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Cleaner and Cheaper: Using the Clean Air Act to Sharply Reduce Carbon Pollution from Existing Power Plants, Delivering Health, Environmental, and Economic Benefits

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On June 25, 2013, President Obama addressed a sweltering audience of students, members of Congress, environmental leaders, business executives, and others to lay out an ambitious Climate Action Plan for his second term. Specifically addressing the students in the audience, the president said, "I refuse to condemn your generation and future generations to a planet that's beyond fixing."

In addition to reaffirming his commitment to address climate change, the president outlined specific steps his administration would take, using laws already on the books. The heart of that plan is to establish the first-ever national standards to limit carbon dioxide emissions from power plants. Here is how the president described the problem:

> Today, about 40 percent of America's carbon pollution comes from our power plants. But here's the thing: Right now, there are no federal limits to the amount of carbon pollution that those plants can pump into our air. None. Zero. We limit the amount of toxic chemicals like mercury and sulfur and arsenic in our air or our water, but power plants can still dump unlimited amounts of carbon pollution into the air for free. That's not right, that's not safe, and it needs to stop.

We agree. Climate and energy experts at the Natural Resources Defense Council crafted a groundbreaking proposal to do just that, which was originally described in a report released in December 2012.[1] This Issue Brief presents an updated analysis of that proposal, including a more ambitious variant and additional scenarios demonstrating that states and power companies have many options for achieving big reductions in carbon pollution from power plants at a low cost, and with large net benefits for our economy, health, and environment. This report describes the following cases:

- *Reference case*, which assumes no new policies and is benchmarked to the reference case of the Energy Information Administration's Annual Energy Outlook of 2013.
- *Moderate, Full Efficiency case*, which assumes the same emission standards and achievable energy efficiency resources as in NRDC's 2012 analysis.
- *Moderate, Constrained Efficiency case*, which assumes the same emission standards and one-half the achievable energy efficiency resources as in NRDC's 2012 analysis.
- *Ambitious, Full Efficiency case*, which assumes more stringent emission standards and the same achievable energy efficiency resources as in NRDC's 2012 analysis.
- *Ambitious, Constrained Efficiency* case, which assumes more stringent emission standards and one-half the achievable energy efficiency resources as in NRDC's 2012 analysis.
- *Ambitious, Constrained Efficiency, PTC case*, which assumes more stringent emission standards and one-half the achievable energy efficiency resources as in NRDC's 2012 analysis, plus an extension of the wind energy production tax credit until 2020.

Under the timetable established by the president, the Environmental Protection Agency (EPA) will use its existing authority under the Clean Air Act to propose a guideline for carbon pollution standards by June 1, 2014, covering about 1,000 existing power plants across the country. After taking public comment on its proposal, the EPA will finalize its guideline by June 2015. States will have until July 2016 to develop and submit to the EPA their plans for achieving the emission reductions specified in the guideline. The EPA will review and approve state plans that are consistent with the guideline. If a state fails to submit a plan or submits an inadequate plan, the EPA is required to establish direct federal regulations to implement the guideline in that state.

NRDC's updated analysis shows one way in which the EPA, in partnership with the states, can set carbon pollution standards that will cut existing power plant emissions 21 to 31 percent by 2020 (relative to 2012 levels); this represents a reduction of 470 million to 700 million tons relative to business as usual. The proposed approach will drive investment in cost-effective energy efficiency and new renewable electricity generation facilities, substantially lowering the cost of compliance, lowering electricity bills, and creating thousands of jobs across the country. Further, NRDC's analysis shows that the benefits—in saved lives, reduced illness, and climate change avoided—far outweigh the costs, by as much as $21 billion to $53 billion in 2020.

There is more than one way to achieve these benefits. The EPA has already emphasized that regardless of the specific approach it uses as the basis of its guideline, states will be able to tailor their implementation plans to reflect their own circumstances and policy preferences, provided they achieve emission reductions equivalent to, or greater than, those resulting from the federal template. For example, states that participate in the Regional Greenhouse Gas Initiative will be able to use this policy framework (perhaps with some adjustments to their emission limits), and other states could join or adopt similar mass-based standards.

Having endured a year in which climate change contributed to record drought, widespread wildfires, and extreme heat waves, which cost many lives and billions of dollars, we can't afford to wait any longer to act. For the

2013

- January 20th: Start of President Obama's second term.
- June 25th: President Obama announces Climate Action Plan.
- September 20th: EPA proposes carbon pollution standards for future power plants.

2014

- May 9th: End of public comment period for future power plant proposal.
- June 1st: EPA to propose guideline for carbon pollution standards for existing power plants.
- June-September: Public comment period on existing power plant proposal.

2015

- June 1st: EPA to finalize power plant carbon pollution standards.

2016

- June 30th: States to submit implementation plans for existing power plants to EPA.
- July-December: EPA reviews state plans for compliance with its guideline.

2017

- January 20th: End of President Obama's second term.

health and welfare of Americans, for the nation's economy, and for the stability of our climate, now is the time to reduce carbon pollution from America's power plants, dramatically increase the energy efficiency of our economy and reduce the threat of climate change.

THE IMPERATIVE TO CUT CARBON POLLUTION

Unless heat-trapping carbon pollution is sharply reduced, negative impacts on the health of our families, communities, economy, and planet will only grow.

Already, climate change is increasing the numbers of record heat waves, droughts, and floods, and these extreme weather events will become even more powerful and frequent, threatening both lives and the global economy. In the wake of superstorm Sandy, which devastated swaths of the U.S. coastline, states and cities must rebuild for this new reality. But simply preparing for more extreme weather is not an answer by itself. Future storms will be stronger and do even worse damage unless we act now to curb the carbon pollution that is driving dangerous climate change.

