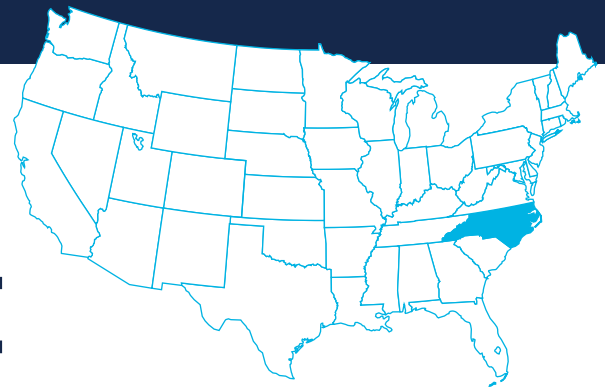




ISSUE BRIEF

NORTH CAROLINA'S CLEAN ENERGY FUTURE



Opportunities to Cut Carbon Pollution Under the Clean Power Plan

North Carolina has an opportunity to tap a new well of economic growth to provide new jobs, expand the economy, and help protect future generations from the worst impacts of a changing climate. That opportunity is clean energy, and a key way for North Carolina to realize more clean energy growth in the coming years is through the U.S. Environmental Protection Agency's Clean Power Plan. North Carolina can significantly reduce its contribution to carbon pollution by improving energy efficiency in homes and buildings and continuing to increase the amount of power it gets from renewable resources, like wind and solar. Although North Carolina already leads in solar installation and growth for the entire Southeast, there is significant room for further expansion.¹ Nationally, the state ranks fourth for total utility-scale installed solar capacity. While it had virtually no solar energy development in 2008, it now has 150 utility-scale solar facilities (573 MW), and another 377 facilities (3,034 MW) are planned.² The 450-plus solar companies in the state have brought in more than \$2 billion in direct investments and support more than 4,300 jobs.³ By continuing to expand its clean energy economy, North Carolina can create new clean energy jobs, protect people from the harmful health effects of air pollution, and save consumers money on their electric bills.

Climate change is a clear and present danger to North Carolinians' health and communities, bringing stronger storms, harsher droughts, and rising temperatures—most recently highlighted by findings that 2014 was, globally, the hottest year on record.⁴ The National Climate Assessment, a recent report from 13 federal agencies, warned that human-induced climate change impacts are being felt today, and worsening in every region of the United States.

Climate change is a threat to the state's economy and public safety. Sea level rise threatens North Carolina's coastal cities and tourism industry. In addition, increased

temperatures put the state's agricultural industry at risk: models predict that North Carolina agricultural profits will decline by 23 percent and livestock yields will decline 10 percent due to rising temperatures.⁵ The costs of climate change are rising as well. Climate-related disasters in 2012 alone cost American taxpayers more than \$100 billion.⁶ Of that total, North Carolinians paid an estimated \$2.4 billion in federal taxes, or \$1,100 per taxpayer.⁷

OVERVIEW OF THE EPA'S CLEAN POWER PLAN

For the sake of our children and generations to come, we have an obligation to reduce the dangerous carbon pollution that traps heat and fuels climate change. The nation's fossil-fuel power plants are the single biggest source of carbon pollution in the United States, accounting for nearly 40 percent of the total. Today we limit mercury, lead, and soot from these power plants, but not carbon pollution. That is changing. On June 2, 2014, the EPA proposed the Clean Power Plan, which sets the first-ever standards limiting carbon pollution. Nationwide, the plan would prevent around 550 million metric tons of carbon dioxide from entering the atmosphere by 2030, and would cut power sector pollution 30 percent below 2005 levels.⁸

Nationwide, the Clean Power Plan can usher in climate and health benefits worth an estimated \$55 billion to \$93 billion in the year 2030, according to an EPA analysis; that includes preventing 2,700 to 6,600 premature deaths. These benefits far outweigh the estimated national costs of \$7.3 billion to \$8.8 billion in the year 2030.⁹ Additionally, the EPA's proposed carbon pollution standards will stimulate investment that puts Americans to work making our homes and businesses more energy efficient. The agency estimates this projected increase in smarter energy use will shrink consumers' electricity bills by roughly 8 percent in 2030 nationwide.¹⁰

Energy efficiency investments reduce energy waste in homes and buildings, leading to smaller monthly electric bills while also cutting pollution. These investments create good-paying jobs as demand increases for manufacturers of efficient appliances, construction workers to build efficient homes and weatherize existing ones, and skilled technicians to do energy audits and install efficient technologies. In addition, as energy bill savings put more money into customers' pocketbooks, there is increased spending on other goods and services—and associated job creation—across the economy.

