

Meeting the Clean Power Plan in Illinois

A Robust Pathway for Securing a Clean Energy Future

HIGHLIGHTS

The Clean Power Plan presents a historic opportunity to reduce global warming pollution from the U.S. electricity sector. The plan sets state-specific targets for cutting power plant carbon pollution, leading to a nationwide reduction of approximately 32 percent below 2005 levels by 2030. It also provides a valuable near-term opportunity to accelerate the transition to a clean energy future—already under way in Illinois—by spurring investment in greater amounts of renewable energy and energy efficiency.

New analysis by the Union of Concerned Scientists shows that strengthening Illinois' clean energy policies, together with a robust carbon emissions trading program, provides a cost-effective pathway for the state to not only cut global warming emissions but also deliver significant health and economic benefits for all of its residents.

The Clean Power Plan (CPP), finalized in August 2015 by the U.S. Environmental Protection Agency (EPA), sets the nation's first-ever limits on carbon dioxide (CO₂) emissions—the primary contributor to global warming—from power plants (see Box 1, p. 2). Each state is assigned its own goal for reducing such emissions, and Illinois' is 35 million tons,¹ or 34 percent below 2012 levels, by 2030² (EPA 2015a).

Illinois is well positioned to meet this target, given its current transition from coal generation and its growing investments in renewable energy and energy efficiency. New analysis by the Union of Concerned Scientists shows that accelerating this transition to clean energy constitutes a cost-effective pathway, or what we call the “Clean Path Case,” for Illinois. This course toward a clean energy future will not only help cut global warming emissions but also reap significant health and economic benefits for all Illinoisans.

For example, our Clean Path Case will:

- Yield nearly 6,000 megawatts (MW) of new wind and solar capacity in Illinois by 2030, which could stimulate \$6.3 billion in new capital investments
- Save more than \$2.6 billion cumulatively through 2030 from reduced fuel and other costs due to the state's renewable energy and energy efficiency policies
- Reduce the typical state household's electricity costs by 9.4 percent in 2030 compared with a Reference Case, or an annual savings of \$100
- Generate \$603 million in average annual revenue from 2022 to 2030 from the sale of carbon allowances
- Provide health and economic benefits through 2030—by decreasing CO₂, sulfur dioxide (SO₂), and nitrogen oxides (NO_x) pollution—worth some \$14.3 billion cumulatively



Illinois has developed more than 3,800 megawatts of wind capacity as of September 2015—ranking it fifth nationally—and has another 250 MW under construction. Increased renewable energy development will help the state meet Clean Power Plan targets while also generating economic benefits.

Illinois' Clean Energy Transition

Coal and nuclear power currently dominate Illinois' power sector (Figure 1, p. 4); in 2014, coal provided 40 percent of the state's electricity generation while nuclear power accounted for 52 percent (EIA 2015a). Most of the state's remaining generation came from wind, solar, and other renewable energy sources (5.7 percent) and natural gas (1.9 percent) (EIA 2015a).

As in many other states, the economic competitiveness of Illinois' aging and inefficient coal power plants is in decline. Insufficient pollution controls to protect public health, together with increasing competition from cleaner lower-cost alternatives such as natural gas, renewable energy, and energy efficiency, are leading to coal plant retirements across the country (Cassar 2015; Fleischman et al. 2013). In Illinois, five coal generators representing 1,293 MW of capacity were retired between 2012 and 2015, and retirement in 2016 for an additional four coal generators (1,816 MW) has been announced (SNL Financial 2015).

As Illinois slowly moves away from coal, investments in the state's diversity of renewable energy resources are increasing. With 3,842 MW of wind capacity installed

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through September 2015, Illinois ranked fifth in the nation, and it has another 250 MW under construction (AWEA 2015). Through 2014, the wind industry has injected \$7.2 billion of capital investment into Illinois' economy, provided \$10.7 million per year in lease payments to landowners, and supported some 4,000 jobs (including many in wind-turbine component manufacturing at 39 facilities in the state) (AWEA 2015). And while Illinois has installed only 50 MW of solar power (EIA 2015a), with more than 3,480 jobs in the solar industry in 2015, it ranked 14th nationally (Solar Foundation 2016).

BOX 1.

The Clean Power Plan

The CPP, developed by the EPA under the authority of the federal Clean Air Act, aims to reduce CO₂ emissions from the U.S. electricity sector—the nation's largest contributor to such global warming emissions—by an estimated 32 percent below 2005 levels by 2030. The EPA set differing targets among the states, however, because each state has a unique mix of electricity generation resources—and also because local technological feasibility, cost, and emissions-reduction potential vary across the country.

