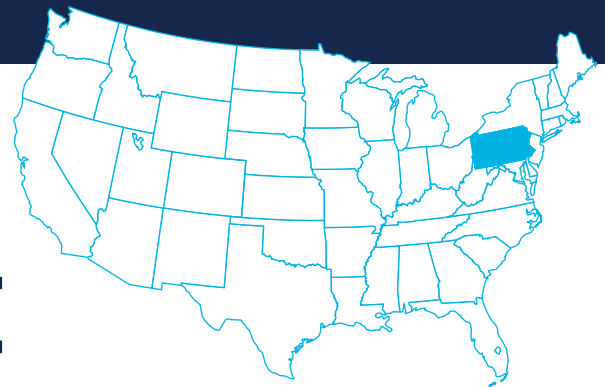




ISSUE BRIEF

PENNSYLVANIA'S CLEAN ENERGY FUTURE



Opportunities to Cut Carbon Pollution Under the Clean Power Plan

Pennsylvania has an opportunity to tap a well of economic growth that could 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 one way for Pennsylvania to realize clean energy growth is through the U.S. Environmental Protection Agency's Clean Power Plan. Pennsylvania can cut a significant amount of carbon pollution by improving energy efficiency in homes and buildings and by increasing the amount of power it gets from renewable sources like the wind and sun. These investments will create new clean energy jobs, protect people from the harmful health effects of air pollution, and save them money on their electric bills.

Climate change is a clear and present danger to Pennsylvanians' health and communities, bringing stronger storms, harsher droughts, and rising temperatures—a point brought home by recent findings that globally, 2014 was the hottest year on record.¹ The National Climate Assessment, a recent report from 13 federal agencies, warned that impacts of human-induced climate change are being felt today, and worsening in every region of the United States.

Climate change experts predict that extreme-heat days will be two to three times more common in Pennsylvania by the 2020s. In 2014, temperatures exceeded 90 °F on only 16 days in Philadelphia.² By 2084, the city could experience temperatures over 90 °F more than 80 days a year.³ Children, the elderly, and the poor are most vulnerable to climate change impacts, including health problems related to heat stress, bad air quality, and extreme weather events.⁴ The costs of climate change are rising as well. Climate-related disasters in 2012 cost American taxpayers more than \$100 billion.⁵ Pennsylvanians paid an estimated \$4.1 billion, or \$1,079 per taxpayer, in federal taxes to recover from extreme weather events in 2012.⁶

OVERVIEW OF THE 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 is fueling climate change. The single biggest source of carbon pollution in the United States is the nation's fossil-fuel power plants; they account 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. The plan, when in place, would prevent about 550 million metric tons of carbon dioxide, nationwide, from entering the atmosphere by 2030 and would cut power sector pollution 30 percent below 2005 levels.⁷

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 2030.⁸ Additionally, the EPA's proposed carbon pollution standards will stimulate investment putting Americans to work making our homes and businesses more energy efficient. The agency estimates this projected increase in energy efficiency will shrink consumers' electricity bills by roughly 8 percent in 2030 nationwide.⁹

Putting carbon pollution limits on power plants also will give the United States leverage in the international community to elicit strong commitments from other nations to reduce pollution. 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.

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, these energy bill savings put more money into consumers' pocketbooks, leading to increased spending on other goods and services—and associated job creation—across the economy.

PENNSYLVANIA'S CARBON POLLUTION TARGET

Every state, Pennsylvania 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 reduction target. Investing in energy efficiency and renewable wind and solar power should be a fundamental part of Pennsylvania's strategy.

The Clean Power Plan proposal sets a pollution reduction target for each state by assessing four readily available methods (or "building blocks") for cutting pollution in that state. The target is expressed in intensity—pounds of carbon dioxide per megawatt-hour (MWh) of electricity produced—and Pennsylvania is being asked to reduce its pollution intensity 31 percent by 2030. The four building blocks the EPA has assessed 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 (reducing energy waste) in homes and buildings.

