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HOUSE DEMOCRATIC POLICY COMMITTEE
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House of Representatives
COMMONWEALTH OF PENNSYLVANIA
HARRISBURG

HOUSE DEMOCRATIC POLICY COMMITTEE HEARING

Topic: Renewable Energy

SB3 – Erie, PA

March 8, 2017

AGENDA

- 9:00 a.m. Welcome and Opening Remarks
- 9:10 a.m. Panel from HERO BX:
- John Nies
Vice President of Operations
 - Christopher Peterson
Vice President of Finance and Commodity Risk
- 9:50 a.m. John Rossi
Executive Board Member
Sierra Club Lake Erie Group
- 10:10 a.m. John Pruvis
President
Solar Revolution Erie
- 10:30 a.m. Joy Knapp
Regional Outreach Coordinator of Clear Air Council
Co-Chair of Northwest PA Green Economy Task Force (NWPAGE)
- 10:50 a.m. Closing Remarks



*John Nies
VP, Operations
Chris Peterson
VP, Finance, Risk / Regulatory*

CONTENT

- Hero BX overview
- What is biodiesel?
- How is biodiesel made?
- Biodiesel feedstocks
- Fuel properties of feedstock
- Biodiesel quality
- Environmental & safety benefits
- Biodiesel economic impact



HERO BX OVERVIEW

- Located on 15 acres within the 108 acre SB3 Industrial Park
- Zoned Industrial
- Strategically located with access to rail, road, and water



HERO BX

- Lake Erie Biofuels, LLC d/b/a Hero BX
 - Owned by Black Family Holdings, LP
- Leading biodiesel producer in the Eastern U.S., producing over 130,000 gallons per day
- Nameplate capacity is 45 million gallons per year
 - Hero BX shipped a record of **49.8 million gallons** in 2013, and **49.2 million gallons** in 2016
- Continuous flow, multi-feedstock Desmet-Ballestra technology and design
- World-class, on-site testing laboratory to ensure we are producing quality product that meets/exceeds ASTM specifications
- BQ-9000 Accredited Producer



WHAT IS BIODIESEL? WHY USE IT?

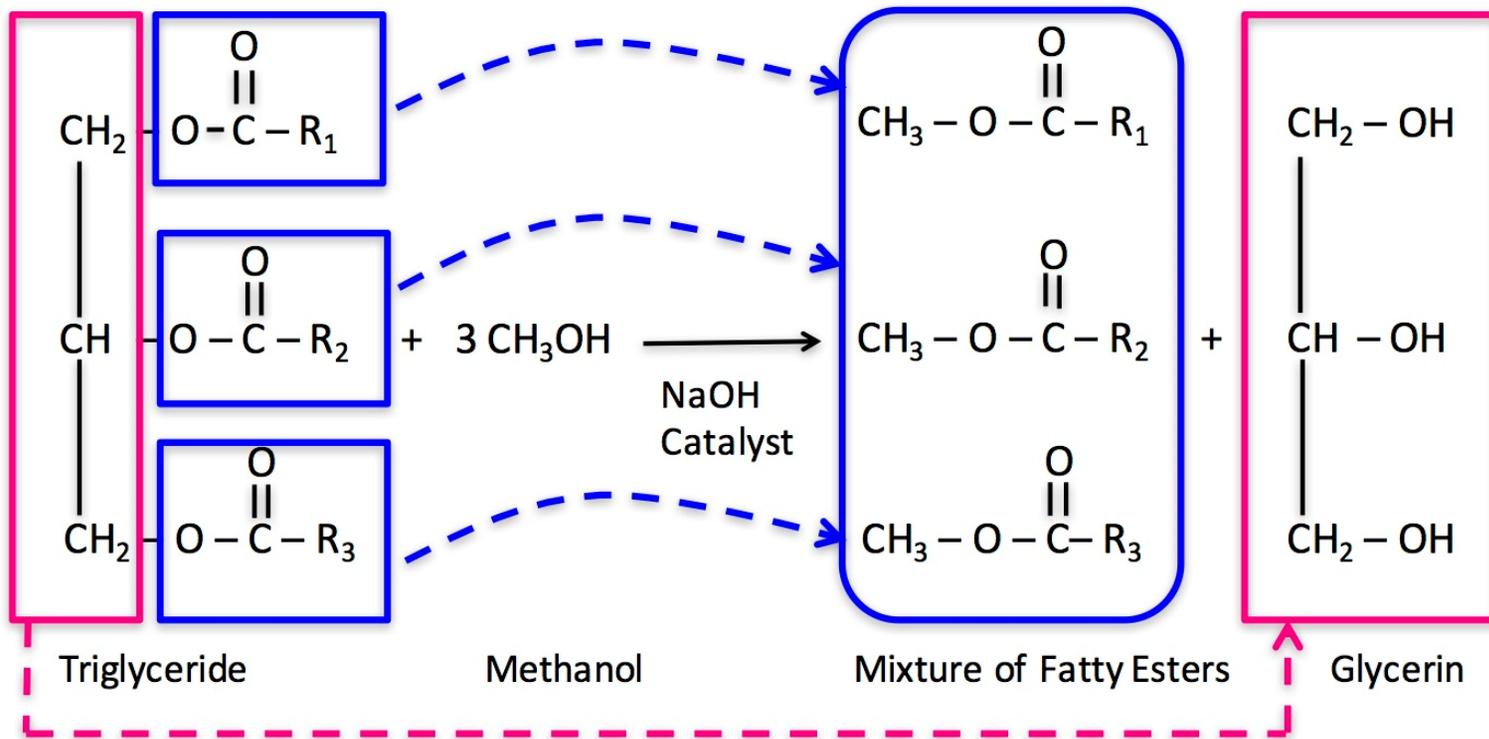
- Alternative fuel produced through acid esterification or transesterification from renewable resources such as vegetable oils, animal fats, and recycled grease
- Biodiesel can be blended with petroleum diesel, home heating oil BIOHEAT®, and off-road diesel
- Biodiesel blends enhance fuel lubricity (that is lacking in Ultra Low Sulfur Diesel) to protect pumps and injectors from premature wear, and do not require diesel engine modifications
- Biodiesel adds value to the U.S. economy while reducing dependence on foreign fossil fuels
- Environmental benefits
 - Cleaner burning alternative fuel
 - Non-toxic
 - Biodegradable

Source:

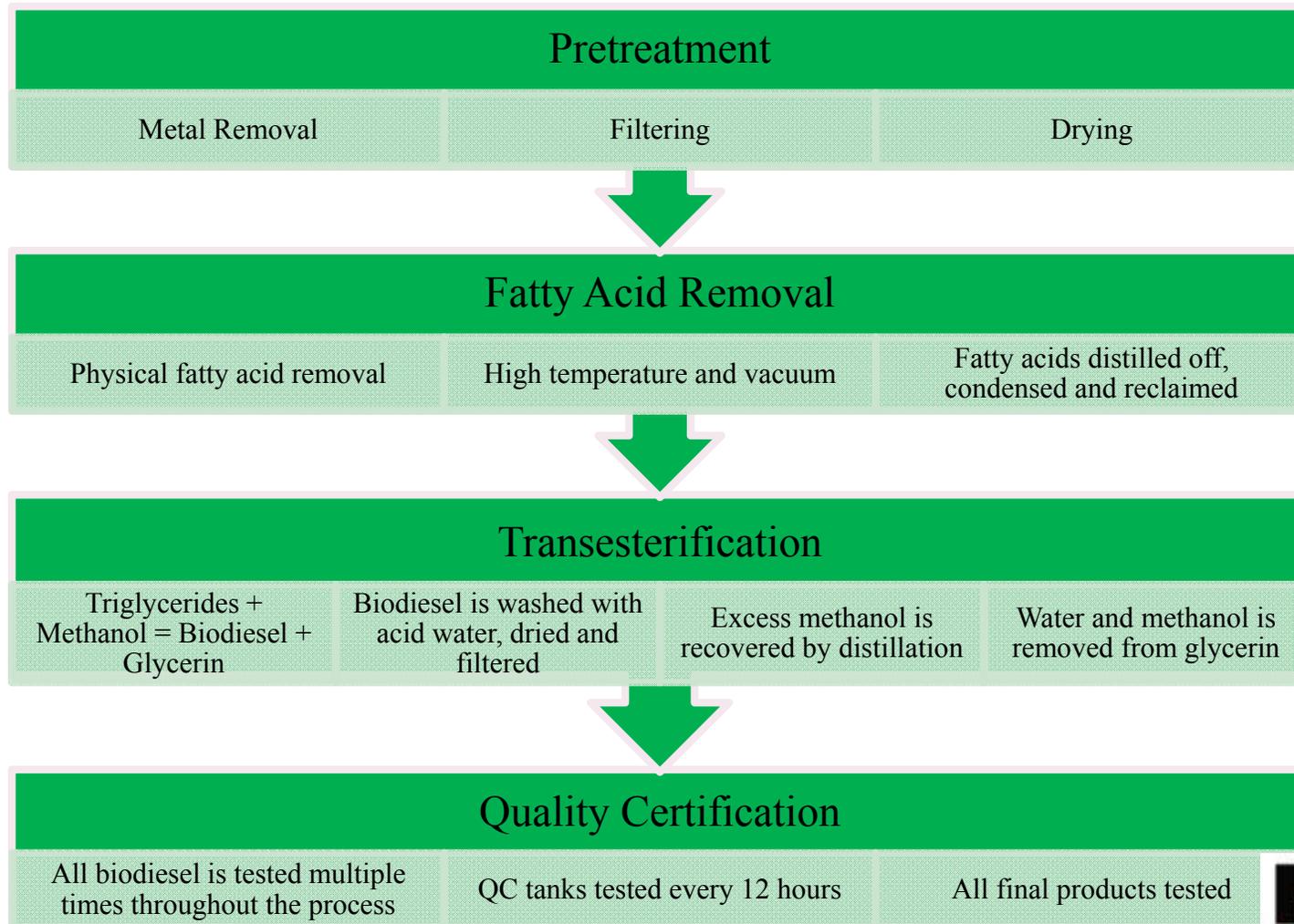
The National Biodiesel Board <http://www.biodiesel.org/what-is-biodiesel/biodiesel-faq's>



BIODIESEL CHEMISTRY



HOW IS BIODIESEL MADE?



Biodiesel Feedstocks

Common Feedstocks used by Hero BX

- ✓ Soybean Oil
- ✓ Canola Oil
- ✓ Waste Vegetable oils (Used Cooking oils)
- ✓ Choice White Grease (Pork Fat)
- ✓ Poultry Grease
- ✓ Beef Tallow
- ✓ Corn Oil (Distillers Dried Grains)



- Feedstocks are chosen based on price, availability, performance and compliance with RFS-2 Regulations

Fuel Properties of Feedstocks

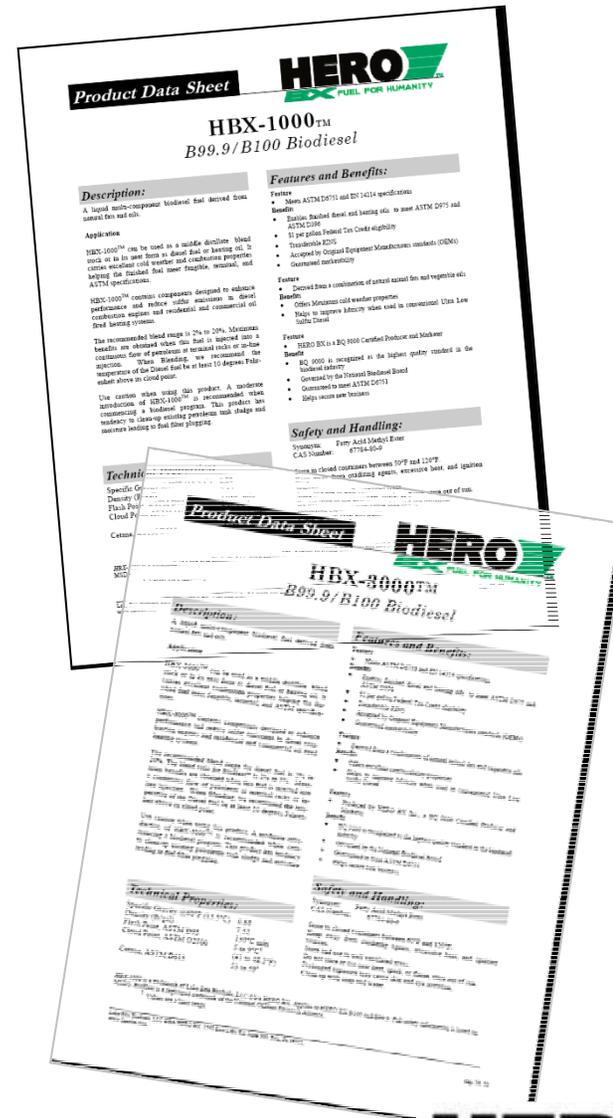
HERO BX Proprietary Blends

HBX-1000

- Cold Flow properties similar to SME
- Lower cost than SME
- Winter-grade transportation fuel

HBX-3000

- Much lower cost than SME
- Higher cloud point than SME
- Much lower iodine, thus higher natural stability than SME
- Very high cetane number



BQ-9000 Quality Management

- BQ-9000 - Voluntary Program
 - Biodiesel quality standard developed by National Biodiesel Board that is a combination of the ASTM standard for biodiesel, ASTM D6751, and quality systems program that includes storage, sampling, testing, blending, shipping, distribution, and fuel management practices
 - Yearly internal and external audits
- HBX is a BQ-9000 accredited Producer of Biodiesel



Source:
BQ-9000 The National Biodiesel Accreditation Program <http://www.bq-9000.org/>



On Site Laboratory

Certified Testing

- Biodiesel Testing
 - ASTM D6751 testing
 - CFPP
 - Karl Fisher Moisture
 - Total Contamination
 - Particulate Contamination
 - Soap
- Feedstock Testing
 - MIU
 - FFA
 - Metals
- Glycerin Testing
 - Proctor and Gamble tests
- Soapstock Testing
- Research Capabilities



ENVIRONMENTAL & SAFETY BENEFITS

Emissions

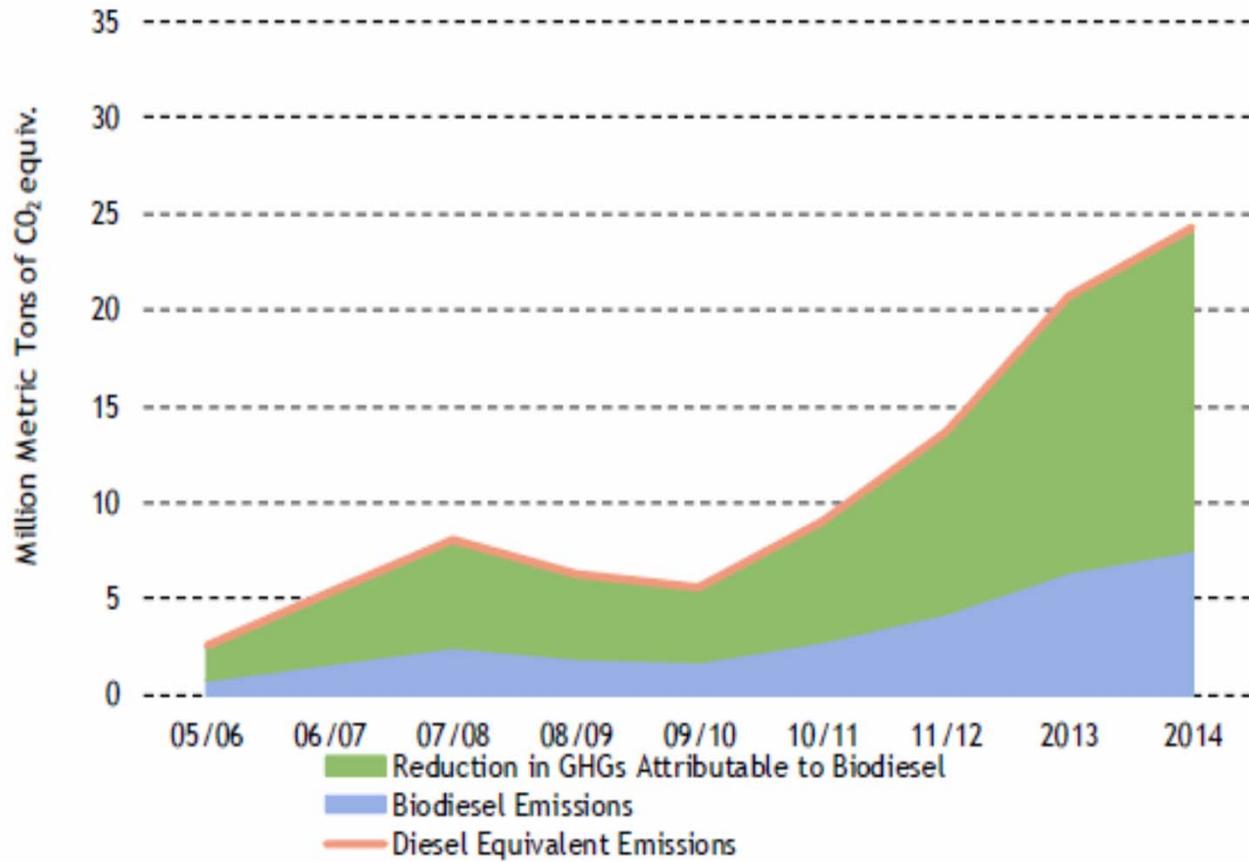
- Biodiesel is the only alternative fuel to have fully completed the health effects testing requirements of the Clean Air Act.
- The use of biodiesel in a conventional diesel engine results in substantial reduction of unburned hydrocarbons, carbon monoxide, and particulate matter compared to emissions from diesel fuel.
- The ozone forming potential of the hydrocarbon emissions from biodiesel is *50% less* than that of diesel fuel.

Source:

The National Biodiesel Board <http://www.biodiesel.org/what-is-biodiesel/biodiesel-faq's>



Diagram 2: GHG reductions attributable to U.S. biodiesel production and consumption



Source:
The Impact of the Biodiesel Industry on the US Economy http://www.biodiesel.org/reports/20131113_GEN-431.pdf



ENVIRONMENTAL & SAFETY BENEFITS

Health Effects

- Biodiesel exhaust is much safer for people to breathe.
- Studies conclude biodiesel emissions have decreased levels of all target polycyclic aromatic hydrocarbons (PAH) and nitrated PAH compounds. PAH and nPAH compounds have been identified as possible cancer causing compounds.

