



HOW WISCONSIN CAN MEET ITS CLEAN POWER PLAN TARGETS

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WHAT DOES THE CLEAN POWER PLAN MEAN FOR WISCONSIN?

In August 2015, the U.S. Environmental Protection Agency (EPA) finalized the Clean Power Plan (CPP), the first-ever carbon pollution standards for existing power plants (Box 1). The CPP builds on progress already underway to move the country toward a cleaner electricity system, including rapidly falling prices of renewables and increased deployment of money-saving energy efficiency measures. The plan enables states to use a wide range of options to meet their standards, such as existing clean energy policies and power plants (the focus of this analysis), other tools to cut electricity use and increase the use of renewables, and broader initiatives such as participation in a cap-and-trade program or use of a carbon tax (Box 2).

On February 9, 2016, the U.S. Supreme Court temporarily halted implementation of the CPP while the courts consider legal challenges brought by a number of states, corporations, and industry groups. Importantly, this “stay” was not a ruling on the merits of the CPP; the challenges are being considered by the U.S. Court of Appeals for the District of Columbia, which will hear arguments on the merits of the case on June 2nd. It is likely that any ruling by the D.C. court will be appealed to the Supreme Court. The stay will last until the case is fully resolved, likely in 2017 or 2018. Despite the stay, some states are moving forward in their efforts to cut emissions from their power sectors and prepare for future compliance with the CPP. The EPA is continuing to provide assistance and developing tools for states that want them.

Disclaimer: *This Fact Sheet contains preliminary research, analysis, findings, and recommendations. It is intended to stimulate timely discussion and critical feedback and to influence ongoing debate on emerging issues. Its contents may eventually be revised and published in another form.*

The stay is not a reason for Wisconsin to stop planning for a lower-carbon power sector. The measures the state can take to cut power sector emissions—like implementing programs to save energy and increasing use of renewable energy—make good economic sense regardless of the politics of the CPP.

This fact sheet shows how Wisconsin can harness economic opportunities in clean energy and put the state in a strong position to meet or exceed the CPP or other standards in the future. The state has already put clean energy policies in place to promote renewable development and improve energy efficiency. By expanding these successful policies, the state can reduce its power sector emissions while harnessing economic benefits from increased investment in clean energy. In addition, it would allow the state to meet, or even surpass, its 2030 target should the CPP remain intact. On the other hand, weakening clean energy programs—as the Wisconsin legislature did recently by reducing funding for energy efficiency—will reduce near-term economic benefits to consumers and make it more costly to comply with the CPP and other future carbon pollution reduction efforts.

WHAT DOES THE CLEAN POWER PLAN REQUIRE FOR WISCONSIN'S POWER PLANTS?

Each state has the flexibility to use one of three targets provided in the Clean Power Plan: (1) an emission rate target for existing power plants, which measures the carbon intensity of the state's existing fossil electricity generation; (2) a mass-based target for existing power plants, which measures the absolute level of CO₂ emissions allowed by the state's affected power plants; or (3) a mass-based target for new and existing power plants (i.e., opting to use the new source complement).

Wisconsin has the option to choose one of the following three targets:

- **Emission rate target for existing sources:** 1,176 pounds per megawatt-hour (lbs./MWh) by 2030, a reduction of 41 percent below its 2012 emission rate of 1,996 lbs./MWh.
- **Mass-based target for existing sources:** 28.0 million short tons of CO₂ in 2030, which is about 34 percent lower than the state's CO₂ emissions from fossil electricity generation in 2012.

■ Mass-based target for new and existing

sources: 28.3 million short tons of CO₂ in 2030, which is about 33 percent lower than the state's CO₂ emissions from fossil electricity generation in 2012.

The percent reductions above are calculated using EPA's "adjusted" 2012 baseline, which includes the CO₂ emissions and generation from fossil plants that are affected by the Clean Power Plan, consistent with EPA's methodology.

