CLEAN JOBS PENNSYLVANIA[1]

PENNSYLVANIA'S KEY TO ECONOMIC RECOVERY

2020

In the wake of America's pandemic-induced economic crisis, Pennsylvania's clean energy economy—and the potential growth it holds—has become more critical than ever to the state's overall economic health in 2020 and beyond.

In 2019, clean energy jobs in Pennsylvania increased for the seventh straight year since E2 began releasing annual clean energy jobs reports in the state, growing to nearly 94,000 workers statewide before the effects of the coronavirus outbreak impacted the nation's economy. A regional and national leader in clean energy jobs, Pennsylvania ranked just outside the top ten (11th) for total clean energy jobs among all 50 states and the District of Columbia for the third year in a row. Since 2017, the state has added more new jobs (8,253) than six of the current top ten states and now trails No. 10 Virginia by fewer than 3,500 workers.

Despite its large workforce size, recent years of strong growth and consistent high performance across clean technologies, Pennsylvania's clean economy is underperforming its potential, as the state's clean energy workforce still makes up a lower share of total statewide jobs than the national average. Growth in recent years has been driven primarily by energy efficiency, solar energy, and grid modernization—high growth areas for the future that will be important as the state's economy faces its toughest test as the nation reels and rebuilds after the impact of COVID-19 economic shutdowns.

E2's Clean Jobs Pennsylvania 2020 details the size, scope, and diversity of this important employment sector, the troubles it is currently facing due to the pandemic, and how focusing recovery policies on clean energy can get struggling Pennsylvania workers and businesses back on track and the state's economy up and running again for the long run.

The Importance of Policy

As Pennsylvania leaders continue to assess policy options for economic recovery in the wake of COVID-19, this report makes clear perhaps more than at any other time before—Pennsylvania's clean energy sector is integral to building the state back better, and faster, from the throes of an economic recession.

As with most other sectors, Pennsylvania's clean energy sector has suffered some of the largest losses across the country. But unlike many sectors, clean energy offers Pennsylvanians an opportunity not only to replace the jobs that have been lost, but to create thousands of new jobs as well, and transition workers who lost jobs because of the crisis. No industry is better suited to getting Pennsylvanians back to work—and quickly—than the industry that was adding jobs to the economy five times faster than statewide employment before the pandemic-fueled crisis.

Now is not the time for Pennsylvania's leaders to overlook clean energy. Now is the time to double down on the potential that the future energy economy can bring to the state—creating new good-paying jobs, driving billions in investments back into state and local businesses, building equity and economic opportunities in urban and rural communities, making energy more affordable for families, reducing pollution, and positioning Pennsylvania as a national hub for the energy technologies that will drive the global economy in the 21st century.

State lawmakers should continue to work to deliver the promise of clean energy to their communities by expanding energy efficiency, renewable energy, and the electrification of transportation and buildings. From increasing the state's renewable energy standards and unlocking community solar to advancing electric vehicle adoption and continuing to address carbon pollution in the electric power sector through the Regional Greenhouse Gas Initiative (RGGI), Pennsylvania lawmakers and agencies must prioritize and accelerate clean energy's continued expansion across the state.

KEY FINDINGS

Q4 2019

#11
PENNSYLVANIA WAS HOME TO THE 11TH MOST CLEAN ENERGY JOBS AMONG ALL 50 STATES AND D.C.

9.6%
JOB GROWTH SINCE 2017, 5 TIMES FASTER THAN OVERALL STATE-WIDE EMPLOYMENT GROWTH (2%)

2X
CLEAN ENERGY EMPLOYED 2 TIMES MORE WORKERS THAN FOSSIL FUELS IN 2019

SINCE COVID-19

18K
PENNSYLVANIA CLEAN ENERGY WORKERS REMAIN JOBLESS AS OF AUGUST

85%
OF PA CLEAN ENERGY WORKERS LEFT UNEMPLOYED BY PANDEMIC HAVE NOT RETURNED TO WORK

19%
OF THE STATE'S CLEAN ENERGY WORKFORCE AS OF Q4 2019 IS NOW OUT OF WORK

PRESENTED BY:
E2
KEEA Keystone Energy Efficiency Alliance
Green Building Alliance
Sustainable Pittsburgh
Our Region. Our Resources. Our Future.
sbn Sustainable Business Network of Greater Philadelphia
Green Building United

SEPTEMBER 2020
E2FS: 20-09-A

WWW.E2.ORG/CLEANJOBSPA
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#CLEANJOBSAMERICA

For more information, contact E2 Eastern States Advocate **Uchenna Bright** at **ubright@e2.org**.

For questions regarding this report, visit E2's report FAQ at **https://www.e2.org/reports/clean-jobs-america-faq**.

COVID-19 & THE CURRENT SITUATION

Heading into 2020, Pennsylvania's clean energy economy was looking forward to another record-breaking year with state clean energy employers projecting to add another 5,000 jobs in 2020 (5.4% growth rate).

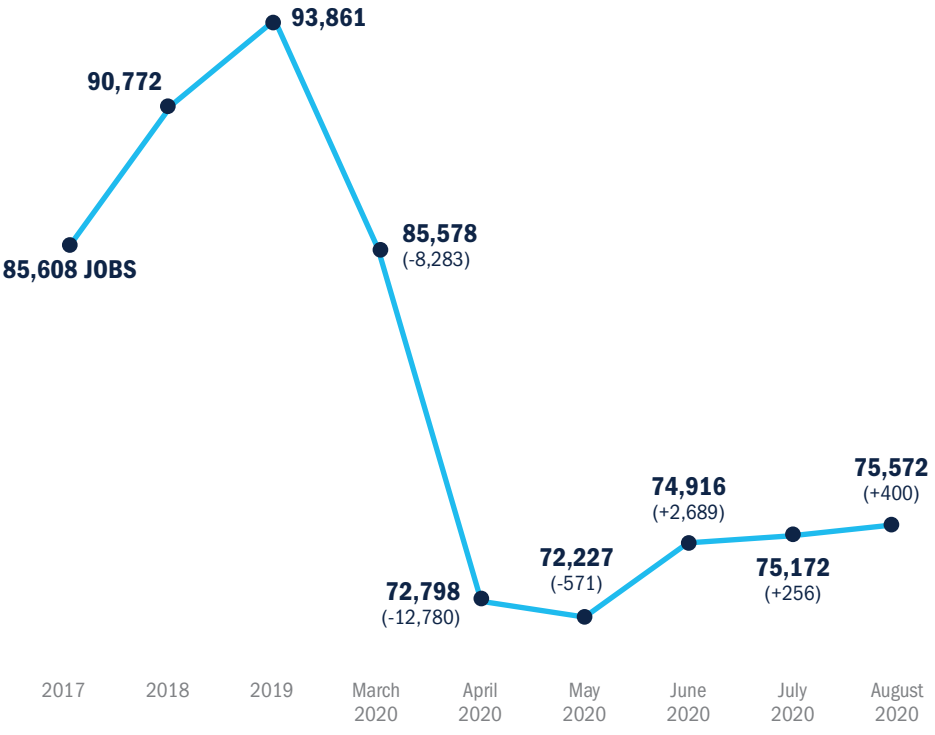
But like most sectors, the nation's clean energy sector was hit by the COVID-19 outbreak and Pennsylvania was no exception. Energy efficiency workers lost their jobs after being shut out of homes and buildings to prevent the spread of the coronavirus. Solar and wind developers furloughed workers after panels and parts were stranded in shut-down factories. Factory workers were let go as assembly lines for Energy Star appliances and electric and hybrid vehicles went dark.

Years of Job Growth

While recent months have brought some jobs back, 18,300 former clean energy employees remain out of work according to E2's latest monthly analysis of unemployment data since March 2020—more than double the sector's entire job growth over the last two years.

About 3,350 Pennsylvania workers have returned to jobs in clean energy since nationwide reopenings began in June. But job recovery remains lower than the growth expected in 2020, and at the current rate it would take about five years for Pennsylvania to reach its pre-COVID-19 employment levels. Overall, the state has lost about 19% of its clean energy workforce since the pandemic began in March.

IMPACT ON CLEAN JOBS
2017–JULY 2020



CLEAN ENERGY JOBS OUTLOOK
PENNSYLVANIA 2020-2021

JOB GROWTH 2017-2019:
+8,253 JOBS (+9.6%)

PRE-COVID-19 PROJECTED JOB GROWTH 2020-2021:
+5,068 JOBS (+5.4%)[2]

JOBS LOST DUE TO COVID-19:
-18,290 JOBS (-19.5%)

A CLOSER LOOK CLEAN ENERGY UNEMPLOYMENT CLAIMS

By Sector

Sector	Jobs Lost	Percent of Workforce
Renewable energy	2,046	14.0%
Energy efficiency	14,196	19.9%
Clean vehicles	756	18.6%
Storage & Grid	814	22.0%
Clean Fuels*	477	14.1%

* Job losses in the clean fuels sector include woody biomass and corn ethanol, which are not included in clean energy employment data throughout the rest of this report.

Counties Hardest Hit

Metro	Jobs Lost	Percent of Workforce
Philadelphia	13,235	26.7%
Pittsburgh	5,775	31.9%

County	Jobs Lost	Percent of Workforce
Allegheny	1,974	15.6%
Philadelphia	1,820	19.3%
Montgomery	1,147	12.6%
Lehigh	1,085	14.1%
Lancaster	635	13.9%
Berks	527	15.4%
York	503	13.7%
Bucks	480	9.2%
Chester	453	8.9%
Delaware	394	11.8%

States Hardest Hit

State	Total Losses	Percent of Clean Energy Workforce
California	84,439	15.3%
Georgia	27,058	31.3%
Florida	25,650	15.3%
Michigan	23,871	18.0%
Texas	23,406	9.5%
North Carolina	20,157	17.6%
Pennsylvania	**18,290**	**18.8%**
Washington	17,979	20.2%
Ohio	15,965	13.8%
New York	15,674	9.6%

BUILDING BACK A CASE FOR OPTIMISM

But we have reason to be optimistic. This is an industry that cannot be ignored. As history shows, it is a proven catalyst for quick job growth in the aftermath of the economic crisis, growing from a few hundred thousand workers in 2008-2009 to nearly 3.4 million nationwide in 2019.

