmental Sciences, Ecological Society of America, "Exposing Extinction Risk Analysis to Pathogens: Is Disease Just Another Form of Density Dependence?" August 2005, Jstor)

The density of it population is an important parameter for both PVA and host-pathogen theory. A fundamental principle of epidemiology is that the spread of an infectious disease through a population is a function of the density of both susceptible and infectious hosts. If infectious agents are supportable by the host species of conservation interest, the impact of a pathogen on a declining population is likely to decrease as the host population declines. A pathogen will spread when, on average, it is able to transmit to a susceptible host before an infected host dies or eliminates the infection (Kermack and McKendrick 1927, Anderson and May l99l). If the parasite affects the reproduction or mortality of its host, or the host is able to mount an immune response, the parasite population may eventually reduce the density of susceptible hosts to a level at which the rate of parasite increase is no longer positive. Most epidemiological models indicate that there is a host threshold density (or local population size) below which a parasite cannot invade, suggesting that rare or depleted species should be less subject to host-specific disease. This has implications for small, yet increasing, populations. For example, although endangered species at low density may be less susceptible to a disease outbreak, recovery to higher densities places them at increasing risk of future disease-related decline (e.g., southern sea otters; Gerber ct al. 2004). In the absence of stochastic factors (such as those modeled in PVA), and given the usual assumption of disease models that the chance that a susceptible host will become infected is proportional to the density of infected hosts (the mass action assumption) a host specific pathogen cannot drive its host to extinction (McCallum and Dobson 1995). Extinction in the absence of stochasticity is possible if alternate hosts (sometimes called reservoir hosts) relax the extent to which transmission depends on the density of the endangered host species.

### 1nc natural :15

#### It’s natural

**Carter et. Al 12–** Robert, PhD, Adjuct Research Fellow, James Cook University, Craig Idso, PhD, Chairman at the Center for the Study of Carbon Dioxide and Global Change, Fred Singer, PhD, President of the Science and Environmental Policy Project, Susan Crockford, evolutionary biologist with a specialty in skeletal taxonomy , paleozoology and vertebrate evolution, Joseph D’Aleo, 30 years of experience in professional meteorology, former college professor of Meteorology at Lyndon State College, Indur Goklany, independent scholar, author, and co-editor of the Electronic Journal of Sustainable Development, Sherwood Idso, President of the Center for the Study of Carbon Dioxide and Global Change, Research Physicist with the US Department of Agriculture, Adjunct Professor in the Departments of Geology, Botany, and Microbiology at Arizona State University, Bachelor of Physics, Master of Science, and Doctor of Philosophy, all from the University of Minnesota, Madhav Khandekar, former research scientist from Environment Canada and is an expert reviewer for the IPCC 2007 Climate Change Panel, Anthony Lupo, Department Chair and Professor of Atmospheric Science at the University of Missouri, Willie Soon, astrophysicist at the Solar and Stellar Physics Division of the Harvard-Smithsonian Center for Astrophysics, Mitch Taylor (Canada) (February 2012, “Eight Centuries of Climate Change in Northeast Spain” <http://www.nipccreport.org/articles/2012/feb/8feb2012a3.html>

According to Morellon *et al*. (2011), "in the context of present-day global warming, there is increased interest in documenting climate variability during the last millennium," since "it is crucial to reconstruct pre-industrial conditions to discriminate anthropogenic components (i.e., greenhouse gases, land-use changes) from natural forcings (i.e., solar variability, volcanic emissions)." Against this backdrop, Morellon *et al*. conducted a multi-proxy study of several short sediment cores they recovered from Lake Estanya (42°02'N, 0°32'E) in the Pre-Pyrenean Ranges of northeast Spain, which "provides a detailed record of the complex environmental, hydrological and anthropogenic interactions occurring in the area since medieval times." More specifically, they say that "the integration of sedimentary facies, elemental and isotopic geochemistry, and biological proxies (diatoms, chironomids and pollen), together with a robust chronological control, provided by AMS radiocarbon dating and 210Pb and 137Cs radiometric techniques, enabled precise reconstruction of the main phases of environmental change, associated with the Medieval Warm Period (MWP), the Little Ice Age (LIA) and the industrial era." And what did they find? The thirteen researchers identified the MWP as occurring in their record from AD 1150 to 1300, noting that their pollen data reflect "warmer and drier conditions," in harmony with the higher temperatures of the Iberian Peninsula over the same time period that have been documented by Martinez-Cortizas *et al*. (1999), the higher temperatures of the Western Mediterranean region found by Taricco *et al*. (2008), and the global reconstructions of Crowley and Lowery (2000) and Osborn and Briffa (2006), which "clearly document warmer conditions from the twelfth to fourteenth centuries," which warmth, in the words of Morellon *et al*. is "likely related to increased solar irradiance (Bard *et al*., 2000), persistent La Niña-like tropical Pacific conditions, a warm phase of the Atlantic Multidecadal Oscillation, and a more frequent positive phase of the North Atlantic Oscillation (Seager *et al*., 2007)." Following hard on the heels of the MWP, Morellon *et al*. note the occurrence of the LIA, which they recognize as occurring from AD 1300 to 1850. And here they report that, on the Iberian Peninsula, "lower temperatures (Martinez-Cortizas *et al*., 1999) characterize this period," which "coincided with colder North Atlantic (Bond *et al*., 2001) and Mediterranean sea surface temperatures (Taricco *et al*., 2008) and a phase of mountain glacier advance (Wanner *et al*., 2008)." And following the LIA they identify the transition period of AD 1850-2004 that takes the region into the Current Warm Period. In discussing all three of these distinctive periods, they say that "a comparison of the main hydrological transitions during the last 800 years in Lake Estanya and solar irradiance (Bard *et al*., 2000) reveals that lower lake levels dominated during periods of enhanced solar activity (MWP and post-1850 AD) and higher lake levels during periods of diminished solar activity (LIA)." And *within* the LIA, they note that periods of higher lake levels or evidence of increased water balance occurred during the solar minima of Wolf (AD 1282-1342), Sporer (AD 1460-1550), Maunder (AD 1645-1715) and Dalton (AD 1790-1830). In light of these several observations it would appear that the multi-centennial climate oscillation uncovered by Morellon *et al*. has been driven by a similar oscillation in solar activity, as well as by multi-decadal solar activity fluctuations superimposed upon that longer-period oscillation. And these relationships suggest that there is no compelling need to attribute 20th-century global warming to the concomitant increase in the air's CO2 content. Natural variability appears quite capable of explaining it all.

### 1nc (-) feedbacks :18

#### Negative feedbacks prevent warming

**Evans 12** ­–consultant of the Australian Greenhouse Office/Department of Climate Change, main modeler of carbon in Australia’s biosphere 1999-2005, mathematician, engineer with 6 university degrees, Ph.D. from Stanford in electrical engineering (David. M. W., “The Skeptic’s Case”, 2/24/12; < https://mises.org/daily/5892/The-Skeptics-Case>)//Beddow

The serious skeptical scientists have always agreed with the government climate scientists about the direct effect of CO2. The argument is entirely about the feedbacks. The feedbacks dampen or reduce the direct effect of the extra CO2, cutting it roughly in half.[5] The main feedbacks involve evaporation, water vapor, and clouds. In particular, water vapor condenses into clouds, so extra water vapor due to the direct warming effect of extra CO2 will cause extra clouds, which reflect sunlight back out to space and cool the earth, thereby reducing the overall warming. There are literally thousands of feedbacks, each of which either reinforces or opposes the direct-warming effect of the extra CO2. Almost every long-lived system is governed by net feedback that dampens its response to a perturbation. If a system instead reacts to a perturbation by amplifying it, the system is likely to reach a tipping point and become unstable (like the electronic squeal that erupts when a microphone gets too close to its speakers). The earth's climate is long-lived and stable — it has never gone into runaway greenhouse, unlike Venus — which strongly suggests that the feedbacks dampen temperature perturbations such as that from extra CO2. The climate models have been essentially the same for 30 years now, maintaining roughly the same sensitivity to extra CO2 even while they got more detailed with more computer power. How well have the climate models predicted the temperature? Does the data better support the climate models or the skeptic's view? One of the earliest and most important predictions was presented to the US Congress in 1988 by Dr James Hansen, the "father of global warming": Hansen's climate model clearly exaggerated future temperature rises. In particular, his climate model predicted that if human CO2 emissions were cut back drastically starting in 1988, such that by year 2000 the CO2 level was not rising at all, we would get his scenario C. But in reality the temperature did not even rise this much, even though our CO2 emissions strongly increased — which suggests that the **climate models greatly overestimate the effect of CO2 emissions**. A more considered prediction by the climate models was made in 1990 in the IPCC's First Assessment Report:[8] It's 20 years now, and the average rate of increase in reality is below the lowest trend in the range predicted by the IPCC. Ocean Temperatures The oceans hold the vast bulk of the heat in the climate system. We've only been measuring ocean temperature properly since mid-2003, when the Argo system became operational.[9][10] In Argo, a buoy duck dives down to a depth of 2,000 meters, measures temperatures as it very slowly ascends, then radios the results back to headquarters via satellite. Over 3,000 Argo buoys constantly patrol all the oceans of the world. The ocean temperature has been basically flat since we started measuring it properly, and not warming as quickly as the climate models predict. The climate models predict a particular pattern of atmospheric warming during periods of global warming; the most prominent change they predict is a warming in the tropics about 10 km up, the "hotspot." The hotspot is the sign of the amplification in their theory (see figure 1). The theory says the hotspot is caused by extra evaporation, and by extra water vapor pushing the warmer, wetter lower troposphere up into volume previously occupied by cool dry air. The presence of a hotspot would indicate amplification is occurring, and vice versa. We have been measuring atmospheric temperatures with weather balloons since the 1960s. Millions of weather balloons have built up a good picture of atmospheric temperatures over the last few decades, including the warming period from the late 1970s to the late '90s. This important and pivotal data was not released publicly by the climate establishment until 2006, and then in an obscure place.[13] Here it is: In reality there was no hotspot, not even a small one. So in reality there is no amplification — the amplification shown in figure 1 does not exist.[16] The climate models predict that when the surface of the earth warms, less heat is radiated from the earth into space (on a weekly or monthly time scale). This is because, according to the theory, the warmer surface causes more evaporation and thus there is more heat-trapping water vapor. This is the heat-trapping mechanism that is responsible for the assumed amplification in figure 1. Satellites have been measuring the radiation emitted from the earth for the last two decades. A major study has linked the changes in temperature on the earth's surface with the changes in the outgoing radiation. Here are the results: This shows that in reality the earth gives off more heat when its surface is warmer. This is the opposite of what the climate models predict. This shows that the climate models trap heat too aggressively, and that their assumed amplification shown in figure 1 does not exist. **All the data here is impeccably sourced — satellites, Argo, and weather balloons.[**18] The air and ocean temperature data shows that the climate models overestimate temperature rises. The climate establishment suggest that cooling due to undetected aerosols might be responsible for the failure of the models to date, but this excuse is wearing thin — it continues not to warm as much as they said it would, or in the way they said it would. On the other hand, the rise in air temperature has been greater than the skeptics say could be due to CO2. The skeptic's excuse is that the rise is mainly due to other forces — and they point out that the world has been in a fairly steady warming trend of 0.5°C per century since 1680 (with alternating ~30 year periods of warming and mild cooling) where as the vast bulk of all human CO2 emissions have been after 1945. We've checked all the main predictions of the climate models against the best data: Test Climate Models Air temperatures from 1988 Overestimated rise, even if CO2 is drastically cut Air temperatures from 1990 Overestimated trend rise Ocean temperatures from 2003 Overestimated trend rise greatly Atmospheric hotspot Completely missing → no amplification Outgoing radiation Opposite to reality → no amplification The climate models get them all wrong. The missing hotspot and outgoing radiation data both, independently, prove that the amplification in the climate models is not present. Without the amplification, the climate model temperature predictions would be cut by at least two-thirds, which would explain why they overestimated the recent air and ocean temperature increases. Therefore, The climate models are fundamentally flawed. Their assumed threefold amplification by feedbacks does not in fact exist. The climate models overestimate temperature rises due to CO2 by at least a factor of three. The skeptical view is compatible with the data. The data presented here is impeccably sourced, very relevant, publicly available, and from our best instruments. Yet it never appears in the mainstream media — have you ever seen anything like any of the figures here in the mainstream media? That alone tells you that the "debate" is about politics and power, and not about science or truth. This is an unusual political issue, because there is a right and a wrong answer, and everyone will know which it is eventually. People are going ahead and emitting CO2 anyway, so we are doing the experiment: either the world heats up by several degrees by 2050 or so, or it doesn't. Notice that the skeptics agree with the government climate scientists about the direct effect of CO2; they just disagree about the feedbacks. The climate debate is all about the feedbacks; everything else is merely a sideshow. Yet hardly anyone knows that. The government climate scientists and the mainstream media have framed the debate in terms of the direct effect of CO2 and sideshows such as arctic ice, bad weather, or psychology. They almost never mention the feedbacks. Why is that? Who has the power to make that happen?

### 1nc no extinction :10

#### No extinction

**Carter et. Al 11–** Robert, PhD, Adjuct Research Fellow, James Cook University, Craig Idso, PhD, Chairman at the Center for the Study of Carbon Dioxide and Global Change, Fred Singer, PhD, President of the Science and Environmental Policy Project, Susan Crockford, evolutionary biologist with a specialty in skeletal taxonomy , paleozoology and vertebrate evolution, Joseph D’Aleo, 30 years of experience in professional meteorology, former college professor of Meteorology at Lyndon State College, Indur Goklany, independent scholar, author, and co-editor of the Electronic Journal of Sustainable Development, Sherwood Idso, President of the Center for the Study of Carbon Dioxide and Global Change, Research Physicist with the US Department of Agriculture, Adjunct Professor in the Departments of Geology, Botany, and Microbiology at Arizona State University, Bachelor of Physics, Master of Science, and Doctor of Philosophy, all from the University of Minnesota, Madhav Khandekar, former research scientist from Environment Canada and is an expert reviewer for the IPCC 2007 Climate Change Panel, Anthony Lupo, Department Chair and Professor of Atmospheric Science at the University of Missouri, Willie Soon, astrophysicist at the Solar and Stellar Physics Division of the Harvard-Smithsonian Center for Astrophysics, Mitch Taylor (Canada) (March 8th, “[Surviving](../../../../Marc/Desktop/Surviving) the Unpreceented Climate Change of the IPCC” <http://www.nipccreport.org/articles/2011/mar/8mar2011a5.html>) Jacome

On the other hand, they indicate that some biologists and climatologists have pointed out that "many of the predicted increases in climate have happened before, in terms of both magnitude and rate of change (e.g. Royer, 2008; Zachos *et al*., 2008), and yet biotic communities have remained remarkably resilient (Mayle and Power, 2008) and in some cases thrived (Svenning and Condit, 2008)." But they report that those who mention these things are often "placed in the 'climate-change denier' category," although the purpose for pointing out these facts is simply to present "a sound scientific basis for understanding biotic responses to the magnitudes and rates of climate change predicted for the future through using the vast data resource that we can exploit in fossil records." Going on to do just that, Willis *et al*. focus on "intervals in time in the fossil record when atmospheric CO2 concentrations increased up to 1200 ppm, temperatures in mid- to high-latitudes increased by greater than 4°C within 60 years, and sea levels rose by up to 3 m higher than present," describing studies of past biotic responses that indicate "the scale and impact of the magnitude and rate of such climate changes on biodiversity." And what emerges from those studies, as they describe it, "is evidence for rapid community turnover, migrations, development of novel ecosystems and thresholds from one stable ecosystem state to another." And, most importantly in this regard, they report "there is very little evidence for broad-scale extinctions due to a warming world." In concluding, the Norwegian, Swedish and UK researchers say that "based on such evidence we urge some caution in assuming broad-scale extinctions of species will occur due solely to climate changes of the magnitude and rate predicted for the next century," reiterating that "the fossil record indicates remarkable biotic resilience to wide amplitude fluctuations in climate.

### 1nc ocean acid

#### Animals will adapt to ocean acid --- their studies are flawed.

**Schlengel et al 2012** - Peter Schlegel, Department of Biological Sciences, Macquarie University, Sydney, Australia, Jon N. Havenhand, Department of Biological & Environmental Sciences, University of Gothenburg, Tjärnö Marine Biological Laboratory, Strömstad, Sweden, Michael R. Gillings, Department of Biological Sciences, Macquarie University, Sydney, Australia, Jane E. Williamson, Department of Biological Sciences, Macquarie University, Sydney, Australia, “Individual Variability in Reproductive Success Determines Winners and Losers under Ocean Acidification: A Case Study with Sea Urchins,” [http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0053118](http://www.plosone.org/article/info%3Adoi/10.1371/journal.pone.0053118))//a-berg

Environmental factors directly affect populations by selecting resilient individuals. Selection at the gametic level, or during early life, has strong and immediate effects at the population level, carrying over into subsequent life stages. Heritability of this resilience leads to cascading adaptive effects in subsequent generations. For example, in free-spawning marine organisms, sperm selection during fertilization plays a key role by determining the nature and diversity of genotypes in the subsequent generation [1], [2] and thus their resilience to environmental change. Rising atmospheric carbon dioxide levels are a key driver of environmental change, and will likely lead to rapid ocean acidification [3], [4]. With gametes possessing no, or only limited, buffering capacities against CO2-mediated pH changes in seawater, the dynamics of fertilization and subsequent development are likely to be affected in all free-spawning marine organisms, with potentially severe implications [5], [6]. Yet we know little about the relative fitness of individuals within species under the predicted acidification of the ocean. The sensitivity of reproductive processes to ocean acidification has thus far been assessed from mean responses of mixtures of gametes and/or larvae obtained from multiple individuals [7]–[10] (but see [11]). However, the key determinant of reproductive success in a future ocean is not the average response, but the proportion of successful offspring contributed by each individual under the changed environmental conditions. Individual-level responses to ocean acidification have been examined to some extent in larval development processes [12], [13], but not closely in fertilization processes. In this context, the importance of naturally high variability that is observed in fertilization success of individual pairwise crosses [14], [15] becomes apparent: not all matings are equal. Consequently, acidification-mediated impacts on reproductive success and subsequent development might result in flow-on consequences for genetic diversity and population demographics [12].