The plan provides a number of options for cutting carbon emissions so that each state can develop a compliance strategy most suited to its own electricity-supply mix, resource availability, and policy objectives. These options include investing in renewable energy, energy efficiency, natural gas, or nuclear power, while shifting from coal-fired power. States are free to combine these carbon-reduction options in a flexible manner to meet their targets. States can also join together in multistate or regional agreements to find the lowest-cost options for reducing their CO₂ emissions, including through emissions trading programs.

The EPA has given states a choice between a rate-based emissions target (measured in pounds of CO₂ per megawatt-hour

of electricity generated) and a mass-based target (measured in short tons of CO₂ emitted by generating units). To avoid undermining the environmental integrity of the target, states must also address the potential for “leakage,” or emissions that might arise because of a shift from existing to new fossil fuel-fired power plants (which are not covered under the CPP). One way that the EPA suggests the states should address leakage is through the adoption of a mass-based target with a “new-source complement,” which represents an increase in a state's emissions target based on an estimate of new power plants required to meet additional electricity demand after 2012. A mass-based target that includes CO₂ emissions from both new and existing power plants is the most straightforward way of bringing all power plants under an emissions cap and ensuring an accurate accounting of the emissions that contribute to climate change.

States must submit a final compliance plan, or an initial plan with a request for an extension of up to two years, by September 6, 2016. However, a February 2016 Supreme Court ruling put a stay on CPP implementation until legal challenges to the rule have been resolved. States may continue to develop their compliance plans in the interim.

One of the primary drivers of wind and solar development in Illinois has been the state's renewable portfolio standard (RPS)—a 2007 requirement that investor-owned utilities and other electricity suppliers derive 25 percent of their power from renewable sources by 2025. Twenty-eight other states have also adopted RPS policies, which have proven to be one of the most successful and cost-effective means for stimulating renewable energy growth in the United States (Heeter et al. 2014).

Despite setting one of the nation's most ambitious renewable energy targets, Illinois is not meeting it because the current RPS fails to address a key barrier to development: the inability of utilities to engage in long-term planning for energy-resource investments. The state's electricity market structure, which allows consumers to choose their electricity provider, creates uncertainty about the size of each supplier's future electricity sales, thereby limiting utilities' ability to make long-term commitments to renewable energy. Consequently, renewable energy development in Illinois has largely stagnated in recent years, even though the state has abundant and cost-effective wind and solar resources.

Illinois has also promoted energy efficiency in homes and businesses as another effective and affordable strategy for shifting from carbon-intensive fossil fuels. In 2007, the state adopted an energy efficiency portfolio standard (EEPS) that requires investor-owned utilities to ramp up efficiency programs over time to reduce electricity demand by 2 percent per year in 2015. Between 2008 and 2014, Illinois invested \$1.2 billion in energy efficiency, which in 2014: (1) saved homes and businesses enough electricity to power 4.7 million homes and enough natural gas to heat 2.3 million homes for a year (ILSAG 2015); and (2) lowered statewide retail electricity sales by 1.08 percent. Because of this success, Illinois was ranked 10th nationally for its efficiency programs by the American Council for an Energy Efficiency Economy (Gilleo et al. 2015).

How Illinois Can Meet Its Clean Power Plan Goals

Under the CPP, Illinois' 2030 target is for the state's power sector (old and new power plants combined) to produce total emissions in that year that are 34 percent lower than in the baseline year of 2012. In terms of mass, this overall target translates into a series of annual targets: 75.6 million tons on average in the interim period from 2022 through 2029, and 67.2 million tons in 2030 (EPA 2015b).

Illinois is well positioned to cost-effectively achieve its overall target by investing in many of the CPP's carbon-reduction options (as described in Box 1) and by participating



Solar panels adorn a building roof in downtown Chicago. Accelerating the growth of renewable energy to help meet the state's emissions reduction targets will also reduce electricity bills for residents and businesses.

