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November 8, 2017 -- Ohio Power Siting Board Hearing on Icebreaker Wind

**Testimony of John Colm, President & Executive Director of WIRE-Net and Global Wind Network**

I'm John Colm, President & Executive Director of WIRE-Net, which is a non-profit, manufacturing-based economic development organization with over 300 member companies that employ more than 20,000 Ohioans. WIRE-Net organized GLWN, the Global Wind Network, in 2007.

GLWN is an international supply chain advisory group with a mission to increase the US domestic content of onshore and offshore wind energy installations. GLWN connects wind industry OEMs and component suppliers to help expand business and keep pace with market demand; helps regions and manufacturers identify and evaluate technical and business pathways in the wind sector; joins with public and private groups to support new investment in component manufacturing; and supports Federal, state and industry efforts that are key to expanding the wind industry. Over the past four years, GLWN has made more than a dozen investigative trips to Europe and Asia to study the offshore wind industry. As a result, GLWN regularly facilitates major technical discussions around the country on the manufacturing challenges and opportunities in offshore wind component production. GLWN's manufacturing engineering and wind supply chain expertise has been significantly leveraged with key projects specific to offshore wind component production for the U.S. Department of Energy, the National Renewable Energy Labs, Lawrence-Berkeley Labs, the Massachusetts Clean Energy Center, and the New Bedford (MA) Economic Development Council. GLWN's most recent projects include an offshore-wind port-readiness evaluation for the Commonwealth of Virginia, and Supply Chain support to Fred. Olsen Renewables USA and LEEDCo for the Icebreaker Wind project.

GLWN has been assisting LEEDCo and Universal Foundation over the last year to vet and evaluate regional fabricators with the capabilities to produce the suction bucket foundation designed specifically for the freshwater installation. GLWN is currently under contract to the Icebreaker Wind project as supply chain partner to identify local suppliers for services, equipment, and material for the six turbine DOE demonstration project, the first freshwater offshore wind installation in North America. GLWN is developing the Icebreaker Wind Regional Supplier Resource Directory which will accompany each bid spec that is released. Additionally, GLWN is providing supplier assistance in connecting to the project opportunities, and providing assistance to suppliers in evaluating their capabilities when considering bidding opportunities. This past December 8<sup>th</sup>, GLWN organized the Icebreaker Wind Regional Supply Chain Open House. Almost 300 attendees packed this 4-hour open house to learn about the Icebreaker project, the regional supply chain opportunities, and the procurement process.

Icebreaker is about clean and renewable power, a healthier Lake Erie, more affordable power, and the birth of a new industry here in Ohio. This industry is taking root here now: I have case studies of three Ohio firms that manufacture components or provide services to the wind industry. AT&F, which is a fabricator of heavy steel components for various markets, including the energy sector; Great Lakes Towing, which could provide marine services to support the offshore wind sector, and AeroTorque, which makes highly engineered products that protect wind turbine transmissions. Combined these 3 firms directly employ 321 Ohioans which support a total of over 1200 jobs in our region due to the manufacturing employment multiplier.

On behalf of my board of directors, and our over 300 manufacturing members, we support the LEEDCo project.

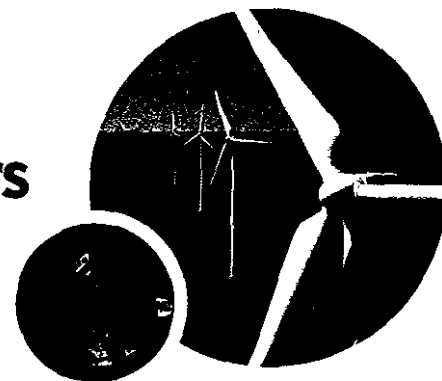
On a personal note, I'd like to point out that I can walk 10 minutes from my home in Lakewood to a Lake Erie overlook. To the east, I can see the Eastlake power plant, and to the west, Avon Point: one burning natural gas, the other coal. I would really like to see sunlight glinting off the blades of 6 no-emissions wind turbines, out beyond the 3-mile crib, through my binoculars, as they will be barely visible with just the naked eye. Thank you.

this is to certify that the images appearing are an accurate and complete reproduction of a case file document delivered in the regular course of business.

