



# Ohio Solar Energy & Wind Power Supply Chain Businesses:

Good for Manufacturing Jobs, Good for Economic Growth  
and Good for Our Environment



**ENVIRONMENTAL LAW & POLICY CENTER**



# Ohio Clean Energy Supply Chain

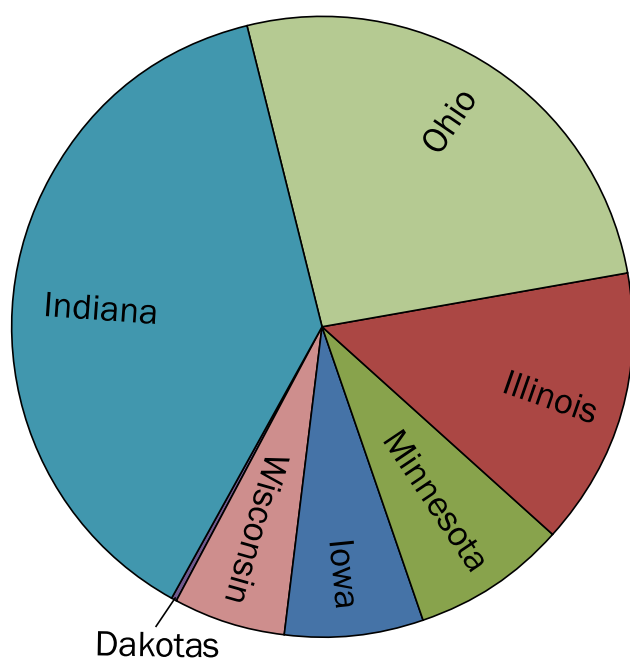
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## Report Findings At-A-Glance:

- 207 Ohio companies supply the solar industry
- 134 Ohio companies supply the wind industry
- 20 Ohio companies supply both industries

## Ohio Clean Energy Leadership

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**Ohio has the second-most installed solar capacity in the Midwest region, (119 MW), and there is tremendous opportunity for growth.**

**The 207 Ohio businesses that supply the solar industry include a large number of component and equipment manufacturers.**

**Many of the state's plastic and glass manufacturers have taken advantage of the growing demand for solar energy. They are retooling to become suppliers in the new clean energy economy.**

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# About the Supply Chain Series ---

The Environmental Law & Policy Center’s *Clean Energy Supply Chain* series examines the breadth of the wind power and solar energy industries in Midwest states. From manufacturing and system design to site planning, engineering, construction and installation, there are hundreds of businesses that employ thousands of workers in the clean energy sector. Each report includes company listings, maps and profiles as well as detailed information about the state and federal policies that can help support clean energy. To view all of ELPC’s state reports and interactive maps, visit [www.ELPC.org/SupplyChain](http://www.ELPC.org/SupplyChain).

# Introduction: Renewables Are Powering Manufacturing Jobs & Economic Growth in Ohio

**Ohio's 2008 clean energy legislation put the state on a path that emphasized renewable energy and energy efficiency, making Ohio a clean energy leader in the Midwest. Five years of strong progress were followed by roadblocks in 2014, when the legislature froze clean energy standards. Ohio is now at a crossroads. Governor Kasich stated that Ohio will continue moving toward a clean energy future that emphasizes renewable energy and energy efficiency. Consistent with the Governor's statements, this report demonstrates how clean wind and solar energy generate economic benefits that can be accelerated by strong policy drivers.**

The nation is moving toward clean energy despite the uncertainty regarding carbon pollution standards in the United States. This movement has both consumer and environmental benefits. When we combine renewable energy with energy efficiency, we lower customers' bills, provide a hedge against volatility in the electricity market, create jobs in the burgeoning clean energy supply chain, and reduce harmful pollution.

Ohio was previously on track to comply with its Renewable Portfolio Standard (RPS), which required that 12.5% of electricity sold in the state come from renewable energy sources by 2025. But in 2014, Ohio adopted SB310 to put a freeze on the RPS and Energy Efficiency Resource Standard (EERS). This legislation has already slowed Ohio's progress on attracting renewable energy businesses to the state, and it threatens the state's chances for cost-effective compliance with the Clean Power Plan.

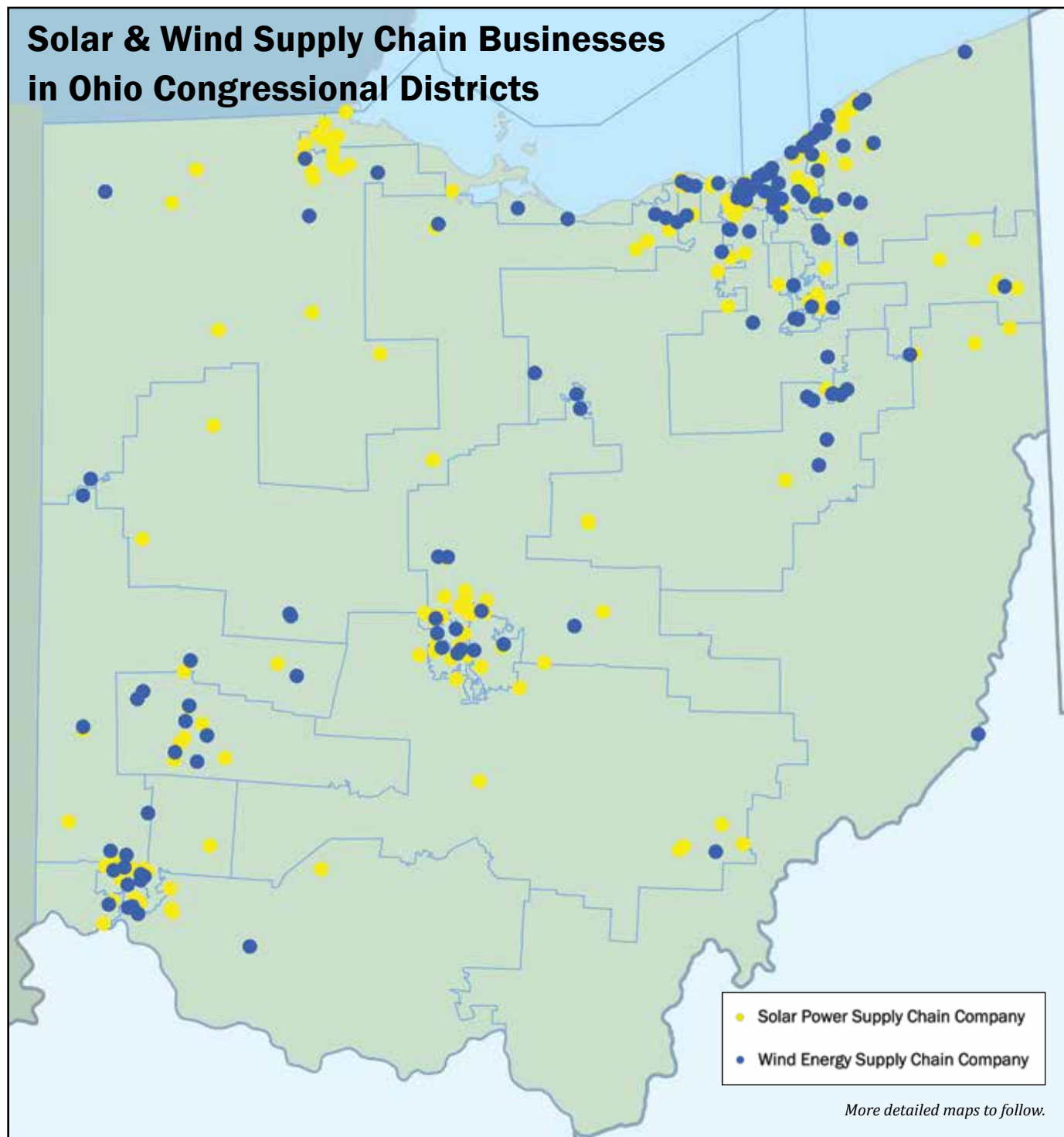
With stronger RPS and EERS policies, the state's clean energy sector can continue to be an economic engine. Here is what makes Ohio a prime location to be the next renewable energy hub:

- **Established Manufacturing Base and Trained Workforce.** Ohio has a strong manufacturing base and trained workforce that are well-suited to produce the equipment for a growing clean energy economy.

- **Central Location with Proven Transportation and Logistics.** Ohio's manufacturing sector has benefited from its central location and transportation system. Ohio is within 600 miles of 62% of all U.S. and Canadian manufacturing locations. As Midwest and other nearby states' Renewable Electricity Standards eventually call for more renewable energy capacity, Ohio is well-positioned in the middle of a huge market for solar and wind power installations.

- **Research Centers and Technical Talent.** Ohio is home to many institutions that encourage the growth and development of the renewable energy industry. For example, research programs at the University of Toledo have helped the region become a center for the production of flexible sheets of "thin film" photovoltaic cells. Battelle, the large non-profit independent research and development firm, is headquartered in Columbus. EWI, also in Columbus, is an engineering and technology organization that provides applied research and manufacturing support to many industries.

## Solar & Wind Supply Chain Businesses in Ohio Congressional Districts





# Smart Renewable Energy Policies Make A Difference

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**Federal and state policies are key to encouraging investment that can grow the wind power and solar energy industries, creating more jobs and economic growth.**

## Ohio Policies

### **Renewable Energy and Energy Efficiency Standards.**

In 2008, Ohio enacted clean energy legislation containing both renewable energy and energy efficiency benchmarks. The standards called for 12.5% renewables by 2025 as well as cumulative electricity savings of 22% by 2025, with annual benchmarks. New legislation froze these standards in 2014, pushing back all of the subsequent annual requirements through the end of 2016. The new statute also removed in-state purchasing requirements, which hurt the wind and solar supply chains in Ohio. The freeze is scheduled to end December 31, 2016, unlocking opportunities to expand solar energy and wind power in ways that create jobs and economic development.

**Net Metering and Interconnection.** In 2014, the Public Utilities Commission of Ohio finalized new rules for net metering and interconnection of distributed generation systems, such as rooftop solar. However, the Commission retracted the rules later that same year, creating

uncertainty regarding investments in renewable energy at homes and businesses. If the Ohio legislature recommitments to better energy efficiency and renewable energy policies, and the Commission does the same with respect to net metering rules, the state can continue creating even more renewable energy manufacturing, installation and related jobs. The solar and wind industries mean real jobs and real economic opportunity for Ohio.

## Federal Policies

**Federal Tax Credits.** In December 2016, Congress passed multi-year extensions of several renewable energy tax credits that are important to Ohio's renewable energy success:

- *Production Tax Credit (PTC).* The PTC currently provides a credit of 2.3 cents per kilowatt hour for wind projects. The PTC will ramp down to 80% in 2018, 60% in 2019, 40% percent in 2020 and expire in 2021.
- *Investment Tax Credit (ITC).* In lieu of the PTC, the ITC



offers a credit equal to 30% of expenditures for solar and small wind projects with no maximum credit for the years 2017 through 2019. The credit ramps down to 26% in 2020 and 22% in 2021. Thereafter the credit will decrease to 10% and become permanent.

- *Residential Renewable Energy Tax Credit.* Homeowners can receive a personal income tax credit for up to 30% of the cost of a solar thermal or photovoltaic system (100 kilowatts or less) installed on their residence. This credit decreases to 26% in 2020, 22% in 2021, and then expires.

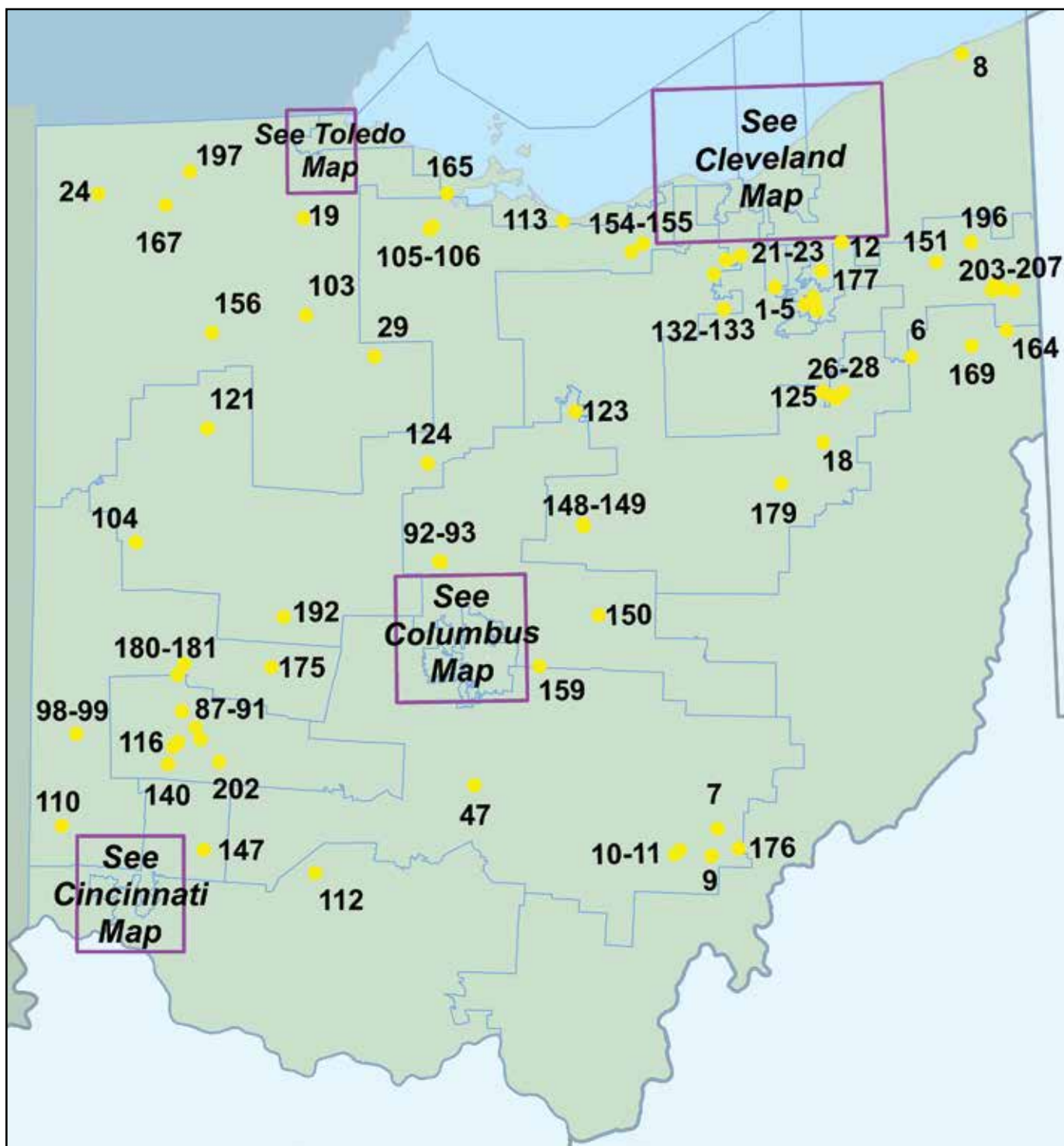
**USDA Rural Energy for America Program (REAP) Grants and Loans.** The REAP should be fully funded and expanded. REAP is a competitive grant and loan guarantee program to promote renewable energy and energy efficiency for agricultural producers and rural small businesses. REAP grants range from \$2,500 to \$500,000 and cover up to 25% of eligible project costs. In 2014, Congress reauthorized mandatory funding for REAP — \$250 million over 5 years. Ohio received \$16.9 million in grants and \$19.8 million in loan guarantees under the program between 2003 and 2015. Those federal investments, in turn, leveraged more than \$260.6 million in total investments in Ohio.

