

— Survey Results —

# CLEAN JOBS PENNSYLVANIA

*Sizing Up Pennsylvania's Clean Energy Jobs Base and its Potential*

Presented by



## ABOUT THE PARTNERS



**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).



The Keystone Energy Efficiency Alliance (KEEA) is a non-profit, tax-exempt 501(c)(6) corporation dedicated to promoting the energy efficiency and renewable energy industries in Pennsylvania. KEEA advocates on behalf of energy efficiency and renewable energy professionals on the local, state, and federal levels. By representing the interests of the clean energy industry in Pennsylvania, KEEA is growing the market for energy efficiency and helping the Keystone State secure a prosperous, sustainable tomorrow.

## 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 Florida, 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.

## ACKNOWLEDGEMENTS

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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.

# INTRODUCTION

Pennsylvania is a powerhouse of American manufacturing and innovation. It has a skilled and talented workforce and world-class universities and technical colleges to train the next generation of leaders to drive its economy forward in the decades to come.

The state is leveraging these competitive advantages to build a strong clean energy economy that is creating new jobs and economic growth in every part of the state. As this report finds, the state's clean energy industry already employs more than 57,000 workers at over 4,200 businesses. These workers are leveraging their know-how and ingenuity to support the build out of a clean energy value chain across Pennsylvania — from scientists and researchers who are developing new clean energy technologies; to manufacturing line workers producing energy-efficient appliances, wind turbine motors and blades, and other parts and components; to engineers, construction workers, and administrative staff that are supporting the installation of clean energy products and services.

What's clear is that this industry is large and poised for significant growth in 2015 and beyond if Pennsylvania's governor, state legislators and other policymakers continue to support and strengthen existing policies that drive clean energy development — and the jobs that come with it.

The state has achieved impressive clean energy growth as a result of its policies, with employment in the industry growing at 4% last year and 8.5% projected next year. While Pennsylvania has a strong foundation to build off of, important policy updates are needed to support

continued job creation and economic development in the industry, consistent with what we see nationally.

Pennsylvania Act 129, the state's energy efficiency law which was enacted in 2008 and requires the state's major electric distributing companies to meet savings targets established by the Public Utilities Commission, has delivered over \$750 million in energy bills savings to date — \$2.40 in benefits for every \$1 customers pay to support energy efficiency programs.<sup>1</sup> The state's own analysis shows that Pennsylvania could capture an additional 27% reduction in energy use over the next ten years by deploying cost-effective energy efficiency technologies.<sup>2</sup> Doing so would help homeowners, businesses, and manufacturers use energy smarter and reap big savings.

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**ENERGY EFFICIENCY.**

The state's renewable energy portfolio standard, which requires that 18% of electric power come from clean energy sources like wind and solar by 2021, has also helped to grow the industry, while providing clean energy options to Pennsylvania businesses and homeowners. More than 1,300 megawatts of wind power at over 25 wind farms and nearly 240 MW of solar — which combined is enough energy to power the equivalent of 330,000 homes — has been installed to date and has brought over \$2.8 billion in capital investment into the state.<sup>3,4</sup>

Pennsylvania's leaders need to act quickly to strengthen and expand these policies if they care about further economic growth and job creation. Luckily, they'll have the opportunity to do just that with the PUC's upcoming proceedings concerning the next phase of Act 129, which will set new energy efficiency savings targets for the state for 2016 and beyond.

The recent release of the federal Clean Power Plan, which will cut carbon pollution by 32 percent by 2030 in Pennsylvania in part by increasing energy efficiency and renewable energy, will also offer the state an opportunity to enact policies to help the state live up to its clean energy potential. Recent analysis conducted by the Natural Resources Defense Council (NRDC) finds that ramping up investments in energy efficiency alone to meet the plan would yield more than 5,100 jobs and save families and businesses more than \$450 million by 2020.<sup>5</sup>

Pennsylvania only has to look to other states like Massachusetts and Illinois for proof that smart policies can drive clean energy growth and create much-needed jobs. As a result of its clean energy policies and programs, Massachusetts has added more than 28,000 jobs since 2010 and now employs over 88,000 workers in its clean energy industries.<sup>6</sup> Illinois's energy efficiency and renewable energy policies have also driven growth with over 60,000 clean energy workers in its energy efficiency sector alone, and more than 96,000 clean energy workers across all technologies.<sup>7</sup>

The Keystone state can create thousands of more jobs too if its policymakers and regulators provide the certainty and support that clean energy businesses and workers need to ramp up development. Fortunately, the state has a solid base of clean energy businesses and jobs on which to build.