Source:

The National Biodiesel Board <http://www.biodiesel.org/what-is-biodiesel/biodiesel-faq's>



ENVIRONMENTAL & SAFETY BENEFITS

Energy Balance

- Biodiesel helps preserve and protect natural resources.
- For every one unit of energy needed to produce biodiesel, 3.2 units of energy are gained. This is the highest energy balance of any fuel. Because of this high energy balance and since it is domestically produced, biodiesel use can greatly contribute to domestic energy security.

Source:

The National Biodiesel Board http://www.biodiesel.org/reports/19980501_gen-388.pdf



BIODIESEL ECONOMIC IMPACT FOR 2016

LMC International evaluated the impact of the biodiesel industry on U.S. economy, employment, and wages.

- Over 2.5 billion gallons of biodiesel were produced domestically (1.9 billion gallons were required under EPA's RFS2).
- Supported \$16.8 billion in total economic impact
- 62,000 jobs were supported
- \$2.6 billion in wages paid

Source:

The Impact of the Biodiesel Industry on the US Economy http://www.biodiesel.org/reports/20131113_GEN-431.pdf



LABORATORY



TRANSESTERIFICATION REACTORS



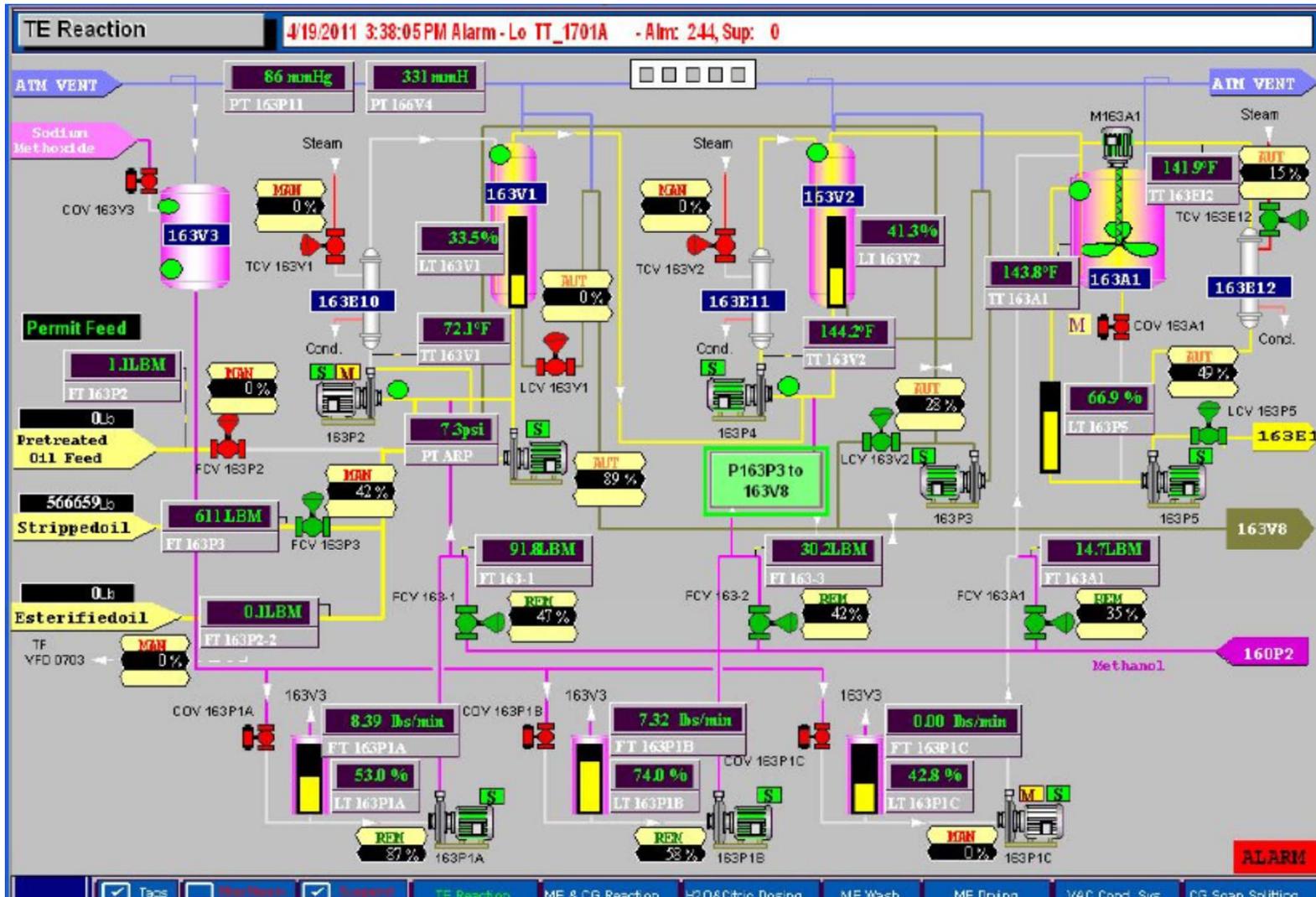
WIRING AND PIPING



CONTROL ROOM



PROCESS CONTROL SCREENS



TRUCKING LOADING/UNLOADING



RAIL LOADING/UNLOADING



TANK FARM



VIDEO

<https://vimeo.com/207478071/e8b5daf93c>



Testimony before the House Democratic Policy Committee on Renewable Energy
Public Hearing at 9 a.m. Wednesday, March 8, 2017
SB3, East Training Room, 3rd Floor, 1540 East Lake Road, Erie.

I want to thank Representatives Pat Harkins and Mike Shule, the VP of Erie Management Group, Sean Wiley, for giving me the opportunity to testify before the committee. I am here today a representative of the Sierra Club, but I am also as a historian engaged in the study of the history of business, technology, and economic development in the United States.

Northwestern Pennsylvania has nearly 50 miles of coastline along Lake Erie and the Commonwealth owns the lake bottom lands under the 759 square miles that constitute the state's Lake's waters. Crossing over those waters are winds that blow harder and longer than winds over land. Because of that, the best and largest contiguous area controlled by Pennsylvania for electrical power generation by wind is in Lake Erie.¹ The National Renewable Energy Laboratory estimates that Pennsylvania Lake Erie winds can generate up to 5,737 megawatts of electricity.² To place this in perspective, 1 megawatt of energy can sustain 1,000 homes for one hour. If Pennsylvania's portion of Lake Erie's wind power was fully tapped, it could power up to 5.7 million homes. One of the reasons for the Lake's high wind power potential, is that Lake Erie is the shallowest of the Great Lakes and many sections of Pennsylvania's part of it are shallower still. This means that commercial development of offshore wind is much easier and cheaper in the Commonwealth's waters.

In short, Pennsylvania has a valuable renewable energy asset off its Lake Erie shoreline that is comparatively easy to develop. And, it is something we desperately need to develop. To explain why we need to look at current economic trends in northwestern Pennsylvania. These trends are applicable to much of the western party of the state.

If one drives down 12th Street, the old industrial corridor of Erie, one cannot help but being struck by the large number of closed factories and deteriorating and empty buildings. This process of industrial decline has taken place in Erie and other cities in the region such as Meadville and Warren over the last 30 years. And, it is a fate suffered by countless other industrial cities and towns in western and central Pennsylvania. Manufacturing *was* a core part of the economies of the region. It provided good paying jobs and significant taxable assets to the people and the communities of the area. As manufacturing declined over the past 30 years, good paying jobs and taxable assets have disappeared. The direct result of this decline has been increasing unemployment and poverty rates, a hollowing out of the middle class, declining public schools, impoverished municipalities, and an out-migration from the region of young adults, often those with a higher education. Residents of the region have responded to this decline with sadness and anger. Without bringing in new industries that create large numbers of jobs the economic future of the region, its communities and its residents is grim.

Developing offshore wind power in Pennsylvania's part of Lake Erie offers the region a transformative industry that can help reverse its economic decline. It is important to note that, unlike many economic development programs proposed in the past for northwestern Pennsylvania, offshore wind is an industry that complements the region's existing manufacturing base in ship-building, electrical equipment production, "heavy fabrication, casting & machining, forging & machining, electrical, and composites." Offshore wind would also create a demand for materials produced in the region, especially steel, and local and regional services such as construction. A Great Lakes WIND Network (GLWN) study projects that an offshore wind development of 100 turbines would generate nearly 1,600 jobs in manufacturing and 1,500

¹U.S. Department of Energy, *Enabling Wind Power Nationwide*, May 2015, p. 11; get URL.

²Walt Musial, Donna Heimiller, Philipp Beiter, George Scott, and Caroline Draxl, *2016 Offshore Wind Energy Resource Assessment for the United States*, September 2016, National Renewable Energy Laboratory, Technical Report, NREL/TP-5000-66599; <http://www.nrel.gov/docs/fv16osti/66599.pdf>

approved in the United States, by far. ...[That could make Baltimore the de-facto headquarters of offshore wind in the United States.” As Paul Rich, director of project development at U.S. Wind, explained: “If we develop an industrial hub, because of our first-mover advantage in Maryland, perhaps when turbine manufacturers are looking to come to the states, they'd entertain reinforcing a 'Silicon Valley of offshore wind' approach and embed it in Baltimore.”¹¹ One of the reasons for this inter-state rivalry is jobs. “According to the New York State Energy Research and Development Authority, direct jobs from offshore wind can average \$140,000 a year in pay and benefits. Supply-chain workers can pull in \$70,000 a year. The jobs ... range from power engineers to machinists to stevedores.”¹²

Despite the election of offshore anti-wind president, Donald Trump, developers are optimistic. “[I]nstalling turbines at sea requires years of planning, and Trump may be out of office by the time some developers need federal approvals. State governments, meanwhile, remain the biggest drivers of renewable energy development, because they can mandate that utilities get a certain amount of power from offshore wind or other sources.”¹³

In the Great Lakes, the city of Cleveland has been one of the main drivers of offshore wind. The next offshore wind project completed in the U.S. is likely to be the Icebreaker Project—“a six-turbine pilot wind farm” seven miles off Cleveland. Conceptualized by the Cleveland Foundation’s President and CEO Romm Richard, it is being developed by the Lake Erie Energy Development Corp. and Fred Olsen Renewables, the leading wind power developer in the United Kingdom. Construction is projected to begin in 2018.¹⁴

Beyond Erie County’s joining LEED Co., Pennsylvania and the municipalities of its northwest, have done little to get into the industry, despite the excellent offshore wind assets of Lake Erie. Two state steps are needed to begin the process: leasing legislation that would allow the lease of more than twenty-five acres of lake bed available under the current law. The second is the mapping of its Lake Erie waters to determine where wind turbines should and should not go. Studies need to be conducted by the state in order to avoid placing turbines and related infrastructure in bird and bat migratory flyways and fish spawning areas. In addition, the viewshed from westward facing beaches on Presque Isle should not be impaired.

Offshore wind development offers the state several advantages not found in onshore wind. Because the state owns the bottom lands beneath the Lake’s waters, lease revenues will mainly go to state treasury. That also means that the state can write into its leases requirements that wind farm developers use a percentage of materials and labor sourced in Pennsylvania. This would ensure that offshore wind in Lake Erie generated business opportunities and jobs within the state. The state should also incentivize the development of offshore in Lake Erie waters, by creating a Pennsylvania-generated offshore wind carve out in its AEPS standards, for example 2.5% by 2027. The state (and local governments) should also use their purchasing power to commit to buying a fixed percentage of their electricity from Pennsylvania offshore wind.

These actions are necessary because one of the primary barriers to the adoption of offshore wind is the cost of electricity it generates. Electricity from the Deepwater Wind development in Rhode Island costs 24¢ a kilowatt hour. For subsequent wind power farms the Wind Energy Foundation projects the cost per kilowatt hour at 19¢. By 2030 the price should fall to 14¢ a kilowatt hour. Other studies suggest even higher price declines. The cost of offshore wind power will fall due to the development of an

¹¹Saqib Rahim, E&E News reporter, “OFFSHORE WIND: States Jockey for Jobs in Nascent U.S. Industry,” *EnergyWire*, February 16, 2017; <http://www.eenews.net/energywire/stories/1060050130/print>

¹²Rahim, “States Jockey for Jobs in Nascent U.S. Industry,” *EnergyWire*.

¹³Ryan and Dlouhy, “Dream of Offshore U.S. Wind Power May Be Too Ugly for Trump.”

¹⁴John Funk, “Cleveland Wind Project Awarded \$40 Million Doe Grant to Develop Lake Wind Farm,” *The Cleveland Plain Dealer*, May 28, 2016; http://www.cleveland.com/business/index.ssf/2016/05/cleveland_wind_project_awarded.html

manufacturing and installation infrastructure and skilled labor base required to produce and erect wind turbines offshore. Further cost reductions will come from the increasing efficiency of wind turbines, and economies of scale from the increased size of wind farms.¹⁵

This is a process that has occurred in onshore wind. Between 1980 and 2015 the cost of electricity generated by onshore wind has fallen by 90 percent. And, between 2009 and 2012 “the price of wind under long-term power purchase contracts in the United States averaged just 4 cents per kilowatt hour, which is 50%” decline in the price of electricity. In many regions of the U.S. the price of onshore wind is the lowest cost source of electricity—lower than solar, nuclear, natural gas and coal.¹⁶

If Pennsylvania wants this new industry it will need to incentivize it in its early years before it becomes truly cost effective. We should do this because Pennsylvania’s industrial communities, especially those in the western half of the state, are at a crossroads: we can continue to watch those communities deteriorate and sink further into poverty and unemployment, or we can adopt state (and local) government policies to revitalize them by bringing in new 21st century industries such as offshore wind. This is one of the great choices we that we confront today. And to turn around the region’s economic decline we need offshore wind in Lake Erie.

Thank you.

¹⁵Wind Energy Foundation, *Wind Energy Economics*; windenergyfoundation.org/about-wind-energy/economics/; Willett Kempton, Stephanie McClellan, and Deniz Ozkan, University of Delaware Special Initiative on Offshore Wind, *Massachusetts Offshore Wind Future Cost Study*, March 2016; <https://www.ceoe.udel.edu/File%20Library/About/SIOW/MA-Offshore-Wind-Future-Cost-Study-FINAL-14-Mar-16.pdf>;

¹⁶Wind Energy Foundation, *Wind Energy Economics*; U.S. Department of Energy, *Wind Power Technologies | Fy17 Budget At-a-Glance*. DOE/EE 1360, March 2016; [https://energy.gov/sites/prod/files/2016/03/f30/At_A_GLANCE%20\(WIND\).pdf](https://energy.gov/sites/prod/files/2016/03/f30/At_A_GLANCE%20(WIND).pdf)



**Democratic Policy Committee Hearing on Renewable Energy
Testimony for LakeErieWinds PA Campaign-March 8, 2017**



Joy L. Knapp, Regional Outreach Coordinator, Clean Air Council, jknapp@cleanair.org
Co-Chair, NWPAGE (Northwest Pennsylvania Green Economy Task Force)

I want to thank you for the opportunity to testify on behalf of renewable energy. I serve as a Regional Outreach Coordinator for the Clean Air Council, as well as Co-Chair of the Northwest PA Green Economy Taskforce. NWPAGE, in collaboration with the Clean Air Council, has been working on the “LakeErieWinds” Pennsylvania campaign, to advocate for the development of offshore wind energy in the PA waters of Lake Erie.

Lake Erie offshore wind is one of Pennsylvania's greatest untapped energy resources. The magnitude of the Great Lakes offshore wind potential is transformative – offering sustainable economic benefits and an abundant source of clean energy.

Created in 2009, the Cleveland-based LEEDCo has been working to spearhead the development of the Great Lakes offshore wind industry. Project Icebreaker, a pilot project proposing to place 6 wind turbines 7-10 miles off of Cleveland’s shores in 2018, and just 90 miles west of Erie, Pennsylvania – is actively solving the technical and engineering challenges facing the nascent Great Lakes offshore wind industry. LEEDCo is, in part, learning from and partnering with leaders in the booming European offshore wind industry – particularly with vested support of Norway’s Olsen Wind Carrier. Pennsylvania has an opportunity right now to help lead a clean energy revolution and build a brighter future. For example, Erie’s DonJon Shipbuilding & Repair, and Deugro, an international logistics company located in Erie, are already involved in Great Lakes offshore wind development effort through their partnership with LEEDCo.

In April 2015 under the leadership of our County Executive, recognizing the real local benefits of developing offshore wind, Erie County Council unanimously voted to join the board of LEEDCo, representing a strong local commitment to this effort, and positioning Pennsylvania to benefit from economic development opportunities, a source of sustainable energy and new long-term jobs for the region.

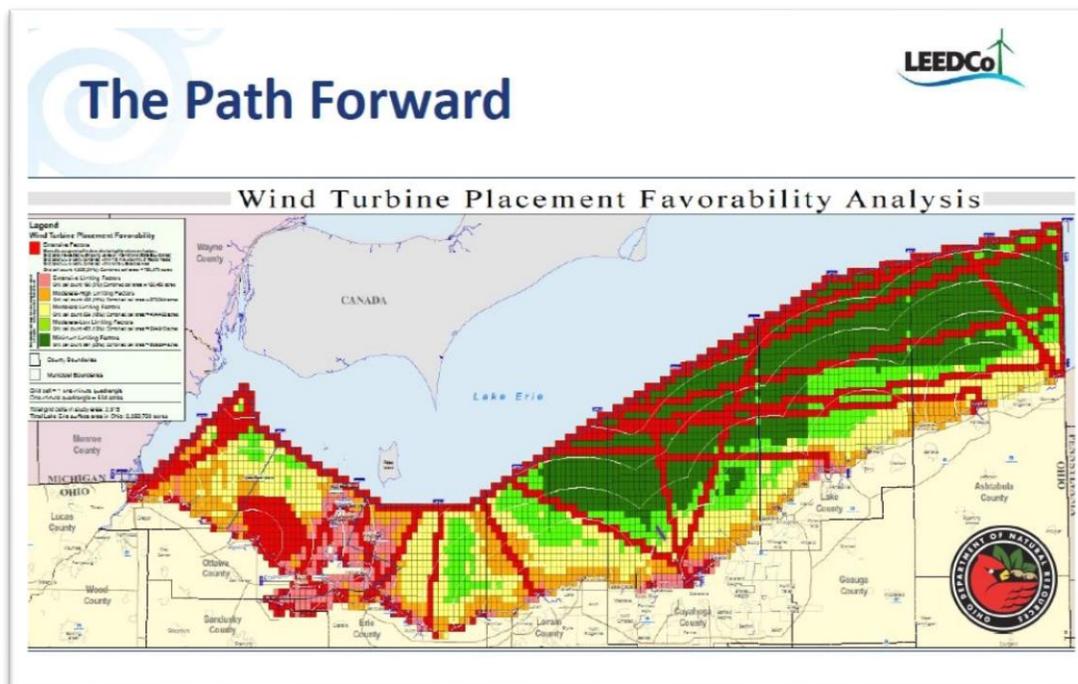
Also in April 2015, representatives of the Great Lakes Wind Network (GLWN), presented a supply chain workshop to local leadership in manufacturing and industry. According to the GLWN, the United States Department of Energy (DOE) has proposed a goal of 54 GW of wind energy by 2030, which will require 10,800 5MW wind turbines. This demand will create a substantial number of supply chain and business opportunities for Erie County in areas of heavy fabrication, casting & machining, forging & machining, electrical, and composites. Wind development would also create a demand for local and regional services, equipment and materials, as well as long- term opportunities for manufacturing jobs.

