

## ISSUE BRIEF

# OHIO'S PATHWAY TO CUTTING CARBON POLLUTION

The Clean Power Plan, finalized by the U.S. Environmental Protection Agency, is a game changer. It sets the first-ever limits on carbon pollution from power plants, the nation's largest source of the pollution that is driving dangerous climate change. We need to act now because we already are seeing its effects in extreme weather, deeper drought, and more wildfires. Analysis of the EPA standards shows that Ohio's energy efficiency and renewable energy policies are essential to cut harmful carbon pollution. By fully harnessing Ohio's clean energy policies that are already in place, Ohio can:

- Protect public health by reducing pollution and improving air quality
- Breathe life into the state's growing clean energy economy
- Achieve the Clean Power Plan carbon pollution limits and thereby address the biggest driver of climate change

The EPA's standards set a limit for power plant pollution in each state. The state carbon pollution limit is expressed in two ways: as a mass-based limit designating a maximum number of tons of carbon dioxide (CO<sub>2</sub>) that may be emitted by covered plants and allowing for some load growth over the years; and as a rate-based limit expressed as a number of pounds of CO<sub>2</sub> per megawatt-hour (MWh) of electricity generated from covered plants for each time period. The standards allow each state the flexibility to design its own cost-effective pathway toward a cleaner electricity system. Under a mass-based standard, Ohio would reduce its carbon pollution from all power plants from 102.2 million short tons in 2012 to less than 74.6 million short tons in 2030.<sup>1</sup> That is equivalent to avoiding carbon pollution from more than 5.2 million cars.<sup>2</sup> In limiting its pollution, Ohio will benefit from the expansion of its clean energy sources, adding jobs to its clean energy economy, which already employs 89,000 workers.<sup>3</sup> The actions that Ohio takes now will move it toward a healthier, economically productive, clean energy future.

## THE EPA'S CLEAN POWER PLAN PROMISES GREAT BENEFITS FOR OHIO AND THE NATION

The Clean Power Plan will reduce the nation's carbon pollution from fossil-fueled power plants 32 percent below 2005 levels by 2030.<sup>4</sup> These emission reductions will come

from a mix of coal plant improvements and retirements, increased dispatch of existing natural gas plants, and increased use of clean energy—both renewable sources and energy efficiency.