### 1nc bio d

#### A) Biodiversity predictions are guess work – we don’t know how species are interconnected.

**O’Riordan and Kleeman, 02**(Tim O'Riordan and Susanne Stoll-Kleemann, Tim was the Professor of Environmental Sciences at the University of East Anglia and Susanne studied geography and social sciences at the Technical University of Berlin where she also received her PhD and she serves as Full Professor and Chair of Applied Geography and Sustainability Science at the University of Greifswald, 02. (“Biodiversity, Sustainability, and Human Communities: Protecting beyond the Protected.” Pg. 3. Columbian University Press. Questia. <http://www.questia.com/read/105051583?title=Biodiversity,%20Sustainability,%20and%20Human%20Communities:%20%20Protecting%20beyond%20the%20Protected>) QP

This planet is unique, at least as far as we will probably ever know. It contains life, which is maintained through self-regulating flows of energy and chemical connections, the science of which is well described by Tim Lenton (98).We also know that these webs of life are frayed (World Resources Institute 00). We are by no means clear as to how much these life-maintaining flows and fluxes are damaged. An assessment by the World Resources Institute (00: 9) entitled Pilot Analysis of Global Ecosystems (PAGE)indicates that there is still a fundamental ignorance of how this web joins, and of what it consists at any scale of analysis, or of human action. The Board on Sustainable Development of the US National Research Council (99: 208, 220–1) points out that this ignorance is all the more worrying because of the complex multiple causes and consequences of this disruption. One of the major threats to ecosystem goods and services is our lack of understanding about how specific ecosystem functions may change with ecosystem transformations. Another cause for concern is our hesitation about deciding on options for coping with and ameliorating these fundamental changes. A third limitation is lack of knowledge about, or incorrect valuation of, the 'worth' of ecosystem functioning for social well-being and economic advantage. A study attempting to calculate the 'worth' of ecosystem services(Costanza et al. 97)came up with a range of estimates on the basis of heroic estimates and ingenious assumptions. These estimates all exceeded the current value of total economic activity for the globe, on an annual basis, by a factor of up to threefold.Frankly there is no way of knowing how accurate this calculation is.What is revealing is that a clever monetary estimate indicates our scale of dependency or 'free riding' on the web of interconnected life. More relevant, perhaps, is the danger of trying to place a market-equivalent value on a mystery for which we should be more in awe than in arithmetic.

#### B) Biodiversity is a diluted and overhyped concept contributed to by unqualified scientists.

**The Daily Rising Kashmir, 09**. (“‘Conservation, exploration of biodiversity should go hand in hand.’” <http://www.risingkashmir.com/?option=com_content&task=view&id=11576>) QP

The seminar “Biodiversity: Present Status and Future Challenges” organized by the varsity’s Botany department was addressed by Minister of Education, Peerzada Muhammad Syed, Vice Chancellor, Prof Riyaz Punjabi, Registrar, Prof S N Raina of Delhi University, Prof Syed Fayaz, Head Botany department, G H Dar and organizing secretary of the **conference, Dr Zafar Reshi.**Speaking on the occasion, Prof Raina said, “Conservation has become a buzz word and people who don’t know even the basics of the subject deliver sermons on it. It is ironic that at times physicists, chemists speak on the need of conservation. Even biologists who don’t have the knowledge of biodiversity deliver speeches.” “This intervention of unknowledgeable people has made the concept of biodiversity vague and diluted,” he added.

#### Status Quo Solves- Organic farmland will bolster biodiversity.

**NERC, 09**(Natural Environmental Research Center, March 13, 09. (“Organic farms could form hotspots of biodiversity.” Planet Earth Online. <http://planetearth.nerc.ac.uk/news/story.aspx?id=357>) QP

Resurgent awareness of the need to provide for a fast-growing population is likely to mean a move in conservation from managing farmland so as to maximise biodiversity to trying to make the landscape as biodiverse as possiblewhile also producing enough food. One possible solution isto make non-organic farming as intensive as possible in the areas that suit it, to maximise food production, whileusing organic farms as 'islands of biodiversity' where conditions suit them.The world's population is predicted to grow by around 40 per cent by mid-century, and factors like increasing use of biofuel crops and the effects of climate change are likely to affect the amount of land on which food can be grown. The result will be unprecedented pressure on agricultural production. 'The global food crisis and the pressure it brings to increase food yields may shift our perceptions of how we should conserve biodiversity,' says Dr Doreen Gabriel, an ecologist in the Institute of Integrative and Comparative Biology at the University of Leeds and the paper's lead author. 'Conservation strategies will shift from asking simply how we enhance biodiversity to asking how we can enhance biodiversity under the constraints of food production.' Organic farming is often seen as more wildlife-friendly, because it provides wild plants and animals with a much greater range of potential habitats. It has become far more popular in recent years, with organically-cultivated land in Britain increasing from around 50,000 hectares before 97 to around 680,000 hectares ten years later.

#### Alt causes – overhunting, unintentional killing and pollution.

Eiperin 8 (October 7. Juliet. Washington Post. <http://www.washingtonpost.com/wp-dyn/content/article/2008/10/06/AR2008100600641.html> Pismarov)

At least a quarter of the world's wild mammal species are at risk of extinction, according to a comprehensive global survey releasedhere Monday. The new assessment -- which took 1,700 experts in 130 countries five years to complete -- paints "a bleak picture," leaders of the project wrote in a paper being published in the journal Science. The overview, made public at the quadrennial World Conservation Congress of the International Union for Conservation of Nature (IUCN), covers all 5,487 wild species identified since 1500. It is the most thorough tally of land and marine mammals since 1996. "Mammals are definitely declining, and the driving factors are habitat destruction and over-harvesting," said Jan Schipper, the paper's lead writer and the IUCN's global mammals assessment coordinator.The researchers concluded that 25 percent of the mammal species for which they had sufficient data are threatened with extinction, but Schipper added that the figure could be as high as 36 percent because information on some species is so scarce.Land and marine mammals face different threats, the scientists said, and large mammals are more vulnerable than small ones. For land species, habitat loss and hunting represent the greatest danger, while marine mammals are more threatened by unintentional killing by pollution, ship strikes and being caught in fishing nets.

#### Even if their harms are true, environmental policies trigger conflicting agendas and are ineffective.

**O’Riordan and Kleeman, 02**(Tim O'Riordan and Susanne Stoll-Kleemann, Tim was the Professor of Environmental Sciences at the University of East Anglia and Susanne studied geography and social sciences at the Technical University of Berlin where she also received her PhD and she serves as Full Professor and Chair of Applied Geography and Sustainability Science at the University of Greifswald, 02. (“Biodiversity, Sustainability, and Human Communities: Protecting beyond the Protected.” Pg. 3. Columbian University Press. Questia. <http://www.questia.com/read/105051583?title=Biodiversity,%20Sustainability,%20and%20Human%20Communities:%20%20Protecting%20beyond%20the%20Protected>) QP

This is a controversial arena for sustainability science. Kaiser (98: 1,183–90) protests that advocacy without responsibility and peer review ould devalue science and remove some of its authority and influence over policy matters. Yet conservative-minded peer review may stifle advocacy science just when it is required to persuade new directions in policy, and build confidence in innovation and experimentation. Biodiversity is one of many scientific arenas nowadays where the natural and the social connect and create united perspectives for analysis and management. Biodiversity with advocacy is most fully appreciated by the ecosystem approach. Yetpromoting biodiversity as a redirection of social as well as environmental policy runs the danger of controversy and contradiction as advocates clash to different agendas and funders. Advocacy in ecology involves the incorporation of social purposes and values with which many in society may not be familiar. Ecologists may promote a mission– to safeguard, to monitor, to protect – and in so doing may exhibit political prejudices and social demands which lie outside accepted interpretations of democracy, consultation and inclusiveness. Advocacy for biodiversity has to be sensitive to social circumstances, to political positioning, to cultural norms and to established views of property rights and landuse practices.This interrelationship does not form an arena in which many ecologists are yet trained or comfortable, even though science and politics have long mixed. We shall see from the case studies that advocacy ecology has to become integrated with styles of political and social involvement and co-operation if it is ever likely to achieve its aims. This provides an important training opportunity and a research collaboration role for ecologists which lie beyond the disciplinary innovations advocated by Bazzaz and his concerned colleagues. In one of the most critical, yet optimistic, appraisals of biodiversity futures, Pimm and his equally distinguished co-authors (01: 2,207) conclude that much can still be done to shift the tides of destruction.

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#### Biochar solves

**Renner 7** (Rebecca, 9/1, Environmental Science & Technology, “Rethinking biochar,” <http://pubs.acs.org/doi/abs/10.1021/es0726097>, mat)

Imagine a simple agricultural soil amendment with the ability to double or triple plant yields while at the same time reducing the need for fertilizer. In addition to decreasing nutrient-laden runoff, what if this amazing ingredient could also **cut greenhouse gases on a vast scale**? This revolutionary substance exists, and it isn’t high-tech, or even novel—its use can be traced back to preColumbian South America. The ingredient is charcoal, in this context called biochar or agrichar, and if a growing number of scientists, entrepreneurs, farmers, and policy makers prevail, this persistent form of carbon will be finding its way into soils around the world. “Biochar has enormous potential,” says John Mathews at Macquarie University in Australia. “When scaled up, it can take out **gigatons of carbon from the atmosphere**,” he adds. Agrichar’s benefits flow from two properties, says Cornell University soil scientist Johannes Lehmann. It makes plants grow well and is extremely stable, persisting for hundreds if not thousands of years. “Biochar can be used to address some of the most urgent environmental problems of our time—soil degradation, food insecurity, water pollution from agrichemicals, and **climate change**,” he says. But fulfilling the promise is going to take more research. “We need to get reliable data on the agronomic and carbon sequestration potential of biochar,” says Robert Brown, director of the Office of Biorenewables Programs at Iowa State University. “The effects are real, but these are hard to quantify at present.” Momentum appears to be building—this year has seen the first international conference on biochar, more research funding, and the scaling up of projects from the greenhouse to the field. Think negative The notion that charcoal, traditionally produced in smoky kilns, might reduce emissions of greenhouse gases may seem counterintuitive, but technology for pyrolyzing biomass makes biochar production relatively clean. And the process is unique because it takes more carbon out of the atmosphere than it releases. In the jargon of carbon accounting, the process goes beyond carbon neutral to carbon negative. Here’s how it works: first, plant biomass takes up CO2 from the atmosphere as it grows. A small amount of this carbon is released back into the air during pyrolysis and the rest is sequestered, or locked up for long periods, as biochar. Because atmospheric carbon has been pulled from the air to make biochar, the net process is carbon negative. Biochar pioneer Makoto Ogawa at the Osaka Institute of Technology (Japan) and colleagues calculated in the journal Mitigation and Adaptation Strategies for Global Change (2006, 11, 429–444) that, even allowing for the carbon emissions during processing, making biochar from waste biomass could sequester 20– 50% of the total carbon originally present in the biomass. Pyrolysis, a technologically advanced form of smoldering, involves burning biomass under controlled, low-oxygen conditions. Small- and large-scale facilities work in various ways and yield a variety of energy products, including bio-oils and gases, with biochar as a byproduct. For the most part, pyrolysis methods are currently being developed not to make biochar but with the goal of maximizing the quality and quantity of the energy product, say biochar advocates. Figuring out how to optimize biochar properties using pyrolysis has not been a priority, but such research is taking shape. In May, Dynamotive USA (a subsidiary of Dynamotive Energy Systems Corp.) and Heartland BioEnergy started testing biochar’s effects in the Iowa corn belt with 12.7 metric tons (t) of biochar and three strips of cornfield. Dynamotive USA’s Canadian parent company has developed a fast pyrolysis process to make a high-quality bio-oil. “Not only has biochar the potential to raise high yield rates of corn another 20%, but we believe there is a real possibility the char trial could also result in evidence that could point the way to dramatic improvements in water quality, which could have far-reaching beneficial consequences,” says farmer and agricultural consultant Lon Crosby of Heartland BioEnergy. He anticipates that farmers using biochar will use less fertilizer and hence will produce less nitrogen- and phosphorus-rich runoff from fields. Madison, Wisconsin-based BEST Energies has developed a slow pyrolysis process. The company received more than $225,000 in June from the Australian state of New South Wales to continue research on biochar’s role in terrestrial carbon sequestration and agricultural greenhousegas mitigation. The company’s Australian subsidiary already produces small amounts of biochar for field trials at New South Wales’s Wollongbar Agricultural Institute. A further $100 million in U.S. research funding is also in the pipeline. U.S. Sen. Ken Salazar (D-CO), a member of the Agriculture Committee, is sponsoring a Farm Bill amendment to fund research into bringing biochar to market. Black gold The agricultural grail that motivates this research is the Amazon region’s “terra preta de indio”, rich black earths whose fertility produces high crop yields even though the surrounding soils are poor. Carbon dating shows that this biochar has lasted for thousands of years. Researchers believe that the area’s original inhabitants cleared forests for fields by slashing down trees and allowing the remains to smolder, forming biochar. Using charcoal as a soil amendment has a long history in Japan, and recent agricultural experiments also demonstrate biochar’s beneficial properties, with increased yields reported for many crops, including corn and sugarcane. These experiments mainly focus on poor soils in Indonesia, the Philippines, Australia, South America, and Asia. Adding biochar to soil generally raises pH, increases total nitrogen and total phosphorus, encourages greater root development, hosts more beneficial fungi and microbes, improves cation exchange capacity, and reduces available aluminum. This track record is promising, but scientists currently do not know how to produce high-quality, consistent biochar in large quantities. Several types of biochar have been tested, but more systematic investigations are needed to determine the effect of specific biochar characteristics. In many instances, scientists may not know the exact composition of the feedstock or the temperature and oxygen content used during smoldering. “These values may not have been measured or reported, and sometimes they can’t be assessed. For example, the temperature in traditional kilns varies with time and position in the kiln,” says Lehmann. “We need a research effort comparable to the development of fertilizers over the past century to provide the underlying scientific information for the development of biochar in this century,” Lehmann adds. Greenhouse-gas reducer Some of the most intriguing research needs surround what appears to be biochar’s ability to decrease emissions of nitrous oxide and methane, two potent greenhouse gases. Nitrous oxide is **several hundred times more potent than CO2** as a greenhouse gas. The agricultural application of nitrogen fertilizers is a major source of the gas and has been difficult to control. Preliminary results indicate that biochar amendments to soil appear to decrease emissions of nitrous oxide as well as methane, which is a greenhouse gas **23 times more potent than CO2** . In greenhouse and field experiments in Colombia, nitrous oxide emissions were reduced by 80% and methane emissions were completely suppressed with biochar additions to a forage grass stand, Marco Rondon of the International Development Research Centre and colleagues told participants at the U.S. Department of Agriculture Symposium on Greenhouse Gases and Carbon Sequestration in 2005. Lukas Van Zwieten and colleagues at Wollongbar Agricultural Institute are seeing similar preliminary results, and Lehmann’s group also has greenhouse and field data showing the same effect. Possible explanations, Lehmann says, include biochar’s influence on water-filled pore space, nitrification rates, and the microbial community structure. Chasing carbon credits Biochar advocates believe that the economic key to unlocking the substance’s potential lies in making it eligible for carbon credits or other incentives for greenhouse-gas mitigation. “That is not to say that other benefits of using biochar are less important,” says Brown, “but in terms of driving implementation, it is greenhouse-gas policies.” Compared with tree planting projects, the earth’s capacity to store biochar is almost endless—theoretically, arable lands could hold all the carbon in the 200 million t of anthropogenic CO2 in the atmosphere today, according to eco-entrepreneur Mike Mason of U.K. biomass company BioJoule. Forest-stored CO2 can also go up in smoke with a fire, he adds, and geological storage can leak. But currently, the soil cycle is not considered a viable sequestration mechanism under the Kyoto Protocol. John Gaunt of GY Associates, a consulting company specializing in sustainable development, has been working with Lehmann and colleagues to delineate how carbon-trading schemes could foster and account for biochar. At the Power-Gen Renewable Energy and Fuels meeting in Las Vegas this past spring, they presented calculations showing that biochar sequestration could be economically attractive when the value of CO2 emissions, currently trading at $4/t on the Chicago Climate Exchange, reaches $37/t. Mathews keeps a bag of biochar on his desk, because he sees it as key to the earth’s future. He contends that the time is right for individual countries to promote pyrolysis and biochar. Kyoto’s cap-and-trade approach “can never get CO2 levels down fast enough or far enough. **The biochar approach can solve global warming** by biosequestration of carbon direct from the atmosphere using the power of photosynthesis.

## warming

### 2nc feedbacks

#### More warrants

#### A) Algae

**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 26 million tons of CO2 is removed from the atmosphere.

#### B) Clouds

**Spencer, 07** – Recipient of NASA’s Medal for Exceptional Scientific Achievement (Cites Roy W., “Cirrus Disappearance: Warming Might Thin Heat-trapping Clouds”, 11/5/2007, http://www.sciencedaily.com/releases/2007/11/071102152636.htm)

Instead of creating more clouds, individual tropical warming cycles that served as proxies for global warming saw a decrease in the coverage of heat-trapping cirrus clouds, says Dr. Roy Spencer, a principal research scientist in UAHuntsville's Earth System Science Center. That was not what he expected to find. "All leading climate models forecast that as the atmosphere warms there should be an increase in high altitude cirrus clouds, which would amplify any warming caused by manmade greenhouse gases," he said. "That amplification is a positive feedback. What we found in month-to-month fluctuations of the tropical climate system was a strongly negative feedback. As the tropical atmosphere warms, cirrus clouds decrease. That allows more infrared heat to escape from the atmosphere to outer space." "While low clouds have a predominantly cooling effect due to their shading of sunlight, most cirrus clouds have a net warming effect on the Earth," Spencer said. With high altitude ice clouds their infrared heat trapping exceeds their solar shading effect. In the tropics most cirrus-type clouds flow out of the upper reaches of thunderstorm clouds. As the Earth's surface warms - due to either manmade greenhouse gases or natural fluctuations in the climate system - more water evaporates from the surface. Since more evaporation leads to more precipitation, most climate researchers expected increased cirrus cloudiness to follow warming. "To give an idea of how strong this enhanced cooling mechanism is, if it was operating on global warming, it would reduce estimates of future warming by over 75 percent," Spencer said. "The big question that no one can answer right now is whether this enhanced cooling mechanism applies to global warming." The only way to see how these new findings impact global warming forecasts is to include them in computerized climate models. "The role of clouds in global warming is widely agreed to be pretty uncertain," Spencer said. "Right now, all climate models predict that clouds will amplify warming. I'm betting that if the climate models' 'clouds' were made to behave the way we see these clouds behave in nature, it would substantially reduce the amount of climate change the models predict for the coming decades." The UAHuntsville research team used 30- to 60-day tropical temperature fluctuations - known as "intraseasonal oscillations" - as proxies for global warming. "Fifteen years ago, when we first started monitoring global temperatures with satellites, we noticed these big temperature fluctuations in the tropics," Spencer said. "What amounts to a decade of global warming routinely occurs in just a few weeks in the tropical atmosphere. Then, as if by flipping a switch, the rapid warming is replaced by strong cooling. It now looks like the change in cirrus cloud coverage is the major reason for this switch from warming to cooling." The team analyzed six years of data from four instruments aboard three NASA and NOAA satellites. The researchers tracked precipitation amounts, air and sea surface temperatures, high and low altitude cloud cover, reflected sunlight, and infrared energy escaping out to space. When they tracked the daily evolution of a composite of fifteen of the strongest intraseasonal oscillations they found that although rainfall and air temperatures would be rising, the amount of infrared energy being trapped by the cloudy areas would start to decrease rapidly as the air warmed. This unexpected behavior was traced to the decrease in cirrus cloud cover. The new results raise questions about some current theories regarding precipitation, clouds and the efficiency with which weather systems convert water vapor into rainfall. These are significant issues in the global warming debate. "Global warming theory says warming will generally be accompanied by more rainfall," Spencer said. "Everyone just assumed that more rainfall means more high altitude clouds. That would be your first guess and, since we didn't have any data to suggest otherwise ..." There are significant gaps in the scientific understanding of precipitation systems and their interactions with the climate, he said. "At least 80 percent of the Earth's natural greenhouse effect is due to water vapor and clouds, and those are largely under the control of precipitation systems. "Until we understand how precipitation systems change with warming, I don't believe we can know how much of our current warming is manmade. Without that knowledge, we can't predict future climate change with any degree of certainty." Spencer and his colleagues expect these new findings to be controversial. "I know some climate modelers will say that these results are interesting but that they probably don't apply to long-term global warming," he said. "But this represents a fundamental natural cooling process in the atmosphere. Let's see if climate models can get this part right before we rely on their long term projections."

