

**UNITED STATES OF AMERICA  
BEFORE THE  
FEDERAL ENERGY REGULATORY COMMISSION**

Interconnection for Wind Energy And Other Alternative Technologies	Docket No.	PL04-15-000
---	------------	-------------

Standardization of Small Generator Interconnection Agreements and Procedures	Docket No.	RM02-12-000
---	------------	-------------

Standardizing Generator Interconnection Agreements and Procedures	Docket Nos.	RM02-1-001 RM02-1-005
--	-------------	--------------------------

**September 24, 2004 Technical Conference  
Comments of Craig Quist, P.E.  
Principal Engineer, PacifiCorp**

**Introduction**

Thanks for allowing PacifiCorp to comment on the Petition for Rulemaking submitted by the American Wind Energy Association (AWEA) seeking the adoption of certain requirements for the interconnection of large wind generators. We bring a fairly unique, balanced perspective to these issues both because wind and other renewable resources are becoming an increasingly important part of our energy portfolio, and because we operate one of the largest investor-owned open-access transmission systems in the Western United States. As such, PacifiCorp has a proven track record of working with AWEA and its members to identify and overcome the challenges of interconnecting and integrating wind facilities into the interstate electricity grid without degrading system reliability. Speaking as the resident Transmission Provider “conscience” on the AWEA Task Force that developed the Petition, I’d like to offer several observations and put forward what we hope are constructive suggestions for improving the Petition.

**PacifiCorp’s Perspective**

PacifiCorp believes the Commission has rightly recognized the need for standards and procedures specific to new technologies such as wind, since non-synchronous (wind)

generators typically differ in critical respects from the conventional synchronous (thermal) technologies assumed in determining the interconnection requirements set forth in Order No. 2003-A. By scheduling this important conference, the Commission has hopefully begun the process of developing much-needed uniform, non-discriminatory, yet technically sound, interconnection standards for large wind generators and turbine manufacturers. The wind industry needs a set of clear and equitable rules that can be applied in a consistent manner across the country, yet are equally responsive to the legitimate concerns of Transmission Providers that their safety and reliability responsibilities not be compromised.

That said, PacifiCorp would like to highlight what we believe are the strengths and weaknesses of the two critical aspects of the AWEA Petition – the proposed low-voltage ride-through capability and reactive power requirements. On principle, PacifiCorp appreciates that AWEA has proposed low-voltage ride-through and voltage support/reactive power standards that ensure that new wind turbines and arrays can remain online through most common power system disturbances and do their part in supporting the integrity and stability of the grid. The lack of wind plant reactive support and the resulting voltage impacts are a major concern for electric utilities. In our view, AWEA’s proposed standards are far superior to many of the blanket exemptions the Commission provided wind generators in Order No. 2003-A that can be shown to be either unnecessary or inappropriate. Like AWEA, PacifiCorp believes Transmission Providers should be authorized to require, for interconnection of non-synchronous generators, the ability to ride-through low-voltage events caused by power system disturbances outside of the generating plant.

Since 2003, PacifiCorp has been evaluating large wind plant interconnection, following best engineering practices, to determine if turbine manufacturers/project developers should include this capability when interconnecting new plants. Now, with this key change, these standards will ensure that new wind turbines and arrays can remain on-line through most common power system disturbances, rather than trip off, which would make a low-voltage situation even worse. This capability will become increasingly important as the level of wind plant penetration increases. PacifiCorp joins AWEA in asking the Commission to find that meeting these standards will presumptively entitle a wind facility to gain the rights to interconnect to a transmission system unless a Transmission Provider can show just reason for more stringent standards.

At the same time, PacifiCorp believes these proposed standards also raise several significant policy and practical implementation concerns that deserve close examination and possible reconsideration. PacifiCorp has reservations about a particular voltage standard being mandated in a Commission Order, rather than being developed through an established standards development process of national organizations such as NERC or IEEE. In the interest of facilitating timely wind energy integration with power systems, however, PacifiCorp recommends that the Commission adopt the AWEA low-voltage ride-through capability standard, without modification, on an interim basis only. Further, PacifiCorp recommends that this standard be modified in the future to conform to any NERC or IEEE low-voltage ride-through standards developed as the wind turbine technology matures. As an alternative, the Commission should direct the applicable regional reliability councils to establish standards to ensure voltage ride-through capability for all (synchronous and non-synchronous) generators. This approach will

leave the door open for regional reliability councils to establish further criteria, as necessary, to meet the needs of their diverse members.

Turning to reactive power, while AWEA's proposed .95 leading/lagging power factor standard is similarly preferable to the status quo, the caveats and disclaimers that AWEA has proposed with regard to the use of such a standard are inappropriate, as PacifiCorp pointed out in our pre-conference comments. PacifiCorp well understands that induction wind generators, which generally lack the capacity to internally generate reactive power, typically must consume reactive power from external reactive resources within their own collector systems. Naturally, this can lead to serious voltage support degradation if left unchecked. For this reason, PacifiCorp believes Transmission Providers should be allowed to require that "Wind Generation Facilities", which include generator installations and collector systems, abide by the same power factor requirements specified in Commission Order No. 2003-A LGIA Section 9.6.1. Ideally in fact, the Commission should set aside the AWEA proposed standard and instead revise Order No. 2003-A and the LGIA so that any exemption is limited to the wind generator unit only and the Wind Generation Facility is still required to meet Article 9.6.1. of the LGIA.

### **Conclusion**

Again, thank you for the chance to contribute our perspective. I look forward to your questions and drilling down a bit further into these issues.