To this end, nothing is more important than reducing carbon dioxide (CO_2) emissions from the largest industrial source of pollution: electricity-generating power plants. In the United States these plants emit about 2.2 billion tons of CO_2 each year, roughly 40 percent of the nation's total emissions.

Clean energy technologies are already stemming the growth in emissions and creating a bright spot in the nation's economy. Today the wind and solar industries employ more people than the coal industry.[2,3,4] Efficiency improvements in lighting alone will lower our national energy bill by billions of dollars every year and reduce demand for fossil power plants by 10 percent.[5]

To be sure, the EPA has taken important first steps by setting standards that will cut the carbon pollution from new automobiles and trucks nearly in half by 2025, and by proposing standards to limit the carbon pollution from new power plants. But the EPA has yet to tackle the CO_2 pollution from hundreds of *existing* fossil-fueled power plants in the United States.

The EPA has both the authority and the responsibility to reduce pollution from these plants under the Clean Air Act, the nation's bedrock air pollution law adopted in 1970. NRDC has proposed an effective and flexible approach to cut carbon pollution from existing power plants. This plan:

- Uses the legal authority established by the Clean Air Act.
- Recognizes differences in starting points among states.
- Charts a path to affordable and effective emission reductions by tapping into the ingenuity of the states and the private sector.

- Provides multiple compliance options, including cleaning up existing power plants, shifting power generation to plants with lower emissions or none at all, and improving the efficiency of electricity use.

Using the same sophisticated, integrated planning model used by the industry and the EPA, NRDC calculated the pollution reductions that would result from the proposed approach—and the costs and benefits of achieving those reductions.

The plan would cut CO_2 pollution from America's power plants by 21 to 31 percent (relative to 2012 levels) by 2020, and 25 to 38 percent by 2025. The reductions are equivalent to 470 million to 700 million short tons relative to the Reference case in 2020, and 560 million to 860 million short tons in 2025. The price tag ranges from no increase over the Reference case to about $14.6 billion in 2020, depending on the level of ambition and the package of solutions employed. But the benefits—in saved lives, reduced illness, and climate change avoided —would be $28 billion to $63 billion, far exceeding the costs. For Americans' health and welfare, for the nation's economy, and for the health of the planet, we can't afford *not* to curb the carbon pollution from existing power plants.

THE EPA'S LEGAL AUTHORITY AND OBLIGATION TO REDUCE CARBON POLLUTION

The Clean Air Act has been remarkably successful over its 40-year history. Most Americans now breathe much cleaner air, our cities are no longer enveloped in smoke and smog, the nation's lakes and rivers are recovering from acid rain, and the ozone layer that shields us from dangerous ultraviolet radiation is healing after the phase-out of CFCs and other ozone-destroying chemicals.

The Clean Air Act can also help stem the threat of climate change by reducing carbon pollution. In 2007, in *Massachusetts v. EPA,* the U.S. Supreme Court ruled that the EPA has the authority and responsibility to curb heat-trapping pollutants under the Clean Air Act, rejecting the Bush administration's claim that greenhouse gases are not pollutants under that law. In that case, the nation's highest court ruled that if the science shows CO_2 and other heat-trapping pollutants endanger public health and welfare, then the EPA must set standards to reduce their emissions from new cars and trucks.

In another decision, in *American Electric Power v. Connecticut,* the Supreme Court ruled in 2011 that it is also the EPA's responsibility to curb the carbon pollution from the nation's power plants. The legal authority for power plant standards comes from Section 111 of the Clean Air Act, which directs the EPA to set "standards of performance" (typically a maximum emissions rate) for stationary sources like power plants that emit harmful air pollutants. Section 111(b) covers new facilities, while Section 111(d) gives the EPA and states shared responsibility for curbing pollution from existing facilities. Under Section 111(d), the EPA issues guidelines on "the best system of emission reduction," and then each state is required to adopt and submit a plan for setting and meeting emission standards.

The price tag ranges from no increase over the Reference case to about $14.6 billion in 2020, depending on the level of ambition and the package of solutions employed. But the benefits—in saved lives, reduced illness, and climate change avoided—would be $28 billion to $63 billion, far exceeding the costs.

In President Obama's first term, the EPA responded to the Supreme Court decision in *Massachusetts v. EPA* by presenting overwhelming scientific evidence that CO_2 and other heat-trapping pollutants do indeed endanger public health and welfare. The administration then set new standards in 2010 and 2012 to dramatically cut the carbon pollution from new cars and SUVs and from heavy trucks and buses. The U.S. Court of Appeals for the District of Columbia Circuit upheld both the endangerment determination and the vehicle standards, and the Supreme Court declined to review those holdings.[6,7]

In September 2013, the EPA took the first step toward addressing power plant pollution as directed by the president's Climate Action Plan by proposing the "Carbon Pollution Standard for New Power Plants" under Section 111(b). The standard would require that new coal power plants emit no more than 1,100 pounds of CO_2 per megawatt-hour (lbs/MWh) and that most new natural gas–fired plants limit emissions to no more than 1,000 lbs/MWh.

To put that in context, existing coal power plants typically produce about 2,100 lbs/MWh, and gas-fired plants emit 1,100/MWh or less. Power companies building new gas plants could meet the standard with efficient natural gas combined-cycle plants. The EPA, the Department of Energy, and most private analysts do not anticipate construction of new coal-fired power plants for economic reasons, but if new coal plants were built in the future, they could meet the standard with partial carbon dioxide capture systems.

