

# Achieving Illinois's Clean Energy Potential

## *Stronger standards would drive investment, save consumers money, and reduce emissions*

Illinois has an opportunity to chart a course toward a truly clean energy future. State lawmakers are considering a proposal to strengthen both the state's Renewable Portfolio Standard (RPS)—to 35 percent renewable energy by 2030—and its Energy Efficiency Portfolio Standard (EEPS)—to 20 percent lower electricity use by 2025. This proposal would both fix shortcomings in the current RPS and EEPS as well as set stronger targets, reestablishing Illinois as a national clean energy leader.

The current RPS, passed in 2007, requires investor-owned utilities and other electricity suppliers to provide 25 percent of their electricity from renewable energy resources such as wind and solar by 2025. Despite setting one of the nation's most ambitious targets, the law fails to address a key barrier to renewable energy development: the ability of utilities to engage in long-term planning for energy resource investments, which would enable sustained renewable energy development. Specifically, the state's electricity market structure that allows customers to choose their electricity provider creates uncertainty about the size of each supplier's electricity sales, limiting utilities' ability to make long-term commitments to renewable energy. Consequently, renewable energy development in Illinois has largely stagnated despite the state's abundant and cost-effective wind and solar resources.

Illinois's current EEPS, also adopted in 2007, requires investor-owned utilities to reduce electricity demand by 2 percent each year (compared with the previous year's sales). Like the RPS, the EEPS has encountered barriers to successful implementation. Illinois's utilities have fallen short of the mandated targets due to statutory caps on spending that prevent utilities from securing additional cost-effective energy savings.

Though the RPS spurred an initial wave of renewable energy investment in Illinois, progress has stalled while robust development has continued in neighboring states. Likewise, Illinois's EEPS has begun to deliver on its promise of energy savings, but cost-effective energy efficiency investments cannot be fully realized under the program's existing constraints. If these policies are not fixed and strengthened, Illinois will fail to

reap the investment and economic development—as well as the consumer, environmental, and public health benefits—that clean energy can provide.

### Reestablishing Illinois as a Clean Energy Leader

The Illinois General Assembly is considering legislation that would fix the flaws in the current RPS and EEPS and strengthen the standards by extending the RPS to 35 percent by 2030 and establishing new energy savings targets under the EEPS to reduce electricity demand by 20 percent in 2025 (compared with average electricity sales from 2014 to 2016). These strengthened standards would continue to apply only to Illinois's investor-owned utilities and alternative retail energy suppliers, as under current law.

The Union of Concerned Scientists (UCS), using an electricity sector model developed by the U.S. Department of Energy, analyzed Illinois's energy future through 2030 under two policy scenarios: one in which the state's current 25 percent by 2025 RPS is fixed and fully achieved and the existing EEPS continues to be implemented under cost caps that constrain energy savings (referred to in this report as the Existing EEPS + Fixed RPS case), and a second in which the RPS is strengthened to 35 percent by 2030 and the EEPS is enhanced to achieve a 20 percent reduction in energy demand by 2025 (referred to as the Strengthened EEPS + RPS case). We also modeled a third scenario (the No Policies case) in which the state's RPS and EEPS requirements effectively end in 2014, providing a baseline by which we can better understand the potential costs and benefits of the RPS and EEPS (see page 3 for more information about our methodology).

Our analysis shows that strengthening Illinois's RPS and EEPS is both achievable and affordable, driving billions of dollars in new renewable energy and energy efficiency investments. Further, the strengthened EEPS significantly reduces the state's electricity expenditures, saving Illinois consumers billions of dollars in avoided energy costs through 2030 even after accounting for the costs of making these

investments. Compared to the No Policies case, our results show that the combined effect of a 20 percent by 2025 EEPS and a 35 percent by 2030 RPS (the Strengthened EEPS + RPS case) would:

