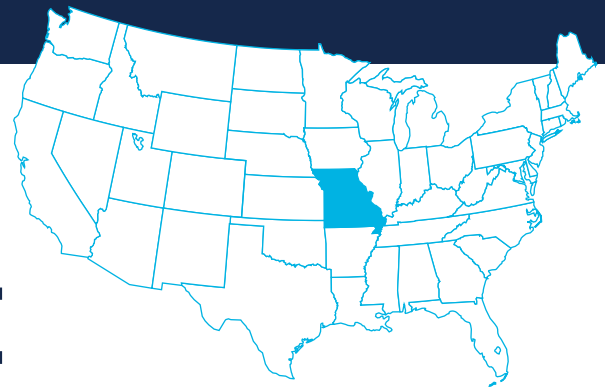




ISSUE BRIEF

MISSOURI'S CLEAN ENERGY FUTURE



Opportunities to Cut Carbon Pollution Under the Clean Power Plan

Missouri 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 Missouri to realize clean energy growth is through the U.S. Environmental Protection Agency's Clean Power Plan. Missouri can cut a significant amount of carbon pollution by improving energy efficiency in homes and buildings and by expanding the amount of power it gets from renewable sources like the wind and sun. These investments will create new clean energy jobs, protect our health from harmful air pollution, and save people money on their electric bills.

Climate change is a clear and present danger to Missourians' 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.¹ The National Climate Assessment, a recent report from 13 federal agencies, warned that human-induced climate change impacts are being felt today and are worsening in every region of the United States, including in Missouri. In 2011, St. Louis County experienced an abnormally high 69 days over 90 °F, compared with the annual average of 50 days.² By the 2080s, more than 90 such days are expected to occur if carbon pollution rates do not decrease.³ Extreme precipitation events are projected to become more frequent and intense due to climate change. These events increase the risks and damages of flooding in the Missouri River Basin, an area that has already experienced some of the largest floods in U.S. history, beginning in the 1990s.⁴

The costs of climate change are rising as well. Climate-related disasters in 2012 cost American taxpayers more than \$100 billion.⁵ Missourians paid an estimated \$1.8 billion, or \$1,100 per taxpayer, in federal taxes to clean up the damage 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 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. The plan would prevent about 550 million metric tons of carbon dioxide 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 that puts Americans to work making our homes and businesses more energy efficient. This projected increase in smarter energy use will shrink consumers' electricity bills by roughly 8 percent in 2030 nationwide.⁹

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

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 consumers' pocketbooks, there is increased spending on other goods and services—and associated job creation—across the economy.

MISSOURI'S CARBON POLLUTION TARGET

Missouri 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. Investing in energy efficiency and renewable wind and solar power should be a fundamental part of Missouri'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 Missouri is being asked to reduce its pollution intensity 21 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 the standards in any way they choose. The Clean Power Plan puts Missouri in the driver's seat, with flexibility to design a plan based on the state's energy mix and costs, to chart a low-carbon path forward.

LESS POLLUTION, MORE JOBS, LOWER ELECTRIC BILLS

Cutting carbon pollution creates benefits to consumers on their electric bills and boosts Missouri'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 do even more to create jobs and reduce consumer energy bills.

If Missouri were to ramp up energy efficiency and renewable power to the higher levels NRDC analyzed, **the state would see the creation of 3,900 new jobs**, and its households and businesses would **save \$363 million on their electric bills in 2020**.^{10,11} Because of these benefits to consumer electric bills and to the state's job growth, NRDC recommended that the EPA require more pollution reductions nationally than currently in the Clean Power Plan proposal.

GRID RELIABILITY IN MISSOURI

For 40 years, our country has been able to dramatically reduce pollution under the Clean Air Act while keeping the lights on and costs reasonable. Grid operators like MISO and SPP, which both operate portions of Missouri's grid, 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, 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.¹² 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. 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 while maintaining reliability. Wind generation can be used to help stabilize the grid with high-quality power.¹³ Unlike fossil-fuel and nuclear sources, which can have large, abrupt, and unpredictable changes in electricity output, changes in wind and solar generation tend to be gradual and predictable.¹⁴ This means that wind and solar need less backup generation than fossil fuels or nuclear sources. In fact, the midwestern electric grid operator MISO needs almost no additional, fast-acting power reserves to back up its 10,000-plus MW of wind power, which is enough to power 10 million homes.¹⁵ Thanks to management, planning, and improvements in grid technologies, Missouri can cut pollution, increase energy efficiency, and add renewable energy capacity while maintaining a strong and reliable electric grid.

