

Growing Ohio's Green Energy Economy

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Environment Ohio Research & Policy Center
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The data included in this report is not exclusive. If you know of a company that is involved in the renewable energy industry that is not included in this data please email info@environmentohio.org

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EXECUTIVE SUMMARY

Ohio's economy is in crisis. Unemployment has reached 9.4 percent, a 25-year high. Major employers, such as DHL, Longaberger, and Limited Brands, have laid off hundreds of employees across the state.

While every industry has suffered under this economic catastrophe to some extent, renewable energy holds great promise to become one of Ohio's leading economic growth engines during the recovery ahead. By taking advantage of local resources like wind and solar power, Ohio can reduce air pollution, create green energy jobs and grow the economy.

The good news is that Ohio is already part of the way there. With a well-developed industrial backbone, a strong labor force, access to raw materials, and nationally recognized higher learning institutions, Ohio is already positioning itself to capitalize on the burgeoning green energy economy. This report evaluates the contribution renewable energy is already making to Ohio's economy, and points toward the potential for future growth.

Ohio is home to more than 440 businesses and research institutions in the solar, wind, biomass, geothermal, and fuel cell industries.

- There are more than 115 businesses and research institutions involved in the solar energy supply chain in Ohio. These companies range from small solar installation companies, to businesses that employ nearly 700 people. In the Toledo area alone more than 6,000 people work in the solar industry.
- More than 220 businesses and research institutions are involved in Ohio's wind energy supply chain, and more than 1,000 companies have been identified as eligible to transition into manufacturing components for the wind energy supply chain. This is especially remarkable given that only four large scale wind turbines have been installed in Ohio as of the end of 2008.
- More than 60 businesses and research institutions in Ohio that are involved in the biomass industry and over 1,300 wood manufacturing companies in Ohio produce residues that are capable of being converted into biomass energy.

Table 1. Green Energy Jobs in Ohio

Renewable Energy Sector	Total Businesses	Renewable Energy Businesses	Auxiliary Services*
Wind	269	221	48
Solar	160	118	42
Biomass	101	62	39
Geothermal	130	93	37
Fuel Cells	159	115	44
TOTAL**	502	444	62

*Auxiliary Services include but are not limited to: Consultants, Non-profits, and Law firms.

**Many of the renewable energy firms are involved in various renewable energy sectors

- More than 90 businesses and research institutions in Ohio are involved in the geothermal industry. Studies estimate that Ohio could generate more than 1,800 jobs from geothermal development.
- More than 115 businesses and research institutions in Ohio are involved in the fuel cell industry. Every 1,000 MW of energy built from fuel cells creates approximately 5,000 jobs.
- More than 60 organizations are involved in providing auxiliary services to these renewable energy industries. These services include consulting, legal, non-profit, and trade associations.
- Ohio's Department of Development estimates that there are already over 60,000 specialized workers supporting the state's advanced energy industries.

These renewable energy industries give vitality to Ohio's economy. The improvements made in the 2008 state energy policy and the recently passed federal economic recovery plan, which included \$32 billion for renewable energy, have helped to lay the ground work for continued growth in the green energy sectors. Ohio's leaders should take further policy actions that will reinforce the move to a green energy future.

Now, Ohio's leaders, at both the state and federal levels, should take the next steps to grow Ohio's green energy industries that will create jobs, grow our economy, and reduce pollution.

On the federal level, Ohio's Congressional leaders should:

- Enact a federal renewable electricity standard of 25 percent by 2025 that will drive up the demand for renewable energy across the country.
- Enact a federal cap and trade policy that will capture the cost of carbon emissions, and put renewable energy resources on a level playing field with fossil fuels. This policy should reduce global warming pollution by 35% by 2020 and 80% by 2050.

On the state level, Ohio's leaders should continue to pass policies that show our state's dedication to renewable energy. Ohio's state leaders should:

- Extend and increase the Ohio Advanced Energy Fund which issues grants and loans for renewable energy installations and energy efficiency improvements.
- Support a Solar Schools Initiative that would install solar panels on every public school within five years. Additionally, the state should remove any barriers to solar installations on schools, homes and businesses.
- Upgrade Ohio's tax structure to account for renewable energy production through fair and equitable taxes which will encourage renewable energy development and benefit all Ohioans.

INTRODUCTION

The energy sources Ohio depends on today create unhealthy air pollution, contribute to global warming, and are a drain on the state's economy. Over 86 percent of electricity used in the Buckeye State comes from coal-fired power plants, causing Ohio to have the second highest emissions of carbon dioxide from electricity generation of any state.¹ In addition, 70 percent of the coal burned in Ohio's power plants is imported from other states.² As a result, Ohio sends approximately \$1.7 billion annually to other states to purchase coal for its power plants.³

Beyond Ohio's addiction to dirty energy, the rest of Ohio's economy is in need of serious repair. Ohio lost over 200,000 manufacturing jobs between 2000-2007. The current economic crisis has driven the unemployment rate up to 9.4 percent in February 2009, compared to 5.3 percent a year ago.⁴

Ohio's economy needs an infusion of new energy.

The good news is Ohio has the resources right here at home to leverage its strengths and grow its economy through clean energy.

The state is blessed with significant potential to generate electricity from clean, renewable, and home-grown resources like wind and solar power – plus enormous potential to use energy more efficiently. Repowering Ohio through clean energy will begin to free our state from our overreliance on fossil fuels, make Ohio more energy independent, reduce the cost of compliance with a cap on global warming pollution, and safeguard future economic security. Moreover, tapping into Ohio's renewable energy potential will help Ohio build and diversify its economy into the 21st century.

In this report, we expose the breadth and depth of Ohio's current renewable energy industry. The results are clear: renewable energy companies are abundant in Ohio and are already contributing significantly to our state's economy. These companies provide real advantages for both Ohio's economy and environment. Given its significant level of activity already, and its massive future market potential, renewable energy should play a central part in Ohio's economic growth strategy and energy policy.

THE RENEWABLE ENERGY OPPORTUNITY

We can protect our environment and strengthen our economy by investing in clean, renewable, homegrown electricity. Growing a green energy economy is one of the wisest moves Ohio can make to increase in-state revenue, create good green jobs, and reverse the damaging environmental effects that have resulted from a historical reliance on fossil fuels.

What is a Green Job?

There are many types of jobs that one may consider “green.” In the broadest sense, any job that is part of an industry making the environment better is a “green job.” In this report, we focus on green jobs in the energy industry, or “green energy jobs.”

Green energy jobs exist within the supply chains for the wind, solar, biomass, geothermal, fuel cells, low-impact hydroelectric, and energy efficiency industries. In this report we focus exclusively on the wind, solar, biomass, geothermal and fuel cell industries.

Energy efficiency technologies and deployment are some of the most labor intensive businesses and are an important part of growing a clean energy economy. We hope to show how energy efficiency businesses contribute to Ohio’s economy in subsequent reports. However, this report focuses specifically on renewable energy generation.

Green energy jobs cover many areas of the workforce and involve each individual necessary to transform an idea for a renewable technology into a consumer good, and to install and operate the renewable technology

“To put people back to work today and reduce our dependence on foreign oil tomorrow, we will double renewable energy production and renovate public buildings to make them more energy efficient.”

-President Obama in his first radio address of 2009

to generate electricity. Thus, the green energy industry includes workers to research and develop these technologies; manufacture the component parts; construct, install, monitor, operate and maintain the completed equipment; and much more.

In this report we break down green energy jobs into two general categories:

1. Direct renewable energy development: This includes, but is not limited to, firms involved in research and development, manufacturing, marketing and selling, installing, supplying and distributing, operating and maintaining, and commercializing renewable energy systems.
2. Auxiliary services: This includes legal services, consulting, business trade associations, educational and non-profit organizations.

Worldwide Growth in Green Energy Jobs

Renewable energy industries have proven to be some of the fastest growing industries in the world.⁵

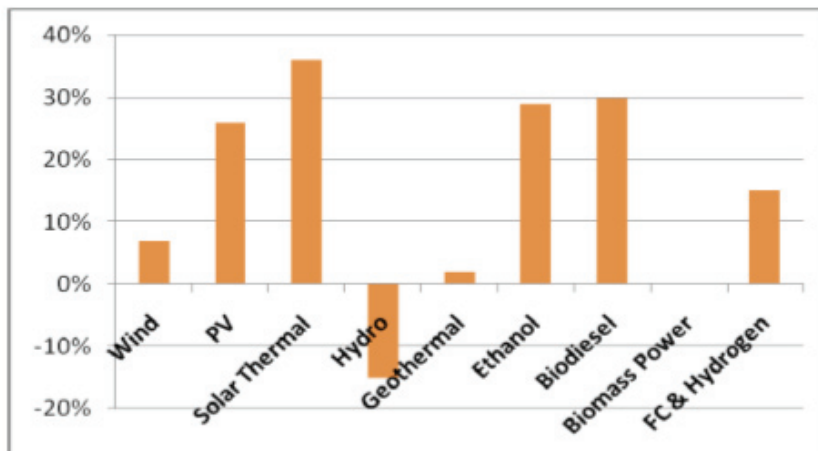
- The growth rate of the U.S. GDP between 2006 and 2007 was 2.19% indicating that the renewable energy industry grew more than three times as fast as the overall U.S. economy.⁶
- Global revenues for solar photovoltaics, wind power, and biofuels expanded from \$75.8 billion in 2007 to \$115.9 billion in 2008.⁷
- Wind power (new installation capital costs) is projected to expand from \$51.4 billion in 2008 to \$139.1 billion in 2018. In the

United States, wind installations represented more than 40 percent of total new electricity generating capacity brought online in 2008 — and moved the U.S. ahead of Germany as the world’s leading generator of wind energy.⁸

- Solar photovoltaics (including modules, system components, and installation) are projected to grow from a \$29.6 billion industry in 2008 to \$80.6 billion by 2018. Annual installations reached more than 4 GW worldwide in 2008, a fourfold increase from 2004.⁹

As seen in Figure 1, significant growth was seen in most renewable energy technologies.

Figure 1: Increase in Real Renewable Energy Revenues, 2006 - 2007 (Constant 2007 dollars)¹⁰



This past and potential growth in global renewable energy production translates to significant job growth. Per unit of energy, renewable energy creates more jobs than fossil-fuel-based energy. A study conducted by the Renewable and Appropriate Energy Laboratory (RAEL) at University of California, Berkeley found that solar and wind energy provided more than five times the number of jobs per unit of energy delivered than energy generated by coal and gas.¹¹

Table 2. Comparison of Jobs/MW_a Across Technologies¹²

Jobs/Average Megawatt (MW _a)			
Energy Technology	Construction, Manufacturing, Installation	Operation & Maintenance and fuel processing	Total Jobs / MW _a
Photovoltaic	5.76	4.80	10.56
Wind	2.51	0.27	2.78
Biomass	0.40	2.44	2.84
Coal	0.27	0.74	1.01
Gas	0.25	0.70	0.95

Growing Green Jobs in Ohio

Ohio is very well positioned to become a key player in the renewable energy industry since many green energy jobs exist in areas of employment already common to the state. In fact, Ohio’s Department of Development estimates that there are already over 60,000 specialized workers supporting the state’s advanced energy industries.¹³ Another industry report shows that gross revenues in Ohio’s renewable energy industry totaled nearly \$800 million, and created more than 6,600 jobs in 2006. These jobs were largely in the wind sector, followed by the biomass and the geothermal sectors.¹⁴

The contribution the renewable energy industry is already making, and its potential for continued growth, is even more compelling when compared to Ohio’s coal industry. Ohio’s historic reputation as a coal state has driven decades of economic and energy policies. However, when given a closer look, the coal industry’s contribution to Ohio’s workforce is minimal. Jobs within the coal industry account for only 0.2% of non-agricultural employment within the state.¹⁵ Furthermore, coal mining provides less than 2,500 jobs in Ohio.¹⁶

Despite the fact that Ohio’s manufacturing sector has lost approximately 200,000 jobs from 2000 to 2007, an analysis of manufacturing trends in Ohio done by the consulting group, Economic Modeling Specialists, Inc. (EMSI) offers a positive outlook.¹⁷ According to EMSI’s data, “manufacturing in Ohio is not going away—it is merely undergoing a profound change in how business gets done. Opportunities abound for entrepreneurial firms that can be agile, low-impact, and highly productive, and for the regions that are able to recruit and retain them.”¹⁸ As EMSI’s research confirms, Ohio has incredible potential to capitalize on the rapidly growing renewable energy industries.

Many studies predict that Ohio will gain jobs as the demand for renewable energy increases. Table 3, based on a study done by the Renewable Energy Policy Project, shows the number of new jobs that Ohio could generate with an increased demand for renewable energy across the country.¹⁹

Continuing to drive the renewable energy industries through economic and energy policies is critical to leverage the state’s current manufacturing and industrial capabilities for the future.

Table 3. New Manufacturing Jobs from a National Investment in Renewable Energy²⁰

Location	New Jobs Wind	New Jobs Solar	New Jobs Geothermal	New Jobs Biomass	New Jobs Total
California	14147	24288	3320	2848	44602
Texas	10000	12299	1841	3261	27401
Illinois	11303	8472	1455	1715	22946
Ohio	13215	5957	1896	1854	22922
Pennsylvania	9029	8119	1538	1832	20517

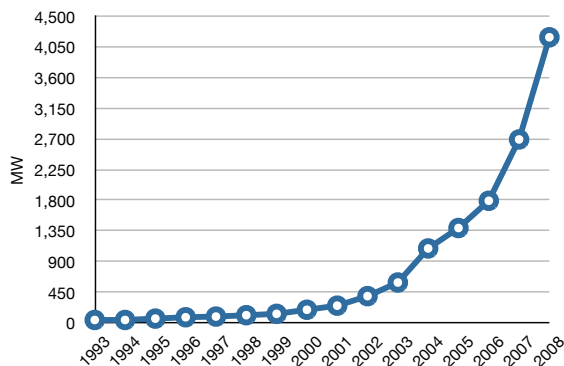
OHIO'S SOLAR INDUSTRY

Solar power has the potential to be a significant part of Ohio's energy future, and Ohio is already home to more than 115 firms involved in the solar energy industry.

The solar photovoltaic (PV) industry has proven to be a bright spot in the global economy. For the past 15 years, the industry has experienced annual growth rates of 30 to 40 percent.²¹ Global solar PV installations grew from 125 MW in 1999 to 4,500 MW in 2008, resulting in a compound annual growth rate of 47 percent for the last 10 years (see Figure 2).²² Looking ahead, most industry observers expect continued 20+% annual growth in the PV markets for many years to come.

One of the largest contributors to this market growth, First Solar, was founded in Perrysburg, Ohio, where it maintains its R&D headquarters and a major manufacturing facility. In 2008, First Solar was the fourth largest producer of solar PV panels in the world.

Figure 2: Global Growth in Solar Photovoltaic Installations, 1993-2008²³



“The Toledo area has become an international center for solar research and production, with more than 6,000 people working in the solar industry.”

-Governor Strickland in his State of the State Address January 28, 2009²⁴

In addition to solar PV, energy from the sun can be harnessed through two other technologies. Solar hot water heaters and concentrating solar technology are additional ways to take advantage of the sun's energy. Solar hot water heating systems use the energy of the sun to heat the water that is used in homes, businesses and industries. These systems work well in Ohio, and there are many installed throughout the state already.

Concentrating solar plants (CSPs) use mirrors to angle rays of sun in such a way that will heat liquid to about 400° Celsius. This generates steam to drive an engine and create electricity. CSP plants installed on just 9 percent of the land area of Nevada – the area contained by a square 100 miles to a side – could produce enough electricity to power the entire United States. While CSP technology is not currently viable for Ohio, our businesses are still able to supply the component parts that are needed to develop this technology.²⁵

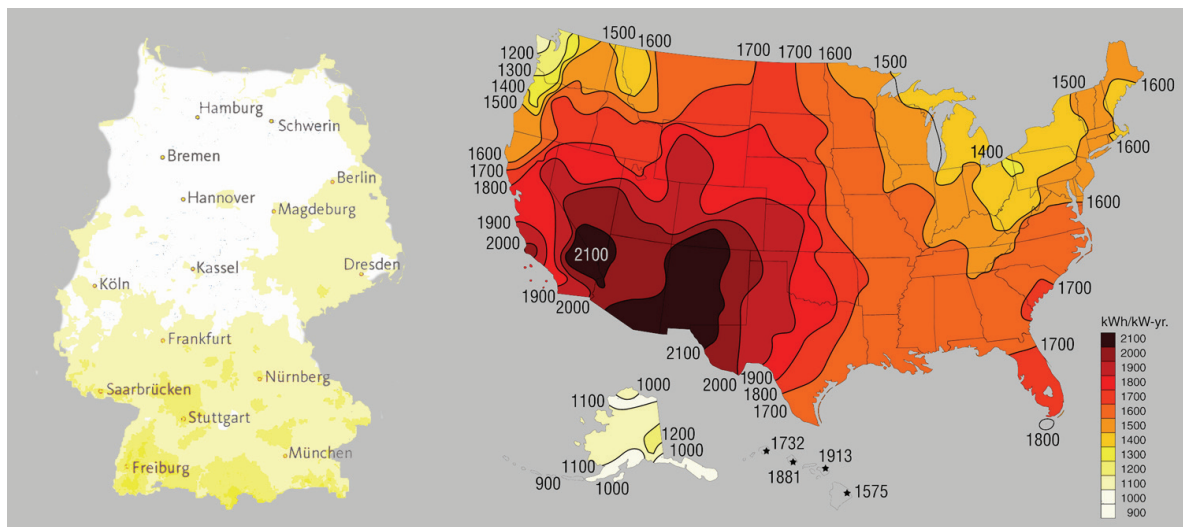
Ohio's Solar Power Potential

Ohio may not be first state that comes to mind when people think about solar power. But solar panels utilize the sunlight that allows us to see, not necessarily the sunlight that makes us hot. Therefore, Ohio's weather is more than adequate to make solar power viable.

The world's largest solar markets are in Germa-

ny and Japan – neither nearly as sunny as Ohio. Within the US, states with the largest amount of solar installations, are also not known for their sunny weather. New Jersey has the second-largest amount of solar installations, and New York, and Connecticut also rank in the top ten.²⁶ The primary driver of these solar markets is the policies enacted in these states and countries, not their solar energy potential.