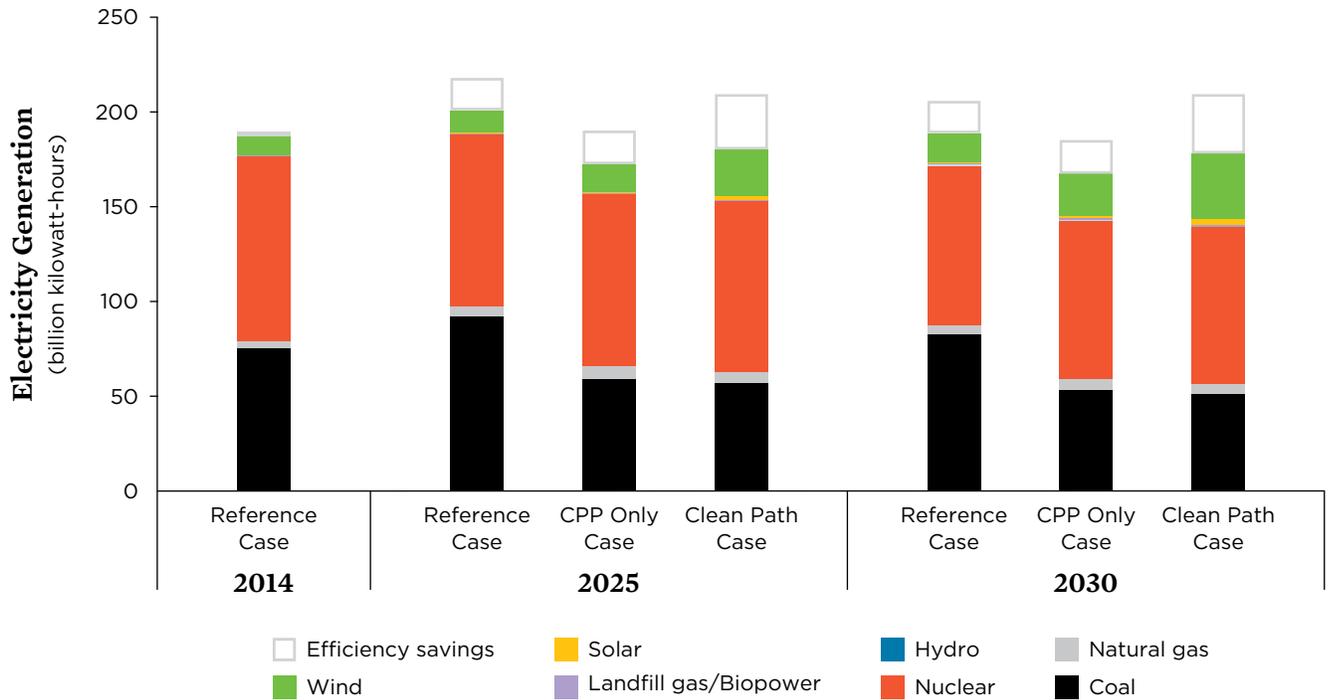
with other states in a well-designed emissions trading program. Administering such a program by auctioning off emission allowances would also allow Illinois to generate revenues that could be used to benefit all of its residents. Further, by complementing its CPP compliance plan with strengthened policies that support renewable energy and energy efficiency, Illinois could accelerate its clean energy transition while increasing consumer, economic, and public health benefits.

The Union of Concerned Scientists examined the likely economic and environmental impacts of Illinois' compliance with the CPP by modeling the above combination of robust policies. We found that this approach, called the Complementary Clean Energy Compliance Pathway, or "Clean Path Case," provides greater environmental, economic, and health benefits for the state, as compared with each of two other scenarios: a "Reference Case," in which no new state or federal policies (including the CPP) are implemented beyond those in place as of October 2015; and a Clean Power Plan Compliance Pathway, or "CPP Only Case," that includes interstate trading of allowances but no additional complementary renewable energy and energy efficiency policies (see Box 2, p. 6 for more details on our methods and assumptions).

Clean Energy Policies Accelerate Illinois' Transition to Low-carbon Electricity

With the CPP and stronger renewable energy and energy efficiency policies to complement it, Illinois can accelerate its shift toward cleaner, low-carbon energy resources. Under the Reference Case scenario—that is, without these policies—both coal and natural gas generation are projected to increase

FIGURE 1. The Clean Path Case Diversifies Illinois' Electricity Mix



Clean Power Plan compliance complemented by renewable energy and energy efficiency policies (“Clean Path Case”) helps Illinois transition faster to a more diversified portfolio of cleaner energy resources. (The above figure does not include generation from combined heat and power plants in the commercial and industrial sectors.)

through 2030 (Figure 1). While renewables and energy efficiency also increase by a modest amount in the Reference Case in order to fulfill existing policies—and nuclear generation stays fixed at current levels throughout most of the forecast period³—the rise in fossil fuel–based generation results in a 21 percent increase in CO₂ emissions by 2025 and a 9 percent increase by 2030, compared with 2014 levels. The Reference Case clearly takes Illinois in the wrong direction.

