Union of Concerned Scientists

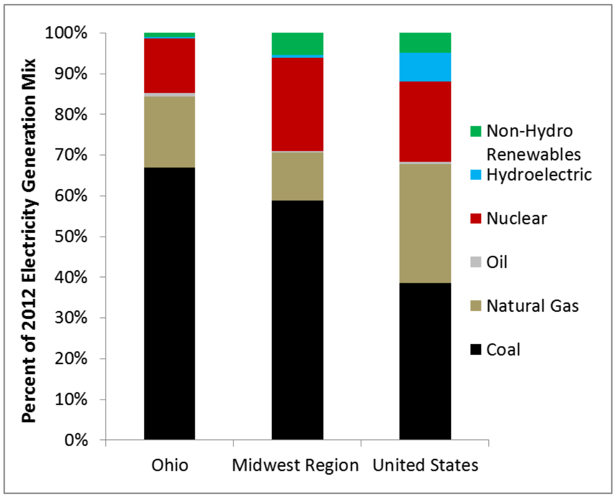
Managing Risk in Ohio

CLEAN ENERGY'S ROLE IN A RELIABLE, DIVERSE POWER SUPPLY

Historically reliant on coal for most of its electricity, Ohio is starting to retire its oldest, dirtiest, and least efficient coal plants. To fill the void, the state is turning primarily to natural gas power plants. But shifting from an electricity system dependent on coal to one dependent on coal and natural gas does not alleviate the myriad risks—to the environment, economy, and public health—posed by coal alone. In fact, it exacerbates them, and even creates new risks. Instead of simply replacing coal with natural gas, Ohio should be moving toward a truly diverse and lower-risk electricity portfolio that includes greater contributions from renewable energy and energy efficiency.

"Don't put all your eggs in one basket" is a mantra for many investors who diversify their portfolios to protect against a volatile stock market. Similarly, Ohio should diversify its electricity portfolio to protect consumers from the serious risks that come with depending too heavily on a small number of energy resources—in particular fossil fuels—to meet their power needs. Renewable energy and energy efficiency can help meet this goal, and bring safe, clean, reliable, and affordable power to Ohio's ratepayers.

Figure 1: Ohio's Coal Dependence



Ohio is more dependent on coal for its electricity supply than both the Midwest region and the nation as a whole, on average. Source: EIA 2013a.

Note: Midwest region includes Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin.

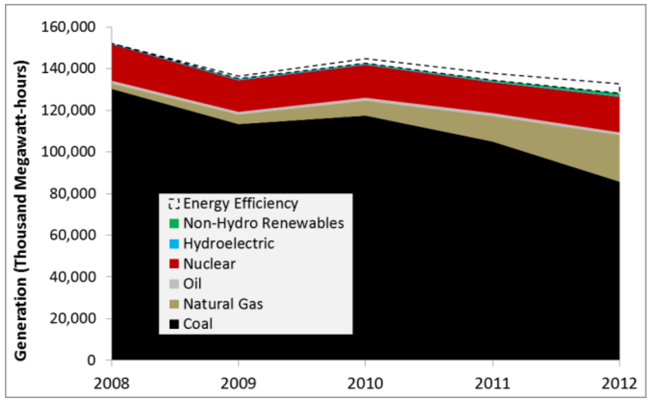
Clean energy is already beginning to deliver important economic, public health, fuel diversity, and environmental benefits to communities throughout the state. Keys to this success have been the energy efficiency and renewable energy requirements included in Ohio's Alternative Energy Portfolio Standard. Adopted with strong bipartisan support in 2008, these standards require utilities to both cut energy use through investments in energy efficiency and increase the share of renewable energy sources—like wind, solar, and biopower—used to meet electricity demand. It is essential to keep these effective policies intact, and strengthen them over time, in order to cut coal dependence and avoid the pitfalls of a new reliance on natural gas. Doing so will put Ohio on the path toward a truly clean and diverse energy future.

The Role of Coal and Natural Gas in Ohio

Coal provided 66.5 percent of Ohio's electricity generation in 2012, significantly more than the United States as a whole or even the Midwest region (see Figure 1). But current market forces have eroded the economic competitiveness of coal. Utilities have already retired more than 2,700 megawatts (MW) of coal generating capacity at a dozen coal plants in the state and have announced plans to shut down nearly 5,000 MW of additional coal capacity by 2015. Further, a recent analysis by the Union of Concerned Scientists (UCS) identified an additional 2,000 MW of coal capacity in Ohio as being economically uncompetitive (Cleetus et al. 2012); while these plants have not yet been slated for retirement, they are good candidates for closure. However, this wave of coal retirements represents only 35 percent of Ohio's total coal capacity, meaning coal will likely continue to supply a significant portion of Ohio's electricity demand under current market conditions.

