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for the

Pennsylvania Public Utility Commission's
En Banc Third Public Hearing on

"Current and Future Wholesale Electricity Markets"

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Introduction

Good afternoon, Chairman Cawley, Vice Chairman Christy, and Commissioners of the Pennsylvania Public Utility Commission. It is a privilege for me to come before you today on behalf of Iberdrola Renewables ("IBR"). I am Eric Thumma, Director of Institutional Relations for IBR. I participate in state level legislative, regulatory and policy issues of interest to IBR in ISO-NE, NYISO, and PJM.

IBR is the largest global owner and operator of renewable energy systems. The United States has been identified as a leading growth market for renewable energy development and just over half of IBR's 42,000 MW renewable energy project pipeline is located in the U.S.

Pennsylvania is a key eastern market for Iberdrola Renewables. We currently own two assets, the 34.5 MW Casselman wind farm in Somerset County and the 26 MW Locust Ridge wind farm in Schuylkill County. IBR is also part owner of the 24 MW Bear Creek wind farm in Luzerne County and is currently constructing a second phase at Locust Ridge. We have an extensive project pipeline across the state anchored by our eastern development headquarters in Radnor, Delaware County which is home to approximately 80 employees.

The Commonwealth is an important market for wind energy for several reasons:

1. It possesses a unique combination of good wind resources (over 5,000 MW of potential according to AWEA and the U.S. Department of Energy) near load centers.

2. Act 213 of 2004, The Alternative Energy Portfolio Standards Act, requires load-serving entities to purchase an ever increasing percentage of renewable energy commensurate with their retail sales. The Act's use of a market-based alternative energy credit system ("AEC") system as the accounting mechanism for compliance creates an effective renewable energy market complement to PJM's wholesale competitive energy market.

3. All of Pennsylvania's utilities are part of an RTO, either PJM or MISO, with competitive wholesale markets, providing a level playing field for commercial scale wind systems seeking interconnection, reliable dispatch and integration, and competitive energy markets.

My testimony will focus on the benefits of the RTO structure generally and competitive wholesale markets specifically for encouraging investments in commercial scale wind energy in Pennsylvania. PJM's RTO and competitive market structure benefits commercial scale wind integration in three primary ways:

1. Provides for standardized interconnection and open transmission tariffs

2. Maximizes efficiencies in wind integration

3. Ensures an ever-willing counterparty for energy and capacity sales

To exemplify the importance of these points, the following is excerpted from a letter to Chairman Kelliher at FERC on behalf of twenty organizations representing renewable energy interests across the country: "Well structured regional wholesale electricity markets operated independently allow far greater amounts of renewable energy and demand response resources to be integrated into the nation's electric grid. In fact, approximately 73 percent of installed wind capacity is now located in such markets, while only 44 percent of wind energy potential is found in these areas."

As the Commission considers wholesale market structures we encourage you to strongly consider that RTOs and competitive wholesale markets provide the best structures to support vital resource diversification and the introduction of new renewable energy projects.

I will now provide more detail regarding each of the three major ways in which the RTO structure and competitive wholesale markets support commercial scale wind development.

Interconnection and Transmission

While not directly related to RTO energy markets – the main focus of these hearings – I would like to note the benefits the RTO system provides for independent power producers, including renewables and wind energy.

RTO's were developed to provide open, non-discriminatory access to the transmission system. While FERC Order 888 essentially requires open transmission access to all generators, the RTO's competitive wholesale market complements the physical interconnection of independent power producers by ensuring that generators can self-schedule and inject their energy whenever they are producing, provided their offer price clears in the market. As we will discuss further below this is particularly advantageous for variable resources like wind energy.

Non-RTO systems are, of course, subject to FERC Order 888, however, without liquid competitive wholesale markets there is no guarantee that independent merchant units will be dispatched in those systems. The effect is a reduction in competition and less incentive for developers to invest in new generation.

There are examples from our own business where sites with strong wind resources are located in non-competitive markets and the challenge for our business people is to find pathways to deliver energy to those liquid markets, such as MISO or PJM in order to ensure that we have a willing counterparty to take power at a predictable price.

