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ATTORNEYS AT LAW

November 30, 2009

Ms. Mary Jo Kunkle
Executive Secretary
Michigan Public Service Commission
6545 Mercantile Way
Lansing, MI 48909

Via E-Filing – Paperless

Dear Ms. Kunkle:

Re: MPSC Case No. U-15899 (Paperless E-File)

Please find enclosed for filing in the above captioned matter a public copy of Indiana Michigan Power Company's response to the Commission's December 4, 2008 Order. The Staff may contact me to arrange access to the confidential version of the response.

Thank you for your assistance. If you have any questions, please feel free to call.

Very truly yours,

FAHEY SCHULTZ BURZYCH RHODES PLC

Richard J. Aaron

Digitally signed by Richard J. Aaron
DN: cn=Richard J. Aaron, o=Fahey Schultz Burzych Rhodes PLC, ou, email=raaron@fsblawyers.com, c=US
Date: 2009.11.30 15:37:32 -05'00'

Richard J. Aaron

/mln

Enclosure

cc w/enc: Matt Satterwhite ***(Via Electronic Transmission)***

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AEP INDIANA MICHIGAN POWER®

A Unit of American Electric Power

Wind Integration in Michigan

Information for the Michigan Public Service Commission
In Accordance with Section 147 of Public Act 295 of 2008
Relating to the Final Report of the Wind Energy Resource Zone Board

PUBLIC
REDACTED VERSION

November 30, 2009

TABLE OF CONTENTS

EXHIBITS

1 FOREWORD

The Commission's December 4, 2008 order in Case No. U-15899 directs electric utilities, affiliated transmission companies, and independent transmission companies to identify existing or new transmission infrastructure necessary to deliver maximum and minimum wind energy production potential for each of the identified regions (Exhibit 1) and to submit such information to the Wind Energy Resource Zone Board's (Board) for its review upon release of the board's final report. According to the request, the information provided shall include estimates of the cost and construction timing associated with any new transmission infrastructure. That report was noticed to the industry by the Michigan Public Service Commission (MPSC) on October 15, 2009.

This document discusses the results of wind integration studies carried out by the American Electric Power Service Corp, as agent for Indiana Michigan Power (I&M), to support the efforts of the board in developing a renewable generation portfolio for the State. I&M appreciates the opportunity to provide comments on this issue and is excited about the prospect of harnessing wind energy in the State of Michigan. Even though the regions defined by the MPSC for wind development are outside of I&M's service territory, I&M stands ready to be part of this venture and supports the MPSC's forward-looking planning approach to the interconnection of wind projects.

2 CONFIDENTIAL CRITICAL ENERGY INFRASTRUCTURE INFORMATION (CEII)

There are a number of exhibits referred to in this document that involve critical energy infrastructure information that I&M is unable to put in this public filing. Those exhibits are *Confidential Exhibits 2-6*. I&M commits to make the documents available to the Commission Staff upon request for reference as long as the confidentiality of the documents can be preserved.

The confidential exhibits include details of I&M's transmission facilities considered to be CEII. FERC regulation 18 CFR 388.113(c)(2) defines CEII as specific engineering, vulnerability, or detailed design information about proposed or existing critical infrastructure that:

> (i) Relates details about the production, generation, transportation, transmission, or distribution of energy;
> (ii) Could be useful to a person in planning an attack on critical infrastructure;
> (iii) Is exempt from mandatory disclosure under the Freedom of Information Act, 5 U.S.C. 552; and
> (iv) Does not simply give the general location of the critical infrastructure.

The FERC definition includes existing and proposed systems and assets, whether physical or virtual, the incapacity or destruction of which would negatively affect security, economic security, public health or safety, or any combination of those matters.