Relying on databases and survey data from Pennsylvania employers, the analysis to follow looks at the size and scope of the state's clean energy economy in an effort to better understand the employment impacts of existing clean energy growth and what policies will be needed to support further progress. The companies and workers profiled in this report provide just a few examples of how the state's workforce are driving clean energy solutions, from energy efficiency building retrofits to solar power systems, all across the state. This growth is not only spurring more jobs and investments in the state, but a healthier future for generations to come.

### CASE STUDY: Honeywell helping drive energy efficiency savings in Pennsylvania homes, businesses

*Honeywell, the Fortune 100 technology company, works in industries ranging from advanced avionics to control technologies for buildings, homes and manufacturing. But a little known fact is that over half of the products and services the company offers help drive energy efficiency. In fact, one specific business that focuses almost exclusively on intelligent energy management is Honeywell Building Solutions.*

*The Building Solutions business has both an energy services arm that develops and delivers projects that provide guaranteed energy savings in facilities and on campuses, and a smart grid services team that helps utilities connect with their commercial and residential customers to reduce energy use and create a smarter, more stable electrical grid.*

*Act 129, passed in 2008, provides the foundation for energy-efficiency and conservation programs in Pennsylvania. These in turn provide savings to homeowners and businesses, help create local jobs and diversify energy supply in the state.*

*Organizations such as Honeywell, which has approximately 1,200 employees in the Keystone State, are gravitating towards that market. Honeywell alone has completed almost 60 guaranteed efficiency projects in the state since 2000, work that is expected to deliver more than \$226 million in energy and operating savings.*



*Supportive energy-efficiency policies help create the environment for both innovation and savings. Together, the state, utilities and technology providers can address the tremendous untapped potential for efficiency gains in Pennsylvania.*

**--Environmental Entrepreneurs**



# EXECUTIVE SUMMARY

Defined as including energy efficiency, renewable energy sources, alternative transportation and greenhouse gas (GHG) management and accounting, the clean energy industry is a source of good jobs for tens of thousands of Pennsylvanians.

In 2014, clean energy firms in Pennsylvania supported 57,330 workers at 4,269 businesses and other establishments. This was an increase of 2,423 jobs over the 2013 total, a 4.4% improvement. Industry employers expect to add 4,846 new workers by the autumn of 2015, for an exceptionally strong employment growth rate of 8.5%.

Energy efficiency work is the largest part of Pennsylvania's clean energy industry. 37,468 workers (65.4% of the industry total) are employed in improving the efficiency of commercial and residential facilities, developing better energy storage options, and building "smart grid" innovations in the state.

Pennsylvania companies in solar energy, wind power, biofuels, combined heat and power and other renewable energy sources supported 13,345 workers in 2014, 23.3% of the total clean energy workforce. Work in biofuels was the largest renewable energy sector, with 5,231 jobs (39% of the renewables total).

Although the renewables workforce in the state is significant, it may be smaller than could be expected. By comparison, for example, the smaller state of

Massachusetts had 20,980 renewable energy jobs in 2014 - 7,635 more than the Pennsylvania total.

Beyond energy efficiency and renewable power firms, an additional 6,517 workers (11.4% of the clean energy total) were employed at firms focused on GHG management, alternative transportation and other activities.

In-state consumers and businesses are the clean energy industry's largest group of customers. Sixty-seven percent of Pennsylvania companies report that the majority of their customers are from Pennsylvania. When seeking vendors and suppliers, however, firms in the industry are less locally-focused. Respondents were evenly split as to where the majority of their vendors or suppliers were located, whether in state or out of state.

Pennsylvania companies express some concern about filling their jobs in the future. Already, 80% of businesses say that it is "difficult" or "very difficult" to find qualified applicants for available positions. Nonetheless, hiring in 2014 was strong, with 55% of new hires going to technician positions and production staff, and the rest divided among management, professional, administrative, sales, and other positions.

Clean energy business owners in Pennsylvania are keenly aware that supportive policies and programs could help generate more customers, increase revenue, and support additional job creation. Specifically, firms point to the proven effectiveness of supportive regulations and programs, such as minimum clean energy standards and the state's previous "Sunshine Program" which supported home solar installations, and incentives that can help customers access clean energy options in the short term as clean energy markets develop as the actions with the greatest potential impact to drive industry growth.

Overall in 2014, Pennsylvania's clean energy industry is in a good position to serve customers and expand payrolls in 2015 and beyond. With effective policies and programs aimed at helping Pennsylvanians choose a clean energy future, the industry could grow even more, providing thousands of additional jobs in the state.

