



# HOW ILLINOIS CAN MEET ITS CLEAN POWER PLAN TARGETS

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## WHAT DOES THE CLEAN POWER PLAN MEAN FOR ILLINOIS?

In August 2015, the 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 electricity infrastructure (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, 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 District of Columbia Circuit Appeals Court, which will hear arguments on the merits of the case on June 2nd. It is likely that any ruling by the D.C. Circuit 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 to 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 Illinois 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 CPP’s politics.

This fact sheet shows how Illinois can harness economic opportunities in clean energy and in doing so put the state in a position to meet or exceed CPP standards. Illinois’s existing clean energy policies are an important tool to reduce carbon dioxide (CO<sub>2</sub>) emissions from the state’s power plants. However, limitations in implementing the state’s clean energy policies are leaving the state’s full efficiency and renewable energy potential untapped. Updating and expanding the state’s clean energy policies will put Illinois in a great position to make significant emission reductions while harnessing the potential economic benefits of investing in more renewable energy and energy efficiency. In addition, it would allow the state to meet, or even surpass, its 2030 target should the CPP remain intact.

## WHAT DOES THE CLEAN POWER PLAN REQUIRE FOR POWER PLANTS IN ILLINOIS?

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 CO<sub>2</sub> 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).

Illinois can choose one of the following three targets:

- **Emission rate target for existing sources:** 1,245 pounds per megawatt-hour (lbs./MWh) in 2030, a reduction of 42 percent below the state’s 2012 power sector emission rate of 2,149 lbs./MWh.
- **Mass-based target for existing sources:** 66.5 million short tons of CO<sub>2</sub> in 2030, which is about 35 percent lower than the state’s power sector CO<sub>2</sub> emissions in 2012.
- **Mass-based target for new and existing sources:** 67.2 million short tons of CO<sub>2</sub> in 2030, which is about 34 percent lower than the state’s power sector CO<sub>2</sub> emissions in 2012.

The percent reductions are calculated using an adjusted 2012 baseline that includes the CO<sub>2</sub> emissions and generation from fossil plants that were operating or under construction by January 8, 2014, and so are affected by the Clean Power Plan, consistent with EPA’s methodology.

## HOW ILLINOIS’S POWER PLANTS CAN MEET—OR EXCEED—THE CLEAN POWER PLAN REQUIREMENTS

Illinois’s power plants have reduced their CO<sub>2</sub> emissions by about 3 percent between 2005 and 2012,<sup>1</sup> due in large part to using more natural gas and renewables and less coal to generate electricity. This has resulted in a 1 percent decrease in the state’s fossil emission rate—a measure of the carbon-intensity of its fossil-fuel fired electricity generation—calculated based on the methods in EPA’s Clean Power Plan. However, CO<sub>2</sub> emissions are expected to increase without additional policy action. According to our business-as-usual (BAU) projections, based in part on the U.S. Energy Information Administration’s (EIA) *Annual Energy Outlook 2015* (AEO2015), existing power plant emissions in the state are expected to grow by 10 percent from 2012 to 2030 due to increased demand.<sup>2</sup>

If Illinois adopts the existing source-only standard and then builds new natural gas plants, it could emit even more CO<sub>2</sub> emissions than our estimated BAU projections if EPA does not enforce protections to prevent leakage (that is, shifting generation from existing to new plants). Adopting EPA’s new source complement standard (see Box 2) would further incentivize zero-carbon generation sources and ensure that future CO<sub>2</sub> emissions from Illinois’s power sector do not increase.

## CO<sub>2</sub> REDUCTIONS FROM EXISTING CLEAN ENERGY POLICIES AND POWER PLANTS

Illinois can achieve significant reductions by following through on its existing renewable energy and efficiency standards. However, several barriers (described below) are preventing the state’s utilities from achieving their full energy efficiency and renewable energy targets. Taking these barriers into account, Illinois’s existing clean energy policies could reduce the state’s emissions by 18 percent below 2012 levels by 2030, achieving over half of the reductions necessary to meet its mass-based emission target.<sup>3</sup> Additional reductions could be achieved by increasing re-dispatch from coal to existing combined

cycle natural gas (NGCC) plants or increasing coal plant efficiency, although the state would still fall short of meeting its mass-based target in 2030.

If the state decides to adopt EPA's rate-based target, complying with its existing clean energy policies while making better use of its existing fossil power plants would allow Illinois's plants to reduce their average emission rate by 42 percent below their 2012 emission rate to 1,240 lbs. per MWh in 2030,<sup>4</sup> meeting the state's rate-based target of 1,245 lbs. per MWh.

