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To: Oceana County Planning Commission

From: Scandia Wind Offshore

RE: April meeting questions

We at Scandia Wind Offshore (Scandia) appreciate the opportunity to respond to questions posed by Mr. Ray Malburg and Dr. David Roseman. We understand and acknowledge the Aegir Project represents change for the counties involved. This change asks the citizens to balance the fact that wind turbines can be viewed four miles or six miles from shore against the opportunity to create jobs, diversify Michigan's energy sources, and improve on the environmental impact with respect to power generation. Lake Michigan and the tourism industry does indeed provide important jobs and tax revenue in Oceana County. The need for new industry and job creation also exists, and a major infrastructure project such as the proposed offshore wind farm would create an opportunity to grow out of West Michigan's untenable economic position.

The potential for increasing the number of jobs in the tourism industry should be balanced with an estimated \$3-4 billion project (including 3,000-6,000 jobs in the manufacturing supply chain and construction) and its capacity to provide such an opportunity during a time high unemployment and a considerable percentage of its citizens subsisting on public assistance. Scandia believes the potential growth in the tourism industry could grow in parallel with the presence of the Aegir Project; pursuing a new industry does not necessarily have to come at the expense of an existing industry.

At this stage of the proposal, our request is to enter into studies that have bearing on this incredible resource -- studies that will reveal the total impacts of the project. Only after these studies can final decisions be made. The studies could reveal ways to utilize the resource while maintaining its beauty. It is important to remember that the changes brought about by the Aegir Project would not be permanent -- the technical life of a turbine is approximately 25 years, and the proposed bottomland lease term is 25 years. The decommissioning (turbine and infrastructure removal) provisions will be outlined in the lease agreement -- clearly defined requirements for removal at the end of the turbines useful life, or the completion of the lease term.¹

Scandia Wind Offshore: Background

Regarding the background and history of Scandia Wind Offshore (Scandia) and its partners, the track record is found in the 44 years of combined wind energy experience of the majority shareholder, Havgul Clean Energy (HCE) of Norway. The experience dates back to 1995, and includes five developments (onshore and offshore) in Norway that have matured to the point where industrial partners (utilities) have

invested in the projects in order to move into the construction and operations phases of the projects. Additionally, two new projects are under development in Norway, as well as a 5,000 – 10,000 MW project proposal in the Texas panhandle.

Scandia Wind Offshore LLC is a company established in 2010. The company is majority-owned by HCE (consisting of five partners) and Northport, Inc. (Steve Warner) is a minority shareholder. There is a core team from the owners working on the Aegir Project at all times as well as deployment of world class consultants to deliver best practices to the process. This includes experts from the environmental, technical, legal and other disciplines relevant to wind farm development. In total, 30 – 50 persons will be dedicated to the work during the peak production period of the development phase.

The company is currently domiciled in Minnesota, but will soon establish an office in Muskegon, MI. The start-up phase of the project requires a heavy presence in Michigan, and therefore, for reasons of convenience, Warner has chosen a home office. HCE members regularly commute from their headquarters Oslo, Norway. Warner's work experience is financial (and not technical); before partnering with HCE and Alpha Clean Energy of Denmark in 2009, he was in the securities and commercial real estate industry (see work history at our website) for over 20 years.

Alpha Wind Energy (AWE) is a partner in the original company, Scandia Wind LLC. AWE is a partner in the aforementioned wind farm project in Texas, the Mariah Project (www.scandiawind.com). AWE is not involved with the Aegir Project.

Renewable Energy in Norway

With respect to Norway's plans for expansion in wind energy generation, the renewable goals are in accordance with the "EU 2020" directive.² Norway will have to increase its renewable energy production by approximately 14% by 2020 in order to comply, and is currently negotiating a joint support scheme with Sweden as a means of achieving these goals. There is a strong political will in Norway to reach these ambitious renewable energy goals.

Energy Prices

Projecting energy prices out several years is difficult, but current prices for projects in Europe can provide some reference. Horns Rev II in Denmark was recently priced at approximately \$.09/kWh, reflecting the price for turbines, turbine foundations and inter-turbine cables.