In fact, no part of the 2009 American Recovery and Reinvestment Act (ARRA) was more successful than the $90 billion in federal investments in clean energy. In the years following ARRA, nearly 1 million clean energy jobs were created. Hundreds of new made-in-America businesses—game-changing companies such as Tesla which employed 45,000 workers before the COVID-19 pandemic—got their start with ARRA-era Department of Energy loans that were repaid in full. Businesses created more than 100,000 wind, solar and other clean energy projects, bringing new investments and markets to states like Pennsylvania.

For Pennsylvania, a similar investment would be critical to its economic recovery. According to the recent report *Build Back Better: How a federal stimulus focusing on clean energy can create millions of jobs and restart America's economy* from E2 and E4Thefuture, a federal stimulus package targeting energy efficiency, renewables, and grid modernization would create over 28,800 jobs every year for at least five years while generating $11.2 billion in economic activity in Pennsylvania.

If Congress Directs
$99.2 BILLION
In federal stimulus, policy initiatives, and other investments nationwide

Pennsylvania's Workforce Grows By
28,800
jobs for at least five years (a total of 144,400 job-years)

Pennsylvania's Economy Generates
$11.2 Billion
in economic activity (GDP) over the next five years

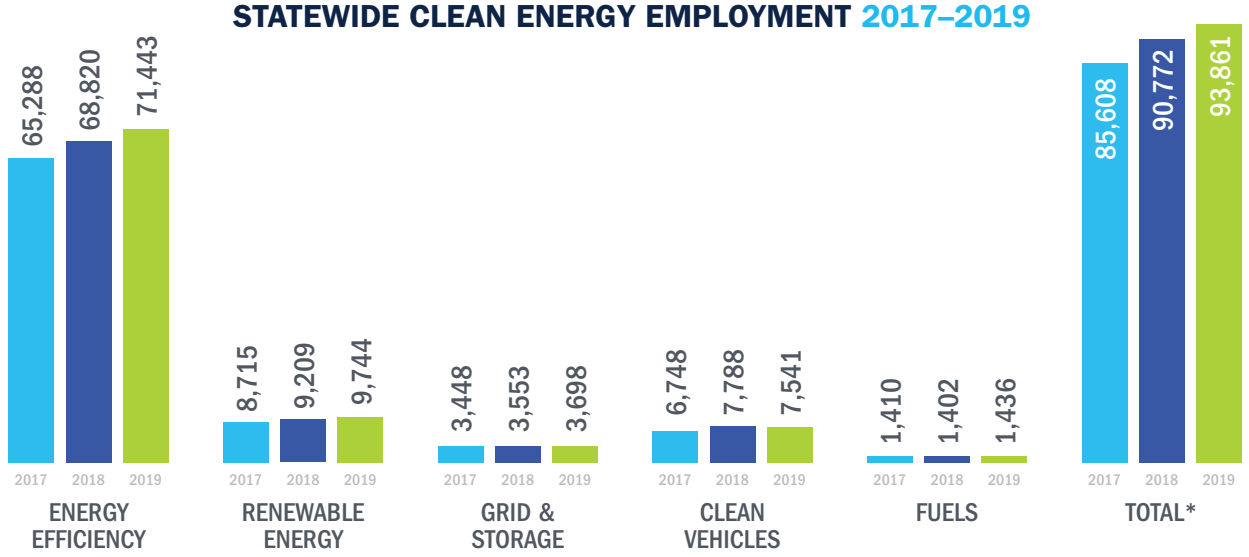
CLEAN JOBS PENNSYLVANIA 2020 YEAR IN REVIEW

In 2019, Pennsylvania's clean energy economy added over 3,000 jobs, driven primarily by growth in renewable energy generation (5.8%), including solar (6.7%) and wind energy (4.3%), grid modernization (3.6%), energy storage (4.6%), and energy efficiency (3.8%).

The state saw growth in 19 of 22 subsectors, including over 5% growth in seven sectors, with the largest growth coming from low-impact hydropower (10.4%). The Clean Vehicles sector was the only sector to see an overall decline in employment (274 jobs) after growing 15.4% in 2018 (part of a nationwide trend). The sector's declines however were limited only to the plug-in hybrids and electric vehicles subsectors. Hybrid electric vehicles (2.6%), natural gas vehicles (3.2%), and hydrogen fuel cell vehicles (10.3%) all saw growth.

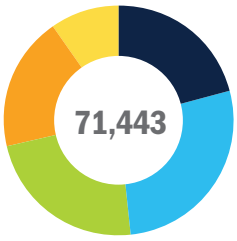
Swelling to nearly 94,000 workers statewide, Pennsylvania's clean energy workforce at the end of 2019 was employed primarily by small businesses ranging across the supply chain from agriculture to manufacturing.

STATEWIDE CLEAN ENERGY EMPLOYMENT 2017–2019



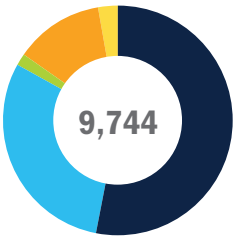
*While E2's clean energy job reports go back to 2014, due to recent methodology changes, we are unable to confidently provide comparable growth numbers before 2017.

INDUSTRY BREAKDOWN Q4 2019



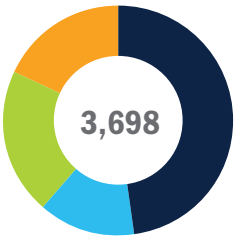
ENERGY EFFICIENCY:

- ENERGY STAR & Lighting: **14,979**
- Trad. HVAC: **19,700**
- High-Efficiency HVAC & Renewable H&C: **16,513**
- Adv Materials: **13,492**
- Other: **6,759**



RENEWABLE ENERGY:

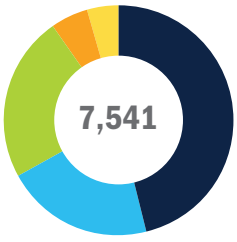
- Solar: **5,173**
- Wind: **2,937**
- Geothermal: **167**
- Bioenergy/CHP: **1,217**
- Low-Impact Hydro: **256**



GRID & STORAGE:

- Storage: **1,770***
- Smart Grid: **504**
- Micro-Grid: **766**
- Other Grid Modernization: **659**

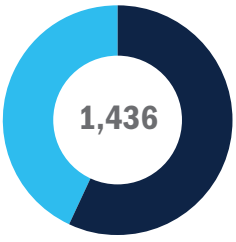
* Storage includes pumped hydro storage, battery storage, thermal storage, and mechanical storage detailed technologies.



CLEAN VEHICLES:*

- Hybrid Electric Vehicles: **3,477**
- Plug-In Hybrid Vehicles: **1,582**
- Electric Vehicles: **1,752**
- Natural Gas Vehicles: **397**
- Hydrogen & Fuel Cell: **332**

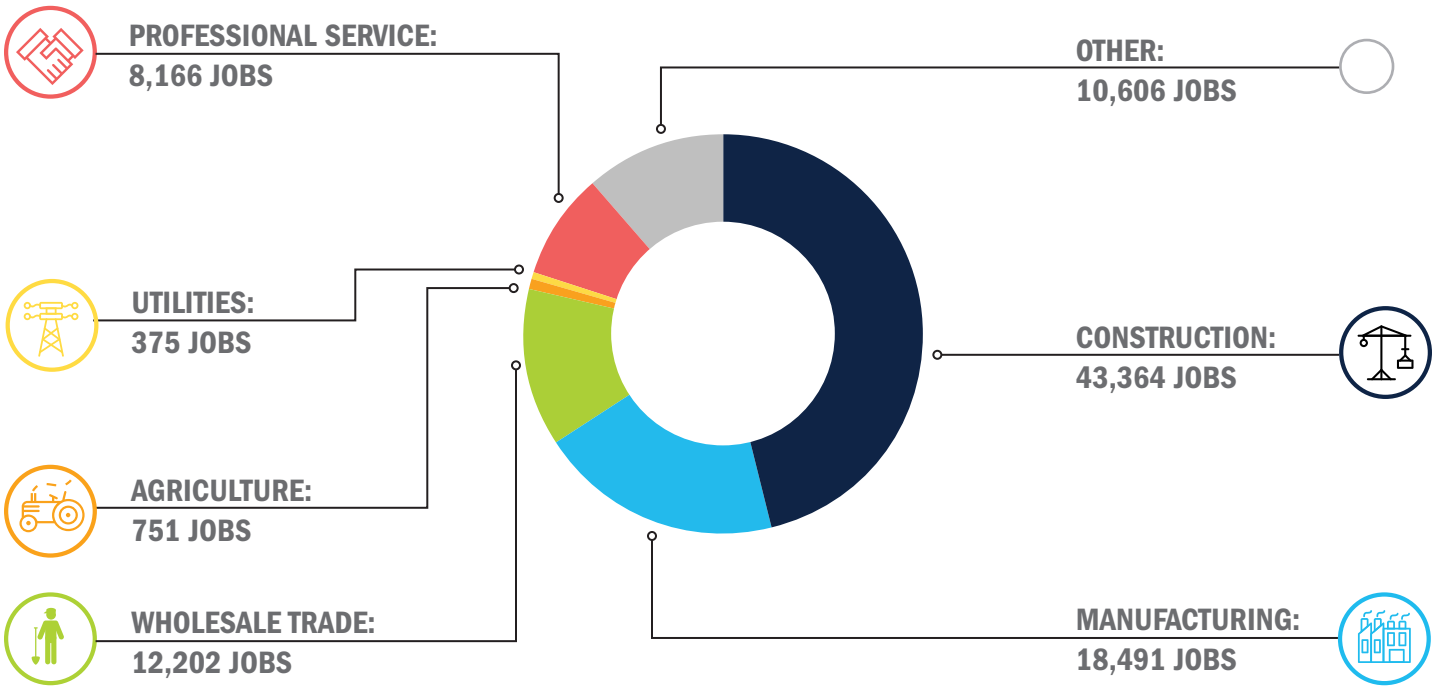
* Not included are 13,500 additional employees who work making gas-powered vehicles more fuel-efficient.



