



Ohio's Clean Energy Success Story, Year 4

**The Clean Energy Law Is Getting Results
in the Buckeye State**



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November 2013

Acknowledgments

The authors thank Dan Sawmiller of the Sierra Club, Dylan Sullivan of the Natural Resources Defense Council, Sam Gomberg of the Union of Concerned Scientists, and Julian Boggs of Environment America Research & Policy Center, for their review and insightful feedback on drafts of this report. Thanks also to Tony Dutzik, Miles Unterreiner and Elizabeth Ridlington at Frontier Group for their editorial support.

Environment Ohio Research & Policy Center is grateful to Edwards Mother Earth Foundation for making this report possible.

The authors bear responsibility for any factual errors. The views expressed in this report are those of the authors and do not necessarily reflect the views of our funders or expert reviewers.

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Cover photo: West Chester Hospital saves energy and cuts costs by participating in Duke Energy's Non-Residential Smart Saver Program (Photo: West Chester Hospital); The 304 MW Blue Creek Wind Farm generates clean energy in Van Wert County, OH (Photo: Iberdrola Renewables); A 1,716 panel solar array was installed in 2012 on the field house of Kent State University in Kent, OH (Photo: *The Plain Dealer*).

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Executive Summary

Ohio's Clean Energy Law is working – spurring wind and solar projects across the state and big investments in energy efficiency. The Clean Energy Law – Senate Bill 221 – was passed in 2008 and sets requirements for energy efficiency and renewable energy for each of the state's four investor-owned utilities (IOUs). Ohioans across the state are benefiting from programs driven by the Clean Energy Law, which are reducing pollution, cutting our dependence on coal and gas, creating jobs, and saving money.

For the first time since the Clean Energy Law came into effect, FirstEnergy, Duke Energy, Dayton Power & Light (DP&L), and American Electric Power (AEP) all met the law's energy efficiency, peak demand reduction and renewable energy requirements in 2012, delivering on the promise of clean energy for Ohio.

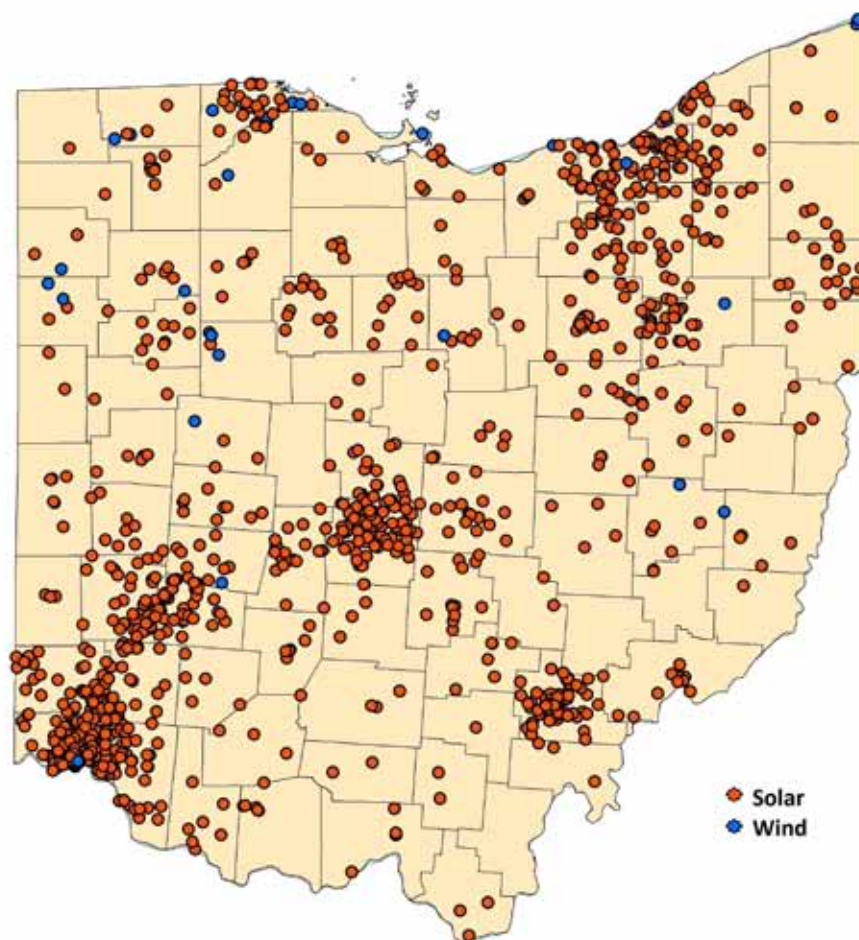
Thus far, Ohio's Clean Energy Law has resulted in 5 million megawatt-hours (MWh) in cumulative energy savings, more power than all households in Cincinnati, Cleveland and Dayton combined use in a year, and has reduced peak electricity demand by 1,583 megawatts (MW) – equivalent to the capacity of Ohio's sixth-largest power plant. In addition, 313 MW of wind power and 25 MW of solar energy were added in 2012, which could produce more power than every household in the city of Dayton uses in a year.

The Clean Energy Law has led to the launch of creative programs to update old technologies with new energy-saving devices, set Ohioans up for long-term energy savings, and helped Ohio transition away from its reliance on dirty energy sources to a clean energy economy.

This report highlights the most creative and effective examples of Clean Energy Law programs in a variety of categories. The success of these programs demonstrates the value of the Clean Energy Law to Ohio's environment and consumers.

- **Solid return on investment** – Clean Energy Law programs such as DP&L's Lighting Program deliver substantial energy savings at a low cost. By distributing more than 1.7 million high-efficiency lighting fixtures, this program saved more power than 6,800 Ohio homes use in a year at a cost of **3.8 cents per kilowatt-hour (kWh) saved** – one-third the retail cost of electricity.
- **Lasting savings** – The Clean Energy Law is driving investments in energy efficiency that will benefit Ohioans for decades to come. Homebuyers in the service territory of AEP are saving energy in the long term with the utility's New Homes Program, which gives builders incentives to upgrade and certify new single-family homes to meet Energy Star efficiency benchmarks. Ohioans living in the 796 Energy Star homes built under this program in 2012 will **save over 100,000 MWh of electricity over the next 25 years** – more than the amount of electricity an additional 650 Energy Star homes would use during that time period.
- **Tapping Ohio's renewable energy potential** – By setting renewable energy standards for utilities, the Clean Energy Law is driving the development of wind and solar energy across the state. In 2012, for example, Ohio added the **304 MW Blue Creek Wind Farm**, in part because FirstEnergy agreed to purchase renewable energy credits from the

Figure ES-1: Map of PUCO-Certified Wind and Solar Energy Facilities in Ohio, as of October 2013



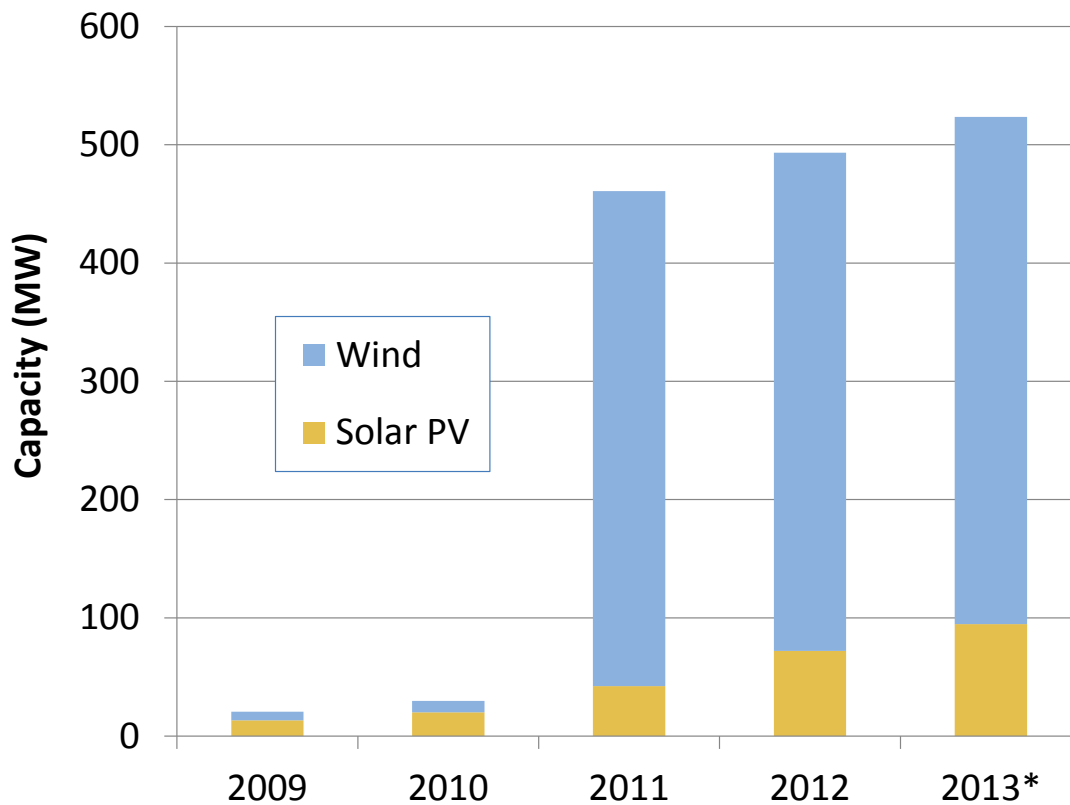
project in order to meet their renewable energy requirements. Solar energy installations also proliferated, including a 1,716-panel solar array on the roof of Kent State University's Field House that generates 500 MWh each year for the university.

- **Saving energy at home** – Residential consumers have benefited from Clean Energy Law programs such as utilities' appliance recycling programs, which offer financial incentives to unplug and recycle old energy-inefficient appliances. The program improves with each year of the Clean Energy Law – more appliances were recycled in 2012 than in any previous year, and, with Duke

Energy joining in October 2012, the program is now available to all Ohio investor-owned utility customers. In 2012, the programs **recycled a total of 21,899 inefficient refrigerators, 5,698 freezers, and 823 room air conditioners** to save a combined 28,791 MWh of energy – equivalent to the amount of power used by 2,419 Ohio homes in a year.

- **Teaching the next generation to save** – The Clean Energy Law has made energy efficiency part of the classroom. The Ohio Energy Project (OEP) has partnered with AEP and DP&L to teach kids about the fundamentals of energy efficiency

**Figure ES-2: Cumulative Capacity of Certified Solar and Wind Power Facilities in Ohio
(shown by date the facility was approved by the PUCO)**



*As of October 18, 2013.

and conservation, empowering them to apply what they've learned when they return home. AEP and DP&L partnered with natural gas companies in their service territories to **train 524 teachers and distribute 40,924 energy efficiency kits to students** – saving the amount of power used by 1,300 Ohio homes in a year.

- **Helping Ohio businesses save** – The Clean Energy Law is making it easy for businesses to save money and energy by replacing outdated, power-sapping equipment with modern, energy-efficient equivalents. DP&L's "Rapid Rebates" Program was particularly effective – in 2012, DP&L incentivized 1,269 energy efficiency projects for businesses across the state, **saving the amount of power used by 5,655 Ohio homes in a year.**

- **Retrofitting large institutions** – Large institutions like hospitals use hundreds of times as much energy per year as the average Ohio home, and Clean Energy Law programs targeting those institutions are delivering big savings. AEP's Prescriptive Business Program saved a verified 132,132 MWh of electricity for businesses and institutions across the state in 2012 by providing incentives that reduce the up-front costs of pre-approved energy efficient equipment. Over the past three years, **35 hospitals actively participating in AEP's business programs have saved more than 40,000 MWh of electricity.**

- **Helping homeowners and businesses to implement renewable energy** – Powering Ohio residences and businesses with small solar and

wind energy systems presents a significant opportunity to boost Ohio's clean energy production. To help Ohio homeowners and businesses owners overcome the upfront costs of installation, AEP's Renewable Energy Technology Program **provided incentives for 166 small renewable energy installations** between July 2011 and June 2013, helping AEP fulfill its renewable energy requirements.

Public officials should ensure that Ohio continues to tap its abundant potential for renewable energy and energy efficiency by maintaining the Clean Energy Law and providing better oversight of utilities' compliance.

- The Public Utilities Commission of Ohio (PUCO) should ensure that utilities are not overstating energy efficiency program savings and are adopting programs that will encourage new savings with long-term benefits. The PUCO should not credit utilities for energy efficiency savings generated in the past by customers without utilities' involvement.
- The PUCO should facilitate utilities' signing of long-term contracts for renewable energy. Unlike year-to-year markets for renewable energy credits, long-term contracts provide renewable energy developers with certainty about returns on their investment over time. The more renewable energy projects in Ohio, the greater the potential for added jobs and economic investment and the less we rely on polluting fossil-fueled energy sources. The PUCO should support long-term projects that offer significant environmental and economic benefits to Ohio, such as AEP's 49 MW Turning Point Solar Project (which was denied approval by the PUCO in January 2013).
- Ohio should strengthen the renewable energy requirements of the Clean Energy Law to prompt further development of Ohio's renewable energy resources, cut pollution and spur growth. In order to continue driving the increase in renewable energy installations in Ohio, the law should require Ohio's IOUs to get 25 percent of their energy from renewable sources by 2025, including 3 percent from solar energy.
- The PUCO should require utilities to present information about their plans and compliance with Ohio's Clean Energy Law in a clear and standardized fashion and the PUCO should issue its own rigorous review of the utilities' filings each year.
- In order to achieve the full benefits of clean energy, the Ohio EPA should develop a robust State Implementation Plan to meet upcoming U.S. EPA standards limiting global warming pollution from power plants. Ohio is in a strong position to meet these standards through existing policies, including by fulfilling the standards of its Clean Energy Law.