HOW WISCONSIN CAN MEET—OR EXCEED—THE CLEAN POWER PLAN REQUIREMENTS

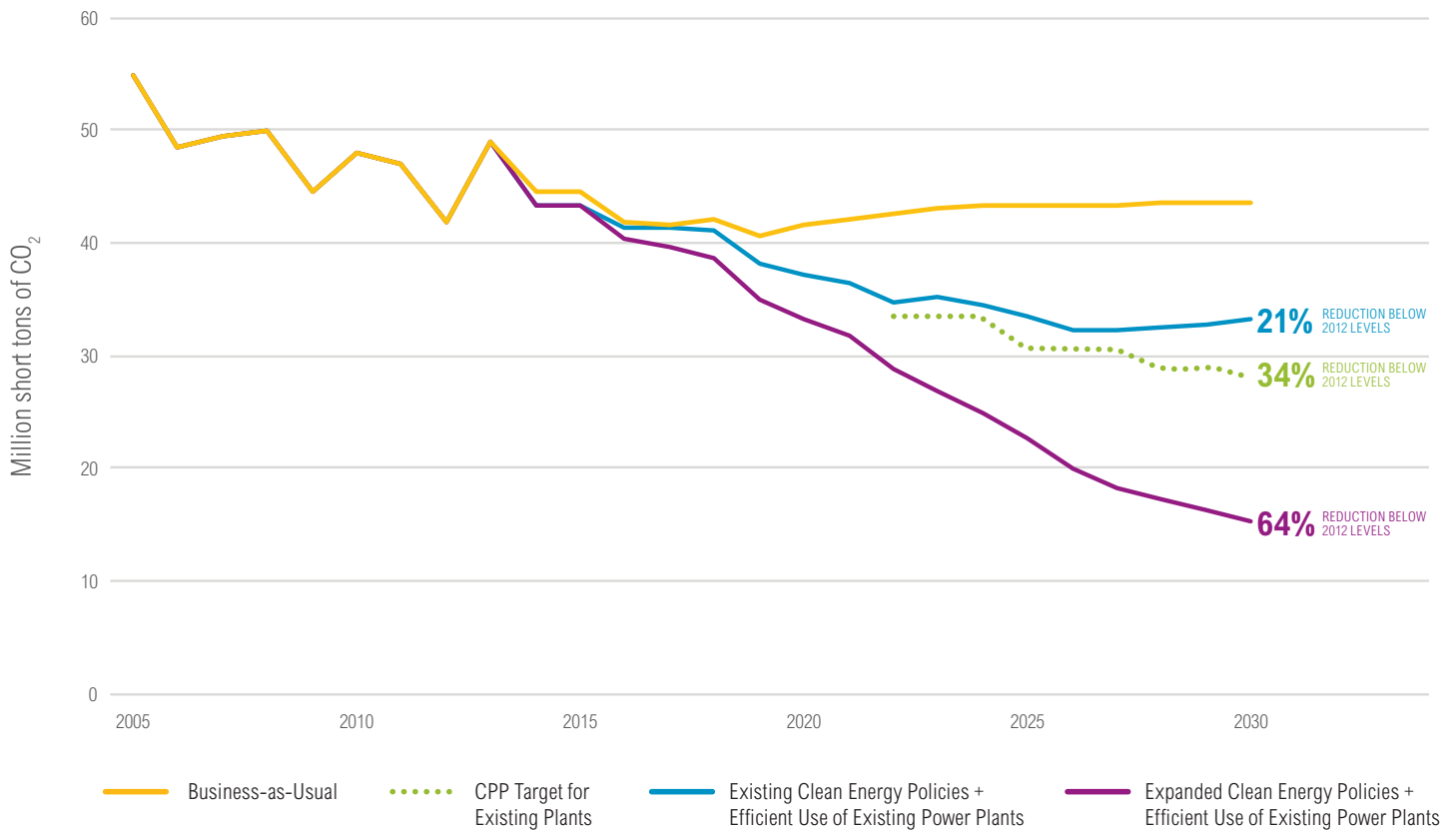
Wisconsin is in a strong position to meet or exceed its emission targets under the Clean Power Plan. Carbon dioxide (CO₂) emissions from the state's power plants fell 24 percent between 2005 and 2012 due to reduced coal generation, increased energy efficiency, and increased use of natural gas and renewables. However, this trend is not expected to continue. According to our business-as-usual BAU projections, based in part on the U.S. Energy Information Administration's *Annual Energy Outlook 2015* (AEO2015), existing power plant emissions are expected to rise 5 percent from 2012 levels by 2030 due mainly to increased coal generation.¹ BAU projections reflect the state's renewable energy standards, which were reached in 2013, but do not fully capture the ongoing effects of the energy efficiency standard. (See the appendix for details.)

CO₂ REDUCTIONS FROM EXISTING CLEAN ENERGY POLICIES AND EXISTING POWER PLANTS

Wisconsin can build on progress made to date and achieve greater reductions by following through on its existing renewable energy and efficiency standards.² By meeting the targets in these clean energy policies and making better use of existing power plants, Wisconsin can achieve 63 percent of the reductions required to meet its mass-based target. By taking the measures listed below, Wisconsin can reduce existing power plant emissions 21 percent below 2012 levels by 2030 (Figure 1).

If Wisconsin were to choose to use the rate-based target, these actions would reduce the average emission rate of the state's existing fossil fleet by 25 percent below its 2012 emission rate—to 1,489 lbs. per MWh—in 2030, achieving 62 percent of the reductions needed to meet the state's rate-based target of 1,176 lbs. per MWh.³

Figure 1 | Existing Power Plant Emission Pathways for Wisconsin



Note: This figure depicts the Clean Power Plan's interim and 2030 mass-based targets for Wisconsin's existing power plants (CPP Target for Existing Plants). The Existing Policies + Efficient Use of Existing Power Plants pathway shows emissions from affected plants after meeting the state's clean renewable energy standard and voluntary efficiency goal and making better use of the state's existing power plants (increasing generation of the existing combined cycle natural gas fleet and improving efficiency of existing coal plants). The Expanded Policies + Efficient Use of Existing Power Plants pathway shows emissions after expanding clean energy policies and making better use of existing power plants. These pathways do not account for potential credits that Wisconsin could generate by taking early action under the Clean Energy Incentive Program.

■ **CONTINUING TO IMPLEMENT EXISTING CLEAN ENERGY POLICIES.** Wisconsin offers money-saving efficiency programs to homes and businesses through its state-wide efficiency program Focus on Energy. As part of this program, the state has adopted annual electricity savings targets of about 0.8 percent of sales, with current targets approved through 2018.⁴ And the state's renewable portfolio standard (RPS), which requires 10 percent of the state's electricity to come from renewables by 2015, was reached two years early in 2013.⁵ By maintaining renewable generation at 10 percent of sales and continuing to achieve 0.8 percent annual efficiency savings through Focus on Energy, Wisconsin could achieve about 17 percent of the reductions required to meet its mass-based target.⁶

■ **INCREASING THE USE OF EXISTING NATURAL GAS PLANTS** Wisconsin's most efficient natural gas plants—combined cycle (NGCC) units—generated less electricity than they were capable of producing in 2012. By running existing NGCC plants at 75 percent in addition to the policies above, Wisconsin can achieve 55 percent of the reductions required to meet its mass-based target.⁷

■ **INCREASING COAL PLANT EFFICIENCY** Low- and no-cost operational improvements and best practices can improve the efficiency of existing coal plants. By increasing the average efficiency of the remaining coal fleet by 4.3 percent in addition to the measures above, Wisconsin can achieve 63 percent of the reductions required to meet its mass-based target.⁸

The power sector is the leading source of carbon dioxide (CO₂) emissions in the United States, but also offers some of the most cost-effective opportunities to reduce those emissions. Power sector emissions at the national level decreased by 16 percent between 2005 and 2012 due to the recession, increased penetration of renewable energy, increased energy efficiency, and the low price of natural gas. Without new policies like the CPP, current projections show that emissions will slowly rise or hold steady through 2030 to reach 10–17 percent below 2005 levels.*

On August 3, 2015, EPA finalized standards for existing power plants that will help drive additional CO₂ emission reductions by 2030. States have the option to comply with either

rate-based (lbs. CO₂ per megawatt-hour) targets for existing fossil plants or mass-based (short tons of CO₂) targets for either the existing fossil fleet or for new and existing fossil plants. EPA developed these state-specific standards by taking into account the composition of each state's existing fossil fleet along with an estimate of the potential to increase the existing coal fleet's efficiency, ramping down coal generation by increasing utilization of the existing natural gas combined cycle fleet, and developing more renewable energy resources.