Natural gas has been the primary fuel choice to fill the electricity generation gap created by Ohio's retiring coal units (Figure 2). Natural gas generating capacity has more than doubled in Ohio over the last decade, from approximately 4,000 MW in 2001 to more than 10,000 MW in 2012. Further, while most older natural gas plants are "peaking" plants, so called because they are designed to operate only during periods of peak demand (typically less than 10 percent of the time), plants added since 2001 are typically designed to run 60 percent or more of the time. This, combined with low natural gas prices, has led to Ohio's average natural gas power plant capacity factor (a measure of how much electricity a power plant produces over time compared with its total potential output during the same period) steadily increasing from 8 percent in 2008 to 58 percent in 2012.

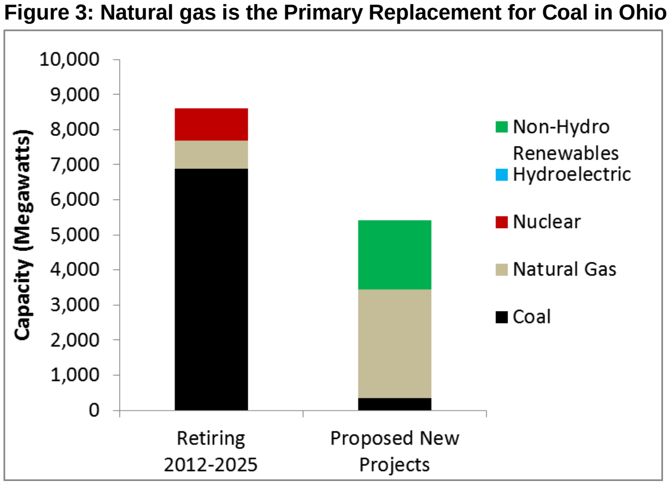
Figure 2: Coal Use is Declining in Ohio



While energy efficiency and renewable energy are increasing in Ohio, coal, with increasing amounts of natural gas, supply the majority of Ohio's electricity. Source: EIA 2013a.

Looking ahead, new natural gas plants will likely continue to replace retiring coal capacity in Ohio. While Ohio's renewable energy standard, combined with declining costs and improving technologies, is driving an increase in renewable energy capacity, natural gas plants continue to make up the majority of new development (see Figure 3). This trend is being fueled by current assumptions of an abundance of cheap natural gas and the relatively low cost of building new natural gas plants.

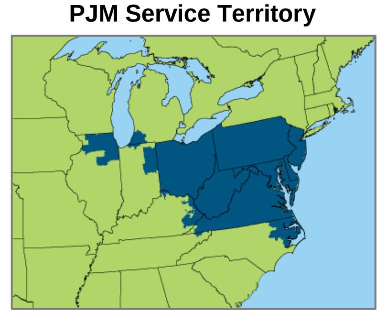
Figure 3: Natural gas is the Primary Replacement for Coal in Ohio



Retiring coal plants in Ohio are primarily being replaced with natural gas plants. Renewable energy and other resources make up a smaller percentage of new projects. Source SNL 2013.
Note: Proposed new projects include those that are under construction, in advanced development, or in early development.

The shift from coal to natural gas is even more widespread across the territory of PJM—the regional wholesale electricity market in which Ohio utilities operate (see map below and Figure 4 on p. 3). PJM's electricity portfolio will become increasingly important to Ohio's electricity future as utilities in the state continue their transition toward deregulation. A deregulated market requires utilities to separate transmission and distribution operations from electricity generation and to purchase power through competitive bidding processes. Deregulated utility companies are able to purchase electricity from outside Ohio, primarily from within this regional market. Therefore, the generation mix in the PJM territory will be largely indicative of the resources supplying power to Ohio consumers. If PJM becomes more dependent on natural gas, so too will Ohio.

