

Regional Transmission Organizations and Wind Energy: A Happy Marriage or Divorce Proceedings?

Preprint

B. Parsons

National Renewable Energy Laboratory

K. Porter

Exeter Associates, Inc.

*To be presented at the American Wind Energy Association (AWEA) WINDPOWER 2002 Conference
Portland, Oregon
June 2-5, 2002*



NREL

National Renewable Energy Laboratory

1617 Cole Boulevard
Golden, Colorado 80401-3393

NREL is a U.S. Department of Energy Laboratory
Operated by Midwest Research Institute • Battelle • Bechtel

Contract No. DE-AC36-99-GO10337

NOTICE

The submitted manuscript has been offered by an employee of the Midwest Research Institute (MRI), a contractor of the US Government under Contract No. DE-AC36-99GO10337. Accordingly, the US Government and MRI retain a nonexclusive royalty-free license to publish or reproduce the published form of this contribution, or allow others to do so, for US Government purposes.

This report was prepared as an account of work sponsored by an agency of the United States government. Neither the United States government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States government or any agency thereof.

Available electronically at <http://www.osti.gov/bridge>

Available for a processing fee to U.S. Department of Energy
and its contractors, in paper, from:

U.S. Department of Energy
Office of Scientific and Technical Information
P.O. Box 62
Oak Ridge, TN 37831-0062
phone: 865.576.8401
fax: 865.576.5728
email: reports@adonis.osti.gov

Available for sale to the public, in paper, from:

U.S. Department of Commerce
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
phone: 800.553.6847
fax: 703.605.6900
email: orders@ntis.fedworld.gov
online ordering: <http://www.ntis.gov/ordering.htm>



Printed on paper containing at least 50% wastepaper, including 20% postconsumer waste.

REGIONAL TRANSMISSION ORGANIZATIONS AND WIND ENERGY: A HAPPY MARRIAGE OR DIVORCE PROCEEDINGS?

Kevin Porter
Exeter Associates, Inc.
12510 Prosperity Dr. Suite 350
Silver Spring, MD 20904
USA
301-622-4500
301-622-2686 fax
porter@exeterassociates.com

Brian Parsons
National Renewable Energy Laboratory
1617 Cole Blvd.
Golden, CO 80401
USA
303-384-6958
303-384-6901
brian_parsons@nrel.gov

Introduction

In 1996, the Federal Energy Regulatory Commission (FERC) issued Order 888, which required transmission-owning utilities under FERC jurisdiction to provide open access transmission service to eligible wholesale power customers. Among other things, the elements of electric service are unbundled, meaning that wind project developers must not only find a taker for the energy but also potentially make interconnection, ancillary service, and transmission arrangements for their wind projects. In 1999, the FERC issued Order 2000, which required transmission-owning utilities to file an intent with FERC on whether they have joined or plan to join a regional transmission organization (RTO). Order 2000 also required RTOs to meet certain criteria and be approved by FERC in order to begin operations as an RTO. More recently, FERC said it would issue a Notice of Proposed Rulemaking in 2002 on certain requirements and services, often termed “standard market design” (SMD), that must be included in all transmission tariffs filed at FERC.

This paper discusses the chronology of open access transmission issues, from Order 888 onward, and reviews some of the important issues raised by FERC’s SMD initiative.

Order 888

Order 888 ushered in open access transmission and ended decades of debate about whether FERC had authority over transmission access (FERC 1996). However, FERC’s implementation of Order 888 resulted in some inadvertent market outcomes, at least for wind energy.

As part of Order 888, FERC incorporated pro forma tariffs that provided the basic service, terms, and conditions for transmission providers to include in their transmission tariffs. Transmitting utilities could offer terms superior to those listed in the pro forma tariffs but could not provide less than the basic provisions in those tariffs. At the time, it was thought that transmitting utilities would introduce new tariff provisions and innovations over time. Instead, transmitting utilities closely adhered to the pro forma tariffs, and those tariffs became a ceiling rather than a floor.

Of specific interest to wind energy generators were the energy imbalance provisions of Order 888 (Milligan 2002). The energy imbalance service corrects for hourly mismatches between the scheduled delivery and the actual delivery of energy to a load located within a control area. FERC also allowed transmission providers to apply a penalty if energy deliveries vary 1.5% or more (either higher or lower) from advance energy schedules. Although Order 888 required transmission providers to offer the energy imbalance service, FERC left the specifics to the individual transmission providers. Typical energy imbalance provisions for an Order 888-style, open-access transmission tariff generally include the following:

- For hourly energy delivered by a generation resource less than the energy scheduled, a charge specified as the greater of: (1) the transmission provider's incremental cost, plus a percentage adder; or (2) a market index, plus a percentage adder; or (3) a pre-set price, such as 100 mills/kWh.
- For hourly energy delivered by the generation resource that is greater than the scheduled amount, a credit equal to some amount less than 100% of the transmission provider's incremental cost or market index.