Putting carbon pollution limits on power plants also will give the United States leverage in the international community to attain strong commitments to reduce pollution from other countries around the world. Already, the Clean Power Plan proposal helped the United States reach a landmark agreement in November 2014 with China to reduce carbon pollution in both countries.

NORTH CAROLINA'S CARBON POLLUTION TARGET

Every state, North Carolina included, has the opportunity to craft its own best strategy to reduce pollution and protect our climate. The EPA is expected to finalize the Clean Power Plan in the summer of 2015, and the following year each state must submit an initial plan to meet its pollution target. Furthering investments in energy efficiency and renewable wind and solar power should be a fundamental part of North Carolina's strategy.

The Clean Power Plan proposal sets a state pollution reduction target by assessing four readily available methods (or "building blocks") for cutting pollution in each state. The target is expressed in intensity—pounds of carbon dioxide per megawatt-hour (MWh) of electricity produced—and North Carolina is being asked to reduce its pollution intensity 40 percent by 2030. The four building blocks the EPA used to establish state targets are: 1) making coal-fired power plants more efficient by increasing the amount of electricity they generate from each ton of coal burned; 2) using natural gas power plants more effectively by dispatching them before coal plants; 3) increasing renewable energy growth, based on a growth rate already being met in the region; and 4) increasing energy efficiency (cutting energy waste) in homes and buildings, thereby reducing the amount of energy that must be generated from fossil fuels to power them. While the carbon pollution targets are based on these building blocks, states can meet their obligations using any variety of policies and resource choices. The Clean Power Plan puts North Carolina in the driver's seat, with flexibility to design a plan based on its energy mix and to chart a low-carbon path forward.

LESS POLLUTION, MORE JOBS, LOWER ELECTRIC BILLS

Cutting carbon pollution will create benefits to consumers on their electric bills and will boost North Carolina's job growth. According to a Natural Resources Defense Council (NRDC) analysis, setting a standard to reduce more carbon pollution than the EPA's current proposal would still create jobs and reduce consumer energy bills.

If the state ramps up energy efficiency and renewable power to the higher but still relatively modest levels NRDC analyzed, **North Carolina would see the creation of 6,700 new jobs**, and the state's households and businesses would **save \$713 million on their electric bills** in 2020.^{11,12} Because of the benefits to electricity customers and to job growth, NRDC recommended during the public comment period that the EPA require more pollution reductions nationally than currently in the Clean Power Plan proposal

GRID RELIABILITY IN NORTH CAROLINA

In the 40 years since the passage of the Clean Air Act, our country has been able to dramatically reduce pollution while keeping the lights on and costs low. Grid operators like PJM, which operates portions of North Carolina's grid, routinely plan ahead to meet changing electricity needs. Smart grid planning, coupled with supply- and demand-side investments, will position grid operators to be able to fulfill electricity demand while states implement the Clean Power Plan. In recent years, billions of dollars have been invested in new transmission infrastructure to make sure electricity can be distributed wherever and whenever it is needed. Energy efficiency savings continue to temper demand, making it easier for utilities and grid operators to ensure adequate electricity supplies.

Moreover, since 2005, changes in the nation's power supply and in state policies have already resulted in a 15 percent reduction in carbon pollution from power plants.¹³ Increases in energy efficiency and renewable energy have displaced fossil generation, and lower-cost natural gas generation increasingly has displaced coal-fired power plants. The grid has easily accommodated these changes through management and planning. This bodes well for our ability to maintain electricity reliability while cutting carbon pollution under the Clean Power Plan.

In addition, renewable energy can actually *increase* reliability of the electric grid. Thanks to more precise weather forecasts and improved technologies, grid operators are increasingly able to predict renewable energy power output while maintaining reliability. Wind power can be used to help stabilize the grid with high-quality power.¹⁴ Unlike fossil and nuclear generation resources, which can have large, abrupt, and unpredictable changes in electricity output, changes in wind and solar generation tend to be gradual and predictable.¹⁵ This means that wind and solar need less backup generation than fossil fuels or nuclear sources.

In fact, increasing renewable energy output sevenfold (35,000 MW) in the PJM power region would increase the need for fast-acting backup electricity sources by only 1 percent of the added renewable energy capacity (340 MW).¹⁶ For comparison, the PJM region currently maintains 3,350 MW of expensive, fast-acting backup sources—enough to power 3.3 million homes—to ensure that it can keep the lights on in case a large fossil-fuel or nuclear power plant unexpectedly breaks down. Thanks to management, planning, and improvements in grid technologies, North Carolina can cut pollution, increase energy efficiency, and add renewable energy capacity while maintaining a strong and reliable electric grid.

