CLEAN LINE
ENERGY PARTNERS

January 30, 2014

Brad Borum
Director of Electricity
Indiana Utility Regulatory Commission
PNC Center, Suite 1500 East
101 West Washington Street
Indianapolis, IN 46204

Dear Mr. Borum:

On November 1, 2013, Indiana Michigan Power ("I&M") filed its Integrated Resource Plan ("IRP"), a document that outlines the overall direction of resource procurements for the 20-year planning horizon. Pursuant to 170 IAC 4-7-2, interested parties are permitted to submit comments on Indiana Michigan Power's IRP within 90 days from its filing date. Clean Line Energy Partners LLC ("Clean Line") respectfully submits these comments.

Respectfully,

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I. Background

As new environmental regulations make existing power generation fleets more expensive, and wind turbine technology continues to improve, high capacity factor wind has become more competitive with other new and existing sources of energy. To access the highest value wind, and thus the least expensive wind energy, an expansion of the electric transmission grid is needed. Clean Line hopes to play an instrumental role in accelerating the delivery of high capacity factor wind power from the central United States to distant load centers by developing long-distance transmission lines.

Clean Line will employ high-voltage direct current ("HVDC") technology to move power as efficiently as possible over long distances, for a total delivered energy price that is competitive with all other types of new generation. Clean Line and its subsidiaries are developing two HVDC transmission line projects that could deliver low-cost, clean energy to I&M and other utilities in the region. The first project, the Grain Belt Express Clean Line ("Grain Belt Express"), is a 750-mile transmission line that originates near Dodge City, Kansas and extends to the Sullivan 765 kV substation in southwestern Indiana. Grain Belt Express is a multi-terminal HVDC project with three converter stations. One converter station will be in western Kansas, where new wind generating facilities will connect to it via alternating current ("AC") lines. The two other converter stations will enable delivery of electricity to the existing AC grid through interconnections with the Midcontinent Independent System Operator, Inc. ("MISO") in Missouri, and with the PJM Interconnection, L.L.C. ("PJM") in Indiana. In May 2013, the Indiana Utility Regulatory Commission ("IURC") granted Grain Belt Express Clean Line LLC a Certificate of Public Convenience and Necessity in Indiana. Grain Belt Express Clean Line LLC also obtained requisite regulatory approvals in Kansas, including a permit to construct the 370-mile Kansas portion of the project in November 2013 and a certificate to operate as a public utility in Kansas in

December 2011. Grain Belt Express expects to be delivering electricity to MISO and PJM as early as 2018.

The second project, the Rock Island Clean Line "Rock Island", is a 500-mile HVDC transmission line that will deliver 3,500 megawatts of wind power from northwest Iowa to the 765 kV Collins substation near Chicago. Rock Island Clean Line LLC has obtained negotiated rate authority from the Federal Energy Regulatory Commission ("FERC") to negotiate transmission service agreements with customers. In addition, Rock Island Clean Line LLC has applied to the Illinois Commerce Commission to become a public utility and certificate the portion of the route in Illinois. Rock Island Clean Line LLC has also initiated a similar proceeding for the Iowa portion of the route with the Iowa Utilities Board. Rock Island expects to begin delivering low-cost electricity to PJM as early as 2017.

Each of the Grain Belt Express and Rock Island Clean Line projects is expected to deliver approximately 18 million megawatt-hours of renewable energy per year. The economic benefits of the projects include reducing wholesale electricity prices, while providing a low-cost option to meet growing demand for renewable energy. Grain Belt Express and Rock Island will also provide a substantial opportunity for economic development from the manufacturing, construction, and operation of the transmission lines and associated wind farms. The projects will increase the geographical diversity of the wind power in the MISO and PJM transmission systems, thereby reducing net variability of wind energy, facilitating wind integration, and improving grid reliability. Both projects will also have a positive impact on the environment by reducing the need for energy generated by power plants that emit carbon dioxide, SO_2, NO_x, and mercury. Further, the projects will reduce water withdrawal and evaporation required for cooling thermal power plants.