Because wind is a variable energy resource and energy is only produced when the wind blows, it is basically impossible for wind generators to deliver wind energy within the 1.5% band included in the Order 888 tariffs. The penalty provisions in Order 888 tariffs typically exceed the commercial value of the wind energy. The best a wind generator could do is sell its output to an entity that can blend the wind energy into a larger diversified portfolio and hence minimize the risk of incurring any energy imbalance costs.

This situation led to efforts to exempt intermittent generators, such as wind, from energy imbalance penalties, or at least minimize the potential risk of incurring energy imbalance penalties. These are summarized below in Table 1. Despite these efforts, more than half of the country is under Order 888 tariffs that rely on penalties.

Order 2000

In issuing Order 2000 in 1999, FERC moved away from individual utility open-access transmission tariffs to focus more on creating regional transmission services and tariffs by instituting RTOs (FERC 1999). In a move that will be more beneficial to wind energy, FERC required RTOs to implement a real-time balancing market to allow transmission customers to balance their energy schedules.

Full implementation of Order 2000 could create many of the conditions wind energy generators need in the bulk power market, such as penalty-free imbalance markets and a liquid real-time balancing market for wind energy generators to sell and buy power in near real-time. Order 2000 has not yet been fully implemented, however. Formation of RTOs under Order 2000 is voluntary, and there are still sectors in the electric power industry and regions in the country where RTO participation is relatively meager. Moreover, RTOs are evolving institutions. It may be several years before RTOs are fully functional with robust real-time balancing markets.

As of April 2002, about 14 RTOs are in various stages of planning or operation.¹ However, many of these RTOs seem perpetually stuck in the planning and development phase. FERC has approved only one RTO proposal (Midwest ISO) under Order 2000.² Furthermore, several of the RTO proposals still rely on balanced schedules or penalties for scheduling deviations, or both. This includes WestConnect; the Midwest ISO (at least until mid-2003, when a hybrid congestion and real-time market will be launched); GridSouth; and GridFlorida. As a result, FERC has refocused its RTO initiative toward authorizing a standard market design that would apply to all RTOs and transmission owners under FERC jurisdiction.

¹ This includes the Electric Reliability Council of Texas ISO, which is not under FERC jurisdiction.

² FERC conditionally approved PJM as a RTO but only if PJM expanded its scope and configuration beyond the Mid-Atlantic region.

Table 1: SELECTED ISO SCHEDULING PROVISIONS OF BENEFIT TO WIND ENERGY

ISO	Provision	Comment
California ISO (Cal ISO)	Positive and negative scheduling deviations from intermittent renewable energy generators will be netted on a monthly basis. Penalties associated with energy imbalances are waived. Cal ISO conducts day-ahead, hourly, and near real-time forecasts of potential wind generation. Wind generators schedule based on the Cal ISO forecasts and pay a forecast fee of up to \$0.10/MWh.	These provisions were recently approved by FERC. CA ISO is the first ISO or RTO that relies on wind forecasting to incorporate wind energy into energy and transmission scheduling protocols.
ERCOT ISO	Wind generation is allowed a 50% deviation from schedules (50% under schedule or 50% over schedule). Load serving entities absorb any energy imbalance costs.	Texas has a mandatory renewables target of 2,000 MW of new renewable energy by 2009. The provision works because load-serving entities are buying wind energy to meet the renewable energy requirement, but the provision is widely perceived as a temporary fix.
New York ISO (NY ISO)	Currently operating intermittent renewable energy generators, and up to 500 MW more of such generating capacity, are exempt from regulation penalties.	If bidding into the day-ahead market, then any deviations in energy deliveries are settled at the real-time prices without penalties, with wind generators being paid the real-time price for energy deliveries over schedule, and conversely, paying the real-time price if energy deliveries are below schedule. These provisions are available to <i>all</i> generators. For the hour-ahead market (advisory in New York), the NY ISO resets the wind schedule to actual metered delivery before real-time settlement. Intermittent renewables are also eligible for revenues from installed capacity (ICAP) markets.
PJM ISO	Any deviations in energy deliveries are settled at the real-time prices without penalties, with wind generators being paid the real-time price for energy deliveries over schedule, and conversely, paying the real-time price if energy deliveries are below schedule. These provisions are available to <i>all</i> generators.	Wind generators must submit a daily schedule but can change those schedules up to 20 minutes before the hour.
RTO West	Proposed to not impose energy imbalance charges on wind energy generators for eight years after RTO West starts operations, as long as energy provider makes best efforts to control energy imbalances, including the use of forecasting.	Proposal pending before FERC.