Introduction

Ohio's energy landscape looked very different before the Clean Energy Law.

In 2007, less than 8 megawatts (MW) of wind energy and only 1 MW of rooftop solar power existed in all of Ohio – not even as much electricity as is used to power the homes in the small town of Greenfield, Highland County, with fewer than 5,000 people.¹ Ohio relied on coal for a whopping 85 percent of its electricity.² Ohio utilities faced no incentive to encourage their customers to use energy more efficiently, no incentive to invest in clean, renewable energy, and no repercussions for the pollution spewing from the smokestacks of the state's coal-fired power plants.

Today, less than five years after the Clean Energy Law took effect, Ohio's energy future looks far different ... and far brighter.

In 2012, Ohio ranked in the top third of U.S. states for cumulative solar electric installations and annual solar PV installations.³ Ohio leads the country in wind energy-related manufacturing facilities, and, in 2011, Ohio was the fastest-growing state for wind energy installations, with a growth rate of over 900 percent.⁴ Ohio residents and businesses are saving money on their electricity bills through Clean Energy Law programs that work to improve energy efficiency. Last but not least, all of Ohio's investor-owned utilities are now exceeding the statutory requirements of the Clean Energy Law and they are doing it cost-effectively, demonstrating that those goals are fully achievable.⁵

Yet, despite these benefits, utilities are fighting to take Ohio back to the "bad old days" of wasteful energy use and overreliance on dirty energy by rolling back the Clean Energy Law.⁶

This report – Environment Ohio Research & Policy Center's fourth annual evaluation of the Clean Energy Law – describes why that would be a mistake. Utility-run energy efficiency programs and renewable energy efforts under the Clean Energy Law are transforming Ohio in ways large and small, making our businesses more competitive, saving money for households and institutions, and sparking a clean energy transition that is helping to revive Ohio's economy. The benefits Ohio has achieved to date are just the first taste of what is to come. As several of the examples highlighted in this report demonstrate, the effectiveness of many of these programs has improved as utilities have gained more experience in operating energy efficiency programs, the state's clean energy industry has matured, and new opportunities for collaboration have developed – suggesting that Ohio has much more to gain from the Clean Energy Law.

A decade ago, Ohio seemed committed to the energy sources and practices of the past – a course that left us dependent on fossil fuels and inflicted immense damage on our environment and our health. Today, Ohio is on the road to a better future. To continue that progress, the state must maintain and improve upon the Clean Energy Law.



This educational, 225-kW wind turbine is harnessing clean energy next to the Great Lakes Science Center in downtown Cleveland.

The Clean Energy Law Is Working in Ohio

Flip on a light switch and electricity instantly helps light the room. In Ohio, which relies on fossil fuel-fired power plants for the majority of its electricity, flipping that light switch also creates pollution that presents a serious threat to public health and the environment. Burning fossil fuels to generate electricity threatens the economy, the environment and public health in Ohio. Fortunately, Ohio is beginning to reduce our reliance on dirty energy by using energy more efficiently and producing more of our electricity with renewable energy.

Ohio is beginning to demonstrate that flipping a light switch doesn't have to come with such a severe cost to public health and the environment. In 2008, Ohio passed Senate Bill 221 (also known as the Clean Energy Law), which committed the state to using energy efficiency and renewable energy to meet future energy needs. The law sets annual requirements for energy efficiency and renewable energy for each of the state's four investor-owned utilities (IOUs), which provide the majority of Ohio's electricity.⁷

Since adoption of the Clean Energy Law, Ohio has experienced rapid development of clean energy resources.

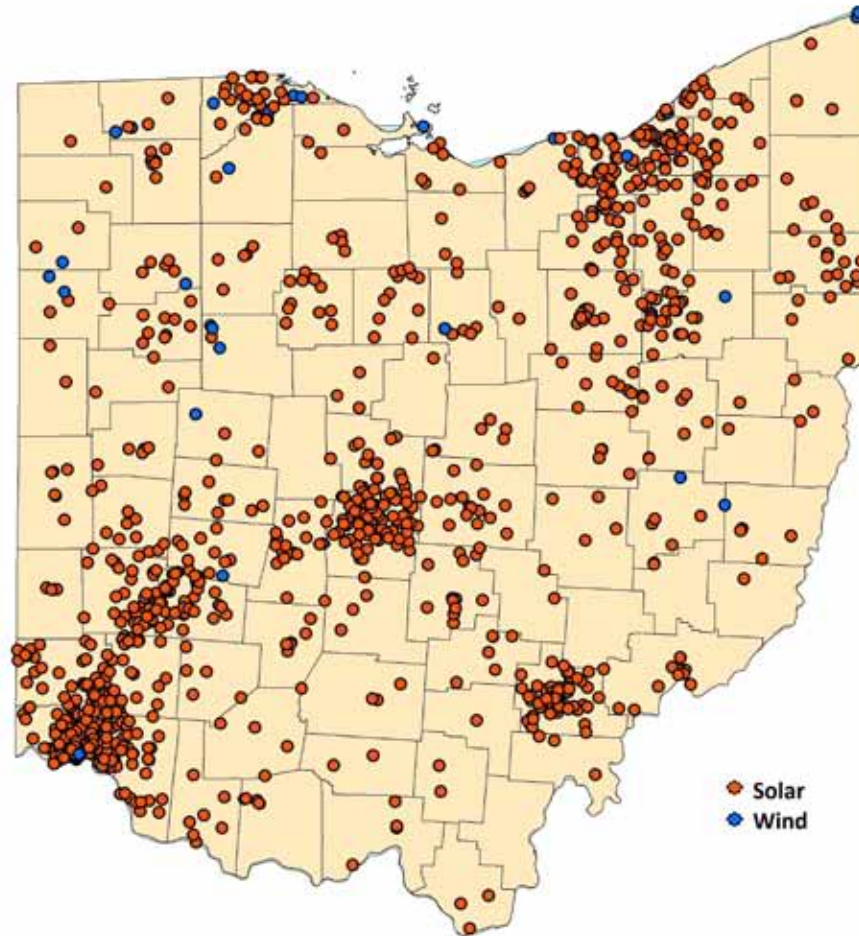
In 2006, two years before Ohio adopted the Clean Energy Law, the state's annual energy efficiency savings were negligible – not even one-100th of one percent of retail sales.⁸ By 2010, two years after passage of the Clean Energy Law, Ohio's new efficiency investments in that year saved 722,929 megawatt-hours (MWh) of electricity on an annual basis, equal to roughly half a percent of retail electricity sales.⁹ With utilities working to meet the requirements of the law, Ohio's energy

efficiency savings more than doubled from 2010 to 2011.¹⁰ As the law's requirements ramp up over time, the positive impact the law makes will spread further across the state.

The Clean Energy Law has also incentivized rapid renewable energy development. In 2012 alone, 313 MW of wind power and 25 MW of solar energy came online, which could produce more power than every household in the city of Dayton uses in a year.¹¹ Ohio is now a national leader in wind energy and an emerging leader in solar power as well:

- Ohio is a leader in new wind energy installations. In 2012, Ohio was among the five fastest-growing states for wind energy installations.¹² Ohio is also a leader in wind manufacturing in the United States. With 62 factories that have over \$775 million in capital investment, it has more wind-related manufacturing facilities than any other state.¹³
- As of October 2013, the Public Utilities Commission of Ohio (PUCO) certified 31 wind energy facilities in Ohio with a total capacity of 429 MW.¹⁴ Once all of these facilities come online, they will be able to produce almost twice as much power as is used by all of the homes in the city of Dayton in a year.¹⁵
- Ohio ranks in the top third of U.S. states for cumulative solar electric installations.¹⁶ As of October 2013, Ohio has 35 utility-scale solar facilities in operation, and 68 more under development.¹⁷ As of October 2013, the PUCO had certified a total of 1,229 residential, commercial and utility-scale solar installations in Ohio, with a total capacity of 95 MW

Figure 1: Map of PUCO-Certified Solar and Wind Energy Facilities in Ohio, as of October 2013²⁰



(See Figures 1 and 2).¹⁸ Once all of these facilities come online, they will be capable of producing the amount of electricity used by 10,400 Ohio homes in a year.¹⁹ See Figure 1 for a map of certified renewable energy facilities in Ohio, as of October 2013.

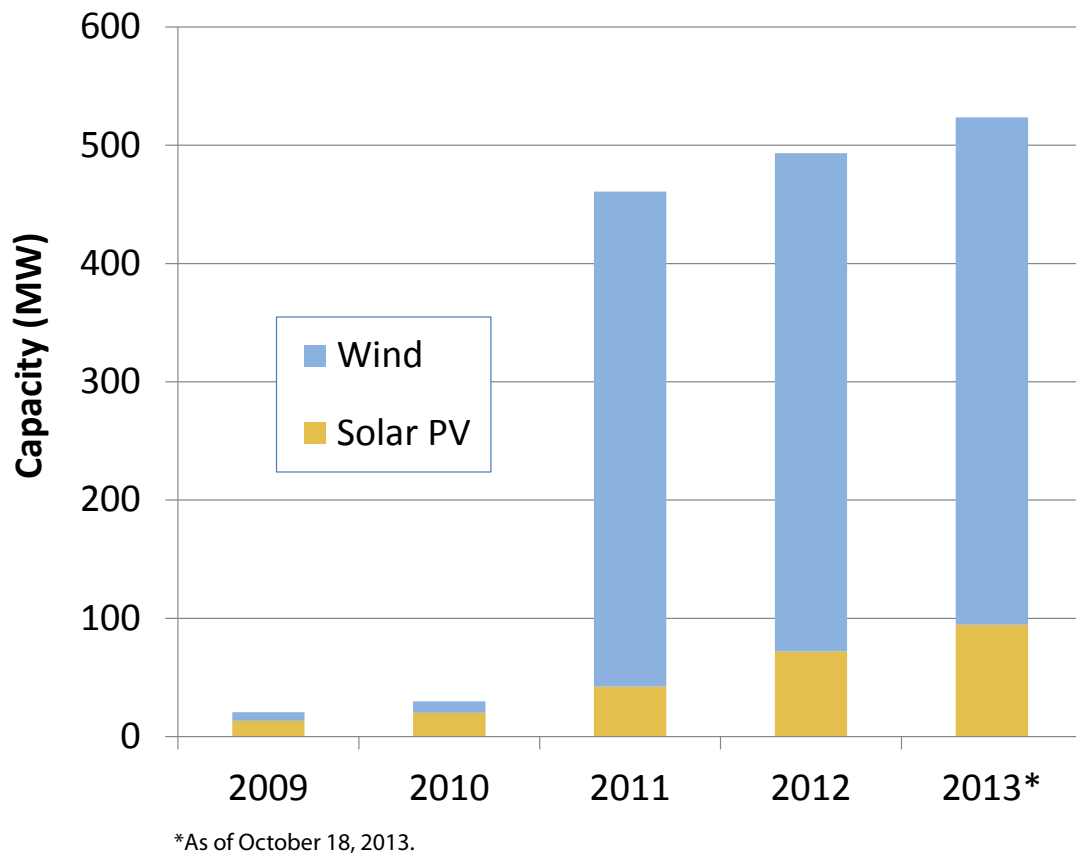
- Renewable energy is also creating jobs for Ohioans. The Solar Energy Industries Association reports that there are 181 solar companies employing 2,900 people in Ohio.²² Ohio also ranks fourth among states for wind energy employment, with more than 5,000 jobs supported by the wind industry in 2011.²³

Thanks to Ohio's Clean Energy Law, Ohio is saving energy, creating new clean energy jobs, and reducing the fossil fuel pollution that threatens our environment and public health.

Utilities Are Meeting the Requirements of the Clean Energy Law

For the first time since the Clean Energy Law came into effect, FirstEnergy, Duke Energy, Dayton Power and Light (DP&L), and American Electric Power (AEP) each met the law's four primary requirements: peak demand reduc-

**Figure 2: Cumulative Capacity of Certified Solar and Wind Power Facilities in Ohio
(shown by date the facility was approved by the PUCO)²¹**



tions, energy efficiency improvements, solar energy development and non-solar renewable energy development.

