



Ohio's Clean Energy Success Story

The Clean Energy Law Three Years In



Ohio's Clean Energy Success Story

The Clean Energy Law Three Years In



Judee Burr and Elizabeth Ridlington
Frontier Group

Julian Boggs
Environment Ohio
Research & Policy Center

February 2013

Acknowledgments

The authors thank Jeremy Faust of the Greater Cincinnati Energy Alliance, Dylan Sullivan of the Natural Resources Defense Council, and Elizabeth Weiner of the Conservation Strategies Group for their review and insightful feedback on drafts of this report. Thanks also to Tony Dutzik and Benjamin Davis at Frontier Group for their editorial support.

Environment Ohio Research & Policy Center is grateful to the 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.

© 2013 Environment Ohio Research & Policy Center

The Environment Ohio Research & Policy Center is a 501(c)(3) organization. We are dedicated to protecting Ohio's air, water and open spaces. We investigate problems, craft solutions, educate the public and decision-makers, and help Ohioans make their voices heard in local, state and national debates over the quality of our environment and our lives. For more information about Environment Ohio Research & Policy Center or for additional copies of this report, please visit www.environmentohiocenter.org.

Frontier Group conducts independent research and policy analysis to support a cleaner, healthier and more democratic society. Our mission is to inject accurate information and compelling ideas into public policy debates at the local, state and federal levels. For more information about Frontier Group, please visit www.frontiergroup.org.

Layout design: Harriet Eckstein Graphic Design

Cover: *Funding from American Electric Power's New Construction program helped Reynoldsburg construct its new high school to strong building energy efficiency standards.* Photo by Brad Feinknopf.

Table of Contents

Executive Summary	1
Introduction	4
Clean Energy Can Reduce Fossil Fuel Use in Ohio	6
Ohio's Clean Energy Law Has Put Ohio on the Path to a Clean Energy Future	9
Energy Efficiency and Renewable Energy Are Helping Ohio Move Toward a Clean Energy Future	13
Utilities Continue to Improve in Meeting the Requirements of the Clean Energy Law	20
Policy Recommendations	26
Appendix: Utility Performance	29
Notes	31

Executive Summary

Ohio's Clean Energy Law is delivering on its promise of improved energy efficiency and increased production of clean, renewable electricity—reducing Ohio's dependence on coal and natural gas power plants, which harm public health and the state's environment. 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).

Between January 2009, when the law took effect, and December 2011 Ohio's four largest utilities implemented energy efficiency programs that have saved 3.2 million megawatt-hours (MWh) of electricity, enough electricity to power 267,000 Ohio homes for a year. The 412 megawatts (MW) of wind and 45 MW of solar photovoltaic capacity added in Ohio between 2009 and 2012 can produce enough energy to power 95,000 Ohio homes.

In 2011, for the first time, all four major utilities in Ohio met the renewable energy requirements of the law. Three of the four utilities met the energy efficiency requirement, using a combination of new energy

efficiency measures and past customer-initiated savings, with only FirstEnergy narrowly missing its energy efficiency benchmark.

The Clean Energy Law is working. Ohio should continue and improve the implementation of the law to maximize the potential of home-grown clean energy to protect our environment, safeguard our health, and invigorate Ohio's economy.

Customers across the state are saving money and cutting pollution as a result of programs established by major utilities to comply with the Clean Energy Law.

- Funding from American Electric Power's (AEP's) New Construction program helped Reynoldsburg build its new high school to strong building energy efficiency standards. With help from more than \$182,000 in incentives from AEP, the new school was constructed to consume less energy than a conventional school building and will cost less to operate. These smart building practices will save Reynoldsburg an estimated 1,660 MWh of energy annually.

- Ohio residents recycled almost 21,000 old, energy-hogging appliances in 2011—saving 35 gigawatt-hours (GWh) of energy that year—through an appliance recycling program operated by AEP, Dayton Power and Light (DP&L) and FirstEnergy.
- A \$130,000 incentive from Duke Energy's Smart Saver Non-Residential Program spurred the Kroger Company to upgrade the cooling equipment in its Cincinnati data center, resulting in savings of 1,013 MWh and reducing Kroger's costs by \$86,555 in the first eight months after the project came online in August 2010.
- Construction of energy-efficient new homes through AEP's New Homes Program saved 885 MWh, enough to power 73 homes for a year, and reduced peak demand by 0.7 MW in 2011, enough energy to run 140 clothes dryers at the same time. AEP and Columbia Gas Ohio are jointly administering this program in their jurisdictions, working with builders to create buildings that will use less energy overall.

The Clean Energy Law has spurred development of new wind and solar energy projects across Ohio. Utilities can use renewable energy credits from approved solar and wind projects to fulfill the renewable energy requirements of the Clean Energy Law—giving residents, schools, businesses and private renewable energy developers strong incentives to adopt clean energy.

- With the installation of solar energy projects at two schools, Centerburg School District will save an estimated \$50,000 annually on its electricity bill. An outside company financed and installed the solar panels, while

Centerburg paid only a modest upfront legal fee. The third-party solar developer will be compensated by selling renewable electricity credits to utilities.

- The Cincinnati Zoo & Botanical Garden has installed solar panels in its parking lot that will generate enough electricity to meet 20 percent of the zoo's electricity needs and reduce global warming pollution by 1,775 tons annually. An agreement with FirstEnergy to buy the renewable electricity credits from the project is helping to finance the installation.
- Cooper Farms, an Ohio-owned turkey and pork producer, has installed wind turbines at one of its processing facilities, obtaining the majority of its electricity from wind power and selling renewable electricity credits to utilities seeking power generated in Ohio. Cooper Farms has also benefited from an industrial energy efficiency program offered by AEP that has cut power consumption by 330 MWh annually—enough energy to power 30 homes for an entire year.
- Blue Creek Wind Farm, a 304-MW facility in Van Wert and Paulding counties, was made possible in part by a long-term 100 MW power purchase agreement that FirstEnergy signed with the wind farm developer. With a firm commitment from a utility to buy electricity from the wind farm, the developer was able to secure funding for the project. Ohio State University also signed a 20-year agreement to purchase 50 MW of power from this wind farm—enough to meet 25 percent of the campus' electricity needs annually and save Ohio State \$1 million every year.

Utilities are meeting, and often exceeding, the requirements of the Clean Energy Law. In 2011, Ohio's four investor-owned utilities achieved virtually all of their targets for renewable energy production, solar energy production, energy efficiency and peak demand reduction established under the Clean Energy Law—a marked improvement over their performance in Environment Ohio Research & Policy Center's two previous clean energy scorecards.

- AEP and DP&L met all the requirements of the Clean Energy Law. Each exceeded its energy efficiency and peak demand reduction benchmarks, and both integrated the renewable energy benchmarks into their business practices by owning or investing in long-term sources of renewable energy.
- Duke Energy met 100 percent of its benchmarks for renewable energy, and it exceeded its requirements for energy efficiency and peak demand reduction.
- FirstEnergy failed to meet its energy efficiency requirement under the Clean Energy Law, but significantly improved its compliance with other aspects of the law after having received a D- on our scorecard for its performance in 2010 and an F for its performance in 2009.

Public officials should ensure that Ohio achieves its potential for

renewable energy and energy efficiency by maintaining the Clean Energy Law and providing better oversight of utilities' compliance.

- The current requirements of the Clean Energy Law should not be weakened, and Ohio should expand and strengthen its renewable energy and energy efficiency policies to match policies adopted by leading states.
- Ohio should adopt a suite of policies to support the Clean Energy Law, enabling low-cost financing for clean energy projects and strengthening the state's building energy codes.
- The Public Utilities Commission of Ohio (PUCO) should facilitate utilities' signing of long-term contracts for renewable energy. The PUCO should not stand in the way of projects that offer significant environmental and economic benefits to Ohio—like AEP's Turning Point Solar Project, which was denied approval by the PUCO in January 2013.
- The PUCO should ensure that utilities are not overstating energy efficiency program savings and are adopting programs that will encourage new savings with long-term potential. The PUCO should not credit utilities for energy efficiency savings generated in the past by customers without utilities' involvement.

Introduction

At school, kids learn how to be part of a broader community, practicing the skills of sharing, communicating with one another, and working with others. Now, in Ohio, students are learning another important skill: how to protect the environment and share a valuable resource by using energy responsibly.

Children at Reynoldsburg City Schools are among those who are learning those skills, with American Electric Power's (AEP's) Energy Conservation Kit "e3Smart" program serving as an educational tool to introduce energy efficiency awareness into their classrooms. AEP is working with the Ohio Energy Project (OEP), a non-profit organization, to provide schools with curricula and teacher trainings that educate Ohio students about energy efficiency.¹ AEP distributed 16,360 kits to OEP in 2011 containing tools to improve residential energy efficiency, including efficient compact fluorescent light bulbs

(CFLs), a low-flow 1.5 gallons-per-minute showerhead and a furnace filter alert whistle.² Kids are given these kits at school to take home and, with their parents, apply what they have learned to use energy more responsibly in their own homes.

Reynoldsburg students also have the opportunity to learn about energy efficiency from their surroundings. Financial incentives from AEP's New Construction program helped Reynoldsburg High School build an energy efficient new building.³ This 173,863 square foot building was built to be more than 30 percent more energy-efficient than the baseline building standard, with a geothermal heating and cooling system, a design that reflects natural light into classrooms, and thermostats that detect and adjust to fluctuating temperatures.⁴

Reynoldsburg isn't the only place in Ohio where there is new excitement around clean energy. Across Ohio—from the

factory floor to the residential kitchen and from wind farms to solar roofs—Ohioans are embracing clean energy as never before.

