# Oil Dependence

#### Contention 1 is Oil Dependence

#### The plan is key to make ethanol viable – sugar is the most effective method for reducing oil dependence – other options fail

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Note that the USA produces about 11% and consumes about 25% of world demand. Recent increases are attributable largely to growing economies in China, India, and other developing countries. At the current rate of worldwide oil consumption, the above worldwide oil reserves equate to about 44 years of production. Of course, total proved reserves includes both developed and undeveloped reserves, and a substantial portion of the total proved reserves have yet to be developed and produced. Such development and production will require considerable expenditures. For economic reasons, therefore, we have tended generally to have somewhere in the range of 10-15 years of developed and producing reserves at any time. Of course, we cannot accurately determine the amount of reserves present until they are developed and produced, but these estimates are developed using reasonable methodologies. What must be understood is that this does not mean we have 10 or 15 or 44 years before the oil runs out. The “peak oil” question must be addressed when new discoveries start to run out, but that has not been the case yet. However, at some point the question of how long we can continue to rely on oil must be faced. Given that the 44 years of reserves identified above represent what has been found with technology to date, and that finding new reserves is becoming technologically more difficult and substantially more expensive, it is not unreasonable to infer from the above that the era of relatively cheap oil will be over within something approaching 50 years, and therefore we need to be migrating away from oil in earnest by that time. The problem with migrating away from oil is that it has proved to be very difficult to find a reasonable alternative to oil. Sandalow has identified ten key facts about oil, each with an important implication, as follows (Sandalow, 2008): One reason that oil is so hard to replace is that it is a relatively efficient energy source. Cleveland, Costanza, Hall, and Kaufmann compared the “energy profit ratio” of various renewable and nonrenewable energy sources (Cleveland, et al, 1984), and Howard T. Odum compared the “energy yield ratio” (Odum, 1976). Their findings were summarized by Richard Heinberg (Heinberg, 2006, pp 162-164). Oil has yield rates in the range of 8 to 11 and natural gas in the range of 7 to 10, with coal even higher. Among alternatives, only sugar cane ethanol (8.3 to 10.2, per Goettemoeller, 2007), 100-year growth rainforest (12.0 per Odum), hydroelectric (11.2 per Cleveland and 10.0 per Odum), solar photovoltaics (1.7 to 10.0, per Cleveland), geothermal from hot dry rock (1.9 to 13.0 per Cleveland and 13.0 per Odum), and tidal electric with a 25-foot tide range (15.0 per Odum). The fossil fuels (oil, natural gas, coal) as a group produce significantly higher energy profit ratios or energy yield ratios than do most green alternatives. This differential is typically reflected in price; we depend so heavily on oil, and to a lesser extent on other fossil fuels, because they provide more energy cheaper than do the currently available alternatives. One barrier to alternative energy sources is that the cost of those alternatives is higher than the cost of oil. However, the cost of oil is also rising. As time passes, we are still making significant discoveries (such as Brazil’s finds in the Campos, Santos, and Espirito Santo basins) and as prices rise so will oil supplies, as some known reservoirs are economically viable to produce only at higher prices. But we appear to have found most of the “easy” oil, and what is discovered in the future can reasonably be expected to be more expensive to produce. Green, Jones, and Leiby, in a 1995 report prepared for the Office of Transportation Technology of the United States Department of Energy, forecasted that “in the long run the net price of oil (price minus marginal extraction costs) will rise steadily at the rate of interest” (Green, et al, 1995, p. 5). Since that time, oil prices have fluctuated wildly but the overall trend is clearly upward. The Energy Information Administration of the U.S. Department of Energy (DOE/EIA) prepares an annual energy report and forecast with projections of future energy supply and demand, specifically projecting supply and demand components for 2020 and 2030. The 2007 and 2009 forecasts (DOE/EIA, 2007 and DOE/EIA, 2009) can be compared as follows (reference case, volumes in quadrillion Btu/year): The 2009 forecast differs from the 2007 forecast primarily in that it considers the impact of the decline in energy consumption during the latter half of 2008. Although both forecasts predict an increase in domestic oil and gas production as well as energy from other source, both forecasts leave the U.S. very much dependent on foreign oil as far into the future as 2030. President Barack Obama has stated, "And for the sake of our economy, our security, and the future of our planet, I will set a clear goal as president: In 10 years, we will finally end our dependence on oil from the Middle East (Obama, 8/28/2008).” Unfortunately, it does not appear that the energy program outline by President Obama will accomplish that goal. Efforts to develop wind, solar, and improved insulation for buildings will have minimal impacts on oil usage. Perhaps the signature element—the electric automobile—is now coming into use, with a goal of 1 million on the road by 2015 (Obama, 1/25/2011). Assuming that each electric vehicle saves 4 gallons of gasoline per day, achieving that goal would reduce current oil consumption by about 200,000 barrels per day, or less than 1 percent. It is entirely likely that on the current path, the US will import more oil in 2015 than today, thus continuing the trend of the last 40 years of becoming ever more dependent on foreign oil. To date, the US has fallen far short of its intended goal of reducing its dependency on foreign oil. In fact that dependency has increased rather than decreased. It is the opinion of the authors that this results from three flaws in the US approach:  There has been a focus on developing a perfect solution in a laboratory environment and then implementing it, rather than making use of what is available.  Particularly with respect to oil, the perfect alternative has not been found, nor at this point is there any strong suggestion of what it might be.  Regulations have hampered many private sector efforts to develop solutions. As a result the US finds itself in a position where it must address two potentially negative factors:  The era of cheap energy is coming to an end.  We currently have no good substitutes for oil. THE APPROACH TAKEN BY BRAZIL Brazil, which was even more dependent on foreign oil than was the U.S. in the 1970s, is today virtually energy-independent. Because of transportation considerations and difficulties refining heavy oil, Brazil does import some oil, primarily from Bolivia (although that is expected to change once production in the offshore Campos, Santos, and Espirito Santo basins is up to speed), but it exports sufficient oil to be a net exporter of energy. Brazil is now among the ten largest suppliers of oil to the USA. Clearly, the Brazilian economy in general, and its energy consumption in particular, is significantly smaller than in the USA, so some lessons are not strictly applicable. However, Brazil clearly did some things better than the U.S., and there are some broad general principles that have significant applicability. Brazil’s well-known and massive effort to develop alternatives to gasoline (sugar cane ethanol) and diesel fuel (soybean-based biodiesel) has replaced approximately 50% of gasoline and 44% of the country’s on-the-road motor fuel. It should be noted that criticism that Brazil has destroyed the Amazon basin to produce ethanol is unfounded. Sugar cane is produced in the Brazilian states of Mato Grosso, Mato Grosso do Sul, Goias, Minas Gerais, Sao Paulo, Parana, Rio de Janeiro, Espirito Santo, Rio Grande do Norte, Paraiba, Pernambuco, Alagoas, and Sergipe. The area with maximum potential for expansion lies in the states of Mato Grosso, Mato Grosso do Sul, and Goias. All these areas lie outside the Amazon basin (Lachlau, Sergio Andre, in Schwind, 2007). Further, it is estimated that approximately 65% of the area now producing sugar cane was converted from pasture land before. Brazil does also produce a significant amount of biodiesel, primarily from soybeans, and a considerable amount of soybean production does take place in areas that have been cleared in the Amazon basin. What may be less well known is that Brazil’s approach also included significant amounts of increased domestic exploration for oil and gas (the source of the other 56% of motor fuel) and hydroelectric (35% of Brazil’s total energy needs). Today Petrobras is perhaps the world’s leading center of expertise in deep water drilling. This has resulted in significant new finds in the offshore Santos, Campos and Espirito Santo basins. While Brazil’s recoverable reserves of oil and gas are less than those of the U.S., they are growing rapidly, and continued development could transform Brazil into one of the largest oil producers in the world (DOE/EIA, Brazil country brief, 2011). This emphasis on a broad frontal attack on the problem from all sources was accompanied by a strong bias in favor of action, specifically action utilizing known technology rather than waiting for future technologies to prove themselves. The ethanol plants are themselves relatively primitive, particularly when compared to a U.S. oil refinery (Schwind, 2007). Brazil has refused to become slave to “perfect” or to allow “perfect” to become the worst enemy of “good enough.” This is quite a contrast to the U.S. effort, where there has been considerable research into a “perfect” solution, but comparatively little effort to get “good enough” solutions implemented. Brazil’s approach also included a heavy orientation toward the private sector and free markets. Realizing that as a government-owned entity, Petrobras would likely be too bureaucratic and not sufficiently nimble to respond as needed, the government sold a large stake in the company and passed management duties and privileges to the non-government shareholders. Brazil moved further toward a free-market approach by ending Petrobras’s exclusive concession to develop all domestic oil and gas, and invited foreign companies to come in and take down exploration and production concessions. The mechanisms whereby sugar growers determine whether to sell there produce for making into sugar or into ethanol, and similarly the mechanisms whereby motorists decide whether to burn gasoline or ethanol in their autos (which are set up to burn either) rely almost entirely upon free-market principles. The sugar cane grower compares the prices he can receive at the sugar mill and at the ethanol plant before deciding where to sell his crop. Because automobiles and trucks are configured to run on either gasoline/diesel or ethanol/bio-diesel, the motorist can check the price of each, adjust for performance differential, and make a rational economic decision which one she should put into her vehicle today. Using sugar cane ethanol as the “swing” product introduces some price elasticity to both