

*ENERGY STANDARDS  
AT WORK:  
OHIO SENATE BILL 221  
CREATES A CLEANER ECONOMY*

A REPORT FROM  
POLICY MATTERS OHIO

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## Executive Summary

In May of 2008, on Governor Strickland's initiative, the Ohio legislature passed Amended Substitute Senate Bill 221, a bill including aggressive clean energy standards that represent the foundation for our state's energy evolution. Ohio law now requires Ohio's electric utilities to generate 12.5% of electricity sales from renewable energy sources and to enact programs that will reduce energy consumption by 22%, all by 2025. In passing the bill, policy makers of both parties argued that it would have economic and job creation benefits for Ohio. This report assesses SB 221's effects on economic growth, emissions reductions, energy independence and energy savings, and finds that as long as utilities are reaching annual benchmarks, Ohio will see jobs created, less pollution and, in the long run, money saved.

*Ohio's Renewable Energy Standard created a Renewable Energy Credit Market in Ohio*, by guaranteeing that Ohioans and outside investors will have a commodity to sell when they invest in renewables here. As of June 2010, 508 applications had been filed at the Public Utility Commission of Ohio to projects as renewable energy resource generators. About 25% of those applications are for projects in Ohio (132), representing over 150 MW of potential homegrown capacity from solar, wind, hydro, and landfill gas, enough to power almost 115,000 homes. Plus, 1500 MW in plant capacity have been approved for co-firing biomass.

*Ohio's Requirements for Investments in Energy Efficiency Create Jobs.* Between 2010 and 2011, Ohio utilities plan to invest about \$340 million in energy efficiency programs in Ohio, to meet standards, including rebate programs for energy efficient appliances, home weatherization programs, education campaigns and energy efficient lighting campaigns. These investments will create about two years of work for 1,700 people. The investments also indirectly support the creation or retention of additional jobs in related industries, some of which are in Ohio. Nearly all 160,000 solar panels used in the Wyandot facility, for instance, were manufactured by First Solar in Perrysburg, which doubled the size of its plant with a \$100 million investment.

*In addition, Ohio's Clean Energy Standards also have the effect of:*

- **Lowering Emissions.** Due to SB221, Ohio could stop as much as 341,890,714 tons of CO<sub>2</sub> from being emitted over 15 years – equal to taking almost 3.8 million cars off the road for 15 years.
- **Producing Energy Savings.** The ACEEE estimates that by 2025 there will be a net energy bill savings of \$18.9 billion due to SB221. For the current three-year period (2009-2011), for which we already have programming plans, we estimate a total net savings to consumers of \$386 million over four years, plus continued savings for the life of the efficiency measures.
- **Energy Independence.** For 2025, we project a reduction of 28 million MWh of coal-generated electricity consumption due to SB221, eliminating the need to purchase 13.5 million short tons of coal in 2025, saving \$562 million from being sent out of state to import it, and reducing Ohio's coal trade deficit by 40%.

*Other interesting developments include,*

- **FirstEnergy's** \$200 million retrofit of the 54-year old R.E. Burger coal Power Plant in Shadyside, saving about 105 jobs and potentially generating enough RECs to fulfill all of FirstEnergy's benchmarks through 2024. The full report discusses this controversial project.

- **American Electric Power** has pioneered new power purchasing agreements and offered discounts and rebates of up to 50% of the incremental cost of purchasing energy-efficient products, including LED traffic signals and new industrial project rebates.
- **Duke Energy Ohio** signed a power purchasing agreement with Benton County Wind Farm in Indiana to purchase 100 MW of power over 20 years and started a program to purchase RECs from customers that invest in renewable energy generation.
- **Dayton Power & Light's** built Yankee Solar Field, and is testing biomass co-firing at its Killen Generating Station and obtained 491 RECs from the facility in 2009. The company plans for the facility to remain coal-firing, with biomass making up 10% of the resource mix at the maximum estimate. Due to an unexpected success of its well-marketed CFL program, DP&L actually surpassed its 2009 savings requirement by approximately 70,000 MWh.

The report also reviews issues related to solar benchmarks, biomass and industrial opt-outs. We find that in 2009, all four of Ohio's Investor-owned utility companies met general renewable benchmarks but fell short on **solar benchmarks**. All were granted *force majeure* waivers for their 2009 solar benchmarks, claiming a lack of certified solar projects in the state. However, Duke Energy Ohio obtained ten times the number of solar RECs as FirstEnergy. We conclude that no *force majeure* applications need be approved going forward.

All four of the companies are using similar strategies to meet non-solar requirements, mainly depending on REC purchases and power purchasing agreements with 3<sup>rd</sup> parties. Almost all projects where utility companies are generating their own renewable energy involve co-firing biomass with coal. We conclude that biomass has a place in transition to green energy; however the magnitude of biomass projects being planned in Ohio is potentially problematic.

Under the law, there is a "mercantile" exemption that allows very large customers to avoid cost recovery fees. Energy efficiency efforts that pre-date the bill's passage are considered eligible for counting towards a company's energy efficiency requirements. There are over 500 filed and voided and 400 open mercantile opt-out cases on file with the PUCO.

We conclude that SB221 is a successful policy. Utilities are changing their behavior and increasing investments in renewable energy. For the law to continue to succeed enforcement efforts of the Public Utilities Commission of Ohio are crucial. As long as utilities are reaching benchmarks, Ohio will see jobs created, less pollution and, in the long run, money saved. The report also recommends that policymakers expand the clean energy standards; expand and extend Ohio's Advanced Energy Fund; enforce the benchmarks; examine biomass more closely and close the mercantile opt-out loopholes.

## Introduction

Ohio is in the early stages of building a green energy infrastructure and rebranding itself as “America’s Energy Gateway.” In the past, Ohio has been consistently noted as one of the largest energy consumers and polluters amongst states. However, this state is now beginning to recognize its great potential to benefit from more sustainable energy practices and contribute to the production of environmentally-friendly technologies.

In recognition of our need to both conserve energy and benefit from the economic development potential in renewables, the Ohio legislature passed Amended Substitute Senate Bill 221 in May of 2008, on Governor Strickland’s initiative, a bill that included aggressive clean energy standards. The bulk of Senate Bill 221 (SB 221) was devoted to re-regulating investor-owned electric utilities to stabilize electricity rates, but it also created alternative energy and energy efficiency requirements for both economic and environmental reasons. The alternative energy standard put new mandates on electric utilities to meet annual benchmarks in energy efficiency and renewable energy generation. The law states that by 2025, 12.5% of the utilities’ sales must come from renewable energy sources and another 12.5% from advanced energy sources. There is also a requirement for electric utilities to reach annual benchmarks in energy efficiency by enacting programs to encourage less consumption and more efficient infrastructure, culminating in 22% energy savings annually by 2025.

In passing these clean energy standards Ohio legislators argued the bill would have great economic benefits for the state. Ohio’s economy has always depended on a large manufacturing and industrial sector that, while once mighty, has been shrinking for many years. Factories producing automobiles and steel have closed their doors, sometimes shipping jobs overseas, and leaving Ohio searching for an industry to fill the void. SB 221 was passed to help fill that gap and grow the state’s economy through clean energy industries. As Governor Ted Strickland stated when unveiling his energy plan in late 2007, “we must implement an advanced energy portfolio standard in order to create thousands of new Ohio jobs.” The Speaker of the House at the time, Representative Jon Husted, bumped heads with the governor on many regulatory issues when writing the law, but never on the economic benefits of the AEPS. Months before the bill was signed into law he said, “We will create an energy policy that will take an environmentally responsible approach, emphasizing renewable energy while transforming our economy with new job-creating green businesses.”

Ohio has taken many other measures to encourage green industry growth in the state but the requirements of the clean energy standards represent the foundation for the state’s energy evolution. By legally requiring lower energy consumption and greater use of renewable energy resources, the law has driven demand for products, labor, and research in green industries. For the law to have its desired effects, environmental and economic, the compliance of Ohio’s electric utility companies and the enforcement efforts of the Public Utilities Commission of Ohio (PUCO) are of the utmost importance. As long as utility companies are reaching their annual benchmarks, Ohio will see jobs created, less pollution and, in the long run, money saved.

This report provides an assessment of SB 221’s effects on Ohio in the areas of economic growth, emissions reductions, and energy independence and savings. It then provides a comparative analysis of the compliance efforts of the four largest investor-owned electric utility

companies in the state: FirstEnergy, American Electric Power, Duke Energy Ohio, and Dayton Power and Light. After detailing initiatives each company has taken to comply with annual benchmarks, the report will assess the effects of each company's efforts. The report also explores issues concerning enforcement of the law and utility company practices. We conclude with a set of policy recommendations to further improve Ohio's commitment to sustainable energy use and green industries.

## Understanding the Law

The renewable energy and energy efficiency requirements work on a basis of annual benchmarks, illustrated in Table 1 below. The percentages applied to each year translate to an amount of Megawatt-hours (MWh) generated in the case of renewable energy, or saved in the case of energy efficiency. To calculate that number a baseline is first calculated by averaging the company's sales in MWh over the three previous years. The baseline will continually adjust as time goes on to reflect the most recent sales data.

Percent of Sales that is Renewable Electricity			Percent of Energy Savings		
Year	Percent Renewable	Percent Solar	Year	Incremental Energy Savings	Cumulative Energy Savings
2009	0.25%	0.004%	2009	0.3%	0.3%
2010	0.5%	0.01%	2010	0.5%	0.8%
2011	1%	0.03%	2011	0.7%	1.5%
2012	1.5%	0.06%	2012	0.8%	2.3%
2013	2%	0.09%	2013	0.9%	3.2%
2014	2.5%	0.12%	2014	1%	4.2%
2015	3.5%	0.15%	2015	1%	5.2%
2016	4.5%	0.18%	2016	1%	6.2%
2017	5.5%	0.22%	2017	1%	7.2%
2018	6.5%	0.26%	2018	1%	8.2%
2019	7.5%	0.30%	2019	2%	10.2%
2020	8.5%	0.34%	2020	2%	12.2%
2021	9.5%	0.38%	2021	2%	14.2%
2022	10.5%	0.42%	2022	2%	16.2%
2023	11.5%	0.46%	2023	2%	18.2%
2024	12.5%	0.5%	2024	2%	20.2%
2025	12.5%	0.5%	2025	2%	22.2%

Data derived from Amended Substitute Senate Bill 221 Section 4928.66.A.1.a and Section 4928.64.B.2

For example, the .3% energy savings in 2009 is based on the average sales from 2006, 2007, and 2008. The 2010 .5% benchmark is based on 2007-2009 data and the 2011 .7% benchmark is based on MWh sales from 2008-2010. As the years go by this adds up to much more than each year's incremental percentage of savings, culminating in over 22% annual energy savings by 2025. The energy savings benchmarks encourage economic growth simply through the actions taken to cut back on energy consumption. The requirements create greater demand for energy efficient appliances, building insulation, better windows, improvement of the electric transmission grid, research, and more. This demand translates to job growth in the

businesses that provide these products or services. Energy savings due to the requirement also keep money in the hands of Ohio's energy consumers that can be spent for alternative and potentially more productive purposes.

Renewable energy percentages simply reflect how much of an electric utility's sales must come from renewable resources each year. It uses the same baseline as energy efficiency – the average sales of the prior three years – and the percentage translates to a straightforward number of MWh from renewable sources that must be sold each year. Included in the benchmarks is an amount that must come specifically from solar power, referred to in the law as the "solar carve-out." The carve-out is meant to ensure Ohio grows its solar industry with the idea that the production of solar panels and generating of solar energy will help Ohio's economy and establish the state as an attractive place for solar businesses.

