

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

Interconnection for Wind Energy and)
Other Alternative Technologies)

Docket No. RM05-4-000

**REPLY COMMENTS OF AMERICAN WIND ENERGY ASSOCIATION
ON NOTICE OF PROPOSED RULEMAKING**

I. Introduction

Pursuant to the Notice of Proposed Rulemaking issued in this proceeding on January 24, 2005 (the “NOPR”), the American Wind Energy Association (“AWEA”)¹ respectfully files these reply comments regarding the interconnection standards for wind energy technologies.² Above all, AWEA again expresses its appreciation for the Commission’s recognition of the unique characteristics of wind energy technologies. The Commission is correct in saying that “the standard procedures and agreement were designed around the needs of traditional synchronous generation facilities, and that generators relying on non-synchronous technologies, such as wind plants, may find that a specific requirement is inapplicable or that a different approach is needed.”³ The Commission is also indisputably correct in noting that “[a] non-synchronous generator possesses significantly different characteristics and responds differently to network disturbances.”⁴ By developing interconnection standards that recognize these basic

¹ AWEA is a national trade association representing a broad range of entities with a common interest in encouraging the expansion and facilitation of wind energy resources in the United States. AWEA members include wind turbine manufacturers, component suppliers, project developers, project owners and operators, financiers, researchers, renewable energy supporters, utilities, marketers, customers and their advocates.

² AWEA also timely filed opening comments on the rulemaking on March 2, 2005.

³ FERC Order No. 2003-A at p. 407, n. 86 and Notice of Proposed Rulemaking, Docket No. RM05-4-000, at pp. 1 and 2.

⁴Notice of Proposed Rulemaking, Docket No. RM05-4-000, at p. 2, n. 2.

differences, the Commission avoids the “one size fits all” approach that would unduly discriminate against non-standard technologies. Most parties support this approach.⁵

As we pointed out in our opening comments, AWEA generally supports the substantive standards proposed in the NOPR. Indeed, these are standards that AWEA proposed to the Commission in its petition for this rulemaking in response to Order 2003-A. However, AWEA’s petition included not just the substantive standards, but also crucial language regarding the timing of implementation and the appropriate application of the standards. As discussed further below, this language is crucial because it ensures that wind turbine manufacturers will be given sufficient time to manufacture wind turbines and developers will have time to develop wind projects that meet the new requirements without undue economic hardship. This language also provides the regulatory stability needed to justify the significant investments by turbine manufacturers in order to manufacture complying equipment. Finally, this language is crucial because it ensures that the standards will be required only where there is a demonstrated reliability need and will not be used as a barrier to market entry.

⁵ See, for example, the *Comments of PacifiCorp and PPM Energy, Inc.* at p. 2; *Edison Electric Institute Comments* at p. 4 (“First and overall, EEI restates its support for the May 20, 2004 American Wind Energy Association [“AWEA”] petition for adding reliability provisions to Appendix G under Order No. 2003....”); *Comments of the Bonneville Power Administration* at p. 3 (“Bonneville concurs with many comments made prior to, and after, the September 2004 technical conference by AWEA, and others that urged the Commission to recognize wind technology as unique with respect to interconnection.”); *Comments of the Western Area Power Administration* at p. 1; *Comments of the California Public Utilities Commission* at p. 2 (“By and large, the CPUC applauds the approach proposed in the NOPR in this docket. In the view of the CPUC, FERC has correctly identified the key areas where the special characteristics of wind energy require further comments or special treatment to facilitate interconnections to the power system.”); *Comments of NRECA and APPA* at p. 1 (“Certainly, wind continues to have some unique technical characteristics, and NRECA and APPA support limited modifications to the interconnection standards to accommodate those characteristics.”); *Comments of the Midwest ISO* at p. 1 (“The Midwest ISO supports the Commission’s proposal to adopt specific technical and operating requirements for large wind farms.”).

Apart from assuring a reasonable transition period, AWEA's other broad concern is that the Commission act on these rules promptly. While a reasonable transition period is a practical necessity, AWEA is anxious to begin that process as soon as possible so as to bring the standard into effect at the earliest possible time. Delay in this rulemaking will only put AWEA in the position of changing its transition period proposal to reflect the lost time. That will not serve the interest of the wind industry nor of ensuring greater electric reliability. Until the Commission issues a final rule, the wind industry is subject to uncertainty and discrimination that make the *status quo* unacceptable. Accordingly, the Commission should not mistake AWEA's request for a reasonable transition period as an effort to delay implementation of the standard. To the contrary, AWEA urges the Commission to complete this rulemaking as soon as possible so as to begin the transition period and bring the standard into effect as soon as possible.