**Clean Power Plan.** The U.S. Environmental Protection Agency's (EPA) Clean Power Plan calls on the power sector to reduce its nationwide carbon pollution by 32% over 2005 levels. To reach the national target, the EPA issued state-level reduction targets based on each state's unique energy profile. Ohio must reduce its power sector carbon pollution from 102.2 million tons to 73.8 million tons by 2030. The state has already reached 78.6% of this goal through achieved and announced reductions from coal plant closures. The state can achieve more carbon pollution reductions in a variety of ways, but the most cost-effective and job-creating strategy would include greater deployment of renewable energy generation and energy efficiency resources.

The urgency for compliance changed on February 9, 2016, when the U.S. Supreme Court granted a stay of the Clean Power Plan pending the resolution of legal challenges before the D.C. Court of Appeals. Regardless of the outcome, energy efficiency and renewable energy are the key elements of a sound energy policy for the future.

## Solar Industry Supply Chain Companies in Ohio \_\_\_\_\_

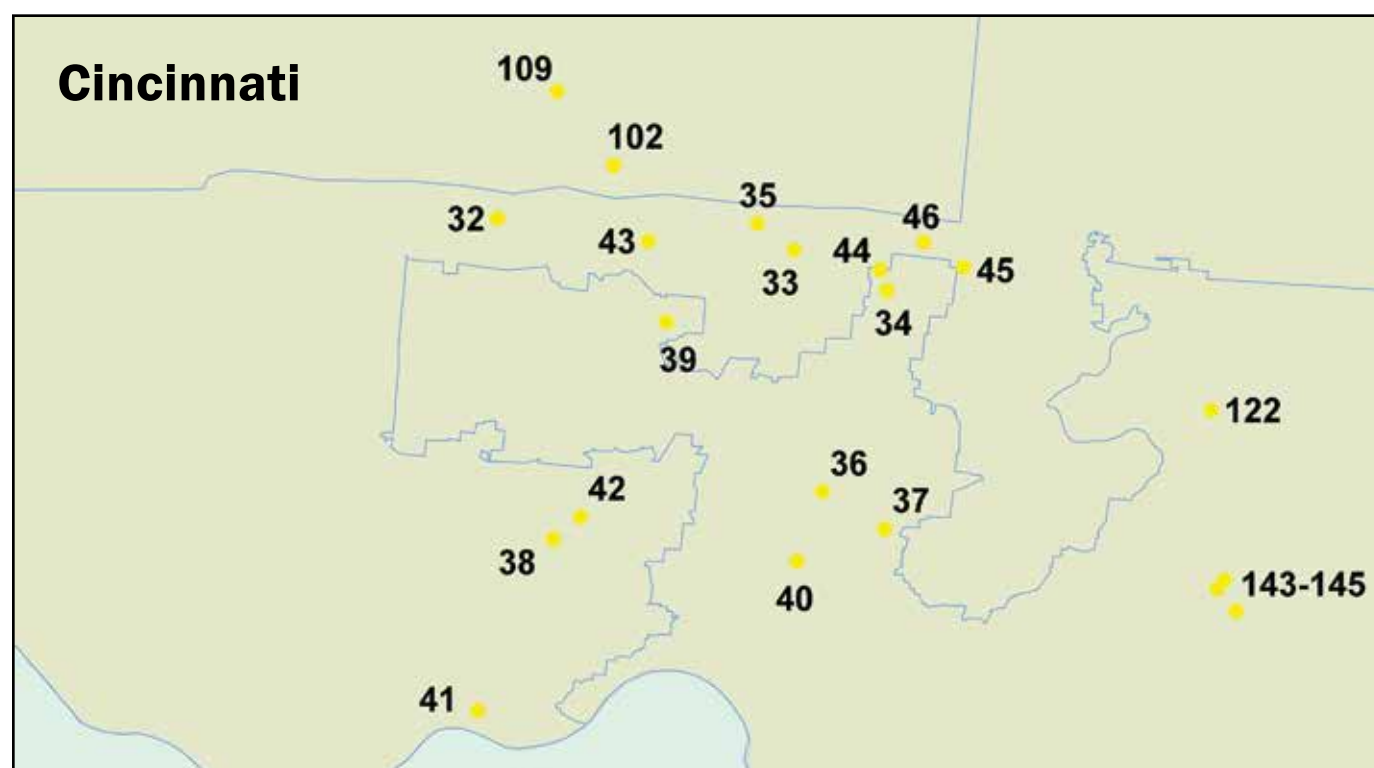
**207 Ohio companies are engaged in the solar industry. Please see the following company listings (alphabetical by city) and city-specific maps.**