THE ELECTRICITY SECTOR IN NORTH CAROLINA TODAY

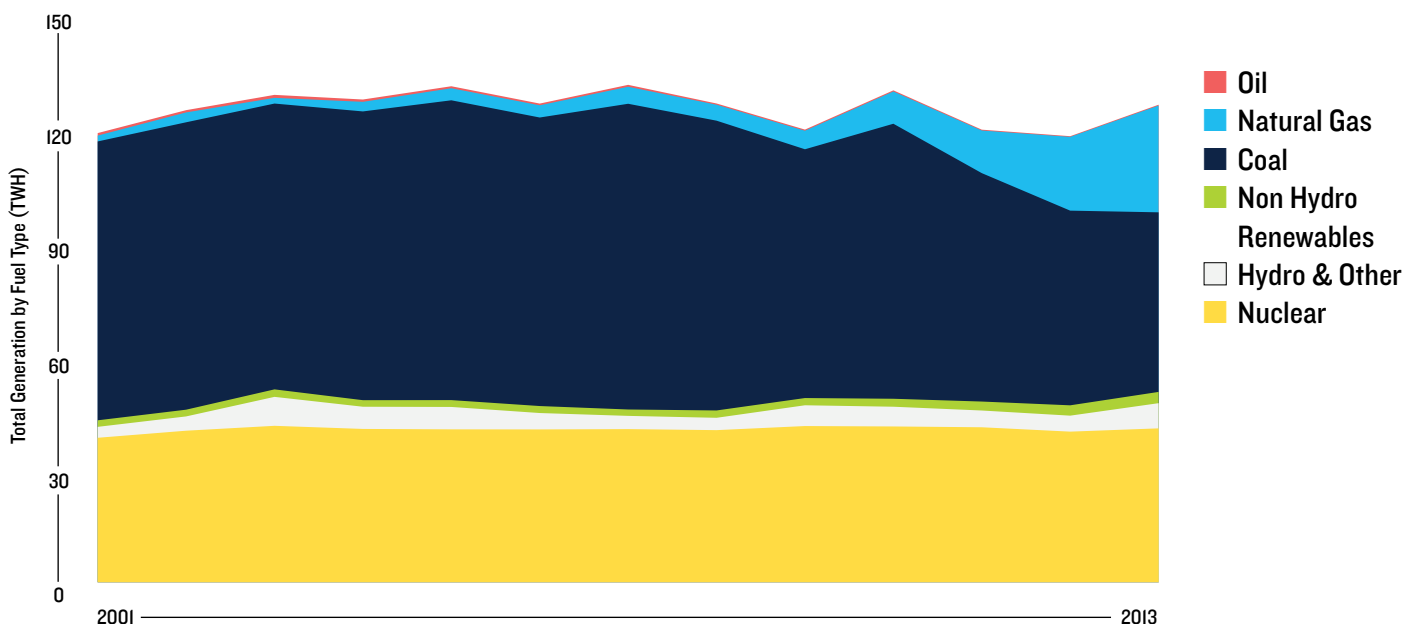
Figure 1, below, shows that in 2013 a significant portion of North Carolina’s electric power came from coal (38 percent). Nearly all the rest of the state’s energy was generated from natural gas (22 percent) and nuclear (32 percent).¹⁷ North Carolina has no active coal mines, so the state must import all of its coal, which represented a cost of \$1.9 billion in 2012 alone. While the amount spent on coal has decreased since 2008, this is still one of the highest coal expenses in the nation.¹⁸ Currently the state generates 2.4 percent of its power from non-hydro renewable sources.¹⁹ However, thanks to its significant solar and wind resources, North Carolina has the potential to vastly increase its renewable energy generation to meet EPA’s standards and keep more energy dollars within the state.