The latest wind park project bid in Denmark is the 400 MW Anholt project. Only one company submitted a bid on this project due to unrealistic program requirements and, unofficially, DONG Energy will build the wind park for approximately \$.175 /kWh. The Danish government is considering is changing the program requirement for this project in order to receive more bids.³

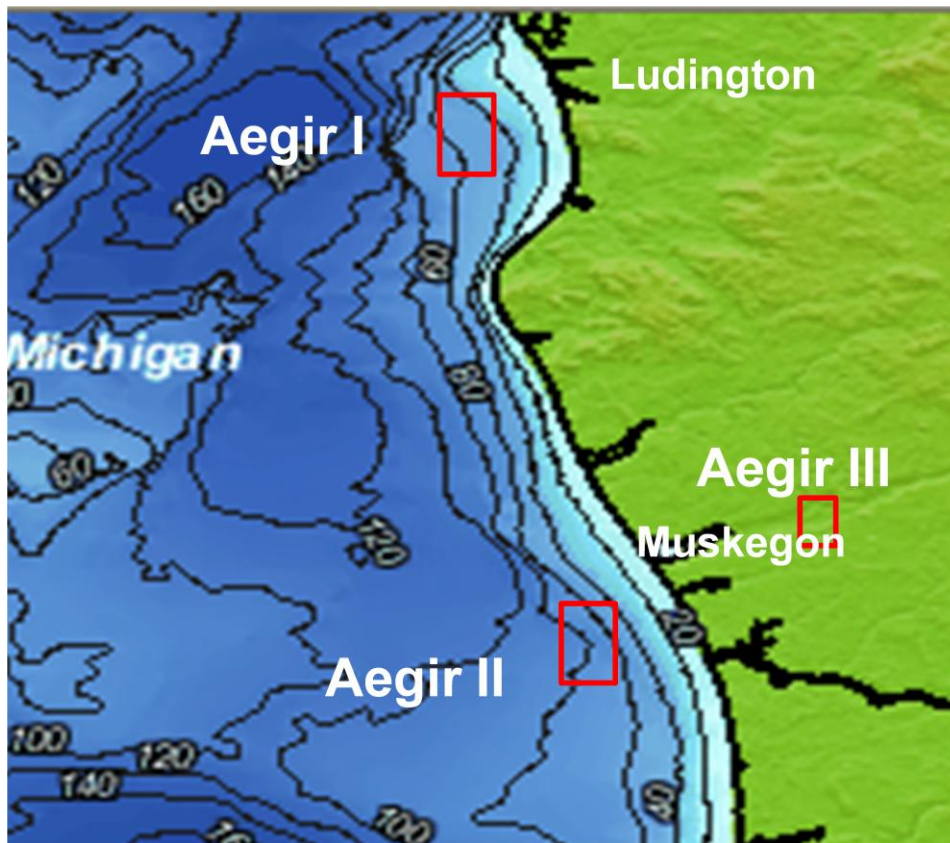
A major U.S. turbine manufacturer has suggested an estimated power price of \$.15/kWh, depending on the wind regime at a given location.

The Aegir Project's proximity to major load centers (densely populated areas with heavy electricity consumption) is a significant factor in the feasibility of an offshore wind farm. There are attractive markets into which the electricity can be sold -- Chicago, Detroit and the PJM (a Regional Transmission

Operator in the Eastern U.S.) markets – at the prices projected for the project. The power generated from the project will be consumed in the region (there is a distinct difference between the “fiscal” market and the” physical” market). The electricity prices at the consumer level will be made competitive by virtue of the support schemes available to wind farm projects – tax credits, cash grants, and other subsidies that serve to keep consumer electricity prices competitive until the industry matures.

Water Depths and Technology, The Jones Act

Lake Michigan’s water depths are the major determinant dictating the project’s distance from shore. The costs associated with construction, installation and operations & maintenance of the wind farm principally define the economic viability of offshore wind projects. The economics of these processes suggest an 80 meter maximum water depth for turbine siting. The turbine foundation technology, a gravity-based concrete structure engineered by Vici Ventus, allows for siting at 80 meter level.⁴ This turbine foundation technology has been in use for over 30 years in the oil & gas industry in Europe. Please see below map illustrating Lake Michigan’s water depths in relation to the proposed sites:



The emergence of “floating platform technology” is fully acknowledged; however, the technology is too expensive at this point and is several years from being commercially viable. The only test site in operation in the world is located in Norway, and was built at a cost approximately 10 times higher than fixed foundations. Furthermore, the platform technology today cannot support the large turbines designed for offshore wind energy production.