#### C) Water Vapor

**McShane, 08** – Chairman of the policy panel of the New Zealand Climate Science Coalition and director of the Centre for Resource Management Studies (Owen, Cites Roy Spencer, U.S. Science Team leader for the Advanced Microwave Scanning Radiometer flying on NASA's Aqua satellite, principal research scientist for U of Alabama in Huntsville, and recipient of NASA's Medal for Exceptional Scientific Achievement, “Climate change confirmed but global warming is cancelled”, 4/4/2008 The National Business Review (New Zealand), Lexis)

So, you might be asking, why the panic? Why does Al Gore talk about temperatures spiraling out of control, causing mass extinctions and catastrophic rises in sea-level, and all his other disastrous outcomes when there is no evidence to support it? The alarmists argue that increased CO2 leads to more water vapour - the main greenhouse gas - and this provides positive feedback and hence makes the overall climate highly sensitive to small increases in the concentration of CO2. Consequently, the IPCC argues that while carbon dioxide may well "run out of puff" the consequent evaporation of water vapour provides the positive feedback loop that will make anthropogenic global warming reach dangerous levels. This assumption that water vapour provides positive feedback lies behind the famous "tipping point," which nourishes Al Gore's dreams of destruction, and indeed all those calls for action now - "before it is too late!" But no climate models predict such a tipping point. However, while the absence of hot spots has refuted one important aspect of the IPCC models we lack a mechanism that fully explains these supposed outcomes. Hence the IPCC, and its supporters, have been able to ignore this "refutation." So by the end of last year, we were in a similar situation to the 19th century astronomers, who had figured out that the sun could not be "burning" its fuel - or it would have turned to ashes long ago - but could not explain where the energy was coming from. Then along came Einstein and E=mc2. Hard to explain Similarly, the climate sceptics have had to explain why the hotspots are not where they should be - not just challenge the theory with their observations. This is why I felt so lucky to be in the right place at the right time when I heard Roy Spencer speak at the New York conference on climate change in March. At first I thought this was just another paper setting out observations against the forecasts, further confirming Evans' earlier work. But as the argument unfolded I realised Spencer was drawing on observations and measurements from the new Aqua satellites to explain the mechanism behind this anomaly between model forecasts and observation. You may have heard that the IPCC models cannot predict clouds and rain with any accuracy. Their models assume water vapour goes up to the troposphere and hangs around to cook us all in a greenhouse future. However, there is a mechanism at work that "washes out" the water vapour and returns it to the oceans along with the extra CO2 and thus turns the added water vapour into a NEGATIVE feedback mechanism. The newly discovered mechanism is a combination of clouds and rain (Spencer's mechanism adds to the mechanism earlier identified by Professor Richard Lindzen called the Iris effect). The IPCC models assumed water vapour formed clouds at high altitudes that lead to further warming. The Aqua satellite observations and Spencer's analysis show water vapour actually forms clouds at low altitudes that lead to cooling. Furthermore, Spencer shows the extra rain that falls from these clouds cools the underlying oceans, providing a second negative feedback to negate the CO2 warming. Alarmists' quandary This has struck the alarmists like a thunderbolt, especially as the lead author of the IPCC chapter on feedback has written to Spencer agreeing that he is right! There goes the alarmist neighbourhood! The climate is not highly sensitive to CO2 warming because water vapour is a damper against the warming effect of CO2. That is why history is full of Ice Ages - where other effects, such as increased reflection from the ice cover, do provide positive feedback - while we do not hear about Heat Ages. The Medieval Warm Period, for example, is known for being benignly warm - not dangerously hot. We live on a benign planet - except when it occasionally gets damned cold. While I have done my best to simplify these developments they remain highly technical and many people distrust their own ability to assess competing scientific claims. However, in this case the tipping point theories are based on models that do not include the effects of rain and clouds. The new Nasa Aqua satellite is the first to measure the effects of clouds and rainfall. Spencer's interpretation of the new data means all previous models and forecasts are obsolete. Would anyone trust long-term forecasts of farm production that were hopeless at forecasting rainfall? The implications of these breakthroughs in measurement and understanding are dramatic to say the least. The responses will be fun to watch.

#### This outweighs – water vapor and clouds are the only important feedback mechanisms

**Spencer, 08** – Principal research scientist for U of Alabama in Huntsville and recipient of NASA's Medal for Exceptional Scientific Achievement (Roy, U.S. Science Team leader for the Advanced Microwave Scanning Radiometer flying on NASA's Aqua satellite, “Global Warming: Has the Climate Sensitivity Holy Grail Been Found?”, simplified version of “Chaotic Radiative Forcing, Feedback Stripes, and the Overestimation of Climate Sensitivity”, a paper that was submitted to the Bulletin of the American Meteorological Society, 6/30/2008, http://www.weatherquestions.com/Climate-Sensitivity-Holy-Grail.htm)

When the Earth warms, it emits more infrared radiation to outer space. This natural cooling mechanism is the same effect you feel at a distance from a hot stove. The hotter anything gets the more infrared energy it loses to its surroundings.For the Earth, this natural cooling effect amounts to an average of 3.3 Watts per square meter for every 1 deg C that the Earth warms. There is no scientific disagreement on this value.Climate sensitivity is how clouds and water vapor will change with warming to make that 3.3 Watts a bigger number (stronger natural cooling, called "negative feedback"), or smaller (weaker natural cooling, called "positive feedback").While there are other sources of change in the climate system, cloud and water vapor changes are likely to dominate climate sensitivity. The greater the sensitivity, the more the Earth will warm from increasing atmospheric greenhouse gas concentrations being produced by humans through the burning of fossil fuels.

#### And—this proves climate sensisitvity is extremely low

**Spencer, 08** – Principal research scientist for U of Alabama in Huntsville and recipient of NASA's Medal for Exceptional Scientific Achievement (Roy, U.S. Science Team leader for the Advanced Microwave Scanning Radiometer flying on NASA's Aqua satellite, “Global Warming: Has the Climate Sensitivity Holy Grail Been Found?”, simplified version of “Chaotic Radiative Forcing, Feedback Stripes, and the Overestimation of Climate Sensitivity”, a paper that was submitted to the Bulletin of the American Meteorological Society, 6/30/2008, http://www.weatherquestions.com/Climate-Sensitivity-Holy-Grail.htm)

This article addresses new satellite and modeling evidence that previous satellite diagnoses of high climate sensitivity--which directly translate into predictions of dangerous levels of global warming--contain a large spurious bias. It is shown that those exaggerated estimates were the result of faulty assumptions regarding clouds when analyzing variations in average global temperature and average reflected sunlight off of the Earth. Specifically, it has been assumed (explicitly or implicitly) that, for global averages on time scales of three months or more, temperature variations cause clouds to change, but that cloud variations do not cause temperature to change. But when properly filtered, the satellite data reveal evidence of cloud variations indeed causing temperature changes, and that this source of natural climate variability biases the estimate of climate sensitivity in the direction of a very sensitive climate system. The new interpretation suggests a very low sensitivity. If the new sensitivity estimate is accurate, it would suggest only 0.5 deg. C of manmade warming by the year 2100. The new sensitivity estimate also suggests that warming over the last century can not be explained by human greenhouse gas emissions alone, but instead might require a mostly natural explanation.

### 2nc ocean acid

#### Schlengel – carry over effect and evolution

#### The most conclusive evidence proves that the carry over effect is true --- rock oysters prove.

**Parker et. Al, ’12** - Laura M. Parker, School of Science, College of Health and Science, University of Western Sydney, Sydney, NSW, Australia, Pauline M. Ross, School of Science, College of Health and Science, University of Western Sydney, Sydney, NSW, Australia, Wayne A. O'Connor, Industry and Investment NSW, Port Stephens Fisheries Centre, Taylors Beach, NSW, Australia Larissa Borysko, School of Science, College of Health and Science, University of Western Sydney, Sydney, NSW, Australia, David A. Raftos, Department of Biological Sciences, Macquarie University, North Ryde, NSW, Australia, Hans-Otto Pörtner, Alfred Wegener Institute for Polar and Marine Research in the Hermann von Helmholtz Association of National Research Centres e. V. (HGF), Bremerhaven, Germany, “Adult exposure influences offspring response to ocean acidification in oysters” Global Change Biology, Jan 2012, <http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2486.2011.02520.x/abstract>) a-berg

