Survey Results

CLEAN JOBS OHIO

Sizing Up Ohio's Clean Energy Jobs Base and its Potential

Presented by

ENVIRONMENTAL ENTREPRENEURS®

MAY 2015

ABOUT ENVIRONMENTAL ENTREPRENEURS

ENVIRONMENTAL ENTREPRENEURS®

Environmental Entrepreneurs (E2) is a national, nonpartisan group of business leaders, investors and others who promote smart environmental policies that drive economic growth. E2 members, active in nearly every state in the country, have built or financed more than 1,700 companies that have created more than 570,000 jobs, and manage more than $100 billion in venture and private equity capital. E2 is an affiliate of the Natural Resources Defense Council (NRDC).

ABOUT THE RESEARCH AND ANALYSIS PARTNERS

BW Research Partnership

BW Research Partnership is a full-service, economic and workforce research consulting firm with offices in Carlsbad, California and Wrentham, Massachusetts. It is the nation's leading provider of accurate, comprehensive clean energy research studies, including the National Solar Census, wind industry analyses for the National Renewable Energy Laboratory and the Natural Resources Defense Council, and state-level clean energy reports for Massachusetts, Illinois, Vermont, Iowa, and Missouri, among others.

The Economic Advancement Research Institute (EARI)

The Economic Advancement Research Institute (EARI) is a nonprofit research organization focused on economic mobility and regional competitiveness. EARI is primarily focused on studying the impact of policies and systems on economic growth and prosperity across all income levels. EARI has conducted numerous labor market analyses that address key economic sectors with high probability to provide opportunities to underrepresented and disadvantaged populations.

INTRODUCTION

The 2008 passage of Ohio's landmark clean energy standards (S.B. 221) marked a turning point in Ohio's economy.

In the wake of the standards to cut energy waste by 22 percent and shift at least 12 percent of the state's electricity to solar, wind and other clean energy sources, Ohio's renewable energy and energy efficiency sectors boomed.

Shuttered or struggling factories from Canton to Toledo were reopened and revitalized to make solar panels and parts for wind turbines. Clean energy companies began hiring out-of-work Ohioans at a record pace, even amid the nation's worst recession in recent history. Ohio quickly became the No. 2 state in the country for solar panel production. Wind and solar companies from around the globe opened offices in the state and broke ground on major wind farms in places like Champaign and Somerset counties and built major solar arrays on vacant former brownfield projects near Cleveland.

The economic benefits have been far-reaching.

Better energy efficiency standards have saved Ohio consumers and businesses more than $1 billion since the passage of the 2008 legislation, according to the state's utilities.[1]

And as this report finds, 89,000 Ohioans had good-paying jobs at 7,200 business establishments in energy efficiency, renewable energy, and clean transportation sectors as of last year. [2]

Today, many of those jobs – and Ohio's continued growth in clean energy – are at risk.

Since June 2014, when Ohio policymakers froze the state's clean energy standards and created additional barriers to clean energy development, the state's clean energy industry has been in a tailspin.

After policymakers enacted S.B. 310 (which freezes the state's energy efficiency and advanced energy standards) and H.R. 483 (which prevents the installation of many new commercial-scale wind projects) solar and wind companies that had relocated to the state are facing an uncertain future and could be forced to pack up and leave. Those that remain are growing at a much slower pace than a few years ago – if they're growing at all.

As this report shows, job growth in solar, wind, and other renewable energy sectors in Ohio slowed to only 1.5% in 2014. If not for the national economic recovery, even that miniscule growth probably would have disappeared.

Those clean energy companies that are still growing are increasingly being forced to go out-of-state for work. Jobs at "local market" sales and installation firms grew by only about 1 percent last year, as opposed to nearly 8-percent growth at firms that focused on out-of-state markets, according to our research.

Major clean energy companies and investors who once were clamoring to establish operations in Ohio are now avoiding the state and relocating to places that have better public policies.

Investments in renewable energy in Ohio have dried up. A report from the Pew Charitable Trusts found that wind and solar investments in Ohio plummeted from $563.2 million in 2012 to nearly zero in 2013 amid market uncertainty spawned by the debate over S.B. 310.[3] Eleven wind projects have been approved by the Ohio Power Siting Board, but have yet to break ground due to continuing uncertainty over state and federal policy.[4] Solar development has ground to a halt, with new solar resources dropping below 100 kW per month when industry averages for the six months prior stood at 1 MW or more per month.[5]

There's no good reason why Ohio's clean energy economy has to continue to erode.

As our report shows, Ohio still has a solid base of companies and employees who are able, willing and ready to resume the state's shift to clean energy. Despite recent setbacks, employers we surveyed still remain optimistic about the future. And the clean energy industry still holds myriad opportunities, especially for the small business sector and for women, minorities and veterans who make up about 20 percent of the workforce at clean energy companies.

After seeing the tremendous economic growth that happened in the wake of the 2008 clean energy legislation and seeing what's happening now in the wake of the 2015 clean energy rollbacks, it's clear that policy matters.

It's also clear that if Ohio lawmakers want the jobs, savings and economic growth that come with clean energy, they should act to build upon the clean energy foundation Ohio began in 2008, instead of letting that foundation continue to crumble from the fracturing legislation that rolled back smart clean energy policies in 2014.

Reinstating Ohio's successful clean energy policies and programs will secure Ohio's clean energy leadership and preserve and grow much-needed jobs. It will also help Ohio protect the public health of its communities and make it easier for the state to meet federal environmental and public health standards, including the Clean Power Plan which will cut carbon pollution from power plants by 30 percent by 2030 in part by increasing renewable energy and energy efficiency. The result will be a cleaner, healthier, and more prosperous future for decades to come.

Bob Keefe
Executive Director, E2

What businesses are saying about Ohio's clean energy freeze:

"All the companies that had started up and were trying to revolutionize our advanced energy economy in Ohio are feeling the effects [of SB 310]. Solar projects are coming to a halt." [6]

-Steve Melink, President of Melink Solar, a solar energy and energy efficiency provider based in Milford, OH.

The uncertainty "over time is just going to dampen investment." Ohio will become "just too risky a place." [7]

-Eric Thumma, Director of Policy and Regulatory Affairs for Iberdrola Renewables, Inc., a Spanish renewable energy developer with American headquarters in Portland, OR and a long history of projects in Ohio and other states.

"People make the investment [in solar projects] and they're looking at that 20 year cash flow to get their investment back. Well, if the legislators said we're going to change the rules in two years, we can't tell you how now—why would you make a 20 year bet?" [8]

-Jay Troger, CEO of Nextronex, a solar manufacturing company based in Holland, OH

EXECUTIVE SUMMARY

Clean energy – defined as renewable energy, energy efficiency, alternative transportation, and greenhouse gas management and accounting – is a significant industry in Ohio poised for rapid hiring growth. With more than 89,000 clean energy workers at more than 7,200 establishments, about 1.5% of all jobs in Ohio are in the clean energy and transportation industry.