Figure 3: Solar Energy Potential Map: Germany (at left – not to scale) is the world's largest solar market, despite solar resources significantly poorer than the United States.²⁷



Ohio's Solar Energy Job Growth Potential

Due to the state's historical involvement in the glass industry, its strong manufacturing base, and innovative leadership at the University of Toledo, many Ohio businesses have already become part of the solar energy supply chain. The supply chain for the solar industry includes manufacturers and system integrators in semi-conducting materials, glass, polymers, thin film coating machines, metal extrusion and stamping, power electronics, roll-to-roll fabrication, and system design and installation.²⁸

Ohio's solar industry is already a major employer, particularly in northwest Ohio. There are 107 companies and research institutions involved in developing solar energy in Ohio. These companies range from small family-run solar installation companies, to First Solar which employs nearly 700 people. Additionally, the solar industry in Ohio has grown so rapidly that companies are continuing to expand in order to keep pace. In 2008 Xunlight Corp., based in Toledo, quadrupled its workforce from twenty to eighty employees.²⁹

Employment sectors that would increase in demand with an investment in solar power include, but are not limited to:³⁰

- Carpenters
- Materials suppliers including glass, plastic, metal, chemicals, sealants, etc.
- Electrical and electronic equipment assemblers
- Electricians
- HVAC mechanics and installers
- Inspectors, testers, and sorters
- Machinists
- Sheet metal workers
- Business operations specialists
- Chemical technicians
- Civil engineers
- Computer and IT managers
- Computer programmers
- Environmental engineers
- Mechanical engineers
- Payroll and timekeeping clerks
- Purchasing agents
- Sales representatives
- Surveyors
- Training and development specialists
- Tool and die makers
- Shipping and receiving clerks

An Ohio Solar Story:

Founded by legendary solar inventor Harold McMaster as a start-up company at the University of Toledo's business incubator in the 1980's, the company now known as First Solar manufactures thin film solar modules in Perrysburg, Ohio. First Solar has gained recognition as the largest manufacturer of thin film solar modules in the United States. Additionally, they have been able to achieve the lowest manufacturing cost per watt in the industry. Based on surging demand for its products, First Solar announced plans for a 500,000 square foot expansion of its Perrysburg plant which currently employs 690 people. Upon completion in 2010, the Perryburg facility will comprise more than 900,000 square feet and employ over 840 associates. The company also plans a global expansion with plants to be built in Europe and Asia.³¹

Table 4. Ohio's Solar Energy Businesses and Research Institutions

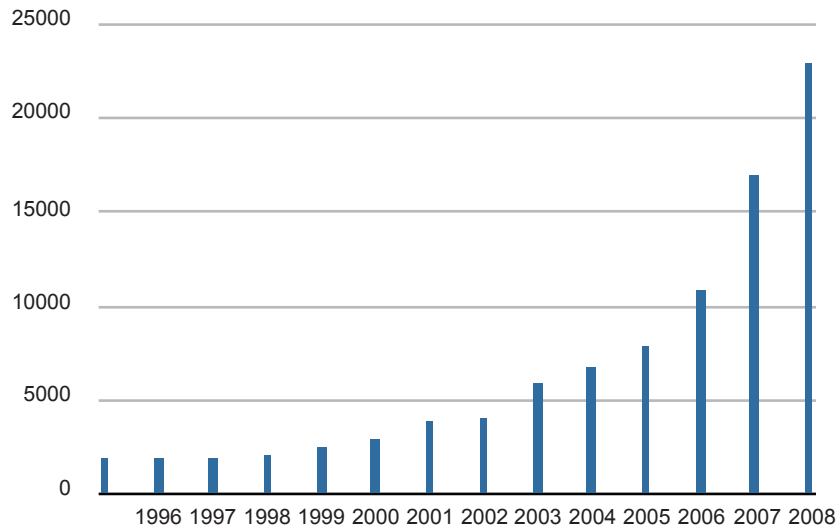
Company	Renewable Energy Sector	Service	Region	County	City
A Better Focus Co.	Solar	concentrating solar dishes	Northeast	Stark	Massillon
Adena Corporation	solar, wind	general contractor	Northeast	Richland	Mansfield
Advanced Distributed Generation, LLC	solar	full service renewable energy provider	Northwest	Lucas	Toledo
Advantech Corporation	fuel cell, solar, wind	energy management solutions	Southwest	Hamilton	Cincinnati
Aggreko LLC	biomass, fuel cell, geothermal, solar, wind	generator rentals	Northeast	Summit	Tallmadge
AltE	solar, wind	distributor/supplier	Central	Franklin	Upper Arlington
American Electric Power (AEP)	biomass, solar, wind	electric utility provider	Central	Franklin	Columbus
AMP Ohio	biomass, fuel cell, solar, wind	electric utility provider	Central	Franklin	Columbus
Baldwin & Sours, Inc.	Solar	distributor/supplier	Central	Franklin	Columbus
Barfield Manufacturing Co.	biomass, fuel cell, geothermal, solar, wind	metal products	Southwest	Butler	Hamilton
Battelle	biomass, fuel cell, solar, wind	commercialization	Central	Franklin	Columbus
Blight to Bright	solar	project developer	Central	Knox	Mt. Vernon
Blue Chip Solar and Wind	solar, wind	installer, designer	Southwest	Hamilton	Cincinnati
Bowling Green University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Northwest	Wood	Bowling Green
Calyxo USA, Inc.	Solar	thin-film modules	Northwest	Wood	Perrysburg
CAS Data Loggers	biomass, fuel cell, geothermal, solar, wind	data logging systems	Northeast	Geauga	Chesterland
Cincinnati State Technical and Community College	biomass, fuel cell, geothermal, solar, wind	education, research and development	Southwest	Hamilton	Cincinnati
Cincinnati Sub-Zero	solar	environmental test chambers	Southwest	Hamilton	Cincinnati
Cleveland Solar & Wind	solar, wind	distributor/supplier	Northeast	Cuyahoga	Cleveland
Cleveland State University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Northeast	Cuyahoga	Cleveland
Columbus Micro Systems	fuel cell, solar, wind	network management	Central	Franklin	Columbus
Cooling Technologies, Inc.	fuel cell, solar, wind	temperature control technologies	Northwest	Lucas	Toledo
Cornerstone Research Group	fuel cell, solar, wind	research and development	Southwest	Montgomery	Dayton
Crown Equipment	biomass, geothermal, fuel cell, solar, wind	lift trucks	Central, Northwest, Southwest	Franklin, Licking, Mercer, Auglaize, Lucas, Hamilton, Montgomery	Columbus, Newark, Celina, New Bremen, Toledo, Cincinnati, Dayton
C-Tec: Career and Technology Education Centers	biomass, fuel cell, geothermal, solar, wind	education	Central	Licking	Newark
Custom Solar Works	Solar	distributor/supplier	Northeast	Stark	Massillon
Dayton Power and Light	biomass, solar, wind	electric utility provider	Southwest	Montgomery	Dayton
Dovetail Solar & Wind	Solar, wind	installer, designer	Central, Southeast, Southwest, Northeast	Franklin, Athens, Hamilton, Cuyahoga	Bexley, Athens, Cincinnati, Cleveland
Duke Energy	biomass, solar, wind	electric utility provider	Central, Southwest	Franklin, Clermont, Hamilton, Butler	Columbus, Batavia, Cincinnati, Fairfield, Moscow, New Richmond
DuPont	fuel cell, geothermal, Solar, wind	renewable energy components	Southwest	Montgomery	Dayton
Eaton Corporation	fuel cell, solar, wind	power solutions	Northeast	Cuyahoga	Cleveland
Emerson Liebert - DC-AC inverters	biomass, fuel cell, geothermal, solar, wind	energy solutions	Central	Franklin	Columbus
Energy Technologies Inc.	fuel cell, solar, wind	fuel cell components	Northeast	Richland	Mansfield
Engineered Process Systems, LTD	Solar, wind	full service renewable energy provider	Northwest	Erie	Huron
Enterprise Welding & Fabricating, Inc.	fuel cell, solar, wind	production line parts	Northeast	Lake	Mentor
ERICO Inc.	solar, wind	electrical products	Northeast	Cuyahoga	Solon

Company	Renewable Energy Sector	Service	Region	County	City
Evely Solar Products, Inc.	Solar	distributor/supplier	Southeast	Lawrence	Rome
Fanning Howey	solar	architecture and engineering	Northwest	Mercer	Celina
Ferro	Solar	distributor/supplier	Northeast	Cuyahoga	Cleveland
First Energy	biomass, solar, wind	electric utility provider	Northeast	Summit	Akron
First Solar, Inc.	Solar	solar power systems	Northwest	Wood	Perrysburg
Five Star Technologies	Solar	dispersions, inks and pastes	Northeast	Cuyahoga	Independence
FoilTek Inc.	solar	solar components	Northeast	Cuyahoga	Cleveland
Garland Company	solar	full service renewable energy provider	Northeast	Cuyahoga	Cleveland
Genesis Lamp Corporation	solar, wind	distributor/supplier	Northeast	Lake	Painesville
Glenn Electric, Inc.	solar	electrical contractor	Central	Licking	Pataskala
GrafTech	fuel cell, solar	graphite components	Northeast	Cuyahoga	Parma
Green by Design	geothermal, solar, wind	distributor/supplier	Northwest	Wood	Bowling Green
Greens Solar Solutions, Inc.	Solar	full service renewable energy provider	Central	Madison	London
IBC Solar Inc.	solar	solar modules	Northeast	Cuyahoga	Cleveland
Iberdrola Renewables	solar, wind	renewable energy developer	Northwest	Van Wert	
IBEW Training Facility	geothermal, solar, wind	workforce development	Northeast	Trumbull	Warren
IBEW Training Facility	solar, wind	workforce development	Northeast	Cuyahoga	Cleveland
IBEW Training Facility	solar, wind	workforce development	Central	Franklin	Columbus
IBEW Training Facility	wind	workforce development	Northeast	Richland	Mansfield
IBEW Training Facility	solar, wind	workforce development	Northeast	Summit	Akron
IBEW Training Facility	solar, wind	workforce development	Northwest	Lucas	Toledo
IBEW Training Facility	solar	workforce development	Southwest	Hamilton	Cincinnati
Inspiramental Col.	solar, wind	full service renewable energy provider	Southwest	Montgomery	Dayton
Invenergy	solar, wind	renewable energy developer	Central	Champaign	
Jennings Heating	geothermal, solar	installer	Northeast	Summit	Akron
Johnson Controls	biomass, geothermal, solar, wind	full service renewable energy provider	Central	Franklin	Columbus
JW Great Lakes Wind	biomass, solar, wind	full service renewable energy provider	Northeast	Cuyahoga	Cleveland
KES Electrical Systems, LLC	solar	installer	Southwest	Hamilton, Clermont, Warren	Loveland
Lake Shore Cryotronics	fuel cell, solar	temperature control products	Central	Franklin	Westerville
LP Hoying	solar, wind	photovoltaic power supplies	Southwest	Shelby	Ft. Loramie
Melink	geothermal, solar, wind	full service renewable energy provider	Southwest	Clermont	Milford
MetaMateria Partners	fuel cell, solar	electrical conductivity products	Central	Franklin	Columbus
Miami University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Southwest	Butler	Oxford
Midwest Optoelectronics, LLC	Solar	optoelectronic devices	Northwest	Lucas	Toledo
Molded Fiber Glass Companies	solar, wind	composites	Northeast	Ashtabula	Ashtabula
Multi Solar Inc.	Solar	distributor/supplier	Northeast	Cuyahoga	Cleveland
NASA Glenn Research Center	biomass, fuel cell, geothermal, solar, wind	research and development	Northeast	Cuyahoga	Cleveland
Nordson	fuel cell, solar	adhesive, sealant, coatings systems	Northeast	Cuyahoga	Westlake
Ohio Green Wind	Solar, wind	full service renewable energy provider	Southwest	Miami	Tipp City
Ohio Rural Electric Cooperatives	biomass, solar, wind	electric utility provider	Central	Franklin	Columbus
Ohio State University	biomass, fuel cell, geothermal, solar, wind	research and development	Central	Franklin	Columbus
Ohio University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Southeast	Athens	Athens
Old State Technologies	Solar, wind	full service renewable energy provider	Northeast	Geauga	Chardon
OTB USA	solar	inline production equipment	Central	Franklin	Hilliard
Owens Community College	biomass, fuel cell, geothermal, solar, wind	workforce development	Northwest	Hancock, Lucas	Findlay, Toledo

Company	Renewable Energy Sector	Service	Region	County	City
Owens Corning	solar, wind	building materials and composites	Central, Northwest	Licking, Lucas	Granville, Toledo
Owens-Illinois, Inc.	solar	glass and plastic products	Northwest	Lucas	Toledo
Pilkington North America	Solar	glass products	Northwest	Wood	Northwood
PolyOne Corp	fuel cell, solar, wind	polymers	Northeast	Lorain	Avon Lake
PPG Industries	solar, wind	glass and fiberglass products	Central, Northeast, Northwest	Franklin, Delaware, Summit, Cuyahoga, Crawford	Columbus, Delaware, Barberton, Cleveland, Euclid, Strongsville, Crestline
Renaissance Group	solar, wind	full service renewable energy provider	Northeast	Lake	Kirtland
Renewable Concepts and Design, LLC	geothermal, solar	full service renewable energy provider	Central	Franklin	Columbus
RePlex Plastics	solar, wind	plastics, research and development	Central	Knox	Mt. Vernon
REPower Solutions	Solar, wind	full service renewable energy provider	Northeast	Cuyahoga	Cleveland
Rexource Thermionics	solar, wind, geothermal	manufacturing	Northeast	Summit	Akron
Schwark Electrical	Solar, wind	distributor/supplier	Southwest	Montgomery	Dayton
Sherwin-Williams	solar, wind	industrial coatings	Northeast	Cuyahoga	Cleveland
Solar Lighting and Roofing Systems, Inc.	Solar	installer	Northeast	Cuyahoga	Westlake
Solaris Blackstone	Solar	installer	Northeast	Portage	Kent
Sunlight Energy Systems	solar	distributor/supplier	Northeast	Stark	North Lawrence
Sunpower, Inc.	biomass, solar	distributor/supplier	Southeast	Athens	Athens
Sunrock Solar	Solar	full service renewable energy provider	Southwest	Hamilton	Cincinnati
Swagelok	fuel cell, geothermal, solar	fluid systems technologies	Northeast	Cuyahoga	Solon
Techneglas	Solar	glass products	Northwest	Wood	Perrysburg
The Freedonia Group	biomass, fuel cell, geothermal, solar, wind	research	Northeast	Cuyahoga	Cleveland
Third Sun Solar & Wind Power Ltd.	solar, wind	full service renewable energy provider	Southeast	Athens	Athens
Tipping Point Renewable Energy	Solar	full service renewable energy provider	Central	Franklin	Columbus
TruSeal Technologies, Inc.	Solar	insulating glass	Northeast	Cuyahoga	Solon
Tyco Electronics Corp	biomass, fuel cell, geothermal, solar, wind	electrical components	Northeast	Richland	Mansfield
University of Akron	biomass, fuel cell, geothermal, solar, wind	education, research and development	Northeast	Summit	Akron
University of Cincinnati	biomass, fuel cell, geothermal, solar, wind	education, research and development	Southwest	Hamilton	Cincinnati
University of Toledo	biomass, fuel cell, geothermal, solar, wind	education, research and development	Northwest	Lucas	Toledo
Valley Electrical Consolidated Inc	solar, wind	renewable energy developer	Northeast	Trumbull	Girard
Vanner Inc	fuel cell, solar, wind	power solutions	Central, Southwest	Franklin, Montgomery	Hilliard, Dayton
Watt Works	geothermal, solar	full service renewable energy provider	Central	Franklin	Columbus
Willard & Kelsey Solar Group LLC	Solar	solar panels	Northwest	Lucas	Toledo
Xunlight Corporation	Solar	photovoltaic modules	Northwest	Lucas	Toledo
Youngstown State University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Northeast	Mahoning	Youngstown

OHIO'S WIND INDUSTRY

Figure 4: US Wind Power Capacity (Cumulative Megawatts)



The wind energy industry is already creating thousands of jobs in Ohio spread out over 220 businesses and research institutions.³²

This is largely due to the global demand for wind turbines and the 8,000 component parts it takes to assemble them. Global wind energy capacity grew by over 28% in 2008, even higher than the impressive average growth over the past decade.³³ The United States has contributed to this recent growth by installing over 8,000 MW in 2008. This brings total wind energy installations in the U.S. to over 25,000 MW, enough to power over 7.5 million homes throughout the country.³⁴ According to the American Wind Energy Association, the new wind projects completed in 2008 account for about 42% of the entire new power-producing capacity added in the U.S. last year, and created 35,000 new jobs.³⁵

This is impressive growth, but the wind energy

industry is just getting started. The U.S. Department of Energy postulated a goal in which 20% of the nation's electricity supply would be supplied by wind by 2030, which if achieved would imply nearly 350,000 MW of wind energy installed – translating to an even larger demand for the products that Ohio's wind energy supply chain delivers.³⁶ Meeting these goals is achievable. The Department of Energy's National Renewable Energy Laboratory (NREL) estimates that America's Atlantic, Pacific and Great Lakes Coastlines could host enough wind turbines to nearly match the capacity of all the country's current electricity generators combined.³⁷

Ohio's Wind Energy Potential

Wind energy could provide electricity for millions of Ohioans. As wind energy technology develops, and the newer studies of Ohio's wind energy resources progress, it is clear that Ohio has significant wind energy potential.³⁸

In 2007, NREL published an updated estimate of Ohio's wind energy potential, along with a detailed map of Ohio's wind resource. (See Figure 5.) The estimate looks at wind resources at 100 meters (m) above the ground, a height commonly utilized by modern wind power technology.

At 100m height, Ohio has 13,000 square kilometers of land with wind speeds high enough to support commercial-scale wind farms.³⁹ Excluding urban areas, environmentally sensitive lands, water bodies, and Lake Erie, NREL estimates that this area could support a total of 66,000 MW of wind power capacity.⁴⁰ This is more energy than is installed in the entire state of Ohio today. If Ohio were to take advantage of only 20 percent of this area, wind energy could provide 20 percent of Ohio's electricity

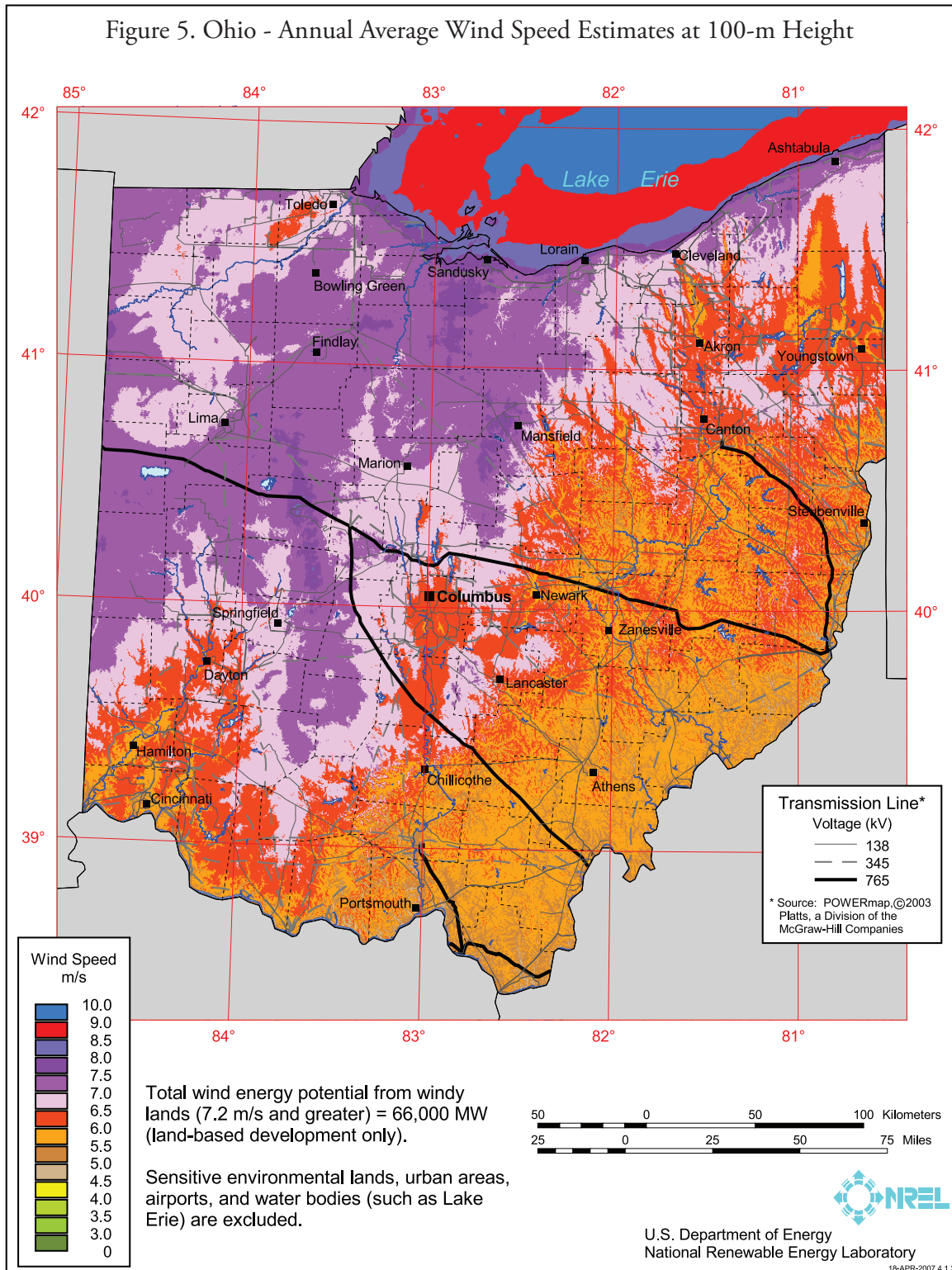
needs.⁴¹ The wind turbines would cover only 0.03 percent of Ohio's total land area and allow farmers to grow crops right up to the turbine base.⁴²

Western, northern and central Ohio have some of the strongest wind energy resources on land in Ohio. However, Ohio's best wind resources are located offshore, in Lake Erie. Developing a fraction of this resource would significantly increase Ohio's potential for producing wind energy. NREL's research shows that 12,150 sq. km of Lake Erie are suitable for wind energy development.⁴³ If this potential were fully developed, Lake Erie's winds could provide enough energy to power more than 18 million homes.⁴⁴

"This wind map shows that Ohio has considerably more wind energy potential than indicated from previous research... If Ohio were to take advantage of only 20% the state's windy land areas the state could install about 13,200 MW of wind capacity. This energy resource would provide approximately 20% of Ohio's electric needs and would only require the development of about .03% of the state's total land area."