#### ■ IMPROVING ENERGY EFFICIENCY

The state's existing efficiency standard requires utilities to implement programs that help customers reduce energy use by 0.2 percent annually starting in 2008, ramping up to 2 percent annually starting by 2015. However, these savings are subject to a spending cap, and utilities were recently authorized to achieve an average 1.4 percent of their previous year's sales as opposed to the 2 percent standard.<sup>5</sup> In addition to the reductions captured in Illinois's business-as-usual projections, maintaining existing measures and policies that help achieve the current level of efficiency savings (1.4 percent) can achieve 23 percent of the reductions required to meet both of the mass-based targets.<sup>6</sup>

#### ■ INCREASING USE OF RENEWABLE ENERGY

Illinois has a renewable energy standard in place requiring 25 percent of the electricity sold by its investor-owned utilities to come from renewables by 2025. However, alternative retail electric suppliers<sup>7</sup> must meet half of the requirement by paying alternative compliance payments instead of investing in renewable generation or purchasing renewable energy credits. These payments are supposed to go toward purchasing renewable energy or credits, but this is not occurring.<sup>8</sup> Combined with the reductions already captured in our business-as-usual projections and the current level of efficiency savings, the state's current renewable energy program can achieve 53–54 percent of the reductions required to meet both of the mass-based targets (assuming that half of the state's alternative retail electric supplier requirements are not being met).<sup>9</sup>

#### □ INCREASING THE USE OF EXISTING NATURAL GAS PLANTS

Illinois's most efficient natural gas plants—combined cycle units—ran at 18 percent of their capacity in 2013, which is much lower than they were capable of producing. Running existing (and those already under construction as of January 2014) NGCC plants at 75 percent—in addition to the measures above—can achieve 68–70 percent of the reductions required to meet both of the mass-based targets.<sup>10</sup>

#### □ INCREASING COAL PLANT EFFICIENCY

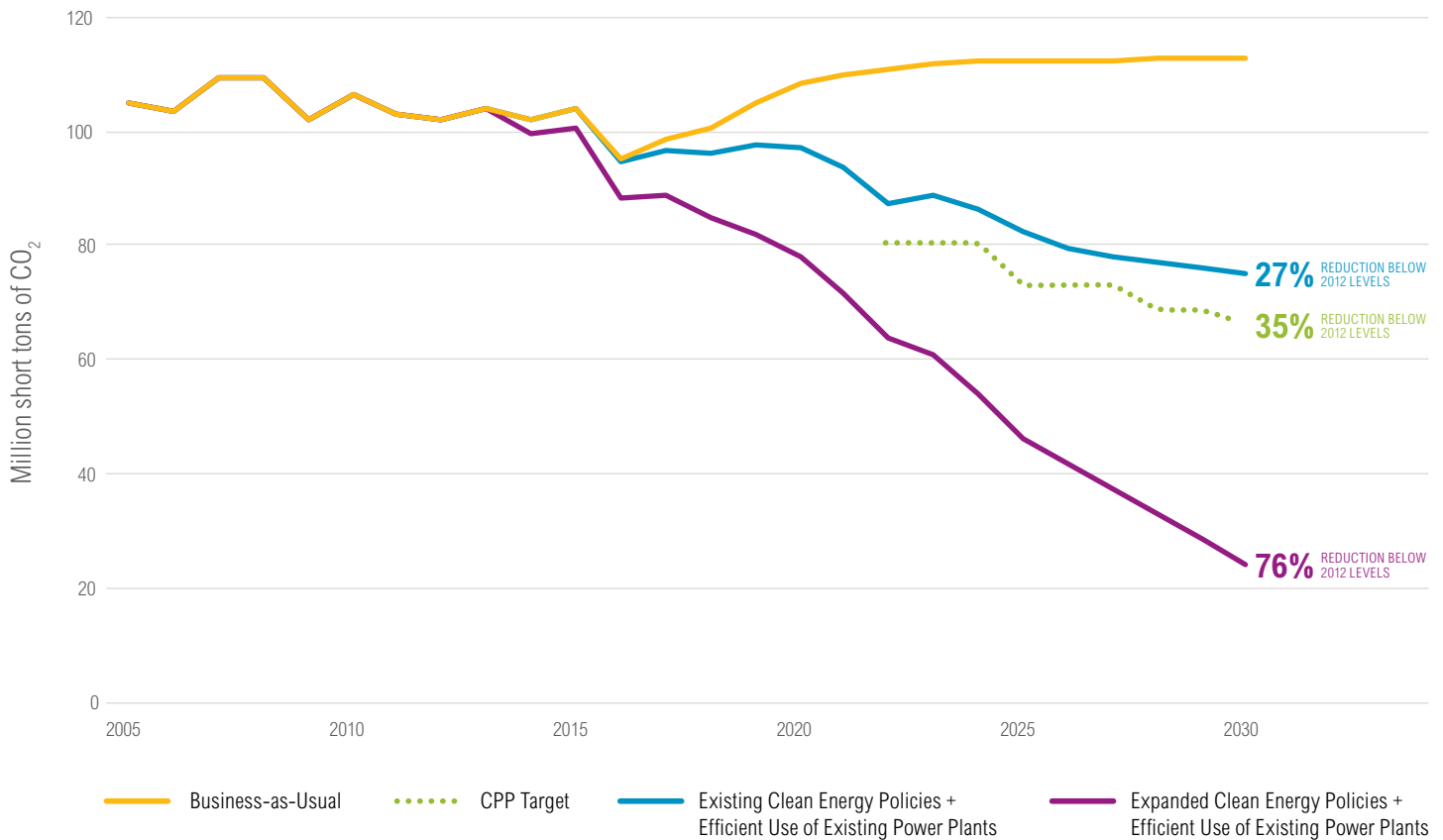
Operational improvements that increase the average efficiency of the remaining coal fleet by 4.3 percent beginning in 2022, together with the measures above, would allow Illinois to achieve 76–77 percent of the reductions required to meet both of the mass-based targets.<sup>11</sup>