II. Comments Applicable to the Standards Generally

a. The Commission Should Allow for a Reasonable Transition Period

In our opening comments, AWEA pointed out the need for a transition period to enable wind turbine manufacturers time to produce compliant machines and to avoid derailing projects nearing completion that have justifiably relied upon existing standards.⁶ This transition period is important with regard to all of the standards proposed in this rulemaking. In the NOPR, the Commission specifically called out the issue of a transition period for comment.⁷ Yet, in reviewing the opening comments of other parties,

⁶ See *AWEA opening comments* at p. 3.

⁷ NOPR at p. 10.

only two parties oppose a reasonable transition period or suggest it will adversely affect reliability.⁸

The fact that urgency does not exist is illustrated by the schedules of industry groups that have been concurrently considering these issues. The Planning Coordination Committee of the Western Electric Coordinating Council (“WECC”), for example, has voted unanimously to recommend to the WECC Board that a low-voltage ride-through standard very similar to the Commission’s proposed standard be adopted, but that implementation should be deferred until March 1, 2006. In addition, the North American Electric Reliability Council (“NERC”) has created a task force to look at the range of issues for reliability and wind power, but plans no actions before the end of 2005. As these schedules demonstrate, neither of these organizations devoted to electric power reliability believe that implementation of a standard must begin immediately.

In contrast to the two comments supporting immediate implementation, parties representing both Transmission Providers and wind developers support a reasonable transition period. For example, Xcel Energy Services, Inc. (“Xcel”) commented that:

The Commission requests comments whether the Commission should establish a transition period. NOPR at P. 10. XES recommends that wind generators who are both (a) in a Transmission Provider’s interconnection queue and (b) in the negotiation stage for a Facilities Study under the Large Generator Interconnection Procedure (“LGIP”) prior to the effective date of the final rule be exempt from the technical requirements of Appendix G.⁹

The Long Island Power Authority and LIPA similarly support a transition period:

⁸ See *Comments of Bonneville Power Authority* at p. 5; *Comments of American Transmission Company* at p. 6.

⁹ *Comments of Xcel Energy Services, Inc.* at p. 3. Xcel Energy Services is the service company for the Xcel Energy Inc. registered holding company system and an affiliate of the Xcel Energy Operating Companies, namely: Northern States Power Company (“NSP”), Northern States Power Company (Wisconsin) (“NSPW”), Public Service Company of Colorado (“PSCo”) and Southwestern Public Service Company (“SPS”).

At the time when the Commission issues its final rule there are likely to be wind generation projects underway. Changing the applicable design standards midstream could impose unduly burdensome redesign requirements and substantial added costs that could delay or completely derail a project that is otherwise proceeding on schedule. LIPA requests that a transition period be extended to projects that are in the study process when the final rule is issued. Granting a period of time to projects already in the study process to comply with the new requirements will permit the resource to connect on schedule and make the changes needed to smoothly transition to the new requirements. Allowing a transition period to units that are in the study process and that have completed a system impact study uncovering no adverse affects to reliability pose no immediate threats to grid safety or reliability and will reduce the financial and schedule uncertainty facing such projects.¹⁰

PacifiCorp and PPM Energy also filed joint comments supporting a transition period, emphasizing the pragmatic consequences of immediate implementation:

From a practical standpoint, while technically the next generation of wind turbines will be designed to meet the low voltage ride-through (“LVRT”) standard, wind turbines already being manufactured but not yet in operation will require substantial changes to the electronic logics to meet the proposed requirements. Many of these add-on turbine changes are of such a magnitude, or come so late in the manufacturing process, as to render retrofit impractical. Similarly, wind farms that have already ordered long-lead time equipment, or commenced construction on facilities whose design has been accepted as meeting grid reliability criteria through the interconnection study process, but cannot meet the LVRT standard, the Power Factor Design Criteria (“Reactive Power”) support standard, and/or the Supervisory Control and Data Acquisition (“SCADA”) standard should not now be required to incur substantial time and expense to retrofit to meet standards that previously did not exist.