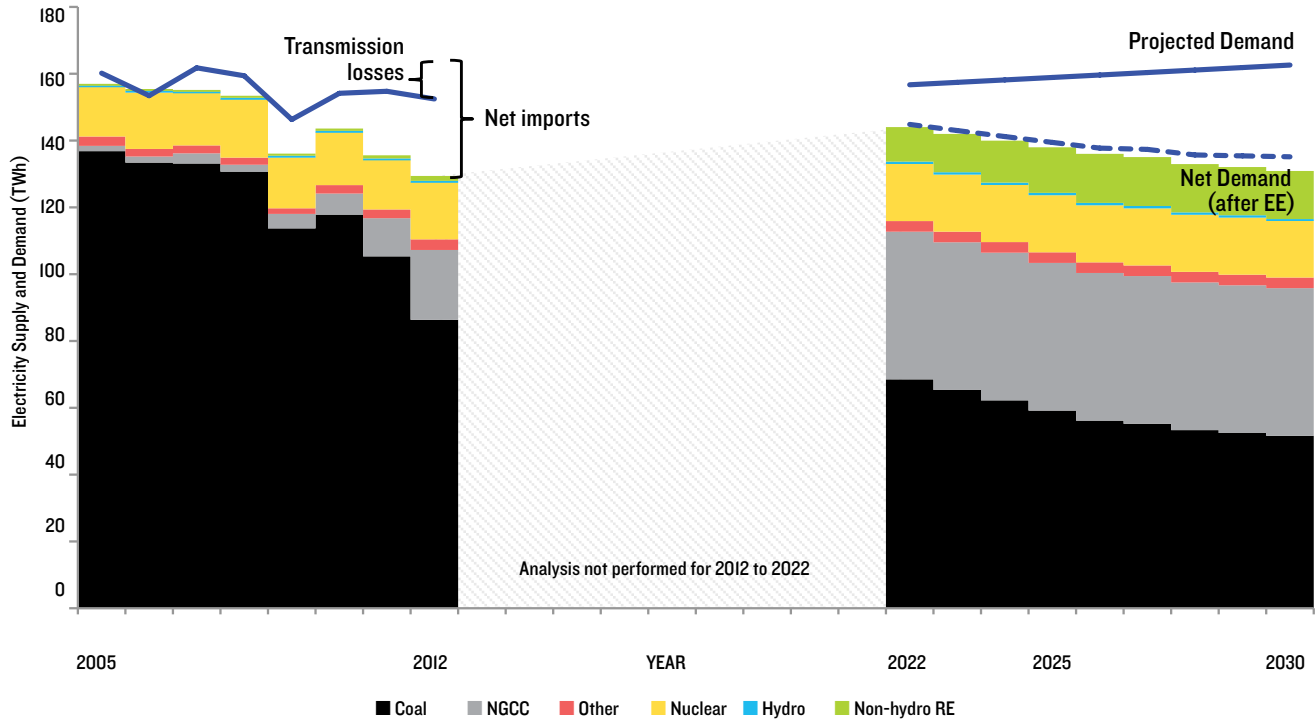
Investment in energy efficiency and renewable energy to cut carbon pollution will stimulate local economies across Ohio and create good-paying jobs. The Ohioans who already work in the clean energy sector receive an average annual salary that is \$3,500 higher than the median salary in Ohio.<sup>5</sup> In addition, a Pew study shows that Ohio attracted \$1.3 billion in private clean energy investment from 2009 to 2013 and predicts that the state would draw an additional \$3 billion over the next 10 years.<sup>6</sup> This new clean energy economy is a way to revive Ohio's manufacturing sector by creating a skilled labor force that can develop, install, and maintain wind and solar energy resources.

As we curb carbon pollution, Ohio and the nation also will reap major health and environmental benefits. Ohio is already experiencing health impacts from climate change, such as flooding and drinking-water contamination related to extreme rainfall events.<sup>7</sup> Rising temperatures also increase ground-level ozone smog, which makes it hard to get a lungful of air. A Harvard analysis shows that the health benefits from reducing particle pollution and smog from power plants could save 2,800 lives and prevent 760 hospitalizations in Ohio from 2020 to 2030.<sup>8</sup> By decreasing