By contrast, both the CPP Only Case and the Clean Path Case result in cleaner and more diversified generation mixes. Under the CPP Only Case, both renewable and natural gas generation increase—while net electricity exports from Illinois to other states decline—to replace the reduction in coal generation needed to meet the state’s emissions-reduction targets. Renewable generation rises to 17.3 percent of electricity sales in 2030 under the CPP Only Case (compared with 11.7 percent in the Reference Case), net electricity exports are 52 percent lower by 2030 than in the Reference Case, and energy efficiency investments result in

an 11 percent reduction in electricity demand by 2030 (the latter reduction occurs in the Reference Case too, as the investments are made so as to meet the state’s existing EEPS).

Even greater clean energy deployment occurs under the Clean Path Case, spurred by the stronger RPS and EEPS policies combined with the CPP. By 2030, energy efficiency savings reach 25 percent of total electricity sales, while renewables (primarily wind and solar) supply more than 30 percent of Illinois’ total sales. Coal generation is 38 percent lower than in the Reference Case by 2030, while natural gas generation is only slightly lower.

Further, as a result of its increased renewable energy and energy efficiency investments, Illinois is largely able to preserve its status as an electricity-exporting state. Under the Clean Path Case, Illinois exports 33 percent of its electricity to other states by 2030, compared with 26 percent under the Reference Case.⁴

To meet the stronger RPS under the Clean Path Case, Illinois would add 4,630 MW of new wind capacity and

1,330 MW of new solar capacity above the Reference Case by 2030. Building this new renewable energy capacity would drive a total of \$6.3 billion in capital investments in Illinois, as well as \$4.5 billion in energy efficiency improvements.⁵ As a result, total installed renewable energy capacity in Illinois would reach nearly 11,450 MW by 2030.

Despite announcements this past year about the potential early retirement of some existing nuclear plants in Illinois, our modeling projects that nuclear generation will stay fixed at current levels throughout most of the forecast period for all three cases. These results are consistent with recent modeling of complying with the CPP by the EPA (OAQPS 2015) and the Energy Information Administration (EIA) (EIA 2015b). The EIA’s projected increase in natural gas prices used in all of these models appears to provide enough of an incentive to keep existing nuclear plants in operation even under the Reference Case. Plus, an implicit or explicit price on carbon, which is needed to reduce emissions under the CPP, would provide an additional incentive to keep these plants going.

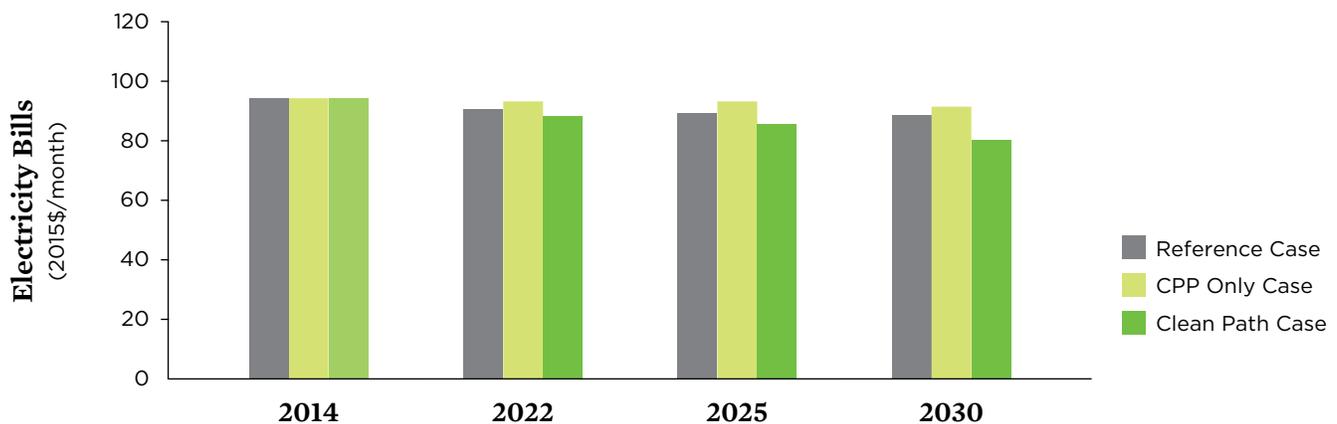
A Cleaner Energy Supply Is Affordable

The clean energy growth in Illinois spurred by the Clean Path Case is not only achievable but also affordable. The Clean Path Case policies (which focus on new renewable energy

projects, energy efficiency programs, and a price on carbon) even lead to modest customer savings over the Reference Case. The average monthly electricity bill for a typical household under the Clean Path Case is 2 percent lower than the Reference Case in 2022, amounting to an annual savings of about \$23. Savings, which grow over time under the Clean Path Case as renewables and energy efficiency ramp up to higher levels, reach \$43 per year (4 percent) by 2025 and \$100 per year (9.4 percent) by 2030 (Figure 2). Primarily as a result of greater investments in energy efficiency from a stronger EEPS, the Clean Path Case leads to greater consumer electricity bill reductions than in the CPP Only Case.