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# Offshore Wind Market Offers New Opportunities for U.S. Manufacturers

*Cleveland's AT&F is first-to-market in fabricating steel foundations for Lake Erie wind project.*



**T**he potential for offshore wind power generation in the U.S. is staggering. At a projected 4,223 gigawatts of electric generating potential (with the Ohio waters of Lake Erie alone accounting for more than 50 GW of that power), offshore wind offers a viable, untapped opportunity for large-scale clean energy projects that produce zero emissions in operation, consume no water, and displace generation from some of our nation's dirtiest power plants.

But the U.S. lags woefully behind the rest of the world in offshore wind power generation. With at least 80 offshore projects in operation or under construction (powered by more than 1,900 wind turbines), Europe leads the world in design and deployment of offshore wind farms, having the backing and support of key developers and governments over the past 30 years to master the many intricacies and challenges related to offshore wind.

Back home in the U.S., offshore wind development is in its infant stages, as federal, state and local governments, along with wind farm developers, have just taken the first steps in a quest to harvest electricity from the consistent and unobstructed wind that bellows off the coast.

## LEEDCo Wades Into Lake Erie with "Icebreaker"

As a front-runner in the race to develop one of the first offshore wind projects in the United

States, the non-profit Lake Erie Energy Development Corporation (LEEDCo) is currently developing a demonstration project called "Icebreaker" that will solve the unique challenges of deploying wind turbines in a freshwater environment. With a design consisting of six wind turbines positioned seven miles off the coast of Cleveland, Icebreaker will become a catalyst to building an offshore wind industry in Ohio and the Great Lakes region.



*Offshore wind farm foundation.  
(Photo: London Array Ltd.)*

And with new industries and new markets come old challenges, according to Eric Ritter, LEEDCo communications and strategy manager, who noted that the natural approach to manufacturing components for such a project would traditionally come from overseas, where the offshore wind industry is already well established. But this is where the tide turns.

"Our options were to either look to Europe and hire suppliers that

had the specific manufacturing capabilities, or go the local route and identify those manufacturers with similar capabilities, then hone those capabilities to meet our offshore standards and requirements," said Ritter.

## Identifying Qualified, Local Suppliers for Offshore Wind

Building a U.S. supply chain is precisely the direction that LEEDCo has taken for Icebreaker. In 2012, the organization assembled a team of international firms with expertise in offshore wind and partnered them with local companies interested in expanding into this emerging market. Together, they developed conceptual engineering designs for the structural foundations that would support Icebreaker's six wind turbines.

With those designs in hand, LEEDCo organized a special workshop in Cleveland and invited a dozen regional steel fabrication and construction firms that were pre-qualified by WIRE-Net's Global Wind Network (GLWN) to review the designs and offer feedback.

"Our goal was to identify a foundation type that could withstand Lake Erie's harshest winters and could also be fabricated by American companies," said Ritter. "Based in part on the feedback from the local supply chain, we ultimately

chose the monopile-type foundation. Now we're working to complete the detailed design and optimize it for the existing capabilities of our domestic steel fabricators. The United States, and our region in particular, has some of the best steel fabrication companies in the world. Our design will enable them to compete against their European counterparts that already have decades of experience in this industry."

As LEEDCo launches its effort to complete the detailed design of the foundation, the non-profit developer recently announced that it has partnered with Cleveland-based AT&F (formerly American Tank & Fabricating) to represent the interests of U.S. fabricators. The company will advise LEEDCo's engineering team to ensure that the final design matches U.S. standards and specifications. As one of the country's top metal fabricators, AT&F has serviced the heavy industrial, energy and defense industries since 1940.

"We can roll the steel for this project and it's right in our backyard," said AT&F president and CEO Michael Forde Ripich. "LEEDCo was instrumental in bringing the design development for the offshore foundations to the table and presenting an integrated solution that garners the strength of suppliers from Northeast Ohio and neighboring states and utilizes their existing strengths and capabilities."