Additionally, it has been the Joint Commenters’ experience that the NOPR’s immediate implementation approach, with allowance for waivers and/or deviations on a non-discriminatory basis, will most likely result in Transmission Providers erring on the side of caution and enforcing the standard immediately for all projects currently under development for fear of discrimination or comparability claims. Therefore, the Joint Commenters strongly recommend that the new standard only apply to Interconnection Agreements signed after January 1, 2006.¹¹

The comments of FPL Energy take a similarly pragmatic approach, outlining the very real consequences of immediate implementation from the perspective of a major utility-affiliate wind developer:

¹⁰ *Comments of the Long Island Power Authority and LIPA* at pp. 4-5.

¹¹ *Comments of PacifiCorp and PPM Energy, Inc.* at pp. 2-3.

Rejection of a transition period is arbitrary and capricious. FPLE (and most likely other wind developers) have already ordered the wind turbines that are expected to be installed during 2005. Construction often can begin immediately after an LGIA is executed or filed, with construction completed for a 100 MW facility in as short as 18 weeks. As the final requirements in Appendix G remain uncertain, as well as the timing for when the rules will be implemented, it would be speculative and costly for wind developers to order low voltage ride-through options, DVAR banks or static capacitors that may or may not be required.

Having to order these options immediately after a Final Rule is issued will likely result in delay, as among other things it is uncertain whether wind turbine manufacturers have sufficient parts in stock to meet the new demand. Depending on the length of the delay, wind developers could suffer significant financial harm. As the Commission is aware, the current Production Tax Credit (“PTC”) expires at the end of 2005. Unless Congress authorizes a PTC extension, any wind facility put in service after December 31, 2005 is not eligible to receive the PTC. Without such an extension, these wind turbines may not be put into service, thus also harming the goals of States that have passed RPS requirements. In addition, power purchase agreements may have been negotiated, with the negotiated pricing based on the use of turbines that do not currently require the proposed capabilities, and turbines for 2006 may have to be ordered prior to the issuance of the Final Rule by the Commission. Having no transition period thus could materially harm wind developers.¹²

In short, while only two parties suggested that immediate implementation is needed to maintain the reliability of *any* control area, several parties (including some Transmission Providers) have joined AWEA in calling for a reasonable transition period. These parties all understand that wind power projects scheduled for completion before the end of 2005 have relied contractually and economically on the standards in effect prior to this rulemaking. Commission action to impose a performance standard without transition time will disrupt these projects and defeat the goal of promoting development of renewable generation without enhancing reliability.

Accordingly, the Final Rule should make clear that all existing individual generator units that have been interconnected to the network at the time of the adoption of the new

¹² *Comments of FPL Energy, LLC* at pp. 13-14.

standards, and any generator that has executed an LGIA prior to January 1, 2006, or has requested in writing the Transmission Provider file with the Commission an LGIA in unexecuted form, will be exempt from meeting the relevant standard(s) for the remaining life of the existing generator equipment. All other generators entering interconnection requests and existing individual generator units that are replaced should be required to meet the new standards. This accommodation will allow a reasonable national interconnection standard (whose costs will be borne by the wind developer/turbine manufacturer) without penalizing generators that have in good faith already made investments based on the old standards.

b. There is No Need to Adopt “Interim” Standards Or Otherwise Anticipate Future Recommended Changes

Some parties submitted comments suggesting that the Commission should only adopt the proposed standards on an interim basis or should explicitly provide for them to be superseded by possible future standards developed by the NERC, regional reliability councils, IEEE or others.¹³ While AWEA has every intention of working closely with NERC and other standard-setting bodies on ongoing technical issues, the Final Rule should reflect industry standards. Calling the standards adopted by the Commission interim is unnecessary and inappropriate.

First, there is no reason for the standards adopted by the Commission for wind generators to be “interim,” while similar standards adopted for synchronous generators are permanent (*i.e.*, the Reactive Power standards in Article 9.6 of the Large Generator Interconnection Agreement). In Order No. 2003-A, the Commission affirmed that: “[T]here is a pressing need for a single, uniformly applicable set of procedures and

¹³ See, e.g. *Comments of NERC* at pp. 2-3; *Comments of the Edison Electric Institute* at pp. 4-5; *Comments of Southern Company Services, Inc.* at p. 2.

agreements to govern the process of interconnection of Large Generators to a Transmission Providers' Transmission System," and that adoption of the Large Generator Interconnection Procedures ("LGIP") and LGIA would prevent "undue discrimination," allow a variety of generation resources to compete in wholesale markets while ensuring reliability.¹⁴ The Final Rule adopted by the Commission should share the competing goals of the underlying orders associated with the Standardization of Generator Interconnection Agreements and Procedures.