Each year, Ohio's four investor-owned utilities must file compliance reports with the PUCO, describing the programs they have implemented and the renewable energy sources they used to meet the requirements of the Clean Energy Law. We reviewed those filings to report on the progress each utility has made in complying with the law. This is Environment Ohio Research & Policy Center's fourth

report examining the performance of Ohio's major utilities. Our previous reports assessed the utilities' performance in 2009, 2010 and 2011.²⁴

Between January 2009 and December 2012, the Clean Energy Law has resulted in 5 million MWh in cumulative energy savings, more power than all households in Cincinnati, Cleveland and Dayton combined use in a year, and has reduced peak electricity demand by 1,583 MW – equivalent to the capacity of Ohio's sixth-largest power plant.²⁹

Ohio's Clean Energy Law Summary

Passed in 2008, the Clean Energy Law calls for Ohio's major utilities to save 22 percent of their sales volume through energy efficiency and to generate 12.5 percent of their electricity from renewable energy by 2025. The law sets four separate clean energy standards, requiring the state's investor-owned utilities to:

- Save 22 percent of electricity sales compared to business-as-usual sales through efficiency by 2025.
- Reduce peak demand by 1 percent in 2009 and by 0.75 percent per year from 2010 to 2018.
- Develop or purchase renewable electricity accounting for 12.5 percent of their sales by 2025. In 2012, every utility was required to source 1.44 percent of its energy from non-solar renewables.
- Develop or purchase solar electricity accounting for 0.5 percent of their sales by 2025. In 2012, every utility was required to source 0.06 percent of its energy from solar.

The law sets annual requirements for efficiency, renewable energy and solar energy, beginning with small steps in the first few years and then requiring greater levels of clean energy each year through 2025, once Ohio's clean energy industry has had time to expand.²⁵

Utilities can meet their renewable energy and solar energy requirements by generating renewable power at their own facilities, by forming long-term agreements with renewable or solar energy generators or by purchasing renewable energy credits (RECs) or solar renewable energy credits (SRECs) off the market. RECs and SRECs are the currency of renewable energy – credits that renewable energy producers earn by producing renewable energy. These credits can then be bought and sold by utilities looking to fulfill their renewable energy requirements. One REC is equivalent to 1 MWh of renewable power generated, and one SREC is equal to 1 MWh of solar power generated.²⁶

Utilities can meet the energy efficiency and peak demand reduction requirements either by implementing savings or demand reduction programs on their own, or through “mercantile customer commitments” – crediting large-scale customers with energy savings or demand reductions from efficiency measures undertaken without utility involvement up to three years prior.²⁷ In order to fulfill the requirements of the law, utilities can also “bank” extra savings – carrying these over from previous years and applying them towards their yearly requirements. Finally, utilities can credit savings or demand reduction from transmission and distribution (T&D) projects that reduce overall electrical line losses to meeting their overall requirements each year.²⁸

However, although all of these options can be used by utilities to comply with the law, savings driven by utilities' programs each year have the greatest benefits to Ohio customers. Utilities that rely on past customer commitments are not investing enough in their own energy efficiency and peak demand reduction programs, which help Ohioans find new ways to save. Transmission and distribution projects also do nothing to develop or strengthen the utilities' program offerings – these projects are often routinely conducted by utilities each year to improve electricity transmission, and they need not be expressly conducted for the purposes of saving energy or reducing peak demand.

American Electric Power

AEP continues to meet the requirements of the Clean Energy Law, netting the most energy savings between 2009 and 2012 of any Ohio utility.³⁰ AEP beat its goals, saving the amount of energy it would take to power 44,975 Ohio homes for a year.³¹ Of the savings AEP credited towards fulfilling its 2012 requirements, 6 percent came from past customer commitments and 4 percent came from electricity transmission and distribution (T&D) projects.³²

AEP also reported 610 MW of peak demand reductions in 2012. AEP generated 383 MW (63 percent) of its program-driven peak demand reduction through its Interruptible Tariff Program, which allows customers to contract with the utility to reduce their electricity at times of high demand.³³

AEP fulfilled its renewable energy obligation under the Clean Energy Law by sourcing 1.5 percent of its energy from renewable solar and wind sources, some of it from long-term agreements, some from small renewable energy producers and some from purchasing RECs and SRECs off the market.³⁴

AEP's long-term agreements for renewable energy and RECs allow the utility to prepare for its compliance for years into the future. AEP signed a 20-year agreement with Wyandot Solar in 2009 to purchase solar energy from its 10 MW facility in Wyandot County, and the utility has a 20-year agreement to purchase in-state wind energy and RECs from the 99 MW Timber Road Wind Farm.³⁵ AEP also offered a "Renewable Energy Technology Program" in 2012, which promoted small renewable energy installations around Ohio.³⁶

AEP was also an investor in the Turning Point Solar Project, a renewable energy project that would have brought a historic amount of clean solar energy to Ohio. This 49 MW solar installation would have been the largest solar array east of the Rockies, and AEP would have been the main purchaser of energy from the project.³⁷ This plan was derailed at the beginning of 2013 by a decision by the PUCO not to allow AEP to pass a portion of the cost of the project along to its customers, leaving the company no other way to fund this clean energy endeavor.³⁸ Pending other

Photo: First Solar, National Renewable Energy Laboratory Image Gallery



First Solar manufactures equipment for solar energy installations in Toledo, Ohio.

financing options, this decision is preventing the clean energy and 600 manufacturing and construction jobs associated with the project from becoming a reality in Ohio.³⁹

Dayton Power and Light

DP&L exceeded its energy efficiency requirement for 2012, generating 181,011 MWh from 2012 energy efficiency programs, or 163 percent of its statutory requirement. In addition, DP&L accumulated 5,515 MWh in customer commitments from past energy savings.⁴⁰

DP&L also exceeded its peak demand reduction requirement, reducing peak demand by an additional 29 MW through its 2012 programs and 23 MW from 2012 past customer commitments for a total of 123 MW of peak demand reduction.⁴¹

DP&L met its renewable energy requirements in 2012. To help meet the solar renewable energy requirement of the Clean Energy Law, DP&L constructed its own 1.1 MW solar array, the Yankee Solar Facility, which began producing electricity in March 2010.⁴²

Duke Energy

Duke Energy exceeded its statutory obligations under the Clean Energy Law in 2012, meeting requirements for both peak demand reduction and energy efficiency. The utility generated 214,913 MWh in energy savings through its programs in 2012, exceeding its yearly requirement. Duke achieved the majority of its energy savings through its “Smart Saver Program,” comprised of residential and non-residential incentive programs for energy-efficient appliances and equipment. Collectively, these programs were responsible for about 75 percent of the energy savings that Duke Energy’s programs generated in 2012, not including Duke’s savings from past customer commitments.⁴³

Duke Energy also outstripped its 2012 peak demand reduction obligation, deriving 73 MW in demand reduction from its energy efficiency and demand reduction programs. Duke was credited with 9 MW of additional reduction from past customer commitments, equal to 11 percent of its total reported energy savings.⁴⁴

Duke Energy fully complied with its renewable energy obligations under the Clean Energy Law in 2012 through the short-term purchase of RECs on the market. However, Duke has failed to invest in long-term sources of renewable energy, which have greater power to assure compliance over the long term and attract renewable energy investment to the state.⁴⁵ The utility should begin making these long-term investments in renewable energy projects in Ohio.

FirstEnergy

FirstEnergy fulfilled its requirements under the Clean Energy Law for the first time in 2012. In the first two years of the law, FirstEnergy failed to meet its energy efficiency standards by a large margin, and the utility narrowly missed compliance with its requirements in 2011.⁴⁶ FirstEnergy has had to regain lost ground from its poor performance in previous years.

Although FirstEnergy complied with the law for the first time in 2012, the utility has relied too heavily on past customer commitments in meeting its energy savings requirements. While AEP, DP&L and Duke Energy also reported savings from past customer commitments, these utilities would have exceeded their energy savings requirements even without these past savings, unlike FirstEnergy (see Appendix A). The utility only met 63 percent of its requirement via its own PUCO-approved energy efficiency programs through 2012; FirstEnergy fulfilled the rest of its requirements through past customer commitments.⁴⁷

In order to prepare to meet its energy savings goals in the future, FirstEnergy must bolster the productivity of its energy savings programs, so that it no longer

relies on past customer commitments. In an order issued in 2009, the PUCO indicated that it expects FirstEnergy to reduce its reliance on the utility's mercantile customer commitment program.⁴⁸ FirstEnergy reduced its percentage of energy savings attained from past commitments from 71 percent in 2011 to 50 percent in 2012, a trend that the utility should work to continue.⁴⁹

FirstEnergy exceeded its peak demand reduction obligation under the Clean Energy Law, reducing peak demand by 469 MW through its own programs. Past customer commitments accounted for 18 percent of FirstEnergy's total credited reduction.⁵⁰

Like the other utilities, FirstEnergy fulfilled its renewable energy requirements. FirstEnergy met its renewable energy requirement in 2012 by obtaining RECs through purchases on the open market and requests for proposals to sell RECs to the utility.⁵¹ It also has signed a long-term agreement with the Blue Creek Wind Farm to purchase RECs.⁵²

Questions remain about FirstEnergy's strategies for complying with the Clean Energy Law. The National Resources Defense Council, Sierra Club, the Ohio Environmental Council and the Environmental Law and Policy Center have argued that the company has failed to take action to implement third-party recommendations for energy efficiency program improvement and that FirstEnergy's evaluator, ADM Associates, has overstated true energy savings for behavioral programs like the Home Energy Analyzer Program and FirstEnergy's CFL Program.⁵⁷ FirstEnergy, as Ohio's largest electric distribution utility, must address these concerns.

The Clean Energy Law has led to the creation of a variety of programs that reduce Ohio's dependence on fossil fuels and save Ohioans money. The very best of these programs use creative strategies to deliver significant, lasting savings at low cost – demonstrating the potential of the Clean Energy Law to deliver critical environmental benefits and energy savings for Ohio residents.

FirstEnergy Overpays for Renewable Energy Credits

FirstEnergy has also made poor decisions to fulfill its renewable energy requirements. For FirstEnergy's customers, this failure comes at a high price.

FirstEnergy has relied on REC purchases to fulfill its renewable energy requirements. However, independent auditors found that FirstEnergy paid significantly more for its in-state RECs than other Ohio utilities did between 2009 and 2011.⁵³ In fact, FirstEnergy paid for renewable energy credits that were more expensive than credits anywhere else in the country before or since, striking a bad deal for its customers.⁵⁴ The utility paid 15 times more for these credits than they would have paid in fines to the PUCO for non-compliance – but fines cannot be tacked onto customers' bills, while REC payments can be.⁵⁵ In August 2013, the PUCO ruled that FirstEnergy would be required to refund the \$43.3 million that it overcharged its customers.⁵⁶

The Clean Energy Law Drives Successful Energy Efficiency and Renewable Energy Programs

The Clean Energy Law has led to the creation of a variety of successful energy efficiency and clean energy programs. The best of these programs are providing significant incentives for the installation of energy-efficient appliances, encouraging the construction of new, energy-efficient homes across the state, training the next generation of Ohioans to save energy, and partnering with business owners large and small to reduce energy use and cut costs. By meeting the requirements of the Clean Energy Law, utilities are also continuing to drive renewable energy investments across the state – giving Ohioans clean sources of electricity.

The exemplary programs recognized in this report show that the Clean Energy Law is getting results for Ohioans. These highlights also demonstrate that utility programs are getting better and more effective with age. Many of the programs highlighted below have been around since 2009 or 2010 and show improvements and creative expansions every year. Utilities that take the targets seriously, incorporate program

feedback from year to year, and use their creativity are meeting the requirements of the law. Ohio is capable of bigger and better things in the years ahead if we maintain our commitment to clean energy.

Saving Energy at a Low Cost: Making Lighting More Efficient

Replacing outdated, inefficient lighting fixtures is a big opportunity for energy savings in Ohio – one that utilities have been taking advantage of to meet their energy savings benchmarks since the Clean Energy Law was passed in 2009. Compact fluorescent bulbs use a quarter of the electricity and last 10 times as long as incandescent bulbs.⁵⁸ New national lighting standards went into effect in 2012 that will require lighting fixtures sold in stores to use about 25 percent less energy than traditional light bulbs.⁵⁹

Among all the lighting programs run by Ohio utilities, Dayton Power & Light's program has been the

“All of the bulbs included in the program are flying off the shelf.”

– Cory Calahan, Assistant Manager in the Electrical Department at Menards in Dayton, OH



DP&L's Residential Lighting Program maintains competitive discounts for CFLs in large packages, ranging from 4 to 18 bulbs.⁶⁰

most successful at saving energy (relative to the size of the utility), and had the highest net lifecycle benefits associated with any energy efficiency program.⁶¹ The program offers attractive discounts on energy-efficient lighting fixtures at retail stores in DP&L's territory. In 2012, discounts were offered on 74 different bulbs, ranging from 7 Watts to 55 Watts, with an average discount of \$1.48 per bulb. An online retailer also provided these discounted products to DP&L customers.⁶²

The independent evaluator that reviewed DP&L's program concluded that DP&L sells "significantly more bulbs per customer than similar programs in other utilities (3.5 versus an average of 1.4 for other programs per year)." The evaluator suggested that it could be because, unlike other utilities, DP&L offers equally high incentives for large packs of CFLs

as they do for small packs.⁶³ DP&L's decision to give equally large incentives for large packages of bulbs demonstrates the program's commitment to encouraging customers to make a more significant investment in energy-efficient lighting. When customers buy a pack of five CFLs instead of just one or two, they will tend to replace that many more lights with energy-efficient bulbs as their existing lights burn out.

