To: Avi Garbow/DC/USEPA/US@EPA;Patricia Embrey/DC/USEPA/US@EPA[]; atricia Embrey/DC/USEPA/US@EPA[]
From: "Doniger, David"
Sent: Tue 11/8/2011 3:46:05 PM
Subject: URGENT: NSPS guidance
ddoniger@nrdc.org
www.nrdc.org
http://switchboard.nrdc.org/blogs/ddoniger/

Avi, Patricia,

Since the NSPS notice posted on the OMB site is exceedingly spare, we need to know how the agency is answering various questions that reporters are asking us and are sure to ask you. We want to be out there in this news cycle in a very supportive way, but cannot get ahead of the agency. So your answers are quite urgent.

Scope: Does this cover both new and existing? (Is EPA confirming it applies to new and modified, not existing?)

Scope: Does this cover more than "steam" EGUs? (Is EPA confirming it also applies to turbines?)

Economically not significant: Why? (Is EPA confirming anything about why this is labeled not significant?)

Schedule: When will these rules (presumably clarified to be limited to new sources) be proposed and promulgated? Is there a new settlement schedule? What about the schedule/settlement for existing sources? (Is EPA going to say anything about the intended proposal and promulgation dates? Regarding the settlement, are you going to say more than "we're still negotiating with the petitioners"?)

NRDC and the co-litigants don't want to be out there with even the obvious answers to these questions before the agency has confirmed those answer.

So please respond ASAP.

David D. Doniger

Policy Director, Climate and Clean Air Program

Natural Resources Defense Council

Please note our new address:

1152 15th Street, NW, Suite 300

Washington, DC 20005

Phone: (202) 289-2403

Cell: (202) 321-3435

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ddoniger@nrdc.org

on the web at www.nrdc.org

read my blog: http://switchboard.nrdc.org/blogs/ddoniger/

Media Relations

Public Service Enterprise Group
80 Park Plaza, T10
Newark, NJ 07102

FOR IMMEDIATE RELEASE
March 27, 2012

Contact: Mike Jennings
973-430-6406

STATEMENT BY PSEG CHAIRMAN AND CEO RALPH IZZO
ON THE EPA'S PROPOSED CARBON POLLUTION STANDARDS

"While we would have preferred that Congress enact legislation limiting greenhouse gas emissions, the EPA took an important step today in addressing the significant environmental threat posed by climate change.

"The Agency's action establishes a logical and modest standard for new electric power plants and provides the industry with much needed regulatory certainty. The EPA provides a framework for the industry to confront this problem in a cost effective manner.

"We understand that the EPA continues to evaluate regulatory options for already existing plants that may be affected by the Clean Air Act and we look forward to working with the Agency to evaluate the best approaches for achieving meaningful greenhouse gas reductions in as flexible and economic manner as possible."

Public Service Enterprise Group (NYSE:PEG) is a publicly traded diversified energy company with annual revenues of more than $12 billion, and three principal subsidiaries: PSEG Power, Public Service Electric and Gas Company (PSE&G) and PSEG Energy Holdings. For more information, visit www.pseg.com.

###

To: Howard Hoffman/DC/USEPA/US@EPA[]
From: Megan Ceronsky
Sent: Sat 6/30/2012 7:37:12 AM
Subject: Comments
comments new power plants GHG NSPS (non-technical) 6 25 2012.pdf
Environmental Defense Fund, Supplemental Comments on the Proposed Carbon Pollution Standards for New Sources, June 25, 2012.pdf
SC et al Final Comments (6.25.2012).pdf
EDF, Comments on White Stallion & Las Brisas re NSPS (6.25.2012).pdf

Dear Howard:

Attached please find the comments submitted by EDF and colleagues on the proposed GHG NSPS for power plants. We would welcome any questions you might have.

Attached you will find:

Non-technical comments in support of EPA's historic standards signed by more than 30 other health and environmental groups;
Technical comments developed in collaboration with Sierra Club, NRDC, Earthjustice, Environmental Law and Policy Center, Southern Environmental Law Center, NWF, and Clean Air Council;
Supplemental EDF comments addressing, among other topics, the urgent need to make steep cuts in emissions documented by climate science, the need for EPA to swiftly promulgate emission standards for existing power plants, the legal justification for EPA's historic carbon pollution standards for new power plants, and the need to bring EPA's Social Cost of Carbon estimates in line with current state-of-the-art models and methodologies.
Comments addressing, in detail, the inactive status of the Las Brisas and White Stallion power plants in Texas, providing documentation of why these two plants should not be granted transitional source status and exempted from the proposed carbon pollution standards.

I hope you have a lovely weekend!

Megan

Megan Ceronsky
Attorney
Environmental Defense Fund
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(303) 440-8052 (F)
2060 Broadway
Suite 300
Boulder, CO 80302

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June 25, 2012

President Barack Obama
The White House
1600 Pennsylvania Avenue
Washington, D.C. 20500

The Honorable Lisa Jackson, Administrator
Environmental Protection Agency
Room 3000, Ariel Rios Building
1200 Pennsylvania Avenue
Washington, D.C. 20460

Attn: Docket ID No. EPA–HQ–OAR–2011–0660. Standards of Performance for Greenhouse Gas Emissions for New Stationary Sources: Electric Utility Generating Units

Dear President Obama and Administrator Jackson:

We, the undersigned groups, on behalf of our millions of members and supporters across the nation, write today to express our strong support for the establishment of protective carbon pollution standards for new power plants issued under the nation's clean air laws. We urge you to finalize these standards as soon as possible and to move swiftly to propose and finalize carbon pollution standards for existing power plants. The carbon pollution standards should ensure that new power plants use the most efficient, lowest-emitting technologies and that emissions from existing power plants are reduced by the amounts that science demands. This goal is achievable because of the availability of cost-effective technologies that are produced in America and create American jobs.

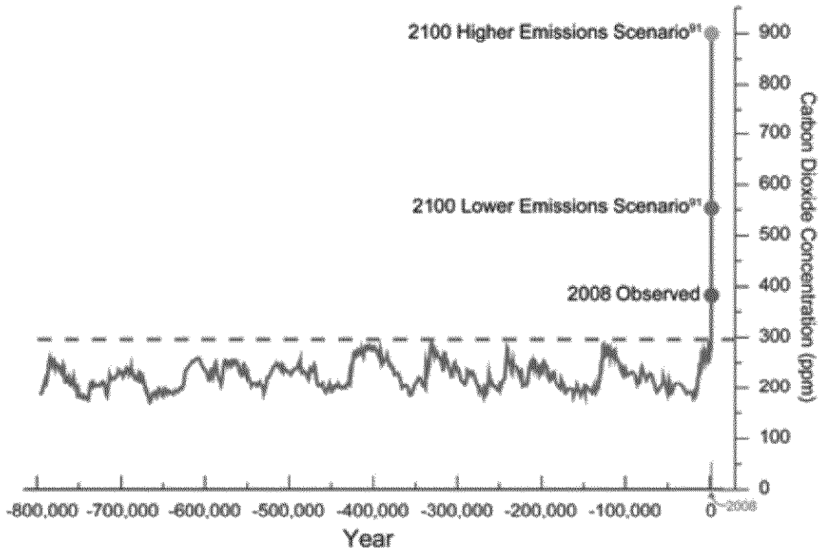
The need to curb climate-destabilizing pollution from power plants is urgent. The new source carbon pollution standards are a vitally important step towards accomplishing this critical task.

In December of 2009 the U.S. Environmental Protection Agency (EPA) concluded—after reviewing a comprehensive and massive body of peer-reviewed scientific research on climate change—that heat-trapping greenhouse gas emissions may reasonably be anticipated to endanger public health and welfare of both current and future generations.[1] Due to human activities—primarily the combustion of fossil fuels and deforestation—the concentration of these gases in the atmosphere is rapidly rising. Atmospheric carbon dioxide (CO_2) levels have increased by approximately 38% since the Industrial Revolution; current atmospheric

[1] *See* Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, 74 Fed. Reg. 66,496 (Dec. 15, 2009) (to be codified at 40 C.F.R. ch. I).

concentrations of both CO_2 and methane (an even more potent greenhouse gas) are significantly higher than they have been for the last 800,000 years.[2]

800,000 Year Record of Carbon Dioxide Concentration



This chart shows CO_2 concentrations in the atmosphere over the last 800,000 years, based upon analyzing air bubbles trapped in an Antarctic ice core. It also shows that unless we curb greenhouse gas emissions atmospheric CO_2 concentrations will likely double or triple by the end of this century.[3]

The increase in the amount of solar radiation that is trapped in the earth's atmosphere is causing average global temperatures to rise. Global temperature records independently assembled by NOAA, NASA, and the United Kingdom's Hadley Center indicate that global mean surface temperatures have risen by 1.3 ± 0.32°F over the past 100 years (1906-2005), with the greatest warming occurring during the past 30 years.[4]

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[2] *See* U.S. ENVTL. PROT. AGENCY, TECHNICAL SUPPORT DOCUMENT FOR ENDANGERMENT AND CAUSE OR CONTRIBUTE FINDINGS FOR GREENHOUSE GASES UNDER SECTION 202(a) OF THE CLEAN AIR ACT ES-1 to -2 (2009); Kenneth L. Denman et al., *Couplings Between Changes in the Climate System and Biogeochemistry*, *in* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS, at 512 (S. Solomon et al. eds., 2007); Piers Forster et al., *Changes in Atmospheric Constituents and in Radiative Forcing*, *in* CLIMATE CHANGE 2007, *supra*; Eystein Jansen et al., *Paleoclimate*, *in* CLIMATE CHANGE 2007, *supra*; THOMAS R. KARL ET AL., U.S. GLOBAL CHANGE RESEARCH PROGRAM, GLOBAL CLIMATE CHANGE IMPACTS IN THE UNITED STATES (2009).

[3] U.S. GLOBAL CHANGE RESEARCH PROGRAM, *supra* note 2, at 13.

[4] *See* Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, 74 Fed. Reg. at 66,522; U.S. ENVTL. PROT. AGENCY, *supra* note 2, at ES-2, -28 to -29; Gabriele C. Hegerl, *Understanding and Attributing Climate Change*, *in* CLIMATE CHANGE 2007, *supra* note 2, at 683.

Climate change presents severe risks to the health and well-being of Americans. If carbon pollution is unchecked, the economic and welfare costs of intensifying climate impacts will be profound.

The United States Global Change Research Program has determined that if carbon pollution emissions are **not** reduced it is likely that American communities will experience increasingly severe and costly climate impacts, including:

- Rising levels of dangerous smog in cities—which will lead to an increased risk of respiratory infections, more asthma attacks, and more premature deaths;
- Increased risk of illness and death due to extreme heat;
- More intense hurricanes and storm surges;
- Increased frequency and severity of flooding;
- Increases in insect pests and in the prevalence of diseases transmitted by food, water, and insects;
- Reduced precipitation and runoff in the arid West;
- Reduced crop yields and livestock productivity; and
- More wildfires and increasingly frequent and severe droughts in some regions.[5]

Climate science indicates that it is necessary to make deep cuts in the amount of carbon pollution emitted—which will require major reductions in power sector emissions.

The National Research Council's 2011 report on climate stabilization concurs that steep emission reductions, on the order of 80% globally, are necessary to stop CO_2 concentrations in the atmosphere from reaching dangerous levels.[6] Cutting emissions from the power sector will be a necessary component of these emissions cuts, as the U.S. power sector is responsible for approximately 40% of U.S. carbon emissions[7] and 7% of global greenhouse gas emissions.[8]

America has the resources and the technologies needed to sharply reduce power sector carbon pollution.

The standards should ensure that new power plants use the most efficient, lowest-emitting technology available, and reflect the emission rates achievable by state-of-the-art combined cycle natural gas plants. Standards issued for existing power plants should achieve the pace and scope of emission reductions that science demands and that proven, cost-effective technologies readily enable.

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[5] U.S. GLOBAL CHANGE RESEARCH PROGRAM, *supra* note 2, at 8-109.

[6] NAT'L RESEARCH COUNCIL, CLIMATE STABILIZATION TARGETS 10 (2011) (excerpt attached as Ex. A). For full report please see: http://www.nap.edu/catalog.php?record_id=12877.

[7] U.S. ENVTL. PROT. AGENCY, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990-2010, at ES-4 tbl.ES-2 (2012).

[8] *Environmental Indicators—GHGs*, U.N. STATISTICS DIV., http://unstats.un.org/unsd/environment/air_greenhouse_emissions.htm (last updated July 2010).

Carbon pollution standards for new and existing power plants will further the progress we are making towards a cleaner, more secure, and more independent future for energy in America. These standards can ensure that we will use our nation's electricity resources more efficiently to cut energy costs for American families and businesses, mobilize American innovation, technologies, and fuels for cleaner energy generation, and ensure that America is at the cutting edge of the clean energy economy of the future.

Sincerely,

Citizens for Pennsylvania's Future (PennFuture)
Clean Air Task Force
Clean Water Action
Climate Solutions
Conservation Law Foundation
Earthjustice
Environment America
Environment Northeast
Environmental Defense Fund
Greenpeace USA
Health Care Without Harm
Interfaith Power and Light, The Regeneration Project
League of Conservation Voters
Moms Clean Air Force
National Wildlife Federation
Natural Resources Defense Council
New Jersey Audubon
NW Energy Coalition
Oregon Environmental Council
Physicians for Social Responsibility
Powder River Basin Resource Council
Renewable Northwest Project
Safe Climate Campaign
Sierra Club
Southern Alliance for Clean Energy
The Center for the Celebration of Creation
The Climate Reality Project
US Climate Action Network
Washington Environmental Council
Western Environmental Law Center
Western Resource Advocates
WildEarth Guardians

June 25, 2011

Via Website and Email
http://www.epa.gov/oar/docket.html
a-and-r-docket@epa.gov, Attn: Docket ID No. EPA-HQ-OAR-2011-0660
EPA Docket Center
U.S. EPA, Mail Code 2822T
1200 Pennsylvania Ave. NW.
Washington, DC 20460

Re: Environmental Protection Agency, Standards of P erformance for Greenhouse Gas Emissions for New Stationary Sources: Electric Utility Generating Units
Docket ID No. EPA-HQ-OAR-2011-0660

Environmental Defense Fund, Inc. ("EDF") respectfully offers the following comments on the U.S. Environmental Protection Agency's ("EPA") proposed Standards of Performance for Greenhouse Gas Emissions for New Stationary Sources ("GHG NSPS").[1] EDF submits these comments on behalf of our hundreds of thousands of members nationwide. EDF has participated in this rulemaking proceeding for some time and these comments and all other comments submitted by EDF and its members, alone or jointly with other commenters, should be considered to reflect the comments and views of EDF as part of this proceeding. All documents referred to herein and all Attachments should be incorporated as part of the administrative record of this rulemaking proceeding.

The comments provided below address the following topics:

(I) The Need to Curb Climate-Destabilizing Emissi ons from Power Plants Is Urgent. The New Source Carbon Pollution Standards Are a Vitally Important Step Towards Accomplishing this Critical Task.

(II) EPA Has Failed to Carry Out Its Legal Respons ibilities to Address Greenhouse Gas Emissions from Power Plants Under § 111 of the Clean Air Act.

[1] 77 Fed. Reg. 22,392 (April 13, 2012).

(III) Both Climate Science and the Clean Air Act R equire EPA To Act To Control Carbon Pollution from Existing Power Plants, and Solutions Are Readily Available to Reduce Emissions From These Sources.

(IV) The Determination that Natural Gas Combined Cycle Technology is the Best System of Emission Reduction Was a Proper Exercise of EPA's Authority Under § 111(b).

