the plan

HOW THE U.S. CAN HELP STABILIZE THE CLIMATE AND CREATE A CLEAN ENERGY FUTURE

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ACKNOWLEDGEMENTS

This work was made possible with the support of the Wesleyan University Green Fund, the Wesleyan University College of the Environment, and the Sierra Club.

Many experts reviewed, provided input on, and commented on different iterations of the work. Their comments and suggestions were of great value. They include:

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Duncan Clark
Susanne Brooks
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INTRODUCTION

On June 25th 2013, President Barack Obama gave a speech at Georgetown University that outlined steps his administration would take to try to reduce our nation's future contributions to global climate change, minimize the adverse effects of a changing climate in the United States, and further our role in international mitigation and adaptation efforts. We applaud the administration on stepping forward with substantive policy proposals, but the United States' current commitment to reduce greenhouse gas (GHG) emissions to 17% below 2005 levels by 2020 is not sufficient to lead the world towards avoiding a 2°C (3.6°F) rise in global temperatures over pre-industrial levels.[1] As an international leader, the second largest annual emitter of greenhouse gases, and the greatest historical contributor to anthropogenic climate change, the United States has a duty to act decisively if the world is to have any chance of averting the most catastrophic outcomes of global climate change scenarios. Doing less demonstrates a lack of true leadership, and is at odds with the legacy of American ingenuity.

The impediments for transition are political—yet the technologies and policies exist to create the conditions that can drive us towards a safe, ecologically stable, just, and equitable future.

In reality, it is *highly unlikely* that even the President's current "Climate Action Plan," in conjunction with existing state and federal policies, will drive our emissions to this insufficient goal, and additional policy actions will *certainly* be needed to see future emissions reductions.[2,3] The current efforts are not bold enough to meet the scope of the climate crisis

[1] IPCC AR4 indicates that industrialized countries need to

[2] Bianco, Nicholas M., et al 2013

[3] Bailey and Bookbinder 2013

nor do they seize many of the opportunities that come with greater action.

Our transition to a decarbonized energy infrastructure is not delayed by a lack of resources or a shortage of feasible technologies. Analyses have shown over and over again that a renewable energy future is possible. In fact, data from the National Renewable Energy Laboratory shows that given *current* performance of renewable technologies, the United States has enough technical renewable energy generation potential from solar, wind, geothermal, hydropower, wave energy, and biomass to provide for our annual energy demand *128 times over*.[4] The impediments for transition are political—yet the technologies and policies exist to create the conditions that can drive us towards a safe, ecologically stable, just, and equitable future.

[4] NREL 2012 and EPRI 2011. Technical generation potential defined as TWh of generation potential based on resource availability, technical performance, topographic limitations, environmental, and land-use constraints only.

Is a Clean Energy Future Really Possible?

Many detractors doubt the feasibility of a world running on 100% renewable energy, or other high renewables scenarios. However, studies have shown that such a future is achievable for the U.S.—and the world.[5]

One of the common talking points against renewable energy systems is that there is an upper limit for the amount of renewable energy that can be fully integrated into the electrical grid without causing reliability disruptions. However, as the IPCC states, **"there are few, if any, fundamental technological limits to integrating [renewable energy] technologies to meet a majority share of total energy demand."**[6] Many techniques or strategies already exist to deal with increased variability and improve reliability from renewable energy systems, such as: controlled curtailment and improved weather forecasting, demand response management, strengthened transmission capacity and expanded grid interconnection, on-site energy storage, ramping and cycling of hydroelectricity, generating synthetic gas or hydrogen from surplus renewable electricity, and vehicle-to-grid integration.[7]

Another common detraction is that the investments and long-term operation costs required for such a transition are too great. Not even considering that such an argument ignores the social, economic, and environmental costs of continuing with business-as-usual, analyses show that long-term energy costs will be reduced and net savings can be realized with aggressive energy efficiency improvements. At the very least, however, costs would be comparable irrespective of efficiency gains likely to unfold in the future.[8] *When you factor in the societal benefits that would come from mitigating climate change, the savings are clear.*[9]

Lastly, although innovations and technology improvements will reduce costs of the energy transition, a future largely powered by renewable energy is possible **just with the use of existing technologies.**[10]

Under these pretenses, we review the limits of the President's proposals and call on both the President and Congress to take action by:

- Adopting a *Comprehensive Greenhouse Gas Fee* that puts a price on emissions of greenhouse gases to account for the costs of pollution and drive our market towards more efficient outcomes
- Enacting further *Energy Incentive Restructuring* to ensure fairness in energy markets and provide incentives for proven climate solutions
- Creating a *National Green Bank* to provide financing for GHG-reducing initiatives to individuals, the private sector, and municipalities
- Managing our resources with *Supply-Side Fossil Fuel Regulations* to ensure valuation at their true costs and better weigh the impacts of extraction
- Establishing a *Presidential Commission on the Unfolding Climate Crisis and America's Energy Future*
- Implementing the *additional administrative actions* outlined in our critique

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[5] Delucci and Jacobson 2010, Greenpeace 2007, NREL 2012, Makhijani 2010, Mathieson et al. 2011, Sovacool and Watts 2009, Wiseman et al. 2013, WWF 2011

[6] IPCC 2011

[7] REN21 2013, Delucci and Jacobson 2010

[8] WWF 2011, Greenpeace 2007, Mathieson et al. 2011, NREL 2012, Sovacool and Watts 2009, Makhijani 2010

[9] Delucci and Jacobson 2010, NREL 2012, Greenpeace 2007, Mathieson et al. 2011, Sovacool and Watts 2009

[10] Delucci and Jacobson 2010, NREL 2012

1: Going Beyond The President's Plans

1.1: As Americans, We Can Do More

The President's "Climate Action Plan" contains some promising proposals for emissions reductions, such as appliance and heavy-duty vehicle efficiency standards, expansion of the "Better Buildings Challenge," and policies and agreements to reduce emissions of hyrdofluorocarbons (HFCs). However, even these, and especially other components of the plan—such as the all-important power plant regulations—represent actions that will achieve insignificant reductions for the necessary timescale that the **presently unfolding** climate crisis demands.

Independent analyses show that the President's plan, if implemented promptly and aggressively would only reduce overall GHG emissions 9-17% from 2005 levels by 2020.[11]

"We have to all shoulder the responsibility for keeping the planet habitable, or we're going to suffer the consequences—together."
—President Barack Obama, June 25 2013

Even if the most stringent and ambitious regulations were put in place, 17% emissions reductions from 2005 levels by 2020 are *still not enough* to avert the most catastrophic risks that global climate change poses.[12][13][14][15][16] In their fourth assessment report, the Intergovernmental Panel on Climate Change (IPCC) argues that industrialized countries must reduce their emissions from 1990 levels by 25% to 40% by 2020 in order to remain on track to keep global average temperatures from rising more than 2°C above pre-industrial levels. For the United States, this is equal to about a 36-49% reduction in emissions from 2005 levels—more than double our current emissions goal.

In many ways it is more politically feasible for wealthy industrialized countries like the United States to have greater shares in

[11] NRDC's report, "Closing the Power Plant Carbon Pollution Loophole" shows that a 26% reduction in electrical power sector CO_2 emissions below 2005 levels could be achieved by 2020 if ambitious emissions standards are set for new and existing power plants. This only amounts to about 10% in overall CO_2 emissions (about 8.7 percent of overall GHG emissions) and assumes that the plan goes into effect in 2012. WRI's more comprehensive analysis of all possible federal and state policies that could be enacted to reduce emissions without new legislation, "Can the U.S. Get There From Here," found that only with the most aggressive actions from the federal government could 17% reductions from 2005 levels be achieved if measures were put in place by 2015. Aggressive or "go-getter" action under WRI scenarios constituted things like "aggregate emissions reduction across all electric generators equal to 38 percent reduction in emissions in 2021 compared to 2012 emission levels" and very large reductions of methane and HFCs.

[12] Climate Analytics 2012

[13] den Elzen, Michel, and Niklas Höhne 2010

[14] den Elzen, Michel GJ, et al. 2010

[15] Soimakallio, Sampo, et al. 2008

[16] Ekholm, Tommi, et al. 2010

emissions reductions because of their average higher per capita emissions and relatively stable growth rates in population, GDP, and energy demand. Additionally, there should be a higher burden on them to reduce emissions because of their historically greater contributions to climate change.

Based on recently released projections from the Energy Information Administration (EIA), if no new actions are taken, the world is on track to emit enough carbon by 2027 to lock in *at least* a 20% chance that global temperatures rise above 2°C.[17] Missing from this already grim forecast is the possibility of permafrost melt which could release unknown amounts of methane hydrates/clathrates into the atmosphere and move our emissions reductions timeline up.[18] Prompt and aggressive action has never been more imperative, and greater emissions reductions sooner will reduce the risks of surpassing dangerous climate tipping points and produce more benefits for Americans down the road.

Lastly, the president's initiatives will not take effect for some time. In a best-case scenario, the cornerstone of the president's initiatives—the limits on emissions from new and existing power plants—won't go into effect until 2017, but this represents an unrealistically optimistic timetable. Based on the timeline of past standards issued under the Clean Air Act and legal battles that may be launched against the president's efforts, the regulations are likely to not go into effect until 2027,[19] by which time it will probably be too late for the U.S. to have any substantial role in keeping atmospheric concentrations of GHGs at safe levels. We need to act rapidly on an aggressive, comprehensive plan to transform our economy and reduce our emissions in line with levels that will more likely promise us a safe future.

[17] Even if we risked having a 33% chance of global temperature rise above 2°C, we would still exhaust our carbon budget by 2033—essentially "buying" us 6 years of time, but with a 13% higher chance of catastrophic warming. (Based on Meinshausen 2009 and EIA IEO data tables)

[18] Whiteman et al. 2013

[19] Bailey and Bookbinder 2013

A Comprehensive Strategy: The Three Key Problems

The Obama Administration's Climate Action Plan boasts that the energy security of the United States is higher than "at any time in recent history." Two factors are responsible for this: increased domestic oil production and decreased consumption. Implicit is the assumption that falling oil imports is a primary goal of United States energy policy. However, true energy security must tackle three key areas that are inadequately addressed by the status quo: (1) Current Account Deficits (when imports of goods and services exceeds exports) and Reliance on Foreign Sources of Energy, (2) Vulnerability to Global Oil Price Spikes, and (3) Global Warming Pollution.

A strategy solely focused on lowering net oil imports ameliorates (1) by reducing the amount of oil we purchase abroad, especially from hostile or politically unstable governments. However, (2) would be largely unaffected because oil is a globally traded commodity. According to RAND, a prominent U.S.-based research institution, "an abrupt and extended fall in the global oil supply and the resulting higher prices would seriously disrupt U.S. economic activity, no matter how much or how little oil the United States imports."[20] Finally, we can be sure that dramatically increasing domestic oil production will increase greenhouse gas pollution that exacerbates (3). Thus, efforts to increase U.S. supply fail to address all three important areas. The United States must instead enact policies to reduce overall oil consumption, not simply net imports, in order to pursue the goal of energy independence while protecting consumers from global oil price shocks and mitigating global warming pollution. Enacting our proposed energy strategy represents a three-for-one opportunity that the American people cannot afford to squander.

[20] Crane et al. 2013

1.2: Getting Beyond Risky Technologies

The President's plan relies on high-risk, unproven, and antiquated technologies—natural gas extracted via hydraulic fracturing and horizontal drilling, offshore drilling, carbon capture and sequestration, and nuclear power—and underplays the potential of the robust renewable energy economy and advanced renewables innovations. In the President's first term, generation of electricity from solar and wind power more than doubled; the Climate Action Plan calls for another unambitious doubling over an unnecessarily longer horizon—by 2020. ***Meanwhile, according to the IEA, in the United States "solar PV capacity is expected to more than quadruple, from 7.7 gigawatts to 31 gigawatts, and wind capacity is expected to nearly double, from 58.8 gigawatts to 93 gigawatts" by 2018 on its own as long as current trends persist.***[21][22] Rather than propping up risky technologies that would impede a transition to a low-emissions economy, we should be investing strongly in proven industries that are already poised for accelerated growth.