According to the Bureau of Labor Statistics, wind turbine service technician was at the top of the 2015 list for fastest-growing jobs. Additionally, machinists, computer-controlled machine tool operators, assemblers, welders, quality-control inspectors, and industrial production managers are highly valued in the wind industry, as their job duties, skills, and training backgrounds are similar to those of manufacturing employees in other industries.

While local elected officials have supported Erie's involvement in offshore wind development, Pennsylvania must reduce the roadblocks for the industry to be able to flourish. From a wind developer's standpoint, Pennsylvania is not yet "open for business." Current state law doesn't enable offshore wind development to occur in the PA side of Lake Erie due to limits on the acreage of lake-bed that can be leased. Rep. Curt Sonney had introduced 2 previous pieces of legislation addressing the lease issue (HB 568 and HB 1269) and most recently introduced HB 589. However, even without legislative action to resolve this issue, Pennsylvania still has the ability to advance the development of offshore wind, while pioneering clean energy and creating sustainable, economic growth. Fortunately, the Governor's Administration has a number of options to help lay the groundwork for this industry to develop and flourish. In addition to articulating a clear vision for PA to lead in the development the Great Lakes offshore wind industry, we have identified three wind-industry specific actions, which do not require legislative action, but that would hasten wind development.

The first is a Wind Turbine Placement Favorability Analysis. Possibly the simplest and most easily attainable component of the suite of wind-industry related actions is the Turbine placement favorability analysis (see example of Ohio's

attached to this testimony). Ohio's example, intended as a guidance document, compiles data of specific importance to offshore wind stakeholders in one easy-to-understand map. It includes data on fisheries, commercial shipping lanes, migratory flyway patterns, and favorable wind patterns. It utilizes a simple red/yellow/green color code to indicate areas that aren't ideal for wind development (red) and areas that are favorable to development (dark green). The color code effectively illustrates that the siting favorability increases farther from shore and toward the eastern basin of Lake Erie. The map was prepared by the Ohio Coastal Management Department's GIS Mapping Specialist, who completed the study in six months. A similar effort by Pennsylvania would provide an initial analysis of potential turbine siting and provide all stakeholders with a tool to evaluate future proposals for offshore wind in PA waters. Providing a practical and easy-to-access map would support informed public dialogue on offshore wind. Given the current effort to establish a Marine Sanctuary in the PA waters of Lake Erie, such a mapping effort could also include data on known shipwreck sites.



The second is clarification of the **Submerged Land Lease Structure and Entity**. Under current law, PA submerged land licenses are limited to 25 acres, which could limit offshore wind development. By comparison, the lease LEEDCo has with

the state of Ohio only requires a lease for the lakebed actually used for turbine foundations with a limited buffer around that area. Thus for a wind farm, only the actual area necessary for the turbine foundation (perhaps including a small buffer zone) would be subject to the submerged land license. Special considerations are required for cables, measured in linear feet, which fall under PUC regulations and are considered as a public right-of-way. While state level legislative action to enable offshore wind development would clearly be beneficial, clarifying the PA lakebed license process along these lines would allow offshore wind developers the flexibility they need to design an economically viable project. For example, the state of New York proactively utilizes a public competitive bid process to attract developers, providing them exclusive rights for a specific timeframe, while the state maintains a level of control.

In addition, PA could clarify that cable transmission routes are covered by easements rather than submerged land licenses and are not subject to the 25 acre limit. Taken in tandem, these simple administrative clarifications would open the possibility of offshore wind development even in the absence of enacting specific legislation.

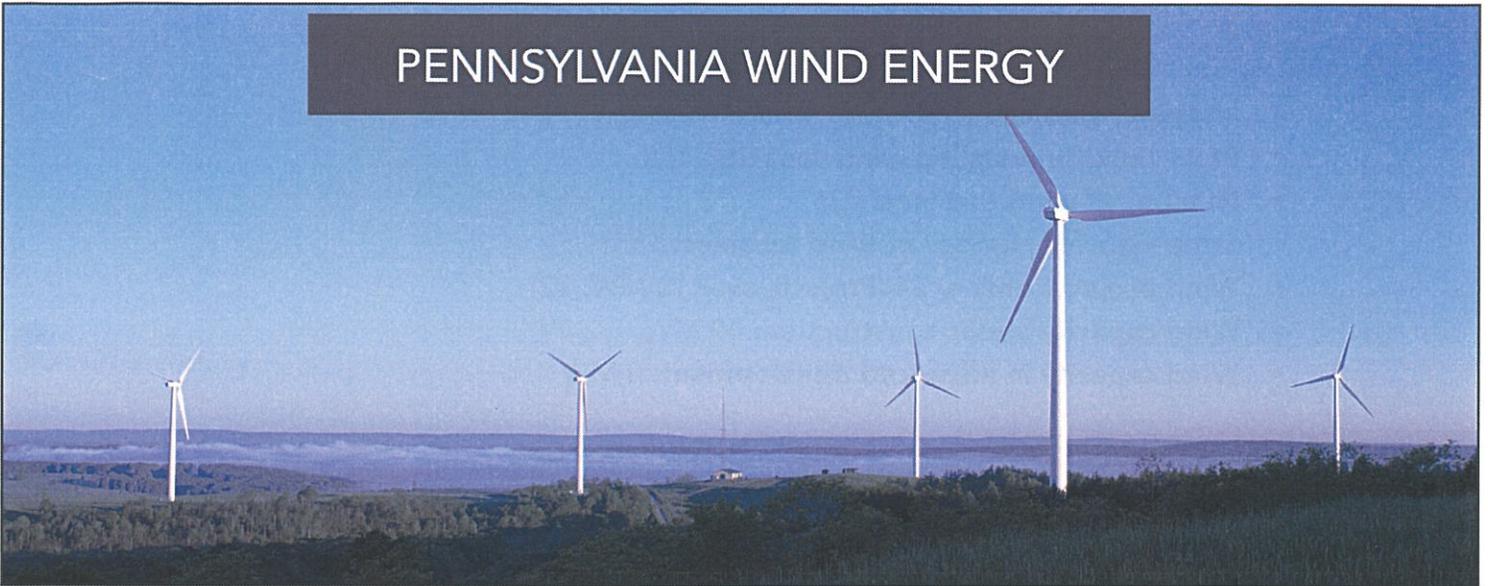
Lastly, provide Regulatory and Permitting Guidance for Wind Developers.

One of the impediments to developing PA's offshore wind power industry is that potential developers may be deterred by the lack of regulatory clarity regarding the various agencies and types of permits they would need in order to proceed with a project. The Pennsylvania Department of Environmental Protection currently has outlined the general required permits and guidance process, containing all necessary permits, including environmental impact assessments among specific permits, but that streamlining this process and the development of a timeline are necessary next steps. We also understand that some flexibility exists within this process, as some permits and requirements will be dependent on an actual project-specific proposal.

Pennsylvania's Administration could enable the advancement of developer assistance by collaborating with relevant agencies to develop a technical guidance document that would provide specific guidance, support and resources to wind developers. The guidance document should lay out in logical sequence the steps a potential developer would need to take and identify the relevant government agencies or bodies responsible at the state and local levels.

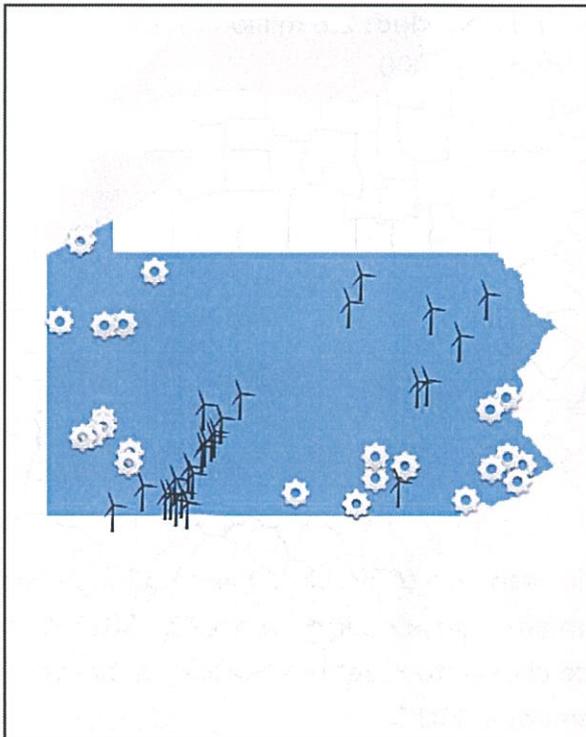
In summary, Pennsylvania has an opportunity right now to be a leader in renewable energy and build a brighter future. There is a broad and diverse group of stakeholders representing businesses, regional and national environmental organizations, and local and state elected officials that want to see Pennsylvania commit to taking action in order to encourage offshore wind development in Pennsylvania. We need a Pennsylvania delegation united in support of this renewable energy source.

PENNSYLVANIA WIND ENERGY



Pennsylvania is a national leader in wind-related manufacturing.

Pennsylvania is a manufacturing leader for the wind energy industry, with at least 26 wind-related manufacturing facilities in the state. Many of the skills Pennsylvania workers possess easily transfer to wind energy manufacturing, providing thousands of new jobs and spurring billions in investment. Many Pennsylvania companies have already begun supplying to the wind energy industry, such as SKF USA Inc. in Hanover. Expanding wind power will create even more opportunities for manufacturers and service suppliers down the supply chain.



 Online Wind Project  Manufacturing Facility

Note: Calculations based on national and state averages.

BENEFITS Jobs & Economic

An investment in wind power is an investment in jobs, including jobs in operations and maintenance, construction, manufacturing and many support sectors. In addition, wind projects produce lease payments for landowners and increase the tax base of communities.

- 2016 direct and indirect jobs supported: 1,001 to 2,000
- Total capital investment: \$2.7 billion
- Annual land lease payments: \$1-5 million

Wind-Related Manufacturing

The United States has over 500 manufacturing facilities producing products for the wind industry that range from blade, tower and turbine nacelle assembly facilities to raw component suppliers, including fiberglass and steel.

- Number of active manufacturing facilities in the state: 26

Wind Projects

- **Installed wind capacity:** 1,369 MW
- **State rank for installed wind capacity:** 16th
- **Number of wind turbines:** 726
- **State rank for number of wind turbines:** 18th
- **Wind projects online:** 24 (Projects over 10 MW: 22)
- **Wind capacity under construction:** 40 MW
- **Wind capacity in advanced development:** 0 MW

Current Wind Generation

For the 12 month period ending October 2016, wind energy provided 1.59% of all in-state electricity production.

- **Equivalent number of homes powered by wind:** 312,000

Wind Generation Potential

The DOE Wind Vision Scenario projects that Pennsylvania could produce enough wind energy by 2030 to power the equivalent of 1.6 million average American homes.

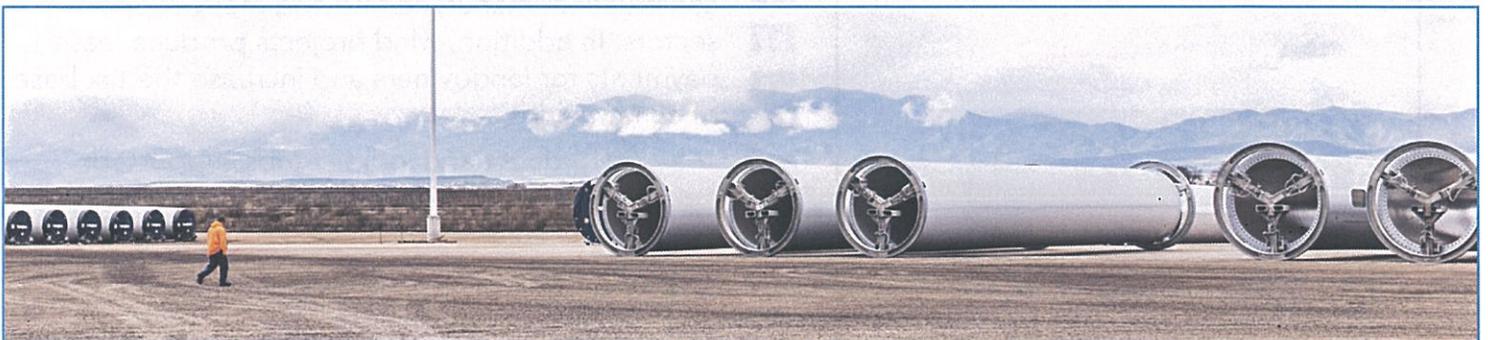
- **Land based technical wind potential at 80 m hub height:** 878 MW
- **Land based technical wind potential at 110 m hub height:** 43,565 MW (Source: NREL)

Environmental Benefits

Generating wind power creates no emissions and uses virtually no water.

- **2015 annual state water consumption savings*:** 1.5 billion gallons
- **2015 equivalent number of water bottles saved:** 11.5 billion
- **2015 annual state carbon dioxide (CO₂) emissions avoided:** 2.6 million metric tons
- **2015 equivalent cars worth of emissions avoided:** 561,000

*Based on national average water consumption factors for coal and gas plants



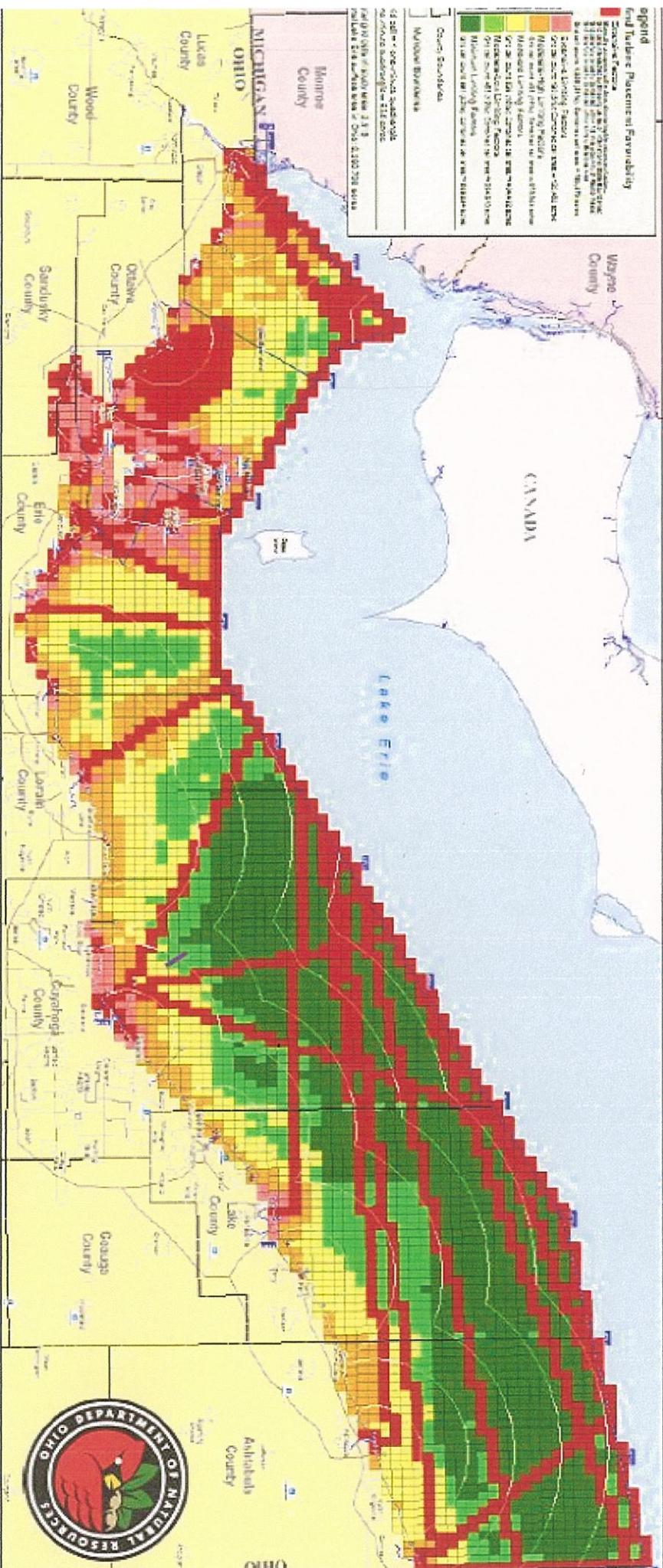
Renewable Portfolio Standard

Pennsylvania passed an Alternative Energy Portfolio Standard (AEPS) in 2004, requiring electricity suppliers to supply 18 percent of their sales from alternative energy sources by 2021. Wind energy has historically been the renewable resource chosen to meet renewable standards requirements, fulfilling 61% of Pennsylvania's requirement in 2014.