(V) The Alternate Pathway Provided for Coal Plants I s Consistent with Both the NSPS Program's Technology-Forcing Purpose and Agency Regulatory Practice.

(VI) EPA Is Not Obligated to Make A New Endangerme nt Finding Once Sources Have Been Listed Under § 111.

(VII) The Social Cost of Carbon Estimate Used in Federal Benefits Analyses Must Be Updated to Reflect Current Science.

(VIII) EPA Should Ensure Future Accessibility of Emission Records.

I. The Need to Curb Climate-Destabilizing Emissio ns from Power Plants Is Urgent. The New Source Carbon Pollution Standards Are a Vitally Important Step Towards Accomplishing this Critical Task.

In December of 2009 the U.S. Environmental Protection Agency ("EPA") concluded—after reviewing a comprehensive and massive body of peer-reviewed scientific research on climate change—that heat-trapping greenhouse gas emissions may reasonably be anticipated to endanger public health and welfare of both current and future generations.[2] Due to human activities—primarily the combustion of fossil fuels and deforestation—the concentration of these gases in the atmosphere is rapidly rising. Atmospheric carbon dioxide (CO_2) levels have increased by approximately 38% since the Industrial Revolution (see Figure 1); current atmospheric concentrations of both CO_2 and methane (an even more potent greenhouse gas) are significantly higher than they have been for the last 800,000 years.[3]

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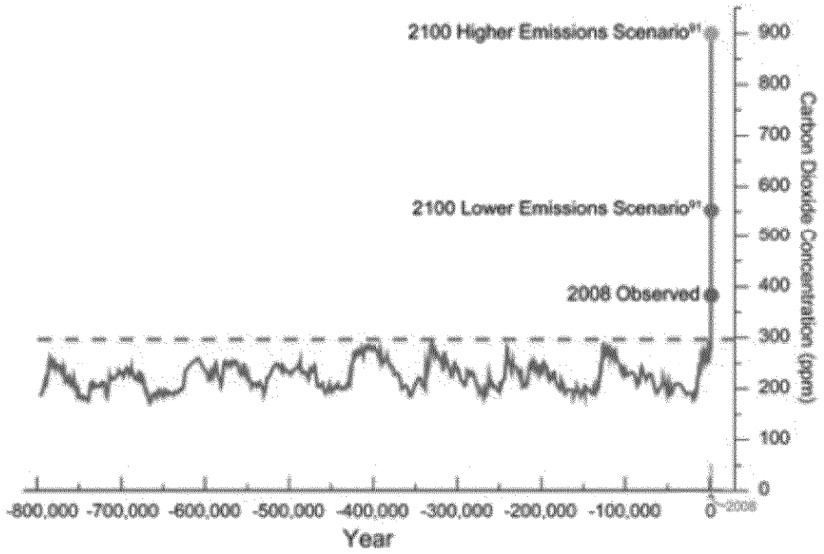
[2] See Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, 74 Fed. Reg. 66,496 (Dec. 15, 2009) (to be codified at 40 C.F.R. ch. I).

[3] See U.S. Envtl. Prot. Agency, Technical Support Document for Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act ES-1 to -2 (2009) (hereinafter TSD); Intergovernmental Panel on Climate Change, Climate Change 2007: The Physical Science Basis, at 512 (S. Solomon et al. eds., 2007) (hereinafter IPCC 2007); U.S. Global Change Research Program, Global Climate Change Impacts in the United States (2009) (hereinafter USGCRP 2009).

Figure 1. 800,000-Year Record of Carbon Dioxide Concentration



This chart shows CO_2 concentrations in the atmosphere over the last 800,000 years, based upon analyzing air bubbles trapped in an Antarctic ice core. It also shows that unless we curb greenhouse gas emissions, atmospheric CO_2 concentrations will likely double or triple by the end of this century from pre-industrial levels.[4]

The increase in the amount of solar radiation that is trapped in the earth's atmosphere is causing average global temperatures to rise. Global temperature records independently assembled by National Oceanic and Atmospheric Administration, National Aeronautics and Space Administration, and the United Kingdom's Hadley Center indicate that global mean surface temperatures have risen by 1.3 ± 0.32°F over the past 100 years (1906-2005), with the greatest warming occurring during the past 30 years.[5] Climate models can successfully replicate historic climates, but they cannot replicate the observed temperature rise over the past 50 years without incorporating the rising quantities of anthropogenic greenhouse gas emissions.[6] See Figure 2. Further, only models including anthropogenic greenhouse gas emissions can replicate the observed pattern of warming observed in different regions and in different parts of the atmosphere.[7]

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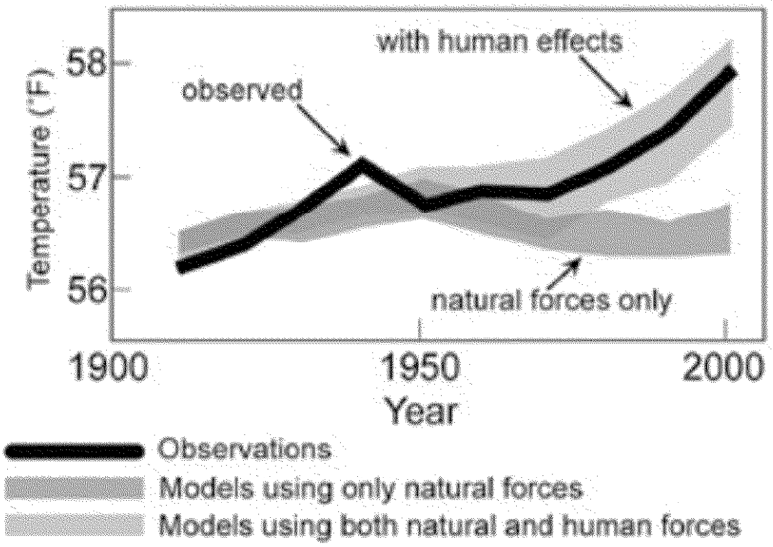
[4] USGCRP 2009 at 2.
[5] See Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, 74 Fed. Reg. at 66,522; TSD at ES-2, -28 to -29; IPCC 2007 at 683.
[6] USGCRP 2009 at 19, 74 Fed. Reg. at 66518.
[7] IPCC 2007 at 74; Fed. Reg. at 66518.

Figure 2. Separating Human and Natural Influences on Climate



This figure shows that models using only natural forces cannot replicate observed warming – in fact, they would predict a slight cooling. Only models accounting for greenhouse gases can duplicate the observed warming trend.[8]

Rising temperatures are causing thermal expansion of the oceans and accelerated melting of snow and ice, driving the rise in global sea levels observed during the 20th century.[9] In addition, approximately half of anthropogenic greenhouse gas emissions have been absorbed by plants and the oceans.[10] Because carbonic acid forms when CO2 dissolves in water, global average sea surface pH has dropped by approximately .1 pH units since the Industrial Revolution (equivalent to a 30% increase in acidity).[11]

Climate change presents severe risks to the health and well-being of Americans.

Most areas of the United States are likely to warm by 1.8-5.4°F between 2010 and 2039 and by 7-11°F by the end of the century under a high emissions scenario (one assuming business-as-usual emissions) and by 4-6.5°F under a lower emissions scenario (assuming reductions in emission rates).[12] This increase in average temperatures is expected to have wide-ranging impacts. Rising temperatures will increase emissions of volatile organic compounds from plants

[8] USGCRP 2009 at 20.
[9] 74 Fed. Reg. at 66518.
[10] TSD at 17.
[11] IPCC 2007 at 750; 74 Fed. Reg. at 66518.
[12] Intergovernmental Panel on Climate Change, Climate Change 2007: Impacts, Adaptation and Vulnerability at 626 (M. L. Parry et al. eds., 2007); USGCRP 2009 at 29; TSD at 69.

and soils (precursors of smog), accelerate ozone (and smog) formation, and increase the frequency and duration of stagnant air masses that allow pollution to accumulate. (TSD at 89-93, USGCRP 2009 at 93-94) Higher ozone levels exacerbate respiratory illnesses, increasing asthma attacks and hospitalizations and increasing the risk of premature death.[13]

Rising temperatures will also result in heat waves that are hotter, longer, and more frequent.[14] Under high emission scenarios, extreme heat waves that currently occur once every twenty years are expected to occur at least every other year in much of the country by the end of the century, with the hottest days approximately 10°F hotter than they are today.[15] The sick and elderly are particularly vulnerable to such impacts. In Los Angeles, annual heat-related deaths are projected to double or triple under a low emissions scenario and to increase by five to seven times under a higher emissions scenario, assuming acclimatization to higher temperatures.[16]

Rising temperatures will reduce snowpack and accelerate snow melt, threatening water supplies in late summer in the West.[17] In addition, significant reductions in winter and spring precipitation are projected for the South, especially in the Southwest, further imperiling water supplies.[18] Rising temperatures will likely increase the length and severity of droughts, especially in the American West.[19] Precipitation events in general and some types of storms, particularly hurricanes, are expected to become more intense, increasing the likelihood of severe flooding.[20]

Droughts are expected to be more frequent, and the extent of drought-limited ecosystems is projected to increase by 11% for every degree C of warming in the United States.[21] This is expected to exacerbate the water scarcity already affecting regions of the United States.[22]

Water shortages and heavy precipitation events are likely to further stress flood control, drinking water, and wastewater infrastructure.[23]

Global sea levels are likely to rise between seven inches and four feet during the 21st century, both because of ice sheet melting and because seawater expands as it warms.[24] This amount of sea level rise, in combination with more powerful hurricanes, will increase the risks of erosion,

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[13] Environmental Protection Agency, Regulatory Impact Analysis for the Proposed Standards of Performance for Greenhouse Gas Emissions for New Stationary Sources: Electric Generating Units (March 2012) at 3-2 -3-3, 5-24 (hereinafter RIA).
[14] IPCC 2007 at 750; 74 Fed. Reg. at 66524-25)
[15] USGCRP 2009 at 33-34.
[16] USGCRP 2009 at 90-92.
[17] USGCRP 2009 at 10, 45-46.
[18] USGCRP 2009 at 30; 74 Fed. Reg. at 66,532.
[19] USGCRP 2009 at 30, 41-46; IPCC 2007 at 262-263, 783; 74 Fed. Reg. at 66,532-34.
[20] USGCRP 2009 at 34-36, 44, 64; TSD at ES-4, 115; AR4, IPCC 2007 at 783; 74 Fed. Reg. at 66,525.
[21] RIA at 3-5, 3-8.
[22] RIA at 3-5.
[23] USGCRP 2009 at 47-51, 132-36; 74 Fed. Reg. at 66,532-33.
[24] USGCRP 2009 at 37, 150; AR4, IPCC 2007 at 750.

storm surge damage, and flooding for coastal communities, especially along the Atlantic and Gulf coasts, Pacific Islands, and parts of Alaska.[25] Under a higher emission scenario, what is currently a once-a-century flood in New York City is projected to be twice as common by mid-century and 10 times as frequent by the end of the century.[26] With accelerated sea level rise, portions of major coastal cities, including New York and Boston, would be subject to inundation during storm surges or even during regular high tides.[27] In the Gulf Coast area, an estimated 2,400 miles of major roadways are at risk of permanent flooding within 50 to 100 years due to anticipated sea level rise in the range of 4 feet.[28]

The RIA reports, based on findings of the National Research Council, that ocean acidity has increased "25 percent since pre-industrial times, and is projected to continue increasing."[29] If atmospheric carbon dioxide doubles, oceanic acidity will also increase, leaving almost nowhere in the ocean where coral reefs can survive and threatening the ocean's food webs, which rely upon coral reefs as fish nurseries and planktonic animals that may be unable to survive a more acidic sea.[30] The loss of healthy ocean ecosystems would have devastating effects on the global food supply.

In addition, the more temperatures rise, the greater the risk that non-linear climate thresholds could be reached, generating abrupt changes with potentially catastrophic impacts for natural systems and human societies.[31] Such thresholds include rapid ice sheet disintegration with related acceleration of sea level rise, abrupt shifts in drought frequency and duration, severe acidification-related impacts on marine ecosystems, and runaway warming due to the release of methane from thawing permafrost and methane hydrates in oceanic sediments.[32]

The need to act to mitigate these harms is truly urgent.

II. EPA Has Failed to Carry Out Its Legal Responsib ilities to Address Greenhouse Gas Emissions from Power Plants Under § 111 of the Clean Air Act.

In 2005, Environmental Defense Fund asked EPA to carry out its responsibilities under the Clean Air Act to address the climate destabilizing greenhouse gas emissions associated with electric generating units. See April 2005 Comments of Environmental Defense Fund et al re

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[25] USGCRP 2009 at 12, 36, 109-10, 142-43, 149-50.
[26] USGCRP 2009 at 109-10.
[27] USGCRP 2009 at 150.
[28] USGCRP 2009 at 62.
[29] RIA at 3-9.
[30] RIA at 3-7, 3-9 – 3-10; National Research Council, Advancing the Science of Climate Change at 55-56, 59-60 (2010), available at http://www.nap.edu/openbook.php?record_id=12782.
[31] USGCRP 2009 at 26; National Research Council, Abrupt Climate Change, Inevitable Surprises at v, 16, 154 (2002); US Climate Change Science Program, Abrupt Climate Change at 10 (2008); TSD at 66.
[32] USGCRP 2009 at 26, 155 (JA 5349, 5478); TSD 75-78, 134, 137-38 (JA 3423-26, 3482, 3485-86).

"Standards of Performance for Electric Utility Steam Generating Units for Which Construction Is Commenced After September 18, 1978; Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units; and Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units." 70 Fed. Reg. 9706 (Feb. 28, 2005).

Since that time, the power sector has discharged over 10 billion tons of climate-disruptive greenhouse gases. And since 2005, over seven years ago, EPA has neither finalized a standard for new EGUs nor taken any action to address the vast volume of emissions from existing plants. EPA's failure to act is manifestly contrary to law.

EPA is required to establish standards of performance addressing the GHGs from new and existing EGUs under section 111(b), (d) of the Clean Air Act. EDF filed a petition for judicial review in the U.S. Court of Appeals for the D.C. Circuit when EPA refused to establish such emission standards in response to our 2005 comments. The court held the briefing on this claim in abeyance when the U.S. Supreme Court granted review in Massachusetts v. EPA.

On April 2, 2007 the Supreme Court held that greenhouse gases were air pollutants within the capacious definition of that term under the Clean Air Act and directed EPA to carry out its responsibility under section 202 of the Clean Air Act to determine whether greenhouse gases endanger human health and welfare on the basis of science. In September 2007, the D.C. Circuit remanded the case challenging EPA's flawed NSPS for EGUs in light of the Supreme Court's ruling in Massachusetts v. EPA, 549 U.S. 497 (2007). See New York v. EPA (D.C. Cir. 06-1322) (order of Sept. 24, 2007).

EPA has a clear and plain responsibility to take action under the law. As a threshold matter, the Clean Air Act commands EPA to publish a list of each category of stationary source that "causes, or contributes significantly to, air pollution which may reasonably be anticipated to endanger public health or welfare." 111(b)(1)(A); see also id. § 111(a)(3) (defining "stationary source"). All of the predicates for EPA to carry out its long overdue rulemaking responsibilities under section 111 are complete. EPA has issued its finding that six greenhouse gases endanger human health and the environment. See 74 Fed. Reg. 66,496 (Dec. 15, 2009); see also 75 Fed. Reg. 49,556 (Aug. 13, 2010) (denying reconsideration petitions). Demonstrated technologies can significantly reduce greenhouse gas emissions from power plants. Indeed, the legal and policy framework for EPA action has long been explicated. See, e.g., CRS, Climate Change: Potential Regulation of Stationary Source Greenhouse Gas Sources Under the Clean Air Act (May 14, 2009).