Europe, Loads, Geotechnical Solutions

Europe has wind farms located in close proximity to populated shorelines. In Copenhagen, Denmark, for example, turbines in the Middelgrunden Offshore Wind Farm are approximately one mile from shore.⁵ In the United Kingdom, numerous wind farms are being located within five miles of shore as the Crown Estate plans to build 25 gigawatts of offshore wind energy.⁶

The Nysted Wind Farm in Rodsand, Denmark is subjected to ice loads in the North Sea. No problems with ice loads have been registered. In the Baltic Sea, where ice loads are a present, Germany plans to construct offshore wind farms mounted on fixed foundations.

By comparison, the engineering for the Aegir Project provides solutions regarding wind, wave, and ice loads. The issue of ice loads is addressed by a cone-shaped concrete fabrication which is mounted to the tower at water level, and serves to break up the ice as it makes contact with the structure. The foundation engineers have also accounted for the sand bottom with regard to stability.

Ludington Pumped Storage Power Plant

The Ludington Pumped Storage Power Plant (LPS) represents a most efficient method of storing renewable power generation for the Aegir Project. The LPS can serve as a “battery” for the wind farm – delivering baseload power to customers via dual renewable energy sources. Regarding the notion of utilizing other sources of power (including wind turbines) to refill the LPS’s reservoir: this is dependent on the level of bottlenecks occurring in the grid. If bottlenecks exist between the production site and the LPS, power from more remote sources could not reach the LPS. Aegir I will be connected to the grid via the same substation currently used by the LPS, therefore no bottlenecks will ever form between the two plants.

The level of excess capacity that may exist at anytime for the LPS is related to the level to which Michigan’s Renewable Portfolio Standard (RPS) is met. Increases from the current requirement of 10% renewable energy generation by 2015 are being discussed in political circles. Can renewable energy generation keep pace with overall demand in order to reach a 10% (or higher) RPS? Another consideration is the state’s aging fleet of coal plants. Over the next 20 years, a significant number of older coal plants will be retired, providing a significant opportunity to change the state’s energy mix in order to make it one that is more environmentally friendly.

No arrangements have been made with Consumers Energy regarding the sale of power to charge the LPS. It is too early in the process to hold such discussions, but these discussions will be initiated after necessary permits have been issued.

Michigan’s Submerged Lands Act and The Public Trust Doctrine

It is Scandia’s understanding that most of the state permitting processes for the Great Lakes bottomlands are regulated by the Submerged Lands Act Pa 247 of 1955 as amended. The act spells out in detail the process by which sale, lease, exchange, filling, or disposition of the lands may occur in order to “preserve and protect the interest of the general public.”

It is our interpretation that the “persons having an interest” stated in Section 324.32504 (1) would be those having specific legal interest such as ownership, partnership, or fiduciary interest that is typical for consideration in other real estate transactions.

(2) It may be interpreted that approval of local units is necessary for agreements involving riparian or littoral property contiguous to their jurisdictions. However, there is some question as to whether this applies to bottomlands four miles offshore.

The Public Trust Doctrine governs development on Lake Michigan and is central to the permitting process. It states that certain natural resources such as navigable waters are incapable of private ownership. Originally used to protect uses such as navigability, commerce, and fishing, it has expanded to include wetland habitat, recreation and most recently, water diversions.

Under the Great Lakes Submerged Lands Act part 324 Section 32502 provides “for the sale, lease, exchange or other disposition . . . whenever it is determined by the department that the private or public uses of those lands and waters will not substantially affect the public use of those lands and waters for hunting, fishing, swimming, pleasure boating, or navigation or that the public trust will not be impaired by those agreements”

In previous cases and debates involving “the public trust” and private use of those properties, much of the focus has been on the public benefit of such uses. In this instance, Scandia believes the generation of electricity for public use by renewable resources is a substantial offset to that use.

New legislation has been proposed to specifically address offshore wind farm development -- Scandia anticipates it will be passed this year. Scandia will comply with procedures set forth by the new legislation.

Shipping, Boating and Navigation

The U.S. Army Corps of Engineers (USACE) and the U.S. Coast Guard (USCG) will determine changes to the wind farm layout and/or changes to shipping lanes. Shipping lanes in Europe are adjusted without material effect on overall shipping routes. Scandia will work closely with the USCG to find an acceptable layout with respect to shipping practices in and around the wind farm.

In Europe, recreational and fishing boats carry on normal activities within wind farm footprints. Active lighting systems will be utilized for navigational safety and aircraft warning purposes. This Federal Aviation Administration (FAA)-approved radar technology will activate lights when aircraft are detected.