sugar and oil. While the sugar market is depressed today, lower sugar prices mean that farmers will deliver more sugar cane to the ethanol plant, and ethanol prices give some insulation against oil—and resulting gasoline—price shocks. The lessons to be learned from the Brazilian experience may be summarized as follows: Table 8 United States Of America Brazil The U.S. has debated the question of “drill here, drill now” versus alternatives versus conservation. The emphasis has been on debate and discussion rather than action. Brazil pursued all available options vigorously and simultaneously. The Brazilian approach has been “drill here, drill now” plus alternatives plus conservation. There has been a strong bias toward action. The U.S. has focused upon developing the “perfect” solution in the laboratory and then bringing that solution to reality. Brazil utilized existing technology to the maximum extent possible, and phased in improved technologies as they make the transition from laboratory to real world usefulness. Brazil has vigorously avoided letting “perfect” get in the way of “good enough”. The U.S. government has maintained an adversarial stance toward the energy industry, and has sought to regulate its activities heavily. Brazil has pushed toward a more cooperative approach with the energy industry, and generally allowed the free market to work. APPLYING THE LESSONS FROM BRAZIL TO THE UNITED STATES These lessons learned from Brazil can be applied to address the USA’s energy problems. Conservation, alternatives, and increased production from conventional domestic sources must be accompanied by vigorous research and development effort. Rather than wait for perfect technology to be developed, the timing is such that we need to implement some “good enough” steps today. Participation by the private sector in an energy market that sends the right price signals is the fastest way to make real progress; this requires a more cooperative, rather than adversarial, relationship with government, and efforts to ensure that free markets send the proper economic signals. The good news is that a solution appears possible. The bad news is that it will not be cheap. The era of cheap energy is over. Pursuing All Available Options Pursuing all available options means that conservation, alternative fuels, and increased production of domestic fuel—fossil and non-fossil—must be accomplished vigorously and simultaneously. Conservation The potential to “find” energy by saving it through conservation is enormous. The USA currently consumes 68.672 barrels of oil per day per 1,000 people, compared to Europe’s 29.42 barrels of oil per day per 1,000 people. Of particular note is that several European countries are able to maintain GDP per capita at, near, or above US levels, with significantly lower energy consumption: Admittedly, Europe has some advantages over the USA, which enable Europeans to use less energy:  Europe is more compact, with less distance between population centers.  Europe has generally better rail and public transit systems.  European homes are generally much smaller, requiring less energy to heat and cool.  Because Europe is so much further north, European summers are cooler, requiring less air conditioning, but this is offset somewhat because European winters are generally cooler, requiring more energy to heat. At the same time, these data suggest considerable potential for improvement. If the USA reduced its oil consumption to European levels, it would require no imports of oil from sources outside NAFTA. More realistically, a report prepared in 2005 for the Natural Resources Defense Council suggested that the United States could save an average of 2.5 million barrels per day by 2015 (Bordetsky, 2005). The proposed approach includes:  Providing tax incentives to auto manufacturers to retool to build more energy-efficient vehicles  Increasing the Corporate Adjusted Fuel Economy (CAFÉ) standards  Requiring replacement tires and motor oil to be at least as fuel efficient as original equipment tires and motor oil;  Requiring efficiency improvements in heavy-duty trucks;  Supporting smart growth and better transportation choices.  Expanding industrial efficiency programs to focus on oil use reduction and adopting standards for petroleum heating;  Replacing chemical feedstocks with bioproducts through research and development and government procurement of bioproducts; Upgrading air traffic management systems so aircraft follow the most-efficient routes; and  Promoting residential energy savings with a focus on oil-heat. Conservative commentator Charles Krauthammer has proposed a revenue-neutral consumption tax on gasoline to encourage conservation (Krauthammer, 2009). The principle behind this proposal is that a substantial tax be added to the price of motor fuel, with an offsetting reduction in the payroll tax. A driver who drove a lesser number of miles, or utilized a more fuel-efficient vehicle, than the standard would realize a net income from this approach. A variation of this approach is that revenue neutrality should apply to a majority of the tax, with the remainder comprising a net revenue stream that could be used to fund alternatives or research or infrastructure to reduce the use of oil. The savings resulting from the imposition of such a tax are not easily quantifiable, but reductions in consumption in response to the 2008 price spike would suggest that this could save at least 1 million barrels a day. Alternatives In the long run, the development of green energy technology will make the biggest difference in reducing or eliminating our dependence upon foreign, and even domestic, oil. The United States’ energy policy needs a more forceful approach to making alternative energy sources mainstream (Toal, 2008). Oil is a natural resource and will deplete in time and as the problem of global warming becomes more severe, the need for alternative fuel becomes more and more imperative (Luchansky & Monks, 2009). Unfortunately, in the short run all alternative fuels suffer from two basic shortcomings:  Because the vast majority of oil is used for transportation, translating alternative energy into an alternative for oil is a difficult proposition.  Alternatives compare poorly to traditional energy sources in at least one of the following areas: o Scale o Infrastructure o Price The relevant question, as stated by Richard Heinberg, ultimately becomes, “To what degree can any given non-petroleum energy source, or combination of sources enable industrial civilization to survive the end of oil?” (Heinberg, 2006, p.138) Heinberg further notes that the advantages of oil as an energy commodity, and by implication the disadvantages of alternatives, are that oil is:  Easily transported (liquid fuels are more easily transported than solids such as coal or gases such as methane, and may be carried in ships far more easily than can be gases);  Energy-dense (gasoline contains roughly 40 kilowatt-hours per gallon);  Capable of being refined into several fuels (including gasoline, kerosene, and diesel fuel) suitable for a variety of applications; and  Suitable for a variety of uses (including transportation, heating, and the production of chemicals and other materials) Because of the above limitations, the use of alternatives must be managed very carefully to obtain maximum advantage. As noted above, Brazil gets 50% of its “gasoline” and over 40% of its motor fuels from Biofuels. An equivalent ratio here would mean somewhere between 5 and 6 million barrels per day from Biofuels. That level is clearly achievable, with relatively inexpensive modifications to automobiles to enable flex fuel operations. The US currently gets about 1 million barrels a day from corn ethanol, and further growth expectations for that market are limited. The quickest possibility of a material impact probably lies with sugarcane ethanol from Latin America. Estimates are that as much as 10% of world gasoline usage could be replaced with sugar cane ethanol using current technology (Goldemberg, 2007). Ron Soligo has estimated the potential for sugar cane ethanol from Latin America to be 2.5 to 3 million barrels per day, depending on amount of land dedicated and yields obtained (Soligo and Jaffe, 2008). If the trade sanctions with Cuba were lifted, Juan Tomás Sanchez of the Association for the Study of the Cuban Economy estimates that Cuba alone could supply up to 3.2 billion gallons of ethanol annually (200,000 barrels/day, or 1% of total U.S. energy consumption), while Cuba expert Jorge Hernandez Fonseca projects a more modest production figure around 2 billion gallons per year (Elledge, 2009). The difficulty arises because the current sanctions make the acquisition of accurate information more difficult. Since Cuban sugar production has declined from 44 million tons/year in 1950 to 11 million tons/year today (Zuurbier, 2008), significant upside potential is obvious. These impacts are substantially larger than any other steps under consideration, except perhaps the “drill here, drill now” option. We would still be importing, but it would be from countries that are closer and have more in common than areas in the Middle East and elsewhere in the third world. The existence of a new cash crop in Latin America could dramatically improve their economies, reducing the pressure from illegal immigration, and could also provide farmers with an alternative to marijuana, cocaine, and other plants that are the source of many drugs currently being smuggled into the U.S. Moreover, the ability to use ethanol as a substitute for gasoline would introduce at least some elasticity into the gasoline consumption model, thereby limiting the exposure to oil price shocks in the future. The EPA estimates that use of sugar cane ethanol could reduce greenhouse gas (GHG) emissions by 61%, compared to 21% for corn ethanol (EPA, 2011). Additional ethanol supplies could be obtained from domestic sugar cane and sugar beets. Estimating the potential production from these sources is difficult, but perhaps another 500,000 barrels per day would be possible. That would mean a total of 4 million barrels per day from ethanol, slightly less than the 40% number, but a significant reduction in oil consumption. Additionally, this would enable the installation of significant ethanol infrastructure now, to be in place already when more exotic forms of ethanol, like cellulosic, become commercially viable. Incurring those costs now would actually reduce the commercial viability threshold for the exotic sources of ethanol, as they become available. The arguments against importing ethanol to add to domestic production center around the negative point that the US would still be importing. However, several counter-arguments should be kept in mind:  The proposed approach makes full use of domestic ethanol production capability, so no domestic enterprise is harmed.  Importing from Central America, the Caribbean, and South America places our energy supplies in far less jeopardy than importing from Asia and Africa.  The development of an additional lucrative cash crop would aid Latin American economies; in addition to being a good neighbor, the US should also see some relief with its drug and immigration issues along its southern border.  Ethanol would be the first true alternative to oil, and having it developed commercially in sufficient volumes would offer some elasticity to the oil-pricing problem, and provide some leverage against oil price spikes.