– Dennis Elliot, principal research scientist at the U.S. Department of Energy's National Renewable Energy Laboratory, April 2007.

Figure 5. Ohio - Annual Average Wind Speed Estimates at 100-m Height



Ohio's Wind Energy Job-Growth Potential

There are currently more than 220 businesses and research institutions in Ohio that are providing green energy jobs in the wind energy sector.⁴⁵ Additionally, the Ohio Department of Development estimates that there are more than 1,000 Ohio businesses that already have the capacity to become part of the wind turbine supply chain.⁴⁶

Currently, Ohio's only large scale wind energy development is 4 wind turbines that have the capacity to generate enough power for about 2,000 homes (7.2 MW), installed outside of Bowling Green, Ohio.⁴⁷

As the demand for wind energy in Ohio and across the country increases, so will the demand for wind turbine component parts. According to a study in 2004 for the Department

of Energy, Ohio ranked behind only California in new job potential from large-scale wind development in the U.S. The study revealed that development of 50,000 megawatts of wind power nationally could generate 11,688 jobs in Ohio.⁴⁸

Ohio is already a leading supplier for the manufacturing of wind turbine component parts including⁴⁹:

- Castings: hubs, base plates and gearbox housings.
- Machining: precision boring and finishing for wind manufacturers.
- Bearings: both manufacturing and researching
- Gears and drive train manufacturing
- Forges: supplying gear blanks and other necessary components
- Fabrications: handling steel bending fabricating and assembly for large-scale components.

Employment would increase in the additional services needed to develop wind projects, including:^{50,51}

- Structural electrical, and mechanical engineering
- Materials supply including glass, plastic, metal, sealants, etc.
- composite manufacturers
- metal fabricators
- Quality control
- Mechanics
- Technical support
- Meteorological
- Electrical and electronic equipment assembly
- Electrical
- Inspection, testing, and sorting
- Machining
- Maintenance
- Business operations
- Computer and IT management
- Computer programming
- Environmental engineering
- Purchasing
- Planning and consulting
- Sales
- Surveying
- Tax preparation
- Legal support
- Bookkeeping and accounting
- Project management
- Tool and die manufacturing
- Shipping and receiving
- Site assessment

Ohio Wind Energy Success Stories:

The day before President Obama's inauguration, he made a stop outside of Cleveland Ohio in Bedford Heights to visit an Ohio wind energy component manufacturer, Cardinal Fasteners. President Obama pointed to Cardinal Fastener as an example of how a company struggling through tough economic times can reinvent itself and recover by recognizing opportunities in the renewable energy market. Rather than falling victim to the slumping economy, Cardinal has become the nation's largest manufacturer of bolts, screws, and double ended studs used in wind towers. Each wind tower installed requires approximately 1,000 products made by Cardinal.⁵² As a result, the company now earns half of its revenues selling products that support wind energy projects. Driven by sales of wind turbine projects, Cardinal projects an addition of over 40 individuals to its workforce in 2009, increasing its total to more than 100 employees.⁵³

For more than 100 years Cast-Fab Technologies has been a strong presence in Cincinnati's manufacturing scene. Cast-Fab provides its metal casting services to supply a number of the 8,000 component parts that are used to make a wind turbine. The company has been able to achieve growth at a time when hiring new employees has become otherwise enormously challenging. Overall, Cast-Fab employs 320 people of which 100 are directly involved in manufacturing wind-related components. The company has experienced an impressive annual growth rate, in its casting sales related to wind energy, of approximately 10%.⁵⁴

Table 5. Ohio's Wind Energy Businesses and Research Institutions

Company	Renewable Energy Sector	Service	Region	County	City
Company	Renewable Energy Sector	Service	Region	County	City
3-D Service	wind	repair and maintenance	Northeast	Stark	Massillon
ABM Drives, Inc.	biomass, wind	motors and generators	Southwest	Clermont	Milford
Acorn Technology Group	wind	switches and switchgear	Northeast	Cuyahoga	Cleveland
Acuren Materials Engineering & Testing	wind	engineering	Northeast	Summit	Akron
Adena Corporation	solar, wind	general contractor	Northeast	Richland	Mansfield
Advance Industrial Manufacturing, Inc.	wind	structural metal	Central	Franklin	Grove City
Advance Manufacturing Corporation	wind	fabricating and machining	Northeast	Cuyahoga	Cleveland
Advantech Corporation	fuel cell, solar, wind	energy management solutions	Southwest	Hamilton	Cincinnati
AFCO Precision Manufacturing Co.	wind	metal fabrication equipment	Northwest	Henry	Napoleon
Aggreko LLC	biomass, fuel cell, geothermal, solar, wind	generator rentals	Northeast	Summit	Tallmadge
AIDA-America Corp.	wind	turbine mechanical sub-components	Southwest	Montgomery	Dayton
Akron Machine Services Inc.	wind	machining	Northeast	Summit	Akron
ALD group LLC	wind	precision machining	Northeast	Lake	Eastlake
Alignment Supplies Inc.	wind	wind farm operations and maintenance	Northwest	Lucas	Maumee
ALL Aerials, LLC	wind	crane sales and rentals	Northeast	Summit	Richfield
ALL Crane Rental Corp.	wind	crane sales and rentals	Northeast	Cuyahoga	Cleveland
ALT Sales Corp.	wind	crane sales and rentals	Northeast	Summit	Richfield
AITE	solar, wind	distributor/supplier	Central	Franklin	Upper Arlington
American Electric Power (AEP)	biomass, solar, wind	electric utility provider	Central	Franklin	Columbus
American Tank & Fabricating	wind	turbine towers	Northeast	Cuyahoga	Cleveland
American Tower Co.	wind	communication towers	Northeast	Richland	Shelby
AMP Ohio	biomass, solar, wind, fuel cell	electric utility provider	Central	Franklin	Columbus
Applied Industrial Technologies	wind	distributor/supplier	Northeast	Cuyahoga	Cleveland
Argo-Hytos Inc.	wind	fluid technologies	Northwest	Wood	Bowling Green
Avalon Precision Casting Co	wind	metal castings	Northeast	Cuyahoga	Brookpark
Avon Bearings Corp	wind	bearings	Northeast	Lorain	Avon
AZ Renewable Energy	wind	distributor/supplier	Northeast	Cuyahoga	Cleveland
Babcock & Brown	wind	renewable energy developer	Central	Champaign	
Barfield Manufacturing Co.	biomass, fuel cell, geothermal, solar, wind	metal products	Southwest	Butler	Hamilton
Barth Industries, Inc.	wind	fabricating and machining	Northeast	Cuyahoga	Cleveland
Battelle	biomass, fuel cell, solar, wind	commercialization	Central	Franklin	Columbus
Beverage Machine & Fabricators, Inc.	wind	fabricating and machining	Northeast	Cuyahoga	Cleveland
Blue Chip Solar and Wind	solar, wind	installer	Southwest	Hamilton	Cincinnati
Bodycote Thermal Processing	wind	thermal processing	Central, Northeast, Southwest	Madison, Cuyahoga, Hamilton	London, Highland Heights, Cincinnati
Bowling Green University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Northwest	Wood	Bowling Green
Brilix Industries	wind	fabricating and machining	Northeast	Mahoning	Youngstown
Canton Drop Forge	wind	large gear blanks	Northeast	Stark	Canton
Cardinal Fastener & Specialty Co., Inc.	wind	bolts	Northeast	Cuyahoga	Bedford Heights
CAS Data Loggers	biomass, fuel cell, geothermal, solar, wind	data logging systems	Northeast	Geauga	Chesterland
Cast-Fab Technologies Inc.	wind	metal casting	Southwest	Hamilton	Cincinnati

Company	Renewable Energy Sector	Service	Region	County	City
Cincinnati State Technical and Community College	biomass, fuel cell, geothermal, solar, wind	education, research and development	Southwest	Hamilton	Cincinnati
Cincinnati Thermal Spray Inc.	wind	industrial coatings	Southwest	Hamilton	Cincinnati
Cleveland Electric Laboratories	wind	engineering and planning	Northeast	Summit	Twinsburg
Cleveland Gear Company	wind	gears	Northeast	Cuyahoga	Cleveland
Cleveland Solar & Wind	solar, wind	distributor/supplier	Northeast	Cuyahoga	Cleveland
Cleveland State University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Northeast	Cuyahoga	Cleveland
Clyde Industrial, LLC	wind	construction and maintenance	Northeast	Lorain	Avon
CMC Utility Products	wind	aluminum and copper connectors	Southwest	Butler	Hamilton
Cognis Corp.	wind	industrial coatings	Southwest	Hamilton	Cincinnati
Columbus Micro Systems	fuel cell, solar, wind	network management	Central	Franklin	Columbus
Cooling Technologies, Inc.	fuel cell, solar, wind	temperature control technologies	Northwest	Lucas	Toledo
Cornerstone Research Group	fuel cell, solar, wind	research and development	Southwest	Montgomery	Dayton
COT-PURITECH Wind LLC	wind	gearbox services and repair	Northeast	Stark	Canton
Crown Equipment	biomass, geothermal, fuel cell, solar, wind	lift trucks	Central, Northwest, Southwest	Franklin, Licking, Mercer, Auglaize, Lucas, Hamilton, Montgomery	Columbus, Newark, Celina, New Bremen, Toledo, Cincinnati, Dayton
C-Tec: Career and Technology Education Centers	biomass, fuel cell, geothermal, solar, wind	education	Central	Licking	Newark
Dan T. Moore Company	wind	research and development	Northeast	Cuyahoga	Cleveland
Darrah Electric Co Inc	wind	power supplies	Northeast	Cuyahoga	Cleveland
Davi American	wind	wind towers	Central	Licking	Granville
Dayton Power and Light	biomass, solar, wind	electric utility provider	Southwest	Montgomery	Dayton
Dayton Superior Corporation	wind	concrete and masonry construction products	Southwest	Montgomery	Dayton
Diversified Design Dynamics	wind	machine and tool assembly and design	Southwest	Hamilton	Cincinnati
Dovetail Solar & Wind	Solar, wind	installer	Central, Southeast, Southwest, Northeast	Franklin, Athens, Hamilton, Cuyahoga	Bexley, Athens, Cincinnati, Cleveland
Duke Energy	biomass, solar, wind	electric utility provider	Central, Southeast	Franklin, Clermont, Hamilton, Butler	Columbus, Batavia, Cincinnati, Fairfield, Moscow, New Richmond
DuPont	fuel cell, geothermal, Solar, wind	renewable energy components	Southwest	Montgomery	Dayton
Dyson Corporation	wind	fasteners and forgings	Northeast	Lake	Painesville
Eaton Corporation	fuel cell, solar, wind	power solutions	Northeast	Cuyahoga	Cleveland
Ebner	wind	turbine components	Northeast	Medina	Wadsworth
Edison Welding Institute	fuel cell, wind	welding	Central	Franklin	Columbus
EGC Enterprises Inc.	wind	fluid sealing products	Northeast	Geauga	Chardon
Ellwood Engineered Castings	wind	metal castings	Northeast	Trumbull	Hubbard
Emega Technologies	wind	research and development	Central	Fairfield	Lancaster
Emerson Liebert - DC-AC inverters	biomass, fuel cell, geothermal, solar, wind	energy solutions	Central	Franklin	Columbus
Energy Technologies Inc.	fuel cell, solar, wind	fuel cell components	Northeast	Richland	Mansfield
Engineered Process Systems, LTD	Solar, wind	full service renewable energy provider	Northwest	Erie	Huron
Engineering Dynamics	wind	turbine mechanical sub-components	Northwest	Lucas	Sylvania
Enterprise Welding & Fabricating, Inc.	fuel cell, solar, wind	production line parts	Northeast	Lake	Mentor
ERICO Inc.	solar, wind	electrical products	Northeast	Cuyahoga	Solon
Everpower Renewables	wind	wind energy developer	Central	Champaign	
Federal Gear	wind	gears and bearings	Northeast	Lake	Willoughby
First Energy (Ohio Edison, Toledo Edison, The Illuminating Company)	biomass, solar, wind	electric utility provider	Northeast	Summit	Akron
Gaspar Inc.	wind	fabricating and welding	Northeast	Stark	Canton

Company	Renewable Energy Sector	Service	Region	County	City
GBSA, Inc.	wind	rotary seals	Northeast	Lake	Mentor
Genesis Lamp Corporation	solar, wind	distributor/supplier	Northeast	Lake	Painesville
Gibraltar Industries	wind	metal products	Northeast	Cuyahoga	Cuyahoga Heights
Glebus Alloys LLC USA	wind	bearings	Northeast	Summit	Akron
Graco Ohio	fuel cell, wind	fluid control	Northeast	Stark	Canton
Graebener Group Technologies	wind	metal fabrication equipment	Northwest	Henry	Napoleon
Great Lakes Towing Company	wind	tugboats	Northeast	Cuyahoga	Cleveland
Green by Design	geothermal, solar, wind	distributor/supplier	Northwest	Wood	Bowling Green
Green Energy Technologies	wind	full service renewable energy provider	Northeast	Summit	Akron
Haeusler AG	wind	metal forming machines	Southwest	Hamilton	Cincinnati
Hamby Young	wind	substation design and supply	Northeast	Portage	Aurora
Harris Battery	wind	battery supplier	Northeast	Tuscarawas	Bolivar
Hartzell Fan, Inc.	wind	industrial ventilation	Southwest	Miami	Piqua
Honeywell	wind	obstruction lighting	Central	Champaign	Urbana
Horizon Wind Energy	wind	wind energy developer	Northwest	Van Wert	Van Wert
Horsburgh & Scott					
	wind	industrial gears	Northeast	Cuyahoga	Cleveland, Euclid
HPM America	wind	fabricating and machining	Central	Morrow	Mount Gilead
Hyundai Ideal Electric Company	wind	motors and generators	Northeast	Richland	Mansfield
Iberdrola Renewables	solar, wind	renewable energy developer	Northwest	Van Wert	
IBEW Training Facility	geothermal, solar, wind	workforce development	Northeast	Trumbull	Warren
IBEW Training Facility	solar, wind	workforce development	Northeast	Cuyahoga	Cleveland
IBEW Training Facility	solar, wind	workforce development	Central	Franklin	Columbus
IBEW Training Facility	wind	workforce development	Northeast	Richland	Mansfield
IBEW Training Facility	solar, wind	workforce development	Northeast	Summit	Akron
IBEW Training Facility	solar, wind	workforce development	Northwest	Lucas	Toledo
ILSCO	wind	mechanical connectors	Southwest	Hamilton	Cincinnati
Inductive Components Mfg Inc.	wind	voltage regulator controls	Southwest	Clermont	Amelia
Insight Services	wind	oil analysis	Northeast	Cuyahoga	Cleveland
Inspiramental Col.	solar, wind	full service renewable energy provider	Southwest	Montgomery	Dayton
Invenergy	solar, wind	renewable energy developer	Central	Champaign	
Jergens, Inc.	wind	fabricating and machining	Northeast	Cuyahoga	Cleveland
Joe Mescan Windmill	wind	distributor/supplier	Northeast	Lorain	Columbia Station
Johnson Controls	biomass, geothermal, solar, wind	full service renewable energy provider	Central	Franklin	Columbus
Joslyn Hi-Voltage	wind	isolating switches	Northeast	Cuyahoga	Cleveland
JW Great Lakes Wind	biomass, solar, wind	full service renewable energy provider	Northeast	Cuyahoga	Cleveland
Kalt Manufacturing	fuel cell, wind	machining	Northeast	Lorain	North Ridgeville
Kaydon Corporation	wind	fabricating and machining	Northeast	Lorain	Avon
Kentak Products Co.	wind	construction	Northeast	Columbiana	East Liverpool
King Machine & Tool Co.	wind	fabricating and machining	Northeast	Stark	Massillon
Konecranes	wind	overhead lifting equipment	Central	Clark	Springfield
Koyo Corporation of USA	wind	bearings	Northeast	Cuyahoga	Westlake
Lincoln Electric Company	wind	distributor/supplier	Northeast	Cuyahoga	Cleveland
LP Hoying	solar, wind	photovoltaic power supplies	Southwest	Shelby	Ft. Loramie
Lubrizol Advanced Materials, Inc.	wind	industrial lubricants	Northeast	Lake	Wickliffe
M&B's Battery Company, Inc.	wind	distributor/supplier	Southwest	Hamilton	Harrison
Magna Machine Co.	wind	fabricating and machining	Southwest	Hamilton	Cincinnati
Magnetech Industrial Services	wind	gearbox services and repair	Northeast	Stark	Massillon
Marathon Special Products	wind	turbine electrical sub-components	Northwest	Wood	Bowling Green