FUELS:

- Other Ethanol/ Non-Woody Biomass: **819**
- Other Biofuels: **617**

CLEAN JOBS BY VALUE CHAIN



FASTEST GROWING TECHNOLOGIES 2018–2019

11.3%	10.4%	9.4%	7.6%	6.7%
HYDROGEN & FUEL-CELL VEHICLES	LOW-IMPACT HYDROPOWER	MICRO GRID	GEOTHERMAL	SOLAR ENERGY

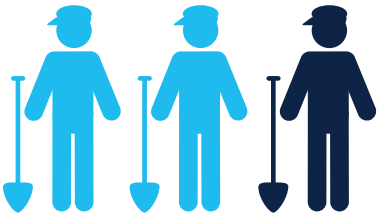
SECTOR SHARE OF JOB GROWTH 2018–2019

78.6%	16%	4.4%	1.0%
ENERGY EFFICIENCY	RENEWABLE ENERGY	GRID & STORAGE	CLEAN FUELS

CLEAN JOBS BY BUSINESS SIZE
Q4 2019

2 OUT OF EVERY 3

CLEAN ENERGY WORKERS IN PENNSYLVANIA ARE EMPLOYED BY BUSINESSES WITH FEWER THAN 20 EMPLOYEES



CLEAN ENERGY WORKERS BY BUSINESS SIZE:

1-4 EMPLOYEES: 332.6%

5-19 EMPLOYEES: 33.5%

20-99 EMPLOYEES: 22.9%

100-499 EMPLOYEES: 4.2%

500+ EMPLOYEES: 6.7%

CLEAN ENERGY POWERING PENNSYLVANIA'S CONSTRUCTION SECTOR

274,000 Pennsylvanians work in construction statewide, and more than 43,000 of them work directly in the clean energy sector—installing new renewable energy systems, making buildings and schools more energy efficient, repairing the electric grid, and more.

ALMOST

1 IN 6

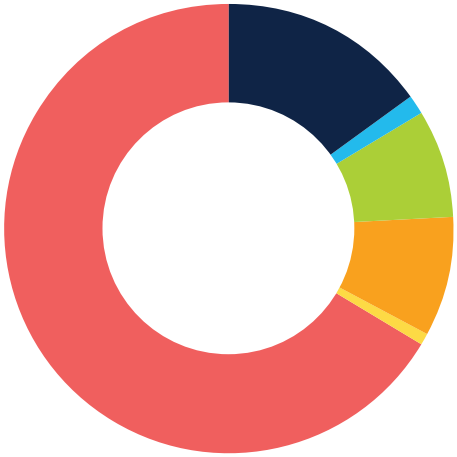
PENNSYLVANIA CONSTRUCTION WORKERS ARE EMPLOYED IN CLEAN ENERGY

CLEAN JOBS BY DEMOGRAPHICS Q4 2019

About **1 in 3** clean energy workers in Pennsylvania were of non-white or Hispanic ethnicity in 2019*

72.4% MEN

27.6% WOMEN



- **HISPANIC: 15.0%**
- **AMERICAN INDIAN: 1.4%**
- **ASIAN: 7.8%**
- **BLACK OR AFRICAN: 8.7%**
- **NATIVE HAWAIIAN OR OTHER PACIFIC ISLANDER: 0.9%**
- **NON-HISPANIC WHITE: 66.2 %**

*8.0% of workers identified as two or more races.

CLEAN JOBS PENNSYLVANIA 2020 ECONOMYWIDE VIEW

In 2019, clean energy was a vital sector driving economic growth in Pennsylvania during a period of generally slow growth. Clean energy jobs made up 1.6% of the Pennsylvania workforce at the end of 2019 after growing nearly 10% since 2017—five times faster than statewide job growth.

Clean energy made up 34.8% of all energy sector jobs in 2019 but has accounted for 49% of its job growth since 2017. In fact, clean energy businesses employ nearly 50,000 more workers than fossil fuels statewide.

While clean vehicle employment growth lagged—attributable to national market uncertainty around Federal clean car standards—clean energy still grew 50% faster than the overall energy economy and more than three times faster than fossil fuels.

WORKFORCE BREAKDOWN Q4 2019

Total Energy Workforce: 269,447 (+8,196 net new jobs in 2019)

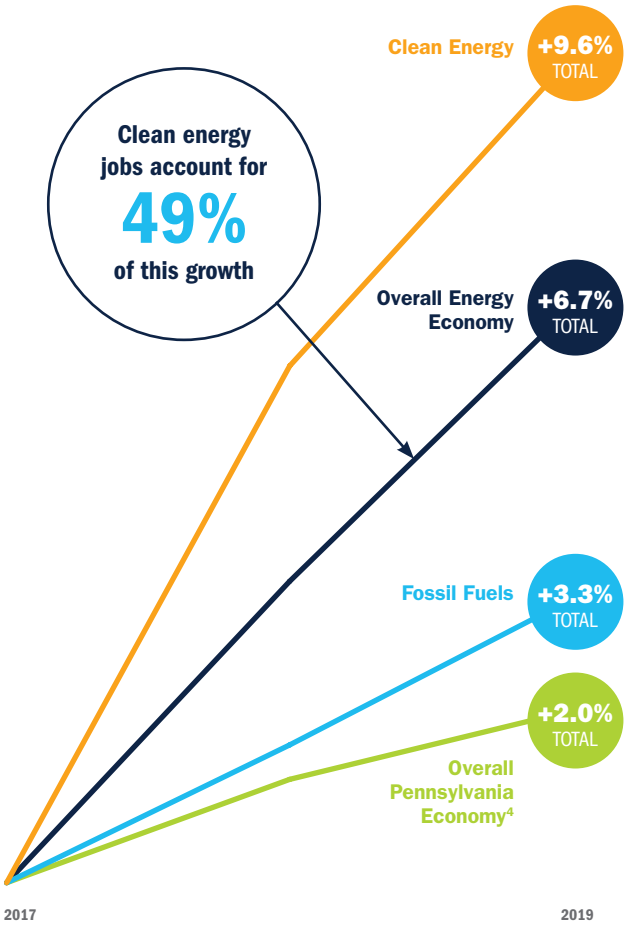
- Clean Energy: **93,861 (+3,089)**
- Fossil Fuels: **44,039 (+732)**
- Motor Vehicles: **73,004 (+1,529)**
- Trad. Transmission & Distribution: **40,330 (+4,228)**
- Nuclear: **4,488 (-118)**
- Other:* **13,725 (-1,264)**

* Includes other energy subsectors such as corn ethanol, woody biomass, large hydropower, and others.

35%

of **all energy sector jobs** in Pennsylvania are in clean energy industries (nearly 2X more than fossil fuels)[3]

3-YEAR GROWTH TRENDS



CLEAN JOBS PENNSYLVANIA 2020: NATIONWIDE VIEW

Pennsylvania's early policy leadership on renewable energy and energy efficiency has made it one of the top states in the U.S. for clean energy employment. In 2019, Pennsylvania employed the 11th most clean energy workers among all 50 states and the District of Columbia, and accounts for 2.8% of all U.S. clean energy jobs.

Notably, while Pennsylvania fell short of the Top Ten for the third year in a row, the state is quickly closing in on the No. 10 spot (Virginia)—cutting the gap nearly in-half from 6,300 jobs in 2017 to just 3,400 in 2019. Pennsylvania does rank among the Top Ten states for jobs in grid modernization, bioenergy and combined heat and power, and overall clean fuels.

Across all sectors Pennsylvania remains one of the most consistent performers, with no sector or subsector ranking lower than 15th nationally except for overall renewable energy jobs (16th). Even California, which ranked first in more categories than every state in 2019 had several subsectors ranked in the 20s. Pennsylvania's consistent high-performance across multiple sectors over the last three years—including 14 sectors and subsectors ranked 11th or 12th—has helped make it one of the fastest-growing markets for clean energy businesses and workers, which bodes well for the sector's recovery and potential after COVID-19, particularly if some policies such as the renewable energy standards are increased in the near future.

PENNSYLVANIA CLEAN ECONOMY NATIONWIDE HIGHLIGHTS Q4 2019

#11

Pennsylvania was home to the 11th most clean energy workers among all 50 states and the District of Columbia in 2019—missing out on the Top 10 by only 3,444 jobs to Virginia (#10).

14

Making a habit of just missing out on the Top 10, Pennsylvania ranks either #11 or #12 in 14 clean energy categories, including wind energy, smart grid, clean energy storage, overall grid and storage, electric vehicles, and overall energy efficiency.

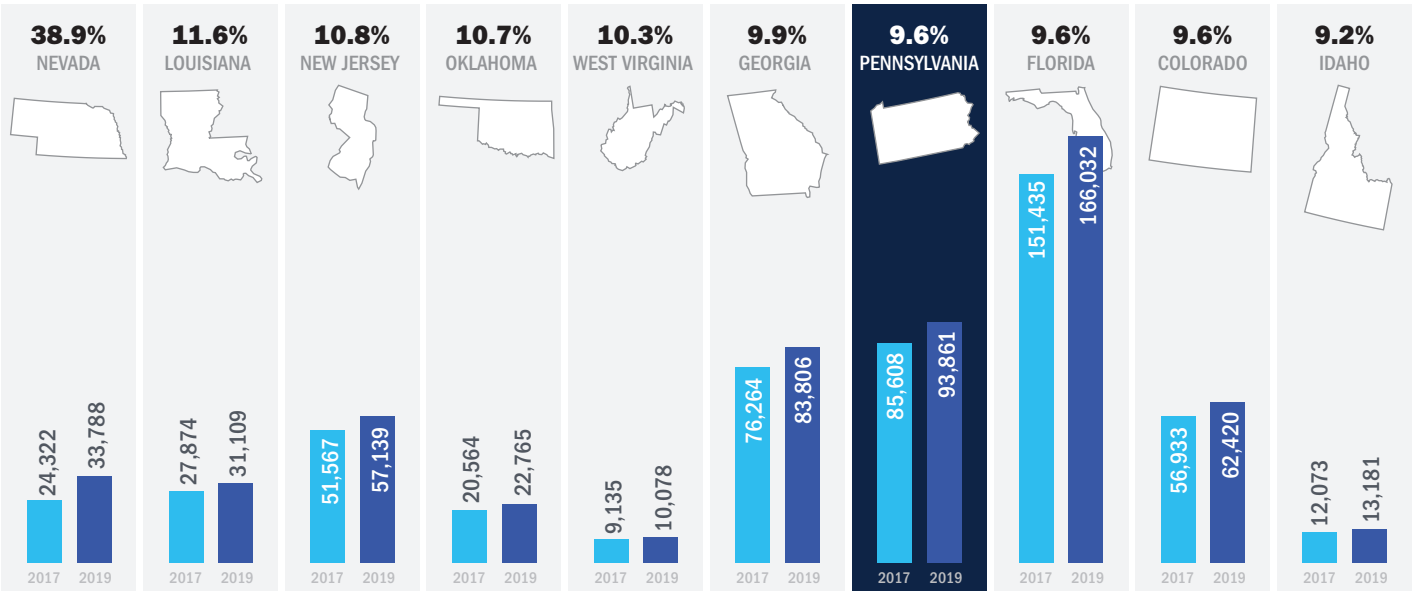
#13 #37

Pennsylvania is home to two metro areas ranked among the top 50 for clean energy jobs in 2019, Philadelphia (13th) and Pittsburgh (37th).