Ohio's Clean Energy Law, adopted in 2008, is a major reason why. In Reynoldsburg, for example, the city's schools received more than \$182,000 in cash incentives from AEP for the construction of the new energy-efficient high school—incentives provided by AEP to meet its obligations under the Clean Energy Law.⁵ These renovations will save Reynoldsburg an estimated 1,660 MWh annually.⁶ Similarly, according to Debby Yerkes of the Ohio Energy Project, the increased interest in the organization's energy education programs driven by the Clean Energy Law was “unbelievable”—putting the tools and

knowledge needed for smarter energy use in the hands of children and their parents in Reynoldsburg and beyond.⁷

This report—the third in a series of reviews of Ohio utilities' performance under the Clean Energy Law—highlights the many ways in which the law is bringing clean energy to communities across the Buckeye State. For the first time, utilities are on the verge of full compliance with the law. And while utilities have a long way to go to make sure that their energy efficiency and renewable energy investments are delivering the greatest, most lasting impact possible, the stories of places like Reynoldsburg show that the Clean Energy Law is working, creating new opportunities for a clean energy future.

Clean Energy Can Reduce Fossil Fuel Use 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 replace dirty energy with energy efficiency measures and renewable energy.

Fossil Fuels Threaten Ohio's Economy, Health and Environment

Most of Ohio's electricity is generated by burning coal, the dirtiest source of electric power, as well as natural gas. Coal

accounted for 82 percent of the electricity generated in Ohio in 2010 and natural gas accounted for 5 percent.⁸ That same year:

- Ohio ranked fourth highest among all states for carbon dioxide pollution from power plants, releasing 121 million metric tons of the global warming pollutant into the atmosphere.⁹
- Ohio ranked third highest for power-plant emissions of nitrogen oxides, a major component of smog, emitting 122,000 metric tons of those pollutants.¹⁰ Low levels of smog inhaled over the long-term can cause and/or aggravate a host of health problems, especially lung problems and cancer.¹¹
- Ohio ranked second highest among all states with emissions of more than 4,200 pounds of airborne mercury from power plants.¹² Mercury is a

powerful developmental toxicant, which can produce lasting mental impairments in children who are exposed to it *in utero*.¹³

- Ohio ranked first among all states with power-plant emissions of 610,000 metric tons of sulfur dioxide, the primary component of acid rain.¹⁴ 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.¹⁵

At the same time, extraction of coal and natural 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 to bring natural gas to the surface. There are more than 450 fracking wells in Ohio, concentrated in the eastern part of the state.¹⁶ Fracking creates millions of barrels of toxic and radioactive waste, and Ohio has become a regional dumping ground for such waste: 12.8 million barrels were dumped in the Buckeye State in 2011, over half of which came from Pennsylvania or West Virginia.¹⁷

Energy Efficiency and Renewable Energy Are Good Solutions for Ohio

Ohio is beginning to prove, however, that flipping a light switch doesn’t have to come with such a severe cost to public health and the environment. Thanks to Ohio’s Clean Energy Law, we are obtaining more of our energy from clean, homegrown, renewable sources of power and wasting less energy through improved efficiency. In the process, Ohio is reducing its dependence on

fossil fuels, creating new clean energy jobs, and reducing the fossil fuel pollution that threatens our environment and puts public health at risk.

Ohio Can Benefit From Energy Efficiency

One of the easiest ways for Ohio to cut its dependence on fossil fuels is to reduce electricity consumption through efficiency measures. A 2009 survey by the American Council for an Energy-Efficient Economy (ACEEE) determined that Ohio could reduce its projected electricity consumption in 2025 by 33 percent through cost-effective energy efficiency measures—a reduction of more than 64,000 gigawatt-hours (GWh) from projected consumption without efficiency measures.¹⁸ American Electric Power (AEP) has reached similar findings about energy savings potential in its own service territory. The utility estimates that it would be economically viable to save as much as 29 percent of overall sales through efficiency measures by 2031, and expects to achieve savings of between 19 and 22 percent.¹⁹

Opportunities for energy efficiency exist throughout the economy, meaning that the vast majority of electricity customers can participate in and benefit from efficiency policies. Across the state, efficiency opportunities are available in homes, businesses and factories. The ACEEE estimates that residential customers could reduce their 2025 electricity consumption by 34 percent through efficiency measures, while commercial and industrial customers could reduce their consumption by 27 percent and 23 percent, respectively.²⁰ Additionally, using combined heat and power technology (which uses the waste heat from electricity generation to heat buildings or provide industrial process heat) in the commercial and industrial sectors could reduce power consumption in those sectors by 8 percent.²¹

Energy efficiency programs also create

jobs, and have the potential to transform Ohio's economy. The Midwest Energy Efficiency Alliance estimates that energy efficiency measures could create 49,100 jobs in Ohio by 2027.²² As of 2010, more than 25,000 Ohioans were employed by Ohio's energy efficiency industry.²³ Long-term investments by utilities in energy efficiency can help build the energy efficiency industry in Ohio, attracting businesses and creating a workforce specializing in energy efficiency retrofits.

Energy Efficiency Is the Cheapest Energy Solution for Ohio

Energy efficiency also saves money for consumers by cutting their electricity consumption and power bills, often more than covering the cost of high-efficiency equipment or home renovations to improve efficiency.

Across the country, the average cost of energy saved through efficiency improvements is 2.5 cents per kilowatt-hour (kWh).²⁴ Of utility-operated energy efficiency programs in 16 states, outlays by utilities ranged from 1.6 cents per kWh saved to 4.4 cents per kWh saved (not counting the share of costs paid for by consumers). The ACEEE found that Ohio could meet the savings goals of the Clean Energy Law with efficiency programs costing 3 cents per kWh saved or less.²⁵ That's a fraction of what consumers pay for electricity. In 2010, the average price of electricity in Ohio was 9.14 cents per kWh.²⁶ According to the Midwest Energy Alliance, Ohio customers net \$3 in savings on their electricity bills for every dollar utilities invest in energy efficiency programs.²⁷

In addition to reducing electricity bills for individual consumers who invest in efficiency measures, investments in energy efficiency reduce costs for all consumers

by cutting the need for expensive infrastructure upgrades. Constructing a new power plant or power line can cost millions of dollars. Incremental investments in energy efficiency, renewable power and peak demand reduction can render unnecessary the construction of expensive new power plants.

Ohio Has Excellent Renewable Energy Potential

Ohio's wind and solar power resources have the potential to generate a large share of the state's electricity supply.

Onshore, Ohio could host up to 55 gigawatts (GW) of wind energy capacity, which could generate 152,000 GWh a year, more than two and a half times as much electricity annually as all of Ohio's homes consume in a year.²⁸ In addition, Ohio has the potential to install more than 46 GW of wind capacity offshore in Lake Erie—enough to power all the state's homes an additional two and a half times over.²⁹

Solar energy can also help to power Ohio's future. A 2008 study conducted for the National Renewable Energy Laboratory concluded that by 2015, Ohio would have the potential to install more than 26 GW of solar generating capacity just on residential and commercial rooftops.³⁰ Those panels could produce 34,000 gigawatt-hours (GWh) of electricity annually, more than half the amount of electricity consumed by Ohio's homes in a year.³¹

In total, Ohio has the potential to produce 327,000 GWh of electricity from onshore and offshore wind and rooftop solar panels, six times as much electricity as the state's homes consumed in 2010, not counting the additional potential available for generating solar electricity on barren or open land.³²

Ohio's Clean Energy Law Has Put Ohio on the Path to a Clean Energy Future

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 between them provide the majority of Ohio's electricity.³³ The utilities are required to implement efficiency programs to hit energy savings requirements each year, building to a cumulative requirement of saving 22 percent of their sales volume (measured annually against their average sales for the previous three years) through efficiency by 2025.³⁴ Utilities can meet this requirement either by implementing savings programs of their own, or by crediting large-scale customers with savings from efficiency measures undertaken without utility involvement at any time since 2006.³⁵ Under the schedule laid out in the Clean Energy

Law, the utilities are also responsible for purchasing or generating more renewable electricity each year until 2025, when each utility is required to obtain 12.5 percent of its electricity from renewable sources, including 0.5 percent that must come from solar energy.³⁶

The Clean Energy Law has driven utilities to invest in energy efficiency programs and peak demand reduction programs across the state. Energy efficiency programs save money for consumers by cutting electricity consumption and power bills. They also remove barriers, including the upfront cost of an efficiency project, that keep customers from investing in energy efficiency even when it makes economic sense to do so. In 2006, two years before Ohio adopted the Clean Energy Law, the state's annual energy efficiency savings were negligible, not even one-hundredth of one percent of retail sales.³⁷ By 2010, two years after passage of the Clean Energy

Law, Ohio's new efficiency investments in that year saved an annual 722,929 MWh of electricity, equal to roughly half a percent of retail electricity sales.³⁸

Between January 2009, when the law took effect, and December 2011 Ohio's four largest utilities implemented energy efficiency programs that have saved 3.2 million megawatt-hours of electricity, enough electricity to power 267,000 Ohio homes for a year.³⁹ By the end of 2011, Ohio's four major utilities reduced peak electricity demand by 1.3 GW—75 percent of the summer capacity of one of Ohio's largest coal-fired power plants.⁴⁰ These programs have reduced costs and saved energy for homeowners, businesses and commercial operations in Ohio.