Renewable energy has a twist that energy efficiency does not in that companies can import half of the renewable energy they sell from out of state. The other half must be generated in Ohio, a rule that was included to assure in-state economic growth from green industries. The half that is imported from out of state must be approved by the PUCO as electricity that it "deliverable to Ohio."

Companies can acquire renewable electricity in three ways. The first is that they can simply generate the electricity themselves by building facilities such as wind farms or solar fields or by retrofitting coal plants to co-fire biomass. Once the PUCO has certified the electricity as a renewable energy resource, the utility can sell the power it generates and count the MWh towards its annual benchmark. Second, the utility can buy renewable energy from a 3<sup>rd</sup> party contractor through a power-purchasing agreement, and apply the MWh towards its benchmark.

Third, utilities can simply acquire the positive externalities of renewable energy, the environmental and social benefits, by purchasing Renewable Energy Credits in the Renewable Energy Credit market. When a business or home installs a renewable energy generator it can then apply to the PUCO to be certified as a renewable energy credit provider. If certified, every MWh generated by the installation creates a Renewable Energy Credit (REC). The owner can then sell those RECs to electric utilities seeking to fulfill their benchmarks. For example, a homeowner could buy a 6 kw -capacity solar installation for a roof. The owner could then apply to the PUCO for a renewable energy certificate so that the positive benefits from each kwh of electricity produced by those panels could be sold to utility companies to be banked against their requirements. The installation would be monitored by a meter on site that would give an exact number of MWh being generated by the panels. A 6 kw solar installation would produce around 7 MWh annually, offsetting the need for an equivalent amount of energy to be produced from polluting fossil fuels, positive benefits which the owner could then sell to utility companies.

RECs and power-purchase agreements provide a major incentive for green industry to grow in Ohio. Large companies have reason to build solar fields and wind farms in Ohio, knowing that there will be demand from electric utilities for the power they generate and their environmental benefits. As local renewable energy generators grow in Ohio to meet demand from electric utilities, further investment ensues to manufacture the clean energy technologies and their component parts – solar panels, wind turbine parts, emissions-reducing technology. Efforts to improve renewable energy and efficiency technology means research and

development work in Ohio as well. In short, the law encourages long-term demand for renewable energy generation and energy efficiency products, as well as the components and research that are related to it.

## Economic Growth

Prior to the passage of SB 221 in 2008, Ohio had already been recognized for its potential to see huge economic benefits from the renewable energy industry. Multiple reports from the Renewable Energy Policy Project (REPP) cited Ohio as one of the top five states for potential job creation from the industry.<sup>1</sup> REPP also cited Ohio's strong manufacturing base as a major advantage in creating jobs in wind turbine component manufacture, showing that Ohio could gain over 11,000 new jobs in this supply chain.<sup>2</sup> A Pew Charitable Trust report showed that Ohio had the second most "clean businesses" in the country in 2008, with over 35,000 Ohioans working for such companies.<sup>3</sup> Reports show Ohio is also well placed to gain economically from the mandated increases in energy efficiency.<sup>4</sup> A report released by the ACEEE estimates that the energy efficiency requirements in SB 221 would generate a total of 32,000 jobs and increase Gross State Product by roughly \$2.6 billion by 2025.<sup>5</sup> The Center for American Progress issued a report saying that if \$3.7 billion dollars were invested in energy efficiency in Ohio, roughly 80,000 in-state jobs would be created.<sup>6</sup> In short, Ohio is slowly building a clean energy economy. With SB 221 mandating that more of Ohio's electricity be generated from renewable sources and requiring efficiency gains be captured, the growth has accelerated since 2008.

### *Ohio's Renewable Energy Credit Market*

With the development of Ohio's Renewable Energy Credit market comes a major incentive for large-scale renewable energy businesses to invest in the state and for Ohio's traditional smaller businesses to start producing their own renewable energy. To be eligible to sell RECs, a facility must be certified by the PUCO as a renewable energy provider. Since June of 2009 and as of mid-June 2010, 508 facilities filed applications to be renewable energy providers, of which two were denied and three withdrawn. Of the facilities approved or pending approval, 132 are in Ohio, representing over 150 MW of potential renewable energy generating capacity that have largely come on-line in 2009 and 2010, and enough power for more than 110,000 homes. This does not include the potential capacity for biomass projects to generate electricity, which is variable and depends on the extent to which it is co-fired with

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<sup>1</sup> Component Manufacturing: Ohio's Future in the Renewable Energy Industry. REPP. October 2005.

[http://www.apolloalliance.org/downloads/Ohio\\_Manufacturing\\_Report\\_2.pdf](http://www.apolloalliance.org/downloads/Ohio_Manufacturing_Report_2.pdf)

<sup>2</sup> Ibid.

<sup>3</sup> The Clean Energy Economy. The PEW Charitable Trusts. June 2009

<sup>4</sup> See Shaping Ohio's Energy Future: Energy Efficiency Works. ACEEE, 2009; Center for American Progress, Political Economy Research Institute, *Green Recovery: A Program to Create Good Jobs and Start Building a Low-Carbon Economy* (2008) at [www.americanprogress.org](http://www.americanprogress.org), and *Renewable Energy and Energy Efficiency: Economic Drivers for the 21<sup>st</sup> Century*, Roger Bezdek. McIntire Communications, Inc. 2007.

<sup>5</sup> Shaping Ohio's Energy Future: Energy Efficiency Works. ACEEE, 2009. P 43

<sup>6</sup> Center for American Progress, Political Economy Research Institute, *Green Recovery: A Program to Create Good Jobs and Start Building a Low-Carbon Economy* (2008) at [www.americanprogress.org](http://www.americanprogress.org).

coal. Of these 132 projects, 90 have been approved by the PUCO. Table 2 illustrates the breakdown of these projects below.

	<b>Number of Applications (Approved)</b>	<b>MW Capacity</b>	<b>Annual MWh</b>
Biomass	10 (6)	Up to 1506 (depends on % co-fired with coal)	Depends
Landfill Gas	12 (9)	106	449,183
Wind	13 (8)	11	19,864
Solar	93 (66)	14	19,786
Solid Waste	2(0)	22	121,800
Hydroelectric	1 (1)	1	3,500
<b>Total</b>	<b>132 (90)</b>	<b>154</b>	<b>614,133</b>

Source: renewable energy certificate applications filed at the PUCO under Industry Code EL and Purpose Code REN.

These projects are a testament to the economic growth SB 221 is ushering into Ohio. All 132 facilities applied for certification during the past year, showing a strong commitment from Ohioans taking advantage of the REC market. By creating demand for renewable energy from electric power distributors, SB 221 has spawned growth in renewable industries from large-scale projects to small residential installations. The annual benchmarks endured by utility companies guarantee that Ohioans and outside investors will have a commodity to sell when they invest in renewable energy in the state.

In the past two years Ohio has had major investments from some of the largest renewable energy businesses in the world. The relationship to SB 221 and utility mandates is best illustrated by the Wyandot Solar Facility, located in Upper Sandusky, Ohio. American Electric Power signed a long-term agreement in July of 2009 to buy all of the power produced by the 10.08 MW facility. The facility was finished three months ahead of schedule and has been operating since June 2010. The solar field represents an estimated investment of \$45 million from Wyandot Solar LLC.<sup>7</sup> The investment had even greater effects than the construction and permanent jobs it created in the area, since all of the 160,000 solar panels for the facility were also built in Ohio.<sup>8</sup> First Solar, a Phoenix based company that invested in Ohio in 2000, has a manufacturing plant in Perrysburg, Ohio that has seen consistent growth since the passage of SB 221. The company will be further expanding to meet the larger demand for solar panels throughout the state and country, and has recently been added to the S&P 500. Governor Strickland recently stated, "With First Solar, ten percent of all solar cells in the nation emanate from Perrysburg, Ohio."<sup>9</sup> The company recently doubled the size of its Perrysburg plant with a \$100 million investment and will further expand Ohio employment. First Solar had 50 employees at its inception in 2000, this year that number is around 840.<sup>10</sup> The chain of

<sup>7</sup> Ohio Private Investment Survey 2007, 2008, 2009. Ohio Department of Development. March 2010.

<sup>8</sup> "First Solar Plant Re-energized" Gary Pakulski, Toledo Blade. November 22, 2009.

<sup>9</sup> Speech to the EnergyBiz Leadership Forum. March 1, 2010.

<sup>10</sup> "First Solar Plant Re-energized" Gary Pakulski, Toledo Blade. November 22, 2009.



growth from SB 221 mandates is easy to see: AEP commissions an out-of-state investor to develop in Ohio, Ohio's workforce is used to build the facility, and an Ohio company receives a large contract to build the panels for the facility.

The First Solar example offers warnings as well, and there have been criticisms of the solar industry growth in Toledo more broadly. First Solar, while it has added jobs in Ohio, has added many more jobs in Malaysia – in December 2009 the company added eight production lines in a manufacturing facility in Malaysia, an operation that already spanned more than ten times as much square footage as the Perrysburg plant.<sup>11</sup> More broadly, the Toledo Blade published a three-day series of reports earlier this year that argued that Ohio was not getting as many solar jobs as competing states and that solar jobs had not grown substantially between 2007 and 2010.<sup>12</sup>

Nonetheless, major investments have come from Ohio's commitment to renewable energy. DuPont recently invested \$175 million to expand its plant in Circleville, Ohio, which develops components of solar panels. The expansion will bring 230 construction jobs and 70 permanent positions to Pickaway County. DuPont expects 30% growth for years to come and the Circleville plant to bring in over \$1 billion in revenue by 2012.<sup>13</sup> Isofoton, Spain's largest solar company, has also come to an agreement with the state of Ohio to build a 60 MW capacity plant in the state between 2010 and 2011. The plant has the potential to employ 350 Ohioans.<sup>14</sup> Another company founded in Toledo, Xunlight Corporation, was recently named one of Business Week's "most promising start-ups" and is a leading figure in solar research and development with its production of flexible solar panels that garner more energy.<sup>15</sup> The company grew from two professors to 110 employees between 2002 and 2010, and is set to start producing its products on a larger scale in 2010 and 2011.

The wind industry is also starting to take shape in Ohio, which promises more jobs and even greater amounts of renewable electricity than the solar boom. The Ohio Power Siting Board approved construction of three large wind farms in Ohio that are set to begin construction in 2010 and go online in 2011. These three projects amount to 483 MW capacity, enough to power over 132,000 homes annually. Three more projects pending the board's approval have a greater combined capacity than the previous three.<sup>16</sup> These enormous projects will provide hundreds of construction jobs to Ohioans. Besides the actual construction of turbines, manufacturing companies throughout Ohio have grown thanks to the demand for the over 8,000 components in each wind turbine.

The expansion of solar manufacturing and investment in Ohio is a testament to the potential Ohio was said to have for years. Toledo had lost thousands of jobs as the automobile industry has reduced employment, a prime example of a "rust belt" city. Its infrastructure for manufacturing glass products has not all gone to waste thanks in part to solar power. The city

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<sup>11</sup> Apollo Alliance

<sup>12</sup> "Analysis: Obama's rosy take on Toledo imprecise: Area's clean-energy progress overstated" at <http://www.toledoblade.com/article/20100822/BUSINESS01/100829933>, August 22, 2010

<sup>13</sup> "DuPont Investment in Circleville Means Jobs" NBC 4i News Report. January 18, 2010.