As shown in Table 1, employment in the clean energy and transportation industry is nearly equivalent to that of the motor vehicle manufacturing industry in Ohio and outpaces other key industries like machinery manufacturing and information technology.[9]

Table 1: Selected Ohio Industry Employment Data (2014)

Industry	Employment
Fabricated metal manufacturing	105,420
Motor vehicles, bodies and trailers, and parts manufacturing	93,485
Machinery manufacturing	78,227
Information Technology	72, 600
Food manufacturing	60,545
Chemical	44,881

Over the past year, Ohio's clean energy workforce added 4,207 jobs – a 5.4% average growth rate, more than five times the state's overall employment growth rate. The renewable energy industry (e.g., wind and solar) reported sluggish job growth of 1.5% last year, while energy efficiency jobs grew 4.5% – both below the average and likely attributable to uncertainty surrounding S.B. 310. Alternative transportation, greenhouse gas accounting and management, and Other clean energy and transportation technologies lifted the overall rate due to increased demand for more fuel-efficient and electric vehicles, corporate sustainability initiatives, and other factors.

Companies are projecting growth to accelerate in the months ahead. While these projections from companies could be overly optimistic in light of the state's continuing policy uncertainty, they could also be the result of expected increased demand for clean energy goods and services in other states that have strong targets in place. For example, companies like FirstSolar and Owens Corning are leading manufacturers and exporters of clean energy products and services to states across the country and the globe where clean energy development is occurring at a more rapid pace.

More than 56,000 Ohioans (63.5% of the total state clean energy workforce) are employed by firms focused on energy efficiency (EE), including residential and commercial efficiency-related activities, "smart grid" work, and energy storage. These strong results have been achieved even as Ohio was ranked only 25th among the states in energy efficiency for 2014 by the American Council for an Energy Efficient Economy (ACEEE). Unfreezing Ohio's clean energy standards and implementing additional policies, incentives and programs would likely generate even stronger business and employment growth.

As of last year, an additional 14,000 Ohioans work in solar, wind and other renewable energy businesses, with another 12,000 employed throughout the alternative

transportation value-chain and the management of greenhouse gas emissions.

Installation, technician, and sales jobs dominate the clean energy workforce in Ohio, in keeping the industry's focus on energy efficiency and the deployment of existing technologies. Clean energy employers in the Buckeye State also support a large number of advanced professional positions in engineering, science, law, finance, architecture, and other fields.

Small businesses are clearly the engines driving clean energy growth in Ohio. More than 80% of the state's clean energy firms have fewer than 25 employees. These small Ohio companies are often local firms serving local markets. In fact, nearly 80% of clean energy businesses in Ohio say that their current customers are primarily in Ohio. Moreover, the majority of the industry's vendors and suppliers are within the state's borders.

METHODOLOGY

Industry Survey Methodology

The data in this report was derived from a comprehensive survey of business establishments in Ohio conducted between September 9, 2014 and September 25, 2014. Surveys were administered online and over the phone to a list of known employers as well as a representative, clustered sample of companies from the North American Industry Classification System (NAICS) identified by the Bureau of Labor Statistics (BLS), BW Research Partnership, and the Economic Advancement Research Institute as being potentially related to the clean energy industry.

The research methodology employed for this report has been used increasingly as a tool for measuring clean energy industry jobs and businesses, including in California, Florida, Illinois, Iowa, Massachusetts, Missouri, Vermont, and other states, as well as several national analyses.

For this study, the research team placed more than 10,300 telephone calls and sent 200 emails to employers. The combined margin of error for the survey effort was approximately +/-3.51 at a 95% confidence interval. The survey yielded responses from 753 employers in Ohio and averaged 14 minutes in length.

Business Establishments Surveyed

The methodology employed for this report accounts for the different types of establishments that are engaged in clean energy activities. The first category of establishments (the "known universe") are drawn from publicly and privately available lists of companies, such as industry association memberships, lists of certified contractors, etc., that are typically pure-play clean energy companies, meaning that all or most of their revenues and work are associated with one or more clean energy activity. These establishments are surveyed using a census approach and each is contacted up to six times to complete a questionnaire.

Research has shown, however, that a large percentage of clean energy activity is found in traditional industries, such as component manufacturing and the construction trades (the "unknown universe"). As a result, an important part of the methodology of this report is to understand the percentage of companies and establishments within such traditional industries that are conducting clean energy activities, as well as determining the percentage of revenues and employment and the different types of activities related to clean energy that such establishments are conducting. Understanding the specific activities and amount of work generated by clean energy for each of these (often) different categories of companies is critical to gain a more comprehensive understanding of a region's clean energy economy.

"Known Universe"

The "known universe" includes firms previously identified by researchers as clean energy companies. The combined database was developed from previous work and databases from BW Research Partnership and the Economic Advancement Research Institute. This list was also supplemented with industry lists provided by partners to the research or that were publicly available. After combining records and duplicate cleaning, the "known universe" of firms included 2,193 businesses.

"Unknown Universe"

The "unknown universe" included firms not previously identified by researchers as clean energy companies. This database was drawn from the Bureau of Labor Statistics Green Jobs Initiative and the NAICS industries identified therein (see: http://www.bls.gov/green/home.htm), as well as businesses drawn from InfoUSA. The full list of NAICs industry codes that were surveyed is provided in Exhibit 1 of the Appendix to this report. 692 firms provided information as to whether they were involved in clean energy or not. The overall margin of error for the incidence rate is estimated at approximately +/-3.66 at a confidence interval of 95%. Of the firms that provided information, 209 firms from the "unknown universe" identified as clean energy and completed the full survey.

SECONDARY DATA SOURCES AND LIMITATIONS

Economic Modeling Specialists, International (EMSI) Data

EMSI industry data have various sources depending on the class of worker. (1) For Quarterly Census of Employment and Wages (QCEW) employees, EMSI primarily uses the QCEW , with supplemental estimates from County Business Patterns and Current Employment Statistics. (2) Non-QCEW employees data area based on a number of sources including QCEW, Current Employment Statistics, County Business Patterns, Bureau of Economic Analysis (BEA) State and Local Personal Income reports, the National Industry-Occupation Employment Matrix (NIOEM), the American Community Survey, and Railroad Retirement Board statistics. (3) Self-Employed and Extended Proprietor classes of worker data area primarly based on the American Community Survey, Non-employer Statistics, and BEA State and Local Personal Income Reports. Projections for QCEW and Non-QCEW Employees are informed by NIOEM and long-term industry projections published by individual states.

