

# Ohio's 9<sup>th</sup> District

Existing and Future Job Creation Opportunities  
PV and Wind Supply Chains



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# Table of Contents

<b>Executive Summary</b>	04
Deliverables	04
Execution of Deliverables	04
General Observations	04
Summary of Findings	
Number of Companies (Firms)	04
Number of Jobs	07
Renewable Energy Transcend Local, Statewide and Political Boundaries	08
Educational Outreach	08
Conclusion	08
<b>Background</b>	
Ohio's Energy History	10
<b>Overview - Current</b>	
Ohio's 9 <sup>th</sup> District	14
Time of Transition	14
Purpose of Report	16
Methodology, Historical Jobs Analysis – REPP Report 2005	16
Methodology, Current Jobs Analysis – Oberlin Report 2005	17
Methodology, Comparison between REPP 2005 and Oberlin Report 2011	18
Supply Chain Partnerships - “Cradle to Cradle”	18
<b>Overview - Future</b>	
Perspective – Urgency and Opportunity	20
Creating Awareness – Develop a Consensus	20
Secure and Expand Job Base – Identify Goals and Objectives	21
Cluster Development – Strategy, Execution	21
SWOT	22
Threats: Market and Policy Issues	23
Epilogue: A Wind Lesson from the Past	24
<b>Appendices</b>	
A: Copy of Mailed Introduction Letter	25
B: PV & Wind Companies - 9 <sup>th</sup> District (as provided by the University of Toledo)	26
C: Survey - Blank Form	34
D: Survey Interviews - Actual	37
E: Survey Interviews – General Comments	38
F: Influential Companies/Organizations Outside District 9	43
G: What are Clusters?	45
H: PowerPoint Presentation	45
<b>End Notes</b>	55

# Executive Summary

This report was supported by an award to Green Energy Ohio (GEO) from Oberlin College through the Department of Energy (DOE)'s National Energy Technology Laboratory (NETL). All work was performed by consultant Joe Perlaky on behalf of GEO.

## Deliverables<sup>i</sup>

- Confirm the accuracy of data collected by The University of Toledo and other sources through in-person visits and phone interviews with company representatives. Identify existing and future alternative energy job creation opportunities within the 9<sup>th</sup> District.
- Provide all data formatted in a sortable spreadsheet for ease of reference.

## Execution of Deliverables

- Schedule on-site visits and phone interviews with as many company representatives as feasibly possible. The actual number of business involved in the 9<sup>th</sup> District was unknown at the beginning of the process; however, fifty to sixty interviews (surveys) were anticipated (Fifty four actually conducted). Projections of 0-6 months, 1-3 year and 3-5 year job creations were noted.

## General Observations

During the interview process specific company needs and assistance beyond the scope of this grant were identified. This information was forwarded to the appropriate economic development agencies for follow-up. For example:

- Most of the companies are operating lean and profitably. No assistance needed but our visits/calls were appreciated. Facility tours and detailed discussions were common.
- A few companies could use minor assistance in a variety of ways such as information on economic development tax credits, grants, funding sources or other inducements. Some of those businesses are early stage companies while others were undercapitalized to sustain the current economic slowdown. Others simply need general guidance.

Overall, there seemed to be a lower percentage of business operators' needing outside assistance than anticipated. Perhaps state of the art technology startups with their higher barrier of entry require a more established, savvy team of owner/operators and investors resulting in less "bootstrapping" needs.

## Summary of Findings - Number of Companies (Firms)

To identify existing and future alternative energy job creation opportunities within the 9<sup>th</sup> District, we felt the best way to approach this task was to focus on the actual # of companies (firms) rather than estimating jobs. We've included more explanation in the section entitled *Summary of Findings - Number of Jobs*.

The number of companies in Ohio's 9<sup>th</sup> District involved in renewable energy is approximately 79. This has increased from 67 as calculated by the 2005 Department of Energy sponsored REPP Report (Renewable energy Policy Project).

This upward trend is consistent in Lucas, Ottawa and Erie counties. Surprisingly, this is not the case in western Lorain County which actually shows a downward, almost underreporting of renewable energy companies. (See Column 2)

Column 1

This column represents the number of firms per county as identified in the 2005 REPP Report.

Column 2

Using methodology similar to the 2005 REPP report (NAICS codes only), the University of Toledo identified 251 companies (both active and potential) in June of 2011 involved in the wind and solar supply chains.

In addition to the similar REPP protocol, UT supplemented its NAICS code searches with nine (9) on-line sources. It's fair to say this additional "data mining" boosted the chances of identifying more companies. It's also a fair assumption that more companies have websites today than six years ago; however, a 3-4x increase in the number of companies initially seemed high.

The 2005 REPP report included all of Lucas and Lorain counties while the UT report only used a portion (about 95% of Lucas & 50% of Lorain, primarily the west side) because of the 9th District focus. *This created a noticeable decline in the # of firms located in Lorain County.*

Further discussion with local county representatives and rechecking the 9<sup>th</sup> District boundary confirmed the fact that the majority of industry is located in the eastern part of the county including the cities of Lorain and Elyria...all outside the congressional 9<sup>th</sup> District.

We are comfortable that our company counts and job calculations are accurate for the western part of Lorain County (9<sup>th</sup> District). *We suspect... but can't say for certain that if the entire county was included in the study, the results may have shown a positive tracking similarly to Lucas, Ottawa and Erie. A countywide study would resolve this unknown.*

Column 3

Our purpose was to verify and confirm accuracy of this information. All 251 companies were sent an introduction letter by mail followed by visits, phone calls and/or emails to each business. These initial conversations quickly reduced our count to 176 firms. It was determined as follows:

• Eliminated companies outside district	-2
• Added companies (discovered as a result of interviews)	+6
• Companies not involved in renewable energy or out of business	-51
• Companies not willing to participate in survey	<u>-26</u>
Balance of companies, active/potential renewable energy capabilities	176

Of the 176 active/potential firms...

- 31% only involved in solar technologies.
- 52% only involved in wind technologies.
- 7% involved in both wind and solar technologies.  
(To avoid counting twice, they were split equally between both technologies)
- Of all solar companies, 70% focus on solar electric while 30% only provide solar thermal services. Very few provide both.
- 5% support the supply chain indirectly in areas such as building materials, education, fuel cells, or legal.

Column 4

Of the remaining 176 firms, 55 companies filled out the survey for a return rate of 31%. Of those, 25 *actual companies* or 45% are **active** in renewable energy either as a Tier I or Tier II supplier.

- Of the 176 firms, we were unable to obtain surveys from the remaining 122 companies; we used the 45% active multiplier to calculate that another 54 companies are likely to be **active** as Tier I and Tier II suppliers bringing the total to 79. We then separated that total per county.

	Column 1	Column 2	Column 3	Column 4
LOCATION	2005 Total Existing Firms	2011 UT Data	2011 Active + Potential	2011 Total Active Firms
Erie	7	36	28	13
Lorain	34	35	18	8
Lucas	22	162	114	51
Ottawa	2	18	15	7
<b>TOTAL</b>	67	251	176	79

Lending Institutions:

Local lending on projects of utility size (generally 1 megawatt or greater) are rare. They are multi-million dollar investments and typically very complex in deal structure often involving many partners (typically land owners). There are about 50 major lending groups worldwide that focus in these types of investments. They generally have their own counsel and often partner with developers and manufacturers.

## **Summary of Findings - Number of Jobs**

The original intention was to count actual renewable energy jobs by contacting 100% of all identified companies located within the 9<sup>th</sup> District. This quickly turned out to be more idealistic than realistic.

Upon further review, we felt that shifting our focus to the # of companies to determine existing and future alternative energy job creation opportunities would accomplish similar results and trends.

You would think that counting jobs would be straight forward. Unfortunately there are several factors that make this task challenging. Crossover responsibilities, seasonality, part-time/full-time implications, shift work are just some of the issues to be considered when calculating current and future jobs.

Early on in our survey, we realized that job projections were “best guestimates” by owners and CEO’s. We often asked the interviewee to reference only wind and solar positions. Unfortunately this was not always possible since most of their workforce tended to be a blend of traditional and renewable positions.

As the survey progressed, it also became apparent that the 3-5 year period for a technology based industry was too far reaching for any degree of accuracy. It became more guess work and wishful thinking than a strategy. The industry just changes too quickly. Although we continued to ask the question, we settled on a job creation time period for this analysis of “within the next 3 years.”

Although it turned out to be unwieldy to count actual jobs as mentioned above, not all was lost. Talking to nearly a third of our companies did result in certain employment observations worth noting. From specific comments generated from our survey (see Appendix E), we can make some general statements and draw a few conclusions:

- Most companies remain uneasy about their current business status and the overall industry climate. They seem to be in a holding pattern and more than happy to be “breaking even” during these challenging economic times. Some view this as a transitional or correction period. Interestingly, most are optimistic for the future...including job creation.
- Most believe NW and NE are perfectly positioned to take advantage of the area’s research experience, available skilled workforce and company retooling capabilities. Many are eager to diversify their core competency to include renewable energy opportunities.
- Tier I renewable energy companies strongly suggest that government inducement programs are critical and must be consistent to the development and sustainability of this industry.
- Companies that are more traditional, been in existence longer or play more of a supporting Tier II role in renewable energy believe government needs to “get out of their way.” Usual recommendations are smaller government, less regulation and mandates, lower taxes, reduced workers compensation rates and better private sector lending terms and conditions.

## **Renewable Energy Opportunities Transcend Local, Statewide and Political Boundaries**

Although the focus of this report was demographically limited to the 9<sup>th</sup> District, we included a table of reference listing those companies that have significant impact located as little as 5 miles outside the District that generate a huge influence in the wealth creation within the District. (See Appendix F: *Influential Companies Outside District 9*)

Between First Solar, Calyxo USA Inc., and Willard and Kelsey they currently employ approximately 1000 people. Potential employment could grow to 1,400 within a year or two.

## **Educational Outreach**

During our conversations, it was interesting to note how many of our school districts are integrating alternative and renewable energy programs into their classrooms. “Teach the teacher” programs give instructional leaders insight to develop coursework consistent with student grade levels they represent.

Introducing new technologies to students require a more creative approach to the learning process. Also, some teachers incorporate small hand held wind and solar demonstration kits into the classroom as learning tools while others arrange for on-site tours. The Green Energy Ohio Solar Tour is held the first weekend of every October and is a great opportunity for bus field trips. Technology is fast and fluid. To get the latest news, bringing in business and industry experts to speak provides students with state of the art information not yet available in books. Similarly, audio video streams found on the internet or even YouTube can be great resources.

Renewable energy can be taught at any class level. Primarily led by science teachers, thousands of public and parochial students throughout the district are shown the benefits of energy conservation and renewable applications. An interesting result of this instruction is the tendency for children to involve parents both in home discussions and field trips.

## **Conclusion**

Overall, both NW and NE Ohio are well positioned to develop a solar and wind cluster community that could significantly impact both industries worldwide. The opportunity to create a multi-generational legacy similar to the influence the automobile created in our area 100 years ago has real potential.

As discussed, technology develops fast and furious. It's usually a cluster of networks with no particular hierarchy. How we collectively respond in the next few years is critical to transition Ohio's potential into reality.

- Over the last 6 years, the number of companies increased from 67 (2005 REPP Report) to 79 (today's 2011 Oberlin Report). Keep in mind this increase is actually greater since the western portion of Lorain County was only included in this study (9<sup>th</sup> District) whereas in 2005 the entire county was counted.
- Although this report did not count actual jobs, increased company representation indicates the job trend is clearly upward. In fact, in 2005 Xunlight, Calyxo and Willard and Kelsey didn't exist yet. First Solar has since doubled their employment base.

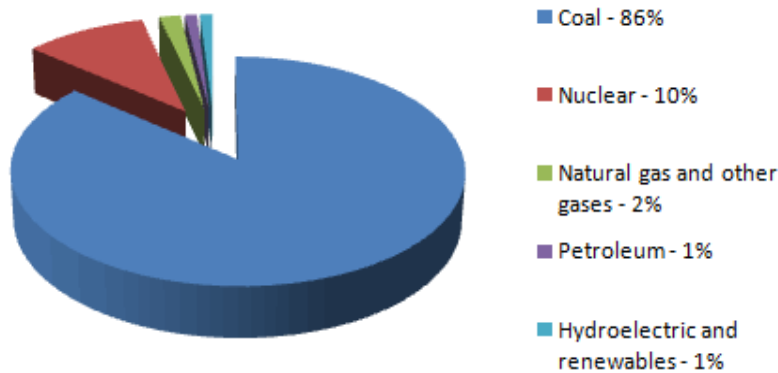


- By far, the biggest threat to Ohio's long-term renewable energy manufacturing future and especially its small business community is the lack of continuity of state grant programs. This politically charged start/stop mentality has killed both small wind and solar in the state. Essentially there have been no new projects as of November of 2010. Committing to a sustainable program is critical and must be implemented ASAP.
- In 2005 and shortly afterwards, NW Ohio were leaders in solar R & D and job creation. Combing academic and private sector research capabilities with available skilled and trained labor force still create a recipe for success. However, global competition is greater today and has closed that early advantage gap.
- Wind manufacturing potential in NE Ohio remains significant. Much effort is being made to capitalize on this opportunity especially in the Cleveland area. Shallow Lake Erie waters with significant wind cache offer an advantage for off-shore installations. Ohio's deep water ports including logistic capabilities offer a huge advantage as a potential wind component staging and assembly area for fresh water installations throughout the five Great Lakes. The use of barges or industrial blimps is the only means of transporting these larger turbines for water installations. Other city ports including Canada also realize the advantage of being the first to establish a logistics foothold and are actively pursuing this opportunity.
- Organize and establish an alternative energy cluster initiative that includes the entire northern tier of Ohio to coalesce and accelerate solar and wind development within the academic, public and private sectors. This holistic approach would be an important step forward in securing future generational wealth creation.