Source: Milligan 2002 and RTO West 2002a.

FERC's Standard Market Design Initiative

FERC is now attempting to standardize wholesale bulk power market and transmission services across the country as much as possible. FERC noted that the pro forma tariffs in Order 888 needed updating, and the different designs with open access transmission and independent system operators revealed some lessons learned that should be applied across the country. FERC believes that standardizing transmission provisions should lower transaction costs and reduce "seams" issues between RTOs and between transmission providers.

The FERC staff has released two white papers that roughly outline what constitutes a standard market design. The first white paper outlines what should be in a standard market design transmission tariff, while the second white paper focuses more on the rate-setting and cost recovery, issues that are raised from a standard market design (FERC 2002a; FERC 2002b). FERC plans to unveil a Notice of Proposed Rulemaking (NOPR) on standard market design in summer 2002 and issue a final rule by the end of 2002 or in early 2003.

The first white paper proposes that transmission services (processing transmission requests, scheduling transactions, and operating the energy imbalance market) should be offered by an independent transmission provider apart from the transmission owner. An RTO or ISO would qualify; a vertically integrated utility not participating in an RTO or ISO would have to contract with an independent entity to provide these functions. Locational-based marginal pricing (LBMP) would be used for congestion management.

Furthermore, all customers, including vertically integrated utilities, would receive network transmission access service that combines both point-to-point and network transmission service. If implemented, this would be a marked departure from the Order 888 pro forma tariffs. Transmission customers would use network service from a source point (a generator) to a delivery point (a sink). Independent transmission providers would operate bid-based day-ahead and real-time markets in energy, regulation, and operating reserves, equivalent to what is done in PJM and the NYISO. Market participants should be able to bid demand or energy, self-supply, or bilateral contracts. In case of transmission congestion, transmission customers can opt to pay congestion charges (up to a customer-specified maximum amount) or can apply transmission rights that may be physical or financial in nature.

FERC's second white paper focuses on how to implement a standard market design, such as who pays the transmission access charge; how quickly transmission customers are switched over to network transmission access service; whether transmission access charges are based on peak load or total usage; how existing transmission contracts are treated; how transmission rights are allocated; and how generation capacity requirements (if any) are implemented.

These provisions can work quite well for wind energy generators. The standard market design could remove the firm versus non-firm dilemma for wind generators, i.e., not needing around-the-clock firm transmission, yet needing something more firm than non-firm transmission that may be curtailed if there is transmission congestion. Furthermore, FERC staff members explicitly state that intermittent renewables must be eligible to participate in all energy, capacity, and ancillary service markets, and that energy imbalances are to be settled at the real-time market price. Intermittent generators are also eligible for capacity accreditation or capacity markets, such as those administered in PJM, NYISO, and ISO-New England. Finally, simply standardizing transmission provisions to the greatest extent possible will be helpful, as wind generators will face a relatively consistent set of rules across the country, rather than being eligible to receive

revenues from some capacity markets (NYISO or ISO-New England, for example) but not in others (such as PJM).

Nevertheless, many important details and questions need to be resolved. As the FERC staff points out in these two white papers, there are important trade-offs between standardization and allowing for regional differences and market innovation. Other important issues include how transmission rights are initially assigned; whether (and how soon) existing transmission customers are converted to network access service; how transmission access charges are assigned and designed; and how to determine cost allocation for new transmission facilities. The scope of these changes is prompting FERC staff to suggest phasing in these requirements over time, with the first phase requiring that transmission tariffs all be updated to reflect FERC changes to the Order 888 tariffs in individual cases that FERC decided, as well as to establish trading hubs.

The remainder of this paper discusses some of the issues with FERC's standard market design initiative from a wind perspective. Because wind is a new entrant into the bulk power market, the likely goal for the wind industry will be to accelerate FERC's SMD initiative as fast as possible. However, transmission customers with existing, favorable transmission arrangements and some state regulators will likely want to slow the transition.