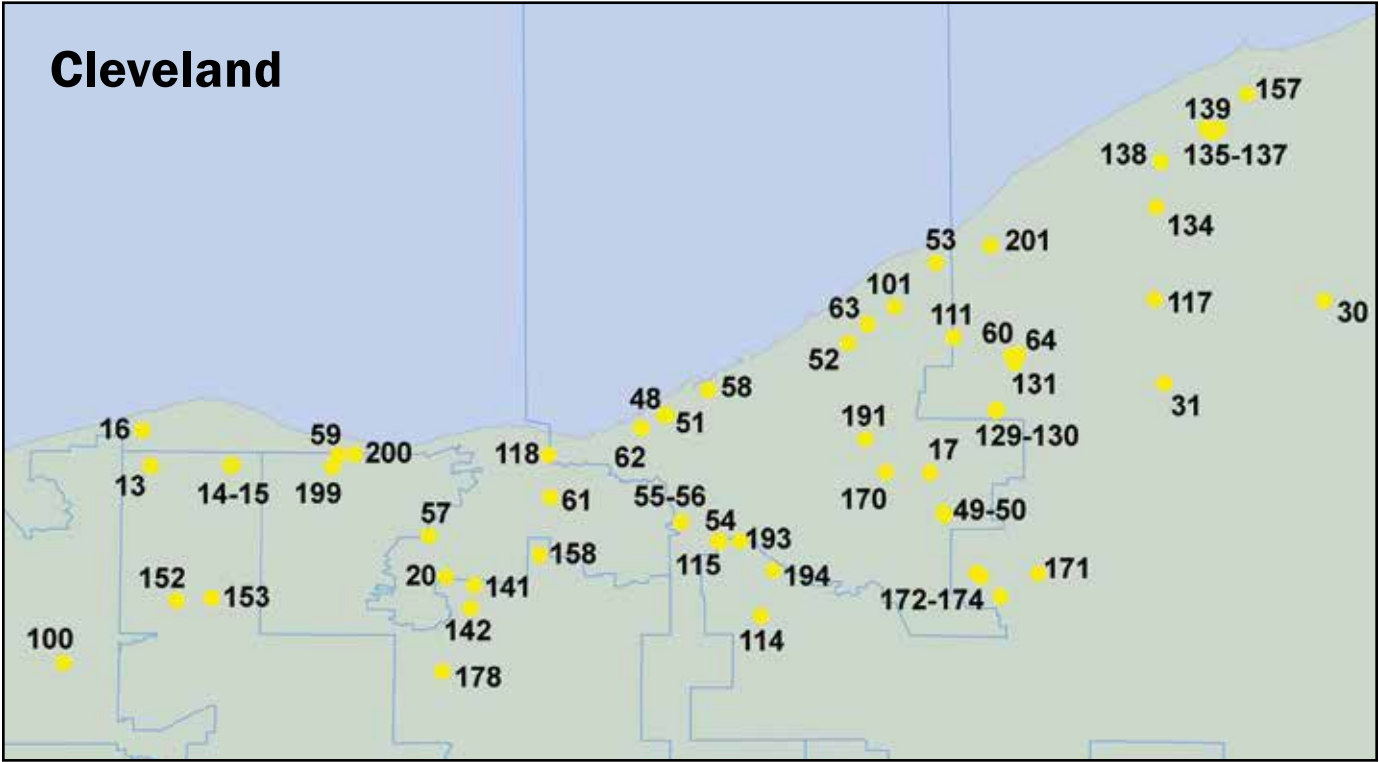


CITY .....	COMPANY .....	MAP #	
Akron.....	Fastener Technology .....	1	Bolivar..... Harris Battery .....18
Akron.....	First Energy.....	2	Bowling Green..... Marathon Special Products .....19
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Athens .....	Third Sun Solar .....	11	Canton..... Olymco .....28
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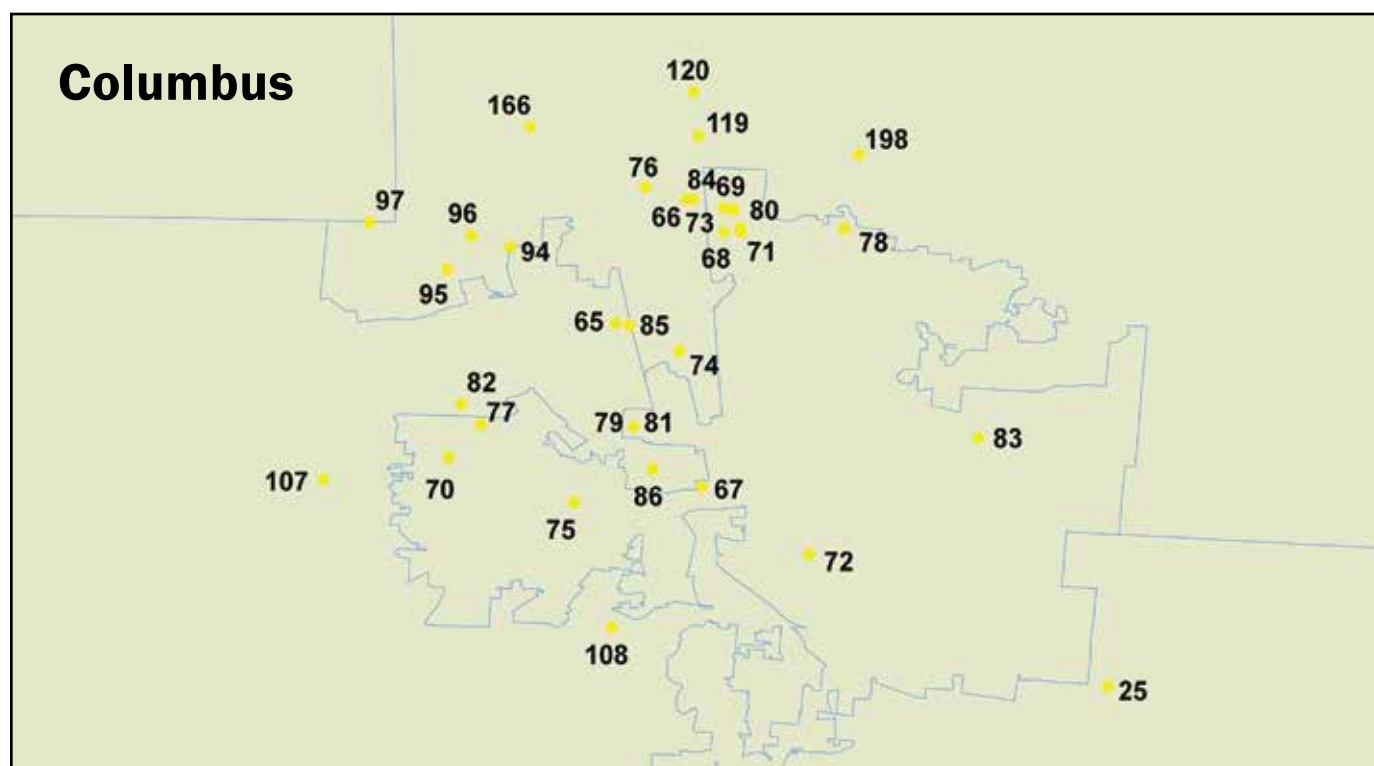
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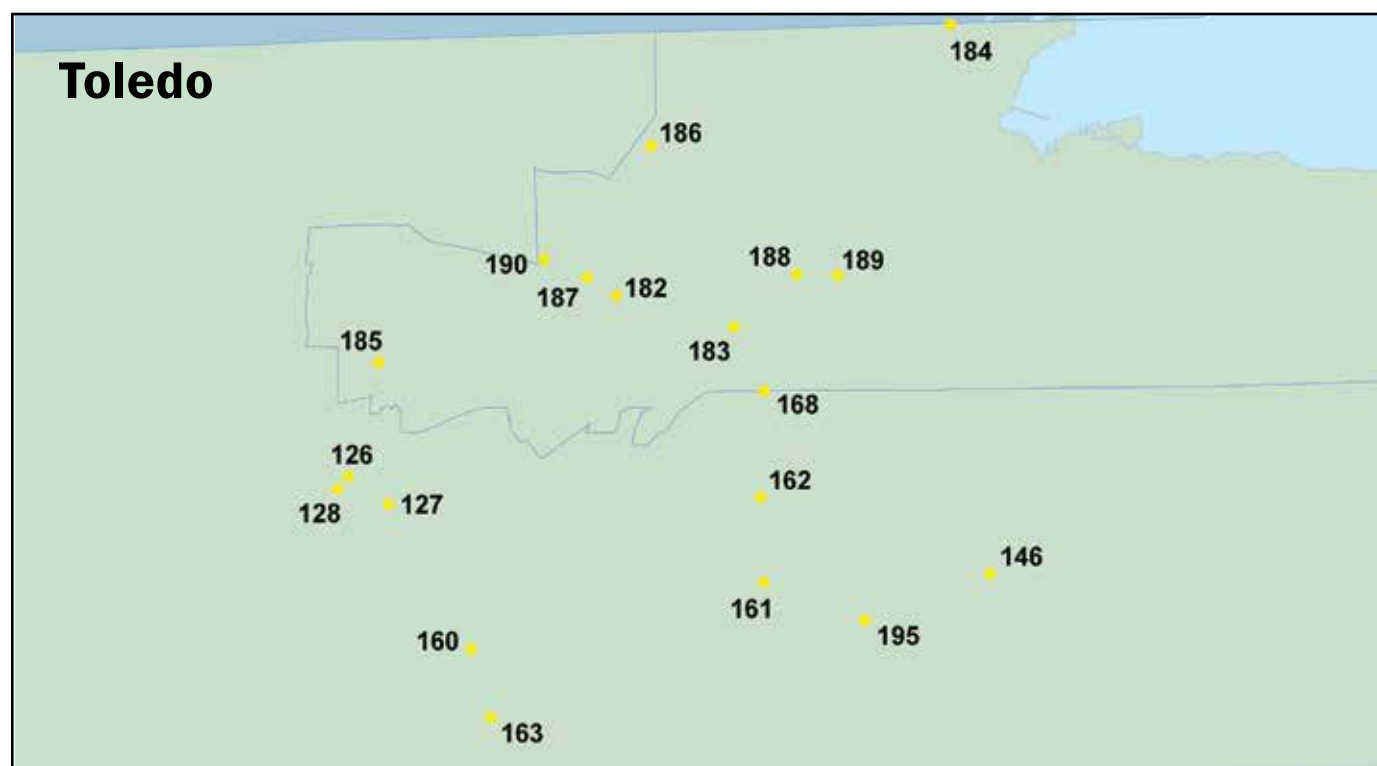
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# Solar Industry Supply Chain