PJM Service Territory



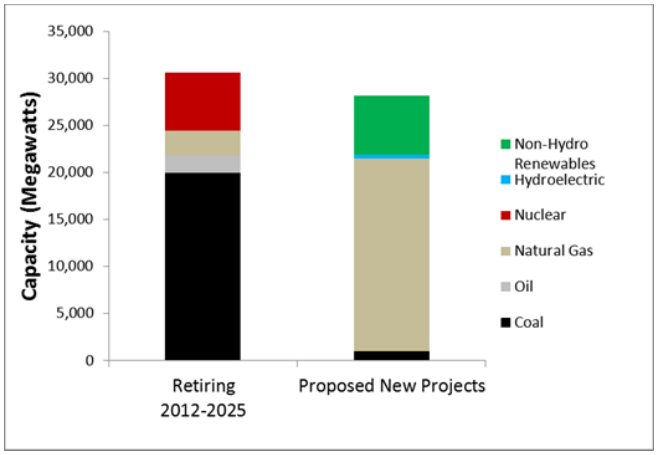
Source FirstEnergy 2013.

Fossil Fuels: A Risky Investment

Historically, Ohio's power choices have been driven primarily by the relative costs of electricity resources. But in many cases, a resource's cost does not take into account the relative risks the resource can pose, whether to the economy, environment, or public health (Binz et al. 2012). Given the long-term nature of capital-intensive energy investments, once a new power plant is built, ratepayers are exposed to the risks of that investment for many years (Mercurio 2013).

There are several types of risk associated with coal- and natural gas-fired electricity generation that should be considered when planning Ohio's energy future and that could be mitigated through a more diversified electricity mix. While these risks can be managed and minimized, ignoring them is not a responsibly strategy for meeting Ohio's electricity demand.

Figure 4: The Shift from Coal to Natural Gas in the PJM Territory



Replacement of retiring coal with natural gas is even more apparent in the PJM region than in Ohio. Source: SNL 2013.

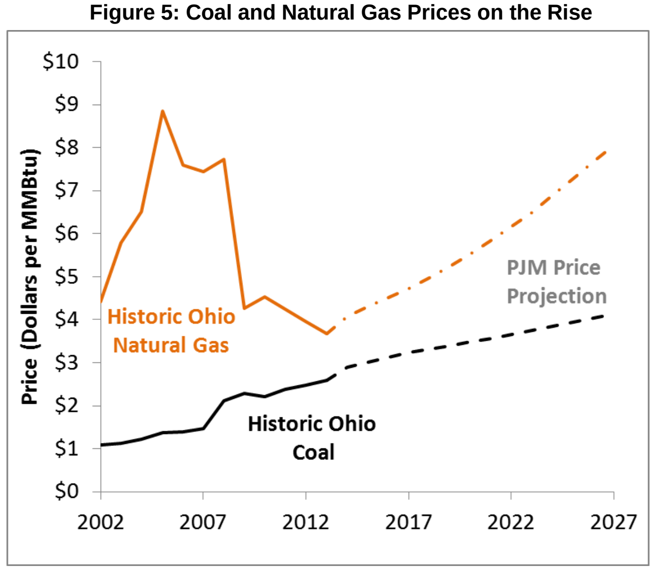
Fuel-cost risks. Perhaps the biggest risk to Ohio consumers is an increase in the cost of natural gas and coal, which could negatively affect the economic viability of power plants or raise rates. Natural gas prices can fluctuate significantly from day to day, but have historically experienced several longer-term periods of volatility. Natural gas prices are about double what they were at the beginning of April 2012 and many energy experts agree that the average price of natural gas will likely continue to increase over the next three to five years (Young, Elliot, and Kushler 2012). Natural gas prices are also projected to continue rising over the longer term, despite increased production from hydraulic fracturing, due to a variety of factors including increased demand from the electricity and industrial sectors and declining reserves of conventional natural gas deposits (EIA 2013b). Because of this volatility, executives of several of the nation's largest utilities—including American Electric Power, Dominion Resources, and Duke Energy—have cautioned against overreliance on natural gas as a source of electricity generation (IG 2012).

Other uncertainties in the energy market could push natural gas prices even higher than projected and cause significant rate increases for communities dependent on natural gas. These include the expanded role of natural gas in fueling vehicles and the potential export of liquefied natural gas to foreign markets.

Coal prices are also projected to increase over the next several years largely due to demand from foreign markets and escalating extraction and transportation costs (Freese et al. 2011). Both China and India have increased their use of coal in recent years, leading to price spikes in the international markets that increasingly affect U.S. coal prices. The depletion of the most easily accessible coal resources could lead to increased mining costs as well. Lastly, the increasing price of petroleum—the primary fuel used to mine coal and transport coal from mines to power plants—is driving the delivered price of coal higher (Freese et al. 2011).