As shown in Figure 2, energy efficiency and renewable energy technologies are zero-carbon, low-cost options that can help meet the goals of the Clean Power Plan. In the

Southeast, energy efficiency is the lowest-cost resource, as electricity savings can be achieved at costs well below those of new generation, resulting in lower retail electricity bills for homes and businesses. Investments in energy efficiency could save North Carolina businesses \$350 million in 2020 alone.²⁰ Further, with technological advances and taller wind turbines that have improved performance, wind power has become competitive with new natural gas plants in many parts of the country.^{21, 22} Solar power also is becoming increasingly competitive, as a result of rapidly declining costs for solar panels, and most analysts expect that these costs will continue to decline over the next decade.²³ Additionally, a recent Deutsche Bank report predicts that solar power will be cheaper than average retail electricity prices in North Carolina by 2016, even without the 30 percent federal Investment Tax Credit.²⁴

North Carolina has taken steps to embrace clean energy as a tool to empower the state economy. The state is the only one in the Southeast to pass a Renewable Energy and Energy Efficiency Portfolio Standard (REPS), which requires investor-owned utilities to supply a percentage of the previous year’s retail sales from renewable energy or energy efficiency gains.²⁵ This percentage ramped up from 3 percent in 2012 to 6 percent in 2015 and will hit 12.5 percent in 2021. Energy efficiency measures can make up 25 percent of the gains through 2021 and then up to 40 percent after 2021.²⁶ Savings from energy efficiency programs were 0.55 percent of annual retail sales in 2013, which was the highest for the Southeast. However, there is still significant room for North Carolina to improve its energy efficiency programs. While the state leads in the region, it ranks 28th in the nation and is slightly below the average savings of 0.67 percent. As shown in Figure 3, other states have achieved significantly higher energy efficiency rates, and

FIGURE 1: NORTH CAROLINA'S ELECTRICITY GENERATION SOURCES (2001–2013)



Source: Energy Information Administration

FIGURE 2: COSTS OF ELECTRICITY GENERATION BY SOURCE (\$/MWH)

Energy efficiency is the cheapest of all energy resources. Wind and utility solar PV are competitive with new natural gas combined cycle plants.