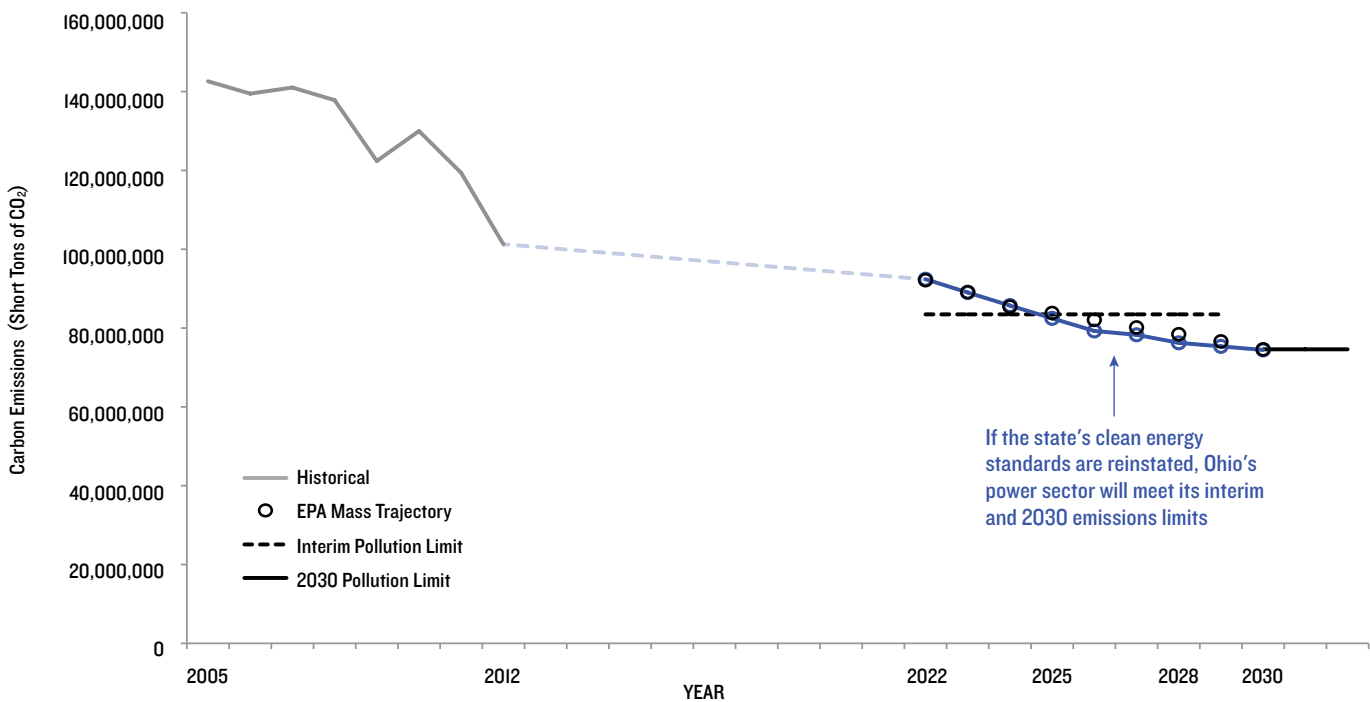
**FIGURE I: PATHWAY TO MEETING OHIO'S CARBON POLLUTION LIMITS<sup>15</sup>**

Figures IA and IB demonstrate that the state's power sector can meet its carbon emissions limits by reinstating its clean energy standards, along with other planned changes to its power sector.

**FIGURE IA: ELECTRICITY MIX, CLEAN ENERGY SCENARIO**



**FIGURE IB: CARBON EMISSIONS PROJECTIONS, CLEAN ENERGY SCENARIO**



the impacts of climate change and reducing the burden of health costs associated with power plant pollution, altogether the EPA standards will provide benefits of up to \$54 billion in 2030. That includes preventing up to 3,600 premature deaths, 1,700 heart attacks, 90,000 asthma attacks, and 300,000 missed work and school days.<sup>9</sup> These benefits far outweigh the estimated national compliance costs of \$8.4 billion in 2030. In addition, the EPA projects that the investments in clean energy spurred by the final rule will save the average household about \$85 a year on its energy bills in 2030.<sup>10</sup>

## POLLUTION LIMITS ARE READILY ACHIEVABLE

The EPA set carbon pollution limits for each state's power plants based on three pollution-reduction approaches, or "building blocks." However, these blocks are not prescriptive; they are simply the EPA's method for estimating achievable pollution cuts from power plants. The Clean Power Plan gives states ample flexibility to meet these standards in any way they choose. NRDC encourages Ohio to be creative and think "outside the blocks," drawing on resources like demand-side energy efficiency. Ohio can now decide on its own path to reduce carbon pollution from power plants in the state—a path that will determine the level of economic, environmental, and public health benefits for Ohio residents.

The adoption of a flexible, market-based framework in combination with complementary state clean energy policies will allow Ohio to cost-effectively meet its carbon pollution limit largely by expanding renewable wind and solar energy and improving the energy efficiency of its homes and businesses.