Because of these trends, both coal and natural gas prices are projected to steadily increase in the PJM territory by 59 and 119 percent, respectively, over the next 15 years (Figure 5).

Figure 5: Coal and Natural Gas Prices on the Rise



Coal and natural gas prices in the PJM region are projected to increase through 2027. Sources: PJM 2013; EIA 2013c; EIA 2012.

Reliability risks. In addition to economic risks, several reliability-related risks could affect Ohio if it remains overly dependent on coal and natural gas for its electricity generation. For example, because natural gas cannot be stored onsite at power plants, pipeline constraints and accidents can limit supply availability, particularly in regions like Ohio that depend heavily on natural gas for home heating. These distribution constraints could force natural gas power plants to reduce their output or suspend operations in times of high natural gas demand. This is already occurring in the Northeast, where high natural gas demand for both electricity and heating led to reliability concerns—and price spikes that were four to eight times higher than normal—during the 2012–2013 heating season (Van Welie 2013; Mercurio 2013).

Coal and natural gas plants also face reliability risks due to competing demands for water resources and electricity production. Most U.S. power plants require significant amounts of water to operate—primarily to cool their electricity-generating steam turbines. Coal plants require three to five times more water than natural gas plants, depending on the cooling technology used (Averyt et al. 2011). However, natural gas faces its own water-constraint risks because hydraulic fracturing requires large amounts of water at each well to complete the extraction process.

As populations grow and agriculture and industry continue to place increasing demands on water resources, the risk of energy-water "collisions" threatens the reliability of coal and natural gas as an electricity resource (UCS 2013a). For example, power plants that require significant amounts of water to operate can be forced to shut down or reduce output during heat waves and droughts when local water supplies are too warm—or too scarce—to be used for cooling, or when their discharged cooling water is too hot for safe release into nearby rivers and lakes (UCS 2011). These collisions between water resources and power generation are poised to worsen in a warming world as power sector carbon emissions contribute to climate change, which in turn affects water availability and quality (Rogers et al. 2013).

Environmental and public health risks. Both coal and natural gas create serious environmental and public health hazards that are a major liability. Coal plants are particularly harmful: in addition to consuming millions of gallons of water, they generate significant amounts of dangerous air pollution (such as mercury, sulfur dioxide, and particulates) and produce toxic coal ash that can contaminate local waterways. Coal generation is also the electricity sector's largest source of heat-trapping carbon dioxide (CO2) emissions. These and other public health and environmental hazards have prompted a variety of regulations that require coal-plant owners to install pollution control equipment—although many plants have yet to be cleaned up. The cost of installing these pollution controls can further erode coal's economic competitiveness, especially at older facilities (Freese et al. 2011; Cleetus et al. 2012).

A prime example of the regulatory risks faced by Ohio's coal plants is FirstEnergy's W.H. Sammis power plant on the Ohio River. In response to air pollution regulations, the 2,200 MW power plant began installing $1.5 billion in emission controls in 2005. By the time the retrofits were complete in 2010, the price of natural gas was on a steady decline to record lows. The plant was idled for much of 2012 because it could not compete in an electricity market dominated by low-cost natural gas (Funk 2012). The plant is still operational, but its recent track record suggests that it will continue to face economic challenges (SNL 2013).

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Ohio's coal plants (like the Miami Fort Coal Plant in Hamilton, Ohio shown here) pose serious environmental and public health hazards that are a significant liability, making them a risky option for meeting electricity demand.

Although natural gas plants emit significantly fewer air and water pollutants than coal plants, the gas industry still poses several environmental and public health risks, especially from the extraction and transport of its product. The large amounts of water used during extraction, combined with chemicals used in the hydraulic fracturing process, raises concerns regarding both water availability and quality. Further, the use of heavy machinery—and the clearing of land to build access roads for such equipment—is raising concerns among communities where hydraulic fracturing is taking place. Finally, leaks in pipelines and distribution networks are an increasing concern as these systems age or are pushed to capacity. Because of these risks, natural gas operations could also be subject to regulations that would affect their economic viability.