# Background

Ohio is a heavily industrialized state located in the mid-west region of the US. It is 7th largest by population. According to Ohio's Public Utilities Commission, 86 percent of electric power is generated from coal followed by nuclear (10%).<sup>ii</sup> Only a small percentage of our electricity is produced by natural gas, petroleum and renewables (4%). Of the 85% of coal used, more than 60 percent is imported from out of state – at a cost of over \$1.5 billion annually.

Ohio Electric Generation by Fuel Source



In 2008 the state legislature adopted a Clean Energy Law which mandates that 12.5% of the state's electricity must come from renewable sources by the year 2025. Two years into the implementation of the law, Ohio is saving enough electricity each year to power 45,000 homes.<sup>iii</sup>

All four utilities purchased enough renewable energy credits in 2009 to meet their requirements under the Clean Energy Law, spurring new renewable development in Ohio. By the end of 2010, the state had 177 renewable energy generating facilities.

Although no utility fully met its solar energy requirement in 2009, by the end of 2010 Ohio had 20 MW of approved solar generating facilities scheduled for installation. That is enough to power 2,400 homes. Currently, there are 6 wind turbines under construction with another dozen or so scheduled.

Energy efficiency is the lowest cost energy resource and strategy available to Ohio.

## Ohio's Energy History<sup>iv</sup>

Ohio has long been at the center of energy development. It was the birthplace of Thomas A. Edison (America's leading pioneer in the development of electrical applications and transmission), as well as the incubator for the wind and oil-refining industries as they emerged during the 19<sup>th</sup> century.

In 1862 John D. Rockefeller established the Rockefeller & Andrews Oil Company (later called the Standard Oil Company) in Cleveland, Ohio. By 1880 Standard Oil controlled more than 90% of America's oil refining capacity.

Charles F. Brush, also of Cleveland, designed and built one of the world's earliest electricity-generating windmills. His engineering company built the "windmill dynamo" which operated from 1888 until 1900. Mounted on a 60-foot tower with a 145-blade 55-foot rotor, this early wind turbine was only rated at 12kW.

Another early energy pioneer, Arthur Compton (a Nobel laureate from Wooster, Ohio) is credited with inventing the florescent light tube and was instrumental in the early development of nuclear energy.

Ohio also played a prominent role in the early development of the oil and gas industry within the US and these energy sectors continue to influence the state's economy. The first oil well drilled in North America can still be found in Caldwell, Ohio. Dug in 1814 by two pioneers looking for salt, they sold the crude oil as a digestive elixir.

Since that first well, the state has drilled over 273,000 additional wells, ranking it fourth in oil exploration behind Texas, Oklahoma and Pennsylvania. Ohio was the country's lead producer of oil between 1895–1903. At its peak of production in 1896, the state produced 24 million barrels of oil. By 2009, production had dropped to just over 5 million barrels per year.

Natural gas was first discovered in 1887 in Clinton County. By 2008, the state produced nearly 85 billion cubic feet of natural gas, almost 100% of this production consumed within the state. Much of the eastern half of the state lies above the Marcellus and Devonian shale formations, thought to contain vast and largely untapped amounts of natural gas. Industry experts estimate the amount of natural gas in the Marcellus at between 363-1,307 trillion cubic feet (TCF) of recoverable resource, which would be enough to supply U.S. consumption for 14 years at the low end of the estimate, to as much as a 42-year supply at current rates of consumption. However, recovery of this resource relies on a technique known as hydraulic fracturing, which has raised considerable environmental concerns as well as resulting in significant groundwater contamination.

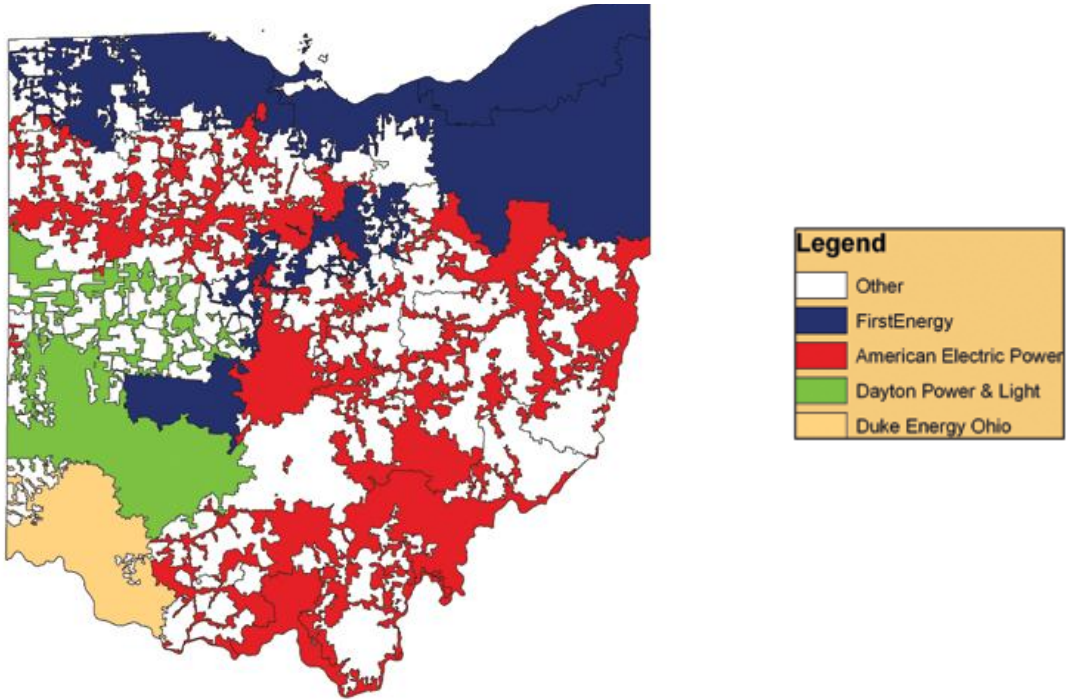
#### Electricity Generation:

Ohio has a deregulated competitive electric power market. The four investor-owned electrical utilities provide over 90% of the electricity consumed within the state. The remaining electricity is provided by various municipal electrical systems (not-for-profit, government-subsidized utilities that provide electricity largely within defined municipal limits) and Rural Electric Cooperatives (consumer-owned cooperatives formed to ensure access to electricity for Ohio's rural consumers).

The investor-owned electrical utilities (in order of size) include:

- FirstEnergy
- American Electric Power (AEP)
- Duke Energy
- Dayton Power & Light (DP&L)

### Service Areas of Ohio Investor-Owned Utilities



In 2010, fuel sources for Ohio's electrical generation (in trillion Btu) consisted of:

- Coal – 1,373 (86%)
- Nuclear – 155.3 (10%)
- Petroleum – 30.6 (2%)
- Natural Gas – 28.8 (2%)
- Hydroelectric – 5.2 (0%)
- Renewables – 1.2 (0%)

Energy generated from nuclear sources comes from two power plants located in northern Ohio. The Perry Nuclear Power Plant began operations in 1987. A boiling water reactor, it produces 1,258 megawatts of electricity, enough to power about 750,000 homes. Built at a cost of \$6 billion, it is one of the most expensive power plants ever built. The second nuclear power plant operating in Ohio is the Davis-Besse Nuclear Power Station. It began generating power in 1979.

#### Energy Consumption:

Electricity consumption within Ohio is growing at a rate of 1.4% per year, even though the state's population growth is only 0.2% per year. Energy consumption in Ohio's industrial sector ranks among the highest in the nation.

Ohio is the 7<sup>th</sup> most populous state in the nation, but ranks 3<sup>rd</sup> in consumption of coal (1,458.4 trillion Btu), 7<sup>th</sup> in consumption of natural gas (824 trillion Btu), 9<sup>th</sup> in consumption of petroleum (1,299.7 trillion Btu) and 4<sup>th</sup> in retail electricity sales (554.8 trillion Btu). However Ohio ranks only 24<sup>th</sup> in total energy consumption per capita at 345.9 million Btu (based on 2008 figures).

Senate Bill 221:

In 2008, the Ohio legislature passed the Clean Energy Law (Senate Bill 221). The law outlines four separate clean energy requirements for the state's investor-owned utilities (municipal systems and electrical cooperatives are not subject to the law's provisions). These include:

- Reduce the consumption of electricity (net sales) 22 percent by 2025 through electrical efficiency measures and programs
- Reduce peak electrical demand by 1 percent in 2009 and by 0.75 percent each year during the 2010-2018 time period
- 12.5 percent of all electrical sales must be provided from renewable energy sources by 2025
- By 2025, 0.5 percent of all electrical energy must come from solar power sources (however, a study by the Environment Ohio Research & Policy Center found that none of the investor-owned utilities had met the law's solar energy benchmarks during 2009).

Ohio's Renewable Energy Potential:

Ohio has made a significant investment in the development of its renewable resources. The state has over 2,100 companies -- the fourth-highest number in the nation -- in industries related to the manufacture of components for renewable energy systems.

While ranked 19<sup>th</sup> amongst the states in wind energy potential (estimated at a potential capacity of at least 54,919.7 megawatts<sup>vi</sup>- this resource primarily located along Lake Erie and the plains in the north-western part of the state), Ohio currently ranks 27<sup>th</sup> in wind power production.

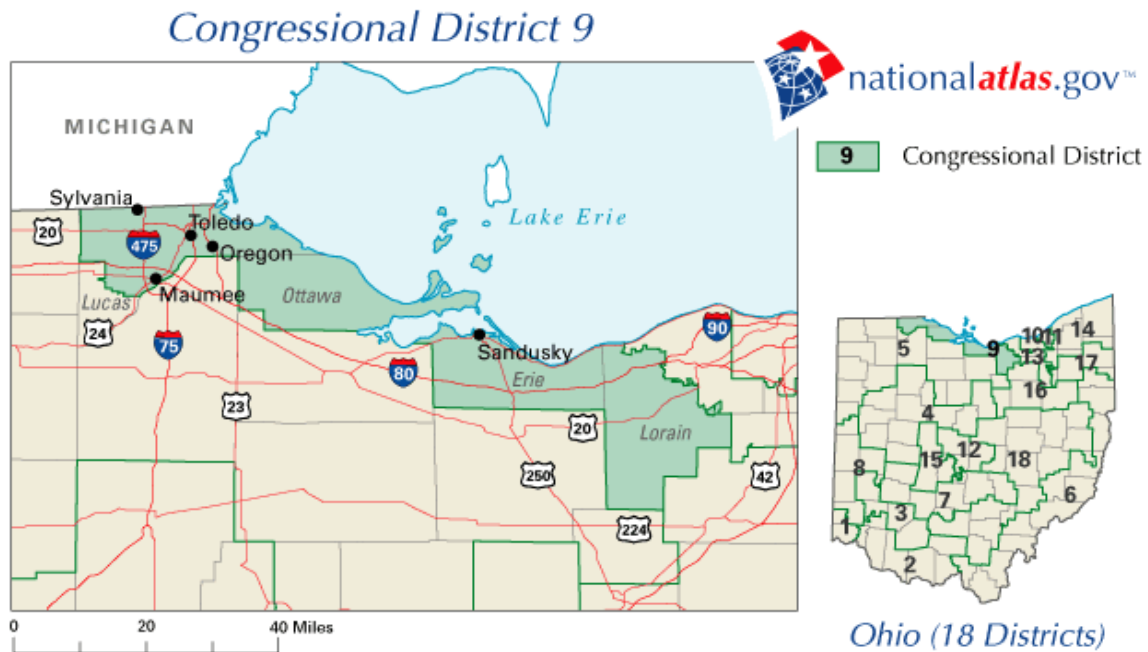
While a significant producer of solar panels (in 2011 there were 63 Ohio companies working to develop solar power components), the state has been slow to install systems within its borders. While there are a number of significant installations in various stages of completion, Ohio currently ranks 45th among states generating solar power, according to statistics provided by the U.S. Energy Information Administration.

Ohio also possesses significant biomass resources. The state currently produces more than 7 million dry tons of biomass each year from urban wood waste, crop residues and forest residues, an amount that ranks it 7th highest in the nation among US states. The Oak Ridge National Laboratory estimates that biomass could generate 7.5 percent of Ohio's electricity needs by 2020.

# Overview - Current

## Ohio's 9<sup>th</sup> District

Ohio's Ninth District includes most of Lucas, all of Ottawa and Erie and the South and West portions of Lorain Counties. All or part of ten cities (whose population is greater than 5,000) are in the district such as Toledo, Sandusky, Sylvania, Oregon, Maumee, Amherst, Vermilion, Oberlin, Huron and Port Clinton.<sup>vii</sup> It is a unique blend of urban (86%) and rural (14%), industry and commercial and agriculture.