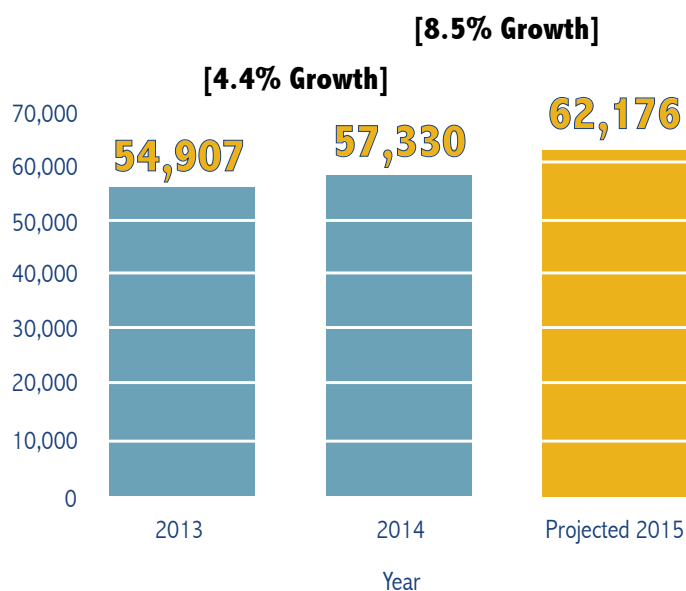
# MAJOR FINDINGS

## PENNSYLVANIA HAS MORE THAN 57,000 CLEAN ENERGY JOBS WITH STRONG GROWTH AHEAD

Pennsylvania's clean energy industry supports 57,330 workers in 2014, an increase of 2,423 jobs (4.4%) from 2013. Companies in the state are bullish on the industry's future. Projected employment growth of 8.5% is expected to add nearly 5,000 workers to Pennsylvania's clean energy workforce by the fall of 2015.

## ENERGY EFFICIENCY SUPPORTS MORE THAN 37,000 PENNSYLVANIA JOBS — IT COULD BE MORE

Pennsylvania is home to 37,468 workers who are improving the energy efficiency of commercial and residential facilities, creating "smart grid" energy solutions, and developing innovations in energy storage. This is 65.4% of the state's clean energy workforce, demonstrating the dominant job-supporting role of energy efficiency.



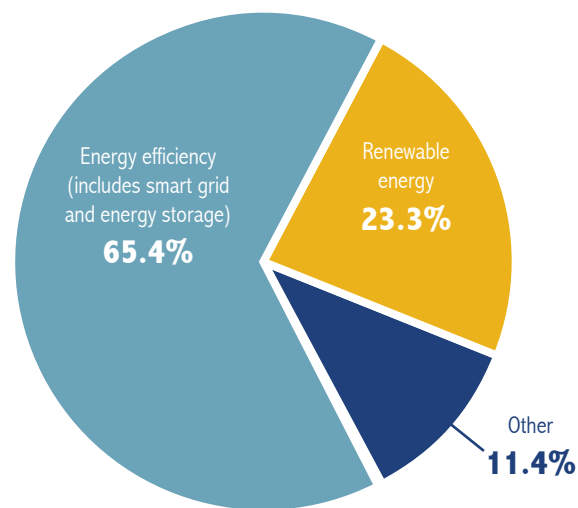
While this is an impressive number, the state could almost certainly support significantly more jobs if it undertook policies and programs that improved its national energy efficiency ranking from the American Council for an Energy Efficient Economy (ACEEE). For example, number one ranked Massachusetts (with a much smaller population than Pennsylvania) has 65,182 energy efficiency jobs in 2014. Pennsylvania is ranked only twentieth among the states by ACEEE and has much smaller targets in place to achieve an average of 2.3% cumulatively from 2014-2016.<sup>8</sup>

## PENNSYLVANIA HAS ALMOST 14,000 JOBS IN RENEWABLE ENERGY AND RELATED SECTORS

The Keystone State's renewable energy companies provide support for 13,345 workers (23.3% of the industry total). Of the 13,345 total, the largest group (5,231) works in bioenergy ) which includes woody and non-woody biomass, notably wood and pellet stoves), followed by solar power (3,897), combined heat and power (1,281), and wind energy (1,207). The remaining 1,729 renewable energy workers are spread among a variety of other renewable sources and activities.

Pennsylvania's clean energy industry also includes 6,517 workers (11.4% of the industry total) who work at employers focused on greenhouse gas emission accounting and management (including sequestration), alternative transportation, and other activities.