By distributing more than 1.7 million high-efficiency lighting fixtures, this program saved more power than 6,800 Ohio homes use in a year at a cost of 3.8 cents per kilowatt-hour (kWh) saved – one-third the retail cost of electricity.⁶⁴ This program also reduced peak energy demand by 8.5 MW.⁶⁵

Local retail store managers praise the program's effectiveness. The Menards retail store in Dayton has participated in the program since it opened in September 2012, and Cory Calahan, Assistant Manager in the Electrical Department, says that DP&L's program has been good for the store. "All of the bulbs included in the program are flying off the shelf," says Calahan, who also stated that DP&L does a great job of working with store staff and making sure they know which program benefits are available.⁶⁶ The program has also been running in Barney's True Value Hardware in Dayton for about a year. According to Marcus Pierce, the store manager, the program is easy to administer, and it is clear that customers like the low prices – some CFLs are marked down to as little as 99 cents.⁶⁷ Both stores intend to continue participating in the program.

Lighting program savings will decline in the coming years as national lighting efficiency requirements make more efficient bulbs the standard, but changing to efficient CFLs and LEDs remains an attractive, easy-to-implement way to save energy. Well-run programs like DP&L's present opportunities to save a significant amount of energy and reach a large number of customers cost-effectively.

Building Long-Term Energy Savings: Energy Star Homes in Ohio

An energy-efficient light bulb lasts for a year or two, but an energy-efficient new home will provide Ohio residents with comprehensive home energy savings for decades into the future. AEP and Columbia Gas of Ohio have partnered to administer the Energy Star New Homes program, which works to improve the energy efficiency of newly built Ohio residences. Residential energy consumption accounted for 34.3 percent of electricity sales in Ohio in 2012, and Ohioans use 32.7

kWh of electricity on average every day at home.⁶⁸ Builders who install energy-efficient lighting, good insulation and efficient heating and cooling systems help occupants save money and energy for years to come.

AEP and Columbia Gas jointly administer this program where their jurisdictions overlap; together they provide incentives to builders for the construction of new single-family homes and duplexes that meet Energy Star standards.⁶⁹ Creating more Energy Star homes provides home-seekers with options that meet high standards of energy efficiency.

Photo: P&D Builders



P&D Builders, based in Delaware, OH, built this Ohio home that is 58 percent more energy efficient than a standard home (based on its HERS score of 42).

Energy Star is a program jointly run by the U.S. Environmental Protection Agency and the U.S. Department of Energy.⁷⁰ Homes are given an Energy Star label when they meet the required energy-efficient construction standards, featuring energy-efficient lighting, heating and cooling, ventilation and insulation, as well as well-sealed construction.⁷¹ These buildings can be more than 35 percent more efficient than Ohio's building code requires.⁷² These residences are also safer purchases; as a new study shows, they are 32 percent less likely to go into default.⁷³ Through this program, AEP and Columbia Gas provide financial incentives to builders and work with rating agencies to train builders to comply with the Energy Star building standards.⁷⁴ These incentives can represent 30 to 50 percent of the cost of upgrading and certifying each home.⁷⁵ Ohioans living in the 796 Energy Star homes built under this program in 2012 will save over 100,000 MWh of electricity over the next 25 years – more than the amount of electricity an additional 650 Energy Star homes would use during that time period.⁷⁶

M/I Homes is one of the building companies that worked with AEP on this program, and the company's partnership with AEP's New Homes programs has benefited the utility, M/I Homes and Ohio residents. M/I Homes specializes in building energy-efficient homes and has committed to building 100 percent of its new homes to Energy Star standards.⁷⁷ The president of M/I Homes, Theresa Lynn P. Collins, says that AEP's program supports the company's production of energy-efficient homes and educational outreach to customers.⁷⁸

Coordination between electric and gas companies on this program has been another advantage – making it possible for builders to design buildings that save electricity and gas at the same time, increasing the energy savings and making the program more effective. Jointly delivering the program in overlapping territory helps AEP and Columbia

Gas provide a consistent program for builders and building raters, offering more financial incentives for participation.⁷⁹ Building efficient homes means offering Ohioans the benefits of energy efficiency in a very literal way – each resident in such a home can see on his or her electricity bill what a difference energy efficiency measures make in their lives.

Spurring Investment in Renewable Energy: New Wind and Solar Power in Ohio

Utilities can comply with the renewable energy requirements of the law by generating renewable energy at their own facilities, forming long-term agreements with renewable energy generators in Ohio or in adjacent states to purchase renewable energy credits (RECs), or purchasing RECs on the open market.⁸⁰ By making a strong, long-term commitment to renewable energy, the Clean Energy Law incentivizes would-be renewable energy developers to invest in Ohio, since they know that the RECs generated by their facilities will be valuable for years to come.

In 2012, Ohio's largest wind farm came online. The 304 MW Blue Creek Wind Farm in Van Wert and Paulding counties would not have been built in Ohio without the passage of the Clean Energy Law. According to project developer Dan Litchfield, "Early development plans for the Blue Creek Wind Farm placed it just inside the Indiana border. But passage of SB 221 in 2008 caused us to shift our plans a few miles to the east and develop the project in Ohio."⁸¹ FirstEnergy signed a 20-year agreement to purchase 100 MW of power from the wind farm, which will help the utility meet the standards of the Clean Energy Law.⁸² Ohio State University also signed a 20-year agreement to purchase 50 MW of power from the farm – enough to meet 25 percent of the campus' electricity needs annually and save



The Blue Creek Wind Farm generates clean energy in Van Wert County, OH.

the university \$1 million every year.⁸³ The Blue Creek Wind Farm created more than 180 construction jobs and brought a \$600 million investment to the state, becoming operational in June 2012.⁸⁴ Local communities will begin to receive tax revenue from the project in 2014, amounting to \$2.8 million per year and making the wind farm the largest single taxpayer in the county.⁸⁵

Local clean energy installations are also coming online across the state – including the largest

solar array at any public university in Ohio.⁸⁶ A 1,716-panel solar PV system was installed at Kent State in July 2012, covering almost one acre of Kent State's field house and generating 500 MWh each year for the university. This clean energy can supply a third of the power needed for both the field house and nearby Dix Stadium. Kent State will sell the SRECs generated from the panels to FirstEnergy to help the utility fulfill its solar renewable energy requirements.⁸⁷

Stopping Energy Waste at Home: Recycling Energy-Sapping Appliances

Old, inefficient appliances waste energy and money in Ohio homes. Appliance energy efficiency standards have improved to the point that a 12-year-old refrigerator uses more than twice the electricity of a new refrigerator today.⁸⁸ Ohio residents can save money and energy by replacing old appliances like refrigerators, freezers and air conditioning units.

Each of the four utilities has contracted with JACO Environmental for pick-up and recycling of old appliances.⁸⁹ JACO Environmental is a national appliance recycling business that helps homeowners and utilities save energy by removing old, energy-inefficient equipment from households.⁹⁰ JACO picks up appliances at a customer's residence and brings them to an in-state facility to disassemble them into raw materials. Tom Steinheiser is the facility manager at JACO's appliance de-manufacturing center in Stowe, and he emphasizes the importance of recycling these old appliances. Not only does unplugging an old refrigerator save homeowners hundreds of dollars on their energy bills per year, but keeping this old equipment out of a landfill prevents pollution, including chemicals and CFCs that escape into the atmosphere and pollute the air if not properly captured.⁹¹

Using the same vendor for the same program across utility jurisdictions has made the program more efficient. Because multiple utilities in Ohio use this program, JACO Environmental built a new recycling facility in Ohio to accommodate the large volume of recycling, which lowered the costs to utilities for appliance transport. JACO Environmental has also improved customer service by coordinating appliance pick-ups across utility lines.⁹² This program is a model on which utilities can build as they develop and standardize their energy efficiency programs.

Of the utility appliance recycling programs in the state, AEP's saved the most energy in 2012, and was the most cost-effective of the established programs. AEP exceeded its program goals and collected more appliances in 2012 than in any other single year of the program. This program also had a high customer satisfaction rate and a decreased rate of people canceling their appliance pick-up appointments from previous years.⁹³

The program's success may be due to the \$50 incentive to its customers to unplug and recycle old energy-inefficient appliances, the highest incentive any utility offered in 2012.⁹⁴ AEP plans to increase the incentive to \$60 for recycled refrigerators and freezers in 2013 in order to keep program participation high.⁹⁵

In 2012, utilities' appliance recycling programs recycled a total of 21,899 inefficient refrigerators, 5,698 freezers, and 823 room air conditioners. This saved a combined 28,791 MWh of energy, the amount of power 2,419 Ohio homes use in a year, and reduced peak demand by 3.9 MW.⁹⁶

Teaching Kids to Save: Families Reduce Energy Use at Home

For Ohioans who are not drawn in by store discounts on energy-efficient appliances or persuaded to save energy by a home energy report, sometimes their children can be the best messengers. AEP, DP&L and FirstEnergy are partnering with the Ohio Energy Project (OEP) to deliver an energy savings education program to kids in the classroom, a program that teaches children about energy efficiency and equips them with the tools to save energy at home.

These school programs, designed to teach kids about the fundamentals of energy efficiency and conservation, send participating students home with energy savings kits to install at home. Although the kits can vary by utility, each child receives products such as

energy-saving compact fluorescent light bulbs, an LED night-light, foam weather-strips for sealing out drafts and saving thermal energy, and more.⁹⁷

AEP was the first utility to implement this energy savings education program. The utility's successful partnership with OEP to run its "Be E3 Smart Program" for students earned the Midwest Energy Efficiency Alliance's Inspiring Efficiency Education Award in 2012.⁹⁸

DP&L took this model and ran with it – implementing the most cost-effective schools program in 2012.⁹⁹ DP&L, in conjunction with OEP, integrated its energy savings kits with an energy efficiency unit in Ohio schools, including training in the curriculum for participating teachers. Post-unit surveys completed by teachers and students demonstrated a 29 percent average improvement in energy-related test scores, and 95 percent of teachers reported that the unit changed family and student attitudes about energy conservation and efficiency. "Most of my students said it made them more aware of their own energy use," noted one Ohio teacher in DP&L's report to the Public Utilities Commission of Ohio. "Many are turning off lights and TVs that they used to leave on."¹⁰⁰

AEP and DP&L also partner with gas distribution companies to pool resources to make their in-school lessons more comprehensive. AEP and Columbia Gas partner on these education programs where their jurisdictions overlap, and DP&L recently partnered with Vectren, the regional gas company, to teach kids in school about electricity and gas simultaneously.¹⁰¹ According to Pam Addison, a Be E3 Smart Education Coordinator with OEP and a former teacher, partnerships between gas and electric companies can be advantageous, allowing the companies to pool their money and offer more to the classes.¹⁰²

Altogether, AEP and DP&L trained 524 teachers and distributed 40,924 energy efficiency kits to students through these programs, saving a verified 15,473 MWh of energy, or the amount of power used by 1,300 Ohio homes in a year.¹⁰³

Helping Ohio Businesses Save: Energy-Efficient Equipment Rebates Cut Costs

No one wants to waste money – least of all Ohio businesses. With an array of expenses to take care of and a bottom line to meet, Ohio businesses are in a logical position to save money by reducing energy waste. Dayton Power and Light's Non-Residential Prescriptive Rebates (Rapid Rebates) Program incentivizes business consumers to replace outdated, power-sapping equipment with modern, energy-efficient equivalents.

This program uses an online application system to provide incentives to non-residential customers for energy-efficient equipment purchases. Business and government customers can choose among 116 energy efficiency measures, such as energy-efficient lighting, HVAC, motors, drives and compressed air measures that can be installed with the help of incentive payments.¹⁰⁴ DP&L chose to manage the program internally to strengthen customer service and build DP&L's knowledge of energy efficiency measures. But DP&L also established a network of "Channel Partners" to help market the program to businesses and manage installations.¹⁰⁵ This group of allies acts as a "marketing extension" of DP&L's program, and these allies were responsible for connecting the majority of participants to DP&L's program in 2012 – distributing 56 percent of the incentives paid through DP&L's Non-Residential Prescriptive Rebates Program to customers. In 2012, DP&L paid incentives to 1,269 projects, amounting to \$3.6 million in incentives given out for the installation of pre-approved energy efficiency measures.¹⁰⁶

These incentives can make the difference between a business being able to afford an expensive energy upgrade that will net significant long-term savings or being stuck with old, energy-wasting equipment. Becker Electrical Supply is a regional electrical



Solar panels produce energy on the roof of Kuss Car Wash, a project completed by Dovetail Wind and Solar with the help of AEP's RET Program.

wholesaler and one of DP&L's Channel Partners that helped to administer the Rapid Rebates Program. Becker Energy Solutions, an energy savings contractor within Becker Electrical, is led by Mark Ross, and they have worked on hundreds of projects in partnership with utilities to offer businesses across Ohio rebates for energy efficiency measures.