NOTE – SMR = standard metabolic rate, Pco2 = carbon dioxide partial pressure

One of the great unknowns in ocean acidification research is whether marine organisms will be able to adapt to long-term multigenerational exposure. More specifically, whether long-term chronic exposure of adults to elevated Pco2, can influence the response of their larvae. Indeed, previous studies have found that the rearing environment during the reproductive conditioning of an organism can influence offspring fecundity and survival (Pacific oyster, *C. gigas*, Lannan, [1980](http://libproxy.library.unt.edu:2159/doi/10.1111/j.1365-2486.2011.02520.x/full#gcb2520-bib-0019); Muranaka & Lannan, [1984](http://libproxy.library.unt.edu:2159/doi/10.1111/j.1365-2486.2011.02520.x/full#gcb2520-bib-0031); asteroid, Luidia clathrata, Hintz & Lawrence, [1994](http://libproxy.library.unt.edu:2159/doi/10.1111/j.1365-2486.2011.02520.x/full#gcb2520-bib-0013); tropical reef damselfish, Pomacentrus amboinensis, McCormick & Gagliano, [2008](http://libproxy.library.unt.edu:2159/doi/10.1111/j.1365-2486.2011.02520.x/full#gcb2520-bib-0026); clam, Ruditapes decussates, Matias et al., [2009](http://libproxy.library.unt.edu:2159/doi/10.1111/j.1365-2486.2011.02520.x/full#gcb2520-bib-0025); and clam, Mercenaria mercinaria, Przeslawski & Webb, [2009](http://libproxy.library.unt.edu:2159/doi/10.1111/j.1365-2486.2011.02520.x/full#gcb2520-bib-0040)). For example, Muranaka & Lannan ([1984](http://libproxy.library.unt.edu:2159/doi/10.1111/j.1365-2486.2011.02520.x/full#gcb2520-bib-0031)) found that the survival of larvae of the Pacific oyster, *C. gigas* was greater when broodstock were conditioned at a salinity of 30 compared to 20. Despite this, studies on the impact of ocean acidification on marine organisms to date, have only considered the impacts on ‘adults’ or ‘larvae’, ignoring the potential link between the two life-history stages and the possible carry-over effects that may be passed from adult to offspring (Dupont et al., [2010](http://libproxy.library.unt.edu:2159/doi/10.1111/j.1365-2486.2011.02520.x/full#gcb2520-bib-0008); Hendriks et al., [2010](http://libproxy.library.unt.edu:2159/doi/10.1111/j.1365-2486.2011.02520.x/full#gcb2520-bib-0012); Kroeker et al., [2010](http://libproxy.library.unt.edu:2159/doi/10.1111/j.1365-2486.2011.02520.x/full#gcb2520-bib-0015)). A growing body of literature on marine systems highlights the importance of maternal effects on the survival and success of offspring (Bernardo, [1996](http://libproxy.library.unt.edu:2159/doi/10.1111/j.1365-2486.2011.02520.x/full#gcb2520-bib-0004); Untersee & Pechenik, [2007](http://libproxy.library.unt.edu:2159/doi/10.1111/j.1365-2486.2011.02520.x/full#gcb2520-bib-0050); Marshall, [2008](http://libproxy.library.unt.edu:2159/doi/10.1111/j.1365-2486.2011.02520.x/full#gcb2520-bib-0022); Marshall et al., [2008](http://libproxy.library.unt.edu:2159/doi/10.1111/j.1365-2486.2011.02520.x/full#gcb2520-bib-0023); Sanford & Kelly, [2011](http://libproxy.library.unt.edu:2159/doi/10.1111/j.1365-2486.2011.02520.x/full#gcb2520-bib-0044)). Persistent maternal effects induced by the environment in which the adult was held can lead to a variation in the response of offspring (Sanford & Kelly, [2011](http://libproxy.library.unt.edu:2159/doi/10.1111/j.1365-2486.2011.02520.x/full#gcb2520-bib-0044)). For example, in the gastropod, *Crepidula convexa* juveniles released in the laboratory from adults collected from a copper polluted site were more tolerant to copper stress than juveniles released from a reference site (Untersee & Pechenik, [2007](http://libproxy.library.unt.edu:2159/doi/10.1111/j.1365-2486.2011.02520.x/full#gcb2520-bib-0050)). Similar results were also found in the bryozoan, *Bugula nerita* (Marshall et al., [2010](http://libproxy.library.unt.edu:2159/doi/10.1111/j.1365-2486.2011.02520.x/full#gcb2520-bib-0024)). The current lack of consideration of the potential for carry-over effects or ‘links’ across life-history stages and the importance of maternal effects in the response of marine organisms to ocean acidification, greatly limits our ability to predict whether marine organisms and ecosystems will have the capacity to adapt over the next century. Those studies that have considered the link between other life-history stages (oysters, S. glomerata, C. gigas, Parker et al., 2009, 2010; shrimp, Palaemon pacificus, Kurihara et al., 2008b; amphipod, Echinogammarus marinus, Egilsdottir et al., 2009; barnacle, Semibalanus balanoides, Findlay et al., 2009) generally find negative effects on one life-history stage carried over to the next. Such carry-over begins with the production of gametes; for example, Kurihara et al. (2008b) found that egg production in the shrimp, P. pacificus was suppressed following long-term exposure of adults to elevated Pco2 of 1000 ppm. Within the next generation, it continues from fertilization to larval development; for example, Parker et al. (2009, 2010) found that the negative effects of elevated Pco2 such as increased abnormality and reduced survival on larvae of the oysters, S. glomerata and C. gigas, were greater when fertilization occurred at elevated compared with ambient Pco2. What these studies do not consider is whether such a carry-over effect from adult to larvae can have positive consequences and provide resilience to the next generation when exposed to elevated concentrations of Pco2. It is also unknown how differing genotypes in a population express different parental effects and create greater resilience in offspring. The Sydney rock oyster, S. glomerata is an ecologically and economically significant molluscan species occupying intertidal and shallow sub-tidal estuarine habitats along the southeast coast of Australia. In the state of New South Wales (NSW), S. glomerata forms the largest and oldest aquaculture industry (White, 2002), generating approximately US$39 million in retail sales each year (O'Connor et al., 2008). Acute studies on the impact of ocean acidification on wild populations of S. glomerata have shown that the early-life-history stages of this species are extremely vulnerable (Parker et al., 2009, 2010). For example, Parker et al. (2009, 2010) found that D-veliger larvae of S. glomerata suffered 100% mortality after only 2 days of rearing at elevated Pco2 of 750 μatm and elevated temperature of 30 °C. More recently, newly metamorphosed wild spat were found to have a 64% reduction in shell growth after 4 days at elevated Pco2 (1000 μatm) when compared with wild spat grown in ambient seawater (Parker et al., 2011). In that study, populations of S. glomerata that had been produced by selective breeding (to increase growth and overcome pressures such as disease) were more resilient than the wild population to elevated Pco2. Herein, we exposed adults of a wild and selectively bred population of the Sydney rock oyster to ocean acidification during reproductive conditioning and measured the development, growth and survival response of their larvae. The hypotheses tested were: (1) Larvae from adults conditioned at elevated Pco2 (856 μatm) will be more resilient to ocean acidification than larvae from adults conditioned at ambient Pco2 (380 μatm), and given that selectively bred larvae grew faster and were not as impacted on exposure to elevated Pco2 in Parker et al. (2011) that (2) Selectively bred larvae will be more resilient than the wild larvae. We also measured standard metabolic rate (SMR) as an indicator of fitness and energy turnover and were thereby able to show that energy turnover and allocation to fitness sustaining processes may be a key element in the long-term resistance to ocean acidification. This study is the first of its kind to look at the possibility of a commercially important mollusc to acclimate to the pressures of ocean acidification during trans-generational exposure. Materials and methods Selected Breeding Programme In 1990, a breeding programme was established for the Sydney rock oyster, S. glomerata in an effort to combat the pressures of declining production (Nell et al. 2000). Oysters were mass selected initially for faster growth and in subsequent years, disease selection was also added. The base population for the mass selected breeding lines was taken from a combination of wild oysters from the four major Sydney rock oyster growing estuaries across the state of NSW. These included Wallace Lake (32°30′S, 152°29′E), Port Stephens (32°45′S, 152°10′E), the Hawkesbury (33°30′S, 151°12′E) and Georges Rivers (34°00′S, 151°10′E). The base population were mass spawned in the hatchery and the fastest growing offspring were selected and returned to the field once they reached the spat stage with a shell height of 12 mm. Each generation, gravid adults of the mass selected lines that have survived an outbreak of disease are returned to the hatchery. This selection process has been repeated over seven generations. For further information, see Nell et al. (2000). Collection and exposure of adults Adult Sydney rock oysters, S. glomerata of approximately 1.5–2 years of age were collected at the beginning of reproductive conditioning (approximately 1–2 weeks of gametogenesis). Two populations of S. glomerata were used in the study. A wild population and a selectively bred population bred for fast growth and disease resistance (selected breeding line B2; seven generations of selection). The wild oysters were collected at random from among naturally occurring oysters in Port Stephens, NSW (32°45′S, 152°10′E). This wild population was chosen because it is historically the major supplier of seed to the NSW oyster industry and thus most representative of farmed stocks in NSW. The selectively bred oysters were collected directly from an Industry & Investment NSW broodstock repository in the Clyde River, NSW (34°78′S, 150°69′E) to ensure they were representative of the B2 line. Three hundred representative oysters from each population (mean flesh weight: wild oysters = 7.15 ± SE 0.32 g, selected oysters = 7.13 ± SE 0.42 g) were transferred in hessian bags to the Industry & Investment NSW, Port Stephens Fisheries Centre (PSFC), Taylors Beach, NSW, Australia. Upon arrival to the hatchery at PSFC, adults of both populations were cleaned to remove mud and fouling organisms. The broodstock were then transferred into 750 L acclimation tanks, where they were held in 40 L trays and maintained under continuously flowing, recirculating seawater (salinity 34.6) at a temperature of 24 °C for 2 weeks. Seawater was collected from Little Beach (152°07′E, 32°72′S), Nelson Bay, NSW, Australia, and was filtered through 1 μm nominal filters prior to delivery into the hatchery. Following the acclimation period, each population was divided equally at random into six 750 L header tanks (50 oysters population−1 tank−1). In each tank, there were 50 wild and 50 selectively bred oysters in separate 40 L flow-through trays (flow rate 3 L min−1) supplied by recirculating water from the same 750 L header tank. There were two Pco2 levels used in the study: a current atmospheric Pco2 level of 380 μatm, pHNBS 8.19–8.20; and an elevated atmospheric Pco2 level predicted for 2100 of 856 μatm, pHNBS 7.89–7.90 (IPCC 2007). The elevated Pco2 level was maintained using pH negative-feedback systems (Aqua Medic, Aqacenta Pty Ltd, Kingsgrove, NSW, Australia; accuracy ± 0.01). Briefly, CO2 was bubbled into 1 μm filtered seawater (FSW) in each header tank using a CO2 reactor to ensure proper mixing. pH was continually monitored by a pH probe connected to a computer. When the set pH level was reached, the delivery of CO2 was stopped by a solenoid valve. The pHNBS level in the header tanks was measured twice daily using a combined pH electrode (mean pH, 380 μatm = 8.2 ± 0.01 units; 856 μatm = 7.9 ± 0.01 units) and total alkalinity (TA) was measured in triplicate (three water samples) before and after each water change by Gran titration (mean TA = 2308 ± SE 42 μmol kg−1). To determine the pH value corresponding to the desired Pco2 levels, pH, TA, temperature and salinity of the seawater were added into a CO2 system calculation programme (CO2 sys) developed by Lewis & Wallace (1998), using the dissociation constants of Mehrbach et al. (1973) (for seawater physiochemical conditions see Table 1). The adults were fed a combined algal diet of 50% Chaetoceros muelleri, 25% Pavlova lutheri and 25% Tahitian Isochrysis aff. galbana at a concentration of 2 × 109 cells oyster−1 day−1. Complete water changes were made every 2 days using pre-equilibrated FSW and oysters were rinsed daily with freshwater. Following 5 weeks of conditioning in the Pco2 treatments, the oysters reached gravid stage. At that time, the SMR of adults from each population was measured and the remaining oysters were removed from the tanks in preparation for spawning. SMR of adults SMR in wild and selectively bred adult Sydney rock oysters that were conditioned at ambient and elevated Pco2 was measured using a closed respirometry system. Oysters were placed in individual 500 mL airtight chambers, fitted with a fibre-optic probe (PreSens dipping probe DP-PSt3, AS1 Ltd, Palmerston North, New Zealand) and the time taken to reduce the percentage oxygen saturation of seawater in the chamber from 100% to 80% when oysters were open and filtering was recorded. The probes were calibrated using a two-point calibration (0% and 100%) and all measurements were done at the experimental temperature of 24 °C. Feeding was stopped 24 h prior to the SMR measurements. Following the measurements, oysters were removed from the chambers and dry tissue mass was determined. SMR of each oyster was calculated as follows: where SMR is the oxygen consumption normalized to 1 g of dry tissue mass (mg O2 g−1 dry tissue mass h−1), Vr is the volume of the respirometry chamber minus the volume of the oyster (L), ΔCwO2 is the change in water oxygen concentration measured (mg O2 L−1), Δt is measuring time (h) and bw is the dry tissue mass (g). Six oysters were tested from each oyster type and Pco2 combination (2 replicate−1; n = 3). Collection and exposure of embryos and larvae Eggs and spermatozoa were obtained from each ‘oyster type’ (wild/selected) and ‘adult exposure’ (ambient/elevated Pco2) combination by strip spawning. Gametes were stripped from the gonad of gravid adults into 1 μm nominal FSW set at the same Pco2 concentration as that in which the adults were conditioned. Eggs and spermatozoa were filtered through a 60 and 45 μm nylon mesh screen, respectively, to facilitate the removal of debris. Eggs from a minimum of 10 females and spermatozoa from a minimum of 10 males were pooled in separate 500 mL containers. Fertilization of each oyster type and adult exposure was undertaken in two 20 L buckets, one set at ambient Pco2 (380 μatm) and the other set at elevated Pco2 (856 μatm) (1 μm FSW; 24 °C; salinity 34.6). Eggs were divided equally across the two buckets and were allowed to incubate for 10 min. Following the incubation period, spermatozoa were added to the eggs at a concentration 1 × 106 mL−1 (sperm concentration determined using a haemocytometer under a light microscope 100×) to allow fertilization to take place. This resulted in production of eight experimental larval lines: adults from wild populations that were conditioned in ambient Pco2 and produced larvae in ambient conditions (wild 380 μatm adults, 380 μatm larvae); adults from wild populations that were condition in ambient Pco2 and produced larvae reared in elevated Pco2 (wild 380 μatm adults, 856 μatm larvae); adults from wild populations that were conditioned in elevated Pco2 and produced larvae in ambient conditions (wild 856 μatm adults, 380 μatm larvae); adults from wild populations that were condition in elevated Pco2 and produced larvae reared in elevated Pco2 (wild 856 μatm adults, 856 μatm larvae); adults from mass selected populations that were conditioned in ambient Pco2 and produced larvae in ambient conditions (selected 380 μatm adults, 380 μatm larvae); adults from mass selected populations that were condition in ambient Pco2 and produced larvae reared in elevated Pco2 (selected 380 μatm adults, 856 μatm larvae); adults from mass selected populations that were conditioned in elevated Pco2 and produced larvae in ambient conditions (selected 856 μatm adults, 380 μatm larvae); and adults from mass selected populations that were condition in elevated Pco2 and produced larvae reared in elevated Pco2 (selected 856 μatm adults, 856 μatm larvae) (see Fig. 1 for further details). The larval experiment was set up in 200 L polyethylene tanks. There were three replicate tanks for each treatment. Prior to the experiment, 24 × 200 L tanks were thoroughly washed with Virkon S solution (Antec Corp, North Bend, WA, USA), rinsed with freshwater and left to air dry for 24 h (O'Connor et al., 2008). The tanks were then fitted with a tap and air stone and were filled with 1 μm FSW (24 °C; salinity 34.6). The elevated Pco2 concentration was obtained in 12 of the tanks by manipulation of pH by direct bubbling of CO2 in seawater controlled by independent pH negative-feedback systems as in the adult experiment (Aqua Medic; accuracy ±0.01). Once the pH was obtained, all 24 tanks were sealed with polyethylene plastic bags to minimize gas exchange, and pH was monitored throughout (mean pH, 380 μatm = 8.2 ± 0.02 units; 856 μatm = 7.9 ± 0.03 units; TA = 2311 ± SE 44; for seawater physiochemical conditions see Table 1). Each tank was gently aerated to keep larvae dispersed in the water column. Fertilized embryos were added into each tank at a concentration of 15 embryos mL−1 (3 million tank−1). After 12 h, the tanks were dropped and sieved through a mesh screen to facilitate the removal of non-developing embryos and reduce the risk of disease. The tanks were then restocked at a concentration of 5 embryos mL−1 (1 × 106 embryos tank−1). Larval feeding began with the appearance of the first D-veligers, after approximately 16 h. Larvae were fed an algal diet twice daily consisting of 50% Chaetoceros calcitrans, 25% P. lutheri and 25% T. Isochrysis aff. galbana for the first week of development (O'Connor et al., 2008). After this time, Ch. calcitrans was gradually replaced with Ch. muelleri as the larvae increased in size. Algal concentrations ranged from 1 × 104 cells mL−1 at the beginning of the experiment up to 1.16 × 105 cells mL−1 at the completion of the experiment. There was a complete water change of each tank every 2 days using pre-equilibrated FSW. At each water change, a subsample was taken from each replicate tank and the mean shell length (antero-posterior measurement) and stage of development (D-veliger, umbonate or eyed larvae) of 10 larvae was measured under the microscope (Leica 100×, Wetzlar, Germany). Larvae remained in the treatments for 19 days, until the appearance of eyed larvae. The number of larvae in each tank was measured at the beginning (following first sieving 12 h after fertilization: initial concentration 1 × 106 embryos per tank) and end of the experiment (day 19) and percentage survival following 19 days of exposure was calculated. The measurements were stopped at this stage as after this, size sieving was required to allow the settlement of eyed larvae and the removal of larvae that were not developing. Data analysis To determine any significant differences between ‘adult exposure’, ‘oyster type’ and ‘Pco2’ on larvae of S. glomerata, the percentage survival, percentage development to the D-veliger, umbonate and eyed larvae stage and the shell length (antero-posterior measurement) of larvae were analysed using a three-way analysis of variance (anova) using gmav5 (Underwood, 1997), where ‘adult exposure’, ‘oyster type’ and ‘Pco2’ were fixed and orthogonal factors. Data were not transformed, as Cochran's test for heterogeneity of variances was not significant. Differences between ‘oyster type’ and ‘Pco2’ on the SMR of adults of S. glomerata was determined using a two-way analysis of variance (anova), where ‘oyster type’ and ‘Pco2’ were fixed and orthogonal factors. Cochran's test was used to determine any heterogeneity of variances, and data were transformed if significant. A Student Newman–Keuls (SNK) test was used to detect differences amongst means (Sokal & Rohlf, 1995). As 100% of larvae reached the D-veliger stage after 24 h across each treatment combination, this datum is not presented. These results are not comparable to the 90% larval development obtained in Parker et al. (2009, 2010) due to the sieving process used in this study after 12 h to reduce the risk of disease. Results Survival of larvae There was no effect of ‘adult exposure’ on the percentage survival of larvae after 19 days. There was, however, a significant effect of both ‘oyster type’ and ‘Pco2’ and no interaction. The larvae from the wild oysters had a lower percentage survival than the selectively bred larvae [mean square (MS) = 2410.58, df = 1 × 16, F = 10.39, P < 0.01; Fig. 2a]. After 19 days under ambient conditions, the average survival of larvae was 82% in the wild oysters and 91% in the selectively bred oysters (Fig. 2a). In addition, elevated Pco2 caused a significant reduction in the survival of larvae (MS = 3012.74, df = 1 × 16, F = 12.99, P < 0.01; Fig. 2a). At the elevated Pco2 level of 856 μatm, the average percentage survival of larvae fell to levels of 48% and 79% in the wild and selectively bred oysters respectively (Fig. 2a). Development of larvae There were significant effects of ‘adult exposure’ and oyster type’ and ‘Pco2’on the rate of development to the umbonate larval stage after 9 days (Fig. 2b, c). For the eyed larval stage, there was a three-way significant interaction between ‘adult exposure × oyster type × Pco2’ after 19 days (Table 2). The rate of development to the umbonate stage for the wild and selectively bred larvae was slower when larvae were reared at elevated compared with ambient Pco2. After 9 days in the treatments, the percentage of larvae that had reached the umbonate stage was reduced up to 30% and 17% in the wild and selectively bred larvae respectively (Fig. 2b). The rate of development differed between the oyster populations with the wild oysters developing slower than the selectively bred oysters at both ambient and elevated Pco2 (Fig. 2b). Finally, when larvae were spawned from adults conditioned at elevated Pco2, they had a faster rate of development than larvae that were spawned from adults conditioned at ambient Pco2. This occurred when larvae were reared at both ambient and elevated Pco2 (Fig. 2b; Table 2; SNK). Table 2. Analysis of mean percentage development to umbonate and eyed larvae in wild and selectively bred larvae of Saccostrea glomerata spawned from CO2-exposed and non-exposed adults and reared at the Pco2 (375, 856 μatm) treatments for 9 days (umbonate larvae) and 19 days (eyed larvae); n = 3 (15/10/10). This was a three-way analysis with adult exposure, oyster line and Pco2 being fixed and orthogonal Similarly, the rate of development to the eyed larval stage was slower in wild larvae compared with selectively bred larvae with a greater percentage of selectively bred larvae reaching the eyed larval stage after 19 days under both ambient and elevated Pco2 conditions (Fig. 2c; Table 2). Furthermore, larvae reared at elevated Pco2 (856 μatm) had a slower development rate than those reared at the ambient Pco2 (380 μatm). On average, the percentage development of eyed larvae after 19 days was 25% (SE ± 7%) lower in larvae reared at 856 μatm compared to 380 μatm. The only experimental line that did not show a difference in development between ambient and elevated Pco2 was the wild larvae spawned from adults conditioned at ambient Pco2 as no larvae had reached the eyed larval stage in the ambient or elevated Pco2 treatments after 19 days (Fig. 2c). Finally, in the wild larvae reared at 380 μatm and selected larvae that were reared at 856 μatm, the rate of development to the eyed larval stage was faster in larvae spawned from adults conditioned at elevated Pco2 compared with those from adults conditioned at ambient Pco2 (Fig. 2c; Table 2; SNK). Shell length of larvae There was a three-way significant interaction between ‘adult exposure × oyster type × Pco2’ on the shell length of larvae of S. glomerata after 19 days of development (Table 3). Overall, at each Pco2 and adult exposure, the selectively bred larvae were larger in size than the wild larvae (Fig. 2d; Table 3; SNK). Furthermore, the shell length of larvae reared at the elevated Pco2 of 856 μatm was significantly smaller than those reared at the ambient Pco2 (380 μatm). The exception to this was in the selectively bred larvae that were spawned from adults conditioned at elevated Pco2, where there was no effect of elevated Pco2 on the size of larvae after 19 days (Fig. 2d; Table 3; SNK). Larvae that were spawned from adults conditioned at elevated Pco2 were larger in size than those spawned from adults conditioned at ambient Pco2 (Fig. 3a, b). The exception to this was in the selectively bred oysters that were reared at ambient Pco2. Herein, there was no difference in shell length of larvae from adults conditioned at ambient or elevated Pco2 (Fig. 2d; Table 3; SNK). At the completion of the experiment, the shell length of S. glomerata larvae was greatest in the selectively bred larvae that were spawned from adults conditioned at elevated Pco2 and whose larvae were reared at both ambient and elevated Pco2 (shell length = 380 μatm: 272.00 ± SE 5.51 μm; 856 μatm: 268.38 ± SE 5.32 μm). Shell length was smallest in the wild larvae that were spawned from adults conditioned at ambient Pco2 and reared at elevated Pco2 (856 μatm) (shell length = 186.80 ± SE 1.31 μm). Finally, the wild larvae spawned from adults conditioned at elevated Pco2 and reared at elevated Pco2 (wild, elevated adults; elevated larvae) were greater in size (shell length = 204.74 ± SE 1.11 μm) than larvae from adults conditioned at ambient Pco2 that were reared at this Pco2 (wild, ambient adults; ambient larvae) (shell length = 200.27 ± SE 2.99 μm). Overall, ocean acidification had negative impacts on larvae of S. glomerata, but the impacts were less severe when larvae came from adults reared at elevated Pco2. Larvae from adults reared at elevated Pco2 were larger, developed faster, but had similar survival compared to larvae from adults reared at ambient Pco2. Furthermore, larvae from selectively bred adults were more resilient to elevated Pco2 than larvae from wild adults. SMR of adults There was a significant effect of both ‘oyster type’ and ‘Pco2’ on the SMR of adult S. glomerata, with no interaction (Fig. 4). The SMR of the selectively bred oysters was significantly higher than the wild oysters at both ambient and elevated Pco2 (MS = 0.82, df = 1 × 8, F = 37.23, P < 0.001; Fig. 4). Exposure of adult S. glomerata to elevated Pco2 for 5 weeks led to a significant increase in SMR in both oyster types (MS = 0.25, df = 1 × 8, F = 11.33, P < 0.01). This was particularly evident in the selectively bred adults, where SMR was increased by 36% compared with the controls. In the wild adults, the increase in SMR was only 14% (Fig. 4). Discussion This study has found that the response of S. glomerata larvae to long-term exposure to elevated Pco2 varies depending on the oyster population and the environment of adults during reproductive conditioning. In our study, larvae of the selectively bred oysters were more resilient to the effects of elevated Pco2 than wild larvae, but in general larvae that were spawned from adults conditioned at elevated Pco2 were also more resilient to the effects of elevated Pco2 than larvae spawned from adults conditioned at ambient Pco2. For example, when larvae were reared at elevated Pco2, they were up to 10% larger in size and had a faster rate of development (but similar survival) when they were spawned from adults conditioned at elevated Pco2 compared with adults conditioned at ambient Pco2. After 19 days of exposure, wild larvae that were spawned from adults conditioned at elevated Pco2 and were subsequently reared at elevated Pco2, were larger in size than wild larvae spawned from adults conditioned at ambient Pco2 that were reared at ambient Pco2. This suggests that there are carry-over effects from adults exposed to elevated Pco2, which may help to compensate or reduce the negative effects of elevated Pco2 on size and rate of development of mollusc larvae as found in previous acute studies (Kurihara et al., 2008a; Parker et al., 2009, 2010; Gazeau et al., 2010). Acclimation of offspring due to history of exposure of the adults has been documented for marine invertebrates exposed to environmental stresses such as salinity (Davis, 1958; Bacon, 1971; Muranaka & Lannan, 1984; Hintz & Lawrence, 1994; Allen et al., 2008). For example, Bacon (1971) found that when embryos of the barnacle, Balanus eburneus were exposed to high or low salinity, the resulting larvae had an increased survival at adverse salinity of a similar level. Furthermore, in the oyster, Crassostrea virginica, the optimum salinity and salinity range for development of embryos and larvae was influenced by the salinity at which the adults were held prior to spawning (Davis, 1958). The benefits of exposing adults to elevated Pco2 during reproductive conditioning in this study were not only seen in larvae that were subsequently reared at elevated Pco2 but also in larvae that were reared at ambient Pco2. Across both Pco2 treatments, larvae spawned from adults conditioned at elevated Pco2 were generally larger and developed faster than larvae spawned from adults conditioned at ambient Pco2 (although survival was similar). Changes in phenotypic traits of offspring following exposure of adults to environmental stress, such as those seen here, are often linked to an adaptive maternal effect (Untersee & Pechenik, 2007; Marshall et al., 2010; Sanford & Kelly, 2011). Mothers can respond to environmental stress by increasing maternal energy investment per offspring thereby increasing offspring size, a trait which is often considered to be beneficial for offspring (Podolsky & Moran, 2006; Allen et al., 2008; Moran & McAlister, 2009). In marine organisms with planktotrophic larval stages such as S. glomerata, maternal investment is limited to eggs prior to liberation with larger egg size typically leading to larger sized larvae (Podolsky & Moran, 2006; Moran & McAlister, 2009). Increases in egg size of marine invertebrates have been documented following exposure of adults to environmental stresses including reduced temperature and intraspecific competition (Allen et al., 2008; Moran & McAlister, 2009). This adaptive strategy can reduce the time that larvae spend in the water column, reduce their dependence on exogenous food and provide them with a competitive advantage following settlement (Allen et al., 2008; Moran & McAlister, 2009). One disadvantage of such an investment, however, is that it can come at a cost to fecundity, with fewer larger eggs produced by a mother in contrast to more numerous smaller eggs (Allen et al., 2008). In this study, gametes needed to be obtained from adults via strip spawning, which makes it impossible to accurately determine fecundity. The effects of elevated Pco2 may also vary among and within populations. Parker et al. (2011) reported that the selectively bred Sydney rock oyster population used in this study was more resilient than the wild population following acute exposure to elevated Pco2. Herein, we showed that long-term exposure of larvae to elevated Pco2 led to similar effects. The selectively bred larvae of S. glomerata exhibited greater survival and growth and had a faster rate of development than the wild larvae when grown at elevated as well as Pco2. This demonstrates that there is variation in response to ocean acidification within a population (Waldbusser et al., 2010; Parker et al., 2011). The differences in the response of the two populations may largely be due to an inherited genetic effect that leads to a higher SMR. SMR of the adults used in this study increased following 5 weeks of exposure to elevated ambient Pco2. This result was similar to those found on other adult oyster species including C. gigas (Lannig et al., 2010) and C. virginica (Beniash et al., 2010) during exposure to elevated Pco2 and is thought to occur due to a higher energy allocation to homeostasis (Beniash et al., 2010). Mechanisms and processes benefiting from a higher SMR would be ion and acid-base regulation, protein synthesis and growth (Pörtner, 2008). A comparison between the wild and selectively bred oysters showed that the SMR of the selectively bred oysters was greater than that of the wild, particularly during exposure to elevated Pco2. A higher SMR may carry over into larval development and provide selectively bred larvae of S. glomerata with a quicker and more complete compensation of homeostatic disturbances induced by elevated Pco2. We do not know, however, whether the SMR of the larval generation was similar to their parents and whether ‘carry-over’ effects exist. Elevated SMR may be one of the mechanisms responsible for higher resilience of oysters, and potentially other marine organisms to elevated Pco2.