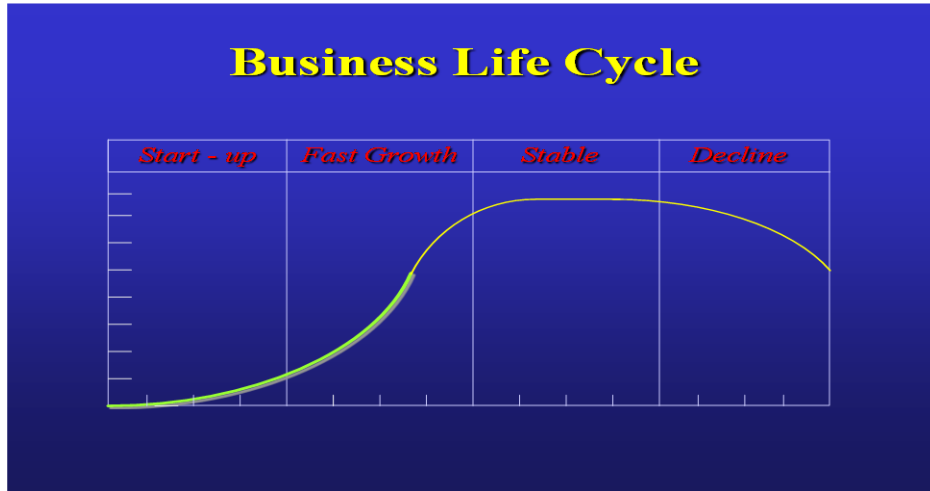


The district, which runs along nearly half of Ohio's Lake Erie lakefront, has a long history of manufacturing, an agricultural economy, vibrant neighborhoods rich in ethnic and religious diversity, and recently... academic and industry research focusing on photo voltaic and other related renewable energy's.<sup>viii</sup>

## Time of Transition

Although rich in history, community values and tradition, many areas in the Midwest US remain economic challenges. The global marketplace requires new strategies and considerations. Transitioning into this marketplace is imperative for economic stability and a generational long-term future.

Fortunately, within our region the two technologies we are focusing on...wind and solar, are still early in their development and deployment. (See exaggerated light-green line located in the startup & fast growth columns of the Business Life Cycle chart on the next page)



- **Start-up clusters** are largely focused on the development of knowledge as opposed to the development of revenue.
- **Fast Growth clusters** are characterized by a rapid influx of firms and people attracted to the emerging opportunities.
- **Stable clusters** continue to grow but less rapidly—both in terms of employment and the number of firms arriving in the cluster.
- **Decline-Stage clusters** sit in the balance. They can either reinvent themselves or fade from relevance. Decline occurs as markets shift either to new products or to alternative sites. \*

\* Trefor Munn-Venn and Roger Voyer, *Clusters of Opportunity, Clusters of Risk*, Conference Board of Canada, August 2004, p. 14.

Wind and solar development are the world's fastest growing energy resources, but the industry still remains highly dynamic. In 2008, "record wind demand has caused a 2-3 year supply shortage of wind turbines and is pushing up the costs of ambitious renewable energy projects in the United States. The demand is causing developers to secure deals for new wind turbines long before construction begins on their projects"<sup>ix</sup>. Currently, many wind supply chain manufacturers that were successful in 2008 and 2009, have been losing business by being underbid by European competitors. Many of the supply chain manufacturers are located in Ohio's 9<sup>th</sup> District specifically NW Ohio (primarily PV) and NE Ohio (primarily wind). Ohio has the opportunity to lead the country in manufacturing and assembling of these items and their component parts. Regional leadership should recognize this potential and seek to capture and sustain a competitive advantage in both industries.

"Overnight successes" like one of the world's largest manufacturing PV plant...*First Solar* which is located in NW Ohio has taken nearly thirty years to develop. Other PV plants have recently opened with others soon to follow. Competition is worldwide. Our pipeline must remain active and full today to expand our supply chain tomorrow.

**Purpose of Report**

Specifically, the purpose of this report was to confirm employment information unique to the 9<sup>th</sup> District in Ohio by visiting as many stakeholders as possible within both renewable supply chains. The value of personal contact is that it “peels back the onion” one more layer offering greater insight and accuracy to business and community opportunities.

**Methodology, Historical Jobs Analysis – REPP Report 2005**

In 2005, a technical report entitled Renewable Energy Policy Project (REPP) was conducted by George Sterzinger and Matt Svrcek.<sup>x</sup> It focused on several renewable energy manufacturing opportunities involving wind, solar, geothermal and biomass supply chains. Using 45 industrial NAICS codes that comprised the major component parts for major renewable energy technologies, the report was able to identify the number of firms and jobs throughout the United States which operate in industries related to the manufacturing of components that go into renewable energy systems. The next step was to reduce this information to the state and county levels.

Knowing the number of existing firms and jobs, the report went on to determine potential new jobs and investment opportunities within the 4 renewables.

Specifically, the methodology<sup>xi</sup> used in the REPP report based Job projections on the number of employees within the selected NAICS codes rather than number of actual firms to account for the different impact of large vs. small companies.

The report listed investment and job potential in the top 20 states ranked by average investment. At that time, Ohio ranked # 3 behind Texas and California. The report also went on to identify key categories such as # of firms, jobs, relating to potential Ohio manufacturing job creation.

**REPP REPORT – 2005 (Solar/Wind Only)**

LOCATION	TOTAL EXISTING FIRMS	POTENTIAL SOLAR JOBS	POTENTIAL WIND JOBS	TOTAL POTENTIAL JOBS
Erie	7	1	292	293
Lorain <sup>1</sup>	34	879	647	1525
Lucas	24	471	222	693
Ottawa	2	0	1	1
<b>TOTAL</b>	<b>67</b>	<b>1360</b>	<b>1162</b>	<b>2512</b>

<sup>1</sup> All of Lorain County - 2005 REPP Report



## Methodology, Current Jobs Analysis – Oberlin Report 2011

Using similar methodology developed by the U.S. Department of Energy funded Renewable Energy Policy Project (REPP), 6 digit NAICS codes were identified for the solar, and wind industries. A search was conducted, using the Harris Index, to identify companies that identified themselves under the industry specific NAICS codes provided by the REPP report.

The search included most of Lucas, all of Ottawa and Erie and the South and Western portion of Lorain Counties in Ohio's 9<sup>th</sup> District

In addition, existing online databases were utilized to identify companies which have the potential to become part of the solar and wind supply chains or are currently active in the solar and supply chains.

A list of companies which have attended renewable energy webinars was also obtained from the Green Energy Ohio Annual Meeting. From this list, a web search was conducted to determine the company's location, employee count, line of business, the renewable energy sector the company belonged to, etc. Manta was the primary source of company information after identification from the webinar attendee sheet. [www.manta.com](http://www.manta.com). Following are other sources used in gathering the information listed above.

- Great Lakes Wind Network (GLWN) <http://maps.glwn.org/wind/>
- Edison Materials Technology Center (EMTEC) <http://emtec.org/sc/photovoltaics>.
- "Alternative Energy Overview and Options." Newark, OH. February, 2010. <http://www.newarkohio.net/city/onlinedocs/AlternativeEnergyOverview.pdf>
- Edison Materials Technology Center. <http://emtec.org/sc/photovoltaics>
- Energy Source Guide <http://energy.sourceguides.com/businesses/byGeo/US/byS/OH/OH.shtml>
- Green Energy Ohio Annual Meeting. <http://www.greenenergyohio.org/page.cfm>
- Manta Small Business Guide. <http://www.manta.com/>
- NorTech Energy Enterprise. <http://www.nortechenergy.org/the-cluster/>

As a result of the compilation of source searches, 251 companies involved in the wind or PV supply chains were identified.

Our role was to contact all 251 businesses with a goal of obtaining surveys from 50-60 companies. All but 6 companies were contacted either by mail, phone or personal visits. We received surveys from 55 companies and general comments were noted. Corrections to contact information were made for those we were able to reach or obtain surveys from. (See Appendix B)

Specifically, the methodology used in this report was based on the following:

- Using methodology similar to REPP report of 2005, NAICS codes were identified for the solar, and wind industries.
- A search was conducted, using the Harris Index, to identify companies that identified themselves under the industry specific NAICS codes provided by the REPP report.
- In addition, existing online databases were also utilized to identify companies which have the potential to become part of the solar and wind supply chains.

*It's important to note that at this juncture, we quickly arrived at two conclusions:*

- 1. To get an accurate actual job count, 100% of all companies needed to be counted and that would not be realistic.*
- 2. We also observed that job projections were based on “best guestimates” by owners and CEO’s. We often asked the interviewee to reference only wind and solar positions. Unfortunately this was not entirely possible since their workforce tended to be a blend of traditional and renewable positions.*

*Instead, the better approach would be to verify the # of companies within the renewable energy supply chain. We could certainly compare the trend of job creation over the last 6 years by comparing our 2011 actual company counts with the 2005 statistical company counts of the REPP report.*

- Our company counts reflect businesses both active and those that have the potential to be involved in the renewable energy supply chain within the 9<sup>th</sup> District. Based on our 31% sampling size, approximately 45% of these companies are actively involved in the renewable energy supply chain... 55% have the potential.

### **Methodology, Comparison between REPP 2005 Report and Oberlin Report 2011**

The REPP report was entirely a statistical analysis of the # of companies and jobs projections. There was no multiplier used to determine the # of jobs based on the # of companies. Both company and jobs counts were extracted from NAICS code data independently.

This report applied a similar methodology initially using NAICS codes, but also added the Harris Index and online databases sources. This created a much larger initial pool of firms to verify but was still manageable. Nearly all companies (245 out of 251) were contacted via mail, personal visits or phone calls.

### **Supply Chain Partnerships - “Cradle to Cradle”**

Product development from concept to commercialization depends on all sectors working seamlessly together. A bad political policy, defective part manufacture or incompetent installer or distributor can cause havoc anywhere along the chain.

Research (academic or private sector) can play a very important role in where the product ultimately gets manufactured. Using PV as an example, consider First Solar, Xunlight, Calyxo USA and Willard & Kelsey. You would think their first manufacturing site would be located in a southern climate somewhere. So why NW Ohio? The availability of a skilled workforce such as engineers, physics graduates and other science majors make a big difference for employers. It's simply easier for a company to set up operations with those assets nearby.

The role of 2 year colleges is also important by providing job training courses and certification. Of late, local union trades have recognized the importance of cross training their employees by offering various renewable energy job programs.

University business incubation efforts should be maintained and expanded. The importance of how academic and private sector R&D can leverage community job creation in the manufacturing and distribution sectors should not be underestimated.

	<i>SUPPLY CHAIN</i>	<i>PRIMARY SECTOR INVOLVEMENT</i>
1	Raw Materials	Private Supplier
2	Research	Academic, Private
3	Prototype	Academic, Private
4	Manufacture	Private
5	Distribute	Private
6	Sales	Private
7	Installation	Private
8	Operate	Academic, Public, Private, Military
9	Service	Private, Public, Military
10	Disposal/Reuse	Academic, Public, Private, Military

NE Ohio has a tremendous opportunity to develop solar manufacturing and assembly sites. The same holds true of wind. Engineers, tool and die and other industrial skill trades and available facilities are abundant. The downsizing of the US auto industry within the region presents a perfect opportunity to convert vacant or underperforming existing facilities into a wind turbine supply chain<sup>xii</sup>.



Another factor is Ohio's deep water ports and their distribution capabilities. NE Ohio is diligently working to construct our nation's first fresh water wind farm. That alone is a monumental task, however, there are other forces supporting this effort. Whoever locates the nation's first off-shore wind assembly facility bordering the Great Lakes will have a huge advantage for a generation of workers. Shipping by barge is the only possible means of off-shore

turbine distribution because of their size. There are 8 states contiguous to the five Great Lakes. And oh by the way, don't forget Canada.

## Overview - Future

*Recognize a need, acknowledge the sense of urgency, develop a consensus, identify goals and objectives, implement a strategy, and execute the plan.*

### **Perspective – Urgency and Opportunity**

With unemployment around 10 percent, many individuals remain under employed and not on any agency's radar, personal and business bankruptcies higher than ever, college graduates leaving the area for jobs elsewhere...doesn't seem like the sense of urgency can get much more obvious.

Products and services have life cycles. With that, comes change and opportunities. As a manufacturing center that focused primarily on the automotive industry for generations, many companies have a chance to diversify production and service capabilities in areas with new opportunities.

From a historical perspective, today's challenges aren't much different than they were generations ago. One hundred years ago our business and community leaders recognized the huge impact the automobile industry would have on our nation's economy. It required research, development, testing which eventually resulted in commercialization, manufacturing and sales. Our forefathers seized the moment and foresaw how it would change the way they lived, worked and played.

Yesterday's automotive industry is today's energy industry. We still have the industrial capabilities, capital investment potential and the skilled workforce to retool...or at a minimum, diversify our manufacturing base. PV and wind research capabilities are already in place both in the academic and private sectors.