But EPA has failed to carry out its responsibilities leaving public health and the environment imperiled. Once EPA has listed a source category, the Agency must promulgate federal standards of performance to regulate emissions from new, modified and reconstructed sources in that category. Section 111(b)(1)(B); see also 111(a)(2) (defining "new source"); 111(a)(4) (defining "modification"); 40 C.F.R. § 60.15(b) (defining "reconstruction"). Such standards are commonly referred to as "new source performance standards" or "NSPS."

By definition, an NSPS is

> a standard for emissions of air pollutants which reflects the degree of emission limitation achievable through the application of the best system of emission reduction which (taking into account the cost of achieving such reduction and any nonair quality health and environmental impact and energy requirements) the Administrator determines has been adequately demonstrated.

Section 111(a)(1).

Section 111(b)(1)(B) explicitly requires that EPA complete a timely review and revision of the NSPS, mandating that "[t]he Administrator shall, at least every 8 years, review and, if appropriate, revise such standards following the procedure required by this subsection for promulgation of such standards." 111(b)(1)(B). This provision further mandates that the 8-year review is required unless "the Administrator determines that such review is not appropriate in light of readily available information on the efficacy of such standard." Id. Similarly, the Administrator must revise the standard "at least every 8 years" unless she promulgates a determination that such a revision is not "appropriate" under the Clean Air Act. Id.

For existing sources, section 111(d) of the Clean Air Act, 42 U.S.C. § 7411(d), requires that the Administrator ensure the promulgation of standards that are based on the new source performance standards. Id. § 7411(d)(1). The procedure that EPA has promulgated for this purpose starts with the required promulgation of federal "emission guidelines" ("EG") for existing sources. See 40 C.F.R. §§ 60.21(e), 60.22; see also 40 C.F.R. §§ 60.20-60.29 (describing overall procedure for existing sources). Specifically, the section 111(d) procedure mandates that:

> Concurrently upon or after proposal of standards of performance for the control of a designated pollutant from affected facilities, the Administrator will publish a draft guideline document containing information pertinent to control of the designated pollutant form [sic] designated facilities. . . . After consideration of public comments and upon or after promulgation of standards of performance for control of a designated pollutant from affected facilities, a final guideline document will be published and notice of its availability will be published in the Federal Register.

Id. § 60.22(a) (emphasis added).

These required emission guidelines for existing sources, like NSPS, must reflect the best demonstrated technology. See id. § 60.22(b)(5); id. § 60.21(e). After EPA establishes these required emission guidelines for existing sources under 40 C.F.R. § 60.22, each State must implement and enforce EPA's guidelines, by submitting a plan that includes standards to control emissions from these sources that are "no less stringent" than the federal emission guidelines. Id. §§ 60.23(a), 60.24(c); see also id. § 60.27.

While EPA has failed to complete its delegated rulemaking responsibilities, the U.S. has represented to the U.S. Supreme Court that EPA is taking action to address greenhouse gases

from the power sector. In nuisance claims maintained by a coalition of states against the nation's largest power companies under the federal common law, the U.S. Government expressly pointed to its Settlement Agreement over its failure to address power plant greenhouse gases and represented to the U.S. Supreme Court that EPA was carrying out the Clean Air Act in a way that "speak[s] directly" to the particular claims in question – the regulation of greenhouse gases from power plants – and the common law nuisance claims were thereby displaced:

> In another significant step indicating EPA's active engagement in the process of determining how and when greenhouse-gas emissions will be regulated, EPA announced on December 23, 2010 that it had entered into a proposed settlement agreement in an earlier case about whether the new source perform ance standards (NSPS) for utility boilers (i.e., power plants like defendants') should include st andards for greenhouse-gas emissions.24 That proposed settlement (which was subject to a 30-day public-comment period that expired on January 31, 2011, see 75 Fed. Reg. at 82,392) would commit EPA to complete a NSPS rulemaking under Section 111 of the CAA (42 U.S.C. 7411). If the settlement is adopted by EPA, the purpose of the ensuing rulemaking would be to consider standards applicable to new and modified facilities; it would simultaneously consider standards under which States would be required (under 42 U.S.C. 7411(d)) to impose regulatory limitations on emissions from existing facilities. See p. 4, supra. Under the settlement, EPA would issue a proposed rule by July 26, 2011 and promulgate final regulations by May 26, 2012. 25. Thus, if the settlement is formally adopted, EPA will have established a precise time line for deciding whether and to what extent emissions standards under the CAA will apply to the very carbon-dioxide emissions at issue in this case.
>
> 3. As the foregoing discussion demonstrates, EPA now regulates greenhouse-gas emissions under the currently existing statutory scheme of the CAA, and it may soon be specifically committed to completing a rulemaking to address greenhouse-gas-emissions standards applicable to defendants' already-existing power plants, even if they are not modified. Thus, it is abundantly clear that the CAA, as it is now being implemented by EPA, "speak[s] directly" (Milwaukee II, 451 U.S. at 315 (quoting Mobil Oil, 436 U.S. at 625)) to the particular issue presented by plaintiffs' federal common-law nuisance claims about climate change: regulation of greenhouse-gas emissions, and in particular emissions from stationary sources (like defendants' power plants). The conclusion that EPA's actions have displaced any common-law emissions standards is unaffected by EPA's decision to adopt an incremental approach that will not necessarily lead to standards specifically governing greenhouse-gas emissions from defendants' already existing power plants (unless they are modified and thus require a PSD permit under the new regulations), at least until some time after May 26, 2012. In Middlesex County Sewerage Authority, the Court held that the Marine Protection, Research, and Sanctuaries Act of 1972 displaced federal common law immediately and entirely, even though "Congress allowed some continued dumping of sludge" for nine years after the statute was enacted based on its "considered judgment that it made sense to allow entities like petitioners to adjust to the coming change." 453 U.S. at 22 n.32; see also Massachusetts v. EPA, 549 U.S. at 533 (recognizing that EPA possesses "significant

> latitude as to the manner, timing, content, and coordination of its regulations"); id. at 524 ("Agencies, like legislatures, do not generally resolve massive problems in one fell regulatory swoop. They instead whittle away at them over time, refining their preferred approach as circumstances change and as they develop a more nuanced understanding of how best to proceed.").
>
> Although EPA has not yet done precisely what plaintiffs demand here (i.e., cap defendants' carbon-dioxide emissions and require them to be reduced annually for at least a decade, J.A. 110, 153), that is not the relevant test. As this Court has stated: "Demanding specific regulations of general applicability before concluding that Congress has addressed the problem to the exclusion of federal common law asks the wrong question. The question is whether the field has been occupied, not whether it has been occupied in a particular manner." Milwaukee II, 451 U.S. at 324; see also id. at 323 ("Although a federal court may disagree with the regulatory approach taken by the agency with responsibility forissuing permits under the Act, such disagreement alone is no basis for the creation of federal common law."); Illinois v. Outboard Marine Corp., 680 F.2d 473, 478 (7th Cir. 1982) (refusing "to find that Congress has not 'addressed the question' because it has not enacted a remedy against polluters," because that "would be no different from holding that the solution Congress chose is not adequate," and "Milwaukee II * * * precludes the courts from scrutinizing the sufficiency of the congressional solution").
>
> Because EPA's regulatory activities speak directly to the issue of greenhouse-gas emissions, any common-law claims seeking to reduce such emissions have been displaced.

Brief of U.S. Government Brief in AEP v. Connecticut (No. 10-174) at ps. 50-53.

While EPA's mandatory responsibilities to act in addressing new and existing sources under section 111 are manifest and the U.S. Government has pointed to its commitment to act in addressing emissions from the power sector, including existing power plants, as the basis for the U.S. Supreme Court to displace federal common law of nuisance claims, no final standards have been adopted. Moreover, EPA has failed to take any regulatory action at all to address the massive emissions from existing sources. EPA's failure to act contravenes its manifest responsibilities under the law. See, e.g., 42 U.S.C. §7604; 40 CFR part 54; see also Telecomms. Research & Action Center v. FCC, 750 F.2d 70 (D.C. Cir. 1984).

III. Both Climate Science and the Clean Air Act R equire EPA to Act to Control Carbon Pollution from Existing Power Plants, and Solutions Are Readily Available to Reduce Emissions From These Sources.

If promptly finalized the proposed carbon pollution standards for new power plants will help ensure that new American power generation infrastructure is cleaner, more efficient, and less damaging to human health and well-being. Such standards are, however, insufficient to satisfy EPA's legal obligation under the Clean Air Act to control dangerous pollution from existing

sources, and incapable of cutting power sector emissions by the amounts demanded by the rigorous science documenting the severe risks posed by climate change to Americans and American communities.

CO_2 emissions from existing power plants are the single largest source of U.S. emissions and are a significant component of global emissions. The EPA's Inventory of Greenhouse Gas Emissions and Sinks reports that electrical generation was responsible for 2,258 million metric tons of CO_2 in 2010 (the most recent year of the inventory), which is 39% of annual U.S. CO_2 emissions.[33] Globally, U.S. power sector emissions constitute approximately 5% of emissions from all anthropogenic sources.[34] It is urgent that we act to reduce greenhouse gas emissions and prevent atmospheric concentrations of these heat-trapping gases from reaching levels that could destabilize our climate with catastrophic impacts for humans and our environment.[35] Dramatically reducing emissions from dominant pollution sources such as the power sector is therefore a necessary component of climate mitigation.

Section 111(d) is well suited to achieving GHG emission reductions from existing sources. Section 111(d) establishes a collaborative, iterative process through which EPA and the States can identify emission reduction opportunities at existing fossil fuel fired power plants and design tailored programs to achieve the required level of reductions. Under § 111(d), EPA will issue Emission Guidelines that identify the best system or systems of emission reduction that have been adequately demonstrated, and establish minimum levels of emission reductions that must be achieved by State plans. The States, however, have considerable flexibility in determining how to achieve the emission reductions identified in the Emission Guidelines. EPA will approve State plans that achieve emission reductions that are equivalent to the emission reductions required in the Emission Guidelines.

There is a wealth of opportunities available to cost-effectively reduce climate-destabilizing emissions from existing power plants. We urge EPA to look broadly across the electric sector in identifying opportunities for emission reductions. Individual plants can reduce their emissions by improving their efficiency, which will allow them to generate more power with less fuel and lower fuel costs. Mobilizing the nation's vast resources of energy efficiency offers the potential to cut not only carbon pollution but also harmful co-pollutant emissions while lowering utility bills for American families and businesses, creating jobs, stimulating local economies via re-channeled energy bill savings, improving energy security, and enhancing grid reliability. Deploying renewable energy and supply-side energy efficiency solutions such as combined heat and power to meet energy demand both have tremendous potential to reduce emissions from fossil fuel fired plants. We can also shift our utilization of fossil-fuel-fired plants to use our cleaner plants more and our dirtier plants less.

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[33] U.S. EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2010 (2012) at Table ES-2.

[34] According to the EDGAR database, global emissions in 2008 were 46,917 million metric tons CO_2e.

[35] National Research Council, Climate Stabilization Targets (2011) at 10.

Marshalling demand-side energy efficiency to secure emission reductions offers a win-win-win solution. A McKinsey analysis of the national economic potential for demand side energy efficiency, for example, indicates that energy efficiency improvements could reduce energy demand by more than 2% each year.[36] Achieving just 70% of the economic energy efficiency potential identified by the McKinsey 2009 analysis would reduce power sector emissions to 10% below 2011 levels by 2020—without considering the emission reduction potential of adding renewables, shifting utilization, or onsite efficiency improvements at power plants. Vermont is already achieving a 2% annual reduction in energy demand through its energy efficiency program.[37] Four states (including Vermont) have binding annual energy savings targets of 2% or above in existing policies: Massachusetts (2.4%), Vermont (2.25%), Arizona (2.2%), and Rhode Island (2.0%). An additional four states have binding annual energy savings targets of 1% or above: New York (1.9%), Minnesota (1.5%), Hawaii (1.5%), and California (1.0%).[38] Demonstrating the potential for reducing emissions via demand side energy efficiency alone will go far towards demonstrating the eminent achievability of significant power section emission reductions in the near term.

Reducing electricity demand via energy efficiency and demand side management – with available technologies – has been demonstrated to be one of the most cost-effective means of reducing GHG emissions from the power sector.[39] The McKinsey 2009 study found that after

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[36] McKinsey, Unlocking Energy Efficiency in the U.S. Economy (2009), available at: http://www.mckinsey.com/Client_Service/Electric_Power_and_Natural_Gas/Latest_thinking/Unlocking_energy_efficiency_in_the_US_economy.aspx. EPRI's 2009 analysis of the economic potential for demand-side energy efficiency, though more limited in scope than McKinsey's, found that the interventions to capture the economic energy efficiency potential could generate a .9% reduction in energy demand per annum—eliminating projected demand growth. EPRI, Assessment of Achievable Potential from Energy Efficiency and Demand Response Programs in the U.S. (2010-2030) (2009), available at: http://www.edisonfoundation.net/iee/reports/EPRI_AssessmentAchievableEEPotential0109.pdf.

[37] Efficiency Vermont, Year 2010 Savings Claim (April 1, 2011) at 3, available at: www.efficiencyvermont.com. Energy efficiency programs in Nevada, Hawaii, Rhode Island, Minnesota, and Vermont all achieved energy demand reductions equivalent to 1% or more of electricity sales in 2009. American Council for an Energy-Efficiency Economy, 2011 State Scorecard (2011) at 17, available at: http://www.aceee.org/research-report/e115.

[38] American Council for an Energy-Efficiency Economy, 2011 State Scorecard (2011) at 21-22, available at: http://www.aceee.org/research-report/e115.

[39] "RGGI investment in energy efficiency depresses regional electrical demand, power prices, and consumer payments for electricity. This benefits all consumers through downward pressure on wholesale prices, yet it particularly benefits those consumers who actually take advantage of such programs, implement energy efficiency measures, and lower both their overall energy use and monthly energy bills. These savings stay in the pocket of electricity users. But positive macroeconomic impacts exist as well: the lower energy costs flow through the economy as collateral reductions in natural gas and oil consumption in buildings and increased consumer disposable income (from fewer dollars spent on energy bills), lower payments to out-of-state energy suppliers, and increased local spending or savings. Consequently, there are multiple ways that investments in energy efficiency lead to positive economic impacts; this reinvestment thus stands out as the most

taking into account the upfront costs of installing efficiency improvements, the efficiency measures they identified would save American families and businesses $500 billion over ten years.[40] In addition, the study estimated that it would require 600,000-900,000 workers during the duration of the 10-year period to develop, produce, and implement the efficiency improvements, administer the programs, and verify the results.[41]

EPA can and must act to curb climate-destabilizing emissions from existing power plants, and can do so in a way that will stimulate the economy, reduce harmful air pollution, and lower utility bills for American families and businesses.

IV. The Determination that Natural Gas Combined Cycle Technology is the Best System of Emission Reduction Was a Proper Exercise of EPA's Authority Under § 111(b).

A. The NSPS Program Is Intended to Be Technology Forcing to Reduce Emissions from High-Emitting Sectors.

1. Congress Established and the Courts Have Affirmed the NSPS as a Program Intended to Drive Innovation to Reduce Emissions.