3 AEP'S EAST ZONE TRANSMISSION SYSTEM

The American Electric Power (AEP) System East Zone (AEP East System) consists of the transmission facilities of the seven eastern AEP operating companies. I&M is one of the electric operating companies in the AEP East System, owning Transmission, Distribution and Generation assets in the States of Indiana and Michigan. This transmission system spans portions of seven states and is planned and operated on an integrated basis and is comprised of over 15,000 miles of circuitry operating at or above 138 kV. The AEP East System is a large integrated transmission system directly connected to eighteen neighboring utility transmission systems at 131 interconnection points, of which 49 are at or above 345 kV. These interconnections provide an electric pathway to assure access to off-system resources as well as a delivery mechanism to adjacent companies.

I&M transmission facilities in the State of Michigan are shown in Confidential Exhibit 2. These facilities are located in Berrien, Cass, Kalamazoo, St. Joseph and Van Buren counties. As mentioned earlier, I&M's transmission system does not extend into the regions identified for wind development by

the board. A radial 69 kV transmission line serving an I&M wholesale customer owned station in Van Buren County is the closest I&M facility, adjacent to the southern boundary of Region 1 in Allegan County. This customer owned facility, known as Phoenix Road Station, is approximately 3.8 miles North of the I&M owned Phoenix Switch. In essence, the closest transmission facility available for a viable generation interconnection is approximately 4 miles from Region 1.

The AEP East System is part of the PJM Interconnection Regional Transmission Organization (PJM) and participates in the PJM energy market. The AEP East System, along with the transmission systems of other members of PJM, is planned on a regional basis through membership in PJM. Therefore, the wind integration analysis presented in this document should be considered as preliminary in the sense that PJM Interconnection, as the registered transmission planner for the AEP East System, including I&M's transmission facilities in Michigan, is responsible for developing and coordinating the Regional Transmission Expansion Plan (RTEP). Furthermore, in accordance with PJM's Open Access Transmission Tariff, Part IV, all requests for generation interconnection to PJM's transmission system must be evaluated by PJM.[1]

4 WIND INTEGRATION ANALYSIS

The board has specified a maximum wind capacity of 445 MW and a minimum wind capacity of 249 MW for Region 1.[2] In the absence of an explicit scope of study to integrate these levels of proposed wind in Region 1, identifying the potential wind capacity that may eventually connect to I&M's Transmission system is not feasible. It is not apparent as to how much of the minimum or maximum wind capacity must be connected to each transmission owner within and in the vicinity of the defined regions. Assuming that the maximum amount of wind will request interconnection to one transmission owner

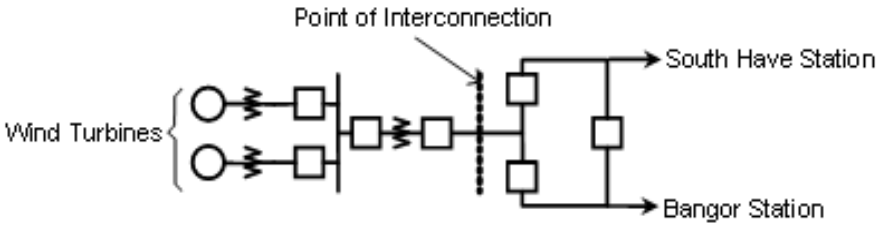
[1] PJM Manual 14A; Generation & Transmission Interconnection Process
http://www.pjm.com/documents/~/media/documents/manuals/m14a.ashx

[2] See Exhibit 1, page 4 for Regions on the MPSC report located at:
http://www.dleg.state.mi.us/mpsc/renewables/windboard/werzb_final_report.pdf

within the region is not reasonable. The amount of capacity interconnected to each transmission owner's system will drive the transmission expansions required.

The most cost effective wind integration solution to achieve the maximum capacity and energy levels for each region while providing the flexibility to interconnect other wind resources in the future should involve optimal placement of wind projects that utilize the available capacity on the transmission system. Without this approach, it is not possible to observe potential tradeoffs between transmission and generation costs of various alternative wind development scenarios. The remaining wind resources in the regions, if any, may be interconnected by developing a collaborative transmission overlay plan. This overlay will help mitigate the variability associated with wind while providing the flexibility to export access wind energy during light load conditions. Please see the section below that explains this overlay in more detail.