The Clean Power Plan makes use of the flexibility allowed by the Clean Air Act so that states can take advantage of several different measures to lower the carbon intensity of its

power generation mix—such as fuel switching, dispatch of existing low-carbon power plants, increased generation by renewable sources, and energy efficiency. EPA also is providing states with several implementation plan options, including the option to get credit for early action, which we discuss in more detail in Box 2. On February 9, 2016, the U.S. Supreme Court temporarily halted implementation of the CPP, which is being challenged in the D.C. Circuit appeals court by a number of states, corporations, and industry groups. This “stay” was not a ruling on the merits of the CPP; the D.C. Circuit Court will hear arguments on the merits of the case on June 2nd. The stay will last until the case is fully resolved, likely by the Supreme Court in 2017 or 2018.

*Notes: * While CO₂ emissions from the power sector have already fallen 16 percent since 2005 (relative to 2012 levels), the U.S. Energy Information Administration's Annual Energy Outlook 2015 projects that power sector emissions will slowly increase between 2012 and 2030 so that CO₂ emissions reach approximately 10 percent below 2005 levels (note, this only takes into account policies that were on the books as of the end of October 2014). On the other hand, EPA's baseline projections for its modeling of the Clean Power Plan, which includes lower cost estimates for renewable technologies, estimate that power sector emissions will reach 17 percent below 2005 levels by 2030. EPA's projections estimate less coal-fired generation and more natural gas and renewable generation in 2030 than EIA's projections.*

Details on the modeling assumptions for this analysis are provided in the appendix.

CO₂ REDUCTION OPPORTUNITIES USING EXPANDED CLEAN ENERGY POLICIES

Because of the flexibility built into the CPP, Wisconsin could make up the gap that remains through a variety of measures. This could include expanding its existing RPS or the Focus on Energy program, encouraging use of combined heat and power at commercial and industrial buildings, joining a regional cap-and-trade program, and others. As one example, we developed a pathway that shows the reductions Wisconsin could achieve if it expanded its RPS and efficiency standard similar to levels being pursued by other states. By taking the following actions in addition to making better use of existing power plants, the state could reduce existing power plant emissions 64 percent below 2012 levels by 2030, nearly doubling the required reductions under a mass-based target:

- Ramping up the energy efficiency standard to 2 percent of sales in 2019 and 2.5 percent in 2025, the upper range of what other states have achieved or plan to achieve with current efficiency policies.
- Increasing the renewable portfolio standard from the current 10 percent of the state's sales by 2015 to 30 percent by 2030, a level required by several other state standards.

Taking these actions would allow Wisconsin to surpass its rate-based target by reducing the emission rate of its existing fossil fleet to 1,117 lbs. per MWh if it opted for a rate-based approach. Since the CPP allows for states to trade carbon allowances or emission rate credits, Wisconsin could generate revenue by going beyond the required reductions and selling excess credits to other states. Wisconsin could also generate extra credits by taking advantage of EPA's Clean Energy Incentive Program, which rewards early action in renewable energy and energy efficiency in low-income communities.

Box 2 | Clean Power Plan Compliance Options

The Clean Power Plan offers states significant flexibility. As states develop their implementation plans, they will need to make a number of decisions that will affect how they comply. Key considerations include:

■ TYPE OF TARGET

States can choose either a rate-based target (in lbs. CO₂/MWh) or a mass-based target (in short tons of CO₂). States using a rate-based target can adopt separate standards for coal and combined cycle natural gas units, a weighted average for all affected units, or equivalent standards that apply to individual units or groups of units. States using a mass-based target can use EPA's standard for existing units only, or for existing and new units collectively (known as a new source complement).

Since mass-based plans will rely on reported power plant emissions, complementary actions to improve energy efficiency and increase renewable generation do not need to be quantified in the state plans. Rate-based plans require an explicit accounting of actions used to adjust the emission rate from affected units, including evaluation, measurement, and verification of those actions.

■ TYPE OF STATE PLAN

The CPP allows two types of state plans. Under an "emission standards" plan, states place mass- or rate-based emissions requirements directly on affected units, which are then required to reduce their emissions or rate directly or

use credits generated by fuel-switching, renewable energy, energy efficiency, or other approved measures. States that adopt a mass-based target can opt for a "state measures" plan. With this type of plan, states can use a portfolio of state-enforced measures, which can apply both to affected units and other entities (for example, demand-side efficiency, renewable portfolio standards, or cap-and-trade programs). Under this approach, states could also implement a carbon tax for compliance. This approach must include emission standards for affected power plants in case the portfolio approach does not achieve the required reductions.*

■ INDIVIDUAL OR MULTISTATE COMPLIANCE

States can choose to comply individually or as part of a multistate plan with an aggregated target. States also can coordinate with other states while retaining an individual state goal. Joining a regional cap-and-trade program—or just allowing trading with other states that adopt the same compliance approach—may be the most cost-effective option for some states, lowering compliance costs while ensuring reliability.^a Studies in the Southwest Power Pool, PJM, and MISO regions have found that regional compliance would be the most cost-effective option.^b

The Regional Greenhouse Gas Initiative illustrates how a multistate trading approach can help reduce emissions

while driving investments in renewable energy and energy efficiency and saving money for electricity customers. Over the first six years of the program, investments from auction proceeds have generated nearly \$3 billion in economic value-added to the region and created over 28,000 job-years of employment.^c

■ TRADING

States don't need to join a cap-and-trade program or formally coordinate with other states to trade. EPA allows states to trade emission rate credits (rate-based target) or emission allowances (mass-based) regardless of their implementation plan type as long as states meet "trading ready" criteria provided in the rule.** However, mass-based states may only trade with other mass-based states and rate-based states may only trade with other rate-based states. Once trading-ready state plans are approved, states can begin trading right away without additional requirements or approval from EPA.