<sup>14</sup> "Governor Ted Strickland Upbeat on Solar Job Growth" Joe Vardon, Toledo Blade. March 8, 2010.

<sup>15</sup> "America's Most Promising Startups – A More Flexible Way to Harvest the Sun" Michael Arndt, BusinessWeek. January 26, 2010.

<sup>16</sup> "Ohio Power Siting Board Approves 483 MW of Wind" RenewableEnergyWorld.com March 24, 2010.

now employs thousands in the solar industry and is one of the largest solar panel producers in the country (First Solar, a producer of solar panels, employs over 1000 people at its Perrysburg plant, although, as mentioned, it employs many more in Malaysia).<sup>17</sup> Likewise, production of wind turbine components has had similar results throughout the state using Ohio's manufacturing infrastructure. Ohio has had shrinking employment and manufacturing over the past decade, but one of the few industries in this dismal economy that is showing consistent growth in the state is renewable energy.

Landfill gas represents a significant portion of existing renewable energy credits. One example, is the Phoenix Golf Links, located in Columbus, which represents nearly 4 MW of electricity generated from landfill methane that is recovered from beneath the golf course. Another example is the landfill gas-to-pipeline plant at the Rumpke Sanitary landfill in Cincinnati, which uses technology to convert gas produced naturally in the landfill to natural gas used by Duke Energy customers in Cincinnati.

### *Ohio's Requirements for Investments in Energy Efficiency Create Jobs*

Between 2010 and 2011, to meet their energy efficiency benchmarks, Ohio's utility companies plan to invest approximately \$340 million in energy efficiency projects in Ohio. Based on formulas derived from the Center for American Progress, suggesting that for every \$46,000 invested in energy efficiency in Ohio, one job is created (made up of .46 direct jobs, .29 indirect jobs and .25 induced jobs), these investments will roughly generate work for about 1,700 people, over the two-year period, plus indirectly support the creation or retention of an additional 1,000 jobs in related industries such as appliance manufacturing. These indirect jobs are not necessarily in Ohio but could be with smart manufacturing policy.<sup>18</sup> Direct jobs refer to any project, which immediately creates a job. This can be related to construction of a smart grid, weatherization or many other hands-on projects. Indirect jobs are created when any related industry increases employment due to the new demand of energy-efficient projects. One example of an indirect job would be a manufacturer of efficient appliances, who will see an increase in demand due to SB 221. There are also induced jobs, which we did not include in our calculation, from the increase the economy will see because of the greater purchasing power that consumers of electricity will enjoy once electricity input costs are reduced because of energy efficiency requirements. Table 3 breaks down the short-term jobs, by year, generated by programs created by Ohio's electric utility companies in response to SB221.

	<b>Total</b>	<b>Direct</b>	<b>Indirect</b>
<b>2010</b>	3,643	1,689	1,058
<b>2011</b>	3,681	1,707	1,069

Job creation estimates based on data from Table 10, *Green Recovery: A New Program to Create Good Jobs and Start Building a Low-Carbon Economy*, which is written by the Center for American Progress.

<sup>17</sup> "Cities on the Front Lines" Joan Fitzgerald, The American Prospect. April 13, 2009.

<sup>18</sup> Center for American Progress, Political Economy Research Institute, *Green Recovery: A Program to Create Good Jobs and Start Building a Low-Carbon Economy* (2008) at [www.americanprogress.org](http://www.americanprogress.org).

## Lowering Emissions

Due to its high consumption of electricity and its enormous commitment to coal, Ohio is one of the most polluting states in America. In 2008 it ranked second only to Texas in its amount of carbon dioxide emissions from the electric industry.<sup>19</sup> Ohio is also the largest emitter of sulfur dioxide in the United States.<sup>20</sup> If Ohio is to improve its dismal environmental record it will have to generate less electricity through coal. The renewable energy mandates in SB 221 are a step in the right direction for lowering Ohio's emissions. Wind, solar, and hydroelectric facilities all produce zero emissions. Landfill Gas facilities that capture methane for generation, use gas that would otherwise be emitted. Biomass co-firing can be CO<sub>2</sub>-neutral over long periods of time as long as it is done in a sustainable fashion.

Using data collected by the Environmental Protection Agency it is possible to estimate the reduction in emissions due to Senate Bill 221's renewable energy and energy efficiency requirements. The EPA provided data from 2005 on the pounds of carbon dioxide (CO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>) and nitrogen oxide (NO<sub>x</sub>) that each power company released per MWh generated. These numbers have been compiled in the table below.

	FirstEnergy	AEP	Duke	DP&L	Unit
CO <sub>2</sub>	2,051.62	1,951.39	1,853.18	1,873.16	lb/MWh
SO <sub>2</sub>	10.92	7.76	12.80	13.41	lb/MWh
NO <sub>x</sub>	3.06	2.25	3.34	3.38	lb/MWh
Emissions per MWh data derived from 2005 EPA estimates: <a href="http://cfpub.epa.gov/egridweb/">http://cfpub.epa.gov/egridweb/</a>					

Each MWh saved through energy-efficiency measures and each one displaced by emissions-free renewable resources reduces the company's emissions in pounds by the numbers listed in the table. An estimate of total emissions reductions can be made when the numbers are aggregated, though some adjustments must be made in the renewable energy field, since not all resources are emissions-free. This is particularly true in the area of biomass, where there is potential for carbon-neutral generation but only if there is an inventory of net biomass growth and only if there are not other preferable uses for the fuel in question.

In total, due to the renewable energy and energy efficiency requirements of SB 221, Ohio could save as much as 341,890,714 tons of CO<sub>2</sub> emissions over the 16-year period, essentially wiping out 2.65 years worth of emissions at the 2008 level, the equivalent of removing almost 3,750,000 cars from Ohio's roadways and keeping them off for 16 years.<sup>21</sup> If utility companies rely heavily on biomass to meet their clean energy mandates this number would be lowered, but even then it seems likely that SB 221 will be responsible for saving at least two years worth of emissions from Ohio's electric power industry between 2009 and 2025. In the worst-case scenario, with total overlap and carbon positive renewable energy sources, SB 221 will save at least 212 million tons of CO<sub>2</sub> (1.65 years worth of Ohio CO<sub>2</sub> emissions), the equivalent of removing over 2.3 million cars from the road and keeping them

<sup>19</sup> Energy Information Administration - Carbon Dioxide Emissions by the Electric Power Industry, 2008.

<sup>20</sup> 2007b. *Electric Power Annual*. [http://www.eia.doe.gov/cneaf/electricity/epa/epa\\_sum.html](http://www.eia.doe.gov/cneaf/electricity/epa/epa_sum.html). Washington, D.C.: U.S. Department of Energy.

<sup>21</sup> <http://www.epa.gov/oms/consumer/f00013.htm>

off for the next 16 years. The following tables break down the impact of the renewable energy versus the energy efficiency standards on these emission numbers.

*Renewable energy mandate's impact on emissions reduction.* In the renewable energy field, if one assumes that benchmarks are met using resources that emit no pollutants, then the reduction will be quite large. The total emissions reductions between 2009 and 2025 are illustrated in the table below. The CO<sub>2</sub> savings is equivalent to one year of CO<sub>2</sub> emissions for Ohio's electric power industry in 2008, or nearly the combined annual CO<sub>2</sub> emissions of the 15 least-polluting states.<sup>22</sup>

2009-2025	FirstEnergy	AEP	Duke	DPL	Total
CO <sub>2</sub>	55,472,958	43,850,564	16,833,944	13,162,028	129,319,494
SO <sub>2</sub>	295,170	174,466	116,254	94,206	680,096
NO <sub>x</sub>	82,768	50,568	30,378	23,752	187,466

Emissions reductions estimates calculated from EPA emissions per MWh data (Table 4) and estimated company benchmarks from 2009-2025.

*Energy efficiency benchmarks will contribute larger savings.* The 2009-2025 savings for each company is listed in the table below.

2009-2025	FirstEnergy	AEP	Duke	DPL	Total
CO <sub>2</sub>	93,497,151	63,725,209	32,374,021	22,974,840	212,571,220
SO <sub>2</sub>	497,495	456,108	223,572	91,409	1,268,585
NO <sub>x</sub>	139,502	114,998	58,421	26,494	339,415

Emissions reductions estimates calculated from EPA emissions per MWh data (Table 4) and estimated company benchmarks from 2009-2025.

## Energy Savings

The ACEEE estimates that by 2025 there will be a cumulative net energy bill savings of \$18.9 billion due to the SB 221 energy efficiency standard.<sup>23</sup> For the current three-year period for which we have utility programming plans (2009-2011), we estimate a total net savings to consumers of \$386 million based on current electricity prices for the three-year program period and one year following the program period. That means by the end of 2012, consumers will save an average of \$70 per year over a four-year period (more specifically \$7 per residential consumer, \$47 per commercial consumer, and \$1,639 per industrial consumer). Total savings nearly doubles the upfront costs within the first year following the implementation of the three-year proposals, with continued energy savings in years following depending on the life of each efficiency measure put in place.<sup>24</sup> Over the entire 16-year period, the average savings per

<sup>22</sup> Carbon Dioxide Emissions by the Electric Power Industry, 2008.  
[http://www.eia.doe.gov/state/state\\_energy\\_rankings.cfm?keyid=86&orderid=1](http://www.eia.doe.gov/state/state_energy_rankings.cfm?keyid=86&orderid=1)

<sup>23</sup> Shaping Ohio's Energy Future: Energy Efficiency Works. ACEEE, 2009

<sup>24</sup> For the 2010-2011 programs already planned, the average cost for Ohio's electric utility companies to save a mw-h is a one time cost of \$112 per mw-h, while the average price to use a mw-h, at current energy prices, is a

customer will be \$216 each year (more specifically, \$82 per residential customer, approximately \$580 for commercial business customers, and for industrial customers it will be over \$20,000).<sup>25</sup>

Type	Percentage of Market	Cumulative Net Savings	Average Savings Per Customer	Average Yearly Savings per Customer	Average Monthly Savings per Customer
Residential	33.66%	\$6,389,264,438	\$1,312	\$82	\$7
Commercial	29.27%	\$5,555,467,188	\$9,255	\$578	\$48
Industrial	37.07%	\$7,035,268,373	\$322,541	\$20,159	\$1,680
All Customers	100.00%	\$18,979,999,999	\$3,456	\$216	\$18

[Calculations based on ACEEE report data from Energy Information Administration. http://www.eia.doe.gov/cneaf/electricity/epa/epat7p2.html](http://www.eia.doe.gov/cneaf/electricity/epa/epat7p2.html)

## Energy Independence

Ohio uses much more coal to generate electricity than we actually produce within the state. In fact, Ohio is the fourth largest consumer of coal in the US and around two-thirds of that is imported from other states.<sup>26</sup> The energy efficiency requirements of SB 221 will reduce demand for electricity and, in turn, the need to import coal from outside of Ohio to generate it. In 2008, prior to the implementation of the SB 221 requirements, Ohio imported over 42 million short tons of coal while only exporting around 8 million short tons.<sup>27</sup> At a price of \$41.86 per short ton of coal, this scenario resulted in a \$1.4 billion trade deficit for Ohio. Ohio's 2008 coal trade is illustrated in Table 8 below.