While the carbon pollution targets are based on these building blocks, states can meet their obligations in any way they choose. The Clean Power Plan puts Pennsylvania in the driver's seat, with flexibility to design a plan based on our energy mix and our unique position as one of the largest net exporters of electricity in the nation.¹⁰

LESS POLLUTION, MORE JOBS, LOWER ELECTRIC BILLS

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.

With a stronger standard than EPA's proposal, made possible by ramping up energy efficiency and renewable power, the NRDC analysis found that **Pennsylvania would see the creation of 5,100 new jobs**, while the state's households and businesses would **save \$456 million on their electric bills** in 2020.^{11, 12} Because of the benefits to electricity consumers and the impact on job growth, NRDC recommended during the public comment period that the EPA require more pollution reductions nationally than the Clean Power Plan currently proposes, particularly for states with proposed targets less stringent than Pennsylvania's.

GRID RELIABILITY IN PENNSYLVANIA

For 40 years, our country has been able to dramatically reduce pollution under the Clean Air Act while keeping the lights on and costs low. Grid operators like PJM, which operates the grid that includes Pennsylvania along with eleven other states and Washington D.C., 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 continues to temper demand, which makes it easier for producers and grid operators to ensure adequate electricity supplies.

Moreover, since 2005, changes in the nation's power supply and shifts in state policies have already resulted in a 15 percent reduction in carbon pollution from power plants. Increases in energy efficiency and renewable energy have displaced fossil generation, and lower-cost natural gas plants have increasingly displaced coal-fired power plants. The grid has easily accommodated these changes through management and planning.¹³ This bodes well for our ability to maintain electricity reliability as we cut 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. Wind power can be used to help stabilize the grid with high-quality power.¹⁴ Unlike fossil fuel and nuclear power sources, 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 fuel or nuclear sources. In fact, increasing renewable energy output sevenfold (35,000 MW) in the PJM power region would increase the needed amount of fast-acting backup electricity by only 340 MW, less than 1 percent of the added capacity.¹⁶ For comparison, PJM 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 if a large fossil-fuel or nuclear power plant unexpectedly breaks down. Thanks to management, planning, and better grid technologies, Pennsylvania can cut pollution, increase energy efficiency, and add renewable energy capacity while maintaining a strong and reliable electric grid.

THE ELECTRICITY SECTOR IN PENNSYLVANIA TODAY

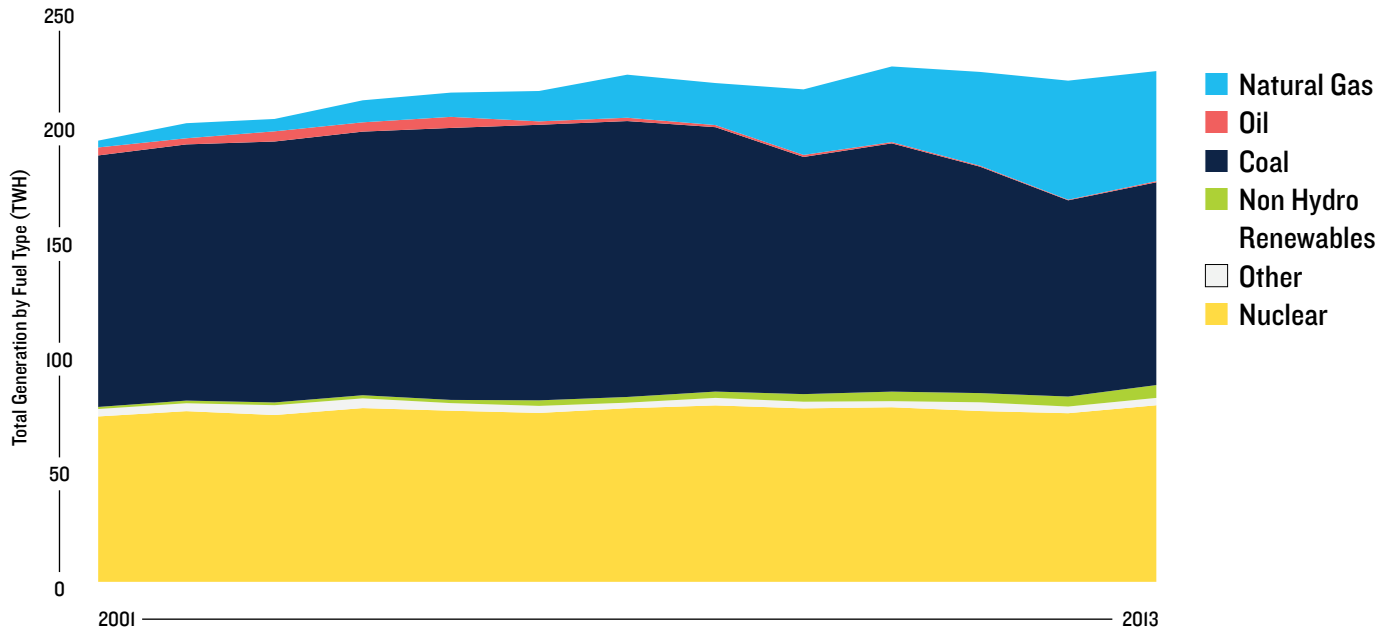
Figure 1, below, shows that in 2012 Pennsylvania's electricity came mainly from coal (39 percent) and nuclear power (34 percent), though natural gas has become a significant power source over the past decade (24 percent).¹⁷ Non-hydro renewables currently make up only a small fraction of the state's generation (2 percent).