#### Ocean acidification will be slow and stable, proven by 1000 studies.

Nova ’11 (Jo**,** received a Bachelor of Science first class and won the FH Faulding and the Swan Brewery prizes at the University of Western Australia. Her major was microbiology, molecular biology. Nova received a Graduate Certificate in Scientific Communication from the Australian National University in 1989,[4] and she did honours research in 1990, prize-winning science graduate, Jo has has done over 200 radio interviews, many on the Australian ABC.  She was formerly an associate lecturer in Science Communication at the ANU and is based in Perth, Western Australia, , “Ocean Acidification — a little bit less alkalinity could be a good thing,” Sept. 11, <http://joannenova.com.au/2011/09/ocean-acidification-a-little-bit-less-alkalinity-could-be-a-good-thing/>)//a-berg

Studies of how marine life copes with less alkaline conditions include many experiments with water at pH values in a range beyond anything that is likely on planet Earth — they go beyond the bounds of what’s possible. There are estimates that the pH of the ocean has shifted about 0.1 pH unit in the last 200 years, yet some studies consider the effects of water that is shifted by 2 or even 4 entire pH units. Four pH units means 10,000 fold change in the concentration of hydrogen ions). That’s a shift so large, it’s not going to occur in the next few thousand years, even under the worst of the worst case scenarios by the most sadistic models. Indeed, it’s virtually impossible for CO2 levels to rise high enough to effect that kind of change, even if we burned every last fossil, every tree, plant microbe, and vaporized life on earth. (Yet still someone thought it was worth studying what would happen if, hypothetically, that happened. Hmm.)¶ 1103 studies on acidification say there’s no need to panic¶ CO2 science has an extraordinary data base of 1103 studies of the effects of “acidification” on marine life. They reason that any change beyond 0.5 pH units is “far far beyond the realms of reality” even if you are concerned about coral reefs in the year 2300 (see Tans 2009). Even the IPCC’s highest end “scenario A2″ estimate predicts a peak change in the range of 0.6 units by 2300.¶ Many of the headlines forecasting “Death to Reefs” come from studies of ocean water at extreme pH’s that will never occur globally, and that are beyond even what the IPCC is forecasting. Some headlines come from studies of hydrothermal vents where CO2 bubbles up from the ocean floor. Not surprisingly they find changes to marine life near the vents, but then, the pH of these areas ranges right down to 2.8. They are an extreme environment, nothing like what we might expect to convert the worlds oceans too.¶ Marine life, quite happy about a bit more CO2?¶ Studies of growth, calcification, metabolism, fertility and survival show that, actually, if things were a little less alkaline, on average, marine life would benefit. There will be winners and losers, but on the whole, using those five measures of health, the reefs are more likely to have more life on and around them, than they are to shrink.¶ Figure 12. Percent change in the five measured life characteristics (calcification, metabolism, growth, fertility and survival) vs. decline of seawater pH from its present (control treatment) value to ending values extending up to the beginning pH value of "the warped world of the IPCC" for all individual data points falling within this pH decline range.¶ How can this be?¶ First, marine life evolved under conditions where most of the time the world was warmer and had more CO2 in the atmosphere than it does today. Second, like life above the water, life-below-water is based on carbon, and putting more carbon into the water is not necessarily a bad thing. That said, the dots in the graph above represent study results, and the ones below zero tell us there will be some losers, even though there will be more winners (above zer0). Thirdly, watch out for some of the more devastating headlines which also come from studies where researchers changed the pH by tossing hydrochloric acid into the tank. Chlorine, as they say, is not the same as the gas nature breathes — CO2. (The strange thing about the studies with hydrochloric acid, is that it doesn’t seem to be bad as we might have expected– nonetheless, it seems like a dubious practice to use in studying the health of corals.)¶ The Ocean Acidification Database is housed at CO2 science.¶ The graph above is just one of many on their results and conclusions page.¶ The bottom line:¶ Yes, we should watch and monitor the oceans careful. No, there is no chance the Great Barrier Reef will be gone in the next 100 years: 1103 studies show that if the worlds oceans were **slightly less basic** then marine life as a whole will be slightly more **likely to grow, survive**, and be fertile.

## framing

### yes war

#### Here’s a card that goes more indepth on those warrants.

**Ferguson 8**—Laurence A. Tisch Professor of History at Harvard University, William Ziegler Professor of Business Administration at Harvard Business School, senior fellow at the Hoover Institute, graduated from Magdalen College in Oxford, named as one of the 100 most influential people in the world by Time Magazine, writer of many bestselling books, including The War of the World, generally a badass british historian, with a specialty in financial and economic history [9/26, Niall, interviewed by Joanne Myers, “The War of the World: Twentieth-Century Conflict and the Descent of the West”, Carnegie Council for Ethics in International Affairs, [https://www.carnegiecouncil.org/resources/transcripts/5396.html/:pf\_printable](https://www.carnegiecouncil.org/resources/transcripts/5396.html/%3Apf_printable), AL]

So The War of the World, singular, is an attempt to explain why the twentieth century was so astonishingly violent, not only in absolute terms—after all, the world is more populous than ever—but also in relative terms. If you work out how many people died violently in the course of the twentieth century, it was of the order of 180 million. One estimate puts it at one in every twenty-two deaths; that is to say, one in every twenty-two human deaths in the twentieth century was violent, not natural. If you take the most explosive of all the conflicts, the one which is right at the heart of this book, World War II, roughly 60 million people died violently in that war. If you work out what percentage of the population of the world in 1939 that was, it's between 2 and 3 percent. None of the great wars of modern history—I hesitate to go further back than 1600, for reasons I'll explain in a second—had such a terrifyingly high mortality rate as that. So there is a question here about why the twentieth century was so violent. Now, experts on thirteenth-century Asia assure me that Genghis Khan—who I used to call "Genghis" in my ignorance—killed comparable proportions, if not higher proportions, of the world population in his time. And it may even be that if we go back beyond the ancient world to the prehistoric world, that primitive societies were still more violent. Some primitive tribes have astonishingly high mortality rates, according to the anthropologists. But that's not really the point. The twentieth century is astonishing because that kind of violence coincided with unprecedented progress. So there is a paradox here which makes the twentieth century really unique. The average human being got maybe four times better off, possibly five times better off, if you try to work out a figure for per-capita gross domestic product. He or she was more likely to live in democracy at the end of the twentieth century than at the beginning. In all kinds of ways, scientific and cultural, the twentieth century was a time of astonishing progress. So it is really very important for us to try to understand why progress coincided with holocausts of violence, with some sixteen conflicts that claimed a million or more deaths. Seen in these terms, the world wars become part of a continuum of organized violence. The book is an attempt to explain why. The best explanations are easy to remember. At least one person besides me in this room will be jet-lagged, and that person will be glad of the fact that my explanation is relatively easy to commit to memory. It has four parts, and each of them begins with the letter "E," which I find always helps under exam conditions. The first is economic volatility. Now, why is economic volatility important? I know we're uptown, we're not on Wall Street, but give me a couple of minutes on this. It's important because it helps you to identify the dangerous times. You see, it's crucial that the twentieth century was not evenly violent. Not every year, not every decade, was equally violent. There were huge spikes of organized violence, particularly between 1914 and 1945. I try to show that one reason for this is that the mid-twentieth century was by far the most volatile time. If you look at fluctuations in growth, inflation, asset prices, the interwar period stands out as being roughly seven times more volatile than our own time. We have almost forgotten what volatility feels like these days. The last ten years have seen almost unprecedented smoothness in the pattern of economic growth in the world's developed economies. And yet, transport yourself back to the 1920s and 1930s, and you enter a time when economic activity went up and down like some kind of fairground ride. So economic volatility, the first of my E's, helps us narrow down the timeframe, because we need to understand why, for example, the early 1940s were the most dangerous time of all time. My second E is ethnic disintegration. This is terribly important. In many ways, it's the most important argument—and, I think, original argument—in the book. It matters because it helps you identify where violence happened, because, once again, it wasn't evenly geographically distributed. It was, in fact, heavily concentrated in certain parts of the world. In a fifty-year period I identify, from 1904-1953, violence in the world was extraordinarily concentrated in two places: Central and Eastern Europe; and at the other end of Eurasia, Manchuria and the Korean Peninsula. If you were born in those parts of the world, your chances of dying violently were much, much higher than if you were born in, say, Canada. That is extremely important. Why? Because when you look at those places—look at an ethno-linguistic map of, say, Central Europe in 1900—what leaps out is what patchworks they were, ethno-linguistic patchworks, extraordinarily heterogeneous societies with enormously interlocked minorities. Now, the key to understanding what happened in the mid-twentieth century is to realize that it was a process of disintegration. In 1900, these multiethnic societies looked remarkably stable. Indeed, in some places, particularly in the German-speaking cities of Central Europe, levels of intermarriage, coeducation, or any of the measures you might take when you were looking for evidence of assimilation and integration, suggested that problems of ethnic conflict were diminishing fast. In a city like Hamburg in the 1920s, one in every two marriages involving at least one Jewish partner was to a non-Jewish partner. Half of these marriages were mixed. Looking at the world in the 1920s, you would have said that Germany was the place that had, in effect, solved what late-nineteenth century racists had called "the Jewish question." But that would be wrong, because what happened—and it wasn't only with respect to Jews and Germans—what happened in Central and Eastern Europe in the period after around 1929 was an astonishing ripping apart of multiethnic societies. I talk about the city of Chernovitz as just an example of what a multiethnic city looked like. It is now Chernivtsi in Ukraine, and very little remains of its identity as Chernovitz. But in 1900 Chernovitz was a great multiethnic Hapsburg city inhabited by German bureaucrats, German-Jewish academics, but also by Ukranians, Poles, Romanians. It was a kind of melting pot—and yet, it was a melting pot that exploded, that blew up, as if something went wrong in the recipe. So ethnic disintegration is the key to understanding the location, if you like, of conflict, to understanding why Ukraine was a bad place to be born in and Sweden much less so. 3) My third component in the great equation of disaster also begins with E: it is empires in decline. Counterintuitively from some liberal perspectives, I argue that it is when empires decline and fall that violence is most likely to spike. It is at the moment of this dissolution that the stakes are suddenly terribly high and local elites do battle for, as it were, the political succession. Roughly, twelve empires declined and fell in the course of the twentieth century. That's a very large number, indeed. In fact, I think I can safely say that in no previous century had so many empires hit the deck. I think that helps explain again why the middle of the twentieth century was so tremendously violent. These great waves of imperial decline, which began with the collapse of the Qing Dynasty in China, continued through the dissolution of the Romanov, Ottoman, Habsburg, and Hohenzollern empires in Central and Eastern Europe towards the end of the First World War, experienced another great wave of crisis when the Japanese unleashed their extraordinary assault on the European, and indeed American, empires in Asia. These times of imperial crisis produced great spikes in the level of organized violence. If you want to go beyond that timeframe, think only of 1947, a date much on our minds. That, after all, saw in many ways the highest level of violence in the history of British India, at its end, at its moment of dissolution. It illustrates the key point. As the imperial authority wanes, those on the ground, in the localities, suddenly have a lot to fight for, and particularly in multiethnic societies. And, since most of the great empires were extraordinarily multiethnic, it's not surprising that in the time of imperial dissolution minorities found themselves vulnerable as never before to what was once called "the tyranny of the majority." 4) The fourth, and final, of my E's - just to recap for those of you revising: economic volatility was the first, ethnic disintegration was the second, empires in decline was the third - the fourth is Eastern ascendancy. You see, we often misunderstand the twentieth century. We think of it in terms of the triumph of the West—or even the American century, although I think that was supposed to begin after World War II. I argue that this is a misunderstanding of the trajectory of modern history. It was in 1900 that the West truly ruled the world. In 1900, 82 percent of the world's population lived in empires, and most of those empires were controlled by Western powers. By Western powers, I mean principally the European powers, but also the United States. It is an astonishing statistic to my mind. It also illustrates better than anything the sheer dominance of Western power. When a relatively small percentage of mankind—and, after all, if you figure out the West as I do in the book, it was never as much as 20 percent of the world's population - such a small proportion was able to rule over the majority of the world's population, because 50 percent of the world's population lived in Asia in 1900, and only a very few (the Japanese) enjoyed anything resembling political independence. I think the descent of the West—and I use the term advisedly, not to invoke the memory of Oswald Spengler, a man of whom I disapprove; I use the term because I want to connote, not only a crude decline from power, but also perhaps a descent in moral terms—the descent of the West is the key to understanding the twentieth century. It was a violent and painful process. It was never smooth. That is why the conflict between Japan and the Western powers in Asia and the Pacific was so astonishingly brutal. We should not think of the transfer of power from West to East as a naturally smooth power. The twentieth century suggests that it has been punctuated by violence. That's why 1904 is such an important date. That's the moment Japan succeeds in beating a European empire for the first time, sinking the entire Russian expeditionary force sent to fight over Korea/Manchuria in the Russo-Japanese War. I think I just have time to draw some conclusions from this argument for our own time. In some ways, the problems that bedeviled the first half of the twentieth century were solved horribly; solved by ethnic cleansing, solved by genocide, solved by partition. The killing fields at either end of Eurasia—Central and Eastern Europe, Korea/Manchuria—ceased to be killing fields after 1953. And yet, violence didn't stop. I try to argue in the epilogue that in many ways the Cold War wasn't cold at all; it was a third world war if you were in Guatemala or Cambodia or Angola. In fact, I call it the "Third World's war," because all that had happened was that violence was relocated to places that people in the dominant powers during the Cold War seldom saw. So violence didn't stop during the Cold War, and there is no reason to assume that it has stopped since the Cold War. There is one part of the world today which already exhibits all the traits that I see as having been explosive in the mid-twentieth century. Where economic volatility, if you just look at growth rates in these countries for the past twenty years, is roughly five times higher than in the United States; where ethnic disintegration is already well underway, a region where a multiethnic city is in the process of tearing itself apart as we speak; and a part of the world where in my view—and those of you who know my last book, Colossus, will see what I am driving at—where in my view an empire is manifestly in decline. I am talking about the Middle East, and the empire I have in mind is, of course, the American empire. To me the most troubling thing about the Middle East today is this conjunction of extraordinary economic volatility. Look at growth rates in Iraq and its neighbors since 1986. You are looking at the kind of volatility Central Europe experienced in the 1920s and 1930s. Look at what is happening in Iraq. Against all expectations—and I include myself in this—a war between insurgents and occupiers has morphed before our very eyes into something very like a civil war between Sunni and Shiite Muslims, not to forget Kurds. The process whereby a multiethnic society tears itself apart is all too familiar to someone like me, who specializes in European history. We have been here before, and we know how it starts, how society's communities that have lived together relatively peacefully despite ethnic and sectarian differences suddenly turn on one another, and neighbor kills neighbor. In The Brookings Institute's recent surveys of Iraq, there are some astonishing findings that leap off the page. Sectarian violence is an order of magnitude higher this year than last year. Ninety-two percent of votes in Iraqi elections were cast by sectarian parties. In surveys, enormous percentages of Sunni Iraqis say that they have themselves experienced, or know people who have experienced, ethnic cleansing. All of this is unfolding because it seems to me the dominant empire in that region, which certainly exerted extraordinary informal power in the 1970s, is waning, losing credibility, losing control. In 1920, it was possible for an English-speaking empire to quell an insurgency and stabilize multiethnic Iraq. But then the ratio of Iraqis to occupying forces was something like 20:1. Today it is 210:1. In other words, the odds of success were an order of magnitude that is smaller this time around. That demographic transition is part of what I mean when I describe the descent of the West. Today the powers that I call the Western powers account for barely 10 percent of the world's population. The populations of the East have grown relatively. That means the prospect of Western power is, from the very word go, significantly diminished. If I am right and the stakes are right here, this is a somber subject. If I am right, then the ingredients for a much higher level of conflict than we have yet seen in the Middle East are in place. That may sound shocking to those of you who think of the Middle East as a terribly violent place. But actually, the amazing thing about the Middle East is how small its wars have generally been, with the sole exception of the Iran-Iraq war. We could see much more violence there. We could see violence of the sort we saw in Central and Eastern Europe in the early 1940s, because the ingredients are all in place. In other words, ladies and gentlemen, The War of the World implies, to my deep alarm, the possibility of a sequel—a sequel played out, not in the killing fields of Poland/Ukraine, but in the killing fields conceivably of Palestine, of Lebanon, of the Persian Gulf.