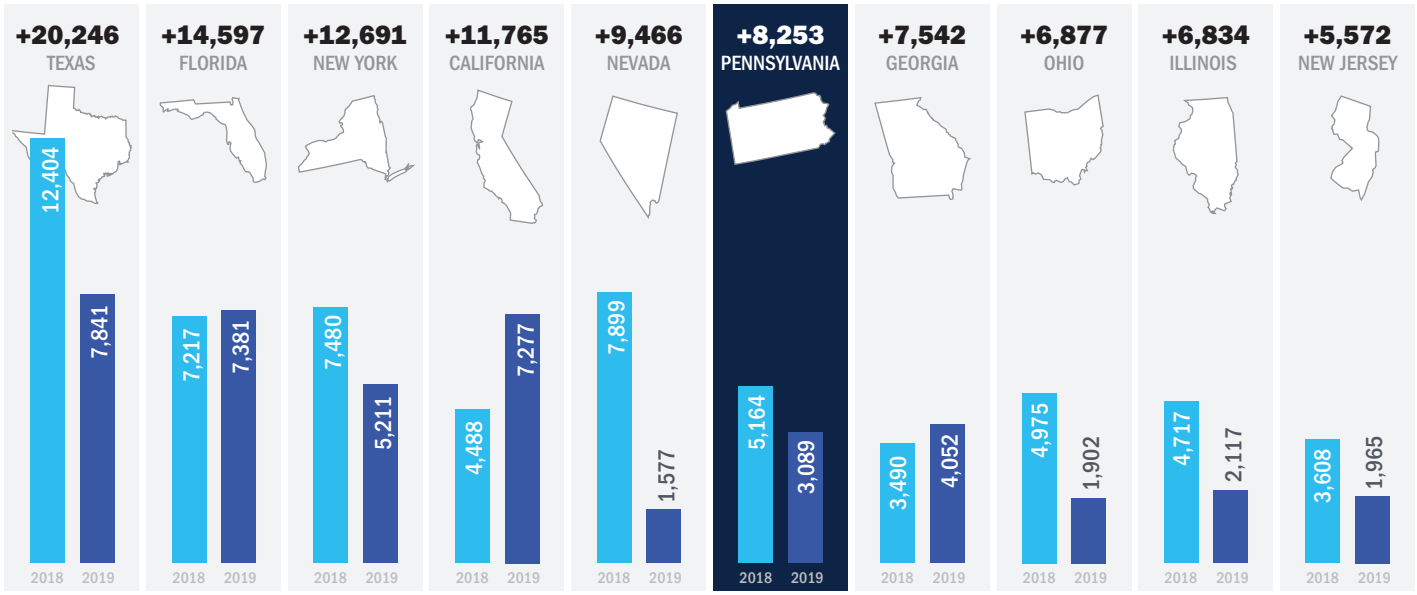
Top 15

Pennsylvania clean energy economy is competitive across every single sector, ranking no lower than 15th in every clean energy sector and subsector except overall renewable energy jobs (16th).

PENNSYLVANIA CLEAN ECONOMY NATIONWIDE JOB GROWTH 2017–2019



PENNSYLVANIA CLEAN ECONOMY NATIONWIDE TOTAL JOBS ADDED 2017–2019



FACES BEHIND THE NUMBERS CARPENTERS' UNION MEMBERS BUILD A BRIDGE FROM THE PAST TO THE FUTURE

Walking on mesh netting suspended 96 feet in the air under steel beams, a crew of 10 from the United Brotherhood of Carpenters and Joiners of America (UBC) Local 441 installed the largest sloped roof solar project in the country at Pittsburgh's Mill 19.

Mill 19, currently under the ownership RIDC (Regional Investment Development Corporation), is one project on the 178-acre Hazelwood Green site, once owned by J&L Steel Hazelwood Works and LTV Steel that sits along the Monongahela River in the Hazelwood neighborhood of Pittsburgh. The rolling mill produced 10" bar steel for several decades. When the steel industry collapsed, the building was abandoned and all that remained was the steel exoskeleton and the roof, which has been removed and replaced with a 2 megawatt (MW) solar project (with an additional 0.5 MW of solar mounted on parking lot canopies).

Tim Sippey, the foreman of the solar installation crew was proud to be installing the final of the 4,784 solar panels in June of 2020 after managing construction over the past year and a half. Most people don't think of bridge builders (which is what this crew typically constructs) as solar installers, but Tim said, "We are a natural fit for this job as we are used to working 100 feet in the air under steel trusses. The most difficult thing about this job was planning the logistics, but our crew was able to devise a technique to pre-wire and construct an array of solar panels and then lift them up by crane to the roofing frame where our guys then mounted them to the existing steel frame."

Tim also has a personal connection to the project as his father, Meade J. Sippey, who passed away in 2012, worked in the LTV steel mill for 34 years on this site and now Tim is here on the same ground installing solar panels—both working to fuel the economy of their times. Tim thought that his father would have enjoyed seeing him work on this project.

Credit: Sharon Pillar

Mill 19 arrays being prepared to be hoisted onto the roof, June 2020.

Scalo Solar Solutions is the solar developer and EPC (engineering, procurement and construction) for Mill 19 who hired the installation crew as their own employees from the UBC for the project. Scalo also contracted with Bruce & Merrilees, a National Electrical Contractor Association (NECA) electrical contractor, to install conduit, wire, and switchgear for the alternating current (AC) side of the solar array and connect it to the electric utility grid.

Mill 19 will generate the majority of the annual net electricity demand for the 90,000-square-foot, three stories of buildings that are being built beneath the steel exoskeleton. The solar panels serve as the new roof over the entire site. Light seeps through the bifacial panels for which solar cells are mounted in both the front and back of the glass of the panels to maximize energy production. The buildings will include offices, ground floor prototyping, lab, and workshop space as well as Carnegie Mellon University's Advanced Robotics for Manufacturing Institute (ARM) and CMU's Manufacturing Futures Initiative (MFI). All the buildings under the solar panels will be LEED v4 Gold certified and they will capture rooftop rainwater that will be reused in the cooling tower and for flushing in the restrooms.

Mill 19 sits on Hazelwood Green property adjacent to Mill 19 that is owned by Almono LP, a collaboration of three major Pittsburgh foundations. Hazelwood Green is envisioned as a model for the transformative redevelopment of an urban brownfield into a center of innovation that fuels Pittsburgh's new economy while remaining grounded in the principles of sustainability, equity, and inclusive economic opportunity.

Credit: Sharon Pillar

Crew at Mill 19, June 2020.

PROFILES IN GROWTH AGRIVOLTAICS: CLEAN ENERGY & AGRICULTURE WORKING TOGETHER FOR A MORE SUSTAINABLE FUTURE

In October of 2018, Susquehanna University (SU) "flipped the switch" on the largest solar array on a college campus in Pennsylvania. The 3.9 megawatt (MW) solar system developed by SCG Power and Heim Electric will meet approximately 30% of the school's electricity demand. The university entered a power purchase agreement (PPA) with WGL Energy Systems which owns the array and will sell the electricity produced by the system to the school for the next 25 years.

In addition, approximately 40 sheep from the Owens Family Farm provide emission-free mowing as they graze around and under the shade of the solar panels during the months of April to November. This co-location of solar and farming is called *agrivoltaics* and provides a dynamic example of how solar can be especially beneficial to Pennsylvania farmers. The Owens Family is a member of the American Solar Grazing Association that estimates that the U.S. has over 4,000 acres of solar sites maintained with sheep.[5]

The Owens family began shepherding in New Hampshire and relocated to their 112-acre family farm in Sunbury, PA in Northumberland County in 2006 with an average flock of about 150 ewes (which can expand to 400 during lambing season). Caroline Owens, a former Vocational Agriculture teacher who holds a B.S. in Animal Science/Agricultural Education and an M.B.A. and her husband David, an engineer who is now running his own database and software consulting business, started raising animals to provide pasture-raised meat, an alternative to industrial agriculture.

Caroline explained that they became solar grazers when SU approached them to inquire if they would graze their sheep on the solar land, which the Owens hadn't done previously. The family quickly learned what was needed and soon became solar grazing advocates. Caroline liked the idea that the clean energy project could also benefit farmers.

Once on site, the sheep stay together in the flock and the Owens family checks on them once a week to ensure they are healthy and to move the flock and fencing system to a different section of the property. From December to March, the flock returns to the Owens Farm for the winter.

Large scale solar arrays can benefit with advanced planning during development to drill a well to provide a water source, by sub-dividing the property with sheep fencing, and planning gates and entrances accessible by the farm trucks. Choosing appropriate plant species such as legumes and grasses are important for the health of the sheep as well. Pollinator-friendly plants provide additional opportunities such as beekeeping and provide pollinator benefits to adjacent farm crops.