Finally, both coal and natural gas pose significant risk to our ability to address climate change. Coal plants remain one of the nation's largest sources of CO_2, and while an efficient natural gas power plant emits 50 to 60 percent less CO_2 than a typical coal plant, burning natural gas still contributes significant levels of CO_2 to the atmosphere. A 2011 study by the International Energy Agency found that a large global shift to from coal to natural gas would lead to a long-term global average temperature increase of more than 6°F (3.5°C)—a level of warming associated with a high risk of catastrophic environmental and economic consequences (IEA 2011). Further, preliminary research indicates that leakage of methane—a heat-trapping gas up to 25 times more potent than CO_2 over a 100-year time period—during the natural gas extraction and distribution process may also be a significant contributor to global climate change (UCS 2013b). Given these realities, Ohio's current transition from coal to natural gas would not effectively curtail the state's contributions to climate change and still leaves the state vulnerable to increasing costs associated with the regulation of global warming emissions.

Renewable Energy and Energy Efficiency: A Lower-Risk Solution

An effective strategy for managing the risks associated with coal and natural gas is to diversify Ohio's electricity portfolio. A diverse mix of energy resources, including meaningful contributions from renewable energy and energy efficiency, provides important risk-management benefits because each type of resource behaves independently from the others under different conditions such as market fluctuations or regulatory changes.

This view is shared by many of the nation's utilities. In congressional testimony, Mark McCullough, executive vice president of American Electric Power, argued that "diversity plays an important role in reducing the potential exposure of our company and customers to fluctuations in markets, costs, regulations, and electric demand. Diversity within the electric power sector can refer to a variety of practices that reduce these exposures. Perhaps the most important measure of diversity for the electric power sector is the practice of fuel diversity" (McCullough 2013).

Renewable energy and energy efficiency offer a valuable hedge against the volatility and uncertainty of coal and natural gas prices. Besides reducing demand for these fuels and therefore putting downward pressure on market prices, renewable resources like wind turbines and solar panels also protect consumers against fuel price volatility because, once built, their "fuel" is free. This allows the cost of renewable energy to remain stable over the life of the clean-energy facility. In contrast, coal and natural gas power plants have large, ongoing, and often uncertain costs associated with purchasing fuel (Mercurio 2013).


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Renewable energy resources, like these wind turbines in Bowling Green, offer a low-risk resource to diversify Ohio's electricity portfolio.

The beneficial hedge value of wind power was recently evaluated and confirmed in a March 2013 analysis by Lawrence Berkeley National Laboratory (Bolinger 2013). The analysis concluded that stable-priced generation resources like wind power hold a unique competitive advantage by providing long-term protection against rising natural gas prices. Utilities whose portfolios include significant contributions from wind power are seeing similar results. One of these is Xcel Energy, which operates in eight states including Minnesota, Wisconsin, and the Dakotas. The company recently stated, "Adding wind to our energy portfolio has … helped us to continue to reduce costs. Simply put, having a variety of energy options gives us the ability to make the smartest choices for our customers" (Xcel 2012).

Beyond mitigating fuel cost risk, renewable energy and energy efficiency provide a number of advantages compared with coal or natural gas, including:

- **Lower risk of fuel disruptions from supply shortages or distribution bottlenecks**—renewable energy resources (other than biopower) and energy efficiency do not depend on a fuel distribution system that can break down or become overcrowded. They are also less vulnerable to prolonged interruptions in operations stemming from safety concerns, terrorist threats, and fuel embargoes (UCS 2013c).
- **Fewer operating risks**—renewable energy and energy efficiency technologies are relatively simple and require little maintenance compared with coal or natural gas generating plants, making them easier to operate reliably over a long period of time and reducing the risk of costly repairs (Binz et al. 2012).
- **Lower risk of regulatory costs**—most renewable energy and energy efficiency technologies do not emit toxic pollutants or contribute to global warming during operation. As a result, they face far fewer risks of regulations that can increase costs or affect resource availability.
- **Little, if any, water supply risk**—renewable energy resources, particularly wind and solar photovoltaic, use little or no water to operate (Rogers et al. 2013; Binz et al. 2012). Energy efficiency reduces water-related risks by reducing demand for electricity as a whole.
- **Less risk of catastrophic failure**—renewable energy and energy efficiency technologies are more modular in nature and less likely to cause significant disruptions to the electricity system if one or more units fail. For example, consider a 100 MW turbine at a coal or natural gas plant versus a 1 MW turbine at a 100-turbine wind farm. The failure of one coal or gas turbine causes the unavailability of 100 percent of generating capacity while a failure of one wind turbine causes a 1 percent reduction in generating capacity.