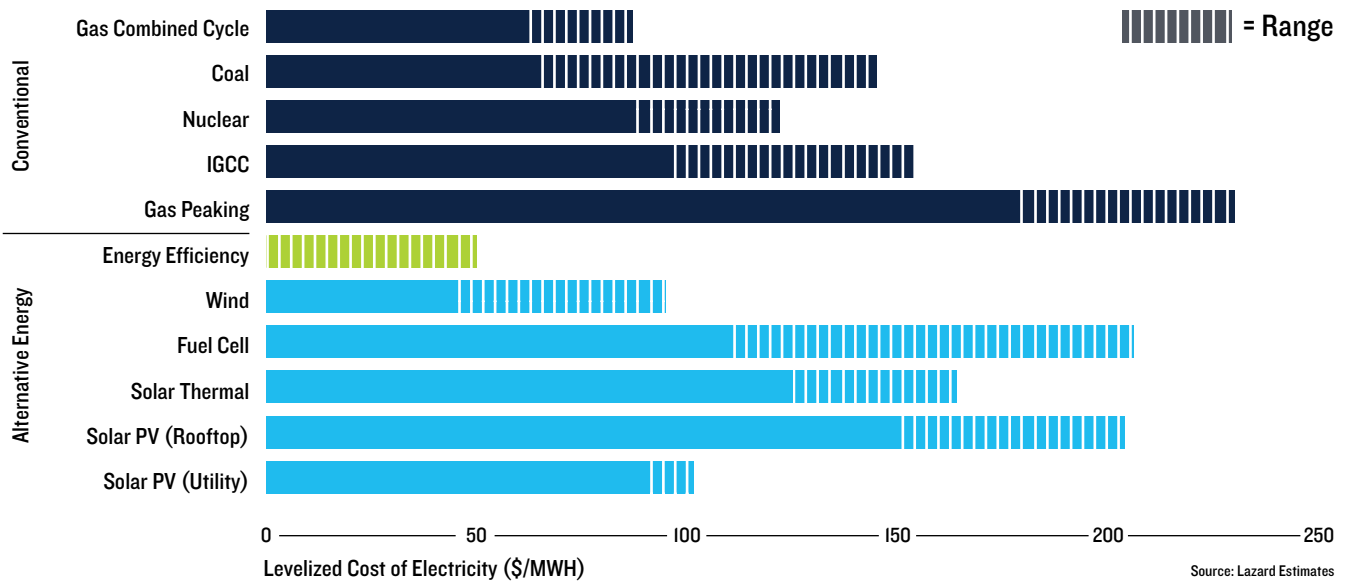
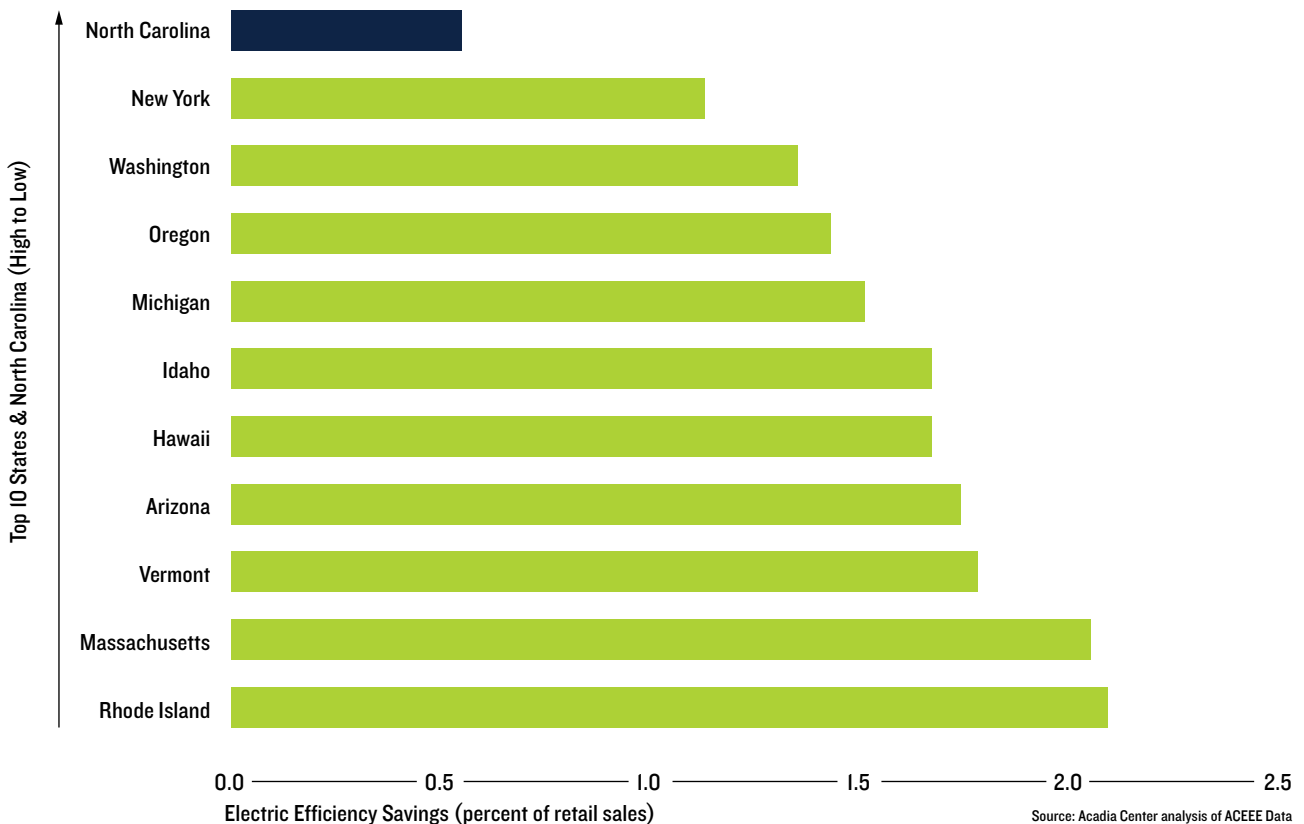


FIGURE 3: NORTH CAROLINA'S ENERGY EFFICIENCY

Comparison with the 10 states with the highest energy efficiency rates. North Carolina ranked 28th as of 2013.



North Carolina has the opportunity to take better advantage of this low-cost resource.

North Carolina's REPS has been an economic success. In the first six years of the program (2007–2012), the standard produced more than \$1.7 billion in economic benefits, created or retained 4,000 jobs and 21,162 job years, and generated \$1.4 billion in new investments.²⁷ In 2012, more than 10,000 new clean energy jobs were announced in the state, ranking North Carolina second in the nation.²⁸ More than 78,000 clean energy jobs now exist in North Carolina, with a median annual salary that is \$2,500 higher than when compared to all jobs in the state.²⁹ In addition, by 2026, the annual energy bill savings for homeowners and businesses will be greater than \$173 million from implementation of the REPS.³⁰ The Clean Power Plan provides the state with an opportunity to build on its success with the REPS and develop an even stronger and more vibrant clean energy economy in the state.