The Owens family is already planning to expand their sheep flock so that they can work on other solar projects in the state. When the flock gets too large to house at their facilities in the winter, they will subcontract with other farmers to rent livestock space, thus providing rippling benefits to the farming community.

Since 2015, Pennsylvania has lost more than 6,000 farms and more farms are foreclosing during the current pandemic. Renewable energy is providing game changing financial models that help farmers in a number of ways including: generating energy for onsite operations through solar, methane digesters, and wind energy; via leasing a portion of their land to large scale solar development where the energy is sold to the grid; or leasing their grazing animals or bees to work on solar project lands.

Community solar (which is still not available in Pennsylvania) and utility scale solar projects typically lease land for 20 to 25-year terms during which the landowner receives dedicated annual payments. This arrangement can provide steady income to farmers when they lease a portion of their land that might otherwise be unusable. At the end of the lease the solar arrays are dismantled and the land can be returned to the farm.

Native pollinator friendly species are often grown under and around the panels that support bees and beekeepers and pollinate other crops on the farm. Some farmers grow shade-loving crops under their solar panels or graze animals such as sheep. This cooperative farming and energy development can save family farms in Pennsylvania and create complementary industries such as grazing for hire (such as the Owens family sheep grazers) and native plant cultivation such as Ernst Seeds, the largest producer of native grass and wildflower seeds in the eastern United States, in Meadville, PA that produces seed mixes for agrivoltaics.

Credit: Caroline Owens

Caroline Owens moving sheep on the Susquehanna University solar array, the largest on-campus university solar project in Pennsylvania.

PROFILES IN GROWTH

TRAINING PHILLY'S DIVERSE FUTURE ENERGY WORKFORCE

The Energy Coordinating Agency (ECA) located in Philadelphia has a mission to help people conserve energy and to promote a sustainable and socially equitable energy future for all. Founded in 1984, the ECA creates lasting solutions to the energy problems of low-income Philadelphians by coordinating low-income energy services, and administering high quality energy conservation, education, heating, and home repair services to reduce households' energy costs and stabilize families in their communities. To build capacity at the grassroots level, ECA established a resilient network of what is now 15 Neighborhood Energy Centers (NECs), each of which serves as a one-stop-shop for low-income energy services, including weatherization, heating system repair and replacement, home repair, bill payment assistance, budget counseling, and home energy education.

ECA's Knight Green Jobs Training Center launched in 2009 to prepare a diverse clean energy workforce. Since then, the Center has helped over 5,000 participants graduate across a broad array of programs, with students attaining national credentials in building science, weatherization, residential and commercial heating, solar installation, environmental remediation, and lead safety. Training Center programs are certified by the Building Performance Institute, the Interstate Renewable Energy Council, and the Environmental Protection Agency. In addition, the Training Center hosts federally recognized apprenticeship programs for clean energy jobs, which ECA's own weatherization staff participate in.

Current core programs include training students to install Solar Photovoltaic panels, training students for tiered levels of commercial HVAC mastery, and training a broad Green Renovation and Retrofit curriculum that prepares students for remediation of hazardous building material and equips them with the fundamental skills to grow across building trades.

Each of ECA's programs is an industry-driven curriculum of training that includes classroom theory, hands-on training, and field experience. Students receive portable, stackable credentials to help them gain full-time jobs and build a career. The Center is located in ECA's LEED Gold facility, which gained a new state-of-the-art commercial heating lab in 2019 thanks to Johnson Controls Inc. The Center also features a residential heating lab, life-size house mock-ups, a modern computer lab which doubles as a Scantron test site, and a house of pressures lab.

One of ECA's graduates, Andy Depestre (pictured), graduated from the ECA's Phase 1 class of the JCI HVAC training. Andy was an excellent student who hired by a plumbing/heating firm in Montgomery County because of this training. He is currently considering Phase 2 of the training, which would provide opportunities to increase his income.

Credit: Adriel Menendez

Andy Depestre during HVAC training at Energy Coordinating Agency.

POLICIES MATTER

Until March, Pennsylvania was continuing its consistent and steady growth in clean energy jobs detailed in past Clean Jobs Reports. Since the start of the COVID-19 pandemic, however, the state has experienced some of the largest clean energy job losses in the country, along with some of the highest overall unemployment rates. As history shows from the 2008 Great Recession, clean energy can be a strong driver for economic recovery. To take advantage of this job-creating opportunity, Pennsylvania will need to strengthen its clean energy policies.

By expanding energy efficiency, renewable energy, and the electrification of transportation and buildings, Pennsylvania can create tens of thousands of family-sustaining clean energy jobs, attract billions of dollars of private investment, and generate new revenues for state and local governments at a time when the need has never been greater—and cut pollution in the process.

Also, clean energy jobs can be an equity builder along economic, racial, and gender lines. Historically, Black, Indigenous, People of Color and women have often not had access to the good-paying jobs in the energy sector traditionally found in rural areas where they were located. As we create a new energy paradigm, we have the opportunity to do things differently.

We also need to deliberately create programs that make clean energy technologies, training programs and jobs accessible to all Pennsylvanians and to create a just transition for fossil fuel workers who are losing their jobs and for those most affected by the impacts of fossil fuels. Lawmakers in Harrisburg can strengthen clean energy and Pennsylvania communities by taking the following policy actions:

// **Increase Pennsylvania's renewable energy standards.**
Since 2004, Pennsylvania's Alternative Energy Portfolio Standard (AEPS) has required a share of electricity sold to state consumers to come from renewables and other "Tier I" sources. In May 2021, however, the AEPS's Tier I requirement will peak at 8%. Without an increase, growth in renewable energy jobs will be stunted. Renewable energy investors are making decisions now about projects that will be built years from now, so updating the AEPS is urgent.

Neighboring states, including New York, New Jersey, and Maryland have state goals of 50% renewables by 2030 or more, and Virginia just passed a 100 percent clean energy standard that includes a goal of 30% renewables by 2030. Pennsylvania is woefully behind.

The AEPS would be one of the largest jobs-incubating bills in the state in decades, especially critical for economic recovery in the wake of the pandemic. An increase in the AEPS does not require tapping into the state's depleted revenue funds. In fact, according to the Finding Pennsylvania's Solar Future plan completed by Pennsylvania's Department of Environmental Protection (DEP), a **10% solar electricity goal by 2030 would result in 60,000 to 100,000 more jobs** throughout the state as well as a net economic benefit of over $1.6 billion annually.[6]

Two bills introduced in Pennsylvania in 2019—House Bill 1195 and Senate Bill 600—would spur more renewables jobs by increasing the AEPS from to 30% by 2030, with 10% of that coming from in-state solar. The bills also require a study to determine targets for energy storage, which would create better balance in energy supply and demand by ensuring renewable energy is available throughout the day or night whenever it is needed. With this more flexible, integrated supply and demand system, energy can be cleaner, more readily available and even more cost-effective. Getting higher percentages of the renewables on the grid as well as increasing energy storage will decrease the need for dirty and expensive "peaker" plants to meet peak demand, lowering electricity costs for everyone, even those who have not directly installed solar on their homes.

// **Expand the use of electric vehicles and increase conversion of diesel vehicles to electric.**
As a recent report by Advanced Energy Economy discussed, Pennsylvania is home to more than 350 firms—many in industries that have seen declines in recent years—that could easily retool to serve the supply chain for electric vehicles (EVs).[7] Pennsylvania could drive EJ job growth at these firms, and more immediately grow jobs in the construction of EV charging stations, by passing Senate Bill 596. This legislation would set a goal for increased EV adoption in Pennsylvania while ensuring charging stations are strategically located and authorizing electric utilities to build charging stations. Transportation is the largest source of greenhouse gas pollution in the United States, and emissions of volatile organic compounds and particulate matter from gasoline and diesel vehicles contribute to respiratory and cardiovascular disease in all parts

of the commonwealth. Electrifying transportation can create thousands of jobs and save thousands of lives.[8]

PA recently signed on to an Memorandum of Understanding (MOU) that would require that 30% of new truck and bus sales to be zero-emission by 2030 and 100% zero-emission by 2050.[9] Pennsylvania should walk the talk and move this commitment into policy.

// **Continue rulemaking to limit carbon pollution from power plants and participate in the Regional Greenhouse Gas Initiative.** In 2019 Governor Wolf directed the state Department of Environmental Protection (DEP) to develop a proposed regulation to limit carbon pollution from power plants and enable Pennsylvania to participate in the Regional Greenhouse Gas Initiative (RGGI). The DEP has developed language for a regulation, and in September 2020 the state Environmental Quality Board (EQB) voted to begin a formal rulemaking process. The EQB should move the proposed regulation forward, take public comment, and finalize a rulemaking as soon as possible. Meanwhile, the General Assembly should enact new legislation to expand the ways in which proceeds from the auction of carbon "allowances" can be used. The estimated $300 million per year should be directed to help low-income customers pay their electric bills, create a Just Transition Fund to expand economic development opportunities in coal and under-resourced communities, and fund clean energy programs.

// **Lift the energy efficiency investment cap on Act 129.** The Pennsylvania Public Utility Commission has initiated Phase IV of Act 129, Pennsylvania's energy efficiency standard. Act 129 requires electric utility to develop and implement plans to help customers save energy. The initiation of Phase IV is a good step—and a recognition that it is still generally less expensive to save energy in Pennsylvania than it is to generate it, even without accounting for the pollution costs of generation, but the legislature should still lift the energy efficiency investment cap on utilities. Pennsylvania's main energy efficiency policy, Act 129, has delivered $6.4 billion in benefits to Pennsylvania electric customers since 2009 and cut electricity consumption by an amount equivalent to critical investments in low-carbon and electric transportation infrastructure.

// **Create and fund an Office on Just Transition** that works to coordinate activities of the Departments of Community and Economic Development, Labor & Industry, and Education that is charged with creating economic redevelopment plans that explore the potential opportunities for communities that had historically supported fossil fuel extraction and assist them in actively attracting businesses, redevelopment and workforce training, such as clean energy workforce training. This office should also encourage workforce training and economic development opportunities in communities that intentionally increase racial and gender diversity.