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The USCG will also determine the foghorn requirements. Preliminary discussions with the USCG indicate foghorns are calibrated to signal watercraft within a two mile radius of the outer boundaries of the wind farm and, as a rule, will not be heard from shore (only under very rare weather conditions, these signals may be heard from shore). Likewise, lighting systems for watercraft safety require a two-mile visual warning system.

Visualizations

The images were shot with a Nikon D2x digital camera using a 35mm lens. This combination of camera and lens is equal to a 52.5mm lens on a 35mm film camera. The horizontal angle is 38.2 degrees and the vertical angle is 25.4 degrees. The methodology used for the visualizations has been tested and verified on thousands of projects since 1996. The turbine sizes have not been minimized.

Recent press report concerning the offshore wind farm proposal off Cape Cod, MA have stated that, from a distance of 5 ½ miles, the turbines would appear to be about ½ inch tall.

Turbine Specifications

The following are estimates of turbine sizes and specifications under consideration:

5MW:

- Hub height: 100m
- Blade length: 61m
- Rotor diameter: 126m
- RPM range: 7.7-12.1
- Blade tip speed: 72 meters per second (approximately 160 mph)

10 MW:

- Hub height: 100m
- Blade length: 72m
- Rotor diameter: 150m
- RPM range: 6.05-11.5
- Blade tip speed: 90 meters per second (approximately 200 mph)

Offshore wind farms, as opposed to onshore wind farms, have no reference points on the horizon. Therefore, when evaluating the visual impact, the *number* of turbines is more important than the turbine *size*.

Energy Costs and Subsidies

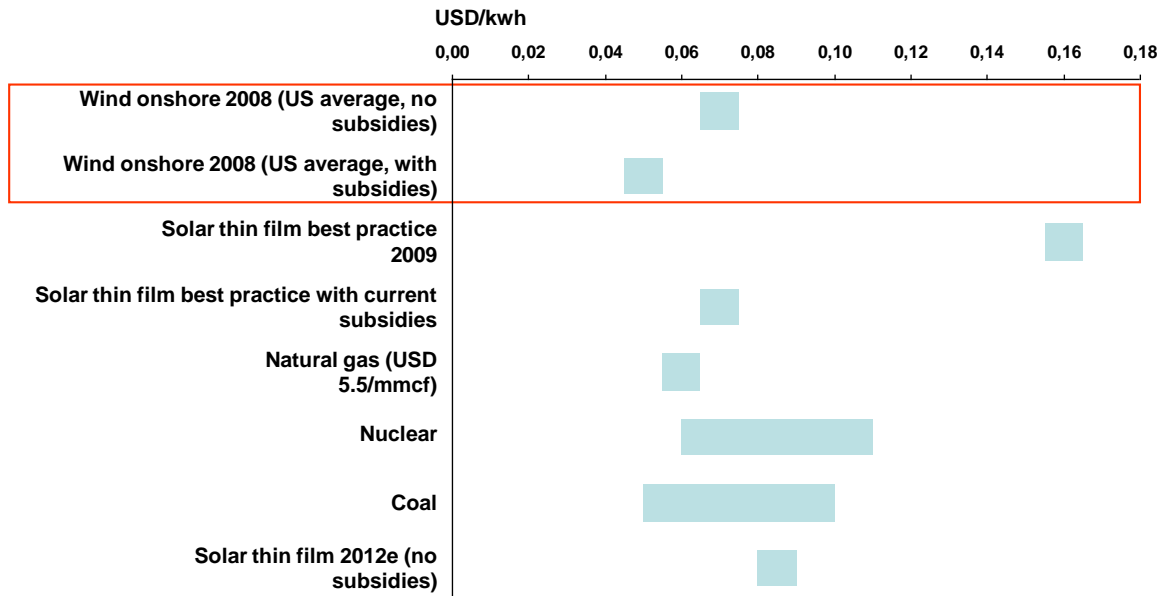
Wind farm projects are eligible for subsidies from the Federal Government in order to encourage development of, and investment in, renewable energy technologies as well as stimulate the economy by creating jobs. The current subsidies available for wind farms are summarized as follows:

- Production tax credits (PTCs): an income tax credit of 2.1cents/kWh, or
- Investment Tax credits (ITCs): a 30% tax credit based on project capital investment, or
- Grants (in lieu of ITCs): a 30% grant based on eligible construction costs

Accelerated depreciation on project assets is also available to owners. Finally, wind farm projects are eligible for federally guaranteed loans (up to 80% of total project costs); this program is also available to nuclear plant projects, where over \$50 Billion in loan guarantees are available.