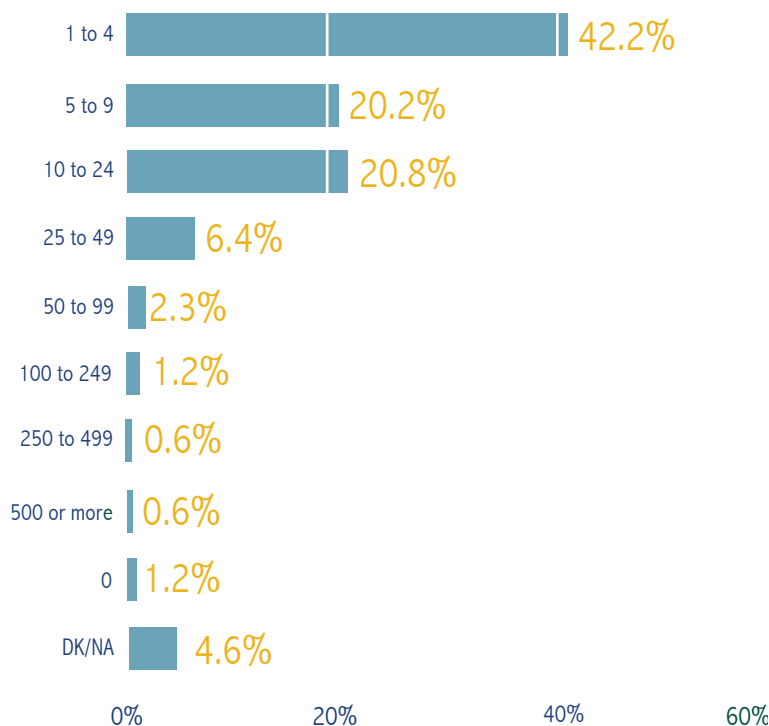
A total of 19,862 Pennsylvania workers are employed in these combined sectors.



## OVER 80% OF CLEAN ENERGY EMPLOYERS HAVE FEWER THAN 25 WORKERS

Pennsylvania's clean energy industry is overwhelmingly dominated by very small businesses. In fact, 62.4% of firms have fewer than 10 employees devoted to the clean energy portion of their business, and most of those have less than five. A full 83.2% of firms in the cluster have fewer than 25 clean energy workers.

Number of Permanent Clean Energy Employees at Clean Energy Firms





**CASE STUDY: Pittsburgh wind company's four Keystone State projects have created 400-plus jobs**

*"We moved our headquarters to Pittsburgh because it was a great place to do business," recalls Jim Spencer, CEO at EverPower Wind Holdings. Founded in 2002 in New York, the firm began placing employees in Pennsylvania in 2008 when it began operating projects along the wind-rich Allegheny ridge in the Southwest part of the state. Now, EverPower employs 36 people in its Pittsburgh headquarters and is the largest owner operator of wind farms in the Keystone State, with 307 MW in operation. The firm's four Pennsylvania projects have created more than 400 construction jobs, 24 permanent jobs and more than \$1 million in revenue to Pennsylvania towns, counties and schools each year.*

*"Community engagement is central to wind development," explains Kevin Sheen, Senior Director of Development and Public Relations. Before developing a wind farm, EverPower staff will attend town hall meetings, hold information sessions, and other events to engage the local community on the project. Schools can be big beneficiaries of wind farms; for example EverPower's 139.4 MW Twin Ridges Farm in Somerset County brought \$223,000 in annual payments to local townships; \$93,000 of which was directed to the surrounding school districts. But it's not just local schools that see the values of wind. While landowner payments can vary — landowners at EverPower's PA wind farms can earn \$15,000-\$20,000 per year by housing a turbine on their property. Small farms often operate on the margin, with revenue varying each year based on economic forces and commodity prices. Despite annual variability, one thing remains certain: the wind will blow, and these farmers will earn income as a result. For small farmers this revenue represents an important component of their annual revenue and has helped many to upgraded equipment or even keep their farms. State level policies like the Alternative Energy Portfolio Standard provide important incentives to develop wind energy projects in Pennsylvania. The federal Production Tax Credit (PTC) provided a per-kilowatt-hour incentive to developers of wind power, helped spur the initial growth of the industry. However, its expiration in 2013, and uncertain future, created boom-and-bust cycles for the industry. Moving forward, EverPower hopes to grow under stable, long-term federal policy, so it can continue to provide clean energy jobs to Pennsylvanians.*