Since adoption of the Clean Energy Law, Ohio has also experienced rapid development of clean energy resources. The 412 MW of wind and 45 MW of solar

photovoltaic capacity added between 2009 and 2012 can produce enough energy to power 95,000 Ohio homes.⁴¹ The 304 MW Blue Creek Wind Farm in Van Wert and Paulding counties would not have happened 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."⁴² 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.⁴³ 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 Ohio State \$1 million every year.⁴⁴ The Blue Creek



The Blue Creek Wind Farm in Van Wert County, OH. (Photo credit: Iberdrola Renewables)

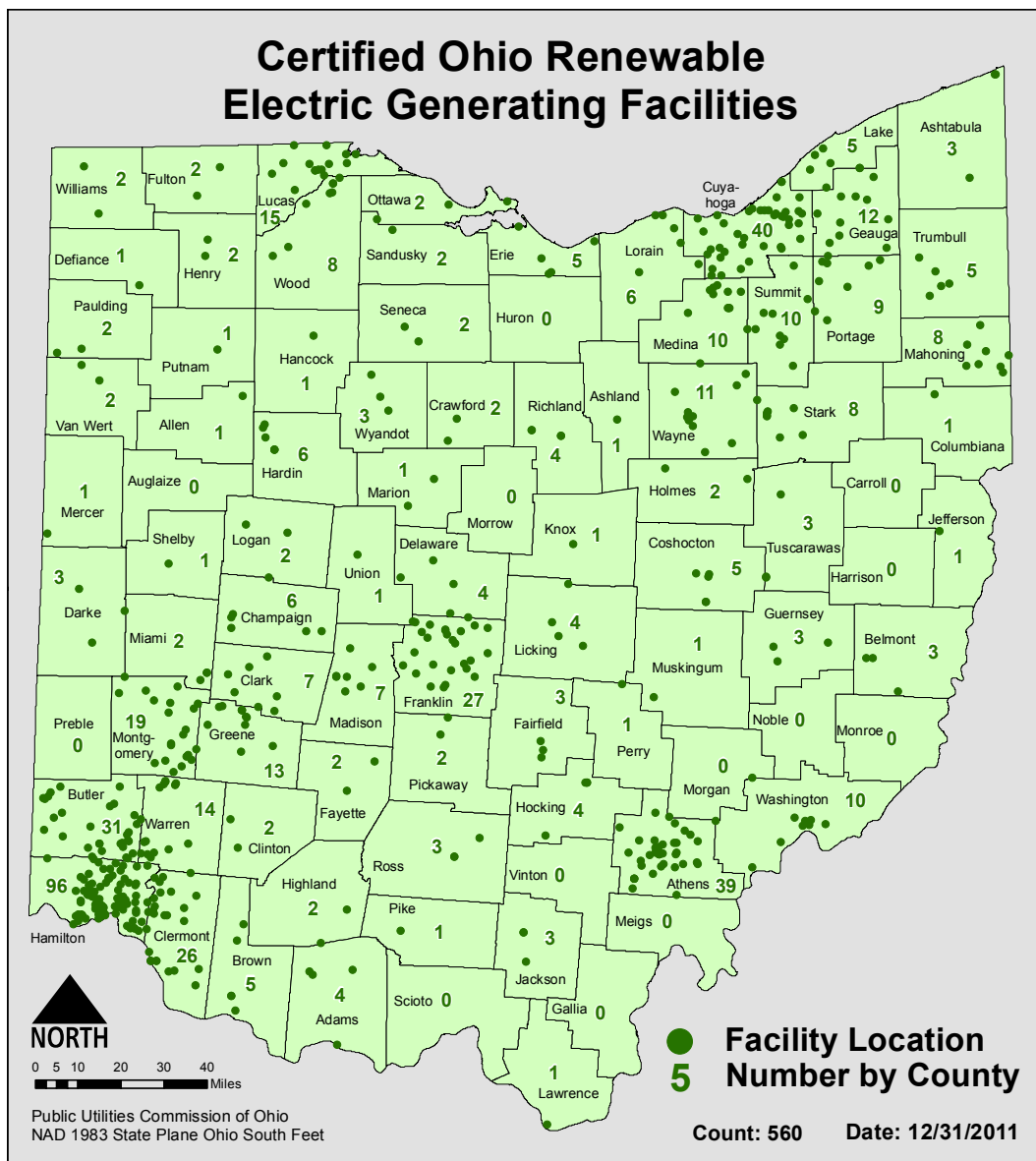


Figure 1. Map of Certified Ohio Renewable Electricity Generating Facilities as of December 31, 2011⁴⁹

Wind Farm created over 180 construction jobs and brought a \$600 million dollar investment to the state, becoming operational in June 2012.⁴⁵

With major wind and solar projects already completed, more renewable energy in the works, and significant progress on energy efficiency since 2008, Ohio is already beginning to see the benefits promised by the Clean Energy Law. Ohio's renewable

energy capacity has expanded significantly since 2008. Ohio is now a national leader in wind energy:

- In 2011, it was the fastest growing state in wind energy installations, with a growth rate of over 900 percent.⁴⁶
- Between June 2009 and October 2012, the Public Utilities Commission of

Ohio certified 24 wind energy facilities in Ohio with a total capacity of 420 MW.⁴⁷

- In addition, 872 solar facilities have been certified in Ohio with a total capacity of 68.05 MW.⁴⁸ (See Figure 1 for a map of certified renewable energy facilities in Ohio, including solar and wind installations.)

The following sections highlight some of the most successful and noteworthy renewable energy and energy efficiency efforts that utilities have implemented in response to the Clean Energy Law. These successes demonstrate that the law has been effective and will continue to drive critical environmental benefits and energy savings for Ohio residents.

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 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.
- Develop or purchase solar electricity accounting for 0.5 percent of their sales by 2025.

The law sets annual benchmarks for the efficiency, renewable energy and solar energy requirements, beginning with small steps in the first few years and then requiring greater annual savings later, once Ohio's clean energy industry has had time to expand.⁵⁰

Energy Efficiency and Renewable Energy Are Helping Ohio Move Toward a Clean Energy Future

Renewable energy facilities and energy efficiency investments have sprouted throughout Ohio as a result of the Clean Energy Law, benefiting the environment, the economy and communities across the state. The programs and investments made by Ohio's investor-owned utilities as a result of this law are driving the growth of clean energy in Ohio.

Ohio. While the largest energy savings have come from the installation of energy-efficient lighting systems, utilities have also launched other programs such as residential appliance recycling and home auditing programs. These programs generate energy savings, lower consumers' bills, and promote greater energy efficiency awareness among Ohio's students, residents and businesses. The following case studies demonstrate the ways that utilities' programs have impacted the state.

Schools, Businesses and Residents across Ohio Save with Utilities' Energy Efficiency and Peak Demand Reduction Programs

The Clean Energy Law has driven the implementation of energy efficiency and peak demand reduction programs across

Three Utilities Cooperate on Residential Appliance Recycling Program

Old, inefficient appliances waste energy and money in Ohio homes. Appliance energy efficiency standards have increased to the point that a 12-year old refrigerator uses more than twice the electricity of a new refrigerator today.⁵¹ Ohio residents

can save money and energy by replacing old appliances like refrigerators and air conditioning units.

Three utilities—AEP, Dayton Power and Light (DP&L) and FirstEnergy—offer financial incentives to their customers to unplug and recycle old energy-inefficient appliances. All three utilities have contracted with JACO Environmental for pick-up and recycling of old appliances.⁵² They were recently joined at the end of 2012 by Duke Energy.⁵³

JACO Environmental is a national appliance recycling business that helps homeowners and utilities save energy by removing old, energy-inefficient equipment from households.⁵⁴ JACO picks up appliances at a customer's residence and brings them to an in-state facility to disassemble them into raw materials. Customers receive an incentive check from their utility after JACO picks up and recycles the appliance. Between 100 and 150 refrigerators are disassembled every day at the JACO facility in Stow.⁵⁵ These old appliances are no longer sitting in Ohio homes, needlessly wasting energy.

This program provides a marked opportunity for utilities to achieve energy reductions for residential customers. In 2011, AEP collected 14,603 appliances, DP&L collected 4,448 appliances, and FirstEnergy collected 1,667 appliances, removing almost 21,000 old appliances from customers' homes and saving a total of 35 GWh of electricity in 2011—enough to power almost 3,000 homes in Ohio.⁵⁶ Using the same vendor for the same program across utility jurisdictions also 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.⁵⁷ This

program is a model that the utilities can build on as they develop and standardize their energy efficiency programs.

Duke Energy Smart Saver Incentives Help Build an Energy-Efficient Data Center

The data centers that support so much of our modern, digital life require constant cooling, which consumes vast amounts of energy. Although different data centers—nodes of computer servers—have different levels of energy efficiency, in 2010 data centers in the United States represented 2 percent of total electricity use and consumed 76,000 GWh of energy.⁵⁸ Inefficient cooling systems waste vast amounts of money and electricity at this scale of usage, but the costs of upgrading old equipment can dissuade businesses from making an investment.