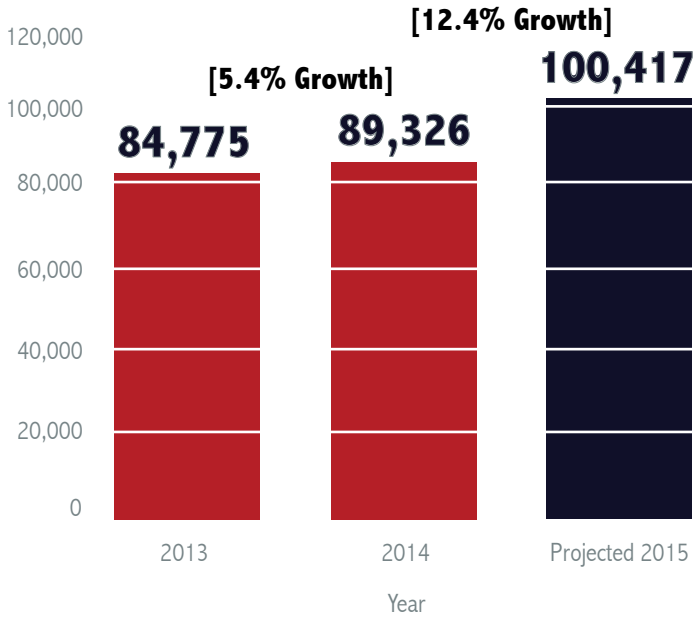
Renewables like wind and solar employ more than 14,000. (Stock photo)

MAJOR FINDINGS

OVERALL CLEAN ENERGY JOB GROWTH IN OHIO WAS FIVE TIMES MORE THAN THE STATE AVERAGE, BUT RENEWABLE ENERGY GROWTH LAGGED DUE TO POLICY UNCERTAINTY

Ohio's clean energy industry employed 89,326 workers at 7,246 establishments in 2014, an increase of 4,551 workers (5.4%) over the 2013 job total. This was five times greater than the state's overall annual employment increase of 1.0%.[10] As noted in the executive summary, this growth rate varied significantly across different technology sectors, with the renewable energy and energy efficiency sectors reporting slower job growth of 1.5% and 4.5% respectively, primarily as a result of policy uncertainty.

Despite this policy uncertainty, firms nonetheless expect that employment growth will more than double in the year ahead, projecting they will add as many as 11,091 new workers by the fall of 2015. These expectations are based on a range of factors, such as return on investment and payback periods for energy efficiency improvements, falling costs of renewable energy systems, continuing demand for more fuel-efficient and electric vehicle options, and the presence of a robust export market to sell Ohio-made products to other states and regions with growing demand for clean energy and transportation products and service. These projections may be overly optimistic given the state of policy uncertainty in Ohio. If companies' projections materialize, it would push the number of clean energy workers in the state to more than 100,000.



1.5% of Ohio's 5,680,552 workers[11] are employed at clean energy establishments. While not a national leader, Ohio compares fairly well to other states that have been studied in terms of the percentage of total workers in the state who are employed in clean energy and transportation, as seen below in Table 2.[12]

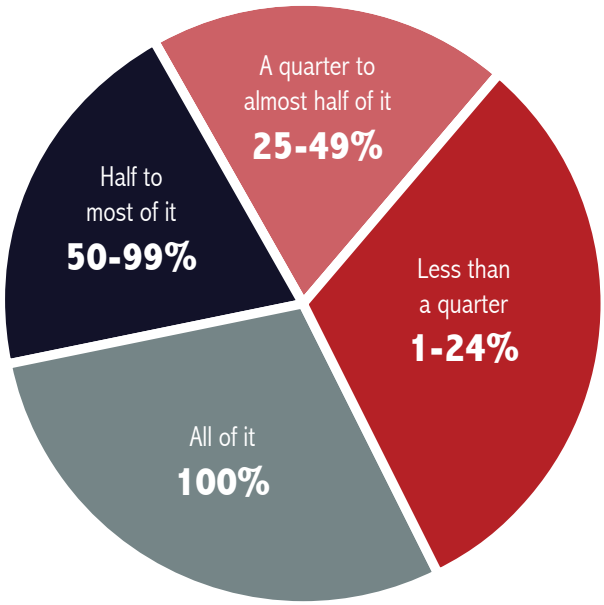
Table 2: Percentage of Total State Employment Attributable to Clean Energy and Transportation

State(s)	% of Total Employment
Vermont	4.3%
California, Massachusetts	2.4%
Florida, Illinois, **Ohio**	1.5%
Missouri	1.3%
Pennsylvania	1.0%

CLEAN ENERGY MEANS REVENUE FOR OHIO COMPANIES

Ohio is home to hundreds of companies that derive all of their revenue from work in energy efficiency, renewable energy and the other clean energy sectors. These firms make up 29.1% of the total number of clean energy establishments.

In addition, clean energy flows throughout the state's economy. Clean energy-related goods and services provide important sales and customers to many companies whose primary line of business is not limited to clean energy. In Ohio, 39.4% of firms in the cluster derive 25-99% of their revenues from clean energy, and another 31.5% garner less than a quarter of their revenue from it.



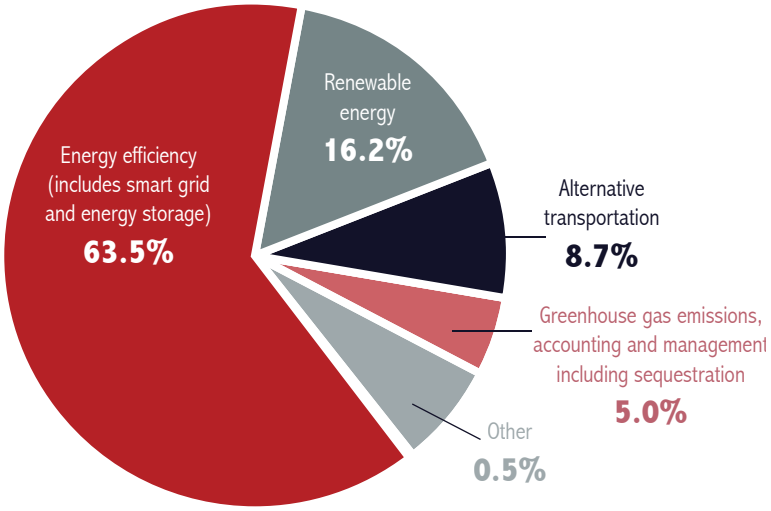
THE ENERGY EFFICIENCY SECTOR SUPPORTS MORE THAN 56,000 WORKERS IN OHIO

Energy efficiency is by far the largest part of Ohio's clean energy industry, supporting 56,697 workers – 63.5% of the total. In addition to residential and commercial energy efficiency (EE) work, the EE sector also includes workers involved in energy storage innovations, and in developing a "smart grid" for Ohio.

Although this is a significant workforce, research and analysis shows that that the Buckeye State is underperforming its potential in energy efficiency. Ohio ranks only 25th on the 2014 state energy efficiency scorecard from the American Council for an Energy Efficient Economy (ACEEE), with a score of only 17.5 points out of a possible 50.[13] Further analysis conducted by ACEEE for the Ohio Manufacturers Association (OMA) shows that carrying out the state's energy efficiency standard through 2025 will save consumers nearly $5.6 billion in avoided energy costs, far exceeding the cost for utilities ($2.8 billion) to implement programs. One of the state's major utilities, American Electric Power (AEP), also studied the energy efficiency potential in its service territory and found that their programs could reduce energy use by a cumulative 6.6% by 2019 and 24% through 2034.[14]

MORE THAN 14,000 OHIOANS WORK FOR RENEWABLE ENERGY FIRMS

Ohio's renewable energy sector is diverse. While just over half of the state's 14,428 renewable energy workers are in solar energy (4,846) and wind power (2,589), Ohio is also home to significant numbers of workers involved in bioenergy (1,784), geothermal power (1,443), fuel cells and hydrogen (1,315), combined heat and power (1,004), and other renewable energy options.