Rather than propping up risky technologies that would impede a transition to a low-emissions economy, we should be investing strongly in proven industries that are already poised for accelerated growth.

Climate Driven Stresses on Conventional Power Generation

Thermoelectric power plants such as those fired by coal, oil, natural gas, nuclear energy, and some concentrated solar power face increased risk of shutting down as extreme weather events become more damaging.[23] The Department of Energy warns that increasing air and water temperatures coupled with flooding and other extreme weather events will negatively affect thermoelectric power generation by lowering power output. In some cases, reduced generation coupled with spikes in demand have lead to power outages. Future climate risks bolster the need to avoid these technologies and switch to more resilient power sources. While the DOE does not make policy prescriptions towards any one technology, it notes that a switch to 80% renewable electricity would reduce water consumption from the power sector by 50%. These climate driven stresses on conventional power generation provide further evidence that transitioning from fossil fuels and nuclear power towards renewables is the most risk-averse method to mitigate carbon emissions.

[21] IEA, Medium-Term Renewable Energy Market Report 2013.

[22] The Institute of Local Self Reliance (ISLR) predicts that by 2016, 33 GW of *unsubsidized* commercial solar (not counting residential) will be at grid parity; it will be cheaper to install up to that much solar PV than buy electricity from the grid. Federal tax credits boost commercial solar potential in 2016 to 131 GW, which better reflects current policies. If the ISLR's projections hold, there exists *considerably* more potential in the solar market than the IEA predicts. Moreover, additional policies such as a greenhouse gas fee would elevate solar's potential even further.

[23] US DOE, U.S. Energy Sector Vulnerabilities to Climate Change and Weather

A Better Natural Gas Strategy

President Obama boasts that the United States has "become the world's leading producer of natural gas – the cleanest-burning fossil fuel," and promotes "fuel switching from oil and coal to natural gas or renewables." However, there are limitations to the potential benefits of continued natural gas developments in combatting climate change. In response, we call for the Obama administration to acknowledge these limitations, support a greenhouse gas fee that would cover fugitive methane emissions from natural gas systems, and further increase regulatory standards for methane capture. In order to maintain a livable climate, we must look past the narrow, near-term goal of coal to gas fuel switching and embrace a direct shift from coal to renewables and energy conservation.

Throughout the production, transmission, distribution, storage and consumption of natural gas there are known and documented leaks of methane (CH_4), a greenhouse gas significantly more potent than carbon dioxide. There exists a considerable amount of variability and uncertainty in estimates of fugitive methane emissions from natural gas production,[25] and the climate benefits of fuel switching from coal or oil to gas depend critically on the rates of these fugitive emissions. Wigley (2011) demonstrates that if the world replaced half of its coal-fired electric power with natural gas, the best-case leakage scenario (0% fugitive methane emissions) results in temperature increase of **3.9˚C**, while

Fugitive Methane Data Uncertainty

Data from fugitive methane emissions exhibit considerable uncertainty because values are generated by multiplying emissions factors by activity data, rather than physically measuring emissions.[24] Other potential unidentified sources of methane in storage, transmission, and distribution sectors indicate that our savings estimates are conservative. Furthermore, the EPA study calculating cost efficiency of fugitive capture technology used a 100-year global warming potential of 21, less than the scientifically established value of 25 used in most other analyses. Measured over shorter timescales, methane's impact on global warming is much higher—72 times as powerful as carbon dioxide on a 20-year scale. Thus, potential savings are greater (abatement costs are lower) than indicated.

[24] IEA, Redrawing the Energy-Climate Map 2013

[25] Howarth 2011 estimates that 1.7% to 7.9% of lifecycle production leaks, but admits that "if [EPA] regulation is adopted and can be adequately enforced, [it] will reduce greatly the difference in emissions between shale gas and conventional gas in the U.S." Some regulations are beginning to come into effect, but it remains to be seen how prudently they will be implemented. Further, O'Sullivan and Paltsev 2012 peg the rate between .39 and 1% using a more comprehensive data set and assuming industry captures 70% of methane, rather than venting 100%. However, troubling recent estimates from Karion et al. 2013 show leakage rates between 6%-12% in one region of Utah. While new EPA standards undoubtedly are a step in the right direction and represent an industry-wide shift to reduce methane leakage, problems clearly still exist.

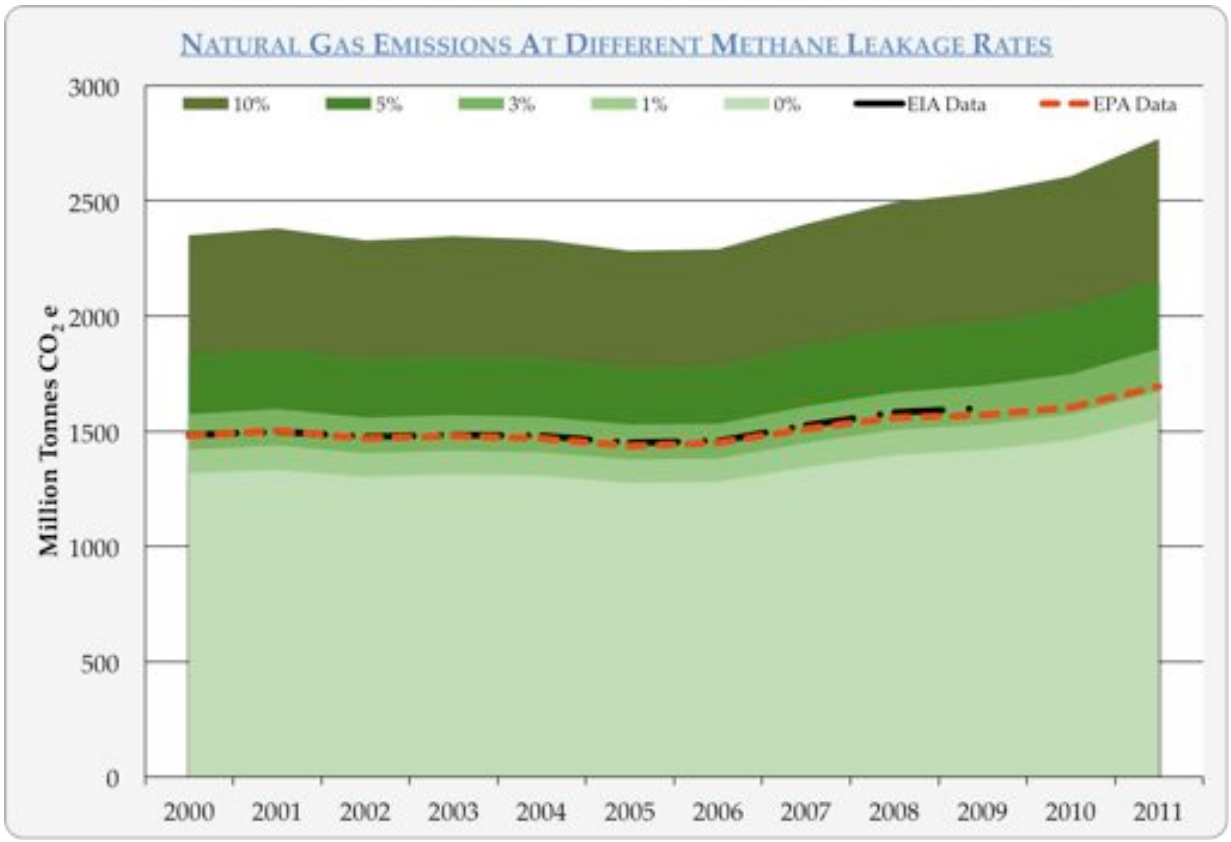

Figure 1 — Source: US EPA, US EIA

This graph shows the CO_2 and methane (CH_4) emissions from natural gas extraction in the U.S. and demonstrates the importance of the rate of methane leakage on emissions. It assumes that all natural gas that was extracted was combusted and released into the atmosphere as CO_2 or leaked/vented to the atmosphere as methane. Assuming a global warming potential of 25 for methane, it projects the impact of different fugitive emissions rates in the natural gas industry on emissions. The rates of fugitive emissions were chosen to represent a range of possibilities that the actual rate of fugitive emissions may fall into given the uncertainty in the data; the high estimates are possible towards the end of the decade given recent discussion on the increases in methane leakages from hydraulic fracturing, but *extremely improbable* at the beginning of the decade.

the worst case leakage scenario (10%), increases temperature by **4.15˚C** relative to year 2000 levels by 2200. Even if we replaced *all coal* with natural gas, global warming would still increase more than 3.5˚C from year 2000 temperature levels by the year 2200. A long-term global shift from coal to gas clearly does not put the world on a safe path and promoting such a strategy here at home is irresponsible. Minimally, the White House must develop a plan to better shape a post-natural gas world, in order to maintain a safe climate. Ideally, the White House should move beyond the "plan" of coal-to-gas substitution by properly setting forth a pathway to bring renewables online in a fast, formidable, and fair manner.

In the Wigley (2011) models, temperature actually increases for many decades before eventually declining to high levels discussed above. This is important because society must be careful of surpassing so-called "climate tipping points"— temperatures at which climate change reinforcing positive feedback loops kick in, causing dramatic environmental change. The initial increase is driven to some extent by

methane, but predominantly by reductions in aerosols (such as SO_2), from which cooling effects would be lost as coal consumption decreases (see Box below). Given that the warming effect from reduced aerosol emissions will occur regardless of the fuel that replaces coal, we stress that natural gas should replace only coal plants with SO_2 capture retrofits to the greatest extent possible. It would better benefit the climate to replace coal-fired power plants without sulfur-reducing technologies[26] with zero-carbon energy because of the limited efficacy of natural gas as a substitute.

Examining a Coal-to-Gas Shift in the United States

Most coal plants emit some amount of sulfur dioxide, which acts as an aerosol to *reflect* rather than contain solar radiation in the way a greenhouse gas does—the lower the sulfur emissions, the greater a power plant's impact on increasing global temperature. The U.S. sulfur dioxide emissions factor (1.36g/kWh) is lower than the global average described in Wigley 2011 (7.3gSO_2/kWh). Thus, in the U.S., natural gas holds slightly more potential than his report would have us believe because of the absence of a strong aerosol effect. Nevertheless, the existence of the low-sulfur U.S. coal fleet should not be used as an excuse to grow ever more dependent on natural gas.

[26] These power plants are slightly better for the climate because of the cooling effect of SO_2, although they are worse for local air quality, as SO_2 contributes to acid rain.

Avoiding Lock-in

Over-reliance on natural gas will lead to lock-in of constructed gas-fired power plants and natural gas infrastructure that will produce emissions greater than the amount needed to meet our climate goals. The more infrastructure we build to run the world on natural gas, the less incentivized we are to invest in the infrastructure needed to run the world on renewables. One possible way to avoid financial lock-in, according to a report from the Center for American Progress,[27] is to build only currently scheduled additions and begin to phase out all natural gas plants above a certain age (it is more economically efficient to retire older plants). It is clear that the business-as-usual trajectory of expanding natural gas infrastructure is not compatible with meeting our climate goals. Implementing a strong greenhouse gas fee and weighing the costs of approving further natural gas infrastructure investments will ensure that we don't overbuild natural gas capacity by creating market incentives to shift investments from fossil fuels to renewable energy.

How will we power the future– with high risk polluting fossil fuels and nuclear power or with the safe and efficient development of renewable energy?

[27] James 2012

Getting Beyond Gas: Policy Prescriptions

Given the limited applications of expanded natural gas production in mitigating U.S. emissions, we need strong policies to move us towards a clean energy future. Stringent regulation of fugitive methane releases from natural gas production is necessary. Limited progress has been made by the EPA's voluntary natural gas STAR program, but the agency can and should strive for further emissions reductions: industry can cost-effectively capture 28% of methane from **gas systems** for $30/tCO_2e$ or less with existing technologies. For $60/tCO_2e$ or less, **54.76%** of fugitive emissions could be captured.[28] Additionally, for $30/tCO_2e$ or less, the coal industry could capture **40%** of fugitive emissions from coalbed methane.[29] More recent analysis shows that as much as 88% of fugitive methane emissions from the oil and gas

We must look past the narrow, near-term goal of coal to gas fuel switching and embrace a direct shift from coal to renewables and energy conservation.