#### Two Scenarios:

#### First, is the economy

#### High oil prices make economic collapse inevitable – the plan promotes growth

Rubin, 12(Jeff Rubin is a Canadian economist and author. He is a former chief economist at CIBC World Markets. Rubin had worked at CIBC World Markets and its predecessors since 1988, and served as chief economist from 1992 to 2009, “How High Oil Prices Will Permanently Cap Economic Growth,” http://www.bloomberg.com/news/2012-09-23/how-high-oil-prices-will-permanently-cap-economic-growth.html, Sep 23, 2012)

For most of the last century, cheap oil powered global economic growth. But in the last decade, the price of oil has quadrupled, and that shift will permanently shackle the growth potential of the world’s economies. The countries guzzling the most oil are taking the biggest hits to potential economic growth. That’s sobering news for the U.S., which consumes almost a fifth of the oil used in the world every day. Not long ago, when oil was $20 a barrel, the U.S. was the locomotive of global economic growth; the federal government was running budget surpluses; the jobless rate at the beginning of the last decade was at a 40-year low. Now, growth is stalled, the deficit is more than $1 trillion and almost 13 million Americans are unemployed. And the U.S. isn’t the only country getting squeezed. From Europe to Japan, governments are struggling to restore growth. But the economic remedies being used are doing more harm than good, based as they are on a fundamental belief that economic growth can return to its former strength. Central bankers and policy makers have failed to fully recognize the suffocating impact of $100-a-barrel oil. Running huge budget deficits and keeping borrowing costs at record lows are only compounding current problems. These policies cannot be long-term substitutes for cheap oil because an economy can’t grow if it can no longer afford to burn the fuel on which it runs. The end of growth means governments will need to radically change how economies are managed. Fiscal and monetary policies need to be recalibrated to account for slower potential growth rates. Energy Source Oil provides more than a third of the energy we use on the planet every day, more than any other energy source. And you can draw a straight line between oil consumption and gross-domestic- product growth. The more oil we burn, the faster the global economy grows. On average over the last four decades, a 1 percent bump in world oil consumption has led to a 2 percent increase in global GDP. That means if GDP increased 4 percent a year -- as it often did before the 2008 recession -- oil consumption was increasing by 2 percent a year. At $20 a barrel, increasing annual oil consumption by 2 percent seems reasonable enough. At $100 a barrel, it becomes easier to see how a 2 percent increase in fuel consumption is enough to make an economy collapse. Fortunately, the reverse is also true. When our economies stop growing, less oil is needed. For example, after the big decline in 2008, global oil demand actually fell for the first time since 1983. That’s why the best cure for high [oil prices](http://topics.bloomberg.com/oil-prices/) is high oil prices. When prices rise to a level that causes an economic crash, lower prices inevitably follow. Over the last four decades, each time oil prices have spiked, the global economy has entered a recession. Consider the first oil shock, after the Yom Kippur War in 1973, when the Organization of Petroleum Exporting Countries’ Arab members turned off the taps on roughly 8 percent of the world’s oil supply by cutting shipments to the U.S. and other Israeli allies. Crude prices spiked, and by 1974, real GDP in the U.S. had shrunk by 2.5 percent. The second OPEC oil shock happened during Iran’s revolution and the subsequent war with Iraq. Disruptions to Iranian production during the revolution sent crude prices higher, pushing the North American economy into a recession for the first half of 1980. A few months later, Iran’s war with Iraq shut off 6 percent of world oil production, sending North America into a double-dip recession that began in the spring of 1981. Kuwait Invasion When Saddam Hussein invaded [Kuwait](http://topics.bloomberg.com/kuwait/) a decade later, oil prices doubled to $40 a barrel, an unheard-of level at the time. The first Gulf War disrupted almost 10 percent of the world’s oil supply, sending major oil-consuming countries into a recession in the fall of 1990. Guess what oil prices were doing in 2008, when the world fell into the deepest recession since the 1930s? From trading around $30 a barrel in 2004, oil prices marched steadily higher before hitting a peak of $147 a barrel in the summer of 2008. Unlike past oil price shocks, this time there wasn’t even a supply disruption to blame. The spigot was wide open. The problem was, we could no longer afford to buy what was flowing through it. There are many ways an oil shock can hurt an economy. When prices spike, most of us have little choice but to open our wallets. Paying more for oil means we have less cash to spend on food, shelter, furniture, clothes, travel and pretty much anything else. Expensive oil, coupled with the average American’s refusal to drive less, leaves a lot less money for the rest of the economy. Worse, when oil prices go up, so does inflation. And when inflation goes up, central banks respond by raising interest rates to keep prices in check. From 2004 to 2006, U.S. energy inflation ran at 35 percent, according to the Consumer Price Index. In turn, overall inflation, as measured by the CPI, accelerated from 1 percent to almost 6 percent. What happened next was a fivefold bump in interest rates that devastated the massively leveraged U.S. housing market. Higher rates popped the speculative housing bubble, which brought down the global economy. Unfortunately, this pattern of oil-driven inflation is with us again. And world food prices are being affected. According to the food-price index tracked by the United Nations Food and Agriculture Organization, the cost of food rose almost 40 percent from 2009 to the beginning of 2012. And since 2002, the FAO’s food-price index, which measures a basket of five commodity groups (meat, dairy, cereals, oils and fats, and sugar), is up about 150 percent. Food Prices A double whammy of rising oil and food prices means inflation will be here sooner than anyone would like to think. Rising inflation rates in China and India are a clear signal that those economies are growing at an unsustainable pace. China has made GDP growth of more than 8 percent a priority but needs to recalibrate its thinking to recognize the damping effects of high oil prices. Growth might not stall entirely, but clocking double-digit gains is no longer feasible, at least without triggering a calamitous increase in inflation. If China and India, the new engines of global economic growth, are forced to adopt anti-inflationary monetary policies, the ripple effects for resource-based economies such as Canada, Australia and [Brazil](http://topics.bloomberg.com/brazil/) will be felt in a hurry. Triple-digit oil prices will end the lofty economic hopes of India and China, which are looking to achieve the same sort of sustained growth that North America and Europe enjoyed in the postwar era. There is an unavoidable obstacle that puts such ambitions out of reach: Today’s oil isn’t flowing from the same places it did yesterday. More importantly, it’s not flowing at the same cost. Conventional oil production, the easy-to-get-at stuff from the Middle East or west Texas, hasn’t increased in more than five years. And that’s with record crude prices giving explorers all the incentive in the world to drill. According to the International Energy Agency, conventional production has already peaked and is set to decline steadily over the next few decades. That doesn’t mean there won’t be any more oil. New reserves are being found all the time in new places. What the decline in conventional production does mean, though, is that future economic growth will be fueled by expensive oil from nonconventional sources such as the tar sands, offshore wells in the deep waters of the world’s oceans and even oil shales, which come with environmental costs that range from carbon-dioxide emissions to potential groundwater contamination. And even if new supplies are found, what matters to the economy is the cost of getting that supply flowing. It’s not enough for the global energy industry simply to find new caches of oil; the crude must be affordable. Triple-digit prices make it profitable to tap ever-more-expensive sources of oil, but the prices needed to pull this crude out of the ground will throw our economies right back into a recession. The energy industry’s task is not simply to find oil, but also to find stuff we can afford to burn. And that’s where the industry is failing. Each new barrel we pull out of the ground is costing us more than the last. The resources may be there for the taking, but our economies are already telling us we can’t afford the cost.