The EPA will accept comments on its proposal for future power plants until May 9, 2014. The agency will then review these comments and, after making any revisions it considers necessary, will finalize the standards for new power plants no later than June 1, 2015.

Also pursuant to the president's Climate Action Plan, the EPA has begun work on the largest source of carbon pollution, *existing* power plants. Since September 2013, the EPA has held numerous meetings with state officials, power companies, environmental organizations, and others, including 11 public listening sessions at which more than 1,600 people spoke. EPA has also received more than 2,000 written submissions from interested parties.

NRDC's approach to setting standards under Section 111(d) is consistent with the many stakeholder comments calling for a flexible approach in which states and power plant owners may design their own plans for achieving the required emission reductions by selecting among a wide variety of measures. The EPA refers to approaches that incorporate these flexible compliance options as "system based" standards.[8] Attorneys at NRDC and Harvard Law School have shown that EPA has the legal authority to set such system-based standards.[9]

NRDC's proposal also addresses the challenge of creating equitable regulations for the affected sources, recognizing that the mix of existing power plants varies among the states. If all plants were limited to 1,000 pounds of CO_2/MWh, for instance, states with a high percentage of coal-fired plants would face a much larger task than would those with lots of natural gas plants or renewables. The approach NRDC has proposed would help reduce the carbon pollution from existing power plants in a fair, affordable, and achievable manner.

STATE-SPECIFIC STANDARDS AND FLEXIBLE COMPLIANCE OPTIONS

The NRDC plan has two key elements:

(1) The EPA would set state-specific emission rates, reflecting the diversity of the nation's electricity sector as well as the state-by-state structure of Section 111(d).

(2) Power plant owners and states would have broad flexibility to meet standards in the most cost-effective way, through a range of technologies and measures.

Here's how it would work: The EPA would first tally up the share of electricity generated by coal and gas-fired plants in each state during the baseline years (2008–2010 was used for this analysis). Then the agency would set a target emission rate for each state for 2020, based on the state's baseline share of coal and gas generation. The Ambitious case state standards analyzed in this report were calculated by applying a benchmark rate of 1,400 pounds of CO_2/MWh for the baseline coal generation share and 700 pounds of CO_2/MWh for the baseline gas-fired generation share. The Moderate case state standards were calculated by applying a benchmark rate of 1,500 lbs/MWh for the baseline coal share and 1,000 lbs/MWh for the baseline gas share.

For example, a state that now gets 90 percent of its fossil-fueled electricity from coal and 10 percent from gas would be required to reduce its 2020 emissions rate to 1,330 lbs/MWh in the Ambitious case [(90 percent x 1,400) + (10 percent x 700)]. In the Moderate case, the target would be 1,450 lbs/MWh [(90 percent x 1,500) + (10 percent x 1,000)]. In contrast, a state with 90 percent gas-fired generation would have a target of 770 lbs/MWh in the Ambitious case [(10 percent x 1,400) + (90 percent x 700)] and 1,050 lbs/MWh [(10 percent x 1,500) + (90 percent x 1,000)] in the Moderate case. A state starting with a 50:50 ratio of coal and gas generation would have a target of 1,050 lbs/MWh in the Ambitious case and 1,250 lbs/MWh in the Moderate case. In all cases, the allowable emissions rate would drop further in 2025.

The emission standard for each state would be an overall average of all fossil fuel plants in the state. An individual plant could emit at a higher or lower rate.

Each covered plant with an emission rate above the state standard could meet the standard by using one or more compliance options: First, a plant could reduce its own CO_2 emission rate by retrofitting a more efficient boiler or installing CO_2 capture systems, for instance, or it could burn a mixture of coal and cleaner fuels such as gas or certain types of biomass.

Second, the owners of multiple power plants could average the emissions rates of their plants, meeting the required emission rate on average by running coal plants less often, ramping up generation from natural gas plants or renewable sources instead. They could retire coal plants and build new natural gas and renewable capacity, if needed, creating a cleaner overall electricity-generating fleet. Low- or zero-emitting sources, such as wind and solar, would earn credits that generators could use to lower their average emissions rate. The plan also allows trading of credits between companies, both within a state and across state lines (among states that choose to allow it), further lowering the overall costs of compliance.

An innovative feature of the proposal is the inclusion of energy efficiency. State-regulated energy efficiency programs could earn credits for avoided pollution resulting from reduced electricity consumption. Generators could purchase and use those credits toward their emissions compliance obligations, effectively lowering their calculated average emissions rate. Energy efficiency is one of the lowest-cost energy resources and emission reduction options. States could use this provision to slash emissions without costly and lengthy power plant retrofits or new construction, reducing the overall cost of the regulations.

Improving energy efficiency also cuts costs to consumers and businesses. Switching to more efficient lightbulbs, adding weather-stripping or insulation in buildings, or installing more-efficient appliances and equipment reduces electricity bills and creates jobs that can't be outsourced to other countries.

Energy efficiency programs should include rigorous requirements to ensure that reductions in electricity use and the resulting emission reductions are real and verifiable. These requirements are addressed in the NRDC proposal.

The range of compliance options enables a 21 to 31 percent reduction in emissions of climate-change-causing CO_2 from existing power plants by 2020 compared with 2012

levels (or, equivalently, a reduction of 470 million to 700 million short tons relative to the Reference case; see Figures 1 and 2).