■ EARLY ACTION

EPA is offering a Clean Energy Incentive Program to reward early investments in energy efficiency projects that benefit low-income communities and in renewable energy. States can earn additional credits from EPA through renewable generation or reduced electricity demand in 2020 and 2021 from projects built since the submission of the state's compliance plan.

Notes: * According to the final rule, a state measures plan "must also include a contingent backstop of federally enforceable emission standards for affected EGUs that fully meet the emission guidelines and that would be triggered if the plan failed to achieve the required emission reductions on schedule." ** These criteria include use of an EPA-approved (or EPA-administered) emission and allowance tracking system (mass-based) and provisions for issuing, tracking, and submitting emission rate credits (rate-based). Section VIII of the final rule provides more guidance (<http://www.epa.gov/airquality/cpp/cpp-final-rule.pdf>).

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HOW WISCONSIN CAN MAXIMIZE THE ECONOMIC BENEFITS OF THE CLEAN POWER PLAN

As we have shown, Wisconsin could achieve 63 percent of the reductions needed to meet its CPP target with its existing clean energy policies and more efficient use of existing power plants. Wisconsin can close the remaining gap with an implementation plan that maximizes the economic benefits to the state and achieves emissions reductions cost-effectively.

Such a plan could include:

■ **Adopting a market-based carbon pricing**

program: A carbon pricing program—in the form of either a cap-and-trade program or a carbon fee—has major economic advantages over alternative implementation approaches:

1. A carbon price encourages the most cost-effective emissions reductions without favoring any particular technology. A study of air pollution regulations found that market-based approaches have ranged from 1.1 times to 22 times more cost-effective than nonmarket approaches to regulation.⁹
2. Revenues from allowance auctions or a carbon fee can be used to accomplish other policy objectives, such as reducing the tax burden on Wisconsin's residents and businesses or making productive public investments. Applying a carbon price of \$10 per short ton to the power plant emissions allowed under Wisconsin's mass-based target for existing plants would provide average annual revenues of roughly \$300 million.¹⁰ This revenue could be used to provide assistance to those who may be adversely affected by the carbon price, such as low-income households and any displaced utility-sector workers; to make strategic investments in renewable energy and energy efficiency; or to offset other taxes. The Regional Greenhouse Gas Initiative illustrates how investment of auction revenue can benefit the local economy. During the period from 2009 to 2014, investments of nearly \$2 billion in auction proceeds into bill assistance, energy efficiency, renewable energy, and other uses generated nearly \$3 billion in economic value-added across the nine participating states, according to a study by Analysis Group.¹¹
3. The CPP encourages states to take advantage of interstate trading opportunities without needing to formally join a regional program. Taking advantage of interstate trading would enable Wisconsin to sell surplus allowances and generate revenue from out-of-state sources if it surpasses its CPP targets—assuming an allowance price of \$10 per short ton, around \$100 million in revenues could flow into the state per year on average between 2022–30 by expanding its clean energy policies and using available infrastructure and selling the credits on interstate markets. (This does not include consideration of any credits that might be generated through the Clean Energy Incentive Program prior to 2022.)
4. Carbon pricing provides financial incentives for regulated entities to reduce their emissions beyond the target, which encourages the adoption and diffusion of low-carbon energy technologies. Such technological advancements can lower overall compliance costs and boost economic growth.

■ **Investing in energy efficiency.** By reducing electricity demand, improvements in energy efficiency reduce the need for investments in electricity supply, which frees up capital to invest in other productive ways across the economy. If the energy efficiency programs are less expensive than electricity generation—as the empirical evidence indicates many of them are¹²—electricity prices should fall in the long run, leaving Wisconsin's residents with more income to spend, save, or invest. Wisconsin's Focus on Energy program returned \$3 in benefits for every dollar invested from 2011–14, saving homes and businesses a cumulative \$1.7 billion.¹³ In the RGGI region, the reinvestment of auction proceeds in energy efficiency and renewable energy during the period from 2012 to 2014 led to net electricity savings of \$341 million for households, businesses, and industry.¹⁴

The investments needed to move toward a low-carbon future will strengthen Wisconsin's economy over the long term. While these investments are likely to involve short-run economic costs—including somewhat higher electricity rates and fewer investment dollars available for alternative opportunities in the electricity sector or across the economy—they will pay off over time. Wisconsin's residents will spend less of their income on electricity thanks to improvements in efficiency and the low oper-

ating costs of renewable energy.¹⁵ For example, Clean Wisconsin found that CPP compliance strategies that encourage increased investment in clean energy can pay for themselves over time and in fact lead to net benefits for the state by 2030 due to energy bill savings and sales of surplus credits.¹⁶ And less reliance on coal will enable more in-state investment—Wisconsin pays an average \$880 million per year to other states to import coal.¹⁷

In a transition to a low-carbon power sector, jobs will be gained in the clean energy industry and will decline in high-carbon industries, like coal, accelerating trends already underway. The clean energy industry creates jobs in manufacturing, construction, home maintenance, and other sectors. State and federal governments should help manage the transition to a lower-carbon economy by offering job training or other programs to ensure that opportunities are available for all workers. However, states can use a carbon pricing policy that produces a revenue stream for the government to cover the costs of these transition policy measures.