The Kroger Company, one of the largest grocery store chains in the country, participated in Duke Energy's Smart Saver Incentive program. Participation in Duke's incentive program made an energy efficiency upgrade a smart choice for Kroger—it received a \$130,000 rebate after hiring PEDCO to install a high efficiency cooling system in its Cincinnati data center.⁵⁹ The new system uses a mixture of cooling techniques and saves energy by using outside air for ventilation when possible. This upgrade has resulted in 1,013 MWh of energy savings and \$86,555 of cost savings for Kroger in the first eight months of the upgraded data center's operation after it came online in August 2010.⁶⁰

Duke Energy reported 52,907 MWh of energy savings and 11 MW of peak demand reduction from the implementation of its Non-Residential Smart Saver Incentive Program in 2011.⁶¹ This program provides incentives to Duke Energy's commercial and industrial customers for the installation of high-efficiency equipment during new construction projects or for the



Energy-efficient cooling equipment was added to the Kroger data center. (Photo Credit: PEDCO)

replacement of old equipment with high efficiency alternatives. The incentives Duke Energy provided to Kroger through this program—from up-front incentives during installation to the prospect of lower energy bills over time—made data center cooling equipment upgrades a no-brainer.

Gas and Electric Utility Collaboration in New Home Construction for Increased Energy Efficiency

The Energy Star New Homes program works to improve energy efficiency in Ohio residences. Residential energy consumption accounted for 35.3 percent of electricity sales in Ohio in 2010, and Ohioans use 13 kWh of electricity on average every day at home—enough to power five flat screen TVs for 24 hours.⁶² Builders that 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 the Energy Star New Homes program where their jurisdictions overlap; together they provide incentives to builders for energy-efficient construction of new single-family homes and duplexes.⁶³

Creating more Energy Star homes in AEP's and Columbia Gas' territories provides home-seekers with options that meet high standards of energy efficiency. Energy Star is a program jointly run by the U.S. Environmental Protection Agency and the U.S. Department of Energy.⁶⁴ 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.⁶⁵ 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.⁶⁶ These incentives can represent 30 to 50 percent of the cost of

upgrading and certifying each home.⁶⁷ In 2011, the program created energy savings of 885 MWh, enough to power 73 homes for a year, and reduced peak demand by 0.7 MW in 2011, the equivalent energy demand of 140 clothes dryers.⁶⁸

Coordination between electric and gas companies has made 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.⁶⁹ The success of the program earned it the accolades of the U.S. Environmental Protection Agency in 2012, which gave AEP and Columbia Gas its 2012 Partner of the Year Award.⁷⁰

Renewable Energy Developments Spurred by the Clean Energy Law

The Clean Energy Law has also spurred demand for wind and solar energy, resulting in the creation of renewable energy projects across the state. Knowing that utilities will need to purchase renewable energy for years to come, a variety of smaller companies have made permanent investments in Ohio in wind and solar energy to serve the growing clean energy market. Utilities have several options for meeting the Clean Energy Law's renewable energy benchmarks. Utilities can generate their own renewable energy, purchase "renewable energy credits" (RECs) or "solar renewable energy credits" (SRECs) through long-term contracts



A 1,716-panel solar array was installed in 2012 on the field house of Kent State University in Kent, OH.⁷² (Photo credit: The Plain Dealer)

with renewable energy developers, or purchase RECs on the open market. Each REC represents the environmental benefits of 1 MWh of renewable electricity, and is treated as a separate commodity from the electricity generated by a wind or solar facility.⁷¹ Schools, zoos and farms are helping to support Ohio's clean energy future by installing renewable energy systems and selling RECs and SRECs to utilities.

Demand for More Solar Energy Leads to School Solar Array

Schools are ideal locations for solar energy installations. Schools use most of their electricity during the day when solar panels produce the most energy, and many schools have the space on school grounds to install solar panels. Meanwhile, the presence of renewable energy at schools provides children with an opportunity to learn about clean energy technology.

The drive for renewable energy has been a benefit to Ohio schools, with the largest school solar project in Ohio opening in May 2012 in the Centerburg School District.⁷³ The 1.5 MW array—consisting of 4,200 solar modules on the ground at the high school and 1,400 on the elementary school roof—was made possible by a 25-year agreement with Solar Planet.⁷⁴

A private company, Solar Planet installs renewable energy systems and provides financing and technical assistance to schools, municipalities, universities and non-profit organizations that may have trouble financing large solar projects.⁷⁵ In the case of Centerburg, Solar Planet funded the \$6.5 million project while Centerburg paid only about \$3,000 in legal fees.⁷⁶ The Centerburg School District expects the solar array will replace as much as 80 percent of the power the schools currently buy from AEP, cutting the district's electricity bill by an estimated \$50,000 annually.⁷⁷ Solar Planet will recoup its investment by selling SRECs from the system.⁷⁸



Solar array at the Centerburg High School.
(Photo credit: Dave Dwyer, Solar Planet)

In addition to a lower energy bill, the Centerburg School District has gained an educational tool. On the Centerburg High School website, an interactive page tracks and displays the energy production of the solar array at the high school and elementary school, along with the environmental benefits of conserving energy and reducing greenhouse gas emissions. As of January 1, 2013, the solar array at the high school and elementary school had generated 1,163 MWh of energy.⁷⁹

Two Ohio Zoos Invest in Solar Energy with Utility Support

Demand for in-state solar energy from Ohio utilities has brought solar projects to two Ohio zoos.⁸⁰ Zoos have the space for large installations and, like schools, have an educational focus. Renewable energy installations in these spaces give the public an opportunity to learn about clean energy technology.

Collaboration with FirstEnergy and the Melink Corporation enabled the Cincinnati Zoo & Botanical Garden to install a 6,400 panel, 1.56 MW solar array in 2011.⁸¹ The project's annual output of 1,680 MWh will provide 20 percent of the zoo's electricity needs—enough to power 200 homes a year—and reduce the zoo's annual global warming pollution by 1,775 tons annually.⁸²



The Cincinnati Zoo solar array covers the zoo's parking lot. (Photo Credit: Cincinnati Zoo & Botanical Garden)

It will also save the zoo \$1.3 million each year.⁸³

The Melink Corporation, a renewable energy developer, developed and now manages this solar project, made possible by a long-term commitment from FirstEnergy to buy the SRECs.⁸⁴ According to Jeremy Chapman, Business Development Manager at Melink Corporation, the cash-flow from a long-term agreement by FirstEnergy to buy SRECs from the project was essential—it would have been too much of a risk for the developer to build the project without this assurance.⁸⁵

The solar energy installation also serves as an educational opportunity for the zoo. Located in the parking lot, where the solar array provides shelter for 800 parking spaces, it is one of the largest publically accessible solar arrays in the country.⁸⁶

The Columbus Zoo and Aquarium took up the challenge for Ohio's most-solar-powered zoo in 2012. They selected Third Sun Solar of Athens to install a large solar array, which will likely be the

largest non-profit solar energy system and largest zoo solar installation in the U.S.⁸⁷ The Columbus solar array is projected to cover 2,000 parking spaces with 16,000 solar panels when completed.⁸⁸

This solar energy project serves multiple purposes for the zoo as an educational and environmentally concerned organization. The on-site solar array will allow the zoo to support sustainable energy production and educate zoo visitors on the importance of renewable energy, while cutting down its million-dollar annual electric bill.⁸⁹

AEP Coordinates with Cooper Farms on Wind Project and Energy Efficiency Measures

The flatlands of western Ohio have immense wind energy potential. Van Wert County is home to Ohio's two largest wind projects—the Blue Creek Wind Farm and the Timber Road Wind Farm.⁹⁰ In these ideal locations, wind energy is a smart investment for businesses like Cooper Farms

looking to lower their energy bills.

In cooperation with AEP, Cooper Farms' Cooked Meats facility in Van Wert County has installed two wind turbines and is in the process of installing a third—with a total capacity of 4.5 MW.⁹¹ The first two turbines came online in the first quarter of 2012 and supplied 60 percent of the plant's energy needs.⁹² Cooper Farms decided to install a third wind turbine after the addition of two large pieces of equipment increased Cooper Farms' energy demand by 25 to 50 percent.⁹³ After the third turbine is installed, wind power will cover 75 percent of the electricity needs of the Cooper Farms' Cooked Meats facility.⁹⁴ American Electric Power connects these turbines to the grid, and has supported the farms' wind development.⁹⁵

Cooper Farms contracted with One Energy, LLC to make this wind project possible. One Energy plans and implements wind farm projects suited to the needs of businesses and commercial operations. Cooper Farms uses the RECs generated by this project to make independent wind

energy installation financially feasible for their business.⁹⁶

In addition to installing wind turbines, Cooper Farms has engaged with AEP's Prescriptive Business Incentive Program to increase the energy efficiency of its facility.⁹⁷ This program provides cash incentives to businesses that replace old equipment and thereby increase their energy efficiency. AEP offers incentives of varying amounts based on the kinds of equipment businesses install.⁹⁸ As quoted in a summary of the project written by AEP, Brad Alspaugh of Cooper Farms states, "the incentives really pushed us to do this project. They helped the return on investment look a lot better."⁹⁹ With the help of \$22,000 worth of funding from AEP, Cooper Farms installed 165 energy-efficient lamps and a variable speed drive on an air compressor, resulting in annual savings of 330 MWh— enough energy to power 30 homes for an entire year.¹⁰⁰ Cooper Farms' experience demonstrates how the Clean Energy Law is driving common-sense efficiency upgrades.

Utilities Continue to Improve in Meeting the Requirements of the Clean Energy Law

Utilities performed better under the Clean Energy Law in 2011 than in any previous year. Every utility met its renewable energy requirement in 2011, and all but FirstEnergy exceeded both their energy savings and peak demand reduction benchmarks.