[28] US EPA International Non-CO2 Mitigation 2012

[29] An EPA Draft of the 2012 Non-CO2 Mitigation report revised downward slightly the potential for methane capture in coal mines.

industry could be recovered using today's technology with payback times below 3 years.[30]

Reductions could occur in two non-mutually exclusive ways:

(1) Congress adopts a greenhouse gas fee which, if set equal to or greater than the above values, would incentivize industry to profit from methane capture. Such a policy tool would likely be most effective at points of extraction, where there are fewer sources of escape for methane emissions and leaks can be more easily monitored and controlled.

(2) **EPA can exercise authority already granted by Congress** by creating technology standards for natural gas systems and regulating fugitive methane emissions under section 111 of the Clean Air Act.[31] The agency has already reduced some emissions from the sector via the voluntary Natural Gas STAR program, which captures roughly 85 billion cubic feet of natural gas per year, saving 34 million tonnes of CO_2e, equivalent to reducing U.S. methane emissions from natural gas drilling by 19% according to EPA data.[32] New regulations on Volatile Organic Compounds (VOCs) finalized in August 2013 will also have the co-benefit of additional reductions in fugitive methane. These regulations are necessary but not sufficient, and additional action by the EPA is warranted.[33] Given that the current social cost of carbon used by the Obama administration is $33/t$CO_2e$,[34] simply expanding coverage from cars and appliances to natural gas systems would ensure capture of over a quarter of current estimated U.S. methane emissions from natural gas systems. There is no legal reason that the Obama administration could not apply the social cost of carbon in fugitive methane cost/benefit analysis.

Technology standards would likely be more effective at capturing downstream sources of emissions (transmission, distribution, storage, and consumption) where there are less monitoring and more potential points of escape.

Effective technology standards working in tandem with a rising greenhouse gas fee will prevent the growth in fugitive emissions from hydraulic fracturing and expanded natural gas production.[35] These two policy mechanisms are **complementary**. It would be unrealistic to assume that all sources of methane leakage are known or fully measurable—thus, in some cases technological standards could save previously undiscovered sources of methane leakage that wouldn't be able to have a fee levied on them.[36]

However, for known and easily measurable sources of emissions, industry will be incentivized to capture the gas as cheaply as possible, as they would face a fee per tonne of methane release in the absence of capturing mechanisms. A substantive and rising greenhouse gas fee, in combination with technology standards where applicable, holds the potential to mitigate a significant portion of fugitive methane emissions. Such policies can also help the push towards renewable sources, which would become increasingly favored in the marketplace.

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[30] Harvey 2012
[31] Bianco 2013
[32] US EPA, Overview of Greenhouse Gases
[33] Bradbury 2013
[34] US EPA, Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis. $33/t$CO_2$ represents the 2010 central value from a range spanning $11-$90/tCO2
[35] US EPA, International Non-CO_2 Mitigation
[36] Burtraw and Palmer 2013

Impacts of Hydraulic Fracturing on Water Supplies

In addition to the climate impacts of unconventional natural gas extraction there remain other well-documented risks to communities and the environment like increases in local air pollution, but especially the contamination of water supplies with methane and dangerous toxic chemicals. To combat these environmental and social harms, we recommend that Congress repeal the exemptions from the Clean Air Act, Clean Water Act, Safe Drinking Water Act, National Environmental Policy Act, Resource Conservation and Recovery Act, Emergency Planning and Community Right-to-Know Act, and the Comprehensive Environmental Response, Compensation, and Liability Act that hydraulic fracturing currently enjoys. Forcing industry to comply with these important environmental laws would not only reduce the harm caused by fracking, but also would likely raise costs which would help in leveling the unfair advantage that the dangerous extraction process benefits from; all of this will have the co-benefit of reducing emissions.

Large water withdrawals from the hydraulic fracturing process pose additional risks in water-scarce regions. "Fracking" withdrawals may seem trivial when compared with overall consumption (less than 1% in Texas, e.g.),[37] but aggregate statistics ignore key regional differences. **Twenty-five percent** of water consumption in Dimmit County, Texas, was used for fracking in 2011.[38] Technologies to reduce potable water consumption from hydraulic fracturing exist, such as utilizing brackish water, but are not in widespread use due to high costs. As droughts become more intense with a changing climate and competition for water sources increases from this scarcity, relying on fracking in water-scarce regions threatens to out-compete the needs of local citizens. While such conflicts may not occur in areas like the rainy Marcellus Shale region, the goal of reducing natural gas consumption should also be accompanied with careful regional planning to alleviate pressure in drought-stricken areas.

The Risks of Offshore Drilling

Accidents from offshore drilling can devastate local industries such as fishing, tourism, and recreation. Exxon Valdez, Deepwater Horizon, and the most recent spill off the coast of Thailand illustrate the risks of offshore drilling. These disasters are detrimental for varied reasons. The remote location of the Exxon Valdez spill made cleanup exceptionally difficult and prolonged the damage.[39] High costs of the Deepwater Horizon spill could be attributed to the number of businesses dependent on the gulf coast for revenue. The Thai oil spill is threatening the tourism industry, upon which the country increasingly depends as other economic sectors struggle.[40] Offshore drilling poses unique risks to ecosystems and economies compared to onshore operations.

The Obama Administration's plan to "explore the energy resource base, develop and implement best practices, and share experiences to enable the environmentally responsible

[37] Nicot and Scanlon 2012
[38] Galbraith 2013
[39] US EPA, Emergency Management: Exxon Valdez
[40] Fuller 2013

The explosion at the Deepwater Horizon oil rig caused the largest accidental marine oil spill in history.

production of oil and natural gas"[41] in the Arctic is particularly troubling. The international push for drilling in the Arctic is greater than ever because of climate change induced melting in the region allowing for commercial access to oil and gas reserves. Instead of promoting more dangerous activity, the Obama Administration should ban offshore drilling in the Arctic and **call for an international ban through leadership in the Arctic Council.** The unique risks of offshore drilling itself, as well as the added climate risks of further developing Arctic resources outweigh any foreseeable benefits.

[41] White House 2013

Carbon Capture and Storage

Carbon Capture and Storage (CCS) holds limited proven potential to mitigate carbon emissions. In the near term, CCS is likely to have little viability because of expensive abatement costs in the range of about 2.5¢/kWh ($80/t$CO_2$) in natural gas power plants to 4¢/kWh ($52/t$CO_2$) in coal power plants.[42] The Obama Administration's plans heavily rely on and strongly support CCS, but it is no climate panacea even in the most optimistic scenarios under which it is deployed

[42] IEA, CCS Roadmap 2013

in both the industrial and electric power sectors. However, there exists a small market niche for which CCS could potentially mitigate carbon emissions at reasonable cost. We advocate for short-term deployment of energy efficiency and renewable energy as a primary energy strategy while CCS becomes cost effective for both coal and gas between 2020 (aggressive greenhouse gas fee) and 2028 (moderate greenhouse gas fee). However, **cost limitations are merely one issue that must be resolved before implementing CCS to its full potential.**[43]

The IEA, an organization that believes CCS "will remain a critical greenhouse gas reduction system," projects that the vast majority of CCS projects will come online after 2020, with more than half after 2030. Given the long-term scope of a technology such as CCS, ***we must focus on proven climate solutions to ensure reductions in the near term.*** Pricing greenhouse gas emissions will be critical in creating a market for CCS (this is necessary, but by no means *sufficient* to the technology's long-term success). **If there are no policy incentives, CCS will not be economically viable.**

In Norway, for example, where offshore oil production is subject to a greenhouse gas fee, CCS has become a limited commercial success in the Sleipner oil field. Statoil, a Norwegian oil company, injects CO_2 beneath the North Sea for \$17/tCO_2, while avoiding their greenhouse gas fee of \$51/tCO_2. Statoil injects 1

The Risks of CCS

CCS can only be effective if carbon is kept in the ground over large timescales (>1000 years). In order to ensure this long-term viability, the EPA finalized rules in 2010 that mandate a 50-year monitoring period.[44]However, there certainly exists the possibility that the corporations responsible for storage today will either not exist at all or have a completely different financial make-up over such a long timescale. If underground formations must be repaired, the costs can't be borne by the responsible party should they cease to exist. Additionally, companies would have little incentive to undertake expensive maintenance projects whose benefits accrue to distant generations at the expense of current shareholders. The financial responsibility, then, should these companies be unable to cover cleanup or maintenance costs, may ultimately be shouldered by the American taxpayer. Leaving the government on the hook for a leak or repair project is irresponsible, and enhances the case against any large-scale reliance on CCS.

[43] Ibid.

[44] US DOE, National Energy Technology Lab

Megatonne (Mt) of CO_2 each year, saving the company $34 million.[45]

Relying on CCS also means that local environmental and health impacts from fossil-fuel combustion and extraction will likely remain, erasing an important co-benefit of GHG mitigation.

It is critical to ensure that all carbon pumped into geologic storage remains completely (>99%) sequestered over timescales of 1000s of years.[46] Substantial leakage would erode all of the climate benefits.[47] Distressingly, as time elapses, the financial liability and environmental damage of the CO_2 stored increases exponentially, because the social costs of emissions rise over time, reflecting increasing marginal damages from increases in atmospheric concentrations of gases above safe limits. Thus, distant estimates of geologic stability are more critically important than estimates in early periods, especially if CCS comprises a large percentage of emissions reductions.[48] Additionally, there may be health concerns associated with the sudden release of large amounts of CO_2, which can asphyxiate animals in large enough quantities.[49] Sequestration projects must undergo rigorous siting to account for this unlikely yet potentially damaging scenario. Further, CCS will incentivize the continued use of coal and natural gas for electric power generation, potentially *dis-incentivizing necessary investments* in renewable technologies and changes in the energy infrastructure. Relying on CCS also means that local environmental and health impacts from fossil-fuel combustion and extraction will likely remain, erasing an important co-benefit of GHG mitigation.

Heavy industry such as steel, cement, and certain chemicals produce CO_2 as an unavoidable byproduct given conventional manufacturing processes.[50] In other words, efficiency and renewables cannot as effectively mitigate emissions in these sectors at present. Retrofitting industrial facilities with CCS could provide 6.3% of cumulative reductions worldwide by 2050.[51] Including electric power generation increases this to 14%. Under a rising greenhouse gas fee, CCS will compete with other forms of electric generation on a level playing field, and innovations could potentially result to reduce implementation costs. As a last note, Biomass Energy Carbon Capture and Sequestration (BECCS) can actually result in *negative* overall emissions, which may be necessary in the long term if we exceed our carbon budget.

[45] IEA, CCS Roadmap 2013
[46] The Economist, CCS Debate 2011
[47] Ibid.
[48] Think about it this way. If we mess up early, we can scrap our CCS plans before we've over committed. If we sequester 20% of carbon emissions and they all start to leak out in 100 years, then it's a disaster because we've planned our carbon budgets around the sequestered carbon.
[49] PBS 2013
[50] IEA, CCS Roadmap 2013
[51] Ibid.

In 1979, a partial meltdown occurred at the Three Mile Island Nuclear Power Plant in Pennsylvania.

Nuclear Energy

Nuclear power is economically, socially, politically and technically non-viable. Aside from the traditional concerns with nuclear power, including risks involved with operation, processing, and lack of a safe and workable national storage plan for nuclear waste, there are additional social, political, and economic concerns. Currently operating nuclear power plants in the U.S. are closing earlier than expected, due to being priced out of the marketplace by cheaper alternatives.[52] Moreover, new plants under construction have taken much longer than expected and are coming in at considerably higher cost than expected, at the ultimate cost to the ratepayer.[53]

The 2011 meltdown at the Tokyo Electric Power Company Daiichi reactors in Fukushima, Japan serves as a recent and stark reminder of the low probability, high consequence risks that are inherent with nuclear power generation. Despite government posturing that the situation has been more-or-less under control and contained, the recently publicized admission after the failure of the underground barrier in August 2013 that contaminated water is and has been leaking into international waters at rates and radiation levels higher than believed, also demonstrates how such disasters can have international and potentially global impacts. The Japanese Government has now stepped in to take over the disaster response and there seems to be no end in sight—with more and more drastic containment measures being proposed.