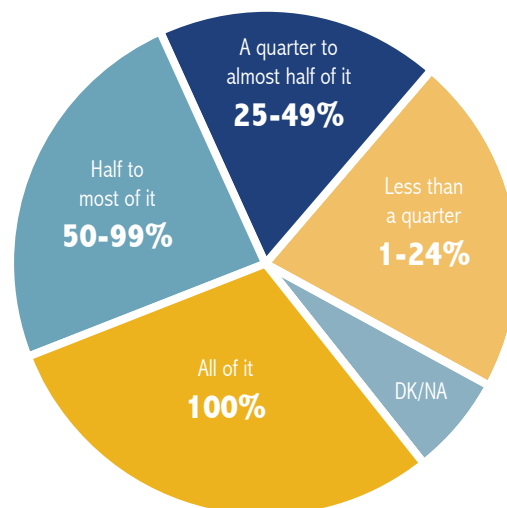
**--Environmental Entrepreneurs**



## CLEAN ENERGY MEANS REVENUE FOR PENNSYLVANIA COMPANIES

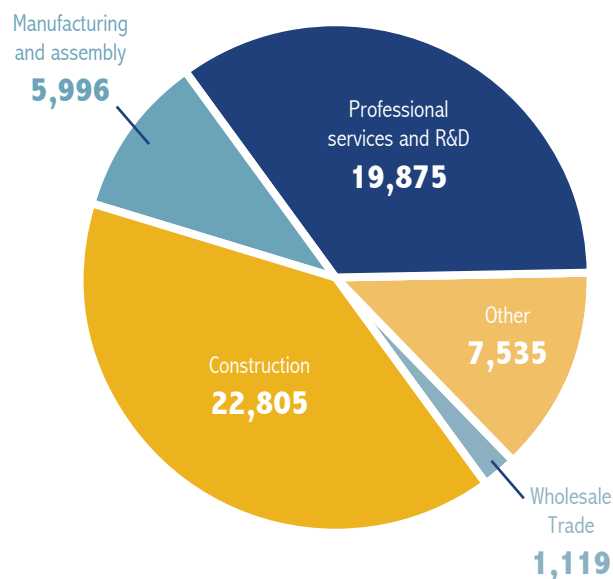
Clean energy work — and the revenue that comes with it — is not limited to companies that engage only in energy efficiency and renewable power. Firms in many different parts of the state's economy depend on clean energy sales to support a portion of their business.

In Pennsylvania, 54% of clean energy firms earn from half to all of their revenue from the clean energy part of their business, and 40% earn from 1-49% of their revenue from their clean energy offerings.



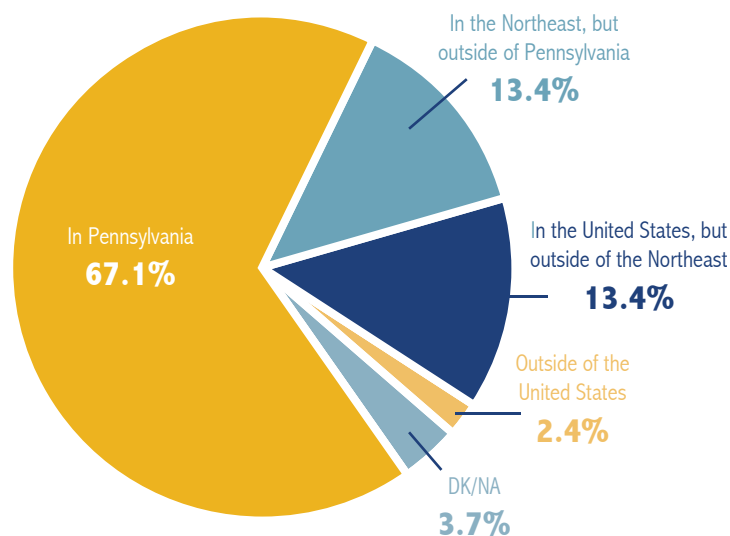
## CLEAN ENERGY IN PENNSYLVANIA OFFERS JOBS AT ALL LEVELS OF THE SUPPLY CHAIN

Pennsylvania's clean energy industry has an unexpectedly diverse workforce, with tradespeople and professionals in all parts of the cluster's supply chain. While 22,805 workers (39.8%) are engaged in construction (roughly mirroring the percentage of firms in that activity); the Keystone State is also home to a vibrant community of 19,875 workers offering professional services and research and development. The state also supports a relatively healthy number of manufacturing and assembly workers (5,996), and those in other supply chain activities.