Second, as discussed further below with regard to the low-voltage ride-through standard, the only reliability council within NERC that has proposed a wind-specific standard is the WECC.¹⁵ That proposal substantively conforms to the Commission's proposed low-voltage ride-through standard.¹⁶

Third, if in the future the NERC or any other appropriate standard setting body (such as IEEE or one of the regional reliability councils) adopts a standard applicable to wind projects that differs from the proposed rules here, any stakeholder will be able to ask that the Commission adopt such standard as a new interconnection standard. There is no need for the Commission to include any language in the rule to enable a remedy which already exists in the Commission's rules.

Finally, while the NERC and others have a critical role in setting reliability standards, it is this Commission that must decide whether any such standard should be an

¹⁴ *Standardization of Generator Interconnection Agreements and Procedures*, 69 Fed. Reg. 15,932 (Mar. 24, 2004), FERC Stats & Regs., Regulations Preambles ¶ 31,160 at PP 2-3 (2004) (citations omitted) (Order No. 2003-A), *order on reh'g*, 70 Fed. Reg. 265 (January 4, 2005), FERC Stats & Regs., Regulations Preambles ¶ 31,171 (2004) (Order No. 2003-B), *reh'g pending*.

¹⁵ As noted above, NERC has created a task force to look at the range of issues for reliability and wind power, but plans no actions before the end of 2005.

¹⁶ See Western Electricity Coordinating Council, Planning Coordination Committee Report, March 11, 2005 found at http://www.wecc.biz/documents/meetings/board/2005/April/PCC_Report_Complete_BackgroundMaterial.pdf

interconnection requirement. The NERC, the regional councils and IEEE have no authority with regard to interconnection that can substitute for the Commission’s responsibility to ensure just and reasonable and not unduly discriminatory or preferential rules in this area. Second, in exercising this authority, it would be inappropriate for the Commission to blindly defer today to a future standard that it has never seen and has no basis for concluding is appropriate as an interconnection requirement.

c. There is a Need to Address Queuing and Information Issues

In AWEA’s opening comments, we pointed out the important differences between large wind projects and conventional generation with respect to the timing of project design and its impact on the queue and the interconnection process.¹⁷ As we noted there:

The first-come, first-served nature of the interconnection queue creates incentives to begin the request process, while the design of the wind generation facility and its point of interconnection are better determined after more discussion with the transmission provider and the permitting agencies.

Accordingly, AWEA proposed that wind projects not be required to submit detailed modeling data at the time the Interconnection Request is submitted.

In the PacifiCorp and PPM Energy joint comments, these parties addressed the same issue, providing additional detail and making a similar proposal.¹⁸ In brief, these parties proposed that:

First, rather than require that the generating plant design be “substantially completed” at the time of the interconnection request, the Commission should allow “best available data” to be submitted in order to establish queue position and to conduct the Feasibility Study. Second, during the Feasibility Study portion of the process, the Transmission Provider should be able to provide “best judgment” inputs to the Interconnection Customer based on previous study findings and generic wind turbine/wind plant models.

* * *

¹⁷ See *AWEA Comments* at p. 8.

¹⁸ *Comments of PacifiCorp and PPM Energy, Inc.* at pp. 6-8.

Finally, no later than at the beginning of the System Impact Study, the Interconnection Customer should be required to provide a “substantially completed” generating plant design, along with either the PSLF data sheets or the newly developed machine models with substantially complete input data to those models.

AWEA strongly supports this proposal.

III. Comments on the Specific Standards

a. The Low-Voltage Ride-Through Standard

i. The Substantive Standard

Apart from the need for a transition period, AWEA urges the Commission to adopt the low-voltage ride-through standard proposed in the NOPR, including specifically the requirements of Figure 1. While most parties appear to concur, NERC has questioned the inclusion of Figure 1.