## Company Profiles

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**Ohio's solar supply chain includes a large number of component and equipment manufacturers. Many of the state's plastic and glass manufacturers have taken advantage of the growing demand for solar energy equipment. They are retooling to become suppliers in the new clean energy economy. Here are some of Ohio's solar supply chain companies.**

**Art Iron — Toledo:** Art Iron is one of the Midwest's largest fabricators of steel. Its 190,000-square-foot plant in Toledo fabricates more than 18,000 tons of steel per year. The company produces solar support structures, solar canopy structures, wind turbine main frames, wind generator frames and community-scale wind towers.

**Dupont — Circleville:** DuPont's Tedlar polyvinyl fluoride film has been manufactured at its Circleville facility since 2012, after a multi-year \$295 million investment to expand the availability of the project. Tedlar film is a material used to make backsheets that protect solar panels

from all-weather conditions for the lifetime of a solar panel. The plant also makes Kapton polyimide films, which are a substrate material for flexible thin film solar panels.

**First Solar — Perrysburg:** First Solar is a global company with 6,350 employees. Six of the company's manufacturing lines are located in Ohio. First Solar addresses the full value chain, from the R&D and manufacturing of PV module technology to the design and construction of utility-scale plants. First Solar markets its high-efficiency modules as having a clear "energy density advantage" over silicon-based modules. First Solar's



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Agua Caliente Solar Project is one of the world's largest operational PV power plants with 290 MW powering 100,000 homes near Yuma, AZ. First Solar has the largest solar project pipeline in the world, with 3 GW power capacity of contracted projects.

**Melink Corporation — Milford:** Melink implements commercial and utility-scale solar projects, providing financial guidance, custom design and installation, maintenance and monitoring. For example, the company constructed a ground-mounted solar PV array at Urbana University, with 2,128 modules providing approximately 15% of the school's energy needs. Melink is also responsible for the 1.5 MW installation at the Cincinnati Zoo & Botanical Garden, providing 20% of the zoo's total power needs.

**Third Sun Solar — Athens:** Third Sun Solar is a design-build contractor for renewable energy systems, serving residential and commercial customers. The company was part of a technology start-up incubation program at Ohio University, where the company received early-stage assistance with its business planning and marketing. During its incubation year, Wayne National Forest hired Third Sun Solar to install 51 kW of solar power generation on its headquarters in Nelsonville. Since then, the company has become the leading solar installer in Ohio and a top-100 installer nationally. Third Sun Solar has now installed more than 600 projects and 11 MWs of solar energy systems in 14 states.

**RBI Solar — Cincinnati:** RBI Solar designs, engineers, manufactures and installs solar-mounting systems for commercial and utility-scale solar projects across the nation. The company completes both ground and roof mounts, as well as custom installations. One of the company's specialties is solar racking for landfills, requiring consideration of dynamic settlements, cap characteristics, slope, and stability. RBI Solar also emphasizes its "single-point responsibility" for the entire solar mounting system, from complete design and engineering to product manufacturing and on-site racking installation. RBI is a sister company of Rough

Brothers, a Cincinnati-based corporation with more than 80 years experience as a specialty design-build greenhouse firm.