A short ton of coal generates about 2 MWh of electricity, so every 2 MWh saved through energy efficiency initiatives reduces the need for one short ton of coal. In 2025 we project energy efficiency benchmarks to save about 32 million MWh of Ohio consumption.<sup>28</sup> Since Ohio generates about 88% of its electricity from coal, we assumed that 88% of those energy efficiency savings would translate to reduced demand for coal.<sup>29</sup> If we look forward to the year 2025, when more than 28 million MWh will be saved that otherwise would have been generated by coal, we can see that this reduction in energy use will reduce the need to

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recurring \$87 per mw-h. That means investments will pay off quickly, with total payoffs dependent on the life cycle of an efficiency measure, which range from three to twenty years.

<sup>25</sup> This estimate incorporates annual costs needed to implement energy efficient programs. This estimate also includes changes in investment and spending due to the decrease in energy prices. Energy prices in this model are derived from the Annual Energy Outlook, which is published by the EIA in 2008. The ACEEE also utilized a study performed by the Minnesota IMPLAN Group, Inc. in 2007, which estimates that only 72% of the energy bill savings will stay in Ohio. This helped them to estimate the number of induced jobs that could be created due to energy efficient programs.

<sup>26</sup> Energy Information Administration: State Energy Profiles  
[http://tonto.eia.doe.gov/state/state\\_energy\\_profiles.cfm?sid=OH](http://tonto.eia.doe.gov/state/state_energy_profiles.cfm?sid=OH)

<sup>27</sup> Table 8

<sup>28</sup> Table 9

<sup>29</sup> Energy Information Administration: State Energy Profiles  
[http://tonto.eia.doe.gov/state/state\\_energy\\_profiles.cfm?sid=OH](http://tonto.eia.doe.gov/state/state_energy_profiles.cfm?sid=OH)

purchase 13.5 million short tons of coal in 2025, and the years following it, saving \$562 million from being sent out of state to import it. This would reduce Ohio's current coal trade deficit by 40% (based current price of \$41.86 per short ton of coal).<sup>30</sup>

<b>Table 8: 2008 Ohio Coal Trade for Electric Power Industry</b>		
<b>Origin State</b>	<b>OH Imports (thousand short-tons)</b>	<b>Cost (\$41.86/short ton)</b>
Virginia	23	\$962,780
Montana	130	\$5,441,800
Indiana	370	\$15,488,200
Illinois	2,345	\$98,161,700
Pennsylvania	5,241	\$219,388,260
Kentucky	9,263	\$387,749,180
Wyoming	11,757	\$492,148,020
West Virginia	13,637	\$570,844,820
<b>Total</b>	<b>42,766</b>	<b>\$1,790,184,760</b>
<b>2008 Ohio Coal exports for electric generation</b>		
<b>Destination State</b>	<b>OH Exports (thousand short tons)</b>	<b>Revenue (\$41.86/short ton)</b>
New York	15	\$627,900
Indiana	20	\$837,200
Michigan	234	\$9,795,240
Florida	255	\$10,674,300
Pennsylvania	1,098	\$45,962,280
Kentucky	1,674	\$70,073,640
West Virginia	4,767	\$199,546,620
<b>Total</b>	<b>8,063</b>	<b>\$337,517,180</b>
<b>OH Imports</b>	<b>42,766</b>	<b>\$1,790,184,760</b>
<b>OH Exports</b>	<b>8,063</b>	<b>\$337,517,180</b>
<b>Trade Deficit</b>	<b>-34,703</b>	<b>-\$1,452,667,580</b>
All import and export numbers by state are from the EIA 2008 Annual Coal Distribution Report. Costs and Revenues are calculated using Ohio's current price for a short ton of coal, \$41.86.		

<sup>30</sup> Table 8

## Ohio's four largest Investor-Owned Electric Utilities: Comparative Analysis

FirstEnergy, American Electric Power, Duke Energy Ohio, and Dayton Power and Light make up about 85% of all electricity sales in Ohio. With this in mind we examined the major initiatives taken by each company to comply with SB 221 benchmarks, and have tracked their progress in the areas of renewable energy generation and energy efficiency.

**Renewable Energy 2009 Compliance.** During 2009, the first year investor-owned utilities had to meet renewable energy benchmarks, there was evidence of positive trends and certain flaws in SB 221. To be effective, the law depends on enforcement of annual benchmarks and compliance from Ohio's largest electric providers. In 2009, all four of the companies met their renewable energy benchmarks but fell short on reaching their solar energy benchmarks. SB 221 stipulates that benchmarks can be waived when companies cannot reach them for reasons outside of their control through a *force majeure* request. All four companies successfully applied for *force majeure* waivers for their 2009 solar benchmarks. The solar MWh that the companies did not obtain in 2009 have been added to their 2010 solar benchmarks. The table below shows that each company reached its renewable energy benchmark and details each company's shortfall in solar energy.

Table 9: Renewable Energy Benchmarks Required by SB 221 (MWh)						
Company	2009 Baseline	2009 Benchmark	Renewable Obtained	Solar Benchmark	Solar Obtained	Solar Shortfall
Ohio Edison	20,889,394	51,387	51,387	836	27	809
Cleveland Electric	17,166,038	42,228	42,228	687	23	664
Toledo Edison	9,070,946	22,314	22,314	363	11	352
<b>FirstEnergy total</b>	<b>47,126,378</b>	<b>115,929</b>	<b>115,929</b>	<b>1,886</b>	<b>61</b>	<b>1,825</b>
Ohio Power	25,708,301	63,242	63,242	1,028	95	933
Columbus Southern Power	19,939,832	49,052	49,052	798	68	730
<b>AEP total</b>	<b>45,648,133</b>	<b>112,294</b>	<b>112,294</b>	<b>1,826</b>	<b>163</b>	<b>1,663</b>
Duke Energy Inc.	17,187,784	42,281	42,281	688	608	80
Duke energy Retail Sales	934,540	2,299	2,299	38	0	38
<b>Duke Energy Ohio total</b>	<b>18,122,324</b>	<b>44,580</b>	<b>44,580</b>	<b>726</b>	<b>608</b>	<b>118</b>
DP&L	11,672,367	28,714	28,714	468	265	203
DP&L Energy Resources	3,263,384	8,028	8,028	132	75	57
<b>DP&amp;L total</b>	<b>14,935,751</b>	<b>36,742</b>	<b>36,742</b>	<b>600</b>	<b>340</b>	<b>260</b>
<b>Ohio Total</b>	<b>125,832,586</b>	<b>309,545</b>	<b>309,545</b>	<b>5,038</b>	<b>1,172</b>	<b>3,866</b>

All of the data above comes from each company's Alternative Energy Compliance Report filed at the PUCO on April 15, 2010. Each report is filed under Industry Code EL and Purpose Code ACP.

The four companies mainly bought RECs to comply with their renewable energy benchmarks in 2009. FirstEnergy bought RECs from a Pennsylvania wind farm and landfill gas facilities in Indiana for its out-of-state portion. The other half of their RECs came from two landfill gas projects in Ohio and a power plant co-firing biomass. AEP also bought much of its power from wind and landfill gas suppliers in Indiana. In Ohio they relied on landfill gas facilities as well as 10,000 RECs from Ohio wind turbines. Dayton Power & Light used a diverse mix of

resources to meet its non-solar REC requirement in 2009. Out-of-state RECs came from wind projects in West Virginia and Indiana, hydroelectric facilities in West Virginia, and landfill gas facilities in Michigan and Indiana. The Ohio non-solar benchmark was met through buying RECs from landfill gas facilities in the state and generating 491 RECs at the Killen Generating Station by co-firing biomass. Duke Energy Ohio did not disclose where it obtained the RECs purchased to meet its 2009 benchmarks.

**2009 Solar Requirement.** While no company reached its solar benchmark in 2009, some companies made far greater efforts than others. FirstEnergy and AEP obtained the smallest amount of solar RECs even though they had benchmarks almost three times the amount of Duke and DP&L. Of the 3,866 solar RECs that were not obtained in 2009, 3,488 were FirstEnergy's and AEP's responsibility. Duke and DP&L were responsible for the other 378 solar RECs not obtained. Duke came closest to their benchmark, obtaining 608 of its 726 solar REC benchmark. DP&L reached 340 of its 600 solar REC benchmark.

In *force majeure* requests filed at the PUCO, the companies attributed the missed benchmarks to a lack of certified solar projects in the state. The PUCO only certified its first renewable energy producer in August of 2009, so RECs were not available at all for the first seven months of the year. Also, many rules for SB 221 were not finalized until December 2009 and the companies said they could not build a solid compliance strategy without the rules in place. These were legitimate arguments in 2009 and opportunities to buy solar RECs in Ohio were certainly scarce. However, there is little evidence to explain why Duke Energy Ohio could obtain 600 solar RECs (when its benchmark was 726) while FirstEnergy only found 61 solar RECs (when its benchmark was 1,825). The same goes for AEP, which only obtained 163 of its 1,663 solar REC benchmark. It was clear that some companies put more effort into complying with as much of the benchmark as possible. For example, no company obtained enough Ohio solar RECs to meet the in-state solar requirement but Duke Energy and DP&L obtained the maximum amount of out-of-state solar RECs to fulfill as much of their benchmarks as possible. FirstEnergy and AEP obtained fewer total solar RECs than Duke and DP&L obtained outside of Ohio. It was clear that while Ohio solar resources were scarce, Duke and DP&L took their benchmarks seriously enough to obtain as many out-of-state solar resources as possible, while AEP and FirstEnergy did not.

In the end, the PUCO agreed that compliance was still extremely difficult for the companies in 2009 and excused the fines that SB 221 would have imposed on them for the shortfall. The 3,866 MWh that were not met in 2009 have been added to the companies' 2010 benchmarks. This will mean enormous jumps for FirstEnergy and AEP in 2010. After obtaining 61 and 163 solar RECs in 2009, the companies will need 6,375 and 6,120 in 2010.

*American Electric Power* has the strongest and clearest strategy for meeting solar benchmarks for the next few years. It has a power purchasing agreement with the Wyandot Solar Field in Salem Township, Ohio for all of the 10.08 MW facility's output. The solar field is one of the largest in the Midwest and has a projected annual output of 15,130 MWh. The ribbon-cutting ceremony was held in mid-August of 2010, and will enhance the company's solar energy portfolio for many years to come.



*Dayton Power & Light* has taken a similar step to help meet its solar benchmarks. Recently, the DP&L-owned 1.1 MW capacity Yankee Solar Field went online and has been selling solar power to DP&L customers. The facility has a projected annual output of 1,390 MWh. The company is considering more facilities based on how cost-effective the Yankee Solar Field is.

*Duke* came closer than any other company to meeting its 2009 solar benchmark by purchasing solar RECs and owning multiple smaller-scale solar facilities. These solar facilities have been collecting power in Cincinnati parks and on public buildings and helped boost the solar REC inventory in 2009.

*FirstEnergy* has not announced any plans to build solar facilities and has not signed any power purchasing agreements. The company recently solicited solar RECs through requests for proposals in 2010 and 2011. However, the company was criticized previously by environmental organizations, in comments filed at the PUCO, for not attempting to sign long-term agreements that are more enticing to REC sellers.

**Going Forward.** According to data compiled from REC applications at the PUCO there should be no reason for solar benchmarks to be missed again in 2010. The PUCO has certified 66 solar projects in Ohio that amount to 19,162 MWh in annual generation. Solar projects that are waiting for certification have extremely good chances of being approved as well and Ohio's solar capacity should only grow. When looking at the company projections for 2010, it would seem there should be more than enough solar electricity being generated to meet the in-state half of the solar benchmark (see Table 10).