#### The plan solves growth – sugar cane is extremely efficient

Newsweek, 7 [“Sugar Rush,” Newsweek, <http://www.thedailybeast.com/newsweek/2007/04/15/sugar-rush.html>, accessed 79/13]

He won't be the last. Thanks to global climate change, sugar now is in big demand. The drum-beat of alarm over global warming has set businesses clamoring for a piece of the sugar-cane action. There are plenty of other ways to make ethanol, of course, and scientists the world over are busy tinkering with everything from switchgrass to sweet potatoes. U.S. farmers make it from corn, but with the scarcity of arable land there's just so much they can plant without crowding out other premium crops, like soy beans. (Meantime, the combination of limited land and surging demand have sent corn prices through the roof). So far nothing beats sugarcane—which grows in the tropics—for an abundant, cheap source of energy. Unlike beets or corn, which are confined to temperate zones and must be transformed into carbohydrates before they can be converted into sugar and finally alcohol, sugarcane is already halfway there. That means the sugar barons like Ometto spend much less energy than the competition, not to mention money. The moral imperative of finding a substitute for fossil fuels has lent an air of respectability to new ventures to produce biofuels from sugar—a marked contrast to the sugar barons of old, known for their ruthless ways and their appetite for taxpayers' money. "The distillers who ten years ago were the bandits of agribusiness are becoming national and world heroes," Brazilian president Luiz Inácio Lula da Silva. Lula declared recently. "[E]thanol and biodiesel are more than an answer to our dangerous 'addiction' to fossil fuels. This is the beginning of a reassessment of the global strategy to protect our environment."

#### Economic collapse causes nuclear war

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Two neatly opposed scenarios for the future of the world order illustrate the range of possibilities, albeit at the risk of oversimplification. The first scenario entails the premature crumbling of the post-Westphalian system. One or more of the acute tensions apparent today evolves into an open and traditional conflict between states, perhaps even involving the use of nuclear weapons. The crisis might be triggered by a collapse of the global economic and financial system, the vulnerability of which we have just experienced, and the prospect of a second Great Depression, with consequences for peace and democracy similar to those of the first. Whatever the trigger, the unlimited exercise of national sovereignty, exclusive self-interest and rejection of outside interference would likely be amplified, emptying, perhaps entirely, the half-full glass of multilateralism, including the UN and the European Union. Many of the more likely conflicts, such as between Israel and Iran or India and Pakistan, have potential religious dimensions. Short of war, tensions such as those related to immigration might become unbearable. Familiar issues of creed and identity could be exacerbated. One way or another, the secular rational approach would be sidestepped by a return to theocratic absolutes, competing or converging with secular absolutes such as unbridled nationalism. One symptom that makes such a scenario plausible has become visible. Many commentators have identified anger or anxiety as a common driver of the Tea Party movement in the United States and the rise of xenophobic parties in Europe, perhaps stemming from a self-perception of decline. Anger (directed towards the neo-colonialist or pro-Israeli West or – especially recently – domestic authoritarian regimes) has also been associated with grievances in the Middle East, following the failure of earlier reformist and secular movements. 10 Despite relative popular optimism, anger can also be detected in Asia, hand in hand with chauvinism and a sense of lack of appropriate recognition by others, stemming from a self-perception of rising influence and power.

#### The second scenario is military dominance

#### Oil dependence collapses military power projection and undermines hegemony

Fitzpatrick ’11 (Senior Policy Advisor for Clean Energy at Third Way, Josh Freed, Vice President for Clean Energy at Third Way, and Mieke Eoyan, Director for National Security at Third Way, June ,Fighting for Innovation: How DoD Can Advance CleanEnergy Technology... And Why It Has To, content.thirdway.org/publications/414/Third\_Way\_Idea\_Brief\_-\_Fighting\_for\_Innovation.pdf)

The military’s reliance on oil from unstable and often unfriendly parts of the world creates a significant security threat. Like most consumers, the Pentagon purchases petroleum on the global market. Some of the largest suppliers in this market are Middle Eastern and North African nations, many of which are prone to internal political instability and/or tenuous relationships with the American government. The ten countries with the largest oil reserves, for example, include the likes of Libya, Iran, Nigeria, Venezuela, and Iraq. This leaves the U.S. vulnerable to petroleum price fluctuations influenced by the Organization of Petroleum Exporting Countries (OPEC), which currently is chaired by Iran.6 Supply concerns are particularly acute in forward-deployed military locations, like Afghanistan and Iraq, which rely on the safe transportation of fuel through volatile regions to power vehicles and generators. Military operations account for 75% of all DoD energy consumption, requiring immense amounts of fuel to be brought to theater.7 U.S. and allied fuel convoys have been targeted by militants in Iraq, Afghanistan, and Pakistan, resulting in military and civilian casualties, as well as disruptions in energy supply to critical operations. In April of 2011, the Taliban warned of a “spring offensive” that would include attacks on “logistical convoys of the foreign invaders” within Afghanistan.8 And in May, militants damaged or destroyed over a dozen fuel tankers taking 15 lives in the process.9 It is estimated that over 3,000 American troops and contractors have been killed while protecting supply convoys in Iraq and Afghanistan.10 As Navy Secretary Ray Mabus has said, “Fossil fuel is the No. 1 thing we import to Afghanistan, and guarding that fuel is keeping the troops from doing what they were sent there to do, to fight or engage local people.”11 Reliance on oil can also make the military less responsive and flexible in its operations. For instance, the Defense Science Board notes that if the Abrams tanks used in operation Desert Shield had been 50% more fuel efficient, there would have been a greatly reduced need for fuel and related infrastructure which, in turn, would have cut the military’s build-up time by 20%.12 Between 2000 and 2008, DoD’s oil expenditures increased by almost 500%, peaking at nearly $18 billion.13 And estimates show that every $10 increase in the cost of a barrel of oil adds another $1.3 billion to the Pentagon’s fuel budget, swelling the national deficit and diverting resources from critical defense priorities.14 The rise in spending on fuel by DoD is not solely due to skyrocketing oil prices. The wars in Afghanistan and Iraq, combined with ever-more energy hungry weapons systems, vehicles and communications devices have increased demand to historic levels. Transporting fuel to military operations sites, often via heavily-protected convoys, also contributes significantly to the cost. Unless DoD makes significant strides to reduce its demand and promote innovative methods of generating and distributing energy, it is on course to spend over $150 billion over the next decade on fuel and electricity. That’s up from the roughly $107 billion the Pentagon spent on energy between 2000 and 2009, at the height of two overseas conflicts.15