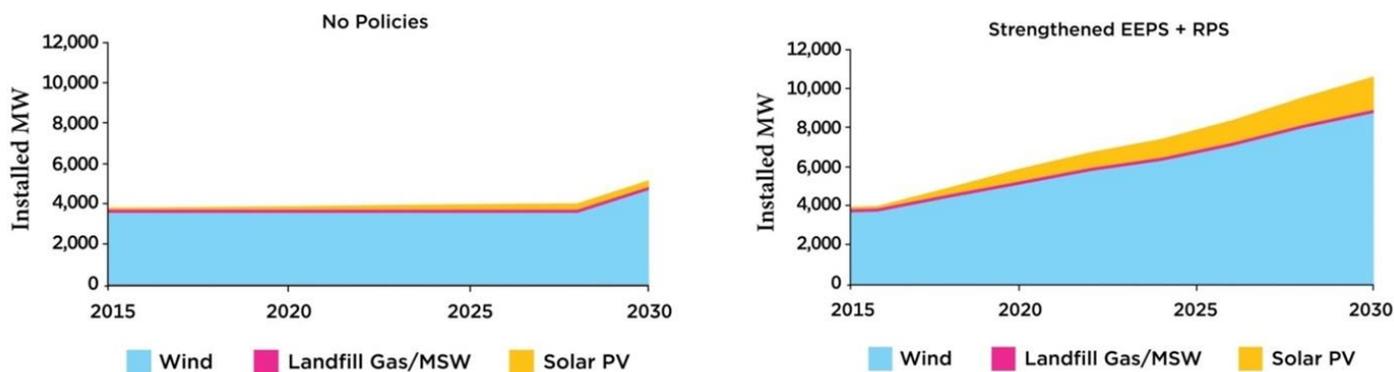
- Drive \$23 billion in clean energy investment in Illinois, consisting of \$6.3 billion in renewable energy investment and \$16.7 billion in energy efficiency investment by 2030
- Build more than 5,200 megawatts (MW) of new wind and solar power capacity in Illinois by 2030
- Generate \$12.1 billion in consumer electricity savings between 2015 and 2030
- Reduce the typical residential customer’s electricity bill by 11 percent (or \$10 per month) in 2020, and by 23 percent (or \$22 per month) in 2030
- Achieve all these benefits despite a 7.7 percent average rise in electricity rates between 2015 and 2030, because lower bills from energy efficiency savings will far outweigh higher electricity prices
- Inject \$237 million annually into Illinois’s economy, through renewable energy operating and maintenance expenditures, lease payments to landowners who host wind farms and, tax revenue to local governments.

### Driving New Clean Energy Investments in Illinois

Through 2012, renewable energy—particularly wind energy—was a success in Illinois. The more than 3,500 MW of wind capacity built in Illinois up to that point attracted more than \$7 billion in capital investment (AWEA n.d.). However, no new wind farms were built in Illinois in 2013 or 2014 due to a lack of certainty in Illinois’s energy market (AWEA 2015; AWEA 2014). As a result, Oklahoma surpassed Illinois in early 2015 as the nation’s fourth-largest wind power producer (Daniels 2015). Without a stable and predictable renewable energy market to drive ongoing investments, Illinois’s renewable energy potential will likely remain unrealized.

Our modeling results show that fixing and strengthening Illinois’s RPS would revive and accelerate growth in both wind and solar investment (Figure 1).<sup>1</sup> Under our No Policies case, renewable energy development in Illinois remains stagnant until after 2025, when just 1,145 MW of new wind capacity is added. However, when implemented concurrently with the 20 percent electricity savings under the strengthened EEPS, the 35 percent by 2030 RPS drives an additional 5,228 MW of new renewable energy capacity—nearly 3,900 MW of wind and more than 1,300 MW of solar.<sup>2</sup> With the addition of these new investments, total installed renewable energy capacity in Illinois would exceed 10,400 MW.

FIGURE 1. A Strengthened RPS Boosts Renewable Energy Development in Illinois



*Strengthening Illinois’s RPS to 35 percent by 2030, when implemented concurrently with the strengthened EEPS, would spur nearly 3,900 MW of new wind generation and more than 1,300 MW of new solar generation compared with the No Policies case.*

NOTE: Landfill gas/MSW refers to biogas captured from municipal waste in landfills.