In our analysis of the three cases, we also examined some of the broader financial impacts on the electricity system in Illinois—including net effects on electricity bills for all customer classes, investments by participants in energy efficiency programs, and net costs for power generators and distributors. In 2022, there is a small net cost of \$86 million, or 0.5 percent of total electricity system costs, to implement the policies outlined in the Clean Path Case (as compared with the Reference Case). But, as in the residential example above, these policies generate financial savings over time and ultimately pay for themselves. In 2030, the net savings are \$1.4 billion, a decrease of 8.5 percent in total electricity system costs. Cumulatively from 2015 through 2030, the policies in the Clean Path Case lead to net savings for the electric system of more than \$2.6 billion.

FIGURE 2. Clean Energy Saves Illinois Residents Money



The Clean Path Case leads to consumer electricity bills in 2030 that are 9.4 percent lower on average than in the Reference Case, saving \$100 per year. Energy efficiency helps consumers save electricity, and more renewable energy helps diversify the electricity mix and limit potential impacts from increases in natural gas prices. Because of greater investments in energy efficiency from a stronger EEPS, the Clean Path Case throughout the forecast period results in greater consumer electricity-bill savings than in the CPP Only Case.⁶

BOX 2.

Methodology

We used a modified version of the Regional Energy Deployment System (ReEDS)—a power-sector model developed by the National Renewable Energy Laboratory—to analyze various possible versions of Illinois’ compliance pathway. ReEDS determines through simulation the electricity-supply mix that would meet electricity demand in the future (through 2050) throughout the contiguous United States at the lowest overall system cost while meeting reliability, environmental, and other legal requirements. The assumptions in our version of the model are based on information used by the Energy Information Administration for the *Annual Energy Outlook 2015* (EIA 2015c), supplemented by data from the recent Wind Vision and SunShot Vision studies (DOE 2015; DOE 2012). We also updated the model’s data for existing power plants to include recent retirements and plants under construction (see the technical appendix, online at www.ucsusa.org/CleanPowerPlanIllinois, for more information).

For this analysis, we first modeled a Reference Case with no new state or federal policies beyond those in place as of October 2015. Our Reference Case also does not include CPP compliance, which was finalized in August 2015. We then compared the Reference Case with two policy cases, each of which had achieved nationwide CPP compliance, and focused here on Illinois-specific results. While the CPP offers “flexible” compliance options—i.e., a wide range of potential strategy mixes—for each state (see Box 1), in our analysis we investigated just these two sets of options for CPP compliance: a Clean Power Plan Compliance Pathway—or “CPP Only Case”;

and a Complementary Clean Energy Compliance Pathway—or “Clean Path Case.”

For the CPP Only Case, we modeled the CPP mass-based targets including both existing and new fossil fuel-fired power plants (see the discussion on leakage in Box 1). We assumed that each state has the option to meet its CPP target by trading carbon allowances with any other state. We also assumed that all states, as part of their compliance strategy, invest in energy efficiency at a level that achieves an electricity-sales decrease of at least 1 percent per year from 2022 to 2030.⁷

The Clean Path Case includes the same elements as the CPP Only Case, but in addition it complements CPP compliance with policies that explicitly support renewable energy and energy efficiency.⁸ For Illinois, we assumed that the state strengthens and extends its mandatory RPS and EEPS in 2018 such that:

- Renewable generation accounts for 35 percent of electricity sales in 2030, with solar providing at least 7 percent of total renewable generation in 2030
- Energy-efficiency savings reduce electricity demand by 20 percent in 2025 (compared with average sales from 2014 to 2016) and keep load growth flat through 2030

Under the Clean Path Case, we also assume that other states with policies to support renewable energy and energy efficiency will continue them and that a few states will add policies or expand their existing requirements.