Strong implementation of the CPP is a critical component of the U.S. commitment to a global climate agreement that can help reduce global emissions and combat climate change. Failure to avoid the worst effects of climate change could result in high costs for Wisconsin's residents as warming temperatures throughout the Midwest lead to greater occurrences of extreme heat, flooding, and droughts.¹⁸

In addition to helping combat climate change, lowering the carbon-intensity of the power sector in Wisconsin will lead to reductions in harmful local air pollutants. According to EPA, exposure to pollutants like particulate matter, nitrogen oxides, and sulfur dioxide can lead to respiratory issues or heart and lung diseases.¹⁹ Reducing these emissions will make for a healthier work force that spends less on medical bills.

Because of the clean energy policies already in place, Wisconsin's existing power plants could decrease their emissions with or without the Clean Power Plan. Wisconsin can now use this rule as an opportunity to maximize economic benefits from curbing emissions and thus meeting or exceeding its Clean Power Plan targets.

THE CLEAN POWER PLAN WILL MAINTAIN ELECTRIC GRID RELIABILITY

The Clean Power Plan provides flexibility aimed at ensuring the continued reliability of the nation's power grid.²⁰ Under the final CPP, states can choose from a wide variety of compliance options that are best suited to that state's existing resources and policies. While EPA is offering states incentives to invest in renewable energy and energy efficiency early, they also have given states additional time to complete and implement their plans by changing the compliance start date from 2020 to 2022. Allowing more time for planning and adjusting the interim targets to allow a "glide path" to the final targets directly addresses concerns raised by the Midcontinent Independent System Operator (MISO) regional transmission organization regarding the proposed rule.²¹ In addition, the Clean Power Plan is requiring each state to consider reliability issues as it develops its implementation plan, while also providing a mechanism for states to revise their plans if significant unplanned reliability issues arise. EPA also created a reliability safety valve that allows a power plant to temporarily exceed its targets during unexpected events or emergencies that raise reliability concerns. EPA consulted closely with the Department of Energy and the Federal Energy Regulatory Commission in developing the CPP's reliability provisions. These agencies will continue to work together to monitor CPP implementation and help resolve any reliability concerns that arise.

The U.S. power sector also has shown it has the ability to reliably deliver electricity to homes and businesses despite changes in electricity mix and demand. EPA's environmental regulations under the Clean Air Act, such as the Acid Rain Program or Mercury and Air Toxics Standards, have never caused blackouts. This is because EPA granted flexibility to power plants in the past—just like it is doing under the Clean Power Plan—and because state regulators have standard reliability practices that have been used for decades to address reliability issues if and when they arise.²² Analyses of the proposed Clean Power Plan have shown that compliance is unlikely to affect reliability—nationwide and within the MISO region specifically—because of these standard practices and the flexibility inherent in the rule.²³ In addition, several studies have found that the flexibility of the current grid would allow for renewable penetration levels exceeding those required by current state targets. These studies have shown that proven technologies and practices can reduce the cost of

operating generation portfolios with high variable renewable energy levels and enable reliable grid operation with more than 50 percent renewable penetration.²⁴

OPPORTUNITIES IN DETAIL

Below, we describe Wisconsin's opportunities to move toward a modern, lower-carbon power sector and comply with the Clean Power Plan in more detail, including: (1) increasing energy efficiency, (2) increasing renewable energy, (3) increasing use of natural gas, (4) improving coal plant efficiency, and (5) other compliance options.

1. INCREASING ENERGY EFFICIENCY

Wisconsin's statewide efficiency program, Focus on Energy (FOE), offers a variety of energy saving programs to the state's electricity customers, including rebates, financing options, and energy assessments. Under this program, the state has adopted annual savings targets of about 0.8 percent of sales since 2011, with current goals approved through 2018.²⁵

Efficiency is a cost-effective strategy that can help the state comply with the CPP while saving money for homes and businesses. Independent evaluation of the FOE program from 2011–14 found the benefits of the state's programs exceeded their costs threefold, with cumulative net benefits of \$1.7 billion.²⁶ New legislation passed in March 2016 will cut FOE funding by \$7 million per year, about 7 percent of the program's annual budget.²⁷ Weakening this program will reduce the economic benefits to the state and its residents.

On the other hand, the state could achieve even greater savings by scaling up its efficiency programs in line with other states. Several states—including Arizona, Maryland, Massachusetts, Rhode Island, and Vermont—have already achieved or have targets that will require 2 percent or more of sales.²⁸ A 2009 study by the Energy Center of Wisconsin found that electricity savings of 1.6 percent per year would be economically achievable by 2012 by deploying energy-efficient technologies and practices that were available at the time, including more efficient lighting, heating, and cooling, and weatherization programs for low-income housing.²⁹ The study found that implementing these cost-effective measures could yield the state a net \$900 million in benefits over the lifetime of measures put into place from 2012–18.

A number of other strategies could help the state capture greater efficiency savings: for example, adopting and enforcing up-to-date building energy codes, increasing access to financing for efficiency, and encouraging deployment of combined heat and power (CHP) at commercial and industrial facilities. As of August 2015, Wisconsin had about 1.6 GW of installed CHP capacity, about one-third of its technical potential.³⁰ Wisconsin has the potential to add about 4 GW of new CHP for a total technical potential of over 5 GW.³¹ If Wisconsin added just 10 percent of its remaining technical potential by 2030 in addition to the other measures in the expanded policies pathway, it could reduce power plant emissions approximately an additional 8 percent below 2012 levels beyond the reductions we modeled.