## CO<sub>2</sub> REDUCTION OPPORTUNITIES USING EXPANDED CLEAN ENERGY POLICIES

Illinois could meet—or even exceed—its mass-based target for existing plants by increasing its clean energy targets in addition to addressing the current barriers that are limiting energy efficiency and renewable energy development. These actions could be achieved by adopting the bipartisan Clean Jobs Bill, which was introduced in the Illinois legislature in February 2015.<sup>12</sup> By taking the following actions in addition to the power plant opportunities listed above (increased NGCC utilization and coal plant efficiency), the state could reduce existing power plant emissions 76 percent below 2012 levels by 2030, roughly doubling the required reductions under a mass-based target:

- Starting in 2018, ramp up the efficiency target so that utilities achieve cumulative energy savings of 20 percent by the end of 2025, relative to average annual electricity sales from 2014 through 2016. Utilities should only be limited to capturing efficiency opportunities that will result in net benefits after taking into account both the full costs and benefits of the efficiency programs.
- Extend and expand the existing renewable target so that 35 percent of the state's sales (excluding electric cooperatives and municipal utilities) are met with renewable energy by 2030. All alternative compliance payments should be used to purchase renewable energy credits.

Figure 1 | Existing Power Plant Emission Pathways for Illinois



Note: This figure depicts the Clean Power Plan’s interim and 2030 mass-based targets for Illinois’s affected power plants (CPP target). Consistent with EPA’s calculation of the 2012 emissions baseline, our business-as-usual pathway includes emissions from both an NGCC and a coal plant starting in 2012, even though the plants were not yet online. Because they were under construction by January 2014, they are counted as existing sources for the purposes of the CPP and their emissions are included starting in 2012. (See endnote 1 for more information.) The existing clean energy policies + efficient use of existing power plants pathway shows emissions from affected plants after implementing the state’s clean energy policies (energy efficiency and renewable energy targets) and making better use of the state’s existing power plants (increasing generation of the existing NGCC fleet, which includes the two NGCC plants that were under construction as of January 2014, and improving the efficiency of existing coal plants). The expanded clean energy policies + efficient use of existing power plants pathway shows emissions after expanding the state’s clean energy policies and removing existing barriers to implementation and making better use of existing power plants. These pathways do not account for potential credits that Illinois could generate by taking early action under the Clean Energy Incentive Program.

Taking these actions would allow Illinois to surpass its rate-based target by reducing the emission rate of its existing fossil fleet to 345 lbs. per MWh if it opted for a rate-based approach. Since the CPP makes it easy for states to trade carbon allowances or emission rate credits, Illinois could benefit by going beyond the required reductions and be in a position to export its allowances or credits to other states with compatible plans. Illinois also could 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.

On the other hand, if Illinois did not expand its clean energy policies or remove some of the barriers toward their implementation, but implemented its existing policies along with the infrastructure opportunities listed above, it would achieve only 78 percent of the reductions required to meet either of its 2030 mass-based targets.<sup>13</sup> This would leave the state’s existing plants with a shortfall of allowances (equating to 13–14 million short tons of CO<sub>2</sub>), which they would have to make up using other measures or by purchasing allowances from out-of-state units.

**Box 1 | Overview of EPA's Final Clean Power Plan**

The power sector is the leading source of carbon dioxide (CO<sub>2</sub>) 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 low price of natural gas, increased penetration of renewable energy, and the combined effects of increased energy efficiency and the recession in electric sales. 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 CO<sub>2</sub> emission reductions by 2030. States have the option to comply with either

rate-based (lbs. CO<sub>2</sub> per megawatt-hour) targets for existing fossil plants or mass-based (short tons of CO<sub>2</sub>) 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 the 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 switch-

ing, 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, 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. Importantly, 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 CO<sub>2</sub> 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 CO<sub>2</sub> 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 remain relatively flat, reaching 17 percent below 2005 levels by 2030. Specifically, EPA's projections estimate less coal-fired generation and more natural gas and renewable generation in 2030 than EIA's projections.*