Our analysis also shows that a national mass-based emissions trading program with auctioned allowances would help Illinois generate significant revenues. By setting a carbon cap and issuing allowances equal to its CPP targets, auctioning those allowances, and participating in an interstate carbon trading program, Illinois could generate average annual revenues of \$603 million per year from 2022 to 2030

The clean energy growth in Illinois spurred by the Clean Path Case is not only achievable, but also affordable.



An analyst from Elevate Energy examines the systems at a multifamily building in Chicago to identify cost-effective energy-saving measures. A CPP compliance plan that prioritizes efficiency efforts such as this can benefit all Illinois residents.

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under the Clean Path Case. These revenues could be used to further reduce consumer electricity bills or be reinvested for the benefit of the state's residents. Investment options could include: supporting deployment of renewable energy and energy efficiency; assistance to communities to address issues of environmental justice and equity; and worker training and other support for communities adversely affected by the transition from coal.

Public Health and Economic Benefits from Less Air Pollution

Under the Clean Path Case, electricity-related CO₂ emissions in Illinois are 80 million tons in 2022 and 57 million tons in 2030, or nearly 40 percent below the Reference Case in 2030, putting Illinois well below both its interim and final targets. Cumulatively from 2016 through 2030, CO₂ emissions in the Clean Path Case are 362 million tons less than in the Reference Case. The lower CO₂ emissions directly reflect the state's cleaner generation mix (see Figure 1) spurred by renewable energy and energy efficiency policies, despite its slightly higher electricity exports. Our analysis shows that electricity suppliers in Illinois have the flexibility to take advantage both of the power market (buying or selling electricity) and of the carbon market (buying or selling carbon allowances) to provide electricity at the lowest costs for consumers while meeting the CPP targets.

In addition to reducing CO₂ emissions, both the CPP Only Case and the Clean Path Case also help cut other air pollutants—including sulfur dioxide (SO₂) and nitrogen oxides (NO_x)—primarily through the reduction in coal generation from older and inefficient plants. Under the Clean Path Case, NO_x emissions are 48 percent lower in 2030 than the Reference Case, while SO₂ emissions are 49 percent lower.

Reducing NO_x, SO₂, and CO₂ emissions leads to tangible health and economic benefits. NO_x and SO₂ are contributors to smog and soot, which exacerbate asthma and other heart and lung diseases and can result in significant disability and premature death from these causes (EPA n.d.). CO₂ emissions contribute to global warming, which leads to sea level rise, to extreme weather such as heat waves, droughts, and heavy downpours, and to other climate impacts that can impair human health and safety.

Using the same methodology applied by the EPA in its impact assessment for the CPP, we estimated the monetary savings from reducing these pollutants.⁹ The combined carbon and health dollar-benefits of the avoided emissions of CO₂, SO₂, and NO_x far outweigh the costs of complying with the CPP under both the Clean Path Case and the CPP

Only Case. Under the Clean Path Case the climate and public health benefits are nearly \$2 billion on average each year from 2015 to 2030. These benefits add up to a total of \$14.3 billion¹⁰ for the entire time period. These savings are in addition to the net financial benefits for the electric sector of more than \$2.6 billion, noted earlier.

Recommendations

Achieving the Clean Path Case's full range of benefits will require policy makers and regulators to work together with utilities, electricity generators, advocates, regional transmission organizations, and other stakeholders to develop a CPP compliance plan that prioritizes renewable energy and energy efficiency and generates benefits for Illinois. Toward these ends, the Union of Concerned Scientists offers the following recommendations:

1. **The Illinois Environment Protection Agency (IEPA) should develop a strong mass-based CPP compliance plan.** The plan should feature a comprehensive stakeholder process as well as a robust public-engagement process that includes, among others, workers and communities adversely affected by changes in the coal industry, and low-income communities and communities of color that are disproportionately affected by power plant pollution. The IEPA should prioritize renewable energy and energy efficiency in its compliance plan, and also develop a mass-based emissions trading program that includes both new and existing sources and allows for interstate trading of carbon allowances. A mass-based approach offers a lower administrative burden, has a long history of successful implementation, and provides the greatest certainty for true achievement of an emissions budget. Such an approach is also better able to incorporate additional carbon-mitigation efforts that must eventually be undertaken for other parts of the economy.
2. **The Illinois legislature should enact strong clean-energy and carbon-market policies.** The legislature should fix the state's currently broken RPS and strengthen it to achieve 35 percent renewable energy by 2030; the legislature should also strengthen its EEPS to achieve a 20 percent reduction in electricity demand by 2025, as proposed in HB 2607/SB 1485. These actions would help reestablish Illinois as a national leader in developing clean energy. The legislature should also require the state to auction carbon allowances as part of the IEPA's emissions trading program and direct the revenues to specific programs that benefit all residents.