Each year, each utility must file a compliance report with the PUCO, describing the programs it implemented and the renewable energy sources it used to meet the requirements of the Clean Energy Law. We reviewed those filings to report on the progress each utility has made in meeting the law's standards. This is Environment Ohio Research & Policy Center's third report examining the performance of Ohio's major utilities. Our previous reports assessed the utilities' performance in 2009 and 2010. This report examines the utilities' performance in 2011, the third year of the law.¹⁰¹

Every utility met its benchmarks in every category, except for FirstEnergy, which fell just short of meeting its energy efficiency benchmark. AEP, DP&L and Duke Energy met their renewable energy requirements and exceeded their energy efficiency and peak demand reduction

requirements. FirstEnergy improved significantly from its performance in 2010, falling just short of its energy efficiency requirement but meeting the renewable energy and peak demand reduction standards.

American Electric Power

AEP continues to meet the requirements of the Clean Energy Law. AEP achieved 171 percent of its energy efficiency benchmark by generating 440,465 MWh of energy savings in 2011 through implementation of its suite of energy efficiency programs and filing 87,200 MWh in mercantile customer commitments, savings committed by its customers from past energy efficiency projects.¹⁰⁴

AEP's 2011 programs consisted of residential and business energy-saving projects, including the Energy-Efficient Products Program for residential consumers, which provides CFLs to customers for a marked-down price, and the Prescriptive Business Incentives Program, which

How Utilities Can Meet the Energy Efficiency Requirements of the Clean Energy Law

A utility can meet its energy efficiency requirements through a combination of savings generated by the utility's programs during the compliance year (like those profiled above), "banked" savings, and "mercantile customer commitments." A utility can "bank" savings when it creates energy savings in excess of its requirement in a given year, and it can apply these excess energy savings to its requirement in future years.¹⁰² "Mercantile customer commitments" are agreements by non-residential customers to commit energy savings or demand reductions from previous years to utilities' overall energy savings or demand reduction requirements. Energy savings from mercantile customer commitments occur without utilities' involvement and can be savings from before the Clean Energy Law's implementation in 2009.¹⁰³ In 2011, utilities fulfilled their energy efficiency requirements through a combination of savings generated through their programs and mercantile customer commitments.

provides businesses with cash incentives to offset the cost of boosting the energy efficiency of their facilities. The Home Energy Report Program generated 12 percent of AEP's energy efficiency savings by providing summary reports of home energy consumption to 125,000 high-use residential customers and 25,000 more to low-income customers, along with tips on conserving more energy at home.¹⁰⁵

AEP also surpassed its peak demand reduction benchmark by accumulating demand reductions of 562 MW in 2011 and 14 MW from past customer commitments—totaling 264 percent of AEP's requirement of 218 MW.¹⁰⁶ Programs that made significant contributions to peak demand reduction were AEP's programs serving businesses, such as its Prescriptive Business Program that offers incentives for the installation of more efficient equipment (reduction of 24 MW) and its Demand Response Program, which provides incentives for large energy users to commit to cutting demand if AEP needs to reduce its overall load (62 MW).¹⁰⁷ AEP's Interruptible Tariff Program (IRP-D) contributed

the most reduction—364 MW—by allowing customers to contract with the utility to reduce their electricity at times of high demand.¹⁰⁸

AEP fulfilled 100 percent of its renewable energy requirement by acquiring RECs from renewable energy facilities, including the 50 percent from in-state facilities required by the Clean Energy Law. AEP signed a power purchase agreement with EDP Renewables to buy electricity and RECs from the Timber Road II wind farm in Paulding County, online since late 2011.¹⁰⁹ AEP also has a 20-year agreement with the Wyandot Solar Farm to purchase all of the solar electricity and SRECs from its 10.08 MW solar facility.¹¹⁰

Long-term agreements enable utilities to plan for future compliance with the Clean Energy Law and support renewable energy developers by providing assurance that utilities will pay for the RECs generated by their projects. However, some plans for these long-term projects have been blocked by the PUCO—like the Turning Point Solar Project. As part of a long-term strategy to meet the renewable

energy standards set forth by the Clean Energy Law, AEP entered into a participation agreement with Turning Point Solar, LLC for a solar facility to be developed in southeastern Ohio on reclaimed mine land. Had the PUCO approved the project, this would have been a 49.9 MW solar farm generating enough electricity to power an estimated 28,000 homes.¹¹¹ But the PUCO denied AEP's proposal for the Turning Point Solar project, citing AEP's insufficient need for the additional solar energy resources. The PUCO made this decision against the recommendation of its own staff and despite the growing popularity of renewable power and the economic and environmental benefits that this project would have brought to Ohio.¹¹²

AEP has also begun signing 15-year agreements to buy RECs from residential producers of renewable energy.¹¹³ AEP purchases the remainder of its RECs on the market.

Dayton Power and Light

DP&L exceeded its energy efficiency requirement by conserving 164,039 MWh of electricity through its energy efficiency programs in 2011 and applying 15,547 MWh of savings from past customer commitments—attaining 181 percent of its energy efficiency requirement for 2011. Lighting programs had the greatest impact for DP&L—the utility's Residential Lighting (CFL) Program produced 57 percent of DP&L's 2011 energy savings. Other programs contributing significantly to overall savings were the Non-Residential Prescriptive Rebates Program and the Non-Residential Custom Rebates Program for energy-efficient equipment.¹⁴⁴

The utility exceeded its peak demand reduction requirement as well, accumulating 24 MW of demand reduction in 2011

and 55 MW from mercantile customer commitments—totaling 112 percent of its requirement. DP&L relied heavily on past customer savings to fulfill its peak demand reduction benchmark in 2011—these past customer commitments composed 69 percent of DP&L's reported reductions.¹¹⁴

DP&L fulfilled 100 percent of its in-state renewable energy requirements and met its renewable energy requirement in 2011. To meet the solar renewable energy requirements 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 2010.¹¹⁵ This facility fulfilled 100 percent of the utility's solar renewable energy needs in 2011.¹¹⁶

Duke Energy

Duke Energy exceeded its requirements for energy efficiency and peak demand reduction and met its benchmarks for renewable energy. This is a dramatic improvement from the C- it received on our scorecard last year for failing to meet renewable energy requirements.¹¹⁷

Duke Energy fulfilled its energy efficiency requirements with 215,644 MWh of savings from its programs in 2011, along with 55 MWh of past customer commitments. The majority of Duke Energy's savings generated in 2011—55 percent—came from its Smart Saver Residential Program, which provides residents and property managers with CFLs and incentives to install high-efficiency lighting systems, cooling systems, motors or pumps.¹¹⁸ The version of this program that serves non-residential customers generated 25 percent of Duke Energy's overall energy savings. Duke Energy's Home Energy Comparison Report Program—which sends reports to users comparing their energy consumption

to that of their neighbors in similar homes and suggesting improvements—generated another 6 percent of its overall savings, with 13,382 MWh of energy use averted.¹¹⁹

Duke Energy reported a peak demand reduction of 199 MW as a result of its programs in 2011 and accumulated savings from 2010. This is 593 percent of Duke Energy's requirement of 34 MW of reductions. Duke's Smart Saver Residential and Non-Residential Programs generated the majority of new peak demand reductions (51 percent) in 2011, with its Property Manager and Power Share Programs contributing 37 percent of its new 2011 reductions by providing incentives for customers to allow Duke to reduce the electricity supplied to them at peak load times.¹²⁰

Duke Energy met the renewable energy requirements of the Clean Energy Law by signing short-term contracts in Ohio and elsewhere for the purchase of RECs and SRECs, and by purchasing RECs and SRECs on the open market. Duke has not invested in long-term sources of RECs due to uncertainty regarding the future size of its customer base, which affects the amount of renewable energy it will need to obtain in order to comply with the Clean Energy Law.¹²¹

FirstEnergy

FirstEnergy improved its compliance with the Clean Energy Law in 2011 by fulfilling 97 percent of its energy efficiency requirement, exceeding its peak demand reduction requirement, and fulfilling its renewable energy benchmarks. FirstEnergy must employ smarter strategies to fulfill its renewable energy and energy efficiency standards, but, after receiving an F in 2009 and a D- in 2010 on our scorecard in the first two years of the law, FirstEnergy has

proven that compliance with the law is more than feasible.¹²²

The Clean Energy Law sets annual requirements of energy efficiency savings for utilities to attain, but, because FirstEnergy failed to meet its energy efficiency requirements in previous years, the utility has been working toward a cumulative requirement set by the PUCO.¹²³ In 2011, FirstEnergy was required to accumulate 792,047 MWh of energy efficiency savings from the operation of its programs in 2009, 2010 and 2011. FirstEnergy fell just short of meeting this requirement, generating 219,095 MWh of energy savings through its programs and attributing 549,651 MWh of savings to its filed savings from past customer commitments, for a total of 768,746 MWh of savings.¹²⁴ This totals to 97 percent of its requirement. A significant source of energy efficiency savings for FirstEnergy was its CFL Program, which generated 49 percent of the savings produced by its programs between 2009 and 2011. The biggest contributor of energy savings to First Energy's overall requirement, however, was not part of FirstEnergy's suite of programs, but came from mercantile customer commitments. These made up 71 percent of the savings that FirstEnergy filed for compliance.¹²⁵ Unfortunately, neither of these programs helps build FirstEnergy's capacity for the larger energy efficiency savings the company will need to obtain in future years. After its lighting programs, the biggest source of energy efficiency savings for FirstEnergy was its Home Energy Analyzer, an online tool allowing customers to evaluate their energy use and receive tips on how to reduce their energy use.¹²⁶