### **Creating Awareness – Develop a Consensus**

*Creating opportunity awareness within our community should be one of our immediate goals.*

To some extent, this intuitively has already begun. Identifying the numbers of firms, their location, contact information, employee counts and other measurables within our existing supply chain is only step one. "Identifying the dots," the players, the stakeholders which include segments of government, academic institutions and private sector companies should be part of an overall strategy to develop and secure the rest of the supply chain by "connecting those dots." This can be accomplished through an adequately funded cluster initiative. Actual demographic boundaries can best be established through a structured networking analysis. Prior to this analysis, arbitrary "drawing lines in the sand" would be speculative and short-sighted and defeat the power of cluster based economic development.

## Secure and Expand Job Base – Identify Goals and Objectives

*Acknowledge Tier I and Tier II supply chain companies already doing business in the area and build upon that employment base.*

Every effort should be made by economic development agencies to retain and attract new companies to the area.

The most effective strategy is to retain those companies already doing business within the area. Thank them for being a part of the community; ask them what can be done to assist them in solidifying or expanding their existing customer base. Offering inducements designed specific to this objective is certainly a tool economic developers use but usually it is the simple “no cost” changes that are more meaningful to businesses such as moving curb cuts, electrical wires, improved alley access, signaling, ease of permitting, zoning changes and generally less governmental red tape (all levels) etc.

Attracting new companies always get the headlines and should be pursued but it is more expensive and time consuming. However, if our community already offers a critical mass of energy suppliers or has the reputation of the “place to be” it should be easier to draw new companies to the area. Having this critical mass also encourages less “push back” from the community. Build upon the communities core competency...exploit it and promote it aggressively.

We all are stakeholders. A community’s “can do” attitude in close collaboration with the academic, public and private sectors can be very powerful.

## Cluster Development – Strategy, Execution

*Establish a renewable energy cluster initiative that includes solar and wind supply chain stakeholders located in BOTH the northwest and northeast Ohio communities.*

Conducting a social networking survey that will “Identify and connect the dots” as described earlier. It establishes a basic foundation for the development of a viable renewable energy cluster within the District. Unfortunately, at this point there are no plans or funding mechanisms in place to support this cluster effort.

It’s increasingly difficult for businesses of all sizes to operate successfully without some sort of collaboration. A successfully organized cluster initiative solves this problem.



*For more information on Clusters see Appendix F*

Case in point: The Maumee Valley Growers Association (formally the NW Ohio Greenhouse Cluster Initiative) which is a consortium of approximately 70 greenhouse growers in NW Ohio who specialize in floriculture realized their industry was in a serious decline cycle. As a result, they have met regularly as a group for nearly six years to find solutions to this downward trend and determine other alternatives to profitability. Collectively they developed a variety of programs that dealt with these challenges head on. Progress has been made. As a general rule, most (but not all) have actually increased their sales while decreasing their expenses.

How? They pooled their marketing, product and energy purchases. Their marketing efforts increased customer awareness which translated into greater sales and on the other side of the ledger, collective product and energy (natural gas/electricity) purchases trimmed their expenses.

They recognized the sense of urgency, developed a consensus, initiated a strategy then executed their plan. Changing times, shifting profit centers and margins happens all the time. It's how you respond to these challenges that separate success from failure. The growers decided their best alternative was to work together to secure a viable solution.

While NW Ohio focuses on solar and NE Ohio concentrates on wind, combining these efforts through a cluster base economic development initiative could benefit both efforts considerably.

An effective cluster initiative will objectively bring together all stakeholders within the academic, public and private sectors. All sectors must be represented to create an effective collaboration. The northern tier of Ohio has too much in common with overlapping and redundant assets to work independently of each other.

There have been modest efforts in the past to share resources but with limited successes. Today's sense of urgency may allow us to look beyond parochial views. With proper coordination and support, there is plenty to gain by all participants if collaboration becomes the cornerstone.

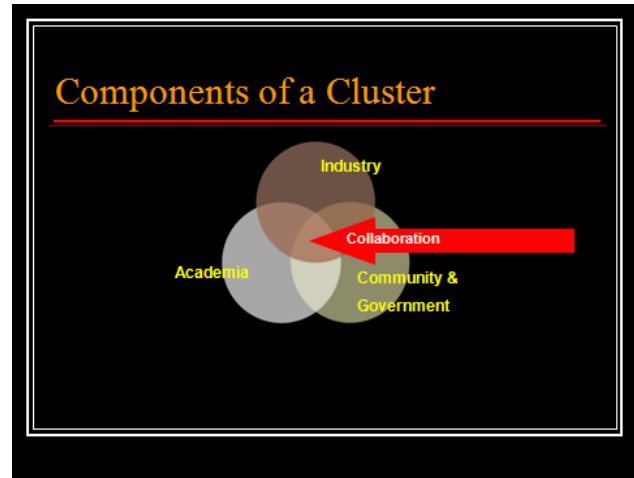
These efforts will require long-term commitments that overlap political election periods and jurisdictions. This is a marathon proposition, not a sprint. A 5-year strategy at a minimum should be anticipated.

A well operated cluster initiative can be a potential "game changer" for a community as well as participating businesses.

## SWOT

If one would conduct a SWOT (Strength/Weakness/Opportunity/Threat) analysis of the solar and wind industries in northern Ohio, results listed in the strength and opportunity categories would be very positive and encouraging. Although this is not the purpose of this report, much reference has been made in those two areas. Ohio certainly has real potential to be one of the top leaders in the nation in wind and solar research and manufacturing.

On the other hand, certain survey responses are indicating real impediments to overcome if opportunities are to be made reality. They are serious threats to job creation and need to be



*Dr. Neil Reid of The University of Toledo & Dr. Michael Carroll from Bowling Green State University – Cluster Based Economic Development – PowerPoint Graph 2010*

rectified as soon as possible. They are divided into two issues classifications...Market and Policy are addressed in the next section.

**Threats:**

**- Market Issues**

- Ohio wind RECS have too low a value for small wind considerations.
- Wind training and certification too expensive.

**- Policy issues**

**State of Ohio**

*The state of Ohio generally has had supportive renewable energy legislative policies as demonstrated with its 2025 plan, however, there are serious complaints about the timing....on again, off again of the programs that support this initiative. Long-term program commitments are needed.*

- By far, financing and incentive programs must be stable. On again - off again state policies are killing long-term business planning both for wind and solar. Successful programs require much longer time periods to implement meaningful change not just those that correspond to election cycles.
- Small wind being treated more and more like utility wind rules and regulations effectively destroying small wind installations and future manufacturing in Ohio. (ODNR)
- Could use support from the state for manufacturing training dollars. Typically (wind) job training focuses on climbing and electrical. More focus needs to be on computer integration, foundations, erection and direct collaboration with wind manufactures etc.
- PUCO need to hold utilities accountable for their REC's (Investment)
- RPS, Feed-in tariffs need to be maintained and consistent.

**Federal Government**

- Small wind being treated more and more like utility wind rules and regulations effectively destroying small wind installations and future manufacturing in Ohio. (US Fish & Wildlife)
- Expiration of the 30% ITC (investment tax credit) 1603 treasury grant program at the end of 2011 which allows for the credit to be converted into a cash grant contribution in lieu of a tax credit for the installation of either PV or wind. Extending this credit program is critical or it will severely affect new installations beginning in 2012.

(More than 2,400 megawatts of wind and solar power and 65,000 jobs were supported by the Section 1603 cash grant program in 2009<sup>xiii</sup>)

- Long-term national energy programs and strategies would neutralize state competition and allow development agencies to focus on sound business deals not private sector threats of moving their companies.

**Epilogue: A Wind Lesson from the Past:**

Charles F. Brush designed and built one of world's earliest electricity-generating windmills in downtown Cleveland in 1888. A 1975 National Geographic article states "NASA'S prototype for the future is the 100 kW Experimental Wind-Turbine Generator at the Plum Brook test area in Ohio. Its two slender blades span 125 feet, and turn a 100-kilowatt generator."<sup>xiv</sup>

Where is that technology today? Perhaps we should ask the Danes.

On the solar side as recent as 8 years ago, Harold McMaster (1916-2003) an inventor with over 100 patents founded several companies such as Permaglass, Glasstech, Solar Cells and the McMaster rotary engine.

Solar Cells, which in 1997 partnered with True North Partners, LLC to form what is now known as First Solar...is one of the largest photovoltaic manufacturers in the world. Much of his research was conducted at the University of Toledo.

"Some believe he will be remembered as the "father" of commercial-scale solar energy, having practically handed the needed technology to society on a platter in the 1990's."<sup>xv</sup>



Mr. McMaster provided NW Ohio a great head start in PV research. We once had that advantage in wind generations ago. Today, our competition is far greater so the question becomes how we will capitalize on today's opportunities. It's nice to have a second chance. Will this be a lesson learned or a lesson forgotten?

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All work contained within this report was compiled between April 20, 2011 and July 07, 2011. If you have further questions, contact:

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Oregon, Ohio 45616

1-419-364-4847

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## Appendix A: Copy of Introduction Letter (Mailed)

University of Toledo  
Joe Perlaky  
R1 Building, 2600 Dorr Street, Mail Stop 218  
Toledo, Ohio 45606

June 8, 2011

Dear colleagues of renewable energy:

Recently, the University of Toledo and I were awarded two separate grants to identify PV and wind companies located within Representative Marcy Kaptur's 9th district. This effort is part of a larger grant awarded to Oberlin College and another half dozen organizations who we are collaborating with.

Using several data sources, the university recently identified 251 companies involved in the PV or Wind supply chains in our area. My purpose is to independently confirm that data through either in-person visits or a short phone survey which takes 10-15 minutes. Its focus is primary to determine job retention and creation opportunities within the 9th District. It will also help in identifying potential business collaborations for those companies operating within the district.

Not everyone will be contacted of course, however, if you are able to meet with me or take my call that would be most appreciative. All information (in aggregation) will be shared with the participants with no company specifics identified.

"Going Green" is much more than a buzz phrase. It is a gradual step-by-step process requiring planning, strategies and careful implementation. International competition continues to challenge our local efforts. We believe this information supports our community's commitment to renewable energy development and usage within Ohio.

I've enclosed a copy of the survey for your review. Please contact Serenity Carr at [serenity.carr@rockets.utoledo.edu](mailto:serenity.carr@rockets.utoledo.edu) or 419-290-9373 with your responses to the survey. Thank you again for your time and considerations.

Sincerely,

Joe Perlaky  
419-364-4847

## Appendix B: PV & Wind Companies, 9<sup>th</sup> Dist.

(251 in Total as Provided by the University of Toledo)

Company Name	Mail Address	Mail City	County	Energy Type	Phone Number	Comments
Absolute Machine Tools, Inc	7420 Industrial parkway	Lorain	Lorain	Wind	450-960-6911	left msg
Acrylic Concepts Inc	10155 Ramm Rd	Monclova	Lucas	Solar	419-824-2228	left msg
Adell Plastic	2211 Densmore Dr	Toledo	Lucas	Solar	419-579-1776	Completed Survey
Advanced Control Solutions, Inc	8750 Resource Park Dr	Sylvania	Lucas	Building Materials	419-845-4820	
Advanced Distributed	200 W Scott Park Dr	Toledo	Lucas	Solar	419-725-3401	Completed survey
Advanced Distribution Generation	2500 Dorr Street	Toledo	Lucas	Solar	419-540-3792	Duplication of above
Advantage Mold Inc	525 N Wheeling St	Toledo	Lucas	Wind	419-691-5576	Left msg
Ahner Fabricating & Sheet	2001 E Perkins Ave	Sandusky	Erie	Solar	419-626-6641	will call back
Airserv Group Inc	9060 Angola Rd	Toledo	Lucas	Solar Thermal	419-868-8655	N/A to their business
Alignment Supplies, Inc.	1681 Lance Pointe Road	Maumee	Lucas	Wind	419-887-5890	Complete survey
Allied Plastic Co Inc	3103 South Ave	Toledo	Lucas	Wind	419-389-1688	No answer
Alro Steel Corp	PO Box 964	Toledo	Lucas	Solar	419-720-5400	firm will not answer survey
Alternative Energy Resources	15004 Kneisel Rd.	Vermilion	Lorain	Wind, Solar	450-396-6810	Emailed Survey
AMC Manufacturing Inc	10584 Middle Ave	Elyria	Lorain	Solar	450-458-5165	
American Frame Corp	400 Tomahawk Dr	Maumee	Lucas	Solar	419-893-5905	left msg
American Manufacturing, Inc.	2375 Dorr Street	Toledo	Lucas	Wind	419-541-9471	
American Steel Associated	2375 Dorr St Ste F	Toledo	Lucas	Wind	419-541-9471	No one willing to answer questions
American Welding Inc	45 W Alexis Rd	Toledo	Lucas	Wind	419-479-8900	N/A to their business
Ames Lock Specialties Inc	2121 W Sylvania Ave	Toledo	Lucas	Wind	419-474-2995	None of the workers have time
Ametek Inc	2166 Laurel Valley Dr	Toledo	Lucas	Wind	419-382-2728	N/A to their business;
Anna Wilkinson	9045 Wakefield Dr	Sylvania	Lucas	Solar Thermal	419-885-5594	Disconnected
Apex Bolt and Machine Co, Inc.	5414 Enterprise Blvd	Toledo	Lucas	Wind	419-729-3741	Not interested
ARES Inc	818 Erie Industrial Park	Port Clinton	Ottawa	Wind	419-636-2176	