## METHODOLOGY

UCS used the Regional Energy Deployment System (ReEDS) model developed by the U.S. Department of Energy to study Illinois's energy future under various policy pathways. ReEDS is long-term capacity-expansion model for the deployment of electric power generation technologies in the United States. ReEDS analyzes the impacts of state and federal energy policies, such as clean energy and renewable energy standards or policies for reducing carbon emissions, in the U.S. electricity sector. ReEDS provides a detailed representation of electricity generation and transmission systems and specifically addresses issues related to renewable energy technologies, such as transmission constraints, regional resource quality, variability, and reliability. For more information on our approach, read the full technical appendix available online at [www.ucsusa.org/IllinoisCleanEnergyAppx](http://www.ucsusa.org/IllinoisCleanEnergyAppx).

Development of new wind and solar power capacity under the stronger RPS would spur \$6.3 billion in new investment in Illinois through 2030 compared with the No Policies case (in

cumulative net-present-value 2013 dollars). This includes \$4.7 billion in new wind power development and \$1.6 billion in new solar energy.<sup>3</sup> When paired with the strengthened EEPS, these additional renewable energy investments can be made while staying within existing statutory rate impact caps.

The rate impact of these investments remains modest due to increasing cost advantages of clean energy technologies versus fossil fuels like coal and natural gas. In fact, the cost of wind energy dropped more than 60 percent from 2009 to 2013 (Wiser and Bolinger 2014), and solar costs declined by 40 percent from 2008 to 2012 and another 15 percent in 2013 (Barbose, Weaver, and Darghouth 2014). Because fossil fuel prices are projected to rise over time, the cost advantages of wind and solar facilities, which have no fuel costs, improve over their typical 20- to 30-year life span.

Under the existing EEPS, 4,120 MW of new renewable energy development would be needed to meet the current 25 percent by 2025 RPS compared to the No policies case. However, because the strengthened EEPS drives additional reductions in energy demand, it decreases the renewable energy needed to achieve the strengthened 35 percent by 2030 RPS. Only 1,100 MW of additional renewable energy (752 MW of wind and 356 MW of solar) would be required to meet the 35 percent by 2030 RPS under the Strengthened EEPS + RPS case (Table 1).

In addition to new capital investments, our analysis shows that the renewable energy development spurred by Illinois's

TABLE 1. New Investment in Renewable Energy and Energy Efficiency in Illinois through 2030

	Additional Renewables: Existing EEPS + Fixed RPS Case* (megawatts)	Additional Renewables: Strengthened EEPS + RPS Case* (megawatts)	Total Additional Renewables (megawatts)*	Total Investment (billions)**
Wind	3,142	752	3,894	\$4.7
Solar	978	356	1,334	+ \$1.6
RPS Totals	4,120	1,108	5,228	= \$6.3
20% EEPS Investment				+ \$16.7***
<b>Total Clean Energy Investment through 2030</b>				<b>= \$23.0</b>

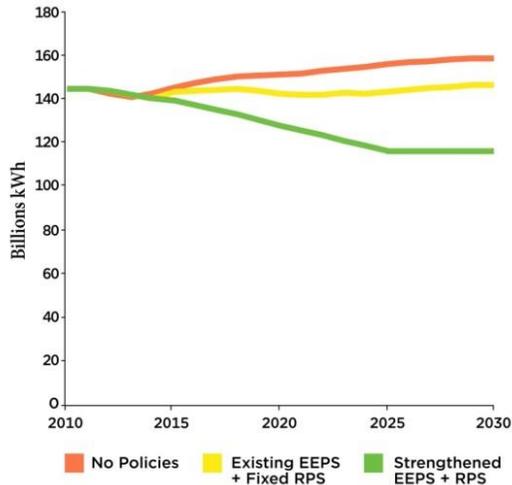
*Implementing the Strengthened EEPS + RPS would drive \$23 billion in new clean energy investment in Illinois, including \$6.3 billion in renewable energy investment and \$16.7 billion in energy efficiency investment by 2030 (in cumulative net present value 2013 dollars).*

\* Versus No Policies case.

\*\*All dollars are discounted to 2013 \$ using a 6.24% discount rate.

\*\*\* Includes both utility and participant costs, encompassing \$5.3 billion in investments to meet the existing EEPS plus \$11.4 billion in additional investments to meet the strengthened EEPS.