TODAY'S ELECTRICITY SECTOR IN MISSOURI

Missouri's energy mix presents a significant opportunity to increase diversity and lower costs. Figure 1 shows that in 2012, the majority of Missouri's electric power came from coal (79.3 percent). Nearly all the rest was generated from nuclear (11.7 percent) and natural gas (6.7 percent).¹⁶ Missouri imported almost \$1.4 billion in coal in 2012 alone; at \$233 per person, this was the second-highest per capita coal expenditure in the country.¹⁷ While eight of the other top-ten states in coal importation have reduced their coal expenditures since 2008, by up to 33 percent, Missouri (ranked fourth) has actually increased its expenditure by 20 percent.¹⁸ Missouri can diversify its electricity mix by redirecting the \$1.4 billion spent annually on coal to instead support homegrown clean energy and strengthen the local economy.

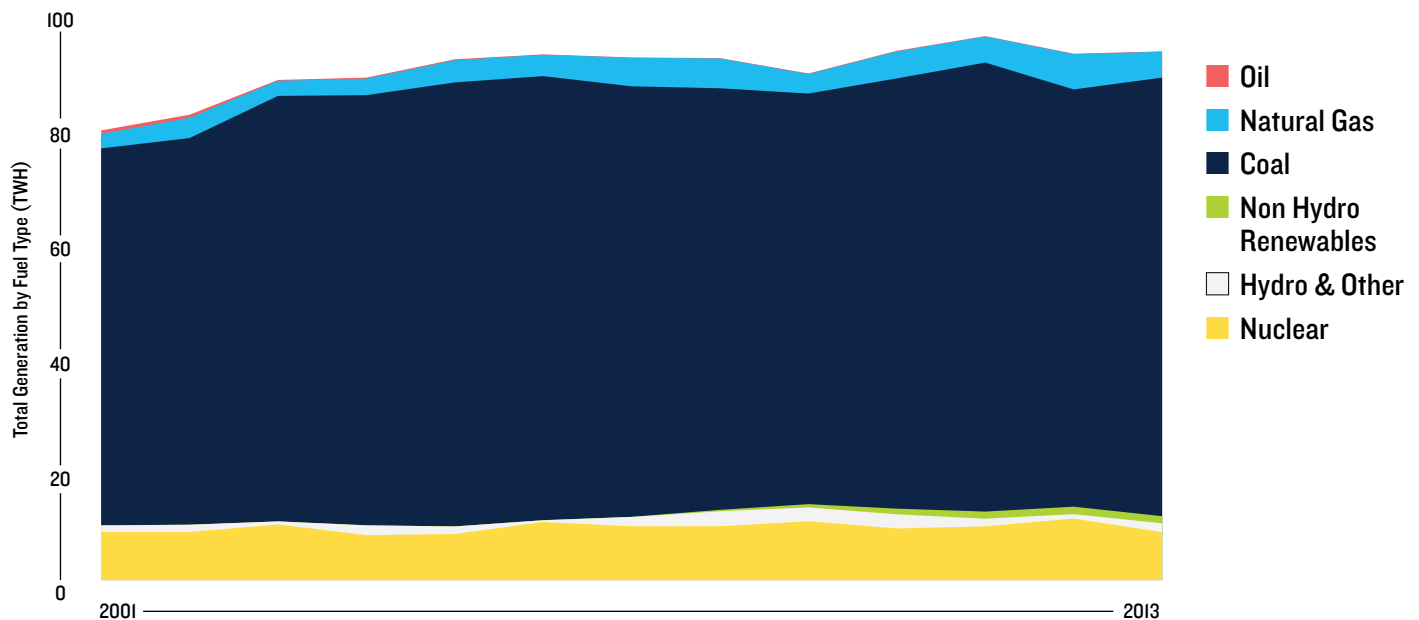
In overall share of the nation's electric generation mix, coal electric generation has decreased considerably.¹⁹ Actual coal plant retirements and estimates of future retirements are higher than industry projections of just a few years ago. From 2000 to 2012, coal-fueled electricity declined from 52 percent of overall electric generation to 37 percent nationwide.²⁰ In this same period the share of natural gas in the nation's electricity mix grew from 16 percent to 30 percent and renewable energy grew from 9 percent to 12 percent.²¹