Ohio's clean energy standards are currently on a two-year hold that is expected to be lifted in 2017 or earlier.<sup>11</sup> By 2026, renewable energy will account for 12.5 percent of the state's electricity sales.<sup>12</sup> In addition, energy efficiency

programs will reduce waste by nearly 22 percent below business-as-usual levels for Ohio customers by 2027.<sup>13</sup> Some of the state's oldest coal plants, totaling over 6,500 MW of capacity, are already slated to be retired or converted to natural gas by the end of 2016.<sup>14</sup>

Along with these planned changes, Figure 1 shows that Ohio's power sector will meet its carbon pollution limits if the state ends the freeze on its clean energy standards on time (or earlier).<sup>15</sup>

## PRIMARY POLICY OPTIONS

States can pick from a number of policy approaches to reduce carbon pollution. The following are key conclusions from extensive analyses of state plan options under the Clean Power Plan.<sup>16</sup>

- Significant pollution reductions can be achieved at very low cost with energy efficiency and renewable energy. Energy efficiency is the most cost-effective option, and these clean energy investments have been found to reduce customers' energy bills.
- Because regional approaches that create larger trading markets significantly reduce costs, states across the country are exploring regional policy approaches and trading, from developing a regional plan to writing individual plans with common elements and trading across borders. Regional consistency also reduces market distortions and pollution "leakage" across state borders.
- The lowest-cost policy choice is a mass-based approach, as long as the allowance value or permit revenue is paid for by polluters and reinvested for customer benefit.

The best approaches are simple, tested, and low-cost. They have high environmental integrity and are easily interconnected across states and regions. A mass-based approach—paired with essential, complementary clean energy policies—would fulfill all these criteria.

## WHY ARE COMPLEMENTARY POLICIES IMPORTANT IN A MARKET-BASED FRAMEWORK?

As Ohio has demonstrated, clean energy policies can drive economic gain and reduce emissions. While these policies need not be explicitly included in a state plan to demonstrate enforceable limits on carbon emissions, they can complement a market-based compliance strategy to ensure the lowest-cost and most effective carbon pollution reductions.

Investment in energy efficiency and renewable energy can provide numerous benefits to customers, including lower wholesale prices, reduced energy bills, and less reliance on volatile fuel markets.<sup>17</sup> These investments can also lower the overall costs and maximize the benefits of a market-based emissions reduction program. A recent analysis of states participating in the Regional Greenhouse Gas Initiative (RGGI) found that net economic benefits and job creation were highest in states with the greatest levels of reinvestment in energy efficiency.<sup>18</sup>

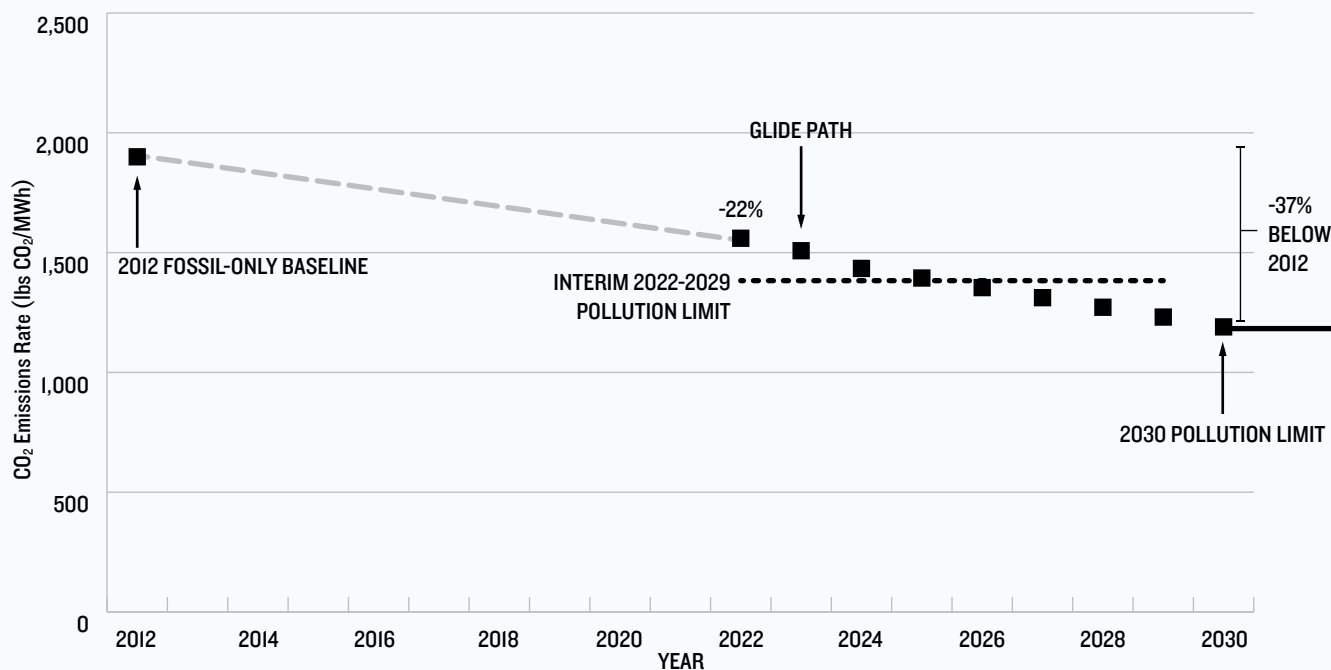
## WHAT IS THE CARBON POLLUTION LIMIT FOR POWER PLANTS IN OHIO?