With well-designed policies and careful planning and coordination, Illinois can greatly increase its clean energy resources, cost-effectively comply with the emissions reductions required by the Clean Power Plan, and reap important economic and public health benefits in the process.

3. **Illinois electricity providers should work to diversify their electricity portfolios, prioritizing low-cost renewables and efficiency.** These steps will help cut consumer electricity bills and further curb harmful emissions from power plants.

With well-designed policies and careful planning and coordination, Illinois could greatly enhance its clean energy resources, cost-effectively comply with the emissions reductions required by the Clean Power Plan, and reap important economic and public health benefits. And with a robust emissions trading program, Illinois could generate significant carbon revenues that could be used to support high-quality jobs in renewable energy and energy efficiency, strengthen disadvantaged communities, make buildings and infrastructure more resilient, and boost economic development in regions dependent on the fossil-fuel economy. These benefits would help ensure a sound and prosperous future for all Illinoisans.

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ENDNOTES

1. "Tons" in this document refers to the U.S. short ton (2,000 pounds).
2. Illinois' mass-based target in 2030, including both new and existing sources, is 67.2 million tons (OAR 2015a). The EPA adjusted each state's actual 2012 emissions to account for such things as significant unit-level outages and under-construction sources; as a result, Illinois' adjusted emissions level in 2012 was 102.2 million tons. Further details are available in OAR 2015b.
3. In all cases, nuclear generation in Illinois remains at current levels until 2029, when Unit 2 of the Dresden plant (867 MW) is expected to be retired after reaching a 60-year lifetime. We assumed that all existing nuclear reactors will receive one 20-year license extension from the Nuclear Regulatory Commission (NRC) to allow them to operate for 60 years. While it's possible that existing reactors could receive another license extension beyond 60 years, the NRC has approved none to date.
4. The generation mix, including the levels of imported and exported electricity, results from the model's calculations for meeting electricity demand in Illinois and across the country at least cost, subject to reliability and other constraints that are based on our assumptions (see the technical appendix, online at www.ucsusa.org/CleanPowerPlanIllinois).
5. Assuming a 7 percent discount rate, based on recommendations outlined in OMB 2014.
6. Electricity costs in the Reference Case and CPP Only Case are based on the average monthly consumption of 700 kilowatt-hours (kWh) for a typical residential customer in 2014, falling to 653 kWh in 2022 and 644 kWh in 2030 because of energy efficiency investments to meet the existing EEPS. In the Clean Path Case, average monthly consumption is yet lower (626 kWh in 2022 and drops to 579 kWh in 2030) because of stronger energy efficiency requirements.
7. The energy efficiency assumption is a proxy for state or utility action; it is needed because the ReEDs model does not include choices on energy efficiency. States with stronger mandatory Energy Efficiency Resource Standard (EERS) policies are assumed to continue meeting their respective targets.
8. The CPP also includes a Clean Energy Incentive Program (CEIP), which offers states incentives for early development of renewable energy and energy efficiency. A portion of the generation that meets the RPS and EERS/EEPS requirements we modeled in the Clean Path Case may qualify for the CEIP, but we did not model the impact of the program, or the benefits that early crediting would have on the cost-effectiveness of qualifying clean energy projects.
9. The health benefits are calculated based on Benefit per Ton Estimates for SO₂ and NO_x, reported in Tables 4-7, 4-8, and 4-9 of OAQPS 2015. See the technical appendix, online at www.ucsusa.org/CleanPowerPlanIllinois, for values and additional information.
10. This is the net present value from 2022 through 2030 using a 7 percent discount rate, based on recommendations outlined in OMB 2014.

REFERENCES

- American Wind Energy Association (AWEA). 2015. Illinois Wind Energy. Fact sheet. Online at <http://awea.files.cms-plus.com/FileDownloads/pdfs/Illinois.pdf>, accessed on January 1, 2016.
- Cassar, C. 2015. Nationwide, electricity generation from coal falls while natural gas rises. *Today in Energy*, October 7. Washington, DC: U.S. Energy Information Administration. Online at www.eia.gov/todayinenergy/detail.cfm?id=23252, accessed on December 24, 2015.
- Department of Energy (DOE). 2015. Wind vision: A new era for wind power in the United States. DOE/GO-102015-4557. Washington, DC. Online at www.energy.gov/sites/prod/files/WindVision_Report_final.pdf, accessed on December 24, 2015.
- Department of Energy (DOE). 2012. SunShot vision study. DOE/GO-102012-3037. Washington, DC. Online at www.energy.gov/sites/prod/files/SunShot%20Vision%20Study.pdf, accessed on December 24, 2015.
- Energy Information Administration (EIA). 2015a. Electric power monthly with data for August 2015. Washington, DC: Department of Energy.