Issues to Consider with FERC's Standard Market Design Initiative

Jurisdictional Issues: Jurisdictional uncertainties have plagued the electric power industry for some time, and it is no different here with FERC's standard market design initiative. Rather than going the voluntary route as it did with RTOs, FERC is trying to push the electric power industry into following its standard market design. Transmission owners must have an independent entity administer their transmission systems, so transmission owners will have to transfer their transmission assets to an independent entity. Depending on the state, this may require state approval, and it is not clear that states are as enamored of a standard market design as FERC is. While not entirely comparable, the Florida Public Service Commission (FPSC) opened a prudence investigation into whether the Florida utilities should hand over operation of their transmission assets to Grid Florida,³ while the Indiana Utility Regulatory Commission (IURC) did not allow American Electric Power and Northern Indiana Public Service Co. to transfer control of their transmission assets to the Alliance RTO. The order stated: "We cannot entrust critical transmission facilities whose costs have been historically recovered from Indiana ratepayers...to an unknown operational leadership" (Platts Megawatt Daily 2001).⁴ In addition, individual states have expressed their skepticism about the benefits of either RTOs or FERC's standard market design initiative (FERC 2002c; Rhode Island Attorney General 2002). Clearly, getting state buy-in is important if FERC's efforts in standard market design are going to succeed.

Phase-In: FERC staff noted that a standard market design presents complex design and implementation issues that will have to be worked through over time, and they have proposed phasing in a standard market design over time. At this point, the FERC staff has only provided a limit set of requirements to phase-in, and they have not provided any specifics on the more

³ The FPSC did determine that transferring control of the Florida utilities' transmission assets to GridFlorida is prudent, subject to changes in the structure and proposed operation of GridFlorida (FPSC 2001).

⁴ In a separate order issued the same day as the Alliance order, the IURC approved the transfer of control of the transmission assets of five utilities to the Midwest ISO. The IURC justified its different opinions by asserting the Midwest ISO has met previous FERC conditions while the Alliance RTO has struggled to meet previous FERC conditions (Platts Megawatt Daily 2001).

ambitious proposals in FERC's two white papers. Furthermore, the National Association of Regulatory Utility Commissioners, the Edison Electric Institute, the National Rural Electric Cooperative Association, and the American Public Power Association asked FERC to slow its initiative—a request FERC denied in April 2002 (FERC 2002e). Given the sweeping nature of some of the proposed changes and the possible resistance from stakeholders, the phase-in timeline could be long and protracted. Because the FERC staff's proposal is mostly advantageous for wind energy generators, efforts will have to be made toward extending the temporary provisions in some ISOs, or accelerating FERC's phase-in schedule, or both.

Energy Imbalance Provisions: FERC staff has proposed that under a standard market design, the energy imbalance market must be operated independently of transmission owners. In addition, RTOs and individual transmission providers must include a bid-based day-ahead market and allow buyers and sellers several options, such as self-supply, long-term and short-term energy and transmission transactions, financial hedging opportunities, and supply or demand options. FERC staff stated that intermittent resources such as wind generators “should be able to participate in the day-ahead [and real-time] markets on the same basis as other resources.”

Assuming the SMD is finalized, penalties for not complying with advance schedules could cease being a problem for wind generators. (FERC staff did say penalties could be necessary for uninstructed deviations that threaten the reliability of the transmission system). Instead, similar to what is done in the PJM, ISO New England and the NYISO, deliveries that differ from day-ahead schedules will be settled through the real-time market at the real-time price.

While the SMD represents an important advance, the details have not yet been determined. For instance, while the administrator of the energy imbalance market must be independent, it is not clear whether the administrator is precluded from owning generating assets or not. Owning generation would possibly give rise to concerns that the energy imbalance market administrator may prefer its own generators, yet other generation may be necessary to maintain reliability within short time intervals. More important, the critical issue is not the form of the energy imbalance market; the issue is whether a market is deep and liquid enough to provide easy opportunity for wind generators to sell or buy energy at near real-time to balance schedules. Yet such deep markets largely do not exist in the electric power industry. Whether such markets will materialize in response to FERC's SMD initiative is unclear.

Regional Variation: The FERC staff's first white paper notes that “a key challenge will be to balance the need for standardization for a seamless transmission grid...with the need to permit regional differences and market innovation.” The FERC staff's call for bid-based day-ahead and real-time markets, and for using LBMP for congestion management, resembles bulk power markets in the Eastern Interconnection, but it is at odds with the more bilateral-based Western Interconnection. Indeed, RTO West argues that because the Pacific Northwest is primarily hydro-based and is covered under a number of international agreements with Canadian provinces, it cannot operate a bid-based market. Furthermore, RTO West maintains it must require balanced schedules and penalties for not submitting those schedules for reliability reasons (RTO West 2002b).⁵ How FERC handles these requests for variations from the standard market design will be key. Not allowing some variation may stifle innovation and make compliance with FERC's standard market design difficult, yet allowing too much variation may remove the standardization

⁵ Wind is exempt from scheduling penalties for in RTO West as long as efforts are made to control energy imbalances, including the use of best-available resource forecasting technology. RTO West can levy charges to recover the costs of providing the resource forecasting service, and it can adopt a rate design that “recognizes the variation of costs with the amount of the imbalance” (RTO West 2002a).

from bulk power markets that FERC wants and introduce “seams” between transmission providers or RTOs.