After unprecedented stakeholder outreach and a review of millions of public comments, the EPA carefully reconsidered and revised its emissions limits to be more consistent nationally and to incorporate the interconnected nature of the electric grid. The EPA set separate, nationally uniform rates for coal and natural gas power plants, treating all plants equally. Ohio's rate-based limit is based on the share of each of those resources within the state. The final (2030) rate-based emissions limit for power plants in Ohio is 1,190 pounds of carbon dioxide per MWh generated. The EPA has also converted rate-based emissions limits into mass-based emissions limits, and NRDC has analyzed compliance with Ohio's mass-based limit (covering existing and new sources) in Figure I on page 2.

Table I: Carbon Pollution Limits for Ohio's Power Plants

Period	Rate-based limit (lbs CO <sub>2</sub> /MWh)	Mass-Based Limit, All sources (short tons)
Baseline (2012)	1,900	102,239,220
Interim Period 2022-2029	1,383	83,476,510
2030 & Beyond Target	1,190	74,607,975

FIGURE 2: CARBON POLLUTION LIMITS FOR OHIO'S POWER PLANTS



## INCENTIVES FOR EARLY INVESTMENTS IN RENEWABLES AND ENERGY EFFICIENCY

Early investments in renewables and energy efficiency can help states comply in two ways. First, in a rate-based policy approach, a power plant can purchase credits from energy efficiency, wind, solar, and other renewable energy projects developed after 2012 and still generating electricity in 2022 and beyond. In a mass-based approach, non-emitting energy efficiency and renewable energy will also contribute to meeting the emissions goal and reduce costs.

In addition, the final Clean Power Plan creates the voluntary Clean Energy Incentive Program (CEIP). The CEIP is designed to recognize emissions reductions that occur before the compliance period begins in 2022. It will allow states to give bonus allowances or credits—which have monetary value—to qualifying renewable electricity generation and energy efficiency investments in low-income communities in 2020 and 2021. Renewable energy and energy efficiency projects are eligible if they are initiated after the state submits its complete state plan—creating an incentive for states to complete their plans early.

## NEXT STEPS FOR OHIO

While states have flexibility to decide on any pollution reduction pathway, some approaches will result in more benefits for the environment, the economy, and electricity customers. Table 2 outlines key decision steps for Ohio to consider as the state designs a plan to meet the carbon pollution limits for its power plants.

These policy options work with many available cost-effective programs that deliver clean energy benefits and keep electricity affordable for everyone, including low-income communities.<sup>18</sup> Prioritizing investment in energy efficiency and renewable energy will keep costs down and avoid overutilizing natural gas.

As Ohio considers the full range of options to reduce carbon pollution from power plants operating in the state, an open and transparent process is essential to crafting a strong state plan that meets all of Ohio’s goals. Robust engagement with the full range of interested stakeholders will ensure that Ohio chooses the best path forward.

