

153 FERC ¶ 61,175  
DEPARTMENT OF ENERGY  
FEDERAL ENERGY REGULATORY COMMISSION

18 CFR Part 35

[Docket No. RM16-1-000]

Reactive Power Requirements for Non-Synchronous Generation

(Issued November 19, 2015)

AGENCY: Federal Energy Regulatory Commission.

ACTION: Proposal to Revise Standard Generator Interconnection Agreements.

SUMMARY: The Federal Energy Regulatory Commission (Commission) is proposing to eliminate the exemptions for wind generators from the requirement to provide reactive power. As a result, all newly interconnecting generators, including both synchronous and non-synchronous generators, would be required to provide reactive power. To implement this requirement, the Commission proposes to revise the *pro forma* Large Generator Interconnection Agreement (LGIA), Appendix G to the *pro forma* LGIA, and the *pro forma* Small Generator Interconnection Agreement (SGIA) in accordance with the Commission's regulations, which require every public utility with a non-discriminatory open access transmission tariff on file to also have on file the *pro forma* LGIA and *pro forma* SGIA "required by Commission rulemaking proceedings promulgating and amending such interconnection procedures and agreements." In this Proposal to Revise Standard Generator Interconnection Agreements (Proposal), the Commission proposes to modify both agreements to eliminate the exemptions for wind generators from the requirement to provide reactive power. As a result, all newly interconnecting generators

(i.e., new generators seeking to interconnect to the transmission system and all existing non-synchronous generators making upgrades to their generation facilities that require new interconnection requests), both synchronous and non-synchronous, would be required to provide reactive power as a condition of interconnection as of the effective date of the final revision.

**DATES:** Comments are due **[INSERT DATE 60 days after publication in the FEDERAL REGISTER]**.

**ADDRESSES:** Comments, identified by docket number, may be filed in the following ways:

- Electronic Filing through <http://www.ferc.gov>. Documents created electronically using word processing software should be filed in native applications or print-to-PDF format and not in a scanned format.
- Mail/Hand Delivery: Those unable to file electronically may mail or hand-deliver comments to: Federal Energy Regulatory Commission, Secretary of the Commission, 888 First Street, NE, Washington, DC 20426.

*Instructions:* For detailed instructions on submitting comments and additional information on this process, see the Comment Procedures Section of this document.

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SUPPLEMENTARY INFORMATION:

UNITED STATES OF AMERICA  
FEDERAL ENERGY REGULATORY COMMISSION

Reactive Power Requirements for Non-Synchronous  
Generation

Docket No. RM16-1-000

PROPOSAL TO REVISE STANDARD GENERATOR INTERCONNECTION  
AGREEMENTS

(Issued November 19, 2015)

1. In this Proposal to Revise Standard Generator Interconnection Agreements (Proposal), the Federal Energy Regulatory Commission (Commission) is proposing to eliminate the exemptions for wind generators from the requirement to provide reactive power. As a result, all newly interconnecting generators, including both synchronous and non-synchronous, would be required to provide reactive power. Specifically, the Commission proposes to modify the two *pro forma* interconnection agreements, the Large Generator Interconnection Agreement (LGIA) and the Small Generator Interconnection Agreement (SGIA), to eliminate the current exemption for wind generators from the requirement to provide reactive power, thereby requiring all newly interconnecting generators (i.e., new generators seeking to interconnect to the transmission system and all existing non-synchronous generators making upgrades to their generation facilities that require new interconnection requests), both synchronous and non-synchronous, to provide reactive power. This Proposal would create comparable reactive power requirements for non-synchronous and synchronous generators, except that the Proposal requires that non-synchronous generators maintain the required power factor range only when the generator's real power output exceeds 10 percent of its

nameplate capacity. Additionally, all existing non-synchronous generators making upgrades to their generation facilities that require new interconnection requests would be required to provide reactive power.

2. The existing *pro forma* LGIA and *pro forma* SGIA both require, as a condition of interconnection, an interconnecting generator “to design its generating facility to maintain a composite power delivery at continuous rated power output at the Point of Interconnection at a power factor<sup>1</sup> of 0.95 leading to 0.95 lagging, or a different range if adopted by the Transmission Provider”<sup>2</sup> (i.e., the reactive power requirement). This reactive power requirement requires dynamic reactive power<sup>3</sup> from generators. As discussed below, however, wind generators have been exempted from the reactive power

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<sup>1</sup> The power factor of an alternating current transmission system is the ratio of real power to apparent power. Reliable operation of a transmission system requires system operators to maintain a tight control of voltages (at all points) on the transmission system. The ability to vary the ratio of real power to apparent power (i.e., adjust the power factor) allows system operators to maintain scheduled voltages within allowed for tolerances on the transmission system and maintain the reliability of the transmission system. The Commission established a required power factor range in Order No. 2003 of 0.95 leading to 0.95 lagging. *See Standardization of Generator Interconnection Agreements and Procedures*, Order No. 2003, FERC Stats. & Regs. ¶ 31,146, at P 542 (2003), *order on reh’g*, Order No. 2003-A, FERC Stats. & Regs. ¶ 31,160, *order on reh’g*, Order No. 2003-B, FERC Stats. & Regs. ¶ 31,171 (2004), *order on reh’g*, Order No. 2003-C, FERC Stats. & Regs. ¶ 31,190 (2005), *aff’d sub nom. Nat’l Ass’n of Regulatory Util. Comm’rs v. FERC*, 475 F.3d 1277 (D.C. Cir. 2007), *cert. denied*, 552 U.S. 1230 (2008).