According to Ross, "DP&L is by far the easiest utility to work with ... they have things streamlined much better [than the other utilities]." One large project the company did was an installation of energy-efficient lighting systems at Dayton Phoenix, an Ohio-based company that manufactures rail and industrial equipment. The project cost was around \$400,000 overall, and the company was able to receive \$50,000 back in rebates.¹⁰⁷

But perhaps most encouragingly, this is an energy savings program that's still improving. In 2012, the program achieved all-time best performances in energy savings, demand savings, and total rebate dollars delivered – exceeding the company's expectations. From January to July 2012, DP&L saw

applications for rebates increase 163 percent over the same time period in 2011. In 2012, the program saved a verified 67,302 MWh of energy – equivalent to the power 5,655 Ohio homes use in a year – and achieved 14.6 MW of demand reduction.¹⁰⁸

Supporting Small Clean Energy Projects: Renewable Energy Programs Are Benefiting All Ohioans

Renewable energy benefits Ohio by reducing our dependence on fossil fuels and clearing our air. But small-scale solar panels and wind turbines located near homes and businesses are an especially powerful renewable energy solution. Distributed forms of renewable energy reduce strain on the transmission grid and save energy by generating power close to where it is used. Some utilities have implemented programs designed specifically to encourage Ohio residents and businesses to generate their own electricity from renewable sources.

AEP made the most serious investment in 2012 in small-scale renewable energy projects across the state. AEP's Renewable Energy Technology (RET) program was a standout in this regard. The Ohio Consumers' Counsel helped create the program to provide Ohio's homeowners and small businesses greater benefits from the Clean Energy Law.¹⁰⁹ The program offered incentives to jumpstart small renewable energy projects in Ohio in exchange for establishing 15-year agreements with these producers for the RECs generated by their projects.¹¹⁰ These incentives are available to business and residential customers who have an interconnection agreement with AEP, and the program can discount up to 40 – 50 percent of the total renewable energy system cost.¹¹¹ Given that the initial costs of a wind or solar installation can be significant, programs like this are very important in driving the development of wind and solar photovoltaic (PV) systems on Ohio homes and businesses.

One of AEP's frequent partners in this program was Dovetail Wind and Solar, a renewable energy installer with five Ohio locations. David Cohen, who frequently worked with AEP's RET program in Dovetail Wind and Solar's Central Ohio office, called the RET program "just phenomenal." According to Cohen, it allowed solar installers to plan ahead and put a value on wind or solar energy in years to come.¹¹² From the program's inception in July 2011 through its expiration in June 2013, AEP's RET program attracted 166 participants.¹¹³

Potential changes to the Clean Energy Law have put the best, most forward-thinking programs on hold, however, to the detriment of Ohio's clean energy future. AEP's Renewable Energy Technology program expired in June 2013 due to uncertainty regarding the future clean energy requirements that utilities will have to meet and because AEP has amassed enough RECs to comply with the law, as it stands, in the coming years.¹¹⁴ Mark Gundelfinger, AEP's Manager of Alternative Energy Resources, says that this program "went beyond

expectations" and AEP might consider reopening it, but that there would be no need for AEP to offer the program if requirements of the Clean Energy Law are weakened.¹¹⁵ "A lot of companies are struggling" in the wake of the program's expiration, said Cohen, who hopes that the program will start up again in the future.¹¹⁶ Programs like AEP's RET program are important to helping solar businesses build a self-sustained, cost-competitive market for renewable energy technologies in Ohio. These programs help make renewable energy generation a possibility for all Ohioans.

Large Savings for Large Facilities: Incentives for Energy Savings at Ohio's Businesses and Institutions

Large institutions consume large amounts of energy. Large retail stores, industrial projects, and other facilities often have equipment running 24 hours a day. It is important to target these customers with utility energy efficiency programs in order to reduce energy use at a large scale in Ohio.

AEP's programs for large businesses and institutions are designed to serve a wide range of facilities including schools, commercial and industrial businesses, hospitals, faith-based organizations and restaurants.¹¹⁷ AEP's Prescriptive Business Program saved the most energy and accumulated the most peak demand reduction of AEP's business programs in 2012. AEP's Prescriptive Business Program provides incentives for the installation of pre-approved energy-efficient equipment, including lighting, HVAC, motors, refrigeration equipment and other industrial grade equipment. There are currently more than 200 energy savings measures covered in the program. These incentives can refund the customer between 20 and 50 percent of the cost to purchase this equipment; businesses can receive up to \$300,000 per project or \$1.2 million per business.¹¹⁸

“The combination of utility rebate programs, the Ohio Hospital Association and Greater Cincinnati Health Council programs, and the engagement of hospitals across the state is producing a true shift in energy efficiency awareness in healthcare.”

– Jason Watkins, chair of the Greater Cincinnati Health Council, and finance director for facilities management at the Cincinnati Children’s Hospital Medical Center

Utility business incentive programs of this kind have made an impact on businesses across Ohio, including Ohio hospitals. A Midwest hospital uses about 20,285 MWh of electricity per year – the amount of power used by 1,700 Ohio homes in a year.¹¹⁹ With such significant energy use, hospitals across the state, led by the Ohio Hospital Association (OHA), are embracing energy efficiency measures; a low-efficiency hospital can spend over \$4,500 per bed more than an energy-efficient hospital on energy each year.¹²⁰ AEP’s service territory contains 53 OHA-member hospitals, 35 of which are actively participating in AEP’s incentive programs.¹²¹ Over the past three years, these hospitals have created over 40,000 MWh of energy savings.¹²² In a blog post, Dylan Sullivan, Energy Advocate at the Natural Resources Defense Council, quoted a hospital engineer discussing hospital energy savings: “Without these efficiency mandates and incentives, it’s very easy for people in

the financial office to focus on things besides energy efficiency,” says Bob Gianfagna, senior energy engineer at the Ohio State University Medical Center in Columbus. “But when you get a check from the utility company, no one argues with that. Those checks incentivize people to explore more opportunities.”¹²³

Mercy Tiffin Hospital is one healthcare facility that has taken advantage of AEP Ohio’s business programs to cut energy costs. Founded in 1913 in Tiffin, this 200,000 square-foot serves Tiffin County with 115 beds and more than 300 employees.¹²⁴ The hospital opened a new facility in 2008 built to Energy Star standards, and, in 2012, hired a professional team of inspectors to ensure that the building continued to meet high energy efficiency standards. Using AEP’s business incentive programs, the hospital found numerous, low- and no-cost ways to reduce energy waste.¹²⁵

Programs such as AEP's Prescriptive Business Program give companies the tools and guidelines they need to cut energy usage, cut costs and move toward a clean energy future. This program provided a verified 132,132 MWh of energy savings in 2012 – more than the power used by six large Midwest hospitals in a year.¹²⁶ According to Jason Watkins, chair of the Greater Cincinnati Health Council, without the Clean Energy Law “these realized advancements would be years behind where they are today.”¹²⁷ Watkins testified that, thanks in part to SB 221, “the combination of utility rebate programs, the OHA and GCHC programs, and the engagement of hospitals across the state is producing a true shift in energy efficiency awareness in health-care.”¹²⁸ Although large businesses and institutions in Ohio may think they are saving as much energy as they can, professional energy audits and smart upgrades continue to produce significant energy savings for these large customers.

As these examples demonstrate, Ohioans are experiencing the benefits of the Clean Energy Law every day – streamlined access to energy-efficient technologies, lower energy bills, and access to more green jobs and cleaner air with more of Ohio's energy coming from non-polluting, renewable sources. Jim Cain, the Vice President of A-Abel Heating and Air Conditioning in Dayton, is another businessman who speaks with enthusiasm about the discounts on energy-efficient heating and air systems that he has been able to give to customers through rebate programs offered by utilities. Cain has watched these programs save Ohioans hundreds of dollars on their energy bills, and he states that energy efficiency is an important part of Ohio's future. Cain concludes, “The overall story is I think it's been a wonderful thing. We're saving a lot of energy...making wonderful improvements in our society and making life better for our children and grandchildren. I feel like I'm making a significant difference and it feels good.”¹²⁹



Solar panels cover 4,682 square feet of the Adam Joseph Lewis Center for Environmental Studies at Oberlin College.

Strong Standards Will Continue to Help Ohio Meet Its Clean Energy Potential

In just four years, the Clean Energy Law has incentivized transformative energy efficiency programs and clean renewable energy production across Ohio – but this is just the beginning. Ohioans support clean, renewable power, Ohio has enormous clean energy potential, and a strong Clean Energy Law will continue to help Ohio realize the public health, environmental and economic benefits of clean energy.¹³⁰ The Clean Energy Law is critical to ensuring that Ohio meets its clean energy potential, and does not fall back into a dangerous, fossil fuel-dominated past.

Fossil Fuels Still Threaten Ohio's Health, Environment and Economy

Burning fossil fuels to generate electricity threatens the economy, the environment and public health in Ohio. Most of Ohio's electricity is generated by burning coal, the dirtiest source of electric power, as well as natural gas. Coal accounted for 67 percent of the electricity generated in Ohio in 2012 and natural gas accounted for 17 percent.¹³¹

Energy production from fossil fuels comes with dangerous health and environmental costs:

- In 2011, Ohio ranked fourth-highest among all states for carbon dioxide pollution from power plants, releasing 112 million metric tons of the global warming pollutant into the atmosphere.¹³²
- In 2011, Ohio ranked third in the nation for power-plant emissions of nitrogen oxides, a major component of smog, emitting 121,000 metric tons of those pollutants.¹³³ Low levels of smog inhaled over the long-term can cause and/or aggravate a host of health problems, especially lung problems and cancer.¹³⁴
- In 2010, Ohio ranked second among all states with emissions of more than 4,200 pounds of airborne mercury from power plants.¹³⁵ Mercury is a powerful developmental toxicant, which can produce lasting mental impairments in children who are exposed to it *in utero*.¹³⁶
- In 2011, Ohio ranked first among all states with power plant emissions of 615,752 metric tons of sulfur dioxide, the primary component of acid rain.¹³⁷ Acid rain devastates forests and lakes, and sulfur dioxide in fine particulate form threatens human health. Exposure to high levels of sulfur dioxide pollution can increase heart attack risk.¹³⁸

Dependence on coal also comes at an economic cost. In 2008, Ohio imported a net 32.7 million short tons of coal from other states, at a cost of \$1.5 billion.¹³⁹

At the same time, extraction of coal and gas in Ohio pollutes our water and land. Of particular concern in Ohio is damage from hydraulic fracturing or “fracking,” which involves injecting a mix of water, sand and toxic chemicals into a well under high pressure

to bring gas to the surface. As of December 2012, there were more than 450 fracking wells in Ohio, concentrated in the eastern part of the state.¹⁴⁰ Fracking presents further threats to Ohioans' health, environment and economy:

- Fracking brings with it the potential for spills, blowouts and well failures that contaminate water supplies.¹⁴¹ In Dimock, Pennsylvania, Cabot Oil & Gas reported having spent \$109,000 on methane removal systems for 14 local households in the wake of drilling-related methane contamination of local groundwater supplies.¹⁴²
- Toxic substances in fracking fluid and wastewater – as well as air pollution from trucks, equipment and wells themselves – have been linked to a variety of negative health effects.¹⁴³ Just across the Ohio border in western Pennsylvania, for example, residents living near one fracking well site have complained of rashes, blisters and other health effects that they attribute to a wastewater impoundment.¹⁴⁴
- Fracking is a particularly dangerous business for workers: The National Institute of Occupational Safety and Health recently warned that workers at fracking sites may be at risk of contracting the lung disease silicosis from inhalation of silica dust.¹⁴⁵
- Fracking can reduce the value of nearby properties as a result of both actual pollution and the stigma that may come from proximity to industrial operations and the potential for future impacts. A 2010 study in Texas concluded that homes valued at more than \$250,000 and within 1,000 feet of a well site saw their values decrease by 3 to 14 percent – there was no discernible impact on property values beyond that distance or for lower-priced houses.¹⁴⁶ Fracking operations can also make nearby homes more difficult to insure.

In July 2012, Nationwide Insurance issued a statement clarifying that its policies do not cover damages related to fracking, noting that “the exposures presented by hydraulic fracking are too great to ignore.”¹⁴⁷

- Fracking creates millions of barrels of toxic and radioactive waste, and Ohio has become a regional dumping ground for such waste: 14.2 million barrels of fracking waste were dumped in the Buckeye State in 2012, more than half of which came from Pennsylvania or West Virginia.¹⁴⁸ Oil and gas companies dispose of this waste by shooting it deep underground into one of Ohio's 191 injection wells.¹⁴⁹ Scientists linked the unusually high number of earthquakes detected in Youngstown between January 2011 and February 2012 to the disposal of wastewater into a nearby deep injection well.¹⁵⁰

Given these dangers, Ohio must continue to reduce our reliance on dirty energy by using energy more efficiently and producing more of our electricity with renewable energy.