Ohio is already well on the way to achieving the Clean Power Plan pollution limits. By reinstating existing clean energy policies that have already reaped more than \$1 billion in savings for the state, Ohio stands to maximize the economic, climate, and health benefits for its citizens.<sup>20</sup> If Ohio takes this opportunity to craft a smart plan, the Clean Power Plan can be achievable and cost-effective and make the electricity system more resilient.

**Table 2: Three key decision steps for developing a state plan**

Decision Steps	Description	
<b>Choose a rate-based or mass-based approach</b>	<b>Option 1: Rate-based, Blended Rate</b> Each generator must meet the state-wide emissions limit in pollution per unit of electricity generated (lbs CO <sub>2</sub> /MWh). Fossil power plants that pollute above the intensity standard must buy credits from generators or efficiency providers that operate below the standard.	<b>Option 3: Mass-based, Existing Sources Only</b> The state has a total emissions limit (tons CO <sub>2</sub> ) that is a fixed amount. The state limit includes some amount of load growth above 2012 levels. Existing power plants have to hold an allowance, issued by a state agency, for every ton of CO <sub>2</sub> emitted. These allowances could be auctioned, with the value returned to customers or used to expand complementary programs.
	<b>Option 2: Rate-based, Dual Rate</b> Each generator must meet applicable emissions rate limit (steam or NGCC) in pollution per unit of electricity generated (lbs CO <sub>2</sub> /MWh). Fossil steam units that pollute above the steam rate must buy credits from new non-emitting resources (including efficiency) or incremental NGCC generation (above 2012 levels). NGCC units can only purchase credits from new non-emitting resources (including efficiency).	<b>Option 4: Mass-based, All Sources (Existing and New)</b> A state may choose to include new power plants in the mass-based standard, which has the advantage of treating all power plants the same in electric power markets, regardless of when they were built. Under this approach, the limit is adjusted upwards to account for the emissions of new power plants meeting any load growth that was not already covered in the limit for existing sources, above.
<b>Opt for an individual state plan or a plan linked with other states</b>	<p>The state can submit its own individual plan or coordinate with neighboring states on common policy approaches. Regional approaches include both formal multistate plans and agreements to link, such as adopting common elements to facilitate trading. Linkage and trading are likely to be much easier under a mass-based approach. Benefits of regional coordination include:</p> <ul style="list-style-type: none"> <li>• LOWER COST—A larger market is more efficient and reduces costs.</li> <li>• IMPROVED ENVIRONMENTAL OUTCOME—Regional approaches avoid different price signals across state boundaries, which also helps avoid emissions leakage and higher-than-anticipated national emissions.</li> <li>• STRONGER ELECTRIC GRID—A larger market and additional flexibility reduce concerns about electric grid reliability.</li> <li>• EQUAL TREATMENT—Generators, market participants, and customers face more consistent market signals, costs, and benefits.</li> </ul>	
<b>Formulate state plan details and complementary policies</b>	<ul style="list-style-type: none"> <li>• In a mass-based approach, the state has to decide how to distribute allowances and either return the value to customers or give away the value to emitters. If pollution allowances are auctioned to emitters, the state will generate revenue that can be reinvested to reduce customers’ electricity bills through energy efficiency investments, rebates, or other state programs.</li> <li>• Complementary measures like clean energy standards and improved utility rate designs can also help address market barriers to investment.</li> <li>• Complementary policies can also address important equity issues for workers in transition, people of color, low-income communities, and others. Complementary policies may include worker retraining, investments in energy efficiency, and direct bill assistance.</li> </ul>	