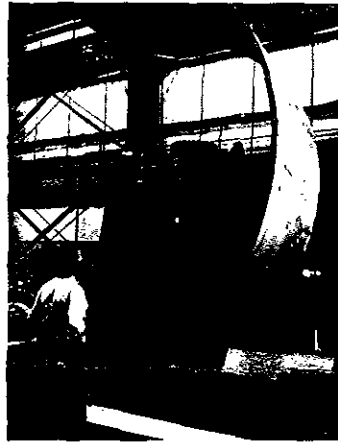
## New Energy Outpaces Traditional Energy Growth for AT&F

The Icebreaker project represents a major addition to AT&F's capabilities in the renewable energy industry, according to Ripich. "Conventional energy industries (oil, gas, shale, nuclear) traditionally have been our key growth areas," he commented. "But there are emerging industries -- like renewable energy -- that are outpacing our traditional business. And we're in at the beginning stages, which is very exciting to us."

But there are barriers to growth in this burgeoning industry. "The capital investment required to produce components in this industry would require a level of volume to justify a return on the asset," Ripich said. "So you can't create a supply base without a commitment to do a lot of work."

Ripich continued: "AT&F and other steel fabricators with similar capabilities can become strong players in the offshore wind market particularly if we have underutilized heavy capacity equipment. In recent years we built special capacity to service the nuclear industry, but that industry is faltering in the U.S. So now we have large assets -- production space, large steel rolling machines, heavy welding and assembly capacity -- which are transferable to the renewable

industry. Additional investment will take time but can grow with the industry if the industry aligns itself with supporting a domestic supply chain."



Rolling steel at AT&F.

Ripich credits LEEDCo with identifying those local manufacturers that can become assets to this new industry. "LEEDCo recognized the underutilized existing capacity in the region and made the compelling case for a pilot project that could be a good start for us in offshore wind," he said.

AT&F estimates that the pilot project will require 20-50 new hires to support the work in Lake Erie.

Further, the collaboration between LEEDCo, AT&F and other Icebreaker suppliers has had added benefits, according to Ripich, who said his company's introduction into Great Lakes Shipyard (another project partner) through LEEDCo has resulted in

collaboration on other projects outside of Icebreaker.

## The Need for Energy in Ohio Presents Market Opportunities

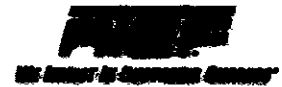
The need to build a local and regional supply chain for the offshore wind industry is vital now more than ever, according to LEEDCo's Ritter. "There are roughly seven gigawatts of coal-burning power plants set to retire in the next year," he commented. "Our aging coal fleet faces mounting pressure from low-priced natural gas and tighter pollution standards. And frankly, the energy is just not competitive anymore. The question is how do we replace that retiring capacity? Natural gas is a big piece of the puzzle, but we have to recognize the value of a balanced portfolio of energy sources. The fact is that offshore wind in Lake Erie is by far the most abundant renewable resource in our region, and Icebreaker is the key to unlocking that resource."

"Especially when you consider the regional assets that are already in Northeast Ohio," he continued. "Our ports, our grid infrastructure, our manufacturing companies, etc. The long term market outlook for offshore wind in Lake Erie looks very strong."

As for Ripich and AT&F, success will take time. "This is a new market in the U.S.," he said. "We can certainly bring in components

more efficiently than the competition. And if we have the patience to build a supply chain, the benefits will be substantial. This is really an opportunity to break the cycle and develop a localized solution."

## CONTRIBUTORS:



## LEEDCo's Unique Approach for Developing a Domestic Offshore Wind Farm

America's clean energy policy is intended to further investment in new technologies that offer health, environmental and manufacturing benefits, while supporting the U.S. companies that pioneer those technologies. But great intentions and actual policy implementation sometimes don't coincide.

The reality is that current U.S. energy policy rarely takes into account the manufacturing component of those benefits mentioned above. The Production Tax Credit and Investment Tax Credit provide investment advantages to developers of clean energy, but ignore domestic manufacturers. Foreign competitors in the clean energy

industry benefit from a host of manufacturer-friendly policies and practices that often tilt the playing field in their favor.

Even without the help of these policies, LEEDCo is doing everything possible to lower the market barriers for U.S. fabricators. Of the projects that competed for the U.S. Department of Energy's offshore wind competition, only LEEDCo found a way to develop and utilize domestic producers across the entire project supply chain, beginning with suppliers in Northeast Ohio and expanding elsewhere in the U.S.

