STATE OF MICHIGAN

BEFORE THE MICHIGAN PUBLIC SERVICE COMMISSION

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In the matter, on the Commission's own motion, to create the wind energy resource zone board and to outline its responsibilities.	))))	Case No. U-15899

At the January 27, 2010 meeting of the Michigan Public Service Commission in Lansing, Michigan.

PRESENT: Hon. Orjiakor N. Isiogu, Chairman
Hon. Monica Martinez, Commissioner
Hon. Greg R. White, Commissioner

ORDER

On October 6, 2008, Governor Jennifer M. Granholm signed into law Michigan's "Clean, Renewable, and Efficient Energy Act," 2008 PA 295 (Act 295), MCL 460.1001 *et seq*. Section 147 of Act 295, MCL 460.1147, states that the "Commission shall, through a final order designate the area of this state likely to be most productive of wind energy as the primary wind energy resource zone and may designate additional wind energy resource zones." In making its determination, Act 295 requires the Commission to base its decision on the findings of the Wind Energy Resource Zone Board (Board). Furthermore, the Commission is to consider and evaluate projected costs and benefits, and other factors identified by MCL 460.1147(3).

The primary purpose for zone designation is to facilitate wind energy development by expediting transmission upgrades. A zone designation at this time does not exclude additional zone designations from being considered in the future, nor does it make a fact finding regarding any non-designated area's potential for wind development in the future.

The Board's Activities and Recommendations

Act 295 provided for the creation of the Board by the Commission. The 11 member Board was appointed by the Commission on December 4, 2008. It included representatives from a variety of constituencies. The Board was charged by Section 145 of Act 295, MCL 460.1145, with the responsibility to conduct studies and identify areas of the state with the highest potential for wind energy production. The Board's responsibilities included consulting with local governments in the study of the potential for wind energy production, evaluating the viability of wind as a source of commercial energy generation in Michigan, and studying the availability of land for potential use by wind energy systems. The Board also conducted modeling and other studies, including examining existing wind energy systems, estimates for additional wind energy development, and average annual recorded wind speeds.

From January through May 2009, the Board met approximately every two weeks to consider data, analyses, and other information related to the topics set forth in Act 295. After May 2009, meetings continued as needed and the Board held its last meeting on December 14, 2009. The Board's meetings were all held in Lansing, except for the March 16, 2009, meeting in Cadillac, when the Board also visited the nearby Stoney Corners wind farm. At these meetings, representatives from a number of organizations and companies made formal presentations to the Board addressing various topics, including, but not limited to, wind energy production potential, land availability for wind energy systems, generation interconnection and planning processes, the role of local governments, and experiences in other states.

During its meetings, the Board also received information from, and provided direction to, its consultants, the Michigan State University Land Policy Institute (LPI) and Public Sector Consultants Inc., related to technical analyses, report preparation, and outreach to local

governments. The Board met a total of 18 times. It also held two public hearings in Bad Axe and Scottville on August 24, 2009, and August 31, 2009, respectively.

On October 15, 2009, having incorporated comments based on feedback received at the public hearings, the Board issued its final report, which identified four regions having the highest potential for wind energy.[1] Table 1 below identifies the four regions, including the counties and townships located in whole or in part in these regions.[2]

Table 1
Local Governments in Identified Regions

Region	County	Townships
1	Allegan	Casco, Clyde, Fillmore, Ganges, Laketown, Lee, and Manlius
2	Antrim	Banks
	Charlevoix	Eveline, Hayes, Marion, and Norwood
3	Benzie	Almira, Benzonia, Blaine, Crystal Lake, Gilmore, Joyfield, Lake, and Platte
	Leelanau	Bingham, Centerville, Cleveland, Empire, Glen Arbor, Kasson, Leelanau, Leland, and Suttons Bay
	Manistee	Arcadia and Pleasanton
4	Bay	Hampton, Merritt, Portsmouth
	Huron	Bingham, Bloomfield, Brookfield, Caseville, Chandler, Colfax, Dwight, Fairhaven, Gore, Grant, Hume, Huron, Lake, Lincoln, McKinley, Meade, Oliver, Paris, Port Austin, Rubicon, Sand Beach, Sebewaing, Sheridan, Sherman, Sigel, Verona, and Windsor
	Saginaw	Blumfield and Buena Vista
	Sanilac	Austin, Delaware, Forester, Marion, Minden, and Wheatland
	Tuscola	Akron, Almer, Columbia, Denmark, Elkland, Ellington, Elmwood, Fairgrove, Gilford, Juniata, Novesta, and Wisner