Below is an energy cost comparison for various energy sources:

Competitive Cost of Wind Energy



Source: Arctic Energy Partners, FPL Energy, IEA, Sun Edison, Simmons, Bloomberg

The cost of wind energy has dropped from \$.30/kWh in the 1980's as the industry matured and economies of scale improved.⁷

Subsidies are essential to wind farm development. The support schemes from the Federal Government has committed to changing the energy mix in the U.S. several reasons, among them:

- Energy independence – reducing the need to import fossil fuels
- Economics – reducing the risk of price fluctuations foreign energy sources, domestic job creation
- Environmental – a commitment to reduce the country's substantial carbon footprint;
- National Security – strategic approach to climate change; economies become destabilized by climate change a represent a threat to the U.S.

Job Creation Opportunity

The opportunity to capture significant market share in the offshore wind industry is available to Michigan. The essential elements required to compete for turbine manufacturing and supply chain fulfillment exist in the state:

- Strong labor force;
- Engineering and manufacturing history in technically similar industries;
- Education system prepared to train the workforce and conduct research;
- Private sector seeking to diversify and grow;
- Incentives and effective non-governmental organizations to attract and retain manufacturers;
- Political will to change the future energy mix.

Many individuals and organizations have been working diligently to make Michigan competitive in the wind energy industry. The combination of a real project and preparation by the non-governmental organizations, educators and private businesses can make Michigan competitive. Other states are preparing as well – we believe there is a distinct advantage to the “first mover” in terms of securing a turbine manufacturer and developing the supply chain in the region. Below are job projections from NextEnergy (www.nextenergy.org) a non-profit company working to advance the renewable energy industry in Michigan:

Manufacturing Potential to Serve U.S. Growth in Renewables (Total U.S.)*

Total U.S.	S. MW	Number of Firms	Millions \$ Investment	New FTE Jobs
Wind	124,900	16,480	\$62,338	398,470
Solar	23,150	10,272	\$69,624	298,194
Geothermal	15,190	3,926	\$15,330	72,324
Biomass	21,760	12,020	\$13,248	81,615
Total:	185,000	42,698	\$160,541	850,603

* Assumes 18,500 MW installed per year for 10 years in U.S. ("Climate Stabilization Case", REPP, 11/06)



Manufacturing Potential to Serve U.S. Growth in Renewables (Michigan)*

Michigan	# U. S. MW	Number of Firms	Millions \$ Investment	New FTE Jobs
Wind	124,900	967	\$3,453	24,350
Solar	23,150	360	\$1,256	6,644
Geothermal	15,190	129	\$272	1,502
Biomass	21,760	594	\$349	2,281
Total:	185,000	2,050	\$5,328	34,777

* Assumes 18,500 installed per year for 10 years in U.S. ("Climate Stabilization Case", REPP, 11/06)



The National Renewable Energy Laboratory (NREL), a facility of the U.S. Department of Energy, has researched the economic development impacts of attracting industry manufacturing and supply chain. The commentary below relates to onshore wind farm development, but it is suggested here that parallels can be drawn to the offshore industry as well. To wit:

“Our research suggests that the single greatest local supply parameter affecting economic development benefits is the supply of wind turbines and their components... As such, the single largest potential driver of economic development benefits is local manufacturing. Policymakers seeking to maximize economic development benefits from wind power are likely to gain the greatest increased benefit by attracting new wind power manufacturing to their state.”

The following chart speaks to construction-period impacts and indicates the potential change in jobs created for Michigan given 1000 MW of wind development under local manufacturing scenarios from 0 to 50%.⁸