<b>Company</b>	<b>2010 Baseline (in mwh)</b>	<b>2010 Solar Target (in mwh)</b>	<b>Missed in 2009 (in mwh)</b>	<b>Total 2010 Solar Benchmark (in mwh)</b>
Ohio Edison	20,479,586	2,048	809	2,857
Cleveland Electric	16,337,169	1,634	664	2,298
Toledo Edison	8,683,821	868	352	1,220
<b>FirstEnergy total</b>	<b>45,500,576</b>	<b>4,550</b>	<b>1,825</b>	<b>6,375</b>
Ohio Power	24,875,672	2,488	933	3,421
Columbus Southern Power	19,694,972	1,969	730	2,699
<b>AEP total</b>	<b>44,570,644</b>	<b>4,457</b>	<b>1,663</b>	<b>6,120</b>
* Duke Energy Inc.	17,187,784	1,719	80	1,799
* Duke Energy Retail Sales	934,540	93	38	131
<b>* Duke energy Ohio total</b>	<b>18,122,324</b>	<b>1,812</b>	<b>118</b>	<b>1,930</b>
DP&L	11,880,205	1,188	203	1,391
DP&L Energy Resources	2,695,043	270	57	327
<b>DP&amp;L total</b>	<b>14,575,248</b>	<b>1,458</b>	<b>260</b>	<b>1,718</b>
<b>Ohio Total</b>	<b>122,768,792</b>	<b>12,277</b>	<b>3,866</b>	<b>16,143</b>

The table above shows that the four companies have a combined 2010 solar benchmark of 16,143 MWh. Only half of that total must come from Ohio. With 19,162 solar MWh already approved by the PUCO and another 579 solar MWh pending, there are enough solar RECs in the state for all four companies to meet their 2010 solar benchmarks. On top of the available Ohio solar RECs, there are another 13,578 solar RECs in adjacent states that have been certified by the PUCO. The PUCO has certified projects that have a total projected annual output of 32,740 solar RECs; more than twice the amount necessary for the four utility companies to comply. No *force majeure* applications concerning Ohio's supply of solar RECs should be approved in 2010.

## Energy Efficiency

Senate Bill 221 also includes a robust energy efficiency requirement that all investor-owned utilities in Ohio must comply with. The law calls for energy savings of 22.2% by the year 2025, achieved through a gradual mechanism that will increase yearly, as outlined in the table below.<sup>31</sup> In response, all of the four investor-owned utilities have similar energy efficiency programs. These include rebate programs for energy efficient appliances, home weatherization programs, education campaigns and energy efficient lighting campaigns.

Year	Energy Efficiency Requirement	FirstEnergy	American Electric Power	Duke	Dayton Power and Light	Total
2009	0.3%	166,272	136,944	68,127	43,193	<b>414,536</b>
2010	0.8%	432,900	359,798	181,523	115,850	<b>1,090,071</b>
2011	1.5%	797,493	666,003	340,894	219,935	<b>2,024,325</b>
2012	2.3%	1,233,105	1,013,564	524,143	342,818	<b>3,113,630</b>
2013	3.2%	1,777,186	1,411,867	732,414	476,574	<b>4,398,041</b>
2014	4.2%	2,397,508	1,857,997	965,424	629,704	<b>5,850,633</b>
2015	5.2%	3,004,989	2,305,055	1,198,746	785,531	<b>7,294,321</b>
2016	6.2%	3,604,416	2,752,670	1,430,710	945,510	<b>8,733,306</b>
2017	7.2%	4,211,941	3,200,566	1,661,296	1,106,031	<b>10,179,834</b>
2018	8.2%	4,828,395	3,649,074	1,890,926	1,269,721	<b>11,638,116</b>
2019	10.2%	6,045,275	4,548,031	2,349,441	1,592,258	<b>14,535,005</b>
2020	12.2%	7,275,450	5,445,286	2,807,096	1,889,223	<b>17,417,055</b>
2021	14.2%	8,521,061	6,343,029	3,282,234	2,204,797	<b>20,351,121</b>
2022	16.2%	9,780,732	7,241,014	3,713,222	2,517,617	<b>23,252,585</b>
2023	18.2%	11,057,448	8,138,674	4,158,749	2,824,217	<b>26,179,088</b>
2024	20.2%	12,348,860	9,036,470	4,599,103	3,136,741	<b>29,121,174</b>
2025	22.2%	13,661,675	9,934,284	5,034,836	3,447,434	<b>32,078,229</b>
<b>Total</b>		<b>91,144,706</b>	<b>68,040,326</b>	<b>34,938,884</b>	<b>23,547,154</b>	<b>217,671,070</b>

Estimates of energy efficiency requirements are based upon data filed with the PUCO. Specifically cases 09-1089-EL-POR, 09-1090-EL-POR, 09-1947-EL-POR, 09-1948-EL-POR, 09-1949-EL-POR, 09-1986-EL-POR, 09-1999-EL-POR and 10-0303-EL-POR.

<sup>31</sup> The target percentage is determined by using the normalized kilowatt-hour sales of the electric distribution utility during the previous three years of sales to customers in Ohio.<sup>31</sup> The Public Utilities Commission of Ohio may adjust this baseline to account for economic conditions.

## Individual Company Efforts

**FirstEnergy.** FirstEnergy is the fifth largest investor-owned utility in the United States, and the largest investor-owned utility in Ohio, representing 40% of Ohio's investor-owned electric market. FirstEnergy is composed of three smaller utilities in Ohio: Ohio Edison Company, Cleveland Illuminating Company and Toledo Edison Company.

*First Energy Renewable Energy Initiatives.* While FirstEnergy currently plans to depend on REC purchases to comply with annual benchmarks in the future, it has taken on one notable project that could generate enough RECs to fulfill the company's non-solar benchmarks indefinitely. The PUCO just approved the company's plans to complete a \$200 million retrofit of the R.E. Burger Power Plant in Shadyside, Ohio, a 54-year-old coal plant owned and operated by a FirstEnergy subsidiary, FirstEnergy Solutions, which recently received approval from the PUCO. Per a consent decree following alleged EPA violations, FirstEnergy elected to retrofit the plant rather than shut it down or pay \$330 million for emission control equipment to allow continued coal use. The retrofit saved an estimated 105 jobs at the plant.<sup>32</sup> The retrofit will allow the company to fire biomass instead of coal in two units of the plant, using woodchips, cornstalks, switchgrass, and grains as fuel sources.<sup>33</sup> According to FirstEnergy, the company's long-term plans are to create a closed loop system in which the biomass fuel is specifically grown to meet the plant's energy needs. In its application to be certified as a renewable energy provider, FirstEnergy claimed the two 156 MW capacity units can provide anywhere from 400,000 to 1.3 million RECs, each, annually. Since RECs can be banked by the company and saved for up to five years, the power plant could provide massive levels of RECs even as benchmarks outpace the plant's production. Even if operating at minimum generation rates (800,000 MWh/year) the project would singlehandedly fulfill the company's benchmarks through 2014.

Year	Percent Renewable	Burger Plant REC Production	Banked RECs needed	REC Benchmark (MWh)	Banked RECs Remaining
2010	.5%	800,000	0	227,503	572,497
2011	1.0%	800,000	0	466,665	905,832
2012	1.5%	800,000	0	725,319	980,513
2013	2.0%	800,000	244,840	1,044,840	735,673
2014	2.5%	800,000	525,034	1,325,034	210,639
2015	3.5%	800,000	1,082,907	1,882,907	-872,268

<sup>32</sup> [http://www.coalpowermag.com/plant\\_design/FirstEnergy-Retools-Coal-Plant-to-Burn-Biomass\\_204.html](http://www.coalpowermag.com/plant_design/FirstEnergy-Retools-Coal-Plant-to-Burn-Biomass_204.html)

<sup>33</sup> See <http://www.uwua.net/local-spotlight/local-350-blazes-trail-in-converting-coal-powered-plant-to-biomass-saving-jobs-and-the-environment.html>, and Bob Downing, Akron Beacon Journal at <http://www.ohio.com/news/42314167.html> (April 2, 2009).

At maximum generation rates (2.6 million MWh/year) the plant would singlehandedly fulfill FirstEnergy's benchmarks through 2021, as well as 93% of its 2022 benchmark.

Year	Percent Renewable	Burger Plant REC Production	Banked RECs needed	REC Benchmark (MWh)	Banked RECs Remaining
2010	.5%	2,600,000	0	227,503	2,372,497
2011	1%	2,600,000	0	466,665	4,505,832
2012	1.5%	2,600,000	0	725,319	6,380,513
2013	2%	2,600,000	0	1,044,840	7,935,673
2014	2.5%	2,600,000	0	1,325,034	9,210,639
2015	3.5%	2,600,000	0	1,882,907	9,927,732
2016	4.5%	2,600,000	0	2,447,820	10,079,912
2017	5.5%	2,600,000	406,465	3,006,465	9,673,447
2018	6.5%	2,600,000	947,115	3,547,115	8,726,332
2019	7.5%	2,600,000	1,476,775	4,076,775	7,249,557
2020	8.5%	2,600,000	1,985,127	4,585,127	5,264,430
2021	9.5%	2,600,000	2,557,571	5,157,571	2,706,859
2022	10.5%	2,600,000	3,090,646	5,690,646	-383,787

Under House Bill 2, passed in the year subsequent to SB 221, The Burger Power Plant became the only renewable energy project eligible for weighted RECs.<sup>34</sup> As a result, the Burger Power Plant will easily be able to generate enough RECs to fulfill all of FirstEnergy's benchmarks through 2024 and beyond. In fact, it is probable that there would be extra RECs from Burger to be sold by FirstEnergy to other electric utilities.

The Burger Power Plant's future possibilities have caused concern among environmental organizations and consumer advocacy groups in Ohio. Multiple organizations intervened at the PUCO to question the power plant's application to become a renewable energy provider. These groups voiced reservations about where the massive supply of biomass will come from and whether it will come from a sustainable source. Some fear the weighted RECs will mean much less renewable energy generation from solar and wind, thereby reducing development of other renewable resources in the state, and instead flooding Ohio's REC market with cheap biomass RECs. Recently, FirstEnergy suggested the biomass supply will more likely come from sustainable sources in southern states, rather than from Ohio or neighboring states, begging the question of whether the practical benefits of generating electricity from biomass in Ohio are outweighed by the opportunity loss of putting equivalent investments in other renewable energy sources such as solar or wind.

<sup>34</sup> The bill allows for certain biomass projects with over 75 MW capacity to receive greater than one REC for every MWh the facility generates. The renewable MWh generated would be multiplied by the quotient derived from dividing the compliance payment (fine) that companies pay for not meeting annual benchmarks by the current market price of an REC. In 2010 the compliance payment is \$45 for every MWh a company falls short in meeting its annual benchmark. In the application filed with the PUCO, FirstEnergy used \$10 as an example for the market price of an REC. Their example leads to the conclusion that for every MWh generated by the Burger Power Plant from biomass, the company would receive 4.5 RECs (\$45 fine divided by \$10 market price).

*FirstEnergy Energy Efficiency Programs.* FirstEnergy has proposed a number of programs in order to attempt to reach energy savings requirements. As shown in Table 14 below, over half of FirstEnergy's savings comes from its Mercantile Energy Efficiency Savings program and two lighting programs. FirstEnergy's Mercantile EE Savings Program takes advantage of the mercantile customer exemption outlined in the Ohio Authorized Code. This allows a mercantile customer, defined as a commercial or industrial customer that uses electricity for nonresidential use and "consumes more than 700,000 kWh per year", to avoid the cost-recovery fees associated with a utility's energy efficiency programs if the company engages in private efforts that can be counted towards the investor-owned utility's energy efficiency requirement.<sup>35</sup> Over a quarter of its energy-efficiency requirements are being met through the use of mercantile customer exemptions.