Who Pays Transmission Access Charges: Because the FERC staff proposes to consolidate the three types of transmission service in the Order 888 pro forma tariffs (firm and non-firm point-to-point transmission service, network transmission service) into network access service, a change is likely in how the embedded costs of transmission are recovered in rates. The question is who pays—everyone who schedules deliveries or load? Under the former approach, anyone who schedules deliveries within a transmission system (i.e., imports, purchases of power by load, or transmission by a generator or marketer to a delivery point) would pay the access charge. Such an approach could result in the payment of multiple access charges if there are intermediate transactions for delivering power to load. Load paying the access charges is an alternative. This is the approach used in PJM, NYISO, ISO-New England, and the California ISO (CA ISO) and is preferred by the wind energy industry (Brown 1999; AWEA 2002).

Transmission Rights: In a bid-based market with congestion pricing, market participants can hedge against congestion with a financial transmission right or reserve transmission with a physical transmission right. The initial allocation of transmission rights will be a pivotal issue. Transmission rights may initially be auctioned off, given to existing transmission customers, or a combination of both. Because wind is a new entrant, and wind generators may need flexible and short-term transmission rights under certain circumstances, wind energy generators want to see as many transmission rights available for auction or purchase as possible. Yet some state regulators and consumer advocates may hold the opposite view. How this is resolved depends at least in part on who pays the transmission access charge. Those paying the transmission access charge likely will be given some preference for transmission rights. Otherwise, market participants may pay the transmission access charge and be exposed to transmission congestion charges, which is not very equitable.

Transition of Transmission Customers to Network Service: As the FERC staff notes in its second white paper, transmission customers under existing wholesale contracts and customers taking bundled retail service often have different terms and conditions than transmission customers taking service under an open access transmission tariff. Because bundled retail service accounts for most of the total electric load, these different terms and conditions can pose a problem. For instance, the CA ISO notes that some existing transmission contracts have scheduling priority on certain transmission pathways up to 20 minutes before the start of the operating hour. The CA ISO simply removes any capacity represented by these existing transmission contracts from any congestion management process, even if some of the capacity may not be used and could be available to other parties (CA ISO 2002). The FERC staff presented three options: converting all service once standard market design is implemented; converting bundled retail service customers and providing incentives to transmission customers with existing contracts to switch; and allowing retail variation. Similar to other issues, wind generators will likely want to switch to network access service as quickly as possible and minimize transitional issues as much as possible. However, this may not be politically feasible, and a phase-in to network access service is a certain outcome.

Interconnection NOPR: A concurrent activity at FERC is a proposed rule requiring transmission-owning utilities to file standard generation interconnection terms and conditions as part of the open access transmission tariffs on file at FERC. When FERC issued Order 888 in 1996, the Commission referred only in passing to generator interconnection, stating it is the responsibility of transmission owners and state commissions. However, FERC became more interested in generator interconnection when some generators complained about difficulties in connecting to

the grid. In 2000, FERC put the industry on notice that it would take an increased role in interconnection when it issued its Tennessee Power order (FERC 2000). That order stated that interconnection service is an element of transmission service, that customers have the right to request interconnection separately from transmission service, and that interconnection must be offered under a transmitting utility's open access tariff. Transmission customers also may request the transmission provider to file an unexecuted interconnection agreement at FERC if an interconnection dispute cannot be quickly resolved.

In October 2001, FERC released an advanced notice of proposed rulemaking (ANOPR) on generation interconnection (FERC 2001d). As part of the process of developing uniform interconnection procedures, FERC started with the Electric Reliability Council of Texas (ERCOT) interconnection protocols as a base, as supplemented with various "best practices" based at least in part on various interconnection agreements and procedures that FERC has approved in the past. FERC also commenced a consensus-making process for stakeholders to reach agreement on as many interconnection issues as possible. In April 2002, FERC issued a draft interconnection NOPR that includes pro forma Interconnection Agreements and requested comments on interconnection pricing, insurance, and liability issues (FERC 2002d).