Each state will have many options to customize a compliance strategy based on the state's energy resources, the structure and geography of its energy markets, local demographics, and the state's economic development plan. States could, for instance, adopt California's portfolio of policies, or model their approach on the Northeast states' Regional Greenhouse Gas Initiative—as long as the states demonstrate those approaches will achieve equal or lower emissions.

THE BENEFITS OF IMPLEMENTING THE PROPOSAL

NRDC asked ICF International to analyze the proposed approach using ICF's proprietary Integrated Planning Model (IPM®) and NRDC's assumptions. Used routinely by both the utility industry and regulators to determine cost-effective ways of meeting the nation's electricity needs and to assess the effects of regulations, the IPM models the entire electric power sector. It integrates extensive information on power generation, fuel mix, transmission, energy demand, prices of electricity and fuel, environmental policies, and other factors.

For this analysis, NRDC made a series of conservative assumptions about fuel prices, energy demand, and policies to plug into the IPM. We also assumed that new EPA rules limiting emissions of mercury and other air toxins and further reducing sulfur dioxide and nitrogen oxides would be implemented.

Electricity Sector Modernization

The results from the model show that the proposed approach would begin to modernize and clean up America's electricity sector without significantly changing the nation's electricity bill. This is because energy efficiency programs adopted in response to the incentives created by the approach would cause overall demand to decline by as much as 6 percent between 2012 and 2020, rather than increase by 4 percent. In response to questions raised about the magnitude of energy efficiency gains assumed in its original analysis, NRDC developed a new approach to allow energy efficiency to be selected on an economic basis within the model, using a three-step energy efficiency supply curve with utility program costs ranging from 2.3 to 3.2 cents per kilowatt-hour. NRDC also examined Constrained Efficiency scenarios in which it assumed that states would implement only half as much energy efficiency by 2020 as assumed in its 2012 analysis. In those cases, electricity demand remains essentially flat from 2012 through 2020.

Figure 1. Projected Generation Mix in 2020

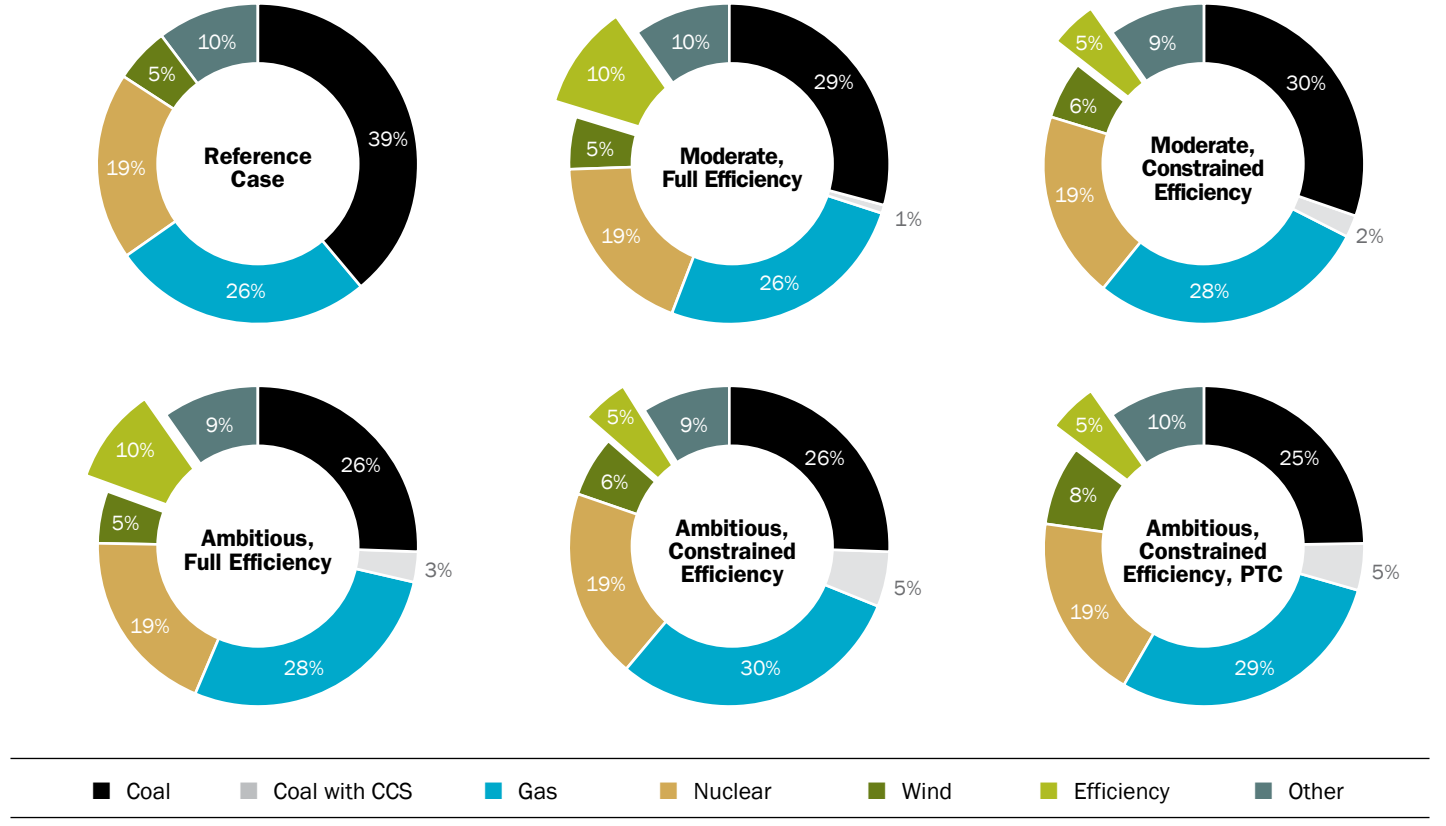


Figure 2. NRDC Policy Cases vs. Reference Case (Emissions 2005 – 2025)