However, FirstEnergy may be overstating the benefits from its efficiency programs. Both the Natural Resources Defense Council and the Ohio Environmental Council note that the energy savings of FirstEnergy's Home Energy Analyzer Program were evaluated using an

invalid control group. They also report that savings from FirstEnergy's CFL program were overstated.¹²⁷

FirstEnergy exceeded its peak demand reduction requirement, reporting 379 MW in reductions from its programs as of 2011 and 72 MW of reductions from mercantile customer commitments. With these reductions, FirstEnergy achieved 165 percent of its 272 MW benchmark for compliance.¹²⁸ FirstEnergy obtained the majority of its savings from its Interruptible Demand Program, in which it contracts with large energy users who agree to cut their energy use during times of high power demand.¹²⁹

FirstEnergy met its renewable energy requirement in 2011 by obtaining RECs through a combination of long-term agreements with renewable energy developers and purchases of RECs on the open market. However, FirstEnergy fulfilled its requirement at a high cost—independent auditors found that FirstEnergy paid significantly more for its RECs than other Ohio utilities. 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.¹³⁰

FirstEnergy is beginning to make smarter compliance choices by investing in long-term renewable energy production in order to secure the RECs it will need in future years with its expanding customer base. FirstEnergy signed a long-term agreement to purchase all of the SRECs generated by a 9.8 MW solar facility installed at a Campbell Soup manufacturing facility.¹³¹ In 2011, FirstEnergy signed a 20-year agreement with the Blue Creek Wind Farm to purchase 100 MW of power produced by the facility.¹³² FirstEnergy also signed long-term contracts with smaller projects, such as the solar array at the Cincinnati Zoo, to ensure that it has enough SRECs to comply with the law in coming years.¹³³ As Ohio's largest electric distribution utility, FirstEnergy will have the highest benchmarks to meet in order to achieve the required amount of renewable energy as a percentage of its overall sales.

Utilities May Not Be Prepared for Future Efficiency Savings

Utilities have relied heavily upon a few programs to meet current energy efficiency requirements and may not have built the programs and expertise needed to obtain greater savings in the future.

The Clean Energy Law allows a utility to meet its energy efficiency requirements either by implementing savings programs of its own, by applying “banked” savings to its requirements, or by crediting large-scale customers with savings from efficiency measures undertaken without utility involvement at any time since 2006.¹³⁴ This latter provision has allowed utilities to report large savings now that they may not be able to produce again in coming years.

By relying on large-scale customers to make energy efficiency investments, utilities have been able to comply with the Clean Energy Law without developing and refining a suite of energy efficiency incentives for residential and commercial customers. Mercantile commitments accounted for 71 percent of FirstEnergy’s filed energy efficiency savings in 2011.¹³⁵ FirstEnergy has let its energy efficiency programs lag and instead has relied on commitments from past customer projects that did not require any assistance from FirstEnergy. The lower savings goals of the early years of the Clean Energy Law provided an opportunity for utilities to develop and test various programs that could provide greater savings in the years to come. Instead of developing expertise when energy efficiency requirements were lower, utilities have largely relied on efficiency upgrades made by individual large customers.

The Clean Energy Law also contains a provision that allows utilities to carry over energy efficiency savings from one year to another. Credit for energy efficiency savings in excess of a utility’s requirement for a particular year can be stored for future years. This provision is beneficial because it gives utilities reason not to end or scale back their programs during the year after they have met their energy efficiency requirements. However, it can also create a disincentive for utilities to diversify their energy efficiency programs and invest in programs that will generate more savings in the future. This can also be a problem when a shrinking customer base allows a utility to use “banked” credits to meet its energy efficiency requirements in future years. Duke Energy and AEP may be in danger of this—both companies have banked enough savings to ensure energy efficiency compliance in future years without needing to ramp up new programs.¹³⁶ Utilities must not rely on banked savings in lieu of creating lasting energy efficiency programs for a utility’s entire customer base.

In coming years, utilities should not be allowed to use their failure to establish effective programs in the early years of the Clean Energy Law as an excuse for not meeting future efficiency savings.

Policy Recommendations

Ohio is turning the corner in efforts to repower the state with clean energy. In the four years since Ohio adopted the Clean Energy Law, the state's utilities have implemented a range of programs to improve energy efficiency and increase the use of renewable energy. Utilities with weak results in 2010 dramatically improved their performance in 2011. While utilities still have a long way to go in maximizing their clean energy potential, Ohioans across the state are increasingly seeing the benefits of energy efficiency and renewable energy at work in their communities.

Now is not the time to backslide on Ohio's commitment to clean energy. Efforts to weaken the Clean Energy Law by capping requirements for energy efficiency at current levels would end the progress Ohio has made and would commit consumers to spending ever more money on energy in years to come.

To build upon the progress Ohio has achieved to date:

- 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 in the past by customers without utilities' involvement.
- Requirements for energy efficiency and peak demand reduction savings should be separated and specified by customer class to **ensure that each utility develops energy efficiency programs that will benefit all of the customers it serves.**
- There should be higher standards of reporting and review from the PUCO to **prevent utilities from submitting compliance reports with bad methodologies** and reporting savings that are not real.
- 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. 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 to invest in renewable energy much less risky.

- 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.¹³⁷
- 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, allowing members of the public to easily follow progress toward Ohio's clean energy requirements.

Ohio will benefit most from clean energy if it augments the Clean Energy Law with policies that remove barriers to renewable energy and energy efficiency development.

- Ohio should complement its existing efficiency programs by **adopting the latest model building energy codes from the International Codes Council.** Ohio's residential and commercial building energy codes are out of date and should be updated.¹³⁸ Home and building energy codes ensure that new houses and buildings take advantage of opportunities for energy efficiency—locking in savings from the time of construction at the lowest possible cost and ramping up savings opportunities during upgrades. Implementing building energy efficiency retrofits nationwide could create energy savings equal to \$1 trillion over the course of 10 years and cut down U.S. global warming pollution by 600 million metric tons per year.¹³⁹
- Programs that **allow property owners to pay for clean energy over the lifetime of their investment** reduce the up-front cost of energy efficiency and solar energy for property owners. Policies like **Property Assessed Clean Energy (PACE)** financing or on-bill repayment would allow more residential and commercial customers to benefit economically from clean energy.
 - Ohio law currently allows cities to adopt PACE legislation (which allows homeowners to pay for clean energy installations over time through an additional charge on their property tax bill), although mortgage restrictions imposed by national lending agencies may limit the use of this mechanism for residential property owners. Cities should adopt enabling legislation, and national political leaders should work to clear the way for widespread use of this mechanism.

- Ohio should move to allow on-bill financing, a mechanism that allows property owners to pay back clean energy loans through a surcharge or line-item on their utility bills. Legislation allowing

this mechanism in Ohio would give home and business owners in the state a new affordable way to spread the costs of clean energy out over the same time frame as the benefits.

Appendix: Utility Performance

Table 1: American Electric Power¹⁴⁰

	2011 Requirement	Total Energy Savings, Demand Reductions or Generation Filed in 2011		Percent Attained
		Utility Driven	Mercantile Customer Commitments	
Energy Efficiency (MWh)	307,000	440,465	87,200	172%
Peak Demand Reduction (MW)	218	562	14	264%
Non-Solar Renewable Energy (MWh)	421,144	421,144	N/A	100%
Solar Renewable Energy (MWh)	13,025	13,025	N/A	100%

Table 2: Dayton Power and Light¹⁴¹

	2011 Requirement	Total Energy Savings, Demand Reductions or Generation Filed in 2011		Percent Attained
		Utility Driven	Mercantile Customer Commitments	
Energy Efficiency (MWh)	98,700	164,039	15,547	182%
Peak Demand Reduction (MW)	71	24	55	112%
Non-Solar Renewable Energy (MWh)	109,190	109,190	N/A	100%
Solar Renewable Energy (MWh)	3,377	3,377	N/A	100%

Table 3: Duke Energy¹⁴²

	2011 Requirement	Total Energy Savings, Demand Reductions or Generation Filed in 2011		Percent Attained
		Utility Driven	Mercantile Customer Commitments	
Energy Efficiency (MWh)	151,431	215,644	55	142%
Peak Demand Reduction (MW)	34	199	0	594%
Non-Solar Renewable Energy (MWh)	155,338	155,338	N/A	100%
Solar Renewable Energy (MWh)	4,804	4,804	N/A	100%

Table 4: FirstEnergy¹⁴³

	Requirement	Total Energy Savings, Demand Reductions or Generation Filed in 2011		Percent Attained
		Utility Driven	Mercantile Customer Commitments	
Energy Efficiency (MWh)*	792,047	219,095	549,651	97%
Peak Demand Reduction (MW)	272	379	72	166%
Non-Solar Renewable Energy (MWh)	176,156	176,156	N/A	100%
Solar Renewable Energy (MWh)	7,025	7,025	N/A	100%