<sup>2</sup> Section 9.6.1 of the *pro forma* LGIA and section 1.8.1 of the *pro forma* SGIA.

<sup>3</sup> Reactive power sources are generally categorized as static or dynamic based on the speed and continuity at which they can produce or absorb reactive power in response to changes in system conditions. In general, dynamic reactive power devices are characterized by faster acting and continuously variable voltage control capability.

requirement absent a study finding the provision of reactive power necessary, because historically, costs for an interconnection customer to design and build a wind generator that could provide reactive power were high and could have created an obstacle to the development of wind generation.<sup>4</sup> However, due to technological advancements, wind generators can now provide reactive power more cheaply and the cost of providing reactive power no longer presents an obstacle to the development of wind generation.<sup>5</sup> The subsequent decline in the cost to wind generators of providing reactive power may make it unduly discriminatory and preferential to exempt wind generators from the reactive power requirement when other types of generators are not exempt. Further, the growing penetration of wind generators on some systems increases the potential for a deficiency in reactive power.<sup>6</sup> Given this potential, the Commission's current requirement that the transmission provider conduct a study to determine whether each new wind generator needs to provide reactive power may unduly place the burden of supplying reactive power on synchronous generators without a reasonable technological or cost-based basis.

3. Therefore, the Commission proposes to eliminate the existing exemptions for wind generators, and thereby require that all newly interconnecting non-synchronous

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<sup>4</sup> *Interconnection for Wind Energy*, Order No. 661, FERC Stats. & Regs. ¶ 31,186, at P 51, *order on reh'g*, Order No. 661-A, FERC Stats. & Regs. ¶ 31,198 (2005).

<sup>5</sup> *Payment for Reactive Power*, Commission Staff Report, Docket No. AD14-7, app. 2, at 1-3 (Apr. 22, 2014).

<sup>6</sup> *See PJM Interconnection, L.L.C.*, 151 FERC ¶ 61,097, at P 7 (2015).

generators provide dynamic reactive power as a condition of interconnection. This requirement would also apply to all existing non-synchronous generators making upgrades to their generation facilities that require new interconnection requests. The proposals set forth in this Proposal are intended to ensure that all generators, synchronous and non-synchronous, are treated in a not unduly discriminatory or preferential manner, as required by sections 205 and 206 of the Federal Power Act (FPA),<sup>7</sup> and to ensure sufficient reactive power is available on the electric grid as more non-synchronous generators seek to interconnect.

4. The Commission seeks comment on these proposed reforms sixty (60) days after publication of this Proposal in the *Federal Register*.

### **Background**

5. Transmission providers require reactive power to control system voltage for efficient and reliable operation of an alternating current transmission system. At times, transmission providers need generators to either supply or consume reactive power. Starting with Order No. 888,<sup>8</sup> which included provisions regarding reactive power from

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<sup>7</sup> 16 U.S.C. §§ 824a, 824b (2012).

<sup>8</sup> *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, FERC Stats. & Regs. ¶ 31,036 (1996), *order on reh'g*, Order No. 888-A, FERC Stats. & Regs. ¶ 31,048, *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 sub nom. Transmission Access Policy Study Group v. FERC*, 225 F.3d 667 (D.C. Cir. 2000), *aff'd sub nom. New York v. FERC*, 535 U.S. 1 (2002).

generators as an ancillary service in Schedule 2 of the *pro forma* Open Access Transmission Tariff (OATT), the Commission issued a series of orders intended to ensure that sufficient reactive power is available to maintain the reliability of the electric grid.

6. Starting with Order No. 2003, the Commission adopted standard procedures and a standard agreement for the interconnection of large generation facilities (the *pro forma* LGIA), which included the reactive power requirement.<sup>9</sup> The Commission recognized in Order No. 2003-A that the *pro forma* LGIA was “designed around the needs of large synchronous generators and that generators relying on newer technologies may find that either a specific requirement is inapplicable or that it calls for a slightly different approach” because such generators “may have unique electrical characteristics.”<sup>10</sup> Therefore, the Commission exempted wind generators from the reactive power requirement and added a blank Appendix G to the *pro forma* LGIA as a placeholder for future interconnection requirements for newer technologies.<sup>11</sup>

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<sup>9</sup> Order No. 2003, FERC Stats. & Regs. ¶ 31,146 at PP 1, 542.

<sup>10</sup> Order No. 2003-A, FERC Stats. & Regs. ¶ 31,160 at P 407 & n.85.

<sup>11</sup> *Id.* Article 9.6.1 of the *pro forma* LGIA provides: “Interconnection Customer shall design the Large Generating Facility to maintain a composite power delivery at continuous rated power output at the Point of Interconnection at a power factor within the range of 0.95 leading to 0.95 lagging, unless Transmission Provider has established different requirements that apply to all generators in the Control Area on a comparable basis. The requirements of this paragraph shall not apply to wind generators.”