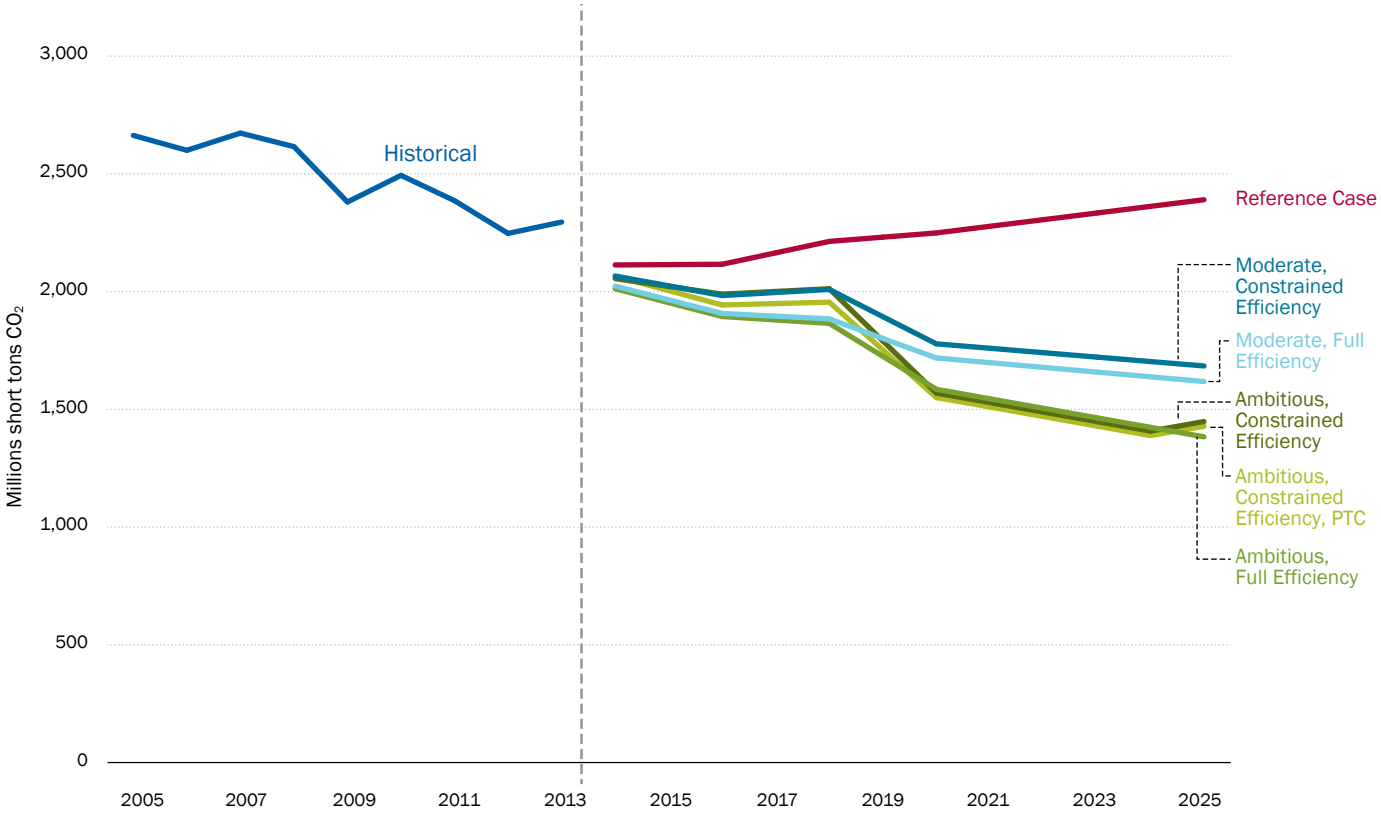


Table 1. Summary Results of NRDC Scenarios in 2020

	Emission Reductions below 2012 (T)	Emission Reductions below 2012 (%)	Incremental Cost (Billions 2012$)	Benefits Range* (Billions 2012$)
Reference	0	0%		
Moderate, Full Efficiency	530	24%	0	29.9 - 50.3
Moderate, Constrained Efficiency	470	21%	6.6	27.6 - 46.9
Ambitious, Full Efficiency	660	29%	8.5	37.3 - 62.0
Ambitious, Constrained Efficiency	670	30%	14.6	36.7 - 60.2
Ambitious, Constrained Efficiency, PTC	700	31%	11.1	38.2 - 63.1

*NOTE: Carbon reduction benefit (low) is calculated according to the Obama administration's updated Social Cost of Carbon (SCC) of $43 (2012$) per short ton in 2020, reflecting the 3% discount rate case. Carbon reduction benefit (high) is calculated according to an SCC estimate of $62 (2012$) per short ton, using a 2% discount rate. Benefits for SO_2 and NOx reductions are preliminary estimates based on scaling previous estimates.[10]

ADDITIONAL DETAILS ON NRDC'S ASSUMPTIONS

To update its 2012 power sector analysis, NRDC revised a number of assumptions to more accurately reflect current trends. The Reference case in the previous analysis relied on projections from the Energy Information Administration's *Annual Energy Outlook* for 2011. This analysis is based on the EIA's outlook for 2013. Given the significant changes in the energy industry over the past few years, the differences in these baseline projections materially affect the results. Power sector carbon dioxide emissions projected for 2020 are 11 percent lower in the updated Reference case than they are in the original Reference case. Additionally, NRDC adopted assumptions for the capital costs of building new wind capacity from the Lawrence Berkeley National Laboratory (LBNL) 2012 *Wind Technologies Market Report* and assumed that nuclear units could be re-licensed beyond a 60-year operating life for an additional 20 years.