#### Hegemony is a backstop against war

Brooks, Ikenberry, and Wohlforth 13 [Stephen G. Brooks is Associate Professor of Government at Dartmouth College.G. John Ikenberry is the Albert G. Milbank Professor of Politics and International Affairs at Princeton University in the Department of Politics and the Woodrow Wilson School of Public and International Affairs. He is also a Global Eminence Scholar at Kyung Hee University.William C. Wohlforth is the Daniel Webster Professor in the Department of Government at Dartmouth College. “Don't Come Home, America: The Case against Retrenchment”, Winter 2013, Vol. 37, No. 3, Pages 7-51,http://www.mitpressjournals.org/doi/abs/10.1162/ISEC\_a\_00107, GDI File]

A core premise of deep engagement is that it prevents the emergence of a far more dangerous global security environment. For one thing, as noted above, the United States’ overseas presence gives it the leverage to restrain partners from taking provocative action. Perhaps more important, its core alliance commitments also deter states with aspirations to regional hegemony from contemplating expansion and make its partners more secure, reducing their incentive to adopt solutions to their security problems that threaten others and thus stoke security dilemmas. The contention that engaged U.S. power dampens the baleful effects of anarchy is consistent with influential variants of realist theory. Indeed, arguably the scariest portrayal of the war-prone world that would emerge absent the “American Pacifier” is provided in the works of John Mearsheimer, who forecasts dangerous multipolar regions replete with security competition, arms races, nuclear proliferation and associated preventive war temptations, regional rivalries, and even runs at regional hegemony and full-scale great power war. 72 How do retrenchment advocates, the bulk of whom are realists, discount this benefit? Their arguments are complicated, but two capture most of the variation: (1) U.S. security guarantees are not necessary to prevent dangerous rivalries and conflict in Eurasia; or (2) prevention of rivalry and conflict in Eurasia is not a U.S. interest. Each response is connected to a different theory or set of theories, which makes sense given that the whole debate hinges on a complex future counterfactual (what would happen to Eurasia’s security setting if the United States truly disengaged?). Although a certain answer is impossible, each of these responses is nonetheless a weaker argument for retrenchment than advocates acknowledge. The first response flows from defensive realism as well as other international relations theories that discount the conflict-generating potential of anarchy under contemporary conditions. 73 Defensive realists maintain that the high expected costs of territorial conquest, defense dominance, and an array of policies and practices that can be used credibly to signal benign intent, mean that Eurasia’s major states could manage regional multipolarity peacefully without the American pacifier. Retrenchment would be a bet on this scholarship, particularly in regions where the kinds of stabilizers that nonrealist theories point to—such as democratic governance or dense institutional linkages—are either absent or weakly present. There are three other major bodies of scholarship, however, that might give decisionmakers pause before making this bet. First is regional expertise. Needless to say, there is no consensus on the net security effects of U.S. withdrawal. Regarding each region, there are optimists and pessimists. Few experts expect a return of intense great power competition in a post-American Europe, but many doubt European governments will pay the political costs of increased EU defense cooperation and the budgetary costs of increasing military outlays. 74 The result might be a Europe that is incapable of securing itself from various threats that could be destabilizing within the region and beyond (e.g., a regional conflict akin to the 1990s Balkan wars), lacks capacity for global security missions in which U.S. leaders might want European participation, and is vulnerable to the influence of outside rising powers. What about the other parts of Eurasia where the United States has a substantial military presence? Regarding the Middle East, the balance begins to swing toward pessimists concerned that states currently backed by Washington— notably Israel, Egypt, and Saudi Arabia—might take actions upon U.S. retrenchment that would intensify security dilemmas. And concerning East Asia, pessimism regarding the region’s prospects without the American pacifier is pronounced. Arguably the principal concern expressed by area experts is that Japan and South Korea are likely to obtain a nuclear capacity and increase their military commitments, which could stoke a destabilizing reaction from China. It is notable that during the Cold War, both South Korea and Taiwan moved to obtain a nuclear weapons capacity and were only constrained from doing so by a still-engaged United States. 75 The second body of scholarship casting doubt on the bet on defensive realism’s sanguine portrayal is all of the research that undermines its conception of state preferences. Defensive realism’s optimism about what would happen if the United States retrenched is very much dependent on its particular—and highly restrictive—assumption about state preferences; once we relax this assumption, then much of its basis for optimism vanishes. Specifically, the prediction of post-American tranquility throughout Eurasia rests on the assumption that security is the only relevant state preference, with security defined narrowly in terms of protection from violent external attacks on the homeland. Under that assumption, the security problem is largely solved as soon as offense and defense are clearly distinguishable, and offense is extremely expensive relative to defense. Burgeoning research across the social and other sciences, however, undermines that core assumption: states have preferences not only for security but also for prestige, status, and other aims, and they engage in trade-offs among the various objectives. 76 In addition, they define security not just in terms of territorial protection but in view of many and varied milieu goals. It follows that even states that are relatively secure may nevertheless engage in highly competitive behavior. Empirical studies show that this is indeed sometimes the case. 77 In sum, a bet on a benign postretrenchment Eurasia is a bet that leaders of major countries will never allow these nonsecurity preferences to influence their strategic choices. To the degree that these bodies of scholarly knowledge have predictive leverage, U.S. retrenchment would result in a significant deterioration in the security environment in at least some of the world’s key regions. We have already mentioned the third, even more alarming body of scholarship. Offensive realism predicts that the withdrawal of the American pacifier will yield either a competitive regional multipolarity complete with associated insecurity, arms racing, crisis instability, nuclear proliferation, and the like, or bids for regional hegemony, which may be beyond the capacity of local great powers to contain (and which in any case would generate intensely competitive behavior, possibly including regional great power war).

# Brazil

#### Contention 2 is Brazilian Ecosystems

#### Cuban ethanol displaces Brazilian ethanol which destroys the Cerrado ecosystem

Specht ‘12

(Jonathan – Legal Advisor, Pearlmaker Holsteins, Inc. B.A., Louisiana State University, 2009; J.D.,¶ Washington University in St. Louis 2012. “Raising Cane: Cuban Sugarcane Ethanol’s Economic and Environmental Effects on the United States” – ExpressO – http://environs.law.ucdavis.edu/issues/36/2/specht.pdf)