Ohio Can Continue to Save Energy

The energy efficiency programs and peak demand reduction programs created by the Clean Energy Law will continue to protect Ohioans' health and environment and improve Ohioans' lives. These programs will continue to save money for consumers by cutting electricity consumption and power bills. They will also drive more energy savings for Ohioans by removing barriers that keep customers from investing in energy efficiency even when it makes economic sense to do so. In its 2013 State Scorecard, the American Council for an Energy-Efficient Economy (ACEEE) recognized Ohio as one of the “most improved” states, ranking Ohio 18th among states for its energy efficiency programs which is up from 22nd in 2012.¹⁵¹

Energy efficiency can continue working for Ohio by dramatically cutting electricity use. A 2009 survey by the ACEEE determined that Ohio could reduce its projected electricity consumption in 2025 through cost-effective energy efficiency measures by more than 64 million megawatt-hours (MWh).¹⁵² That difference in electricity use is more than all Ohio households consume in a year.¹⁵³ Given the cumulative 5 million MWh that the Clean Energy Law has already saved Ohioans, this means Ohio has only reached 8 percent of its energy savings potential – the state has over 59 million MWh left to save from energy efficiency measures as of 2012.¹⁵⁴

Renewable Energy Can Power Ohio

The Clean Energy Law is spurring an increase in renewable energy investments across Ohio and will continue to drive Ohio residents, businesses and renewable energy developers to harness clean energy resources in the state for years to come. Ohio has the potential to generate a significant part of the state's electricity supply with wind and solar energy.

Onshore, Ohio could host up to 55,000 MW of wind energy capacity, which could generate 144 million MWh a year, more than two and a half times as much electricity as all of Ohio's homes consume in a year.¹⁵⁵ This amount of wind energy would produce as much energy as Ohio's nine largest power plants operating at full capacity.¹⁵⁶ Ohio's top eight power plants are all coal plants, with the largest plant, AEP's General James M. Gavin power plant, being ranked the seventh-dirtiest power plant in the country.¹⁵⁷ In addition, Ohio has the potential to install more than 46,000 MW of wind capacity offshore in Lake Erie – capable of producing the equivalent of two and a half times the amount of power used by all the state's homes each year.¹⁵⁸ Large scale renewable energy projects can also

bring new jobs to Ohio; NorTech, an energy developer, reports that they could create over 600 jobs by developing 20 MW of wind turbines offshore in Lake Erie.¹⁵⁹

Solar energy can also help to power Ohio's future. A 2012 study conducted for the National Renewable Energy Laboratory concluded that by 2015, Ohio would have the potential to install more than 27,000 MW of solar generating capacity just on residential and commercial rooftops.¹⁶⁰ Those panels could produce 36 million MWh of electricity annually, more than half the amount of electricity consumed by all Ohio homes in a year.¹⁶¹

Utility-scale solar projects in Ohio could alone produce enough energy to completely meet the state's needs, according to the same NREL study. Ohio has the capacity to install 2.4 million MW of solar in urban areas and on rural land – enough to supply more than 20 times the amount of electricity used in the state each year.¹⁶² All of this available land will not be developed for utility-scale solar projects, but the vast solar power resources that exist in Ohio indicate that utility-scale solar can play an important role in meeting the state's electricity demands with clean, renewable power.

Ohio can meet a growing share of its electricity demand with clean, renewable power: onshore and offshore wind power, solar projects distributed on the rooftops of Ohio homes and businesses, and large utility-scale solar projects all have roles to play in powering Ohio sustainably and cost-effectively. With the help of the Clean Energy Law, Ohio can continue progressing towards that vision of a healthy clean energy future.

Policy Recommendations

The Clean Energy Law is working. The programs highlighted in this report demonstrate that utilities can cost-effectively comply with the law and that well-designed utility programs are driving energy savings, renewable energy installations and cost-savings across Ohio.

Now is not the time to backslide on Ohio's commitment to clean energy. Efforts to weaken the Clean Energy Law, if successful, would end the progress Ohio has made and would commit consumers to spending increasingly more money on energy in years to come.

To build upon the progress Ohio has achieved to date:

Energy efficiency and peak demand reduction programs should deliver real savings that benefit all Ohioans:

- Utilities should **ensure that energy efficiency programs deliver real savings to customers**. Several utilities have achieved portions of their savings through programs that credit large non-residential customers for past improvements. Utilities should prioritize new savings instead and the Public Utilities Commission of Ohio (PUCO) should not credit utilities for energy efficiency savings generated by customers without utilities' involvement.
- The PUCO should not credit utilities with energy savings or peak demand reduction that would have happened under business-as-usual conditions or without any utility involvement. Currently,

utilities can be credited with savings from transmission and distribution projects that would have been conducted even without a strategy to save energy, as part of electrical line upkeep. **Only projects undertaken by the utilities primarily for energy efficiency or peak demand reduction purposes** should count towards utilities compliance with the Clean Energy Law.¹⁶³

The Clean Energy Law and PUCO's enforcement of the law should support Ohio's long-term transition to clean, renewable power:

- The PUCO should **facilitate the signing of long-term contracts for renewable energy**. Long-term power purchasing agreements are the best tools for encouraging renewable energy development. Unlike year-to-year markets for renewable energy credits, they provide renewable energy developers with certainty about returns on their investment over the long-term, making Ohio a safer environment in which to invest. Since renewable energy pays off over the long term after a large initial investment, a contract that ensures steady demand for electricity from the facility over several decades makes the decision for a private firm to invest in renewable energy much less risky. These contracts also allow developers and utilities to agree on a firm price for electricity over the life of the agreement, thereby avoiding any rising costs for electricity from other sources during that time.

- Ohio should **strengthen the renewable energy requirements** of the Clean Energy Law to prompt further development of Ohio's renewable energy resources, cut pollution and spur growth. Ohio has the potential to produce much more renewable energy than the current requirement of 12.5 percent of energy consumption. Leading states in renewable energy development have set requirements as high as 33 percent of consumption, and Ohio should follow suit.¹⁶⁴ In order to continue driving the increase in renewable energy installations in Ohio, Ohio should double its renewable energy standard. The Clean Energy Law should require Ohio's IOUs to get 25 percent of their energy from renewable sources by 2025, including 3 percent from solar energy.

The PUCO should hold utilities to higher standards of reporting and issue its own rigorous review of the utilities' filings each year.

- The Public Utilities Commission should **require utilities to present information about their plans and compliance with Ohio's Clean Energy Law in a clear and standardized fashion.** Currently, utility filings with the PUCO vary in format and level of detail. The PUCO should require all utilities to submit information on their performance in detail and in a standardized format; this will allow members of the public to easily follow progress toward Ohio's clean energy requirements and allow each utility to more easily draw from the experiences of the others.

- There should be higher standards of reporting and review from the PUCO to **prevent utilities from submitting compliance reports with bad methodologies** and reporting energy savings that are not real. This should include an annual report by the PUCO on the veracity of the savings reported by each utility, as the law states that the PUCO will do.¹⁶⁵

In order to achieve the full benefits of clean energy, the Ohio EPA should **develop a robust State Implementation Plan to meet upcoming U.S. EPA standards** limiting global warming pollution from power plants.

- The U.S. EPA has proposed new carbon pollution standards which require new power plants to be built with clean technologies to reduce carbon pollution.¹⁶⁶ The U.S. EPA will also propose standards for existing power plants by January 2014. According to a study from the World Resources Institute, Ohio is in a strong position to meet these standards through existing policies, including by fulfilling the standards of its Clean Energy Law.¹⁶⁷ WRI reports that Ohio could reduce its carbon emissions by 27 percent in 2020 compared to 2011 levels by adhering to existing renewable energy and energy efficiency standards and taking advantage of infrastructure opportunities.¹⁶⁸

Appendix A:

Utilities' Performance under the Clean Energy Law

The energy savings in the charts below are reported by utilities in their 2012 Portfolio Status Reports and 2012 Alternative Compliance Reports filed with the Public Utilities Commission of Ohio (PUCO). See Appendix B for information on where to find these report filings.

These charts compare utilities' individual requirements to utilities' reported compliance for energy savings, demand reduction, solar renewable energy and non-solar renewable energy. The charts below compare these utilities' performance with their requirements in 2012.

In addition to comparing the utilities' total achievements to their requirements, the charts below also separately list utilities' energy savings and peak demand reduction attained from past customer commitments and transmission and distribution projects in 2012.

Past customer commitments are energy savings or demand reduction from projects completed without any utility involvement. Utilities that rely on these commitments are not investing enough in their own energy efficiency and peak demand reduction programs, which help Ohioans find new ways to save. Transmission and distribution projects also do nothing to develop or strengthen the utilities' program offerings – these projects are often routinely conducted by utilities each year to improve electricity transmission, and they need not be expressly conducted for the purposes of saving energy or reducing peak demand.

Table A.1: Energy Efficiency Savings (MWh)

	Requirement	Energy Savings Achieved and Filed in 2012 Report	Of the Energy Savings Achieved	
			Past Customer Commitments	T&D Projects
American Electric Power (2012)	340,700	593,300	35,900	22,400
Dayton Power & Light (2012)	111,139	186,526	5,515	0
Duke Energy (2012)	167,149	262,437	47,524	0
FirstEnergy (cumulative, 2009-12) ¹⁶⁹	1,199,764	1,562,807	788,362	16,262

Table A.2: Peak Demand Reduction (MW)

			Of the Demand Reduction Achieved	
	Requirement	Demand Reduction Achieved and Filed in 2012 Report ¹⁷⁰	Past Customer Commitments	T&D Projects
American Electric Power	287	610	6	6
Dayton Power & Light	90	123	23	0
Duke Energy	33	255	9	0
FirstEnergy	372	579	105	5

Table A.3: All Renewable Energy (MWh)

	Requirement	Percent of Requirement Achieved
American Electric Power	584,073	100%
Dayton Power & Light	142,796	100%
Duke Energy	163,182	100%
FirstEnergy	357,909	100%

Table A.4: Solar Renewable Energy (MWh)

	Requirement	Percent of Requirement Achieved
American Electric Power	24,336	100%
Dayton Power & Light	5,950	100%
Duke Energy	6,800	100%
FirstEnergy	14,913	100%

Appendix B:

Utilities' Alternative Compliance Plans and Portfolio Status Reports Filed with the PUCO

American Electric Power

Alternative Energy Compliance Report

Initial filing by AEP Ohio in PUCO case 13-0880-EL-ACP, *In the Matter of the Annual Alternative Energy Status & Compliance Report Under Rule 4901:1-40-05, Ohio Administrative Code, for Ohio Power Company*, opened April 15, 2013.

Portfolio Status Report

Initial filing by AEP Ohio in PUCO case 13-1182-EL-EEC, *In the Matter of the Annual Portfolio Status Report Under Rule 4901:1-39-05(C), Ohio Administrative Code, by Ohio Power Company*, opened May 15, 2012.

Second filing by AEP Ohio in PUCO case 13-1182-EL-EEC, *In the Matter of the Annual Portfolio Status Report Under Rule 4901:1-39-05(C), Ohio Administrative Code, by Ohio Power Company*, opened May 15, 2012.

Third filing by AEP Ohio in PUCO case 13-1182-EL-EEC, *In the Matter of the Annual Portfolio Status Report Under Rule 4901:1-39-05(C), Ohio Administrative Code, by Ohio Power Company*, opened May 15, 2012.

Dayton Power & Light

Alternative Energy Compliance Report

Initial filing by Dayton Power and Light Company in PUCO case 13-873-EL-ACP, *In the Matter of The Dayton Power and Light Company's Annual Alternative Energy Portfolio Status Report*, opened April 15, 2013.

Portfolio Status Report

Initial filing by Dayton Power and Light Company in PUCO case 13-1140-EL-POR, *In the Matter of Dayton Power and Light Company's Portfolio Status Report*, opened May 15, 2013.

Duke Energy

Alternative Energy Compliance Report

Initial filing by Duke Energy Ohio, Inc. in PUCO case 13-903-EL-ACP, *In the Matter of the Report of Duke Energy Ohio, Inc., Concerning its Advanced and Renewable Energy Baseline and Benchmarks and Ten Year Compliance Plan*, opened April 12, 2013.

Portfolio Status Report

Initial filing by Duke Energy Ohio, Inc. in PUCO case 13-1129-EL-EEC, *In the Matter of the Annual Energy Efficiency Portfolio Status Report of Duke Energy Ohio, Inc.*, opened May 15, 2013.

The second through eighth filings of this report contain the rest of the portfolio status report.

FirstEnergy

Alternative Energy Compliance Report

Initial filing by The Cleveland Electric Illuminating Company and Ohio Edison Company and the Toledo Edison Company in PUCO case 13-0913-EL-ACP, *In the Matter of the Annual Alternative Energy Status Report of Ohio Edison Company, The Cleveland Electric Illuminating Company and The Toledo Edison Company*, opened April 15, 2013.