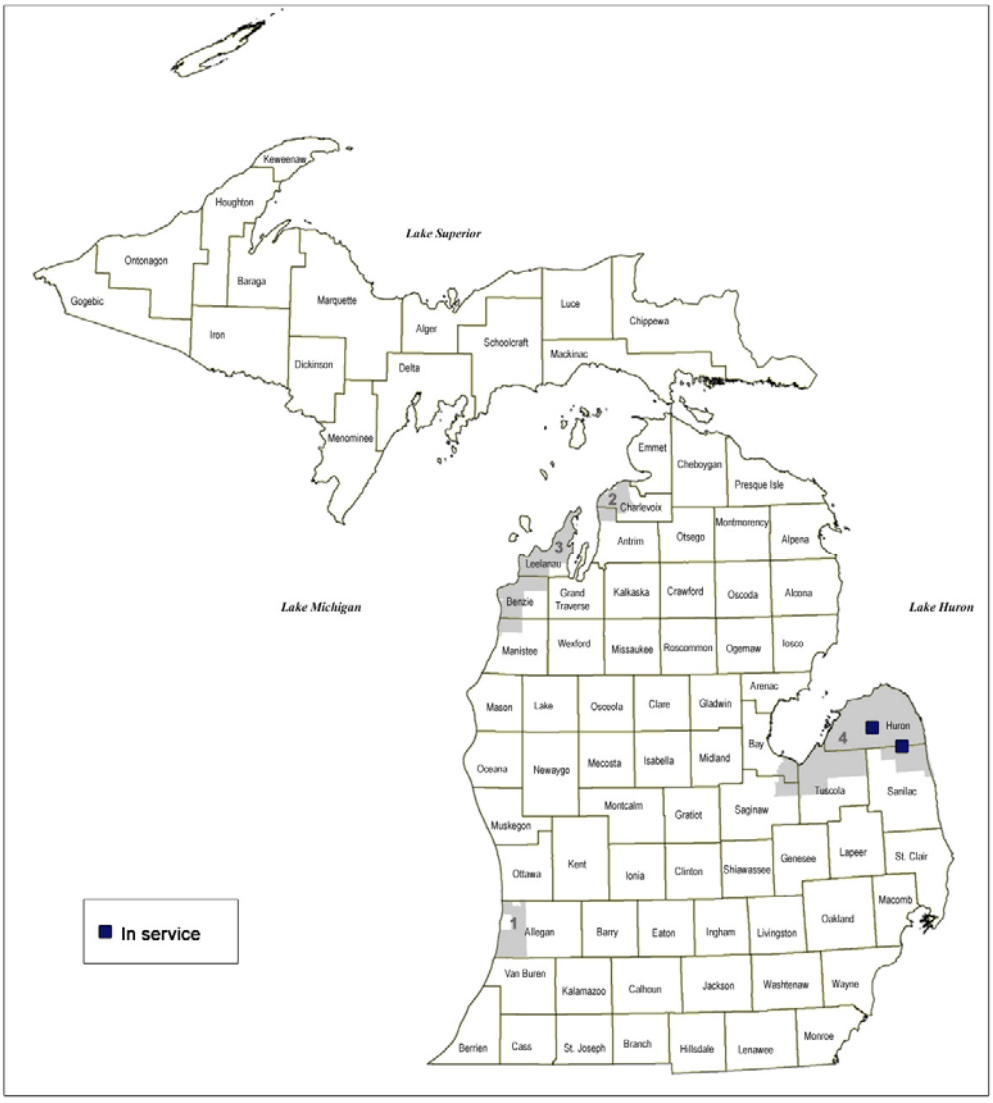
SOURCE: Research findings from Michigan State University Land Policy Institute, 2009, prepared for WERZ Board. NOTE: The additional governments (cities, villages, and townships) within the geographic area of the four regions but not included in the calculation of the regions' wind energy potential are as follows (by county):
Allegan County (Region 1)—Douglas, Fennville, Holland, Saugatuck, Saugatuck Township, and South Haven
Antrim County (Region 2)—Ellsworth
Charlevoix County (Region 2)—Boyne City, Charlevoix, and Charlevoix Township
Benzie County (Region 3)—Benzonia, Beulah, Elberta, Frankfurt, and Lake Ann
Leelanau County (Region 3)—Empire, Northport, and Suttons Bay
Bay County (Region 4)—Bay City and Essexville
Huron County (Region 4)—Bad Axe, Caseville, Elkton, Harbor Beach, Kinde, Owendale, Pigeon, Pointe aux Barques Township, Port Austin, Port Hope, Sebewaing, and Ubly
Saginaw County (Region 4)—Saginaw and Zilwaukee

[1]The Board also considered 9 alternative regions for wind zone designation.