CASE STUDY: *Melink expanding into new markets, new technologies*

Melink Corp., based in Cincinnati, is an industry leader in energy efficiency and renewable energy. Founded in 1987 by Steve Melink, the company now has four separate businesses and its employees work across the United States.

One business segment provides HVAC testing and balancing services to major domestic chain stores and restaurants including Walmart, Target and McDonald's. This segment also provides construction and facilities services in Canada.

Soon after starting his business, Melink invented the first variable-speed controls for commercial kitchen ventilation systems. Since then, the Melink Corp.'s Intelli-Hood business has sold more than 10,000 units. The company's controls have become the industry standard in hotels, hospitals, schools and restaurants, Melink said.

In 2005, for its new headquarters, Melink Corp. designed the first LEED Gold-certified office building. Melink's headquarters is now LEED Platinum certified, Energy Star-rated with 99 out of a possible 100 points, and is energy net-zero – meaning it generates as much energy as it uses and makes it one of the the world's greenest building. Melink also has a fleet of hybrid and electric cars.

Soon after the 2005 construction of its new headquarters, the company started its Melink Solar business. Many projects later – including the solar canopy at the Cincinnati Zoo – this is Melink Corp.'s fastest-growing business segment.
The company's latest venture is Melink Geo, which is being launched in 2015. This business segment will help mainstream geothermal HVAC systems in the commercial building sector.

Melink's goal of growing 30 percent per year is being achieved by expanding into new geographic markets and developing new technologies. For example, Melink Corp. is exhibiting its Intelli-Hood controls in Dubai, UAE and Germany, and applying for additional patents related to its next-generation design.

Although Ohio's solar PV industry is currently experiencing policy uncertainty, Melink's solar business is developing several large projects in forward-looking states like North Carolina and Massachusetts.

"Solar PV continues to grow rapidly across the U.S. while Ohio misses out," Melink said.

-Environmental Entrepreneurs

Cincinnati's Melink Corporation is creating jobs by focusing on energy efficiency and renewable energy. (Photo credit: Mark Byron/Byron Photography, via NRDC Switchboard)

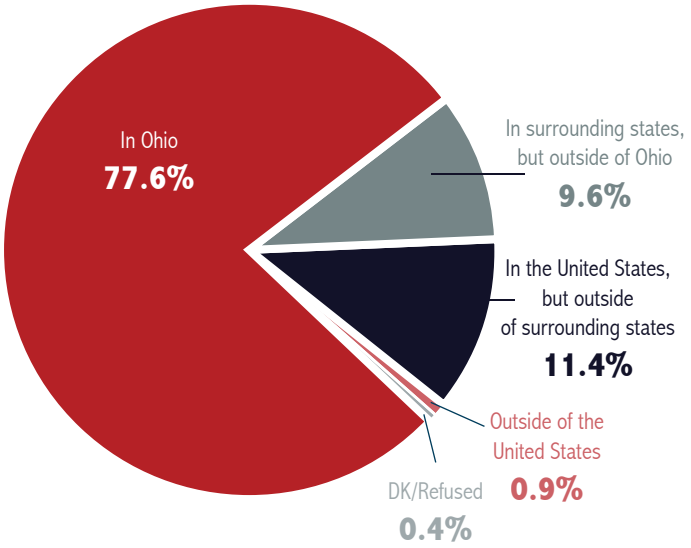
ALTERNATIVE TRANSPORTATION EMPLOYS MORE THAN 7,700 WORKERS IN OHIO

The large size of Ohio's alternative transportation[15] workforce reflects Ohio's place as the third-largest state in the nation for auto supply chain manufacturing, employing nearly 100,000 workers.[16] Alternative transportation workers are also found at repair and professional and support service firms focused on hybrid and electric vehicles.

OHIO'S CLEAN ENERGY INDUSTRY IS LARGELY DEPENDENT ON IN-STATE CUSTOMERS

More than three-fourths (77.6%) of Ohio's clean energy firms report that their customers are primarily in the state. This large local customer base is typical of clean energy industries made up of many small businesses engaged in deployment of existing technologies.

This large local customer base is a sign that consumers in Ohio are reaping the benefits of energy efficiency and renewable power in large numbers. Moreover, Ohio's large population suggests that the in-state market for clean energy has only begun to be tapped. The remainder of the state's clean energy customer base is found among other states in the region (9.6%) and the rest of the nation (11.4%). Ohio's industry has only a tiny group of international customers, at least when considering the number of firms that primarily find their customers outside of the U.S.

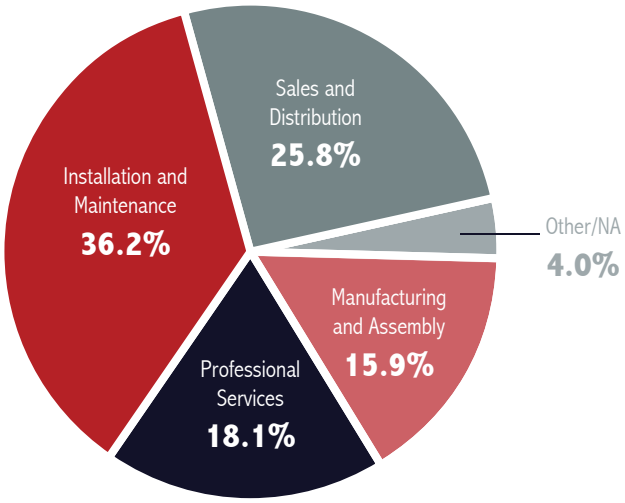


OHIO IS HOME TO A SIGNIFICANT GREENHOUSE GAS EMISSION MANAGEMENT SECTOR

While most of Ohio's clean energy industry is in energy efficiency, renewable power and alternative transportation, the state also boasts a small but significant number of workers engaged in accounting and management related to greenhouse gas (GHG) emissions. Ohio companies are thus well-positioned to compete in a sector that is expected to grow in the wake of new national and international regulation of GHG emissions and the need for carbon management more generally.

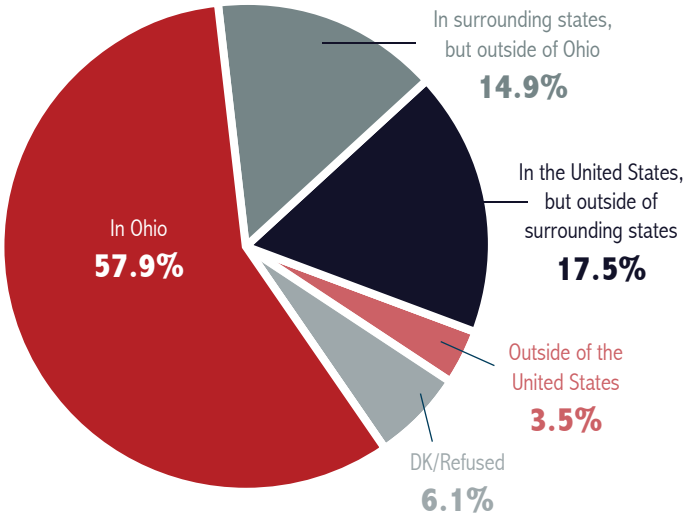
CLEAN ENERGY WORK IN OHIO SUPPORTS EVERY PART OF THE SUPPLY CHAIN

More than three-fifths (62.0%) of Ohio's clean energy workforce is engaged in installation, maintenance, sales, and distribution. The remaining 38 percent of the state's clean energy workforce has significant numbers in professional services (18.1%) and manufacturing and assembly (15.9%).