The AEP summer peak power flow model was used to assess the performance of the existing I&M transmission system in Michigan during the projected peak of 2013 with different levels of wind penetration. For the purposes of this analysis it was assumed that Phoenix Switch will be converted to a Substation, which will serve as a point of interconnection for wind projects in Region 1.



Phoenix Interconnection Station - Figure 1

Wind projects, in peak load scenarios, are usually studied at an output level which is significantly lower than the nameplate capacity. For instance, in the present generation interconnection queues within

PJM, a 13% capacity value at peak load levels is assigned to a wind project requesting interconnection. However, to completely assess the transmission system performance, light load conditions must also be analyzed. This is particularly important for wind resources connected to the load serving sub-transmission system because available transmission margins are typically small. Therefore, in this assessment, the wind projects are modeled at full capacity and unity power factor. This assumes that the wind projects will not depend on the connected system for reactive power support nor will they provide any reactive support to the system.

Confidential Exhibits 3 thru 6 contain "transcription diagrams" which detail the technical feasibility studies conducted to evaluate transmission system performance for various levels of wind penetration.

The transcription diagram in *Confidential Exhibit 3* illustrates the loading and voltage profile of I&M's 69 kV system in Michigan for a maximum wind penetration of 445 MW under normal conditions; i.e., with no prior outage of a transmission facility or component. The 69 kV transmission facilities, under this scenario, are loaded beyond their thermal capabilities with voltages as low as 0.86 per unit (86% of nominal). This analysis clearly shows that I&M's 69 kV transmission system in its current state cannot interconnect 445 MW of Wind.

The transcription diagram in *Confidential Exhibit 4* illustrates the loading and voltage profile of I&M's 69 kV system in Michigan for a minimum wind penetration of 249 MW under normal conditions. The 69 kV transmission facilities, under this scenario, are still loaded beyond their thermal capabilities. As *Confidential Exhibit 5* demonstrates, transmission line loadings increase further and the voltage profile deteriorates under single outage scenarios.

The transcription diagram in *Confidential Exhibit 6* illustrates the loading and voltage profile of I&M's 69 kV system in Michigan for 75 MW of wind interconnection under single contingency

conditions. At this level of wind penetration, the system performance meets AEP's transmission planning criteria.

5 NEED FOR AN OVERLAY & COLLABORATIVE STUDIES

As explained above, the current I&M system cannot interconnect the estimated 445 MW of wind potential. Thus, in order to accommodate connection of wind generators in excess of 75 MW, investment in the existing infrastructure would be required. The issue facing Michigan is the same issue faced by other states and RTOs across the country as individual planning authorities struggle to integrate significant amounts of renewable generation resources while not jeopardizing the integrity of the interconnection-wide grid. Since most planning initiatives today focus on specific regional processes or on single goal solutions, we are inherently missing the opportunity to maximize the utilization and value of the interconnection-wide transmission grid. Piecemeal planning on an individual basis can result in missed energy efficiency opportunities, long-term reliability compromises, and increased ROW usage compared to designing an effective and efficient long-term interconnection-wide solution.

The Michigan 765 kV Feasibility Study, performed in 2007, is an excellent example of this point. This technical study evaluated the feasibility of extending AEP's 765 kV transmission infrastructure into and through the state of Michigan.[3] The study proposed that the existing 765 kV transmission system integrating the southwest corner of the Lower Peninsula of Michigan be extended east across Michigan and south down to the existing 765 kV infrastructure in Ohio (Exhibit 7). This study focused on identifying the benefits of overlaying the existing and currently planned lower voltage transmission system with higher voltage EHV transmission lines. The addition of the 765 kV lines frees up significant amounts of transmission capacity on the existing 345 kV system throughout the Lower Peninsula of

[3] Please see http://www.aep.com/about/transmission/docs/AEP&ITC-TechnicalStudyReportJuly27-2007.pdf for a copy of the study which was performed under a memorandum of understanding with ITC Holding Corp.