[2]To calculate the minimum and maximum generating capacity and annual energy production potential for each region, the Board assumed that there were no turbines placed within the boundaries of the villages and cities, or three of the townships. This assumption was due to the limited land availability in the cities, villages, and select townships after the Board applied exclusion criteria for areas that may not be suitable for wind turbines because of roads, airports, urban areas, and other man-made and natural features. However, these communities are listed in the notes for Table 1 because they are part of the regions identified by the Board.

The following map (Figure 1) shows the location of the four regions identified by the Board. Within these four regions, two wind energy systems are currently in service: Harvest Wind Farm LLC, and Michigan Wind I, both of which went into commercial operation in 2008. These two systems are both located in Region 4 and represent a total of nearly 122 megawatts (MW) of capacity, or 94 percent of the total installed wind energy capacity in Michigan.

Figure 1
Regions with the Highest Wind Energy Potential and Location of Existing Wind Energy Systems in the Regions



SOURCE: Public Sector Consultants Inc., 2009, using research findings from Michigan State University Land Policy Institute, 2009, prepared for the Board.
NOTE: The four regions shaded in grey represent the total land area of that region. Within each region, the Board excluded areas based on environmental and man-made features (e.g., Great Lakes shoreline, water, wetlands, airports, roads, urban areas, buildings) for the purpose of estimating generating capacity and energy production potential. As part of the Board's analysis to calculate the minimum and maximum generating capacity and annual energy production potential for each region, no turbines were assumed to be placed in the villages and cities and certain townships located within the four identified regions. This is discussed further in the Methodology section and in Appendix B of the Board's final report.

Table 2 displays the Board's estimates of the minimum and maximum number of turbines, wind energy generating capacity, and annual energy production associated with each of the identified regions. Region 4, in Michigan's Thumb, has the highest estimated generating capacity and annual energy production potential.

Table 2
Estimated Minimum and Maximum Number of Turbines, Capacity, and Annual Energy Production, by Identified Region

		Minimum			Maximum		
Region	Counties	Number of turbines	Capacity (MW)	Annual energy potential (MWh)	Number of turbines	Capacity (MW)	Annual energy potential (MWh)
1	Allegan	166	249	747,938	296	445	1,338,415
2	Antrim Charlevoix	102	153	439,555	183	274	786,572
3	Benzie Leelanau Manistee	435	652	1,991,679	778	1,167	3,564,058
4	Huron Bay Saginaw Sanilac Tuscola	1,578	2,367	6,723,472	2,824	4,236	12,031,477
TOTAL		**2,281**	**3,421**	**9,902,644**	**4,081**	**6,122**	**17,720,522**

SOURCE: Research and findings from Michigan State University Land Policy Institute, 2009, prepared for the Board. NOTE: These estimates are based on the Board's base-case analysis described in the Methodology section and assume a 1.5-megawatt (MW) wind turbine with a hub height of 80 meters. The MW capacity is calculated by multiplying the nameplate capacity of the wind turbine times the estimated number of turbines. The annual energy production in megawatt hours (MWh) is the amount of energy that these turbines are expected to produce over the year, taking into account variability in wind speeds and other factors.

Table 3 shows how the Board excluded areas not suitable. The exclusion criteria were based primarily on criteria for wind turbine siting set forth in "Sample Zoning for Wind Energy

Systems," which was published by the Michigan Energy Office,[3] as well as input from wind energy developers and other experts.[4]

Table 3 - Summary of Exclusion Criteria

Excluded area or buffer	Description	Data source
Great Lakes shoreline	A one-mile buffer inland from each of the Great Lakes was removed to minimize considerations related to disruption of the view, tourism, and potentially ecologically sensitive areas close to shore, i.e., sensitive dune habitat	Michigan Center for Geographic Information (2008b)
Areas not defined as "open space"	Turbine placement limited modeling to areas with open space classification, which consists of six land cover types: agricultural land, shrub or scrub, forest land, barren land, pasture, and grassland	U.S. Geological Survey 2001 National Land Cover Database (2003)
Airports	Excluded areas within 10 miles of commercial airports, 6.32 miles of local airports, and 1.25 miles of small airports (See Note 1)	Environmental Systems Research Institute (2001)
Wetlands	Excluded emergent, forested, and shrub or scrub wetlands, from the National Wetland Inventory, greater than 5 acres (See Note 2)	U.S. Fish & Wildlife Service, National Wetlands Inventory (1994–1997)
Lakes and rivers	Excluded areas within specified distance based on turbine height (i.e., 120 meters or 150 meters)	Michigan Center for Geographic Information (2008c)
Housing and other structures	Excluded areas within 200 meters of built areas, as defined by National Oceanic and Atmospheric Administration (See Note 3)	NOAA, *Land Cover Classification of Michigan* (2001)
Roads	Excluded areas within specified distance of all public roads (i.e., 120 meters or 150 meters) (See Note 4)	Michigan Center for Geographic Information (2008a)

[3] *See*, http://www.michigan.gov/eorenew. On that web page, the link to the appropriate document is under "Publications."