While FERC is addressing interconnection and standard market design in different rulemakings, there are overlapping issues between the two, not the least of which is that a generator must be interconnected in order to access transmission services under a standard market design. Therefore, some consistency is necessary between the interconnection NOPR and FERC's impending standard market design NOPR to avoid the introduction of additional market hurdles. Whether that will be accomplished remains to be seen. As discussed before, the FERC staff's white papers on standard market design envision combining point-to-point transmission and network transmission service into a single transmission service called network transmission access service. However, the interconnection NOPR defines two types of interconnection services: energy resource interconnection service that allows a generator to interconnect and deliver energy using existing firm and non-firm transmission capacity on an "as available" basis, and network resource interconnection service that is comparable to how a transmission owner, or ISO or RTO with locational-based marginal pricing, integrates generation facilities to serve load. Whether these provisions in the interconnection NOPR are inconsistent with the network transmission access service as described in the FERC staff white papers will depend on how FERC defines the details in its rulemakings on interconnection and standard market design.

In addition, whether generators or transmission customers will pay for transmission improvements associated with interconnecting new generating capacity is a controversial issue in FERC's interconnection NOPR. The debate briefly spilled over into Congress, when Senator Mary Landrieu (D-LA) sponsored an amendment to the Senate energy bill that would require generators to pay for new transmission upgrades if necessary to interconnect their generating plants (the amendment was eventually withdrawn).

Transmission Planning to Enhance Competitive Markets: In orders on the GridFlorida, Midwest ISO, ISO New England, and PJM RTOs last year, FERC stated it wanted RTOs to more aggressively plan for transmission improvements and transmission capacity additions in order to facilitate a competitive power market (FERC 2001a; FERC 2001b; FERC 2001c; FERC 2001e). In the first standard market design white paper, FERC stated that "the regional transmission planning process should identify opportunities for increasing competition, particularly the elimination of local market power when possible, and it should be aggressive about facilitating new demand response, transmission, or generation construction as needed." However, FERC

offered few details on what it means, apparently preferring to leave this to RTOs and transmission providers to figure out.

Demand Side Response: There has been increasing interest in incorporating more of an electric demand response to energy market prices, in order to try to reduce the near-inelasticity of electric demand, and reduce potential generator market power at times of peak demand. FERC has expressed interest in demand side response, and the two staff white papers are peppered with references to the desire to better incorporate demand side response. However, the details are noticeably lacking, and it appears FERC is relying on the industry to come forward with proposals on how better to incorporate demand-side response.

Conclusion

While wind energy continues its rapid growth, the future prospects of wind energy in the United States depend on how FERC implements RTO requirements under Order 2000—particularly the real-time balancing provisions—as well as its upcoming NOPR on SMD. The Order 888 energy imbalance provisions make it impossible for wind energy generators to utilize a utility’s open access transmission tariff. Indeed, the only viable market option for a wind generator is to sell its wind output to a load serving entity that can balance the wind energy within its portfolio and minimize the risk of incurring energy imbalance penalties. Because of this, efforts have been made to either exempt intermittent generators, such as wind, from penalties in the energy imbalance provisions, or widen the allowable deviation band from advance energy schedules. Even so, more than half of the country still operates under energy imbalance provisions that include stiff penalties for deviations from advance energy schedules.

Should Order 2000 be fully implemented, the requirement for a real-time balancing market in Order 2000 could alleviate this issue for wind energy generators. However, two-and-a-half years after FERC enacted Order 2000, only one RTO has secured FERC approval, and most of the other planned or proposed RTOs are stuck in a developmental mode.

FERC’s SMD initiative contains several promising elements for wind energy and could do much to accelerate the market prospects of wind energy. However, certain elements of the FERC staff white papers are proving quite controversial, such as converting transmission customers to a single transmission service. In addition, because of the complexity and contentiousness of some of these proposals, FERC staff is proposing to phase-in its SMD initiative, although FERC’s timeline is not defined at the moment. If FERC’s SMD initiative proceeds at the pace of RTO development under Order 2000, then for the wind energy industry, the SMD initiative may represent something quite promising that never fully materializes. Until then, the wind energy industry will have to rely on, and continue to push for, temporary provisions to minimize the impact of energy imbalance penalties.

Acknowledgments

The U.S. Department of Energy (DOE) and the National Renewable Energy Laboratory’s (NREL) Wind Technology Programs funded this paper and the supporting research. The author thanks Brian Parsons of NREL and Jack Cadogan of DOE for their continued support. The author also thanks Matt Kahal, a consultant based in Silver Spring, Maryland, for his review of an early draft of this paper; and Mark Bolinger of Lawrence Berkeley National Laboratory, Jim Caldwell of AWEA, and Michael Milligan of NREL for their helpful comments.