## ENDNOTES

- 1 U.S. Environmental Protection Agency (EPA), *Fact Sheet: Overview of the Clean Power Plan*, August 2015, [www.epa.gov/airquality/cpp/fs-cpp-overview.pdf](http://www.epa.gov/airquality/cpp/fs-cpp-overview.pdf).
- 2 The average passenger vehicle emits 5.24 short tons of CO<sub>2</sub> per year. See U.S. Environmental Protection Agency, Greenhouse Gas Equivalencies Calculator, <http://www.epa.gov/cleanenergy/energy-resources/calculator.html>.
- 3 Environmental Entrepreneurs, *Clean Jobs Ohio*, May 2015, [www.e2.org/ext/doc/CleanJobsOhio\\_FINAL\\_HiRes.pdf](http://www.e2.org/ext/doc/CleanJobsOhio_FINAL_HiRes.pdf).
- 4 U.S. Environmental Protection Agency (EPA), *Fact Sheet: Overview of the Clean Power Plan*, August 2015, [www.epa.gov/airquality/cpp/fs-cpp-overview.pdf](http://www.epa.gov/airquality/cpp/fs-cpp-overview.pdf).
- 5 Environmental Entrepreneurs, “Clean Energy Works for Ohio,” July 2014, <http://cleanenergyworksforus.org/wp-content/uploads/2014/07/Ohio-Fact-Sheet-Web.pdf>.
- 6 The Pew Charitable Trusts, “Clean Energy Spurs Investment in Ohio: Policy Uncertainty Clouds Industry’s Future,” January 13, 2015, [www.pewtrusts.org/en/about/newsroom/news/2015/01/13/clean-energy-spurs-investment-in-ohio](http://www.pewtrusts.org/en/about/newsroom/news/2015/01/13/clean-energy-spurs-investment-in-ohio).
- 7 Ohio State University, “Climate Change Brings Mostly Bad News for Ohio: Big Algae Bloom in Lake Erie, Very Dry 2015 Forecast,” *Science Daily*, May 20, 2014, [www.sciencedaily.com/releases/2014/05/140520120135.htm](http://www.sciencedaily.com/releases/2014/05/140520120135.htm).
- 8 Joel Schwartz et al., *Health Co-benefits of Carbon Standards for Existing Power Plants*, Harvard School of Public Health, Syracuse University, Boston University, 2014, [www.chgharvard.org/resource/health-co-benefits-carbon-standards-existing-power-plants](http://www.chgharvard.org/resource/health-co-benefits-carbon-standards-existing-power-plants).
- 9 U.S. Environmental Protection Agency (EPA), *Fact Sheet: Overview of the Clean Power Plan*, August 2015, [www.epa.gov/airquality/cpp/fs-cpp-overview.pdf](http://www.epa.gov/airquality/cpp/fs-cpp-overview.pdf).
- 10 Ibid.
- 11 See Ohio Senate Bill 310, [http://archives.legislature.state.oh.us/BillText130/130\\_SB\\_310\\_EN\\_N.pdf](http://archives.legislature.state.oh.us/BillText130/130_SB_310_EN_N.pdf). SB 310 freezes Ohio’s energy efficiency and renewables requirements for 2015 and 2016 and reinstates them by 2017 in the event no further action is taken.
- 12 Established by Ohio Senate Bill 221 (Schuler by Request, 127-GA), [http://archives.legislature.state.oh.us/bills.cfm?ID=127\\_SB\\_221](http://archives.legislature.state.oh.us/bills.cfm?ID=127_SB_221); see also Database for State Incentives & Renewable Energy, “Ohio: Alternative Energy Portfolio Standard,” last updated July 24, 2014, [programs.dsireusa.org/system/program/detail/2934](http://programs.dsireusa.org/system/program/detail/2934). The original energy efficiency standard ran through 2025, and the renewable standard ran through 2024. SB 310 extended these dates by two years.
- 13 Ibid.
- 14 The retirement list for Ohio compiled by the consulting group MJ Bradley & Associates includes the following coal units (6,518 MW total): Walter C Beckjord 1-6; Miami Fort 6; First energy Ashtabula 5; Avon Lake 7 and 9; First Energy Eastlake 1-5; FirstEnergy Lakeshore 18; Conesville 3; Picway 5; O H Hutchings 1-6; Niles 1 and 2; FirstEnergy R E Burger 3; Muskingum River 1-5; FirstEnergy Bay Shore 2-4.