[4] In all scenarios, the Board assumed that federal lands were available for potential placement of wind turbines except in areas that were otherwise removed from consideration due to the exclusion criteria shown in Table 3, including, but not limited to, lakes and rivers, wetlands, steep slope, and the one-mile buffer for the Great Lakes shoreline. In addition, the Board did not model any turbines on Isle Royale and North and South Manitou Islands, all of which are federal lands.

Excluded area or buffer	Description	Data source
State land	Examined three options based on state land availability: (1) State lands were not excluded (that is, state lands were treated like non-state land and turbines were modeled in state lands, including parks, forests, and management areas); (2) All state land excluded; and (3) Turbines limited to state forest management areas only	Ducks Unlimited and the Nature Conservancy in Michigan, Conservation and Recreation Lands (CARL) (2008)
Slope	Land with slope greater than 20% excluded	U.S. Geological Survey (1994)
Urban areas	Excluded all urbanized areas	U.S. Census Bureau (2000)

SOURCE: Michigan State University Land Policy Institute, 2009.
NOTES: (1) Airport exclusions are based on expert input from wind developers in Michigan.
(2) Wetlands greater than 5 acres require permitting and mitigation for construction of turbines and represent additional engineering challenges and material costs for the installation of wind turbines.
(3) This was to account for the state siting guidelines related to turbine noise (i.e., turbine noise at property lines should be less than 55DBa). Both turbine types used in the Board's analysis show a noise signature of 55DBa or less at 150 meters; the added 50 meters accounts for lack of information on the location of property lines.
(4) The state siting guidelines require road setbacks of 1.5 times tower height. Because two different turbines (80 meter and 100 meter) were used in the analysis, two sets of setbacks were developed: 120 and 150 meters for the smaller and larger turbines, respectively.

After identifying the areas of the state that may be available for potential use by wind energy systems based on the application of the exclusion criteria, to calculate a theoretical maximum for the number of turbines that can be placed in a particular area, the Board found that the remaining areas would be overlaid with a grid of wind turbines spaced 450 meters apart based on the inter-turbine spacing required to minimize interference between turbines, known as wind robbing.[5] The theoretical maximum turbine spacing does not take into account many locally important details regarding individual turbine siting. Therefore, reductions of approximately either 4/5 or 2/3 of the theoretical maximum were applied when estimating the number of turbines that might reasonably be expected to be installed in each region.

After accounting for the 4/5 or 2/3 reductions in the maximum number of turbines, **t**he total generating capacity in MW was calculated by the Board by multiplying the nameplate capacity of

[5]This happens when an upwind turbine is placed too close to a downwind turbine and thereby reduces the wind resource available to the downwind turbine.

each turbine by the total estimated number of turbines that might be installed in each township.[6] The annual energy production potential in MWh was calculated for each turbine based on average wind speed, the power curves of the specified turbines, variability of wind speeds, interconnection efficiency, and other factors.[7] The total annual energy production within each township of the state was then calculated by summing the potential of all wind turbines that were modeled as being placed within the township for this analysis. This resulted in a theoretical estimate of capacity and energy production potential by township based on the hypothetical placement of the turbines.

The Board identified the regions of the state with the highest production potential by aggregating townships into five tiers in terms of wind production capability based on estimated total annual energy production and the per turbine power output ratio for each township. Turbines were not placed in cities, villages, and certain townships because of the application of the exclusion criteria. To identify a "region," all townships in the top tier were selected, along with as neighboring townships within the second tier and an additional ring of townships to account for potential error in wind data.

The Board also considered an alternative model, which classified townships as being in one of 15 tiers in terms of wind production capability, with the townships in the top five tiers then selected as the core of each potential wind development region. In this alternative approach, the immediately adjacent townships were included to derive a region. This approach identified nine candidate regions. However, the Board decided only the few largest contiguous areas with the

[6]Because turbines were not placed in cities and villages in the regions due to the application of exclusion criteria (e.g., road setbacks, etc.), this discussion refers to townships only.

[7]This calculation was performed with a Weibull-shape parameter of 2, standard temperature and pressure, and 285-meter elevation. This elevation is the average height above sea level for Michigan and relates to the air density, which can affect the power output. In this context, Weibull analysis refers to the use of probability theory to better estimate the amount of energy a wind turbine is capable of producing.

highest wind potential should be eligible for wind energy resource zone selection and did not use the alternative model.