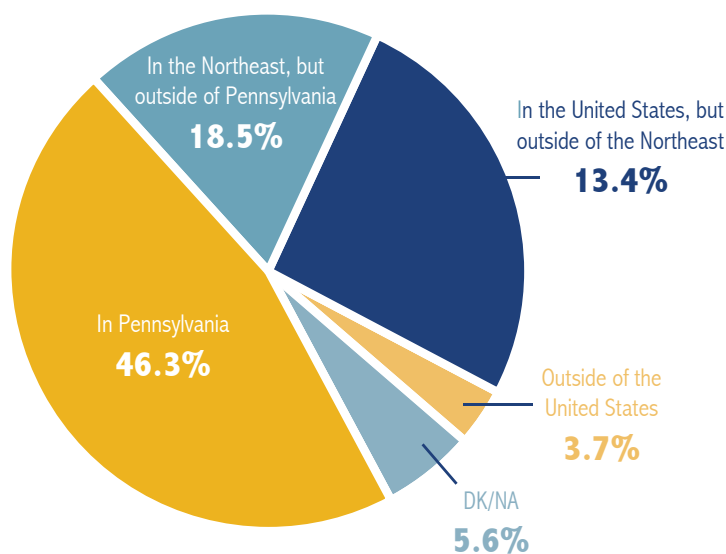
## PENNSYLVANIA'S CLEAN ENERGY FIRMS DEPEND ON IN-STATE CUSTOMERS

Since Pennsylvania's clean energy industry is focused largely on energy efficiency and installation of renewables like solar and biofuels, one would expect to see a large local and regional customer base. And, this is exactly what the study found. 80% of the majority of the industry's customers were in Pennsylvania or the Northeast region.



## THE INDUSTRY'S VENDORS AND SUPPLIERS ARE EVENLY SPLIT BETWEEN IN-STATE AND OUT-OF-STATE LOCATIONS

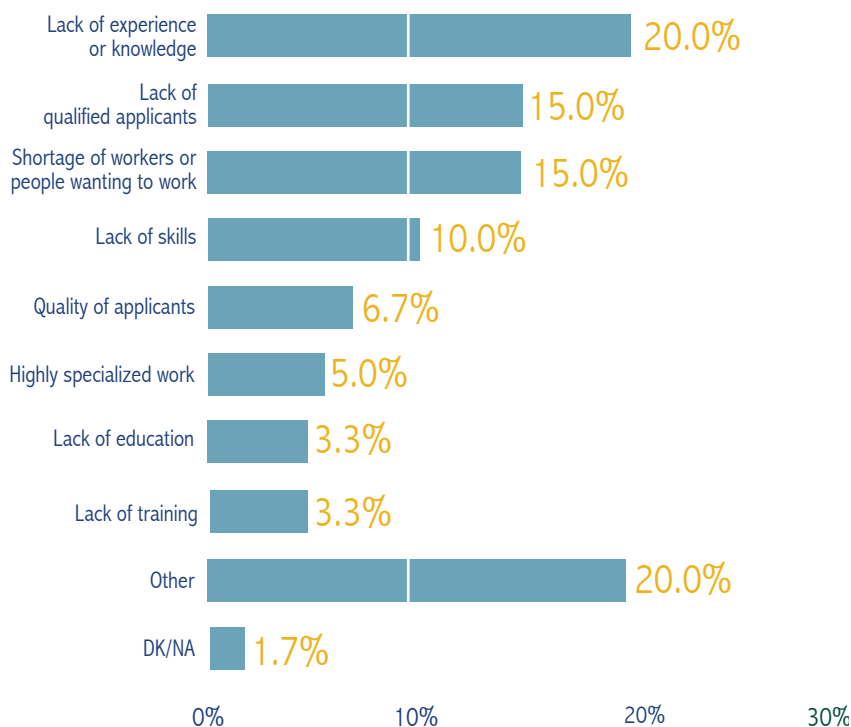
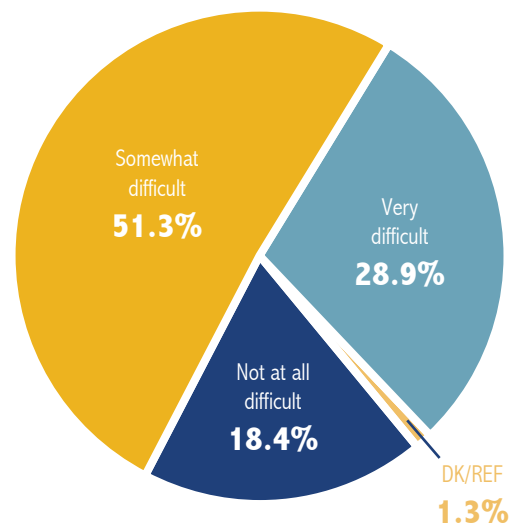
While the state's clean energy companies largely draw revenue from in-state customers, a significant portion of those dollars leave the state because firms engage with vendors and suppliers in other parts of the Northeast and other regions of the United States. This suggests that there are opportunities for Pennsylvania firms to increase their own sales by identifying goods and services that clean energy firms are currently buying out-of-state.