In addition, there are other important policy recommendations that could also expand the demand for clean energy, including:

// **Enable Community Solar by passing HB 531 and SB 705** that permit multiple subscribers to purchase a portion of a larger solar project and get credit for the electricity generated on their utility bill.

// **Pass Community Choice Aggregation or Municipal Aggregation enabling legislation** that permits municipalities to enter into agreements to procure large amounts of clean energy on behalf of their residents.

// **Encourage Electric Distribution Companies to require a certain percent of renewable energy in their default supply procurement.** Utilities are required to purchase electricity for all their customers who do not choose an electricity generator themselves, which is typically sourced from nonrenewable sources. If utilities entered into long-term contracts with renewable energy projects (which they are permitted to do), they could procure clean energy at lower rates for their customers and help to increase renewables on the grid—all without policy intervention.

CLEAN JOBS PENNSYLVANIA 2020 OPPORTUNITIES FOR UNION WORKERS

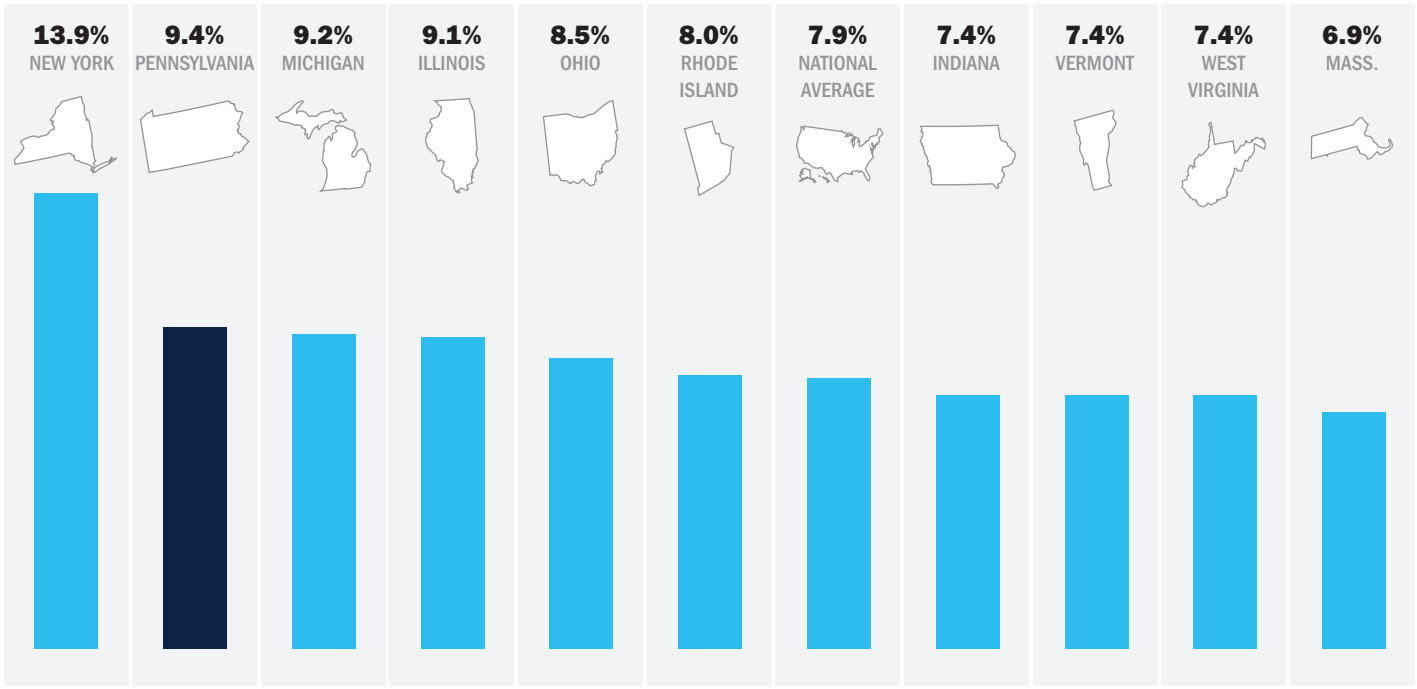
Unions helped create the United States' middle class in the twentieth century and are crucial to preserving and expanding it today. By fighting for the rights of working people, unions raise wages and working conditions, support the economy (which depends on families' having money to spend), and boost democracy by giving workers political power.

Pennsylvania—a state with a long history of union organizing—has the second highest percentage of clean energy jobs (9.4%) that belong to unionized workers of the 21 Northeast and Mid-Atlantic States. Only New York state has a higher percentage of unionized clean energy jobs (13.3%).

Pennsylvania union members are taking advantage of the emerging workforce at a higher rate than most other states in the region. The percentage of Pennsylvania's clean energy workforce is similar to the overall national union membership rate of 10.3%.[10]

Expanding policies that increase clean energy will grow opportunities for labor unions and their workers in the clean energy economy.

PENNSYLVANIA CLEAN ECONOMY
PERCENTAGE OF CLEAN ENERGY WORKERS IN UNIONS, BY STATE



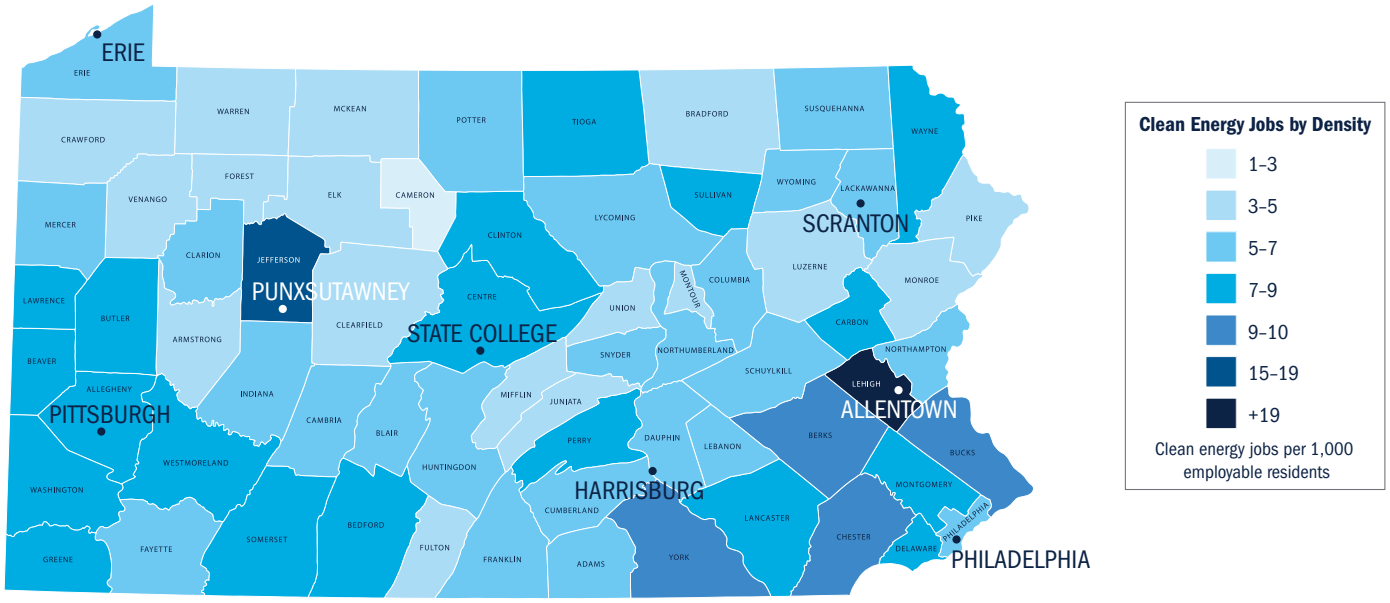
CLEAN JOBS PENNSYLVANIA 2020 GEOGRAPHIC DRILLDOWN

Clean energy's impact in Pennsylvania spread to all 67 counties, metros, and municipalities in 2019—from Lake Erie to the Delaware Bay and everywhere in-between. Despite ranking 11th in total number of clean energy jobs and having two metros rank among the top 40 (Philadelphia and Pittsburgh) at the end 2019, the state still had significant geographic room to grow.

Pennsylvania's clean energy economy made up a lower share of all jobs statewide (1.6%) than the national average (2.3%)—and well below many neighboring states such as Massachusetts (3.3%), Maryland (3.0%), Ohio (2.1%), Delaware (3.0%), and Virginia (2.4%).

This unrealized potential combined with the state's consistent high performance across all clean energy sectors forecasts vast growth opportunities for Pennsylvania's clean energy economy in the coming years as the state and country turn to rebuilding and recovery.

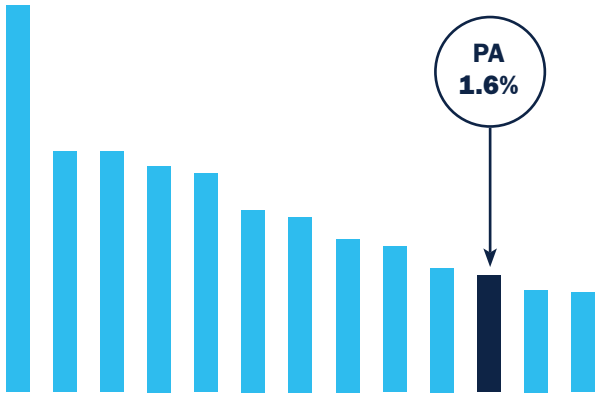
SHARE OF TOTAL COUNTY EMPLOYMENT Q4 2019



SHARE OF TOTAL STATEWIDE EMPLOYMENT Q4 2019

1.6% of all jobs in Pennsylvania were in clean energy industries at the end of 2019, one of the lowest in the Northeast and the country. Looking across at neighboring states it is clear Pennsylvania has significant room to add tens of thousands of new jobs in the coming year.