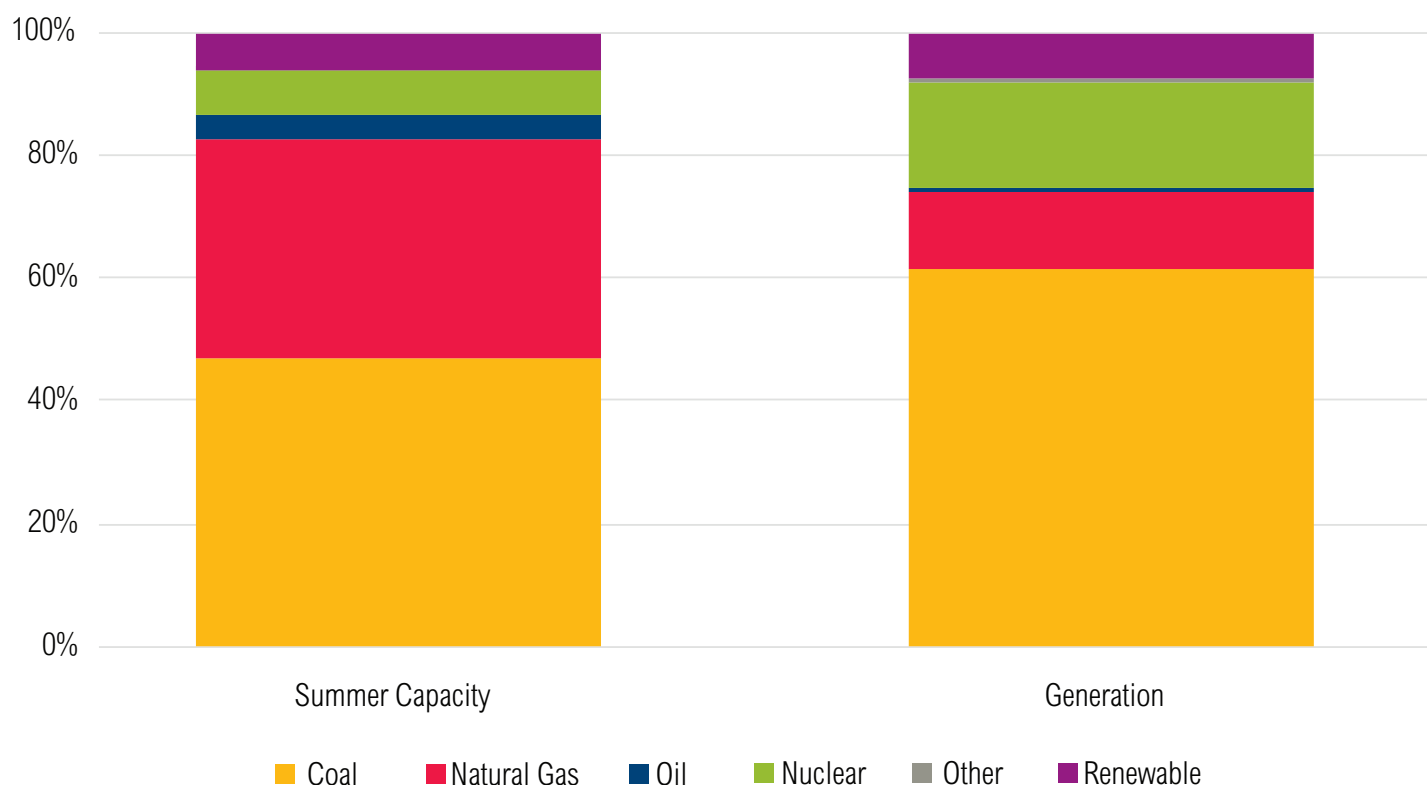
Achieving reductions beyond those required by the CPP through efficiency could help the state generate extra emission credits to trade with other states.

2. INCREASING RENEWABLE GENERATION

Wisconsin's renewable portfolio standard requires 10 percent of the electricity sold in the state to be generated by renewable sources by 2015.³² This goal was reached in 2013 and utilities have sufficient renewable assets and credits to remain in compliance at least through 2020.³³ According to EIA data, wind capacity nearly doubled between 2008 and 2011, but growth has stagnated since then as utilities have come into compliance with the RPS.³⁴

Wisconsin's neighbors are demonstrating that much greater levels of renewables are possible—Iowa has reached nearly 30 percent of generation from renewables, Minnesota has reached 20 percent toward a standard of 26.5 percent by 2025, and Illinois has a bipartisan proposal to reach 30 percent by 2030.^{35,36} Five other states—California, Colorado, Maine, New York, and Vermont—have adopted renewable standards of about 30 percent or greater.³⁷

Figure 2 | Wisconsin Generation and Generating Capacity by Fuel, 2013



Continuing to scale up its renewable development beyond current RPS requirements could help Wisconsin comply with the CPP and capture local economic benefits. According to the American Wind Energy Association, by 2014 Wisconsin's wind industry generated over \$1 billion in investments within the state and \$2 million per year in lease payments to local landowners.³⁸ The Union of Concerned Scientists found that increasing the RPS to 25 percent by 2025 could generate over \$2 billion in new capital investment, over \$600 million in lease payments to landowners, and over 2,500 new jobs.³⁹ Scaling up renewable development can also help keep more of Wisconsin's spending on power production within the state. Wisconsin imports all of its coal from other states, spending an average \$880 million per year from 2008–13. And the price per short ton that the state's utilities pay to import coal is on the rise, growing 20 percent over the same time period.⁴⁰

3. INCREASING USE OF EXISTING NATURAL GAS PLANTS

According to data from the U.S. Energy Information Administration, the capacity factor of Wisconsin's existing combined cycle natural gas fleet was only 31 percent in 2013—meaning that these plants generated much less electricity than they are capable of producing. As a result, natural gas comprised only 12 percent of total generation in 2013, even though it comprised nearly 26 percent of total generating capacity in the state (Figure 2).⁴¹ Increasing the capacity factor of these existing units to 75 percent—together with Wisconsin's existing clean energy policies—could help the state cut power sector emissions. For illustrative purposes, we show the effects of emissions under a 75 percent maximum capacity factor (Figure 1). The state will need to consider issues associated with increased combined cycle natural gas output, including potential transmission or pipeline constraints and impacts on winter heating costs.⁴²