The Path Forward



Wind Turbine Placement Favorability Analysis

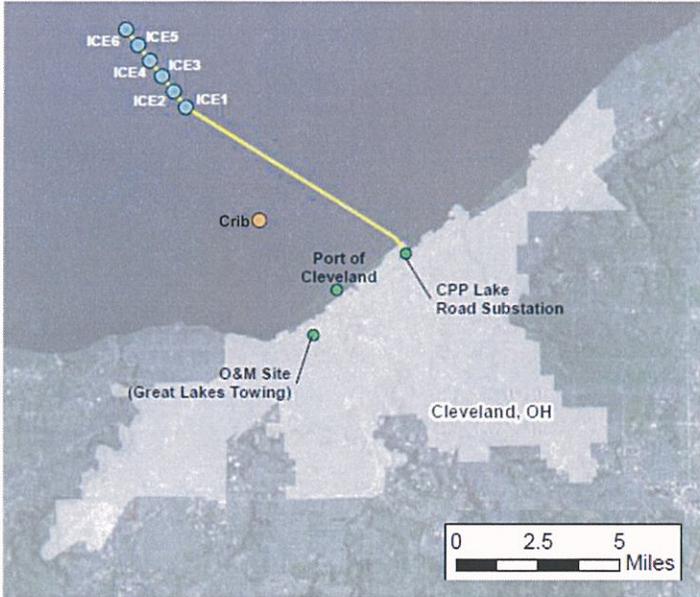


LAKE ERIE ENERGY DEVELOPMENT CORPORATION



LEEDCo is a regional non-profit economic development organization working to build an offshore wind power industry in Northeast Ohio to generate locally grown clean energy, create jobs, and drive economic growth. LEEDCo is a public-private partnership of Ohio's four eastern-most lakefront counties (Ashtabula, Cuyahoga, Lake and Lorain), Erie County, Pa., the City of Cleveland, The Cleveland Foundation and NorTech.

PROJECT ICEBREAKER



6 3.45-MW Turbines	20.7 MW Locally Generated Clean Energy
7 - 10 Miles Offshore	6,000 Households Powered
500+ Jobs	\$168 Million Lifecycle Local Economic Impact

Icebreaker™ will be the first offshore wind project in the Great Lakes and is designed to unlock the 1000's of MW of offshore wind potential in Lake Erie. It is a demonstration project that will validate innovations that lower the cost of energy as well as develop the manufacturing supply chain. It will also serve as

an industry leading environmental research center and provide a model for responsible offshore wind development. Most significantly, it will position Northeast Ohio as a nationwide leader in a new industry that will create 1000's of jobs by 2030. In fact, **this transformation has already started** with Fred. Olsen Renewables (FOR), a leader in the European wind industry, establishing FOR USA in Cleveland.

LEEDCo's Local Partners



Understanding Regional Opportunities in Offshore Wind



GLWN: Patrick Fullenkamp pfullenkamp@glwn.org



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GLWN - supply chain expertise

- **OEM's and Tier 1's** – identify the supply chain needs and find domestic qualified suppliers
- **Manufacturers** – educate, qualify, and connect to opportunities
- **Regional Economies** – assist leaders in the wind industry supply chain development
 - Better understanding their regional supply chain
 - Planning for attraction and JV opportunities
 - Land Use & Workforce considerations



GLWN.....Call us Global

◆ **Mission:**

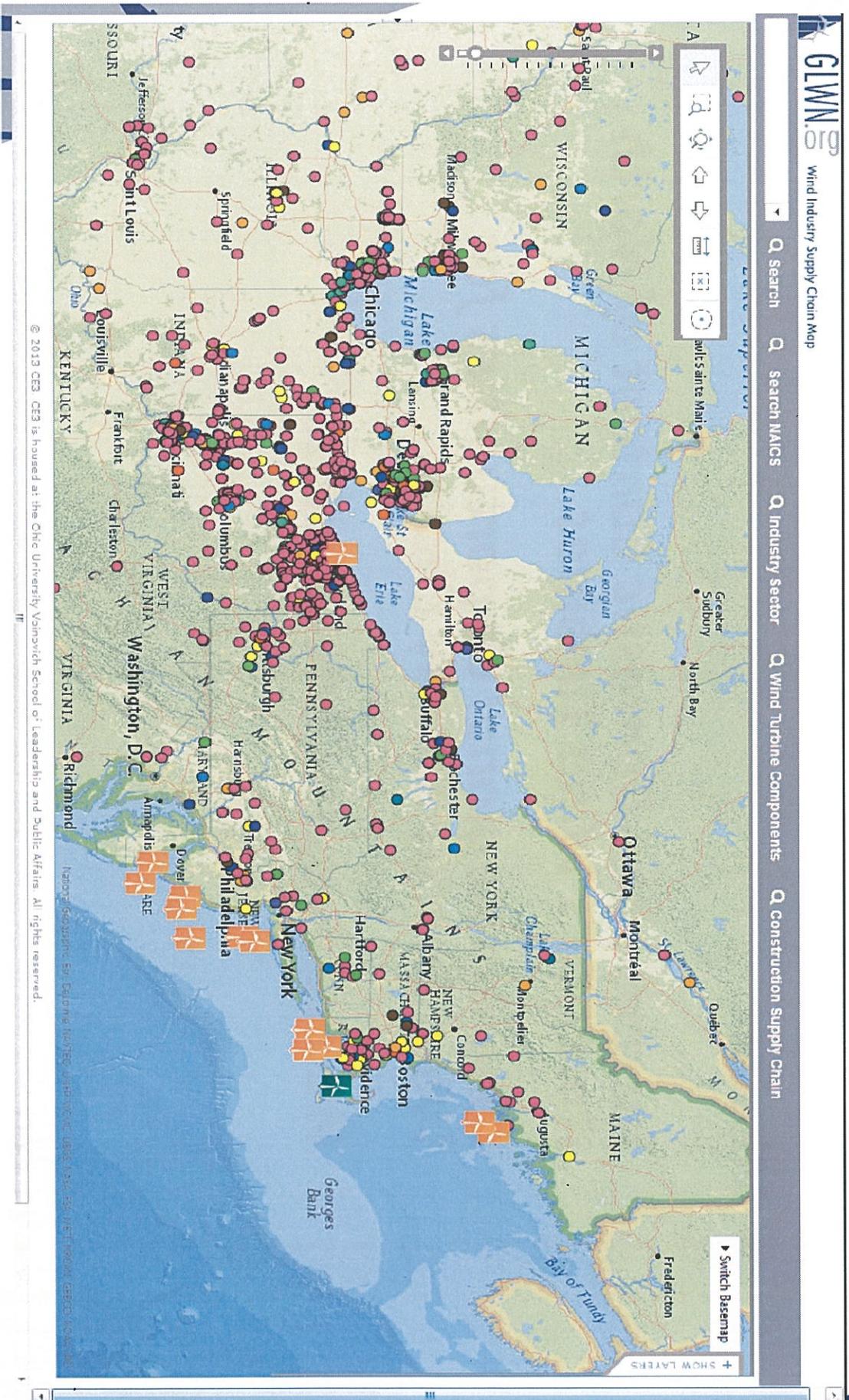
Increase the Domestic Content of North America's Wind Turbines

Develop Regional Opportunities for Wind Energy Supply Chain

We are Supply Chain Experts



GLWN Wind Supply Chain Map



GLWN Wind Supply Projects

- ◆ **New Bedford (MA) Economic Development Council – Offshore Wind Supply Chain**
 - Identify and qualify New Bedford regional suppliers capable of supplying the wind industry
 - Conduct technical workshops for manufacturers
 - Connect qualified companies to opportunities in wind
- ◆ **Massachusetts Clean Energy Center (MassCEC) – Offshore Wind Supply Chain**
 - Same as the focused project for New Bedford but for the entire SE and SW industrial regions of Mass
 - Offshore Wind Component Land Use Report



GLWN Wind Supply Projects

- ◆ **U.S. Department of Energy, EERE – U.S. Wind Energy Manufacturing and Supply Chain: A Competitiveness Analysis**
 - **An analysis of U.S. manufacturers capability and competitiveness to supply the next generation wind turbine and foundation. (3MW and 5MW)**
 - Towers, blades, PM Generators, jacket foundations
 - Cost Breakdown Analysis and Value Stream Mapping
 - Global analysis of 22 companies in U.S., Europe, and China
 - **Identify, assess, and score America’s readiness to supply the next generation key turbine and balance-of-plant components**
 - towers, blades, foundations [monopiles & jacket supplier], gearboxes, generators, cast hubs & support bases, fabricated support bases, forged shafts & yaw rings, composite nacelle & spinner covers, and subsea cabling



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GLWN Wind Supply Projects - Current

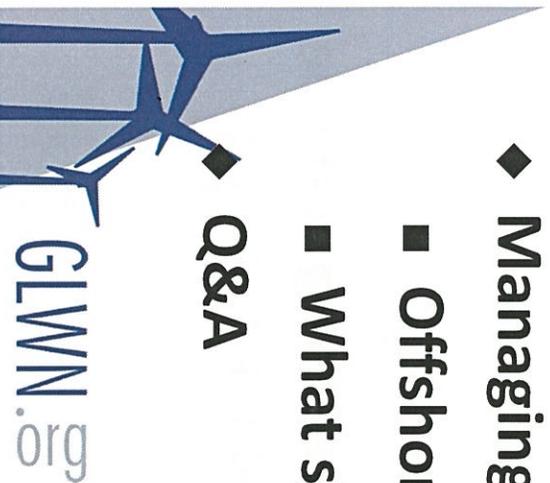
- ◆ **LEEDCo – Icebreaker**
 - Manufacturing liaison with potential U.S. suppliers for foundations
- ◆ **Virginia Offshore Wind Port Readiness Evaluation**
 - Jobs Characterization, education and technical skill requirements for Component Manufacturing
 - Blades, towers, generators, nacelle assembly, jacket foundations, and subsea cabling.
- ◆ **Maryland Offshore Wind Supply Chain Review**
 - identify the potential Maryland supply chain including port side supply chain services, portside heavy manufacturing, general manufacturing, and special services.



Topics to be covered

- ◆ **The Offshore Wind Supply Chain**
 - **Turbine Components**
 - **Balance-of-Plant**
 - **Portside Staging/Assembly**
 - **Regional/Local buys**
 - **Near term and longer term opportunities**
- ◆ **Managing our Expectations**
 - **Offshore Wind Supply Chain development in Europe**
 - **What should Erie County businesses be doing now?**

◆ **Q&A**

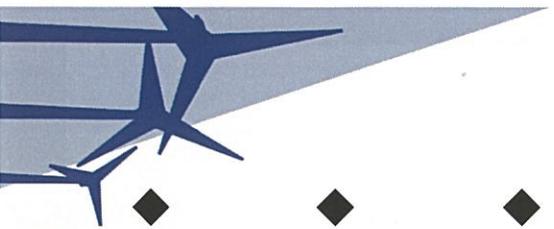


U.S. Offshore Wind

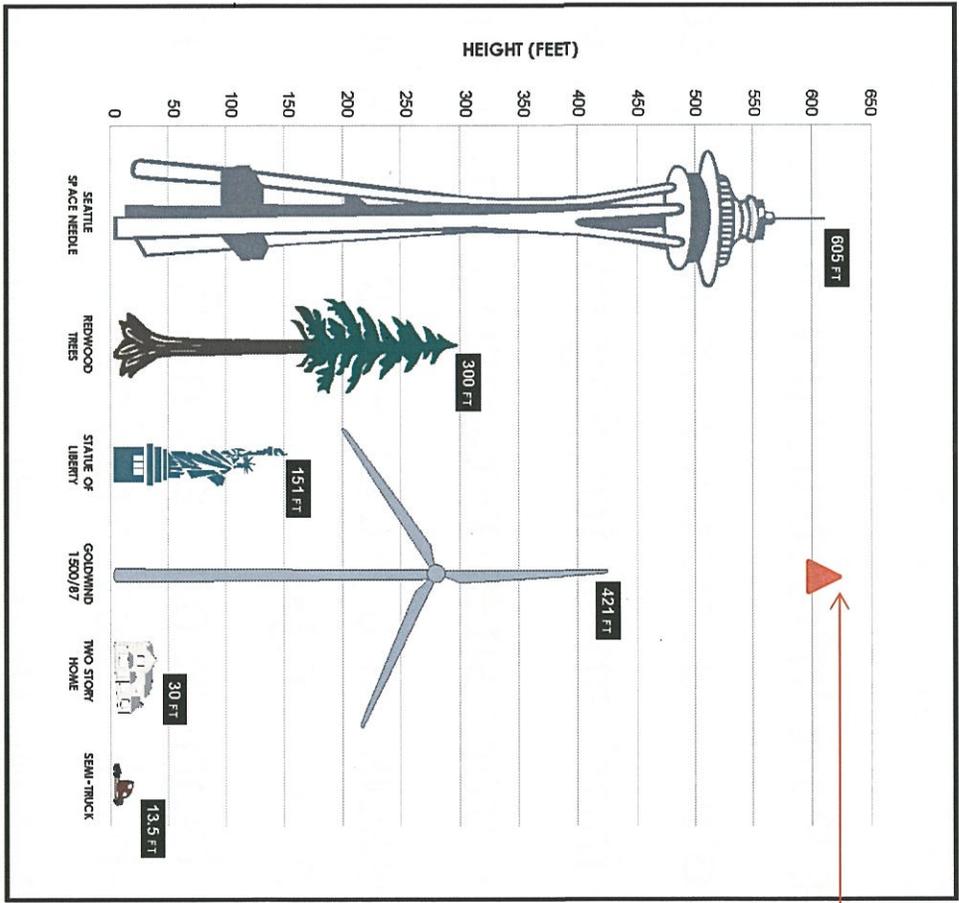
Supply Chain Opportunities

DOE Goal: 54 GW by 2030 = 10,800 5MW turbines

- ◆ **Logistic & Port Infrastructure Impact**
- ◆ **Foundations** - fabrication-machining-coatings
- ◆ **Towers** – fabrication-forging-machining-coatings
- ◆ **Blades** – composites-processing-machining
- ◆ **Support Bases and Hubs** – casting/fabrication-machining-coatings
- ◆ **Vessels** – fabrication-casting-forging-machining-electrical-hydraulics-coatings
- ◆ **Cable & Substation** – all major manufacturing sectors

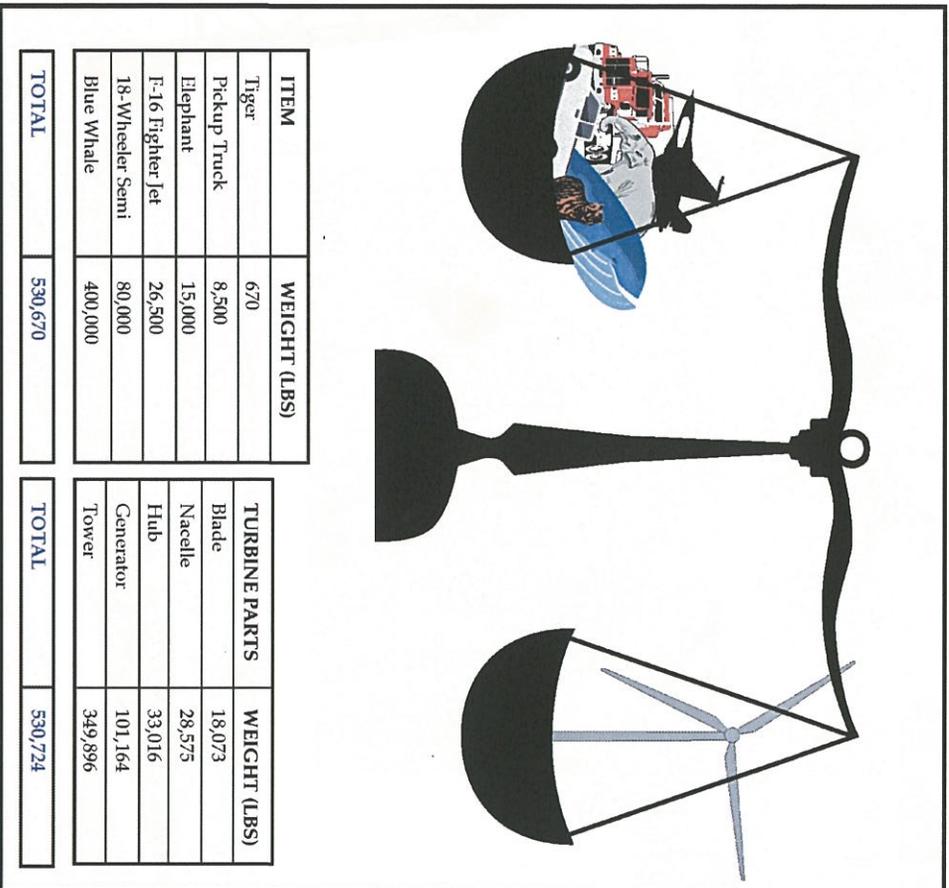


SIZE COMPARISON OF GOLDWIND 1500/87 WIND TURBINE



6MW !