#### You should prefer our evidence --- they over generalize rational actor models.

**Busch ‘4** (Nathan, Visiting Ass. Prof. Public & Int’l Affairs – Center for Int’l. Trade & Security – UGA, “ No End in Sight: The continuing Menace of Nuclear Proliferation”, p. 313)

Note: NWS = Nuclear Wielding State

While abstract theorizing can be found on both sides of the debate, it is especially common among the optimists. Rather than asking how NWSs actually do act, optimists have begun with theories of how states should act—that is, in accordance with supposedly “realist" rational-actor models-—and predicted the actions of states on that basis. One need only recall Waltz’s confident statement, “We do not have to wonder whether they [NWSs] will take good care of their weapons. They have every incentive to do so.”“° On the contrary, the proper approach to theory would begin with wonder about whether states do, in fact, always act with such rational incentives in mind. As the present study has demonstrated, there is little empirical support for such an optimistic position where nuclear proliferation is concerned. While realist theories may be useful for explaining certain types of state actions, they are inappropriate models for predicting specific policies and actions that NWSs will take. Having oversimplified the causes and motivations of state action, the optimists make highly inappropriate policy recommendations regarding nuclear proliferation. Indeed, those recommendations go beyond what the optimists’ own theories could possibly support. In a context other than the proliferation debate, Waltz argues that his theories cannot predict specific policies or particular actions by individual states; instead, he maintains, they can predict only general trends."‘ But, as Jeffrey Knopf has pointed out, when one is advocating a further proliferation of nuclear weapons, predicting general trends is not enough: one must be certain that one’s theories are correct all of the time."\* It is likely that a certain awareness of the special dangers attending nuclear weapons policy leads Waltz to misapply his own realist theory and predict that NWSs will act rationally without exception. But that awareness must be replaced by fully conscious practical reasoning. Empirically grounded theories, combined with the prudence of the policymaker, would lead to policy recommendations that are more sound.

#### Ikenberry is wrong.

**Gosnell and Orzetti 12** - Lieutenant Commander Rachael Gosnell, pursuing graduate degree in international security at Georgetown University, U.S. Navy, and Second Lieutenant Michael Orzetti, U.S. Marine Corps, 2011 graduate of the Naval Academy and master’s degree from Georgetown University’s Edmund A. Walsh School of Foreign Service, “Now Hear This – Is Great-Power War Still Possible?” April 2012 Vol. 138/4/1,310, http://www.usni.org/magazines/proceedings/2012-04/now-hear-great-power-war-still-possible)//a-berg

The Center for Naval Analyses recently published Grand Strategy: Contemporary Contending Analyst Views and Implications for the U.S. Navy , a survey of potential U.S. strategies being debated in the academic and defense communities. The study identifies four competing lines of strategic thought: maintaining American hegemony, selective engagement, offshore balancing, and integrating collective international efforts. Two additional options—isolationism and world government—are noted and disregarded as not viable. Under this list of strategic options a sharp division is apparent, dictated by the question, “Is great-power war obsolete?” This fundamental question must be answered before any logical strategic decisions can be made. If great-power war is possible, then the de facto existential threat to U.S. interests, latent in the international system, must be addressed before all others. There are enormous implications for weapon procurement, operational doctrine, and force levels driven by this single issue. Global strategists point to economic globalization and the proliferation of nuclear weapons as modern guarantors of peace among major powers. However, we contend that these very rational hedges against violence can still be shattered by decidedly irrational and reactionary forces. Thus, the possibility of great-power war between China and the United States cannot be ruled out. Economic interdependence offers benefits beyond the sheer transfer of capital and goods—there can be no doubt of that. However, history renders globalization’s deterrent effects at least somewhat questionable. Substantial economic interdependence existed throughout Europe prior to World War I, and Japan was hugely dependent on American oil imports in the years leading up to World War II. It was this dependence that made the U.S oil embargo intolerable, ultimately motivating the Japanese to attack Pearl Harbor. On the other hand, the existential threat of nuclear weapons has certainly resulted in a universal desire keep Pandora’s Box firmly shut. While we concede the remarkable ability of weapons of mass destruction to dampen the oscillations of great-power relations, it is unclear that the nuclear restraint against total war ever takes limited war off the table as a strategic option. More fundamentally, though, the arguments for a nuclear-based “state of peace” are constrained by the limits of rationality. Rational bounds do not apply to the ephemeral—yet extremely powerful—waves of bellicose nationalism that can sweep up an entire nation. National pride is embedded in the Chinese DNA—and rightly so. In certain segments of society, however, the sentiment manifests itself with a particular fervor, and some elements of the People’s Liberation Army (PLA) epitomize this zeal. Alarmingly, the Communist Party leadership appears increasingly unable to act as a check on the military. Both Mao Zedong and Deng Xiaoping had ironclad control over the PLA, having earned unquestionable credibility during the Long March. Neither General Secretary of the Communist Party Hu Jintao nor First Secretary Xi Jinping can claim a similar rapport with the PLA. Neither possesses a comparable level of control. Any surge of aggressive nationalism, either in the PLA or among the greater masses, could conceivably compel contemporary party leadership toward a bellicosity it does not desire. How might this happen? The two most likely scenarios deal with Chinese “core interests” in the Pacific: sovereignty in the South China Sea and Taiwan. The South China Sea is no stranger to conflict. Its location and material promise have led to a host of conflicting territorial claims and brought the Chinese and Vietnamese to armed conflict over the Spratly Islands in the late 1980s. After a period of relative calm, tensions have once again begun to flare. American commitment to freedom of the seas in the region, exemplified by Secretary of State Hillary Clinton’s July 2010 speech in Hanoi, Vietnam, provides ample opportunity for a Sino-American butting of heads. Similarly, the Republic of China remains a perennially sore issue for the Chinese; the furor over the sale of American F-16s provides an ample platform for future, more-polarizing interactions over Taiwan. War between China and the United States is unlikely. Economic interdependence and nuclear weapons are powerful, persuasive deterrents against it. However, Sino-American dealings, particularly in Taiwan or the South China Sea, provide instances in which the powder keg of Chinese nationalism could explode, effectively forcing party leadership into a series of irrational but irreversible actions. As such, the possibility of great-power war, unlimited or otherwise, cannot be ruled out. U.S. policymakers must plan accordingly.

### yes extinction

#### Best science and studies goes negative.

**Star 9**, University of Sydney, 8/2/09, (Stephen Starr and Peter King, , “Nuclear suicide”, Sunday, 02 August 2009, http://www.sciencealert.com.au/opinions/20090208-19496.html)

But there is little evidence yet that either the government or the Commission is fully alert to the most momentous truth of the present era: Our best science now predicts that nuclear arsenals are fundamentally incompatible with continued human existence. It is imperative that the message coming from scientists in the US, Russia and elsewhere about the environmental consequences of nuclear war be included in the general debate about the control and abolition of nuclear weapons. Unfortunately, the nuclear weapon states apparently remain oblivious to the climatic, ecological and biological consequences of nuclear war. No "environmental impact statement" has ever been created for the US or Russian nuclear weaponry, which is one of the reasons why there still are 22,000 intact nuclear weapons in their deployed and reserve arsenals. However, new peer-reviewed studies done at several US universities predict the detonation of even a tiny fraction of the global nuclear arsenal will result in major changes in the global climate and massive destruction of the stratospheric ozone layer (which protects the Earth from deadly UV light). Even a "regional" nuclear conflict between India and Pakistan, fought with 100 Hiroshima-size weapons, is predicted to loft five million tons of smoke above cloud level; there it would block about 10 per cent of warming sunlight from reaching the surface of the Northern Hemisphere. This would produce average surface temperatures colder than any experienced for the last 1000 years. The smoke would remain in the stratosphere for more than a decade and seriously impact global climate. It would probably be too cold to grow wheat in Canada for several years; grain exports would likely cease from grain-exporting nations .and global nuclear famine would result, Within a few years, most of the already-hungry human populations could perish, and the populations of any nation dependent upon grain imports would be at risk.

#### Cause firestorms, atmospheric destruction, and ocean disruption --- even if the initial war doesn’t cause extinction the effects will kill everything.

**Mosher 2011** (2/25, Dave, Wired Science, “How one nuclear skirmish could wreck the planet”, <http://www.wired.com/wiredscience/2011/02/nuclear-war-climate-change/?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed:+wiredscience+(Blog+-+Wired+Science)>, WEA)

WASHINGTON — Even a small nuclear exchange could ignite mega-firestorms and wreck the planet’s atmosphere. New climatological simulations show 100 Hiroshima-sized nuclear bombs — relatively small warheads, compared to the arsenals military superpowers stow today — detonated by neighboring countries would destroy more than a quarter of the Earth’s ozone layer in about two years. Regions closer to the poles would see even more precipitous drops in the protective gas, which absorbs harmful ultraviolet radiation from the sun. New York and Sydney, for example, would see declines rivaling the perpetual hole in the ozone layer above Antarctica. And it may take more than six years for the ozone layer to reach half of its former levels. Researchers described the results during a panel Feb. 18 at the [annual meeting of the American Association for the Advancement of Science](http://www.aaas.org/meetings/2011/), calling it “a real bummer” that such a localized nuclear war could bring the modern world to its knees. “This is tremendously dangerous,” said environmental scientist [Alan Robock of Rutgers University](http://envsci.rutgers.edu/~robock/), one of the climate scientists presenting at the meeting. “The climate change would be unprecedented in human history, and you can imagine the world … would just shut down.” To defuse the complexity involved in a nuclear climate catastrophe, Wired.com sat down with [Michael Mills](http://acd.ucar.edu/~mmills/), an atmospheric chemist at the National Center for Atmospheric Research, who led some of the latest simulation efforts. ‘It’s pretty clear this would lead to a global nuclear famine.’ Wired.com: In your simulation, a war between India and Pakistan breaks out. Each country launches 50 nukes at their opponent’s cities. What happens after the first bomb goes off? Michael Mills: The initial explosions ignite fires in the cities, and those fires would build up for hours. What you eventually get is a firestorm, something on the level we saw in World War II in cities like Dresden, in Tokyo, Hiroshima and so on. Today we have larger cities than we did then — mega cities. And using 100 weapons on these different mega cities, like those in India and Pakistan, would cause these firestorms to build on themselves. They would create their own weather and start sucking air through bottom. People and objects would be sucked into buildings from the winds, basically burning everything in the city. It’ll burn concrete, the temperatures get so hot. It converts mega cities into black carbon smoke. Wired.com: I see — the firestorms push up the air, and ash, into the atmosphere? Mills: Yeah. You sometimes see these firestorms in large forest fires in Canada, in Siberia. In those cases, you see a lot of this black carbon getting into the stratosphere, but not on the level we’re talking about in a nuclear exchange. The primary cause of ozone loss is the heating of the stratosphere by that smoke. Temperatures initially increase by more than 100 degrees Celsius, and remain more than 30 degrees higher than normal for more than 3 years. The higher temperatures increase the rates of two reaction cycles that deplete ozone. Wired.com: And the ozone layer is in the stratosphere, correct? Mills: OK, so we live in the troposphere, which is about 8 kilometers [5 miles] thick at the poles, and 16 km [10 miles] at the equator. At the top of the troposphere, you start to encounter the stratosphere. It’s defined by the presence of the ozone layer, with the densest ozone at the lowest part, then it tails off at the stratopause, where the stratosphere ends about 50 km [30 miles] up. We have a lot of weather in the troposphere. That’s because energy is being absorbed at the Earth’s surface, so it’s warmest at the surface. As you go up in the atmosphere it gets colder. Well, that all turns around as you get to the ozone layer. It starts getting hotter because ozone is absorbing ultraviolet radiation, until you run out of ozone and it starts getting colder again. Then you’re at the mesosphere. How Nukes Gobble Up Ozone When we talk about ozone, we’re talking about the odd oxygen family, which includes both ozone (O3) and atomic oxygen (O). Those two gases can interchange rapidly within hours. Ozone is produced naturally by the breakdown of molecules of oxygen, O2, which makes up 20 percent of the atmosphere. O2 breaks down from ultraviolet solar radiation and splits it into two molecules of O. Then the O, very quickly, runs into another O2 and forms O3. And the way O3 forms O again is by absorbing more UV light, so it’s actually more protective than O2. Ozone is always being created and destroyed by many reactions. Some of those are catalytic cycles that destroy ozone, and in those you have something like NO2 plus O to produce NO plus O2. In that case, you’ve gotten rid of a member of the odd oxygen family and converted it to O2. Well, then you’ve got an NO which can react with ozone and produce the NO2 back again and another O2. So the NO and NO2 can go back and forth and in the process one molecule can deplete thousands of molecules of ozone. It’s a similar process to chlorofluorocarbons, Those are the larger molecules that we’ve manufactured that don’t exist naturally. They break down into chlorine in the stratosphere, which has a powerful ozone-depleting ability. —Michael Mills Wired.com: Where do the nukes come in? I mean, in eroding the ozone layer? Mills: It’s not the explosions that do it, but the firestorms. Those push up gases that lead to oxides of nitrogen, which act like[chlorofluorocarbons](http://www.wired.com/wiredscience/2010/12/siberian-traps/). But let’s back up a little. There are two important elements that destroy ozone, or O3, which is made of three atoms of oxygen. One element involves oxides of nitrogen, including nitrogen dioxide, or NO2, which can be made from nitrous oxide, or N2O — laughing gas. The other element is a self-destructive process that happens when ozone reacts with atomic oxygen, called O. When they react together, they form O2, which is the most common form of oxygen on the planet. This self-reaction is natural, but takes off the fastest in the first year after the nuclear war. In years two, three and four, the NO2 builds up. It peaks in year two because the N2O, the stuff that’s abundant in the troposphere, rose so rapidly with the smoke that it’s pushed up into the stratosphere. There, it breaks down into the oxides like NO2, which deplete ozone. Wired.com: So firestorms suck up the N2O, push it up into the stratosphere, and degrade the ozone layer. But where does this stuff come from? Mills: N2O is among a wide class of what we call tracers that are emitted at the ground. It’s produced by bacterias in soil, and it’s been increasing due to human activities like nitrogen fertilizers used in farming. N2O is actually now the most significant human [impact on the ozone](http://www.wired.com/wiredscience/2008/05/reactive-nitrog/), now that we’ve mostly taken care of CFCs. Wired.com: You did [similar computer simulations](http://www.wired.com/wiredscience/2008/04/regional-nuclea/) in the past few years and saw this [ozone-depleting effect](http://www.pnas.org/content/105/14/5307.abstract). What do the new simulations tell us? Mills: Before, we couldn’t look at the ozone depletion’s effects on surface temperatures; we lacked a full ocean model that would respond realistically. The latest runs are ones I’ve done in the Community Earth System Model. It has an atmospheric model, a full-ocean model, full-land and sea-ice models, and even a glacier model. We see significantly greater cooling than other studies, perhaps because of ozone loss . Instead of a globally averaged 1.3-degree–Celsius drop, which [Robock’s atmospheric mode](http://onlinelibrary.wiley.com/doi/10.1002/wcc.45/abstract)l produced, it’s more like 2 degrees. But we both see a 7 percent decrease in global average precipitation in both models. And in our model we see a much greater global average loss of ozone for many years, with even larger losses everywhere outside of the tropics. I also gave this to my colleague [Julia Lee-Taylor](http://acd.ucar.edu/~julial/) at NCAR. She calculated the UV indexes across the planet, and a lot of major cities and farming areas would be exposed to a UV index similar to the Himalayas, or the hole over the Antarctic. We’re starting to look at the response of sea ice and land ice in the model, and it seems to be heavily increasing in just a few years after the hypothetical war. Wired.com: What would all of this do to the planet, to civilization? Mills: UV has big impacts on whole ecosystems. Plant height reduction, decreased shoot mass, reduction in foliage area. It can affect genetic stability of plants, increase susceptibility to attacks by insects and pathogens, and so on. It changes the whole competitive balance of plants and nutrients, and it can affect processes from which plants get their nitrogen. Then there’s marine life, which depends heavily on [phytoplankton](http://www.wired.com/wiredscience/2010/08/phytoplankton-blooms-gallery/). Phytoplankton are essential; they live in top layer of the ocean and they’re the plants of the ocean. They can go a little lower in the ocean if there’s UV, but then they can’t get as much sunlight and produce as much energy. As soon as you cut off plants in the ocean, the animals would die pretty quickly. You also get damage to larval development and reproduction in fish, shrimp, crabs and other animals. Amphibians are also very susceptible to UV.

## topicality

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#### C) reflects consensus of the lit.

**Mastanduno, 1** – professor of Government at Dartmouth College (Michael, “Economic Engagement Strategies: Theory and Practice” [http://web.archive.org/web/20120906033646/http://polisci.osu.edu/faculty/bpollins/book/Mastanduno.pdf](http://web.archive.org/web/20120906033646/http%3A/polisci.osu.edu/faculty/bpollins/book/Mastanduno.pdf)

An examination of the scholarly literature on economic engagement as an instrument of statecraft reveals a striking pattern. Albert Hirschman’s 1945 study, National Power and the Structure of Foreign Trade, is widely acknowledged today as a starting point for analysis (Hirschman, 1945/1980). Hirschman argued that the conscious cultivation of asymmetrical interdependence, if conducted strategically by the government of a powerful state, would lead weaker states to reorient not only their economies but also their foreign policies to the preferences of the stronger state. He developed a systematic framework for analysis and applied it to the trading and political relationships between

## at: we meets

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#### Allowing effects topicality is a limits disaster on this topic – everything the US does effects the international economy

**Derrick, 98** - LIEUTENANT COLONEL ROBERT R. DERRICK United States Army (“ENGAGEMENT: THE NATIONS PREMIER GRAND STRATEGY, WHO'S IN CHARGE?” <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA342695>)

In addition to the agencies that administer the programs listed in figure 3, the State Department proclaims that "...protecting national interests and advancing US goals involve virtually every agency of the government...."16 US governmental agencies with international reach directly engage as a part of their daily routines. Agencies that deal strictly with domestic policy **indirectly engage through the effect their actions have on US markets and thus world markets**. For example the Departments of State, Defense, Agriculture, Transportation, and Energy, have both domestic and international responsibilities. From trade status to travel status, from immigration rules to export of tools, from training flights to basing rights, US agencies directly and indirectly engage through **hundreds of programs**. US governmental agencies that inadvertently operate at crosspurposes, through misunderstanding or ignorance, must ultimately be coordinated at some point. Since there is no single director below the President to coordinate the US engagement activities of the three elements of national power, it becomes the responsibility of the regional CINCs and Ambassadors.