## HOW ILLINOIS CAN MAXIMIZE THE ECONOMIC BENEFITS OF THE CLEAN POWER PLAN

As we have shown, Illinois can achieve almost 80 percent of the reductions necessary to meet its mass-based CPP target by following through on its existing clean energy policies and making better use of its existing power plants. Looking forward, Illinois can develop an implementation plan that maximizes the economic benefits to the state and achieves the emission reductions necessary to cost-effectively comply with the CPP. The proposed Clean Jobs Bill would not only remove current barriers that are prohibiting the state from achieving its energy efficiency and renewable energy targets, but also authorize the Illinois Environmental Protection Agency to implement

a cap-and-invest program or other similar market-based mechanism to regulate the state's CO<sub>2</sub> emissions. 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 emission 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 non-market approaches to regulation.<sup>14</sup>



## 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. CO<sub>2</sub>/MWh) or a mass-based target (in short tons of CO<sub>2</sub>). 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 for compliance. 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 by using

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.<sup>a</sup> Studies in the Southwest Power Pool, PJM, and MISO regions have found that regional compliance would be the most cost-effective option.<sup>b</sup>

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.<sup>c</sup>

### ■ 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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2. Revenues from allowance auctions or a carbon fee can be used to accomplish other policy objectives such as reducing the tax burden on Illinois or making productive public investments. Applying a carbon price of \$10 per ton to the power plant emissions allowed under Illinois's mass-based target for its existing plants would provide average annual revenues of over \$730 million.<sup>15</sup> 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 coal industry workers. It could also be used to make further investments in energy efficiency to help lower household and business electricity bills and reduce wholesale electricity costs. 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.<sup>16</sup> States that want to maximize their potential revenue stream might find adopting EPA's new source complement standard attractive, as they would not need to devote additional resources and/or portions of their allowance budget to addressing leakage concerns.
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 Illinois 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 ton, over \$300 million in revenues could flow into the state per year on average between 2022–30 if it expanded its clean energy goals as specified in the Clean Jobs Bill and increased its use of the state's existing natural gas fleet and sold 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 areas across the economy. If the energy efficiency programs are less expensive than electricity generation—as the empirical evidence indicates many of them are<sup>17</sup>—electricity prices should fall, leaving Illinois residents with more income to spend, save, or invest.

The investments needed to move toward a low-carbon future will strengthen Illinois'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—as explained above, there are ways to offset some of these costs. In the long term, these investments are likely to pay off. The state's residents will spend far less of their income on electricity thanks to improvements in efficiency and the low operating costs of renewable energy.<sup>18</sup> Analysis by the Union of Concerned Scientists found that implementing the renewable and efficiency policies in the Clean Jobs Bill would save consumers \$2.6 billion in lower electricity and fuel costs cumulatively through 2030.<sup>19</sup> Depending on the investments the state makes, electricity rates may even decrease—Advanced Energy Economy found that compared to a business-as-usual scenario in 2030, electricity rates decrease by 0.15 cents per kWh under a scenario where the Clean Jobs Bill is enacted, the existing nuclear fleet remains online, and output from the existing natural gas fleet increases while output from the existing coal fleet significantly decreases.<sup>20</sup>

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—in 2014, the wind and solar industries employed 7,800 people in Illinois.<sup>21</sup> 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 Illinois's residents. According to a Risky Business report, continued warming could include the following effects on Illinois's economy:<sup>22</sup>

- Some counties in Illinois will likely see average commodity crop losses up to 18 to 24 percent each year over the next 5–25 years due to extreme heat without significant adaptation by farmers.
- By 2020–2039, Illinois could see economic gains of just over \$1 billion per year due to increased yields, or losses of over \$2.6 billion per year due to decreases in crop productivity, especially for corn and soybeans. Over the longer term, the state is likely to lose \$1.5 to \$13 billion per year from crop losses alone by 2100.
- Energy costs in the Chicago area could increase by 6–22 percent due to extreme heat.

In addition to helping combat climate change, lowering the carbon intensity of the power sector in Illinois will lead to reductions in harmful local air pollutants. According to EPA, exposure to pollutants—including particulate matter, nitrogen oxides, and sulfur dioxide—can lead to respiratory issues or heart and lung diseases.<sup>23</sup> Reducing these emissions will make for a healthier work force that spends less on medical bills.

## 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.<sup>24</sup> 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. 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 (FERC) 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.<sup>25</sup> Analyses of the proposed Clean Power Plan have shown that compliance is unlikely to affect reliability because of these standard practices and the flexibility inherent in the rule.<sup>26</sup> FERC recently proposed guiding principles and standard practices to grid operators on how to incorporate reliability into CPP modeling.<sup>27</sup> 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.<sup>28</sup> PJM, a regional transmission organization whose footprint includes a portion of northern Illinois, found that it could handle 30 percent variable renewable penetration with no reliability issues as long as adequate additions in transmission and regulation reserves were made.<sup>29</sup>

## OPPORTUNITIES IN DETAIL

Illinois has multiple opportunities to move toward a modern, lower-carbon power sector and comply with the Clean Power Plan in more detail, including increasing (1) energy efficiency, (2) renewable energy, (3) use of existing natural gas power plants, and (4) coal plant efficiency.