PJM's standardized interconnection was designed to provide for known timetables and open access to the electricity grid. PJM ensures that standard interconnection rules apply across many different utility territories. Other benefits of PJM's standardized interconnection process include elimination of seams issues and superior technical expertise from PJM staff participating and performing many wind interconnection studies. There are, no doubt, current challenges with interconnection backlogs in a number of RTOs, including MISO and PJM. While this is a challenge, at a minimum the RTO structure allows for governance and stakeholder participation that at least gives generators a voice in reforming protocols and procedures. Still, on balance the RTO standardized interconnection process is far preferable to a balkanized set of standards and protocols, differing from utility territory to utility territory.

Wind Integration

Wind energy is a variable resource. This means that it does not respond to dispatch signals that either burn more or less fuel to change energy output. Wind, not unlike some other traditional forms of electricity generation such as hydropower, varies from time to time. In wind's case its variability is solely linked to the speed at which the wind is blowing. Consequently, it is necessary for the larger electricity system to be capable of ramping or de-ramping other dispatchable units in response to changes in wind energy production. However, studies have demonstrated that large RTOs like PJM can accommodate approximately 10% or more wind energy penetration with relative ease at low costs.

Large electricity systems, like PJM or MISO, are uniquely equipped to cost-effectively integrate wind energy. Even before the advent of significant wind energy development, RTOs developed reserve markets to deal with fluctuations in both load and generation. In PJM "supplemental reserve" is dispatched to account for changes in wind production. According to former Interim President and CEO of PJM Interconnection, Karl Pfirrmann, the cost to maintain reserve functions to integrate wind energy in PJM is very small, ranging from $0.75 to $2.00 per megawatt hour. This cost is born by the generator.[i]

Integrated electricity systems like RTOs are fundamentally better equipped than smaller systems to handle wind variability. This is because many dispersed wind units over a broad geographic area have less aggregate variability than concentrated wind units in a small geographic area and the RTO has a greater variety of generation units and transmission options to balance supply and demand

The wholesale energy market plays a very important role in efficiently allowing the system to stay in balance, benefitting wind integration. "RTOs and ISOs in the U.S. have fast energy markets, which result in a new economic dispatch every 5 to 15 minutes, depending on the market. The fast energy markets make it possible to hold the regulating units closer to their

preferred operating point because they can be brought back to the mid-point of their operating range much faster than if the redispatch did not occur for an hour. Therefore, there is less need for regulation in faster energy markets. This results in a significant reduction in costs because regulation is typically the most expensive ancillary service. Thus, when calculating wind integration costs, such features that reduce balancing costs generally will lead to lower wind integration costs."[ii]

Further, RTO's efficiency in accommodating variable resources, especially PJM and MISO, allow wind energy to inject its full production into the spot market. This feature allows for the maximization of wind energy production.

Competitive Wholesale Energy Markets

In reviewing the previous testimony, I recognize that the En Banc hearings have focused largely on the role competitive wholesale energy markets have on price formation. As discussed previously in my testimony competitive wholesale energy markets play a meaningful role in wind integration and promoting reliability for variable resources at the lowest costs. Just as importantly, competitive wholesale markets level the playing field for independent power producers seeking to enter the market. Additionally, the single market clearing price enables wind to easily bid into PJM's energy market as a price taker.

In a rate of return model or in other markets which do not run a day two energy market, but only a balancing function, new independent power projects, such as wind energy are seriously disadvantaged. This has to be put in the further context of the demand generated for renewables by Pennsylvania's AEPS. Based on estimates by IBR – a chart is attached to this testimony for your review – the Commonwealth will require approximately six million MWhs of Tier I resources by 2012. Accordingly, approximately 1,000 to 1,500 MWs of new wind capacity will be needed to meet this requirement based on wind meeting 50 percent and 75 percent of the requirement respectively. In looking more broadly at PJM wide state RPS requirements – since wind energy is fungible across PJM state RPS mandates – approximately 25 million MWhs of renewables will be necessary, equating to 5,000 to 7,000 MWs of installed wind capacity based on the same 50 percent and 75 percent scenarios.

To meet these requirements it is essential that energy markets have maximum flexibility to promote resource investment and development. PJM's competitive wholesale energy market does this by ensuring that there is always a willing counter-party for energy from renewable projects. This enables developers to begin investing in projects without the sometimes onerous task of negotiating a bilateral contract as would be required in either the rate of return model or in other markets without day two energy markets. Further, the liquidity of PJM's energy markets are such that developers have enough confidence in forward pricing to take to their investment committees to get project approval.