The Commission's Analysis, Findings, and Recommendations

Following the issuance of the Board's final report on October 15, 2009, the Commission scheduled a hearing to receive public comment. The hearing took place November 23, 2009 at the Commission's Lansing office, with simultaneous electronic links with satellite locations in Bad Axe and Traverse City. The Commission finds that the comments received from the public are helpful to its task of evaluating the Board's findings for purposes of this order. Additionally, the Commission notes that on November 30, 2009, ITC Holdings Corp. (ITC), Wolverine Power Supply Cooperative, Inc. (Wolverine), and Indiana Michigan Power Company, a subsidiary of American Electric Power Company (AEP), filed transmission reports in this docket. The Commission determines that these transmission reports are also relevant to the Commission's evaluation.

At the outset of our analysis, the Commission would like to thank and congratulate the Board and its individual members on an outstanding job of performing its duties under Act 295. As noted previously, Act 295 requires the Commission to consider findings of the Board for its designation of a primary wind zone and possible additional wind zones. The dedication of the Board to its tasks has made the Commission's role much more manageable.

The primary purpose of this order is to designate "the area of this state likely to be most productive of wind energy," which shall be known "as the primary wind energy resource zone." MCL 460.1147(1). The Commission also "may designate additional wind energy resource zones." MCL 460.1147(1).

Section 147(3) of Act 295, MCL 460.1147(3), provides the Commission with the following instructions:

> In preparing its order, the commission shall evaluate projected costs and benefits in terms of the long-term production capacity and long-term needs for transmission. The order shall ensure that the designation of a wind zone does not represent an unreasonable threat to the public convenience, health, and safety and that any adverse impacts on private property values are minimal. In determining the location of a wind zone, the commission shall consider all of the following factors pursuant to the findings of the board:
>
> (a) Average annual wind velocity levels in the region.
> (b) Availability of land in the region that may be utilized by wind energy conversion systems.
> (c) Existing wind energy conversion systems in the region.
> (d) Potential for megawatt output of combined wind energy conversion systems in the region.
> (e) Other necessary and appropriate factors as to which findings are required by the commission.

After careful consideration of and reliance on the findings of the Board, the Commission finds that Region 4 as identified by the Board shall be designated as the primary wind energy resource zone per Act 295. Additionally, the Commission finds that Region 1 as identified by the Board shall also be designated as a wind energy resource zone due to potential necessary transmission upgrades and the likelihood for project development in that region. The two zones designated are thus eligible for expedited transmission siting treatment as provided by Act 295. As for Regions 2 and 3, the Commission notes that there are no currently planned projects in those locations and the Board determined that there was little interest in developing wind farms in either area.

Within the confines of the findings of the Board and in designating these wind energy resource zones, the Commission considered all of the factors set forth in MCL 460.1147(3). The Commission's evaluation of these factors relies heavily on the Board's findings, which are fully detailed in its report filed in this docket. However, the Commission will emphasize the underlying rationale for its conclusions as it considers each of the statutory criteria seriatim.

A. Costs and benefits in terms of long-term production capacity.

The Board report indicates that there is a potential for a minimum of 166 wind turbines with a 1.5 MW per wind turbine nameplate capacity in Region 1, which could be expected to annually produce 747,938 MWh. The maximum number of Region 1 wind turbines is estimated to be 296, which would have a capacity of 445 MW and produce up to 1,338,415 MWh annually.

With regard to Region 4, the Board found that there is a potential for a minimum of 1,578 wind turbines, which would have a capacity of 2,367 MW and which could be expected to annually produce 6,723,472 MWh. The maximum number of Region 4 wind turbines is estimated to be 2,824, which would have a capacity of 4,236 MW and could produce up to 12,031,477 MWh annually.

Because the 1,744 to 3,120 wind turbines will need to be manufactured, constructed, and maintained, it is reasonable to assume that a number of manufacturing, construction, and maintenance jobs will be created. Landowners will receive payments from the wind developers. Tax revenues on the property and income will also be generated for the federal, state, and local governments.

In addition, wind power production is associated with several other benefits that will accrue to Michigan citizens, especially citizens in the designated wind zones. Some of these benefits, however, are not presently accounted for in most assessments of electric power costs. These include, for example, reductions in noxious emissions and air pollutants, resulting in cleaner air; avoided fuel imports; increased fuel diversity and sustainability; increased energy self-reliance and security; and greater energy price stability.

B. Costs and benefits in terms of long-term need for transmission.

Investments in transmission upgrades to achieve the wind energy potential in Michigan are significant in Region 4. Currently, under transmission planning in both Midwest ISO and PJM, the focus tends to be on planning for single project upgrades. Such planning on an individual project basis does not enable the state to benefit from efficiency opportunities for the system, effective right of way usage, and a wholistic approach to meeting out RPS goals.