### 1. ENERGY EFFICIENCY OPPORTUNITIES

In 2007, Illinois enacted an energy efficiency resource standard requiring annual electricity savings ramping up to 1 percent in 2012 and 2 percent in 2015 and each year thereafter.<sup>30</sup> The standard is subject to a rate impact cap, which limits how much customers can be charged to offset program implementation costs. If utilities demonstrate that efficiency programs will increase their customers' per-kWh electricity charges more



than 2 percent, annual electricity savings goals may be lowered.<sup>31</sup> To meet their savings goals, Illinois's utilities offer a variety of energy saving programs to their customers, including rebates, financing options, and energy assessments. The Natural Resources Defense Council estimates that the energy efficiency standard will save customers \$500 million per year starting in 2015, ramping up to over \$1 billion per year in 2025.<sup>32</sup> The state's Illinois Energy Now program—which is available to public facilities and low-income entities located within the Ameren and ComEd electrical service areas—created over 17,000 jobs between 2008–14, leading to \$585 million in energy cost savings over the lifetime of the efficient equipment installed.<sup>33</sup>

Ramping up the state's investment in energy efficiency consistent with the Clean Jobs Bill (20 percent cumulative energy savings by the end of 2025) could lead to even more savings. A recent analysis by the Union of Concerned Scientists found that this level of savings could generate about \$12 billion in consumer electricity savings between 2015 and 2030, reducing the average monthly residential electricity bill by \$10 in 2020 and \$22 in 2030.<sup>34</sup>

## 2. RENEWABLE ENERGY OPPORTUNITIES

Illinois's renewable portfolio standard (RPS) requires 25 percent of the electricity sold by its investor-owned utilities to be procured from renewable sources by 2025.<sup>35</sup> To the extent that it is available, at least 75 percent of the requirement each year must be met with wind and, by 2015, 6 percent of the requirement must be met with solar. According to EIA data, renewable generating capacity in Illinois has grown in recent years, from 1.8 GW in 2009 to over 3 GW in 2013. Renewable energy development has been good for the state—Illinois State University's Center for Renewable Energy found that the 23 largest wind farms in the state (totaling 3,335 MW of nameplate capacity) will generate a total economic benefit of almost \$6 billion during the construction and 25-year operational lives of the projects.<sup>36</sup> However, no new wind projects were completed between 2013–15.<sup>37</sup> Furthermore, a significant amount of the state's renewable target is not even being met, even after considering the use of renewable energy credits.

Under the current standard, alternative retail electric suppliers (businesses that supply electricity to retail customers in a competitive market separate from an electric utility, electric cooperative, or municipal

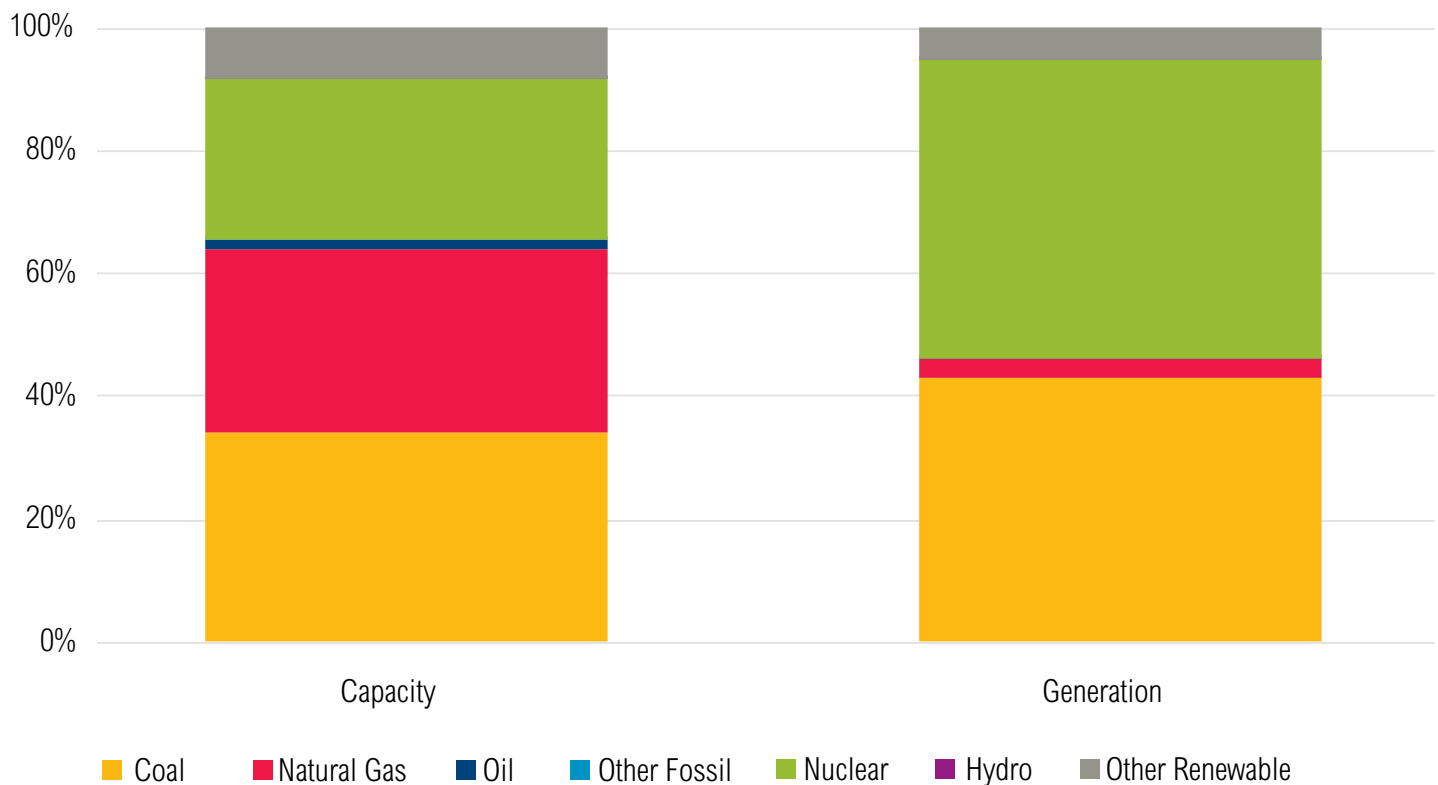
system) must meet half of their requirement by paying alternative compliance payments instead of investing in renewable generation or purchasing renewable energy credits. The state's alternative compliance payment fund should then be used by the Illinois Power Agency to buy renewable energy or credits for the state's investor-owned utilities. However, these utilities have been able to easily meet their renewable targets since their customer bases have decreased dramatically as a result of the 2010 "municipal aggregation" law, which allows cities, towns, and counties to leave their current utility and seek another electricity supplier.<sup>38</sup> As a result, the Illinois Power Agency has not needed to purchase additional renewable energy credits. In addition, the fund has been used by the state for needs other than renewable energy procurement, given Illinois's budget crisis.<sup>39</sup> Given these current barriers, the state is procuring close to 40 percent less renewable energy than required. If these barriers persist, renewable procurement is likely to be much lower than the 25 percent required by 2025.