7. In June 2005, the Commission issued Order No. 661,<sup>12</sup> establishing interconnection requirements in Appendix G to the *pro forma* LGIA for large wind generators.<sup>13</sup> Recognizing that, unlike traditional synchronous generators, wind generators had to “install costly equipment” in order to maintain reactive power capability, the Commission in Order No. 661 preserved the exemption for large wind generators from the reactive power requirement unless the transmission provider shows, through a System Impact Study, that reactive power capability is required to ensure safety or reliability.<sup>14</sup> The Commission explained that this qualified exemption from the reactive power requirement for large wind generators would provide certainty to the industry and “remove unnecessary obstacles to the increased growth of wind generation.”<sup>15</sup>

8. In May 2005, the Commission issued Order No. 2006,<sup>16</sup> in which it adopted standard procedures and a standard agreement for the interconnection of small generation

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<sup>12</sup> *Interconnection for Wind Energy*, Order No. 661, FERC Stats. & Regs. ¶ 31,186, Appendix B (Appendix G – Interconnection Requirements for a Wind Generating Plant), *order on reh’g*, Order No. 661-A, FERC Stats. & Regs. ¶ 31,198 (2005).

<sup>13</sup> *Id.* P 1.

<sup>14</sup> *Id.* PP 50-51. Appendix G states: “A wind generating plant shall maintain a power factor within the range of 0.95 leading to 0.95 lagging, measured at the Point of Interconnection as defined in this LGIA, if the Transmission Provider’s System Impact Study shows that such a requirement is necessary to ensure safety and reliability.”

<sup>15</sup> *Id.* P 50.

<sup>16</sup> *Standardization of Small Generator Interconnection Agreements and Procedures*, Order No. 2006, FERC Stats. & Regs. ¶ 31,180, Attachment F (Small  
(continued...))

facilities (*pro forma* SGIA).<sup>17</sup> In Order No. 2006, the Commission completely exempted small wind generators from the reactive power requirement.<sup>18</sup> The Commission reasoned that, similar to large wind generators, small wind generators would face increased costs to provide reactive power that could create an obstacle to the development of small wind generators. Additionally, the Commission reasoned that small wind generators would “have minimal impact on the Transmission Provider’s electric system” and therefore the reliability requirements for large wind generators that were eventually imposed in Order No. 661 were not needed for small wind generators.<sup>19</sup>

9. Since the Commission provided these exemptions from the reactive power requirement for wind generators, the equipment needed for a wind generator to provide reactive power appears to have become more commercially available and less costly, such that the cost of installing equipment that is capable of providing reactive power is

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Generator Interconnection Agreement), *order on reh’g*, Order No. 2006-A, FERC Stats. & Regs. ¶ 31,196 (2005), *order granting clarification*, Order No. 2006-B, FERC Stats. & Regs. ¶ 31,221 (2006).

<sup>17</sup> *Id.* P 1.

<sup>18</sup> *Id.* P 387. Section 1.8.1 of the *pro forma* SGIA states: “The Interconnection Customer shall design its Small Generating Facility to maintain a composite power delivery at continuous rated power output at the Point of Interconnection at a power factor within the range of 0.95 leading to 0.95 lagging, unless the Transmission Provider has established different requirements that apply to all similarly situated generators in the control area on a comparable basis. The requirements of this paragraph shall not apply to wind generators.”

<sup>19</sup> *Id.* P 24.

comparable to the costs of a traditional generator.<sup>20</sup> Recognizing these factors, the Commission recently accepted a proposal by PJM Interconnection, L.L.C. (PJM) to effectively remove the wind generator exemption from the PJM tariff.<sup>21</sup> Specifically, the Commission granted PJM an “independent entity variation” from Order No. 661 in accepting PJM’s proposal to require interconnection customers seeking to interconnect non-synchronous generators,<sup>22</sup> including wind generators, to use “enhanced inverters” with the capability to provide reactive power.<sup>23</sup> The Commission observed that, “[a]lthough there are still technical differences between non-synchronous generators [such as wind generators] and traditional generators, with regard to the provision of reactive power, those differences have significantly diminished since the Commission issued Order No. 661.”<sup>24</sup> The Commission agreed with PJM “that the technology has changed both in availability and in cost since the Commission rejected [the California

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<sup>20</sup> *Payment for Reactive Power*, Commission Staff Report, Docket No. AD14-7, app. 1, at 6, app. 2, at 4-5 (Apr. 22, 2014).

<sup>21</sup> *PJM Interconnection, L.L.C.*, 151 FERC ¶ 61,097, at P 28 (2015).

<sup>22</sup> Non-synchronous generators are “connected to the bulk power system through power electronics, but do not produce power at system frequency (60 Hz).” They “do not operate in the same way as traditional generators and respond differently to network disturbances.” *Id.* P 1 n.3 (citing Order No. 661, FERC Stats. & Regs. ¶ 31,198 at P 3 n.4). Wind and solar photovoltaic generators are two examples of non-synchronous generators.

<sup>23</sup> *Id.* PP 1, 6.

<sup>24</sup> *Id.* P 28.