FirstEnergy is also heavily reliant upon CFL programs. FirstEnergy's residential CFL plan that was originally approved by the PUCO, was to distribute two energy efficient light bulbs to each customer. Customers would have then been charged around \$22 for the lost profits associated with the new efficiency. As participation in this program was involuntary, many customers grew upset and eventually Governor Strickland called on FirstEnergy to suspend the program.<sup>36</sup> FirstEnergy has since made participation in this program voluntary, by incorporating the use of vouchers and a variety of means of distributing CFL's to customers who seek them. The new program design has been supported by the First Energy customer collaborative, but the PUCO has not, as of August 2010, approved these programs.

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<sup>35</sup> In order to qualify for this exemption the customer must send a yearly report on its energy savings seen in the past year to the PUCO.

<sup>36</sup> Gongwer Ohio, Statehouse News Bureau (Volume #78, Report #195, Article #7--Wednesday, October 7, 2009)

<b>Table 14: FirstEnergy: Energy Efficiency Program Portfolio</b>								
Program Name	2010 Annual Budget	2011 Annual Budget	2012 Annual Budget	2010 MWh	2011 MWh	2012 MWh	% of Budget	% of Savings
<b>Residential</b>								
Direct Load Control	\$3,782,085	\$1,980,518	\$2,201,626	433	2,178	3,218	3.63%	0.24%
Appliance Turn-In Program	\$3,842,479	\$3,015,182	\$3,928,960	8,896	39,237	66,448	4.92%	4.72%
Energy Efficiency Products Program	\$5,373,436	\$5,579,822	\$7,374,375	9,112	56,154	101,467	8.35%	6.87%
Efficient New Construction Program	\$1,637,156	\$1,474,587	\$1,661,723	566	3,375	5,747	2.18%	0.40%
Residential Retrofit Program	\$2,991,018	\$3,157,577	\$4,253,927	2,958	18,397	33,856	4.74%	2.27%
Online Audit Program	\$2,531,401	\$2,101,900	\$2,101,900	3,201	17,211	42,111	3.07%	2.58%
Online Energy Efficiency Products	\$737,500	\$737,500	\$737,500	926	2,776	4,626	1.01%	0.34%
CFL Program	\$5,345,701	\$5,345,701	\$0	45,653	201,409	268,544	4.87%	21.24%
Appliance Turn-In Program	\$338,979	\$247,326	\$325,835	721	3,186	5,421	0.42%	0.38%
Energy Efficiency Products Program	\$37,423	\$33,458	\$42,926	388	2,410	4,371	0.05%	0.30%
Community Connections	\$5,450,001	\$5,450,001	\$5,450,001	2,634	7,902	14,061	7.45%	1.01%
CFL Program- Low Income	\$2,472,046	\$0	\$0	33,803	51,217	51,217	1.13%	5.61%
<b>Residential Total</b>	<b>\$34,539,225</b>	<b>\$29,123,572</b>	<b>\$28,078,773</b>	<b>109,291</b>	<b>405,452</b>	<b>601,087</b>	<b>41.81%</b>	<b>45.97%</b>
Program Name	2010 Annual Budget	2011 Annual Budget	2012 Annual Budget	2010 MWh	2011 MWh	2012 MWh	% of Budget	% of Savings
<b>Non-Residential</b>								
Small Enterprise Audits & Equipment Program	\$1,075,848	\$976,716	\$1,295,681	3,190	19,544	35,412	1.53%	2.40%
C/I Equipment Program (Commercial Lighting)	\$17,354,971	\$13,032,169	\$16,698,763	22,154	101,516	173,008	21.46%	12.22%
C/I New Construction Program	\$240,238	\$203,438	\$274,771	236	1,517	2,864	0.33%	0.19%
Mercantile EE Savings*	\$958,000	\$691,000	\$558,000	168,143	218,585	243,562	1.01%	25.97%
Interruptible Demand Reduction	\$9,841,969	\$9,821,231	\$9,786,088	114	707	1,298	13.42%	0.09%
C/I Audits & Equipment Program	\$761,977	\$91,332	\$124,048	9,700	45,413	81,197	0.45%	5.62%
C/I Equipment Program (Commercial Lighting)	\$12,173,665	\$6,290,283	\$8,919,972	535	2,324	4,105	12.48%	0.29%
C/I Equipment Program (Industrial Motors)	\$168,931	\$65,569	\$90,426	0	0	0	0.15%	0.00%
Government Lighting	\$4,429,875	\$5,002,937	\$6,747,646	2,005	12,658	23,640	7.37%	1.58%
T&D Projects	\$0	\$0	\$0	20,966	45,939	70,912	0.00%	5.68%
<b>Non-Residential Total</b>	<b>\$47,005,474</b>	<b>\$36,174,675</b>	<b>\$44,495,395</b>	<b>227,043</b>	<b>448,203</b>	<b>635,998</b>	<b>58.19%</b>	<b>54.03%</b>
<b>Total</b>	<b>\$81,544,699</b>	<b>\$65,298,247</b>	<b>\$72,574,168</b>	<b>336,334</b>	<b>853,655</b>	<b>1,237,085</b>		

Based on data contained in PUCO cases 09-1947-EL-POR, 09-1948-EL-POR and 09-1949-EL-POR.

**AEP Initiatives.** American Electric Power is the second largest investor-owned utility in Ohio, representing 1/3 of Ohio's investor-owned electric market. AEP is composed of two smaller subsidiaries, Columbus Southern Power Company and Ohio Power Company.

*AEP Renewable Energy Initiatives.* Like the other companies, AEP will be depending on RECs to continue complying with annual benchmarks. However, AEP has excelled in the area of power purchasing agreements, locking in RECs over long periods of time. It signed 20-year power purchasing agreements with both the Wyandot Solar Field in Ohio and the Fowler Ridge Wind Farm in Indiana. The company has shown a commitment to wind power and claimed in its 2009 compliance report that, "wind energy, being already under development, predominates in the resulting plan" to meet state alternative energy portfolio standards. AEP also reported looking into Ohio-based wind projects that are currently being developed. The company has also been testing the idea of co-firing biomass in some of its Ohio power plants. So far, AEP has not received any RECs from biomass and the projects in three of its Ohio coal plants remain in the testing phases. The company remains tepid about pouring too many resources into biomass projects for one of the same reasons environmental organizations have had concerns about them: "biomass co-firing is constrained by a supply of suitable fuel and/or transportation options anticipated to be in proximity to the host coal units evaluated."

*AEP's Energy Efficiency Programs.* American Electric Power's proposed programs for reaching its energy savings requirements are fairly well balanced and reflect its market composition. A large majority of the savings will come from incentive programs. American Electric Power's Efficient Products Program is its largest residential energy efficiency program, meeting over 20% of its requirement. It encourages the purchase of efficient lighting and other appliances at retail channels through discounts and rebates. The Prescriptive Incentive program is a similar program for non-residential customers. It incentivizes 20%-50% of the incremental cost of purchasing energy efficient products, including LED traffic signals for governmental customers. American Electric Power's approach to the mercantile customer exemption is more proactive than FirstEnergy's program, allowing customers to seek a large rebate based on expected energy savings for energy efficiency measures taken now or in the past, but the company provides a smaller rebate for measures taken prior to enactment of the efficiency standard (retroactive measures receive only 75% of the rebate for similar measures taken now). American Electric Power encourages implementation of future energy efficiency projects by incentivizing them with a higher rebate than projects that have occurred in the past. The company determines the size of the rebate through a formula that heavily weights current and future projects and limits the amount of credit given for forward-looking actions.

<b>Table 15: American Electric Power: Energy Efficiency Program Portfolio</b>								
<b>Program Name</b>	<b>2009 Budget</b>	<b>2010 Budget</b>	<b>2011 Budget</b>	<b>2009 Total Energy Savings (MWh)</b>	<b>2010 Total Energy Savings (MWh)</b>	<b>2011 Total Energy Savings (MWh)</b>	<b>% of Budget</b>	<b>% of Savings</b>
<b>Residential</b>								
Efficient Products Program	\$3,441,732	\$5,616,033	\$6,434,867	40,838	111,597	195,363	10.20%	23.65%
Appliance Recycling Program	\$1,193,527	\$2,028,309	\$3,462,740	4,665	12,989	27,200	4.40%	3.05%
Existing Home Retrofit Program	\$990,308	\$1,273,138	\$1,576,956	5,194	12,752	23,199	2.53%	2.80%
Low Income Program	\$4,236,236	\$5,485,211	\$7,234,834	12,149	29,789	53,189	11.17%	6.47%
Residential New Construction Program	\$0	\$1,157,574	\$833,505	0	5,663	9,744	1.31%	1.05%
<b>Residential Total</b>	<b>\$9,861,803</b>	<b>\$15,560,265</b>	<b>\$19,542,902</b>	<b>62,846</b>	<b>172,790</b>	<b>308,695</b>	<b>29.61%</b>	<b>37.02%</b>
<b>Non-Residential</b>								
Prescriptive Incentive Program	\$8,861,266	\$12,906,212	\$17,978,141	68,244	192,022	369,370	26.18%	42.82%
Custom Program	\$6,958,741	\$8,588,662	\$11,724,734	37,565	87,315	156,937	17.96%	19.17%
Self Direct Program	\$5,000,000	\$2,000,000	\$2,000,000	N/A			5.93%	N/A
C&I New Construction Program	\$0	\$289,500	\$266,795	0	1,496	2,878	0.37%	0.30%
C&I Demand Response Program	\$0	\$3,371,250	\$3,434,625	N/A			4.48%	N/A
<b>Non-Residential Total</b>	<b>\$20,820,007</b>	<b>\$27,155,624</b>	<b>\$35,404,295</b>	<b>105,809</b>	<b>280,833</b>	<b>529,185</b>	<b>54.91%</b>	<b>62.28%</b>
<b>Program Name</b>	<b>2009 Budget</b>	<b>2010 Budget</b>	<b>2011 Budget</b>	<b>2009 Total Energy Savings (MWh)</b>	<b>2010 Total Energy Savings (MWh)</b>	<b>2011 Total Energy Savings (MWh)</b>	<b>% of Budget</b>	<b>% of Savings</b>
<b>Government</b>								
LED Traffic Lights (Within Above Program)	\$310,257	\$326,164	\$358,669	1,369	2,808	4,391	0.66%	0.58%
<b>Multi Sector</b>								
Renewable Energy Technology Program	\$500,084	\$2,000,004	\$2,500,004	108	535	1,059	3.29%	0.12%
Energy Education and Training Program	\$7,527,000	\$3,822,000	\$3,651,000	N/A			9.88%	N/A
New Pilots/Emerging Technology Program	\$500,000	\$1,000,000	\$1,000,000	N/A			1.65%	N/A
<b>Multi-Sector Total</b>	<b>\$8,527,084</b>	<b>\$6,822,004</b>	<b>\$7,151,004</b>	<b>108</b>	<b>535</b>	<b>1,059</b>	<b>14.82%</b>	<b>0.12%</b>
<b>Total</b>	<b>\$39,519,151</b>	<b>\$49,864,057</b>	<b>\$62,456,70</b>	<b>170,132</b>	<b>456,966</b>	<b>843,330</b>		

Based on data contained in PUCO cases 09-1089-EL-POR and 09-1090-EL-POR.