Portfolio Status Report

Initial filing of FirstEnergy subsidiaries Ohio Edison Company, The Cleveland Electric Illuminating Company, and the Toledo Edison Company in PUCO case 13-1185-EL-EEC, *In the Matter of the Portfolio Status Report on the Companies' Peak Demand Reduction Results for the Year Ended December 31, 2011*, opened May 15, 2013. Also, see PUCO case 13-1186-EL-EEC

and PUCO case 13-1187-EL-EEC for comments regarding the same filing submitted on behalf of The Cleveland Electric Illuminating Company and the Toledo Edison Company.

Links to the appendices containing annualized savings and the program savings verifier reports prepared by ADM Associates can be found by clicking the link to view FirstEnergy's Portfolio Status Report.

FirstEnergy also misreported the savings from its Motors program and issued corrected numbers in the PUCO filing on 7/13/2013 of the same docket, 13-1185-EL-EEC, as its Portfolio Status Report. This filing should be referenced to see corrected pro-rata, annualized, and Motors-program specific energy savings and reduction totals for FirstEnergy in 2012.

Notes

1. Less than 8 MW of wind in 2007: American Wind Energy Association, *Wind Energy Facts: Ohio*, May 2011; 1 MW distributed solar in 2007: Elizabeth Brown and Sarah Busche, National Renewable Energy Laboratory, *State of the States 2008: Renewable Energy Development and the Role of Policy*, "Table 24. Distributed Solar (On- and Off-Grid) by State (2007)," October 2008; Not as much electricity as is used by the town of Greenfield: Greenfield has 1,978 households per FindTheData, ACS City Social Data, *Greenfield, OH*, downloaded from acs-social-city.findthedata.org, 14 October 2013. 8 MW of wind and solar can power 1,877 households assuming wind power operates at 30 percent capacity per National Renewable Energy Laboratory, "30 percent Capacity Factor at 80 meters" in *Wind Powering America: 80 Meter Wind Maps and Wind Resource Potential*, 13 April 2011, and solar power operates at a conservative 15 percent capacity per US Department of Energy, *2010 Solar Technologies Market Report* (Chapter 3.2.3), November 2011, downloaded from www.nrel.gov. This is based on Ohio households consuming 11.9 MWh of electricity per year in 2011: 53,687,000 MWh of energy were consumed by Ohio households in 2011 according to U.S. Energy Information Administration, *Electric Power Monthly with Data for December 2012*, February 2013 and there were 4.5 million households in Ohio in 2011 according to U.S. Census Bureau, *2011 American Community Survey 1-Year Estimates, Table NP01: Population and Housing Narrative Profile: 2011*, 2011; Greenfield, OH has a population of 4,696: U.S. Census Bureau, *2010 Demographic Profile*, downloaded from factfinder2.census.gov, 31 October 2013.

2. 85 percent of electricity generation in 2008: Department of Energy, Energy Information Administration, *State Electricity Profiles 2008*, Ohio, March 2010.

3. Ohio ranked 16th for cumulative and annual solar PV installations in 2012: Tony Dutzik, Frontier Group, and Rob Sargent, Environment America Research & Policy Center, *Lighting the Way: What We Can Learn from America's Top 12 Solar States*, July 2013.

4. Ohio leads the country in wind energy manufacturing facilities: American Wind Energy Association, *AWEA Ohio Wind Energy Summit*, 24 September 2013, available at www.awea.org; Fastest-growing in 2011: American Wind Energy Association, *U.S. Wind Industry, Fourth Quarter 2011 Market Report*, January 2012.

5. See Appendix A for utilities' compliance with their requirements set by the Clean Energy Law, and see Appendix B for a listing of utilities' 2012 Alternative Energy Compliance Reports and their 2012 Energy Efficiency and Peak Demand Reduction Portfolio Status Reports, which contain the results of cost-effectiveness evaluations of utilities' portfolio plans.

6. Bowdeya Tweh and Chrissie Thompson, "Seitz Bills Raising Storms in Columbus," *Cincinnati.com*, 25 September 2013.

7. American Electric Power, Dayton Power & Light, Duke Energy and FirstEnergy are among Ohio's top five electricity retailers: U.S. Department of Energy, Energy Information Administration, *State Electricity Profiles 2010*, 30 January 2012, Table 3, 212.

8. Maggie Eldridge et al., American Council for an Energy-Efficient Economy, *The 2008 State Energy Efficiency Scorecard*, October 2008.

9. Ben Foster et al., American Council for an Energy-Efficient Economy, *The 2012 State Energy Efficiency Scorecard, Report Number E12C*, Table 12, October 2012.

10. Annie Downs et. al., American Council for an Energy-Efficient Economy, *2013 State Energy Efficiency Scorecard*, November 2013.

11. 313 MW of wind power in 2012: American Wind Energy Association, *Wind Energy Facts Ohio*, January 2013; 25 MW of solar power: SEIA, *Ohio Solar*, downloaded from www.seia.org/state-solar-policy/ohio, 29 September 2013; Power used by the entire city of Dayton: This assumes that wind power operates at 30 percent capacity, solar power operates at a conservative 15 percent, and Ohio households consume 11.9 MWh of electricity per year in 2011 (see note 1). So wind and solar installed in Ohio in 2012 could power 71,700 households, and the city of Dayton has 57,843 households according to U.S. Census Bureau, *Dayton (city), Ohio*, downloaded from quickfacts.census.gov, 17 October 2013; On MW vs. MWh: Watts (W) are a measure of instantaneous demand for energy (i.e. the amount of energy an appliance requires at any given point in time), and megawatts (MW) are equal to 1,000,000 W. Watt-hours (Wh) describe the amount of electricity used over a period of time – 1 megawatt-hour (MWh) is the use or generation of one million watts for one hour. A power plant with the capacity of 10 MW would produce 240 MWh of electricity by operating at full capacity for 24 hours. See the following NREL presentation for explanations of basic energy terms: National Renewable Energy Laboratory, *Renewable Energy and Energy Efficiency for Tribal Community and Project Development* (powerpoint), downloaded from http://apps1.eere.energy.gov/tribalenergy/pdfs/energy04_terms.pdf, 24 October 2013.

12. See Wind Energy Summit in note 4.

13. U.S. wind-industry manufacturing leader: American Wind Energy Association, *Wind Industry Leaders Make Business Case for Ohio Renewable Energy Policies* (press release), 24 September 2013.

14. Table of PUCO Certified Renewable Energy Facilities, provided by Jason Cross, Public Utilities Commission of Ohio, Regulatory Engineering Specialist, personal communication, 17 October 2013.

15. Almost twice the power used by the entire city of Dayton: This is based on Ohio households consuming 11.9 MWh of electricity per year in 2011 and wind power operating at 30 percent capacity (see note 1). So wind installed in Ohio up until October 2013 could power 94,700 households, and the city of Dayton has 57,843 households (see note 11).

16. See note 3.

17. Utility-scale projects include “ground-mounted solar power plants larger than 1 MW”: SEIA, *Major Solar Projects in the United States Operating, Under Construction, or Under Development*, Updated 1 October 2013.

18. See note 14.

19. 10,400 Ohio homes: This assumes Ohio households consume 11.9 MWh of electricity per year in 2011, and solar power operates at 15 percent capacity throughout the year (see note 1).

20. Data for this map was provided by the Public Utilities Commission of Ohio on October 18, 2013 (see note 14). There are 64 certified solar facilities and one certified wind facility in Ohio missing from this map because their addresses could not be geocoded using ArcGIS tools. This means 1,165 out of 1,229 certified solar facilities in Ohio appear on this map, and 30 of 31 certified wind facilities in Ohio appear on this map.

21. This is a graph of the cumulative capacity of PUCO-certified wind and solar energy facilities in Ohio by year. The data were provided by the PUCO on October 18, 2013 (see note 14). Facilities are listed in the year they were approved by the PUCO, not the year in which they started producing energy, as the date of approval is used by the PUCO to catalog these facilities.

22. See SEIA in note 11.

23. American Wind Energy Association, *The Wind Energy Industry Is Creating Manufacturing Jobs throughout Ohio* (factsheet), January 2013.

24. Rob Kerth, Frontier Group, and Julian Boggs, Environment Ohio Research & Policy Center, *Ohio's Clean Energy Report Card: How Wind, Solar and Energy Efficiency Are Repowering the Buckeye State*, March 2011; Rob Kerth, Frontier Group, and Julian Boggs, Environment Ohio Research & Policy Center, *Ohio's Clean Energy Report Card, Year 2: Wind, Solar, and Energy Efficiency on the Rise*, March 2012; Judee Burr and Elizabeth Ridlington, Frontier Group, and Julian Boggs, Environment Ohio Research & Policy Center, *Ohio's Clean Energy Success Story: The Clean Energy Law Three Years In*, 20 March 2013.

25. General Assembly of the State of Ohio, *127th General Assembly, SB 221*, as signed into law on 5 May 2008.

26. For more information on RECs and SRECs, see U.S. Environmental Protection Agency, *EPA's Green Power Partnership; Renewable Energy Credits*, July 2008.

27. "Mercantile customers" are "commercial or industrial customer[s] if the electricity is for nonresidential use and the customer consumes more than seven hundred thousand kilowatt hours per year": Ohio Revised Code, *Chapter 4928.01: Competitive Retail Electric Service Definitions (19)*, downloaded from codes.ohio.gov/orc/4928, effective 10 September 2012. Mercantile customers can commit savings or demand reduction to the utility from up to three years prior per Ohio Revised Code, *Chapter 4928.66: Implementing Energy Efficiency Programs (A)(2)(c)*, downloaded from codes.ohio.gov/orc/4928.66, effective 10 September 2012; On the difference between peak demand reduction and energy savings: "Electric demand (load) is the amount of electricity you require at an instantaneous point in time. When you turn on an electric appliance, a "demand" for power is created. This instantaneous amount of electricity demand is measured in kilowatts (kW)." Energy savings are a reduction in "electrical energy," which is defined as "the generation or use of electric power (W) over a period of time (h), often expressed in kilowatt-hours (kWh), megawatt-hours (MWh) or gigawatt-hours (GWh)." See the NREL presentation in note 11 for explanations of energy terms.

28. See SB 221 in note 25, Sec. 4928.66 (A)(2)(d). In Appendix A, we separate energy savings and peak demand reduction from T&D projects from energy savings and

peak demand reduction from utilities' other EE/PDR programs, because many of these T&D projects would have happened with business-as-usual practices. The PUCO allows utilities to get credit for compliance with the law without taking any additional actions to save energy or reduce peak demand. As we state in the policy recommendations, utilities should only be credited with energy savings or peak demand reduction that would not have happened through business-as-usual practices.

29. 5 million MWh in energy savings: Cumulative savings are all savings that utilities have reported towards compliance with their requirements, including mercantile customer commitments and transmission and distribution (T&D) savings. This cumulative energy savings total was calculated by adding utilities' incremental 2009, 2010, 2011 and 2012 energy efficiency savings together. Some of the older energy efficiency measures in 2009 or 2010 may have expired by 2012, so it is possible that not all of these energy savings are still at work in 2012. Regarding FirstEnergy's savings, although FirstEnergy's savings are reported as "pro-rated" in their filing, the utility's annualized savings (found in Appendix A of the utility's Portfolio Status Report) are used to calculate these cumulative totals because all other utilities report annualized savings. See Appendix B for utilities' PUCO filings for savings reported in utilities' Portfolio Status Reports; Power all households in Cleveland, Cincinnati and Dayton for a year: Cleveland has 169,665 households per U.S. Census, *Cleveland (city), Ohio*, downloaded from quickfacts.census.gov, 17 October 2013, Cincinnati has 131,892 per US Census Bureau, *Cincinnati (city), Ohio*, downloaded from quickfacts.census.gov, 17 October 2013, and the city of Dayton has 57,843 households per note 11. This is based on Ohio households consuming 11.9 MWh of electricity per year in 2011 (see note 1); Reduced peak demand by 1,583 MW: See Table A.2 for peak demand reduction reported in utilities' Portfolio Status Reports. Regarding FirstEnergy's demand reduction, although FirstEnergy's demand reduction is reported as "pro-rated" in their filing, the utility's annualized peak demand reduction (found in Appendix A of the utility's Portfolio Status Report) is used to calculate this cumulative total because all other utilities report annualized peak demand reduction; Sixth largest power plant: see *State Elec-*

tricity Profiles 2010 in note 7. This plant is slated to be closed down by AEP by 2015: Sierra Club, *American Electric Power Agrees to Retire Three Coal-Fired Power Plants in Major Clean Air and Climate Victory* (press release), 25 February 2013.

30. For a discussion of what we mean by “cumulative” energy savings: Ibid.

31. 44,975 homes: This is based on Ohio households consuming 11.9 MWh of electricity per year in 2011 (see note 1).

32. See Table A.1 for a breakdown of these savings for each utility. For AEP’s reported savings, see Appendix B for AEP’s 2012 Portfolio Status Report.