A U.S. Government Accountability Office (GAO) report states that from January 2010 to May 2014, power companies retired 100 coal-generating plants representing 15,000 MW of capacity.²² This trend is expected to continue. The U.S. Energy Information Administration's "2014 Annual Energy Outlook" projects that 60,000 MW of coal generation will be retired between 2012 and 2020.²³

Missouri is not immune to these trends. Kansas City Power & Light (KCP&L) recently announced that it would stop burning coal at three of its Missouri power plants that provide 700 MW of capacity.²⁴ One is already equipped to run on natural gas, and KCP&L is deciding whether to shut down the other two or convert them to run on alternative fuels. KCP&L stated that **"ending coal use at these plants is the most cost-effective and cleanest option for our customers."** This decision will not result in any job losses; all affected employees will transition to other job opportunities within the company.²⁵ In addition, KCP&L recently announced the development of an additional 400 MW of wind power in the region and expanded energy efficiency programs as part of the utility's continued efforts to provide cleaner energy to the region and its customers.²⁶

KCP&L's actions highlight the national trend in the utility industry to transition away from coal-fired electricity. Many factors are driving this transformation in the nation's electric generation mix. The age of the nation's existing coal facilities has naturally led to an increase in coal plant

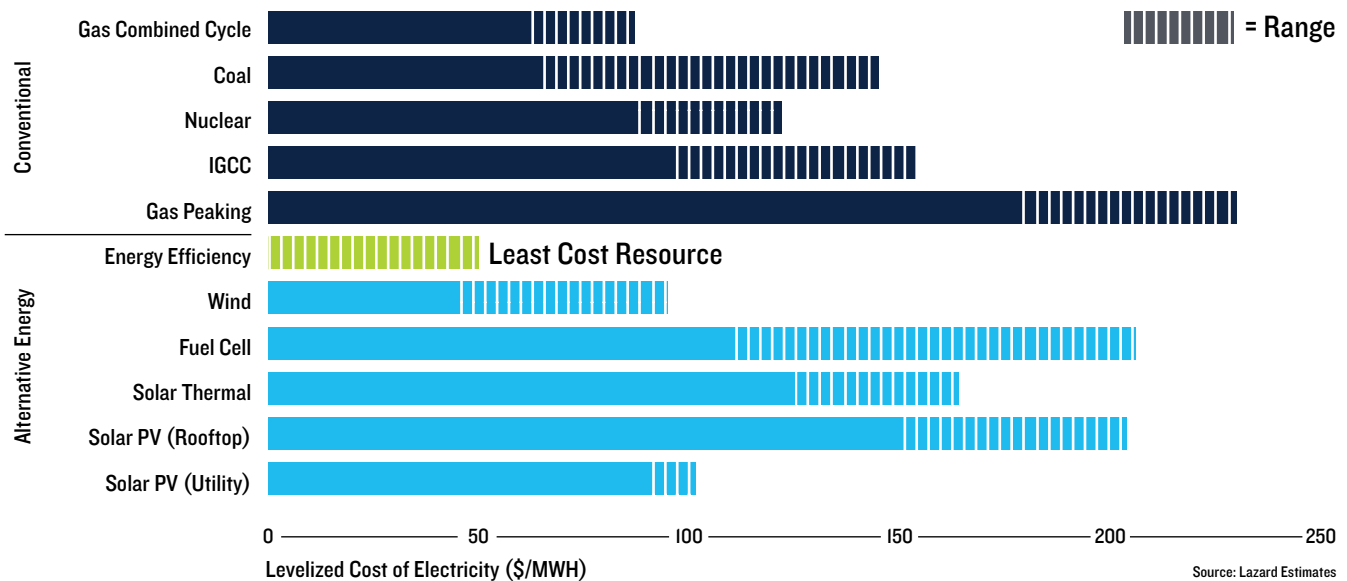
FIGURE I. MISSOURI'S ELECTRICITY GENERATION SOURCES (2001-2013)



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.



retirements. Natural gas costs have dropped significantly. Wind and solar power have become price competitive with fossil-fuel-based electricity sources, thanks to advances in solar and wind power technology and significant increases in renewable power generation. Last, coal mining is associated with considerable environmental, land use, and social impacts, and the burning of coal for electricity creates dangerous air pollutants—including carbon, mercury, and soot—that threaten people’s health and the climate.