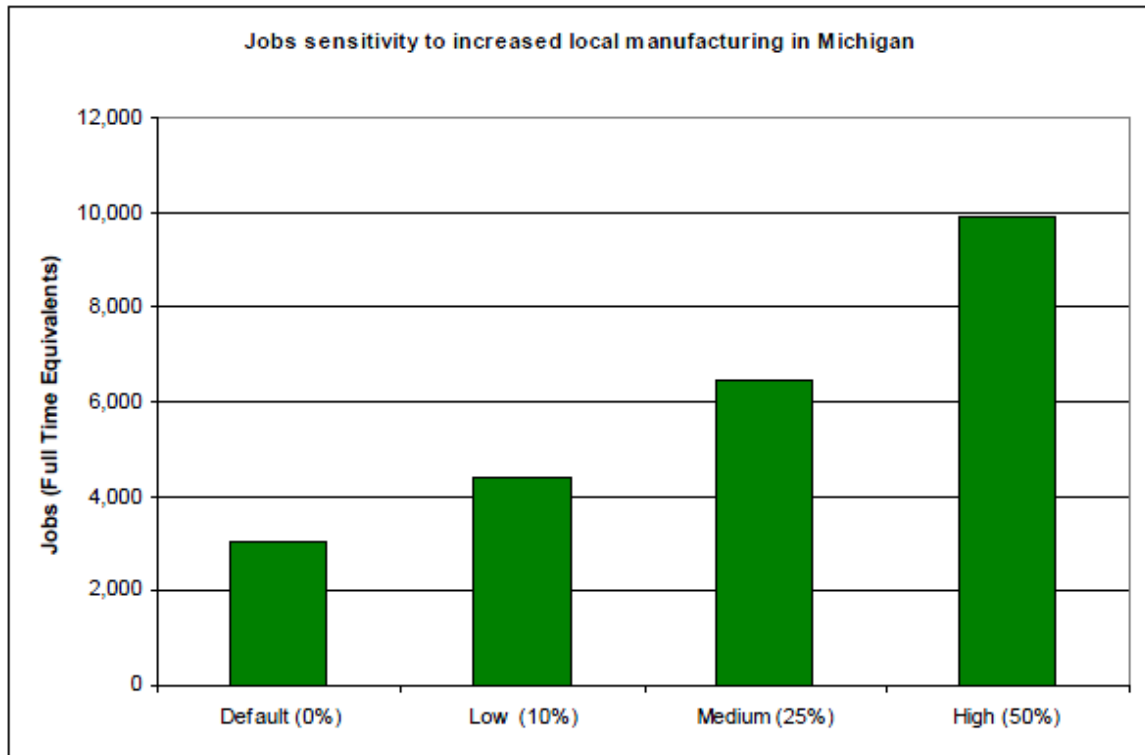


Figure 5. Construction Period Jobs Impacts in Michigan from increased reliance on local manufacturing (1000 MW of wind power)

Muskegon has been identified as an attractive site for a turbine manufacturing facility as well as test and research facilities. Muskegon and Mason County have been suggested for Operations & Maintenance facilities for the Aegir Project’s operational phase. Residents in Oceana and Ottawa Counties (as well as the entire region) are certainly in position to compete for the thousands of jobs available in the industry’s supply chain.

The projections for growth in the industry and the real opportunity to participate in that growth have mobilized Michigan’s policymakers, private industry and citizens to take action. In the past, much of the capital investments and benefits have flowed to Europe because there has been no market in the U.S. That dynamic is rapidly changing as domestic manufacturing is increasing, and high-level decisions regarding where to locate manufacturing facilities are currently under consideration. Today, the U.S. wind industry supports an estimated 85,000 jobs and, according to the Department of Energy, producing 20% of American electricity from wind by 2030 would create 500,000 American jobs.⁹

The fact that a company such as General Electric is dramatically expanding its investment in manufacturing (including offshore wind) is a testament to the growth potential of the industry. Currently, there are nine turbine manufacturers in the U.S. Manufacturing follows the markets, further evidence that developing a real project can launch the industry in Michigan and generate many, many long-term job opportunities.

Impacts

The environmental and socioeconomic impacts are precisely what Scandia proposes to study as it seeks advice from the counties as to whether to move forward into these studies. It is anticipated that the results from the environmental studies will reveal acceptable impacts to wildlife and marine life, consistent with the extensive studies and findings in European offshore wind farms.¹⁰

Noise issues are not applicable to the offshore areas of the Aegir Project. The offshore turbines will not be heard from shore under any circumstances. Scandia is unaware of any documented health issues onshore, but onshore setback requirements are well established to address issues such as shadow/flicker.

Finally, Scandia fully acknowledges the questions regarding tourism impacts. Extensive studies in Scotland conclude that impacts are minimal, and, in some circumstances, there are positive impacts on tourism.¹¹ There are communities (Copenhagen, Denmark, for example) that embrace the marketing moment provided by a proximate wind farm – establishing it as an attraction with tours and prominent placement in its tourism communication.