For the policy cases, NRDC developed an endogenous approach to representing demand-side energy efficiency in the model using a simplified supply curve. NRDC derived the energy efficiency supply curve from the total electricity demand reduction from energy efficiency projected by Synapse Energy Economics on the basis of the performance of leading state programs; this was also used in the 2012 analysis. For the present analysis, NRDC divided that total into three equal blocks with different costs. The maximum projected savings from energy efficiency in 2020 was 482 TWh, so each cost block represents 161 TWh of demand reduction. Then NRDC assigned utility program costs to each block such that the cost of the middle block would be equal to the cost assumed in the 2012 analysis. The relative costs assigned to the other two blocks were scaled on the basis of a generic cost curve given in a 2013 LBNL report on the projected costs and savings of utility-funded energy efficiency programs.[11] The first block of energy efficiency savings was available at 2.3 cents/kWh, the second block at 2.6 cents/kWh, and the third block at 3.2 cents/kWh. The costs are uniform throughout the country, while the quantities of energy efficiency available vary by region based on the Synapse assessment. In each region, the model selects how much energy efficiency to deploy based on its levelized cost relative to other sources. The selection of the efficiency resource in the model is based on these utility program costs, but NRDC includes the participant's contribution (assumed to be 45 percent of the total cost of efficiency measures) in the calculations of total compliance costs. To examine scenarios in which energy efficiency contributes to compliance on a more limited basis, the Constrained Efficiency cases assume that only half the amount of energy efficiency is available. This is represented in the model simply by reducing the amount of energy efficiency available in each cost block by 50 percent.

The Ambitious policy scenarios included in the present analysis is based on tighter nominal emission rate targets in the 2020 and 2025 compliance years compared with the Moderate case, which used the same targets as the 2012 analysis. The Ambitious case also includes an additional step in 2030 (Table 2).

Table 2. Nominal CO_2 Emission Rate Targets (lbs/MWh)

	2020	2025	2030
Moderate cases	Coal: 1,500 Gas: 1,000	Coal: 1,200 Gas: 1,000	Coal: 1,200 Gas: 1,000
Ambitious cases	Coal: 1,400 Gas: 700	Coal: 1,150 Gas: 600	Coal: 900 Gas: 500

NRDC added the Ambitious policy scenarios to examine the potential for even greater emission reductions because the cases based on the Moderate emission rate targets showed minimal to low compliance costs.

NRDC also examined a case in which the federal wind production tax credit (PTC) is extended until 2020 with ambitious targets and constrained efficiency. This case results in a compliance scenario that relies more heavily on wind and less heavily on efficiency and natural gas than in the other cases, all of which assume that the PTC is phased out on its current schedule. All of the cases assume that existing state renewable energy standards remain in place but are not strengthened.