## CLEAN ENERGY EMPLOYERS REPORT DIFFICULTY FINDING QUALIFIED WORKERS

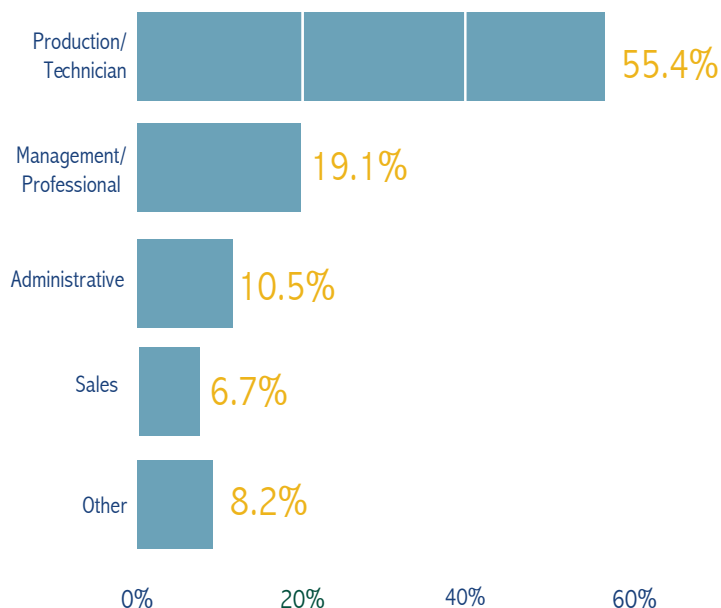
More than 80% of Pennsylvania's clean energy firms say that it is "somewhat difficult" or "very difficult" to find qualified applicants to fill their available job openings. These levels of difficulty are slightly above those of clean energy employers in other surveyed states. The reasons for difficulty in hiring included perceived gaps in skills, training, education, experience, motivation, and sheer numbers, but the result was the same — concern about recruiting and hiring a qualified clean energy workforce.

Only a small fraction of employers selected "difficulty finding workers" as one of the top barriers to future company growth, suggesting that firms are finding "work-arounds" to recruit, hire and retain workers. As sales and customers grow, however, workforce issues will move higher on the list of industry priorities.



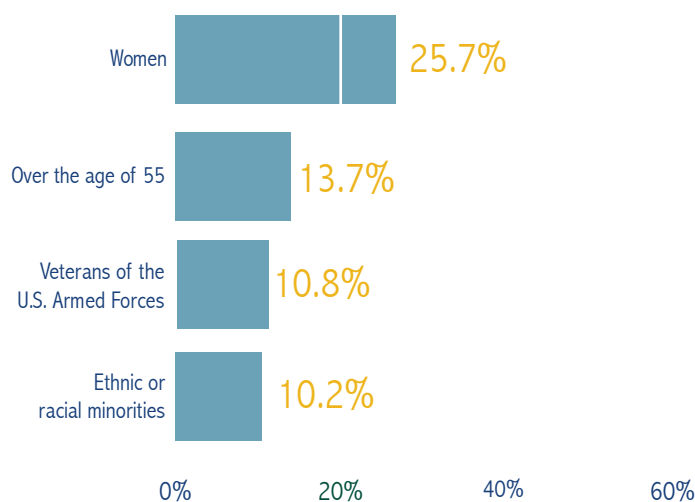
## OVER HALF OF NEW HIRES ARE TECHNICIANS AND PRODUCTION STAFF

Over the last twelve months, clean energy firms in Pennsylvania have hired hundreds of workers in all occupational categories. Production staff and technicians have been the majority of new hires.



## WOMEN ARE A GROWING PART OF PENNSYLVANIA'S CLEAN ENERGY WORKFORCE

The clean energy workforce in Pennsylvania is becoming more diverse, though hiring is still less diverse than the overall demographic profile of the Keystone State. In 2014, 25.7% of new hires were women. Employers also drew strongly from the ranks of minority groups, veterans, and those over the age of 55.



## CASE STUDY: Lowry EcoSolutions finds opportunity in energy efficiency

Eric Lowry personifies many clean energy entrepreneurs—he made an opportunity for himself in the middle of the recession helping homeowners reduce their energy bills and access clean energy options. Lowry, a civil engineer for over twenty years, found himself out of work in 2009. When he couldn't find a new job, he started looking to perfect time: when Pennsylvania had "very little competition and lots of leaky old houses." Lowry founded home energy audit company Lowry EcoSolutions LLC and has been working ever since to help clients use energy smarter.