WEIGHT COMPARISON OF GOLDWIND 1500/87 WIND TURBINE

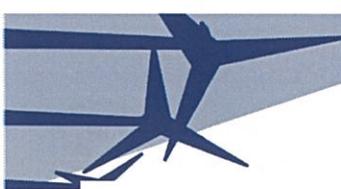
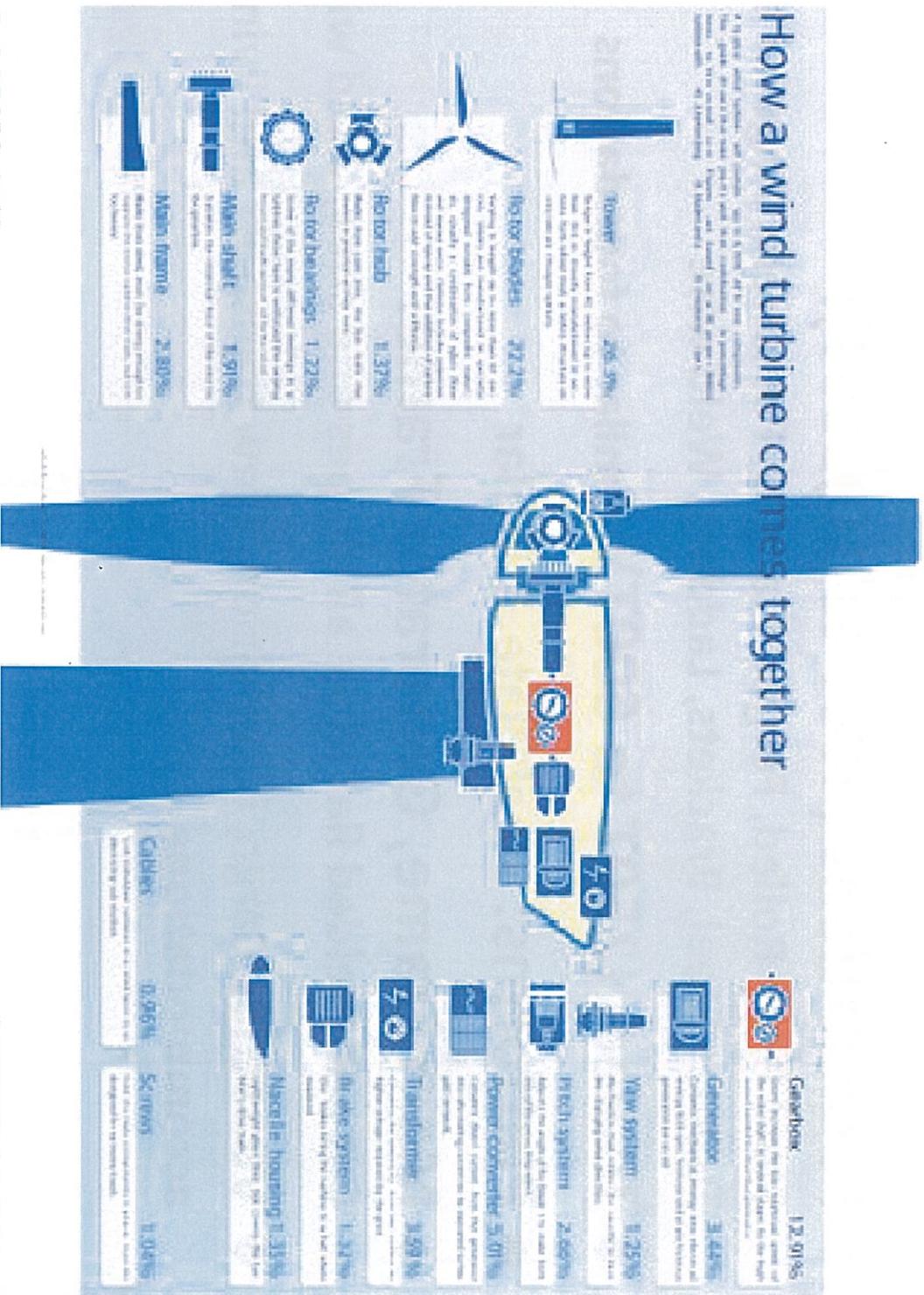


Offshore Wind – size matters



Wind Turbine Systems

Where the WT goes, so goes the supply chain



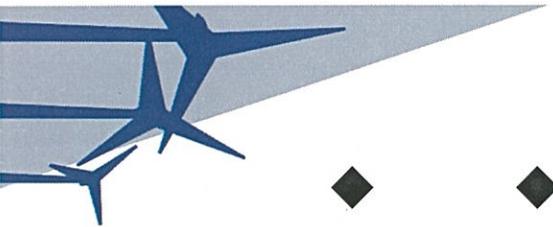
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Heavy Fabrication

Foundation, Wind Turbine, Vessels

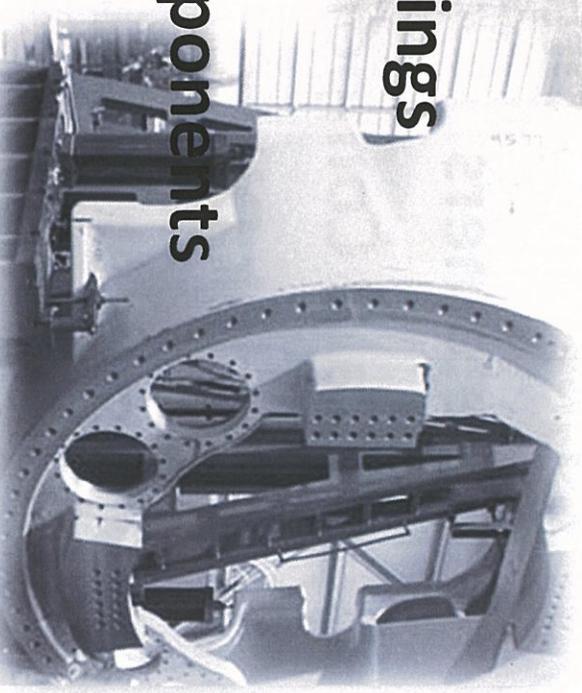
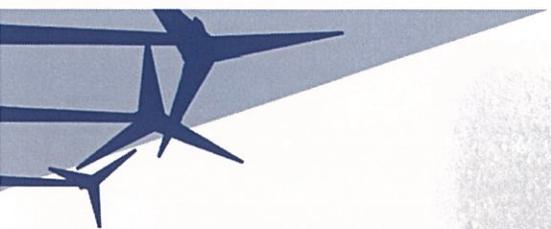
- ◆ **Foundations (400T to 10,000T):**
Steel Plate Rolled, Forged Flanges, Fasteners, Angular and Tubular Steel, Brackets, Ladders, Weld wire
- ◆ **Towers (250T to 600T):** similar to foundations
- ◆ **Platforms:** Steel Plate, Tubular
- ◆ **Main Frame, Generator Frame:**
Cut and welded flat plate all shapes and sizes, Weld wire
- ◆ **Vessels:** Cargo, installation, Crew transport and living accommodations



Casting and Machining

Wind Turbine

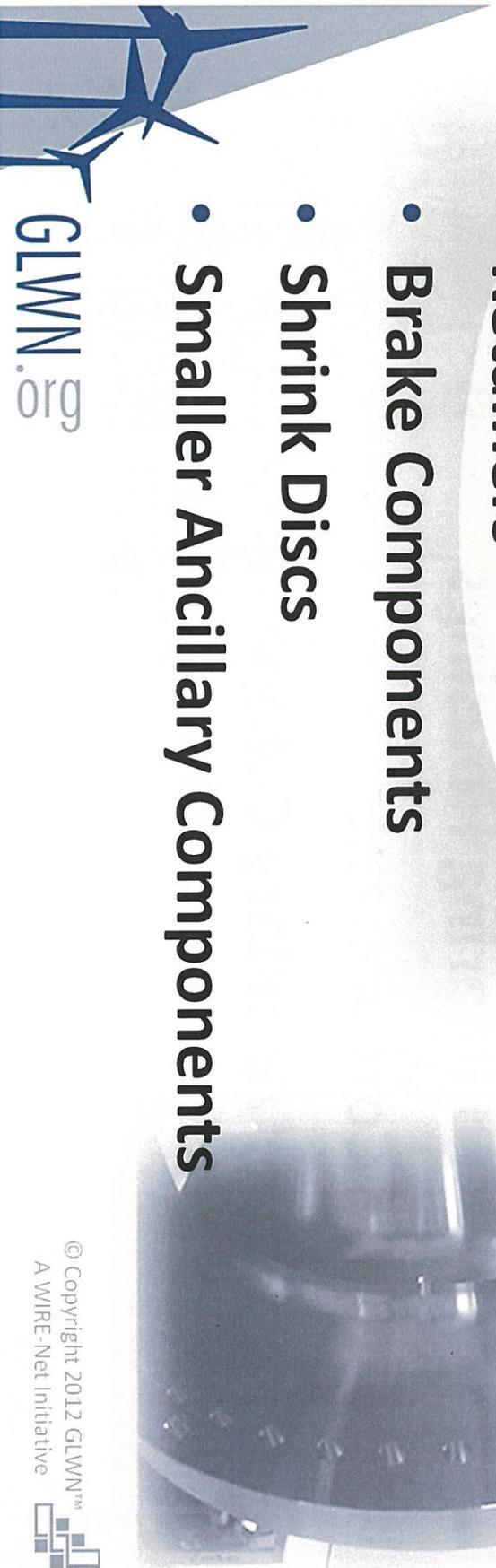
- ◆ Support Bases / Main Frames
- ◆ Rotor Hub
- ◆ Gearbox or Direct Drive Housings
- ◆ Generator Housings
- ◆ Forward Bearing Housings
- ◆ Brake Components
- ◆ Smaller Ancillary Components



Forging and Machining

Wind Turbine

- **Main Shafts**
- **Flanges, Tower and Foundation**
- **Attachment Studs**
- **Gearbox / Drive Internals: shafts, Gears, Retainers**
- **Brake Components**
- **Shrink Discs**
- **Smaller Ancillary Components**



Electrical

Wind Turbine, Substation, Array and Export Cable

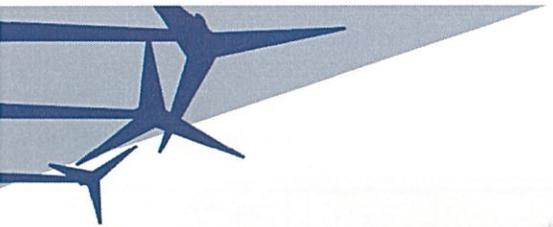
- **Generators**
- **Transformers**
- **Invertors**
- **Substations**
- **Power Controls**
- **Cable**
- **Circuit Boards, Lighting, Harnesses, Insulators, Sensors, Motors, Universal Power Supplies**
- **Subsea Cable – Inter array and Export**



Composites

Wind Turbine

- **Blades (55m to 100m) (16 to 25 ton)**
- **Nacelle Housings**
- **Fiberglass**
- **Carbon Fiber**
- **Mesh, Cloth, Fabrics**
- **Resins, Ancillary Chemicals**
- **Substrates, Cores**
- **Protective Films**



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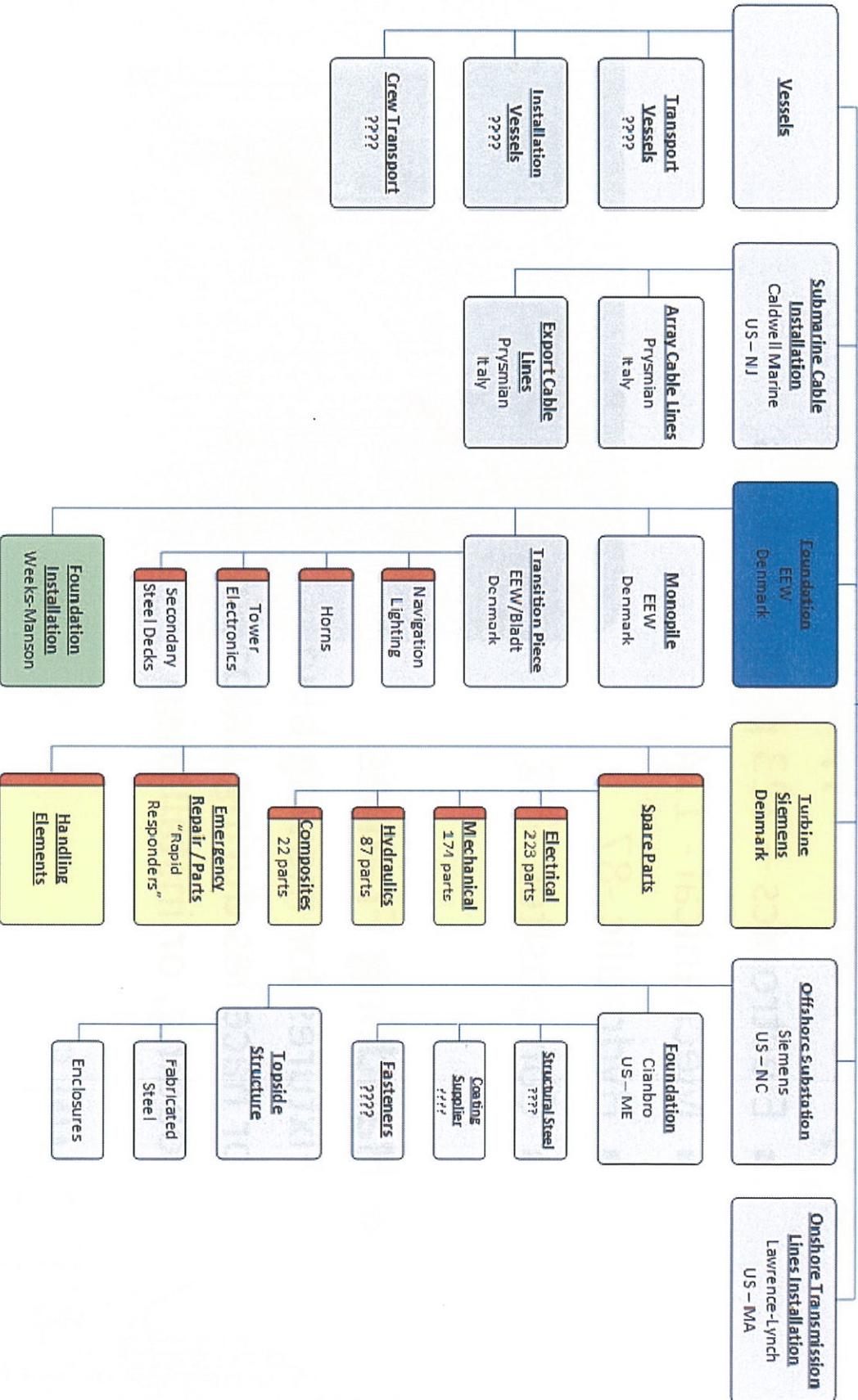


Stateside Buys

- Final assembly foundation parts
- WT spare & emergency repair parts
- Handling fixtures

CAPE WIND

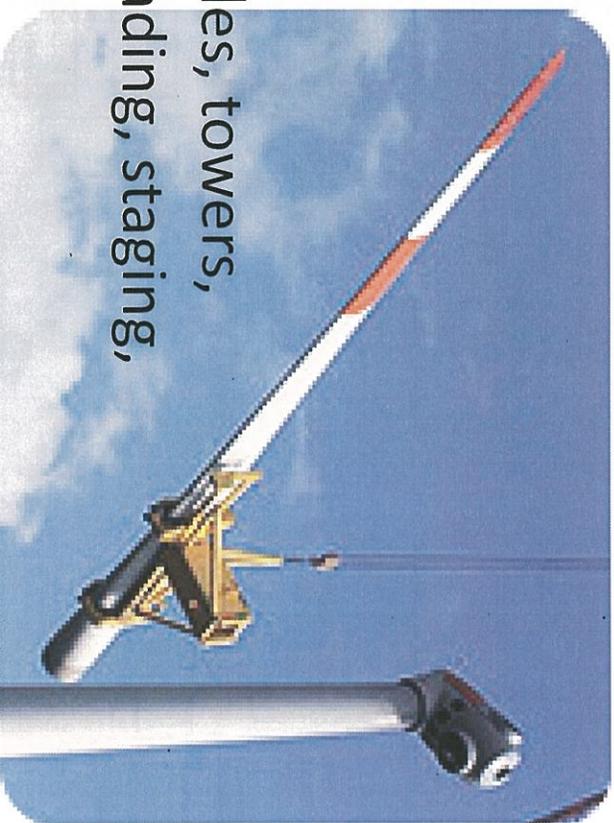
DEVELOPER
Energy Management Corp



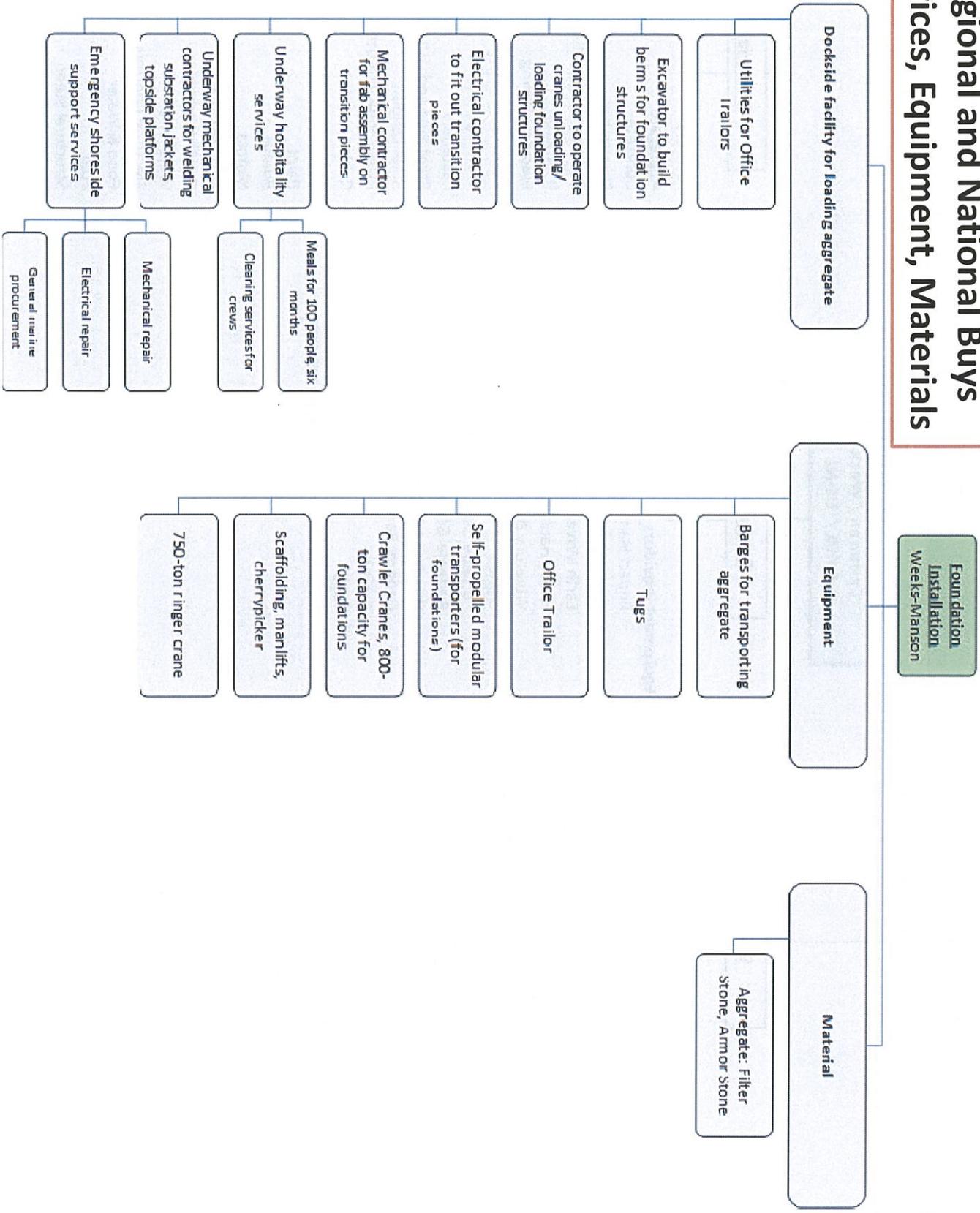
Siemens Supply Chain Opportunities

- ◆ **Spare Parts – Typical Wind Turbine**
 - Electronics – 223 part numbers
 - Mechanical - 174
 - Hydraulic -87
 - Composites – 22

- ◆ **Handling Frames**
 - Fixtures for moving blades, towers, or nacelles during unloading, staging, loading, or installation



Regional and National Buys Services, Equipment, Materials



Local and Regional Buys Services, Equipment, Materials

NB MARINE PORT TERMINAL

GENERAL CONTRACTOR

Cashman / Weeks
S-MA / US-NJ

Services

Service Providers (Contractors or Subcontractor)

Excavating Contractors
Foundation Contractors
Foundation Testing
Engineering and Project Planning
Electrical Contractors
Plumbing Contractors (Drainage)
HVAC Contractors
Building Construction Contractors
Drilling Contractors
Pile Driving Contractors
Civil Contractors
Inspection Contractors (concrete)
Environmental Contractors
Hotels & Restaurants
Rebar installer

Equipment

Equipment Providers

Impact Hammers
Diggers, Trenchers,
Earth Movers (offroad)
Heavy Haul Trucks
Vibratory Driver/Extractor
Cranes
Portable Sanitary Units
Portable Generators
Welding Equipment
General Rental
Barges
Tugs
Mechanical Building (prefab concrete,

Material

Material Providers

Aggregate
Concrete
Steel rebar
Building construction material
Insulation
Electrical Wiring
Lighting
Welding supplies
Fasteners
Steel Pipe and fittings
Steel conduit
Plastic Pipe and fittings
Cable
Fence
Paint
Pumps
Motors
Compressors
Building cranes
Weld wire
Electrical Controls
Food & Water
Fuel
Structural Steel
Fenders, Bollards

Foundations - account for approximately 20% of the total cost of bringing offshore wind farms to fruition *



Foundation Types

- Gravity
- Monopile
- Tri-Piles & Tripods
- Jacketed
- Floating
- Universal

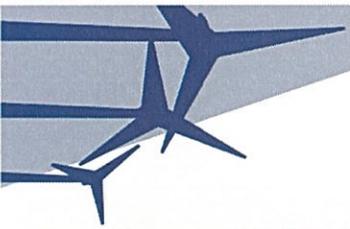
Worker!