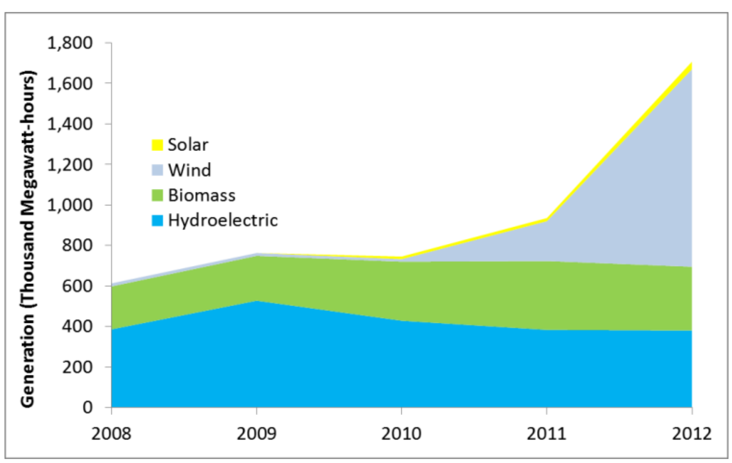
Renewable resources have also demonstrated greater resilience, as well as significant safety advantages, during recent extreme events. For example, wind and solar facilities experienced few operational problems compared with coal, natural gas, and nuclear plants during Hurricane Sandy (Wood 2012). Wind power also played a critical role in mitigating power crises during a winter freeze and summer heat wave in Texas that caused outages at some conventional plants (Galbraith 2011; Bode 2011).

These examples underscore the findings of a recent analysis by Ceres that assessed the range of risks posed by various electricity generation resources. It concluded that renewables and efficiency were the lowest-risk options for meeting future electricity demand (Binz et al. 2012).

Clean Energy Standards Drive Diversification

Ohio has begun to take steps to diversify its energy mix and mitigate the risks posed by its overreliance on coal and natural gas. The state's Alternative Energy Portfolio Standard (AEPS), which passed with near-unanimous support in the state legislature in 2008, requires utilities to ramp up their usage of renewable energy to meet 12.5 percent of demand by 2025, and implement energy efficiency programs that will reduce energy demand by 22 percent by 2025 compared with business as usual. (The law also requires utilities to meet an additional 12.5 percent of demand by 2025 with "advanced energy resources" that may include renewable energy. However, this target can also be met using coal, nuclear, or natural gas; in addition, it has no annual benchmarks for implementation that would require utility compliance, and thus does not drive resource development. As a result, this second 12.5 percent requirement is not considered a renewable energy standard.)

Figure 6: Ohio is Beginning to Tap into Renewable Energy



Renewable energy generation in Ohio has more than doubled since 2011, and nearly tripled since 2008.
Source: EIA 2013a.

Though still early in its implementation, the state's renewable energy standard is already producing results. Since June 2009, the Public Utilities Commission of Ohio (PUCO) has approved more than 5,500 renewable energy facilities to contribute to meeting Ohio's standard, totaling about 3,800 MW of capacity (Snitchler 2013). These projects have produced enough electricity to meet Ohio's current benchmarks for renewable energy and have significantly increased the amount of renewable energy generated in Ohio (see Figure 6). In 2011, the latest PUCO reporting year, full compliance with the standard was nearly universal and, in several categories, utility performance exceeded the law's requirements (PUCO 2013a).

Ohio's energy efficiency standard is also a success. The state's four regulated utilities reduced electricity use by nearly 3.1 billion kilowatt-hours (kWh) through energy efficiency between 2009 and 2011, an average annual savings equivalent to a 125 MW power plant operating year round during that same time period (Snitchler 2013). A recent study by the American Council for an Energy-Efficient Economy (ACEEE) found that Ohio's utilities are generating energy efficiency savings at a cost considerably lower than that of any new generation resource. During the first three years of Ohio's efficiency standard, utilities achieved the 3.1 billion kWh of electricity savings at a cost of just over 1 cent per kWh saved, compared with the next cheapest generation resource, wind, at 6 cents per kWh generated. Even as deeper energy savings are pursued, the costs of implementing Ohio's efficiency programs are projected to average only 3 cents per kWh (Neubauer et al. 2013).