Congress created the NSPS program in order to drive down emissions of dangerous air pollutants from major sources of pollution, and designed it to be technology-forcing in systems of emission reduction. The Senate Committee Report issued prior to passage of the Clean Air Act in 1970 stated that "[s]tandards of performance should provide an incentive for industries to work toward constant improvement in techniques for preventing and controlling emissions from stationary sources."[42] The Senate Report also clarified that an emerging control technology used as the basis for standards of performance need not "be in actual routine use somewhere."[43]

Long-established case law confirms that NSPS is intended to be a technology-forcing regulatory mechanism to drive reductions in emissions from major pollution-generating sectors. See Sierra Club v. Costle, 657 F.2d 298, 364 (D.C. Cir. 1981) ("[W]e believe EPA does have authority to hold the industry to a standard of improved design and operational advances, so long as there is substantial evidence that such improvements are feasible."); Portland Cement Association v. Ruckelshaus, 486 F.2d 375, 391 (D.C. Cir. 1973) (The court "reject[ed] the suggestion of the cement manufacturers that the [Clean Air] Act's requirement that emission limitations be 'adequately demonstrated' necessarily implies that any cement plant now in existence be able to

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economically beneficial use of RGGI dollars." The Analysis Group, The Economic Impacts of the Regional Greenhouse Gas Initiative on Ten Northeast and Mid-Atlantic States (Nov. 15, 2011) at 7, available at: http://www.analysisgroup.com/uploadedFiles/Publishing/Articles/Economic_Impact_RGGI_Report.pdf.

[40] McKinsey, Unlocking Energy Efficiency in the U.S. Economy at 14.

[41] Id. at 99.

[42] S. Rep. No. 91-1196, at 17 (1970).

[43] Id. at 16.

meet the proposed standards."). The D.C. Circuit has explained that as EPA fulfills its innovation-forcing mandate, the Agency should be forward-looking when determining what systems of emission reduction are available: "Section 111 looks toward what may fairly be projected for the regulated future, rather than the state of the art at present."[44]

2. New Source Performance Standards Have Played Key Technology-Forcing Roles in the Past.

The Congressional Research Service (CRS) documented the technology-forcing function that NSPS have played in its report on the potential regulation of GHG sources under the Clean Air Act. The report notes that the flexibility inherent in the Administrator's authority to determine which technologies have been adequately demonstrated "has been used to authorize control regimes that extended beyond the merely commercially available to those technologies that have only been demonstrated, and thus are considered by many to have been 'technology-forcing.'"[45]

The CRS report focuses on the 1971 and the 1978 NSPS for sulfur dioxide (SO_2) emitted by coal-fired electric generating units as a prime example of the Agency incentivizing technology development and thereby facilitating ambitious emission reductions through NSPS. The 1971 NSPS required a 70% reduction in new power plant SO_2 emissions, on average, and could be met initially only by burning low-sulfur coal or by using an emergent technology known as flue gas desulfurization (FGD). When the 1971 utility SO_2 NSPS was promulgated, there was only one FGD vendor and only three FGD units in operation. The 1979 NSPS retained the 1971 emission standard but also required a 70-90% reduction in combustion emissions, depending upon the sulfur content of the coal. This requirement could then be met only by using an FGD device.

A history of the development of FGD devices (cited in the CRS report) further illustrates how much the SO_2 NSPS motivated the development of this technology:

> The Standards of Performance for New Sources are technology-forcing, and for the utility industry they forced the development of a technology that had never been installed on facilities the size of utility plants. That technology had to be developed, and a number of installations completed in a short period of time. The US EPA continued to force technology through the promulgation of successive regulations. The development of this equipment was not an easy process.
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> . . .
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> Chemical and mechanical engineers had never dealt with the challenges they faced in developing FGD systems for utility plants during this period. Chemical engineers had never designed process equipment as large as was required, nor had they dealt with the complex chemistry that occurred in the early FGD

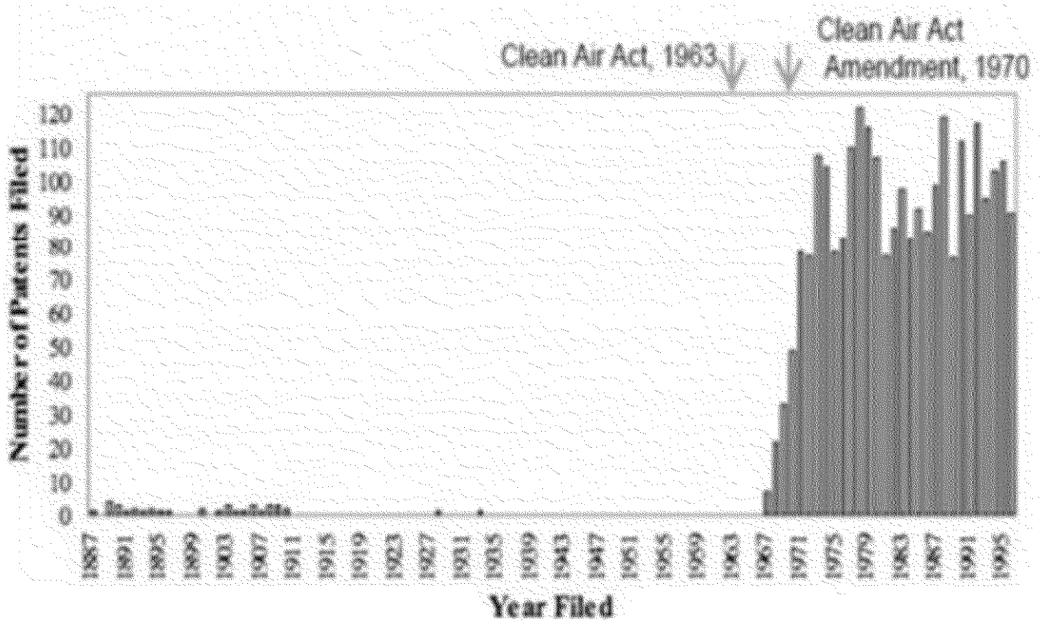
[44] Id.
[45] Larry Parker & James E. McCarthy, Cong. Research Serv., R40585, Climate Change: Potential Regulation of Stationary Greenhouse Gas Sources Under the Clean Air Act 12 (2009).

> systems. Mechanical engineers were faced with similar challenges. While they had designed equipment for either acid service or slurry service, they typically had not designed for a combination of the two. Generally, equipment was larger than what they normally dealt with in chemical plants and refineries.
>
> It is an understatement to say that the new source performance standards promulgated by the EPA were technology-forcing. Electric utilities went from having no scrubbers on their generating units to incorporating very complex chemical processes. Chemical plants and refineries had scrubbing systems that were a few feet in diameter, but not the 30- to 40-foot diameters required by the utility industry. Utilities had dealt with hot flue gases but not with saturated flue gases that contained all sorts of contaminants. Industry, and the US EPA, has always looked upon new source performance standards as technology-forcing, because they force the development of new technologies in order to satisfy emission requirements.[46]

As can be seen in Figure 3, analysis of patenting activity further demonstrates the dramatic rise in control technology innovation in the U.S. that followed the 1971 SO_2 NSPS promulgation.[47]

[46] Donald Shattuck et al., A History of Flue Gas Desulfurization (FGD) – The Early Years at 15, 3.
[47] M. Taylor, The Influence of Government Actions on Innovative Activities in the Development of Environmental Technologies to Control Sulfur Dioxide Emissions from Stationary Sources 211-12 (Jan. 2001) (unpublished Ph.D. thesis, Carnegie Mellow University) [hereinafter Taylor Ph.D.] (on file with author); see also ICF Consulting, The Clean Air Act Amendments: Spurring Innovation and Growth While Cleaning the Air 106-08, 118-20, 211-12 (2005).

Figure 3: U.S. Patents Relevant to SO_2 Control Technology as Identified with the Patent Subclass Method[48]



Thanks to these technology advances, when Germany subsequently implemented a program to control acid rain, 33% of the FGD systems installed were licensed from U.S. companies.[49] Researchers of this and similar regulatory initiatives have observed that stringent regulation is required to stimulate significant innovation in control technologies; neither weak regulation nor legislation supporting control technology research have this effect.[50]

The 1979 NSPS is a compelling example of both the flexibility of the Agency's authority under Section 111 and the efficacy of innovation-focused standards in incentivizing technology development.

B. Congress Expanded EPA's Consideration of Solutions, Including Consideration of Cleaner Fuels and Combustion Methods, to Achieve the Protective Emission Standard Reflected in the "Best System of Emission Reduction"

1. Congressional Changes to the NSPS Statutory Provisions Have Authorized Expansive Flexibility to Achieve Rigorous Performance Standards.

In 1990, Congress redefined "standard of performance" to provide expansive flexibility in designing and meeting rigorous performance standards. The 1990 amendments eliminated two requirements from the NSPS provisions (both added via the 1977 amendments): (1) that the

[48] Id. at 107.
[49] Id. at 56, 131.
[50] See id. at 220; M. Taylor et al., Control of SO2 Emissions from Power Plants: A Case of Induced Technological Innovation in the U.S., 72 Technological Forecasting & Soc. Change 697 (2005).

NSPS be based on a "technological" system of emission reduction and (2) that combustion emissions from "fossil fuel fired stationary sources" be reduced by a set percentage. The 1977 amendments had precluded satisfying the NSPS by simply burning a relatively cleaner fuel (low-sulfur coal).

Throughout the existence of the NSPS program, Congress's statutory mandate has required the Agency to establish strong, protective emission standards based on the best system of emission reduction that could be utilized. The 1990 amendments, however, made statutory adjustments conferring expansive discretion on EPA in considering the solutions that could be deployed to achieve emission reductions – allowing that solution set to go beyond technologies, and to include use of cleaner fuels.[51] The House Committee Report articulated "the effect of the new standard" as "giv[ing] units the flexibility to meet the emission rates established under the new standards through whatever combination of fuels and emission controls the units choose."[52] EPA's proposed establishment of a fuel-neutral "standard of performance" based on the best available clean burning fossil fuels and more efficient combustion methods, such as efficient combined cycle natural gas turbines, together with an alternative compliance pathway for coal-fired EGUs, is thoroughly consonant with these statutory adjustments to EPA's delegated rulemaking authority.[53]

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[51] EPA has previously relied on a particular type of fuel as a means by which a source (gas turbines in Subpart GG of 40 C.F.R. Part 60) can meet the NSPS for sulfur dioxide emissions. See Standards of Performance for New Stationary Sources: Gas Turbines, 44 Fed. Reg. 52,792, 52,800 (Sept. 10, 1979) (codified at 40 C.F.R. § 60.333 (2011)) (providing options for compliance including not burning "fuel which contains sulfur in excess of 0.8% by weight"). The current version of the standard also presents fuel selection as one possible means of compliance. See What emission limits must I meet for sulfur dioxide (SO2)?, 40 C.F.R. § 60.4330 (2011) (providing options for compliance including not burning "fuel which contains total sulfur with potential sulfur emissions in excess of 180 ng SO_2/J (0.42 lb SO2/MMBtu) heat input"). The Sierra Club v. Costle decision specifically approves EPA's practice of setting emission standards based on fuel characteristics (the sulfur content of coal), even though it was decided under the 1977 version of the Clean Air Act. In addition to finding that "the text of the statute nowhere forbids a distinction based on [a fuel's] sulfur content," the D.C. Circuit stated that "reading section 111 to permit a variable standard based on the sulfur content of coal comports with common sense" because "the amount of sulfur in coal is the most relevant factor in designing standards to reduce emissions of sulfur." Sierra Club v. Costle, 657 F.2d 298, 319 (D.C. Cir. 1981). Both of the court's findings are directly analogous to the present rulemaking. EPA's historic consideration of sulfur content parallels its current consideration of GHG emission potential, and it comports with common sense to consider carbon content—the most relevant factor to GHG emissions—when designing GHG emission standards.

[52] H.R. Rep. No. 101-490, pt. 1 (1990) (emphasis added).

[53] Numerous states have likewise adopted or are in the process of adopting fuel-neutral greenhouse gas performance standards for baseload electricity generation based on the emission rates achievable by natural gas fuel combusted in an efficient combined cycle turbine. See, e.g., Wash. Rev. Code § 80.80.040 (2011); Cal. Pub. Util. Code § 8341(d)(1) (West 2012); Or. Rev. Stat. Ann. §§ 757.524, 757.528 (West 2012); N.Y. Comp. Codes R. & Regs. tit. 6, § 251.3 (New

2. The "Best System of Emission Reduction" Language Is Broad and Easily Encompasses a Combined Cycle Turbine Design Burning Natural Gas.

EPA emphasized as early as 1976 that BSER could encompass low-emission production methods.[54] In setting the smelter NSPS, the agency rejected the notion that BSER determinations must rely exclusively on emission control hardware:

> For some classes of sources, the different processes used in the production activity significantly affect the emission levels of the source and/or the technology that can be applied to control the source. For this reason, the Agency believes the 'best system of emission reduction' includes the processes utilized and does not refer only to emission control hardware. It is clear that adherence to existing process utilization could serve to undermine the purpose of section 111 to require maximum feasible control of new sources.[55]

The 1970 "best system of emission reduction" language that the agency interpreted is nearly identical to the current language, adopted in 1990.[56]

In today's electricity sector, coal- and combined-cycle gas-burning power plants—two systems of electricity generation—are largely functionally interchangeable in providing baseload and load-following generation.[57] Indeed, as EPA's proposal notes, the only new generation projected to be built to serve baseload and intermediate demand is from combined cycle natural gas plants.[58] In

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York Department of Environmental Conservation, Proposed Part 251 CO_2 Performance Standards for Major Electric Generating Facilities (proposed 6 NYCRR Part 251, available at http://www.dec.ny.gov/regulations/79520.html).

[54] See Standards of Performance for New Stationary Sources, Primary Copper, Zinc, and Lead Smelters, 41 Fed. Reg. 2332, 2333 (Jan. 15, 1976).

[55] Id.

[56] Compare CAA Amendments of 1970, PL 91-604, § 111(a)(1), 84 Stat. 1676, 1683 (1970) ("The term 'standard of performance' means a standard for emissions of air pollutants which reflects the degree of emission limitation achievable through the application of the best system of emission reduction which (taking into account the cost of achieving such reduction) the Administrator determines has been adequately demonstrated.") with CAA § 111(a)(1), 42 U.S.C. § 7411(a)(1) (2006) ("The term 'standard of performance' means a standard for emissions of air pollutants which reflects the degree of emission limitation achievable through the application of the best system of emission reduction which (taking into account the cost of achieving such reduction and any nonair quality health and environmental impact and energy requirements) the Administrator determines has been adequately demonstrated.").

[57] 77 Fed Reg. at 22411.

[58] Courts have explicitly approved EPA's practice of taking into account industry trends when setting standards. See National Lime Ass'n v. EPA, 627 F.2d 416, 426 n.28 (D.C. Cir. 1980) ("It is expected that as supplies of natural gas and oil become more expensive or unavailable, all new kilns would be rotary lime kilns designed to burn coal."); Standards of Performance for New Stationary Sources: Lime Manufacturing Plants, 42 Fed. Reg. 22,506, 22,507 (May 3, 1977)

identifying BSER, EPA has an obligation to consider the substantial emission advantages of combined-cycle plants burning natural gas as compared to coal-fired plants and to set the performance standard accordingly. The substantial cost advantages of NGCC further reinforce the reasonableness of NGCC as BSER. When considering two functionally interchangeable processes, not to set BSER based on the lower-emitting process, especially when that process is also less expensive, would fail to fulfill the statutory directives of CAA § 111(b) to maximize emission reductions considering cost and other relevant impacts.[59]

V. The Alternate Pathway Provided for Coal Plants is Consistent with Both the NSPS Program's Technology-Forcing Purpose and Agency Regulatory Practice.