B. Environmental Effects of Sugarcane-Based Ethanol If future legislation does not revive the United States ethanol tariff that expired at the end of 2011 and the trade embargo against Cuba is kept in place, Brazil will likely be the primary beneficiary.109 The argument can be made that Brazilian sugarcane-based ethanol is a more environmentally beneficial fuel source than domestic-corn based ethanol, because of the nature of sugarcanebased ethanol (discussed below).110 Brazilian sugarcane-based ethanol comes, however, with its own set of environmental consequences. The full debate over the environmental consequences of the Brazilian biofuel¶ production¶ 111¶ is largely beyond the scope of this Article. Still, the primary issue¶ in this dispute is worth noting, because it accentuates one of the most significant¶ differences between the U.S. corn-based ethanol industry and the potential¶ Cuban sugarcane-based ethanol industry. In Brazil, the expansion of sugarcane¶ production to meet demand for ethanol production has led to land use changes that parallel the expansion of corn production for ethanol in the United States.¶ Clearing portions of the Amazon rainforest¶ —¶ one of the most significant¶ repositories of carbon on Earth¶ 112¶ —¶ would represent an environmental cost of¶ ethanol production that outweighs its benefits. The Amazon region, however, is¶ largely unsuitable for sugarcane production.¶ 113¶ But, sugarcane production is¶ contributing to destruction of another sensitive habitat, the bio-diverse Cerrado¶ savannah region of Brazil.¶ 114¶ Cuban sugarcane-based ethanol would have the environmental benefits of¶ Brazilian sugarcane-based ethanol without its most obvious negative factor,¶ damaging habitat in the Cerrado¶ .¶ The environmental effects of biofuels depend¶ on a number of factors. Whether or not a given type of biofuel is¶ environmentally beneficial “depends on what the fuel is, how and where the¶ biomass was produced, what else the land could have been used for, how the¶ fuel was processed and how it is used.”¶ 115¶ Taken together, these factors point to¶ sugarcane-based ethanol grown in Cuba as one of the most environmentally friendly biofuels possible. ¶ The environmental benefits of using sugarcane to produce ethanol are¶ numerous. First, it is much more energy efficient to derive ethanol from¶ sugarcane than corn. Making ethanol from corn only creates approximately 1.3¶ times the amount of energy used to produce it, but making ethanol from¶ sugarcane creates approximately eight times the amount of energy used to produce it.¶ 116¶ Second, unlike much of the corn presently grown in Great Plains¶ states, sugarcane grown in Latin America does not need to be irrigated.¶ 117¶ Third,¶ sugarcane requires relatively small amounts of chemical fertilizers, herbicides,¶ and pesticides.¶ 118¶ Fourth, whereas most U.S. ethanol refineries are powered by¶ coal or natural gas,¶ 119¶ sugarcane ethanol refineries can be powered by¶ bagasse¶ , a¶ natural product left over from the sugar refining process.¶ 120¶ In fact, refineries¶ powered with¶ bagasse¶ can even produce more electricity than they need and sell power back to the electric grid.¶ 121¶ Fifth, although corn can only be planted and¶ harvested once a year, in tropical climates sugarcane can be cut from the same¶ stalks multiple times per year.¶ 122¶ Each of these factors in favor of sugarcane ethanol is true of ethanol from¶ Brazil as well as of any potential ethanol from Cuba. However, there are¶ additional environmental factors that clinch Cuban sugarcane-based ethanol as¶ one of the most environmentally friendly fuel sources available to the United¶ States under current technology.¶ 123¶ First, because Cuba is closer to the United¶ States, transporting ethanol from Cuba to the United States would require less¶ energy than transporting ethanol from Brazil to the United States (especially if it¶ is used in Florida, an option further explored in the section on economic¶ effects).¶ 124¶ Another reason Cuban sugarcane-based ethanol could be one of the most¶ environmentally friendly fuels possible is that Cuba could produce a significant¶ amount of ethanol without any negative impacts on native habitat. A striking¶ amount of Cuban agricultural land — fifty five percent as of 2007 — is simply¶ lying fallow and is not cultivated with anything.¶ 125¶ Although its character may¶ have changed due to years of neglect, this land is not virgin native habitat like¶ the grasslands of North Dakota or the Cerrado of Brazil. Cuba therefore could¶ greatly increase its production of sugarcane, and thus its production of¶ sugarcane-based ethanol, without negative impacts on wildlife habitat. While it¶ is not environmentally perfect — no form of energy is — Cuban sugarcane-¶ based ethanol would raise fewer environmental concerns than the fuel sources it¶ would displace: petroleum, domestic corn-based ethanol, and Brazilian¶ sugarcane based ethanol. Therefore, from a purely environmental perspective,¶ changing U.S. law and policy in order to promote the importation of Cuban¶ sugarcane-based ethanol should be encouraged.

#### The Cerrado is an environmental game-changer – key to medical breakthroughs, biodiversity, and carbon sinks

Vitali ‘11

(Isabella Vitali – Senior Policy Officer, WWF-UK.“Soya and the Cerrado: Brazil’s forgotten jewel – http://assets.wwf.org.uk/downloads/soya\_and\_the\_cerrado.pdf)

Loss of the Cerrado is of global concern not only because¶ of its significant contribution to the world’s biodiversity,¶ but also because of its importance in terms of climate¶ change. CO2 emissions associated with the conversion¶ of the Cerrado are more than half the total emissions of the UK and probably already exceed those from Amazon¶ deforestation. Much less well known than its giant neighbour, the Amazon, the Brazilian Cerrado or¶ woodland-savannah is an extraordinary ecosystem worthy of global attention,¶ especially in view of the intense pressure it has suffered and continues to suffer.¶ Originally covering an area larger than Mexico, more than 2m sq km, the Cerrado is¶ an extremely diverse landscape occupying the entire central part of Brazil, thought to¶ be a remnant of the ancient continent that existed at the time of the dinosaurs, before¶ the separation of South America and Africa.25¶ Most of the Cerrado is located on the high plateau of the continent. The ecosystem is¶ characterised by a pronounced dry period, between May and September. This leads¶ to fire-prone conditions in the drought season to which vegetation has adapted over¶ millions of years.26¶ Under the umbrella term Cerrado, the region actually consists of a rich mosaic of¶ contrasting landscapes that makes this the most biodiverse savannah region on the¶ planet. No fewer than 11 different categories of landscape have been defined,¶ including three types of forest; four varieties of ‘true’ savannah with shrubs and¶ sparse, twisted trees; and three separate kinds of grassland.27¶ The diversity of landscapes leads to a diversity of plantlife that qualifies the Cerrado¶ to be one of the planet’s biodiversity hotspots, when combined with the threats which¶ it is facing. A recent checklist of vascular (i.e. flowering) plants in the biome¶ identified more than 11,000 species, of which around 44% are endemic – that is, they¶ appear nowhere else in the world. The Cerrado is estimated to contain some 5% of¶ the entire Earth’s biodiversity.28¶ The plant biodiversity and its long adaptation to adverse conditions make Cerrado vegetation of great interest and potential high value for a wide range of human uses,¶ including for medicines, novel food and potentially even crops better suited to future¶ conditions under climate change.29¶ Among the charismatic mammal species to be found in the Cerrado are the giant¶ anteater, giant armadillo, maned wolf and jaguar. More than 800 bird species occur¶ in the biome30 – emblematic birds include the Toco toucan, the rhea or South¶ American ostrich, and various species of macaw.¶ Apart from the great biodiversity, the Cerrado’s position on the high plateau of the¶ continent gives it an important role in safeguarding the water resources of a large¶ part of Brazil and neighbouring countries. This has given it the nickname ‘Brazil’s¶ water tank’: of 12 hydrological regions in the country, six have sources in the Cerrado.¶ In the case of three major river basins – the Tocantins/Araguaia, São Francisco and¶ Paraná-Paraguay (La Plata) – more than 70% of the water resources originate in the¶ Cerrado. Although the Amazon River itself starts in the Andes, some 4% of the water¶ in the Amazon basin flows from tributaries originating in the Cerrado.31¶ The Cerrado also has global importance because of the large stock of carbon stored in¶ its vegetation and soil. Although it would appear to be much sparser than the well-known carbon store of the Amazon, the Cerrado has been described as a forest¶ standing on its head, with about 70% of biomass underground.32 Recent studies suggest the carbon stock of trees, bushes, litter, roots and soil may be nearly double the figure given by the Intergovernmental Panel on Climate Change (2000), at some¶ 265 tonnes of carbon per hectare.33