Generally, many project owners will attempt to engage in longer-term contracts to hedge their risk – and in some cases smaller developers may only be able to achieve project financing with long-term, fixed price contracts -- but the value of liquid energy markets, which allow for some merchant capacity as well as a price reference for bilateral contracts, are vital to maximizing investments in new energy resources.

Variable resources, like wind energy, bid into the wholesale market as a price taker. This benefits rate-payers by pushing more expensive marginal resources out of the bid stack. Variable resources are able to adopt this bidding strategy because of the single market clearing price structure of PJM's energy market. A "pay as bid" structure would require wind energy owners to undertake expensive and inefficient analyses to determine where a market is likely to clear, which would be further complicated in that variable resources essentially participate in the spot market, rather than the day ahead market and would have limited time, to make assessments regarding price before sending in their schedules to PJM.

In reviewing other testimony and commentary related to these hearings there has seemingly been consternation regarding the lack of long-term contracts in the PJM market. In our experience, PJM's liquid wholesale markets have actually facilitated our ability to offer long-term retail contracts, as energy hedges, based on a contract for differences. The liquidity of PJM's nodal market allows for pricing information that enables the writing of contracts for differences for retail customers looking to hedge their energy costs. Only a liquid market, like PJM's can enable a variable resource, like wind energy, to offer this type of retail product. Having this option multiplies the number of potential buyers for our energy, enhancing our ability to do deals and build projects, and demonstrates how Pennsylvania's retail competitive market is directly complemented by PJM's competitive wholesale market.

In sum, PJM's energy markets enable variable resources like wind energy to easily schedule its maximum output and get paid at the market price for energy. The market's liquidity enables developers to begin development and construction without bilateral contracts since PJM is an ever-willing counterparty for energy bid into a market as a price taker. This encourages maximum development opportunities and market entry. Other energy payment systems, either rate of return, balancing markets, or pay as bid would not provide the flexibility or certainty needed to maximize renewable energy development at a time when Pennsylvania and regional RPS requirements are calling for significant investments in new renewables.

Conclusion

Pennsylvania and regional AEPS, increasing electricity demand, and energy security require additional electricity generation. The RTO and competitive energy markets provide the most effective and efficient market structure to encourage new electricity generation. Competitive

energy markets ensure that independent power producers strive to reduce their development costs and maximize electricity production, benefitting rate-payers. For example, as an independent power producer with a 20% public stake, it is imperative that Iberdrola Renewables construct its projects to reduce costs while seeking sites that allow for maximum electricity production. Other less competitive market structures, such as the rate of return model, or markets that rely primarily on bilateral contracting, do not provide the same incentives for independent power producers to reduce costs and maximize production efficiency. The rate of return model does not provide incentives to limit development costs, in many cases it perversely encouraged higher costs in order for a utility developer to maximize its rate of return. Similarly, markets that rely entirely on bilateral contracts provide limited potential market upside for new projects, reducing incentives to maximize energy production. This is because bilateral contracts will typically cover a fixed amount of production, with excess only available to an illiquid balancing market that does not provide the same incentives as more liquid day two energy markets.

Energy markets account for a large part (50% to 75%) of a new commercial-scale wind farms financial value. As such, ensuring efficient and accessible competitive energy markets is essential for our business.

Iberdrola Renewables strongly encourages the Pennsylvania PUC's continued support for the RTO structure and PJM and MISO's competitive wholesale energy market model. This market structure is most accommodating to independent power producers, including new renewables and new commercial-scale wind projects.

I would be pleased to answer any questions at this time.

Appendix
Require Tier I Renewables in Pennsylvania and PJM by 2012

Region	Current Wind (MW)	50% Wind (MW)	75% Wind (MW)	Total MWh
Pennsylvania	294	1,000	1,600	5.7 million
PJM	1,000 (approx.)	5,000	7,200	25 million

[i] PennFuture E3: Vol. 9, No. 5 – December 5, 2007. "PJM on Wind."

[ii] B. Kirby and M. Milligan. "Facilitating Wind Developent: The Importance of Electric Industry Structure." National Renewable Energy Laboratory. Technical Report, NREL/TP-500-43251, May 2008. P. 9.