II. Comments

A. The IRP should consider high capacity factor wind energy from out of state because of its low costs.

I&M should consider high capacity factor wind power imported from outside of Indiana as an affordable way to meet its energy needs. The IRP acknowledges that "advancements in both solar PV and wind turbine manufacturing have brought costs down."[1] However, the IRP's assumed cost at real value of $65/MWh[2] for wind power purchase agreements does not reflect the cost of wind energy that can be generated in regions with high capacity factor wind, such as western Kansas. In January 2014, Grain Belt Express completed a Request for Information ("RFI") for wind generators located in and around western Kansas, to determine the level of interest in Grain Belt Express. Over 13,500 MW of wind farm projects under development responded to the RFI. As part of their responses, generators provided indicative power purchase agreement pricing, which is their own calculation of their levelized cost of energy. As can be seen in Table 1 and 2, the lowest-priced 4,000 MW of wind generation was priced at an average of $17/MWh[3] (in real 2013 dollars) with the Production Tax Credit ("PTC"), and $39/MWh[4] (in real 2013 dollars) without the PTC.

Table 1: Cost of Wind Energy Delivered by Grain Belt Express with the PTC

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	Nominal Price ($/MWh)	2013 Real Price ($/MWh)
Wind Energy Price	20	17
Clean Line Tariff Price	15- 20	13-17
Delivered Energy Cost	35- 40	30- 34

[1] Indiana Michigan Power Integrated Resource Planning Report to the Indiana Utility Regulatory Commission, Nov. 1, 2013, pp 124
[2] Indiana Michigan Power Integrated Resource Planning Report to the Indiana Utility Regulatory Commission, Nov. 1, 2013, pp 129
[3] The Grain Belt request for information requested flat nominal prices for 25-year PPAs. To better compare to the I&M inputs given in real dollars, Clean Line converted these flat nominal prices to real 2013 dollars assuming 2% annual inflation and discount rate of 9%.
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Table 2: Cost of Wind Energy Delivered by Grain Belt Express without the PTC

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	Nominal Price ($/MWh)	2013 Real Price ($/MWh)
Wind Energy Price	47	39
Clean Line Tariff Price	15- 20	13- 17
Delivered Energy Cost	62- 67	52- 56

I&M states in its IRP, "[a]nother obstacle with wind power is that its most critical factors (i.e., wind speed and sustainability) are typically highest in very remote locations, and this forces the electricity to be transmitted long distances to load centers necessitating the build out of EHV transmission to optimally integrate large additions of wind into the grid."[5] Through its Grain Belt Express and Rock Island projects, Clean Line is seeking to address these challenges. The cost to deliver to Indiana, through the Grain Belt Express, would be about $13 to $17/MWh (in real 2013 dollars.) Adding this cost to the wind energy price would result in an overall delivered energy cost without PTCs of $52 to $56/MWh, which is substantially lower than I&M's assumption of $65/MWh in the IRP. (The values are shown in nominal dollars and real dollars in Table 2.)

I&M assumes in its IRP that the PTC will lapse at year-end 2013.[6] However, projects started by year-end 2013 have until 2015 to take advantage of the PTC. Many developers have purchased turbines in 2013 in order to be able to install them in future years and claim the PTC. Further, since its creation in the mid-90s, the production tax credit has been extended every time that it has faced expiration.

[5] Indiana Michigan Power Integrated Resource Planning Report to the Indiana Utility Regulatory Commission, Nov. 1, 2013, pp 124
[6] Indiana Michigan Power Integrated Resource Planning Report to the Indiana Utility Regulatory Commission, Nov. 1, 2013, pp 129

Rather than assume its demise, a more appropriate assumption would be for I&M to assume the PTC is available in future years. Alternatively, I&M could run a sensitivity analysis assuming the availability of the PTC.

B. Out of state wind offers increased capacity value.

I&M credits wind with a capacity value of 13% of the nameplate capacity.[7] While 13% is the default capacity value ascribed to wind by PJM, the value can be updated based on actual wind data and output pursuant to PJM Manual 21.[8] In high wind speed sites with modern turbine technology, the actual capacity value of wind is much higher than 13%, a historical figure derived from less windy sites with now obsolete technology. Based on Clean Line's meteorological program in western Kansas and detailed analysis of hourly production data, Clean Line believes the capacity contribution of western Kansas wind delivered by Grain Belt Express will be about 40%. This value is derived using the method set forth in PJM Manual 21 and is based on the average output during peak summer hours ending 3, 4, 5 and 6 local prevailing time.

C. Out of state wind also increases the geographic diversity of wind generation in the PJM footprint.

The IRP acknowledges that additional cycling capability may be needed in thermal generation as renewable energy penetration increases.[9] This need can be reduced by integrating wind across a wide geographic footprint. Geographically dispersed wind farms produce energy at different times, and therefore create smaller ramps on the grid.