Michigan and northern Ohio. This would allow as much as 5,000 megawatts (MW) of additional power to be transported to and/or through these areas from more distant generation resources. In addition, to providing access to a broader range of competitive generation resources, increased transfer capability through Michigan lessens the need for new generation in Michigan that would otherwise be needed to meet generation reserve requirements.

6 CONCLUSION

In conclusion I&M has identified three specific areas of consideration related to the MPSC's request to identify existing or new transmission infrastructure necessary to deliver maximum and minimum wind energy production potential for each of the regions identified. Those main issues for consideration are:

1) Necessary Upgrades - Unless significantly upgraded, I&M's current system cannot integrate the total 445MW of wind potential in Region 1,

2) PJM/MISO Involvement - Regardless of where upgrades are recommended, PJM and/or Midwest ISO will need to be involved to evaluate the upgrades to the system, and

3) Integration Solution - There is a lack of integration of new renewable resources within the state of Michigan. Overlay of the existing lower-voltage Michigan network is recommended as a solution to solving the problem. In particular, a looped EHV solution is recommended to prepare for existing capacity needs and future growth requirements across the state of Michigan.

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Exhibit - 1

Regions Identified by MPSC Wind Resource Zone Board

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Confidential Exhibit - 2

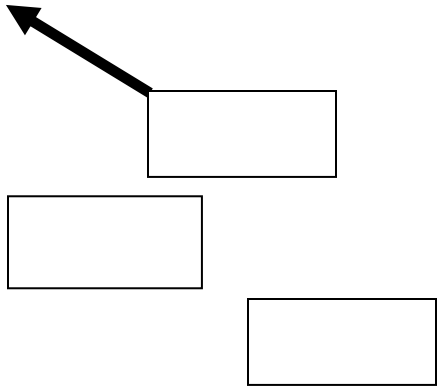
I&M's Transmission System in the State of Michigan

REGION 1

Redacted as CEII

I&M's Transmission System in the State of Michigan for 445 MW of Wind Penetration – Normal Conditions

Redacted as CEII



CONFIDENTIAL EXHIBIT - 4

I&M's Transmission System in the State of Michigan for 249 MW of Wind Penetration – Normal Conditions

Redacted as CEII

CONFIDENTIAL EXHIBIT - 5

I&M's Transmission System in the State of Michigan for 249 MW of Wind Penetration – Single Contingency

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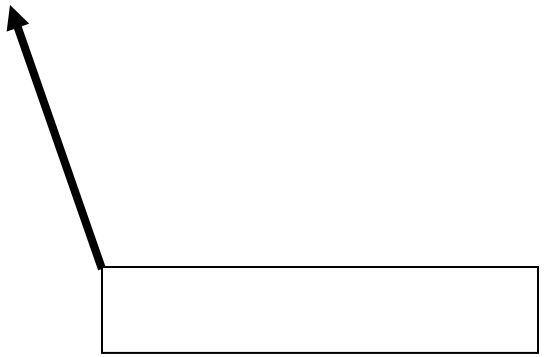

CONFIDENTIAL EXHIBIT - **6**

I&M's Transmission System in the State of Michigan for 75 MW of Wind Penetration – Single Contingency

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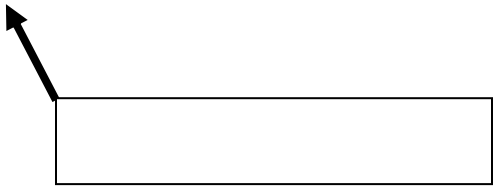

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Exhibit - 7

Conceptual Map of AEP – ITC 765 kV Proposed Project