FIGURE 2. Strengthened EEPS Significantly Reduces Electricity Demand



Strengthening Illinois's EEPS would cut electricity consumption by more than 318 billion kilowatt-hours through 2030—more than twice the 153-billion kilowatt-hour reduction under the existing EEPS.

strengthened RPS would inject \$237 million annually into the state's economy by 2030. Local contractors who operate and maintain renewable energy facilities would receive more than \$214 million annually, while landowners who host wind projects would collect about \$12 million each year in lease payments. These facilities would also add to local tax revenues; for example, the first-year tax payments (excluding capital depreciation) from wind farms built under the Strengthened EEPS + RPS case total nearly \$11 million.<sup>4</sup>

### Strengthened Energy Efficiency Investments Further Reduce Electricity Demand

Achieving the energy savings required by the 20 percent by 2025 EEPS would drive \$16.7 billion in investments in energy-saving technologies and programs statewide—\$11.4 billion more than under the existing EEPS. These investments reflect the sum of utilities' energy efficiency program costs (47 percent of the total) and participant costs (53 percent).

Strengthening the EEPS to achieve a cumulative annual electricity demand reduction of 20 percent by 2025 (compared with average sales from 2014 to 2016) would drive significant additional energy savings compared with the existing EEPS. Under the existing EEPS spending cap, energy savings have been limited to approximately 1.35 percent of annual electricity sales rather than the 2 percent intended by the statute.

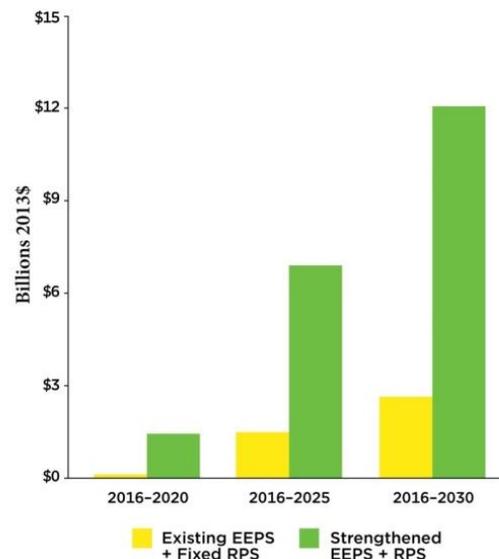
The strengthened EEPS would cut electricity consumption in Illinois homes and businesses by more than 318 billion kilowatt-hours through 2030—more than twice the savings achieved under the existing EEPS (153 billion kilowatt-hours) (Figure 2). This reduction reflects the impact of energy efficiency programs and investments in energy-saving technologies on statewide power consumption.

### Reduced Electricity Demand Delivers Savings to Consumers

Consumers across Illinois would realize significant reductions in electricity expenditures if a stronger RPS and EEPS are implemented concurrently, largely due to reductions in electricity demand driven by the strengthened EEPS. These savings occur because the cost of avoiding electricity use by investing in energy efficiency is cheaper than the cost of generating and delivering electricity to consumers.

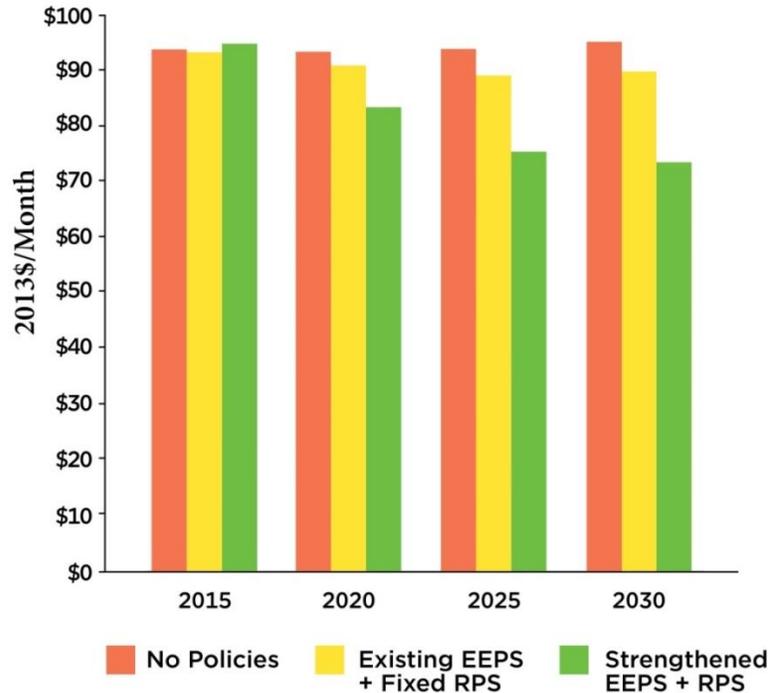
Electricity demand reductions achieved between 2016 and 2030 would result in cumulative statewide net consumer savings of \$12.1 billion compared with the No Policies case (\$12.1 billion) compared with the No Policies case (Figure 3). When compared with the \$2.7 billion saved under the Existing EEPS + Fixed RPS case, the Strengthened EEPS +