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* Less transportation costs



Gravity foundation shallow waters

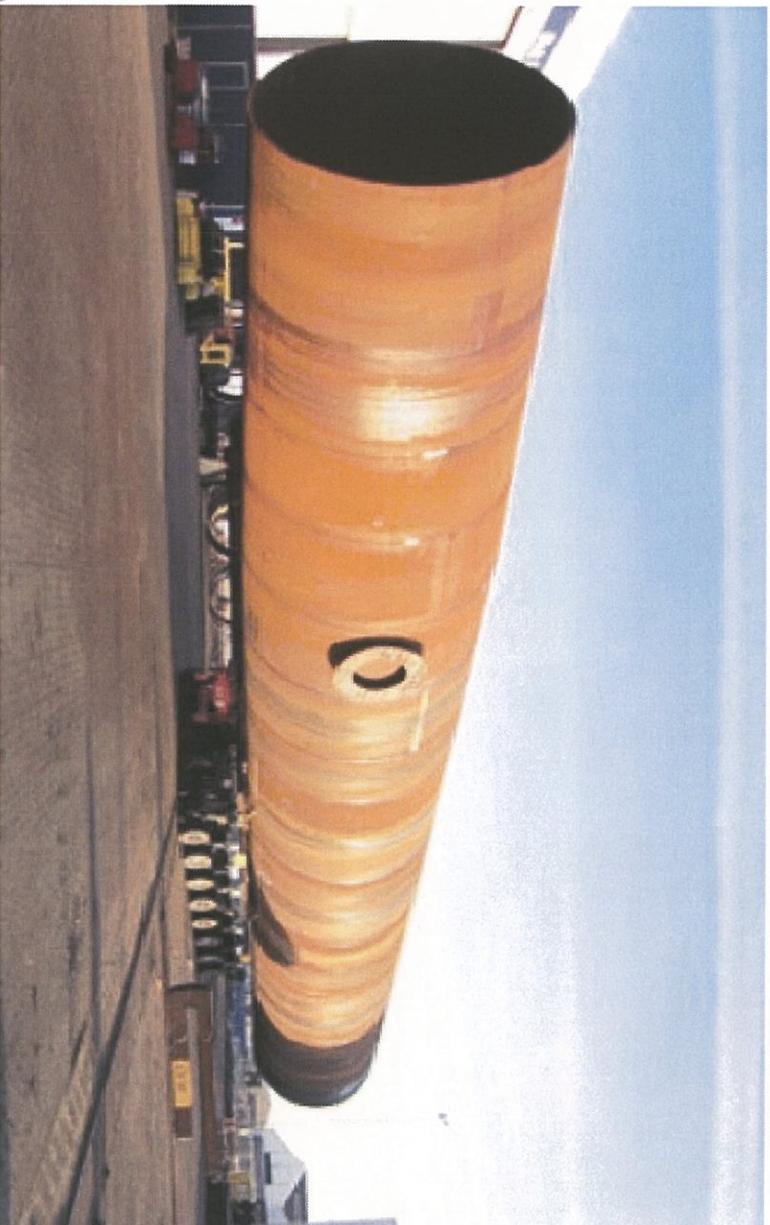


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Monopile



Fabricator

**300 – 700 Tons
of Steel Plate**

Processing

Cut

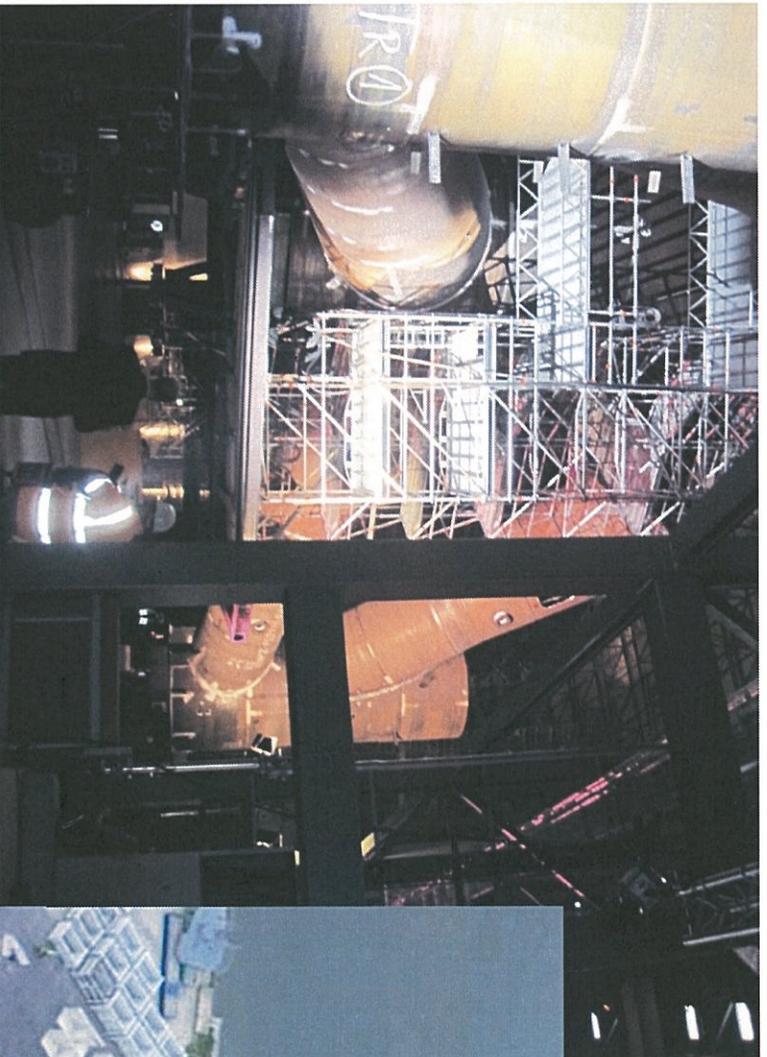
Rolled

Welding

Grist Blast

Coating

Tripods

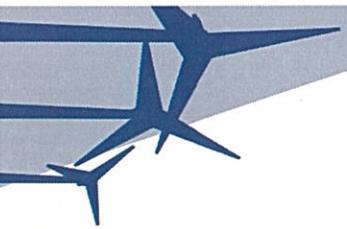


Fabricator

- Rolled, Welded Cylinders
- Fabricated Steel Plate
- Submerged arc-welded

Specialty Coater

- Anti-corrosion coatings



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Mini-van



Tri-Piles



Monopiles for
Tri-piles

450 ton
Tri-pile Base



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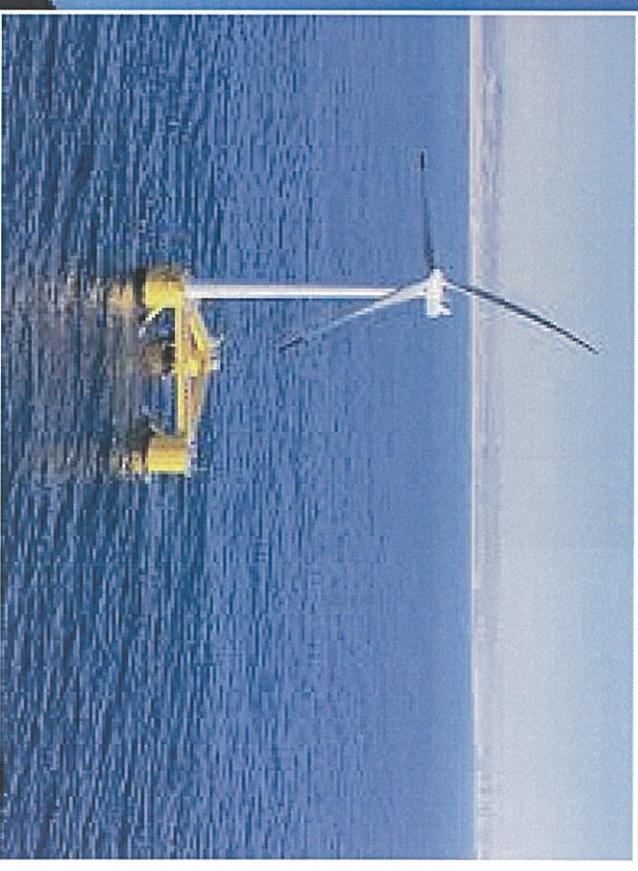




Jacketed Foundations for turbines and substations



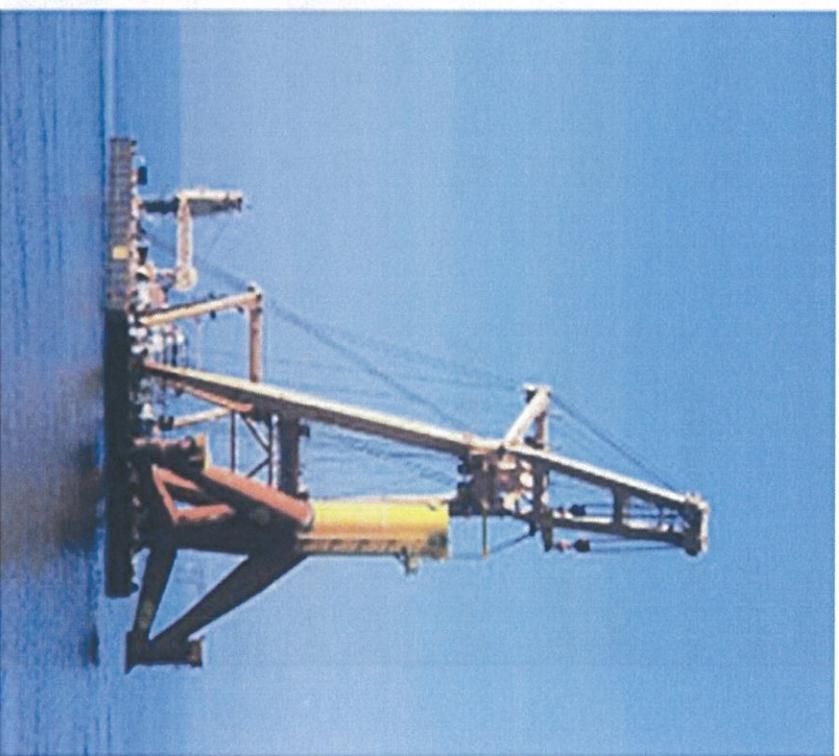
Floating Platforms for deep water applications – Pacific Coast



Gravity Foundation Installed



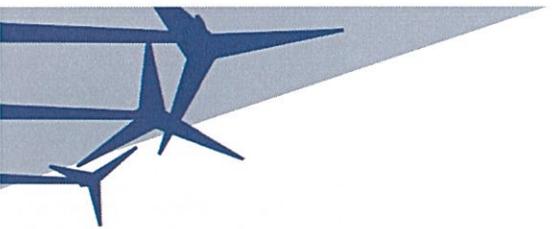
Installation-- Tripods



Long Term Opportunities - Attraction

Manufacturing Land Use Requirements

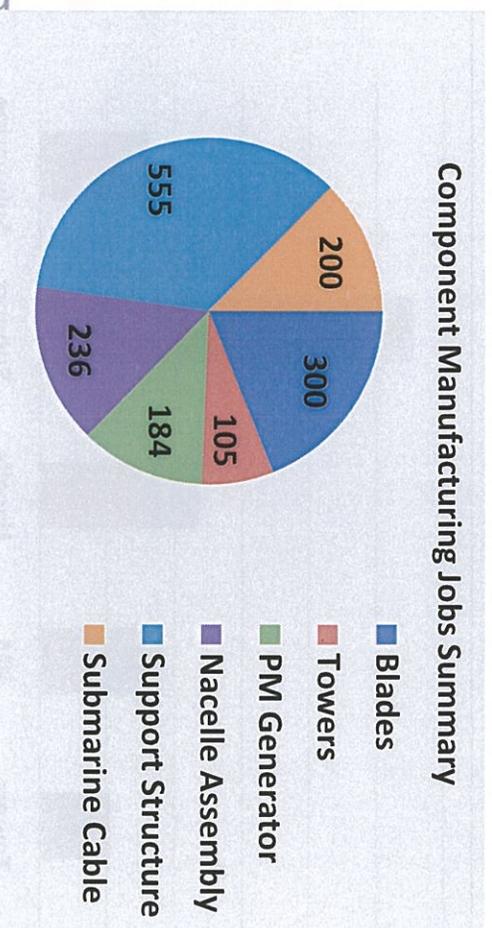
Activity	Land parcel size	Road and rail access
Blade manufacturing	37 to 62 acres	Needs rail or road Over-sized trucks
Generator manufacturing	15 to 19 acres	Flexible
Nacelle assembly	15 to 25 acres	Flexible
Tower manufacturing	30 to 50 acres	Flexible
Foundation manufacturing and staging	30 to 50 acres	Flexible
Submarine cable manufacturing and load-out	20 to 22 acres	Flexible
Construction staging	40 to 50 acres	Flexible



Long Term Opportunities - Jobs

estimates based on installing 100 turbines in one construction season

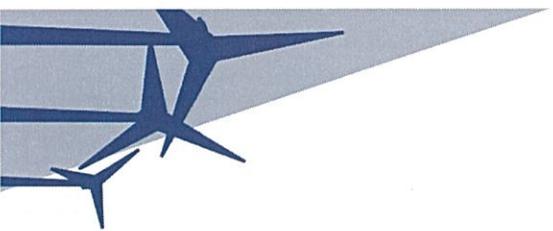
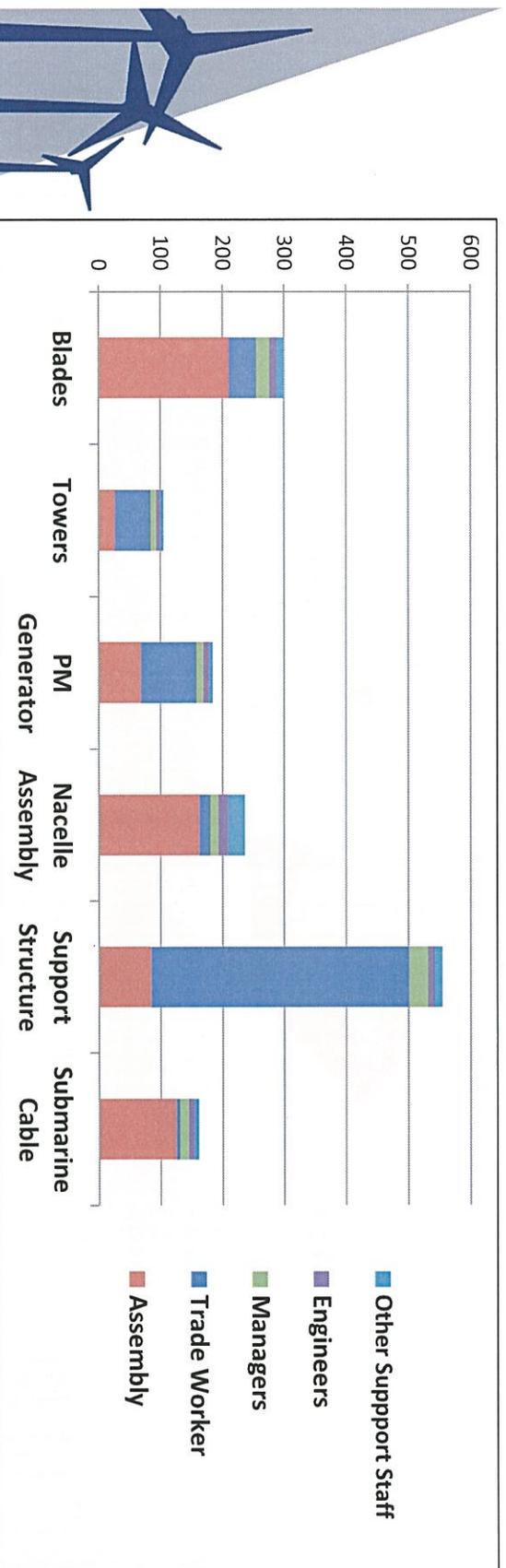
Component Manufacturing Jobs Summary			
	Mfg Jobs	Support	Total
Blades	255	45	300
Towers	84	21	105
PM Generator	158	26	184
Nacelle Assembly	180	56	236
Support Structure	501	54	555
Submarine Cable	165	35	200
	1343	237	1580