A CLEAN ENERGY FUTURE FOR NORTH CAROLINA

North Carolina is well positioned to meet its carbon pollution reduction target by increasing its commitment to energy efficiency and renewable energy. In fact, through retirements, fuel-switching to natural gas, and simply meeting its REPS, North Carolina can achieve the EPA's final 2030 target—by 2021. There are several coal plants that have been retired since 2012 or are slated for retirement in the next few years, to be replaced by lower-emitting natural gas power plants. Along with these changes, North Carolina can fully achieve its interim (2020–2029 average) target simply by meeting its own state goal for clean energy resources by 2021, as demonstrated in Figure 4. After accounting for existing nuclear and renewables, as shown in the “2012 adjusted emissions rate” in Figure 4, North Carolina's planned changes to its fossil fleet and its own renewable energy and energy efficiency goals get the state most of the way from its 2012 adjusted rate to its final 2030 target. In fact, if North Carolina were to increase the share of clean energy past 2021, the final year of NC REPS ramp up, the state would achieve the goals of the Clean Power Plan with plenty of time to spare.

More pollution-free resources like wind and solar would allow more flexibility for North Carolina's generation fleet under the state's pollution target, and would provide a buffer against potential fuel price volatility. **Investment in energy efficiency and renewable energy is the key to North Carolina's pollution reductions and its clean energy future.**

STATES CAN CHOOSE FROM A RANGE OF POLICY APPROACHES

A smart, effective, and forward-looking North Carolina plan can reduce market barriers that might otherwise hinder the development of clean energy. Table 1 shows the policy options available to states under the flexibility provided by the EPA's Clean Power Plan and offers recommendations for how states can achieve economic and environmental benefits as they cut carbon pollution.

The Clean Power Plan also provides states the option to pursue partnerships with other states to reduce carbon pollution. Regional approaches present a number of potential advantages over a single-state plan, such as consumer savings, reduced compliance costs, increased flexibility, and avoided electricity market distortions.

CONCLUSION

North Carolina's leaders have an opportunity to chart a clean energy future. Under the proposed Clean Power Plan, states have incredible flexibility to design their own best, most cost-effective plan to cut carbon pollution. North Carolina will be required to submit an initial state plan to the EPA in 2016 to demonstrate how it will reduce carbon emissions from its power plant fleet. Energy efficiency is the lowest-cost resource North Carolina can use to both cut carbon pollution and create thousands of new, homegrown jobs.

North Carolina's energy future rests in its hands. The Clean Power Plan presents the state with the opportunity to improve public health, foster new economic development, and help stabilize our climate.

FIGURE 4: ONE NORTH CAROLINA PATHWAY TO CUT CARBON POLLUTION

North Carolina can reach its interim target (1077 lbs CO₂/MWh) and achieve 90 percent of its final 2030 goal (992 lbs CO₂/MWh), simply by implementing already planned changes to its power plant fleet and achieving its clean energy goals.

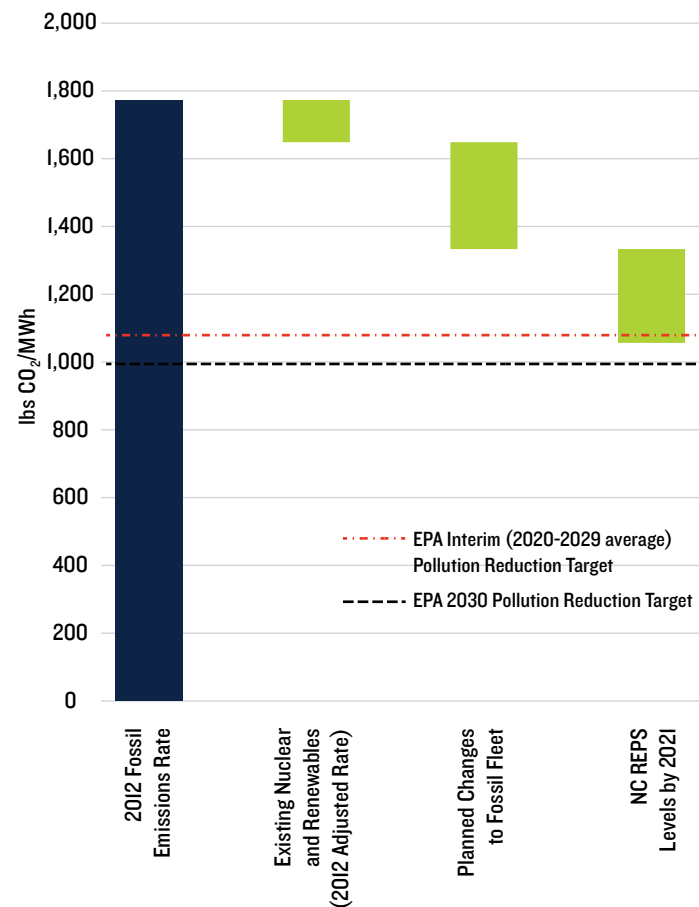


TABLE I. STATE POLICY OPTIONS FOR CLEAN POWER PLAN COMPLIANCE.