FIGURE 3. Illinois Consumers Save \$12 Billion in Avoided Electricity Spending through 2030



The Strengthened EEPS + RPS case would deliver \$12.1 billion in cumulative net savings to consumers (through avoided electricity expenditures) compared to the No Policies case, \$9.4 billion in additional savings compared to the \$2.7 billion savings under the Existing EEPS + Fixed RPS case.

FIGURE 4. Increased Clean Energy Investments Lower Consumers' Bills



Implementing the Strengthened EEPS + RPS case would reduce typical residential customers' electricity bills: by 8.4 percent in 2020 and more than 18 percent in 2030 compared with the Existing EEPS + RPS case, and by 11 percent in 2020 and 23 percent in 2030 compared with the No Policies case (assuming 700 kwh in average monthly usage).

RPS case would deliver an additional \$9.4 billion in consumer savings (all dollars are discounted to 2013 \$ using a 6.24% discount rate).

These consumer savings result from investments in new clean energy technologies; savings reflect the capital, financing, and operating and maintenance (O&M) costs associated with building and operating new renewable energy and energy efficiency technologies and programs. These savings also capture the value of avoided capital, O&M, and fuel costs resulting from reduced reliance on coal and natural gas power.

### The Bottom Line: Lower Electricity Bills

Compared to the No Policies case, the Existing EEPS + Fixed RPS case provides consumers with modest savings, lowering typical monthly residential electricity bills by 3 percent in 2020 and by 5.5 percent in 2030. On average, the typical monthly household electricity bill in 2020 would decline by nearly \$3 in 2020 and by more than \$5 in 2030 (in constant 2013 dollars). The Strengthened EEPS + RPS case, however, would deliver far greater consumer savings, lowering electricity bills by 11

percent, or more than \$10 per month in 2020, and 23 percent, or nearly \$22 per month, in 2030 (Figure 4), with consumers seeing net savings beginning in 2018. When compared to the Existing EEPS + Fixed RPS case, the Strengthened EEPS + RPS case would reduce typical residential customers' electricity bills by 8.4 percent in 2020 and more than 18 percent in 2030.

These savings are achieved despite a 7.7 percent average rise in electricity rates between 2015 and 2030 because lower bills from energy efficiency savings will far outweigh higher electricity prices. When compared with the Existing EEPS + Fixed RPS case, however, the incremental rate increase is only 4.7 percent through 2030. Lower consumer bills from reduced electricity usage far outweigh slightly higher electricity prices.

### Clean Energy Diversifies Illinois's Energy Mix and Boosts Exports

Coal and nuclear power have long dominated Illinois's power sector, producing 43 percent and 48 percent of the electricity generated in 2013, respectively, with natural gas, renewable

energy, and other minor sources comprising the remainder (EIA 2014). With the adoption of stronger clean energy policies, however, Illinois can reduce demand while boosting its production of renewable energy.