* Savings are Cumulative from 2009, 2010, and 2011 Programs

Notes

- 1 Ohio Energy Project, *About OEP*, downloaded from www.ohioenergy.org/about, 27 December 2012.
- 2 Initial filing by AEP in PUCO case 12-1537-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.
- 3 American Electric Power, *AEP Case Study: New High School a Model of Energy Efficiency, Conservation*, downloaded from aepohio.com/global/utilities/lib/docs/save/programs/SuccessStories, 4 December 2012.
- 4 For information on the Summit Campus, see Note 3 and Debbie Briner, “Environmental Issues: Beyond LEED,” *Columbus CEO*, 27 June 2012.
- 5 For information on incentives, see AEP, *AEP New Construction Program* (fact sheet), downloaded from aepohio.com on 10 December 2012; for information on the Summit Campus, see Note 4.
- 6 Debbie Briner, “Environmental Issues: Beyond LEED,” *Columbus CEO*, 27 June 2012.
- 7 Debby Yerkes, Executive Director, The Ohio Energy Project, personal communication, 30 November 2012.
- 8 U.S. Department of Energy, Energy Information Administration, *State Electricity Profiles 2010*, 30 January 2012.
- 9 Ibid.
- 10 Ibid.
- 11 U.S. Environmental Protection Agency, *Nitrogen Dioxide: Health*, downloaded from www.epa.gov/oaqps001/nitrogenoxides/health.html, 7 December 2012.
- 12 Travis Madsen, Frontier Group, and Lauren Randall, Environment Ohio Research & Policy Center, *Ohio’s Biggest Mercury Polluters: How Cleaning Up Power Plants in the State and Across the Nation Will Protect Our Health*, November 2011.
- 13 Shelley Vinyard and Lauren Randall, Environment America Research & Policy Center, *Dirty Energy’s Assault On Our Health: Mercury*, January 2011.
- 14 See Note 8.

- 15 Hazrijie Mustafic et al., “Main Air Pollutants and Myocardial Infarction: A Systematic Review and Meta-Analysis,” *JAMA*, 307(7) 713-721, 15 February 2012.
- 16 “Ohio ‘Fracking’ Wells Map Database Updated,” *Coshocton Tribune*, downloaded from www.coshoctontribune.com, 7 December 2012.
- 17 Spencer Hunt, “Fracking Brine; Gas-well Waste Full of Radium,” *The Columbus Dispatch*, 3 September 2012.
- 18 American Council for an Energy-Efficient Economy, *Shaping Ohio’s Energy Future: Energy Efficiency Works*, March 2009.
- 19 American Electric Power, *2012 to 2014 Energy Efficiency / Peak Demand Reduction (EE/PDR) Action Plan*, 29 November 2011. Information is in Appendix A.
- 20 See Note 18.
- 21 Ibid.
- 22 Midwest Energy Efficiency Alliance, *Energy Efficiency Saves Money and Creates Jobs for Ohio*, May 2011.
- 23 Advanced Energy Economy Ohio, *Employment in Ohio’s Advanced Energy Industry*, July 2012.
- 24 Katherine Friedrich, et al., American Council for an Energy-Efficient Economy, *Saving Energy Cost-Effectively: A National Review of the Cost of Energy Saved Through Utility-Sector Energy Efficiency Programs*, September 2009.
- 25 See Note 18.
- 26 See Note 8.
- 27 See Note 22.
- 28 55 GW and 152,000 GWh: 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 (update); Residential consumption: See Note 8.
- 29 Offshore generation: Marc Schwarz et al., National Renewable Energy Laboratory, *Assessment of Offshore Wind Energy Resources for the United States*, June 2010; 46 GW of turbines producing at a 35 percent capacity factor would produce 141,000 GWh of electricity annually; Residential consumption: See Note 8.
- 30 J. Paidipati, et al., Navigant Consulting, for the National Renewable Energy Laboratory, *Rooftop Photovoltaics: Market Penetration Scenarios*, February 2008.
- 31 Assuming a capacity factor of 15 percent for installed solar facilities. Residential consumption: See Note 8.
- 32 Calculated as the total of (1) onshore generation, 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 (update); (2) offshore generation at a 35 percent capacity factor, per Marc Schwarz, et al., National Renewable Energy Laboratory, *Assessment of Offshore Wind Energy Resources for the United States*, June 2010; and (3) Solar energy at a 15 percent capacity factor, see Note 30.
- 33 See Note 8.
- 34 General Assembly of the State of Ohio, *127th General Assembly, SB 221*, as signed into law on 5 May 2008.
- 35 Ibid.
- 36 Ibid.
- 37 Maggie Eldridge, et al., American Council for an Energy-Efficient Economy, *The 2008 State Energy Efficiency Scorecard*, October 2008.

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

39 3.2 million MWh in savings: For utilities' 2009 savings see 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; For utilities' 2010 savings, see 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. Utilities' 2011 savings: Initial filing by AEP in PUCO case 12-1537-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; Initial filing by Dayton Power and Light Company in PUCO case 12-1420-EL-POR, *In the Matter of Dayton Power and Light Company's Portfolio Status Report*, opened May 15, 2012; Initial filing by Duke Energy Ohio, Inc. in PUCO case 12-1477-EL-EEC, *In the Matter of the Annual Energy Efficiency Portfolio Status Report of Duke Energy Ohio, Inc.*, opened May 15, 2012; and Initial filing of FirstEnergy subsidiaries Ohio Edison Company, The Cleveland Electric Illuminating Company, and the Toledo Edison Company in PUCO case 12-1533-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, 2012. Also, see PUCO case 12-1534-EL-EEC and PUCO case 12-1535-EL-EEC for comments regarding the same filing submitted on behalf of The Cleveland Electric Illuminating Company and the Toledo Edison Company. 267,000 homes: The per capita consumption of electricity in Ohio homes was 4,722 kWh in 2010, according to U.S. Department of Energy, *Ohio Residential Energy Consumption*, 26 November 2012, downloaded from apps1.eere.energy.gov, 28 December 2012. The

average size on an owned Ohio home is 2.57 individuals as recorded in the U.S. Census Bureau, American Fact Finder, *Selected Housing Characteristics, 2011 American Community Survey 1-year estimates*, 2011; the average Ohio household then consumes 12,000 kWh annually.

40 1 million MWh in savings and 944 MW of peak demand reduction: See utilities' filings listed in Note 39; 83,000 homes: the average Ohio household consumes 12,000 kWh annually, see Note 39. The average net summer capacity of one of Ohio's 10 largest power plants is 1.7 GW: See Note 8.

41 412 MW of wind installed in Ohio: American Wind Energy Association, *Wind Energy Facts: Ohio* (factsheet), October 2012. Only 11 MW of this solar capacity was online as of May 2011, and 3 MW were added in 2010, according to American Wind Energy Association, *Wind Energy Facts: Ohio* (factsheet), May 2011. 45 MW of solar: Ohio's solar capacity grew from 1.7 MW in 2009 to 47 MW in 2012 according to Solar Energy Industries Association, *Ohio Solar*, downloaded from www.seia.org/state-solar-policy/ohio, 6 February 2013. 97,000 homes: Assumes wind turbines are operating at a capacity of 30 percent and solar panels are producing energy at 15 percent. The average Ohio household consumes 12,000 kWh annually, see Note 39.

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

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

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

45 U.S. Department of Energy, *Blue Creek Wind Farm Case Study*, 19 June 2012.

Started generating power in June 2012: See Note 44.

46 AWEA, *U.S. Wind Industry, Fourth Quarter 2011 Market Report*, January 2012.

47 Clean Energy States Alliance, *Updates from Ohio and Oregon: State-Federal RPS Collaborative Webinar* (powerpoint), 5 November 2012.

48 Ibid.

49 Ibid.

50 See Note 34.

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

52 See Note 39, initial filing by AEP in PUCO case 12-1537-EL-EEC and the initial filing by Dayton Power and Light Company in PUCO case 12-1420-EL-POR; and see ADM, Environmental Research and Evaluation, Prepared for FirstEnergy Ohio Companies, *Appendix C: Impact and Process Evaluation of 2011 Appliance Turn-in Program*, May 14, 2012, appendix to Initial filing by The Cleveland Electric Illuminating Company and Ohio Edison Company and the Toledo Edison Company in PUCO case 12-1246-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 16, 2012.

53 Hamilton County Recycling and Solid Waste District, *Appliance Recycling: Duke Energy Ohio and Kentucky Launches an Appliance Recycling Program in the TriState*, 4 October 2012.

54 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.

55 Ibid.

56 For information about appliances recycled and energy saved, see Note 52. Almost 3000 homes: the average Ohio household consumes 12,000 kWh annually, see Note 39.

57 See Note 39, initial filing by Dayton Power and Light Company in PUCO case 12-1420-EL-POR.

58 2 percent of total electricity use and 76,000 GWh of energy: James Glanz, “Power, Pollution and the Internet,” *The New York Times*, 22 September 2012.

59 Kelly Blake, PEDCO, *PEDCO Client Receives \$130,000 in Incentives through Duke Energy’s Smart Saver Program* (press release), 26 July 2011.

60 Ibid.

61 See Note 39, initial filing by Duke Energy Ohio, Inc. in PUCO case 12-1477-EL-EEC.

62 35.3 percent of retail sales: see Note 8. A flat screen TV has an estimated wattage of 120 W, according to U.S. Department of Energy, *Estimating Appliance and Home Electric Energy Use*, 31 August 2012. Ohioans use 13 kWh of electricity on average every day at home: See Note 39, the per capita consumption of electricity in Ohio homes was 4,722 kWh in 2010, and the average size on an owned Ohio home is 2.57 individuals.