References

AWEA 2002. *Comments of the American Wind Energy Association on Options Paper for Resolving Rate and Transition Issues for Standardized Transmission Service and Wholesale Electric Market Design*, May 1, 2002, Docket No. RM01-12-000. Available at <http://www.ferc.gov/Electric/RTO/mrkt-strct-comments/ef200205015067.pdf>.

CA ISO 2002. *California Independent System Operator Market Design 2002 Project: Preliminary Draft Comprehensive Design Proposal*, January 8, 2002.

Brown, Andrew; Ellison, Christopher; and Porter, Kevin. *Transmitting Wind Energy: Issues and Options in Competitive Electric Markets*. Washington: National Wind Coordinating Committee, 1999. Available at <http://www.nationalwind.org/pubs/trans/phase2.pdf>.

FERC 2002a. *Working Paper on Standardized Transmission Service and Wholesale Electric Market Design*, March 15, 2002. Available at http://www.ferc.gov/Electric/RTO/mrkt-strct-comments/discussion_paper.htm.

FERC 2002b. *Options for Resolving Rate and Transition Issues in Standardized Transmission Service and Wholesale Electric Market Design*, April 10, 2002. Available at http://www.ferc.gov/Electric/RTO/mrkt-strct-comments/discussion_paper.htm.

FERC 2002c. *In the Matter of State-Federal Regional RTO Panels: Carolina Regional RTO Panel Discussion*, April 22, 2002. Available at <http://www.ferc.gov/Electric/RTO/04-22-02-RTO-transc.pdf>.

FERC 2002d. *Standardization of Generator Interconnection Agreements and Procedures: Notice of Proposed Rulemaking*, Docket No. RM02-1-000, 99 FERC ¶ 61,086, April 24, 2002. Available at http://www.ferc.gov/electric/gen_inter/rm02-1-04-24-02NOPR.pdf.

FERC 2002e. *Notice Regarding Requests for Extension of Time*, Docket No. RM01-12-000, April 26, 2002. Available at <http://www.ferc.gov/Electric/RTO/mrkt-strct-comments/RM01-12-04-26-02.pdf>.

FERC 2001a. *Order Provisionally Granting RTO Status (GridFlorida)*, Docket No. RT01-67-000, March 28, 2001. Available at <http://www.ferc.gov/Electric/RTO/rto/issuance/rt01-67-001.pdf>.

FERC 2001b. *Order Provisionally Granting RTO Status (PJM)*, Docket No. RT01-2-000, July 12, 2001. Available at <http://www.ferc.gov/Electric/RTO/rto/issuance/rt01-2-000july.pdf>.

FERC 2001c. *Order Granting in Part, and Denying in Part, Petition for Declaratory Order (ISO New England)*, Docket No. RT01-94-000, July 12, 2001. Available at <http://www.ferc.gov/Electric/RTO/rto/issuance/rt01-86-000july.pdf>.

FERC 2001d. *Standardizing Generator Interconnection Agreements Procedures, Advance Notice of Proposed Rulemaking*, 66 Fed. Reg. 55,140 (Nov. 1, 2001), FERC Stats. & Regs. ¶ 35,540 (2001). Available at http://www.ferc.gov/electric/gen_inter/rm02-1.pdf.

FERC 2001e. *Order Granting RTO Status and Accepting Supplemental Filings (Midwest ISO)*, Docket No. RT01-87-000, December 20, 2001. Available at http://www.ferc.gov/Electric/RTO/rt01_87_000.pdf.

FERC 2000. *Tennessee Power Co.*, 90 FERC ¶ 61,238 (2000); Order on Rehearing, 91 ¶ FERC 61,271 (2000).

FERC 1999. *Regional Transmission Organizations, Order No. 2000*, 65 Fed. Reg. 809 (January 6, 2000), FERC Stats. & Regs. ¶ 31,089 (1999) (Order No. 2000), order on reh'g, Order No. 2000-A, 65 Fed. Reg. 12,088 (March 8, 2000), FERC Stats. & Regs. ¶ 31,092 (2000) (Order No. 2000-A), aff'd sub nom. Public Utility District No. 1 of Snohomish County, Washington v. FERC, Nos. 00-1174, et al. (D.C. Cir. 2001). Available at <http://www.ferc.gov/news/rules/pages/order2000.htm>.