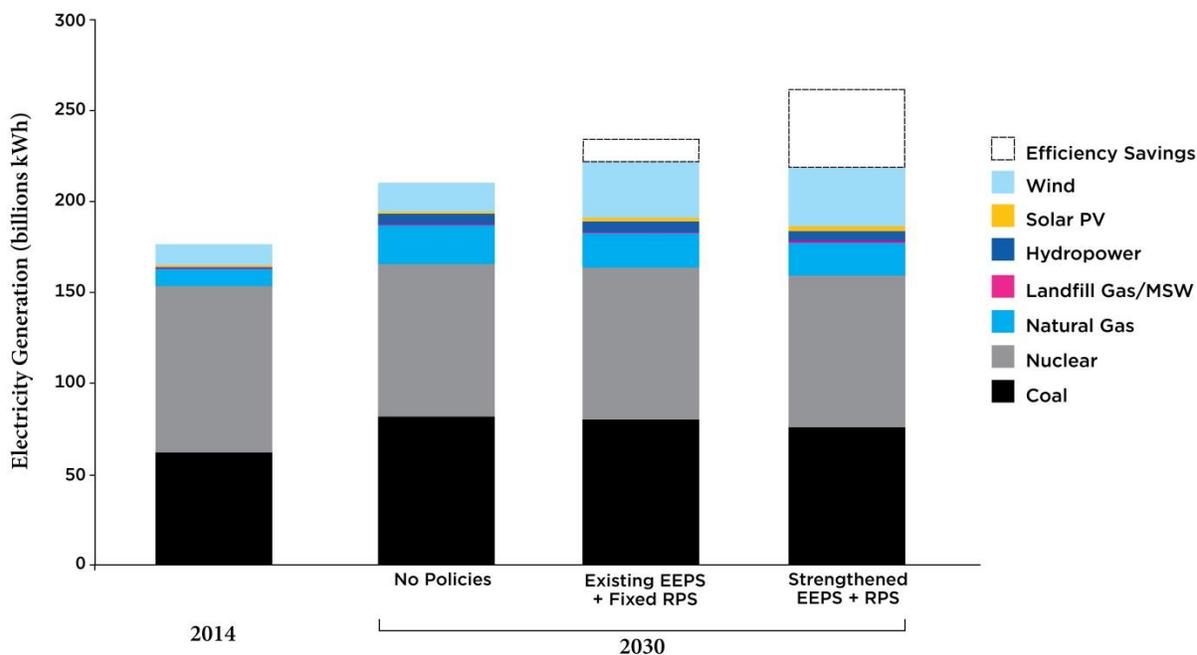
In addition, ramping-up clean energy would diversify Illinois’s energy portfolio and help reduce Illinois’s reliance on coal and natural gas imported from other states, providing a valuable hedge against rising fossil fuel prices.<sup>5</sup> In 2012, for example, Illinois imported 85 percent of the coal its power plants burned (mainly from Wyoming), sending \$1.45 billion out of the state (UCS 2014). Boosting clean energy investments could help cut coal and natural gas fuel costs for Illinois consumers.

Historically, Illinois has been a net exporter of electricity, generating more power than it needs to meet in-state demand, with excess generation exported to meet regional power needs. Our analysis shows that the clean energy investments under the Strengthened EEPS + RPS case allow Illinois to maintain sufficient electricity supplies throughout the year while contributing to a more than doubling its power exports by 2030

compared with the No Policies case (Figure 5). While energy savings under the strengthened EEPS lower in-state demand, Illinois increases its electricity exports to meet growing regional power needs, as the state’s power plants boost their output and new renewable generation is developed.

Under the No Policies case, nearly 1,500 MW of the state’s least efficient and most polluting coal plants are projected to be retired by 2030. Under the Strengthened EEPS + RPS an additional 1,300 MW of additional coal capacity in Illinois would retire. However, the state’s remaining coal plants operate at higher output levels because they remain cost-competitive in regional power markets, allowing them to help meet regional demand. Over time, these plants will either be retired as well or require upgrades to comply with regulations, reduce public health impacts and maintain safe operations. Increasing Illinois’s use of in-state renewable energy resources, while reducing demand through strengthened energy efficiency policies, will help cost-effectively replace Illinois’s aging coal fleet.

FIGURE 5. Renewable Energy and Energy Efficiency Help Diversify Illinois’s Energy Mix



While energy savings under the strengthened EEPS would lower in-state electricity demand, Illinois increases its electricity exports to meet growing regional power needs, as the state’s power plants boost their output and new renewable generation is developed.