NERC argues that Figure 1 would permit a wind generator to trip offline if voltage drops below 15% of nominal voltage and that this will cause a violation of an applicable reliability standard:

NERC Reliability Standard TPL-002-0, System Performance Following Loss of a Single BES [Bulk Electric System] Element, requires the planning authority and the transmission planner to ensure that the bulk electric system will remain stable with thermal and voltage limits within applicable ratings, and with no loss of demand or curtailed firm transfers, for a normally cleared fault on a single element (an interval of several cycles). If a fault occurs on a transmission line near a wind plant, the voltage measured at that point could drop instantaneously to 0 for the short interval required to clear the fault. Figure 1 would permit a wind generator to trip offline if voltage drops below 15% of nominal voltage. Unless the wind plant stays on line through a normally cleared fault, its capacity will be lost to the system, in effect creating a double contingency (loss of the line and loss of the plant) and a violation of TPL-002-0.¹⁹

There are several reasons that AWEA does not share this concern. First, wind turbines complying with the Figure 1 Standard will exceed the fault ride-through

¹⁹ *Comments of NERC* at p. 3

capabilities of the typical existing conventional power plant employing a synchronous generator when subjected to most real world fault conditions. Simply because a synchronous generator itself is, generally speaking, theoretically capable of withstanding a few cycles at zero terminal voltage without losing synchronization does not mean that the plant employing that generator will ride-through a "typical" severe real world fault. Second, the NERC comment appears to *assume* that wind generators that meet the proposed Figure 1 Standard will trip during a normally cleared fault. In fact, studies conducted by several organizations, including the Alberta ESO²⁰ and NYSERDA for the New York ISO,²¹ all demonstrated the ability of wind generators that meet the proposed standard in Figure 1 to ride through all credible simulated single element network faults on the systems studied. Third, the NERC comment appears to *assume* that the hypothetical temporary loss of the wind generator will necessarily cause a violation of the standard. That is not the case. The temporary loss of some wind generation is not likely to cause, let alone certain to cause, the bulk electric system to become unstable or to exceed applicable ratings nor is it likely or certain to cause any loss of demand or curtailment of firm transfers. The fact is that TPL-002-0 is a standard applicable to the performance of the bulk electric system and it does not require that all generation ride through all normally cleared faults.

Indeed, the fact is that today there are many different forms of generation connected to the grid with varying abilities to ride-through low-voltage events. Over the years, the absence of standards for LVRT has allowed a mix of generation technologies

²⁰ AESO Wind Interconnection Standard, John Kehler Alberta Electric System Operator, March 30, 2005, Wind Power Transmission Workshop, Toronto, CA.

²¹ *The Effects of Integrating Wind Power on Transmission System Planning, Reliability, and Operations Report on Phase 2: System Performance Evaluation*. New York State Energy Research and Development Authority, March 4, 2005.

to be installed to the power system. Generators using technology well-suited for operation in a wide range of conditions operate near other generation that will come off-line because of the many auxiliary systems that are not capable of continued performance through low voltage events (nuclear plants are in this category). As CenterPoint Energy points out, the existing NERC standard addressing voltage stability is vague and subject to varying interpretations, as it is not included in the version 0 NERC standards.²² The Commission’s adoption of a final rule with Figure 1 and a transition period will improve the system response—it will certainly not cause increased violations of any standard.

Fourth, as most observers recognize, in setting the LVRT standard the Commission must balance reliability needs against the need for the wind industry to have an achievable standard that is stable and consistent across markets. The standard represented by Figure 1 strikes this appropriate balance.²³ It is a standard developed for use in major European markets with much higher penetrations of wind generation than is the case in the United States. It has been unanimously endorsed by the Planning Coordination Committee of the WECC. Plainly, if the Figure 1 standard necessarily would cause bulk power systems to violate essential stability standards, neither Europe nor the WECC would be endorsing it.

NERC further argues for the removal of Figure 1 on an additional ground:

If Figure 1 is included in the Commission’s rule, it is likely to be static over time and may limit technological development. Figure 1 also may not be appropriate for every application of wind generation at every wind plant location, because

²² *Comments of CenterPoint Energy Houston Electric, LLC* at pp. 3-4 and note 3.

²³ NERC appears to concede this by saying “NERC understands that the intent of Figure 1 is to have a reasonable requirement for system reliability and also meet the physical capabilities of existing generation technology.” *Comments of NERC* at p. 3.

reliability needs may require different engineering or operating procedures over the North American electric system.²⁴

This comment overlooks a crucial element in finding the appropriate balance for this interconnection requirement. The stability of the requirement over time and place is precisely what turbine manufacturers require to justify the investments necessary to achieve this improvement in performance. There is nothing that prevents the Commission from re-examining this requirement from time to time in light of changing technology and circumstances. However, it is critical that the Commission provide market stability through a definitive standard such as Figure 1 rather than the more ambiguous and varying approach suggested in this comment. Manufacturers faced with constantly changing patchwork standards will necessarily be frustrated in their attempts to standardize production and achieve lower costs. Moreover, the lack of a clear and consistent interconnection standard flies in the face of the very purpose of the entire interconnection NOPR—that is, to create a standardized national rule to prevent the undue discrimination that has resulted from the type of Transmission Provider discretion that NERC appears to urge here.