4. INCREASING COAL PLANT EFFICIENCY

Existing coal plants can increase their efficiency through refurbishment and improved operation and maintenance practices.^{43,44} In developing the final CPP, EPA found that coal plants could significantly increase their efficiency by improving operations to return to the best performance they have achieved in the past. By comparing average coal plant heat rates in 2012 to their best demonstrated performance between 2002 and 2012, EPA estimated that the coal fleet could achieve average efficiency improvements of 2.1–4.3 percent across interconnection regions, or about 4 percent nationwide.⁴⁵

EPA expects that these improvements can largely be achieved through application of no- or low-cost best practices—for example, operations and maintenance improvements, replacing worn seals and valves, and cleaning equipment—and will not require equipment upgrades. However, upgrades can be used to comply with the rule. While there are high up-front costs associated with refurbishing existing coal units, the resulting increase in unit efficiency will lead to annual fuel savings.⁴⁶ Some plants could also decrease their emission intensity by co-firing with natural gas, using the igniters that are already built into many existing pulverized coal boilers.⁴⁷

Increasing the efficiency of Wisconsin’s existing coal fleet by an average 4.3 percent starting in 2022, the potential improvement rate that EPA identified for the eastern interconnection, could help Wisconsin cut its power sector emissions. Wisconsin already improved the efficiency of its coal fleet by 2.6 percent between 2012 and 2014, largely due to shifting generation from lower efficiency to higher efficiency units.⁴⁸

5. OTHER COMPLIANCE OPTIONS

The compliance options we modeled in our analysis illustrate the reductions the state could achieve using its clean energy policies and existing power plants. Because of the flexibility in the CPP, Wisconsin could take advantage of a mix of strategies to meet its target, including those we modeled and other measures to increase use of low-carbon generation options and improved efficiency. For example, states can use new nuclear generation to help meet their Clean Power Plan targets, an option Wisconsin could pursue if it passes proposed legislation to lift the ban on construction of nuclear plants.⁴⁹

In addition to using individual policies, states also can take broader approaches to reduce emissions, including joining a cap-and-trade program or implementing a carbon tax. As previously discussed, market-based approaches can help reduce compliance costs while generating revenue for the state.

OUTLOOK FOR WISCONSIN

Even with the stay on the Clean Power Plan, Wisconsin has every reason to move forward with its transition to a lower-carbon power sector. The state's renewable and energy efficiency policies are already driving investment in clean energy technologies and saving money for the state's residents while reducing power sector CO₂ emissions. By being proactive, Wisconsin can scale up these benefits and get a head start toward CPP compliance. Weakening its clean energy policies—as the state legislature did by reducing funding for Focus on Energy—will reduce these benefits and make compliance with the CPP more costly.

Box 3 | About the Series

In *Delivering on the U.S. Climate Commitment*, WRI identified ten key actions the Obama administration must take in the absence of congressional action in order to meet the U.S. commitment to reducing greenhouse gas (GHG) emissions by 26–28 percent below 2005 levels by 2025. These actions include setting performance standards for existing power plants, reducing consumption of hydrofluorocarbons, reducing fugitive methane emissions from natural gas systems, and increasing energy efficiency. Of these ten actions, the greatest opportunity for reductions comes from the power sector. In his Climate Action Plan, President Obama directed EPA to work expeditiously to finalize carbon dioxide (CO₂) emission standards for new power plants and adopt standards for existing power plants. As states prepare to comply with these standards, it will be necessary to understand available opportunities for reducing CO₂ emissions from the power sector. This series of fact sheets aims to shed light on these opportunities by illustrating the potential for CO₂ emission reduction in a variety of states. We show how these emissions savings stack up against the reductions required under the Clean Power Plan. This series is based on WRI analysis conducted using publicly available data. See the appendix for additional information on our methodology and modeling assumptions.^a

Note:

a. World Resources Institute. 2015. *How States Can Meet Their Clean Power Plan Targets*. Appendix A: Detailed Overview of Methods. Washington, DC: World Resources Institute.

Together with more efficient use of existing power plants, Wisconsin's existing clean energy policies can achieve 63 percent of the reductions required to meet its CPP target. The state can make up the gap that remains, and go well beyond its target, through a variety of measures, including expanding these policies in line with what other states are achieving. In doing so, Wisconsin can develop its own clean energy economy rather than supporting other states' economies through purchase of credits. Adopting EPA's new source complement standard would further incentivize zero-carbon generation sources and ensure that future CO₂ emissions from the state's power sector do not increase in the future.

POLICY FRAMEWORK AND INTERACTION

This analysis provides a technically feasible range of emissions reductions; it is not an economic analysis. We assume the existing policies and other reduction opportunities discussed in the text are fully implemented. Depending on the combination of measures actually implemented by Wisconsin, each will have different impacts on the generation mix and resulting emissions. For example, renewable energy standards result in fewer emissions reductions in this analysis than if considered in isolation because energy efficiency standards reduce the total generation upon which the renewable standards are applied. The emissions reductions presented in the text are a result of each policy applied in the following sequence: (1) energy efficiency improvements applied to business-as-usual generation; (2) increased combined heat and power capacity (in the expanded policies pathway); (3) increased renewable generation applied to the resulting adjusted generation; (4) increased use of existing combined cycle natural gas units; and (5) increased efficiency of any remaining coal units. For consistency with EPA's approach, we include only the existing fossil fleet as part of our business-as-usual projections, and only new renewable generation and energy efficiency measures put into place after 2012.