Figure 3. Projected Emission Reductions from Reference Case in 2020

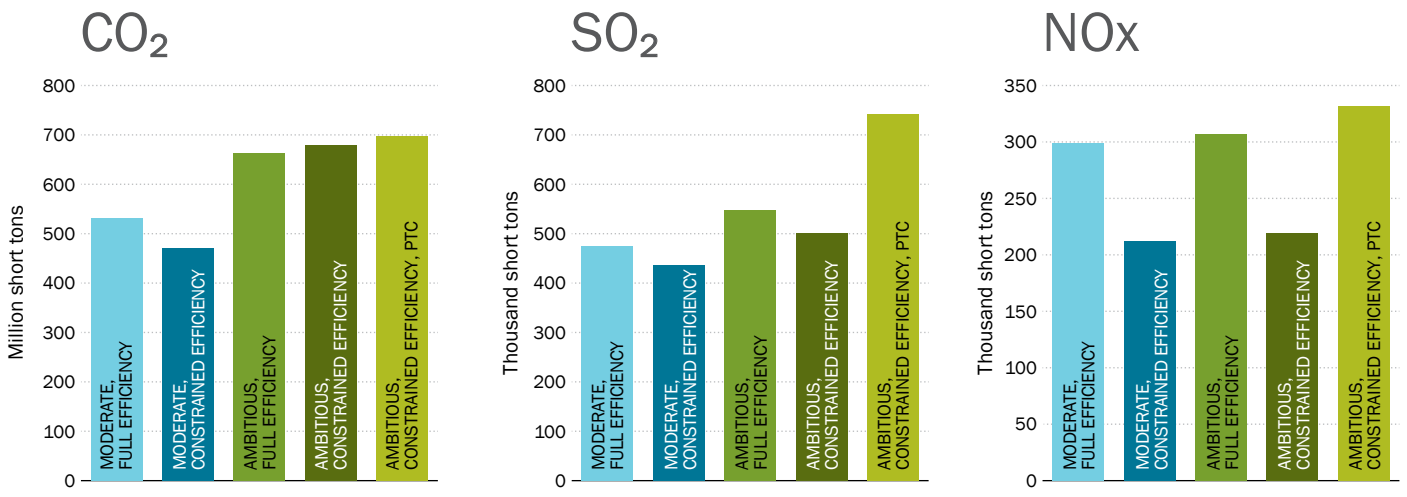
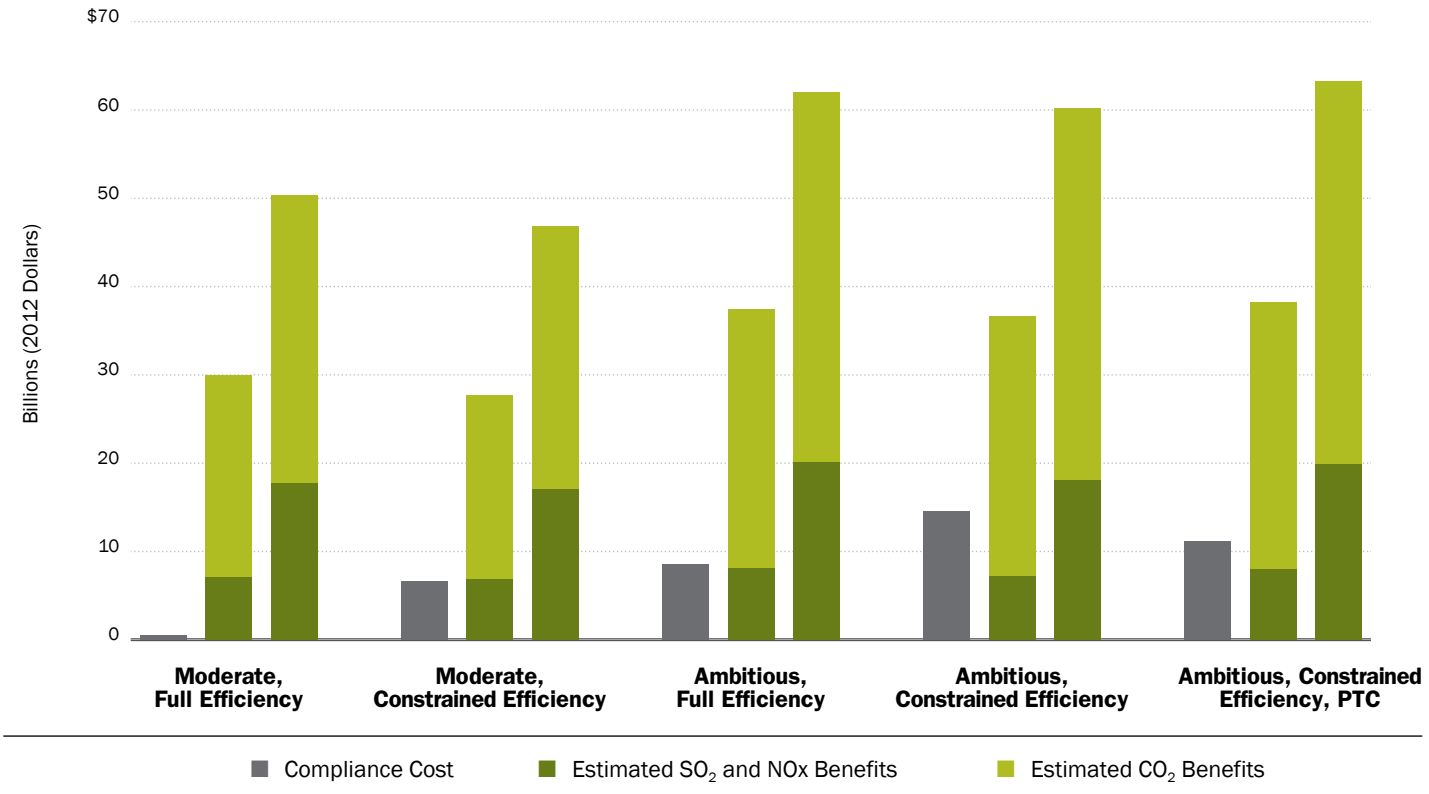


Figure 4. Large Benefits, Low Costs (Cost and Benefits from Reduced Emissions, 2020)



NOTES

- Benefits from SO_2 and NOx reductions are scaled from previous estimates using an extensively peer-reviewed dispersion model developed by Abt Associates to estimate health impacts from power plants for EPA. Lower and Higher estimates based on different statistical relationships between pollution concentrations and health effects that are used by EPA. Value of statistical lives lost is the primary component of the monetary value of the estimated benefits.
- Lower carbon reduction benefit calculated with Social Cost of Carbon (SCC) of $43 (2012$) per short ton in 2020, reflecting the Administration's 3% discount rate case. Higher carbon benefit calculated with independently calculated SCC of $62 (2012$) per short ton in 2010, reflecting a 2% discount rate case. See Endnote 13.

Coal-fired generation's market share of total electricity services (including energy efficiency) drops from 39 percent in the Reference case to between 25 percent (in the Ambitious, Full Efficiency case) and 30 percent (in the Moderate, Constrained Efficiency case). Natural gas generation's market share in the policy cases remains about the same as in the Reference case at 26 to 30 percent, but the total number of kilowatt-hours generated with natural gas declines compared with 2012 levels. Wind's market share increases from 3.5 percent in 2012 to between 5 percent (in the Reference case and Full Efficiency cases) and 8 percent (in the Production Tax Credit extension case).