#### They are mixing burdens --- trade expansion has to be the action of the plan, not the result of the plan

**Celik, 11 –** master’s student at Uppsala University (Department of Peace and Conflict Research) (Arda, Economic Sanctions and Engagement Policies <http://www.grin.com/en/e-book/175204/economic-sanctions-and-engagement-policies>)

Economic engagement policies are strategic integration behaviour which involves with the target state. Engagement policies differ from other tools in Economic Diplomacy. They target to deepen the economic relations to create economic intersection, interconnectness, and mutual dependence and finally seeks economic interdependence. This interdependence serves the sender state to change the political behaviour of target state. However they cannot be counted as carrots or inducement tools, they focus on long term strategic goals and they are not restricted with short term policy changes.(Kahler&Kastner,2006) They can be unconditional and focus on creating greater economic benefits for both parties. Economic engagement targets to seek deeper economic linkages **via promoting institutionalized mutual trade** thus mentioned interdependence creates two major concepts. Firstly it builds strong trade partnership to avoid possible militarized and non militarized conflicts. Secondly it gives a leeway to perceive the international political atmosphere from the same and harmonized perspective. Kahler and Kastner define the engagement policies as follows, “It is a **policy** of deliberate expanding economic ties with and adversary in order to change the behaviour of target state and improve bilateral relations”.(p523-abstact).It is an intentional economic strategy that expects bigger benefits such as long term economic gains and more importantly; political gains. The main idea behind the engagement motivation is stated by Rosecrance (1977) in a way that “the direct and positive linkage of interests of states where a change in the position of one state affects the position of others in the same direction.”

#### More ev.

**Sheen, 2** – associate professor at the Graduate School of International Studies, Seoul National University (Seongho, The Korean Journal of Defense Analysis, Vol. XIV, No. 1, Spring 2002, “US Strategy of Engagement During the Cold War and Its Implication for Sunshine Policy” <http://www.kida.re.kr/data/2006/04/14/seongho_sheen.pdf>) footnote 22

22 Speaking of different strategies of economic statecraft, Michael Mastanduno distinguishes: “Whereas economic warfare and a strategic embargo aim to weaken the capabilities (economic and/or military) of a target state and rely on either comprehensive or selective trade denial, linkage strategies are characterized by a reliance on some degree of **trade expansion as a means** to influence the behavior or policies of a target government.” In particular, he calls the unconditional positive engagement policy as a “structural linkage” strategy. Michael Mastanduno, Economic Containment: CoCom and the Politics of East-West Trade (Ithaca: Cornell University Press, 1992), pp. 53–58.

#### This means trade has to be the mechanism of the plan – engagement is a deliberate expansion of economic ties, not an effect

**KARAKASIS, 8** – MA in INTERNATIONAL RELATIONS at Instabul Bilgi University (VASILEIOS, “THE IMPACT OF EUROPEANIZATION ON GREECE’S ENGAGEMENT STRATEGY TOWARDS TURKEY”, <http://www.academia.edu/667112/The_Impact_of_Europeanization_on_Greeces_Engagement_Strategy_towards_Turkey>)

This policy is accompanied by an economic pillar. By economic engagement what can be implied is a policy of deliberately expanding economic ties with the adversary aiming to change its attitude and improve the bilateral relations. This pillar **relies on increasing levels of trade** and investments aiming to moderate the target’s interests’ conceptions by shifting incentives and building networks of interdependence.48 Economic interdependence is able to operate as transforming agent that reshapes the goals of the latter. It can generate and establish vested interests in the context of target society and government undermining old values of military status and territorial acquisition. The beneficiaries of this interdependence become addicted to it and protect their interests by putting pressure on the government to accommodate the source of independence.49 Internationalist elites committed to economic openness and international stability might marginalize nationalist elites which are wedded to the threat or use of force. Regardless whether the society of targeted society constitutes a pluralist democracy or not, interests tied to international economy become a critical part of the electorate to whom political elites must respond.50

# 1nr

### 2nc overview

### 2nc putin stability

#### prices key to Putin’s political stability

**Judah 13** (Ben, Fellow – European Stability Initiative, Moscow Correspondent – Reuters, Russian Politics Research Fellow – European Council on Foreign Relations, B.A. in Modern History and Politics – Oxford University, “Five Traps for Putin”, GLOBAL TRANSITIONS PROSPERITY STUDIES, Legatum Institute, March, http://www.li.com/docs/default-source/publications/five-traps-for-putin---ben-judah-march-2013-(legatum-institute).pdf, Deech)

More recently, Putin has abandoned carefully balanced budgets, largely for political reasons. Although currency reserves remain high—Russia has the third largest reserves in the world—and government borrowing is still relatively low, state spending has been rising steadily since the 2009 crisis, and now accounts for 41 percent of GDP.41 Between 2007 and 2010, funding for the Russian provinces increased by $58 billion, rising from 5.7 percent to 9.2 percent of GDP.42 Again in 2010, pensions were hiked 50 percent. The following year pensions were raised by 10 percent again with a 6.5 percent across the board increase in public sector wages.43 The Kremlin has also announced a ten-year, $613 billion spending programme for the military, a policy largely designed to maintain employment in Russia’s many single-industry military production towns.44 During the 2012 campaign, Putin doubled military and police salaries and promised $160 billion worth of giveaways.45 As a result, the Kremlin now must rely on a much **higher oil price** in order to balance its budget. In 2007, $40 a barrel would have sufﬁced.46 By 2012, more than $110 was required.47 Should the price of oil now fall for any substantial length of time, Russia could be forced to return to large scale borrowing, even cut beneﬁts or implement some form of austerity, thus **undermining support** for the regime in the provinces and among low-wage earners. It is ironic, but Putin’s support now **depends upon** the one thing he cannot control: the price of oil. This economic populism looks particularly reckless in the light of Russia’s unreformed pension system, its slowing growth and its shrinking trade surplus. If no alterations are made, government expenditure on pensions alone will rise from 9 percent of GDP to 14 percent of GDP by 2030.48 Adding further uncertainty is the fact that Russia is slowly running out of cheap oil. Its current reserves are of declining quality and its huge potential ﬁelds lie in extremely difﬁcult terrain in Eastern Siberia or under the Arctic Ocean. Similar problems are looming in the gas sector as LNG and shale gas pose long-term problems for Gazprom’s business model. Russia is set to stay an energy superpower, but the best years of the “double boom”—high oil production and high oil prices—are over. At the a VTB bank investor conference in 2012 there was much talk about Russian growth slowing, perhaps as low as an annual 2 percent. As a result of these changes, economic policy, once a source of stability and consensus, has increasingly divided the Russian political and business elite. Not since the arrest of Mikhail Khodorkovsky in 2003 have there been such vocal disagreements. Alexey Kudrin, the former ﬁnance minister, has publicly warned that unless the Kremlin reigns in spending it will be exposed to dangerous economic shocks. Igor Sechin, chief executive of the state energy giant Rosneft, has also gone out of his way to obstruct Medvedev’s ambitious privatization agenda. Other leading ofﬁcials have been openly at odds with one another as well. These bitter disputes are corroding Putin’s once unchallenged role as arbiter in chief. Not only is the Russian economy vulnerable to an economic crisis thanks to state spending, in other words, but the Russian president is **vulnerable** too.

#### Putin's leadership solves nuclear modernization

**Bugriy 13** (Maksym, Correspondent – Ukrainian Week, “Russia is Arming Itself, but Against Whom?”, Ukrainian Week, 3-31, http://ukrainianweek.com/World/76030, Deech)

The intensification of military reforms was an **ideological cornerstone** of Putin’s 2012 presidential campaign. In a programmatic article, he wrote about a new global trend: increasingly frequent attempts to resolve economic issues and obtain access to resources through force. Thus, his claim is that Russia should not “lead anyone into temptation by being weak”. As he was preparing his return to the presidency, Putin announced “**unprecedented programmes** to develop the Armed Forces and modernize the defence industrial complex”, declaring that some 23 trillion roubles (US $750 bn) would be allocated to this end in the next decade. Tellingly, the key programmatic theses in the article begin with stressing the need to reform strategic analysis for national defence. The goal is to have foresight, an ability to estimate threats 30-50 years in advance. As far as a security strategy is concerned, the Kremlin has embraced the classical theory of nuclear containment as its main mechanism. At the same time, Russia will be following a contemporary worldwide trend of producing high-precision long-range conventional weapons that can also later be used for strategic containment purposes. READ ALSO: Do the Russians Want War? Moscow’s **emphasis** on nuclear containment forces it to follow the classical geopolitical conceptions of “air force” and “naval force”. Hence, strategic bombers, joined by drones and fifth-generation fighter aircraft, will form the core of its Air Force. The Navy will be modernized with an emphasis on long-range submarines and securing an “oceanic fleet” with a strategic presence in regions of interest. In March 2012, Vice-Admiral Viktor Churikov, Russia’s Air Force Commander, confirmed the decision to have a permanent operational unit of five to six ships from Russia’s Black Sea fleet stationed in the Mediterranean and said that similar units may be formed to navigate the Pacific and Indian Oceans. According to other sources, Russia was in negotiations with Vietnam this winter about opening military bases there. Putin is critical of modernization in the form of “spot purchases” of Western equipment (such as the acquisition of French Mistral aircraft carriers) and supports the modernization of Russia’s own military industrial sector. **High-priority** weaponry and combat equipment for Russia’s Armed Forces include **modern nuclear arms** (many of the existing missiles have been in service for over 20 years and must be upgraded) and air and space defence systems, complete with new anti-aircraft armaments; high-tech communications, reconnaissance and control systems; unmanned drones; personal combat protection systems; high-precision weapons and the means to counteract them. Russia’s Armed Forces are to focus on nuclear containment and conventional high-precision weapons, developing oceanic naval forces, the Air Force and space defence. The goal is to create a common national system of air and space defence. Together with nuclear containment forces, it will counter the antiaircraft systems of, above all, the USA and NATO. Geographically, Russia will be “a guarantor of stability” in Eurasia: an collective security system for the “Eurasian space” based on the Collective Security Treaty Organization is in the works, and the North (primarily the resource-rich Arctic) and the Asian-Pacific region will be high-priority regions for the Kremlin.

#### That prevents accidental nuclear use

**Mosher 3** (David, Senior Policy Analyst in Nuclear Weapons Policy – RAND, “Excessive Force”, RAND Corporation, Fall, http://www.rand.org/pubs/periodicals/rand-review/issues/fall2003/force.html, Deech)

Russian strategic nuclear forces remain the only current threat to the national **existence** of the United States. Although the risk of deliberate attack from Russia has sharply fallen since the end of the Cold War, the risk of an **accidental** or **unauthorized** use of Russian nuclear forces has arguably **risen**. For example, Russia’s early-warning system has severely **deteriorated**, as has the country’s ability to keep its mobile (and thus survivable) nuclear forces deployed. There are additional concerns about the state of Russia’s command-and-control system and the rise of separatist violence. None of the nuclear arms control treaties after the Cold War have dealt with the issue of accidental or unauthorized use of nuclear weapons. Instead, these treaties have concentrated on reducing the total number of nuclear warheads each side wields. While these reductions are extremely important for improving the overall U.S.-Russian relationship, they do little to ease the risks of an accidental or unauthorized nuclear launch. This is because those risks stem from the nuclear postures and underlying nuclear doctrines of each nation, which remain firmly rooted in the hostile relationship forged during the Cold War.

#### Russian accidental launch causes extinction

**Mintz 1** (Morton, Former Chair – Fund for Investigative Journalism and Reporter – Washington Post, “Two Minutes to Launch”, The American Prospect, http://www.prospect.org/cs/articles?article=two\_minutes\_to\_launch)

Hair-trigger alert means this: The missiles carrying those warheads are armed and fueled at all times. Two thousand or so of these warheads are on the intercontinental ballistic missiles (ICBMs) targeted by Russia at the United States; 1,800 are on the ICBMs targeted by the United States at Russia; and approximately 1,000 are on the submarine-based missiles targeted by the two nations at each other. These missiles would launch on receipt of three computer-delivered messages. Launch crews--on duty every second of every day--are under orders to send the messages on receipt of a single computer-delivered command. In no more than two minutes, if all went according to plan, Russia or the United States could launch missiles at predetermined targets: Washington or New York; Moscow or St. Petersburg. The early-warning systems on which the launch crews rely would detect the other side's missiles within tens of seconds, causing the intended--or accidental--enemy to mount retaliatory strikes. "**Within a half-hour, there could be a nuclear war that would extinguish all of us**," explains Bruce Blair. "It would be, basically, a nuclear war by checklist, by rote."

### 2nc uniqueness run

### 2nc link run

**And, The plan freaks out speculators**

**Spectator Business 8** (“The sheikhs still call the shots”, July / August, Lexis)

The stereotype of indolent sheikhs counting their petrodollars while the industrial world grinds to a halt should stay where it belongs, back in the 1970s; in today's inter-connected global markets, cause and effect are far more complex. Speculation has clearly played a **big**ger **part** in this price spike than physical imbalances of supply and demand: Mr Khelil says hedge funds have added $40 to the barrel price, and his guess is probably as good as anyone's. But speculators are simply trying to anticipate the actions and reactions of producers - while assuming, on the other side of the equation, a relatively predictable pattern of rising demand from China, partially offset by faltering demand from the West The speculators are betting that, at any price north of $100, producer countries will hoard oil in the ground - and so far, they are absolutely right. But if ever there was a price bubble, this is surely a prime example, so the worldly-wise speculator will also be watching for a **signal** from producers that will precipitate a **sell-off**. Whatever Mr Khelil says, Opec could give that signal. Its members should now be considering just how damaging to the global economy, and therefore to future oil demand, a prolonged oil shock will be. They should be watching how quickly Westem capital investment is switching towards **alternative energy** sources that are competitive against $100-plus oil. And they should be calculating the scale and timing of production increases that might bring about an orderly decline in oil prices back towards a range - entirely feasible in terms of real- world supply and demand - of $60 to $80 a barrel. Such a fall would drive the speculators elsewhere, keep the sheikhs in the style to which they are accustomed, and allow the rest of the world to breathe a sigh of relief. There has rarely been good reason to be confident in Opec' s ability to reach intelligent, long-term decisions, but the fact remains that the cartel's leaders have more say than any other single player in the complex game as to which way the oil price goes next, and how fast It is complacent and cowardly of them to pretend that they do not hold that power.

**that supercharges the link**

**Stevens 7-25** (Paul, Fellow – Chatham House, “The world might be drifting into an oil price shock”, Financial Times, 2013, http://www.ft.com/intl/cms/s/0/fb0dd938-f493-11e2-a62e-00144feabdc0.html#axzz2aYnzQWdw, Deech)

Thus **market responses** will affect prices as in 1986, possibly leading to a **significant collapse**. The key will be how long Saudi Arabia continues to act as swing producer before the pain becomes too great, as it did in 1985. While in recent years the Saudis have been able to accumulate a financial cushion – although exactly how much is uncertain – cushions eventually disappear. If they are no longer willing or able to protect prices then these must fall. Opec, now facing extra sectarian divisions following the 2003 invasion of Iraq, would struggle to respond. But there are differences between today and the 1981-86 period that complicate the story. Then there were no “paper” markets trading future barrels of oil. Today futures markets play a **big role** in **price determination** and lead to prices changing at a **much faster rate** than before. The new supplies today have a different cost structure: supplies will **respond faster** to lower prices than was the case in the early 1980s.

**Simply the threat of a flood triggers speculator reaction and collapse prices**

**Washington Times 4** (“OPEC Plan Spurs Drop in Oil Prices,” 5-27, http://www.washingtontimes.com/news/2004/may/27/20040527-110406-8642r/?page=all)

Signs that OPEC may move next week to aggressively increase oil production caused a **plunge** in oil prices yesterday, raising hopes that prices at the pump will follow. The easing of oil prices comes amid evidence that record-high fuel costs have had little impact on the U.S. economy. Growth picked up to a strong 4.4 percent in the first quarter despite climbing fuel prices, the Commerce Department reported. World leaders, in urging producers to pump more oil, have warned that high oil prices could start to hurt growth. But in the United States, the world's largest market for oil, the main impact so far has been to stoke inflation, which nearly tripled to a 3 percent rate from the fourth quarter of last year, Commerce said. Crude oil prices dropped 3 percent to $39.44 per barrel in New York trading yesterday after the president of the Organization of Petroleum Exporting Countries said the cartel is eyeing a "significant" increase in production to try to break the market psychology that has driven oil prices up to records near $42 per barrel this year. An "option" at the cartel's June 3 meeting in Beirut "is to increase the quota **significantly** so it will bring a significant **psychological impact** to lower prices," Purnomo Yusgiantoro told reporters in Jakarta, Indonesia, where he is oil minister. Energy Secretary Spencer Abraham, who is traveling in Europe, predicted that OPEC would adopt the 2 million-barrel-a-day output increase recommended by Saudi Arabia last week. Mr. Abraham said major non-OPEC producers like Mexico and Russia are scrambling to increase production to meet growing global demand for oil. Their efforts are expected to start paying off with substantial increases in oil supplies in 2005 and 2006. But in the short run, only OPEC -- primarily Saudi Arabia -- is in a position to flood the market with oil. Polls show the public does not blame OPEC or President Bush for high oil prices so much as "price gouging" by oil companies and the Iraq war. A Gallup poll this week found that 22 percent of people interviewed blamed profiteering by big oil companies, and 19 percent blamed the war in Iraq. Only 9 percent held OPEC responsible, by contrast, while 5 percent blamed President Bush. Analysts say prices could **drop dramatically** if OPEC -- which produces about a third of the world's oil -- were to succeed in breaking market psychology and forcing out speculators who have been betting on climbing oil prices. Sung Won Sohn, chief economist at Wells Fargo & Co., said speculation centered on potential supply disruptions in the Middle East has driven up the price of oil by as much as one-third, or $10 to $15 a barrel. Proof that hedge funds and other speculators are having a powerful influence on oil prices is seen in the trading patterns of oil futures contracts on the New York Mercantile Exchange. Recently, contracts betting on further increases in oil prices outnumbered contracts betting on price decreases by four to one, Mr. Sohn noted. That may be changing, however, as the number of contracts betting on price increases dropped by 15 percent in the week ended May 18, according to figures kept by the Commodity Futures Trading Commission. Doug Leggate, an analyst at Citigroup Inc., said oil prices would be $10 lower, and could **fall precipitously**, if speculators dropped out of the market. "Speculators have been driving the market since the end of the Iraq war," he said. Price drops could **accelerate** because speculators **"follow momentum"** and will **quickly exit** the market once upward price momentum fades, he said.

**Even a slight drop in prices causes Iran to convene an emergency OPEC meeting --- $100 is a key benchmark**

**Press TV 13** (“Iran to demand emergency OPEC meeting if prices keep falling”, 4-15, http://www.presstv.ir/detail/2013/04/15/298410/iran-to-call-opec-meeting-if-prices-fall/, Deech)

An Iranian Oil Ministry official says Iran will ask OPEC to call an emergency meeting to discuss oil prices if they slump **below USD 100** a barrel. “To that effect, Iran’s oil minister [Rostam Qasemi] will have telephone conservation with OPEC president about an extraordinary meeting,” the official, who was not named, said Monday. On Sunday, Qasemi said Iran wanted oil prices to stay above USD 100 per barrel, noting that “an oil price below USD 100 is not reasonable for anyone.”