For these reasons, AWEA urges the Commission to adopt the low-voltage ride-through standard proposed in the NOPR including Figure 1 (with an appropriate transition period). Such action will enhance reliability compared to the *status quo*. It will encourage the development of new, complying technology. Most of all, the inclusion of Figure 1 will help achieve the purpose of the Commission’s interconnection NOPR: remedying undue discrimination in interconnection.

²⁴ *Comments of NERC* at p. 3.

ii. The Point of Measurement

Another issue raised in the comments is whether the low-voltage ride-through standard should be measured at the point of interconnection, the high side of the wind facility substation or at the generator. AWEA believes that the point of interconnection is the appropriate point of measurement. The point of interconnection is the point where this standard is measured for other technologies. The Commission should apply the same rule to wind generation absent a compelling reason to do otherwise. Proponents of alternative measurement points have not made any such compelling showing.

For example, Southern California Edison proposes that the standard be measured at the turbine terminal based upon the following reasoning:

Since wind turbine manufacturers design the turbines based upon the voltage at the machine, and not at the voltage at the high side of the wind plant substation transformer, it is more appropriate to specify the low-voltage ride-through capability based upon the turbine terminal voltage *while recognizing that system operators are more concerned with voltage performance at the interconnection point.*²⁵

AWEA appreciates Edison's consideration of the needs of wind turbine manufacturers (even at the expense of system operators). Having reviewed this issue with its manufacturer members, however, AWEA has concluded that a reasonable and stable standard at the point of interconnection will not pose a hardship. In fact, a perfectly acceptable and cost effective engineering solution to providing low voltage ride-through capability may very well include additional voltage support equipment external to the turbine itself but imbedded in the wind project collection system. The FERC standard should not preclude this engineering option. Accordingly, recognizing (as Edison acknowledges) that system operators are concerned with the voltage at the point of

²⁵ *Comments of Southern California Edison Company* at p. 5, emphasis added.

interconnection, AWEA believes it is appropriate to measure performance under this standard at that point. This will have the further benefit of removing the need for the additional reactive support described by Edison in its comments.²⁶

The American Transmission Company also proposed measurement at the wind plant rather than the point of interconnection, but offered no substantive reason other than that “it seems preferable” for doing so.²⁷ AWEA does not concur that it is preferable. Plainly, this unsupported statement of preference is insufficient to support measuring wind differently from other technologies.

b. Power Factor Correction Standard

In Order 2003-A, the Commission recognized that asynchronous generators such as wind turbines are not necessarily inherently capable of providing reactive power as are conventional generators. For wind projects, power factor control can be an “add-on” requirement involving considerable additional expense.²⁸ Moreover, the remote location for most wind generation 20 MW and larger means that reactive power capability is typically less valuable than similar equipment installed near load, and in many cases may be of no value.²⁹

²⁶ *Id.*

²⁷ *Comments of the American Transmission Company* at p. 3 (“In addition, it seems preferable to apply the LVRT at the wind plant and not the POI.”)

²⁸ When required, a wind generator can and will add static and dynamic reactive power devices to provide additional grid support capability to the utility. These additional devices are added capital equipment, and not part of the inherent capability of the generator, as is true for synchronous generators. The Electrical Guide to Utility Scale Wind Turbines filed in this docket by AWEA illustrates the designs and resulting performance available from wind turbine manufacturers.

²⁹ The Commission has collected information on a wide range of practices and approaches to providing the reactive power needed by the electric power system. Generally, there are several methods to supply the voltage support near to the electric consumers and electrical infrastructure that drive the need for reactive power. AWEA believes that these methods (discussed at the FERC Technical Conference on March 8th) will lead to a sound approach to providing voltage support where needed. *See Technical conference on principles for efficient and reliable reactive power supply and consumption* (Docket No. AD05-1-000).