Investments in energy efficiency are the lowest-cost compliance pathway—much cheaper than building new power plants or installing pollution control equipment—so including this flexibility significantly reduces overall costs. Because of the many benefits of energy efficiency, utilities scaled up annual demand-side management program budgets from $2.7 billion in 2007 to $6.9 billion in 2012,[12] with a corresponding increase in energy savings. Efficiency investments reduce the need to build additional power plants and infrastructure, reduce wholesale power prices, and deliver significant bill savings to individuals and businesses. Because substantial reductions in CO_2 can be achieved through energy efficiency without building many new power plants or installing lots of expensive pollution control equipment, the total costs of compliance would be low—ranging from no increase (relative to the Reference case) in electricity system costs in the Moderate, Full Efficiency case in 2020, to a net compliance cost of $14.6 billion in the Ambitious, Constrained Efficiency case.

Health, Environmental, and Economic Benefits

The benefits of the proposal far outweigh the costs. Carbon dioxide from power plants contributes to the severity of heat waves, droughts, floods, and rising sea levels, all of which bring an enormous toll in human lives, environmental devastation, and economic disruption. The value of reducing carbon pollution in 2020 is estimated at $43 to $62 per ton, or more.[13]

The proposal also brings additional cuts in emissions of pollutants that are already regulated, such as sulfur and nitrogen oxides (SO_2 and NOx). The emissions reductions delivered by implementing the proposal would prevent more than 17,000 asthma attacks annually, avoid more than 1,000 emergency room visits and hospital admissions per year, and prevent thousands of premature deaths, among other benefits.

The benefits of reducing CO_2 and the traditional pollutants are both substantial, adding up to $28 billion to $63 billion across the cases in 2020, yielding net benefits ranging from $21 billion (low estimate, Moderate, Constrained Efficiency case) to $53 billion (high estimate, Ambitious, Full Efficiency case). See Figure 4.

What's more, this approach would stimulate investments of $52 billion to $121 billion in energy efficiency and renewables between now and 2020, boosting local and state economies. Establishing such CO_2 emission standards now will also give the power industry the investment certainty it needs to avoid billions of dollars of stranded investment in obsolete power plants.

ENDNOTES

1 www.nrdc.org/air/pollution-standards/files/pollution-standards-report.pdf.

2 NRDC, *American Wind Farms: Breaking Down the Benefits from Planning to Production*, September 2012, www.nrdc.org/energy/files/american-wind-farms-IP.pdf. The wind industry now employs 75,000 Americans.

3 Solar Foundation, *National Solar Jobs Census 2013* (January 2014), thesolarfoundation.org/sites/thesolarfoundation.org/files/TSF%20Solar%20Jobs%20Census%202013.pdf. As of November 2013, the solar industry employed 142,698 workers.

4 *See* Energy Information Administration, Annual Coal Report, December 12, 2013. There are 180,000 jobs in the coal industry: 89,000 in mining, 31,000 in transportation, and 60,000 in power generation. This is many fewer than the total jobs in the wind and solar industries (217,000), and the latter figure does not even include the thousands of additional jobs created in the clean energy sector from investments in energy efficiency.

5 Brian Lee et al., *Clean Currents v2: A Light at the End of the Tunnel*, Research Roundtable, Goldman Sachs Equity Research, March 9, 2014.

6 *Coalition for Responsible Regulation v. EPA*, 684 F. 3d 102 (D.C. Cir. 2012).

7 *See* D. Doniger, "Carbon Copy: Understanding What Is, and Is Not, At Stake in the Latest Supreme Court Climate Case," NRDC Switchboard, switchboard.nrdc.org/blogs/ddoniger/carbon_copy_understanding_what.html. The Supreme Court denied petitions for certiorari on these questions in *Utility Air Regulatory Group v. EPA*, 134 S. Ct. 418 (Oct. 15, 2013), granting review only on a question relating to the Clean Air Act permitting provisions. The decision on the permitting question (expected by June 2014) will not affect the EPA's authority to set standards for power plants under Section 111 of the Act.

8 www2.epa.gov/sites/production/files/2013-09/documents/20130923statequestions.pdf.

9 See http://www.nrdc.org/air/pollution-standards/files/system-based-pollution-standards-IB.pdf, blogs.law.harvard.edu/environmentallawprogram/files/2013/03/The-Role-of-Energy-Efficiency-in-the-111d-Rule.pdf.

10 See D. Lashof and S. Yeh, Closing the Power Plant Carbon Pollution Loophole: Smart Ways the Clean Air Act Can Clean Up America's Biggest Climate Polluters, "Chapter 10: The Economic Benefits of Emission Reductions," pp. 30-32. Direct PM emission reductions are not modeled in this analysis.

11 The Future of U.S. Utility-Funded Energy Efficiency Programs: Projected Spending and Savings Through 2025, Lawrence Berkeley National Laboratory, January 2013.

12 Consortium for Energy Efficiency (CEE), www.cee1.org/annual-industry-reports.

13 The value of reducing carbon pollution is calculated in accordance with the Administrations' Social Cost of Carbon (SCC) of $43 (2012$) per short ton in 2020, reflecting the 3% discount rate case. For more details on the Administration's SCC, see its Technical Support Document, "Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866, available at: http://www.whitehouse.gov/sites/default/files/omb/assets/inforeg/technical-update-social-cost-of-carbon-for-regulator-impact-analysis.pdf. The $62 (2012$) per short ton SCC is based on an independent estimate using the 2% discount rate case. See L.Johnson and C.Hope, The Social Cost of Carbon in U.S. Regulatory Impact Analyses: an Introduction and Critique," *Journal of Environmental Studies and Sciences* (September 2012), available at: http://link.springer.com/article/10.1007%2Fs13412-012-0087-7.

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