Company	Renewable Energy Sector	Service	Region	County	City
Mariner Energy Systems, LLC	wind	full service renewable energy provider	Northeast	Medina	Brunswick
Martindale Electric Co.	wind	tools	Northeast	Cuyahoga	Lakewood
Maumee Authority Stamping	wind	metal and plastic stampings	Northwest	Lucas	Maumee
Maumee Valley Fabricators, Inc.	fuel cell, wind	metal fabricating	Northwest	Lucas	Toledo
McSwain Manufacturing, Inc.	wind	fabricating and machining	Southwest	Hamilton	Cincinnati
Melink	geothermal, solar, wind	full service renewable energy provider	Southwest	Clermont	Milford
Metal Improvement Company	wind	metal treatment	Northeast	Summit	Twinsburg
Miami University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Southwest	Butler	Oxford
Michael Byrne Manufacturing Co., Inc	wind	earth boring equipment	Northeast	Richland	Mansfield
Mid America Stainless	wind	steel and specialty metals	Northeast	Cuyahoga	Cleveland
Midwest Industrial Supply Inc.	wind	wind farm operations and maintenance	Northeast	Stark	Canton
Midwest Terminals of Toledo	wind	ports and terminals	Northwest	Lucas	Toledo
Milacron, Inc.	wind	fabricating and machining	Southwest	Brown	Mt. Orab
Minster Machine Company	wind	fabricating and machining	Northwest	Auglaize	Minster
Mirka Abrasives	wind	construction	Northeast	Summit	Twinsburg
Molded Fiber Glass Companies	solar, wind	composites	Northeast	Ashtabula	Ashtabula
MRD Solutions LLC	wind	fabricating and machining	Northeast	Lake	Eastlake
NASA Glenn Research Center	biomass, fuel cell, geothermal, solar, wind	education, research and development	Northeast	Cuyahoga	Cleveland
Nautica Windpower LLC	wind	wind energy developer	Northeast	Cuyahoga	Olmsted Falls
Nelson Stud Welding Inc.	wind	fasteners	Northeast	Lorain	Elyria
Norbar Torque Tools, Inc	wind	torque tools	Northeast	Lake	Willoughby
North Coast Wind & Power, LLC	wind	full service renewable energy provider	Northwest	Ottawa	Port Clinton
Norwalk Concrete Industries	wind	precast concrete products	Northwest	Huron	Norwalk
NPA Coatings	wind	industrial coatings	Northeast	Cuyahoga	Cleveland
O'Brock Windmill Distributors	wind	installer	Northeast	Mahoning	North Benton
Ohio Green Wind	Solar, wind	full service renewable energy provider	Southwest	Miami	Tipp City
Ohio Rural Electric Cooperatives, Inc.	biomass, solar, wind	electric utility provider	Central	Franklin	Columbus
Ohio Semitronics, Inc.	wind	power measurement equipment	Central	Franklin	Hilliard
Ohio State University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Central	Franklin	Columbus
Ohio University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Southeast	Athens	Athens
Ohio Windmill Manufacturing Co. LLC	wind	windmills	Northeast	Mahoning	Berlin Center
Old State Technologies	Solar, wind	full service renewable energy provider	Northeast	Geauga	Chardon
Olympic Steel Co.	wind	metal components	Northeast	Cuyahoga	Bedford Heights
OSG TAP AND DIE, INC.	wind	tools	Southwest	Warren	Mason
Owens Community College	biomass, fuel cell, geothermal, solar, wind	workforce development	Northwest	Hancock, Lucas	Findlay, Toledo
Owens Corning	solar, wind	building materials and composites	Central, Northwest	Licking, Lucas	Granville, Toledo
Parker Fabricating Co.	wind	steel fabricating	Northeast	Summit	Akron
Parker Hannifin	wind	motion control technologies	Northeast, Northwest	Cuyahoga, Fulton	Cleveland, Metamora
Phillips Electric	wind	renewable energy developer	Northeast	Cuyahoga	Cleveland
PolyOne Corp	fuel cell, solar, wind	polymers	Northeast	Lorain	Avon Lake
Power Systems Development (PSD)	wind	high voltage electrical substation projects	Northeast	Stark	Canton
PPG Industries	solar, wind	glass and fiberglass products	Central, Northeast, Northwest	Franklin, Delaware, Summit, Cuyahoga, Crawford	Columbus, Delaware, Barberton, Cleveland, Euclid, Strongsville, Crestline

Company	Renewable Energy Sector	Service	Region	County	City
PPM Instruments	fuel cell, wind	power supply testing products	Northeast	Cuyahoga	Cleveland
Preformed Line Products	wind	lines and cables	Northeast	Cuyahoga	Mayfield Village
Process Equipment Company	wind	fabricating and machining	Southwest	Miami	Tipp City
PSL of America	wind	bearings	Northeast	Summit	Twinsburg
PT Tech Inc	wind	industrial clutches and brakes	Northeast	Medina	Sharon Center
Quadrant Insurance Managers	wind	insurance services	Central	Franklin	Columbus
R&M Materials Handling Inc.	wind	wind farm operations and maintenance	Northeast	Cuyahoga	North Olmsted
Renaissance Group	solar, wind	full service renewable energy provider	Northeast	Lake	Kirtland
Replex Plastics	solar, wind	plastic products, research and development	Central	Knox	Mt. Vernon
REPower Solutions	Solar, wind	full service renewable energy provider	Northeast	Cuyahoga	Cleveland
Rexource Thermionics	solar, wind, geothermal	manufacturing	Northeast	Summit	Akron
Rittal Corp.	wind	wind farm control equipment	Central	Champaign	Urbana
Rol-Fab Incorporated	wind	steel fabricating	Northeast	Cuyahoga	Cleveland
Rotek Corporation	wind	ring bearings	Northeast	Portage	Aurora
Schwark Electrical	Solar, wind	distributor/supplier	Southwest	Montgomery	Dayton
Sherwin-Williams	solar, wind	industrial coatings	Northeast	Cuyahoga	Cleveland
SIME Corp.	wind	breaking systems	Southwest	Montgomery	Dayton
Sky Climber Wind Solutions	wind	blade services and repair	Central	Delaware	Delaware
St. George's Renewable Energies	wind	wind energy developer	Northwest	Huron	Wakeman
Staco Energy Products Co.	wind	wind farm control equipment	Southwest	Montgomery	Dayton
Stark's Inc.	wind	installer	Northwest	Wood	Bowling Green
Swiger Coil Systems Inc	wind	motors	Northeast	Cuyahoga	Cleveland
System Seals Incorporated	wind	hydraulic seal technologies	Northeast	Cuyahoga	Cleveland
T & B Foundry Co.	wind	ductile iron castings	Northeast	Cuyahoga	Cleveland
Team NEO	fuel cell, wind	commercialization	Northeast	Cuyahoga	Cleveland
The Freedomia Group	biomass, fuel cell, geothermal, solar, wind	research	Northeast	Cuyahoga	Cleveland
Thermatex Corporation	fuel cell, wind	insulating products	Northeast	Trumbull	Newton Falls
Third Sun Solar & Wind Power Ltd.	solar, wind	full service renewable energy provider	Southeast	Athens	Athens
Timken Co	wind	fabricating and machining	Northeast	Stark	Canton
Torq Hoist Inc.	wind	lifting equipment	Northeast	Cuyahoga	Cleveland
TPI Composites, Inc	wind	composite structures	Central	Clark	Springfield
Tuf-Tug Products /Deuer Developments	wind	maintenance	Southwest	Montgomery	Moraine
Tyco Electronics Corp	biomass, fuel cell, geothermal, solar, wind	electrical components	Northeast	Richland	Mansfield
United Tool & Gage Company	wind	fabricating and machining	Northeast	Cuyahoga	Cleveland
University of Akron	biomass, fuel cell, geothermal, solar, wind	education, research and development	Northeast	Summit	Akron
University of Cincinnati	biomass, fuel cell, geothermal, solar, wind	education, research and development	Southwest	Hamilton	Cincinnati
University of Toledo	biomass, fuel cell, geothermal, solar, wind	education, research and development	Northwest	Lucas	Toledo
Valley Electrical Consolidated Inc	solar, wind	renewable energy developer	Northeast	Trumbull	Girard
Vanner Inc	fuel cell, solar, wind	power solutions	Central, Southwest	Franklin, Montgomery	Hilliard, Dayton
Walsh Manufacturing Corporation	wind	metal components	Northeast	Cuyahoga	Cleveland
Webcore Technologies Inc.	wind	composites	Southwest	Montgomery	Miamisburg
Weiss North America, Inc.	wind	assembly components	Northeast	Lake	Willoughby
Wind Turbines of Ohio, LLC.	wind	full service renewable energy provider	Northeast	Stark	Alliance

Company	Renewable Energy Sector	Service	Region	County	City
Windharness Development Corp.	wind	wind energy developer	Northeast	Tuscarawas	Dennison
WLS Stamping & Fabricating	wind	fabricating and machining	Northeast	Cuyahoga	Cleveland
Woolpert Inc.	wind	engineering and planning	Southwest	Hamilton	Cincinnati
Wright Tool	wind	tools	Northeast	Summit	Barberton
Youngstown State University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Northeast	Mahoning	Youngstown
Z & Z Manufacturing	wind	hydraulic fittings	Northeast	Cuyahoga	Cleveland

OHIO'S BIOMASS INDUSTRY

More than 60 companies and research institutions in Ohio are involved in the biomass industry and over 1,300 wood manufacturing companies in Ohio produce residues that are capable of being converted into biomass energy.⁵⁵

Biomass energy can be generated from organic materials including:⁵⁶

- agricultural crops, crop byproducts or residue resources
- wastes such as landscape or right-of-way-tree trimmings
- gasified animal waste
- landfill gas

Biomass products can be used either to generate electricity through gasification, or biomass grains can be fermented into an ethanol or converted into biodiesel for fuel.

Primary sources of biomass are generated from forest treetops and limbs, and wood industry residues such as saw dust, wood chips, bark, and edging. Forecasting of possible sites for biomass power plants is based largely on the availability of forest and industrial wood residues.⁵⁷ Because of its enormous agricultural capacity and significant number of wood manu-

facturing companies, Ohio is an attractive site for innovators of biomass technology.

Landfill gas capture is another source of biomass that is currently being used in Ohio. There are about 17 operational landfill gas projects in Ohio that either use the gas directly or use it to generate electricity. Seven of these projects generate electricity with a combined capacity of around 37 MW. The EPA's Landfill Methane Outreach Program (LMOP) has identified more than 20 landfills with the ability to become new landfill gas-to-energy projects and an additional 20 landfills with the potential for project development pending further research and acquisition of data about site-specific needs.⁵⁸

Producing electricity through biomass is job-intensive. Ohio is positioned to manufacture and service the needs of the biomass industry. The biomass supply chain includes harvesting equipment, waste separation equipment, and a plethora of unit processing technologies.⁵⁹ The National Renewable Energy Laboratory reports that for every megawatt of biomass power produced, 4.9 jobs are created.⁶⁰

Biomass energy development will help grow companies that make and service the following products.⁶¹

- Power boilers and heat exchangers
- Conveyors and conveying equipment
- Air purification equipment
- Industrial and commercial fans and blowers
- Heating equipment
- Other general purpose machinery
- Industrial valves
- Overhead traveling cranes, hoists, and monorail systems
- Electronic equipment
- Switchgear and switchboard apparatuses
- Air-conditioners
- Pumps and pumping equipment
- Construction machinery
- Measuring instruments and related products
- Heavy gauge metal tanks
- Power, distribution, and specialty transformers
- Fluid power cylinders
- Air and gas compressors
- Iron and steel pipes from purchased steel
- Mineral wood manufacturing

An Ohio Biomass Energy Story:

In Norwalk, Ohio, Bio-Gas Technologies, Ltd makes use of the waste that most of us would like to never see again once the garbage truck drives away. In fact, in 1991 the company was responsible for building one of the nation's first landfill gas-to-energy systems.⁶² To date, Bio-Gas Technologies has 8.5 MW of renewable energy in commercial operation and recently entered into an agreement with Erie County to create power from landfill-gas which will then be sold to AMP Ohio.⁶³ Bio-Gas Technologies has experienced consistent growth in the demand for these innovative systems, which just goes to show that one man's waste really is another man's treasure.

Table 6. Ohio's Biomass Energy Businesses and Research Institutions

Company	Renewable Energy Sector	Service	Region	County	City
ABM Drives, Inc.	biomass, wind	motors and generators	Southwest	Clermont	Milford
Aggreko LLC	biomass, fuel cell, geothermal, solar, wind	generator rentals	Northeast	Summit	Tallmadge
American Electric Power (AEP)	biomass, solar, wind	electric utility provider	Central	Franklin	Columbus
American Landfill	biomass	landfill gas	Northeast	Stark	Waynesburg
AMP Ohio	biomass, fuel cell, solar, wind	electric utility provider	Central	Franklin	Columbus
Barfield Manufacturing Co.	biomass, fuel cell, geothermal, solar, wind	metal products	Southwest	Butler	Hamilton
Battelle	biomass, fuel cell, solar, wind	commercialization	Central	Franklin	Columbus
Bedford #1 Landfill	biomass	landfill gas	Central	Franklin	Columbus
Bedford #2 Landfill	biomass	landfill gas	Central	Franklin	Columbus
Bio-Gas, Ltd.	biomass	gas-to-energy systems	Northwest	Huron	Norwalk
Bowling Green University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Northwest	Wood	Bowling Green
Carbon Limestone LF	biomass	landfill gas	Northeast	Mahoning	Lowellville
CAS Data Loggers	biomass, fuel cell, geothermal, solar, wind	data logging systems	Northeast	Geauga	Chesterland
Cherokee Run Landfill	biomass	landfill gas	Northwest	Logan	Bellfontaine
Cincinnati State Technical and Community College	biomass, fuel cell, geothermal, solar, wind	education, research and development	Southwest	Hamilton	Cincinnati
Cleveland State University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Northeast	Cuyahoga	Cleveland
Crown Equipment	biomass, geothermal, fuel cell, solar, wind	lift trucks	Central, Northwest, Southwest	Franklin, Licking, Mercer, Auglaize, Lucas, Hamilton, Montgomery	Columbus, Newark, Celina, New Bremen, Toledo, Cincinnati, Dayton
C-Tec: Career and Technology Education Centers	biomass, fuel cell, geothermal, solar, wind	education	Central	Licking	Newark
Cuyahoga Regional Sanitary Landfill	biomass	landfill gas	Northeast	Cuyahoga	Solon
Dayton Power and Light	biomass, solar, wind	electric utility provider	Southwest	Montgomery	Dayton
Duke Energy	biomass, solar, wind	electric utility provider	Central, Southeast	Franklin, Clermont, Hamilton, Butler	Columbus, Batavia, Cincinnati, Fairfield, Moscow, New Richmond
Elda LF	biomass	landfill gas	Southwest	Hamilton	Cincinnati
Emerson Liebert - DC-AC inverters	biomass, fuel cell, geothermal, solar, wind	energy solutions	Central	Franklin	Columbus
Evergreen Recycling & Disposal Landfill	biomass	landfill gas	Northwest	Wood	Northwood
First Energy (Ohio Edison, Toledo Edison, The Illuminating Company)	biomass, solar, wind	electric utility provider	Northeast	Summit	Akron
Franklin County Sanitary Landfill	biomass	landfill gas	Central	Franklin	Grove City
Garick Solutions	biomass	gas-to-energy systems	Northeast	Cuyahoga	Cleveland
Guild Associates, Inc.	biomass	adsorption systems	Central	Franklin	Dublin
Hardy Road Landfill	biomass	landfill gas	Northeast	Summit	Akron
Johnson Controls	biomass, geothermal, solar, wind	full service renewable energy provider	Central	Franklin	Columbus
JW Great Lakes Wind	biomass, solar, wind	full service renewable energy provider	Northeast	Cuyahoga	Cleveland
KB Compost Services, Inc.	biomass	biosolids management	Northeast	Summit	Akron
Lake County Landfill	biomass	landfill gas	Northeast	Lake	Painesville
Lorain County II Landfill	biomass	landfill gas	Northeast	Lorain	Oberlin
Makel Engineering	biomass, fuel cell	research and development	Northeast	Cuyahoga	Cleveland
Miami University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Southwest	Butler	Oxford

Company	Renewable Energy Sector	Service	Region	County	City
NASA Glenn Research Center	biomass, fuel cell, geothermal, solar, wind	research and development	Northeast	Cuyahoga	Cleveland
National Electric Coil Inc	biomass, geothermal	generator and motor windings	Central	Franklin	Columbus
Norton Environmental Equipment Company, Ltd	biomass	composting systems	Northeast	Cuyahoga	Independence
Ohio Rural Electric Cooperatives, Inc.	biomass, solar, wind	electric utility provider	Central	Franklin	Columbus
Ohio State University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Central	Franklin	Columbus
Ohio University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Southeast	Athens	Athens
Ottawa County LF	biomass	landfill gas	Northwest	Ottawa	Port Clinton
Owens Community College	biomass, fuel cell, geothermal, solar, wind	education, research and development	Northwest	Hancock, Lucas	Findlay, Toledo
Peter Cremer North America	biomass	distributor/supplier	Southwest	Hamilton	Cincinnati
Phase 3 Developments & Investments, LLC	biomass	commercialization	Southwest	Hamilton	Cincinnati
Pinnacle Road Landfill	biomass	landfill gas	Southwest	Montgomery	Dayton
Renewable Lubricants, Inc	biomass	bio-based lubricants	Northeast	Stark	Hartsville
Rumpke Sanitary Landfill, Inc.	biomass	landfill gas	Southwest	Hamilton	Cincinnati
Schmack Bioenergy	biomass	full service waste management and renewable energy company	Northeast	Wayne, Cuyahoga	Wooster, Cleveland
Stony Hollow Landfill	biomass	landfill gas	Southwest	Montgomery	Dayton
Sunpower, Inc.	biomass, solar	distributor/supplier	Southeast	Athens	Athens
Technology Business Development LLC	biomass	research and development	Northeast	Lorain	North Ridgeville
The Freedonia Group	biomass, fuel cell, geothermal, solar, wind	research	Northeast	Cuyahoga	Cleveland
ThermalTech Engineering Inc.	biomass	engineering	Southwest	Hamilton	Cincinnati
Tremont Landfill	biomass	landfill gas	Southwest	Clark	Springfield
Tyco Electronics Corp	biomass, geothermal, fuel cell, solar, wind	electrical components	Northeast	Richland	Mansfield

OHIO'S GEOTHERMAL INDUSTRY

Ohio's geothermal resources provide energy for hundreds of homes and businesses throughout the state. More than 90 companies in Ohio are involved in building and installing these geothermal systems.

Geothermal energy is fairly simple in principle, using the constant heat of the earth to warm and even cool buildings. Given the amount of heat below the earth's surface, potential geothermal energy reserves are considered inexhaustible.⁶⁴

Geothermal energy can be tapped in various methods. In the western United States, geothermal power can be used to generate base-load electric power. As of August 2008, over 2,955 MW of geothermal power were operating in the United States.

Unfortunately, the geothermal resources in Ohio are not strong enough to produce electricity directly. Ohio's geothermal potential can be captured through heat pumps which take advantage of the earth's relatively constant temperature at depths of about 10 to 300 ft. These systems can deliver heating and cooling, depending on the season, as well as heating for a hot water tank.

Ohio has the manufacturing base necessary to make component parts for geothermal plants, and thus is well positioned to benefit from geothermal energy development. In fact, Ohio is second only to California in the number of jobs that would be created by an investment into geothermal energy.