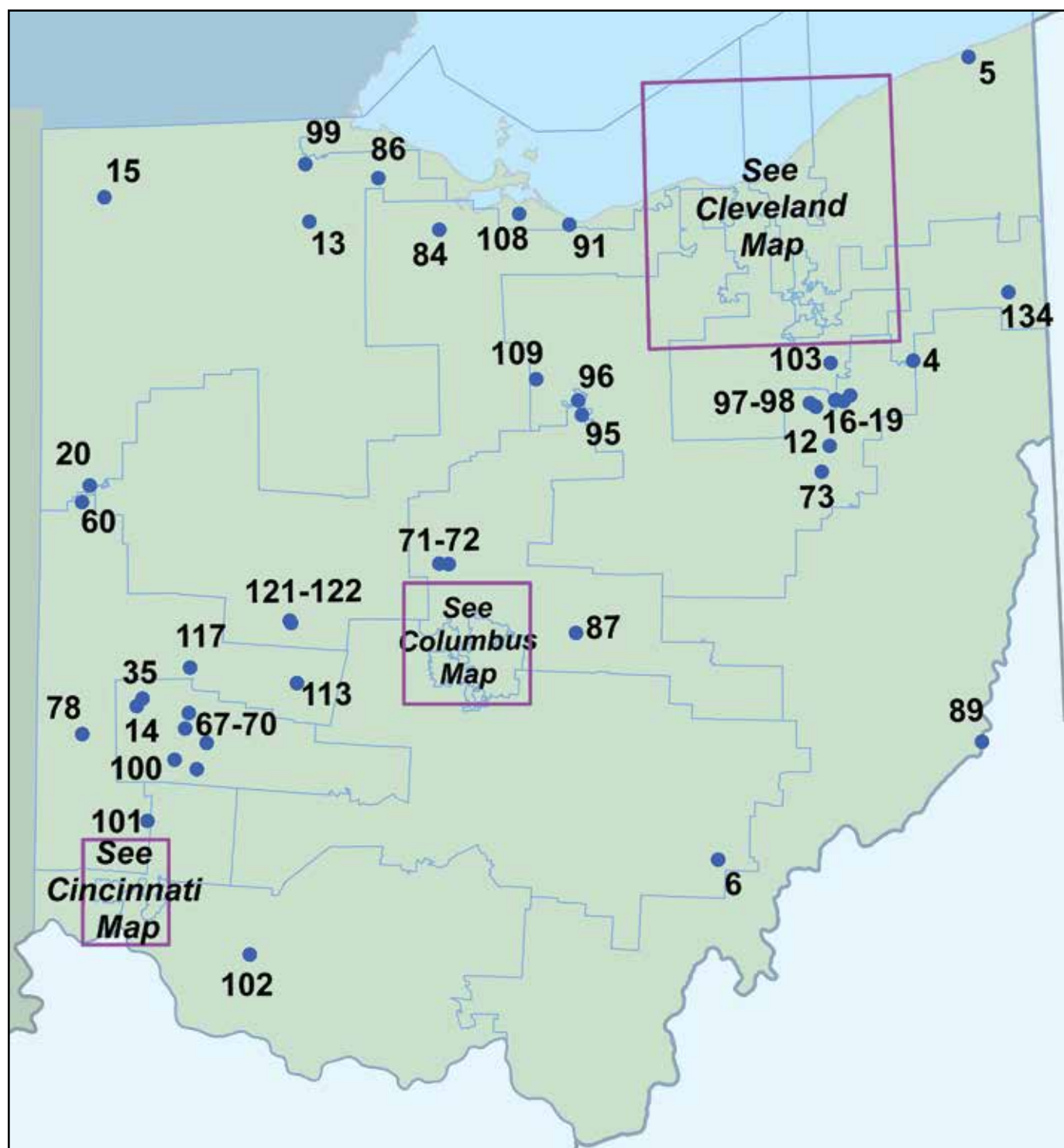
**Replex Plastics — Mt. Vernon:** Replex Plastics manufactures, shapes, trims, coats, cuts, sells, and ships industrial thermoformed optical plastic lenses and mirrors. Replex Plastics uses advanced engineering to design, manufacture and test solar mirrors, which are used for gathering and reflecting solar energy. The company manufactures solar mirrors in three "grades" of UV absorption, allowing system designers to ensure that only the useful range of light is added to the module.

**Rittal Corporation — Urbana:** Rittal Corp. engineers and manufactures industrial and IT enclosures, racks and accessories — including high-efficiency, high-density climate control and power management systems for industrial, data center, outdoor and hybrid applications. The company provides enclosure solutions for outdoor use for central inverters in PV applications, as well as pitch control enclosures for wind turbine rotors. The company's manufacturing center in Urbana is situated on a 105-acre campus containing state-of-the-art equipment, in-house engineering and modification services. An additional warehouse space in Urbana spans another 60,000 square feet.