WIRE-Net, GLWN and other pro-manufacturing economic development organizations continue to highlight the need for stronger connections between our domestic energy and manufacturing policy. America deserves clean energy technology which utilizes American-made components.

# Promising Start-Up Industry Awaits Political Support to Ignite Economic Development & Job Creation

*The Great Lakes Towing Company Forecasts Unprecedented Economic Growth in Clean, Offshore Wind Energy in Lake Erie.*



Often lauded by pundits, politicians and many industry leaders as the "Saudi Arabia of Wind," Lake Erie has the potential to supply enough clean energy to light up tens of thousands of homes and power thousands of businesses.

Lake Erie Energy Development Co. (LEEDCo) has provided the spark necessary to ignite that power generation. Armed with \$50 million in federal support, LEEDCo will carry the distinction of being the first-to-market player in the freshwater offshore wind energy arena, with the anticipated completion of its "Icebreaker" wind farm in 2018.

## Lake Erie: The Central Hub for U.S. Offshore Power Generation

Once complete, the six-turbine demonstration project located eight miles from the Cleveland shoreline could potentially position Lake Erie as a central hub for U.S. offshore wind power generation. As quoted by U.S. Rep. Marcy Kaptur (D-OH), "The strength of the Icebreaker project, as opposed to its competitors, lies in LEEDCo's commitment to leverage offshore wind energy with local Ohio-based jobs in the steel, construction and transportation industries. This means local job possibilities beyond wind generation are on the horizon."

One of those Ohio-based suppliers with its sights set on

the vital maritime role in future offshore wind development is The Great Lakes Towing Company (GLT), a fixture on the Cleveland shoreline since 1899.

GLT owns and operates a fleet of tugboats and a full-service shipyard, and has been pursuing multiple market opportunities in offshore wind, including manufacturing of turbine foundations, construction logistics, and long-term maintenance, repair and operations services.

## A Key Role in a New Industry

One of LEEDCo's primary roles during the Icebreaker project has been development of an installation strategy that leverages the use of existing regional assets such as tugs and barges, port infrastructure, and local manufacturing. That strategy will also consider future offshore wind projects both in Lake Erie and throughout the Great Lakes, much to the benefit of companies like GLT.

"The potential for growth in wind energy is significant, and we see the demands of the industry as a natural fit with our core skills and capabilities," says Joe Starck, President of GLT. "We look at Europe, with its

4,000 offshore turbines, being serviced by a large number of shipyards with great success and impressive results. The support we can provide in Lake Erie is a natural extension of our existing business." In addition to use of its floating assets, GLT is working with AT&F, one of the country's top steel fabricators, to leverage its shipyard assets for the assembly, construction, and delivery of the wind turbine foundations.

## The Promise of Clean Energy for the Local Supply Chain

Because of its relatively small scope, the Icebreaker project represents a tremendous ground-floor opportunity for local supply chain manufacturers and service providers to enter the clean energy marketplace, according to Robert Zadkovich, Vice President of Business Development for GLT.

"A six-turbine wind farm is a nice number for local companies to gain experience, and can open

the door to our local suppliers because, at this level, large international suppliers simply aren't interested in participating," Zadkovich says. "So it's advantageous for local businesses to get into this industry on the entry-level side now to learn as much as possible and obtain critical experience,

so that they will be equipped to compete when the large-scale projects come later."

But, he adds, "The next piece in this overall puzzle is absolutely critical."

If Icebreaker proves successful, expansion of wind industry in the Great Lakes is imminent. LEEDCo's vision is to build a thriving offshore wind industry, generating thousands of megawatts for Ohio and other Great Lakes states, which presents huge potential for GLT and the hundreds of companies that, along with it, comprise the regional supply chain.

Presently, there are several factors driving offshore wind development in the Great Lakes, with the most notable being the cost to construct such projects. From the development of specialized foundations that will support the turbines, to optimized onshore methods for assembling and welding the massive components required for each foundation, every effort is being made by suppliers to reduce costs.

"Driving down the costs of construction and installation will reduce the bottom line cost of electricity generation, and make further offshore wind development in this region more attractive," says Zadkovich, adding that "Developers will naturally gravitate toward the projects with the best earnings opportunities."