Ohio has the manufacturing base necessary to make component parts for geothermal plants, and thus is well positioned to benefit from geothermal energy development. In fact, Ohio is second only to California in the number of jobs that would be created by an investment into geothermal energy. The Ohio Apollo Alliance projected that Ohio stands to create more than 1,800 jobs from geothermal development.⁶⁵

Jobs that are likely to increase with the growth of the geothermal industry include:⁶⁶

- Welders
- Mechanics
- Pipe fitters
- Plumbers
- Machinists
- Electricians
- Carpenters
- Construction and drilling equipment operators
- Architects and designers
- HVAC technicians
- Researchers

An Ohio Geothermal Success Story:

Simpson Heating and Cooling, based in New Philadelphia, Ohio, was founded in 1999 as a company that provided traditional heating and cooling systems for homes and businesses. Recently, however, the company has capitalized on the national demand for clean energy. Simpson Heating and Cooling now employs 14 individuals who are able to install geothermal systems that use energy from the earth to heat and cool buildings. The company has been installing geo systems across the region for ten years, saving their customers energy dollars while expanding their reach into this clean energy industry. They are capable of installing geothermal systems into buildings during construction as well as retrofitting traditional heating and cooling systems to run on geothermal energy. Simpson Heating and Cooling recently purchased its own drilling rig, which has allowed the company to increase its geothermal installation capabilities.⁶⁷

Table 7. Ohio's Geothermal Businesses and Research Institutions

Company	Renewable Energy Sector	Service	Region	County	City
Company	Renewable Energy Sector	Service	Region	County	City
Aggreko LLC	biomass, fuel cell, geothermal, solar, wind	generator rentals	Northeast	Summit	Tallmadge
Allied Services Inc	geothermal	installer	Southwest	Montgomery	Clayton
AMETEK Solid State Controls	geothermal	power systems	Central	Franklin	Columbus
Arronco Comfort Air	geothermal	installer	Southwest	Hamilton	Cincinnati
Ashland Comfort Control	geothermal	installer	Northeast	Ashland	Ashland
Bard Manufacturing Co.	geothermal	climate control solutions	Northwest	Williams	Bryan
Barfield Manufacturing Co.	biomass, fuel cell, geothermal, solar, wind	metal products	Southwest	Butler	Hamilton
Bill Spade Electric Inc.	geothermal	installer	Southwest	Montgomery	Miamisburg
Bowling Green University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Northwest	Wood	Bowling Green
CAS Data Loggers	biomass, fuel cell, geothermal, solar, wind	data logging systems	Northeast	Geauga	Chesterland
Century Heating and Cooling, LLC	geothermal	installer	Northeast	Summit	Sagamore Hills
Champion-Air	geothermal	installer	Central	Knox	Mt. Vernon
Cincinnati State Technical and Community College	biomass, fuel cell, geothermal, solar, wind	education, research and development	Southwest	Hamilton	Cincinnati
CJ Contracting	geothermal	installer	Central	Franklin	Columbus
CJS Systems Heating & Cooling	geothermal	installer	Southwest	Montgomery, Greene	Dayton, Xenia
Cleveland State University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Northeast	Cuyahoga	Cleveland
Cosby Heating & Cooling	geothermal	installer	Central	Knox	Mt. Vernon
Crown Equipment	biomass, geothermal, fuel cell, solar, wind	lift trucks	Central, Northwest, Southwest	Franklin, Licking, Mercer, Auglaize, Lucas, Hamilton, Montgomery	Columbus, Newark, Celina, New Bremen, Toledo, Cincinnati, Dayton
Crown Heating & Cooling	geothermal	installer	Northeast	Stark	Alliance
C-Tec: Career and Technology Education Centers	biomass, fuel cell, geothermal, solar, wind	education	Central	Licking	Newark
Danco Enterprises Inc	geothermal	installer	Central, Northeast	Clark, Geauga	Springfield, South Russell
Del-Monde Inc.	geothermal	installer	Southwest	Montgomery	Miamisburg
DeLong Air Inc	geothermal	installer	Central	Clark	Springfield
DuPont	fuel cell, geothermal, Solar, wind	renewable energy components	Southwest	Montgomery	Dayton
Echos Air, Inc	geothermal	installer	Northeast	Cuyahoga	Parma
Elite Heating and Cooling Inc.	geothermal	installer	Central	Licking	Pataskala
Emerson Liebert - DC-AC inverters	biomass, fuel cell, geothermal, solar, wind	energy solutions	Central	Franklin	Columbus
Fairfield Heating & Cooling	geothermal	service and sales	Central	Fairfield	Lancaster
Federal Heating & Cooling	geothermal	installer	Southeast	Muskingum	Dresden
First Geothermal Energy	geothermal	installer	Northeast	Wayne	Wooster
G & C Quality Air Care, Inc	geothermal	service	Northeast	Lorain	Vermilion
Gagel Plumbing and Heating	geothermal	installer	Northwest	Auglaize	Minster
Geo Source One, Inc.	geothermal	installer	Central	Madison	Plain City
Geo-Hydro Supply LTD	geothermal	distributor/supplier			Sugarcreek
Geothermal By Wenigs	geothermal	installer	Central	Marion	Marion
Geothermal Professionals	geothermal	installer	Northeast	Geauga	South Russell
Grace Geothermal Inc.	geothermal	installer	Northeast	Lake, Geauga	Painesville, Thompson
Green by Design	geothermal, solar, wind	distributor/supplier	Northwest	Wood	Bowling Green

Company	Renewable Energy Sector	Service	Region	County	City
Greensleeves, LLC.	geothermal	installer	Northwest	Hancock	Findlay
Hauck Bros Heating & Air Conditioning	geothermal	installer	Central	Clark	Springfield
Heaberlin Heating & Air Conditioning	geothermal	installer	Southeast	Lawrence	East Kitts Hill
Hite Air Conditioning & Refrigeration Inc	geothermal	installer	Central	Farfield	Carroll
Hohler Sheet Metal	geothermal	installer	Northwest	Erie	Huron, Sandusky
Hudepohl Heating and Air	geothermal	installer	Southwest	Brown	Sardinia
IBEW Training Facility	geothermal, solar, wind	workforce development	Northeast	Trumbull	Warren
Icykx	geothermal	installer	Northeast	Tuscarawas	Sugarcreek
Jackson and sons Drilling and Pump Co.	geothermal	geothermal drilling	Northeast	Richland	Belleville
Jennings Heating	geothermal, solar	installer	Northeast	Summit	Akron
Johnson Controls	biomass, geothermal, solar, wind	full service renewable energy provider	Central	Franklin	Columbus
KCA Geothermal Services Inc	geothermal	distributor/supplier	Northeast	Richland	Mansfield
LeBeau Geothermal Heating and Cooling	geothermal	installer	Northeast	Carroll	Malvern
M & D Heating & Cooling	geothermal	installer	Southeast	Guernsey	Byesville
M & S Equipment Inc	geothermal	distributor/supplier	Northwest	Huron	Wakeman
McCullough Heating & Cooling	geothermal	installer	Central	Fairfield	Lancaster
Melink	geothermal, solar, wind	full service renewable energy provider	Southwest	Clermont	Milford
Miami University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Southwest	Butler	Oxford
Middleton Geothermal Services	geothermal	full service renewable energy provider	Northeast	Summit	Akron
NASA Glenn Research Center	biomass, fuel cell, geothermal, solar, wind	education, research and development	Northeast	Cuyahoga	Cleveland
National Electric Coil Inc	biomass, geothermal	generator and motor windings	Central	Franklin	Columbus
Ohio State University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Central	Franklin	Columbus
Ohio University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Southeast	Athens	Athens
Owens Community College	biomass, fuel cell, geothermal, solar, wind	workforce development	Northwest	Hancock, Lucas	Findlay, Toledo
Pier Associates, Inc.	geothermal	sales and service	Northeast	Summit	Akron
Ray's Refrigeration, Inc.	geothermal	distributor/supplier	Northwest	Mercer	Coldwater
Recker and Boerger, Inc.	geothermal	installer	Southwest	Hamilton	Cincinnati
Renewable Concepts and Design, LLC	geothermal, solar	full service renewable energy provider	Central	Franklin	Columbus
Rexource Thermionics	solar, wind, geothermal	manufacturing	Northeast	Summit	Akron
Roberts Brothers Heating & Air Conditioning	geothermal	installer	Central	Champaign	Saint Paris
Rumer Loudin Inc	geothermal	installer	Southeast	Belmont	Barnesville
Schalmo Builders	geothermal	contractor	Northeast	Stark	Canal Fulton
Simpson Heating and Cooling	geothermal	installer	Northeast	Tuscarawas	Dover
Sisler Heating and Cooling	geothermal	installer	Northeast	Medina	Medina
Southern Ohio Mechanical	geothermal	installer	Southeast	Pike	Waverly
Southwest Ohio Geothermal	geothermal	installer	Southwest	Butler	Collinsville
Swagelok	fuel cell, geothermal, solar	fluid systems technologies	Northeast	Cuyahoga	Solon
Terrasource Geothermal Systems	geothermal	distributor/supplier	Southwest	Clermont	Batavia
The Freedonia Group	biomass, fuel cell, geothermal, solar, wind	research	Northeast	Cuyahoga	Cleveland
Tin Man Heating & Cooling	geothermal	installer	Northwest	Wood, Hancock	Bowling Green, Findlay
Tomich Heating & Air	geothermal	installer	Northwest	Erie	Sandusky

Company	Renewable Energy Sector	Service	Region	County	City
Tyco Electronics Corp	biomass, fuel cell, geothermal, solar, wind	electrical components	Northeast	Richland	Mansfield
United Home Comfort	geothermal	installer	Northwest	Wood	Bowling Green
Universal Mechanical Company Heating & Air Conditioning	geothermal	installer	Southeast	Hocking	Rockbridge
University of Akron	biomass, fuel cell, geothermal, solar, wind	education, research and development	Northeast	Summit	Akron
University of Cincinnati	biomass, fuel cell, geothermal, solar, wind	education, research and development	Southwest	Hamilton	Cincinnati
University of Toledo	biomass, fuel cell, geothermal, solar, wind	education, research and development	Northwest	Lucas	Toledo
Watt Works	geothermal, solar	full service renewable energy provider	Central	Franklin	Columbus
West Jefferson Plumbing and Heating	geothermal	installer	Central	Madison	West Jefferson
Western Hills Heating and AC, Inc.	geothermal	installer	Southwest	Hamilton	Harrison
Wind Bender Heating and Cooling, Inc	geothermal	installer	Southwest	Greene	Jamestown
Ww Heating And Air Conditioning	geothermal	installer	Northwest	Allen	Lima
Yoder Drilling and Geothermal	geothermal	installer	Northeast	Tuscarawas	Sugarcreek
Youngstown State University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Northeast	Mahoning	Youngstown
Zimmer Heating and AC, Inc.	geothermal	installer	Southwest	Hamilton	Cincinnati

OHIO'S FUEL CELL INDUSTRY

Due to collaborative efforts between universities, industry, and government there are more than 115 businesses and research institutions already involved in producing breakthrough fuel cell technologies right here in Ohio. Additionally, Ohio is one of the few places in the world where each step in the process of fuel cell development occurs; from research and development to manufacturing and commercialization. For these reasons Ohio is seen as an international leader in the fuel cell industry.⁶⁸

Hydrogen powered fuel cells function by directly converting the chemical energy in hydro-

gen to electricity. Instead of creating harmful greenhouse gases in the process of making energy, the only byproducts of power generation from fuel cells are water and heat.⁶⁹ In order to maintain the environmental integrity of a fuel cell, it is crucial that the feedstock of the fuel cell's energy come from a renewable energy resource.

The deployment of fuel cell technology also offers enormous opportunity for job creation. It is estimated that for every 1,000 MW of fuel cell capacity that is installed 5,000 jobs will be created.⁷⁰

Fuel cell development demands the skills of both non-technical workers and individuals with scientific backgrounds. The following employment opportunities will increase with fuel cell development initiatives.^{71,72}

- Electrical and electronic equipment assemblers
- Inspectors, testers, and sorters
- Commercial and residential installation specialists
- Utility maintenance workers
- Construction workers
- Heavy equipment operators
- Computer technicians
- Machinists
- Legal support
- Bookkeeping and accounting clerks
- Information technology specialists
- Marketing and public relations professionals
- Consultants
- Electrochemical engineers
- Mechanical and Automotive engineers
- Polymer engineers
- Material scientists
- Chemists
- Ceramic engineers
- Fluid flow engineers
- Controls engineers
- Physicists
- Sales representatives
- Shipping and receiving clerks
- Tax preparers
- Training and development specialists

An Ohio Fuel Cell Story:

Dayton, Ohio recently became home to UltraCell Corp.'s newest manufacturing facility for portable fuel cells. To support manufacturing activities at the new facility UltraCell relies on over 62 additional Ohio businesses to supply necessary components for fuel cell production. UltraCell currently employs 15 individuals in the Dayton area but the company estimates the addition of over 60 jobs by 2010 as the demand for fuel cells increases.

Table 8. Fuel Cell Companies in Ohio

Company	Renewable Energy Sector	Service	Region	County	City
24plug, Inc.	fuel cell	custom designed computer software and hardware	Northeast	Cuyahoga	Cleveland
5iTech, LLC	fuel cell	commercialization	Northeast	Cuyahoga	Cleveland
Advanced Material and Technology Commercialization	fuel cell	commercialization	Northeast	Summit	Akron
Advantech Corporation	fuel cell, solar, wind	energy management solutions	Southwest	Hamilton	Cincinnati
Aggreko LLC	biomass, fuel cell, geothermal, solar, wind	generator rentals	Northeast	Summit	Tallmadge
American Hydrogen	fuel cell	ammonia to hydrogen electrolyzer	Southeast	Athens	Athens
American Trim	fuel cell	metal forming and coating	Northwest, Southwest	Allen, Auglaize, Shelby	Lima, Wapakoneta, Sidney
Avtron Industrial Automation	fuel cell	power testing products	Northeast	Cuyahoga	Independence
Azbil-Yamatate Sensing Controls	fuel cell	measurement and control products	Southwest	Warren	Mason
Barfield Manufacturing Co.	biomass, fuel cell, geothermal, solar, wind	metal products	Southwest	Butler	Hamilton
Barnes Group, Inc.	fuel cell	components	Northeast, Northwest	Cuyahoga, Lucas	Brecksville, Cleveland, Maumee
Battelle	biomass, fuel cell, solar, wind	commercialization	Central	Franklin	Columbus
Battelle	biomass, fuel cell, solar, wind	commercialization	Central	Franklin	Columbus
Bowling Green University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Northwest	Wood	Bowling Green
Bulk Molding Compounds	fuel cell	bulk molding compounds	Northwest	Wood	Perrysburg
CAS Data Loggers	biomass, fuel cell, geothermal, solar, wind	data logging systems	Northeast	Geauga	Chesterland
Catacel	fuel cell	catalytic Heat-Exchanging Materials	Northeast	Portage	Garrettsville
Chembar	fuel cell	distributor/supplier	Central	Franklin	Gahanna
Chemsultants International	fuel cell	research and development	Northeast	Lake	Mentor
Cincinnati State Technical and Community College	biomass, fuel cell, geothermal, solar, wind	education, research and development	Southwest	Hamilton	Cincinnati
Cleveland State University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Northeast	Cuyahoga	Cleveland
Columbus Micro Systems	fuel cell, solar, wind	network management	Central	Franklin	Columbus
Cooling Technologies, Inc.	fuel cell, solar, wind	temperature control technologies	Northwest	Lucas	Toledo
Cornerstone Research Group	fuel cell, solar, wind	research and development	Southwest	Montgomery	Dayton
CSA America Inc.	fuel cell	standards writing	Northeast	Cuyahoga	Cleveland
DAI Ceramics	fuel cell	ceramic cores	Northeast	Lake	Willoughby
Dana Corporation	fuel cell	fuel cell components	Northwest	Lucas	Toledo
Daychem Laboratories, Inc.	fuel cell	specialty chemicals	Southwest	Montgomery	Vandalia
DJW Technology	fuel cell	research and development	Central	Franklin	Dublin
DuPont	fuel cell, geothermal, Solar, wind	renewable energy components	Southwest	Montgomery	Dayton
Dylon Industries, Inc.	fuel cell	lubricants	Northeast	Cuyahoga	Cleveland
Eaton Corporation	fuel cell, solar, wind	power solutions	Northeast	Cuyahoga	Cleveland
Edison Welding Institute	fuel cell, wind	welding	Central	Franklin	Columbus
Emerson Liebert - DC-AC inverters	biomass, fuel cell, geothermal, solar, wind	energy solutions	Central	Franklin	Columbus
Energy Technologies Inc.	fuel cell, solar, wind	fuel cell components	Northeast	Richland	Mansfield
Enterprise Welding & Fabricating, Inc.	fuel cell, solar, wind	production line parts	Northeast	Lake	Mentor
F Squared Laboratories	fuel cell	testing services	Northeast	Richland	Mansfield
Faraday Technology	fuel cell	engineering	Southwest	Montgomery	Clayton
Graco Ohio	fuel cell, wind	fluid control	Northeast	Stark	Canton

Company	Renewable Energy Sector	Service	Region	County	City
GrafTech	fuel cell, solar	graphite components	Northeast	Cuyahoga	Parma
Graphite Sales	fuel cell	graphite components	Northeast	Cuyahoga	Chagrin Falls
Great Lakes Institute for Energy Innovation	fuel cell	research and development	Northeast	Cuyahoga	Cleveland
Hadlock Plastics Corporation	fuel cell	composite plastics	Northeast	Ashtabula	Geneva
Harco Industries	fuel cell	hydraulic brake hoses	Southwest	Montgomery	Dayton
Harrop Industries	fuel cell	kilns and dryers	Central	Franklin	Columbus
Heat Exchange Applied Technology, Inc	fuel cell	heat exchangers	Northeast	Wayne	Orville
Henry M. Wood Co.	fuel cell	distributor/supplier	Southwest	Butler	West Chester
Hohman Plating and Manufacturing, Inc.	fuel cell	electroplating	Southwest	Montgomery	Dayton
Howard Industries Inc.	fuel cell	chemical processing	Central	Franklin	Columbus
HydroGen LLC	fuel cell	fuel cell modules	Northeast	Cuyahoga	Cleveland
Kalt Manufacturing	fuel cell, wind	machining	Northeast	Lorain	North Ridgeville
Lake Shore Cryotronics	fuel cell, solar	temperature control products	Central	Franklin	Westerville
Laszeray Technology, Inc.	fuel cell	fuel cell components	Northeast	Cuyahoga	North Royalton
LCP Technology Incorporated	fuel cell	chemical solutions	Southwest	Hamilton	Cincinnati
Makel Engineering	biomass, fuel cell	research and development	Northeast	Cuyahoga	Cleveland
Mansfield Industries, Inc.	fuel cell	fabricating and machining	Northeast	Richland	Mansfield
Marwin Ball Valves, Div. of Richards Industries, I	fuel cell	industrial valves	Southwest	Hamilton	Cincinnati
Maumee Valley Fabricators, Inc.	fuel cell, wind	metal fabricating	Northwest	Lucas	Toledo
McGeady Group, LLC	fuel cell	outsource field sales	Southwest	Greene	Spring Valley
MCM Precision Castings	fuel cell	precision castings	Northwest	Wood	Weston
MetaMateria Partners	fuel cell, solar	electrical conductivity products	Central	Franklin	Columbus
Miami University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Southwest	Butler	Oxford
Mound Technical Solutions	fuel cell	research and development	Southwest	Montgomery	Miamisburg
Myers Power Products	fuel cell	power inverters	Northeast	Stark	Massillon
NASA Glenn Research Center	biomass, fuel cell, geothermal, solar, wind	research and development	Northeast	Cuyahoga	Cleveland
NexTech Materials	fuel cell	fuel cell stacks	Central	Delaware	Lewis Center
Nordson	fuel cell, solar	adhesive, sealant, coatings systems	Northeast	Cuyahoga	Westlake
Ohio Cast Metals Association	fuel cell	metal castings	Central	Franklin	Columbus
Ohio Cat	fuel cell	fluid analysis	Central, Northeast, Northwest, Southwest	Franklin, Tuscarawas, Cuyahoga, Stark, Mahoning, Lucas, Harrison, Muskingum, Hamilton, Montgomery, Miami	Columbus, Bolivar, Broadview Heights, Canton, Cleveland, Youngstown, Toledo, Cadiz, Zanesville, Cincinnati, Oakwood, Troy
Ohio State University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Central	Franklin	Columbus
Ohio University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Southeast	Athens	Athens
Owens Community College	biomass, fuel cell, geothermal, solar, wind	workforce development	Northwest	Hancock, Lucas	Findlay, Toledo
Pacific Fuel Cell Corp.	fuel cell	fuel cell components	Northeast	Lake	Willoughby
Pemery (Ashlawn Group)	fuel cell	fuel cell modules	Northeast	Lake	Painesville
Pemery Corporation	fuel cell	research and development	Northeast	Lake	Painesville
Performance Plastics Ltd.	fuel cell	plastic components	Southwest	Hamilton	Cincinnati
PhyMet, Inc.	fuel cell	industrial lubricants	Southwest	Warren	Springboro
PIA Group	fuel cell	fuel cell components	Southwest	Hamilton	Cincinnati
Plug Power	fuel cell	fuel cell modules	Southwest	Shelby	Sidney
PolarCell - SKRL	fuel cell	cast and molded parts	Northeast	Lake	Eastlake