**And --- that magnifies the link --- generates uncertainty and price declines**

**Horan 4** (Stephen M., Professor of Finance – St. Bonaventure University, “Implied Volatility of Oil Futures Options Surrounding OPEC Meetings”, The Energy Journal, 25(3), pg. 103-125, Proquest, Deech)

Table 1 shows the pattern of average implied volatility of crude oil options during a 41-day window period surrounding the 48 OPEC meetings using the three models described above. Several patterns are noteworthy. First, visual inspection of the data indicates that the volatilities within the pre-event, event, and post-event windows appear to be very stable, suggesting a high degree of internal consistency and veracity of the volatility estimates. second, there appears to be a general increase in volatility during the pre-event period, which is consistent with the stylized pattern predicted by Patell and Wolfson (1981). They distinguish between instantaneous volatility of the underlying asset and average volatility over the life of the option, which is captured by implied volatility calculations and reported in Table 1. They demonstrate that a predictable spike in instantaneous volatility, such as that associated with a potentially informative and previously scheduled OPEC meeting, creates an upward drift in average volatility until the event date at which time it drops precipitously. Several days in the pre-event window experience a significant increase in volatility (e.g., t = -14 and t = -8). Since volatility drifts upward in the preevent window, one would expect some statistically significant increases, especially when zero change is used as the null hypothesis. Another way to approach this issue is to use the secular upward drift as the null in the t-tests. Using an upward drift of 0.4% per day (as indicated by results that follow) as the null hypothesis, no daily percent change in the pre-event window is significant above the 90% level of confidence. Consistent with the pattern predicted by Patell and Wolfson (1981), Table 1 reports that average implied volatility drops by almost three percent on the first day of OPEC meetings. This drop in volatility is statistically significant at the 99% level of confidence. By way of comparison, Ederington and Lee's (1996) study the impact of scheduled macroeconomic news releases on the implied volatility of T-Bond and Eurodollar options. Their strongest results are less than half as large. The direct link between the information disclosed from OPEC meetings and the value of the crude oil may account for the magnitude of the reaction. In contrast, there may be more confounding factors that can affect the value of interest rate options on a given day. If the last day of the meeting is designated as day zero, no significant volatility change exists. It also appears from Table 1 that volatility begins to drop even before the first day of the meeting. Finally, Table 1 shows that average volatility appears to trend upward after OPEC meetings. We have no definitive explanation for this trend, but posit that the resolution of uncertainty after an OPEC meeting may "fade out" as new economic developments introduce new sources of uncertainty. For example, it may become less clear over time whether production quotas will be adhered to or what effect they might have on market prices as other economic factors develop. Alternatively, the upward trend over the entire window period could be explained by the volatility smile associated with maturity identified by Canina and Figlewski (1993) and Dumas, Fleming and Whaley (1998). In many cases the volatility smile, which is caused by model misspecification, might cause a serious methodological conundrum. In our case, however, its effect is limited since the focus of this study is changes in volatility rather than levels of volatility. Another explanation for the upward drift after meetings is that the post-event window of one meeting can over lap with the pre-event window of another meeting during which we expect an upward drift in volatility. This situation occurs fourteen times in our sample and could be responsible for the post-event upward drift. In any case, there is no obvious reason why it might affect the results around the event window or the resulting inferences.

**Plan leads to the electric grid use --- #hippies would drive more electric cars**

**Berman 6-10** (Brad, Contributor – New York Times and Reuters, Transportation Editor – Home Power Magazine, “Toyota Europe Wants Clean Grid Before Pushing Electric Cars”, PluginCars, 2013, http://www.plugincars.com/toyota-europe-wants-clean-grid-pushing-electric-cars-127465.html, Deech)

It’s no secret that Toyota is lukewarm on pure electric cars. Didier Stevens, Toyota Europe’s head of government affairs and environmental issues, today provided an articulated rationale for why the company is content to mostly sit on the sidelines when it comes to all-electric cars. According to Stevens, EVs really aren’t that green, when considering today’s energy mix. Stevens’s comments were published today on RTCC.org, a U.K.-based non-profit website that focuses a climate change issues. “We always assess a vehicle from well to wheel,” said Stevens. “If the electricity is not **sourced from renewables** then it makes little sense.” He said that Toyota would “prefer to step back” unless electricity provided to electricity cars is produced by low-carbon **renewable sources**. In other words, Steven is challenging European utilities to reduce the carbon content of grid-supplied electricity, which is used as fuel for electric cars. He pointed to recent failures by the U.K. parliament to set low-carbon targets in a new energy bill. And he questioned Germany’s pro-EV position. “We are looking with some concern at the German plan of having 1 million electric vehicles on the road by 2020,” he said. “If more and more of their electricity is going to come from coal, then this does not solve the problem. It just shifts the emissions to another area. This is not how it should be.”

**electric car development triggers the link**

**Allan 8** (Sterling D., Correspondent – Pure Energy Systems News, Citing 60 Minutes, “Saudi Oil Kingdom Resisting Renewables”, http://pesn.com/2008/12/21/9501509\_Saudi\_Oil\_Kingdom/, Deech)

In watching this excellent documentary, it struck me the extent to which oil has a **vested interest** in perpetuating their dominance, and that they would likely have **no compunction** to take any measure to **prevent** serious alternatives that would make them obsolete. Part I includes footage showing Saudi efforts to find new oil. Up until now in their history, they've extracted 260 billion barrels. After stating that, the executive confidently asserts that there is "potential to add another 200 billion [barrels] -- are there to be found." The documentary takes a look at two new major facilities and the high-tech (and more expensive) methods being deployed to extract it. At the Sheva facility, they had to move mountains of sand in order to get at the bedrock to plant their new facility, roads, and airport. They had to install a 400-mile pipeline, and they are drilling guided holes underground horizontally as far as 5 miles to get to the oil under the sand. The facility will increase the country's production capacity from 10 to 12 million barrels per day; and will begin producing in the beginning of 2009. Lesley Stahl also traveled to the Kareas (sp?) facility, which is "the biggest oil project in history." It will take more than 50 years to deplete the oil there. But because the oil is low pressure, in order to extract it, the Saudis will pump sea water into the ground at a rate of 50 million barrels a day, through a pipeline from 150 miles away. The project employs 22,000 workers laying thousands of miles of pipeline, will cost 50 billion dollars over a 5 year period -- paid in cash. I should mention that this information affirms indirectly the "peak oil" premise that oil production on the planet has surpassed the half-way point, and that everything from here on will be increasingly more expensive and difficult to access. Given the abiotic oil data that shows a continual replenishment of some oil fields from deep within the earth, the "Peak Oil" dogma should not necessarily be taken at face value. However, the rate of new oil generation in these cases is not enough to keep up with current world demand. The documentary talks about Saudi Aramco, the largest oil company in the world, which began as a US company in the 1930s, but then was bought out by Saudi interests and nationalized. It's headquarters are huge -- a city within a city. The cultural ramifications are quite stark. Outside that enclave exists conservative Muslim culture and dress, but those same standards are not adhered to within the enclave, where women can drive, work along side men, and they don't have to wear the full-body cover that's required outside the enclave. CBS was let into the nerve center complex that controls all facilities, every valve, every pipeline -- all of this from one humongous room. I couldn't help but think that they must be glad they don't have terrorists targeting them because that sure would seem like a point of devastating vulnerability. The documentary addresses recent oil price fluctuations and the instability it creates for the Saudi government. It costs them only $2/barrel to produce their crude oil. The rest is used to run their country. They need at least $55/barrel to do that, so when oil drops below that point, they get nervous. In discussing a recent oil summit, and pressure that was being brought to bear from Venezuela and Iran to push oil prices as high as possible, I found the Saudi Oil Minister, Al-Naimi's response humorous: "No one jams anything down our throat." He defended the Saudi support of the recent cut in oil production to curtail the recent drop in prices, explaining that if the price goes too low, then ability to tap additional reserves will be compromised, and future prices will skyrocket. The documentary also mentions some of the extracurricular uses of the oil profits such as funding militias including Hamas. It didn't go so far as to mention the funding of terrorism or of hit men and tactics to keep alternatives from reaching the market. But it did come close. Lesley pushes two of the Saudi oil executives about the "addiction to oil" that the West is trying to get out from under. "Is it Aramco's hope to prevent a switch away from oil? Someone said, 'The country IS the oil business. You absolutely need to do this for your own survival.' " The executive responded, "What's wrong with that?" [1] One thing the Saudi industry is doing to **prevent** a move away from oil toward **electric cars** is to assuage our concerns about the environment. They showed CBS their new $4 million dollar project with an experimental combustion engine that burns fuel more efficiently and produce less emissions. "Green oil," is the image they are trying to put forth with this token effort.

**Rate is framing issue for the link debate --- the plan’s rapid expansion of renewables collapses investment in oil**

**Johnson 9** (Keith, Correspondent – Wall Street Journal, “Crude Awakening: Saudi Oil Minister Warns Against Renewable Exuberance”, Wall Street Journal, 2-11, http://blogs.wsj.com/environmentalcapital/2009/02/11/crude-awakening-saudi-oil-minister-warns-against-renewable-exuberance/, Deech)

Oil executives will talk about how the world needs more renewables and more oil. But there is **tension** between crude oil purveyors and renewable energy adherents. Saudi Arabia Oil Minister Ali Naimi lobbed a verbal salvo in the crude vs. renewables scuffle. In a speech to oil executives in Houston, he warned that promoting the growth of renewable fuels **too quickly** could create a **“nightmare scenario”** – too little investment in oil, while renewables aren’t yet ready to pick up the slack. His remarks seemed aimed at officials in Washington D.C. and particularly members of President Barack Obama’s administration. His speech comes at a time when the new Obama administration embarks on an ambitious path to steer the country’s energy policy away from fossil fuels. President Obama was to instate a national renewable electricity mandate and a carbon cap-and-trade system this year. “We must be mindful that efforts to **rapidly** promote alternatives could have a ‘chilling effect’ on investment in the oil sector,” he said at the Cambridge Energy Research Associates oil conference, according to his prepared remarks. “A nightmare scenario would be created if alternative energy supplies fail to meet overly optimistic expectations, while traditional energy suppliers scale back investment.” That echoes an argument made last summer by a Dutch think tank–basically, that oil-producing nations are just as concerned about “security of demand” as consumer countries are about “security of supply.” Mr. Naimi’s warning against ramping up investments and expectations in renewable energy comes at a time when OPEC members are feeling the financial pain of low crude oil prices.

**And --- that collapses the Russian economy --- here’s more ev their on the brink on the brink now**

**Herszenhorn 6-20** (David M., Moscow Correspondent – New York Times, “Oil Wealth Ebbing, Russia Needs to Lure Foreign Capital”, New York Times, 2013, http://www.nytimes.com/2013/06/21/world/europe/oil-wealth-reduced-russia-needs-to-lure-foreign-capital.html?pagewanted=all&\_r=0, Deech)

Those heady days seem to be running out, however. The great gush of oil and gas wealth that has fueled Mr. Putin’s power and popularity and has raised living standards across Russia is leveling off. Foreign investors, wary of endemic corruption and an expanding government role in the economy, are **hanging back**, depriving the economy of **essential capital**. In many respects, analysts say, the same iron fist that Mr. Putin wielded to public approval in the early years of his presidency could be the biggest obstacle to a badly needed economic restructuring, and potentially even turn public opinion against him. Russia’s economy, the world’s eighth largest, slowed to a **near standstill** in the first months of this year, and the Kremlin is now preparing to dip into its $171 billion rainy day fund in a bid to spur growth. But the problems for Russia’s economy run deeper than its overwhelming dependence on oil and gas revenues, which now account for more than half the federal budget. Despite the conspicuous consumption of oligarchs and the growing middle class in Moscow, most of Russia’s goods-producing economy has been languishing for decades. Many provincial cities and towns have grown shabby, the factories that sustained them decrepit. Young people have moved away. With flattening revenues, the government **badly needs** to **attract foreign capital**, but the Kremlin’s recent move to tighten its grip on the oil industry through Rosneft, the national oil company, is just the latest warning flag to potential investors.

**Plan facilitates a climate accord --- that also kills prices**

**BG 10** (BusinessGreen, “IEA fears oil price escalation without global climate deal”, 11-4, http://www.businessgreen.com/bg/news/1869352/iea-fears-oil-price-escalation-global-climate-deal, Deech)

Failing to implement ambitious global climate change policies and cut fossil fuel subsidies will see oil prices **skyrocket** over the next two decades. Not the prediction of green groups or renewable energy firms, but the view of the International Energy Agency (IEA), the global body tasked with monitoring oil supplies, which is set to warn in a report next week that the world is on the brink of yet another oil price shock. In its annual World Energy Outlook report, due to be released on 9 November and seen in draft format by the Financial Times, the energy watchdog will predict that by 2035, strong environmental policies could result in per-barrel oil prices **$20 lower** than a 'business as usual' scenario. But it cautions that without action, oil prices could **soar** from around $85 a barrel today to $135 by 2035.

**The plan includes biomass**

**US Code 13** (“42 USC § 15852 - Federal purchase requirement”, http://www.law.cornell.edu/uscode/text/42/15852#b\_2, Deech)

(2) Renewable energy

The term “renewable energy” means electric energy generated from solar, wind, **biomass**, landfill gas, ocean (including tidal, wave, current, and thermal), geothermal, municipal solid waste, or new hydroelectric generation capacity achieved from increased efficiency or additions of new capacity at an existing hydroelectric project.

**And --- that ends oil dependence**

**DOE 13** (Department of Energy, BIOENERGY TECHNOLOGIES OFFICE, “Replacing the Whole Barrel: To Reduce U.S. Dependence on Oil”, May, https://www1.eere.energy.gov/bioenergy/pdfs/replacing\_barrel\_overview.pdf, Deech)

Converting domestic biomass into affordable **fuels**, **products**, and **power** supports our national strategy to diversify energy resources and reduce dependence on imported oil. Indeed, biomass is the only renewable energy source that can offer a **substitute** for petroleum-based, liquid transportation fuels for the near term.1 Developing domestic biomass as a clean, sustainable energy resource for transportation fuels offers a range of significant benefits. Stimulate the economy: The dollars that America spends on biofuels will recirculate in our own economy—instead of enriching foreign interests or adding to the trade deficit. Employment in the U.S. biofuels industry has grown an average of 8.9% annually since 20042 and represented 87,000 direct jobs in 2011.3 The industry’s continued growth will generate new job opportunities across the country—particularly in rural areas. Improve our trade balance: Petroleum-related products accounted for about 40% of the roughly $540 billion total U.S. trade deficit in 2012.4 U.S. biofuels improve this balance in two ways. First, they directly reduce imports; ethanol is estimated to have displaced about $47.2 billion worth of imported crude in 2012 (based on an acquisition cost of $101.53 per barrel).3 In addition, every job in the biofuels sector generates a significantly greater value of exports than the average U.S. job.5 Mitigate climate impacts: Biofuels typically offer a net life-cycle reduction in greenhouse gas (GHG) emissions relative to petroleum-based fuels. The GHG impact of a particular biofuel depends on the energy used to grow and harvest the feedstock as well as the energy used to produce the fuel (e.g., coal, natural gas, biomass). If processing uses clean, renewable energy, emerging technologies for advanced biofuels could reduce GHGs by 70% to more than 100%, relative to conventional gasoline.6 Increase energy security: Domestic biofuels diversify our energy portfolio and decrease our dependence on foreign sources of energy. Biorefineries may potentially serve as regionally self-sufficient energy facilities, independent of national transportation and power networks. These attributes provide each region and the nation with greater energy security and resilience, enabling the continuation of critical regional operations in the event of a natural disaster or national emergency.

**Independently, the plan’s engagement collapses US oil dependence**

**Wood 10** (Duncan, Professor of International Relations – Instituto Tecnológico Autónomo de México, Senior Adviser – Renewable Energy Initiative of the Woodrow Wilson International Center for Scholars, Senior Associate – Center for Strategic and International Studies, Ph.D. in Political Studies – Queen’s University, “Environment, Development and Growth: U.S.-Mexico Cooperation in Renewable Energies”, Woodrow Wilson International Center for Scholars, December, http://wilsoncenter.org/sites/default/files/Renewable%20Energy%20report.pdf, Deech)

This study examines one of the most important and potentially lucrative dimensions of the growth of the renewable energy sector in Mexico, namely bilateral cooperation between Mexico and the United States. The 2009 bilateral framework should be seen in the context of an emerging trend in Mexico toward renewable energy, and as recognition of the need for the United States to take advantage of this if it is to meet its own carbon emissions reduction goals. The long border shared by the two countries, so often seen as a point of conflict due to the thorny issues of migration, drugs, and security, holds the potential to benefit both states through the trade in renewable energy from wind, geothermal, biomass, and solar sources. But the promise of a in the sector goes far beyond the border. The United States has been engaged with Mexico in RE issues for over 15 years now on multiple levels, and this has brought tangible results that have had a significant impact on both Mexico and on bilateral relations. U.S. engagement with Mexico in the area of renewable energy has been **driven by** three main concerns. First, the U.S. government has focused much of its efforts over the past 15 years on using renewable energy applications to improve living standards and business opportunities for Mexicans living in rural areas. Second, the contribution of RE to climate change mitigation strategies has become a central pillar of U.S. work in the area. Mexico’s impressive potential for RE offers great hope for the **reduction** of **current dependence** on fossil fuels. Third, the possibility of satisfying growing U.S. demand for RE from Mexican sources has not been lost on decision-makers in both countries, and collaborative work has progressed toward this goal.

**And --- ending dependence ensures a flood**

**Kole 7** (William, Correspondent – AP, “Despite Rising Prices, OPEC Appears to be in No Rush to Raise its Output Targets”, 9-8, http://nwitimes.com/articles/2007/09/08/business/business/doc7e79bb33cb7ec6f28625734f00723bfd.txt)

1. If you remember what happened in the 1970's (look it up if you don't) you will find the biggest fear OPEC has. It is that oil prices will go up and stay high long enough to fuel investment into conservation and alternative energy sources to the point that a critical mass is reached and the need for their oil is **greatly diminished** or **replaced** by other energy sources they don't control. That's exactly what started happening in the 1970's and it took OPEC opening up the tap to make oil cheap again over a decade to reverse the trends. The result was that interest in conservation and alternative energy waned and investments dried up in the face of cheap oil again. We are once again nearing that point and you can expect to see OPEC **flood the market** again if they see us getting serious with conservation and alternative energy sources that compete with, or worse yet, actually **replace** demand for their oil. OPEC walks the fine line between price and demand and wants to keep us hooked up to their oil like a bunch of junkies on drugs while making as much money as possible.