Even with prices on greenhouse gas emissions, analysis shows nuclear being an unattractive option for ratepayers.[54] Moreover, nuclear reactors take many years to go through

[52] Wald June 11, 2013
[53] Wald June 13, 2013

[54] Cooper 2013

regulatory approval and construction, whereas renewables can be deployed in a very short period of time. Given the urgency of rapid emissions reductions, nuclear becomes an even less attractive option.

Nuclear is being touted as a solution to climate change in that it can help us reduce our emissions from the electrical sector. While there is little doubt that this is true, it has been shown that on a cost basis, **there are much cheaper, more effective, and risk-averse ways to reduce emissions** such as investments in energy efficiency, combined heat and power, and wind energy.[55] Some will also claim that nuclear is an important part of overcoming our energy challenges because it can provide low-carbon "base-load" power. However, many forms of renewables such as geothermal, wave and tidal energy, existing hydropower, and to some extent concentrated solar power, can provide this as well—even without storage technologies. Considering that and the potential for high consequence events like the Three-Mile Island disaster, the Chernobyl Disaster, the recent Fukushima meltdown (the impacts of which are still unfolding and unknown), or the potential for terrorist attacks that are unique to nuclear power generation, our society should be moving *away* from the use of nuclear power rather than attempting to prop up an industry that would otherwise be relegated to irrelevance.

Nuclear Power: Excessive Risk Shifted to the Taxpayer

The Price-Anderson Indemnity Act illustrates the high level of risk inherent in the nuclear industry. While there is nothing principally wrong with regulations that pool insurance premiums to spread risk, it is quite telling that the amount of contribution by the private sector is capped. In the event that damages from a nuclear accident exceed $375 million (the amount of insurance each reactor is covered for), the current fleet of 104 reactors will be charged up to $111.9 million, for a total liability cap of $11.6 billion. If damages exceed this number, the taxpayer is on the hook for the remaining balance.[56] Price-Anderson distorts the insurance market by eliminating the need for insurers to consider low probability, high consequence events such as the meltdown at Fukushima; this artificially lowers premiums. Nuclear power plants are effectively *too dangerous to insure* cheaply, further proving that relying on nuclear power poses unnecessary risks to the American public.

[55] Lovins and Sheikh 2008

[56] U.S. Nuclear Regulatory Commission Factsheet

1.3: The Great Transportation Transition

The higher fuel efficiency standards for passenger vehicles that the Obama Administration finalized in 2012 represent a truly impressive accomplishment that will produce a variety of benefits for generations to come. Efficiency alone, however, will not solve the full range of our transportation tribulations and "free America from the tyranny of oil." Reimagining our transportation systems will mitigate emissions, invigorate our nation's economy, empower working class Americans, and make our communities more resilient. The White House gives no mentions of improving the efficiency of or expanding public transportation options, investing in high-speed transportation, or funding advanced transportation innovations in its plan.

Reducing emissions from the transportation sector is more difficult than reducing emissions from the electricity sector. This is, in part, due to a lack of presently cost-effective alternatives, in part due to price inelasticity (consumer insensitivity to changes in price), and in part due to a lack of competition in some of the markets. While

Reimagining our transportation systems will mitigate emissions, invigorate our nation's economy, empower working class Americans, and make our communities more resilient.

reducing emissions from the transportation sector may not be the most cost effective in the short-run, there are significant co-benefits in many of the strategies to reduce transportation related emissions that help justify these costs, such as: improved access to transportation, resilience to extreme weather events, increased productivity, and the economic and security benefits of reduced dependence on foreign oil (97% of U.S. transportation energy use is petroleum based).[57]

While an economy-wide incentive like a greenhouse gas fee would reduce emissions from the transportation sector, complementary policies can help to produce greater results at lower cost to consumers and taxpayers.[58] One such policy would be to increase funding for public transit and improve overall transit planning to maximize efficiency and minimize emissions. The U.S. Department of Transportation estimates that an increase in capital investment above currently needed investments of around $30 billion over 20 years could *double* the expected rate in ridership growth and help to reduce transportation-

[57] US DOT 2010
[58] Ibid.

related emissions by 0.2-0.9% percent by 2030 or 0.4-1.5% by 2050.[59] This would result in overall emissions reductions of .12-.5% by 2050. If such investments were combined with land use changes, expansion of bike lanes, and improvements in pedestrian conditions, transportation sector emissions would be reduced by 2-5% in 2030 and 3-10% by 2050, equaling overall GHG emissions reductions of 1-3%.[60]

Although expanding public transport is costly (~$1,000/t$CO_2$e), the Department of Transportation estimates that when you factor in the co-benefits of "improved mobility, especially for low-income travelers" and savings in "personal vehicle ownership and operation" the net effect is a *savings* of $900/t$CO_2$e.[61]

The Federal government also needs to continue and expand its support and funding for research and development of advanced battery technologies. The Department of Transportation estimated in 2010 that "if significant advances were to occur in battery technology and the use of low-carbon energy sources for electricity generation" electrifying our transportation fleets would produce significant benefits. Light-duty vehicles would see greenhouse gas emissions reductions of "80% or more per vehicle in the long term." If 56% market penetration were achieved in the light-duty vehicle sector, total transportation related emissions could be reduced by 26-30% in 2050.[62] This equates to overall emissions reductions of 7.5-10% by 2050. Of all of the alternative-fuel options evaluated, electric vehicles had the most potential for reducing emissions, as well as the most certainty that large reductions could be achieved. Additionally, consumers will save considerable amounts of money on gasoline—even at current prices—and vehicle-to-grid (V2G) technology will enhance electrical grid stability, further benefit consumers through rebates from utilities, and allow for more integration of renewable energy into our electrical system.

Instead, the White House plan calls for converting our nation's transportation fleets to run on Compressed Natural Gas (CNG). Unfortunately, this will not produce climate benefits in most likely scenarios, because the methane leakage rate of natural gas systems would have to be kept at rates below 1.6% for there to be any immediate marginal benefits in converting light-duty vehicles to run on CNG

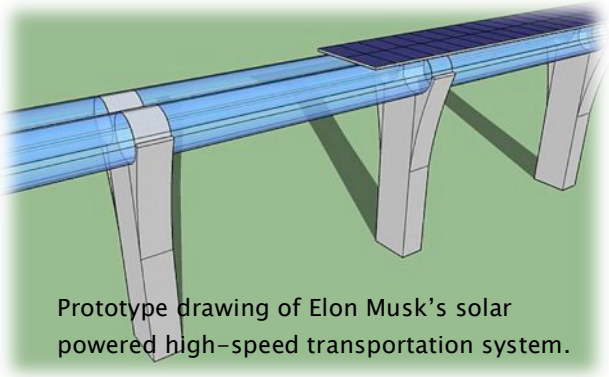
[59] The DOT estimated that increasing investment to $71 billion from 2006 to 2026 over the $42 billion that would be needed to accommodate currently projected ridership growth could double annual growth rate from the current rate of 2.4% to 4.6%.
[60] Ibid.
[61] US DOT 2010

[62] Ibid.

and below 1% for heavy-duty vehicles.[63][64][65] Based on the high uncertainty of current emissions rates, this is not a good bet for the conversion of the transportation fleet; zero-carbon and alternative transportation methods are needed.[66] The DOT also notes that using natural gas in vehicles would compete with its use in the power sector, where GHG emission reductions are more likely to be seen.[67]

"Advanced" biofuels are vaguely endorsed by the Administration without specifying what types of technologies they support, whether there will be strict requirements for lifetime carbon footprints of fuels, whether we will continue to endorse fuels that compete with food crops for land and raise prices, and in what sectors biofuels will be used.[68] Corn ethanol in the United States has not delivered enough benefit relative to its negative impact on food prices and dubious climate benefit, and further reliance on it will not lead us to a sustainable future. In 2010, the Administration controversially ruled that switching to corn ethanol would decrease emissions into the future, however, studies estimate that lifecycle emissions from corn ethanol are somewhere within 20% lower to 93% *higher* than the emissions of gasoline[69]—hardly a sustainable alternative. Although some *cellulosic* biofuels currently in production provide hope for emissions reductions while balancing land use and environmental needs, much ***more investments are needed into algal biofuels, electrofuels, renewable-generated liquid hydrogen.*** So far, these liquid fuels offer the most promising hope for emissions reductions while balancing other social and environmental concerns.

We have the opportunity to transform our communities with *low-emissions public transportation*, make them more resilient to extreme weather, and support economic growth. With *vehicle-to-grid (V2G)* technologies, *enhanced batteries*, and *smart-grid technology* we can electrify our transportation systems and provide for a more stable electrical grid that can handle more variable energy from renewable sources. With *high-speed transportation* solutions like high-speed rail and other innovations, we can reduce emissions from driving and aviation and connect our major cities like never before.



Prototype drawing of Elon Musk's solar powered high-speed transportation system.

[63] Alvarez, Ramón A., et al. 2012
[64] Bradbury, James, et al. 2013
[65] The results are even worse if the conversion is from diesel rather than gasoline.
[66] The EPA (which gets it data from industry) and industry groups say the leakage rate is about 1.5%, but almost all independent analyses peg it as being higher, sometimes significantly.
[67] US DOT 2010
[68] See Kammen, D. http://www.ametsoc.org/atmospolicy/documents/2008ESS/ESSS42508/Kammen-AMS-biofuels-4-25-08.pdf
[69] Searchinger 2008

1.4: Ending Emissions Exports & Improving International Impact

One of the most troubling parts of the Administration's plans is that it does very little to control our fossil fuel exports and doesn't do enough to support the reductions of emissions from other countries. In some scenarios, it is possible that the President's "climate policy" could have the indirect effect of increasing global warming pollution overall, even if our domestic emissions do fall.

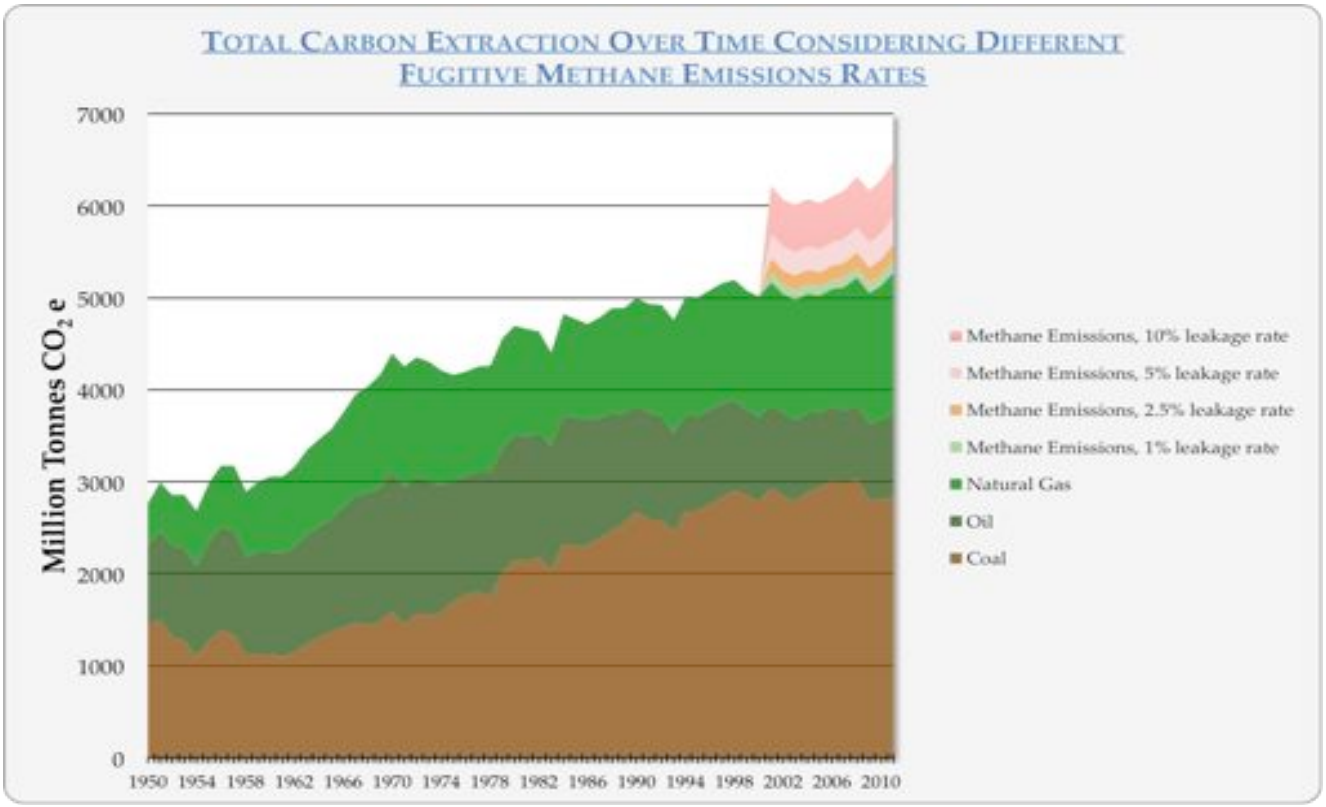


Figure 2 Source: US EIA, US EPA[70]