A. Designing an NSPS to Incentivize the Development of Low-Emitting Technologies Is Consistent with § 111.

Through the alternative compliance pathway EPA has signaled that carbon capture and sequestration technology will play a role in controlling CO_2 emissions from fossil-fuel-fired power plants—making investments in developing and deploying this technology secure. This regulatory certainty is what power sector participants have identified as the missing link in the development of CCS. In discussing the decision to stop moving forward with a broader deployment of CCS at its West Virginia Mountaineer plant, American Electric Power Chairman and CEO Mike Morris said: "Going forward without a carbon legislation or without an appropriate approach to carbon and its impact it was simply not able for us to go forward and continue that project. . . . We are encouraged by what we saw, we're clearly impressed with what we learned and we feel that we have demonstrated to a certainty that the carbon capture and storage is in fact viable technology for the United States and quite honestly for the rest of the world going forward."[60]

As noted above, the NSPS is intended to drive innovation in methods of reducing emissions. The Sierra Club court determined that legislative history reinforced its interpretation of the statute that one of the purposes of NSPS is to "create incentives for new technology."[61] The court cited several examples from the legislative history about the CAA Amendments of 1977 in which legislators address technology-forcing portions of CAA § 111.[62] The House Committee Report, for instance, noted that "it is prudent public policy to require achievement of the

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("[V]irtually all the new kilns that have been built in the last few years have been of the rotary type. . . . [T]he present trend is to build and operate rotary kilns whenever possible.").

[59] While there is a cost advantage of natural gas, section 111 calls for the "best system of emission reduction" to be determined "taking into account the cost of achieving such reduction" and other pertinent statutory factors. 42 U.S.C. §7411(a)(1). The costs of a fuel neutral standard based on this best system, therefore, do not require a cost advantage but must not be unreasonable.

[60] American Electric Power Q2 2011 Earnings Call (July 29, 2011), CallStreet Raw Transcript.

[61] See Sierra Club v. Costle, 657 F.2d 298, 346-47 (D.C. Cir. 1981).

[62] See id. at 346 n.174.

maximum degree of emission reduction from new sources, while encouraging the development of innovative technological means of achieving equal or better degrees of control."[63]

The Senate Committee Report on the CAA Amendments of 1970 also clarified that "[s]tandards of performance should provide an incentive for industries to work toward constant improvement in techniques for preventing and controlling emissions from stationary sources."[64] An emerging control technology used as the basis for standards of performance need not "be in actual routine use somewhere."[65] The D.C. Circuit, analyzing the Senate's intent, found that "[t]he essential question was [] whether the technology would be available for installation in new plants."[66]

The D.C. Circuit sanctioned the tailoring of an NSPS to incentivize the development of specific innovative, low-emitting technologies in Sierra Club v. Costle.[67] There, EPA declined to adopt a uniform requirement that all entities in the regulated category reduce SO_2 emissions by 90% because that requirement would have prevented some low-sulfur-coal facilities from using the new technology known as dry scrubbing.[68] EPA thought that it was important to "provid[e] an opportunity for full development of dry SO_2 technology."[69] The court found that, provided that EPA balanced the factors listed in the NSPS provision, designing the NSPS to incentivize new technologies was consistent with the text of the CAA.[70]

EPA's alternative pathway for coal plants serves this well-established technology-forcing purpose by providing regulatory certainty and thus regulatory "pull" for CCS as an emerging control technology. As discussed above, the SO_2 NSPS served this purpose for scrubbers in the 1970s. The CRS report noted that the NSPS could play a similar role for deployment of carbon capture and sequestration: "The [SO_2 scrubber] example indicates that technology-forcing regulations can be effective in pulling technology into the market—even when there remain some operational difficulties for that technology. . . . As an entry point to carbon capture deployment, a regulatory approach such as NSPS may represent a first step."[71]

EPA's alternative compliance pathway for coal plants is thus providing an innovation-driving mechanism for CCS that power sector participants deploying CCS have called for, consistent with the court-affirmed Congressional intent that NSPS serve a technology-forcing role in order to drive down emission reductions.

B. EPA's Analysis of BSER Availability Should Be Forward-Looking and Is Owed Deference.

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[63] Id.
[64] S. Rep. No. 91-1196, at 17 (1970).
[65] Id. at 16.
[66] Portland Cement Ass'n v. Ruckelshaus, 486 F.2d 375, 391 (D.C. Cir. 1973).
[67] See Sierra Club v. Costle, 657 F.2d 298 (D.C. Cir. 1981).
[68] See id. at 343.
[69] Id. at 327-28.
[70] See id. at 346.
[71] Larry Parker & James E. McCarthy, supra note 4, at 19-20.

The thirty-year compliance framework for coal plants using CCS that EPA has proposed involves a forward-looking availability analysis. The courts have affirmed EPA's authority to make such projections. In Portland Cement Association v. Ruckelshaus, the court found that "[t]he Administrator may make a projection based on existing technology, though that projection is subject to the restraints of reasonableness and cannot be based on 'crystal ball' inquiry. . . . [T]he question of availability is partially dependent on 'lead time', the time in which a technology will have to be available."[72] Further, the court noted that "[i]t would have been entirely appropriate if the Administrator had justified the standards, not on the basis of tests on existing sources or old test data in the literature, but on extrapolations from this data, and on testimony from experts and vendors made part of the record."[73]

As discussed above, courts have properly deferred to EPA's analysis of the best systems of emission reduction available.[74] In Sierra Club, the court "on close questions [gave] the agency the benefit of the doubt out of deference for the terrible complexity of its job."[75]

C. NSPS May Alter Business as Usual.

By its very nature, technology forcing may prevent some actors from proceeding with business as usual, if business as usual would entail a lagging process that is more polluting, or would need greater investment to meet a standard, than a lower-emission technology. In setting NSPS for copper smelters, EPA explained that it could set a "single standard [that] would effectively preclude using a process which is much less expensive than the permitted process" so long as the total cost of the standard was reasonable.[76] This precedent demonstrates that "effectively preclud[ing]" a production method can be entirely consistent with reasonableness and economic achievability. Given the entirely reasonable cost of the standard proposed here and the enormous harm to Americans' health, safety, and environment caused by the pollution generated by uncontrolled coal-fired power plants, EPA was entirely justified – indeed, required – to set a standard that will require any new coal plant to be designed and operated in a manner that will make deeps cuts in the amount of harmful pollution generated.

D. The Alternative Compliance Option in the Proposed Rule Closely Resembles Flexibility Mechanisms in Other Rules that EPA Has Promulgated and Courts Have Approved.

1. EPA Has Adopted Other Flexibility Mechanisms.

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[72] Portland Cement Ass'n v. Ruckelshaus, 486 F.2d 375, 391 (D.C. Cir. 1973).
[73] Id. at 401-02. The standards challenged in Portland Cement were finalized after the Agency conducted testing at seven plants, which the D.C. Circuit found to be sufficient. See Portland Cement Ass'n. v. Train, 513 F.2d 506, 509 (D.C. Cir. 1975).
[74] See Sierra Club v. Costle, 657 F.2d at 343, 364 (incentivizing and forcing technology); Portland Cement Ass'n v. Ruckelshaus, 486 F.2d at 391 (relying on cutting-edge technology).
[75] Sierra Club v. Costle, 657 F.2d at 410.
[76] See Standards of Performance for New Stationary Sources: Primary Copper, Zinc, and Lead Smelters, 41 Fed. Reg. 2332, 2333 (Jan. 15, 1976) (emphasis added).

The provision of alternate compliance pathways is a familiar approach under § 111. As noted above, in Subpart GG of 40 C.F.R. Part 60, EPA established burning a particular type of fuel as one option for meeting the SO_2 emissions standard. The agency described that option as "an alternative SO_2 emissions limit."[77] The main limit set a numeric emission standard to be met at the stack, regardless of the fuel burned.[78] In essence, EPA provided an alternative compliance option that remains valid.

The 1981 Sierra Club decision provides another clear example of an alternative compliance option. At issue were the NSPS for EGUs finalized by EPA in June 1979.[79] The main standard required a maximum of 1.20 lbs SO_2/MMBtu and a 90% reduction from uncontrolled levels.[80] EPA, however, also allowed for an optional method of compliance – what the Sierra Club court called an "optional standard" – similar to the "alternative compliance option" in the proposed GHG NSPS.[81] The option provided that, if a fuel's potential SO_2 emissions were less than 0.60 lbs/MMBtu, the emission-reduction requirement decreased from 90% to 70%.[82] As a practical matter, the optional standard allowed low-sulfur-coal facilities to use dry scrubbing rather than wet scrubbing.

Under the Municipal Waste Combustors NSPS for existing sources (also promulgated under a "best system of emission reduction" analysis), EPA authorized states to permit municipal waste combustors to average nitrogen oxides emissions from different units at the same facility or to trade emission reduction credits with other facilities.[83]

EPA's alternative compliance pathway for coal fits within this regulatory tradition.

2. These Types of Flexibility Mechanisms Have Been Judicially Approved.

In Sierra Club v. Costle, environmental petitioners argued that an NSPS's optional standard violated CAA § 111.[84] The court disagreed, relying on § 111(b)(2), which authorizes EPA to "distinguish among classes, types, and sizes within categories of new sources for the purpose of establishing . . . standards."[85]

Also of note, the Sierra Club court was more deferential to EPA when reviewing the optional standard than the main standard. The court did not ask if dry scrubbing could have served as an

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[77] Standards of Performance for New Stationary Sources: Gas Turbines, 44 Fed. Reg. 52,792, 52,792 (Sept. 10, 1979) (emphasis added).
[78] See id.
[79] New Stationary Source Performance Standards: Electric Utility Steam Generating Units, 44 Fed. Reg. 33,580 (June 11, 1979).
[80] See id. at 33,580.
[81] Sierra Club v. Costle, 657 F.2d 298, 316 (D.C. Cir. 1981).
[82] See 44 Fed. Reg. at 33,580.
[83] See Standards of Performance for Municipal Waste Combustors, 60 Fed. Reg. 65,387, 65,402 (Dec. 19, 1995).
[84] See 657 F.2d at 316-17.
[85] CAA § 111(b)(2), 42 U.S.C. § 7411(b)(2) (2006); see also Sierra Club v. Costle, 657 F.2d at 319-20.

independent basis for the standard because it had already found that wet scrubbing was the BSER.

Instead, the court limited its analysis to whether EPA had a reasonable basis for its technical analysis of dry scrubbing. The court determined that "the support in the record for selecting 70% as the magic percentage for encouragement of dry scrubbing [was] less than overwhelming" but recognized that EPA was trying to encourage the development of dry scrubbing technology.[86] Because "it was reasonable for EPA to seek to encourage dry scrubbing and to be concerned with the effect of the NSPS on the future of the new technology," the court upheld the optional standard.[87]

As with the SO_2 NSPS's optional standard in Sierra Club, the alternative compliance option in the proposed GHG NSPS merits respect because it reasonably balances the relevant statutory factors required to be considered in establishing a standard of performance under the law.

VI. EPA Is Not Obligated to Make a New Endangerme nt Finding Once Sources Have Been Listed Under § 111.

Section 111(b)(1)(A) states that the Administrator "shall include" a category of sources in the list for which performance standards are required "if in [her] judgment it causes, or contributes significantly to, air pollution which may reasonably be anticipated to endanger public health or welfare." Section 111(b)(1)(B) then directs the Administrator to "establish[] Federal standards of performance for new sources within" a listed category. Section 111(a)(1) defines a "standard of performance" as "a standard for emissions of air pollutants which reflects the degree of emission limitation achievable through the application of the best system of emission reduction" which the Administrator determines to have been adequately demonstrated. The statutory language separates the "endangerment" and "contribution" findings, both components of the process of listing a category of sources, from the mandate to promulgate standards of performance for particular air pollutants emitted by those sources. Long Agency practice confirms that EPA's legal obligation to make an endangerment finding under § 111 is satisfied once the initial endangerment finding is made when a group of sources is added to the list of regulated sectors for which NSPS are promulgated. The statutory command directing EPA to promulgate standards of performance for the air pollutants emitted by those sources is separate, and does not include a requirement for an endangerment determination.

In accordance with the statutory language, EPA has never issued a new or revised endangerment finding when revising an NSPS under CAA § 111. See Commercial and Industrial Solid Waste Incineration Units: Reconsideration and Proposed Amendments, Non-Hazardous Secondary Materials that are Solid Waste, 76 Fed. Reg. 80,452 (Dec. 23, 2011) (amending 65 Fed. Reg. 75,338 (Dec. 1, 2000)); Standards of Performance for Stationary Compression Ignition and Spark Internal Combustion Engines, 76 Fed. Reg. 37,954 (June 28, 2011) (amending 71 Fed. Reg. 39,153 (July 11, 2006)); Standards of Performance for New Stationary Sources and

[86] 657 F.2d at 351.
[87] Id.

Emission Guidelines for Existing Sources: Commercial and Industrial Solid Waste Incineration Units, 76 Fed. Reg. 15,704 (Mar. 21, 2011) (amending 65 Fed. Reg. 75,338 (Dec. 1, 2000)); Standards of Performance for New Stationary Sources and Emissions Guidelines for Existing Sources: Hospital/Medical/Infectious Waste Incinerators, 74 Fed. Reg. 51,368 (Oct. 6, 2009) (amending 62 Fed. Reg. 48,348 (Sept. 15, 1997)); Standards of Performance for Fossil-Fuel-Fired Steam Generators for Which Construction Is Commenced After August 17, 1971, Electric Utility Steam Generating Units for Which Construction Is Commenced After September 18, 1978, Industrial-Commercial-Institutional Steam Generating Units, and Small Industrial-Commercial-Institutional Steam Generating Units, 74 Fed. Reg. 5072 (Jan. 28, 2009) (amending 36 Fed. Reg. 24,876 (Dec. 23, 1971)); Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry: Standards of Performance for Equipment Leaks of VOC in Petroleum Refineries, 72 Fed. Reg. 64,860-01 (Nov. 16, 2007) (amending 49 Fed. Reg. 22,598-01 (May 30, 1984), 48 Fed. Reg. 48,328-01 (Oct. 18, 1983)); Standards of Performance for Fossil-Fuel-Fired Steam Generators for Which Construction Is Commenced After August 17, 1971, Electric Utility Steam Generating Units for Which Construction Is Commenced After September 18, 1978, Industrial-Commercial-Institutional Steam Generating Units, and Small Industrial-Commercial-Institutional Steam Generating Units, 72 Fed. Reg. 32,710 (June 13, 2007) (amending 36 Fed. Reg. 24876 (Dec. 23, 1971)); Standards of Performance, Emission Guidelines, and Federal Plan for Municipal Solid Waste Landfills and National Emission Standards for Hazardous Air Pollutants: Municipal Solid Waste Landfills, 71 Fed. Reg. 53,272 (Sept. 8, 2006) (amending 61 Fed. Reg. 9905 (Mar. 12, 1996)); Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Large Municipal Waste Combustors, 71 Fed. Reg. 27,324 (May 10, 2006) (amending 60 Fed. Reg. 65,387 (December 19, 1995)); Standards of Performance for Electric Utility Steam Generating Units for Which Construction Is Commenced After September 18, 1978, Industrial-Commercial-Institutional Steam Generating Units, and Small Industrial-Commercial-Institutional Steam Generating Units, 71 Fed. Reg. 9866 (Feb. 27, 2006) (amending 44 Fed. Reg. 33,580 (June 11, 1979)); Standards of Performance for Municipal Solid Waste Landfills, 67 Fed. Reg. 36,476 (May 23, 2002) (amending 61 Fed. Reg. 9905 (Mar. 12, 1996)); New Source Performance Standards for New Small Municipal Waste Combustion Units, 65 Fed. Reg. 76,378 (Dec. 6, 2000) (amending 60 Fed. Reg. 65,382 (Dec. 19, 1995)); New Source Performance Standards for New Small Municipal Waste Combustion Units, 65 Fed. Reg. 76,350 (Dec. 6, 2000) (amending 60 Fed. Reg. 65,382 (Dec. 19, 1995)); Amendments for Testing and Monitoring Provisions, 65 Fed. Reg. 61,744 (Oct. 17, 2000) (amending testing and monitoring procedures throughout 40 C.F.R. pt. 60); Revision of Standards of Performance for Nitrogen Oxide Emissions From New Fossil-Fuel Fired Steam Generating Units: Revisions to Reporting Requirements for Standards of Performance for New Fossil-Fuel Fired Steam Generating Units, 63 Fed. Reg. 49,442 (Sept. 16, 1998) (amending 51 Fed. Red. 42,768 (Nov. 25, 1986)); Revision of New Source Performance Standards for the Phosphate Fertilizer Industry: Granular Triple Superphosphate Storage Facilities, 62 Fed. Reg. 18,277 (Apr. 15, 1997); Amendment to Standards of Performance for New Stationary Sources: Small Industrial-Commercial-Institutional Steam Generating Units, 61 Fed. Reg. 20,734 (May 8, 1996) (amending 55 Fed. Reg. 37,674 (Sept. 12, 1990)); Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Municipal Waste Conductors, 60 Fed. Reg. 65,387 (Dec. 19, 1995) (amending 54 Fed. Reg. 52,251 (Dec. 20, 1989), 54 Fed. Reg. 52,209 (Dec. 20,