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 Northeast, energy efficiency is the lowest-cost resource. Pennsylvania already has more than 118,000 clean energy jobs, many from energy efficiency, a sector set to expand with further investment in clean energy.¹⁸ An independent evaluator showed that Pennsylvania could capture an additional 27 percent reduction in energy use over the next 10 years by expanding energy efficiency.¹⁹

Renewable energy investments and installations have led to a burgeoning clean energy economy in the state. Pennsylvania's wind power capacity is currently 1,340

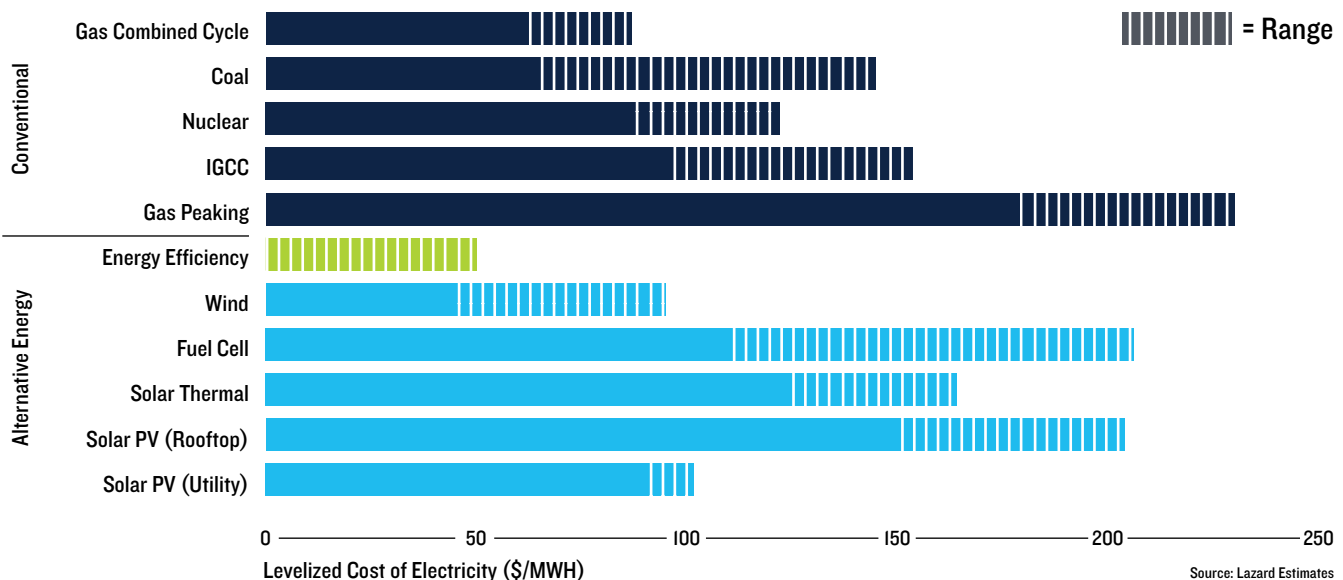
FIGURE I. PENNSYLVANIA'S ELECTRICITY GENERATION SOURCES (2001-2013)