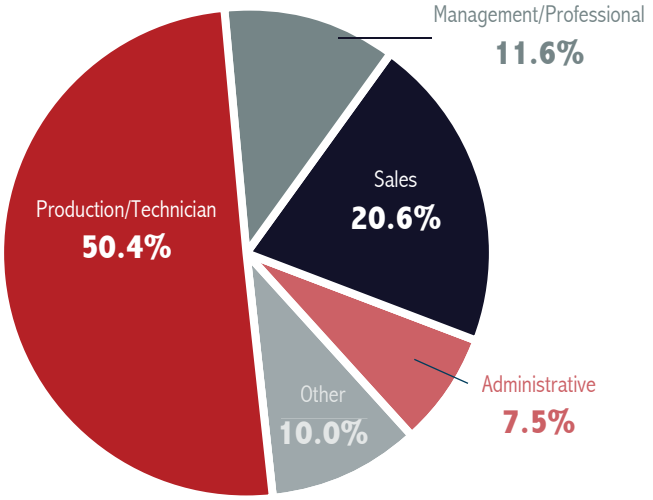
VENDORS AND SUPPLIERS ARE DRAWN FROM WITHIN AND BEYOND OHIO

While Ohio's clean energy industry is largely dependent on in-state customers, its base of vendors and suppliers is less focused within Ohio. Although a majority of these firms (57.9%) are in Ohio, significant percentages come from a mix of other geographies, including a small but significant international connection.



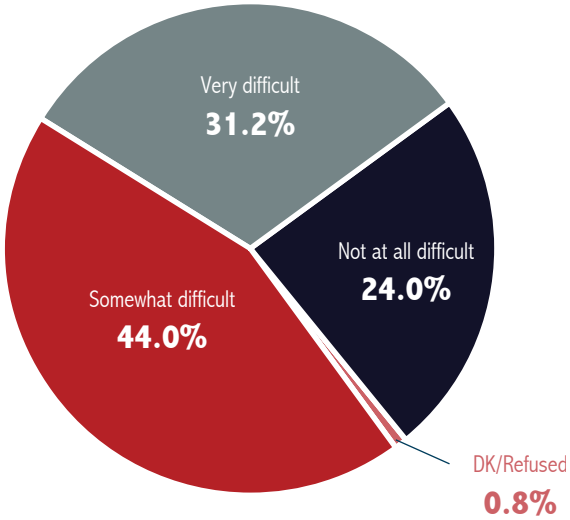
PRODUCTION, TECHNICIAN AND SALES JOBS DOMINATE NEW HIRING IN CLEAN ENERGY

Seven out of 10 new clean energy hires in Ohio over the last year (71%) were in production, technician, and sales positions. This is in keeping with earlier findings about the structure of Ohio's industry, including its majority focus on energy efficiency, deployment of current technology options, and high proportion of firms engaged in installation, maintenance, sales, and distribution.

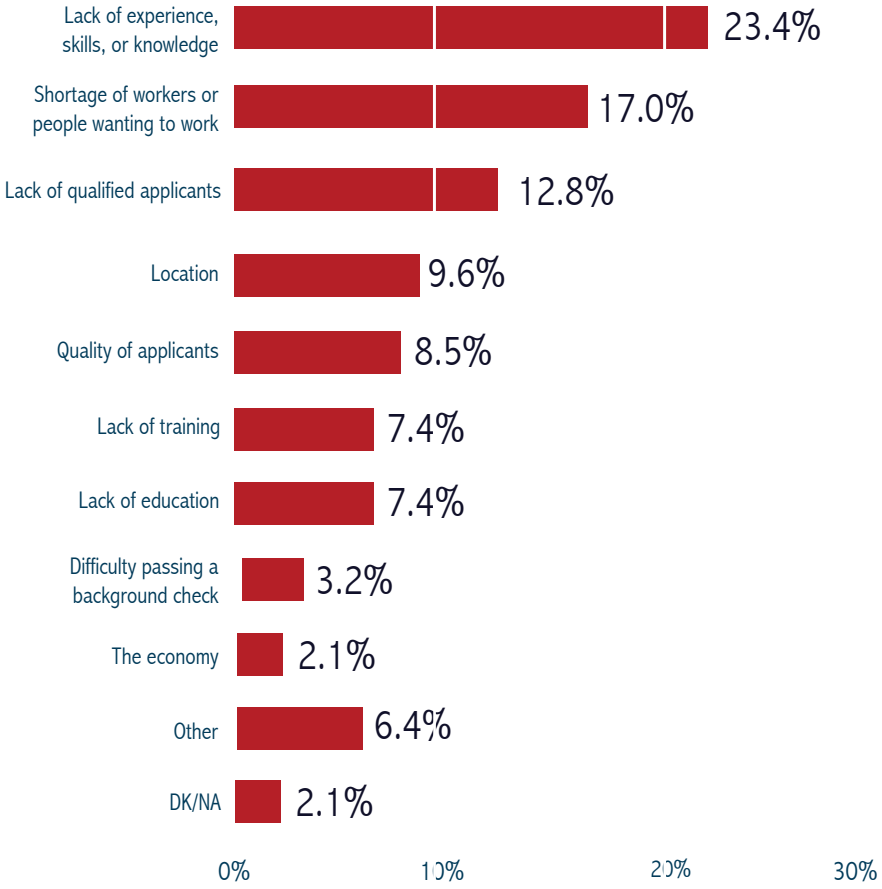


CLEAN ENERGY EMPLOYERS IN OHIO ARE CONCERNED ABOUT TALENT SHORTAGES

In a clear sign that recruiting and hiring issues are a major concern, over three-quarters (75.2%) of Ohio's clean energy employers reported that it is "very difficult" or "somewhat difficult" to find qualified applicants for available jobs. Hiring concerns were prevalent in all sectors of Ohio's industry.

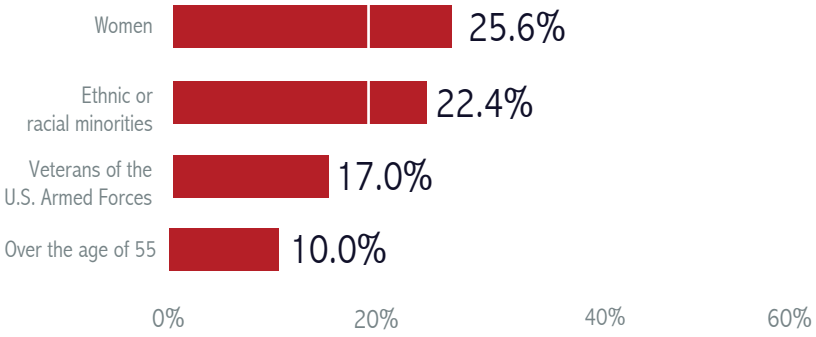


When asked to comment on the reasons for difficulty in filling open positions, Ohio's clean energy business owners listed a variety of different concerns and barriers. Taken together, the barriers to hiring reflected a sense that the existing labor force had an insufficient number of "qualified" candidates, with "qualified" defined by experience, skills, training, education, location, and even "wanting to work."