In Region 1, ITC, Michigan Electric Transmission Company (METC), and Wolverine do not expect the wind energy potential of 249 to 445 MW to require any transmission upgrades. However, AEP reports that only 75 MW of new generation may be interconnected to its system without necessitating additional upgrades. AEP suggests that an extra-high voltage (EHV) overlay, such as the previously proposed 765 kilovolt (kV) loop through Lower Michigan, will be needed to integrate large amounts of variable-output power generation into the grid.[8]

The vast potential for wind development in Region 4, however, reveals a need to upgrade that area's transmission infrastructure. These findings were thoroughly spelled out in the joint transmission report filed by ITC and Wolverine in this docket, and are not fully restated here. It is sufficient to note that significant transmission system enhancements would be required in this region. Options include six 230 kV circuits to support the minimum wind generation capacity level, at an approximate cost of $560 million, or eight 230 kV circuits or four 345 kV circuits to support the maximum wind generation capacity level, at approximate costs of $740 million and $510 million, respectively. In addition, there would be costs associated with needed distribution system upgrades required to integrate the new higher voltage transmission upgrades.

[8]AEP transmission report, Case No. U-15899, 11/30/2009, http://efile.mpsc.state.mi.us/efile/docs/15899/0026.pdf.

Because 70% of Michigan's estimated renewable energy generation is located in Region 4, the Commission finds that Region 4 should be designated as the primary wind zone. In doing so, **t**he Commission needs to address the issue of the cost allocation methodology for the transmission build-out required to develop renewable wind generation in Michigan's Region 4.

Currently, the cost allocation methodology in the Midwest ISO tariff is intended for transmission designed to meet reliability and market efficiency criteria, but does not adequately address the unique circumstances of transmission needed for renewable energy development and the equitable sharing of associated costs within Michigan.

Under the current Midwest ISO tariff, transmission that is pre-built to serve future wind generation qualifies as an "other" project, and all of the costs for the project's transmission investments eventually would be recovered from retail customers in that transmission owner's local geographic territory, which, in Michigan, corresponds with the distribution utility's local pricing zone. Region 4 falls entirely within the service territory of The Detroit Edison Company (Detroit Edison) and Thumb Electric Cooperative. Detroit Edison is rightly concerned that its customers may end up paying the costs for all of the anticipated transmission upgrades in addition to the cost of related investments Detroit Edison must make to upgrade its high voltage distribution circuits and substations to accommodate electric power flows that will result from the construction of the higher voltage transmission lines in this area. This is despite the fact that other utilities within Michigan will be utilizing that same transmission to meet their renewable energy plan requirements.

The Commission believes one way to solve this problem is an agreement[9] between the parties on cost sharing or allocation. This agreement would be to aggregate and allocate among the parties the costs of building the needed transmission to support development of the Region 4 wind resources. Furthermore, the Commission recommends that a deadline for an expeditious agreement be imposed to preserve the queue positions of wind developers currently under the time constraints of the Midwest ISO generator interconnection queue process as well as to facilitate the implementation of Michigan electricity providers' renewable energy plans.

Toward that end, the Commission orders that all affected parties shall have 21 days from the date of this order to reach agreement on a voluntary cost allocation methodology for the transmission upgrade projects needed to develop wind generation in Region 4 as designated in this order. If an agreement is reached, then the necessary actions will be taken by the parties at the Midwest ISO.

However, if after the passage of 21 days, the parties are unable to resolve a cost allocation treatment amongst themselves, then the Commission will pursue another process to resolve the matter from amongst the available options that are open to the Commission.[10]

C. Public Convenience, Health, and Safety.

First, it should be noted that neither the Board nor any other participant to the proceedings expressed any explicit concern that wind turbines would present a threat to the public convenience. For that reason, the Commission finds that wind projects will not pose an unreasonable threat to public convenience.

[9]Midwest ISO FERC Electric Tariff, Section III.A.2 allows for the assignment of cost responsibility based on an agreement from one or more market participants electing to assume those costs.

[10]Among the options available is the creation of a single pricing area in Michigan's Lower Peninsula for transmission charges.

Additionally, at this time the Commission is not persuaded that wind projects to be located in the designated zones have been demonstrated to pose any threat to health or safety of the public. The Commission, however, is cognizant that there is disagreement with this finding.

During the comment phase, many comments were received regarding the potential effects wind turbines and wind farms might have on the health and safety of adjacent land owners. Some persons favored increased wind development. Notably, thirteen people expressed explicitly negative comments, stating various recommendations for changes in Michigan wind farm development policies. Some persons wanted greater setback distances from turbines. Others wanted to ban the development of wind turbines in farming communities or near houses. A few supported a complete moratorium on any wind development in their communities.