This graph shows the total CO_2 emissions from fossil fuel *extraction* in the U.S., rather than simply looking at domestic emissions. It assumes that all U.S. fossil fuels that were extracted domestically were fully combusted somewhere in the world and released into the atmosphere as CO_2. Not even accounting for imports and other non-fossil sources of CO_2 emissions, this graph illustrates that saying "domestic emissions are beginning to fall" does not tell the whole story. Also, beginning in 2000, it projects what the impact of different fugitive emissions rates for methane in the natural gas industry would have on the extraction picture, assuming a methane global warming potential of 25. The rates of fugitive emissions were chosen to represent a range of possibilities that the actual rate of fugitive emissions may fall into given the uncertainty in the data; the high estimates are possible towards the end of the decade given recent discussion on the increases in methane leakages from hydraulic fracturing, but extremely improbable at the beginning of the decade.

[70] Based on modeling by Clark 2013

The EIA projects that the U.S. will be a net natural gas exporter by 2020,[71] with almost all the increase in production coming from shale gas. The proposed Liquid Natural Gas export capacity currently amounts to over 40% of 2011 U.S. natural gas consumption.[72] If methane emissions from the oil and gas industry are left unchecked and continue to rise as they have since 2002,[73] increases in natural gas exports and promoting fuel switching from coal to natural gas through the Unconventional Gas Technical Engagement Program (UGTEP) may produce a net increase in short and long term global climate forcing.[74] This is especially true because 1) methane leakage rates are even greater when natural gas is exported, due to increased opportunities for fugitive emissions, and 2) the U.S. is helping to exploit unconventional gas resources in developing countries where emissions controls of methane leakages on natural gas systems are likely to be even worse than they are in the U.S.[75] Despite this, the President still intends to internationally "promote fuel-switching from coal to gas for electricity production and encourage the development of a global market for gas" and "encourage the adoption of heavy duty natural gas vehicles as well."

We should abolish programs like UGTEP, which will serve to prolong global dependence on fossil fuels and slow the transition to safer and cleaner energy. Instead, we should be building upon our successes in bilateral dialogues on renewable technology solutions to create a **Global Renewable Energy and Efficiency Exchange Network (G.R.E.E.E.N.)**. Such a partnership between countries with expertise in these areas like Germany, Spain, Japan, the United States, and China would encourage the sharing of best practices, technical guidance, academic and intellectual resources, information on successful policies, and could host conferences and seminars with other countries to help them develop their renewable potential in a manner similar to how UGTEP currently functions.

The President can and should use his executive powers under the National Environmental Policy Act (NEPA) to reject major projects under his jurisdiction that are determined to have significant impact on global emissions.

While the President *more-or-less* calls for "an end to U.S. government support for public financing of new coal plants overseas," and coal consumption in the U.S. is projected to decrease in almost any scenario, the EIA actually projects that coal *production* will begin to increase again starting in 2016 as a result of now growing coal exports. The construction of coal export terminals in Oregon and Washington combined with expanded coal mining operations in Montana and Wyoming would result in an

[71] US EIA
[72] US DOE 2012, Food and Water Watch 2012
[73] US EIA
[74] Some of this increase will be because of the reduction in the cooling effect of aerosols produced from coal combustion.
[75] The cooling effect of aerosols from coal is also likely greater in these countries.

additional 190 million tonnes of coal exports a year, adding 420 million tonnes of CO_2 a year to global emissions before 2020.[76] This project is likely to have an even greater impact than that of the highly politicized and dangerous exploitation of Alberta tar sands from the Keystone XL pipeline. While this may be a boon to coal exporters, it would be detrimental to the global climate.

The President can and should use his executive powers under the National Environmental Policy Act (NEPA) to reject major projects under his jurisdiction that are determined to have significant impact on global emissions. By rejecting large projects like coal export terminals, liquid natural gas export facilities, and large international pipelines such as Keystone XL, *the United States would be setting a major precedent* for other world leaders to take note of. Contracting global supplies of fossil fuels would eventually have the effect of reducing fossil fuel demand and promoting the switch to cleaner technologies.

Lastly, the "Climate Action Plan" overstates its contribution to global clean energy financing. While the Overseas Private Investment Corporation (OPIC) and the Trade and Development Agency (TDA) have made significant contributions to renewable energy

[76] Voorhar and Myllyvirta, 2013

development in the past few years, the 2012 spending figures from the U.S. Export-Import Bank show $356 million in financing for renewables projects while enabling an unprecedented $9.6 *billion* in financing for energy projects using fossil fuels.[77] The United States should begin a transition away from funding fossil-fuel projects through the Export-Import Bank (as it has through the TDA and OPIC) and begin shifting that funding towards financing renewable energy and energy efficiency technologies. Wherever possible, we must encourage "energy leapfrogging" among nations whose populations don't have 100% access to electricity, including major economies like India (66% access), South Africa (75%), Indonesia (65%), and Pakistan (62.4%), but also less developed countries where access is especially low.[78] Phasing out inefficient fossil fuel subsidies and expanding clean energy financing from the Export-Import Bank, OPIC, and the TDA can level the playing field by encouraging energy development immune to volatile world energy prices and without polluting air and water.

If we are truly serious about reducing our nation's impact on climate change, we must consider and regulate the effects of the full range of our nation's actions—the emissions we produce, the emissions we export, the emissions we lock in by financing dirty energy projects abroad, and the emissions we approve to pass through our borders with projects like the Keystone XL pipeline.

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[77] Export-Import Bank, 2012
[78] World Bank DataBank

2: Comprehensive Greenhouse Gas Fee

In order to substantially reduce our emissions, encourage energy efficiency, spur domestic green job growth, promote energy innovation and ensure cost-effective deployment of technology solutions, our nation needs a predictable, economy-wide price signal that finally makes polluters pay for their emissions of climate-altering greenhouse gases that are pumped into our atmosphere. Only a quickly rising *Greenhouse Gas Fee* that covers all emissions from energy sources offers a climate solution that is economically efficient and cannot be politically gamed. It will level the playing field for low-emissions technologies and help sufficiently reduce our near- and long-term emissions in order to position the United States to **lead** the clean energy revolution and protect future generations from the most unacceptable risks of climate change.

Unlike current policy proposals, a *Greenhouse Gas Fee* has the potential to provide large sources of revenue to protect the most vulnerable consumers and workers from price changes, protect vulnerable communities from climate changes, and further aid in emissions reductions and technology improvements across sectors. A *Greenhouse Gas Fee* not only reduces the uneven impacts of climate change across generations, regions, and socioeconomic class, but also has the ability to compensate for the uneven incidence that *any* climate policy would necessarily have across different regions and levels of income, unless accounted for as we propose.[79][80][81][82][83] Such a fee would produce greater benefits at reduced cost to society when compared to direct "command-and-control" regulations, such as those proposed by President Obama.[84][85] By setting a direct price on emissions, consumers and industries can then decide how best to cost effectively reduce their emissions.

A *Greenhouse Gas Fee* is visible and predictable. The exact price level would be known at each year going forward, allowing consumers to more effectively reduce emissions.

A carefully constructed Greenhouse Gas Fee could help drive the US to carbon neutrality by 2050.

Installing solar panels, for example, depends critically on the future price of electricity because the more expensive grid electricity becomes, the greater the value of the solar investment. In the transportation sector, where energy exhibits considerably more price volatility, drivers looking to buy fuel-efficient cars could more accurately predict future gas savings based on the future price of gasoline under a predictably rising fee. A comprehensive *Greenhouse Gas Fee* would

[79] Burtraw et al. 2008
[80] Grainger and Kolstad 2010
[81] Hasset et al. 2007
[82] Shammin and Bullard 2009
[83] Weber 2013
[84] Richardson and Fraas 2013
[85] CBO 2008

provide the financial certainty to the American people necessary for businesses and consumers to make investments to reduce their footprints. A similar fee on emissions in British Columbia has resulted in a demand response far greater than what would have occurred with an equivalent market-price change. In other words, the predictability of the fee caused consumers to reduce consumption more than if the price had suddenly changed because of external causes.[86] Combatting climate change involves both short and long term investments, and a *Greenhouse Gas Fee* conveys the visible price signals that allow consumers, producers, and investors the most certainty in making plans to reduce emissions.

Unlike current policy proposals, a Greenhouse Gas Fee has the potential to provide large sources of revenue to protect the most vulnerable consumers and workers from price changes, protect vulnerable communities from climate changes, and further aid in emissions reductions and technology improvements across sectors.

Many like to claim that energy efficiency improvements and technological innovations *in and of themselves* can achieve the necessary emissions reductions, but this is not the case. While efficiency does represent one of the lowest-cost ways to reduce emissions, its efficacy is limited by low energy prices. There currently exists no plan to meet long-term reduction targets solely through energy efficiency measures, because such a strategy has marginally diminishing effectiveness and can only go so far. That said, one of the goals of a greenhouse gas fee is to *encourage efficiency and innovation*; these should be viewed as an end, while the *Greenhouse Gas Fee* is the means, and an effective one at that.[87] However, without correcting current prices that leave out external costs, the economy will remain over-incentivized to consume fossil fuels, despite the increasing amount of use obtainable from them.

For these reasons, we propose the introduction of an economy-wide GHG Fee that helps achieve short-term reductions in the range of 36-49% of 2005 levels by 2020[88] and drives us towards a net zero-carbon economy by 2050. The fee should rise annually and rapidly to ensure sustained emissions reductions and to reflect the rising marginal costs of greenhouse gas pollution. The revenue from such a fee should be used to:

[86] Rivers and Brandon 2013

[87] McKinsey 2009

[88] Emissions reductions necessary from industrialized countries according to IPCC AR IV

1. *Protect vulnerable consumers* from price increases either through tax-shifting or through direct dividends to households. (**around 40-60% of total revenue**)

2. Provide funding for renewable energy technology *Research and Development*. (a doubling of about **$4 billion** over next few years could be allocated efficiently and effectively)[89]

3. Establish a "*Climate Adaptation Fund*" that will help vulnerable communities prepare for inevitable extreme weather events and other changes in the climate and ecosystems. (costs of adaptation projected to be **$32-80 billion by 2030**)[90]

4. Provide jobs *Training and Transition programs* for blue-collar workers in vulnerable industries, such as coal miners, oil rig operators, etc. (**maximum $10 billion annually)**

5. Support municipal and regional governments in funding *alternative transportation* to create more resilient transportation networks, reduce dependence on oil-based transportation, and protect low-income consumers from high-gasoline prices. **(~$2 billion annually)**

6. Fund upgrades to the electricity grid nation-wide, creating a so-called "smart-grid" to support renewable energy generation and reduce transmission waste. (**$17-24 billion annually over 20 years**)[91]

Of course, funding many of these measures would increase the efficacy and rate at which the main goal of the fee—reducing emissions—is accomplished. Due to constantly changing conditions, flexibility in the level and rate of the fee as well as the levels of apportionments to different causes is crucial over time. The Treasury Department should administer the fee at the source of production in conjunction with the EPA and the two departments should establish an independent "Greenhouse Gas Fee Oversight Committee" to:

- analyze the effectiveness of the fee in reaching goals
- adjust the fee and/or rate of growth when necessary, based on
    - analysis of observed market responses
    - unexpected technology disruptions
    - unplanned consumption increases due to consumer rebates
    - changes in understandings of climate science and projected impacts
- distribute revenue and reevaluate apportions annually based on changing conditions and needs.