NEW HIRES BRINGING GREATER DIVERSITY TO OHIO'S CLEAN ENERGY WORKFORCE

More than a quarter of newly hired employees in 2014 were women, and over 20% were people from racial or ethnic minorities.



CASE STUDY: *Saving Ohioans money on energy bills – and creating good jobs*

At Greg Smith's energy efficiency company in Tipp City, there's a jobs boom underway.

"We've gone from one employee less than five years ago – me – to more than 40 employees," Smith said.

At schools and other government buildings, workers from Smith's business, Energy Optimizers, USA, conduct comprehensive building energy-efficiency retrofits. They install new temperature control systems, upgrade lighting, arrange power-purchase agreements with solar energy companies, etc.

Clients quickly realize financial benefits from these types of projects.

In south-central Ohio, for example, an $870,000 project at the Jackson City School District – which teaches 2,500 students at five schools – Energy Optimizers retrofits were expected to lower a $1 million energy bill by close to $140,000 annually. But savings ended up being much higher than that – almost $400,000 was saved after one year.

"If we can save a teacher's salary or two by doing this, it makes sense," Phil Howard, the district's superintendent said, before the full savings from the retrofits were known.

Other successful projects Energy Optimizers has completed include: lighting retrofits at Barleycorn's (a restaurant), the Dayton Children's Hospital, and Aptalis Pharmaceuticals; and energy efficiency upgrades at Miami (Ohio) University and buildings owned by the City of Dayton.

Smart, state-level policies have helped Ohio's economy become more energy efficient and create jobs. Smith said an efficiency standard requiring Ohio's electric utilities to help customers save energy has been particularly helpful. The utilities offer incentives to "buy down" the cost of efficiency upgrades.

"The rebates are driving projects," said Smith, who got his start in energy efficiency while working at Trane, the heating, ventilation, and air-conditioning industry giant.

In addition to utility incentives, Smith has a tight business model. He guarantees buildings his company retrofits will hit projected energy savings – or Smith sends a check for the difference.

Politically, Smith identifies himself as a conservative.

"This is not what people think about when they think about conservatives," he said. "But I think energy efficiency and renewable energy are important for conservatives and independents to take note of."

Smith said promoting energy efficiency and renewable energy through legislation like Ohio's Energy Efficiency Portfolio Standard is in the country's best interest, but that legislation was frozen in 2014, forcing renewable energy and energy efficiency companies to re-think Ohio investments.

In addition to ramping up the RPS in Ohio, Smith said strong implementation of the federal Clean Power Plan in Ohio and other Midwestern states is crucial to sending a strong, clear market signal that will attract innovative, growing companies – and their jobs.

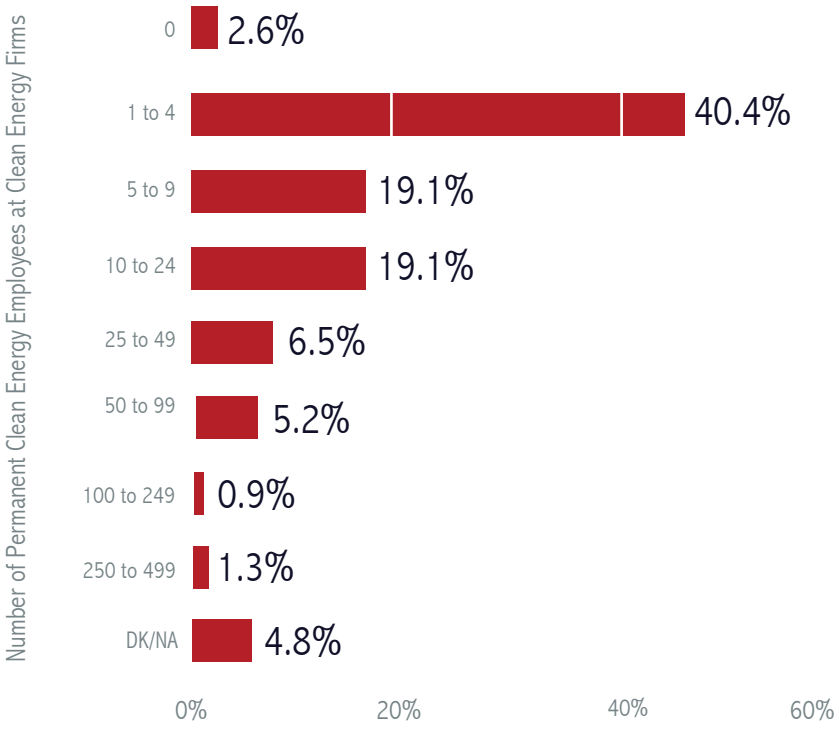
"In my mind, this is the next Industrial Revolution," Smith said.

-Environmental Entrepreneurs

Greg Smith is the founder of Tipp City-based Energy Optimizers. He said strong implementation of the federal Clean Power Plan in Ohio and other Midwestern states is crucial to sending a strong, clear market signal that will attract innovative, growing companies – and their jobs.
(Photo courtesy of Belinda Kenley/Energy Optimizers, USA)

SMALL BUSINESSES ARE THE CLEAN ENERGY LEADERS

In Ohio, clean energy firms are overwhelmingly small employers. 40% of these firms or units have no more than four workers, and 62% have fewer than 10. Fully 80% of Ohio's clean energy enterprises have fewer than 25 workers.



CLEAN ENERGY FIRMS SEE VALUE IN CUSTOMER INCENTIVES AND SUPPORTIVE POLICIES

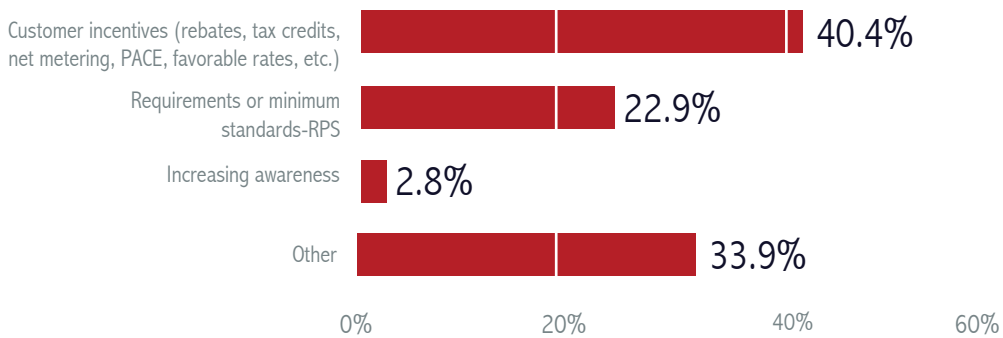
In addition to information on clean energy and transportation employment, the survey also asked firms which government or utility company policies or programs that have the greatest impact in fueling growth in sales and customers. Firms were given an open-ended response to provide their perspective.