**Duke Energy Ohio Initiatives.** Duke Energy is the third largest investor-owned utility in Ohio, and is less than half the size of FirstEnergy (representing 16% of the private electric market in the state).

*Duke's Renewable Energy Initiatives.* Duke Energy Ohio has not disclosed where it purchased RECs and has not taken on major projects to generate renewable energy in Ohio. However, the company does have a power-purchasing agreement with Benton County Wind Farm in Indiana to purchase 100 MW worth of power over a 20-year period. The company has also started customer-sited renewable energy programs in which Duke will purchase RECs from its customers that invest in renewable energy generation. Duke has also built multiple small-scale solar projects around Cincinnati, which has given it a small boost towards reaching in-state solar RECs benchmarks. Like the other three companies, it has also explored the possibility of co-firing biomass at three of its Ohio coal power plants.

*Duke's Energy Efficiency Programs.* Duke's "Save-A-Watt" programs fairly represent the market composition of its customers. Duke's Smart-Saver programs are responsible for the largest savings in both residential and non-residential classes and account for over 60% of Duke's proposed energy savings. The Smart-Saver program incentivizes the installation of energy efficient equipment through rebates and discounted prices at retailers. Another of Duke's proposed programs, the Home Energy Comparison Report (HERC), shows a great deal of promise. HERC allows residential customers to see savings achieved by customers similar to themselves from the adoption of best practices, meaningful information customers can relate to that helps customers create reasonable energy savings baselines and to identify cost effective and substantial energy saving measures. In a regular report issued to its residential customers Duke will include suggestions on how to reduce electricity usage. These suggestions can range from weatherization measures that have proven successful in similar households to the installation of certain types of energy-efficient appliances.

<b>Table 16: Duke Energy: Energy Efficient Program Portfolio</b>						
Program Name	2010 Budget	2011 Budget	2010 Incremental* Energy Savings (MWh)	2011 Incremental* Energy Savings (MWh)	% of Budget	% of Savings
<b>Residential</b>						
Residential Energy Assessments	\$1,657,520	\$1,974,355	8,682	9,840	6.93%	7.05%
Residential Smart Saver Energy Efficiency	\$3,444,586	\$3,478,511	36,172	35,614	13.22%	27.31%
Low Income Services	\$965,816	\$995,846	7,289	6,130	3.75%	5.11%
Energy Efficient Education Program for School	\$2,205,000	\$3,255,000	15,604	23,406	10.42%	14.84%
Power Manager	\$4,255,927	\$4,312,202	0	0	16.36%	0.00%
Home Energy Comparison Report (HECR)	\$165,182	N/a*	3,199	N/A	0.68%	2.54%
	<b>\$12,694,031</b>	<b>\$14,015,914</b>	<b>70,946</b>	<b>74,989</b>	<b>50.99%</b>	<b>55.52%</b>
<b>Non-Residential</b>						
Non-Residential Energy Assessments	\$506,087	\$556,686	N/A	N/A	2.03%	0.00%
Smart Saver	\$7,710,782	\$8,460,911	51,123	51,784	30.87%	39.15%
Powershare	\$2,489,300	\$3,190,698	0	0	10.84%	0.00%
Prepaid Meter	\$787,000	\$1,968,750	3,999	9,997	5.26%	5.33%
	<b>\$11,493,169</b>	<b>\$14,177,045</b>	<b>55,122</b>	<b>61,782</b>	<b>49.01%</b>	<b>44.48%</b>
<b>Total</b>	<b>\$24,187,200</b>	<b>\$28,192,959</b>	<b>126,068</b>	<b>136,771</b>		
Based on data contained in PUCO case 09-1999-EL-POR.						

**Dayton Power & Light Initiatives.** Dayton Power and Light is the smallest investor-owned utility in Ohio, representing approximately 10% of Ohio's private electric utility market.

*DP&L's Renewable Energy Initiatives.* Dayton Power & Light reached its 2009 benchmark mainly through the purchase of RECs, but has taken on two large projects to generate renewable energy itself. Its Yankee Solar Field is a commendable solution for reaching in-state solar REC benchmarks that has recently gone online. The company is evaluating the costs and benefits of building more solar fields in the future to comply with rising benchmarks. DP&L has also been testing biomass co-firing at its Killen Generating Station and obtained 491 RECs from the facility in 2009. The company plans for the facility to remain largely a coal-firing plant, with biomass making up 10% of the generation resource mix at the maximum estimate. This makes the Killen Generating Station's use of biomass large, but more viable and sustainable than other projects planned in Ohio.

*DP&L's Energy Efficiency Programs.* Dayton Power and Light is only required to save 43,194 MWh in 2009 which is roughly one quarter the required saving of FirstEnergy. In 2009, Dayton Power and Light surpassed its savings requirement by approximately 70,000 MWh, largely due to an unexpected success of its CFL program which was implemented through the use of a third party vendor, Ecos Consulting. Dayton Power and Light offered rebates on a wide selection of energy efficient light bulbs at location-targeted retailers in order to encourage customers to purchase them. Retailers were chosen in order to maximize customer participation while simultaneously minimizing participation of the customers of other utility companies. The program was well marketed at both stores and through traditional media such as radio. Since customers of Dayton Power and Light viewed participation in this program as voluntary, there was little backlash as was seen with FirstEnergy's CFL program.

<b>Table 17: Dayton Power and Light: Energy Efficiency Program Portfolio</b>								
Program Name	2009 Budget	2010 Budget	2011 Budget	2009 Incremental Energy Savings (MWh)	2010 Incremental Energy Savings (MWh)	2011 Incremental Energy Savings (MWh)	% of Budget	% of Savings
<b>Residential</b>								
Residential Lighting (CFL)	\$2,627,175	\$2,763,213	\$2,862,272	85,210	54,730	70,850	24.14%	54.55%
Residential HVAC Rebates	\$1,062,545	\$1,589,752	\$1,647,196	3,071	3,408	4,050	12.58%	2.72%
Residential HVAC Diagnostic & Tune Up	\$146,616	\$1,164,815	\$1,206,719	0	1,266	1,899	7.37%	0.82%
Residential Appliance Recycling	\$270,026	\$455,459	\$589,824	2,721	4,505	5,374	3.85%	3.26%
Residential Appliance Rebates	N/A*							
Residential Low Income Affordability	\$34,698	\$1,031,763	\$1,065,294	0	1,705	1,705	6.24%	0.88%
	<b>\$4,141,060</b>	<b>\$7,005,002</b>	<b>\$7,371,305</b>	<b>91,002</b>	<b>65,614</b>	<b>83,878</b>	<b>54.18%</b>	<b>62.24%</b>
<b>Non-Residential</b>								
Non-Residential Prescriptive Rebates	\$1,374,344	\$2,289,645	\$2,732,610	20,694	24,140	28,223	18.71%	18.91%
Non-Residential Custom Rebates	\$260,339	\$1,691,887	\$2,189,310	2,592	11,746	14,721	12.12%	7.52%
Mercantile Self-Direct Program	\$166,418	\$0	\$0	0	19,100	22,700	0.49%	10.82%
Education, School Programs	\$647,980	\$1,484,000	\$1,619,625	0	0	0	10.98%	0.00%
Mercantile Customer Commitments	N/A							
PJM Demand Response	N/A							
T&D Infrastructure Improvements	\$1,206,594	\$0	\$0	991	500	500	3.53%	0.52%
	<b>3,655,675</b>	<b>5,465,532</b>	<b>6,541,545</b>	<b>24,277</b>	<b>55,486</b>	<b>66,144</b>	<b>45.82%</b>	<b>37.76%</b>
<b>Total</b>	<b>\$7,796,735</b>	<b>\$12,470,534</b>	<b>\$13,912,850</b>	<b>115,279</b>	<b>121,100</b>	<b>150,022</b>		
Based on data contained in PUCO cases 09-1986-EL-POR, 10-030-EL-POR and 08-1094-EL-SSO.								

## The Biomass Issue<sup>37</sup>

All four of the companies are using similar strategies to meet non-solar requirements, mainly depending on REC purchases and power purchasing agreements. Almost all projects conceived by the companies to generate their own renewable energy involve co-firing biomass with coal in their existing coal plants with projects in testing phases at this time. Biomass certainly has a place in any transition to green energy; however the magnitude of biomass projects being planned in Ohio is potentially problematic.

Since the requirements of SB 221 were put into place to improve Ohio's environmental record, make Ohio more energy independent and spur economic growth, the use of significant quantities of biomass to fulfill annual benchmarks must be addressed. The concept of burning biomass as a renewable alternative to coal has come under heavy fire in recent years. Simply put, if wood consumption for biomass exceeds new forest growth, then the environmental benefits are put into question, raising reasonable concerns about the supply of biomass and the soundness of forest management. Biomass also generates electricity less efficiently than coal and requires greater amounts to produce power. New reports show that most forms of biomass combustion emit more pollutants - especially carbon dioxide, nitrogen oxide, and sulfur dioxide – than coal combustion.<sup>38</sup> The advantage of biomass is that these emissions can be sequestered over long periods of time by new forest growth. However, this is an extremely long process that requires vigilant forest management for decades to come.<sup>39</sup>

Most importantly, there is the issue of how much biomass fuel is available for Ohio power plants. Ohio's forests grow almost 9 million tons per year, more than half of which is already in use for lumber, paper, and fuel. The remaining half could hypothetically fuel about 450 MW of biomass generation. In addition, overlapping state and federal government subsidies for ethanol production impact the availability of agricultural biomass for use in the generation of electricity. Therefore, how multiple large-scale biomass projects in Ohio would find a sustainable supply of biomass in Ohio to co-fire remains an unanswered question.

The PUCO has already certified projects amounting to 1,505 MW in total plant capacity that could co-fire biomass, and has over 3,000 MW of applications pending, where a variable but substantial portion of that capacity would be employed using biomass sources (with some applications contemplating the possibility of eventually making a 100% fuel switch to biomass). It is possible that demand could quickly outweigh supply of homegrown biomass fuels under these conditions. Facilities looking to import fuel from outside Ohio could run into similar problems elsewhere since other states have biomass facilities sprouting up as well. Therefore, some of these facilities may be unsustainable in the long run and could fail, leaving the costs of converting or building them to fall on electric utility customers. Importing biomass fuels also begs the question of whether RECs generated from such fuel can be used to fulfill in-state

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<sup>37</sup> There is a common misunderstanding that landfill gas projects are the same as biomass projects that involve co-firing. In actuality, landfill gas projects simply capture methane and other gases that would be emitted whether they were used for energy or not. Biomass projects involving co-firing actually burn plant material to create new emissions. This is why landfill gas projects are referred to as emissions-free, while co-firing biomass require much more to be carbon neutral.

<sup>38</sup> *Biomass Sustainability and Carbon Policy Study*. Manomet Center for Conservation Sciences. June 2010. [http://www.manomet.org/sites/manomet.org/files/Manomet\\_Biomass\\_Report\\_ExecutiveSummary.pdf](http://www.manomet.org/sites/manomet.org/files/Manomet_Biomass_Report_ExecutiveSummary.pdf)

<sup>39</sup> Ibid.

renewable energy benchmarks in SB 221. While the electricity would be generated in Ohio (along with the resulting emissions), the biomass fueling it might be grown and processed outside the state. In this scenario, Ohio would be receiving fewer benefits from the facility than the spirit of SB 221 contemplates, and would experience greater pollution.