From a consumer's viewpoint, offshore wind power still has a



high-cost stigma attached to it. But with more technology firms and energy users like Amazon, Google and Facebook becoming increasingly aware of the social footprint they leave as a result of the huge demand for energy to run their massive server farms and distribution facilities, the trend towards clean power falls right in line with the desire to become more socially and environmentally conscious.

Those companies – and other businesses like Honda, GM and Campbell Soup Company – are also realizing the economic benefits of diversifying their power supply, a move that is becoming more common as a strategy to mitigate against utility price gouging.

“Not only are those companies willing to pay more for clean energy, they’re actively seeking clean energy states that offer affordable real estate and low-cost work environments, and hiring new employees at those locations to fill top-dollar positions,” says Zadkovich.

## Economic Growth Delayed by Political Indecision

The region’s ability to attract such investment stalled in 2014 when Ohio suspended its Renewable Portfolio Standard (RPS), a regulation that requires the increased production of energy from renewable energy sources such as wind, solar, biomass and geothermal.

“Suspension of the RPS resulted in all of the clean energy developers leaving the state,” claims Zadkovich. “And when the developers left, the industry came to a standstill. Nothing has happened since then, and there’s just no one left.”

As legislators debate the level at which the state will support clean energy, Ohio supply chain businesses have put off decisions to further invest in the industry.

“It’s very important to have a project like Icebreaker right in our backyard,” says Starck. And it’s especially important for the heavy industrial base across Northeast Ohio. We envision broadening our market from Lake Erie to the East Coast, and other potential offshore wind projects to work on future wind farm projects.

“But we can’t start ramping up on specialized equipment when we’re not sure if anything is going to happen. We believe the decision to go forward is in large part dependent upon a stable and proactive policy that will support the production and use of renewable energy.”



Having a consistent policy is vital to spur growth in a start-up industry such as offshore wind energy, according to Zadkovich. “Our legislators need to decide what the government’s role is in economic development opportunities for local and regional businesses, and if that role is worthwhile,” he says. “There’s definitely an opportunity to attract out-of-state companies interested in operating their businesses on clean power. Why not build and generate that power right here? The fact is, no local companies are benefiting from Ohio utilities that are bringing in power from Texas and elsewhere.

“Certainly the start-up of any new business is never 100% efficient,” Zadkovich says. “But, if we’re able to launch this entirely new industry, we will be able to beat our competition to the market, and then drive down costs. Icebreaker is a great start

for us. Once these six turbines are up and running, we’ll know exactly where and, perhaps more importantly, how to bring out a fair amount of costs.”

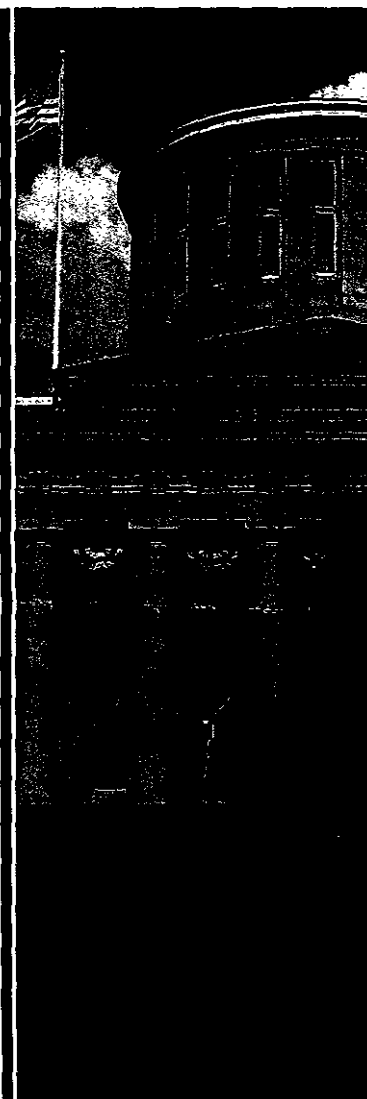
## An Optimistic View of the Future for Clean Energy

Zadkovich is optimistic that Ohio legislators will realize the positive impact that a supportive RPS will have on manufacturers, and the economic ripple effect that such a policy can generate in the areas of the supply chain, jobs, and ultimately making a burgeoning industry increasingly more efficient and self-sustaining while also attracting out-of-state companies yearning for low-cost, sustainable locations to set up facilities powered by clean energy.