A strong plurality of clean energy companies (40.4%) noted direct customer incentives, such as rebates, tax credits, net metering, PACE legislation that provides capital for clean energy investments, favorable credit terms for clean energy loans, and so forth.

Second place (22.9%) went for strong Renewable Portfolio Standards (RPS) and other requirements that encourage or require energy efficient buildings and operations, and the development of more renewable energy options.

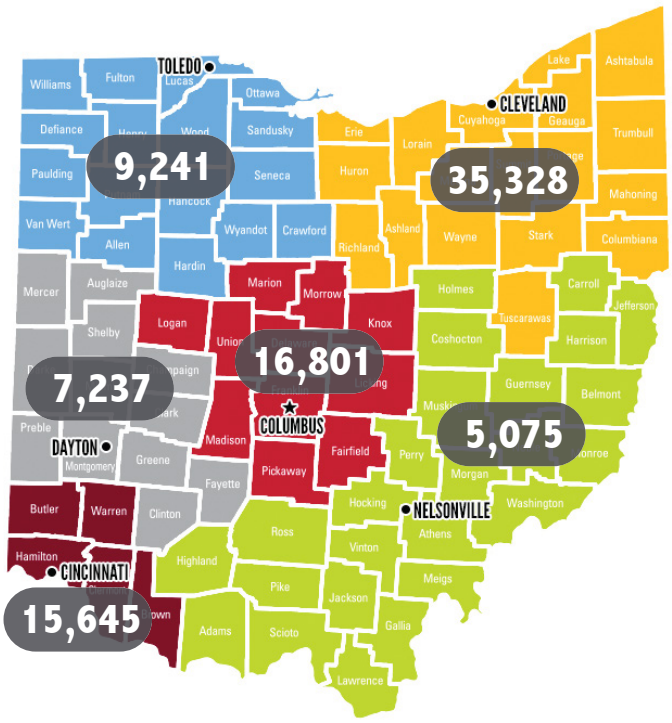
These figures are quite high given that the responses were "unaided," meaning that no choices were offered as prompts, so answers were provided on recall without the benefit of examples. Furthermore, responses were not required, which suggests that these issues are top-of-mind issues for employers in Ohio.

At the same time, support for these two types of clean energy policies are in line with responses in other states, suggesting that industry firms in Ohio have seen the same kind of on-the-ground results from incentives and standards that has been noted throughout the nation.



JOB OPPORTUNITIES IN EVERY PART OF THE STATE

Breaking down clean energy and transportation employment by the six geographic regions established by The JobsOhio Network, this analysis finds that nearly 40 percent of the industry's jobs are located in the Cleveland region. The Columbus and Cincinnati regions make up a significant chunk of the remaining clean energy and transportation jobs in the state – home to nearly 19 percent and 18 percent of workers respectively.



TOTAL=89,326 CLEAN ENERGY JOBS

CONCLUSION

Ohio's clean energy and transportation businesses and workforce are driving economic growth and providing cleaner, more sustainale energy options for communities across the state. However, the significant progress Ohio has made, and the thousands of jobs that have come with it, are currently at risk unless policymakers reinstate the state's successful clean energy standards and level the playing field for additional clean energy development.

Ohio's businesses have the ingenuity, manpower and commitment to make the state a continued leader in manufacturing and developing clean energy and transportation technologies. However, they need clear market signals to invest in these growing industries and provide access to the clean energy sources and advanced transporation options that Ohio homeowners and businesses want.

CASE STUDY: ***After taking hit from S.B. 310, stalwart Ohio clean energy company turns to other states for business***

Three years ago Al Frasz's renewable energy company, Dovetail Solar and Wind, was humming along nicely.

The growing business employed more than 40 workers across Ohio. Dovetail had procurement specialists and a structural engineer in Athens, design teams in both Athens and Cincinnati, a safety manager in Toledo, and a team of installation technicians and project managers widely distributed across Ohio. All these employees were part of an expanding workforce helping to build commercial-scale renewable energy projects.

They collaborated on projects ranging from a solar array at an Air National Guard base in Columbus to a wind turbine in an apple orchard in Lexington. Back in those days, Frasz had plans to hire even more workers.

But then S.B. 310 was passed by the state legislature, and signed into law by Gov. John Kasich. Ohio's successful renewable portfolio standard was suddenly frozen in its tracks. Dovetail's business dropped sharply. The company began losing money. To keep it from going under, Frasz opened new lines of credit. He even pumped a large amount of his own cash into the business.

By 2014, Frasz's business volume was a third of what it used to be, and he had to lay off half his workforce. At its post-S.B.-310 low point, just 22 people worked at Dovetail.

Frasz quickly realized that he had to realign his business model to focus more on where the action was: out-of-state. In addition to its five Ohio locations, Dovetail opened offices in Brighton, Mich., and Asheville, N.C., to take advantage strong renewable policies in those states. "Ohio is putting up roadblocks, while the rest of the world is moving forward," said Frasz, noting that Dovetail has completed more than 350 projects.

More than 95 percent of Dovetail's work used to be in Ohio; that figure has now dropped to less than 60 percent.

But Dovetail's shift in strategy has paid off, and Frasz's business has stabilized. By adding a few more workers, Dovetail's workforce has inched back up to 26 employees. Frasz is looking to add more installers, electricians and logistical workers.

Frasz would prefer to do more projects – and employ more people – closer to home. He said building projects out-of-state is challenging. For example, to compete with local installers, he has to be more aggressive on his margins. Plus, travel, insurance and licensing expenses add to the overhead of working on out-of-state projects, Frasz said.

Even as Gov. Kasich and Ohio's state legislature have seemingly turned their backs on the state's clean energy industry, Dovetail does its best to remain loyal to businesses in its home state. Frasz sources as many of Dovetail's components as possible from manufacturing companies based in Ohio, even though, thanks to S.B. 310, the ultimate destination of more and more of those Made-In-Ohio components is out of state, or even out of the country.

Still, consumer demand remains strong for more renewable energy in Ohio – even though state policy keeps many potential large projects from moving forward, according to Frasz. "Our Ohio residential business is growing as electric rates continue to rise and more homeowners seek to reduce and lock in their energy costs," he said.

Ohio's farmers are also embracing clean energy, he said. "They understand and are not afraid of the technology," Frasz said.

Dovetail has completed more than 25 solar and wind projects on farms, many of which took advantage of incentives offered by the U.S. Department of Agriculture. However, Frasz said USDA renewables programs are underfunded, and when S.B. 310 had a chilling effect on renewables projects on Ohio farms, it was farm families and rural school districts (which often get increased tax revenue from renewables projects) that were hurt the most.

-Environmental Entrepreneurs

Workers install 6,800 watts of PV solar panels on the Kilpatrick Farm in Warren, OH.
(Photo courtesy of Dovetail Solar and Wind)

ACKNOWLEDGEMENTS

E2 would like to thank all the firms that provided information on their clean energy and transportation activities in response to the Clean Jobs Ohio survey. Researchers could not have gathered this data without respondents' willingness to share their valuable time and insights.