For example, the times when the wind is blowing in western Kansas, the western terminus of the Grain Belt Express, are almost completely statistically independent from times when the wind blows

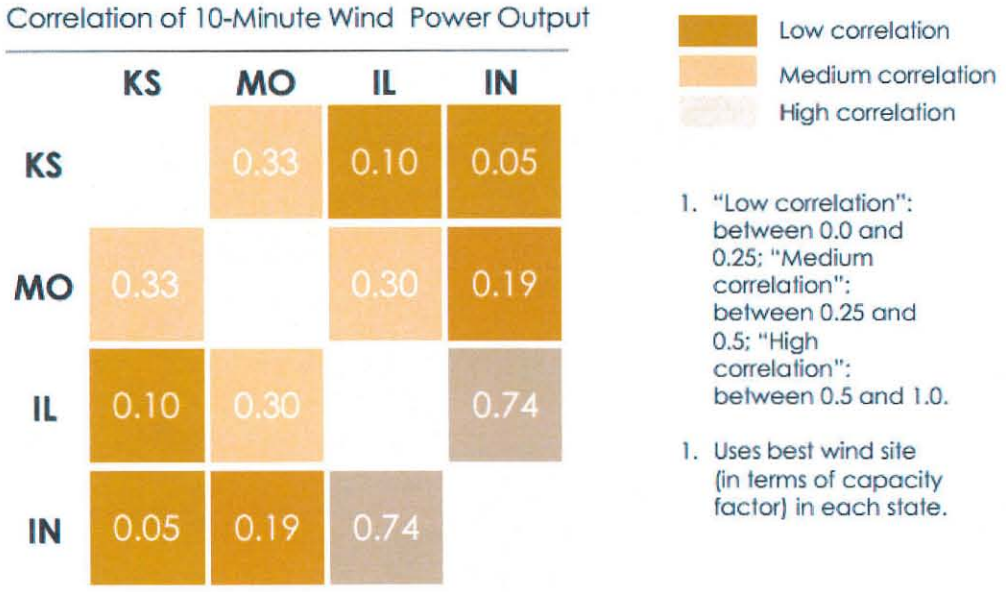
[7] Indiana Michigan Power Integrated Resource Planning Report to the Indiana Utility Regulatory Commission, Nov. 1, 2013, pp 129
[8] PJM Manual 21, October 1, 2013, http://www.pjm.com/~/media/documents/manuals/m21.ashx
[9] Indiana Michigan Power Integrated Resource Planning Report to the Indiana Utility Regulatory Commission, Nov. 1, 2013, pp 123

in the best wind resource locations in Indiana. The wind often blows in the Grain Belt Express resource area when it is not blowing heavily in Indiana, and vice versa.

The exhibit below created from NREL's Eastern Wind Integration and Transmission Study (EWITS) shows the correlation of wind generation between different states. Using numerical weather models that capture the way weather patterns move across the United States, the EWITS study developed a time series of the output at wind farms across the United States. The exhibit shows the correlation coefficients between wind power generated at modeled wind farms in western Kansas and modeled wind farms situated in the best wind resource areas in Indiana, Illinois, and Missouri. As can be seen from the chart, wind power generated in Kansas has a very low correlation with wind power generated in Illinois and Indiana, the two states where most of the wind farms in PJM are currently located and the two PJM states that are likely to see the highest number of installations in the future. Therefore, the amount of electricity generated from wind farms in western Kansas is statistically independent from the amount of electricity generated from wind farms in Indiana, Illinois, and Missouri.

A geographically diverse portfolio of wind farms will result in steadier production and smaller ramps than a portfolio of wind farms in the same geographic locations, thus reducing the need for additional cycling capability from thermal generation. Clean Line recommends that I&M study out of state wind and its ability to contribute more consistent power including at peak load in Indiana.

Correlation (r-value) of 10-minute wind generation



III. Conclusion

When properly analyzed, the delivered cost of high capacity factor wind energy is competitive with, and is often lower than, the cost of other energy sources. For these reasons, I&M should further consider more wind energy at lower prices and with higher capacity values in its IRP.

Increased options to buy the most affordable wind energy will be available to I&M within the IRP's 20-year planning horizon. The transmission challenges mentioned in the IRP should not limit the analysis of purchasing additional low-cost wind energy, such as that delivered by the Grain Belt Express Clean Line to I&M's Sullivan 765 kV substation in southwestern Indiana.