“There will be more offshore wind development in the U.S.,” he states, matter-of-factly. “The question is, will Ohio position itself to lead that development in the Great Lakes region or will we lose out to the East Coast states?”

“We really hope that development starts in Ohio soon and grows throughout the Great Lakes. We’ll be ready when that day comes. Long-term, a healthy RPS will help us plan for growth and investment with the comfort of some certainty.”

## CONTRIBUTORS:



## Ready to Take Action?

Visit WIRE-Net’s Clean Energy Manufacturing webpage (see link below) where you can contact Governor Kasich to tell him you support his position to reinstate the renewable and efficiency standards that will strengthen Ohio manufacturing:

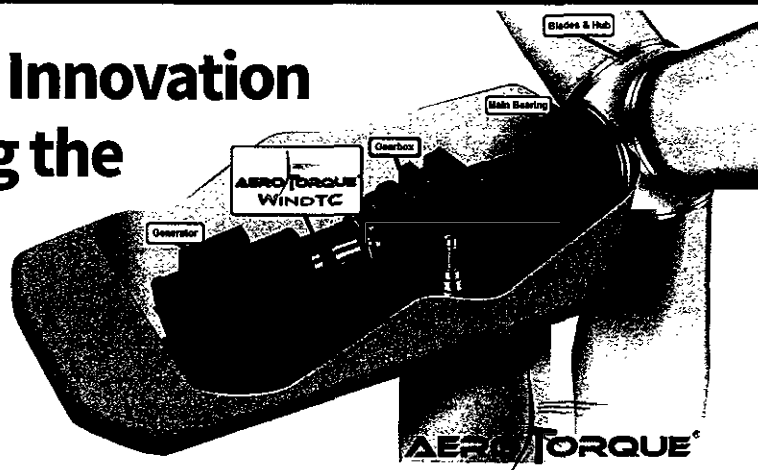
[www.wire-net.org/manufacturingServices/clean-energy.aspx](http://www.wire-net.org/manufacturingServices/clean-energy.aspx)

At the Ohio Manufacturers Association, you can also cut & paste the same message to share it with your Ohio State Legislators:

<http://bit.ly/OMALegislators>

# Smart Policy Bolsters the Innovation and Market Forces Driving the Wind Industry

*AeroTorque uses ingenuity to extend wind turbine life and achieve company growth.*



Wind farm developers and wind turbine OEMs face an ongoing struggle dealing with key forces that inflict damage on their wind turbine components, particularly the excessive mechanical loads that impact turbine drivetrains during occurrences of significant torque reversal impact at the end of a hard start (wind gust) or hard stop.

In an effort to delve deeper into the issues related to these damaging reverse shock loads in wind turbine drivetrains, The Timken Company turned to – and subsequently acquired – Sharon Center, Ohio manufacturer PT Tech and its wind industry subsidiary, AeroTorque. PT Tech engineers torque management solutions for large-scale equipment used in industrial applications such as tunnel boring, underground mining, rock crushing, wood waste grinding and steel mill operations. These “extreme machines” are equipped with costly, high-end drivetrains that require protection from shock-load damage (a force caused by sudden drivetrain acceleration or deceleration) and assurance that the equipment continues to perform in such environments.

Similarly, AeroTorque offers several valuable options for wind farm owners and wind turbine OEMs, including torsional control products that regulate shock loads and extend gearbox life; torque monitoring equipment that keeps real-time data on actual torque in a wind turbine’s drivetrain; and custom engineering, partnering with the OEM to improve drivetrain applications.

## Innovation Driving the Industry

The goal in wind development has been to drive down the cost per megawatt, and that only happens by producing more power for the same (or less) cost. As such, manufacturers are beginning to build bigger, longer-lasting turbines which reduce overall capital costs and increase power producing margins.

But as today’s wind turbines increase in size and output, the load spectrum in gearboxes dramatically changes. And because wind power is produced in such

variable and unpredictable conditions around the world, it’s very difficult to monitor the load case.