Several comments request additional research on potentially adverse health effects alleged to occur due to close proximity to wind turbines. Some recommend that health studies should be completed and moratoria should be put in place until that time. There were general comments on further setbacks for new installations being recommended to minimize any potentially adverse health and safety impacts. Residents living in potential wind zone areas expressed concerns about negative health effects they believe will arise from commercial scale wind turbines, due to low-frequency sound and infra-sound.[11] Some referred to a World Health Organization (WHO) document,[12] which they allege recommends a one-mile setback. Some also referenced the 2009 book "Wind Turbine Syndrome" written and self-published by Nina Pierpont, M.D.

The Commission is aware that the WHO report referenced in comments is a general report about noise from any source, which does not specifically address noise from wind turbines.

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[11]Infra-sound refers to waves below the commonly understood threshold for human hearing.

[12]World Health Organization Europe Night Noise Guidelines for Europe 2009 http://www.euro.who.int/Document/E92845.pdf

Further, the WHO report does not differentiate between measurable noise coming from inside or outside the dwelling. As for Dr. Pierpont's book, supporters of wind power filed comments that called her conclusions into question.

The Commission observes that the docket also contains comments that refute health and safety setback concerns expressed by others. Some commenters believe that persons with noise and other setback concerns are, by and large, those who are not happy with compensation from the wind development companies. There were also comments from residents that live within 1,000 feet of a wind farm and 1,700 feet of three wind turbines that have no complaints of noise or complications with the wind turbines.

Finally, the Commission notes that the American and Canadian Wind Energy Associations have published a report from a panel of experts that "undertook extensive review, analysis, and discussion of the large body of peer reviewed literature on sound and health effects in general, and on sound produced by wind turbines." That panel of experts concludes that the current literature indicates no evidence that the audible or sub-audible sounds emitted from wind turbines have any direct adverse physiological effects.[13] This report also concludes that ground-borne vibrations from wind turbines are too weak to be detected by humans and that the sounds emitted by wind turbines are not unique. In summary, this report finds no reason to believe that the sounds from wind turbines could have adverse health consequences.

Given the extreme divergence of opinion by both the experts and ordinary citizens, the Commission finds that it cannot conclude that the interests of the public in convenience, health, and safety will be adversely affected by the construction of wind farms in Michigan.

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[13]Wind Turbine Sound and Health Effects, December 2009. An Expert Panel Review prepared by American Wind Energy Association & Canadian Wind Energy Association. http://www.awea.org/newsroom/releases/AWEA_CanWEA_SoundWhitePaper_12-11-09.pdf

D. Effect on Private Property.

MCL 460.0147(3) requires the Commission to assure that "any adverse impacts on private property values are minimal."

At the Commission's November 23 public hearing, eighteen comments were received regarding potential effects of wind farm proximity on real estate values. All but one of the comments addressed wind farm development negatively. Negative comments compared wind farm development effects on property values with commercial and industrial development and the claimed negative effects those types of development might have on rural, residential real estate values. One commenter stated that potential real estate buyers in the area of the proposed farms are awaiting confirmation of wind development plans before purchasing in the area. Others want assurances that the wind developer or utility company will give them the undepreciated fair market value for their homes, if and when they decide to sell. Many of the comments referred to studies purported to have found detrimental impacts on real estate values due to wind farms, but none contained direct references.

The Commission can appreciate that the current condition of the state's economy no doubt has contributed to heightened sensitivity regarding real property values. Many homeowners have seen the value of their houses decline in recent years. This is a statewide and even national and international phenomenon related to many factors including the recent financial crisis and associated bank failures, high unemployment rates, and a general and widespread sense of financial insecurity. Given the current economy, the Commission finds that it would be erroneous to assume that wind farms are solely to blame for any drop in real estate values.

In this regard, the Commission notes a recent Lawrence Berkeley National Laboratories (LBL) report issued December 2, 2009, which investigates the effect of proximity to and views of wind

farms on real estate values. This study employs market data from approximately 7,500 real estate transactions in the vicinity of 24 wind farms scattered over 9 states. The homes studied were located anywhere from 800 feet to over 5 miles from the nearest turbine and the transactions analyzed took place as much as two years prior to any announcement of a planned wind farm to four years after construction. The LBL report reaches this conclusion:

> Based on the data and analysis presented in this report, no evidence is found that home prices surrounding wind facilities are consistently, measurably, and significantly affected by either the view of wind facilities or the distance of the home to those facilities. Although the analysis cannot dismiss the possibility that individual or small numbers of homes have been or could be negatively impacted, if these impacts do exist, they are either too small and/or too infrequent to result in any widespread and consistent statistically observable impact. Moreover, to the degree that homes in the present sample are similar to homes in other areas where wind development is occurring, the results herein are expected to be transferable.[14]

Based on the current knowledge of the subject, the Commission cannot reasonably conclude that wind developments in the designated wind energy resource zones will have a significant adverse effect on private property values. On the contrary, the increased job creation from the construction and maintenance of wind farms, and perhaps more importantly the increased manufacturing jobs associated with wind powered electricity production, could plausibly have positive effects on property values in the wind zones and throughout broader areas in Michigan and the Midwest.