Independent System Operator's] proposal in 2010," such that "PJM's proposal will not present a barrier to non-synchronous resources."<sup>25</sup>

### **Discussion**

10. The continued exemption from the reactive power requirement in the *pro forma* LGIA and the *pro forma* SGIA for newly interconnecting wind generators appears to be unjust, unreasonable, and unduly discriminatory or preferential. Older wind turbine generators consumed reactive power; however, they lacked the capability to produce and control reactive power without the use of costly equipment because they did not use inverters like other non-synchronous generators.<sup>26</sup> Technological advances have been made in the inverters used by wind generators.<sup>27</sup> Based on these improvements, requiring newly interconnecting wind generators to provide reactive power does not appear to be the obstacle to the development of wind generation that it was when the Commission issued Order Nos. 2003, 661, and 2006.<sup>28</sup> In particular, the wind turbines being installed

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<sup>25</sup> *Id.*

<sup>26</sup> Order No. 661, FERC Stats. & Regs. ¶ 31,186 at PP 50-51.

<sup>27</sup> Non-synchronous generators produce electricity that is not synchronized to the electric grid (i.e., direct current (DC) power or alternating current (AC) power at a frequency other than 60 hertz). Inverters convert non-synchronized AC or DC power into synchronized AC power that can be transmitted on the transmission system.

<sup>28</sup> As discussed above, in exempting wind generators from the reactive power requirement, the Commission sought to avoid creating an obstacle to the development of wind generation. For example, in Order No. 661, the Commission was concerned with "remov[ing] unnecessary obstacles to the increased growth of wind generation." *Id.* P 50.

today are generally Type III and Type IV inverter-based turbines,<sup>29</sup> which are capable of producing and controlling dynamic reactive power, which was not the case in 2005 when the Commission exempted wind generators from the reactive power requirement in Order No. 661.<sup>30</sup> The Commission preliminarily concludes that improvements in technology and the corresponding declining costs to newly interconnecting wind generators in providing reactive power make it unduly discriminatory and preferential to exempt such non-synchronous generators from the reactive power requirement when other types of generators are not exempt. Given the reduced costs to newly interconnecting wind generators to provide reactive power, requiring them to operate within the required power factor range would ensure they satisfy the same requirements as other generators and satisfy a basic requirement of interconnection.<sup>31</sup>

11. Further, the Commission is concerned that, as the penetration of wind generation continues to grow, exempting a class of generators from providing reactive power could create reliability issues if those generators represent a substantial amount of total

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<sup>29</sup> A Type III wind turbine is a non-synchronous wound-rotor generator that has a three phase AC field applied to the rotor from a partially-rated power-electronics converter. A Type IV wind turbine is an AC generator in which the stator windings are connected to the power system through a fully-rated power-electronics converter. Both Type III and Type IV wind turbines have inherent reactive power capabilities.

<sup>30</sup> *Id.* PP 50-51.

<sup>31</sup> *See, e.g., Sw. Power Pool, Inc.*, 119 FERC ¶ 61,199, at P 29 (“Providing reactive power within the [standard power factor range] is an obligation of a generator, and is as much an obligation of a generator as, for example, operating in accordance with Good Utility Practice.”), *order on reh’g*, 121 FERC ¶ 61,196 (2007).

generation, or if many of the resources that currently provide reactive power are retired from operation. Local reliability issues, due to the short distances that reactive power can be transmitted, that are not readily apparent given the current generation mix could result if a region were to lose synchronous resources that supply reactive power and the resulting generation mix consisted of a significant quantity of resources that were exempt from providing reactive power. Further, the Commission believes that maintaining this exemption may unduly place the burden of supplying reactive power on synchronous generators without a reasonable technological or cost-based distinction between synchronous and non-synchronous generators.<sup>32</sup>

12. Therefore, the Commission preliminarily concludes that the continued exemption from the reactive power requirement for newly interconnecting wind generators is unjust and unreasonable and unduly discriminatory and preferential. The Commission, therefore, proposes to revise the *pro forma* LGIA, Appendix G of the *pro forma* LGIA, and the *pro forma* SGIA to eliminate the exemptions for wind generators from the reactive power requirement.<sup>33</sup> Under this Proposal, newly interconnecting non-

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<sup>32</sup> See *PJM Interconnection, L.L.C.*, 151 FERC ¶ 61,097, at P 7 (2015); *Payment for Reactive Power*, Commission Staff Report, Docket No. AD14-7, app. 1 (Apr. 22, 2014).

<sup>33</sup> The Commission does not propose to revise any regulatory text. The Commission proposes to revise the *pro forma* LGIA and *pro forma* SGIA in accordance with section 35.28(f)(1) of the Commission's regulations, which provides: "Every public utility that is required to have on file a non-discriminatory open access transmission tariff under this section must amend such tariff by adding the standard interconnection procedures and agreement and the standard small generator interconnection procedures and agreement required by Commission rulemaking proceedings promulgating and (continued...)"

synchronous generators would be eligible for the same payments for reactive power as other generators.<sup>34</sup> Any compensation would be based on the cost of providing reactive power. We note that the cost to a wind generator of providing reactive power may not be easily estimated using existing methods that are applied to synchronous generators.<sup>35</sup>

The Commission also proposes that transmission providers that are not public utilities will have to adopt the requirements of this Proposal as a condition of maintaining the status of their safe harbor tariff or otherwise satisfying the reciprocity requirement of Order No. 888.<sup>36</sup>