Biomass should be considered a “renewable” resource if it comes from a sustainable supply. However, policies must be put in place to assure biomass supplies are sustainable, forest management is maintained over long periods of time, and biomass facilities offer the economic and environmental benefits to Ohioans that are expected in SB 221. Biomass is an important part of Ohio’s green energy evolution. It can help retain jobs in traditional generation facilities like coal plants and can produce a lot of power. However, greater oversight is needed over these projects in order to ensure demand for biomass matches a sustainable supply, before the PUCO actually qualifies biomass facilities as renewable.

### Industrial Opt Out Issue

Under the law, there is a “mercantile” exemption that allows very large customers to avoid the cost recovery fees associated with a utility’s energy efficiency programs, provided the customer implements equivalent efficiency measures on its own.<sup>40</sup> The main purpose of allowing mercantile customers to opt out of the cost recovery rider is to incentivize the implementation of energy efficient programs and practices that would not have been utilized by the customer if it were not for the opt out. Essentially the energy efficiency gained through the private efforts of manufacturers is allowed to count towards the investor owned utility’s energy efficiency requirement and, in turn, the manufacturer can forgo any energy efficiency charge for an amount of time agreed upon between the two parties. However, any energy efficient effort undertaken since January 1st, 2006, a date two years prior to SB 221 even being passed, is currently considered eligible for counting towards a company’s energy efficiency requirements. Naturally, it is questionable whether retroactive approval of efficiency measures taken prior to the dates of passage for SB 221 serves the purpose of effectively encouraging new energy efficient programs effectively. It also has the potential for abuse.

Currently there are over 400 open mercantile opt-out cases on file with the PUCO and there are almost 500 filed and voided cases as well (some approved, some not). Each of the electric utilities recognizes that some mercantile customers will seek an exclusion from the cost recovery rider for utility energy efficiency programs.<sup>41</sup> However, many of these cases have been filed by or on behalf of customers of FirstEnergy. What differentiates the companies is their adherence not to the letter of the law, but to the spirit of it. FirstEnergy’s Mercantile EE

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<sup>40</sup> A mercantile customer is a commercial or industrial customer that uses electricity for nonresidential use and “consumes more than 700,000 kWh per year or is a part of a national account involving multiple facilities in one or more states.” (Amended SB 221) In order to qualify for this exemption the customer must send a yearly report on its energy savings seen in the past year to the PUCO.

<sup>41</sup> **Sec. 4928.66** (c) states “Compliance with [the energy efficiency requirements] shall ... includ[e] the effects of all demand-response programs for mercantile customers .... Any mechanism designed to recover the cost of energy efficiency and peak demand reduction programs under [the energy efficiency requirements] may exempt mercantile customers that commit their demand-response ... whether existing or new, for integration into the electric distribution utility's demand-response, energy efficiency, or peak demand reduction programs, *if* the commission determines that that exemption reasonably encourages such customers to commit those capabilities to those programs.”

Savings program represents a deviation from the goals of the law, while American Electric Power's system of using rebates to incentivize mercantile customers to invest in efficiency better reflects the law's spirit. A similar comparison can be made between FirstEnergy and Dayton Power and Light's efficient lighting programs. The table in the appendix shows the amount that each utility company spent per reduced MWh. FirstEnergy spent \$90.40 per MWh reduced. This relatively low cost compared to other utility companies is largely a function of the decision to focus on identifying efficiency measures already put in place by manufacturers prior to passage of Senate Bill 221, via the bill's mercantile opt-out provision, while other companies provided incentives for consumers undertaking new efficiency measures. In contrast, American Electric Power's \$103.26 per MWh reflects the costs associated with a well-balanced portfolio of programs. As previously mentioned, American Electric Power has adopted a better practice of encouraging implementation of new energy efficiency projects by incentivizing them with a higher rebate than projects that have occurred in the past, a practice that more accurately reflects the spirit of the law.

### Conclusion and Policy Recommendations

Senate Bill 221 is a successful policy reform overall. Ohio's investor-owned utilities are changing their behavior in order to comply with the law and increase investments in renewable energy. This is stimulating investment in wind, solar and biomass. By legally requiring lower energy consumption and greater use of renewable energy resources the law has driven demand for products, labor, and research in green industries. For the law to have its desired effects, environmental and economic, the compliance of Ohio's electric utility companies and the enforcement efforts of the Public Utilities Commission of Ohio (PUCO) are crucial. As long as utility companies are reaching their annual benchmarks, Ohio will see jobs created, less pollution and, in the long run, money saved. The following recommendations will ensure continued progress in compliance with this law and in creating green jobs and reducing pollution:

1. **Expand and Extend Ohio's Advanced Energy Fund:** Strengthening our public investment in renewable energy and energy efficiency, preferably through the already existing Advanced Energy Fund, will complement both the renewable energy and energy efficiency standards found in Senate Bill 221, by helping to reduce market barriers to renewable energy and energy efficiency products and services. A strong Advanced Energy Fund can be used to increase public awareness regarding clean energy options and reduce upfront capital costs for renewable energy and energy efficient equipment.
2. **Enforce the benchmarks:** Beyond 2009, there is no reason that any of Ohio's four companies should be eligible for a *force majeure* approval if it fails to meet the solar benchmarks in 2010, as there are more than enough RECs for companies to meet all of their benchmarks. Therefore, any company not meeting its solar requirements for 2010 should be charged the penalty dictated in SB 221 of \$400 per MWh that remains unmet under the benchmark.

3. **Examine biomass:** We must better understand biomass supply to know if it is truly sustainable and, in turn, renewable. We recommend seeking an independent third party recommendation in this area, perhaps by creating a sustainable biomass taskforce to determine the level of biomass that can be sustainably produced within the region, and to recommend appropriate limits and other policies.
4. **Transform when converting:** Electricity from biomass should also be generated using the most efficient technology available. Coal-powered plants in Ohio are energy inefficient, with more energy lost during generation and transmission of electricity than actually reaches the end user. Simply retrofitting a coal plant to burn biomass only exacerbates the issue because biomass burns less efficiently than coal. At a minimum, combined heat and power technology can double the efficiency of electricity generation, and should be used wherever biomass is burned to help ensure the sustainability of biomass supply that necessary to qualify biomass as a truly renewable source of energy.
5. **Close Mercantile Opt Out loopholes:** The opt out has the potential to be seriously abused and should be monitored closely, perhaps through an independent third party verifying the validity of measures and certifying savings. Past 2010, no new exemptions should be granted for efficiency measures taken prior to the adoption of SB 221.
6. **Require Pragmatic Transparency:** There should be a standardized executive summary (no more than 5 pages) that explains the proposed programs, the required benchmarks, the budget, and the rider being charged to customer and that points to specific documents where claims can be substantiated. Unfortunately, important data and information is now hidden among numerous and lengthy filings. Also, companies' reported data vary considerably, making it difficult to compare and contrast programs.
7. **Expand the clean energy standards:** Ohio should expand its policy to include specific aggressive goals for natural gas utility efficiency programs. In the near term, natural gas efficiency programs may take the form of appliance programs and boiler retrofits, over time there should be a convergence of natural gas and electric utility efficiency programs and zero energy building practices. Cost-sharing between the utilities and the construction industry can convert our building stock to a very low energy requirement which can in turn be provided by renewables, over about forty or fifty years. How fast this happens depends entirely on how fast we get started.

## Conclusion

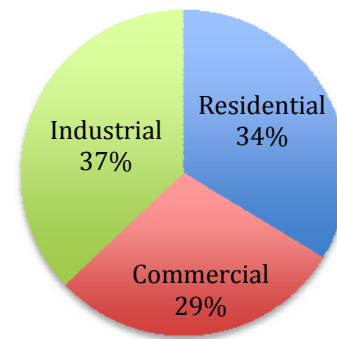
Senate Bill 221 is working—the green economy is growing, Ohio's abysmal pollution levels are stabilizing, and outside investment is happening. Projects like American Electric Power's Wyandot Solar Field and the DP&L Yankee Solar Field would not likely have happened by this time without the provisions found in SB 221. This law is helping Ohio, but better enforcement is crucial for continued success. Biomass also must be closely examined to ensure its sustainability. Strong enforcement of this law will allow the newly-created renewable energy and energy efficiency markets to thrive.



## Appendix

For contextual background, figure 1 shows the breakdown of who uses that electricity, per customer class.

**Figure 1. Breakdown of Ohio Electricity Sales, per customer class (2008)**



Under SB 221 utility companies are allowed to seek cost recovery for energy efficiency programs.<sup>1</sup> This cost recovery mechanism takes place through the use of a rider attached to customers monthly bill. The table below outlines the riders being charged by each investor owned utility in Ohio for three customer classes. An average residential customer will pay between \$1.60 to \$2.30 per month for the energy efficiency rider, an average commercial customer will pay between \$3.77 and \$13.22 more and an average industrial customer will pay between \$125.68 and \$440.80 for the rider.

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<sup>1</sup> Section 4901:1-39-07 of Ohio Authorized Code

<b>Energy Efficiency Rider Comparison</b>							
Residential (1,000kWh per month)							
Company	American Electric Power		First Energy			Duke	Dayton Power and Light
	Columbus Southern Power Company	Ohio Power Company	Ohio Edison	Cleveland Electric Illuminating	Toledo Edison		
Rider (\$/kWh)	0.0022436	0.0023024	0.001889	0.002088	0.002032	0.0016018	0.0020875
Bill without Rider	\$111.03	\$91.34	\$120.32	\$128.05	\$126.80	\$116.63	\$116.47
Monetary Difference	\$2.24	\$2.30	\$1.89	\$2.09	\$2.03	\$1.60	\$2.09
Bill with Rider	\$113.27	\$93.64	\$122.21	\$130.14	\$128.83	\$118.23	\$118.55
Percentage Difference	2.02%	2.52%	1.57%	1.63%	1.60%	1.37%	1.79%
Commercial (6,000 kWh per month, using between 10-30kW)							
Company	American Electric Power		First Energy			Duke	Dayton Power and Light
	Columbus Southern Power Company	Ohio Power Company	Ohio Edison	Cleveland Electric Illuminating	Toledo Edison		
Rider (\$/kWh)	0.002204	0.0020802	0.001252	0.001392	0.000776	0.001613	0.0006284
Bill without Rider	\$695.15	\$520.51	\$580.53	\$856.17	\$587.08	\$600.00	\$872.23
Monetary Difference	\$13.22	\$12.48	\$7.51	\$8.35	\$4.66	\$9.68	\$3.77
Bill with Rider	\$708.37	\$532.99	\$588.04	\$864.52	\$591.74	\$609.68	\$876.00
Percentage Difference	1.90%	2.40%	1.29%	0.98%	0.79%	1.61%	0.43%

Industrial (200,000 kWh per moth, 1,000 kW)							
Company	American Electric Power		First Energy			Duke	Dayton Power and Light
	Columbus Southern Power Company	Ohio Power Company	Ohio Edison	Cleveland Electric Illuminating	Toledo Edison		
Rider (\$/kWh)	0.002204	0.0020802	0.001252	0.000677	0.000776	0.001613	0.0006284
Bill without Rider	\$21,373.56	\$15,548.54	\$23,942.48	\$19,764.72	\$27,161.00	\$20,000.00	\$25,324.32
Monetary Difference	\$440.80	\$416.04	\$250.40	\$135.40	\$155.20	\$322.60	\$125.68
Bill with Rider	\$21,814.36	\$15,964.58	\$24,192.88	\$19,900.12	\$27,316.20	\$20,322.60	\$25,450.00
Percentage Difference	2.06%	2.68%	1.05%	0.69%	0.57%	1.61%	0.50%

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