Vermont	5.3%
Massachusetts	3.3%
Rhode Island	3.3%
Maryland	3.1%
Delaware	3.0%
New Hampshire	2.5%
Virginia	2.4%
Ohio	2.1%
D.C.	2.0%
New York	1.7%
Pennsylvania	**1.6%**
West Virginia	1.4%
New Jersey	1.37%



Clean Energy Jobs by Metro Areas[11]

Metro	Clean Energy Jobs*	Renewable Energy Generation Jobs	Energy Efficiency Jobs
Allentown-Bethlehem-Easton	4,496	373	3,507
Altoona	856	69	670
Erie	1,731	145	1,348
Harrisburg-Carlisle	3,821	338	2,958
Johnstown	628	55	487
Lancaster	4,065	567	2,976
Lebanon	795	80	608
New York-Northern New Jersey-Long Island	4,630	276	3,703
Philadelphia-Camden-Wilmington	30,380	3,044	23,265
Pittsburgh	18,116	2,051	13,552
Reading	4,506	1,053	2,937
Scranton--Wilkes-Barre	3,762	318	2,929
State College	913	104	688
Williamsport	818	66	640
York-Hanover	2,496	199	1,953
Youngstown-Warren-Boardman	544	47	423

Note: Nearly 11,300 additional clean energy jobs are located in Pennsylvania's rural areas and not included in a metropolitan statistical area.

Clean Energy Jobs by Counties

County	Clean Energy Jobs*	Renewable Energy Generation Jobs	Energy Efficiency Jobs
Adams	470	116	268
Allegheny	12,462	1,507	9,784
Armstrong	161	14	117
Beaver	893	358	405
Bedford	246	10	189
Berks	3,233	981	1,742
Blair	759	38	549
Bradford	186	6	138
Bucks	5,038	631	3,704
Butler	1,460	94	1,138
Cambria	573	41	440
Cameron	10	1	8
Carbon	231	26	100
Centre	1,000	145	741
Chester	4,730	361	3,659
Clarion	153	19	96
Clearfield	285	18	183
Clinton	209	18	113
Columbia	273	29	198
Crawford	272	46	167
Cumberland	1,748	113	1,379
Dauphin	2,163	321	1,530
Delaware	3,241	300	2,505
Elk	121	3	98
Erie	1,537	167	1,094
Fayette	453	23	307
Forest	11	0	10
Franklin	644	22	498
Fulton	58	6	32
Greene	227	6	178
Huntingdon	137	12	96
Indiana	360	27	262
Jefferson	491	318	141
Juniata	63	4	46
Lackawanna	1,205	80	837
Lancaster	4,413	604	3,246
Lawrence	433	22	363
Lebanon	592	55	404
Lehigh	7,600	135	6,932
Luzerne	1,447	103	1,165
Lycoming	684	42	517
McKean	144	9	119
Mercer	473	14	353
Mifflin	133	7	95
Monroe	434	19	335
Montgomery	8,954	808	7,084
Montour	99	4	46
Northampton	1,248	50	1,025
Northumberland	388	30	227
Perry	120	5	85
Philadelphia	9,188	776	7,520
Pike	102	14	71
Potter	57	3	22
Schuylkill	538	61	366

Clean Energy Jobs by Counties continued

County	Clean Energy Jobs*	Renewable Energy Generation Jobs	Energy Efficiency Jobs
Snyder	202	10	146
Somerset	392	23	256
Sullivan	23	7	14
Susquehanna	105	8	83
Tioga	226	10	130
Union	175	52	102
Venango	157	11	114
Warren	96	7	58

County	Clean Energy Jobs*	Renewable Energy Generation Jobs	Energy Efficiency Jobs
Washington	1,430	53	1,179
Wayne	226	8	195
Westmoreland	2,162	239	1,637
Wyoming	111	9	78
York	3,564	548	2,435

* Total includes all clean energy jobs categories, including solar, wind, EE, clean vehicles, battery storage, advanced biofuels, low-impact hydro and other areas.

Clean Energy Jobs by District

Data shows that distribution of clean energy jobs in Pennsylvania crosses all political boundaries, with clean energy jobs in every congressional, state senate, and state assembly district.

U.S. Congressional District

District	Total Clean Energy Jobs	Renewable Energy Generation Jobs	Energy Efficiency Jobs
1 (Rep. Fitzpatrick)	4,788	616	6,246
2 (Rep. Boyle)	3,400	358	4,356
3 (Rep. Evans)	4,608	488	5,906
4 (Rep. Dean)	4,498	474	5,763
5 (Rep. Scanlon)	2,770	379	3,635
6 (Rep. Houlahan)	7,345	1,058	9,697
7 (Rep. Wild)	5,049	596	6,508
8 (Rep. Cartwright)	5,545	835	7,355
9 (Rep. Meuser)	3,920	387	4,996

District	Total Clean Energy Jobs	Renewable Energy Generation Jobs	Energy Efficiency Jobs
10 (Rep. Perry)	4,228	410	5,382
11 (Rep. Smucker)	2,863	316	3,687
12 (Keller)	5,065	789	6,744
13 (Rep. Joyce)	1,102	110	1,406
14 (Rep. Reschenthaler)	5,015	1,048	7,075
15 (Rep. Thompson)	4,841	1,075	6,766
16 (Rep. Kelly)	2,500	413	3,353
17 (Rep. Lamb)	1,795	190	2,300
18 (Rep. Doyle Jr.)	2,111	204	2,686

Clean Energy Jobs by District: State Senate

District	Total Clean Energy Jobs
1 (Sen. Farnese)	5,040
2 (Sen. Tartaglione)	1,252
3 (Sen. Sharif)	371
4 (Sen. Haywood)	1,811
5 (Sen. Sabatina)	242
6 (Sen. Tomlinson)	4,276
7 (Sen. Hughes)	1,729

District	Total Clean Energy Jobs
8 (Sen. Williams)	581
9 (Sen. Killion)	4,576
10 (Sen. Santarsiero)	2,546
11 (Sen. Schwank)	3,853
12 (Sen. Collett)	1,277
13 (Sen. Martin)	3,173
14 (Sen. Yudichak)	2,201

District	Total Clean Energy Jobs
15 (Sen. DiSanto)	2,315
16 (Sen. Browne)	2,540
17 (Sen. Leach)	3,490
18 (Sen. Boscola)	1,527
19 (Sen. Dinniman)	1,812
20 (Sen. Baker)	1,568
21 (Sen. Hutchinson)	2,313

Clean Energy Jobs by District: State Senate continued

District	Total Clean Energy Jobs
22 (Sen. Blake)	1,791
23 (Sen. Yaw)	2,014
24 (Sen. Mensch)	1,067
25 (Sen. Scarnati)	1,430
26 (Sen. Kearney)	694
27 (Sen. Gordner)	1,196
28 (Sen. Phillips-Hill)	2,387
29 (Sen. Argall)	1,006
30 (Sen. Ward)	2,480
31 (Sen. Regan)	1,626
32 (Sen. Stefano)	1,530
33 (Mastriano)	828
34 (Sen. Corman)	1,278
35 (Sen. Langerholc)	1,117
36 (Sen. Aument)	1,184
37 (Sen. Iovino)	4,756
38 (Sen. Williams)	2,018
39 (Sen. Ward)	2,643
40 (Sen. Scavello)	971
41 (Pittman)	1,801
42 (Sen. Fontana)	3,439
43 (Sen. Costa)	746
44 (Sen. Muth)	399
45 (Sen. Brewster)	484
46 (Sen. Bartolotta)	1,522
47 (Sen. Vogel)	1,385
48 (Sen. Arnold)	762
49 (Sen. Laughlin)	1,785
50 (Sen. Brooks)	1,034

Clean Energy Jobs by District: State Assembly

District	Total Clean Energy Jobs
1 (Rep. Harkins)	763
2 (Rep. Merski)	667
3 (Rep. Bizzarro)	300
4 (Rep. Sonney)	121
5 (Rep. Jozwiak)	1,074
6 (Rep. Roae)	483
7 (Rep. Longietti)	480
8 (Rep. Bonner)	725
9 (Rep. Sainato)	527
10 (Rep. Bernstine)	398
11 (Rep. Mustello)	319
12 (Rep. Metcalfe)	606
13 (Rep. Lawrence)	854
14 (Rep. Marshall)	422
15 (Rep. Kail)	637
16 (Rep. Matzie)	400
17 (Rep. Wentling)	20
18 (Rep. Tomlinson)	857
19 (Rep. Wheatley)	3,047
20 (Rep. Ravenstahl)	1,077
21 (Rep. Innamorato)	554
22 (Rep. Schweyer)	875
23 (Rep. Frankel)	193
24 (Rep. Gainey)	408
25 (Rep. Markosek)	778
26 (Rep. Hennessey)	1,055
27 (Rep. Deasy)	1,149
28 (Rep. Vacant)	353
29 (Rep. Schroeder)	1,143
30 (Rep. Mizgorski)	31
31 (Rep. Warren)	1,225
32 (Rep. DeLuca)	457
33 (Rep. Dermody)	202
34 (Rep. Lee)	359
35 (Rep. Davis)	622
36 (Rep. Readshaw)	251
37 (Rep. Fee)	2,415
38 (Rep. Kortz)	74
39 (Rep. Puskaric)	711
40 (Rep. Mihalek)	816
41 (Rep. Miller)	453
42 (Rep. Miller)	-
43 (Rep. Greiner)	799
44 (Rep. Gaydos)	836
45 (Rep. Kulik)	49
46 (Rep. Ortitay)	165
47 (Rep. Gillespie)	1,335
48 (Rep. O'Neal)	63
49 (Rep. Cook)	689
50 (Rep. Snyder)	140
51 (Rep. Dowling)	256
52 (Rep. Warner)	241
53 (Rep. Malagari)	1,174
54 (Rep. Brooks)	1,637
55 (Rep. Petrarca)	529
56 (Rep. Dunbar)	40
57 (Rep. Nelson)	111
58 (Rep. Davanzo)	113
59 (Rep. Reese)	396
60 (Rep. Pyle)	288
61 (Rep. Hanbidge)	1,243
62 (Rep. Struzzi)	416
63 (Rep. Oberlander)	307
64 (Rep. James)	335
65 (Rep. Rapp)	294
66 (Rep. Dush)	418
67 (Rep. Causer)	226
68 (Rep. Owlett)	778
69 (Rep. Metzgar)	305
70 (Rep. Bradford)	1,283
71 (Rep. Rigby)	387
72 (Rep. Burns)	221
73 (Rep. Sankey)	313
74 (Rep. Williams)	396
75 (Rep. Gabler)	378
76 (Rep. Borowicz)	1,114
77 (Rep. Conklin)	84
78 (Rep. Topper)	508
79 (Rep. Schmitt)	720
80 (Rep. Gregory)	69
81 (Rep. Irvin)	166
82 (Rep. Hershey)	634
83 (Rep. Wheeland)	705
84 (Rep. Everett)	254
85 (Rowe)	325
86 (Rep. Keller)	487
87 (Rep. Rothman)	1,111
88 (Rep. Delozier)	216
89 (Rep. Kauffman)	526
90 (Rep. Schemel)	17
91 (Rep. Moul)	683
92 (Rep. Keefer)	402
93 (Rep. Jones)	598
94 (Rep. Saylor)	66
95 (Rep. Hill-Eans)	-
96 (Rep. Sturla)	-