Long Term Opportunities - Jobs

estimates based on installing 100 turbines in one construction season

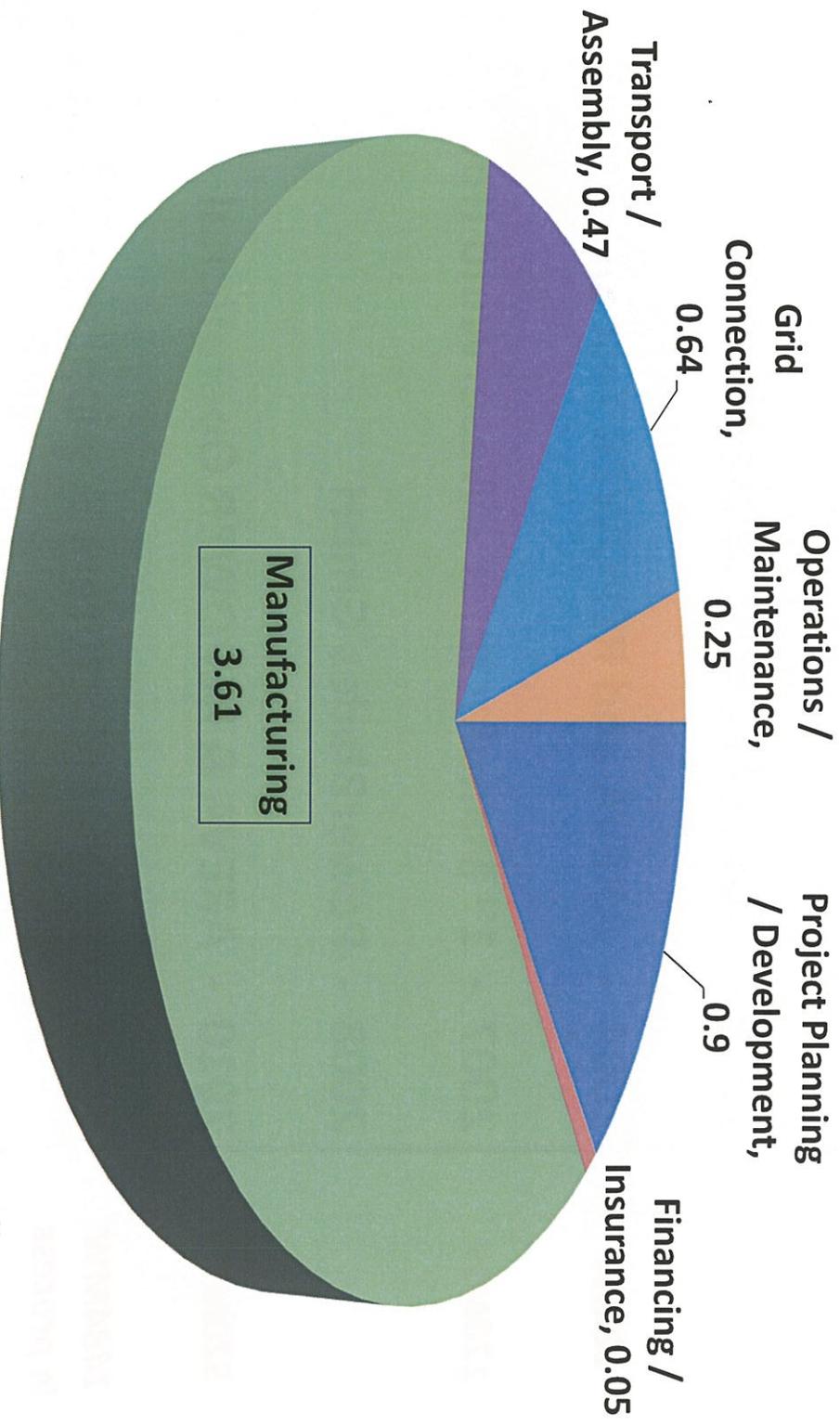
Summary of Jobs Classifications						
	Trade Worker	Assembly	Managers	Engineers	Other Support Staff	
Blades	45	210	21	11	13	
Towers	58	26	9	6.5	5.5	
PM Generator	90	68	11	9	6	
Nacelle Assembly	18	162	13	15	28	
Support Structure	417	84	30	10	14	
Submarine Cable	5	125	15	9	7	
	633	675	99	60.5	73.5	



Managing our Expectations

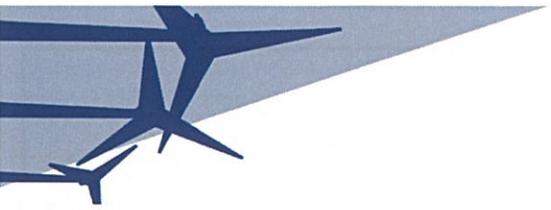
Offshore Wind Supply Chain development in Germany

Total Value Add - 5.9B euros as of 2011



Source: wab, windenergie agentur

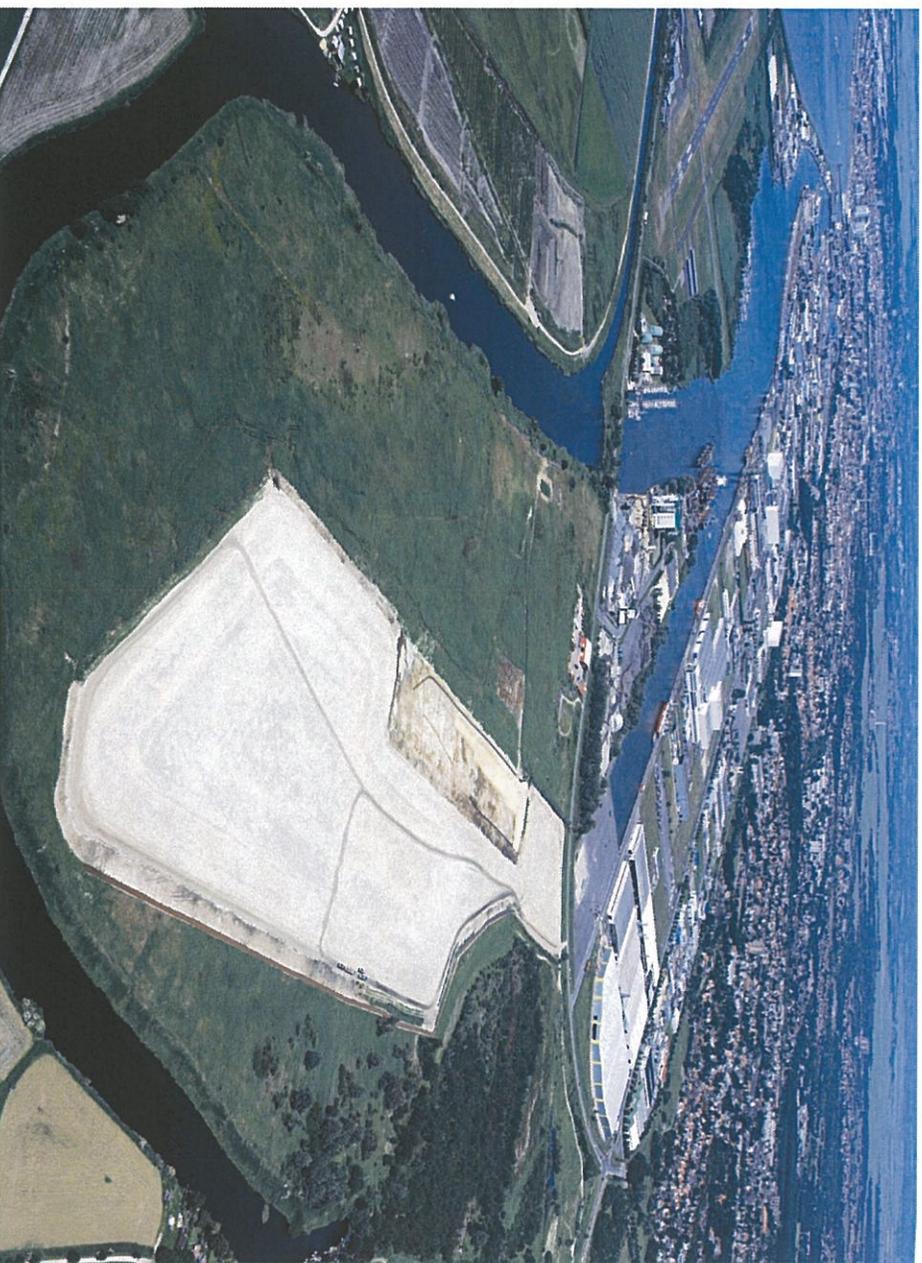
In Billion Euro's



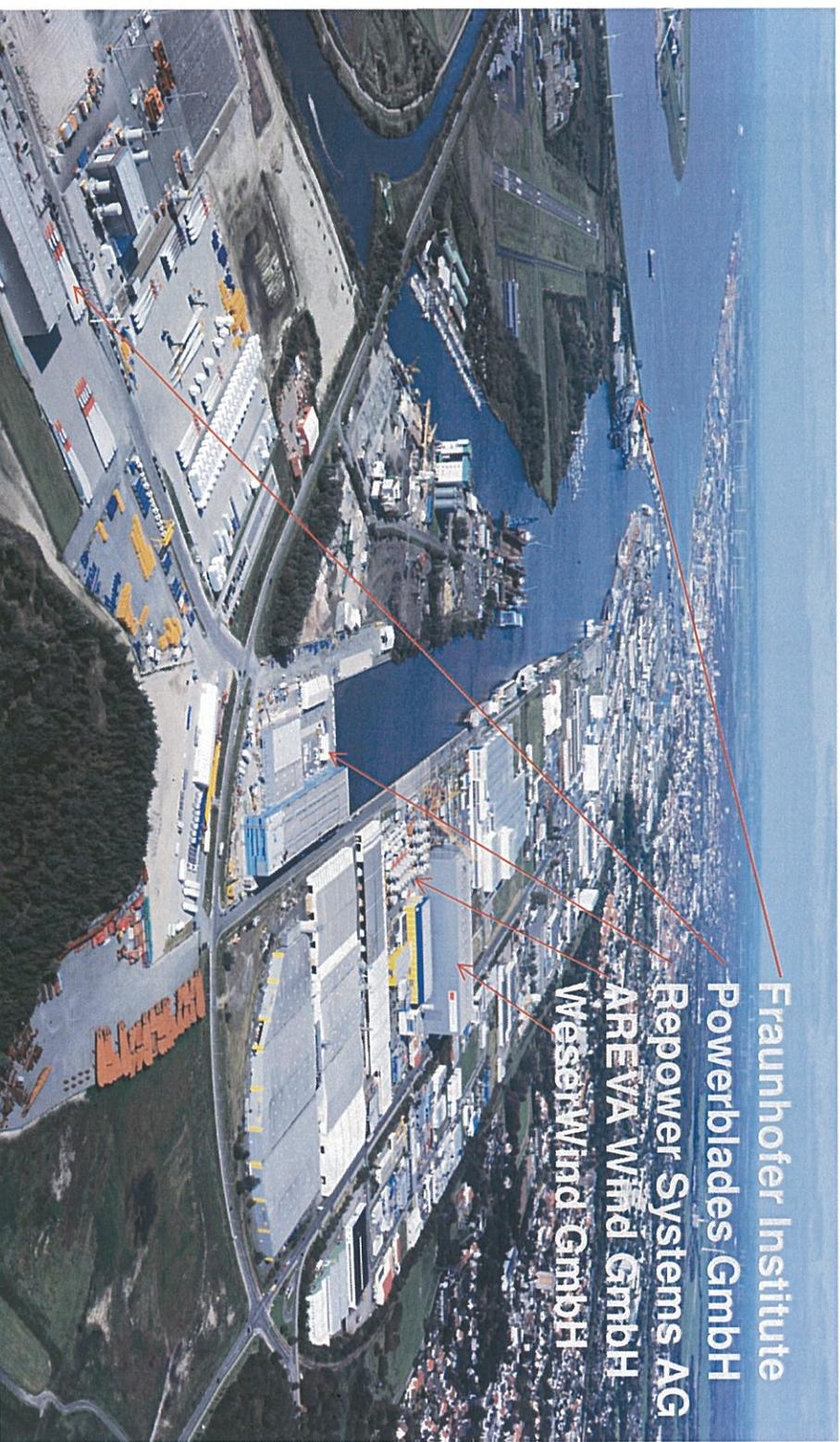
Bremerhaven Timeline

<u>Installed MW</u>	
	1995 - 1 st Legislation supporting Wind Industry
	1998 - Start of Port Construction
12MW	2004 - AREVA and REPOWER Test Site
120MW	2007 - 1 st Manufacturer - MeserWind (foundations)
	2008 - PowerBlades GmbH
520MW	2010 - AREVA & REPOWER Operational
1484MW <i>In process</i>	2012 - 25 Manufacturers & suppliers in Wind
2000MW	Total MW installed in German Offshore Wind Farms

Bremerhaven Offshore Wind Story

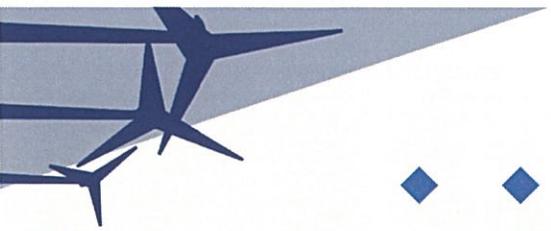


Offshore-wind industry in the south of Bremerhaven in 2012



Bremerhaven OW Terminal

- ◆ A Primary Port - for Alpha Ventus Wind Farm
- ◆ WT Assembly - AREVA & Repower [100 units per year]
- ◆ Foundations - WeserWind GmbH
- ◆ Blades - Power Blades GmbH
- ◆ Logistics and Installation - BLG Logistics
- ◆ Offshore Training Center - Falck Nutec
- ◆ Future Expansion - 200 hectares (500 ac.) for other manufacturers and suppliers



Germany Offshore Wind Farms

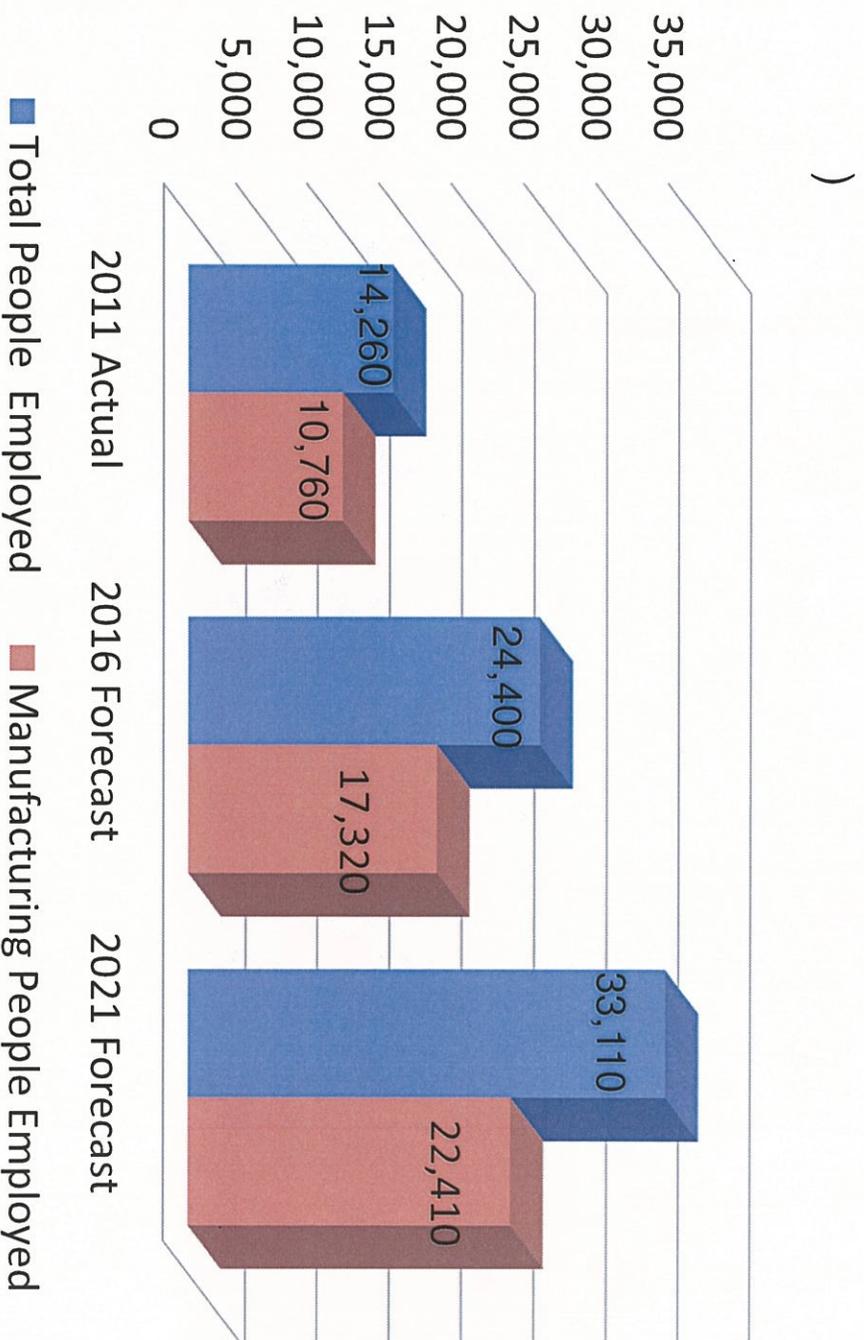
Farm	MW	No. Turbines	Start Constr Date	Run date
Ems Emden	4.5	1	2000	2004
Breitling	2.5	1	2002	2006
Hooksiel	5	1	2004	2008
Alpha Ventus	60	21	2006	2010
Baltic 1	48.3	21	2007	2011
BARD Offshore 1	400	80	2010	2012
Meerwind Sud	288	80	2012	2014 plan
Nordsee Ost	288	48	2011	2013
Global Tech I	400	80	2012	2014 plan
Trianel Windpark	400	80	2012	2014 plan
Borkum Riffgat	108	30	2012	2015 plan