Based on these facts, the Commission did not require that wind facilities meet the Power Factor standard required of conventional generation in Order 2003-A. The Commission instead invited the industry to propose a different power factor standard (or no standard) in Appendix G. Recognizing that there are circumstances where reactive power from wind turbines could be both reasonable and valuable, the industry responded with a proposal to provide *up to* the same 0.95 leading and 0.95 lagging standard as adopted in Order 2003-A for conventional generation. However, the unique circumstances of the wind industry were reflected in specific language in the AWEA proposal making this requirement conditional: *the standard would apply only to the extent that the transmission provider could demonstrate a real reliability need justifying the added cost based on the system impact studies.*

In the NOPR, the Commission changed this concept to allow the Transmission Provider to waive the power factor requirement for wind plants where such capability is not needed at that location or for a generating facility of that size, provided that such waiver is not unduly discriminatory and is offered on a comparable basis to similarly situated wind plants. Thus, under the NOPR waivers would not be based on the outcome of a specific System Impact Study, but instead would depend on the Transmission Provider's subjective determination as to whether similarly situated wind plants would in the future require reactive power capability.

Several parties agree with AWEA that often there is no need for the full reactive power requirement based on the System Impact Study. For example, the Bonneville Power Administration commented:

Bonneville supports this approach so long as the power factor requirements are established in the System Impact Study (SIS). As recognized in the NOPR,

adherence to any particular power factor range may not be necessary, as the Transmission Provider may not need the generator's reactive power capability or support in the electrical vicinity of the point of generator interconnection.³⁰

However, several parties (and to some extent the NOPR) have proposed to turn AWEA's proposed standard on its head, changing the "up to" requirement into an "at least" requirement and shifting the burden to the wind developer to show that there is *not* a reliability need justifying the additional expense.³¹

These comments ignore several important realities. First, they ignore that the usefulness for wind projects to provide large quantities of reactive power at the point of interconnection is the exception, not the rule. Acceptable voltage control on the generally radial portion of the grid near the wind project should be the controlling engineering design criterion – not blindly attempting to push bulk reactive power over long distances only to compromise local voltage control and lose most of the reactive power in any event. A typical, remotely-located large wind project should not be required to provide the same reactive power as generation electrically located near inductive load or any reactive power at all if that reactive power cannot be transmitted to where it is needed and does not contribute to good system voltage control and/or disturbance recovery. Thus, those who would argue for absolutely no differentiation following the System Impact Study would treat the typical case as exceptional and *vice versa*.

Second, these comments would ask the wind developer to "prove the negative" by demonstrating the *absence* of any need. This is inherently difficult, if not impossible, to accomplish. It is far more practical to demand a demonstration of the presence of a need rather than its absence.

³⁰ *Comments of the Bonneville Power Administration* at p. 9.

³¹ *See, e.g. Comments of NRECA and APPA* at p. 6-7.

Third, these comments ignore that the Transmission Provider has far more capability than the wind developer to evaluate the value of reactive power on its system. Plainly, the provider has access to much more information regarding its system and at lower cost than does the wind developer. Simply put, the provider is far better positioned to prove the presence of value than the developer is to prove its absence.

Fourth, these comments ignore the practical reality that the Transmission Provider still controls access to its system. Thus, the remedy available to Transmission Providers in a dispute—i.e. refusing interconnection—is immediate, effective and cheap. The remedy available to developers—i.e. a complaint to this Commission—is *at best* time consuming and expensive. For many projects with tight tax credit or other deadlines, such a remedy is not practical at all. This practical imbalance of power is another reason that Transmission Providers should bear the burden of proof with regard to compliance with this standard.

Fifth, the Commission must recognize that Transmission Providers have little incentive to “waive” standard requirements, particularly when it does not have to rely upon an objective standard. The additional costs caused by unnecessary reactive power requirements are not borne by Transmission Providers—they are either borne by the generator or passed on to the power purchaser. Moreover, most utilities have a well-deserved reputation for conservatism when it comes to the application of the Commission’s rules. That conservatism rewards the strict application of standard rules and discourages making exceptions or granting waivers.

Finally, the Commission must also keep in mind the reason it initiated its interconnection rulemaking in the first place. The Commission found that Transmission

Providers—many of whom have competitive market interests in generation—continue to engage in undue discrimination in allowing interconnection to their systems.

All of the foregoing reasons support AWEA’s original proposal in our petition for rulemaking that the last paragraph in the power factor correction standard for wind projects in Appendix G should be modified as follows:

The Transmission Provider ~~may agree to~~ shall waive the dynamic power standard, the use of dynamic reactive power or agree to defer compliance with the reactive power standard if it has determined during the performance of the Interconnection System Impact Study that compliance with the reactive power standard is not required or is not anticipated to be required for system reliability. A lesser standard may also be applied if determined during performance of the Interconnection System Impact Study (e.g., reliability criteria are met at less than (closer to unity) 0.95 lagging (capacitive)). However, any such waiver or exemption must be considered a non-conforming agreement pursuant to section 11.3 of the LGIP.