We also would like to thank Steve Melink, President, Melink Corporation; Greg Smith, Founder and President, Energy Optimizers, USA; Belinda Kenley, Energy Optimizers, USA; Al Frasz, Dovetail Solar and Wind, for their time and contributions to the company profiles featured in this report.

The publication of this report would not have been possible without the hard work and dedication of the following individuals:

The BW Research Partnership and EARI Team:
Philip Jordan
Kevin Doyle
Josh Williams
Ryan Young
Cynthia Alvarez

Other contributors:
Gail Parson, E2
Jeff Benzak, E2
Christina Angelides, NRDC
Lauren Kubiak, NRDC
Sam Williams, NRDC

DISCLAIMER

The inclusion of any company within this document is not a statement of support by those companies for any of the policy recommendations contained herein.

APPENDIX

Exhibit 1: NAICs Industry Codes Surveyed

NAICS	Description Code
111000	Crop Production
113110	Timber Tract Operations
113310	Logging
221111	Hydroelectric Power Generation
221113	Nuclear Electric Power Generation
221114	Solar Electric Power Generation
221115	Wind Electric Power Generation
221116	Geothermal Electric Power Generation
221117	Biomass Electric Power Generation
221118	Other Electric Power Generation
221122	Electric Power Distribution
221210	Natural Gas Distribution
221330	Steam and Air-Conditioning Supply
236115	New Single-Family Housing Construction (except For-Sale Builders)
236118	Residential Remodelers
237130	Power and Communication Line and Related Structures Construction
237990	Other Heavy and Civil Engineering Construction
238150	Glass and Glazing Contractors
238210	Electrical Contractors and Other Wiring Installation Contractors
238220	Plumbing, Heating, and Air-Conditioning Contractors
238310	Drywall and Insulation Contractors
238990	All Other Specialty Trade Contractors
325193	Ethyl Alcohol Manufacturing
332321	Metal Window and Door Manufacturing
333414	Heating Equipment (except Warm Air Furnaces) Manufacturing
333415	Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing
333611	Turbine and Turbine Generator Set Units Manufacturing
333613	Mechanical Power Transmission Equipment Manufacturing
334413	Semiconductor and Related Device Manufacturing
334512	Automatic Environmental Control Manufacturing for Residential, Commercial, and Appliance Use
335110	Electric Lamp Bulb and Part Manufacturing
335121	Residential Electric Lighting Fixture Manufacturing
335122	Commercial, Industrial, and Institutional Electric Lighting Fixture Manufacturing
335221	Household Cooking Appliance Manufacturing
335222	Household Refrigerator and Home Freezer Manufacturing
335224	Household Laundry Equipment Manufacturing
335228	Other Major Household Appliance Manufacturing
335311	Power, Distribution, and Specialty Transformer Manufacturing
335312	Motor and Generator Manufacturing
335911	Storage Battery Manufacturing
335999	All Other Miscellaneous Electrical Equipment and Component Manufacturing
336111	Automobile Manufacturing
336320	Motor Vehicle Electrical and Electronic Equipment Manufacturing
423610	Electrical Apparatus and Equipment, Wiring Supplies, and Related Equipment Merchant Wholesalers
423720	Plumbing and Heating Equipment and Supplies (Hydronics) Merchant Wholesalers
423730	Warm Air Heating and Air-Conditioning Equipment and Supplies Merchant Wholesalers
511210	Software Publishers
541310	Architectural Services
541330	Engineering Services
541350	Building Inspection Services
541370	Surveying and Mapping (except Geophysical) Services
541511	Custom Computer Programming Services
541512	Computer Systems Design Services
541614	Process, Physical Distribution, and Logistics Consulting Services
541620	Environmental Consulting Services
541690	Other Scientific and Technical Consulting Services
541711	Research and Development in Biotechnology
541712	Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology)
811111	General Automotive Repair
811212	Computer and Office Machine Repair and Maintenance

ENDNOTES

[1] Utility self-reported energy efficiency data for program years 2009-2014, derived from annual status reports available via the Public Utility Commission of Ohio's online docketing system at www.dis.puc.state.oh.us.

[2] The Bureau of Labor Statistics defines an establishment as the physical location of a certain economic activity, such as a store, office, or manufacturing facility. An establishment generally produces a single good or provides a single service. An enterprise (a private business, government, or nonprofit organization) can consist of a single establishment or multiple establishments.

[3] The Pew Charitable Trusts, Clean Economy Rising: Manufacturing Powers Clean Energy in Ohio, January 2015, available at http://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2015/01/manufacturing-powers-clean-energy-in-ohio, accessed on January 25, 2015.

[4] Dan Gearino, "Future of Wind Farms in Ohio is Cloudy: State Regulatory Changes and Uncertainty over a Federal Tax Credit Have Clouded the Future," The Columbus Dispatch, December 21, 2014, available at http://www.dispatch.com/content/stories/business/2014/12/21/its-an-ill-wind.html, accessed on January 25, 2015.

[5] Kathiann M. Kowalski, "Amid Energy Law Freeze, Ohio Solar Market Stalls," Midwest Energy News, September 18, 2014, available at http://www.midwestenergynews.com/2014/09/18/amid-energy-law-freeze-ohio-solar-market-stalls/, accessed on January 25, 2015.

[6] Ibid.

[7] Kathiann M. Kowalski, "Industry: Setback changes will end new wind farms in Ohio," Midwest Energy News, June 19, 2014, available at http://www.midwestenergynews.com/2014/06/19/industry-setback-changes-will-end-new-wind-farms-in-ohio/, accessed on January 25, 2015.

[8] Karen Kasler, "Researchers: Renewable Energy Freeze Has Chilled Industry," Ohio Public Radio and Television, January 15, 2015, available at http://wosu.org/2012/news/2015/01/15/researchers-renewable-energy-freeze-chilled-industry/, accessed on January 25, 2015.

[9] Ohio Department of Job and Family Services, Office of Workforce Development, and Bureau of Labor Market Information, "Labor Market Review," November 2014, available at http://ohiolmi.com/ces/LMR.pdf, accessed on January 24, 2015.

[10] EMSI Class of Worker 2014.3.

[11] Id.

[12] Vermont: http://publicservice.vermont.gov/sites/psd/files/Announcements/Vermont%20Clean%20Energy%20Industry%20Report%20FINAL.pdf; Massachusetts: http://www.masscec.com/content/2014-clean-energy-industry-report; Illinois: http://www.cleanjobsillinois.com/#welcome; Florida: http://cleanjobsflorida.com/; Missouri: http://www.cleanjobsmissouri.com/; Pennsylvania: http://www.cleanjobspa.com/.

[13] American Council for an Energy Efficient Economy 2014 State Scorecard (http://database.aceee.org/state/ohio)

[14] AEP Ohio, Volume 1: 2015 to 2019, Energy Efficiency/Peak Demand Reduction (EE/PRR) Action Plan, March 26, 2015, available at http://www.aceee.org/files/pdf/aep-ohio-2015-2017-ee-pdr-plan.pdf, accessed on 2/17/2015.

[15] Alternative transportation includes electric vehicles and electric rail.

[16] EMSI Complete Employment, 2014.3