Ohio's 9th. District: Existing & Future Job Creation Opportunities – PV & Wind Supply Chains

Art Iron & Steel Inc	823 Hamilton St	Toledo	Lucas	Wind	419-255-0740	
Arthur Corp	1305 Huron Avery Rd	Huron	Erie	Wind	419-454-7202	call next week when back vacation
Artisan Mold Co Inc	PO Box 219	Grafton	Lorain	Wind	450-926-4511	left msg
Assembly Works Inc	1705 Sawmill Pkwy	Huron	Erie	Solar	419-454-5010	N/A to their business
Associated Spring Raymond	370 West Dussel	Maumee	Lucas	Wind	419-740-6033	
Automotive Components Holdings	3020 Tiffin Ave	Sandusky	Erie	Wind	419-627-3600	left msg
Ayling & Reichert Co Consent	PO Box 389	Oak Harbor	Ottawa	Solar Thermal	419-898-2471	Owner on vacation for 3 weeks
Baker Fabricating	8203 Strecker Rd	Bellevue	Erie	Wind	419-483-4237	N/A to their business
Banks Manufacturing Co Inc	40290 Banks Rd	Grafton	Lorain	Wind	450-458-8661	left msg
Barnes Group	370 W Dussel Dr Ste A	Maumee	Lucas	Fuel Cells	860-583-7070	Disconnected
Batteries Plus	3128 Secor Rd	Toledo	Lucas	Solar	419-724-5888	Completed survey
Benjamin Company	808 Langram Road	Put-In-Bay	Ottawa	Wind	419-285-2585	
BGSU – Firelands Campus	One University Dr.	Huron	Erie	Wind	419-372-7201	Completed survey
Bernard Engraving Corp	PO Box 310034	Fairfield			419-479-5510	Disconnected
Billington Co Inc	PO Box 155	Wellington	Lorain	Solar	450-647-3039	Emailed survey
Bionix Development Corp	PO Box 936	Toledo	Lucas	Wind	419-727-8421	Completed survey
Bobco Enterprises Inc	PO Box 39	Sylvania	Lucas	Solar Thermal	734-850-8333	No one available to complete
Brentbrook Advisors	4729 Corey Road	Toledo	Lucas	Wind	419-704-9062	
Bruker-Staleck	1510 Alban Rd.	Holland	Lucas	Solar	419-865-2457	Completed survey
Buckeye Awning Co	4947 Alexis Rd	Sylvania	Lucas	Solar	419-474-3600	
Buc-Ray Corp	8638 Airport Hwy	Holland	Lucas	Solar	419-865-1364	Disconnected
Builder Tech Wholesale LLC	2736 Dorr St	Toledo	Lucas	Wind	419-546-7606	left msg
Bunting Bearings LLC	PO Box 729	Holland	Lucas	Wind	419-866-7000	Not get past automated system.
Busch & Thiem Inc	PO Box 1088	Sandusky	Erie	Solar, Solar Thermal	419-625-7515	Completed survey
C Nelson Manufacturing Co	265 N Lake Winds Pkwy	Oak Harbor	Ottawa	Solar Thermal	419-898-3305	Disconnected
Cameo Counter Tops Inc	1610 Kieswetter Rd	Holland	Lucas	Solar	419-865-6371	Left msg
Champion Window Co of Toledo	6214 Monclova Rd	Maumee	Lucas	Solar	419-841-0155	Emailed survey
Claycor Inc	1260 Progress Ave	Toledo	Lucas	Wind	419-729-0655	Left msg
Clay's Welding & Fabricating	22031 Fairgrounds Rd	Wellington	Lorain	Solar	450-647-5557	No answer
Cleveland City Forge Inc	46950 State Route 18	Wellington	Lorain	Wind	450-647-5500	Completed Survey
Clinton Pattern Works, Inc.	1215 West Bancroft St.	Toledo	Lucas	Wind	419-245-0855	Emailed survey
Cockpit Assemblies LLC	300 Phillips Ave Ste 2002	Toledo	Lucas	Wind	419-720-3600	
Coley CNC Machining	1775 Liberty Avenue	Vermilion	Lorain	Wind	450-967-5540	left msg

Ohio's 9th. District: Existing & Future Job Creation Opportunities – PV & Wind Supply Chains

Comfort Line Inc	5500 Enterprise Blvd	Toledo	Lucas	Wind	419-729-8520	Completed Survey
Concast Birmingham Inc	PO Box 76	Birmingham	Erie	Wind	800-288-7955	No time to answer questions
Connectronics Corp	PO Box 3365	Toledo	Lucas	Solar	419-547-0020	Completed Survey
Cook Composites & Polymers Co	1311 1st St	Sandusky	Erie	Solar	419-625-1197	Completed Survey
Cooling Technologies	6120 N Detroit Ave	Toledo	Lucas	Fuel Cell, PV,Wind	419-546-9006	
Crown Battery Manufacturing Co.	9036 American Rd E	Toledo	Lucas	Fuel Cell, PV,Wind	419-727-9739	Not available to answer questions
Crum Manufacturing	1265 Waterville-Monclova	Waterville	Lucas	Wind	419-879-9779	Completed Survey
D and R Innovations LLC	1108 Custer Drive	Toledo	Lucas	Wind	419-479-0672	Left msg
D and S Utility Construction, Inc.	PO Box 107	Lagrange	Lorain	Other	450-365-4233	No answer
Dana Holding Company	3939 Technology Drive	Maumee	Lucas	Wind	419-887-3000	Completed Survey
Dana Lease Finance Corp	1801 Richards Rd	Toledo	Lucas	Wind	419-312-7450	
Dan-Mar Inc	10319 Wikel Rd	Huron	Erie	Wind, Solar	419-454-4579	Completed Survey
Davis Fabricators Inc	15765 W State Route 2	Oak Harbor	Ottawa	Wind	419-898-5297	emailed survey
Decker Homes	2666 Sterns Rd. PO Box 467	Toledo	Lucas	Solar	734-855-2663	Completed survey
Deckster North Coast Ltd	13605 State Route 113	Wakeman	Erie	Solar	450-965-8407	Disconnected
Deco Tools Inc	1551 Coining Dr	Toledo	Lucas	Solar Thermal	419-476-9311	Emailed survey
Decor Architectural Products	2375 Dorr St Ste E	Toledo	Lucas	Solar	419-547-9493	Not interested in answering questions
Denton ATD Inc	900 Denton Dr	Huron	Erie	Wind	557-265-5200	Left msg
Detroit Technologies Inc	2990 Nebraska Ave	Toledo	Lucas	Wind	248-647-0400	Not interested
Digital Technologies Inc	145 S Saint Clair St	Toledo	Lucas	Wind	419-245-2102	Disconnected
Don-Ell Corp	PO Box 361480	Toledo	Lucas	Wind	419-841-1828	Completed survey
Dovetail Solar & Wind	2600 Dorr St. R-1 Bld.	Toledo	Lucas	Wind, Solar, Thermal	419-913-0317	Completed survey
Doyle Manufacturing Inc	1450 Holloway Rd	Holland	Lucas	Wind	419-865-8451	Emailed survey
Dph Holdings Corp	2509 Hayes Ave	Sandusky	Erie	Wind	419-627-7000	N/A to their business
DRDC Realty Inc	4501 Jackman Rd	Toledo	Lucas	Solar	419-479-7091	Left msg
DRS Industries Inc	1067 Hamilton Dr	Holland	Lucas	Solar	419-861-0334	Not interested in answering questions
Durivage Patter and MFG, Inc.	P.O. Box 337	Williston	Ottawa	Wind	419-836-8655	Left msg
Dyotec Solar Inc	811 Madison Ave	Toledo	Lucas	Solar	419-247-4974	No answer
E and R Welding, Inc.	360 South Main Street	Wellington	Lorain	Wind	450-319-9387	Completed survey
E I Du Pont De Nemours & Co	1930 Tremainsville Rd	Toledo	Lucas	Solar	419-479-1211	Completed survey
Eaton Fabricating Co Inc	1009 McAlpin Ct	Grafton	Lorain	Wind, Solar	450-926-3121	No time to answer questions
Eaton-Aeroquip Inc	1660 Indian Wood Cir	Maumee	Lucas	Solar Thermal	419-891-7775	Emailed survey
Ecosmart Ventures LLC	PO Box 362485	Toledo	Lucas	Solar	419-546-9457	No answer

Ohio's 9th. District: Existing & Future Job Creation Opportunities – PV & Wind Supply Chains

Edco, Inc	5245 Enterprise Blvd	Toledo	Lucas	Wind	419-726-1905	No answer
Edison Solar & Wind	3809 State Route #113 E	Milan	Erie	Wind, Solar	419-499-0000	Completed Survey
Electa-Lite	6009 Conneaut Light Dr	Vermilion	Erie	Wind	450-967-1961	Resent survey
Electronic Concepts & Engg	1306 Kittle Rd	Holland	Lucas	Wind	419-861-9000	
Encore Plastics Corp	319 Howard Dr	Sandusky	Erie	Wind	419-626-8000	Left msg machine
Engineered Process Systems	201 Sprowl Rd.	Huron	Erie	Wind, Solar	419-454-7048	Completed survey
Engineering Dynamics	8617 Black Forest Circle	Sylvania	Lucas	Wind		
Exothermics Inc	5040 Enterprise Blvd	Toledo	Lucas	Solar Thermal	419-729-9726	Not interested
Formed Metal Products Co	PO Box 261	Lagrange	Lorain	Solar	450-775-0819	No answer
G & C Quality Air Care, Inc	8365 Gore Orphanage Rd	Vermilion	Lorain	Building Materials	450-963-4173	No answer
Galaxy Manufacturing Co Inc	PO Box 529	Toledo	Lucas	Wind	419-729-1650	Left msg
Gallery Industries Inc	2283 Fulton St	Toledo	Lucas	Wind	419-241-6771	Call Tracy Poling in the morning
General Fabrications Corp	PO Box 2461	Sandusky	Erie	Solar Thermal	419-625-6055	Emailed survey
General Plug & Manufacturing	PO Box 26	Grafton	Lorain	Wind, Solar	450-926-2411	Left msg
Giant Industries Inc	PO Box 3187	Toledo	Lucas	Solar Thermal	419-541-4600	Left msg
Glass City Plastics Inc	971 Hamilton Dr	Holland	Lucas	Solar	419-861-2690	Too busy
Global Sustainable Center	1016 3rd Street	Sandusky	Erie	Building Materials	419-503-8294	Will try to get it
Graham Packaging	1 Seagate	Toledo	Lucas	Wind	419-247-5000	Disconnected
Graver Tank Co	10590 Geiser Rd	Holland	Lucas	Solar Thermal	419-865-1731	Left msg
Green Energy Wind & Power LLC	607 Main St Ste C	Huron	Erie	Wind	419-616-0018	Completed survey
Guardian Automotive Products	24145 W Moline Martin Rd	Millbury	Ottawa	Solar	419-855-7706	Left msg
Gundlach Sheet Metal Works Inc	910 Columbus Ave	Sandusky	Erie	Solar	419-626-4525	Completed Survey
Hafner's Sheet Metal & Supply	300 S Summit St	Toledo	Lucas	Solar	419-245-8825	Left msg
Hale Chrome Service	2282 Albion Street	Toledo	Lucas	Wind	419-245-6451	N/A to their business
Hammill Mfg/Co-op Tool	1517 Coining Drive	Toledo	Lucas	Wind	419-729-0076	
Helm Instrument Co Inc	361 W Dussel Dr	Maumee	Lucas	Wind, Solar	419-893-4555	
Hertwich Engineering	3313 Darlington Rd	Toledo	Lucas	Wind	419-547-0907	No answer
Hohler Sheet Metal	110 Decatur St	Sandusky	Erie	Solar Thermal	419-625-7474	N/A to their business
Honeywell	4263 Monroe St	Toledo	Lucas	Solar	419-473-9721	
Ice Industries	3810 Herr Road	Sylvania	Lucas	Wind	419-842-3631	Completed Survey
ICO Products LLC	5247 Secor Rd Ste 5	Toledo	Lucas	Wind	419-472-3300	Completed Survey
iKoring	5834 Monroe Street	Sylvania	Lucas	Other	419-283-5003	Completed Survey
Impact Products LLC	2840 Centennial Rd	Toledo	Lucas	Wind	419-841-2891	

Ohio's 9th. District: Existing & Future Job Creation Opportunities – PV & Wind Supply Chains