The proposed Clean Jobs Bill will help Illinois achieve the full extent of its renewable target by ensuring that all alternative compliance payments will be used to purchase renewable energy credits. It will also extend and expand the existing target so that by 2030, the state procures 35 percent of its electricity from renewable sources. By doing so, the Union of Concerned Scientists found that \$226 million would be added to the state's economy annually through renewable energy operating and maintenance expenditures and lease payments to landowners.<sup>40</sup>

## 3. INCREASING THE USE OF EXISTING NATURAL GAS PLANTS

According to EIA data, the capacity factor of Illinois's existing combined cycle natural gas (NGCC) fleet was 18 percent in 2013—meaning that these plants generated far less than the amount of electricity they are capable of producing.<sup>41,42</sup> As a result, natural gas comprised 3 percent of the state's generation, while it comprised 30 percent of total generating capacity (Figure 2). Invenenergy's Nelson Energy Center NGCC plant was under construction as of January 2014 (coming online in 2015) and is counted as part of Illinois's existing fossil fleet under the Clean Power Plan, giving the state even more opportunity to utilize its existing gas fleet over higher-carbon generation. Increasing the capacity factor of these existing units to 75 percent—together with Illinois's existing clean energy policies—could help the state cut power sector emissions.<sup>43,44</sup>

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



Note: Figure 2 does not include the capacity and generation of the two “under construction” power plants—one NGCC plant and one coal plant—EPA includes in Illinois’s baseline.

#### 4. INCREASING COAL PLANT EFFICIENCY

Existing coal plants can increase their efficiency through refurbishment and improved operation and maintenance practices.<sup>45,46</sup> 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 ranging from 2.1 to 4.3 percent in the different interconnection regions.<sup>47</sup>

EPA expects that these improvements can largely be achieved through application of low-cost best practices (e.g., operations and maintenance improvements; replacing worn seals and valves; 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.<sup>48</sup> In addition, some plants could decrease their emissions intensity by co-firing with natural gas using the igniters that are already built into many existing pulverized coal boilers.<sup>49</sup>

Increasing the efficiency of Illinois’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 Illinois achieve over half the reductions required under its mass-based target when implemented with existing clean energy policies and increasing use of natural gas.