While the nation is trending away from coal and toward cleaner sources of energy, non-hydro renewable energy provides only 1.4 percent of Missouri’s electricity, despite the state’s very strong renewable energy potential.²⁷ While Missouri is one of the leading states in wind power potential, ranked 14th in the nation, the state is ranked only 24th for actual wind development.²⁸ Missouri is especially well situated to reap the rewards of wind power because many urban centers are located near large land tracts that are ideal for wind development.²⁹ 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.^{30,31}

Missouri’s utilities have recognized that wind power is the most economic option for its customers. As mentioned above, KCP&L has announced plans to add 400 MW of wind power to its portfolio through projects in Missouri and Kansas.³² Ameren Missouri noted in its 2014 Integrated Resource Plan that “wind energy resources exhibit the

lowest cost on an LCOE [levelized cost of electricity] basis among all candidate resource options.”³³

Solar power is also 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.³⁴ In November 2014, Governor Jay Nixon and Sungevity, a top residential solar company, announced that Kansas City, Missouri, would be the location for a new sales and service center, creating 600 jobs, to support Sungevity’s expanding customer base.³⁵ A recent Deutsche Bank report predicts that rooftop solar power will be as cheap as average retail electricity prices in Missouri by 2016.³⁶ Missouri and utility companies can and should take advantage of low-cost and abundant renewable energy resources throughout the region.

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 Midwest, including in Missouri, energy efficiency is the lowest-cost resource to meet the state’s carbon pollution reduction goals. Electricity savings can be achieved at costs well below those of building new generation, resulting in lower electricity bills for homes and businesses. Investments in energy efficiency could save Missouri businesses \$183 million in 2020 alone.³⁷

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

A CLEAN ENERGY FUTURE FOR MISSOURI

Missouri is well positioned to meet its Clean Power Plan pollution reduction target and has an opportunity to increase its commitment to energy efficiency and renewable energy. Missouri has taken steps to embrace clean energy as a tool to rebuild and empower the state economy. The state has adopted a Renewable Energy Standard (RES) of 15 percent by 2021. Studies by the University of Missouri predict that this standard will create 9,591 jobs and generate \$2.86 billion in economic activity in the RES's first 20 years.³⁸ Missouri's own renewable energy goals, which voters endorsed by a two-to-one margin when they enacted the state's RES in 2008, far exceed the modest renewables projections that the EPA used in setting the state's pollution reduction target.

In addition to the RES, the state also has a voluntary energy efficiency goal of 9.9 percent in 2020 and nearly 18 percent (cumulative) by 2030.³⁹ As shown in Figure 3, Missouri's energy efficiency savings in 2013 were 0.5 percent of annual retail sales, below the national average of 0.67 percent, and well below the savings of the top 10 states. This indicates that Missouri can achieve greater energy efficiency savings. Realizing this potential for improvement,