Innovative Controls Detention	1364 E Broadway St	Toledo	Lucas	Wind, Solar	419-691-6684	
International Automotive	1608 Sawmill Pkwy	Huron	Erie	Wind	419-454-5554	
Ironhead Fabricating & Contr	2245 Front St	Toledo	Lucas	Wind	419-690-0000	
Jensar Manufacturing LLC	1230 S Expressway Dr	Toledo	Lucas	Wind	419-727-8360	Not interested
Johnson Controls Battery Group	10300 Industrial St	Holland	Lucas	Solar	419-865-1900	Left msg
Jones and Henry Engineers, Ltd.	2000 West Central Avenue	Toledo	Lucas	Wind	419-473-9611	
Kar Electronics Inc	11908 Pyle S Amherst	Oberlin	Lorain	Wind, Solar	450-774-5152	On vacation
Kingdom 7 Industries LLC	116 Erie St	Oak Harbor	Ottawa	Wind, Solar	419-707-0550	Phone mailbox full
Knight Industries Corp	9049 Telegraph Rd	Toledo	Lucas	Solar	419-479-8550	N/A to their business
Kuebler & Co	828 Warehouse Rd Ste 12	Toledo	Lucas	Wind	419-382-8899	No answer
Kuhlman Engineering Co	840 Champlain St	Toledo	Lucas	Solar	419-245-2196	
La Grange Electrical Assemblie Co	349 South Center Street	La Grange	Lorain	Wind	450-365-5488	All on vacation for 3 weeks
Lakecraft Inc	1010 W Lakeshore Dr	Port Clinton	Ottawa	Solar Thermal	419-734-2828	Completed Survey
Linak US Inc	6800 W Central Ave Ste L2	Toledo	Lucas	Solar	419-841-2148	No answer
Lockrey Manufacturing	203 Matzinger Road	Toledo	Lucas	Wind	419-476-6572	Completed Survey
Lorain County JVS	15181 State Route 58	Oberlin	Lorain	Other	450-774-1051	
Lorain-Medina Rural Elect. Co-op	22898 West Road	Wellington	Lorain	Other	450-647-2133	
Lowry Manufacturing Inc	8630 Airport Hwy	Holland	Lucas	Wind	419-865-0255	Left msg
LTI Power Systems	10800 Middle Ave Hngr B	Elyria	Lorain	Other	450-317-5050	Completed Survey
Lucas SWCD	130-A West Dudley	Maumee	Lucas	Other	419-893-1966	Completed Survey
M&K Fabricating Ltd	10774 Lagrange Rd	Elyria	Lorain	Wind	450-458-6791	No answer
Mack Iron Works Co Inc	124 Warren St	Sandusky	Erie	Solar	419-626-6225	Completed Survey
Magna Solutions LLC	7255 Crossleigh Ct # 101	Toledo	Lucas	Solar Thermal	419-841-8310	
Marshall and Melhorn, LLC	4 Seagate Eighth Floor	Toledo	Lucas	Other	419-249-7100	
Maumee Authority Stamping	920 Illinois Avenue	Maumee	Lucas	Wind	419-304-2887	
Maumee Valley Fabricators Inc	4801 Bennett Rd	Toledo	Lucas	Wind, Solar Thermal	419-476-1411	Not interested
McNaughton-McKay Electric	365 Tomahawk Dr Unit 1	Maumee	Lucas	Solar	419-427-9704	Left msg
Meadow Environments LLC	2412 Scheid Rd	Huron	Erie	Biomass	419-454-5549	Completed Survey
Meldrum Mechanical Services, Inc.	455 South Avenue	Toledo	Lucas	Wind	419-546-3600	Completed Survey
Metzger Compressor & Pumps	42660 Whitney Rd	Lagrange	Lorain	Solar Thermal	450-365-6312	No answer
Midwest Optoelectronics, LLC	2600 Dorr Street	Toledo	Lucas	Solar	419-724-3710	
Midwest Terminals of Toledo	3618 Saint Lawrence Dr	Toledo	Lucas	Wind	419-698-8171	
Modine Manufacturing Co	2010 Brent Dr	Toledo	Lucas	Solar Thermal	419-727-8867	

Ohio's 9th. District: Existing & Future Job Creation Opportunities – PV & Wind Supply Chains

Motor City Mold Co	6847 Heather Cove Pl	Maumee	Lucas	Wind	419-866-0993	Disconnected
MV Circuit Design Inc	691 Grand Street	Vermilion	Lorain	Wind	450-967-9854	No answer
National Safety Technologies	5155 Enterprise Blvd	Toledo	Lucas	Wind, Solar	419-727-0552	Left msg
Netterfield Group	4609 Wyndwood Dr	Toledo	Lucas	Wind	419-842-1004	Left msg
Nextronex	2600 Dorr R-2	Toledo	Lucas	Solar	419-364-6973	Completed Survey
Nichols Consulting	4645 Edgemont Rd	Toledo	Lucas	Wind	419-727-3645	Disconnected
Nordson Corp	100 Nordson Dr Ms 81	Amherst	Lorain	Solar Thermal	450-985-4000	left msg
North Coast Wind & Power, LLC	P O Box 298	Port Clinton	Ottawa	Wind	419-341-7479	Completed Survey
Northern Manufacturing Co Inc	131 N Railroad St	Oak Harbor	Ottawa	Wind	419-898-2821	Completed Survey
Oberlin College	101 N Professor St	Oberlin	Lorain	Other	450-775-8411	
Off Co Inc	PO Box 87	Wellington	Lorain	Solar Thermal	450-647-5500	Disconnected
Ohio Solar Wind Energy Solutions	2231 Hinde Road	Toledo	Lucas	Wind, Solar	419-579-7338	Disconnected
Ohio Wind Turbines	10407 Main Road	Berlin Heights	Erie	Wind	450-965-4541	Will call back if relevant
Oil Free Compressor Parts LLC	PO Box 476	Maumee	Lucas	Solar Thermal	877-841-5717	Left msg
Okamoto Sandusky Manufacturing	3130 W Monroe St	Sandusky	Erie	Wind	419-626-1633	Left msg
Ottawa Rubber Company	1600 Commerce Drive	Holland	Lucas	Wind	419-865-1379	N/A to business
Owens Community College	1724 Indian Wood Circle	Maumee	Lucas	Wind, Solar	557-661-7459	Completed Survey
Owens Corning Corp. Headquarter	1 Owens Corning Parkway	Toledo	Lucas	Wind	419-248-8806	
Owens-Illinois, Inc.	1 Seagate	Toledo	Lucas	Wind	419-247-5000	
P & K Ventures Inc	26 Wolf Ridge Dr	Holland	Lucas	Wind	419-861-0602	Disconnected
P and J Manufacturing, Inc.	1645 Campbell Street	Toledo	Lucas	Wind	419-345-0798	Completed Survey
P B Fabrication Mechanical	750 W Laskey Rd	Toledo	Lucas	Wind, Solar	419-479-4869	No answer
P J Associates Inc	PO Box 119	Port Clinton	Ottawa	Wind	419-731-3305	Left msg
Panel Master LLC	222 Commerce Dr	La Grange	Lorain	Wind, Solar	450-365-4542	Does not want to complete survey
Perfect Measuring Tape Co	1116 N Summit St	Toledo	Lucas	Wind	419-245-6811	Completed survey
Perstorp Polyols Inc	600 Matzinger Rd	Toledo	Lucas	Solar	419-729-5548	N/A, wants to be removed from all lists
Pexco Packaging Corp	PO Box 6550	Toledo	Lucas	Solar	419-470-9036	Left msg
Plastex Industries Inc	4050 South Ave	Toledo	Lucas	Wind	419-541-0189	Left msg for Susan
Plastic Works Inc	PO Box 369	Huron	Erie	Wind, Solar	419-454-6576	No answer
Plastics Unlimited	2851 South Ave Ste 7	Toledo	Lucas	Wind	419-385-1421	No answer
Precision Fittings	709 North Main Street	Wellington	Lorain	Wind, Solar	450-647-4145	Completed Survey
Precision Steel Services Inc	31 E Sylvania Ave	Toledo	Lucas	Wind, Solar	419-476-5702	Not interested
Preform Technologies LLC	PO Box 964	Holland	Lucas	Wind	419-720-0365	No answer



Ohio's 9th. District: Existing & Future Job Creation Opportunities – PV & Wind Supply Chains

Pro-Pak Industries	1125 Ford Street	Maumee	Lucas	Wind	419-729-0751	
Quality Blow Molding Inc	636 Oberlin Elyria Rd	Elyria	Lorain	Wind	450-458-6550	Emailed survey
Quality Tool Company	577 Mel Simon Drive	Toledo	Lucas	Wind	419-476-8228	Completed Survey
Quikstir Inc	PO Box 317	Port Clinton	Ottawa	Solar Thermal	419-731-2601	Very angry; Asked UT to never call
R and D Custom Machin and Tool	9061 American Road east	Toledo	Lucas	Wind	419-727-1700	Emailed survey
R B M Environmental & Constr	PO Box 167704	Oregon	Lucas	Wind	419-693-5840	Completed survey
R B Mfg Co	4101 Venice Rd	Sandusky	Erie	Solar	419-626-9464	Would not answer questions
R G Mold	8385 Water Park	Holland	Lucas	Wind	419-868-9390	Left msg
R R Fabricators	PO Box B	Graytown	Ottawa	Solar Thermal	419-862-2045	Will call back
Radco Industries, Inc.	3126 Frenchmens Road	Toledo	Lucas	Wind	419-541-4731	Completed Survey
Raka Corp	203 Matzinger Rd	Toledo	Lucas	Solar	419-476-6572	Will call back
Reebar Die Casting Inc	1177 Farnsworth Rd	Waterville	Lucas	Wind	419-879-7901	Will call back
Rexles Inc	PO Box 26	Port Clinton	Ottawa	Wind	419-731-8188	Completed Survey
Rieter Automotive North Amer	645 N Lallendorf Rd	Oregon	Lucas	Solar	419-693-0511	
Riverside Machine and Automation	1240 North Genoa-Clay Ctr.	Genoa	Ottawa	Wind	419-855-8308	Left msg
RLM Fabricating, Inc.	5521 Enterprise Blvd	Toledo	Lucas	Wind	419-729-6130	Everyone too busy to complete
Roswell Inc	9808 Barrows Rd	Huron	Erie	Wind	419-454-4709	Left msg
Schwab Machine, Inc.	3120 Venice Road	Sandusky	Erie	Wind	419-626-0245	Completed Survey
Sierra Lobo	11401 Hoover Rd	Milan	Erie	Fuel Cell	419-499-9654	
Solar Solutions and Skylights	1768 Tremainsville Rd	Toledo	Lucas	Solar	419.245.4790	Completed survey
Spec Weld Technologies Inc	4285 N Lickert Harder Rd	Graytown	Ottawa	Wind	419-898-6874	Left msg
Stantec Consulting Service	5555 Airport Hwy Ste 210	Toledo	Lucas	Wind, Solar	419-867-6666	Disconnected
Steel Mart	2650 York St Ste F	Toledo	Lucas	Wind	419-693-3982	Disconnected
Sterling Pipe & Tube Inc	5436 Enterprise Blvd	Toledo	Lucas	Solar Thermal	419-729-9755	
Stoneacre Energy Solutions	833 S Raab Rd	Swanton	Lucas	Wind, PV, Solar Ther	419-491-4685	Completed survey
Superior Packaging	2930 Airport Hwy	Toledo	Lucas	Wind, Solar	419-380-3336	No answer
SUREnergy	319 Howard Drive	Sandusky	Erie	Wind	888-979-7674	Completed survey
Surface Combustion, Inc.	1700 Indian Wood Circle	Maumee	Lucas	Wind	419-891-7134	
Sy Fabrications Inc	828 Warehouse Rd Ste 11	Toledo	Lucas	Wind	419-385-3152	Disconnected
Systems & Specialty Control Co	1550 Coining Dr	Toledo	Lucas	Solar	419-479-4155	Completed Survey
T M Machine and Tool	521 Mel Simon Drive	Toledo	Lucas	Wind	419-479-9174	Fax number
Teledyne Technologies Inc	PO Box 6971	Toledo	Lucas	Wind	419-470-3000	
Tembec BTL SR Inc	PO Box 2570	Toledo	Lucas	Solar	419-245-5855	On vacation



Ohio's 9th. District: Existing & Future Job Creation Opportunities – PV & Wind Supply Chains