Ohio's renewable energy and energy efficiency programs also reduce the costs of electricity and capacity in the PJM wholesale market in which Ohio utilities participate. All things being equal, higher demand is associated with higher energy prices as more expensive resources enter the market to meet demand. Further, many communities must pay "capacity payments" to owners of peaking plants (i.e., plants that only operate during periods of high electricity demand) to keep the plant available at all times, even if power is only needed for a few hours of the year. By reducing demand through energy efficiency measures, Ohio reduces its reliance on higher-priced generation resources and fewer capacity payments need to be made. ACEEE estimates that the wholesale price suppression and reduced capacity payments resulting from implementing Ohio's energy efficiency standard, after accounting for the costs of energy efficiency programs, will provide net savings of \$2.7 billion by 2020 (Neubauer et al. 2013). Recent decisions by the PUCO are now requiring FirstEnergy and Duke to bid their energy efficiency into the PJM markets, meaning Ohioans will begin to see these price suppression effects beginning in 2013.

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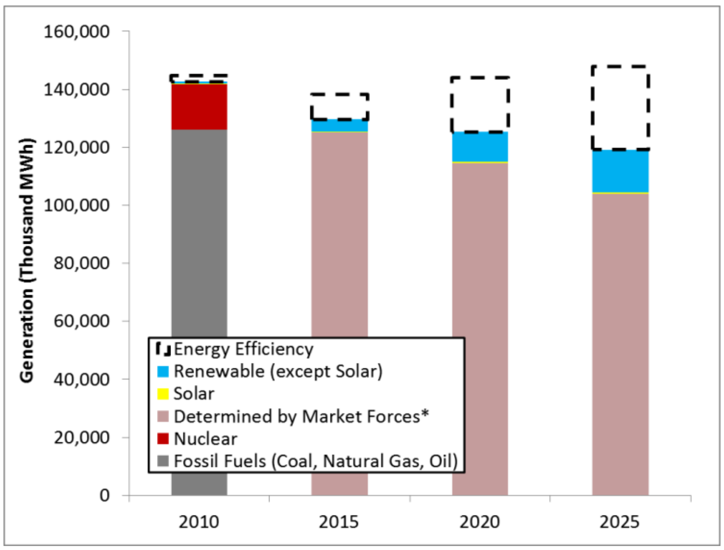
Reducing energy demand can avoid the use of expensive "peaking" plants (like the Woodsdale natural gas plant in Butler, OH, above).

Also, a recent analysis by the PUCO demonstrates that incorporating renewable generation resources into Ohio's electricity portfolio reduces wholesale market prices by offsetting more expensive generation from conventional power plants. The report concludes that projects already operational in Ohio are reducing wholesale electricity prices by an average of 0.15 percent. The savings more than triple when projects that are currently approved (but not yet operational) are included, with wholesale electricity prices in Ohio going down an average of 0.51 percent (PUCO 2013b). These results are in line with region-wide analyses that conclude doubling the amount of wind power in the PJM territory above what is already expected under existing state energy policies would generate net savings of almost \$7 billion per year by 2026 (Fagan et al. 2013).

Overall, Ohio's renewable energy and energy efficiency standards are translating into significant savings for consumers. A March 2013 study by the Center for Resilience at The Ohio State University modeled how the current standards have performed and found that, despite having been implemented for only four years, they have led to a 1.4 percent reduction in ratepayer costs between 2008 and 2012, for a total savings of $230 million (AEEOI 2013). The upfront costs of developing Ohio's renewable energy resources increased ratepayer costs by an estimated 0.54 percent in 2012; however, improvements in energy efficiency more than offset this increase, delivering a 1.9 percent reduction in ratepayer costs that same year.

Looking ahead, Ohio's renewable energy generation and energy efficiency are poised to increase significantly over the next several years. According to the Ohio Power Siting Board, there are 14 wind projects under various stages of development. If all of these projects move forward, another 1,546 MW of wind power capacity will be added, more than tripling Ohio's wind power fleet (OPSB 2013). In addition, solar energy is continuing to grow rapidly across Ohio, and is projected to increase by more than 50 times over 2010 levels by 2025 (PUCO 2012). Ohio utilities will also be required to ramp up energy efficiency savings in the years ahead, thereby reducing customer bills and avoiding new power plant and infrastructure costs (see Figure 7).

Figure 7: The Impact of Ohio's Renewable Energy and Energy Efficiency Standards through 2025



If fully implemented, Ohio's renewable energy and energy efficiency standards will help diversify Ohio's electricity portfolio.