13. Removing the exemptions for wind generators from the reactive power requirement would specifically require all newly interconnecting non-synchronous generators, and all existing non-synchronous generators proposing upgrades to their generation facilities that require new interconnection requests, to design their generating

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amending such interconnection procedures and agreements, or such other interconnection procedures and agreements as may be required by Commission rulemaking proceedings promulgating and amending the standard interconnection procedures and agreement and the standard small generator interconnection procedures and agreement.” 18 C.F.R. § 35.28(f)(1) (2015). *See Integration of Variable Energy Resources*, Order No. 764, FERC Stats. & Regs. ¶ 31,331, at PP 343-345 (adopting this regulatory text effective September 11, 2012), *order on reh’g and clarification*, Order No. 764-A, 141 FERC ¶ 61,232 (2012), *order on clarification and reh’g*, Order No. 764-B, 144 FERC ¶ 61,222 (2013). While not revising regulatory text, the Commission is using the process provided for rulemaking proceedings, as defined in 5 U.S.C. § 551(4)-(5) (2012).

<sup>34</sup> Order No. 2003-A, FERC Stats. & Regs. ¶ 31,160 at P 416.

<sup>35</sup> *See Payment for Reactive Power*, Commission Staff Report, Docket No. AD14-7, app. 2 (Apr. 22, 2014).

<sup>36</sup> Order No. 888, FERC Stats. & Regs. ¶ 31,036 at 31,760-63.

facilities to maintain reactive power within a power factor range of 0.95 leading to 0.95 lagging, or the standard range established by the transmission provider and approved by the Commission, to be measured at the Point of Interconnection.<sup>37</sup>

14. The Commission also proposes to require that the reactive power capability installed by non-synchronous generators be dynamic. In Order No. 661, the Commission declined to require dynamic reactive power capability from wind generators, unless the System Impact Study showed that dynamic reactive power capability was needed for system reliability, reasoning that dynamic reactive power capability may not be needed in every case.<sup>38</sup> Based on technological advancements, the Commission no longer believes it is just and reasonable and not unduly discriminatory or preferential to exempt wind generators from the requirement to provide dynamic reactive power.<sup>39</sup>

15. Further, the Commission proposes to require that newly interconnecting non-synchronous generators be required to design the generating facility to maintain the required power factor range only when the generator's real power output exceeds 10

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<sup>37</sup> The *pro forma* LGIA defines "Point of Interconnection" as "the point, as set forth in Appendix A to the Standard Large Generator Interconnection Agreement, where the Interconnection Facilities connect to the Transmission Provider's Transmission System." Similarly, the *pro forma* SGIA defines "Point of Interconnection" as "[t]he point where the Interconnection Facilities connect with the Transmission Provider's Transmission System."

<sup>38</sup> See Order No. 661, FERC Stats. & Regs. ¶ 31,186 at P 66.

<sup>39</sup> *Payment for Reactive Power*, Commission Staff Report, Docket No. AD14-7, at 7 (Apr. 22, 2014).



percent of its nameplate capacity.<sup>40</sup> In requiring a generator to provide reactive power, the interconnection agreements would state: “Non-synchronous generators shall only be required to maintain the above power factor when their output is above 10 percent of the Generating Facility Capacity.” The Commission’s understanding is that the inverters used by non-synchronous generators are not capable of producing reactive power when operating below 10 percent of nameplate capacity.<sup>41</sup>

16. Specifically, the Commission proposes to revise section 9.6.1 of the *pro forma* LGIA to read:

Interconnection Customer shall design the Large Generating Facility to maintain a composite power delivery at continuous rated power output at the Point of Interconnection at a power factor within the range of 0.95 leading to 0.95 lagging, unless Transmission Provider has established different requirements that apply to all generators in the Control Area on a comparable basis. ~~The requirements of this paragraph shall not apply to wind generators.~~ Non-synchronous generators shall only be required to maintain the above power factor when their output is above 10 percent of the Generating Facility Capacity.<sup>42</sup>

The Commission similarly proposes to revise section 1.8.1 of the *pro forma* SGIA to read:

The Interconnection Customer shall design its Small Generating Facility to maintain a composite power delivery at continuous rated power output at the Point of Interconnection at a power factor within the range of 0.95 leading to 0.95 lagging, unless the Transmission Provider has established different requirements that apply to all similarly situated generators in the control area on a comparable basis. ~~The requirements of this paragraph~~

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<sup>40</sup> See Order No. 661, FERC Stats. & Regs. ¶ 31,186 at P 46.

<sup>41</sup> *Id.*

<sup>42</sup> Section 9.6.1 of the *pro forma* LGIA.