- 15 The Natural Resources Defense Council has analyzed Ohio’s emissions reductions trajectory using the Clean Power Plan compliance tool developed by MJ Bradley & Associates. This tool, designed to perform a simple resource analysis for each state, is available at [www.mjbradley.com/about-us/case-studies/clean-power-plan-evaluation-tools](http://www.mjbradley.com/about-us/case-studies/clean-power-plan-evaluation-tools). Note: The emissions projection in Figure 1B corresponds to the “Achieved” line in the tool under the assumptions outlined. In this analysis, Ohio’s clean energy standards are reinstated in 2017, and clean energy displaces in-state fossil generation at a rate of 91% coal, 9% natural gas. This would correspond to a scenario in which a carbon policy drives higher displacement of coal than natural gas in order to meet the emissions limits. This scenario also assumes that all proposed new natural gas capacity comes online, although not all of this is necessarily likely to be built, in which case there would be a different pathway to compliance. This assumption can be adjusted in the Interconnection Queue feature of the tool. Other assumptions: new NGCCs run at a capacity factor of 55%; new power plants are covered by the emissions limits.
- 16 PJM Interconnection, *PJM Interconnection Economic Analysis of EPA Clean Power Plan Proposal*, March 2015. Nicholas Institute, Duke University, *Assessing Impacts of the Clean Power Plan on Southeast States*, May 2015. Nicholas Institute, Duke University, *Enhancing Compliance Flexibility Under the Clean Power Plan: A Common Elements Approach to Capturing Low-Cost Emissions Reductions*, March 2015. Center for Climate and Energy Solutions, *Modeling EPA’s Clean Power Plan: Insights for Cost-Effective Implementation*, May 2015. Bipartisan Policy Center, *Insights from Modeling the Proposed Clean Power Plan*, April 2015. Analysis Group, *EPA’s Clean Power Plan: States’ Tools for Reducing Costs and Increasing Benefits to Consumers*, July 2014. Analysis Group, *The Economic Impacts of the Regional Greenhouse Gas Initiative on Nine Northeast and Mid-Atlantic States*, July 2015.
- 17 Lawrence Berkeley National Laboratory, *A Survey of State-Level Cost and Benefit Estimates of Renewable Portfolio Standards*, 2014. Union of Concerned Scientists, *How Renewable Electricity Standards Deliver Economic Benefits*, May 2013, [www.ucsusa.org/sites/default/files/legacy/assets/documents/clean\\_energy/Renewable-Electricity-Standards-Deliver-Economic-Benefits.pdf](http://www.ucsusa.org/sites/default/files/legacy/assets/documents/clean_energy/Renewable-Electricity-Standards-Deliver-Economic-Benefits.pdf). Regulatory Assistance Project, “Recognizing the Full Value of Energy Efficiency,” October 2013, <http://www.raponline.org/event/recognizing-the-full-value-of-efficiency-theres-more-layers-in-the-layer-cake-than-many-account>.
- 18 Analysis Group, *The Economic Impacts of the Regional Greenhouse Gas Initiative on Nine Northeast and Mid-Atlantic States*, July 2015, [http://www.analysisgroup.com/uploadedfiles/content/insights/publishing/analysis\\_group\\_rggi\\_report\\_july\\_2015.pdf](http://www.analysisgroup.com/uploadedfiles/content/insights/publishing/analysis_group_rggi_report_july_2015.pdf).
- 19 Natural Resources Defense Council, *Bridging the Clean Energy Divide: Affordable Clean Energy Solutions for Today and Tomorrow*, April 2015, [www.nrdc.org/energy/files/clean-energy-benefits-vulnerable-comms-report.pdf](http://www.nrdc.org/energy/files/clean-energy-benefits-vulnerable-comms-report.pdf).
- 20 Utility self-reported energy efficiency data for program years 2009–2014, derived from annual status reports. Public Utilities Commission of Ohio, Docketing Information System, [dis.puc.state.oh.us/](http://dis.puc.state.oh.us/) (accessed June 1, 2015).