Company	Renewable Energy Sector	Service	Region	County	City
Polymer Packaging Inc.	fuel cell	polymer products	Northeast	Stark	Canton
PolyOne Corp	fuel cell, solar, wind	polymers	Northeast	Lorain	Avon Lake
Powdermet Inc.	fuel cell	metal and ceramic products	Northeast	Cuyahoga	Euclid
PPM Instruments	fuel cell, wind	power supply testing products	Northeast	Cuyahoga	Cleveland
Precision Energy and Technology	fuel cell	fuel cell components	Southwest	Montgomery	Kettering
Refractory Specialties	fuel cell	industrial insulation	Northeast	Mahoning	Sebring
Rolls-Royce Fuel Cell Systems	fuel cell	fuel cell systems and components	Northeast	Stark	Canton
SCI Engineered Materials	fuel cell	ceramic and metal components	Central	Franklin	Columbus
Sierra Lobo	fuel cell	engineering and technical services	Northwest	Sandusky, Erie	Fremont, Milan
SSOE Architects and Engineers	fuel cell	architecture and engineering	Central, Northwest, Southwest	Franklin, Allen, Lucas, Hamilton	Columbus, Lima, Toledo, Cincinnati
SSP Fittings	fuel cell	fluid systems technologies	Northeast	Summit	Twinsburg
Swagelok	fuel cell, geothermal, solar	fluid systems technologies	Northeast	Cuyahoga	Solon
Taratec Corporation	fuel cell	commercialization	Central	Franklin	Columbus
Team NEO	fuel cell, wind	commercialization	Northeast	Cuyahoga	Cleveland
Technical Staffing Professionals LLC	fuel cell	staffing	Northeast	Trumbull	Warren
Technology Management Inc.	fuel cell	solid oxide fuel cell systems	Northeast	Cuyahoga	Cleveland
Thaler Machine Company	fuel cell	precision machining	Southwest	Montgomery	Dayton
The Freedonia Group	biomass, fuel cell, geothermal, solar, wind	research	Northeast	Cuyahoga	Cleveland
The Lanly Company	fuel cell	heat processing	Northeast	Cuyahoga	Cleveland
The Minco Group	fuel cell	custom plastic molds	Southwest	Montgomery	Dayton
Thermatex Corporation	fuel cell, wind	insulating products	Northeast	Trumbull	Newton Falls
Timcal Graphite and Carbon	fuel cell	graphite and carbon products	Northeast	Cuyahoga	Westlake
UltraCell	fuel cell	micro fuel cells	Southwest	Montgomery	Vandalia
University of Akron	biomass, fuel cell, geothermal, solar, wind	education, research and development	Northeast	Summit	Akron
University of Cincinnati	biomass, fuel cell, geothermal, solar, wind	education, research and development	Southwest	Hamilton	Cincinnati
University of Toledo	biomass, fuel cell, geothermal, solar, wind	education, research and development	Northwest	Lucas	Toledo
Vanner Inc	fuel cell, solar, wind	power solutions	Central, Southwest	Franklin, Montgomery	Hilliard, Dayton
Velocys	fuel cell	commercialization	Central	Madison	Plain City
Wellman Products	fuel cell	fabricating and machining	Northeast	Summit, Medina, Cuyahoga	Akron, Medina, Solon
Youngstown State University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Northeast	Mahoning	Youngstown
YSI, Inc.	fuel cell	environmental monitoring and testing	Southwest	Greene	Yellow Springs
YXLON International Feinfocus Inc.	fuel cell	material testing	Northeast	Summit	Mogadore
Zircoa, Inc	fuel cell	refractories and ceramics	Northeast	Cuyahoga	Solon
ZOOK Enterprises	fuel cell	rupture disks	Northeast	Cuyahoga	Chagrin Falls

POLICY RECOMMENDATIONS

Growing Ohio's manufacturing base through renewable energy can boost Ohio's economy into a cleaner energy future. By taking advantage of Ohio's renewable energy resources like wind and solar power, Ohio will reduce air pollution, create green energy jobs, and grow our economy.

More than 440 firms in Ohio are already creating jobs that are involved in developing renewable energy in Ohio, and an additional 60 firms help to support this industry through auxiliary services. As the renewable energy sector continues to grow rapidly, the level of renewable energy activity in Ohio will only increase.

To facilitate the growth of these industries, Ohio's leaders should continue to adopt policies which promote Ohio's green energy future. With the state's renewable electricity standard and the recently passed federal economic recovery plan, the groundwork has been laid. Now, Ohio's leaders should take the next step both at the state and federal levels to continue growing the green energy industries of the future.

Federal Recommendations

On the federal level, President Obama and Congress chose to make clean energy and green infrastructure a cornerstone of America's economic recovery. The final bill, as passed by Congress on February 13th, 2009, invested \$32.80 billion in clean energy, and \$26.86 billion in energy efficiency.⁷³ This investment is a great kick-start to the national clean energy industries. Now, Congress should reinforce this investment with energy policies to match.

Ohio's Congressional leaders should:

• *Repower America With Clean Energy:*

Renewable energy can become a reality across the entire country if Congress enacts a federal renewable electricity standard. This commitment will drive up the demand for renewable energy and help manufacturing and distribution-oriented states like Ohio grow more green jobs. This standard should require at least 25 percent of the nation's electricity to come from renewable energy resources by 2025.

• *Reduce Carbon Pollution that Contributes to Climate Change:*

Slowing global warming is one of the biggest challenges the world is facing today. The good news is, addressing this problem goes hand in hand with growing the green energy economy of the future. In order to reduce climate change pollution and increase clean energy technologies, Congress should enact a federal cap and trade policy. Most importantly, the cap on carbon emissions should be reduced over time according to the limits that science tells us are necessary to prevent the worst impacts of global warming. At minimum, America's carbon cap should be set to achieve pollution reductions of 35 percent by 2020 and at least 80 percent by 2050.

• Additionally, any federal cap-and-trade program must auction, rather than give away, emission allowances, and use the proceeds of those auctions to accelerate the transition to a clean energy economy and reduce the cost of the program to consumers.

Ohio's New Renewable Energy Law

After more than a year of work and debate by Ohio's state legislators, on May 1, 2008, Governor Strickland signed Senate Bill 221 into law with Speaker Husted at his side. The legislation creates a strong renewable energy standard that requires each major electric utility to invest in renewable energy immediately. This means that Ohio joins the ranks of 27 other states, and Washington D.C., that have made this type of commitment to renewable energy.⁷⁴ Senate Bill 221 also contains an energy efficiency resource standard that will increase the use of energy efficiency in Ohio by 22% by 2025.

The renewable energy standard requires Ohio's electric utilities to invest in renewable energy resources starting this year. By 2025, utilities must diversify their energy resources such that 12.5% of their energy portfolio comes from renewable energy resources. Additionally, another 12.5% of their energy portfolio must come from either renewable energy, energy efficiency or other advanced energy resources.⁷⁵ The annual renewable energy requirement increases over time, as shown in Table 9.

Table 9. Renewable Energy Development Required in Senate Bill 221⁷⁶

Year	Renewable Energy Required	
	%	MWh
2009	0.25	369,962
2010	0.5	747,394
2011	1.0	1,468,162
2012	1.5	2,157,778
2013	2.0	2,811,410
2014	2.5	3,568,553
2015	3.5	5,065,894
2016	4.5	6,537,542
2017	5.5	8,016,224
2018	6.5	9,498,401
2019	7.5	10,860,515
2020	8.5	12,187,201
2021	9.5	13,473,326
2022	10.5	14,717,705
2023	11.5	15,915,034
2024+	12.5	17,049,056
Cumulative	124,444,155	

Table 10. Solar Energy Development Required in Senate Bill 221

Year	Solar Specific Requirement		
	%	MWh	MW
2009	0.004	5,919	4
2010	0.01	14,948	10
2011	0.03	44,045	30
2012	0.06	86,311	60
2013	0.09	126,513	88
2014	0.12	171,291	119
2015	0.15	217,110	150
2016	0.18	261,502	181
2017	0.22	320,649	222
2018	0.26	379,936	263
2019	0.3	434,421	301
2020	0.34	487,488	337
2021	0.38	538,933	373
2022	0.42	588,708	407
2023	0.46	636,601	440
2024+	0.5	681,962	472
Cumulative		4,996,337	3457

Statewide Recommendations

On the state level, Ohio's leaders should continue to pass policies that reaffirm our state's dedication to renewable energy.

Ohio's state leaders should:

- *Expand Renewable Energy Grant and Loan Programs:*

Currently, the Department of Development oversees the Advanced Energy Fund, which funds renewable energy and energy efficiency projects in Ohio. The fund collects nine cents per electricity customer each month as a rider on utility bills. However, the fund is set to expire in 2010. The state should extend the duration of the rider and increase its size in order to support more renewable energy development and take advantage of additional energy efficiency opportunities throughout Ohio.

- *Increase and Enforce the State's Renewable Energy Standard:*

As the Public Utilities Commission of Ohio (PUCO) promulgates the rules and regulations to implement the recently passed renewable energy law, Ohio's lawmakers should work with the PUCO to vigilantly ensure that utilities comply with the current standards, and consider increasing the standards for renewable energy in the future.

- *Repower Ohio's Schools with Solar Panels:*

All new schools in Ohio are already required to be constructed "solar ready." But, in order to take advantage of a "solar ready" school, Ohio should set a goal to install solar roofs on every public school within five years. Additionally, the state should remove any regulatory barriers to solar installations on our schools, homes and businesses.

- *Revise Ohio's Tax Code to Encourage Wind Development:*

In order to encourage development of clean renewable energy resources, Ohio should re-define how renewable energy development is taxed. The State should upgrade its tax laws to support renewable energy production through fair and equitable taxes consistent with other nearby states, which will encourage in-state renewable energy development and benefit all Ohioans.

**Table 11. Renewable Energy Businesses & Auxiliary Services in Ohio
(listed by region)**

Company	Renewable Energy Sector	Service	Region	County	City
Champaign Advocates for Renewable Energy	biomass, fuel cell, geothermal, solar, wind	non-profit	Central	Champaign	Champaign
Roberts Brothers Heating & Air Conditioning	geothermal	installer	Central	Champaign	Saint Paris
Honeywell	wind	obstruction lighting	Central	Champaign	Urbana
Rittal Corp.	wind	wind farm control equipment	Central	Champaign	Urbana
Babcock & Brown	wind	renewable energy developer	Central	Champaign	
Everpower Renewables	wind	wind energy developer	Central	Champaign	
Invenergy	solar, wind	renewable energy developer	Central	Champaign	
DeLong Air Inc	geothermal	installer	Central	Clark	Springfield
Hauck Bros Heating & Air Conditioning	geothermal	installer	Central	Clark	Springfield
Konecranes	wind	overhead lifting equipment	Central	Clark	Springfield
TPI Composites, Inc	wind	composite structures	Central	Clark	Springfield
Sky Climber Wind Solutions	wind	blade services and repair	Central	Delaware	Delaware
NexTech Materials	fuel cell	fuel cell stacks	Central	Delaware	Lewis Center
Ohio Energy Project	biomass, fuel cell, geothermal, solar, wind	education	Central	Delaware	Lewis Center
Emega Technologies	wind	research and development	Central	Fairfield	Lancaster
Fairfield Heating & Cooling	geothermal	service and sales	Central	Fairfield	Lancaster
McCullough Heating & Cooling	geothermal	installer	Central	Fairfield	Lancaster
Hite Air Conditioning & Refrigeration Inc	geothermal	installer	Central	Farfield	Carroll
American Electric Power (AEP)	biomass, solar, wind	electric utility provider	Central	Franklin	Columbus
AMETEK Solid State Controls	geothermal	power systems	Central	Franklin	Columbus
AMP Ohio	biomass, fuel cell, solar, wind	electric utility provider	Central	Franklin	Columbus
Audubon Ohio	biomass, fuel cell, geothermal, solar, wind	non-profit	Central	Franklin	Columbus
Baldwin & Sours, Inc.	Solar	distributor/supplier	Central	Franklin	Columbus
Battelle	biomass, fuel cell, solar, wind	commercialization	Central	Franklin	Columbus
Bedford #1 Landfill	biomass	landfill gas	Central	Franklin	Columbus
Bedford #2 Landfill	biomass	landfill gas	Central	Franklin	Columbus
Blue Green Alliance	biomass, fuel cell, geothermal, solar, wind	non-profit	Central	Franklin	Columbus
CJ Contracting	geothermal	installer	Central	Franklin	Columbus
CJR Group Inc.	biomass, fuel cell, geothermal, solar, wind	consulting	Central	Franklin	Columbus
Columbus Micro Systems	fuel cell, solar, wind	network management	Central	Franklin	Columbus
Columbus State Community College	solar	workforce development	Central	Franklin	Columbus
Edison Welding Institute	fuel cell, wind	welding	Central	Franklin	Columbus
Emerson Liebert - DC-AC inverters	biomass, fuel cell, geothermal, solar, wind	energy solutions	Central	Franklin	Columbus
Environment Ohio	biomass, fuel cell, geothermal, solar, wind	non-profit	Central	Franklin	Columbus
Government Edge	wind	consulting	Central	Franklin	Columbus
Greater Ohio	biomass, fuel cell, geothermal, solar, wind	non-profit	Central	Franklin	Columbus
Green Columbus	biomass, fuel cell, geothermal, solar, wind	non-profit	Central	Franklin	Columbus
Green Energy Ohio	biomass, fuel cell, geothermal, solar, wind	non-profit	Central	Franklin	Columbus
Harrop Industries	fuel cell	kilns and dryers	Central	Franklin	Columbus

Company	Renewable Energy Sector	Service	Region	County	City
Howard Industries Inc.	fuel cell	chemical processing	Central	Franklin	Columbus
Johnson Controls	biomass, geothermal, solar, wind	full service renewable energy provider	Central	Franklin	Columbus
MetaMateria Partners	fuel cell, solar	electrical conductivity products	Central	Franklin	Columbus
Mid-Ohio Regional Planning Commission	biomass, fuel cell, geothermal, solar, wind	non-profit	Central	Franklin	Columbus
National Electric Coil Inc	biomass, geothermal	generator and motor windings	Central	Franklin	Columbus
Ohio Advanced Energy	biomass, fuel cell, geothermal, solar, wind	business trade association	Central	Franklin	Columbus
Ohio Cast Metals Association	fuel cell	metal castings	Central	Franklin	Columbus
Ohio League of Conservation Voters	biomass, fuel cell, geothermal, solar, wind	non-profit	Central	Franklin	Columbus
Ohio Rural Electric Cooperatives	biomass, solar, wind	electric utility provider	Central	Franklin	Columbus
Paul Werth Associates	biomass, wind	consulting	Central	Franklin	Columbus
Powur of Citizenre	solar	consulting	Central	Franklin	Columbus
Renewable Concepts and Design, LLC	geothermal, solar	full service renewable energy provider	Central	Franklin	Columbus
SCI Engineered Materials	fuel cell	ceramic and metal components	Central	Franklin	Columbus
Simply Living	biomass, fuel cell, geothermal, solar, wind	non-profit	Central	Franklin	Columbus
Taratec Corporation	fuel cell	commercialization	Central	Franklin	Columbus
The Ohio Environmental Council	biomass, fuel cell, geothermal, solar, wind	non-profit	Central	Franklin	Columbus
The Ohio State University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Central	Franklin	Columbus
The Sierra Club	biomass, fuel cell, geothermal, solar, wind	non-profit	Central	Franklin	Columbus
Tipping Point Renewable Energy	Solar	full service renewable energy provider	Central	Franklin	Columbus
Tom Fries Associates	biomass, fuel cell, geothermal, solar, wind	consulting	Central	Franklin	Columbus
University Clean Energy Alliance of Ohio	biomass, fuel cell, geothermal, solar, wind	education	Central	Franklin	Columbus
Watt Works	geothermal, solar	full service renewable energy provider	Central	Franklin	Columbus
Environmental Defense Fund (The CJR Group)	biomass, fuel cell, geothermal, solar, wind	non-profit	Central	Franklin	Columbus
The National Wildlife Federation	biomass, fuel cell, geothermal, solar, wind	non-profit	Central	Franklin	Columbus
IBEW Training Facility	solar, wind	workforce development	Central	Franklin	Columbus
DJW Technology	fuel cell	research and development	Central	Franklin	Dublin
Guild Associates, Inc.	biomass	adsorption systems	Central	Franklin	Dublin
Chembar	fuel cell	distributor/supplier	Central	Franklin	Gahanna
Advance Industrial Manufacturing, Inc.	wind	structural metal	Central	Franklin	Grove City
Franklin County Sanitary Landfill	biomass	landfill gas	Central	Franklin	Grove City
Ohio Semitronics, Inc.	wind	power measurement equipment	Central	Franklin	Hilliard
OTB USA	solar	inline production equipment	Central	Franklin	Hilliard
EnviroQuest Energy Solutions	geothermal	consulting	Central	Franklin	Reynoldsburg
AltE	solar, wind	distributor/supplier	Central	Franklin	Upper Arlington
Energy Designs LLC	Solar	education	Central	Franklin	Westerville
Lake Shore Cryotronics	fuel cell, solar	temperature control products	Central	Franklin	Westerville
National Groundwater Association	geothermal	trade association	Central	Franklin	Westerville
Polymer Ohio Inc.	fuel cell, wind	trade association	Central	Franklin	Westerville
Kenyon College	biomass, fuel cell, geothermal, solar, wind	education	Central	Knox	Gambier
Blight to Bright	solar	project developer	Central	Knox	Mt. Vernon