1989)); Standards of Performance for New Stationary Sources: Automobile and Light-Duty Truck Surface Coating Operations, 59 Fed. Reg. 51,383 (Oct. 11, 1994) (amending 45 Fed. Reg. 85,410 (Dec. 24, 1980)); Standards of Performance for New Stationary Sources: Fossil-Fuel-Fired Steam Generators, 52 Fed. Reg. 28,946 (Aug. 4, 1987) (amending 50 Fed. Reg. 3688 (Jan. 25, 1985)); Standards of Performance for New Stationary Sources: Volatile Organic Liquid Storage Vessels, 52 Fed. Reg. 11,420 (Apr. 8, 1987) (amending 38 Fed. Reg. 15,406 (June 11, 1973), 45 Fed. Reg. 23,374 (Apr. 4, 1980)); Review and Amendment of Standards of Performance for New Stationary Sources; Kraft Pulp Mills, 51 Fed. Reg. 18,538, 18,544 (May 20, 1986); Review and Amendment of Standards of Performance for New Stationary Sources Hot Mix Asphalt Facilities, 51 Fed. Reg. 3298 (Jan. 24, 1986) (amending 39 Fed. Reg. 9308 (Mar. 8, 1974)); Standards of Performance for New Stationary Sources Glass Manufacturing Plants, 49 Fed. Reg. 41,030 (Oct. 19, 1984); Standards of Performance for New Stationary Sources: Stationary Gas Turbines, 47 Fed. Reg. 3767 (Jan. 27, 1982) (amending 44 Fed. Reg. 52,798); Emission Monitoring Requirements and Revisions to Performance Testing Methods, 40 Fed. Reg. 46,250 (Oct. 6, 1975).

The Agency has not issued an endangerment finding even when the revised NSPS adds a new pollutant to those already regulated for a category. See Standards of Performance for Coal Preparation and Processing Plants, 74 Fed. Reg. 51,950, 51,957 (Oct. 8, 2009) ("The plain language of section 111(b)(1)(A) provides that such findings are to be made for source categories, not for specific pollutants emitted by the source category. . . . Determinations regarding the specific pollutants to be regulated are made, not in the initial endangerment finding, but at the time the performance standards are promulgated.") (amending subpart Y, which had set PM standards since 1976); Primary Aluminum Industry, 41 Fed. Reg. 3826 (Jan. 26, 1975) (relying on an endangerment finding for one pollutant when setting standards for two pollutants); National Emission Standards for Hazardous Air Pollutants From Coal- and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units, 77 Fed. Reg. 9304 (Feb. 16, 2012) (amending 71 Fed. Reg. 9866 (Feb. 27, 2006)); National Emission Standards for Hazardous Air Pollutants From the Portland Cement Manufacturing Industry and Standards of Performance for Portland Cement Plants, 75 Fed. Reg. 54,970 (Sept. 9, 2010) (amending 36 Fed. Reg. 24,876 (Dec. 23, 1971)); Standards of Performance for Petroleum Refineries, 73 Fed. Reg. 35,838 (June 24, 2008) (amending 39 Fed. Reg. 9308 (Mar. 8, 1974)); Standards of Performance for New and Existing Stationary Sources: Electric Utility Steam Generating Units, 70 Fed. Reg. 28,606 (May 18, 2005) (amending 36 Fed. Reg. 24,876 (Dec. 23, 1971)); Standards of Performance for New Stationary Sources; Fluid Catalytic Cracking Unit Regenerators, 54 Fed. Reg. 34,008 (Aug. 17, 1989) (amending 39 Fed. Reg. 9308 (Mar. 8, 1974)); Standards of Performance for New Stationary Sources; Industrial-Commercial-Institutional Steam Generating Units, 52 Fed. Reg. 47,826 (Dec. 16, 1987) (amending 51 Fed. Reg. 42,768 (Nov. 25, 1986)).

The Agency has maintained its practice of not issuing a new or revised endangerment finding even when adding a new source to a category. See Oil and Natural Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews, 76 Fed. Reg. 52,738, 52,745 (proposed Aug. 23, 2011) (proposing to regulate VOC

emissions from several new source categories of natural gas operations based on existing endangerment finding for SO_2 emissions from natural gas processing plants) (amending 50 Fed. Reg. 40,158 (Oct. 1, 1985)); Standards of Performance for Large Municipal Waste Combustors for Which Construction Is Commenced After September 20, 1994, or for Which Modification or Reconstruction Is Commenced After June 19, 1996 and Emission Guidelines and Compliance Times for Large Municipal Waste Combustors That Are Constructed on or Before September 20, 1994, 66 Fed. Reg. 36,473 (July 12, 2001) (amending 60 Fed. Reg. 65,387 (Dec. 19, 1995)).

VII. The Social Cost of Carbon Estimate Used in Federal Benefits Analyses Must Be Updated To Reflect Current Science.

It is critical that EPA collaborate with other federal agencies and carry out its responsibilities to accurately account for the Social Cost of Carbon ("SCC").

The Social Cost of Carbon is a monetary measure of the incremental damage resulting from greenhouse gas emissions. The SCC assigns a net present value to the marginal impact of one additional ton of carbon dioxide-equivalent emissions released at a specific point in time. EDF commented extensively on the consideration of the SCC in the first light-duty vehicle greenhouse gas rulemaking, the heavy-duty vehicle greenhouse gas rulemaking, and the Notice of Intent for Draft EIS. Those comments are hereby incorporated.

It is imperative that EPA rigorously and transparently account for the SCC in analyzing the impact of the GHG NSPS. In the proposal, EPA used the SCC as estimated by the Interagency Working Group on Social Cost of Carbon (February 2010). While we support the collaboration and work of the Group, the SCC used should always be based on models reflecting the latest science, as the Agency has itself committed to do. All three modeling teams, whose work led to the report by the Interagency Working Group, have since updated their models to reflect the latest research and methodological developments. At the very least, the SCC used should be updated using the current versions of the models.

We make additional suggestions below as to how current modeling approaches can and should be improved in order to meet the Agency's commitment to update the social cost of carbon as the underlying models and methodologies are improved:[88]

- Declining discount rate over time: In assigning a dollar value to reductions in CO_2 emissions, the Agency uses the social cost of carbon and the discount rates included in the Interagency Working Group on Social Cost of Carbon. This includes the use of 5 percent, 3 percent and 2.5 percent discount rates. Recent advances in economic theory indicate that it is not appropriate to use such high and constant discount rates in the context of the social cost of carbon analysis, with a constant 5 percent discount rate being particularly inappropriate. A certainty-equivalent approach, for example, would yield much lower constant discount rates than those currently used. At the very least, we

[88] Interagency Working Group on the Social Cost of Carbon, United States Government, Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis – Under Executive Order 12866 (February 2010).

encourage the Agency to use a range of discount rates of 3 percent and below in its SCC analysis. We strongly recommend, however, that the Agency move as soon as possible to the use of a declining social discount rate. Appropriately accounting for uncertainty around the discount rate over long time horizons generates a discount rate that declines over time. As demonstrated at an academic workshop convened by Resources for the Future on Intergenerational Discounting, September 22-23, 2011, there is broad support for the use of declining discount rates within the relevant community of experts.[89] These declining rates reflect the scientific, economic, and ethical complexities and uncertainties inherent in inter-generational discounting.

- Evaluating catastrophic risks: The SCC numbers currently used seriously undervalue low-probability/high-consequence climate impacts. Functional form assumptions in the models used in the Interagency Report misrepresent these risks and lead to inaccurately low SCC numbers. In particular, they cut off the tails of distribution functions too quickly, ignoring potentially catastrophic climate risks.[90] The SCC numbers used should reflect the uncertainty range around different functional forms and standard assumptions around risk aversion in order to more accurately value potentially catastrophic climate impacts.[91]

- Evaluating non-monetized benefits: GHG reduction policies can significantly undervalue benefits simply because some of these benefits are not easily quantifiable. The White House Office of Management and Budget recognizes that some costs and benefits will be difficult to monetize, but directs agencies to consider other means of quantification.[92] We request that the social cost calculations be updated to include the latest results on newly monetized benefits. All additional climate impacts omitted from the models should at the very least be identified explicitly. A table should be provided that lists, for each economic model, what impacts were not included in the model's estimate of monetized damages. Accompanying text should serve to explain and complement the table entries but not be a substitute for them. Below, we have provided an example table listing impacts typically omitted from SCC models.

List of Impacts Typically Omitted from SCC Models[93]

Agriculture	Reduction in growing season (e.g., in Sahel/southern Africa)
	Increase in growing season in moderate climates
	Impact of precipitation changes on agriculture

[89] See "Workshop on Intergenerational Discounting," 22-23 September 2011, Resources for the Future. http://www.rff.org/Events/Pages/Intergenerational-Discounting-Workshop.aspx

[90] See Martin Weitzman, "Fat-Tailed Uncertainty in the Economics of Climate Change," Review of Environmental Economic Policy, 5(2), 275-292 (Summer 2011).

[91] See Robert E. Kopp, Alexander Golub, Nathaniel O. Keohane, and Chikara Onda, The Influence of the Specification of Climate Change Damages on the Social Cost of Carbon, 6 Economics: The Open-Access, Open-Assessment E-Journal 2012-13 (2012), url http://dx.doi.org/10.5018/economics-ejournal.ja.2012-13.

[92] See OFFICE OF MGMT. & BUDGET, CIRCULAR A-4, 26 (2003).

[93] Information and format for table based on EPA, TECHNICAL SUPPORT DOCUMENT ON BENEFITS OF REDUCING GHG EMISSIONS 16-17 (2008), and EPA, 420-D-09-001, DRAFT REGULATORY IMPACT ANALYSIS: CHANGES TO RENEWABLE FUEL STANDARD PROGRAM 691 tbl. 5.3-4 (2009).

	Impact of weather variability on crop production
Biomes/ Ecosystems	Reverse of carbon uptake, amplification of climate change
	Thresholds or "tipping points" associated with species loss, ecosystem collapse, and long-term catastrophic risk (e.g., Antarctic ice sheet collapse)
	Species existence value and the value of having the option for future use
	Earlier timing of spring events; longer growing season
	Poleward and upward shift in habitats; species migration
	Shifts in ranges of ocean life
	Increases in algae and zooplankton
	Range changes/earlier migration of fish in rivers
	Impacts on coral reefs
	Ecosystem service disruption (e.g., loss of cold water fish habitat in the U.S.)
	Coral bleaching due to ocean warming
Energy	Energy production/infrastructure
	Water temperature/supply impacts on energy production
Foreign Affairs	Social and political unrest abroad that affects U.S. national security (e.g., violent conflict or humanitarian crisis)
	Damage to foreign economies that affects the U.S. economy
	Domestic valuation of international impacts
Forest	Longer fire seasons, longer burning fires, and increased burn area
	Disappearance of alpine habitat in the United States
	Tropical forest dieback in the Amazon
GDP/ Economy	Insurance costs with changes in extreme weather, flooding, sea level rise
	Global transportation and trade impacts from Arctic sea ice melt
	Distributional effects within regions
	Vulnerability of societies highly dependent on climate-sensitive resources
	Infrastructure costs (roads, bridges)
	Extreme weather events (droughts, floods, fires, and heavy winds)
Health	Increased deaths, injuries, infectious diseases, stress-related disorders with more frequent extreme weather (droughts, floods, fires, and heavy winds)
	Increases in malnutrition, food-borne illnesses
	Air quality interactions (e.g., ozone effects, including premature mortality)
Snow/ Glacier	Changes in Arctic/Antarctic ecosystems
	Enlargement and increased numbers of glacial lakes; increased flooding
	Snow pack in southeastern United States

Tourism	Changes in tourism revenues due to changes in ecosystems and weather events
	Arctic hunting/travel/mountain sports
Water	River flooding
	Infrastructure; water supply
	Precipitation changes on water supply; increased runoff in snow-fed rivers
	Increasing ground instability and avalanches

VIII. EPA Should Ensure Future Accessibility of Emission Records.

EPA should take specific and transparent action to ensure forward-compatibility of and continued access to all records submitted from sources that make use of the 30-year compliance pathway under 60.5520(b). Because computer and records technology changes rapidly, it is very likely that data formats used in 2012 will not be the same as those in effect in 2042 or beyond. EPA should take specific actions, including consulting with appropriate experts, to ensure that data are stored and maintained in a format that continues to be accessible for future enforcement, review, and policy-making actions. In addition, and for the same reasons, EPA should modify 60.5565(b) to require sources to prepare and annually update plans for maintaining access to all data required to be maintained under the 60.5520(b) pathway.

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Thank you for your consideration of our views. If you have any questions about the content of these comments, please contact:

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Standards of Performance for Greenhouse Gas Emissions for New Stationary Sources: Electric Utility Generating Units	)	**Docket No. EPA-HQ-OAR-2011-0660**
		Via regulations.gov
		June 25, 2012

Thank you for accepting these comments on EPA's proposed Standards of Performance for Greenhouse Gas Emissions for Stationary Sources; Electricity Utility Generating Units ("EGU NSPS"), 72 Fed. Reg. 22,392 (Apr. 13, 2012).

We submit these comments on behalf of Sierra Club, Environmental Defense Fund, Natural Resources Defense Council, Earthjustice, National Wildlife Federation, Environmental Law and Policy Center, Southern Environmental Law Center, and Clean Air Council ("Joint Environmental Commenters").