- Energy Information Administration (EIA). 2015b. *Analysis of the impacts of the Clean Power Plan*. Washington, DC: Department of Energy. Online at <https://www.eia.gov/analysis/requests/powerplants/cleanplan/pdf/powerplant.pdf>, accessed on January 1, 2016.
- Energy Information Administration (EIA). 2015c. *Annual energy outlook 2015 with projections to 2040*. DOE/EIA-0383(2015). Washington, DC: Department of Energy. Online at [www.eia.gov/forecasts/aeo/pdf/0383\(2015\).pdf](http://www.eia.gov/forecasts/aeo/pdf/0383(2015).pdf), accessed on December 24, 2015.
- Environmental Protection Agency (EPA). 2015a. Carbon pollution emission guidelines for existing stationary sources: Electric utility generating units. Final rule, 40 CFR 60.
- Environmental Protection Agency (EPA). 2015b. Clean Power Plan: State at a glance: Illinois. Online at <http://www3.epa.gov/airquality/cpptoolbox/illinois.pdf>, accessed on January 1, 2016.
- Environmental Protection Agency (EPA). No date. Six common air pollutants. Online at www3.epa.gov/airquality/urbanair/, accessed on January 13, 2016.
- Fleischman, L., R. Cleetus, J. Deyette, S. Clemmer, and S. Frenkel. 2013. Ripe for retirement: An economic analysis of the U.S. coal fleet. *The Electricity Journal* 26(10):51–63. Online at www.ucsusa.org/sites/default/files/legacy/assets/documents/clean_energy/Ripe-for-Retirement-An-Economic-Analysis-of-the-US-Coal-Fleet.pdf, accessed on January 19, 2016.
- Gilleo, A., S. Nowak, M. Kelly, S. Vaidyanathan, M. Shoemaker, A. Chittum, and T. Bailey. 2015. *The 2015 state energy efficiency scorecard*, U1509. Washington, DC: American Council for an Energy-Efficient Economy. Online at www.aceee.org/research-report/u1509, accessed on December 24, 2015.
- Heeter, J., G. Barbose, L. Bird, S. Weaver, F. Flores-Espino, K. Kuskova-Burns, and R. Wiser. 2014. *A survey of state-level cost and benefit estimates of renewable portfolio standards*, NREL/TP-6A20-61042. Golden, CO: National Renewable Energy Laboratory. Online at www.nrel.gov/docs/fy14osti/61042.pdf, accessed on December 24, 2015.
- Illinois Energy Efficiency Stakeholder Advisory Group (ILSAG). 2015. The impact of energy efficiency in Illinois. Online at http://ilsagfiles.org/SAG_files/Landing_Page/SAG_Successes_Fact_Sheet_Version_1_Final_08-11-15.pdf, accessed on January 1, 2016.
- Office of Air and Radiation (OAR). 2015a. *New source complements to mass goals: Technical support document for CPP final rule*. Washington, DC: Environmental Protection Agency. Online at www.epa.gov/sites/production/files/2015-11/documents/tsd-cpp-new-source-complements.pdf, accessed on January 1, 2016.
- Office of Air and Radiation (OAR). 2015b. *CO₂ emission performance rate and goal computation: Technical support document for CPP final rule*. Washington, DC: Environmental Protection Agency. Online at www.epa.gov/sites/production/files/2015-11/documents/tsd-cpp-emission-performance-rate-goal-computation.pdf, accessed on January 1, 2016.
- Office of Air Quality Planning and Standards (OAQPS). 2015. *Regulatory impact analysis for the Clean Power Plan final rule*. Research Triangle Park, NC: Environmental Protection Agency, Office of Air and Radiation. Online at <http://www2.epa.gov/sites/production/files/2015-08/documents/cpp-final-rule-ria.pdf>, accessed on December 24, 2015.
- Office of Management and Budget (OMB). 2014. Circular A-94: Guidelines and discount rates for benefit-cost analysis of federal programs. Washington, DC.
- SNL Financial. 2015. SNL Interactive. Online at www.snl.com (paywall restricted).
- Solar Foundation. 2016. State solar jobs census 2015. Online at www.thesolarfoundation.org/fact-sheet-state-solar-jobs-census-2015, accessed on February 16, 2016.



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