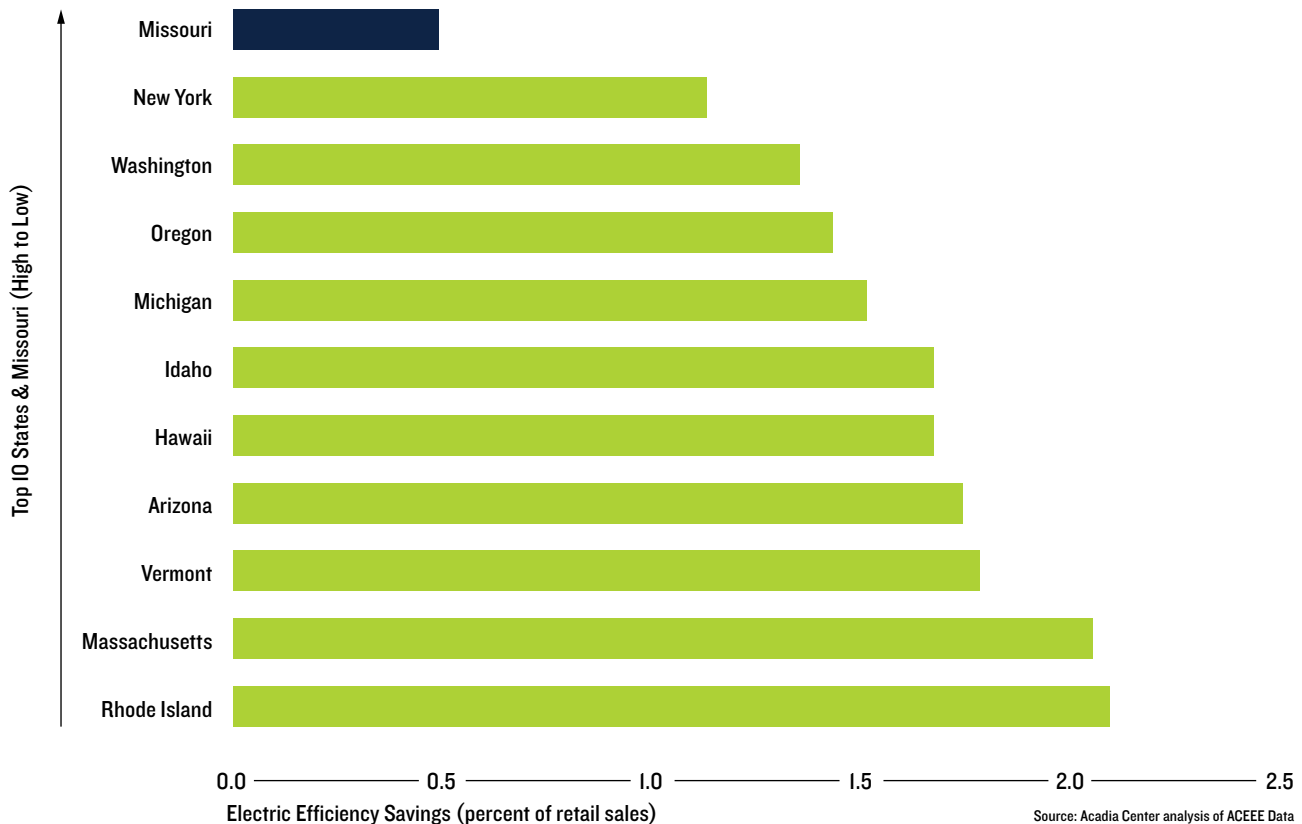
Kansas City's mayor, Sylvester "Sly" James, Jr., has expressed support for the Clean Power Plan and enthusiasm to work with the state of Missouri on its pollution reduction plan. Mayor James aspires to make Kansas City, Missouri, one of the most energy-efficient cities in America, working in collaboration with Kansas City Power & Light and the Kansas City Chamber of Commerce to launch a number of energy efficiency programs.⁴⁰

Missouri's renewable energy and energy efficiency goals, if fully implemented for all of the state's electrical providers, will put the state on track to meet its Clean Power Plan targets nine years ahead of schedule.⁴¹ They will not only put the state ahead of the game in cutting carbon emissions, but will also save consumers money on their utility bills, create jobs, and spur the local economy.

More pollution-free resources like energy efficiency, wind, and solar would allow more flexibility for Missouri's generation fleet under the state's pollution target and would provide a buffer against potential fuel price volatility. Missouri could also take advantage of strong wind resources in neighboring states.⁴² Investment in energy efficiency and renewable energy is the key to Missouri's pollution reductions and clean energy future.

FIGURE 3. MISSOURI'S ENERGY EFFICIENCY RATE

Comparison with the 10 states with the highest energy efficiency rates. Missouri ranked 31st as of 2013.



STATES CAN CHOOSE FROM A RANGE OF POLICY APPROACHES

A smart, effective, and forward-looking Missouri plan can reduce market barriers that may 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. Table 1 addresses the option of regional approaches, which present a number of potential advantages over single-state plans such as consumer savings, reduced compliance costs, increased flexibility, and avoided electricity market distortions.

CONCLUSION

Missouri’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. Missouri 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 Missouri can use to both cut carbon pollution and create thousands of new, homegrown jobs.

Missouri’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.

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:	<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 			

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