Tex-Tyler Corp	5148 Stickney Ave	Toledo	Lucas	Solar	419-729-4951	Call back Monday
The Anderson's Fabrication Shop	415 Illinois Avenue	Maumee	Lucas	Wind	419-891-2718	
Tite Seal Case Co Inc	PO Box 86	Wellington	Lorain	Solar Thermal	450-647-2371	No one knew who to refer me
Tolco Corp	1920 Linwood Ave	Toledo	Lucas	Solar Thermal	419-241-1113	Completed Survey
Toledo Gearmotor Co	5549 Roan Rd	Sylvania	Lucas	Wind	419-885-3769	Completed survey
Toledo Molding & Die Inc	PO Box 6760	Toledo	Lucas	Wind	419-470-3950	
Toledo Nameplate Engraving Inc	813 Warehouse Rd Ste 5	Toledo	Lucas	Wind	419-479-1793	No answer
Toledo Pro Fiberglass Inc	210 Wade St	Toledo	Lucas	Wind	419-241-9390	Left msg
Toledo Transducers Inc	PO Box 10	Holland	Lucas	Wind, Solar	419-867-4170	Emailed
Toledo Window & Awning Inc	3036 W Sylvania Ave	Toledo	Lucas	Solar	419-474-3396	Not interested
Tomich Heating and Air	110 Decatur St	Sandusky	Erie	Solar Thermal	419-625-7474	left msg
Total Molding Services LLC	8520 Central Ave	Sylvania	Lucas	Wind	419-829-2100	Disconnected
Tuppas Software Corp	PO Box 171	Waterville	Lucas	Wind	419-897-7902	
Union Fabricating & Machine Co	3427 Venice Rd	Sandusky	Erie	Wind	419-626-9063	Completed Survey
United Circuits Inc	1000 Commerce Dr	Grafton	Lorain	Wind	450-926-1000	Did not want to complete survey
Universal Service & Repair Ltd	5509 Telegraph Rd	Toledo	Lucas	Wind	419-269-1777	Left msg
University of Toledo	2801 West Bancroft Street	Toledo	Lucas	Solar	419-540-4749	
US Coexcell Inc	400 W Dussel Dr Ste C	Maumee	Lucas	Wind	419-897-9110	Completed survey
US Tsubaki Inc	1010 Edgewater Ave	Sandusky	Erie	Wind	419-626-4550	
V M Systems Inc	3125 Hill Ave	Toledo	Lucas	Solar	419-546-1045	
Valley Plastics Co Inc	399 Phillips Ave	Toledo	Lucas	Wind	419-666-2349	Emailed Survey
Vgl Resources Group Inc	105 Cottage Cove Dr	Lakeside Marblehead	Ottawa	Wind, Solar	419-798-4600	N/A to his business
Vinyl Design Corp	7955 Hill Ave	Holland	Lucas	Wind	419-865-4009	N/A to their business
W. Drescher and Associates	6611 Maplewood Ave	Sylvania	Lucas	Wind	419-885-7515	Refused to answer questions
Wayne Frame Products Inc	5831 Lakeside Ave	Toledo	Lucas	Wind	419-729-4006	Left msg
Williams and Moser, LLC	2 Maritime Plaza	Toledo	Lucas	Other	419-215-7699	
Wiremax Ltd	PO Box 3336	Toledo	Lucas	Solar	419-541-9500	Emailed survey
Wolff Bros. Supply Inc.	2800 W Strub Rd	Sandusky	Erie	Other	419-626-1996	
World Energy Systems of Toledo	5525 Angola Rd	Toledo	Lucas	Solar	419-866-3808	Answering service
Wright Center for PVIC	2600 Dorr Street, Ste 2100F	Toledo	Lucas	Solar	419-540-3845	
Xunlight Corporation	3145 Nebraska Avenue	Toledo	Lucas	Solar	419-469-8600	Completed survey
Xunlight Corporation 26	3145 Nebraska Avenue	Toledo	Lucas	Solar	540-4797	Completed survey
Yaeder Manufacturing Co	PO Box 6886	Toledo	Lucas	Wind	419-476-3933	Not interested

# Appendix C: Survey (Blank Form)

<b>RENEWABLE ENERGY ON-SITE SURVEY</b> <b>NW Ohio</b>
--

## Company Information

Company Name	City/State/ZIP/County		
Contact Name	Phone	E-mail	Date of Contact

## History

1. Affiliation to parent company: Parent / Subsidiary / Division / Branch
2. Years in business
3. Does your company have other facilities...in Ohio, the US or outside the country?

## Product / Service

4. Is your company primarily involved in...
  - Research & Development
  - Materials
  - Component Manufacturing
  - Equipment Manufacturing
  - Equipment Assembly
  - Distribution
  - Product Sales
  - Services
  - Installations
  - End User
  - Other
5. What renewable energy product(s) or services are you engaged in?
  - PV Solar
    - i. Crystalline Silicon
    - ii. Thin Film (CdTe)
    - iii. CIGS
  - Solar Concentrators

Solar Thermal

Wind

- iv. <100 kW (Small)
- v. 100 kW – 1 MW (Community)
- vi. 1 MW+ (Large, on or off-shore)

Other

**Market**

- 6. Geographical, where is the company's primary market? Local / Regional / National / International
- 7. Where are your primary competitors located? (City, Region, & Country) (Who)
- 8. How is your business weathering this downturn?

**Workforce**

- 9. Current Employees:
  - Full-time
  - Part-time
  - Temporary
- 10. Are your expected employment needs for this facility increasing, stable or decreasing?
  - 0-6 months / How many?
  - 1-3 year / How many?
  - 3-5 years / How many?
- 11. What are your top 1 or 2 workforce issues? (attraction, retention, training etc.)
- 12. Is the company experiencing recruitment problems with employee positions or skills?
  - Yes
  - No
  - Maybe
- 13. If yes, what problems, positions, skills?
- 14. Estimated number of unfilled positions today:
- 15. Is there new technology emerging that will substantially change either your company's primary product/service or how it is produced?

Yes  
No  
Don't Know

**Industry**

16. What other renewable energy suppliers **in our area** or **outside our area** should we be talking to or adding to the region's supply chain?
17. Do you see NW Ohio as a growing region for Renewable Energy related business? And why?
18. Do you anticipate any federal, state or local legislation changes that will **adversely or positively affect** your business in the next 3-5 years?
19. What are the 1 or 2 items that would be most helpful to address your current needs and challenges and/or grow your business?
20. Do you have any final comments you would like to share?

## Appendix D: Survey Interviews (actual)

**NOTE:**

55 in total are attached to this report and/or scanned electronically

## Appendix E: Survey – General Comments

### How is your business weathering this downturn?

- Very risky, not much work now but the future looks promising.
- As a startup franchise, ok at best.
- Ok, we've been around for a while so our corporate support is solid.
- Very, very difficult. The housing trade is down 80% nationally which directly affects us. Products costs are increasing.
- Doing well. Up 160%.
- More challenging. Inconsistent grant programs and they move at too slow of a processing pace.
- Stable.
- Challenging, cutting expenses.
- Fine until Ohio discontinued their grant program. (wind) As a result, laid off people
- No layoffs, but grant funded. It's a slow scale up due to tightening of private sector capital.
- Very well, growing
- Holding our own
- Fairly well
- Difficult, had to use savings to keep business going
- Ok
- Have had the best 3 years in history

**Do you see NW Ohio as a growing region for Renewable Energy related business? And why?**

- Yes, it has allowed our company to grow but Ohio has to continue to promote renewable programs.
- Yes. Depends on market share.
- Yes, the cluster of PV companies makes the region strong.
- Yes, renewable energy awareness is increasing and prices are coming down. The incentives have worked.
- Yes, the interest for new installations is increasing.
- Yes, the supply chain companies that are already located here make the area a desirable place to do business.
- No, wind rulings very restrictive even down to the small turbine level. Grant support inconsistent, can't plan.
- Yes, strong and willing workforce.
- Yes, UT and PV research in NW Ohio strong because of clusters of similar businesses.
- No, with Ohio discontinuing their grant programs they effectively have killed small wind in the state.
- Yes, plenty of innovative companies in area.
- No, not as much as other areas of the country.
- Yes, there is clearly a pool of talent and expertise here. Need strong state and regional growth strategies, long term, to encourage new investments.
- No, unions are crushing the business atmosphere.
- Yes, UT incubator at UT has contributed significantly to attraction of new solar technologies.
- Hope so, Ottawa County at 19% unemployment rate.
- The region is behind but it does has a lot to offer
- Yes, historical business base experience and R&D available from both business and academic communities.
- We need more skilled labor.
- UT and its R&D
- Yes, if we can get past the stigma of "not in my backyard".
- No, not without the grant programs.

**Do you anticipate any federal, state or local legislation changes that will adversely or positively affect your business in the next 3-5 years?**

- PUCO need to hold utilities accountable for their REC's (Investment)
- Energy subsidy programs still necessary.
- RPS, Feed-in tariffs need to be maintained and consistent.
- Must keep the 30% tax credit. Easy to work with, no hassles like grant funded projects.
- Financing and incentive program must be stable. Start and stop is killing long-term planning.
- Funding limitations.
- Lack of academic funding for basic research...both state and federal.
- Workers compensation too high. An Ohio company can't compete in Michigan.
- Yes, always an issue.
- Ohio solar RECS need stability. Enforce utility investments already mandated.
- Yes, education offerings at UT & Owens CC.
- Yes, Ohio wind RECS have too low a value for small wind considerations.
- Ohio workers comp incompatible with Michigan.
- Small wind being treated more and more like utility wind rules and regulations effectively destroying small wind installations and future manufacturing in Ohio.
- Expiration of the 30% ITC (investment tax credit) 1603 treasury grant program at the end of 2011 which allows for the credit to be converted into a cash grant contribution in lieu of a tax credit for the installation of either PV or wind. Extending this credit program is critical or it will severely affect new installations beginning in 2012.
- Yes, RPS and Feed in tariffs are inconsistent
- Need longer times to respond to grant opportunities
- Yes, can't compete with other states because of lack of Ohio incentives.
- Yes, federal funding has been a positive influence
- Healthcare is too costly
- Lower taxes, lower insurance costs
- Yes, Loss of tax credits or grants to support continuing efforts to make solar competitive with fossil fuels.
- Yes, workers compensation costs hampering the hiring of additional employees
- Need to drill for oil in state parks
- Need windmills in Lake Erie
- Increased regulatory environment makes it difficult for small business



**What are the 1 or 2 items that would be most helpful to address your current needs and challenges and/or grow your business?**

- Workforce very expensive with prevailing wage is required for grant funded project. This is a disincentive.
- Re-instill the state grant programs.
- More individuals are being trained in wind than there are job opportunities statewide.
- Advancement of thin film and integrated roofing.
- Working capital, lines of credit are tight making it difficult to scale up and grow.
- Transportation costs high due to fuel costs impact company bottom line on distribution necessities.
- Banking terms and conditions restrictive on lines of credit.
- Could use support from the state for manufacturing training dollars. Typically job training focuses on climbing (wind) and electrical. More focus needs to be on computer integration, foundation, erection etc.
- It would be nice if community colleges could partner with wind manufacturers to offer training specific to turbine designers.
- Wind: Would like to see better collaboration between state and federal agencies with private sector installer companies. Too much indecisiveness, delays and anti-wind rhetoric based on hypothetical environmental factors and not sound science. Need solutions not speculation.
- Desperately need national inducement programs to equalize state competition.
- Companies looking for stamped or fabricated metal components.
- Get politics out of business. Reduce business taxes and regulations.
- Fuel efficient and alternative fuel vehicles
- Addition of a few more good engineers
- Understanding of emerging markets
- Need fair trade laws with China

- Banking industry restrictions not good for small business
- More funding options. Regional Growth Partnership is fantastic
- Business needs to work closer with each other. Not complimenting or working together enough
- Concerned about cost to provide renewable energy and validity of need
- Need more sales

## Appendix F: Influential Companies / Organizations Outside District 9

NAME OF FIRM	RENEWABLE TYPE	LOCATION	CURRENT JOBS	POTENTIAL JOBS
Calyxo USA Inc.	Solar	Perrysburg	20	50
First Solar	Solar	Perrysburg	1000	60
*IBEW	Solar	Rossford	-----	-----
*Penta Career Center	Wind	Perrysburg	-----	-----
Willard & Kelsey	Solar	Perrysburg	55	200

- *\* Nearly 1000 workers received both wind and PV installation certification through the IBEW training programs. They also work closely with Penta County and their students.*
- *Current and potential job listings are only for the immediate area. If there are other locations outside Ohio such as First Solar, they are not counted.*
- *Potential Jobs are estimates of additional positions.*
- *The state also has two major wind farms soon to be constructed within 100 miles of NW and NE Ohio.*

## Appendix G: What are Clusters?

Clusters are geographic concentrations of interconnected companies who work closely with each other, local suppliers, infrastructure providers, educational institutions, and other relevant agencies. When businesses look beyond their own limited capacity and strategically partner with other companies and organizations in their region, they can realize higher levels of competitiveness.

Cluster-based economic development begins when a geographic region identifies a small number of

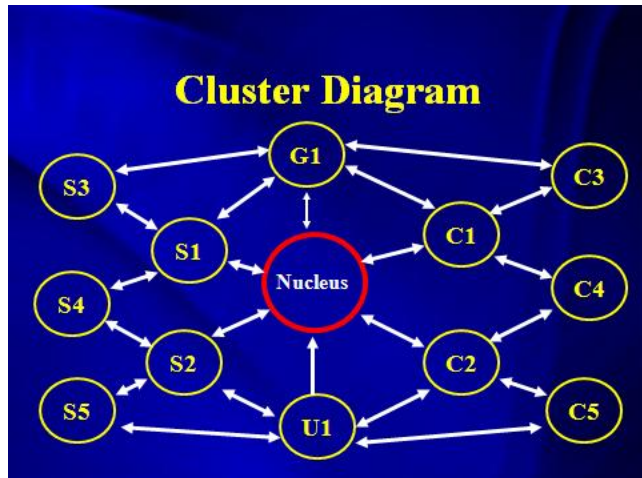
Cluster-based approaches to economic development help companies identify new market opportunities and become more innovative.

industries as their focal point for their development strategy.

### **Why focus on Clusters?**

Clustering brings a variety of benefits to firms and the local economy.