“Early designers thought their turbines would perform the same in the U.S. as in Europe, but the terrain and turbulence factor changes

dramatically depending on where you are in the world, or even where you are in the U.S.” says Doug Herr, director of marketing and technical sales for AeroTorque. “The industry has learned that, in wind, one size does not fit all. That’s what makes today’s turbine design and engineering so important. No developer plans to run their turbines for just 20 years. They want to operate for 40 years. And that involves radically different thinking, planning and strategies.”

## More Reliance on Market Forces, Less on Policy Support

Like any other burgeoning industry, Herr believes that the domestic renewable energy market has become more proactive in terms of both design-engineering to reduce costs, and reducing its own reliance on government policies to drive industry growth. “There’s a better understanding of wind turbines now,” he says. “Today’s turbines are built to last several decades because of better condition monitoring, improved bearings and other equipment advancements such as what AeroTorque offers, which ultimately extends the life of the turbine.”

From a policy aspect, the rise and eventual wind-down of the PTC (production tax credit) has spurred and now leveled out new installation work within the industry. “The roller coaster impact caused by the lack of political support for the PTC wasn’t good for anyone,” Herr commented. “But the conversation has now shifted beyond the PTC and the renewable market has been impelled to move past the impacts of federal

policy to sustain growth. We planned for the possibility that the PTC would eventually expire, and worked towards a successful business model that wouldn't rely as much on unstable federal policy." By developing an international book of business, AeroTorque has successfully mitigated against U.S. policy shifts that have created boom-bust cycles.

And from a wind farm development standpoint, Herr cites the potential development in the northwest corner of the state. "There's a huge opportunity there that developers can't actively go after because of siting and set-back issues. And while all this is going on, the marketplace continues to grow and wind farms will still be built. They'll just be built outside of the state."

But in the long run, Herr believes demand will

continue to drive the industry. AeroTorque's global customer base operates in places with much more stable policies, some of which have been in place (i.e., Germany) for several decades. "For some manufacturers, policy changes now could be potentially disastrous," he says. "But from a global perspective, which is how we look at it, the industry demand for our products is purely market driven."

### The Forecast is Positive

As for the long-term, Herr predicts gradual growth for the two key markets AeroTorque serves: new turbine OEMs and the aftermarket wind farm owners. "The new turbine market is very stable, and annual global installation of wind turbines is growing, with thousands being built or planned," he notes. "We see this side of the industry

growing over the next three years before settling down and leveling out.

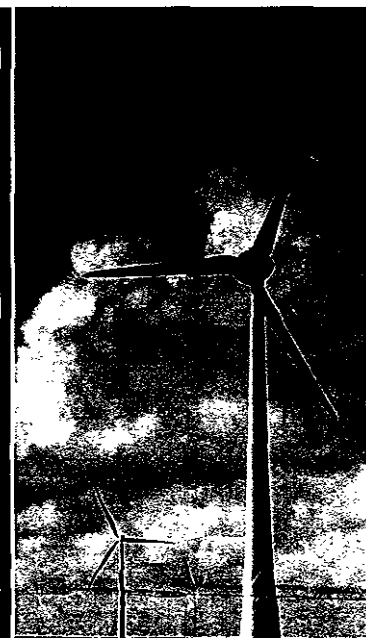
"The aftermarket business is completely different, as we predict a solid growth trend over the next ten years or so. From our perspective, there are approximately 60,000 existing turbines around the world that could utilize our products and services right now."

Overall, Herr is very bullish on the wind industry markets, which bodes very well for AeroTorque. "Between developers trying to squeeze more years from their out-of-warranty turbines to markets expanding domestically and in the Middle East and Africa -- along with the growth of offshore wind farms -- we're very optimistic with the industry's growth," he says. "And as it grows, we'll be right here to service it."

### CONTRIBUTORS:



**TIMKEN**



**Strengthening  
manufacturing  
to create healthy  
communities and  
fuel economic  
growth**

WIRE-Net and GLWN support clean and renewable energy standards that help manufacturers control electricity costs, grow new Ohio industries, attract investment and jobs, and support a healthy Ohio.

For more information, and to view other case studies, visit:

<http://www.wire-net.org/manufacturingservices/clean-energy.aspx>