Some residents of Pentwater and others opposing the project suggest the project will doom their tourism business. Scandia respects this opinion; however, this is not consistent with the findings in vacation destinations in Europe, nor is it necessarily the opinion of tourism industry leaders in Michigan.¹²

As with the all issues around the proposed project, Scandia seeks the majority voice. The process undertaken to date has been conducted for this express purpose -- to inform the public about all the issues and opportunities that come with entering into a new industry and to allow the democratic process to play out fairly, so that minority (and often louder) voices do not destroy the opportunity before the facts are known.

Miscellaneous

Please see below additional responses to questions not specifically answered:

From Mr. Malburg:

Could a paint color be used to blend into the surroundings as seen from the beach?

The FAA currently requires white paint on turbines.

What is proposed to keep vandals away from defacing the towers? Will they get repainted if defaced?

The turbines will be insured against damage. Maintenance crews will also be regularly working in the wind park.

Why are they in the process of getting permits? (Army Corp of Engineers, MDEQ, Coast Guard, etc.) (this is a long, long, process, I've applied for them before & it has taken over a year).

The permitting process would begin shortly after the advice from the counties (to move forward with the studies) has been given and will require approximately two years to complete.

From Dr. Roseman:

Assuming no other use of the LPS, how many days of electrical production could be stored there?

The use of the LPS as a battery depends on the constraints in the existing grid and the spot prices on the open market. These metrics will change from year-to-year; however, the use of the LPS ensures that the wind farm will never be shut down due to curtailments, thereby maximizing the operation of the wind farm.

Would the proposed on-shore wind turbine projects in Mason and Oceana Counties reduce the need for off-shore projects?

This is dependent on how much industry market share the counties and state are interested in competing for, and how much electricity the State of Michigan would like to export (or, alternatively, reduce its need to import fuel sources.) A serious commitment to these items would result in substantial job growth.

You have said that you would stop pursuing the project if local governments objected.¹ However, I understand that you have also said that even if the State objects, you would try to have the Federal government override the State. Is that accurate?

No, we will not pursue the project beyond the State's regulations. And the notion has never been voiced by anyone at Scandia.

Will nearshore wind turbines affect wave action and beach/dune erosion?

No.

What previous experience does Scandia Offshore Wind have in offshore wind technology?

The projects HCE has developed have always used the most cost efficient wind power technology available at the time of construction. There are over 100,000 turbines in operation today, providing access to a tremendous amount of design and operational experience from which to choose.

Is there a possibility that homeland defense concerns will limit the use of the waters in the proposed windfarm?

It is difficult to second guess what the Homeland Security Administration will consider in the future. Given the nature and already existing vulnerability of our present power infrastructure, it is hard to conceive that HSA would consider this a special case.

Would the turbines survive impact by a slightly off-course ore boat?

Engineering for impact of this magnitude is not feasible and therefore will not be considered.

We at Scandia Wind Offshore appreciate both the questions posed by Mr. Malburg and Dr. Roseman, and the opportunity to respond. The importance of fleshing out all issues cannot be overstated; our position from the beginning of the process has been that stakeholders fall into one of three categories:

- Supporters of the Aegir Project – people who embrace renewable energy and the prospect of a “New Economy”
- Detractors -- a vocal, often well-heeled minority that seeks the status quo and cannot accept the change in the view;
- Undecided – the majority of residents, those seeking information in order to make an informed decision; people who recognize the project as an opportunity but want to learn more about a relatively young industry and the potential impacts in terms of the environment, existing industry, and job creation.

The business model for our firm dictates a transparent process that invites a healthy debate around the Aegir Project – one that will ultimately result in well informed citizens and community leaders -- leaders who can take appropriate action based on the majority voice in their respective constituencies. Approval for the project is not requested at this point, merely advice as whether the view change is acceptable in order to move forward with environmental, socioeconomic and technical studies.

It is understood that approval is required on a state and federal level but the project will not move forward into the studies without the advice to do so from the Counties. There is a window of opportunity to build a new industry in West Michigan; a business proposition for which the Aegir Project can serve as a catalyst. A tremendous amount of work has been done by various groups and individuals in the state to prepare for the next generation-industry, energy independence and environmental stewardship. We look forward to working with you.

Thank you for your consideration.

Respectfully submitted,



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