I. Introduction

As EPA has properly concluded, the scientific record demonstrating that "elevated concentrations of greenhouse gases in the atmosphere may reasonably be anticipated to endanger the public health and welfare of current and future U.S. generations is robust, voluminous, and compelling."[1] Electric generating units (EGUs) are the single largest source of domestic greenhouse gas emissions. Accordingly, as we discuss at length below, EPA must control greenhouse gas pollution from this source category under section 111 of the Clean Air Act, 42 U.S.C. § 7411. Indeed, unless emissions from new and existing power plants are reduced, the United States will be unable to prevent or mitigate serious harm from climate change.

In this introductory section, we briefly describe some of the harms associated with greenhouse gas emissions and show why the emissions profile of the EGU sector demands expeditious regulation under section 111.

A. Climate Change and Ocean Acidification Caused by EGU Emissions Threaten Public Health and Welfare

[1] 75 Fed. Reg. 49,556, 49,557 (Aug. 13, 2010) (Endangerment Reconsideration Denial), attached as **Ex. 1;** *see also* 74 Fed. Reg. 66,496, 66,523 (Dec. 15, 2009) (Endangerment Finding), attached as **Ex. 2**.

EPA's Regulatory Impact Analysis (RIA)'s overview of the pressing threats associated with greenhouse gas emissions ably canvasses the dangers which the NSPS must combat. The RIA is based largely on the EPA's 2009 Endangerment Finding, along with a 2010 report by the National Research Council.[2] The climate science that forms the basis of the 2009 Endangerment Finding provides a legally sufficient and scientifically compelling justification for curbing greenhouse gas emissions from power plants. Global greenhouse gas emissions and atmospheric concentrations, and hence the risk of catastrophic damage, have increased since they were issued, underlining the importance of emissions controls. Climate science published since 2009 further underlines the urgency of mitigating greenhouse gas emissions.[3]

1. **Harms Associated with Climate Change**

Climate change will comprehensively alter our world. As the RIA recognizes, these changes will cause a wide variety of harms.

a. Direct Threats to Public Health and Welfare from Climate Change

Climate change is threatening, and can be expected to continue to threaten, public health in many regards. It is expected, for instance, to increase the incidence and severity of heat waves which are particularly dangerous to the elderly, very young, and infirm.[4] Warmer days lead to enhanced ozone, or smog, formation, which can exacerbate respiratory illnesses, contributing to asthma attacks and hospitalizations and an increased risk of premature death.[5] Because a warmer atmosphere will hold more moisture, climate change will also be associated with heavier precipitation events, stronger tropical cyclones, and associated flooding, which can damage infrastructure and injure or kill people.[6] Pathogens and pests are expected to spread among susceptible populations due to changes in those species' survival, persistence, habitat

[2] *See* RIA at 3-1, 3-8. Many of the fundamental assessment reports upon which the Endangerment Finding and the RIA rely are attached and incorporated by reference. The Fourth Synthesis Report by the Intergovernmental Panel on Climate Change is attached as **Ex. 3**, the National Research Council's Report on *Advancing the Science of Climate Change* is attached as **Ex. 4**, and the U.S. Global Change Research Program's Report on *Global Climate Change Impacts in the United States* is attached as **Ex. 5.**

[3] *See, e.g.* Natural Research Council, Climate Stabilization Targets: Emissions, Concentrations, and Impacts over Decades to Millennia (2010), attached as **Ex. 6**; RIA 3-9; Natural Research Council, Advancing the Science of Climate Change, **Ex. 4**, *supra*; RIA, 3-8.

[4] RIA at 3-1 – 3-2.

[5] *Id.* at 3-2 -3-3, 5-24.

[6] *Id.* at 3-3.

range and transmission under changing climate conditions, further endangering the public.[7]

As EPA has documented at length, climate change threatens public welfare. Sea level rise is well-documented and very likely to accelerate.[8] Rising seas, amplified by storm surges and stronger tropical cyclones, will threaten homes, cities, and infrastructure all along our coast, forcing expensive efforts to protect or relocate critical resources.[9] Millions of U.S. citizens will be affected and many will be displaced. Inland, shrinking snowpacks and early spring melts will increase flood risk early in the melt season and will cause water shortages throughout much of the West, which now depends on snowpacks as a reliable water source.[10] Droughts, especially in the western and southern United States, are expected to occur more frequently, and the extent of drought-limited ecosystems is projected to increase by 11% for every degree C of warming in the United States.[11] This is expected to exacerbate the water scarcity already affecting regions of the United States.[12] Further, the combination of changing atmospheric chemistry and shifting, more violent, weather patterns is likely to lead to damage to crops and even to crop failures, with corresponding increases in food prices and declines in availability.[13] On forested lands, the same changes will be associated with more severe fires, pest outbreaks, and higher tree mortality which are likely to disrupt timber production.[14]

b. Climate-Linked Threats to Ecosystems Upon Which Society Depends

These shifts also have major implications for wildlife, biodiversity, and the basic ecosystems services upon which we depend. Observed changes in our climate are already shifting habitat ranges, altering migration patterns, and impacting reproductive behavior.[15] At anticipated levels of increased global average temperature changes, many terrestrial, freshwater and marine species at far greater risk of extinction than in the past.[16] In the Arctic, wildlife faces even greater challenges as climate change leads to significant loss of sea ice and dramatic reduction in marine habitat for polar bears, ice-inhabiting seals, and other animals.[17] And the resilience of many ecosystems is likely to

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[7] *Id.*
[8] *Id.* at 3-6 – 3-7.
[9] *Id.* at 3-3, 3-6 – 3-7.
[10] *Id.* at 3-5.
[11] *Id.* at 3-5, 3-8; U.S. Global Change Research Program's Report on *Global Climate Change Impacts in the United States*, **Ex. 5** *supra*, at 33, 44.
[12] *Id.* at 3-5.
[13] *Id.* at 3-4.
[14] *Id.* at 3-4 -3-5.
[15] *Id.* at 3-7.
[16] *Id.* at 3-7.
[17] *Id.* at 3-7.

be exceeded this century by an unprecedented combination of climate change, associated disturbances (e.g. flooding, drought, wildfire, insects, ocean acidification) and other global change drivers (e.g. land use change, pollution, fragmentation of natural systems, overexploitation of resources).[18]

The footprint of humans on the planet has already stressed ecosystems more than at any time in human history. Terrestrial, freshwater, and marine environments have already undergone extensive transformation and deterioration.[19] More than 75% of Earth's ice-free land has been altered,[20] while about 43% of the native ecosystems in the United States have been converted for agriculture, urban growth, and other economic activities.[21] More than 40% of the world's oceans, and more than 65% of oceans within the United States Exclusive Economic Zone, are designated as having an anthropogenic impact rating of at least "medium high."[22]

Together with these numerous other stressors, climate change is having a significant effect on ecosystems. For example, climate change and other anthropogenic stressors are causing the sixth mass extinction of global biodiversity, with current extinction rates 100 to 1,000 times greater than historical rates.[23] Species with a narrow tolerance for changes in climate conditions and those that cannot easily shift their distribution are at increased risk of extinction.[24] In 2007, the IPCC concluded that 20 to 30% of species

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[18] *See* **Ex. 3,** *supra,* at 48.

[19] Millennium Ecosystem Assessment, *Ecosystems and Human Well-being: Biodiversity Synthesis* (2005), attached as **Ex. 7**; Brook *et al. Synergies among extinction drivers under global change* 23 Trends in Ecology and Evolution 453-46 (2008), attached as **Ex. 8**; Butchart *et al.* Global biodiversity: indicators of recent declines. 328 Science 1164 (2010) , attached as **Ex. 9**.

[20] Ellis EC and Ramankutty N, *Putting people in the map: anthropogenic biomes of the world*, 6 Frontiers in Ecology and the Environment 439 (2008), attached as **Ex. 10**.

[21] Lubowski *et al., Major uses of land in the United States*, *2002* (2006), attached as **Ex. 11**.

[22] Halpern *et al., A global map of human impact on marine ecosystems*. 319 Science 948 (2008), attached as **Ex. 12**; Kappel *et al.*, *In the zone comprehensive ocean protection*. 25 Issues in Science and Technology 33–44 (2009), attached as **Ex. 13**.

[23] Pimm, *et al.*, *The future of biodiversity*, 269 Science 347 (1995), attached as **Ex. 14**; Dirzo *et al., Global state of biodiversity and loss*, 28 Annual Review of Environment and Resources 137 (2003), attached as **Ex. 15**; Pimm, *Biodiversity: Climate Change or Habitat Loss — Which Will Kill More Species*, 18 Current Biology R117 (2008), attached as **Ex. 16**; Pereira *et al.*, *Scenarios for Global Biodiversity in the 21st Century*, 330 Science 1496 (2010), attached as **Ex. 17**; Barnosky *et al.*, *Has the Earth's sixth mass extinction already arrived?*, 471 Nature 51 (2011), attached as **Ex. 18**.

[24] Altermatt, *Tell me what you eat and I'll tell you when you fly: diet can predict phenological changes in response to climate change*, 13 Ecology Letters 1475(2010), attached as **Ex. 19**; Clavel, *et al.*, 2011. *Worldwide decline of specialist species: toward a*

worldwide would be committed to extinction if temperatures increase 2.2-4.0° F above late 20th century levels.[25]

Even species that do not go extinct will have to contend with ecological conditions they have not faced before. Many terrestrial species are shifting their geographical ranges in response to changing climate conditions. Plants and animals have moved to higher elevations at a median rate of 0.011 kilometers per decade, and to higher latitudes at a median rate of 16.9 kilometers per decade, 2 to 3 times faster than previously reported.[26] For example, of the 305 bird species tracked in annual Christmas bird counts during the last four decades, 177 species (58%) had significant northward range shifts, with more than 60 species moving 100 miles or farther.[27] It is expected that these range shifts will create unprecedented interactions among species.

Shifts in seasons, especially in the duration and intensity of winter, are also having significant impacts on ecosystems. One consequence of shifting seasons is the increased likelihood of mismatches between interdependent species (e.g., predator and prey, insects and flowers).[28] A striking example is found in the western forests, where warmer winters and longer growing seasons have promoted mountain pine beetle outbreaks and more intense and extensive fires.[29] In turn, the decreased availability of whitebark

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global functional homogenization?, 9 Frontiers in Ecology and the Environment 222 (2011), attached as **Ex. 20**.

[25] IPCC, *Climate change 2007: Impacts, Adaptation, and Vulnerability* (2007), available at http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_wg2_report_impacts_adaptation_and_vulnerability.htm.

[26] Chen *et al*., Rapid range shifts of species associated with high levels of climate warming. 333 *Science* 1024 (2011), attached as **Ex. 21**.

[27] National Audubon Society, *Birds and Climate Change: Ecological Disruption in Motion* (2009), attached as **Ex. 22**.

[28] Miller-Rushing, A *et al., The effects of phenological mismatches on demography*, 365 Philosophical Transactions of the Royal Society B-Biological Sciences 3177 (2010), attached as **Ex. 23**; Thackeray, *et al*., *Trophic level asynchrony in rates of phenological change for marine, freshwater and terrestrial environments*, Global Change Biology 16:3304-3313 (2010), attached as **Ex. 24**; Yang *et al.*, *Phenology, ontogeny and the effects of climate change on the timing of species interactions*, 13 Ecology Letters 13:1-10 (2010), attached as **Ex. 25**.

[29] Westerling *et al*., *Continued warming could transform Greater Yellowstone fire regimes by mid-21st century*, 108 Proceedings of the National Academies of Science, U.S.A., 13165-13170 (2011), attached as **Ex. 26**; Westerling *et al.*, *Warming and earlier spring increases western U.S. Forest wildfire activity*, 313 Science 940 (2006) , attached as **Ex. 27**.

pine nuts as a food source for grizzly bears has been tied to lower cub birth rates, lower over-winter survival rates, and increased conflicts between bears and humans.[30]

These shifts, including changing precipitation regimes and extremes in weather and climate, will, in short, have significant impacts on ecosystems in the coming decades, in some cases causing ecosystem transitions to significantly different community types.[31] For example, more arid ecosystems and river habitat areas are likely to be especially sensitive to changes in precipitation.[32] Reduced river flow and longer droughts in such regions is projected to induce native cottonwood-willow forests to convert to exotic tamarisk or other non-native species with higher drought tolerance.[33] Such changes in ecosystem composition and function will pose significant adaptation challenges for affected human communities.

The upshot is that greenhouse gas emissions are fundamentally destabilizing global ecosystems. Because human society depends upon the goods and services which these ecosystems provide, this ecological crisis is a pressing threat to public welfare.

c. Harms Associated With Ocean Acidification

Some of the carbon dioxide emitted via fossil fuel combustion is absorbed by the oceans. Because carbonic acid forms when carbon dioxide dissolves in water, rising carbon dioxide emissions are causing the seas to become more acidic. As the RIA notes, ocean acidification alone, independent of climate change, demonstrates that greenhouse gases endanger public welfare.[34] The RIA reports, based on findings of the National Research Council, that ocean acidity has increased "25 percent since pre-industrial times, and is projected to continue increasing."[35] If atmospheric carbon dioxide doubles, oceanic acidity will also increase, substantially reducing the area in the ocean where coral reefs can survive and threatening the ocean's food webs, which rely

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[30] Gunther, *et al.*, *Grizzly bear-human conflicts in the Greater Yellowstone Ecosystem* (2010), attached as **Ex. 28**; Gunther *et al.*, *Grizzly bear–human conflicts in the Greater Yellowstone ecosystem, 1992–2000*. 15 Ursus 10 (2004).

[31] Peters, *et al.*, *Long-term trends in climate and climate-related drivers* (2011).

[32] Peters, *et al.*, *Directional climate change and potential reversal of desertification in arid and semiarid ecosystems*, 18 Global Change Biology 151 (2012), attached as **Ex. 29**.

[33] Rood, *et al.*, *Declining summer flows of Rocky Mountain rivers: Changing seasonal hydrology and probable impacts on floodplain forests*, 439 Journal of Hydrology 397 (2008), attached as Ex. **30**.
Stromberg, *et al.*, *Effects of stream flow patterns on riparian vegetation of a semiarid river: implications for a changing climate*, 26 River Research and Applications 712 (2010), attached as **Ex. 31**.

[34] *Id.* at 3-9- 3-10.

[35] *Id.* at 3-9.

upon coral reefs as fish nurseries and planktonic animals that may be unable to survive a more acidic sea.[36]

Ocean acidification is also taking place with extraordinary rapidity. According to a recent paper published in the journal *Science*, which canvassed ocean chemistry for hundreds of millions of years, the current rate of CO_2 release to the oceans, and hence, the rate of acidification, "stands out as capable of driving a combination and magnitude of ocean geochemical changes potentially unparalleled in at least the last ~ 300 [million years] of Earth history."[37] Even if emissions were increasing less quickly than they now are, ocean acidity will increase by 100-150% by the end of this century.[38] Troublingly, this increase in acidity will be accompanied by increasing surface stratification of the ocean, which is a consequence of warmer surface waters. As a result, phytoplankton will experience both increased acidity and more intense light—which in combination has been shown in recent research to dramatically reduce the photosynthesis and growth of diatoms, currently responsible for approximately 40% of total primary production in the oceans."[39] The result of acidification in combination with ocean stratification may be a "widespread decline in marine primary production," doing great damage to the base of the oceanic food chain, with potentially devastating effects on the food supply for many regions.[40]

2. **Increasing Severity of Harm**

Greenhouse gas emissions and atmospheric concentrations have continued to rise in the years since EPA made its Endangerment Finding. As EPA finalizes the NSPS, this evidence of an intensifying threat demonstrates the importance of selecting the most protective standards possible in this rule, along with continued efforts to control emissions from other sectors.