#### Two impacts:

#### First is biodiversity – it’s key to solve extinction

Science Daily 11 ("Biodiversity Key to Earth's Life-Support Functions in a CHanging World," Cites Albert-Ludwigs-Universitat Freiburg, August 11, [www.sciencedaily.com/releases/2011/08/110811084513.htm](http://www.sciencedaily.com/releases/2011/08/110811084513.htm)

ScienceDaily (Aug. 11, 2011) — The biological diversity of organisms on Earth is not just something we enjoy when taking a walk through a blossoming meadow in spring; it is also the basis for countless products and services provided by nature, including food, building materials, and medicines as well as the self-purifying qualities of water and protection against erosion. These so-called ecosystem services are what makes Earth inhabitable for humans. They are based on ecological processes, such as photosynthesis, the production of biomass, or nutrient cycles. Since biodiversity is on the decline, both on a global and a local scale, researchers are asking the question as to what role the diversity of organisms plays in maintaining these ecological processes and thus in providing the ecosystem's vital products and services. In an international research group led by Prof. Dr. Michel Loreau from Canada, ecologists from ten different universities and research institutes, including Prof. Dr. Michael Scherer-Lorenzen from the University of Freiburg, compiled findings from numerous biodiversity experiments and reanalyzed them. These experiments simulated the loss of plant species and attempted to determine the consequences for the functioning of ecosystems, most of them coming to the conclusion that a higher level of biodiversity is accompanied by an increase in ecosystem processes. However, the findings were always only valid for a certain combination of environmental conditions present at the locations at which the experiments were conducted and for a limited range of ecosystem processes. In a study published in the current issue of the journal Nature, the research group investigated the extent to which the positive effects of diversity still apply under changing environmental conditions and when a multitude of processes are taken into account. They found that 84 percent of the 147 plant species included in the experiments promoted ecological processes in at least one case. The more years, locations, ecosystem processes, and scenarios of global change -- such as global warming or land use intensity -- the experiments took into account, the more plant species were necessary to guarantee the functioning of the ecosystems. Moreover, other species were always necessary to keep the ecosystem processes running under the different combinations of influencing factors. These findings indicate that much more biodiversity is necessary to keep ecosystems functioning in a world that is changing ever faster. The protection of diversity is thus a crucial factor in maintaining Earth's life-support functions.

#### Second is warming – it’s real and human-caused – powerful carbon sinks are vital to solve

Hu ‘9

(et al – all authors listed. JIA HU = Department of Ecology and Evolutionary Biology, University of Colorado, Boulder. DAVID J. P. MOORE = Department of Geography, King’s College London. SEANP.BURNS = National Center for Atmospheric Research (NCAR). RUSSELL K . MONSON – Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder. “Longer growing seasons lead to less carbon sequestration by a subalpine forest” – Global Change Biology; http://www.mmm.ucar.edu/people/burns/files/gcb10\_hu\_growingseason.pdf)

Human activities, such as the burning of fossil fuels and¶ land use changes, have increased the atmospheric CO2 concentration over the past century. The increase in CO¶ 2¶ and other greenhouse gases is very likely to have caused climate warming at unprecedented rates (IPCC,¶ 2007). While approximately half of the emitted anthropogenic CO2 stays in the atmosphere, the remainder is assimilated into terrestrial and ocean ecosystems (Ca-¶ nadell¶ et al¶ ., 2007). These natural carbon sinks are vital for sequestering atmospheric CO2 , and yet the strength and longevity of these sinks may be diminishing (Cramer¶ et al¶ ., 2001; Canadell¶ et al¶ ., 2007). The tendency for ecosystem growing seasons to lengthen in response to climate warming (Myneni¶ et al¶ ., 1997; Cao & Wood-¶ ward, 1998; Black¶ et al¶ ., 2000) may enhance the strength of the terrestrial carbon sink, and thus diminish the rate of atmospheric CO2 buildup. An earlier spring, and¶ associated longer growing season may increase the¶ potential time for photosynthetic CO¶ 2¶ uptake by terres-¶ trial ecosystems.

#### Warming causes extinction through hydrogen sulfide poisoning

Ward, 10

(Peter, PhD, professor of Biology and Earth and Space Sciences at the University of Washington, paleontologist and NASA astrobiologist, Fellow at the California Academy of Sciences, The Flooded Earth: Our Future in a World Without Ice Caps, June 29, 2010)

In the rest of this chapter I will support a contention that within several millennia (or less) the planet will see a changeover of the oceans from their current “mixed” states to something much different and dire. Oceans will become stratified by their oxygen content and temperature, with warm, oxygen-free water lining the ocean basins. Stratified oceans like this in the past (and they were present for most of Earth’s history) have always been preludes to biotic catastrophe. Because the continents were in such different positions at that time, models we use today to understand ocean current systems are still crude when it comes to analyzing the ancient oceans, such as those of the Devonian or Permian Periods. Both times witnessed major mass extinctions, and these extinctions were somehow tied to events in the sea. Yet catastrophic as it was, the event that turned the Canning Coral Reef of Devonian age into the Canning Microbial Reef featured at the start of this chapter was tame compared to that ending the 300 million- to 251 million-year-old Permian Period, and for this reason alone the Permian ocean and its fate have been far more studied than the Devonian. But there is another reason to concentrate on the Permian mass extinction: it took place on a world with a climate more similar to that of today than anytime in the Devonian. Even more important, it was a world with ice sheets at the poles, something the more tropical Devonian Period may never have witnessed. For much of the Permian Period, the Earth, as it does today, had abundant ice caps at both poles, and there were large-scale continental glaciations up until at least 270 million years ago, and perhaps even later.4 But from then until the end of the Permian, the planet rapidly warmed, the ice caps disappeared, and the deep ocean bottoms filled with great volumes of warm, virtually oxygen-free seawater. The trigger for disaster was a short-term but massive **infusion of carbon dioxide** and other greenhouse gases into the atmosphere at the end of the Permian from the spectacular lava outpourings over an appreciable portion of what would become northern Asia. The lava, now ancient but still in place, is called the “Siberian Traps,” the latter term coming from the Scandinavian for lava flows. The great volcanic event was but the start of things, and led to changes in oceanography. The ultimate kill mechanism seems to have been a lethal combination of rising temperature, diminishing oxygen, and influx into water and air of the highly poisonous compound hydrogen sulfide. The cruel irony is that this latter poison was itself produced by life, not by the volcanoes. The bottom line is that life produced the ultimate killer in this and surely other ancient mass extinctions. This finding was one that spurred me to propose the Medea Hypothesis, and a book of the same name.5 Hydrogen sulfide poisoning might indeed be the worst biological effect of global warming. There is no reason that such an event cannot happen again, given short-term global warming. And because of the way the sun ages, it may be that such events will be ever easier to start than during the deep past. How does the sun get involved in such nasty business as mass extinction? Unlike a campfire that burns down to embers, any star gets ever hotter when it is on the “main sequence,” which is simply a term used to described the normal aging of a star—something like the progression we all go through as we age. But new work by Jeff Kiehl of the University of Colorado shows that because the sun keeps getting brighter, amounts of CO2 that in the past would not have triggered the process result in stagnant oceans filled with H2S-producing microbes. His novel approach was to estimate the global temperature rise to be expected from carbon dioxide levels added to the energy hitting the earth from the sun. Too often we refer to the greenhouse effect as simply a product of the gases. But it is sunlight that actually produces the heat, and that amount of energy hitting the earth keeps increasing. He then compared those to past times of mass extinctions. The surprise is that a CO2 level of 1,000 ppm would—with our current solar radiation—make our world the second hottest in Earth history—when the five hottest were each associated with mass extinction. In the deep history of our planet, there have been at least five short intervals in which the majority of living species suddenly went extinct. Biologists are used to thinking about how environmental pressures slowly choose the organisms most fit for survival through natural selection, shaping life on Earth like an artist sculpting clay. However, mass extinctions are drastic examples of natural selection at its most ruthless, killing vast numbers of species at one time in a way hardly typical of evolution. In the 1980s, Nobel Prize-winning physicist Luis Alvarez, and his son Walter Alvarez, first hypothesized that the impact of comets or asteroids caused the mass extinctions of the past.6 Most scientists slowly come to accept this theory of extinction, further supported by the discovery of a great scar in the earth—an impact crater—off the coast of Mexico that dates to around the time the dinosaurs went extinct. An asteroid probably did kill off the dinosaurs, but the causes of the remaining four mass extinctions are still obscured beneath the accumulated effects of hundreds of millions of years, and no one has found any credible evidence of impact craters. Rather than comets and asteroids, it now appears that short-term global warming was the culprit for the four other mass extinctions. I detailed the workings of these extinctions first in a 1996 Discover magazine article,7 then in an October 2006 Scientific American article, and finally in my 2007 book, Under a Green Sky.8 In each I considered whether such events could happen again. In my mind, such extinctions constitute the worst that could happen to life and the earth as a result of short-term global warming. But before we get to that, let us look at the workings of these past events. The evidence at hand links the mass extinctions with a changeover in the ocean from oxygenated to anoxic bottom waters. The source of this was a change in where bottom waters are formed. It appears that in such events, the source of our earth’s deep water shifted from the high latitudes to lower latitudes, and the kind of water making it to the ocean bottoms was different as well: it changed from cold, oxygenated water to warm water containing less oxygen. The result was the extinction of deep-water organisms. Thus a greenhouse extinction is a product of a changeover of the conveyor-belt current systems found on Earth any time there is a marked difference in temperatures between the tropics and the polar regions. Let us summarize the steps that make greenhouse extinction happen. First, the world warms over short intervals due to a sudden increase in carbon dioxide and methane, caused initially by the formation of vast volcanic provinces called flood basalts. The warmer world affects the ocean circulation systems and disrupts the position of the conveyor currents. Bottom waters begin to have warm, low-oxygen water dumped into them. The warming continues, and the decrease of equator-to-pole temperature differences brings ocean winds and surface currents to a near standstill. The mixing of oxygenated surface waters with the deeper and volumetrically increasing low-oxygen bottom waters lessens, causing ever-shallower water to change from oxygenated to anoxic. Finally, the bottom water exists in depths where light can penetrate, and the combination of low oxygen and light allows green sulfur bacteria to expand in numbers, filling the low-oxygen shallows. The bacteria produce toxic amounts of H2S, with the flux of this gas into the atmosphere occurring at as much as 2,000 times today’s rates. The gas rises into the high atmosphere, where it breaks down the ozone layer. The subsequent increase in ultraviolet radiation from the sun kills much of the photosynthetic green plant phytoplankton. On its way up into the sky, the hydrogen sulfide also kills some plant and animal life, and the combination of high heat and hydrogen sulfide creates a mass extinction on land.9 Could this happen again? No, says one of the experts who write the RealClimate.org Web site, Gavin Schmidt, who, it turns out, works under Jim Hansen at the NASA Goddard Space Flight Center near Washington, DC. I disagreed and challenged him to an online debate. He refused, saying that the environmental situation is going to be bad enough without resorting to creating a scenario for mass extinction. But special pleading has no place in science. Could it be that **global warming could lead to the extinction of humanity**? That prospect cannot be discounted. To pursue this question, let us look at what might be the most crucial of all systems maintaining habitability on Planet Earth: the thermohaline current systems, sometimes called the conveyor currents.