ENDNOTES

1. Because AEO2015 does not include state-level projections, we relied on regional projections of annual electricity generation growth rates by fuel for Wisconsin's electricity projections. Because neighboring states have varying policies that will affect future in-state generation differently, these regional projections may not fully capture all the relevant trends that are expected to occur within the state's power sector.
2. While AEO2015 does not explicitly model state efficiency standards, its projections do capture some of the effects of efficiency programs through regional demand trends. We estimate the amount of efficiency embedded in our BAU projections using a methodology developed by EPA and Synapse (<http://epa.gov/statelocalclimate/documents/pdf/EPA%20background%20and%20methodology%20EE_RE_02122014.pdf>; <<http://www.synapse-energy.com/project/state-energy-efficiency-embedded-annual-energy-outlook-forecasts>>). See appendix for details. The emission reductions listed here reflect the efficiency from meeting Wisconsin's efficiency goal that is additional to the efficiency embedded in the BAU projections.
3. States can choose to develop an implementation plan based on either the mass- or rate-based target. Wisconsin would not need to meet the rate-based target if it chooses to use a mass-based target.
4. The current Focus on Energy contract specifies savings in terms of net electricity savings, requiring savings of 2 TWh over the four-year period 2015–18.
5. Public Service Commission of Wisconsin. Memorandum, July 1, 2015, 2014 Renewable Portfolio Standard Summary Report.
6. Our analysis also finds that meeting its clean energy policies without taking other actions to reduce emissions can get Wisconsin 28 percent of the reductions required to meet its rate-based emissions standard.
7. Our analysis also finds that increasing the use of its existing natural gas plants—in addition to its clean energy policies—can get Wisconsin 55 percent of the reductions required to meet its rate-based emissions standard.
8. Our analysis also finds that improving coal plant efficiency together with all other measures can get Wisconsin 62 percent of the reductions required to meet its rate-based emissions standard.
9. For more information, see: <<http://yosemite1.epa.gov/EE/epa/eed.nsf/6058a089548635578525766200639df3/f9c8c8a37d6aab6f8525774200597f421OpenDocument>>.
10. This estimate of annual revenue from a \$10 carbon price uses Wisconsin's interim and final mass-based targets between 2022 and 2030. Revenue in any given year will be higher or lower, depending on the response to the carbon price.
11. Analysis Group. 2011. "The Economic Impacts of the Regional Greenhouse Gas Initiative on Ten Northeast and Mid-Atlantic States." Accessible at: <http://www.analysisgroup.com/uploadedfiles/content/insights/publishing/economic_impact_rggi_report.pdf>; Analysis Group. 2015. "The Economic Impacts of the Regional Greenhouse Gas Initiative on Nine Northeast and Mid-Atlantic States." Accessible at: <http://www.analysisgroup.com/uploadedfiles/content/insights/publishing/analysis_group_rggi_report_july_2015.pdf>.
12. For more information see: <<http://emp.lbl.gov/sites/all/files/total-cost-of-saved-energy.pdf>>.
13. <<https://www.focusonenergy.com/sites/default/files/Evaluation%20Report%202014%20-%20Volume%20I.pdf>>
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15. EPA modeling of the CPP estimated that electricity bills for the average American will be 7–7.7 percent lower in 2030 due to changes in the average electricity price and demand.
16. Clean Wisconsin. 2015. "Clean Power Plan in Wisconsin." Accessible at: <<http://www.cleanwisconsin.org/wp-content/uploads/2015/12/Clean-Power-Plan-for-Wisconsin-Report-December-2015.pdf>>.
17. Calculated using EIA data on the quantity and cost of coal shipments to electric utilities by state for 2008 through 2013 (<http://www.eia.gov/coal/data.cfm>).
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22. Susan F. Tierney. 2015. "How to Examine the U.S. Energy Information Administration's Report: Analysis of the Impacts of EPA's Clean Power Plan." Testimony Before the U.S. House of Representatives Committee on Science, Space and Technology, Subcommittee on the Environment and Subcommittee on Energy. Accessible at: <http://www.analysisgroup.com/uploadedfiles/content/news_and_events/news/tierney_testimony_house_science_and_technology_committee_6-22-2015.pdf>. Analysis Group. 2015. "Electric System Reliability and EPA's Clean Power Plan: Tools and Practices." Accessible at: <http://www.analysisgroup.com/uploadedFiles/Content/Insights/Publishing/Electric_System_Reliability_and_EPAs_Clean_Power_Plan_Tools_and_Practices.pdf>.
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39. Union of Concerned Scientists. 2010. *Raising the Bar in Wisconsin*. Accessible at: <http://www.ucsusa.org/assets/documents/clean_energy/Wisconsin-renewable-portfolio-standard.pdf>. The economic data presented here assumes no Canadian imports of hydropower.
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ABOUT WRI

World Resources Institute is a global research organization that turns big ideas into action at the nexus of environment, economic opportunity and human well-being.

Our Challenge

Natural resources are at the foundation of economic opportunity and human well-being. But today, we are depleting Earth's resources at rates that are not sustainable, endangering economies and people's lives. People depend on clean water, fertile land, healthy forests, and a stable climate. Livable cities and clean energy are essential for a sustainable planet. We must address these urgent, global challenges this decade.

Our Vision

We envision an equitable and prosperous planet driven by the wise management of natural resources. We aspire to create a world where the actions of government, business, and communities combine to eliminate poverty and sustain the natural environment for all people.

Our Approach

COUNT IT

We start with data. We conduct independent research and draw on the latest technology to develop new insights and recommendations. Our rigorous analysis identifies risks, unveils opportunities, and informs smart strategies. We focus our efforts on influential and emerging economies where the future of sustainability will be determined.

CHANGE IT

We use our research to influence government policies, business strategies, and civil society action. We test projects with communities, companies, and government agencies to build a strong evidence base. Then, we work with partners to deliver change on the ground that alleviates poverty and strengthens society. We hold ourselves accountable to ensure our outcomes will be bold and enduring.

SCALE IT

We don't think small. Once tested, we work with partners to adopt and expand our efforts regionally and globally. We engage with decision-makers to carry out our ideas and elevate our impact. We measure success through government and business actions that improve people's lives and sustain a healthy environment.