TABLE 2. Pollution Reductions from Greater Clean Energy Investment\*

Pollutant	Existing EEPS + Fixed RPS Case	Strengthened EEPS + RPS Case
Carbon Dioxide	-2.5%	-9.3%
Sulfur Dioxide	-2.7%	-12.6%
Nitrogen Oxides	-2.4%	-9.1%

*The Strengthened EEPS + RPS case achieves greater reductions in carbon dioxide, sulfur dioxide, and nitrogen oxides through 2030 compared with the Existing EEPS + Fixed RPS case.*

\*Compared to the No Policies Case

## Clean Energy Investments Cut Carbon Pollution and Improve Air Quality

While exports increase substantially through 2030, the rise in output from Illinois’s remaining coal and natural gas power plants would be tempered by investments in renewable energy and energy efficiency under the Strengthened EEPS + RPS case. Compared to the No Policies case, total coal and natural gas generation would decline by 7.8 and 15.9 percent, respectively, through 2030, leading to a 9.3 percent reduction in carbon dioxide emissions from Illinois’s power sector (Table 2).

Further cuts in fossil fuel–fired generation and its associated carbon emissions would likely require broader policy action beyond a strengthened EEPS and RPS, such as the forthcoming regulations under the Environmental Protection Agency’s Clean Power Plan. By setting the first-ever limits on global warming emissions from power plants, the plan could prompt further switching from coal-fired power to natural gas and cleaner energy resources such as renewable energy and energy efficiency.

The investments in renewable energy and energy efficiency driven by the Strengthened EEPS + RPS case will better position Illinois to cost-effectively comply with the Clean Power Plan. Compliance could be further fostered through market-based mechanisms for achieving cost-effective carbon reductions, such as a “cap and invest” program that would create a state or regional carbon market.

The Strengthened EEPS + RPS case would deliver additional environmental and public health benefits by reducing pollutants associated with lung disease, asthma, and other respiratory ailments: sulfur dioxide would be cut by 12.6 percent in 2030 and nitrogen oxides would be cut by 9.1 percent. The electricity demand reductions driven by the

strengthened EEPS, combined with the additional output from in-state renewable resources under the strengthened RPS, deliver greater reductions of sulfur dioxide, nitrogen oxide, and carbon dioxide emissions than the Existing EEPS + Fixed RPS case.

## Recommendations

With a strengthened EEPS and RPS Illinois can cost-effectively renew its commitment to clean energy and reap greater economic, environmental, and public health benefits. The state should strengthen its EEPS to achieve a 20 percent reduction in energy demand by 2025, and fix and strengthen its RPS to achieve 35 percent renewable energy by 2030. The combination of cost-effective energy efficiency with a robust, predictable market for renewable energy development will spur economic growth, diversify the state’s electricity mix with clean energy resources, cut pollution, and provide Illinois’s consumers with significant savings.

**Steven Frenkel** is Midwest office director in the UCS Climate and Energy Program. **Alison Bailie** is an energy modeler in the program. **Sam Gomberg** is lead Midwest energy analyst in the program. **Steve Clemmer** is director of energy research in the program.

### ENDNOTES

- 1 Even under Illinois’s current RPS, some renewable energy development is likely to occur beyond 2014 levels due to external market or other forces. While we did not model Illinois’s energy future under the current RPS, recent sharp declines in renewable energy investments in Illinois suggest there will continue to be significantly less investment without legislation to address flaws in the state’s current RPS.
- 2 The ReEDS model is limited in its choice of solar resources to utility-scale solar. Small-scale solar is an input into the model based on separate analysis by the National Renewable Energy Laboratory (DOE 2012). All solar results presented in this report reflect only utility-scale solar capacity. Other economic factors and policies will impact the relative mix of utility-scale versus small-scale solar in Illinois.
- 3 Because the model is limited to utility-scale solar in its selection of solar resources, we only report the investments resulting from the build-out of utility-scale solar. These results do not fully reflect investments made to develop Illinois’s small-scale solar resources.
- 4 Tax payments are calculated using Illinois-specific valuation, assessment, and property tax values. The calculated tax payments do not reflect the impact of depreciation on tax payments.
- 5 Despite recent declines in the price of natural gas, industry and government projections predict rising fossil fuel prices over the coming decades. For this analysis, we used fuel cost projections from the U.S. Energy Information Administration (EIA). EIA’s price projections are conservative because they do not capture the historic volatility in natural gas prices.