Company	Renewable Energy Sector	Service	Region	County	City
Champion-Air	geothermal	installer	Central	Knox	Mt. Vernon
Cosby Heating & Cooling	geothermal	installer	Central	Knox	Mt. Vernon
Replex Plastics	wind, solar	plastic products, research and development	Central	Knox	Mt. Vernon
Davi American	wind	wind towers	Central	Licking	Granville
Denison University	biomass, fuel cell, geothermal, solar, wind	education	Central	Licking	Granville
Elite Heating and Cooling Inc.	geothermal	installer	Central	Licking	Pataskala
Glenn Electric, Inc.	solar	electrical contractor	Central	Licking	Pataskala
C-Tec: Career and Technology Education Centers	biomass, fuel cell, geothermal, solar, wind	education	Central	Licking	Newark
Greens Solar Solutions, Inc.	Solar	full service renewable energy provider	Central	Madison	London
Geo Source One, Inc.	geothermal	installer	Central	Madison	Plain City
Velocys	fuel cell	commercialization	Central	Madison	Plain City
West Jefferson Plumbing and Heating	geothermal	installer	Central	Madison	West Jefferson
Geothermal By Wenigs	geothermal	installer	Central	Marion	Marion
HPM America	wind	fabricating and machining	Central	Morrow	Mount Gilead
Quadrant Insurance Managers	wind	insurance services	Central	Franklin	Columbus
Danco Enterprises Inc	geothermal	installer	Central, Northeast	Clark, Geauga	Springfield, South Russell
PPG Industries	solar, wind	glass and fiberglass products	Central, Northeast, Northwest	Franklin, Delaware, Summit, Cuyahoga, Crawford	Columbus, Delaware, Barberton, Cleveland, Euclid, Strongsville, Crestline
Parker Hannifin	wind	motion control technologies	Central, Northeast, Northwest	Union, Cuyahoga, Fulton	Marysville, Cleveland, Metamora
Bricker & Eckler	biomass, fuel cell, geothermal, solar, wind	legal services	Central, Northeast, Southwest	Franklin, Cuyahoga, Hamilton	Columbus, Cleveland, Cincinnati
Squire, Sanders & Dempsey L.L.P.	wind	legal services	Central, Northeast, Southwest	Franklin, Cuyahoga, Hamilton	Columbus, Cleveland, Cincinnati
Bodycote Thermal Processing	wind	thermal processing	Central, Northeast, Southwest	Madison, Cuyahoga, Hamilton	London, Highland Heights, Cincinnati
Owens Corning	solar, wind	building materials and composites	Central, Northwest	Licking, Lucas	Granville, Toledo
SSOE Architects and Engineers	fuel cell	architecture and engineering	Central, Northwest, Southwest	Franklin, Allen, Lucas, Hamilton	Columbus, Lima, Toledo, Cincinnati
Crown Equipment	biomass, geothermal, fuel cell, solar, wind	lift trucks	Central, Northwest, Southwest	Franklin, Licking, Mercer, Auglaize, Lucas, Hamilton, Montgomery	Columbus, Newark, Celina, New Bremen, Toledo, Cincinnati, Dayton
Vanner Inc	fuel cell, solar, wind	power solutions	Central, Southwest	Franklin, Montgomery	Hilliard, Dayton
Duke Energy	biomass, solar, wind	electric utility provider	Central, Southwest	Franklin, Clermont, Hamilton, Butler	multiple
Ashland Comfort Control	geothermal	installer	Northeast	Ashland	Ashland
Molded Fiber Glass Companies	solar, wind	composites	Northeast	Ashtabula	Ashtabula
Hadlock Plastics Corporation	fuel cell	composite plastics	Northeast	Ashtabula	Geneva
LeBeau Geothermal Heating and Cooling	geothermal	installer	Northeast	Carroll	Malvern
Kentak Products Co.	wind	construction	Northeast	Columbiana	East Liverpool
Cardinal Fastener & Speciality Co., Inc.	wind	bolts	Northeast	Cuyahoga	Bedford Heights
Olympic Steel Co.	wind	metal components	Northeast	Cuyahoga	Bedford Heights
Precision Machined Products Assoc.	biomass, fuel cell, geothermal, solar, wind	trade association	Northeast	Cuyahoga	Brecksville
Avalon Precision Casting Co	wind	metal castings	Northeast	Cuyahoga	Brookpark
Graphite Sales	fuel cell	graphite components	Northeast	Cuyahoga	Chagrin Falls
ZOOK Enterprises	fuel cell	rupture disks	Northeast	Cuyahoga	Chagrin Falls
24plug, Inc.	fuel cell	custom designed computer software and hardware	Northeast	Cuyahoga	Cleveland

Company	Renewable Energy Sector	Service	Region	County	City
5iTech, LLC	fuel cell	commercialization	Northeast	Cuyahoga	Cleveland
Acorn Technology Group	wind	switches and switchgear	Northeast	Cuyahoga	Cleveland
Advance Manufacturing Corporation	wind	fabricating and machining	Northeast	Cuyahoga	Cleveland
ALL Crane Rental Corp.	wind	crane sales and rentals	Northeast	Cuyahoga	Cleveland
American Tank & Fabricating	wind	turbine towers	Northeast	Cuyahoga	Cleveland
Applied Industrial Technologies	wind	distributor/supplier	Northeast	Cuyahoga	Cleveland
AZ Renewable Energy	wind	distributor/supplier	Northeast	Cuyahoga	Cleveland
Barth Industries, Inc.	wind	fabricating and machining	Northeast	Cuyahoga	Cleveland
Beverage Machine & Fabricators, Inc.	wind	fabricating and machining	Northeast	Cuyahoga	Cleveland
Case Western Reserve University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Northeast	Cuyahoga	Cleveland
CEC Consultants	biomass, geothermal, solar, wind	consulting	Northeast	Cuyahoga	Cleveland
Cleveland Gear Company	wind	gears	Northeast	Cuyahoga	Cleveland
Cleveland Solar & Wind	solar, wind	distributor/supplier	Northeast	Cuyahoga	Cleveland
Cleveland State University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Northeast	Cuyahoga	Cleveland
CSA America Inc.	fuel cell	standards writing	Northeast	Cuyahoga	Cleveland
Dan T. Moore Company	wind	research and development	Northeast	Cuyahoga	Cleveland
Darrah Electric Co Inc	wind	power supplies	Northeast	Cuyahoga	Cleveland
Dylon Industries, Inc.	fuel cell	lubricants	Northeast	Cuyahoga	Cleveland
Early Stage Partners LP	fuel cell	venture capital	Northeast	Cuyahoga	Cleveland
Earth Day Coalition	biomass, fuel cell, geothermal, solar, wind	non-profit	Northeast	Cuyahoga	Cleveland
Eaton Corporation	fuel cell, solar, wind	power solutions	Northeast	Cuyahoga	Cleveland
Ferro	Solar	distributor/supplier	Northeast	Cuyahoga	Cleveland
FoilTek Inc.	solar	solar components	Northeast	Cuyahoga	Cleveland
Garick Solutions	biomass	gas-to-energy systems	Northeast	Cuyahoga	Cleveland
Garland Company	solar	full service renewable energy provider	Northeast	Cuyahoga	Cleveland
Great Lakes Institute for Energy Innovation	fuel cell	research and development	Northeast	Cuyahoga	Cleveland
Great Lakes Towing Company	wind	tugboats	Northeast	Cuyahoga	Cleveland
Great Lakes Wind Network	wind	non-profit: business development	Northeast	Cuyahoga	Cleveland
Green City Blue Lake Institute (at CMNH)	biomass, fuel cell, geothermal, solar, wind	non-profit	Northeast	Cuyahoga	Cleveland
HydroGen LLC	fuel cell	fuel cell modules	Northeast	Cuyahoga	Cleveland
IBC Solar Inc.	solar	solar modules	Northeast	Cuyahoga	Cleveland
IBEW Training Facility	solar, wind	workforce development	Northeast	Cuyahoga	Cleveland
Insight Services	wind	oil analysis	Northeast	Cuyahoga	Cleveland
Jergens, Inc.	wind	fabricating and machining	Northeast	Cuyahoga	Cleveland
Joslyn Hi-Voltage	wind	isolating switches	Northeast	Cuyahoga	Cleveland
JW Great Lakes Wind	biomass, solar, wind	full service renewable energy provider	Northeast	Cuyahoga	Cleveland
Lincoln Electric Company	wind	distributor/supplier	Northeast	Cuyahoga	Cleveland
LNE Group	fuel cell, wind	consulting	Northeast	Cuyahoga	Cleveland
Makel Engineering	biomass, fuel cell	research and development	Northeast	Cuyahoga	Cleveland
Maple Fund	fuel cell	venture capital	Northeast	Cuyahoga	Cleveland
McMahon DeGulis, llp	biomass, fuel cell, geothermal, solar, wind	legal services	Northeast	Cuyahoga	Cleveland
Mid America Stainless	wind	steel and specialty metals	Northeast	Cuyahoga	Cleveland
Multi Solar Inc.	Solar	distributor/supplier	Northeast	Cuyahoga	Cleveland
NASA Glenn Research Center	biomass, fuel cell, geothermal, solar, wind	education, research and development	Northeast	Cuyahoga	Cleveland

Company	Renewable Energy Sector	Service	Region	County	City
Natural Resources Defense Council	biomass, fuel cell, geothermal, solar, wind	non-profit	Northeast	Cuyahoga	Cleveland
NorTech	biomass, fuel cell, geothermal, solar, wind	non-profit: business development	Northeast	Cuyahoga	Cleveland
NPA Coatings	wind	industrial coatings	Northeast	Cuyahoga	Cleveland
Ohio Fuel Cell Coalition	fuel cell	non-profit: business development	Northeast	Cuyahoga	Cleveland
Pew Environmental Group	biomass, fuel cell, geothermal, solar, wind	non-profit	Northeast	Cuyahoga	Cleveland
Phillips Electric	wind	renewable energy developer	Northeast	Cuyahoga	Cleveland
Policy Matters Ohio	biomass, fuel cell, geothermal, solar, wind	non-profit	Northeast	Cuyahoga	Cleveland
PPM Instruments	fuel cell, wind	power supply testing products	Northeast	Cuyahoga	Cleveland
REPower Solutions	Solar, wind	full service renewable energy provider	Northeast	Cuyahoga	Cleveland
Rol-Fab Incorporated	wind	steel fabricating	Northeast	Cuyahoga	Cleveland
Sherwin-Williams	solar, wind	industrial coatings	Northeast	Cuyahoga	Cleveland
Swiger Coil Systems Inc	wind	motors	Northeast	Cuyahoga	Cleveland
System Seals Incorporated	wind	hydraulic seal technologies	Northeast	Cuyahoga	Cleveland
T & B Foundry Co.	wind	ductile iron castings	Northeast	Cuyahoga	Cleveland
Team NEO	fuel cell, wind	commercialization	Northeast	Cuyahoga	Cleveland
Technology Management Inc.	fuel cell	solid oxide fuel cell systems	Northeast	Cuyahoga	Cleveland
The Freedonia Group	biomass, fuel cell, geothermal, solar, wind	research	Northeast	Cuyahoga	Cleveland
The Lanly Company	fuel cell	heat processing	Northeast	Cuyahoga	Cleveland
Torq Hoist Inc.	wind	lifting equipment	Northeast	Cuyahoga	Cleveland
United Tool & Gage Company	wind	fabricating and machining	Northeast	Cuyahoga	Cleveland
Walsh Manufacturing Corporation	wind	metal components	Northeast	Cuyahoga	Cleveland
WIRE-Net	biomass, fuel cell, geothermal, solar, wind	consulting	Northeast	Cuyahoga	Cleveland
WLS Stamping & Fabricating	wind	fabricating and machining	Northeast	Cuyahoga	Cleveland
Z & Z Manufacturing	wind	hydraulic fittings	Northeast	Cuyahoga	Cleveland
Horsburgh & Scott	wind	industrial gears	Northeast	Cuyahoga	Cleveland, Euclid
Cuyahoga Community College	geothermal, solar, wind	workforce development	Northeast	Cuyahoga	Cleveland, Highland Hills, Parma, Warrensville Heights, Westlake
Gibraltar Industries	wind	metal products	Northeast	Cuyahoga	Cuyahoga Heights
Powdermet Inc.	fuel cell	metal and ceramic products	Northeast	Cuyahoga	Euclid
Avtron Industrial Automation	fuel cell	power testing products	Northeast	Cuyahoga	Independence
Five Star Technologies	Solar	dispersions, inks and pastes	Northeast	Cuyahoga	Independence
Norton Environmental Equipment Company, Ltd	biomass	composting systems	Northeast	Cuyahoga	Independence
Martindale Electric Co.	wind	tools	Northeast	Cuyahoga	Lakewood
Preformed Line Products	wind	lines and cables	Northeast	Cuyahoga	Mayfield Village
R&M Materials Handling Inc.	wind	wind farm operations and maintenance	Northeast	Cuyahoga	North Olmsted
Laszeray Technology, Inc.	fuel cell	fuel cell components	Northeast	Cuyahoga	North Royalton
Nautica Windpower LLC	wind	wind energy developer	Northeast	Cuyahoga	Olmsted Falls
Echos Air, Inc	geothermal	installer	Northeast	Cuyahoga	Parma
GrafTech	fuel cell, solar	graphite components	Northeast	Cuyahoga	Parma
Cuyahoga Regional Sanitary Landfill	biomass	landfill gas	Northeast	Cuyahoga	Solon
ERICO Inc.	solar, wind	electrical products	Northeast	Cuyahoga	Solon
Swagelok	fuel cell, geothermal, solar	fluid systems technologies	Northeast	Cuyahoga	Solon
TruSeal Technologies, Inc.	Solar	insulating glass	Northeast	Cuyahoga	Solon
Zircoa, Inc	fuel cell	refractories and ceramics	Northeast	Cuyahoga	Solon

Company	Renewable Energy Sector	Service	Region	County	City
Koyo Corporation of USA	wind	bearings	Northeast	Cuyahoga	Westlake
Nordson	fuel cell, solar	adhesive, sealant, coatings systems	Northeast	Cuyahoga	Westlake
Solar Lighting and Roofing Systems, Inc.	Solar	installer	Northeast	Cuyahoga	Westlake
Timcal Graphite and Carbon	fuel cell	graphite and carbon products	Northeast	Cuyahoga	Westlake
EGC Enterprises Inc.	wind	fluid sealing products	Northeast	Geauga	Chardon
Old State Technologies	Solar, wind	full service renewable energy provider	Northeast	Geauga	Chardon
CAS Data Loggers	biomass, fuel cell, geothermal, solar, wind	data logging systems	Northeast	Geauga	Chesterland
Advanced Materials & Processes International	fuel cell	trade association	Northeast	Geauga	Materials Park
Geothermal Professionals	geothermal	installer	Northeast	Geauga	South Russell
ALD group LLC	wind	precision machining	Northeast	Lake	Eastlake
MRD Solutions LLC	wind	fabricating and machining	Northeast	Lake	Eastlake
PolarCell - SKRL	fuel cell	cast and molded parts	Northeast	Lake	Eastlake
Renaissance Group	solar, wind	full service renewable energy provider	Northeast	Lake	Kirtland
Chemsultants International	fuel cell	research and development	Northeast	Lake	Mentor
Enterprise Welding & Fabricating, Inc.	fuel cell, solar, wind	production line parts	Northeast	Lake	Mentor
GBSA, Inc.	wind	rotary seals	Northeast	Lake	Mentor
Dyson Corporation	wind	fasteners and forgeings	Northeast	Lake	Painesville
Genesis Lamp Corporation	solar, wind	distributor/supplier	Northeast	Lake	Painesville
Lake County Landfill	biomass	landfill gas	Northeast	Lake	Painesville
Pemery (Ashlawn Group)	fuel cell	fuel cell modules	Northeast	Lake	Painesville
Pemery Corporation	fuel cell	research and development	Northeast	Lake	Painesville
Lubrizol Advanced Materials, Inc.	wind	industrial lubricants	Northeast	Lake	Wickliffe
DAI Ceramics	fuel cell	ceramic cores	Northeast	Lake	Willoughby
Federal Gear	wind	gears and bearings	Northeast	Lake	Willoughby
Norbar Torque Tools, Inc	wind	torque tools	Northeast	Lake	Willoughby
Pacific Fuel Cell Corp.	fuel cell	fuel cell components	Northeast	Lake	Willoughby
Weiss North America, Inc.	wind	assembly components	Northeast	Lake	Willoughby
Grace Geothermal Inc.	geothermal	installer	Northeast	Lake, Geauga	Painesville, Thompson
Avon Bearings Corp	wind	bearings	Northeast	Lorain	Avon
Clyde Industrial, LLC	wind	construction and maintenance	Northeast	Lorain	Avon
Kaydon Corporation	wind	fabricating and machining	Northeast	Lorain	Avon
PolyOne Corp	fuel cell, solar, wind	polymers	Northeast	Lorain	Avon Lake
Joe Mescan Windmill	wind	distributor/supplier	Northeast	Lorain	Columbia Station
Nelson Stud Welding Inc.	wind	fasteners	Northeast	Lorain	Elyria
Kalt Manufacturing	fuel cell, wind	machining	Northeast	Lorain	North Ridgeville
Technology Business Development LLC	biomass	research and development	Northeast	Lorain	North Ridgeville
Lorain County II Landfill	biomass	landfill gas	Northeast	Lorain	Oberlin
Oberlin College	biomass, fuel cell, geothermal, solar, wind	education, research and development	Northeast	Lorain	Oberlin
G & C Quality Air Care, Inc	geothermal	service	Northeast	Lorain	Vermilion
Ohio Windmill Manufacturing Co. LLC	wind	windmills	Northeast	Mahoning	Berlin Center
Carbon Limestone LF	biomass	landfill gas	Northeast	Mahoning	Lowellville
O'Brock Windmill Distributors	wind	installer	Northeast	Mahoning	North Benton
Refractory Specialties	fuel cell	industrial insulation	Northeast	Mahoning	Sebring
Brilex Industries	wind	fabricating and machining	Northeast	Mahoning	Youngstown

Company	Renewable Energy Sector	Service	Region	County	City
Vogelsang	biomass	pumps	Northeast	Portage	Ravenna
Adena Corporation	solar, wind	general contractor	Northeast	Richland	Mansfield
American Tower Co.	wind	communication towers	Northeast	Richland	Shelby
Energy Technologies Inc.	fuel cell, solar, wind	fuel cell components	Northeast	Richland	Mansfield
F Squared Laboratories	fuel cell	testing services	Northeast	Richland	Mansfield
Hyundai Ideal Electric Company	wind	motors and generators	Northeast	Richland	Mansfield
IBEW Training Facility	wind	workforce development	Northeast	Richland	Mansfield
Jackson and sons Drilling and Pump Co.	geothermal	geothermal drilling	Northeast	Richland	Belleville
KCA Geothermal Services Inc	geothermal	distributor/supplier	Northeast	Richland	Mansfield
Mansfield Industries, Inc.	fuel cell	fabricating and machining	Northeast	Richland	Mansfield
Michael Byrne Manufacturing Co., Inc	wind	earth boring equipment	Northeast	Richland	Mansfield
Tyco Electronics Corp	biomass, fuel cell, geothermal, solar, wind	electrical components	Northeast	Richland	Mansfield
3-D Service	wind	repair and maintenance	Northeast	Stark	Massillon
A Better Focus Co.	Solar	concentrating solar dishes	Northeast	Stark	Massillon
Canton Drop Forge	wind	large gear blanks	Northeast	Stark	Canton
COT-PURITECH Wind LLC	wind	gearbox services and repair	Northeast	Stark	Canton
Crown Heating & Cooling	geothermal	installer	Northeast	Stark	Alliance
Custom Solar Works	Solar	distributor/supplier	Northeast	Stark	Massillon
Gaspar Inc.	wind	fabricating and welding	Northeast	Stark	Canton
Graco Ohio	fuel cell, wind	fluid control	Northeast	Stark	Canton
King Machine & Tool Co.	wind	fabricating and machining	Northeast	Stark	Massillon
Magnetech Industrial Services	wind	gearbox services and repair	Northeast	Stark	Massillon
Midwest Industrial Supply Inc.	wind	wind farm operations and maintenance	Northeast	Stark	Canton
Myers Power Products	fuel cell	power inverters	Northeast	Stark	Massillon
Polymer Packaging Inc.	fuel cell	polymer products	Northeast	Stark	Canton
Power Systems Development (PSD)	wind	high voltage electrical substation projects	Northeast	Stark	Canton
Renewable Lubricants, Inc	biomass	bio-based lubricants	Northeast	Stark	Hartville
Rolls-Royce Fuel Cell Systems	fuel cell	fuel cell systems and components	Northeast	Stark	Canton
Schalmo Builders	geothermal	contractor	Northeast	Stark	Canal Fulton
Sunlight Energy Systems	solar	distributor/supplier	Northeast	Stark	North Lawrence
Timken Co	wind	fabricating and machining	Northeast	Stark	Canton
Wind Turbines of Ohio, LLC.	wind	full service renewable energy provider	Northeast	Stark	Alliance
Acuren Materials Engineering & Testing	wind	engineering	Northeast	Summit	Akron
Advanced Material and Technology Commercialization	fuel cell	commercialization	Northeast	Summit	Akron
Aggreko LLC	biomass, fuel cell, geothermal, solar, wind	generator rentals	Northeast	Summit	Tallmadge
Akron Machine Services Inc.	wind	machining	Northeast	Summit	Akron
ALL Aerials, LLC	wind	crane sales and rentals	Northeast	Summit	Richfield
ALT Sales Corp.	wind	crane sales and rentals	Northeast	Summit	Richfield
Century Heating and Cooling, LLC	geothermal	installer	Northeast	Summit	Sagamore Hills
Cleveland Electric Laboratories	wind	engineering and planning	Northeast	Summit	Twinsburg
First Energy (Ohio Edison, Toledo Edison, The Illuminating Company)	biomass, solar, wind	electric utility provider	Northeast	Summit	Akron
Glebus Alloys LLC USA	wind	bearings	Northeast	Summit	Akron
Green Energy Technologies	wind	full service renewable energy provider	Northeast	Summit	Akron