# Wind Industry Supply Chain Companies in Ohio

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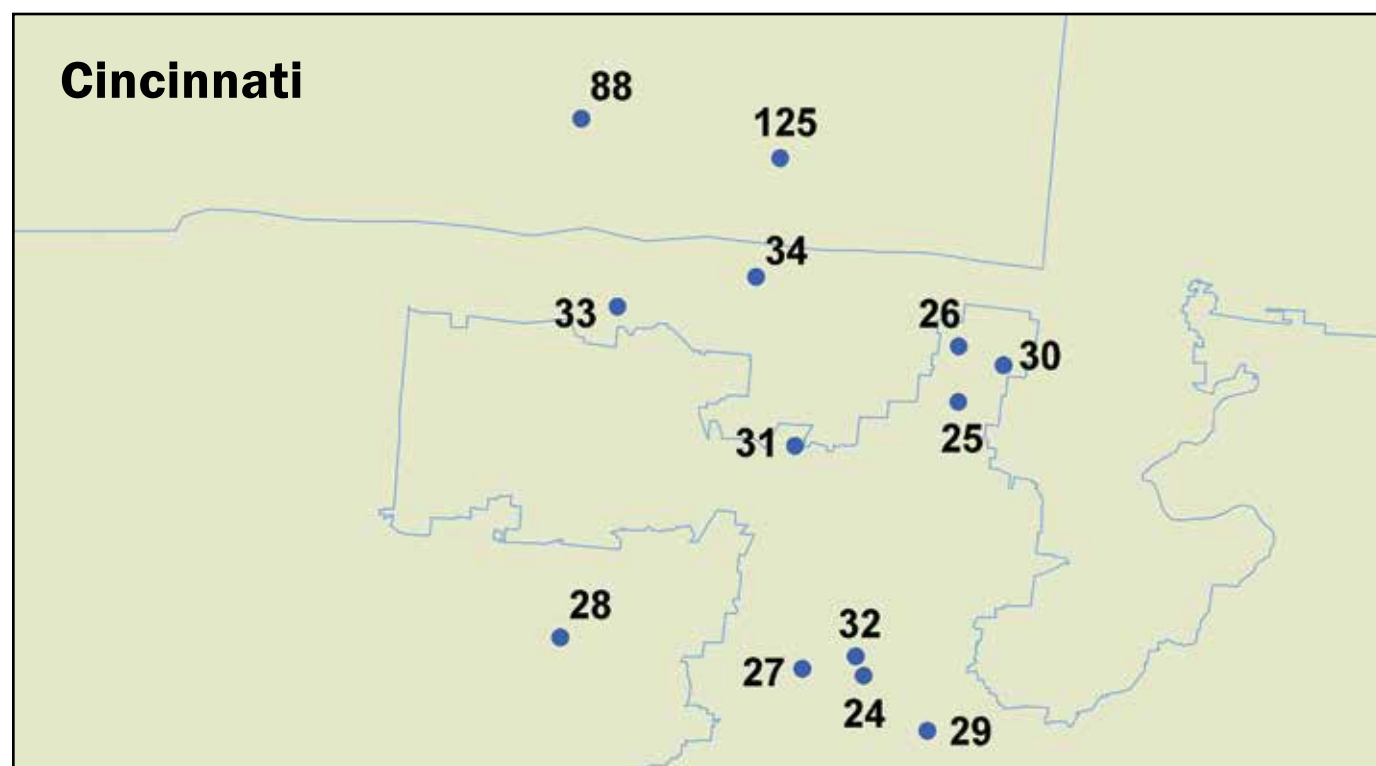
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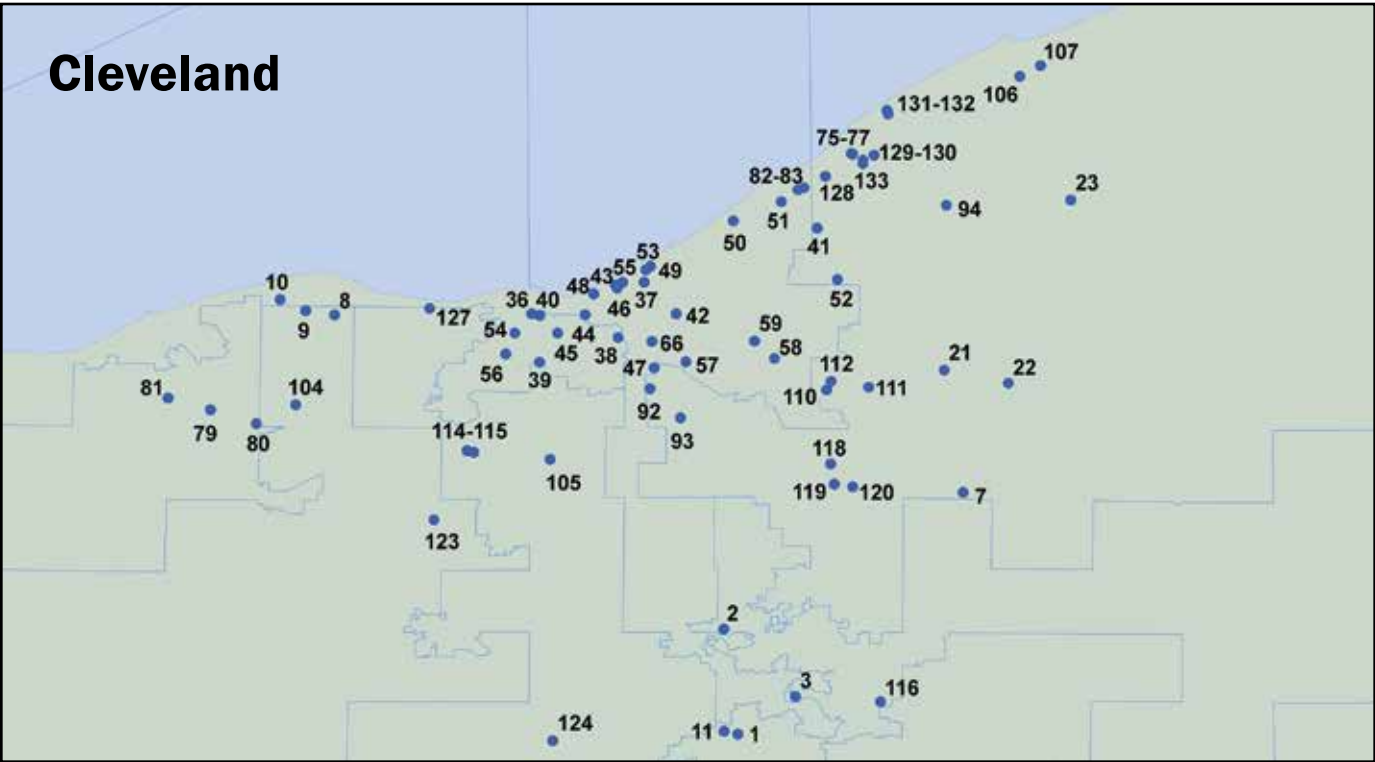
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# Wind Industry Supply Chain

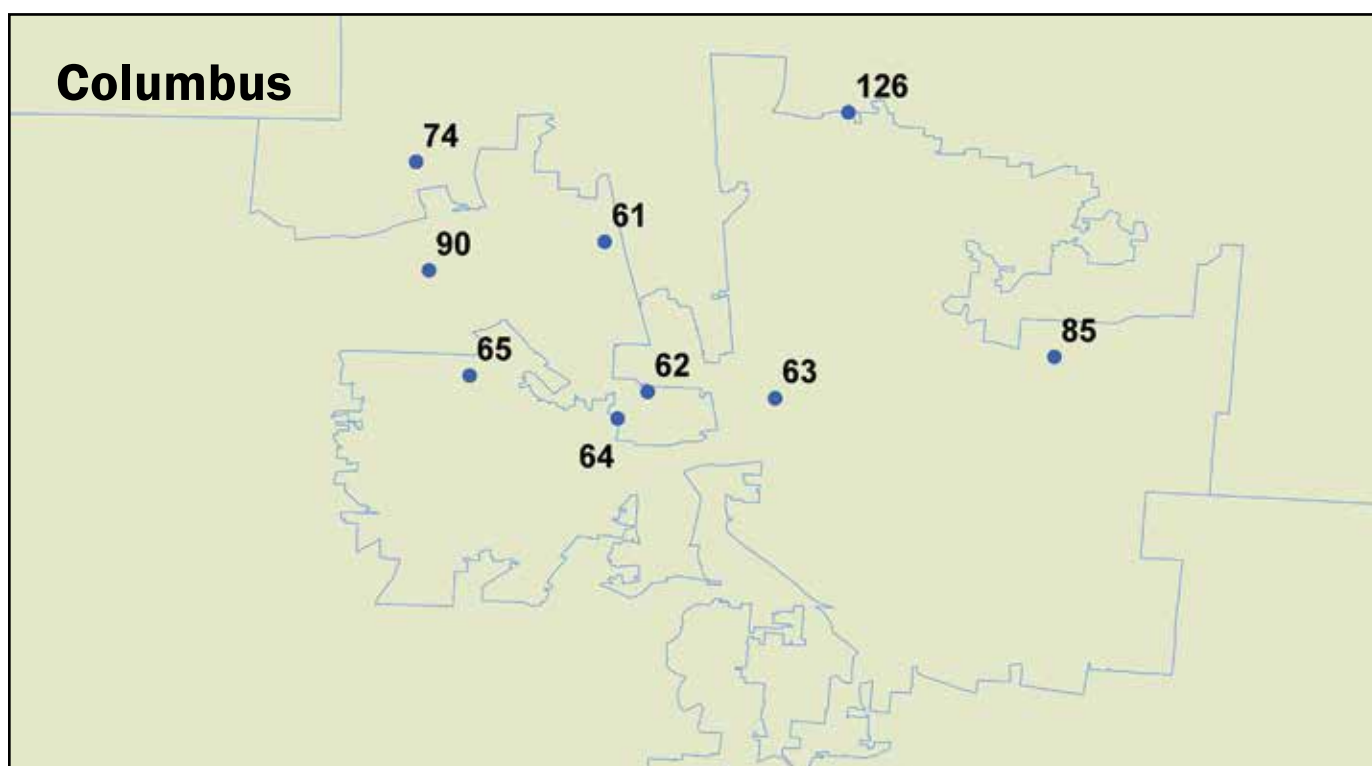
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# Wind Industry Supply Chain Company Profiles