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.



Source: Lazard Estimates

MW—enough to power more than 1.3 million homes—which places the state 15th in the nation for total installed wind power capacity.²⁰ These wind installations have brought in more than \$2.7 billion in capital investments while supporting 1,000 to 2,000 wind-related jobs, and have created an additional \$3.6 million annually through lease payments.²¹ In addition, the solar industry invested more than \$144 million within the state in 2013 alone.²² Renewable energy continues to become more cost-competitive with conventional energy sources. A recent Deutsche Bank report predicted that solar power will be cheaper than average retail electricity prices in Pennsylvania by 2016.²³ 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.^{24,25} 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.²⁶

To help reduce its need for fossil-fueled power, Pennsylvania already has a relatively modest but promising statutory energy efficiency standard in Act 129, under which the state’s electric utilities such as PPL, Duquesne, FirstEnergy, and PECO are running programs to cut energy waste in homes and businesses.²⁷ In six years, these initiatives at PPL and PECO have saved customers a total of \$750 million.²⁸ In 2013, the utilities’ programs resulted in annual energy savings of 0.97 percent of retail sales, placing

Pennsylvania 16th among the states in energy savings (see Figure 3).²⁹ The same year, Pennsylvania’s West Penn Power Company achieved the fifth-highest energy efficiency savings of all investor-owned utilities in the nation, with 1.95 percent annual savings for 2013.³⁰ Pennsylvania could save customers even more on their electric bills by increasing efficiency savings to 2 percent per year by 2020. The state also has an alternative energy standard (AEPS) to meet 18 percent of its electricity demand from alternative energy by 2021.³¹ The state can build on this progress as it shapes its carbon pollution plan.