The biggest challenges Lowry has faced breaking into the industry are his clients' misconceptions. Most homeowners don't have the understanding of what simple things can be done to make their homes more energy efficient and comfortable, he says. Further, Lowry has found that many homeowners believe that energy audits are expensive and don't yield much savings when, in fact, the return on investment of an energy audit can be realized often within months. Recently, Lowry has seen homeowners become more educated about energy efficiency and begin to "realize hiring me is pretty small potatoes dollar wise and the return is much, much better."

As customers realize the benefits of Lowry EcoSolutions, Lowry hears more success stories from satisfied clients. Recently, a former client called him to let him know that Lowry EcoSolutions had helped him cut his home utility bills by 60-70% per month. Despite his success in saving his clients energy and money, Lowry recognizes that Pennsylvania and the nation could do a better job incentivizing energy efficiency, and believes that more people would take advantage of energy audits if there were better policies in place.

--Environmental Entrepreneurs

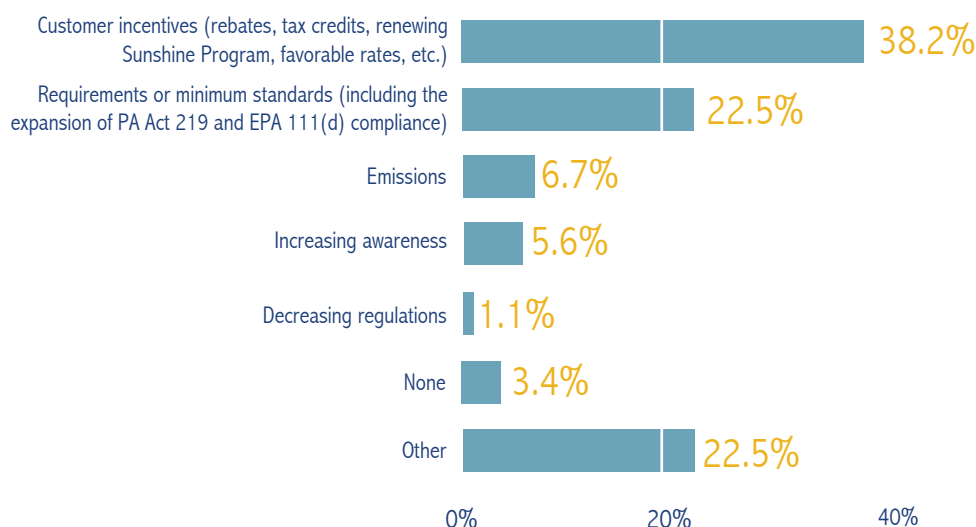




## SUPPORTIVE POLICIES COULD HELP PENNSYLVANIA FIRMS CREATE MORE JOBS

Clean energy business owners selected two categories of policy and program support that would have “the greatest potential positive impact” on the industry. The largest number (38.2%) called for improved incentives for individual and business customers to choose energy efficiency and renewable power. Suggested incentives include rebates, tax credits, favorable rates for renewables, and renewing Pennsylvania’s “Sunshine Program.”

A significant number (22.5%) called for energy related requirements or minimum standards to help drive customer choice and industry growth. Many specifically referred to the need to expand Pennsylvania Act 129.



## JOB OPPORTUNITIES IN EVERY PART OF THE STATE

One-third of Pennsylvania’s clean energy firms and workers are located in the Greater Philadelphia Metropolitan Statistical Area (MSA). The Greater Pittsburgh MSA is home to over 21% of the state’s clean energy employment.

Region	Clean Energy Employment	Percentage of State Clean Energy Employment
Philadelphia	17,329	30.2%
Pittsburgh	12,154	21.2%
Rest of Pennsylvania	27,847	48.6%
Total	57,330	100%



## METHODOLOGY

### Industry Survey Methodology

The data in this report was derived from a comprehensive survey of business establishments in Pennsylvania conducted between September 4 and October 28, 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 Massachusetts, Illinois, Vermont, Missouri, Iowa, Florida, and other states, as well as several national analyses.

For this study, the research team placed more than 9,000 telephone calls and sent 1,200 emails to employers. The combined margin of error for the survey effort was approximately  $\pm 3.27$  at a 95% confidence interval. The survey yielded responses from 867 employers in Pennsylvania and averaged 14 minutes in length.

### “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 337 businesses.

### “Unknown Universe”

The “unknown universe” included firms not previously identified by researchers as clean energy companies. This database was drawn from BLS NAICS industries and InfoUSA businesses. 841 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  $\pm 3.32$  at a confidence interval of 95%. Of the firms that provided information, 107 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 primarily 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.