**Note: Through 2025, the makeup of that portion of Ohio's electricity portfolio that will be determined by market forces will likely be primarily a mix coal and natural gas depending on the respective costs and risks of each resource. However, renewable energy and energy efficiency will have the opportunity to compete for a portion of this mix and will likely gain additional market share as these technologies continue to mature and come down in price.*

Even given this progress, Ohio could do more to diversify its electricity resource portfolio, particularly with regard to renewable energy. Ohio's 12.5 percent by 2025 renewable energy standard ranks toward the bottom compared with state renewable energy standards nationwide. Of the 28 states with standards in place, 17 have targets of 20 percent or higher (UCS 2013d). A recent review of state renewable energy policies found that utilities are successfully and affordably achieving their annual targets, including those with higher targets than Ohio (UCS 2013d); thus, Ohio should be encouraged to follow suit and strengthen its renewable energy standards.

Clean Energy Standards Drive Economic Growth

The development of Ohio's renewable energy and energy efficiency resources also delivers a wide range of economic benefits beyond reducing the cost and risks of meeting the state's electricity demand. For example, a recent ACEEE study found that a $1 million investment in energy efficiency supports between 14 and 20 jobs. In contrast, a $1 million investment in the energy generation industries supports about 10 jobs (Bell 2012). In Ohio, an analysis by the Advanced Energy Economy Ohio Institute identified nearly 10,000 jobs throughout Ohio's energy efficiency supply chain and credited the sector with $2.1 billion in annual sales (AEEOI 2012).

Furthermore, with lower electricity costs, consumers have more money to spend in the local economy, supporting additional jobs in other industries (Neubauer et al. 2013). Through 2012, implementing Ohio's energy efficiency standard has supported more than 4,000 new jobs in Ohio, and this total is expected to increase to more than 32,000 by 2025 assuming the energy efficiency standard is fully implemented. During this same period, utility energy efficiency programs will save Ohio ratepayers $3.3 billion (Laitner et al. 2012).

Wind and solar industries are also investing in Ohio. There is currently 426 MW of wind power capacity online in the state—enough to power more than 100,000 homes and avoid more than 700,000 metric tons of CO_2 emissions annually (AWEA 2013). In all, the wind industry supports between 5,000 and 6,000 jobs in Ohio, provides $3.6 million in annual property tax payments, and yields more than $2.5 million in lease payments to landowners that host wind turbines (AWEA 2013). Ohio has also become a leading state for manufacturing wind turbine components, with more than 50 such manufacturing companies in the state (AWEA 2013).

There are also more than 170 companies providing jobs in the solar industry in Ohio, 63 of which have manufacturing facilities located within the state (SEIA 2013). In total, these solar companies provide nearly 3,000 jobs to Ohioans. In 2012 alone, more than $61 million was invested in Ohio to install solar on residential and business rooftops, driven by both Ohio's renewable energy standard and a 26 percent drop in solar costs (SEIA 2013).

Conclusions and Recommendations

There are significant risks associated with Ohio's heavy dependence on coal and natural gas for its electricity generation, and delaying a shift toward a cleaner energy future increases these risks. By diversifying its electricity generation portfolio with renewable energy and energy efficiency, Ohio can meet its future electricity needs in an affordable, reliable, and sustainable manner.


Solar manufacturing has become big business in Ohio, providing jobs and attracting investments in communities around the state.

To achieve this goal, Ohio's energy efficiency standard should be fully implemented as currently written to ensure Ohio residents and businesses continue to save money and use electricity wisely. But the state should go further and increase its renewable energy standard to require 20 percent or more renewable energy by 2025. This would bring even greater diversity to Ohio's electricity portfolio and bring additional economic benefits to the state.

Finally, the state's renewable energy standard should also be strengthened to encourage long-term contracts for renewable energy development. Locking in renewable energy supplies and prices for 10 years or more maximizes the risk-mitigating benefits of renewable energy because supply and price stay constant for the life of the contract regardless of other market or regulatory conditions. Long-term contracts also provide renewable energy developers the financial certainty they need to invest in capital-intensive projects.

Ohio is at a crossroads. As the state retires its aging fleet of coal power plants, it must decide which energy resources will best serve Ohio ratepayers over the coming decades. Natural gas has been the primary fuel of choice in recent years, but an energy system heavily reliant on fossil fuels brings myriad environmental, economic, and public health risks that cannot be ignored. Fortunately, diversifying the state's electricity portfolio with renewable energy and energy efficiency helps minimize these risks and brings added economic benefits to the state. By maintaining, and even strengthening the renewable energy and energy efficiency requirements under its Alternative Energy Portfolio Standard, Ohio will ensure that its ratepayers have affordable, reliable, clean power for years to come.

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