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IBEW Training Facility	solar, wind	workforce development	Northeast	Summit	Akron
Jennings Heating	geothermal, solar	installer	Northeast	Summit	Akron
KB Compost Services, Inc.	biomass	biosolids management	Northeast	Summit	Akron
Metal Improvement Company	wind	metal treatment	Northeast	Summit	Twinsburg
Middleton Geothermal Services	geothermal	full service renewable energy provider	Northeast	Summit	Akron
Mirka Abrasives	wind	construction	Northeast	Summit	Twinsburg
Parker Fabricating Co.	wind	steel fabricating	Northeast	Summit	Akron
Pier Associates, Inc.	geothermal	sales and service	Northeast	Summit	Akron
Plastech Consulting, Inc.	fuel cell	consulting	Northeast	Summit	Tallmadge
PSL of America	wind	bearings	Northeast	Summit	Twinsburg
Rexource Thermionics	solar, wind, geothermal	manufacturing	Northeast	Summit	Akron
SSP Fittings	fuel cell	fluid systems technologies	Northeast	Summit	Twinsburg
Today's Energy Solutions	wind	advertising and marketing	Northeast	Summit	Richfield
University of Akron	biomass, fuel cell, geothermal, solar, wind	education, research and development	Northeast	Summit	Akron
Wright Tool	wind	tools	Northeast	Summit	Barberton
YXLON International Feinfocus Inc.	fuel cell	material testing	Northeast	Summit	Mogadore
Wellman Products	fuel cell	fabricating and machining	Northeast	Summit, Medina, Cuyahoga	Akron, Medina, Solon
Ellwood Engineered Castings	wind	metal castings	Northeast	Trumbull	Hubbard
IBEW Training Facility	geothermal, solar, wind	workforce development	Northeast	Trumbull	Warren
Technical Staffing Professionals LLC	fuel cell	staffing	Northeast	Trumbull	Warren
Thermatex Corporation	fuel cell, wind	insulating products	Northeast	Trumbull	Newton Falls
Valley Electrical Consolidated Inc	solar, wind	renewable energy developer	Northeast	Trumbull	Girard
Geo-Hydro Supply LTD	geothermal	distributor/supplier	Northeast	Tuscarawas	Sugarcreek
Harris Battery	wind	battery supplier	Northeast	Tuscarawas	Bolivar
Icykx	geothermal	installer	Northeast	Tuscarawas	Sugarcreek
Simpson Heating and Cooling	geothermal	installer	Northeast	Tuscarawas	Dover
Windharness Development Corp.	wind	wind energy developer	Northeast	Tuscarawas	Dennison
Yoder Drilling and Geothermal	geothermal	installer	Northeast	Tuscarawas	Sugarcreek
First Geothermal Energy	geothermal	installer	Northeast	Wayne	Wooster
Heat Exchange Applied Technology, Inc	fuel cell	heat exchangers	Northeast	Wayne	Orville
Schmack Bioenergy	biomass	full service waste management and renewable energy company	Northeast	Wayne, Cuyahoga	Wooster, Cleveland
Parker Hannifin	wind	motion control technologies	Northeast, Northwest	Cuyahoga, Fulton	Cleveland, Metamora
Barnes Group, Inc.	fuel cell	components	Northeast, Northwest	Cuyahoga, Lucas	Brecksville, Cleveland, Maumee
Ww Heating And Air Conditioning	geothermal	installer	Northwest	Allen	Lima
Gagel Plumbing and Heating	geothermal	installer	Northwest	Auglaize	Minster
Minster Machine Company	wind	fabricating and machining	Northwest	Auglaize	Minster
Engineered Process Systems, LTD	Solar, wind	full service renewable energy provider	Northwest	Erie	Huron
Hohler Sheet Metal	geothermal	installer	Northwest	Erie	Huron, Sandusky
Tomich Heating & Air	geothermal	installer	Northwest	Erie	Sandusky
Greensleeves, LLC.	geothermal	installer	Northwest	Hancock	Findlay
Owens Community College	biomass, fuel cell, geothermal, solar, wind	workforce development	Northwest	Hancock, Lucas, Wood	Findlay, Toledo, Perysburg
AFCO Precision Manufacturing Co.	wind	metal fabrication equipment	Northwest	Henry	Napoleon

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Graebener Group Technologies	wind	metal fabrication equipment	Northwest	Henry	Napoleon
Bio-Gas, Ltd.	biomass	gas-to-energy systems	Northwest	Huron	Norwalk
M & S Equipment Inc	geothermal	distributor/supplier	Northwest	Huron	Wakeman
Norwalk Concrete Industries	wind	precast concrete products	Northwest	Huron	Norwalk
St. George's Renewable Energies	wind	wind energy developer	Northwest	Huron	Wakeman
Advanced Distributed Generation, LLC	solar	full service renewable energy provider	Northwest	Lucas	Toledo
Alignment Supplies Inc.	wind	wind farm operations and maintenance	Northwest	Lucas	Maumee
Cooling Technologies, Inc.	fuel cell, solar, wind	temperature control technologies	Northwest	Lucas	Toledo
Dana Corporation	fuel cell	fuel cell components	Northwest	Lucas	Toledo
Engineering Dynamics	wind	turbine mechanical sub-components	Northwest	Lucas	Sylvania
IBEW Training Facility	solar, wind	workforce development	Northwest	Lucas	Toledo
Innovative Thin Films, LLG	Solar	venture capital	Northwest	Lucas	Toledo
Maumee Authority Stamping	wind	metal and plastic stampings	Northwest	Lucas	Maumee
Maumee Valley Fabricators, Inc.	fuel cell, wind	metal fabricating	Northwest	Lucas	Toledo
Midwest Optoelectronics, LLC	Solar	optoelectronic devices	Northwest	Lucas	Toledo
Midwest Terminals of Toledo	wind	ports and terminals	Northwest	Lucas	Toledo
Owens-Illinois, Inc.	solar	glass and plastic products	Northwest	Lucas	Toledo
University of Toledo	biomass, fuel cell, geothermal, solar, wind	education, research and development	Northwest	Lucas	Toledo
W. Drescher & Associates	wind	legal services	Northwest	Lucas	Sylvania
Willard & Kelsey Solar Group LLC	Solar	solar panels	Northwest	Lucas	Toledo
Xunlight Corporation	Solar	photovoltaic modules	Northwest	Lucas	Toledo
Fanning Howey	solar	architecture and engineering	Northwest	Mercer	Celina
Ray's Refrigeration, Inc.	geothermal	distributor/supplier	Northwest	Mercer	Coldwater
Benjamin Company, The	fuel cell, solar, wind	consulting	Northwest	Ottawa	Port Clinton, Put-In-Bay
North Coast Wind & Power, LLC	wind	full service renewable energy provider	Northwest	Ottawa	Port Clinton
Sierra Lobo	fuel cell	engineering and technical services	Northwest	Sandusky, Erie	Fremont, Milan
Horizon Wind Energy	wind	wind energy developer	Northwest	Van Wert	Van Wert
Iberdrola Renewables	solar, wind	renewable energy developer	Northwest	Van Wert	
Bard Manufacturing Co.	geothermal	climate control solutions	Northwest	Williams	Bryan
Argo-Hytos Inc.	wind	fluid technologies	Northwest	Wood	Bowling Green
Bowling Green University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Northwest	Wood	Bowling Green
Bulk Molding Compounds	fuel cell	bulk molding compounds	Northwest	Wood	Perrysburg
Calyxo USA, Inc.	Solar	thin-film modules	Northwest	Wood	Perrysburg
First Solar, Inc.	Solar	solar power systems	Northwest	Wood	Perrysburg
Green by Design	geothermal, solar, wind	distributor/supplier	Northwest	Wood	Bowling Green
MCM Precision Castings	fuel cell	precision castings	Northwest	Wood	Weston
Pilkington North America	Solar	glass products	Northwest	Wood	Northwood
Stark's Inc.	wind	installer	Northwest	Wood	Bowling Green
Techneglas	Solar	glass products	Northwest	Wood	Perrysburg
United Home Comfort	geothermal	installer	Northwest	Wood	Bowling Green
Tin Man Heating & Cooling	geothermal	installer	Northwest	Wood, Hancock	Bowling Green, Findlay
Marathon Special Products	wind	turbine electrical sub-components	Northwest	Wood	Bowling Green
American Trim	fuel cell	metal forming and coating	Northwest, Southwest	Allen, Auglaize, Shelby	Lima, Wapakoneta, Sidney
American Hydrogen	fuel cell	ammonia to hydrogen electrolyzer	Southeast	Athens	Athens

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Hocking College	biomass, fuel cell, geothermal, solar, wind	education, research and development	Southeast	Athens	Nelsonville
Ohio University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Southeast	Athens	Athens
Sunpower, Inc.	biomass, solar	distributor/supplier	Southeast	Athens	Athens
Third Sun Solar & Wind Power Ltd.	solar, wind	full service renewable energy provider	Southeast	Athens	Athens
Rumer Loudin Inc	geothermal	installer	Southeast	Belmont	Barnesville
M & D Heating & Cooling	geothermal	installer	Southeast	Guernsey	Byesville
Universal Mechanical Company Heating & Air Conditioning	geothermal	installer	Southeast	Hocking	Rockbridge
Evely Solar Products, Inc.	Solar	distributor/supplier	Southeast	Lawrence	Rome
Heaberlin Heating & Air Conditioning	geothermal	installer	Southeast	Lawrence	East Kitts Hill
Inspiramental Col.	solar, wind	full service renewable energy provider	Southeast	Montgomery	Dayton
Federal Heating & Cooling	geothermal	installer	Southeast	Muskingum	Dresden
Southern Ohio Mechanical	geothermal	installer	Southeast	Pike	Waverly
Shawnee State University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Southeast	Scioto	Portsmouth
Hudepohl Heating and Air	geothermal	installer	Southwest	Brown	Sardinia
Milacron, Inc.	wind	fabricating and machining	Southwest	Brown	Mt. Orab
Barfield Manufacturing Co.	biomass, fuel cell, geothermal, solar, wind	metal products	Southwest	Butler	Hamilton
CMC Utility Products	wind	aluminum and copper connectors	Southwest	Butler	Hamilton
Henry M. Wood Co.	fuel cell	distributor/supplier	Southwest	Butler	West Chester
Miami University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Southwest	Butler	Oxford
Southwest Ohio Geothermal	geothermal	installer	Southwest	Butler	Collinsville
ABM Drives, Inc.	biomass, wind	motors and generators	Southwest	Clermont	Milford
Inductive Components Mfg Inc.	wind	voltage regulator controls	Southwest	Clermont	Amelia
Melink	geothermal, solar, wind	full service renewable energy provider	Southwest	Clermont	Milford
Terrasource Geothermal Systems	geothermal	distributor/supplier	Southwest	Clermont	Batavia
McGeady Group, LLC	fuel cell	outsource field sales	Southwest	Greene	Spring Valley
Wind Bender Heating and Cooling, Inc	geothermal	installer	Southwest	Greene	Jamestown
YSI, Inc.	fuel cell	environmental monitoring and testing	Southwest	Greene	Yellow Springs
Advantech Corporation	fuel cell, solar, wind	energy management solutions	Southwest	Hamilton	Cincinnati
Arronco Comfort Air	geothermal	installer	Southwest	Hamilton	Cincinnati
BHE Environmental Inc.	wind	consulting	Southwest	Hamilton	Cincinnati
Blue Chip Solar and Wind	solar, wind	installer	Southwest	Hamilton	Cincinnati
Cast-Fab Technologies Inc.	wind	metal casting	Southwest	Hamilton	Cincinnati
Cincinnati State Technical and Community College	biomass, fuel cell, geothermal, solar, wind	workforce development	Southwest	Hamilton	Cincinnati
Cincinnati Sub-Zero	solar	environmental test chambers	Southwest	Hamilton	Cincinnati
Cincinnati Thermal Spray Inc.	wind	industrial coatings	Southwest	Hamilton	Cincinnati
Cognis Corp.	wind	industrial coatings	Southwest	Hamilton	Cincinnati
Diversified Design Dynamics	wind	machine and tool assembly and design	Southwest	Hamilton	Cincinnati
Future Enviroassets, LLC	biomass	consulting	Southwest	Hamilton	Cincinnati
Haeusler AG	wind	metal forming machines	Southwest	Hamilton	Cincinnati
IBEW Training Facility	solar	workforce development	Southwest	Hamilton	Cincinnati
ILSCO	wind	mechanical connectors	Southwest	Hamilton	Cincinnati
LCP Technology Incorporated	fuel cell	chemical solutions	Southwest	Hamilton	Cincinnati
M&B's Battery Company, Inc.	wind	distributor/supplier	Southwest	Hamilton	Harrison

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Magna Machine Co.	wind	fabricating and machining	Southwest	Hamilton	Cincinnati
Marwin Ball Valves, Div. of Richards Industries, I	fuel cell	industrial valves	Southwest	Hamilton	Cincinnati
McSwain Manufacturing, Inc.	wind	fabricating and machining	Southwest	Hamilton	Cincinnati
Performance Plastics Ltd.	fuel cell	plastic components	Southwest	Hamilton	Cincinnati
Peter Cremer North America	biomass	distributor/supplier	Southwest	Hamilton	Cincinnati
Phase 3 Developments & Investments, LLC	biomass	commercialization	Southwest	Hamilton	Cincinnati
PIA Group	fuel cell	fuel cell components	Southwest	Hamilton	Cincinnati
Recker and Boerger, Inc.	geothermal	installer	Southwest	Hamilton	Cincinnati
Star Sailor	wind	manufacturer	Southwest	Hamilton	Cincinnati
Sunrock Solar	Solar	full service renewable energy provider	Southwest	Hamilton	Cincinnati
TechSolve	fuel cell	consulting	Southwest	Hamilton	Cincinnati
ThermalTech Engineering Inc.	biomass	engineering	Southwest	Hamilton	Cincinnati
University of Cincinnati	biomass, fuel cell, geothermal, solar, wind	education, research and development	Southwest	Hamilton	Cincinnati
Western Hills Heating and AC, Inc.	geothermal	installer	Southwest	Hamilton	Harrison
Woolpert Inc.	wind	engineering and planning	Southwest	Hamilton	Cincinnati
Zimmer Heating and AC, Inc.	geothermal	installer	Southwest	Hamilton	Cincinnati
KES Electrical Systems, LLC	solar	installer	Southwest	Hamilton, Clermont, Warren	Loveland
Hartzell Fan, Inc.	wind	industrial ventilation	Southwest	Miami	Piqua
Ohio Green Wind	Solar, wind	full service renewable energy provider	Southwest	Miami	Tipp City
Process Equipment Company	wind	fabricating and machining	Southwest	Miami	Tipp City
AIDA-America Corp.	wind	turbine mechanical sub-components	Southwest	Montgomery	Dayton
Allied Services Inc	geothermal	installer	Southwest	Montgomery	Clayton
Bill Spade Electric Inc.	geothermal	installer	Southwest	Montgomery	Miamisburg
Cornerstone Research Group	fuel cell, solar, wind	research and development	Southwest	Montgomery	Dayton
Daychem Laboratories, Inc.	fuel cell	specialty chemicals	Southwest	Montgomery	Vandalia
Dayton Power and Light	biomass, solar, wind	electric utility provider	Southwest	Montgomery	Dayton
Dayton Superior Corporation	wind	concrete and masonry construction products	Southwest	Montgomery	Dayton
Del-Monde Inc.	geothermal	installer	Southwest	Montgomery	Miamisburg
DuPont	fuel cell, geothermal, Solar, wind	renewable energy components	Southwest	Montgomery	Dayton
EMTEC	fuel cell, solar, wind	non-profit: business development	Southwest	Montgomery	Dayton
Faraday Technology	fuel cell	engineering	Southwest	Montgomery	Clayton
Harco Industries	fuel cell	hydraulic brake hoses	Southwest	Montgomery	Dayton
Hohman Plating and Manufacturing, Inc.	fuel cell	electroplating	Southwest	Montgomery	Dayton
Mound Technical Solutions	fuel cell	research and development	Southwest	Montgomery	Miamisburg
National Methane	biomass	consulting	Southwest	Montgomery	Dayton
Precision Energy and Technology	fuel cell	fuel cell components	Southwest	Montgomery	Kettering
Schwark Electrical	Solar, wind	distributor/supplier	Southwest	Montgomery	Dayton
SIME Corp.	wind	braking systems	Southwest	Montgomery	Dayton
Sinclair Community College	biomass, fuel cell, geothermal, solar, wind	workforce development	Southwest	Montgomery	Dayton
Staco Energy Products Co.	wind	wind farm control equipment	Southwest	Montgomery	Dayton
Thaler Machine Company	fuel cell	precision machining	Southwest	Montgomery	Dayton
The Minco Group	fuel cell	custom plastic molds	Southwest	Montgomery	Dayton
Tuf-Tug Products /Deuer Developments	wind	maintenance	Southwest	Montgomery	Moraine
UltraCell	fuel cell	micro fuel cells	Southwest	Montgomery	Vandalia

Company	Renewable Energy Sector	Service	Region	County	City
University of Dayton	biomass, fuel cell, geothermal, solar, wind	education, research and development	Southwest	Montgomery	Dayton
Webcore Technologies Inc.	wind	composites	Southwest	Montgomery	Miamisburg
Wright State University	biomass, fuel cell, geothermal, solar, wind	education, research and development	Southwest	Montgomery	Dayton
CJS Systems Heating & Cooling	geothermal	installer	Southwest	Montgomery, Greene	Dayton, Xenia
LP Hoying	solar, wind	photovoltaic power supplies	Southwest	Shelby	Ft. Loramie
Plug Power	fuel cell	fuel cell modules	Southwest	Shelby	Sidney
Azbil-Yamatake Sensing Controls	fuel cell	measurement and control products	Southwest	Warren	Mason
Native Wind Energy	wind	consulting	Southwest	Warren	Lebanon
OSG TAP AND DIE, INC.	wind	tools	Southwest	Warren	Mason
PhyMet, Inc.	fuel cell	industrial lubricants	Southwest	Warren	Springboro
Stress Engineering Services, Inc.	solar, wind	consulting	Southwest	Warren	Mason

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