As to the point of measurement for power factor control, the appropriate point is either the point of interconnection or the high side of the wind plant’s transformer depending upon the particular electrical circumstances. The point of measurement as well as the appropriate level of reactive support to the grid within the generic bandwidth should be determined based upon the results of the System Impact Study. Commission oversight including the dispute resolution process contained in Order 2003-A is always available to balance grid reliability needs with ensuring nondiscriminatory practices.

c. Supervisory Control and Data Acquisition (SCADA) Capability

In our opening comments, AWEA reiterated the critical distinction between the hardware necessary to provide this capability and the contractual and market rules regarding its use:

AWEA proposed that the interconnection standards for windfarms over 20 MW include the capability to communicate in two directions by SCADA. AWEA is concerned that the wording to “receive instructions” (NOPR Appendix G, section

ii) from the Transmission Provider implies that there is an obligation created to perform a range of operational changes that are more properly the subject of either bilateral contracts or market rules. AWEA simply wishes to clarify that the SCADA capability in the interconnection requirements does not establish a presumption that automatic generator control or other output controls are part of the standard.

AWEA emphasizes that this proposed standard requires only the installation of the physical equipment as an interconnection standard. It is crucial to this standard that the Commission clearly state that the terms and conditions for use of this capability is a separate transmission service issue, not an interconnection issue. Accordingly, such terms and conditions must be resolved by contract or Commission approved transmission tariff and not as an interconnection standard. (AWEA Petition at 9).³²

Many of the parties commenting on this aspect of the NOPR have either misunderstood or ignored the critical distinction between installing SCADA hardware capability, on the one hand, and mandating its use in particular ways, on the other. There is simply no basis in this record or elsewhere for the Commission to require that this hardware requirement include the obligation to provide any particular data or operational control to the Transmission Provider. AWEA reiterates that such capability should be the subject of good faith negotiation between the wind developer and the Transmission Provider (or a Commission-approved transmission tariff) in the context of *transmission* service, not interconnection.

A number of parties argue that SCADA equipment should provide the Transmission Provider with the ability to control generation output, ramp rate or voltage with changing system conditions.³³ The LGIP and LGIA do not require synchronous generators to have Automatic Generation Controls as a condition of interconnection, but that is essentially what these commenters seek. From a system reliability standpoint, the needed control

³² *Comments of AWEA* at pp. 11-12.

³³ *Comments of the Midwest Independent Transmission System Operator* at p. 4, *Comments of the Bonneville Power Administration* at pp. 7-8; , and *Comments of the New York Independent System Operator* at pp. 5-6.

over wind generators is limited. Accordingly, AWEA proposes the following revision to the rule proposed in the NOPR:

Supervisory Control and Data Acquisition (SCADA) Capability

The wind plant shall provide SCADA capability to transmit data and receive instructions from the Transmission Provider to protect system reliability. The Transmission Provider and the wind plant Interconnection Customer shall determine what SCADA information is essential for the proposed wind plant, taking into account the size of the plant, its characteristics, location, and importance in maintaining generation resource adequacy and transmission system reliability in its area.

IV. Conclusion

In its petition for rulemaking that spawned this docket, AWEA presented proposed interconnection standards that reflected the input of both the wind industry and other key stakeholders, including major Transmission Providers. That effort resulted in a set of proposals that would impose significant new reliability obligations on wind projects greater than 20 MW, but which are reasonable and provide the appropriate transition periods and uniformity to support the needs of the industry.

Virtually all parties submitting comments in this docket have acknowledged that wind projects differ from conventional generation in their impact on the transmission grid. As a result, the vast majority of the parties support the Commission's adoption of interconnection requirements that reflect the unique characteristics of this technology.

AWEA appreciates that the Commission has proposed to adopt most of the substantive requirements proposed in its petition. However, those standards are only workable for the industry if the transition periods and conditions on imposition of the requirements proposed in the petition are also made part of the rule. Thus, it is critical that the Commission adopt the proposed rules with the amendments set forth in our

opening comments and reiterated in these reply comments. With these changes, AWEA is confident that the wind industry can continue its remarkable growth while contributing to the reliable operation of the transmission grid.

Dated: April 1, 2005

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document upon each party designated on the official service list in this proceeding.

Dated at Sacramento, California, this 1st day of April, 2005.

Travis Merlo