## OUTLOOK FOR ILLINOIS

Even with the stay on the Clean Power Plan, Illinois has every reason to move forward with its transition to a low-carbon power sector. By being proactive, Illinois can get a head start, enabling it to capture economic benefits to the state that could result from increased investment in energy efficiency and renewable energy. The state has already put policies in place that have the potential to increase the state's use of energy efficiency and renewable energy. However, current barriers are preventing these policies from being fully implemented, such as the cost cap on its efficiency program and failing to use alternative compliance payments for renewable energy procurement. Should the stay on the Clean Power Plan be lifted, Illinois would not only need to make better use of existing fossil plants, but also remove these existing barriers in order to meet its CPP targets. The state can do this by implementing the Clean Jobs Bill, which

### 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 (CO<sub>2</sub>) 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 CO<sub>2</sub> emissions from the power sector. This series of fact sheets aims to shed light on these opportunities by illustrating the potential for CO<sub>2</sub> emission reductions 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.<sup>a</sup>

#### Notes:

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.

would also expand Illinois's energy efficiency and renewable energy targets. Going beyond the state's current clean energy targets could allow Illinois to surpass the Clean Power Plan targets for its existing power plants. This has the potential to create higher revenue streams for the state, given the potential for in-state plants to sell excess CO<sub>2</sub> allowances to units in other states looking for the most cost-effective ways to meet their own emissions standards. Adopting EPA's new source complement target would further incentivize zero-carbon generation sources and ensure that future CO<sub>2</sub> emissions from the state's power sector do not increase, without needing to rely on EPA's leakage protections.

However, failing to remove the barriers to the state's clean energy policies, or failing to expand their targets, would likely put Illinois in a position to have to purchase allowances from other states in order to comply with its CPP targets, subsidizing other states' clean energy economy instead of its own. By expanding its clean energy policies, Illinois would put itself in a position to be ahead of the game when EPA is able to move forward with regulating carbon pollution from power plants. At the same time, the state would be able to scale up the benefits from these policies, reduce the need to invest in other states' power sectors, and achieve deeper carbon emission reductions more cost-effectively.

## POLICY FRAMEWORK AND INTERACTION

This analysis assumes the existing policies and other reduction opportunities discussed in the text are fully implemented. Depending on the combination of measures actually implemented by Illinois, each will have different impacts on the generation mix and resulting emissions. For example, renewable energy standards result in fewer emission 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 emission 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 renewable generation applied to the resulting adjusted generation; (3) increased use of existing combined cycle natural gas units; and (4) 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. We adjusted Illinois's 2012 emission levels for existing fossil plants to account for the state's new NGCC and coal plants, which were operating or under construction by January 2014 (Nelson Energy Center natural gas combined cycle plant and Prairie State Generating Station coal plant). EPA counts these plants as existing sources and includes the generation and emissions from these plants under Illinois's baseline and compliance fossil emission rate and emission levels. Historical emission levels from: U.S. Energy Information Administration. 2014. *Annual Energy Review*. Accessible at: <[http://www.eia.gov/electricity/data/state/emission\\_annual.xls](http://www.eia.gov/electricity/data/state/emission_annual.xls)>.
2. Because AEO2015 does not include state-level projections, we relied on regional projections of annual electricity generation growth rates by fuel for Illinois'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. We adjusted our projections based on AEO2015 to include the re-firing of the Joliet coal plant to natural gas in 2016 (<http://www.power-eng.com/articles/2015/10/illinois-epa-oks-air-permit-for-joliet-coal-to-gas-conversion.html>).
3. While AEO2015 does not explicitly model state efficiency standards, its projections do capture some of the effects of these 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://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 A for details. The emission reductions listed here reflect the additional efficiency from Illinois's standard that is not embedded in the BAU projections. Renewable energy standards are explicitly modeled in AEO2015; however, for purposes of our analysis we assume that the standards are met through in-state generation and adjust renewable projections accordingly. This results in 2–7 TWh of additional renewable generation per year beyond business-as-usual projections between 2014 and 2030.
4. This result does not consider increased generation at Illinois's existing nuclear fleet, which could be used as a compliance option.
5. Union of Concerned Scientists. 2015. "Achieving Illinois's Clean Energy Potential." Accessible at: <http://www.ucsusa.org/sites/default/files/attach/2015/04/achieving-illinois-clean-energy-potential-technical-appendix.pdf>.
6. Our analysis finds that achieving annual energy savings of 1.4 percent can get Illinois 66 percent of the reductions required between 2012 and 2030 in order to meet its rate-based emissions standard under the Clean Power Plan.
7. Illinois defines "alternative retail electric supplier" as a business (like resellers, aggregators, and power marketers) that sells electricity to retail customers in a competitive retail market separate from an electric utility, electric cooperative, or municipal system. See: Illinois Public Utility Act. Accessible at: <<http://www.ilga.gov/legislation/ilcs/ilcs4.asp?ActID=1277&ChapterID=23&SeqStart=35100000&SeqEnd=39400000>>.
8. The state's alternative compliance payment fund should be used by the Illinois Power Agency to buy renewable energy or credits for the state's investor-owned utilities. However, these utilities have been able to easily meet their renewable targets since their customer bases have decreased dramatically as a result of the 2010 "municipal aggregation" law, which allows cities, towns, and counties to leave their current utility and seek another electricity supplier. Additionally, the fund can be used by the state for needs other than renewable energy procurement. For more information, see: Kari Lydersen. 2013. "Fix for Illinois renewable energy law faces utility opposition." *Midwest Energy News*. Accessible at: <<http://midwestenergynews.com/2013/05/20/fix-for-illinois-renewable-energy-law-faces-opposition-from-utilities/>>. Kevin Borgia. "Inside Illinois: Can the State Fix its Broken RPS?" *NA Wind Power*. Accessible at: <[http://www.nawindpower.com/issues/NAW1504/FEAT\\_01\\_Inside-Illinois-Can-The-State-Fix-Its-Broken-RPS.html](http://www.nawindpower.com/issues/NAW1504/FEAT_01_Inside-Illinois-Can-The-State-Fix-Its-Broken-RPS.html)>.
9. Our analysis also finds that Illinois's current renewable energy program (in addition to the reductions already captured in our business-as-usual projections and the current level of efficiency savings being achieved) can achieve 85 percent of the reductions required between 2012 and 2030 in order to meet its rate-based emissions standard under the Clean Power Plan.
10. Our analysis also finds that running existing NGCC plants at 75 percent—together with meeting its clean energy targets—can get Illinois 96 percent of the way toward meeting its rate-based emissions standard.
11. Our analysis also finds that with increasing coal plant efficiency together with all other measures, Illinois can meet its rate-based emissions standard.
12. State of Illinois, 99th General Assembly, 2015 and 2016, SB1485. Accessible at: <<http://ilga.gov/legislation/99/SB/PDF/09900SB1485lv.pdf>>. Illinois Clean Jobs Coalition. 2015. "Lawmakers Introduce Bipartisan Bill Strengthening Renewable Energy, Energy Efficiency Standards To Create Tens Of Thousands Of Jobs." Accessible at: <<http://wbnmjdd.wpengine.com/wp-content/uploads/2015/03/Lawmakers-introduce-bipartisan-bill-strengthening-renewable-energy-energy-efficiency-standards-to-create-tens-of-thousands-of-jobs.pdf>>.
13. This figure is calculated assuming the state's utilities achieve 1.4 percent annual energy savings instead of the state's target of 2 percent and that alternative retail electric suppliers make alternative compliance payments to meet half of their renewable energy target, which do not go toward buying renewable energy.
14. Accessible at: <<http://yosemite1.epa.gov/EE/epa/eed.nsf/6058a089548635578525766200639df3/f9c8c8a37d6aab6f8525774200597f42!OpenDocument>>.
15. This estimate of annual revenue from a \$10 carbon price uses Illinois's interim and final mass-based targets between 2022 (80.4 million short tons of CO<sub>2</sub>) and 2030 (66.5 million short tons of CO<sub>2</sub>). Revenue in any given year will be higher or lower, depending on the response to the carbon price.