~~shall not apply to wind generators.~~ Non-synchronous generators shall only be required to maintain the above power factor when their output is above 10 percent of the generator nameplate capacity.<sup>43</sup>

In addition, the Commission would strike paragraph A.ii of Appendix G to the *pro forma* LGIA, “Technical Standards Applicable to a Wind Generation Plant.”<sup>44</sup>

A wind generating plant shall maintain a power factor within the range of 0.95 leading to 0.95 lagging, measured at the Point of Interconnection as defined in this LGIA, if the Transmission Provider’s System Impact Study shows that such a requirement is necessary to ensure safety or reliability. The power factor range standard can be met by using, for example, power electronics designed to supply this level of reactive capability 606 (taking into account any limitations due to voltage level, real power output, etc.) or fixed and switched capacitors if agreed to by the Transmission Provider, or a combination of the two. The Interconnection Customer shall not disable power factor equipment while the wind plant is in operation. Wind plants shall also be able to provide sufficient dynamic voltage support in lieu of the power system stabilizer and automatic voltage regulation at the generator excitation system if the System Impact Study shows this to be required for system safety or reliability.<sup>45</sup>

17. The Commission proposes to apply the reactive power requirement to all newly interconnecting non-synchronous generators, as well as all existing non-synchronous generators making upgrades to their generation facilities that require new interconnection requests, as of the effective date of the final revision. The Commission also proposes to apply the reactive power requirement to all newly interconnecting non-synchronous

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<sup>43</sup> Section 1.8.1 of the *pro forma* SGIA.

<sup>44</sup> The full text of the *pro forma* LGIA will be posted on the Commission’s internet page at: <http://www.ferc.gov/industries/electric/indus-act/gi/stdn-gen.asp>. The full text of the *pro forma* SGIA will be posted on the Commission’s internet page at: <http://www.ferc.gov/industries/electric/indus-act/gi/small-gen.asp>.

<sup>45</sup> Section A.ii of Appendix G to the *pro forma* LGIA.

generators that have requested that an LGIA or SGIA be filed unexecuted with the Commission that is still pending before the Commission as of the effective date of the final revision. Thus, the requirement would not apply to non-synchronous generators that have executed an LGIA or SGIA, as relevant, prior to the effective date of the final revision, unless they propose upgrades to their generation facilities that require new interconnection requests. Given that not all existing wind generators are capable of providing reactive power without incurring substantial costs to install new equipment, we do not believe it is reasonable or necessary to require those generators to provide reactive power. However, existing wind generators that make upgrades to their generation facility that require a new interconnection request will be required to conform to this new requirement.

18. The Commission seeks comments on the Proposal to remove the exemptions for wind generators from the reactive power requirement. Further, the Commission seeks comments on whether the current power factor range of 0.95 leading to 0.95 lagging, as set forth in the existing *pro forma* interconnection agreements,<sup>46</sup> is reasonable given the technology used by non-synchronous generators. The Commission also seeks comments on the proposed requirement that newly interconnecting non-synchronous generators only be required to produce reactive power when the generator's real power output is greater than 10 percent of nameplate capacity. And finally, we note that a non-synchronous generator will be eligible for compensation for reactive power, consistent with the

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<sup>46</sup> Section 9.6.1 of the *pro forma* LGIA and section 1.8.1 of the *pro forma* SGIA.

compensation provisions of the *pro forma* LGIA and *pro forma* SGIA.<sup>47</sup> The Commission seeks comment on whether the existing methods used to determine reactive power compensation are appropriate for wind generators and, if not, what alternatives would be appropriate.<sup>48</sup>

### **Proposed Compliance Procedures**

19. To comply with the requirements of this Proposal, the Commission proposes to require each public utility<sup>49</sup> transmission provider to submit a compliance filing within 90 days of the effective date of the final revision in this proceeding revising its *pro forma* LGIA and *pro forma* SGIA subject to the Commission's jurisdiction as necessary to demonstrate that it meets the requirements set forth in this Proposal.

20. In some cases, public utility transmission providers may have provisions in their currently effective *pro forma* LGIAs and *pro forma* SGIAs related to the provision of reactive power by non-synchronous generators that the Commission has deemed to be consistent with or superior to the *pro forma* LGIA and *pro forma* SGIA. Where these *pro forma* LGIA and *pro forma* SGIA provisions will be modified by the final revision, public utility transmission providers must either comply with the final revision or

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<sup>47</sup> Section 9.6.3 of the *pro forma* LGIA and section 1.8.2 of the *pro forma* SGIA.

<sup>48</sup> See *Payment for Reactive Power*, Commission Staff Report, Docket No. AD14-7, app. 1 (Apr. 22, 2014).

<sup>49</sup> For purposes of this Proposal, a public utility is a utility that owns, controls, or operates facilities used for transmitting electric energy in interstate commerce, as defined by the FPA. See 16 U.S.C. § 824(e) (2012). A non-public utility that seeks voluntary compliance with the reciprocity condition of an OATT may satisfy that condition by filing an OATT, which includes the *pro forma* LGIA and SGIA.

demonstrate that these previously-approved *pro forma* LGIA and *pro forma* SGIA variations continue to be consistent with or superior to the *pro forma* LGIA and *pro forma* SGIA as modified by the final revision.

21. The Commission will assess whether each compliance filing satisfies the proposed requirements and principles stated above and issue additional orders as necessary to ensure that each public utility transmission provider meets the requirements of this Proposal and the subsequent final revision.

22. The Commission proposes that transmission providers that are not public utilities will have to adopt the requirements of this Proposal and subsequent final revision as a condition of maintaining the status of their safe harbor tariff or otherwise satisfying the reciprocity requirement of Order No. 888.<sup>50</sup>

### **Information Collection Statement**

23. The collection of information contained in this Proposal to Revise Standard Generator Interconnection Agreements is subject to review by the Office of Management and Budget (OMB) regulations under section 3507(d) of the Paperwork Reduction Act of 1995 (PRA).<sup>51</sup> OMB's regulations require approval of certain informational collection requirements imposed by an agency.<sup>52</sup> Upon approval of a collection(s) of information, OMB will assign an OMB control number and an expiration date. Respondents subject

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<sup>50</sup> Order No. 888, FERC Stats. & Regs. ¶ 31,036 at 31,760-63.