States have ample flexibility under the Clean Power Plan to choose the best method to reduce pollution.

	Flexible Intensity-based	Mass-based with Trading	Carbon Fee	Portfolio/Resource Standards
Environmental Goal, Units, & Outcome	State has emissions intensity goal in pollution per unit of electricity generated (lbs/MWh)	State has emissions limit in total, fixed amount (tons), regardless of amount of electricity generation	State establishes a carbon fee (\$/ton) at price estimated to deliver the emissions goal; price is fixed but emissions outcome is uncertain	State sets minimum requirements for efficiency and renewable resources at levels estimated to deliver the emissions goal
Market Structure & Trading	Fossil power plants that pollute above the intensity standard must buy credits from others that operate below the standard	State agency issues allowances (tons) equal to the emissions limit; allowances can be auctioned or allocated; fossil power plants have to hold an allowance for every ton of emissions	State agency estimates the carbon fee (\$/ton) needed to achieve the emissions goal; revenue could be returned to utility customers through rebates, energy efficiency investments, or other state goals	Eligible resources are identified (i.e., efficiency and renewables) and energy (MWh) is tracked using generator certificate tracking systems; the distribution utilities need enough certificates to show they are meeting the required standard
Electric System Reliability	All of these market-based approaches provide significant flexibility for plant operators, grid operators, and regulators to ensure that reliability requirements are met. If a plant is needed in the short term it can keep operating by buying allowances or credits or by paying a fee. A unit could be designated as “must-run” for reliability reasons until the reliability constraint is addressed, and other facilities would adjust their performance to accommodate the output from that plant.			
Regional Approaches:	<p>There are significant benefits associated with states pursuing consistent regional approaches to compliance. The primary benefits are:</p> <ol style="list-style-type: none"> 1) LOWER COST—A larger market should be more efficient and reduce costs 2) EQUAL TREATMENT—Generators, market participants, and consumers should face consistent market signals, costs and benefits 3) IMPROVED ENVIRONMENTAL OUTCOME—Regional approaches avoid different price signals across a market region and on either side of state boundaries. This would help avoid emissions leakage and higher national emissions than anticipated 4) REMOVE OR REDUCE RELIABILITY CONCERNS—A larger market and additional flexibility further reduces reliability concerns 			

ENDNOTES

- 1 Lukas Brun, Danny Hamrick, and Jack Daly, “The Solar Economy: Widespread Benefits for North Carolina,” Center on Globalization, Governance & Competitiveness, Duke University, February 15, 2015, www.cgge.duke.edu/pdfs/02152015Duke_CGGC_NCSolarEnergyReport.pdf.
- 2 Ibid.
- 3 Ibid.
- 4 NOAA National Climate Data Center, *State of the Climate: Global Analysis—Annual 2014*, December 2014, www.ncdc.noaa.gov/sotc/global/2014/13.
- 5 Kim Ross et. al, Center for Integrative Environmental Research, University of Maryland, *Economic Impacts of Climate Change on North Carolina*, September 2008, <http://cier.umd.edu/climateadaptation/North%20Carolina%20Economic%20Impacts%20of%20Climate%20Change%20Full%20Report.pdf>
- 6 Daniel Lashof and Andy Stevenson, “Who Pays for Climate Change? U.S. Taxpayers Outspend Private Insurers Three-to-One to Cover Climate Disruption Costs,” NRDC, May 2013, www.nrdc.org/globalwarming/files/taxpayer-climate-costs-IP.pdf.
- 7 Natural Resources Defense Council (hereinafter NRDC), “Carbon Pollution Standards Fact Sheet: North Carolina,” May 2014, www.nrdc.org/air/pollution-standards/files/cps-state-benefits-NC.pdf.
- 8 U.S. Environmental Protection Agency (hereinafter EPA), *Regulatory Impact Analysis for the Proposed Carbon Pollution Guidelines for Existing Power Plants and Emission Standards for Modified and Reconstructed Power Plants*, June 2, 2014, www2.epa.gov/sites/production/files/2014-06/documents/20140602ria-clean-power-plan.pdf.
- 9 EPA, “Fact Sheet: Clean Power Plan,” www2.epa.gov/carbon-pollution-standards/fact-sheet-clean-power-plan, accessed December 15, 2014.
- 10 EPA, “Fact Sheet: Clean Power Plan Overview,” www2.epa.gov/carbon-pollution-standards/fact-sheet-clean-power-plan-overview, accessed December 15, 2014.
- 11 In NRDC’s analysis, performed prior to the release of the Clean Power Plan, North Carolina’s 2020 and 2025 carbon pollution targets were 1,464 lbs/MWh and 1,185 lbs/MWh, respectively, whereas EPA’s proposed interim (2020–2029) average target is 1,077 lbs/MWh. However, the targets are not directly comparable; for example, in the NRDC analysis new sources were covered under the standard, whereas in the EPA’s proposal they are not covered. At the national level, NRDC’s proposed targets were more ambitious, resulting in a 36 percent reduction in CO₂ emissions below 2005 levels by 2020.
- 12 NRDC, “New Carbon Pollution Standards Can Save Households \$13 Billion on Electric Bills, Create 274,000 Jobs,” May 2014, www.nrdc.org/air/pollution-standards/state-benefits.asp.