Lastly, in the absence of multilateral international climate policy agreements, border tax adjustments should be put in place to ensure American competitiveness under a Greenhouse Gas Fee and also to minimize "carbon-leakage"—the "exporting" of emissions to other economies without stringent climate policies through businesses moving high emissions operations abroad.

[89] Newell 2008
[90] UNFCCC 2007
[91] EPRI 2011

We propose for consideration three different fee structures—*a $15 per metric ton fee that rises at **$15 annually*** and *a $15 per metric ton fee that rises at **15% annually,** and a "**hybrid**" fee structure.*[92] The fee rising at a flat rate would have the benefit of reducing emissions greater in the short-term while producing decreased marginal reductions in annual emissions levels in the long run. On the other hand, the fee that increases exponentially doesn't reduce emissions as much in the near term but leads to much lower emissions levels by the year 2050. Since it is important to reduce our emissions substantially now *and* to ensure that we continue to reduce our emissions in the long term, **a combination of the two fee structures over time would produce the best results.** We advocate a "hybrid" approach, starting with a flat-rate increase of $15 per metric ton annually, followed by a switch in **2025** to an increase of 15% annually. This would ease the economy in to higher fossil-fuel prices while ensuring the necessary short-term emissions reductions to reduce the risk of passing climate-tipping points as well as guarantee climate stability in the long term.

$15/tCO2e GHG Fee rising at $15 annually				
	2015	2020	2035	2050
Fee (2010 dollars/tCO2)	$15	$83	$223	$294
Annual Revenue (billions of 2010 dollars)	$73	$328	$702	$888
CO2 emissions (millions of metric tons)	5,001	4,091	3,210	3,057
% Change from 2005 levels	-15%	-31%	-46%	-48%
$15/tCO2e GHG Fee rising at 15% annually				
	2015	2020	2035	2050
Fee (2010 dollars/tCO2)	$15	$28	$174	$1,089
Annual Revenue (billions of 2010 dollars)	$73	$131	$602	$1,313
CO2 emissions (millions of metric tons)	5,001	4,886	3,540	1,207
% Change from 2005 levels	-15%	-17%	-40%	-80%
"Hybrid" GHG Fee				
	2015	2020	2035	2050
Fee (2010 dollars/tCO2)	$15	$83	$493	$3,094
Annual Revenue (billions of 2010 dollars)	$73	$328	$1,014	$783
CO2 emissions (millions of metric tons)	5,001	4,091	2,075	253
% Change from 2005 levels	-15%	-31%	-65%	-96%

A **$15** per metric ton CO_2e economy-wide fee on greenhouse gas emissions implemented in **2015** and rising at **$15 annually**, on its own, could reduce CO_2 emissions from

[92] Fee levels are in 2010 dollars; rates of increase are nominal. All numbers are based on models created by the Carbon Tax Center. The fee values in their models are in $/short ton while our fee values are represented in metric tons. Our modeling extrapolates to 2050 based on their assumptions, which can be found on their website.

2005 levels by at least **31% in 2020** and **48% in 2050.**[93] The same initial fee rising at **15% annually** could reduce CO_2 emissions from 2005 levels by **17% in 2020** and **80% in 2050.**[94] The "hybrid" fee could reduce CO_2 emissions from 2005 levels by **31% in 2020** and **96% in 2050**.[95]

The $15 fee rising at 15% annually applied to natural gas, coal, and oil system emissions of methane, according to the EPA [EIA], would help to incentivize overall methane emissions reductions of **12.5% [12.2%]** in 2020.[96][97] The $15 fee rising at $15 annually and the "hybrid" fee would reduce methane emissions by **19.3% [19.1%]** in 2020.[98] By 2050, if a rising fee achieved a maximum savings in natural gas and oil systems of 88% (achievable at current technology),[99] all of the proposed Greenhouse Gas Fees would reduce overall fugitive methane emissions **36.6% [35.2%]**.[100][101][102]

It is important to emphasize that **we do not expect the higher fee values modeled for the later years** (for the exponentially increasing and hybrid models) **to be necessary.** Rather, these are estimates of what would be necessary if there were no major technological changes (which the fee would certainly inspire) or any changes in currently estimated levels of consumer or market responsiveness to price changes (which the visible and swiftly rising fee would certainly induce). The design of the fee allows for necessary changes in the level of the fee or the rate at which it rises in response to unexpected advances in technology, faster than expected or slower than needed market responses to reduce emissions, or changes in responsiveness to higher emissions fees. In the unlikely scenario that such changes do not occur, the levels presented are what would be needed to ensure the safe levels of emissions reductions; the goal of the fee is to reduce emissions to safe levels by making polluters and consumers pay for the prices of their emissions, not to punish hard-working Americans. Our proposal has the potential to ensure the necessary short and long-term reductions in emissions, protect vulnerable consumers and workers, and gradually urge forward the economy on a steady transition towards a clean energy future.

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[93] This would represent overall GHG emissions reductions of around 29.3% in 2020 and 46% in 2050.
[94] This would represent overall GHG emissions reductions of around 16.5% in 2020 and 75.8% in 2050.
[95] This would represent overall GHG emissions reductions of around 29.3% in 2020 and 91.2% in 2050.
[96] If leakages of methane are greater than the EPA and EIA estimate, which is likely, then the overall emissions reductions will be much greater as well.
[97] (1.2% [1.4%] of 2005 net GHG emissions)
[98] (1.8% [2.3%] of 2005 net GHG emissions)
[99] Harvey 2012
[100] (3.5% [4.2%] of 2005 net GHG emissions)
[101] The short-term savings in radiative forcing, however, would be much greater.
[102] The EIA and EPA have comparable net GHG emissions, but the EIA estimates higher methane emissions. Further, EIA data is from 2009, a year with lower net GHG emissions than 2010. Were we to compare 2010 with 2010, the EIA net emissions reductions would be slightly lower, but still greater than those from EPA data. The EIA data shows lower methane emissions reductions because natural gas, coalbed, and oil systems comprise a smaller percentage of total methane emissions than in EPA data.

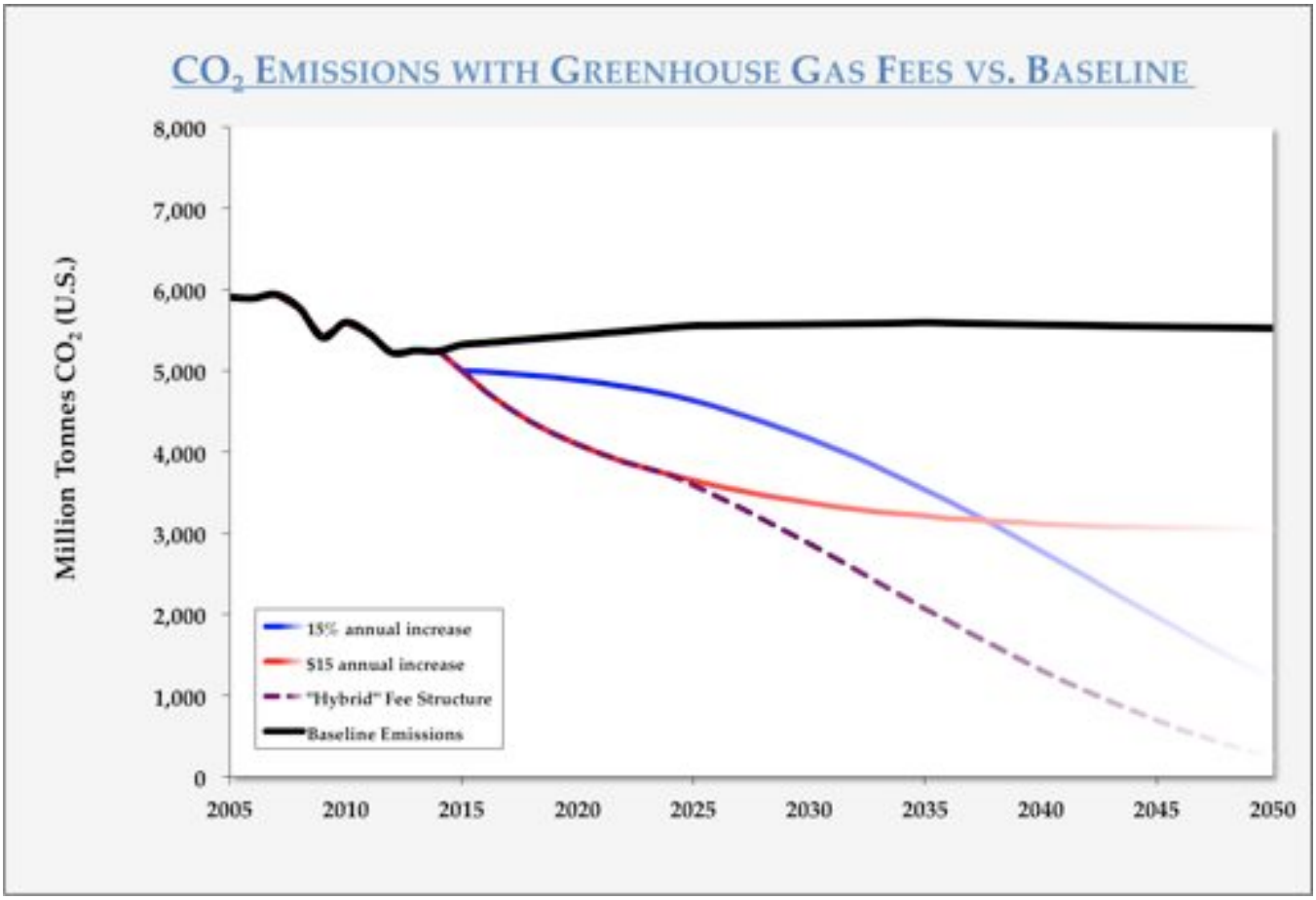


Figure 3: Based on models provided by the Carbon Tax Center

Global Equity Implications of Greenhouse Gas Fees

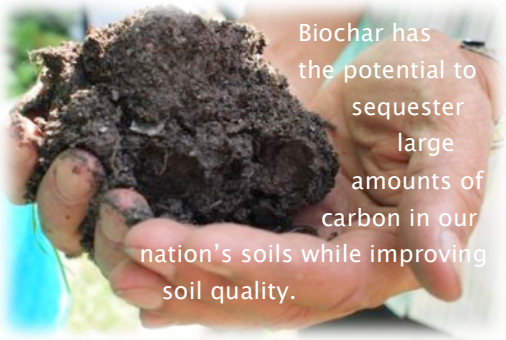
Under the Greenhouse Gas Fee that rises at **$15** annually, the United States would emit 179 $GtCO_2$ by 2050, representing **23.6%** of the global "carbon budget" from 2005, or the maximal amount of CO_2 emissions that ensures an 80% chance of holding warming below 2˚C. Under the Greenhouse Gas Fee rising at **15%** annually, the United States would emit 183 $GtCO_2$ by 2050, representing **24.2%** of this same global "carbon budget." Under the **Hybrid** Greenhouse Gas Fee, the United States would emit 144 $GtCO_2$ by 2050, representing **19.0%** of the global "carbon budget."

Since the U.S. is the world's largest historical greenhouse gas polluter, some might argue in favor of a stronger greenhouse gas fee to ensure equity. Put another way, because the U.S. has consumed the largest share of the carbon budget in the past, we should strive to minimize our future contribution.