<sup>51</sup> 44 U.S.C. § 3507(d) (2012).

<sup>52</sup> 5 C.F.R. § 1320.11 (2015).

to the filing requirements will not be penalized for failing to respond to these collections of information unless the collections of information display a valid OMB control number.

24. The reforms proposed in this Proposal would amend the Commission's standard generator interconnection agreements in accordance with section 35.28(f)(1) of the Commission's regulations<sup>53</sup> to require that each public utility transmission provider amend its *pro forma* LGIA and *pro forma* SGIA to: (1) eliminate the exemptions for wind generators from the requirement to provide reactive power; and (2) require that all newly interconnecting non-synchronous generators, as well as all existing non-synchronous generators making upgrades to their generation facilities that require new interconnection requests, provide reactive power as a condition of interconnection, as of the effective date of the final revision. The reforms proposed in this Proposal would require filings of *pro forma* LGIAs and *pro forma* SGIAs with the Commission. The Commission anticipates the reforms proposed in this Proposal, once implemented, would not significantly change currently existing burdens on an ongoing basis. With regard to those public utility transmission providers that believe that they already comply with the reforms proposed in this Proposal, they could demonstrate their compliance in the filing required 90 days after the effective date of the final revision in this proceeding. The Commission will submit the proposed reporting requirements to OMB for its review and approval under section 3507(d) of the Paperwork Reduction Act.<sup>54</sup>

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<sup>53</sup> 18 C.F.R. § 35.28(f)(1) (2015).

<sup>54</sup> 44 U.S.C. § 3507(d) (2012).

25. While the Commission expects the adoption of the reforms proposed in this Proposal to provide significant benefits, the Commission understands that implementation can be a complex and costly endeavor. The Commission solicits comments on the accuracy of provided burden and cost estimates and any suggested methods for minimizing the respondents' burdens.

Burden Estimate and Information Collection Costs: The Commission believes that the burden estimates below are representative of the average burden on respondents. The estimated burden and cost<sup>55</sup> for the requirements contained in this Proposal follow.

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<sup>55</sup> The estimates for cost per response are derived using the following formula: Average Burden Hours per Response \* \$72 per Hour = Average Cost per Response. The hourly cost figure comes from the FERC average salary of \$149,489. Subject matter experts found that industry employment costs closely resemble FERC's regarding the FERC-516 information collection.

<b>Data Collection FERC 516</b>					
	<b>Number of Applicable Registered Entities (1)</b>	<b>Annual Number of Responses per Respondent (2)</b>	<b>Total Number of Responses (1)*(2)=(3)</b>	<b>Average Burden (Hours) &amp; Cost Per Response<sup>56</sup> (4)</b>	<b>Total Annual Burden Hours &amp; Total Annual Cost (3)*(4)=(5)</b>
Conforming LGIA changes to incorporate proposed revisions	132	1	132	7.5 \$540.00	990 hours \$71,280.00
Conforming SGIA changes to incorporate proposed revisions	132	1	132	7.5 \$540.00	990 hours \$71,280.00
<b>Total</b>			264	15 hours \$1,080	1,980 hours \$142,560.00

Cost to Comply: The Commission has projected the total cost of compliance as

follows:<sup>57</sup>

- Year 1: \$142,560 (\$1,080/utility)
- Year 2: \$0

<sup>56</sup>  $\$149,489 / \$2,080 = \$71.8697$  and is rounded to \$72.00 per hour.

<sup>57</sup> The costs for Year 1 would consist of filing proposed changes to the *pro forma* LGIA and *pro forma* SGIA with the Commission within 90 days of the effective date of the final revision plus initial implementation. The Commission does not expect any ongoing costs beyond the initial compliance in Year 1.



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After Year 1, the reforms proposed in this Proposal, once implemented, would not significantly change existing burdens on an ongoing basis.

Title: FERC-516, Electric Rate Schedules and Tariff Filings.

Action: Proposed revisions to an information collection.

OMB Control No.: 1902-0096

Respondents for this Proposal: Businesses or other for profit and/or not-for-profit institutions.

Frequency of Information: One-time during year one.

Necessity of Information: The Federal Energy Regulatory Commission makes this Proposal to improve the reliability of the electric grid by requiring all newly interconnecting non-synchronous generators to provide reactive power and to ensure that all generators are being treated in a not unduly discriminatory or preferential manner.

Internal Review: The Commission has reviewed the proposed changes and has determined that such changes are necessary. These requirements conform to the Commission's need for efficient information collection, communication, and management within the energy industry. The Commission has specific, objective support for the burden estimates associated with the information collection requirements.

26. Interested persons may obtain information on the reporting requirements by contacting the following: Federal Energy Regulatory Commission, 888 First Street, NE, Washington, DC 20426 [Attention: Ellen Brown, Office of the Executive Director], e-mail: [DataClearance@ferc.gov](mailto:DataClearance@ferc.gov), phone: (202) 502-8663, fax: (202) 273-0873.