- 13 U.S. Energy Information Administration (hereinafter EIA), “U.S. Energy-Related Carbon Dioxide Emissions, 2013,” October 2014, www.eia.gov/environment/emissions/carbon/.
- 14 National Renewable Energy Laboratory, “Variable Renewable Generation Can Provide Balancing Control to the Electric Power System,” NREL/FS-5500-57820, www.nrel.gov/docs/fy13osti/57820.pdf.
- 15 NRDC, “Power Grid Reliability Fact Sheet,” December 2014, www.nrdc.org/air/pollution-standards/files/power-grid-reliability-FS.pdf.
- 16 GE Energy Management, “PJM Renewable Integration Study: Final Project Review Revision 07,” presentation, stakeholder meeting, March 3, 2014, at 50, III, www.pjm.com/-/media/committees-groups/committees/mic/20140303/20140303-pjmpris-final-project-review.ashx.
- 17 EIA, “Net Generation by State by Type of Producer by Energy Source” (EIA-906, EIA-920, and EIA-923), www.eia.gov/electricity/data/state/.
- 18 Acadia Center analysis based on EIA fossil fuel spending data file
- 19 EIA, “Net Generation by State by Type of Producer by Energy Source.”
- 20 NRDC, “Carbon Pollution Standards Fact Sheet: North Carolina.”
- 21 Lawrence Berkeley National Laboratory, “2013 Wind Technologies Market Report,” August 2014, emp.lbl.gov/publications/2013-wind-technologies-market-report.
- 22 Herman K. Trabish, “Experts: The Cost Gap Between Renewables and Natural Gas ‘Is Closing,’” Greentech Media, May 6, 2014, www.greentechmedia.com/articles/read/The-Price-Gap-Is-Closing-Between-Renewables-and-Natural-Gas.
- 23 U.S. Department of Energy, “Photovoltaic System Pricing Trends: Historical, Recent, and Near-Term Projections,” Sunshot, October 2014, www.nrel.gov/docs/fy14osti/62558.pdf.
- 24 Deutsche Bank, “2014 Outlook: Let the Second Gold Rush Begin,” January 6, 2014, www.deutschebank.nl/nl/docs/Solar_-_2014_Outlook_Let_the_Second_Gold_Rush_Begin.pdf.
- 25 Database of State Incentives for Renewables & Efficiency, North Carolina: Renewable Energy and Energy Efficiency Portfolio Standard, last reviewed February 3, 2015, <http://programs.dsireusa.org/system/program/detail/2660>.
- 26 Ibid.
- 27 NRDC, “Carbon Pollution Standards Fact Sheet: North Carolina.”
- 28 Environmental Entrepreneurs, “The North Carolina Clean Energy Economy: A Closer Look,” cleanenergyworksforus.org/wp-content/uploads/2013/07/North-Carolina.pdf.
- 29 Brookings Institution and Battelle, “Sizing the Clean Economy: A National and Regional Green Jobs Assessment,” July 2011, www.brookings.edu/research/reports/2011/07/13-clean-economy; www.brookings.edu/~media/Series/Clean%20Economy/39.PDF.
- 30 Luis Martinez, “North Carolina Leads the Way in Clean Energy Jobs. Let’s Keep It That Way,” NRDC Switchboard, March 2013, switchboard.nrdc.org/blogs/lmartinez/north_carolina_leads_the_way_i.html.