# Plan

#### Thus the plan: The United States federal government should lift all import restrictions on sugar cane ethanol produced in Cuba and facilitate the growth of a Cuban sugar cane ethanol sector through foreign direct investment.

# Solvency

#### Contention 3 is solvency

#### Cuba will say yes to ethanol FDI – Raul loves biofuels

Posner ‘8

Andrew Posner – In 2007, Andy was an Environmental Studies Masters student at Brown University. He has gone on to be the Transportation correspondent for Treehugger.com – “Cuba: Can 'Red' Ethanol Be Green?” – Treehugger.com – February 25, 2008 – http://www.treehugger.com/cars/cuba-can-red-ethanol-be-green.html

After 49 years in power, Fidel Castro has stepped aside and allowed his brother Raúl, 76, to become president. While hopes that "a younger generation might take power" have been washed away, many still expect to see changes with the "pragmatic military officer" in charge. One changes may come in the form of an ethanol boom in Cuba, where experts believe as much as 2 billions gallon could one day be produced annually, which would place Cuba third in worldwide production. According to Wired.com,¶ Fidel Castro hated ethanol. He thought it punished the poor by driving up food prices. But Cuba produces a lot of sugar, and with Fidel's brother Raul - a fan of biofuels - expected to call the shots, Cuba could become a key player in the global ethanol game.¶ Of course, Cuba wouldn't be able to start producing all that ethanol without "a huge investment in Cuba's rickety sugar industry." And doing so will require the kind of reform that has helped make China the powerhouse that it is: namely, foreign investment. This kind of reform may not be as unlikely as it sounds. According to a Washington Post article entitled 'End of Castro's Rule Opens Door for Reforms,' "Cuba's leaders likely will "want to pursue an incremental, gradual approach to reform" that does not privatize the large state-run sector but allows a new private sector to grow alongside it." Oh, and by the way, Cuba has been modernizing its ethanol infrastructure, albeit quietly.

#### Loosening embargo restrictions provides an effective export base

Conanson, ‘8 (Joe Conanson is a journalist, author and political commentator, “One more good reason to lift the embargo on Cuba”, Salon.com, http://www.salon.com/2008/07/18/cuba\_6/, 7-18-2008)

Now there is at least one more incentive to change course. With its huge potential for producing clean, renewable, sugar-based ethanol, Cuba represents a significant source of energy that will remain unavailable to American consumers unless we undo the embargo. Agricultural experts have estimated that Cuba could eventually provide more than 3 billion gallons of fuel annually, perhaps even more when new technologies for extracting energy from sugar cane waste (known as “bagasse”) come online — placing the island third in world ethanol production, behind the U.S. and Brazil. Given the relatively small demand for auto fuel in Cuba, nearly all of that ethanol would be available for export to its nearest neighbor.¶ Today the Cuban government manufactures only nominal amounts of ethanol, mainly because of government policies favoring table sugar and rum instead. Fidel Castro reportedly feels that using cane for fuel instead of food is a capitalist crime against the poor. Having ceded power to his brother Raúl, however, the aging ruler may no longer control economic policy — and Raúl is widely viewed as the more flexible and pragmatic Castro. A revitalized ethanol industry in Cuba would have an enormous ready market only 90 miles away. It is also worth noting that sugar ethanol not only seems to burn cleaner than the kind made from grain but could also reduce pressure on food prices. (Besides, everyone would be better off eating less sugar.)¶ Like offshore oil, Cuban ethanol would not be available overnight. Sugar production has dropped precipitously under Castro and Cuba lacks substantial biorefinery capacity. Whether that capacity can be constructed faster than Exxon can find oil and build platforms is an open question. But the difference is that Cuba could certainly grow far more sugar cane than it does currently. And once the oil is gone, there will be no more, while cane can grow year after year indefinitely — without contributing to climate change or polluting the oceans.¶ Aside from pandering to the exile community in Miami, the sole argument against doing business with Cuba is the repressive nature of that regime, with its muzzled media, political prisoners and one-party state. But the same or worse can be said of Saudi Arabia, a country whose dismal human rights record we routinely ignore because we need its oil. Yoked by sharia law and the tender House of Saud, the Saudi people arguably suffer worse indignities than the poor Cubans. Neither can be called a free country, yet we arm and protect Riyadh while we harass and denounce Havana.¶ The silly hypocrisy of our Cuba policy — especially contrasted to our close commercial and financial ties with Saudi Arabia, China and similarly execrable governments — has been obvious for many, many years. We have done the Cubans and ourselves no favors by refusing to engage their government, as nearly every other country in other country in the world already does.