33. For AEP’s reported demand reduction, see Table A.2.

34. See Appendix B for AEP’s 2012 Alternative Compliance Plan.

35. Wyandot Solar: American Electric Power Ohio, *AEP Ohio Fact Sheet: Solar Power*, May 2012; American Electric Power Ohio, *AEP Ohio Participates in Wind Energy Ribbon Cutting with EDP Renewables, North America* (news release), 5 November 2011.

36. See Appendix B for AEP’s 2012 Alternative Compliance Plan.

37. American Electric Power Ohio, *AEP Ohio Partnering on Solar Generating Facility* (press release), 5 July 2011.

38. Dan Gearino, “Turning Point Solar Project in Noble County All But Dead,” *The Columbus Dispatch*, 9 January 2013.

39. 600 construction and manufacturing jobs: see note 37.

40. See Appendix B for DP&L’s 2012 Portfolio Status Report.

41. Ibid.

42. See Ohio’s Clean Energy Report Card, Year 2 in note 24; For DP&L’s compliance with its renewable energy requirements, see Appendix B for DP&L’s 2012 Alternative Energy Compliance Report.

43. See Appendix B for Duke Energy’s 2012 Portfolio Status Report.

44. Ibid.

45. See Appendix B for Duke Energy’s 2012 Alternative Energy Compliance Report.

46. See Ohio’s Clean Energy Report Card and Ohio’s Clean Energy Report Card, Year 2 in note 24.

47. See Appendix B for FirstEnergy’s 2012 Portfolio Status Report.

48. Public Utilities Commission of Ohio, *In the Matter of the Application of Ohio Edison Company, The Cleveland Electric Illuminating Company, and the Toledo Edison Company for Approval of Administrator Agreements and Statements of Work*, Case No. 09-533-EL-EEC, 2 December 2009.

49. See Appendix B for FirstEnergy’s 2012 Portfolio Status Report.

50. Ibid.

51. Ibid.

52. See Appendix B for FirstEnergy’s 2012 Alternative Energy Compliance Report.

53. Public Utilities Commission of Ohio, Exeter Associates, *Final Report (Redacted) Management/Performance Audit of the Alternative Energy Resource Rider (Rider AEP) of the FirstEnergy Ohio Utility Companies for October 2009 through December 31, 2011*, Case No. 11-5201-EL-RDR, June 15, 2012, iv.

54. John Funk, “Audit Finds FirstEnergy Overpaid for Renewable Energy Credits, Passed on Expense to Customers,” *The Plain Dealer*, 17 August 2012.

55. Ibid.

56. Environmental Law and Policy Center, *FirstEnergy Renewable Energy Credit Case Shows Clean, Renewable Energy is Affordable, Working for Ohio*, 7 August 2013, available at elpc.org.

57. See Appendix B for FirstEnergy's 2012 Portfolio Status Report: see filings from the Natural Resources Defense Council, the Ohio Environmental Council and the Environmental Law and Policy Center.

58. Energy Star, *Information on Compact Fluorescent Light Bulbs (CFLs) and Mercury*, November 2010.

59. US Department of Energy, *New Lighting Standards Begin in 2012*, 29 July 2012.

60. See Appendix B for DP&L's 2012 Portfolio Status Report, Cadmus review of DP&L's Residential Lighting Program, 17.

61. When comparing ex-post reported savings that have been verified by the utility's third-party evaluator, this utility program saved the most energy as a percentage of the respective utility's electricity sales. For cost-benefit analysis results and savings numbers from utilities' lighting programs, see Appendix B for utilities' 2012 Portfolio Status Reports; Larger packages of bulbs: see Appendix B for DP&L's 2012 Portfolio Status Report, Cadmus review of DP&L's Residential Lighting Program, 10.

62. See Appendix B for DP&L's 2012 Portfolio Status Report, 3-3, 3-5.

63. See Appendix B for DP&L's 2012 Portfolio Status Report, Cadmus review of DP&L's Residential Lighting Program, 10.

64. DP&L's Residential Lighting program saved 80,442 MWh of electricity in 2012 at 3.8 cents per kWh: See Appendix B for DP&L's 2012 Portfolio Status Report, Cadmus review of DP&L's Residential Lighting Program, 10. Throughout this report, "verified" energy savings or peak demand reduction refer to the energy savings or peak demand reduction that an independent evaluator has confirmed were actually accumulated by the utility program being evaluated. These are known as "ex-post" or "adjusted" savings in the independent evaluator verification reports. For AEP, DP&L and FirstEnergy, independent evaluations of 2012 programs are found filed along with or as appendices to their 2012 Portfolio Status Reports; 6,800

homes for a year: This is based on Ohio households consuming 11.9 MWh of electricity per year in 2011 (see note 1); One-third the retail cost of electricity: The average cost of electricity per kWh among residential, industrial and commercial users is \$0.11 per kWh according to the Public Utilities Commission of Ohio, *A Report by the Staff of the Public Utilities Commission of Ohio: Ohio Utility Rate Survey*, 15 September 2013.

65. See Appendix B for DP&L's 2012 Portfolio Status Report.

66. Cory Calahan, Assistant Electrical Department Manager, Menards, Dayton, OH, personal communication, 26 September 2013.

67. Marcus Pierce, Store Manager, Barney's True Value Hardware, Dayton, OH, personal communication, 26 September 2013.

68. 34.3 percent of retail sales: see *Electric Power Monthly with Data for December 2012* in note 1. Ohioans use 32.7 kWh of electricity on average every day at home: This is based on Ohio households consuming 11.9 MWh of electricity per year in 2011 (see note 1).

69. See Appendix B for AEP's 2012 Portfolio Status Report.

70. U.S. Environmental Protection Agency, *About Energy Star*, downloaded from www.energystar.gov, 30 January 2013.

71. American Electric Power Ohio, *AEP Ohio Launches Energy Star New Homes Program* (news release), 20 April 2011.

72. Database of State Incentives for Renewables & Efficiency, *Columbia Gas of Ohio – Home Performance Solutions Program*, 13 November 2013.

73. Emily Badger, "Energy Efficient Homes Are Much Less Likely to Go into Default," *The Atlantic Cities*, 19 March 2013.

74. See note 71.

75. See Appendix B for AEP's 2012 Portfolio Status Report.

76. 796 homes: see Appendix B for AEP's 2012 Portfolio Status Report, Appendix G, 9; Over 100,000 MWh: This is based on Ohio households consuming 11.9 MWh of electricity per year in 2011 (see note 1). An Energy Star home uses 45 percent less energy because an average energy star home is ranked 55 on the Home Energy Rating System (HERS) Index, while a conventional home is 100 on the HERS Index per AEP's 2012 Portfolio Status Report, Appendix G, 4, listed in Appendix B. Each 1 point decrease in the HERS Index corresponds to a 1 percent decrease in projected energy use per American Electric Power, Columbia Gas and Electric and Energy Star, *New Homebuyer's Guide: Top 14 Energy Features Every Homebuyer Should Know*, 23 November 2013; This energy saved over the next 25 years assumes that the home will maintain its home energy status report (HERS) index rating over that time, which would require the replacement of worn-out appliances with updated energy star appliances.

77. Energy Star, *M/I Homes, Energy Star Partner of the Year*, downloaded from www.energystar.gov, 30 September 2013.

78. American Electric Power Ohio, *gridSMART Testimonials*, downloaded from aepohio.com/global/utilities/lib/docs/save/programs/SuccessStories, 7 November 2013.

79. U.S. Environmental Protection Agency, *AEP: Energy Star Partner of the Year*, downloaded from www.energystar.gov, 10 December 2012.

80. Public Utilities Commission of Ohio, Rules for Alternative Energy Portfolio Standard: Administrative Code Section 4901:1-40, downloaded from www.puco.ohio.gov, 30 September 2013.

81. "Single largest private investment in 2011" and quote: Dan Litchfield, Lead Business Developer, Iberdrola Renewables, personal communication, 2 January 2013.

82. Iberdrola Renewables, *Iberdrola Renewables and FirstEnergy Solutions Sign Agreement for the Largest Wind Power Project in Ohio* (press release), 8 February 2011.

83. Encarnacion Pyle, "OSU to Save \$1 Million a Year by Buying Wind Power," *The Columbus Dispatch*, 28 January 2013.

84. 180 construction jobs and \$600 million investment: U.S. Department of Energy, *Blue Creek Wind Farm Case Study*, 19 June 2012; Started generating power in June 2012: See "OSU to Save \$1 Million a Year by Buying Wind Power", *Ibid*.

85. Joan Trojanowski, "Experiencing a Wind Farm from a Farmer's Perspective," *Green Energy News, Northwest Ohio News*, Volume 6, Issue 3, Fall 2013.

86. John Funk, "Kent State University Is Going Solar," *The Plain Dealer*, 14 June 2012.

87. *Ibid*.

88. Natural Resources Defense Council, *Efficient Appliances Save Energy – And Money*, 1 January 2010.

89. See Appendix B for utilities' 2012 Portfolio Status Reports, where they describe their recycling programs.

90. Lauren Kubiak and Pierre Bull, Environmental Entrepreneurs, *What Clean Energy Jobs? These Clean Energy Jobs! Second Quarter 2012 Clean Energy Jobs Round-up*, August 2012.

91. Tom Steinheiser, JACO Environmental, Facility Manager, personal communication, 27 September 2013.

92. See DP&L's 2011 Portfolio Status report in PUCO case 12-1420-EL-POR.

93. See Appendix B for AEP's 2012 Portfolio Status Report.

94. Of established programs: Duke Energy's appliance recycling program was reported as more cost-effective, but it began in October 2012; See Appendix B for utilities' 2012 Portfolio Status Reports, where they describe their recycling programs.

95. See Appendix B for AEP's 2012 Portfolio Status Report, Appliance Recycling Appendix.

96. No appliances recycled numbers were reported for Duke Energy in its 2012 filing, only the amount of energy saved, so any appliances recycled by Duke Energy are not counted in the appliances recycled totals. The program savings reported are “ex-post” savings, the utilities’ program savings that have been evaluated and verified by an independent evaluator. There was a significant difference between AEP’s reported savings and verified savings because Navigant, its programs savings verifier, used a different method to calculate savings. These program results can be found in the utilities’ PUCO filings for 2012, see Appendix B; 2,419 homes for a year: This is based on Ohio households consuming 11.9 MWh of electricity per year in 2011 (see note 1).

97. See Appendix B for utilities’ 2012 Portfolio Status Reports, in which AEP, DP&L and FirstEnergy describe their education programs.

98. “AEP Ohio Wins MEEA Education Award for Hands-on Energy Savings Program,” *Jackson County Daily*, January 2013.

99. See Appendix B for DP&L’s 2012 Portfolio Status Report

100. Ibid.

101. Ibid, 5-1.

102. Pam Addison, Ohio Energy Project, Be E3 Smart Education Coordinator, personal communication, 26 September 2013.

103. Train 524 teachers and distribute 40,924 energy efficiency kits: see Appendix B for AEP’s 2012 Portfolio Status Report, Appendix D, 9-10 and DP&L’s 2012 Portfolio Status Report, 73; Power used by 1,300 homes in a year: This is based on Ohio households consuming 11.9 MWh of electricity per year in 2011 (see note 1).

104. See Appendix B for DP&L’s 2012 Portfolio Status Report.

105. Ibid.

106. Ibid.

107. Project details: Mark Ross, Becker Energy Solutions, Becker Electrical Supply, Energy Savings Contractor, personal communication, 25 September 2013; About Dayton Phoenix: Dayton Phoenix Group, *About*, downloaded from www.dayton-phoenix.com, 7 November 2011.

108. See Appendix B for DP&L’s 2012 Portfolio Status Report, Cadmus review of Non-Residential Prescriptive Rebates Program. 5,655 homes: This is based on Ohio households consuming 11.9 MWh of electricity per year in 2011 (see note 1).

109. Dan Sawmiller, Sierra Club, Senior Campaign Representative, Ohio and Kentucky, personal communication, 23 October 2013.

110. Green Energy Ohio, Central Ohio News, “AEP Ohio’s Renewable Energy Technology Program,” downloaded from www.greenenergyohio.org, on 30 September 2013.

111. Ibid.

112. David Cohen, Dovetail Wind and Solar, Central Ohio Office, personal communication, 30 September 2013.

113. Mark Gundelfinger, Manager, AEP’s Alternative Energy Resources, personal communication, 15 October 2013 and Mike Grieshop, AEP Ohio, DG Coordinator, Alternative Energy Resources, personal communication, 25 October 2013.

114. Concerning the success of AEP’s RET program: Mark Gundelfinger, Manager, AEP’s Alternative Energy Resources, personal communication, 26 September 2013; AEP has enough RECs and SRECs to meet its requirements through 2025: see Mike Grieshop, note 113.

115. See Mark Gundelfinger, Ibid.

116. See note 112.

117. American Electric Power Ohio, *Incentive Programs for Businesses*, downloaded from aepohio.com, 23 September 2013.

118. See Appendix B for AEP's 2012 Portfolio Status Report, 20.

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170. The peak demand reduction filed by utilities in their 2012 Portfolio Status reports may include peak demand reduction achieved from utilities' 2009-2011 programs if this peak demand reduction is still at work in 2012.