Global greenhouse gas emissions are now rising faster than the IPCC's highest emissions scenario from 2007, as shown in the figure below, compiled by the European Environment Agency.[41]

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[36] *Id.* at 3-7, 3-9 – 3-10; NRC (2011) at 209-210; NRC (2010) at 55-56, 59-60.

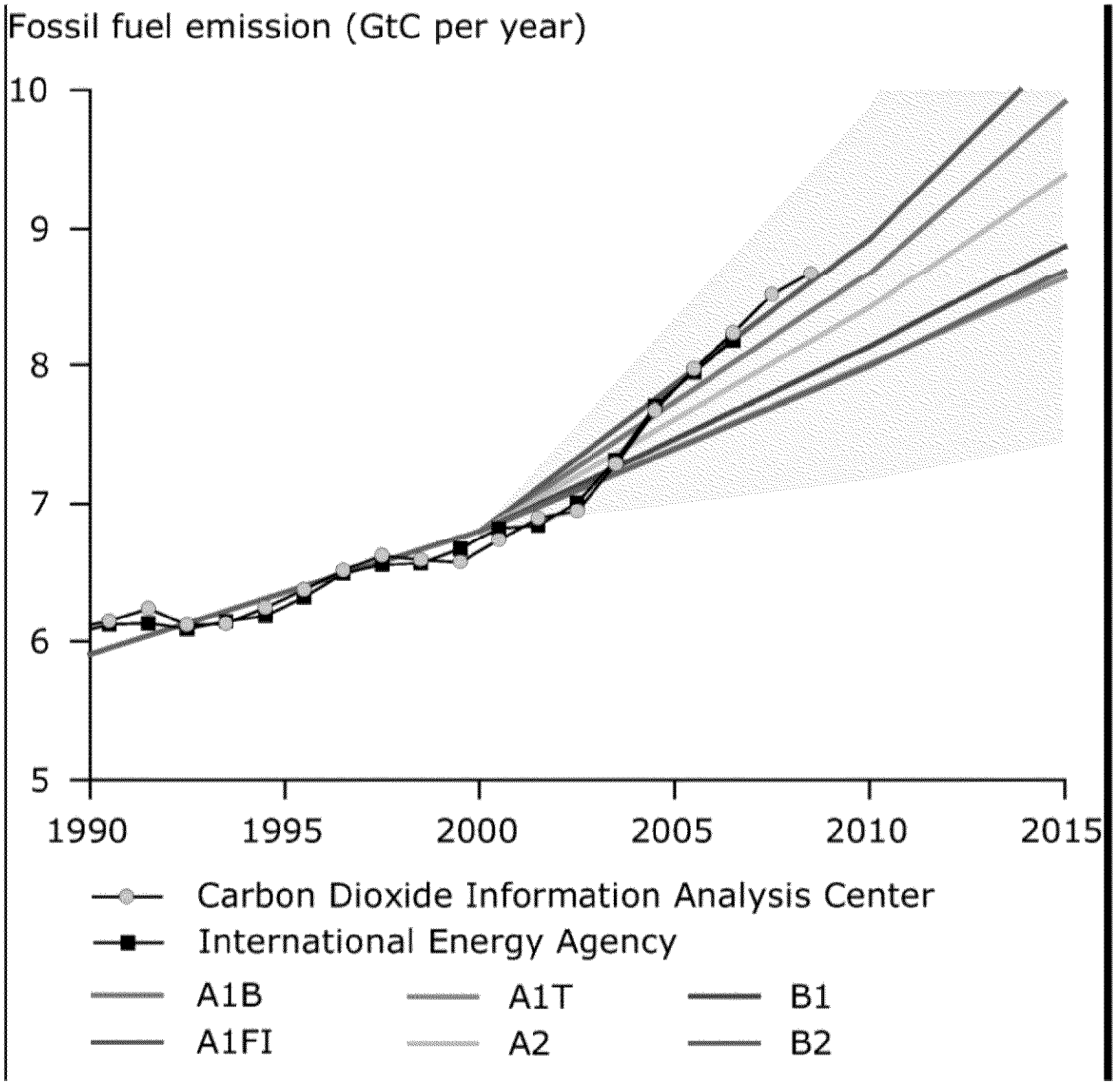
[37] Barbel Honsich *et al.*, *The Geological Record of Ocean Acidification*, 335 Science 1058, doi: 10.1126/science/1208277 (Mar. 16, 2012), attached as **Ex. 32.**

[38] Kunshan Gao *et al.*, *Rising CO_2 and increased light exposure synergistically reduce marine primary productivity, Nature Climate Change*, doi 101038/nclimate1507 (May 6, 2012), attached as **Ex. 33**.

[39] *Id.* at 3.

[40] *Id.* at 1.

[41] Available at http://www.eea.europa.eu/data-and-maps/figures/observed-global-fossil-fuel-co2/ccs102_fig2-3.eps.



The graph shows six IPCC emissions scenarios (labeled A1B to B2), compared with atmospheric carbon measurements from two sources. The highest scenario, A1F1, which is based on a "world of very rapid economic growth" with "fossil-intensive" energy systems,[42] is the most aggressive scenario generally modeled. As the graph demonstrates, global emissions have rapidly increased to match, or even slightly outpace, the A1F1 scenario. Thus, in the absence of swift emissions reductions, we can expect to experience harms even greater than those projected under the IPCC's highest emissions scenarios.

Indeed, recent reports from the IPCC and leading scientific journals confirm that threats to public health and welfare from greenhouse gases are even more pressing than

[42] *See* IPCC, Fourth Synthesis Report at 44 (2007), **Ex. 3**, *supra*.

anticipated just a few years ago. Evidence continues to accumulate that the IPCC's sea level rise projections in its Fourth Assessment Report were quite conservative. A recent IPCC report, for instance,[43] notes that "satellite-measured sea levels continue to rise at a rate closer to that of the upper range of [earlier] projections" and that "the contribution to sea level due to [ice] mass loss from Greenland and Antarctica is accelerating.".[44] Thus, sea level rise – and associated infrastructure damage to American communities – is likely rise at a rate closer to the upper bound, or higher than, the IPCC's projections.[45]

Recent modeling results project that by mid-century warming may by significantly greater than scientists had previously forecast. According to these researchers, average global temperatures could warm by 1.4-3°C (2.5 – 5.4°F), relative to the 1961-1990 period, by 2050, even under mid-range emissions scenarios (which global emissions presently significantly exceed).[46]

This research—in combination with the recent comprehensive analyses by the National Research Council of the National Academy of Sciences of the risks posed by climate change to American communities—indicates that the urgency of acting to curb greenhouse gas emissions has, if anything, grown since the 2009 Endangerment Finding. Emission trajectories are already at or beyond what was anticipated in the foundational 2007 IPCC reports, and are causing severe effects on an accelerated timeline. In the absence of substantial emissions reductions, these threats to public health and welfare may well be catastrophic.

B. Climate Stabilization Requires Immediate, Deep, Reductions in Emissions in the EGU Sector.

1. Emissions from the U.S. Power Sector Must be Controlled to Prevent Serious Harm to Public Health and Welfare

Emissions from the United States power sector are among the single largest contributors to greenhouse gas pollution. Without emissions controls for this sector, it will be very difficult, if not impossible, to stabilize atmospheric greenhouse gas emissions at a safe level.

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[43] IPCC, *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation* (2012), attached as **Ex. 34.**

[44] *Id.* at 178-79.

[45] For a discussion of those impacts, see U.S. Global Change Research Program, Global Climate Change Impacts in the United States (2009) at 111, 139, 145, 149.

[46] *See* Daniel J. Rowlands *et al.*, *Broad range of 2050 warming from an observationally constrained large climate model ensemble*, 5 Nature Geoscience 256 (2012), doi: 10.1038/nego1430 (Mar. 25, 2012), attached as **Ex. 35.**

CO_2 emissions from power plants are the single largest source of U.S. emissions and are a significant component of global emissions. The EPA's Inventory of Greenhouse Gas Emissions and Sinks reports that electrical generation was responsible for 2,258 million metric tons of CO_2 in 2010 (the most recent year of the inventory), which is 39% of annual U.S. CO_2 emissions. [47] Power plant emissions are larger than those of the next largest stationary source category, oil and gas production,[48] and are larger than emissions from the entire U.S. transportation sector. If we are to reduce the United States' contribution to global warming, we must address this major emissions source.

Importantly, doing so will require controlling emissions from plants fueled by *all* fossil fuels, not just coal plants. This is because natural gas plants, in particular, have significant emissions and because, as EPA recognizes in its proposed NSPS, the majority (if not all) of new fossil-fired plants are likely to use natural gas. *See, e.g.*, 77 Fed. Reg. at 22,399. Further efforts to cut carbon emissions must, accordingly, include reductions from these plants.

Specifically, in 2010, combustion at coal-fired power plants was responsible for 1,827.3 million metric tons of CO_2 emissions, while combustion at natural-gas-fired plants was responsible for 399.4 million metric tons of CO_2 emissions.[49] The dominance of coal combustion emissions demonstrates why controls on all coal-fired power plants are necessary to reduce sector emissions, but natural gas-fired plant emissions are also highly significant.

These emissions are particularly important to constrain because natural-gas-fired power plants are the primary source of growth in the category. As the Energy Information Administration (EIA) records, from 2007 to 2011, as the boom in shale gas production lowered gas prices, net coal generation fell from over 2 billion MWh to 1.73 billion MWh, and is set to decline further.[50] During the same period, net natural gas generation climbed from 869 million MWh to over 1 billion MWh, as a result of both increased capacity factors at existing plants and new facility construction, and, as EPA predicts, is likely to continue to increase.[51]

The combustion emissions from new natural gas plants are significantly lower than conventional coal-fired generation. However, achieving greenhouse gas pollution reduction benefits relative to conventional coal-fired plants depends on using the most efficient and lowest-emitting natural gas plants with state-of-the-art combined cycle

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[47] U.S. EPA, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2010* (2012), attached as **Ex. 36**, at Table ES-2.
[48] *See id.*
[49] *Inventory of U.S. Greenhouse Gas Emissions and Sinks* at Table 3-6.
[50] EIA, *Electric Power Monthly* (May 2012) at Table 1.1., attached as **Ex. 37**.
[51] *Id.*

turbines, and also ensuring that potent methane emissions from the production, transportation, and distribution of natural gas are minimized.[52]

Doing so is important if we are to curb dangerous climate-destabilizing emissions, and to responsibly manage the nation's natural gas resources. Further, it is essential that the nation's clean air and clean energy policies stimulate innovation in and deployment of low-carbon and renewable energy resources so that the nation can transition to low-carbon energy generation and expansive use of energy efficiency.

2. Deep Cuts in U.S. Power Sector Emissions Are Consistent with the Global Need for Emissions Reductions

Domestic action will have global benefits. As of 2008, the United States was responsible for approximately 14% of anthropogenic global greenhouse gas emissions.[53] Globally, U.S. power sector emissions constitute approximately 5% of emissions of all greenhouse gases (in CO2e terms) from all anthropogenic sources and about 10% of CO2 emissions.[54] Reducing these emissions will help to substantially reduce the U.S. contribution to climate change.

Significant reductions from large sources like the U.S. power sector are important because steep global cuts are necessary to prevent truly disastrous climate disruption. The National Research Council's 2011 report on climate stabilization reports that steep emission reductions, on the order of 80% globally, are necessary to stop CO_2 concentrations in the atmosphere from reaching dangerous levels and temperatures from exceeding 2°C above pre-industrial levels.[55] To do so, as shown by the below table

[52] We note that emissions from the natural gas production required to support these power plants are also significant; gas production is the second largest stationary source of greenhouse gas pollution according to EPA. *See Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2010*) at Table ES-2. EPA's recent emissions standards for that sector contain partial collateral mitigation of methane emissions from production, and so are critically important to maintain and strengthen as production expands. These standards, however, include important gaps; most notably, they do not directly control methane and do not set standards for existing infrastructure which produces the bulk of emissions. If natural gas generation continues to play an important role in the EGU sector, EPA must set appropriate production standards to ensure that increases in natural gas generation are not coupled with increases in greenhouse gas pollution due to methane leakage during gas extraction and transmission.

[53] European Union Emission Database for Global Atmospheric Research (EDGAR), *Total GHG Emissions Table*, available at http://edgar.jrc.ec.europa.eu/overview.php.

[54] According to the EDGAR database, global emissions in 2008 were 46,917 million metric tons CO_2e.

[55] National Research Council, *Climate Stabilization Targets* (2011) at 10, **Ex. 6,** *supra*.

drawn from the IPCC's Fourth Assessment Report, global CO_2 emissions must fall by between 50-85% by 2050.[56]

Category	Radiative forcing (W/m^2)	CO_2 concentration[a] (ppm)	CO_2-eq concentration[c] (ppm)	Global mean temperature increase above pre-industrial at equilibrium, using "best estimate" climate sensitivity[b], [c] (°C)	Peaking year for CO_2 emissions[d]	Change in global CO_2 emissions in 2050 (% of 2000 emissions)[d]	No. of assessed scenarios
I	2.5-3.0	350-400	445-490	2.0-2.4	2000-2015	-85 to -50	6
II	3.0-3.5	400-440	490-535	2.4-2.8	2000-2020	-60 to -30	18
III	3.5-4.0	440-485	535-590	2.8-3.2	2010-2030	-30 to +5	21
IV	4.0-5.0	485-570	590-710	3.2-4.0	2020-2060	+10 to +60	118
V	5.0-6.0	570-660	710-855	4.0-4.9	2050-2080	+25 to +85	9
VI	6.0-7.5	660-790	855-1130	4.9-6.1	2060-2090	+90 to +140	5
						Total	177

a) The understanding of the climate system response to radiative forcing as well as feedbacks is assessed in detail in the AR4 WGI Report. Feedbacks between the carbon cycle and climate change affect the required mitigation for a particular stabilization level of atmospheric carbon dioxide concentration. These feedbacks are expected to increase the fraction of anthropogenic emissions that remains in the atmosphere as the climate system warms. Therefore, the emission reductions to meet a particular stabilization level reported in the mitigation studies assessed here might be underestimated.
b) The best estimate of climate sensitivity is 3°C [WG 1 SPM].
c) Note that global mean temperature at equilibrium is different from expected global mean temperature at the time of stabilization of GHG concentrations due to the inertia of the climate system. For the majority of scenarios assessed, stabilisation of GHG concentrations occurs between 2100 and 2150.
d) Ranges correspond to the 15th to 85th percentile of the post-TAR scenario distribution. CO_2 emissions are shown so multi-gas scenarios can be compared with CO_2-only scenarios.

It will be difficult to meet these reductions without emissions controls for the U.S. power sector.

In the remainder of these comments, we explain what EPA must do in order to meet its Clean Air Act mandate to ensure that all sources in this sector comply with Section 111 standards. A strong NSPS for the power sector is critical to achieving the emissions reductions necessary to prevent dangerous climate change.

II. Delineation of the Source Category

A. EPA Has Reasonably Grouped Coal- and Natural Gas-Fired Power Plants in Category TTTT

EPA proposes to create a new category, TTTT, encompassing "electric utility steam generating units (boilers and IGCC units, which are currently included in the Da category) and combined cycle units that generate electricity for sale and meet certain size criteria (which are currently included in the KKKK category)" for the purposes of regulating GHG emissions. 77 Fed. Reg. at 22,394/2.

This proposal falls squarely within EPA's broad discretion under section 111 to group sources that perform the same function into a single category, combining sources that

[56] IPCC, *Summary for Policymakers, Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (2007) at 15, **Ex. 3** *supra*.