E. Average annual wind velocity levels in the regions.

The Board observed that wind speeds are typically reported at different heights, including elevations of 30, 50, and 100 meters, and are generally faster at higher elevations. It appears that the 100-meter wind speed data for Michigan corresponds well with the height of commercial wind

[14] The LBL report is available at http://eetd.lbl.gov/ea/ems/re-pubs.html , p. 75.

turbines used currently by industry, which typically have hub heights ranging from 80 to 100 meters. There appears to be, however, greater confidence with the 50-meter statewide data for Michigan because it has been validated with additional measurements. Thus, the Commission finds that both the 50-meter and 100-meter data that is presently available are appropriate measures of wind speeds in Michigan.

Based on both the 50-meter and 100-meter data, it appears to the Commission that Michigan has ample areas of land, in multiple regions, with wind speeds that could support utility-scale wind energy development. Wind is classified according to wind power classes, which are based on typical average annual wind speeds.[15] Exhibit 19 to the Board's report shows the areas in Michigan with Class 3 or higher winds at 50 meters. According to the Board, these areas are expected to have even greater wind productivity at 100 meters.

F. Availability of land in the region that may be utilized by wind energy conversion systems.

As discussed earlier, the Board applied on a statewide basis a number of exclusion criteria for roads, airports, wetlands, Great Lakes shoreline, and other natural and man-made features to determine the land available for potential use by wind energy systems. Exhibit 20 in the Board's report shows the land areas remaining after the application of all these exclusion criteria.

G. Existing wind energy conversion systems in the regions.

As of April 2009, there were five utility-scale wind energy systems operating in Michigan, consisting of a total of nearly 130 MW of installed capacity; almost all of this capacity was placed into service during 2008. Information on these systems is shown in Table 4. The two largest and newest wind systems, Michigan Wind I and Harvest Wind Farm, are located in Region 4.

[15]U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Wind Powering America – Michigan Wind Resource Map [online, accessed 5/14/09], available: http://www.windpoweringamerica.gov/maps_template.asp?stateab=mi.

Table 4 - Wind Energy Systems in Service in Michigan, April 2009

Name	Location	Capacity (MW)	Units	Turbine manufacturer	Developer/ owner	Power purchaser	Year online
Michigan Wind I	Ubly, Huron County	69.0	46	GE Energy	Noble Environmental Power/John Deere Wind Energy*	Consumers Energy	2008
Stoney Corners Wind Farm	Richland Township, Missaukee County	5.0	2	Fuhrlander	Heritage Sustainable Energy	DTE Energy	2008
Harvest Wind Farm	Pigeon, Huron County	52.8	32	Vestas	John Deere Wind Energy	Wolverine Power Cooperative	2008
Mackinaw City	Mackinaw City	1.8	2	NEG Micon	Mackinaw Power	Consumers Energy	2001
Traverse City Light and Power	Traverse City	0.6	1	Vestas	Traverse City Light and Power	Traverse City Light and Power	1996

SOURCE: American Wind Energy Association, U.S. Wind Energy Projects – Michigan as of March 31, 2009 [online, accessed 5/14/09], available: http://www.awea.org/projects/Projects.aspx?s=Michigan.
* Michigan Wind 1 is part of the former Noble Thumb Windpark, which John Deere Renewables acquired from Noble Environmental Power in October 2008.

H. Potential for MW output of combined wind energy conversion systems in the regions.

Table 2 displays the Board's minimum and maximum estimates of the number of turbines, wind energy generating capacity, and annual energy production associated with each of the identified regions.

THEREFORE, IT IS ORDERED that:

A. The Wind Energy Resource Zone Board report is formally accepted.

B. The area of this state likely to be most productive for wind energy as the primary wind energy resource zone is Region 4 as specified in the Wind Energy Resource Zone Board report.

C. Region 1 is designated as an additional wind energy resource zone.

D. Affected parties shall have 21 days from the date of this order to reach agreement on a voluntary cost allocation methodology for the transmission upgrade projects needed to develop wind generation in Region 4.

The Commission reserves jurisdiction and may issue further orders as necessary.

Any party desiring to appeal this order must do so in the appropriate court within 30 days after issuance and notice of this order, under MCL 462.26.

MICHIGAN PUBLIC SERVICE COMMISSION

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Orjiakor N. Isiogu, Chairman

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Monica Martinez, Commissioner

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Greg R. White, Commissioner

By its action of January 27, 2010.

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Mary Jo Kunkle, Executive Secretary