3: Energy Incentives Restructuring

3.1: Incentives for Bio-Sequestration

The potential for biological sequestration of CO_2 emissions should not be overlooked. If forests and soils in the United States were restored to their historical potential, they could sequester an additional 39 Gt CO_2 annually[103]—around 6 times the United States' yearly emissions and more than the entire world's annual anthropogenic CO_2 emissions. Simply through basic changes in land-use, agricultural, and forestry practices, the United States has the technological potential to sequester an additional 40-60 Gt CO_2 over 50 years and a "few tens of billions over the next half-century."[104] This works out to approximately 1 Gt CO_2 per year. Less conventional forms of biological sequestration, such as the manufacture of *biochar* to store carbon in soils, also should be embraced. If incentives for biological sequestration are incorporated into the GHG fee, biological sequestration could help offset emissions by at least **10-20%** below 2005 levels **in 2020** and **5-10%** below 2005 levels **in 2050**.[105]



Basic changes in land-use, agricultural, and forestry practices can help the U.S. reduce our global warming impact substantially.

3.2: Remove the Corn Ethanol Standard

While biofuels that compete with food crops do reduce oil imports and susceptibility to price volatility, they provide little climate benefit and contribute to higher food prices.[106] Requiring a less stringent (or removing the) ethanol quota from the Renewable Fuels Standard (RFS) could reduce ethanol production by 10% (14%) and lower corn prices by 20% (24%).[107] Though corn ethanol production would still total roughly 11.5 billion

[103] Burress et al., 2008
[104] CBO 2007
[105] Potential for biological sequestration decreases overtime because of initial potential for larger changes in land-use and due to limits of soil and forest sequestration.
[106] FAO, IFAD, and WFP UNCTAD 2011
[107] Babcock 2012

gallons absent a mandate, further reductions would be realized following the introduction of a greenhouse gas fee, as less emissions intensive non-feedstock biofuels and alternative transportation methods gain competitiveness. **We call for the elimination of the corn ethanol mandate from the RFS.**

On January 1st, 2012, Congress allowed both the tax credit for corn ethanol and tariff on foreign ethanol to expire. However, the RFS, first enacted by Congress in 2005 and amended in 2007, still requires 36 billion gallons of ethanol to be blended into U.S. gasoline supply by 2022. The overwhelming majority of biofuel production in 2011 came from corn ethanol[108] (roughly 13 billion gallons, slightly less than the 10% of the 134 billion gallons of gasoline consumed in the U.S. in 2011).[109] However, the amount of corn ethanol that can be blended into the U.S. fuel mix is capped at 15 billion gallons per year starting in 2015 under the RFS. Therefore, the remaining 21 billion gallons in 2022 are mandated to come from cellulosic and other advanced fuels. Although the environmental impact of advanced biofuels are lower than those of corn ethanol, future production of advanced cellulosic biofuels is expected to fall far short of RFS mandates, meaning that corn ethanol will continue to dominate more environmentally friendly alternatives.[110] Further, as we approach the "E10 wall," a technical limit for current gasoline vehicles in the U.S. at which ethanol comprises 10% of motor fuel blend, refiners will have to increase ethanol content in the fuel mix relative to neat gasoline (gasoline with 0% ethanol) and diesel. This will force consumers to buy an unpopular product (E85, gasoline comprised of 85% ethanol) or create artificial diesel shortages, raising prices.[111] This upcoming constraint, projected to occur in 2014, crowds out non-corn ethanol's ability to compete fairly in the marketplace.[112] The E10 wall provides further impetus to eliminate the corn ethanol portion of the RFS and allow fair competition in the biofuel marketplace.

The EPA mandates that corn ethanol must have lifecycle GHG emissions at least 20% below that of conventional gasoline (though pre-2008 production facilities are grandfathered in).[113] While Searchinger et al. indicate that lifecycle emissions of corn ethanol are almost double that of gasoline,[114] the DOE and others claim Searchinger's results overestimate emissions due to inaccurate modeling of future corn ethanol production and antiquated data.[115][116] Where both parties agree, however, is that "an effective system would have to guarantee that biofuels use a feedstock, such as a waste product, or carbon-poor lands that will not trigger large emissions from land-use change."[117] Due to the uncertainty around corn ethanol's environmental impact, lower

[108] US DOE, Alternative Fuels Data Center 2013
[109] US EIA, Petroleum and Other Liquids 2013
[110] US EIA, Annual Energy Outlook 2013
[111] Foster et al. 2011
[112] US EPA, Renewable Fuels: Regulations and Standards 2013
[113] Schnepf 2013
[114] Searchinger 2008
[115] US DOE Actively Engaged in Investigating the Role of Biofuels in Greenhouse Gas Emissions from Indirect Land Use Change, n.d.
[116] Wang and Haq, 2008
[117] Ibid.

emissions alternatives with greater certainty in emissions reductions should be favored.

A variety of factors such as increasing corn prices have created an unlikely "Baptist-bootlegger" coalition of oil industry lobbyists, livestock farmers, and environmentalists to renew efforts to relax the RFS corn mandate (though each for different reasons).[118] We support the phase-out of corn-based biofuels from the RFS because of environmental risk, minimal national security gain, and negative cross-sectoral economic impacts. Eliminating the corn ethanol requirement in the Renewable Fuels Standard will lower corn prices for farmers and the public, and allow corn-based fuel to compete against other fuels in the market. Further, as a greenhouse gas fee comes into effect, lower emissions fuels and technologies will replace corn ethanol in the long run.

[118] Harder 2013

3.3: Loan Guarantees

Secretary Moniz and President Obama have agreed to release up to $8 billion in federal loan guarantees for "advanced fossil energy projects" as authorized under Section 1703 of the Energy Policy Act of 2005. However, these funds **can be allocated to any innovative technologies** that "avoid, reduce, or sequester… anthropogenic emissions of greenhouse gases" including ***"biomass, hydrogen, solar, wind/hydropower…electricity delivery and energy reliability, alternative fuel vehicles, [and] industrial energy efficiency projects."***[119] Earmarking these funds exclusively for fossil energy projects is an unnecessary handout to the fossil fuel industry that ignores the potential of many firms with advanced ideas in renewable energy, energy efficiency, energy delivery, and transportation solutions. Loan guarantees are also one of the only incentives keeping the risky and otherwise uneconomical nuclear industry afloat. Loan guarantees should be made available to any firm that the Department of Energy believes has a project with potential to reduce emissions as the Energy Policy Act of 2005 authorizes, but should be especially directed towards the projects with the least overall risks and largest potential reductions.

[119] *1703*. U.S. Department of Energy Loans Program Office 2013

3.4: Leading on Fossil Fuel Subsidies

The U.S. should lead by example by eliminating domestic subsidies for fossil fuels, which lead to wasteful consumption habits, strain government budget deficits, and crowd out spending in other critical areas, such as infrastructure, education, and healthcare. According to the International Energy Agency (IEA), direct fossil fuel subsidies amounted to $523 billion worldwide in 2011. Accelerating the (partial) phase-out of fossil fuel subsidies around the world represents 360 million tonnes of CO_2e abated by 2020.[120] Fossil fuel subsidies inefficiently compensate low-income families for rising energy prices. In fact, the IMF calculated that the bottom consumption quintile of developing country households receive only 7% of the benefit of fuel subsidies, while the top two quintiles realize over 65% of benefits. These inefficient subsidies must be eliminated, and we must take action immediately to encourage other governments to follow our lead.

While removing fossil fuel subsidies in the U.S. would not have much of an effect on emissions reductions, the impact of doing so globally would be large. We should lead by example here at home, and encourage other nations to follow suit.

Subsidies in the United States are hardly as prevalent as those in countries such as Saudi Arabia, Venezuela, or Nigeria. Thus, eliminating fossil fuel subsidies would have less impact in the United States than in those regions. Despite comprising only a small fraction of GDP, U.S. subsidies are nevertheless large in magnitude. In order to drive other countries to adopt subsidy reform and spur greater global impact, we must set the example here at home.

In 2011, U.S. direct subsidies totaled $13.15 billion per year.[121] Though this entire amount doesn't represent waste (low-income home heating assistance and the strategic petroleum reserve have important roles given existing infrastructure), eliminating policies such as percentage-cost-depletion would decrease domestic oil production by .4%, increasing world oil prices by a mere 6 cents/barrel (the average U.S. consumer pays 60 cents more each year).[122] Carbon dioxide emissions would decrease by 4 million tonnes annually.[123] Eliminating such tax provisions would raise approximately $40 billion over 10 years—money that could be more effectively spent in R&D, clean energy deployment, or reducing the deficit.

[120] IEA, Redrawing the Energy-Climate Map 2013

[121] OECD-IEA, Inventory of Estimated Budgetary Support and Tax Expenditures for Fossil Fuels, 2013

[122] Allaire and Brown 2009

[123] Allaire and Brown 2012

Encouraging Other Nations to Follow Suit

The U.S. government must promote the following steps internationally to ensure long-term viability of fossil fuel subsidy reform and protect the poor from large welfare losses[124][125][126]:

- Targeting compensation principally to low-income households, such as direct transfer payments (preferred when possible) or scaling up existing safety-net programs
- Conducting public communications campaigns to espouse budgetary, environmental, and health benefits of reducing subsidies
- Maintaining data transparency to allow independent analysis of the costs of fossil fuel subsidies
- Ensuring prices don't increase rapidly to lower public inflationary expectations and allow consumers and industry time to adjust
- Beginning subsidy phase-out with the least-regressive sectors (typically electricity and gasoline, in the developing world), delaying subsidy reduction where the poor might be more negatively impacted (such as kerosene)
- Establishing automatic pricing mechanisms, which help smooth out large price fluctuations in the short term, ensuring world prices pass through to domestic prices in the medium-term.
- Avoiding delayed reform, which may lead to complete policy abandonment
- Providing alternative energy sources to reduce vulnerability to price increases

> ***"We will continue to lead by the power of our example, because that's what the United States of America has always done."***
> ***—President Barack Obama, June 25 2013***

3.5: No New Nuclear Subsidies

Given the limited scope of nuclear subsidies, we advocate for no new incentive changes for the nuclear industry. Pervasive cost overruns provide enough reason for the private sector to shy away from nuclear investments. Current subsidies will not provide the boost the nuclear industry needs to increase its share of generation capacity, but removing subsidies already in place would only harm ratepayers.

In the Energy Policy Act of 2005, there was a change in tax preference for nuclear decommissioning costs.[127] Nuclear power operators are no longer taxed on decommissioning funds set up initially to fund the expensive decommissioning process. This preferential tax treatment cost the U.S. taxpayers $1 billion in 2007.[128] There also exists a production tax credit of 1.8cents/kWh for advanced nuclear facilities during the first 8 years of operation (although none have been

[124] Cottarelli et al. 2013
[125] Vagliasindi 2013
[126] OECD 2013
[127] US Nuclear Power Policy 2013
[128] US DOE, Direct Federal Financial Interventions and Subsidies in Energy in Fiscal Year 2010

built yet).[129] However, the total amount of benefit is capped at $750 million per year, or $6 billion over 8 years,[130] and no nuclear power plants that applied after December 31st, 2008 can claim the credit.

Bayman (2012) asserts: "that only one new application has been filed since 2008 lends support to the proposition that investors will generally refuse to go forward with construction unless a credit is available." If every one of the 24 nuclear units proposed before the cutoff date is constructed, the tax credit will only be available for one-quarter of the electricity produced per plant. The national limitation of 6 GW of power available for subsidies means that nuclear plants are competing for portions of a fixed pie. The greater the number of reactors, the smaller the slice of the subsidy each receives.