- Clusters increase levels of local expertise.
- Clusters give firms the ability to draw together complementary skills in order to bid on larger contracts.
- Clusters allow for potential economies of scale to be realized by further specializing production within each firm, by joint purchasing of common raw materials to attract bulk discounts or by joint marketing.
- Clusters strengthen social and other informal links, leading to the creation of new ideas and new businesses.
- Clusters improve information flows within industries.



*Dr. Neil Reid of The University of Toledo & Dr. Michael Carroll from Bowling Green State University – Cluster Based Economic Development – PowerPoint Graph 2004*

Cluster-based economic development represents an opportunity for industries in our region to reach unprecedented levels of competitiveness.

Our 9<sup>th</sup> District which includes portions of the NW and NE Ohio region has a rich pool of knowledge and expertise which if harnessed strategically, can generate job growth and enhance the quality of life of all residents.

# Appendix H: PowerPoint Presentation

**Ohio's 9<sup>th</sup> District**  
Existing and Future Job Creation Opportunities  
PV and Wind Supply Chains



The map displays the geographical boundaries of Ohio's 9th Congressional District, highlighted in green. Major cities and towns within the district include Toledo, Findlay, Lima, and Elyria. The map also shows major interstate highways (I-75, I-190, I-275, I-76) and Lake Erie to the north. A red location pin is placed on the city of Toledo.

**Ohio's 9<sup>th</sup> District**  
Existing and Future Job Creation Opportunities  
PV and Wind Supply Chains



This map is an identical duplicate of the one above, showing the 9th District of Ohio with its green outline and various geographical features like cities, highways, and Lake Erie.

## Ohio's 9<sup>th</sup> District



Erie

Lorain

Lucas

Ottawa

(Western Portion)

(95%)

## Deliverables

- Confirm the accuracy of data collected by The University of Toledo and other sources through in-person visits and phone interviews with company representatives.
- Identify existing and future alternative energy job creation opportunities within the 9<sup>th</sup> District.
- Provide all data formatted in a sortable spreadsheet for ease of reference.

We focused on the # of companies to determine existing and future alternative energy job creation opportunities.

## Counting Actual Jobs, Problematic

- Employee crossover responsibilities
- Seasonality
- Part-time/full-time implications
- Shift work
- Owner and CEO's only "best guesstimates"

## Methodology

- UT Company Search
  - NAICS Codes
  - Harris Index
  - On Line Sources

251 Companies, both active and potential

## Methodology

- All 251 companies were sent an introduction letter by mail followed by phone calls/visits to each business.
    - Eliminated companies outside district -2
    - Added companies (discovered as a result of interviews) +6
    - Companies not involved in renewables or out of business -51
    - Companies not willing to participate in survey -26
- Balance of companies, active/potential renewable energy capabilities 176



## Methodology

- Of the 176 active/potential companies....
  - 31% only involved in solar technologies.
  - 52% only involved in wind technologies.
  - 7% involved in both wind and solar technologies.
  - Of all solar companies, 70% focus on solar electric while 30% only provide solar thermal services. Very few provide both.
  - 5% support supply chain indirectly in areas such as building materials, education, fuel cells, or legal services.

## Methodology

- Of the 176 active/potential Companies....
  - 54 companies completed the survey for a return rate of 31%.
  - Of those, 24 companies or 44% are **active** in renewable energy either as a Tier I or Tier II supplier.

## Methodology

- Of the 176 firms...
  - 122 companies, no surveys
  - 44% active multiplier to calculate that another 53 companies are likely to be *active* as Tier I and Tier II suppliers bringing the total to 78.
  - We then separated that total per county.

	Column 1	Column 2	Column 3	Column 4
LOCATION	2005 Total Existing Firms	2011 UT Data	2011 Active + Potential	2011 Total Active Firms
Erie	7	36	28	13
Lorain	34	35	18	8
Lucas	22	162	114	51
Ottawa	2	18	15	7
TOTAL	67	251	176	79

## Survey – General Comments

*How is your business weathering this downturn?*

- Very risky, not much work now but the future looks promising
- Ok, we've been around for a while so our corporate support is solid
- Very, very difficult. The housing trade is down 80% nationally which directly affects us. Products costs are increasing
- Doing well. Up 160%.
- More challenging. Inconsistent grant programs and they move at too slow of a processing pace.
- Stable
- Challenging, cutting expenses
- Fine until Ohio discontinued their grant program. (wind) As a result, laid off people
- No layoffs, but we are grant funded. It's a slow scale up due to tightening of private sector capital.
- Very well, growing
- Holding our own
- Fairly well
- Difficult, had to use savings to keep business going
- Ok
- Have had the best 3 years in history

## Survey – General Comments

*Do you see NW Ohio as a growing region for Renewable Energy related business?*

### YES

- It has allowed our company to grow but Ohio has to continue to promote renewable programs.
- Depends on market share.
- The cluster of PV companies makes the region strong.
- If we can get past the stigma of "not in my backyard".
- Renewable energy awareness is increasing and prices are coming down. The incentives have worked.
- UT and its R&D are assets
- The interest for new installations is increasing.
- Historical business base experience and R&D available from both business and academic communities.
- The supply chain companies that are already located here make the area a desirable place to do business.
- Strong and willing workforce.
- UT and PV research in NW Ohio strong because of clusters of similar businesses.
- Plenty of innovative companies in area.
- Pool of talent and expertise here. Need strong state & regional growth strategies, long term, to encourage new investments.
- UT incubator at UT has contributed significantly to attraction of new solar technologies.
- Hope so, Ottawa County has 15% unemployment rate.
- The region is behind but it does has a lot to offer

### No

- Not as much as other areas of the country.
- Unions are crushing the business atmosphere.
- We need more skilled labor.
- With Ohio discontinuing their grant programs they effectively have killed small wind in the state.
- Wind rulings very restrictive even down to the small turbine level. Grant support inconsistent, can't plan.

## Survey – General Comments

*Do you anticipate any federal, state or local legislation changes that will adversely or positively affect your business in the next 3-5 years?*

- PUCO needs to hold utilities accountable for their REC's (Investment)
- Energy subsidy programs still necessary
- RPS, Feed-in tariffs need to be maintained and consistent
- Must keep the 30% tax credit. Easy to work with, no hassles like grant funded projects
- Financing and incentive program must be stable. Start and stop is killing long-term planning
- Bank funding limitations
- Lack of academic funding for basic research... both state and federal
- Workers compensation too high. As an Ohio company we can't compete in Michigan
- Ohio solar RECS need stability. Enforce utility investments already mandated
- Ohio wind RECS have too low a value for small wind considerations
- Small wind being treated more and more like utility wind effectively destroying small wind future manufacturing in Ohio
- Expiration of 1803 treasury grant program at the end of 2011 which allows for the credit to be converted into a cash
- RPS and Feed in tariffs are inconsistent
- Need longer times to respond to grant opportunities
- Can't compete with other states because of lack of Ohio long-term incentives
- Healthcare is too costly
- Lower taxes, lower insurance costs
- Loss of tax credits or grants to support continuing efforts to make solar competitive with fossil fuels
- Workers compensation costs hampering the hiring of additional employees
- Need to drill for oil in state parks
- Need windmills in Lake Erie

## Survey – General Comments

*What are the 1 or 2 items that would be most helpful to address your current needs and challenges and/or grow your business?*

- Workforce very expensive with prevailing wage required for grant funded projects. This is a disincentive.
- Re-instate the state grant programs.
- More individuals are being trained in wind than there are job opportunities statewide.
- Advancement of thin film and integrated roofing.
- Working capital, lines of credit are tight making it difficult to scale up and grow.
- Transportation costs high due to fuel costs impact company distribution necessities.
- Need wind training dollars to focus more on computer integration, foundation, erection etc.
- Community colleges need to partner with wind manufacturers to offer training specific to turbine designers.
- Indecisiveness, delays and anti-wind rhetoric based on hypothetical environmental factors and not sound science.
- Desperately need national inducement programs to equalize state competition.
- Get politics out of business. Reduce business taxes and regulations.
- Need fuel efficient and alternative fuel vehicles
- Addition of a few more good engineers
- Better understanding of emerging markets
- Need fair trade laws with China
- More bank funding options. Regional Growth Partnership is fantastic
- Business needs to work closer with each other. Not complimenting or working together enough
- Concerned about the cost to provide renewable energy and validity of need
- Need more sales

## Survey - Conclusions

Both NW and NE Ohio is well positioned to develop a solar and wind cluster community that could significantly impact both industries worldwide. The opportunity to create a multi-generational legacy similar to the influence the automobile created 100 years ago has real potential.

- Technology develops fast and furious. Usually characteristic of a cluster of networks with no particular hierarchy.
- Over the last 6 years, the number of companies increased from 67 to 79. (likely higher)
- By far, the biggest threat to Ohio's long-term renewable energy manufacturing future and especially its small business community is the lack of continuity of state grant programs. This politically charged start/stop mentality has killed both small wind and solar in the state. Essentially there have been no new projects as of November of 2010. Committing to a sustainable program is critical.
- Companies and job employment trending upward. Sunlight, Calyx and Willard and Kelsey didn't exist in 2008. First Solar has since doubled their employment base.
- Combining academic and private sector research capabilities with available skilled and trained labor force creates a recipe for success.
- Global competition much greater today.
- Wind manufacturing potential in NE Ohio remains significant.
  - Shallow Lake Erie waters
  - Significant wind cache
  - Ohio's deep water ports a huge advantage as a potential wind component staging and assembly area for fresh water installations.
- Next Steps? Alternative energy cluster initiative needed in Ohio's northern tier to coalesce and accelerate solar and wind development within the academic, public and private sectors.

## End Notes

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<sup>i</sup> Agreement Between Oberlin College and Green energy Ohio for consultant Services, March 2011

<sup>ii</sup> Ohio's PUCO website:

<http://www.puco.ohio.gov/puco/index.cfm/consumer-information/consumer-topics/where-does-ohioe28099s-electricity-come-from/>

<sup>iii</sup> Ohio's Clean Energy Report Card: How Wind, Solar, and Energy Efficiency are Repowering the Buckeye State, March 2011 <http://www.environmentohio.org/uploads/ee/75/ee758efc7c57740d7f5f11833a8d1e0d/Ohios-Clean-Energy-Report-Card-web.pdf>

<sup>iv</sup> Republished from the Encyclopedia of Energy Forthcoming from Salem Press 2012

<sup>v</sup> Based on data from Public Utilities Commission of Ohio, *Maps and GIS Data*, [www.puco.ohio.gov/puco/gis](http://www.puco.ohio.gov/puco/gis)

<sup>vi</sup> "Estimates of Windy Land Area and Wind Energy Potential, by State, for areas  $\geq$  30% Capacity Factor at 80m." *Wind Powering America*. U.S. Department of Energy. 4 Feb. 2010. Web. 13 Jun. 2011. <[http://www.windpoweringamerica.gov/docs/wind\\_potential\\_80m\\_30percent.xls](http://www.windpoweringamerica.gov/docs/wind_potential_80m_30percent.xls)>.

<sup>vii</sup> Rep. Marcy Kaptur website:

[http://www.kaptur.house.gov/index.php?option=com\\_content&view=article&id=2855&Itemid=300239](http://www.kaptur.house.gov/index.php?option=com_content&view=article&id=2855&Itemid=300239)

<sup>viii</sup> Ibid

<sup>ix</sup> Ohio Department of Development RFP #08-08 *Ohio Wind Supply Chain Program*

<sup>x</sup> Component Manufacturing: Ohio's Future in the Renewable Energy Industry, REPP Renewable energy Policy Project, George Sterzinger/Matt Svrcek, Technical Report, October 2005  
[http://www.repp.org/articles/static/1/binaries/Ohio\\_Report\\_Long\\_Appndx\\_ABC.pdf](http://www.repp.org/articles/static/1/binaries/Ohio_Report_Long_Appndx_ABC.pdf)

<sup>xi</sup> "Investment in new wind will create a demand for all of the components that make up a wind generator. As a rule of thumb, every 1000 MW requires a \$1 Billion investment in rotors, generators, towers and other related investments...This Report assumes 50,000 MW will be developed and proceeds in three steps to trace the distribution of benefits. First we determine how the total installed cost of the new wind development will flow into demand for each of the 20 separate components of the turbines (grouped into 5 categories). Second, we spread the total demand among the regions of the country by allocating the \$50 billion investment according to the number of employees at firms identified by the NAICS codes. The number of employees is used rather than number of firms to account for the different impact of large vs. small companies, and hence to more accurately distribute the investment. This produces a "map" of manufacturing activity across the United States based on firms that have the technical potential to become active manufacturers of wind turbine components. Third, we translate the regional dollar allocation by assuming that all component manufacturing has the same ratio of jobs/total investment of 3000 FTE jobs/\$1 billion of investment.

<sup>xii</sup> Lake Erie Alternative Power website: <http://leapwind.com/JobCreation.aspx>

<sup>xiii</sup> Preliminary Evaluation of the Impact of the Section 1603 Treasury Grant program, April 2010  
<http://eetd.lbl.gov/ea/emp/reports/lbnl-3188e.pdf>

<sup>xiv</sup> National Geographic Magazine, December 1975

<sup>xv</sup> [HAROLD A. MCMASTER, 1916-2003: Inventor became philanthropist](#), obituary, Article published August 26, 2003, Toledo Blade