## REFERENCES

- American Wind Energy Association (AWEA). No date. Illinois wind energy. Fact sheet. Washington, DC. Online at <http://awea.files.cms-plus.com/FileDownloads/pdfs/Illinois.pdf>, accessed February 5, 2015.
- American Wind Energy Association (AWEA). 2015. U.S. wind industry fourth quarter 2014 market report. Washington, DC. Online at [www.awea.org/4Q2014](http://www.awea.org/4Q2014), accessed February 5, 2015.
- American Wind Energy Association (AWEA). 2014. U.S. wind industry fourth quarter 2013 market report. Washington, DC. Online at [www.awea.org/4Q2013](http://www.awea.org/4Q2013), accessed February 5, 2015.
- Barbose, G., S. Weaver, and N. Darghouth. 2014. Tracking the sun VII: An historical summary of the installed price of photovoltaics in the United States from 1998–2013. Berkeley, CA: Lawrence Berkeley National Laboratory. Online at <http://emp.lbl.gov/sites/all/files/lbnl-6858e.pdf>, accessed February 5, 2015.
- Daniels, S. 2015. Illinois drops in U.S. wind power ranks. *Crain's Chicago Business*, January 28. Online at [www.chicagobusiness.com/article/20150128/NEWS11/150129792/illinois-drops-in-u-s-wind-power-ranks](http://www.chicagobusiness.com/article/20150128/NEWS11/150129792/illinois-drops-in-u-s-wind-power-ranks), accessed February 5, 2015.
- Department of Energy (DOE). 2012. *Sunshot vision study*. Washington, DC. Online at [www1.eere.energy.gov/solar/pdfs/47927.pdf](http://www1.eere.energy.gov/solar/pdfs/47927.pdf), accessed February 10, 2015.
- Energy Information Administration (EIA). 2014. State electricity profiles: Illinois. Online at [www.eia.gov/electricity/state/illinois](http://www.eia.gov/electricity/state/illinois), accessed November 15, 2014.
- Union of Concerned Scientists (UCS). 2014. Illinois's dependence on imported coal. Cambridge, MA. Online at [www.ucsusa.org/sites/default/files/legacy/assets/documents/clean\\_energy/Illinois-Coal-Imports-BCBC-Update-2014.pdf](http://www.ucsusa.org/sites/default/files/legacy/assets/documents/clean_energy/Illinois-Coal-Imports-BCBC-Update-2014.pdf), accessed April 8, 2015.
- Wiser, R., and M. Bolinger. 2014. 2013 wind technologies market report. Berkeley, CA: Lawrence Berkeley National Laboratory. Online at [http://emp.lbl.gov/sites/all/files/2013\\_Wind\\_Technologies\\_Market\\_Report\\_Final3.pdf](http://emp.lbl.gov/sites/all/files/2013_Wind_Technologies_Market_Report_Final3.pdf), accessed February 4, 2015.



FIND THIS DOCUMENT ONLINE: [www.ucsusa.org/IllinoisCleanEnergy](http://www.ucsusa.org/IllinoisCleanEnergy)

*The Union of Concerned Scientists puts rigorous, independent science to work to solve our planet's most pressing problems. Joining with citizens across the country, we combine technical analysis and effective advocacy to create innovative, practical solutions for a healthy, safe, and sustainable future.*

### NATIONAL HEADQUARTERS

Two Brattle Square  
Cambridge, MA 02138-3780  
Phone: (617) 547-5552  
Fax: (617) 864-9405

### WASHINGTON, DC, OFFICE

1825 K St. NW, Suite 800  
Washington, DC 20006-1232  
Phone: (202) 223-6133  
Fax: (202) 223-6162

### WEST COAST OFFICE

500 12th St., Suite 340  
Oakland, CA 94607-4087  
Phone: (510) 843-1872  
Fax: (510) 843-3785

### MIDWEST OFFICE

One N. LaSalle St., Suite 1904  
Chicago, IL 60602-4064  
Phone: (312) 578-1750  
Fax: (312) 578-1751