First 10 Years
520 MW

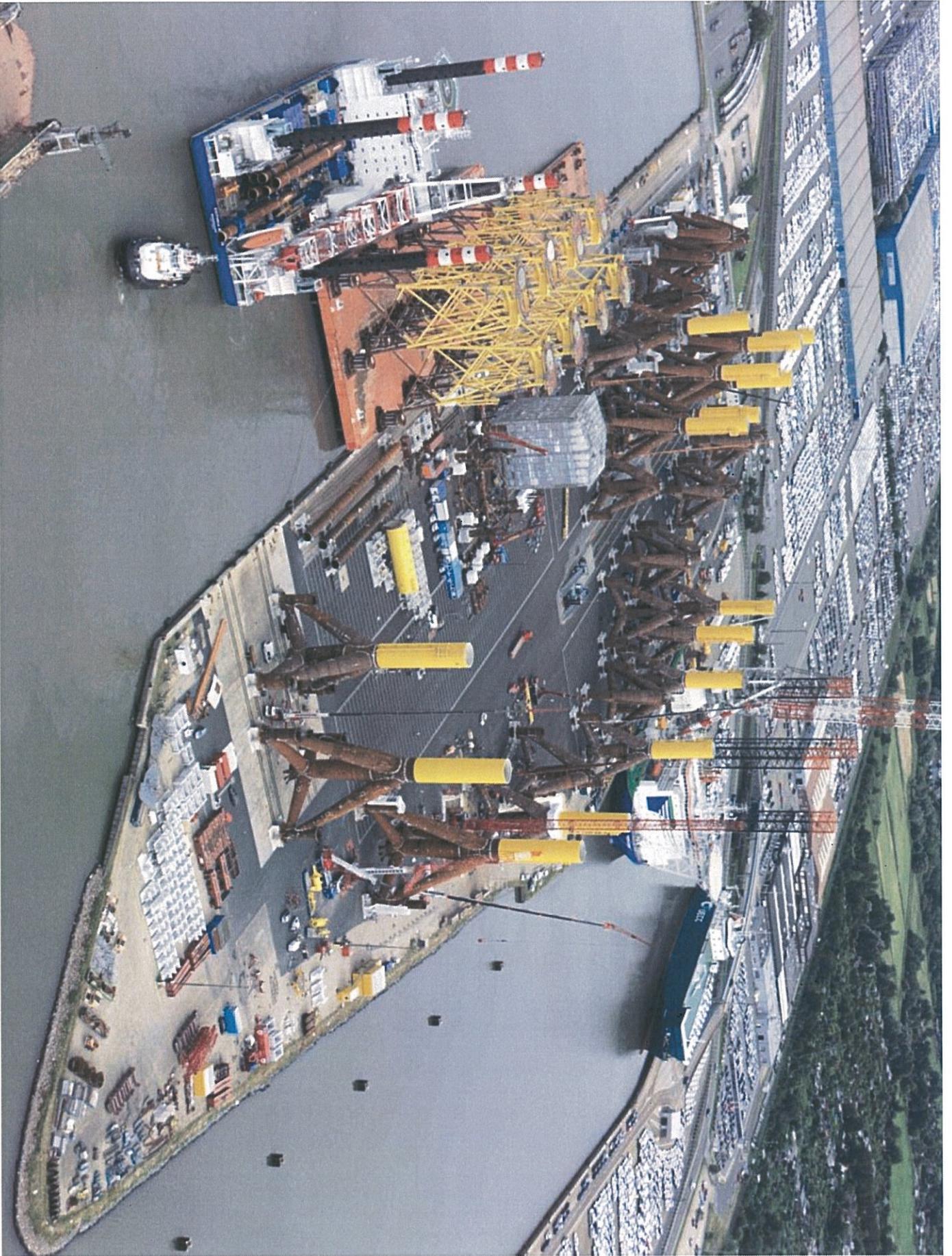
In just 1 year
1484 MW



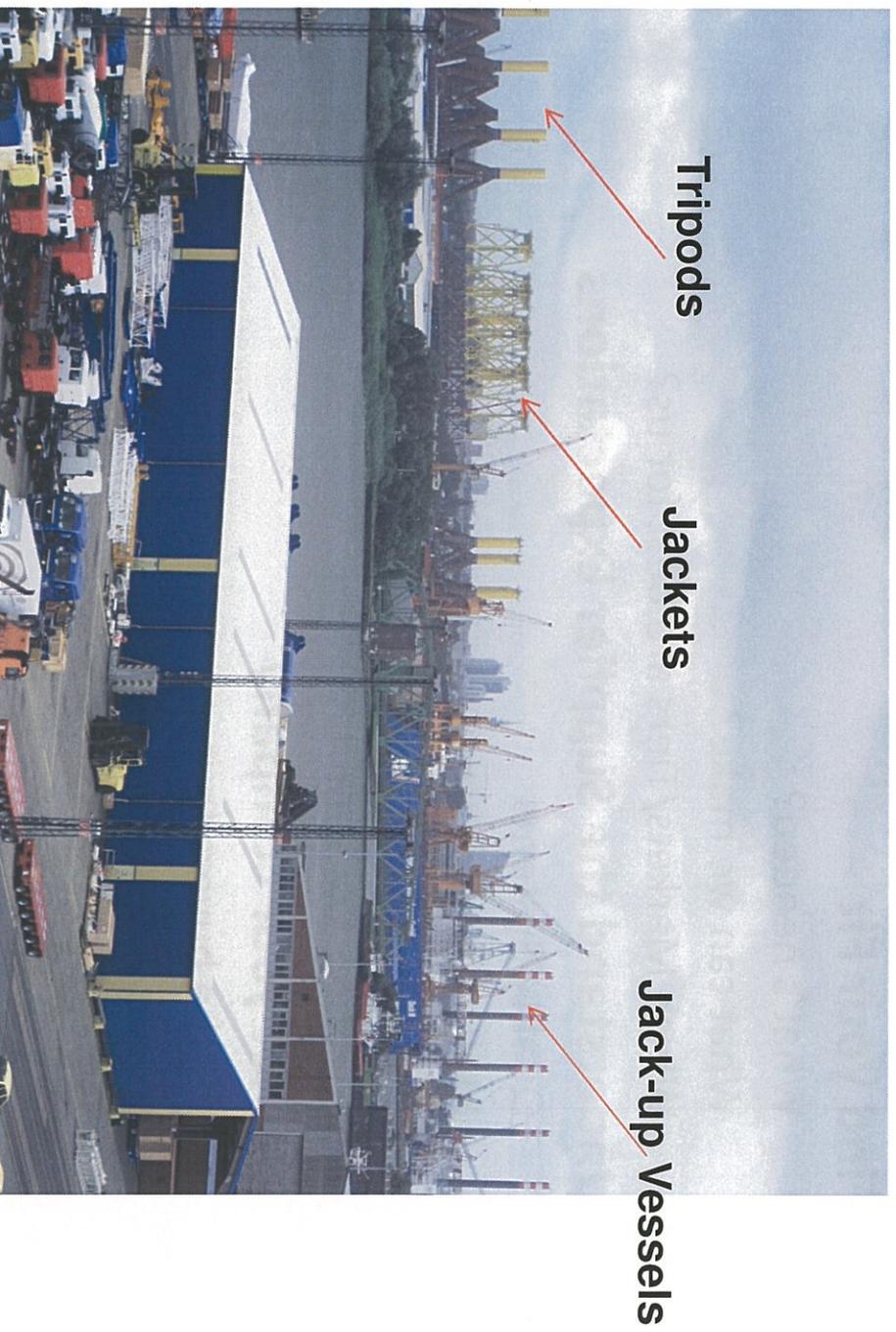
German Offshore Wind Employment



Source: wab, windenergie agentur



2012 Manufacturing is Buzzing in Bremerhaven, Germany- **This can be in the USA – Lake Erie!**



What should Erie County business be doing?

Find your Fit

- What's needed?
- What can we make?
- Which Markets/Tiers are best for us?

Understand the Supplier Expectations

- Quality Systems
- Multiple Processes
- Flexible & Responsive
- Location-Location-Location

Market your company

- ID the buyers (events, networking, websites)
- Develop Partners
- DIG DIG DIG**



What should Erie County Leaders be doing?

- ◆ Support your state RPS
- ◆ Be a voice to support the Federal PTC
- ◆ Pay attention to offshore wind development along the Atlantic Coast
- ◆ Support the LEEDCo Icebreaker project
- ◆ Call GLWN with wind questions – supply chain land-based and offshore



THANK YOU!



Photo: North Sea Germany June 2013 BARD 1

Patrick Fullenkamp
pfullenkamp@glwn.org



Testimony Submitted by Stephen J. Porter
PA House Democratic Policy Committee
Public Hearing On Renewable Energy
Erie, PA
March 8, 2017

Thank you for the opportunity to submit testimony on the vital role of renewable energy to both the economy and environment of Northwest Pennsylvania. My name is Stephen Porter, a resident of Fairview and an environmental attorney.

I will touch on three topics. The transformative potential of off-shore wind energy. The power of community solar projects to empower and revitalize neighborhoods and communities. And the need to “close the border” to out of state renewable energy credits to incentivize renewable energy investment in Pennsylvania. Taken together, proactive policies in these three areas will allow our region to participate in the energy revolution that is underway. Change is happening fast and we can either engage and reap the rewards or stand by and watch other regions of the country capture the benefits of renewable energy development.

Off-shore Wind Power. We have a powerful wind resource blowing over the PA waters of Lake Erie. Just a hundred miles to the west off the shores of Cleveland, the Ice Breaker project is moving forward. This pilot project will be putting the first freshwater offshore wind turbines in the United States into operation. Already, local businesses are starting to benefit from this tentative first step. But where is Pennsylvania? An offshore wind bill passed the House back in 2010(?), but it died in the Senate. And no action has been taken since – by the Legislature or the Governor. This absence of leadership is troubling – given the potential economic benefits to our region.

Community Solar. Around the country, local communities are building collective solar arrays and sharing in the cheap, clean energy they produce and the local jobs they help sustain. In addition, community solar projects galvanize local residents to invest locally and help lead the urban revitalization we all want for our cities and towns. The lack of virtual net metering under current PA law and regulations prevents citizens and businesses from banding together to develop collective solar projects – thus stunting this opportunity for creative local solutions.

Other states (see Colorado, Minnesota, New York) have adopted virtual net metering and comprehensive policies to support and encourage this kind of grass-roots investment in local communities. A recent article in the Christian Science Monitor does a good job of laying out the local benefits of community solar – particularly when those projects are targeted to support low and middle income households. (see www.csmonitor.com/Environment/Inhabit/2017/0209/Panels-to-the-people-Community-solar-aims-to-democratize-the-sun?cmpid=gigya-tw)

[MORE ON BACK]

Close the SREC loophole. PA homeowners who install solar arrays generate renewable energy credits (RECs) for the power they produce. In other states, these RECs have values between \$200 and \$400 each whereas the PA homeowner gets a miserly \$10 each! This is because PA law allows out of state RECs to be used to satisfy PA's renewable energy generation targets for utility companies rather than requiring PA utilities to purchase PA RECs. Simply closing the border to out of state RECs will ensure the benefits of PA's energy portfolio standards stay in Pennsylvania. Why should Pennsylvanians' energy dollars end up supporting renewable energy investments in other states instead of ours?

Thank you again for the opportunity to submit testimony. I have touched on three key aspects of how state policy can support renewable energy investments in the Erie region that deserve your attention and action. That said, there is a broad array of policy options beyond the three I have highlighted for you to consider to support renewable energy development in our area. The most important point I want to leave you with is this: do something! Don't study it to death while other states and regions establish leadership. Take action to help bring the jobs and other benefits of renewable energy to our region.

House Democratic Policy Committee
Hearing on Renewable Energy
March 8, 2017

To all concerned:

I am strongly opposed to wind turbines in Lake Erie in general and LEEDCO's proposed Icebreaker project in particular.

Wind turbines in Lake Erie would be extremely destructive and would serve no purpose except to make subsidy sucking energy companies such as LEEDCO richer. Wind energy cannot be stored or regulated and adds nothing to the electrical power grid that must run at one hundred percent capacity at all times. It has a capacity factor of 0.

Studies have shown that turbines don't reduce fossil fuel emissions at all. On the contrary, turbines have to be backed up 100% of the time by traditional mostly fossil-fueled power plants because the wind must blow at the perfect speed for them to kick in - about 25% of the time. Would you buy a car that only works 25% of the time and you never knew when it would work or not?

LEEDCO has now become a subsidiary of Fred Olsen Renewables headquartered in Norway. They are licking their chops at the possibility of installing 3,000 turbines in Lake Erie starting with the Icebreaker project outside of Cleveland. They do not know or care about what Lake Erie means to the eleven million people who get their drinking water from the lake. The installation of these monstrous but ineffective energy sources on the lake floor would stir up now dormant layers of toxic substances from shipping lanes and past coastal industries. The vibration would ensure constant agitation of toxic settlements safely buried deep in a lake that was once called "dead" but is now thriving because of vigorous regulatory efforts.

Turbines in Lake Erie would create a whole new environmental disaster in the lake as turbine blades wear out in less than twenty years, especially in shallow Lake Erie where they will be pummeled by high winds, waves, pounding rain, and thick ice in the winter. Exploding and burning IWTs are becoming more commonplace as the numbers of IWTs increase, and when this occurs, there is no way to reach and extinguish them on an iced-over lake. As turbine blades burn, they create toxic emissions and blade throw can be lethal and catastrophic. Large, sharp blade segments have been known to be thrown up to a mile, some still burning.

If the hope is to eventually construct three thousand IWTs in Lake Erie, that is nine thousand fiber carbon blades, up to 250 feet in length each, all at risk for toxic exploding, burning, and blade throw, trashing the lake! And in the best of circumstances, they ultimately age out. In Denmark with six thousand aging IWTs, and thus eighteen thousand aging blades, their leading business journal states, "A gigantic mountain of scrap blades is building up.... there exists no solution", as they can not be practically

recycled and are too toxic to incinerate. Even onshore, damaged and rusting IWTs are increasing in number, now at least 4,500 in California alone, in spite of promises and plans for decommissioning! Is Lake Erie destined to become a toxic, filthy, burned out and rusting industrial junk yard? LEEDCO will promise that will not happen, but it does happen all too often, and it likely will!

We all heard last week that federal funding will be drastically reduced for the Great Lakes Restoration Initiative (GLRI) from \$300 million to \$10 million. I oppose this drastic cut. I suggest that the \$40 million now being awarded to the LEEDCO Icebreaker project (6 offshore turbines in Lake Erie near Cleveland) should instead be reallocated to the GLRI as it is obvious that the offshore turbine project is in direct conflict with the GLRI goals of eliminating pollutants and toxic substances from the lake, and protecting the habitats of the many birds and fish that inhabit the lake and shoreline.

Pennsylvania is one of only three U.S. States that places citizens' environmental rights on a par with their political rights. Our environmental rights are secured in [Section 27 of Article 1](#), the state Constitution's declaration of rights, which reads:

"The people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic, and esthetic values of the environment. Pennsylvania's public natural resources are the common property of all of the people, including generations to come. As trustee of these resources, the Commonwealth shall conserve and maintain them for the benefit of all the people." Adherence to this constitutional right has held up in court against those who would exploit our land and water for personal financial gain.

That means that the 72-mile Pennsylvania shoreline is off limits to LEEDCO carpetbaggers. We Pennsylvanians have a constitutional right that our drinking water not be contaminated, that our millions of shorebirds and bats not be chopped to pieces by turbine blades, that our fish and waterbirds not be harmed by the noise, vibration, and pollution that would be caused by the underwater trenching necessary to set thousands of high-power electrical lines crisscrossing the lake floor. And that one of the most beautiful sunsets in the world be preserved for future generations.

Pat Hersch
535 Hilltop Road
Erie, Pa 16509



233 Baer Drive 11
Erie, PA 16505

March 6, 2017

PA Representative Curt Sonney
PA House of Representatives
4th Legislative District
434 North Center Street
Corry, PA 16407

Dear Representative Sonney:

Thank you for your letter of February 27, 2017 regarding the status of your House Bill 589 of the 2017-18 session. As you know, I am strong supporter of further development of both offshore and onshore wind energy as an important part of our State's future in Clean Energy. I applaud your efforts to guide and allow the lease of submerged lands in Lake Erie for future energy generation facilities, with concerns for environmental issues such as migratory bird pathways and near shore recreation areas. I attempted to review your legislation at the General Assembly's website at [Http://www.legis.state.pa.us/](http://www.legis.state.pa.us/), but was unable to find any reference to House Bill 589. It may not yet be posted, but I will continue to search for and follow it's progress.

The view above is of the band of nearly 500 wind turbines that were installed on ridges about 6 years ago just east of my former home in East Aurora, NY, actually stretching from Attica to near Olean in the southern tier. There had been some local concerns before they were installed, but now they are welcome in the local communities because of the related township and school tax benefits. There have been no environmental or air traffic concerns, even though they within 20 miles of the Buffalo International Airport. I bring this up as the same as in the case of offshore wind development in Europe, as we have seen the same acceptance of wind turbines there after they were installed.

I recently received word that State Rep. Patrick Harkins, D-Erie, will host a House Democratic Policy Committee public hearing on renewable energy at 9 a.m. Wednesday, March 8, which I plan to attend, and will submit this letter as part of related testimony for consideration by the Committee.

One final related note is that I feel that our Harrisburg State Government economic development efforts missed a golden opportunity by not working hard enough to encourage the General Electric diesel electric locomotive manufacturing plant here in Erie to convert to the production of their large wind generators, as much of the technology, facilities, and skilled work force were in place here. It may not be too late, as the facilities still exist in place. Not only for the production of the large electric generators, but also for the production of the electric motors that powered the locomotive wheels, as the same are needed on a smaller scale for the rapidly increasing need for electric vehicle motors. Our local Erie plastics manufacturing facilities could be retooled to produce the large wind turbine blades and towers needed, and our local engineering university programs would provide the specialized training for the rapidly developing Clean Energy workforce needed.

Western New York State invested heavily in new Solar City manufacturing facilities, producing thousands on new jobs, and we here in Western PA can and need to make a similar investment ASAP.

Respectfully submitted,

A handwritten signature in black ink that reads "James S. Miller". The signature is fluid and cursive, with a long horizontal stroke at the end.

James S. Miller, MSEE (Retired)
Member of the Local Sierra Club LKE Group ExCom
Member of the Our Water Our Air Our Rights Local Environmental Group

716-713-8621

cc: State Rep. Patrick Harkins Committee Members