There are, then, disincentives for an increase in the number of reactors. Given the risks associated with significant expansion of nuclear power, we think this is a good thing. The optimal energy strategy is to maintain the current incentive structure and allow the nuclear industry to compete with other sources of energy in the electricity market.[131]

[129] Bayman 2013
[130] Ibid.
[131] Bradford 2013

4: National Green Bank

The United States should establish a National Green Bank to create a permanent source of financing for capital projects that reduce GHG emissions that is independent, government-owned, and non-profit (much like the U.S. Export-Import Bank or the Overseas Private Investment Corporation). The Bank will lower capital costs (costs of debt) for low-carbon energy deployment and reduce investor risk. Green energy startups, which normally pay higher interest rates due to their relatively new business strategies, will then be able to receive lower interest rates on loans, increasing the net-present value (NPV) of investments.[132] A National Green Bank will be self-sustaining—that is, operate at no net cost to the U.S. taxpayer. In fact, a Greenhouse Gas Fee without a National Green Bank would mean higher interest rates for renewable energy. A National Green Bank will actually lower the cost of renewable energy, causing electricity price decreases of 1.6 cents/kWh for a hypothetical wind project.[133]

According to the Center for American Progress a national "Green Bank" requiring initial funding of $10 billion would leverage capital at a 10-1 ratio, raising $100 billion in private investment.[134] CAP estimates this will reduce GHG emissions between 22 and 59 MMT CO_2/year. The Coalition for the Green Bank gives reduction estimates of "20-30% of the annual reduction needed from the Waxman-Markey through 2020 or 5-10% of the CO_2 emitted from the power sector in a business as usual scenario."

At no net cost to taxpayers and ratepayers, we can more efficiently reduce GHGs, create jobs, and decrease financial risk in renewables with the creation of a National Green Bank.

While reduction estimates differ, it is clear that the transition to a low-carbon economy will require both a Greenhouse Gas Fee and capital market reform to boost confidence in newer technologies. At no net cost to taxpayers and ratepayers, we can more efficiently reduce GHGs, create jobs, and decrease financial risk in renewables with the creation of a National Green Bank.

[132] Peck 2009
[133] Ibid.
[134] Caldwell 2009

5: Supply Side Fossil Fuel Regulations

Significant development of domestic fossil fuel reserves reduces the possibility of limiting the global average temperature increase to under 2˚C, the "safe upper limit" agreed upon by many scientists. In the event that a greenhouse gas fee is applied at the source of fossil fuel production, the increased price of fossil fuels will help to account for its pollution and control supply. In the event that a greenhouse gas fee is not applied, the Bureau of Land Management can and should account for the benefit of not combusting fossil fuels through its leasing program in order to prevent fossil fuel over-extraction. As we earlier proposed, NEPA may also be used to ensure that our fossil fuel resources are not overdeveloped.

U.S. coal development, U.S. shale gas production, and Canadian tar sands extraction represent three of fourteen "carbon bombs,"[135] or projects containing massive new stores of fossil fuel reserves. If fully developed, these projects would emit one-third of the greenhouse gases humans can safely put into the atmosphere and almost certainly commit the world to unsafe levels of warming.[136] Put another way, exploiting these "carbon bombs" would be like adding another United States worth of emissions to the atmosphere each year. The United States must work to keep these three carbon bombs—along with the other eleven—in the ground in order to stay on course to protect the climate.

Peabody Energy recently acquired mining rights to 402 million short tons of coal in the Southern Powder River Basin (public lands) in Wyoming at a price of $1.11 per ton.[137] Peabody was the only bidder in the "competitive" auction, receiving the coal at rates that we now know have been undervalued by the Bureau of Land Management (BLM), by some estimates as much as $1 billion annually over the past 30 years.[138] In reality, the amount that the American taxpayer has been shortchanged is far greater than this original estimate when the costs of the combustion of those resources are taken into account. Each of the 442 million short tons of coal extracted from public lands in 2012 contains 1.87 tonnes of carbon dioxide embedded in it.[139] Applying the U.S. Government's value for the Social Cost of Carbon ($33/tonne)[140] used throughout regulatory cost/benefit analysis yields damages in excess of $60 per short ton of coal, or over $27 billion *each year*, dwarfing the above estimate of $1 billion per year.

In the absence of a Greenhouse Gas Fee, we can defuse these "carbon bombs" by ensuring that coal companies face the true cost of pollution in future BLM auctions by

[135] Voorhar and Myllyvirta, 2013
[136] Ibid.
[137] Gallagher 2012
[138] Wolf 2012
[139] Hong and Slatick, 1994
[140] US EPA Technical Update 2013

factoring in social and environmental costs to the calculations of the Fair Market Value (FMV) of the starting bid. The BLM cannot accept bids below FMV by law, so in order for coal companies to purchase coal assets from the American people, they would have to increase their bids to reflect the cost of carbon pollution on the environment.[141] Given that the social costs exceed winning bid prices by a factor of over 50, such a recalculation of the FMV would help ensure that coal reserves remain buried, which is essential in the fight to keep temperature change below safe thresholds.

We should also consider the true value of oil and natural gas. In 2012, 9% of total oil production and 20% of all natural gas production, as well as 44% of all coal production, occurred on federal and tribal lands.[142] Resources owned collectively by the American people should be valued to reflect all costs that will ultimately be borne; internalizing this externality will ensure fairness to the American taxpayer. Further, additional revenue from these auctions can be used to offset according price increases that will ultimately be passed on to the American consumer—not through fossil fuel subsidies, but through direct transfers, increased welfare program spending, or tax-shifting. **We believe that such a valuation is possible under existing federal authority**.[143]

In the event of an implemented Greenhouse Gas Fee, exports should not be exempt from the fee, as is currently the case in some other States with implemented fees. Greenhouse gas emissions are a global problem and if we are committed to help solve climate change as a nation, it is not in the national interest to reduce our emissions at home while profiting off the sale of our natural resources to be combusted in excess in other countries.

Lastly, the President should not shy away from exercising his **Congressional mandate** under NEPA to consider the impacts of climate change when reviewing fossil fuel extraction and production projects under the purview of the federal government.

[141] BLM, Coal Operations

[142] US EIA, Sales of Fossil Fuels Produced from Federal and Indian Lands 2013

[143] Banks 2013

6: Presidential Commission on the Unfolding Climate Crisis & Our Energy Future

We ask our presidents to **do something**, and surely this is a fair thing to ask, so long as we understand not to expect too much. In January 2010 President Obama created the Blue Ribbon Commission on America's Nuclear Future—dubbed the "BRC". The Commission submitted its final report to the Secretary of Energy on January 26, 2012. Few probably ever heard of the BRC. It came and went, barely noticed. On some level then, Presidential commissions have spotty records. Sometimes the reports are stuffed away on a shelf, having served no other purpose than to deflect attention. But on an issue as critical as climate change this certainly does not have to be the case.

> ***"I am convinced this is the fight America can, and will, lead in the 21st century. And I'm convinced this is a fight that America must lead. But it will require all of us to do our part." —President Barack Obama, June 25 2013***

In his most recent State of the Union address, President Obama said, "if Congress won't act soon to protect future generations, I will," but he has done little since then to urge Representatives and the American people forward in a conversation around climate change solutions. President Obama should create a multi-partisan Presidential Commission on the Unfolding Climate Crisis & Our Energy Future.[144] We need such a Commission to gather critical information both to get out ahead of the unfolding climate crisis and to plan now for our future energy policy decisions. The membership of the Commission can further help to foster political consensus among organized interests—from business to civil society—who would serve on it.[145] The Commission is not the only medicine to bring down the rising planetary temperature. However, it can be a table around which the best and brightest minds—would-be climate and energy surgeons—gather to begin to seriously tackle this unfolding crisis in proper proportion to its vast scope and extent.

[144] It should have wide bi-partisan engagement, from Republicans and Democrats, as well make concerted efforts to involve independents, Greens, and others who place themselves outside of the bounds of the traditional bi-partisan divide.

[145] Zegart, A. Blue Ribbons, Black Boxes: Toward a Better Understanding of Presidential Commissions. Presidential Studies Quarterly 34, no. 2 (June).

CONCLUSION

What More President Obama Should Do Under Executive Authority:

- Establish a Presidential Commission on the Unfolding Climate Crisis and Our Energy Future
- Direct the EPA to thoroughly regulate fugitive methane emissions capture from coal and gas production by applying technology standards to sources of known emissions
- Shift federal loan guarantees from solely being available to advanced fossil and nuclear energy projects towards renewable energy, energy efficiency, and transportation solutions
- Acknowledge limitations of "clean" coal, nuclear energy, corn ethanol, and domestic and international fuel-switching to natural gas vehicles
- Reject projects under federal jurisdiction that would have significant detrimental effect on the global climate, including: coal and LNG export terminals, tar-sands pipeline projects, and drilling in the arctic
- Abolish the Unconventional Gas Technical Exchange Program (UGTEP) and create a Global Renewable Energy and Efficiency Exchange Network (G.R.E.E.E.N.) to encourage exchange of best practices around the world
- Direct Export-Import Bank investments strongly away from fossil fuels and towards supporting renewable energy technologies
- Encourage the international community to responsibly repeal fossil fuel subsidies
- Promote, through the Arctic Council, an international ban on offshore drilling in the Arctic
- Direct the BLM to include greenhouse gas damages in the valuation of our public coal, oil, and gas resources (in absence of a Greenhouse Gas Fee)

What President Obama Must Urge Congress and the American People to Support:

- Adopt a comprehensive Greenhouse Gas Fee that funds research & development, transportation initiatives, electrical grid enhancements, bio-sequestration incentives, and the protection of vulnerable communities from climate and price changes
- Establish a National Green Bank
- Increase funding for public transportation expansions and research and development of advanced battery technologies, hydrogen fuels, and cellulosic biofuels
- Repeal the exemptions from the CAA, CWA, SDWA, NEPA, RCRA, EPCRA, and CERCLA that hydraulic fracturing currently enjoys
- Eliminate domestic fossil fuel subsidies
- Remove the corn ethanol standard
- Avoid new nuclear subsidies

Transforming the ways in which we produce and use energy here in the United States will not be an easy task and it cannot be accomplished overnight. It will require the hard work and creative cooperation of industry, advocates, scientists, engineers, citizens, and our government leaders. However, it is a challenge that we have an imperative to rise to. If we embrace this challenge with true American leadership, we can create a better world for everyone.

> ***"I understand the politics will be tough. The challenge we must accept will not reward us with a clear moment of victory....Our progress here will be measured differently -- in crises averted, in a planet preserved. But can we imagine a more worthy goal?"***
> ***—President Barack Obama, June 25 2013***

We put forth a risk-averse strategy that can begin to limit our nation's impact on climate change by reducing emissions to levels that our best scientists and policy experts say is necessary. *The Plan* will transform our economy by creating green jobs and energy independence, reduce the impacts of climate change on vulnerable communities, reduce the impacts of climate policy on vulnerable consumers and workers, and lead the world on a path towards a clean energy future. Our strategy reduces emissions here at home, while also ensuring that our policies and resources are not supporting the development of fossil-fueled futures in other parts of the world.

The Plan reduces net domestic greenhouse gas emissions from their 2005 levels by **29.4-54.2% in 2020** and **57.5-108.4%[146] by 2050** through:

- Greenhouse Gas Fee on CO_2 emissions from fossil fuels: 16.5-29.3% by 2020, 46.0-91.2% by 2050
- Greenhouse Gas Fee and regulations on fugitive methane: 1.2-2.3% by 2020 and 3.5-4.2% by 2050
- National Green Bank: 1.7-2.6% by 2020, 3% minimum by 2050
- Bio-sequestration: 10-20% by 2020, 5-10% by 2050

To ensure that as our emissions decline, global emissions do not increase as a result of our policies, the President should also exercise his powers to reject international export projects through NEPA, shift financing practices of the Export-Import bank, promote international cooperation on renewable energy and energy efficiency, and institute additional supply-side fossil fuel regulations if Congress does not act.

Our estimates of potential reductions are conservative, and don't factor in the effects of many of our proposed policies, such as expanding funding for transportation initiatives or building a 21st century electrical grid. If fully implemented, our policies would catalyze and underscore transformative changes in our economy with untold economic and environmental potential. Coupling these sensible policies with the ambitious and promising parts of President Obama's current plan will set our nation on the path towards ensuring a safer, more prosperous, and more just future for ourselves and our posterity.

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[146] Bio-sequestration can result in negative emissions

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