FERC 1996. *Promoting Wholesale Competition Through Open Access Non-discriminatory Transmission Services by Public Utilities; Recovery of Stranded Costs by Public Utilities and Transmitting Utilities, Order No. 888*, 61 Fed. Reg. 21,540, at 31,664-65 (1996), FERC Stats. & Regs. ¶ 31,036 (1996), order on reh'g, Order No. 888-A, 62 Fed. Reg. 12,274 (1997), FERC Stats. & Regs. ¶ 31,048 (1997), order on reh'g, Order No. 888-B, 81 FERC ¶ 61,248 (1997), order on reh'g, Order No. 888-C, 82 FERC ¶ 61,046 (1998), aff'd in relevant part, remanded in part on other grounds sub nom. Transmission Access Policy Study Group, et al. v. FERC, 225 F. 3d 667 (D.C. Cir. 2000), aff'd, *New York v. FERC*, 122 S.Ct. 1012 (2002). Available at <http://www.ferc.gov/news/rules/pages/order888.htm> and <http://www.ferc.gov/news/rules/pages/order889.htm>.

FPSC 2001. *In Re: Review of Florida Power Corp., Florida Power & Light Co., and Tampa Electric Co. and Impact of Participation in GridFlorida, a Florida Transmission Co., on Retail Ratepayers*, Order No. PSC-01-2489-FOF-EI, December 20, 2001. Available at <http://www.floridapsc.com/psc/dockets/index.cfm?event=documentFilings&documentNumber=15875-01&requestTimeout=240>.

Michael Milligan, Kevin Porter, Brian Parsons, and Jim Caldwell. "Wind Energy and Power System Operations: A Survey of Current Research and Regulatory Actions," *Electricity Journal*, April 2002, pp. 56-67. Reprinted from Vol. 15, No. 2, ©2002, with permission from Elsevier Science.

Platts Megawatt Daily 2001. "Indiana Regulators Set Back Alliance RTO," *Platts Megawatt Daily*, December 19, 2001, pp. 1-2.

RTO West 2002a. *RTO West Transmission Operating Agreement*, March 29, 2002. Available at http://www.rtowest.org/Doc/Stage2Filing_TOA_AttachmentAtoFilingLetter.PDF.

RTO West 2002b. *Comments of RTO West Filing Utilities on Standardized Transmission Service and Wholesale Electric Market Design*, April 10, 2002, Docket No. RM01-12-000. Available at http://www.ferc.gov/Electric/RTO/mrkt-strct-comments/JointSMDCmnts_Apr10.pdf.

Rhode Island Attorney General 2002. *Comments of the Rhode Island and New Mexico Attorneys General, the Colorado Office of Consumer Counsel, and the Rhode Island Division of Public Utilities and Carriers*, May 3, 2002, Docket No. RM01-12-000. Available at <http://www.ferc.gov/Electric/RTO/mrkt-strct-comments/RM0112Comments.pdf>.

REPORT DOCUMENTATION PAGE			Form Approved OMB NO. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.				
1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE May 2002	3. REPORT TYPE AND DATES COVERED Conference Paper		
4. TITLE AND SUBTITLE Regional Transmission Organizations and Wind Energy: A Happy Marriage or Divorce Proceedings? Preprint			5. FUNDING NUMBERS WER24250	
6. AUTHOR(S) B. Parsons and K. Porter				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) National Renewable Energy Laboratory 1617 Cole Blvd. Golden, CO 80401-3393			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) National Renewable Energy Laboratory 1617 Cole Blvd. Golden, CO 80401-3393			10. SPONSORING/MONITORING AGENCY REPORT NUMBER NREL/CP-500-32467	
11. SUPPLEMENTARY NOTES				
12a. DISTRIBUTION/AVAILABILITY STATEMENT National Technical Information Service U.S. Department of Commerce 5285 Port Royal Road Springfield, VA 22161			12b. DISTRIBUTION CODE	
13. ABSTRACT (<i>Maximum 200 words</i>) In 1996, the Federal Energy Regulatory Commission (FERC) issued Order 888, which required transmission-owning utilities under FERC jurisdiction to provide open access transmission service to eligible wholesale power customers. Among other things, the elements of electric service are unbundled, meaning that wind project developers must not only find a taker for the energy but also potentially make interconnection, ancillary service, and transmission arrangements for their wind projects. In 1999, the FERC issued Order 2000, which required transmission-owning utilities to file an intent with FERC on whether they have joined or plan to join a regional transmission organization (RTO). Order 2000 also required RTOs to meet certain criteria and be approved by FERC in order to begin operations as an RTO. More recently, FERC said it would issue a Notice of Proposed Rulemaking in 2002 on certain requirements and services, often termed "standard market design" (SMD), that must be included in all transmission tariffs filed at FERC. This paper discusses the chronology of open access transmission issues, from Order 888 onward, and reviews some of the important issues raised by FERC's SMD initiative.				
14. SUBJECT TERMS wind energy; regional transmission organizations; RTOs; utilities			15. NUMBER OF PAGES	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UL	