Comments concerning the collection of information and the associated burden

estimate(s), may also be sent to the Office of Information and Regulatory Affairs, Office of Management and Budget, 725 17th Street, NW, Washington, DC 20503 [Attention: Desk Officer for the Federal Energy Regulatory Commission, phone: (202) 395-0710, fax: (202) 395-7285]. Due to security concerns, comments should be sent electronically to the following e-mail address: oira\_submission@omb.eop.gov.

Comments submitted to OMB should include FERC-516 and OMB Control No. 1902-0096.

### **Regulatory Flexibility Act Certification**

27. The Regulatory Flexibility Act of 1980 (RFA)<sup>58</sup> generally requires a description and analysis of rules that will have significant economic impact on a substantial number of small entities. The RFA does not mandate any particular outcome in a rulemaking. It only requires consideration of alternatives that are less burdensome to small entities and an agency explanation of why alternatives were rejected.

28. To the extent the RFA applies to this proceeding, the Commission estimates that the total number of public utility transmission providers that would have to modify their currently effective *pro forma* LGIA and *pro forma* SGIA is 132. Of these, the Commission estimates the total number that are small entities is 11. The Commission estimates the average total cost of these entities will be minimal, requiring on average 15 hours, or \$1,080 in expenses. The Commission does not consider this to be a significant economic impact. As a result, the Commission certifies that the reforms proposed in this

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<sup>58</sup> 5 U.S.C. § 601-12 (2012).

Proposal would not have a significant economic impact on a substantial number of small entities.

### **Environmental Analysis**

29. The Commission is required to prepare an Environmental Assessment or an Environmental Impact Statement for any action that may have a significant adverse effect on the human environment.<sup>59</sup> The Commission concludes that neither an Environmental Assessment nor an Environmental Impact Statement is required for this Proposal under section 380.4(a)(15) of the Commission's regulations, which provides a categorical exemption for approval of actions under sections 205 and 206 of the FPA relating to the filing of schedules containing all rates and charges for the transmission or sale of electric energy subject to the Commission's jurisdiction, plus the classification, practices, contracts and regulations that affect rates, charges, classifications, and services.<sup>60</sup> The revisions proposed in this Proposal would update and clarify the application of the Commission's standard interconnection requirements to wind generators. Therefore, this Proposal falls within the categorical exemptions provided in the Commission's regulations, and as a result neither an environmental impact statement nor an environmental assessment is required.

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<sup>59</sup> *Regulations Implementing the National Environmental Policy Act of 1969*, Order No. 486, 52 Fed. Reg. 47,897 (Dec. 17, 1987), FERC Stats. & Regs., Regulations Preambles 1986-1990 ¶ 30,783 (1987).

<sup>60</sup> 18 C.F.R. § 380.4(a)(15) (2015).

### Comment Procedures

30. The Commission invites interested persons to submit comments on the matters and issues proposed in this Proposal to be adopted, including any related matters or alternative proposals that commenters may wish to discuss. Comments are due [**60 days after publication in the FEDERAL REGISTER**]. Comments must refer to Docket No. RM16-1-000, and must include the commenter's name, the organization they represent, if applicable, and their address.

31. The Commission encourages comments to be filed electronically via the eFiling link on the Commission's web site at <http://www.ferc.gov>. The Commission accepts most standard word processing formats. Documents created electronically using word processing software should be filed in native applications or print-to-PDF format and not in a scanned format. Commenters filing electronically do not need to make a paper filing.

32. Commenters that are not able to file comments electronically must send an original of their comments to: Federal Energy Regulatory Commission, Secretary of the Commission, 888 First Street, NE, Washington, DC 20426.

33. All comments will be placed in the Commission's public files and may be viewed, printed, or downloaded remotely as described in the Document Availability section below. Commenters on this Proposal are not required to serve copies of their comments on other commenters.

**Document Availability**

34. In addition to publishing the full text of this document in the Federal Register, the Commission provides all interested persons an opportunity to view and/or print the contents of this document via the Internet through the Commission's Home Page (<http://www.ferc.gov>) and in the Commission's Public Reference Room during normal business hours (8:30 a.m. to 5:00 p.m. Eastern time) at 888 First Street, NE, Room 2A, Washington, DC 20426.

35. From the Commission's Home Page on the Internet, this information is available on eLibrary. The full text of this document is available on eLibrary in PDF and Microsoft Word format for viewing, printing, and/or downloading. To access this document in eLibrary, type the docket number of this document, excluding the last three digits, in the docket number field.

36. User assistance is available for eLibrary and the Commission's website during normal business hours from the Commission's Online Support at (202) 502-6652 (toll free at 1-866-208-3676) or email at [ferconlinesupport@ferc.gov](mailto:ferconlinesupport@ferc.gov), or the Public Reference Room at (202) 502-8371, TTY (202) 502-8659. E-mail the Public Reference Room at [public.referenceroom@ferc.gov](mailto:public.referenceroom@ferc.gov).

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List of subjects in 18 C.F.R. Part 35:

Electric power rates

Electric utilities

Non-discriminatory open access transmission tariffs

By direction of the Commission.

( S E A L )

Nathaniel J. Davis, Sr.,  
Deputy Secretary.

Document Content(s)

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