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**Ohio has 134 wind supply chain companies, ranging from old-line manufacturers to new entrepreneurial ventures. Half of the suppliers are component manufacturers, while about a dozen are small wind turbine manufacturers. All of the companies tell a similar story about the importance of wind energy demand to spur job creation and growth of this business sector.**

## **Cast-Fab Technologies — Cincinnati:**

Cast-Fab Technologies is a 90-year-old metal casting foundry, metal fabrication and machining shop. The company supplies a broad customer base with gray and ductile iron castings, patterns, steel-welded fabrications, and precision sheet metal components. Cast-Fab produces wind turbine castings of rotor hubs, bedplates, support bases, nacelles and gear box housings.

**Hughey & Phillips — Urbana:** Hughey & Phillips designs and manufactures obstruction lighting technology. The company's low-, medium- and high-intensity lighting technology provides illumination for wind turbines as well as communication towers, buildings, smokestacks, bridges and other obstructions to aerial navigation. Hughey & Phillips also provides engineering design for optical, electrical and mechanical projects.

# Wind Industry Supply Chain Company Profiles

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## **Cincinnati Gearing Systems — Cincinnati:**

Cincinnati Gearing Systems is a precision gear and transmission design manufacturer of products for the oil and gas, transportation, military, marine and wind industries. The company has serviced more than 1,000 wind turbine gearboxes over the last 25 years. It offers replacement hardware and contact repairs for wind turbine components, shafts, housings and bearings. Cincinnati Gearing Systems provides engineering, inspection, and design services for turbines ranging from 250 Kw to 2.5 MW.

**Dovetail Solar and Wind — Athens:** Dovetail has more than 21 years experience in renewable energy system design, installation and green building. Founded in 1995, Dovetail has completed more than 400 system installations totaling more than 15.6 MW of wind, solar PV and solar thermal. The company has five locations in Ohio — Athens, Cleveland, Columbus, Cincinnati and Toledo —

and serves the region. Dovetail works to buy many of its components locally and gives back to the community by teaching classes at local community colleges.

**Dyson Corporation — Painesville:** Dyson was founded in 1884 as a specialty forge shop in Cleveland. Today, the forgings made at its Painesville plant range in size from 0.5 to 10,000 pounds. For the wind industry, Dyson manufactures anchor bolts, nuts, washers, bosses, screws and other fastening and forging products that can be used in the blade/hub/nacelle, tower, or foundation of a wind turbine.

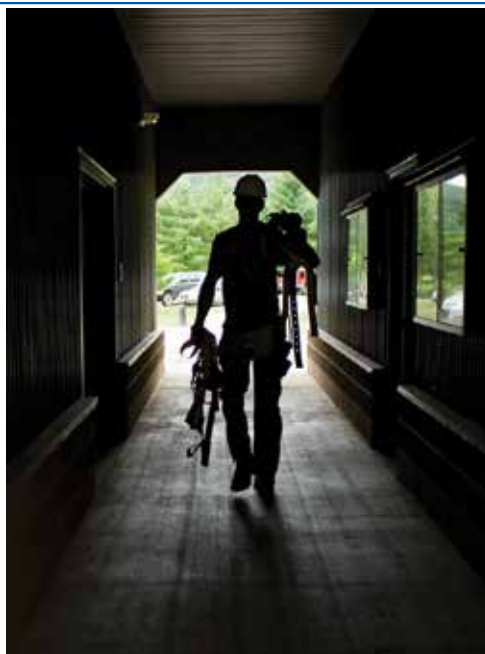
**Glebus Alloys — Akron:** Glebus Alloys manufactures self-lubricated bearings, wear plates and bushings for a variety of industries including hydropower and wind power. The company produces G-METAL, a self-lubricating technology that lowers maintenance costs, decreases down time, eliminates complex lubrication



systems, and reduces polluting effects. Glebus produces yaw gears, pitch bearings and self-lubricating sliding parts for the wind industry. The Poland-based company has six sales employees in Ohio.

**Owens Corning — Toledo:** Owens Corning operates in three areas — insulation, roofing, and composites — the last of which supplies the wind industry. The company has developed a fiberglass reinforcement for the wind industry called WindStrand Plus. This product allows turbine blade manufacturers to increase the length of the blades without increasing the weight, thereby generating more power from the same turbine at a lower cost. The company's trademarked Ultrablade technology enables the construction of longer, lighter and more efficient turbine blades. Owens Corning also does business in residential energy efficiency.

**Timken — Canton:** Timken produces highly engineered bearings and wind turbine main shafts for the wind industry. It also provides aftermarket products such as bearing re-manufacturing and condition monitoring services. The company has been supplying the wind energy market since 1982. In addition to supplying the U.S. market, Timken exports to China as part of a joint venture with a Chinese manufacturer.



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## Environmental Law & Policy Center

The Environmental Law & Policy Center is the Midwest's leading public interest environmental legal advocacy and eco-business innovation organization. We develop and lead successful strategic advocacy campaigns to improve environmental quality and protect our natural resources. We are public interest environmental entrepreneurs who engage in creative business dealmaking with diverse interests to put into practice our belief that environmental progress and economic development can be achieved together. ELPC's multidisciplinary staff of talented and experienced public interest attorneys, environmental business specialists, public policy advocates and communications specialists brings a strong and effective combination of skills to solve environmental problems.

ELPC's vision embraces both smart, persuasive advocacy and sustainable development principles to win the most important environmental cases and create positive solutions to protect the environment. ELPC's teamwork approach uses legal, economic and public policy analysis, and communications advocacy tools to produce successes. ELPC's strategic advocacy and business dealmaking involves proposing solutions when we oppose threats to the Midwest environment. We say "yes" to better solutions; we don't just say "no."

ELPC was founded in 1993 and has achieved a strong track record of successes on national and regional clean energy development and pollution reduction, transportation and land use reform, including high-speed rail development, and natural resources protection issues. ELPC's creative public advocacy effectively links environmental progress and economic development together and improves the quality of life in our Midwestern communities.

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