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27. FERC Staff White Paper on Guidance Principles for Clean Power Plan Modeling Docket No. AD16-14-000. Accessible at: <<http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14123779>>.
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32. Estimates prepared by the American Council for an Energy Efficient Economy for the Natural Resources Defense Council in 2011. Accessible at: <[http://switchboard.nrdc.org/blogs/rstanfield/today\\_illinois\\_senate\\_presiden.html](http://switchboard.nrdc.org/blogs/rstanfield/today_illinois_senate_presiden.html)>.
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41. WRI estimates based on data from U.S. Energy Information Administration, EIA-923 Generation and Fuel Data. Accessible at: <<http://www.eia.gov/electricity/data/eia923/>>. EIA-860 Annual Electric Generator Data. Accessible at: <<http://www.eia.gov/electricity/data/eia860/>>.
42. We did not account for the increases in methane associated with the increased production of natural gas due to higher demand for the fuel. Going forward, industry should work with EPA to reduce methane leakage rates from natural gas systems. For additional information, see these WRI publications: "Reducing Methane Emissions from Natural Gas Development: Strategies for State-level Policymakers." Accessible at: <<http://www.wri.org/publication/reducing-methane-emissions-natural-gas-development-strategies-state-level-policymakers>>. "Clearing the Air." Accessible at: <<http://www.wri.org/publication/clearing-the-air>>.
43. Our estimate of potential generation from NGCC units includes all existing units listed in the EIA-860 database. NGCC units are designed to be operated up to 85 percent capacity (see [http://mitei.mit.edu/system/files/NaturalGas\\_Chapter4\\_Electricity.pdf](http://mitei.mit.edu/system/files/NaturalGas_Chapter4_Electricity.pdf)), but actual maximum capacity factors may differ among units. For illustrative purposes, we assume a conservative maximum capacity factor of 75 percent. The state will need to consider issues associated with increased NGCC output including potential transmission or pipeline constraints and impacts on winter heating costs.
44. We did not account for the increases in methane associated with the increased production of natural gas due to a higher demand for the fuel. Going forward, industry should work with EPA to reduce methane leakage rates from natural gas systems. For additional information, see: <<http://www.wri.org/publication/clearing-the-air>> and <<http://www.wri.org/publication/reducing-methane-emissions-natural-gas-development-strategies-state-level-policymakers>>.
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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.



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