Clean Energy Jobs by District: State Assembly continued

District	Total Clean Energy Jobs
97 (Rep. Mentzer)	-
98 (Rep. Hickernell)	352
99 (Rep. Zimmerman)	145
100 (Rep. Cutler)	184
101 (Rep. Ryan)	703
102 (Rep. Diamond)	107
103 (Rep. Kim)	1,074
104 (Rep. Helm)	463
105 (Rep. Lewis)	-
106 (Rep. Mehaffie)	-
107 (Rep. Masser)	763
108 (Rep. Culver)	49
109 (Rep. Millard)	157
110 (Rep. Pickett)	320
111 (Rep. Fritz)	631
112 (Rep. Mullins)	1,016
113 (Rep. Flynn)	455
114 (Rep. Kosierowski)	137
115 (Rep. Madden)	645
116 (Rep. Toohil)	616
117 (Rep. Boback)	361
118 (Rep. Carroll)	489
119 (Rep. Mullery)	556
120 (Rep. Kaufer)	28
121 (Rep. Pashinski)	104
122 (Rep. Heffley)	308
123 (Rep. Goodman)	395
124 (Rep. Knowles)	246
125 (Rep. Tobash)	222
126 (Rep. Rozzi)	415
127 (Rep. Caltagirone)	41
128 (Rep. Gillen)	395
129 (Rep. Cox)	62
130 (Rep. Maloney)	261
131 (Rep. Simmons)	1,006
132 (Rep. Schlossberg)	538
133 (Rep. McNeill)	773
134 (Rep. Mackenzie)	269
135 (Rep. Samuelson)	154
136 (Rep. Freeman)	425
137 (Rep. Emrick)	341
138 (Rep. Hahn)	313
139 (Rep. Peifer)	294
140 (Rep. Galloway)	1,154
141 (Rep. Davis)	103
142 (Rep. Farry)	634
143 (Rep. Ullman)	1,257
144 (Rep. Polinchock)	83
145 (Rep. Staats)	24
146 (Rep. Ciresi)	212
147 (Rep. Toepel)	128
148 (Rep. Daley)	1,324
149 (Rep. Briggs)	1,326
150 (Rep. Webster)	24
151 (Rep. Stephens)	670
152 (Rep. Murt)	460
153 (Rep. Sanchez)	392
154 (Rep. McCarter)	187
155 (Rep. Otten)	481
156 (Rep. Comitta)	2,275
157 (Rep. Shusterman)	487
158 (Rep. Sappey)	372
159 (Rep. Kirkland)	621
160 (Rep. Barrar)	58
161 (Rep. Krueger)	982
162 (Rep. Delloso)	571
163 (Rep. Zabel)	708
164 (Rep. Davidson)	-
165 (Rep. O'Mara)	440
166 (Rep. Vitali)	-
167 (Rep. Howard)	-
168 (Rep. Quinn)	19
169 (Rep. Klunk)	56
170 (Rep. White)	239
171 (Rep. Beninghoff)	33
172 (Rep. Boyle)	515
173 (Rep. Driscoll)	-
174 (Rep. Neilson)	-
175 (Rep. Isaacson)	2,621
176 (Rep. Rader)	159
177 (Rep. Hohenstein)	175
178 (Rep. Thomas)	81
179 (Rep. Dawkins)	212
180 (Rep. Cruz)	-
181 (Rep. Kenyatta)	74
182 (Rep. Sims)	2,195
183 (Rep. Mako)	174
184 (Rep. Fiedler)	286
185 (Rep. Donatucci)	100
186 (Rep. Harris)	74
187 (Rep. Day)	2,303
188 (Rep. Roebuck)	99
189 (Rep. Brown)	34
190 (Rep. Green)	74
191 (Rep. McClinton)	-
192 (Rep. Cephas)	26
193 (Rep. Ecker)	380
194 (Rep. DeLissio)	303
195 (Rep. Bullock)	-
196 (Rep. Grove)	9
197 (Rep. Burgos)	-
198 (Rep. Youngblood)	61
199 (Rep. Gleim)	0
200 (Rep. Rabb)	-
201 (Rep. Kinsey)	32
202 (Rep. Solomon)	-
203 (Rep. Fitzgerald)	-

Methodology

The analysis expands on data from the 2020 U.S. Energy and Employment Report (USEER) produced by the Energy Futures Initiative (EFI) in partnership with the National Association of State Energy Officials (NASEO), using data collected and analyzed by the BW Research Partnership. The USEER analyzes data from the U.S. Bureau of Labor Statistics (BLS) Quarterly Census of Employment and Wages (QCEW) to track employment across many energy production, transmission, and distribution subsectors. In addition, the 2020 USEER relies on a unique supplemental survey of 30,000 business representatives across the United States. Created and conducted by BW Research and approved by the Office of Management and Budget and U.S. Department of Energy (DOE), this survey is used to identify energy-related employment within key subsectors of the broader industries as classified by the BLS and to assign them into their component energy and energy efficiency sectors.

E2 is a partner on the USEER, which was first released by the Department of Energy in 2016. The 2020 USEER was released on March 23, 2020 and is available at www.usenergyjobs.org.

An FAQ is also available here to answer any questions.

ENDNOTES

1 Unless otherwise stated, all data is from the 2020 U.S. Energy and Employment Report (USEER), March 2020, NASEO and EFI. All employment findings in USEER is based on survey and data analysis collected from Q4 2019 prior to any onset of the COVID-19 crisis. See Pages 201-206 for methodology questions.

2 USEER 2019 Employer Survey.

3 Based on the 2019 U.S. Energy and Employment Report individual state snapshot for Pennsylvania, available at http://usenergyjos.org.

4 United States Bureau of Labor Statistics (BLS) Q2 employment (2017, 2018, 2019), all ownerships.

5 Solar Grazing Foundation Brochure, available at https://solargrazing.org/wp-content/uploads/2019/06/Solar-Grazing-Brochure.pdf.

6 https://www.dep.pa.gov/Business/Energy/OfficeofPollutionPrevention/SolarFuture/Pages/Finding-Pennsylvania%E2%80%99s-Solar-Future.aspx#:~:text=Finding%20Pennsylvania's%20Solar%20Future%20aims,more%20solar%20energy%20by%202030.

7 Advanced Energy Economy, May 2020. Electric Transportation Supply Chain in Pennsylvania, May 2020. Available at https://www.aee.net/articles/report-pennsylvania-could-leverage-electric-vehicle-supply-chain-for-economic-growth.

8 Advanced Energy Economy, May 2020.

9 NRDC. 15 States Take Historic Action on Transportation. Available at https://www.nrdc.org/experts/patricio-portillo/15-states-take-historic-action-transportation-pollution.

10 https://www.bls.gov/opub/ted/2020/union-membership-rate-8-point-6-percent-in-manufacturing-23-point-4-percent-in-utilities-in-2019.htm?view_ful.

11 Based on the metropolitan and nonmetropolitan area definitions used by the Bureau of Labor Statistics' OES survey, see the MSA definitions page available at https://www.bls.gov/oes/current/oessrcma.htm.

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About E2

E2 (Environmental Entrepreneurs) is a national, nonpartisan group of business leaders, investors and others who advocate for smart policies that are good for the environment and good for the economy. For additional insight into E2's Clean Jobs America 2020 or our other annual Clean Jobs America reports, visit e2.org/reports.

KEEA is Pennsylvania's trade association for the energy efficiency industry. Our membership, comprised of 75 companies, ranges from small local businesses to large multinational corporations, and operates across the value chain of energy efficiency. We engage our membership and key policymakers at the state and local level to expand the market and jobs for energy efficiency. keea.org

Green Building Alliance (GBA) advances innovation in the built environment by empowering people to create environmentally, economically and socially vibrant places. Founded in 1993, GBA is an independent 501(c)3 nonprofit organization—and one of the oldest regional green building organizations in the United States. GBA proudly serves Pittsburgh and the 26 counties of Western Pennsylvania, with stakeholders across the Mid-Atlantic, United States, and the world. go-gba.org

Green Building United promotes the development of buildings that are sustainable, healthy for inhabitants, resilient, and cost effective. Through education, advocacy, and strategic initiatives Green Building United informs and engages individuals and organizations to transform the way buildings and communities are designed, built, and operated. greenbuildingunited.org

The Sustainable Business Network of Greater Philadelphia (SBN) is building a just, green, and thriving economy in the region. We empower the local independent business community to be change agents in the movement towards equity and climate resilience, and advocate with them and on their behalf to ensure that an equitable and climate resilient local economy is fully supported to grow and thrive. sbnphiladelphia.org

Sustainable Pittsburgh is a 501(c)(3) nonprofit, Sustainable Pittsburgh empowers decision-making that builds a fundamentally equitable, resilient, healthy, and prosperous region. The organization works with hundreds of businesses, nonprofits, municipalities, and other organizations throughout southwestern Pennsylvania to advance policy, share expertise, and create community. Learn more at SustainablePittsburgh.org.

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Good for the Environment.