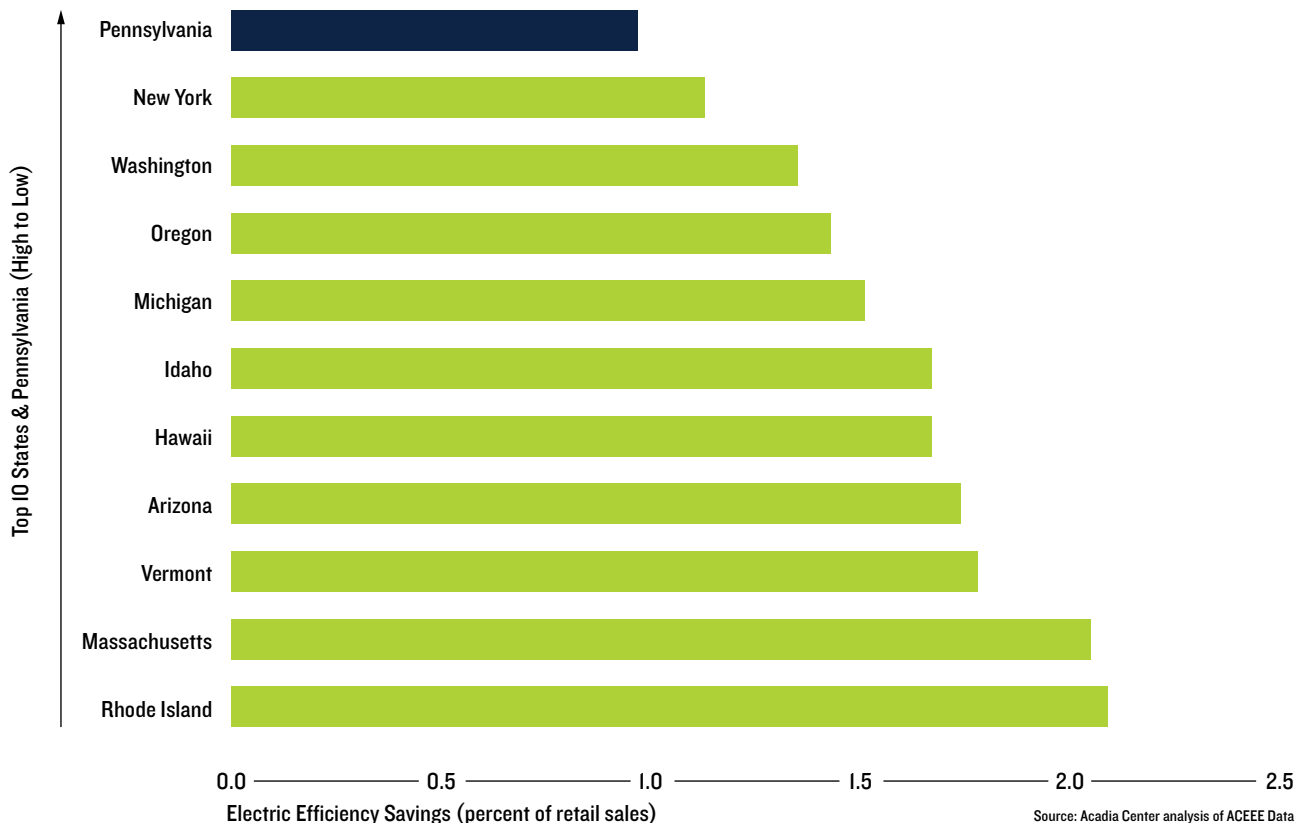
A CLEAN ENERGY FUTURE FOR PENNSYLVANIA

Pennsylvania is well positioned to meet its Clean Power Plan pollution target. Due to a number of regulatory and market factors reshaping the power sector, power companies in the state have, since 2012, retired (or announced plans to retire) nearly 5,000 MW of older, inefficient fossil fuel-fired generation; plans also exist to convert roughly 1,500 MW of coal generation to cleaner-burning natural gas. For context, PJM has already retired 20,000 MW over the past decade, due to economics, without reliability issues. Many of the planned changes have already been approved by the Pennsylvania Public Utilities Commission and will help Pennsylvania meet its state emissions target.

Pennsylvania has the potential to increase its commitment to energy efficiency and renewable energy development. More pollution-free resources like wind and solar would allow more flexibility for Pennsylvania’s

FIGURE 3. PENNSYLVANIA’S ENERGY EFFICIENCY

Comparison to the 10 states with the highest energy efficiency rates. Pennsylvania ranked 16th as of 2013.



generation fleet under the state’s pollution target and would provide a buffer against potential fuel price volatility. Pennsylvania could also take advantage of strong wind resources in neighboring states. Investment in energy efficiency and renewable energy is the key to Pennsylvania’s pollution reductions and clean energy future.

STATES CAN CHOOSE FROM A RANGE OF POLICY APPROACHES

A smart, effective, and forward-looking Pennsylvania plan can reduce market barriers that may hinder the development of clean energy. For states such as Pennsylvania that are major net exporters of electricity, a mass-based, multistate regional approach presents a significant opportunity for cost-effective compliance. For example, recent analysis conducted by PJM concluded that a regional approach to compliance would be approximately 30 percent cheaper than a patchwork of state-by-state approaches.³² 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.

CONCLUSION

Pennsylvania’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. Pennsylvania 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 Pennsylvania can use to both cut carbon pollution and create thousands of new, home-grown jobs.

The Clean Power Plan also provides states the option to pursue regional 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.

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

TABLE 1. 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:	There are significant benefits associated with states pursuing consistent regional approaches to compliance. The primary benefits are:			
	<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 			

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