63 See Note 39, initial filing by AEP in PUCO case 12-1537-EL-EEC.

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

65 AEP, *AEP Launches Energy Star New Homes Program* (news release), 20 April 2011.

- 66 Ibid.
- 67 See “Appendix F” in the second filing by AEP in PUCO case 12-1537-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.
- 68 885 MWH of energy savings and 0.7 MW of peak demand reduction: See Note 67. The capacity of a clothes dryer is up to 5,000 W according to U.S. Department of Energy, *Estimating Appliance and Home Electric Energy Use*, 31 August 2012.
- 69 U.S. Environmental Protection Agency, *AEP: Energy Star Partner of the Year*, downloaded from www.energystar.gov, 10 December 2012.
- 70 Columbia Gas of Ohio, *Energy Star EPA Recognizes AEP/Columbia Gas of Ohio New Homes as 2012 Energy Star Partner of the Year*, 2011.
- 71 For more information on RECs and SRECs, see U.S. Environmental Protection Agency, *EPA’s Green Power Partnership; Renewable Energy Credits*, July 2008.
- 72 John Funk, “Kent State University Going Solar in July,” *The Plain Dealer*, 14 June 2012.
- 73 Pamela Schehl, “Solar Power a Reality at Centerburg Schools,” *Mount Vernon News*, 14 May 2012.
- 74 Ibid.
- 75 Solar Planet, *About Us*, downloaded from www.solarplanetpower.com, 4 December 2012.
- 76 Tim Feran, “The Owner of Charley’s Grilled Subs Starts Solar Planet,” *The Columbus Dispatch*, 13 July 2012.
- 77 Ibid. Also see Note 73.
- 78 Michael Hebenthal, District Superintendent, Centerburg Local Schools, personal communication, 4 December 2012.
- 79 Centerburg High School, *Energy*, downloaded from www.centerburgschools.org, 1 Jan 2012.
- 80 Jeremy Chapman, Business Manager, Melink Corporation, personal communication, 6 December 2012.
- 81 Cincinnati Zoo & Botanical Garden, *Cincinnati Zoo Announces Advanced Energy Project: Largest Publically Accessible, Urban, Solar Array in the U.S* (press release), January 19, 2010.
- 82 Melink Corporation, *Melink Solar Canopy at the Cincinnati Zoo & Botanical Garden* (factsheet), downloaded from www.melinkcorp.com, 4 December 2012.
- 83 Ibid.
- 84 See Note 81.
- 85 See Note 80.
- 86 See Note 81.
- 87 Barb Revard, Green Energy Ohio, *Columbus Zoo Has Potential to Be Largest Zoo Solar Array in U.S.*, downloaded from www.greenenergyohio.org, 4 December 2012.
- 88 Kathy Lynn Gray, “Zoo Plans Solar Field to Create Electricity,” *The Columbus Dispatch*, 7 October 2011.
- 89 Ibid.
- 90 Ed Gerbert, “A Look at the Future of Wind in Van Wert County,” *Times Bulletin*, 14 April 2011.
- 91 Cooper Farms, *Cooper Farms Plans Third Wind Turbine*, downloaded from cooperfarms.com, 5 December 2012.
- 92 American Wind Energy Association,

U.S. Third Quarter Market Report 2012, 17 October 2012; Cooper Farms, *Cooper Farms Plans Third Wind Turbine*, downloaded from cooperfarms.com, 5 December 2012.

93 See Note 91.

94 Ibid.

95 Goldwind Media, *Goldwind Announces U.S. Turbine Sales—Continues Momentum in Americas, Projects in Rhode Island and Ohio Will Feature Goldwind's 1.5 MW Permanent Magnet Direct Drive Turbines*, downloaded from www.goldwindamerica.com, 5 December 2012.

96 Cassie Jo Arend, Communications Coordinator, Cooper Farms, personal communication, 7 December 2012.

97 AEP, *Family-Owned Business Has Grown Steadily Over Seven Decades*, downloaded from aepohio.com/save/programs/SuccessStories, 5 December 2012.

98 AEP Prescriptive Program, *Incentives for Common Energy-Efficient Products*, 1996–2012, downloaded from aepohio.com/save/programs, 10 December 2012.

99 See Note 97.

100 For information on AEP's work with Cooper Farms: See Note 97; Power 30 Texas homes for a year: the average Ohio household consumes 12,000 kWh annually, see Note 39.

101 This year, unlike in previous years, we are not grading the utilities' performances. We have reported on utilities' compliance with the law in 2011 and made recommendations on how their performances can continue to generate the most positive results for Ohio.

102 Ohio Administrative Code, *Chapter 4901: 1-39-05 Energy Efficiency Programs, Benchmark and Annual Status Reports*, effective 10 December 2012.

103 Ibid.

104 See Note 39, initial filing by AEP in PUCO case 12-1537-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.

105 Ibid.

106 Ibid.

107 Ibid.

108 Ibid.

109 EDP Renewables, *EDP Renewables North America Builds Ohio's First Utility-Scale Wind Farm; Invests Approximately \$175 Million in Paulding County* (press release), 5 October 2011.

110 AEP, *Solar Power* (factsheet), May 2012.

111 Sam Shawver, "Noble County Solar Farm Still in the Works," *The Marietta Times*, 2 April 2012.

112 On the popularity of renewable energy, see Melissa Harrison, *Oil, Gas, and Coal Attacks Have Little Impact*, NRDC Action Fund, 12 November 2012.

113 AEP, *Renewable Energy Technology Program*, downloaded from www.aepohio.com/save/renewable/RETIncentiveProgram, 2 January 2013.

114 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.

115 Ibid.

116 Dayton Power and Light, *Solar*, downloaded from www.dpandl.com/environment/recent-investments/solar, 10 December 2012.

117 See 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.

118 See Note 39, initial filing by Duke Energy Ohio, Inc. in PUCO case 12-1477-EL-EEC, *In the Matter of the Annual Energy Efficiency Portfolio Status Report of Duke Energy Ohio, Inc.*, opened May 15, 2012.

119 Ibid.

120 Ibid.

121 See filing by E. Watts on behalf of Duke Energy Business Services in PUCO case 11-1439-EL-FOR, *2011 Duke Energy Ohio Long-term Electric Service Report and Resource Plan*, filed July 15, 2011.

122 See 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, and see 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.

123 See the Finding & Order by the PUCO in PUCO case 09-1004-EL-EEC, *Finding and Order Stating that FirstEnergy's Application be Granted to the Extent Set Forth in Findings (9) and (10) and Motions to Intervene Filed by NRDC, OPAE, OEC, OCC, Citizen Power, ELPC, Sierra Club and IEU-Ohio be Granted*, opened October 27, 2009.

124 See Note 39, initial filing of FirstEnergy subsidiaries Ohio Edison Company, The Cleveland Electric Illuminating Company, and the Toledo Edison Company in PUCO case 12-1533-EL-EEC.

125 Ibid.

126 Ibid.

127 See the filing by the OEC and NRDC in filing of FirstEnergy subsidiaries Ohio Edison Company, The Cleveland Electric Illuminating Company, and the Toledo Edison Company in PUCO case 12-1533-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, 2012.

128 See Note 124.

129 Ibid.

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

131 Enfinity, *Campbell's Soup Company Dedicates 9.8-Megawatt Solar Power System* (press release), 21 June 2012.

132 John McKenna, "Iberdrola Completes Ohio's Biggest Wind Project," *Windpower Monthly*, 6 March 2012; Iberdrola Renewables, *Blue Creek Wind Farm* (factsheet), downloaded from www.iberdrolarenewables.us/pdf/blue-creek-fact-sheet.pdf, 10 December 2012.

133 See Note 81.

134 See Note 34.

135 See Note 39, initial filing of FirstEnergy subsidiaries Ohio Edison Company, The Cleveland Electric Illuminating Company, and the Toledo Edison Company in PUCO case 12-1533-EL-EEC.

136 See Note 39, initial filing by Duke Energy Ohio, Inc. in PUCO case 12-1477-EL-EEC, and initial filing by AEP in PUCO case 12-1537-EL-EEC.

137 California Public Utilities Commission, *33% RPS Procurement Rules*, 15 June 2012.

138 U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Codes Energy Program, *Status of State Energy Code Adoption*, downloaded from www.energycodes.gov/status-state-energy-code-adoption, 10 December 2012.

139 The Rockefeller Foundation and Deutsche Bank Climate Change Advisors, *U.S. Building Energy Efficiency Retrofits: Market Sizing and Financing Models*, March 2012.

140 See Initial filing by AEP in PUCO case 12-1212-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 13, 2012; See Note 39, Initial filing by AEP in PUCO case 12-1537-EL-EEC.

141 See Initial filing by Dayton Power and Light Company in PUCO case 12-1203-EL-ACP, *In the Matter of The Dayton Power and Light Company's Annual Alternative Energy Portfolio Status Report*, opened

April 13, 2012; See Note 39, initial filing by Dayton Power and Light Company in PUCO case 12-1420-EL-POR.

142 Initial filing by Duke Energy Ohio, Inc. in PUCO case 12-1214-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, 2012; See Note 39, initial filing by Duke Energy Ohio, Inc. in PUCO case 12-1477-EL-EEC.

143 Initial filing by The Cleveland Electric Illuminating Company and Ohio Edison Company and the Toledo Edison Company in PUCO case 12-1246-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 16, 2012; See Note 39, initial filing of FirstEnergy subsidiaries Ohio Edison Company, The Cleveland Electric Illuminating Company, and the Toledo Edison Company in PUCO case 12-1533-EL-EEC.

144 See Note 39, Initial filing by Dayton Power and Light Company in PUCO case 12-1420-EL-POR.