

withdrawal of real power by facilities capable of responding appropriately to a transmission system operator's automatic generation control (AGC) signal.³ When a balancing authority area experiences an energy deficiency, as measured by Area Control Error (ACE),⁴ the system operator may direct Regulation resources to increase output (RegUp). When a balancing authority area experiences an energy surplus, the system operator may direct Regulation resources to decrease output or withdraw energy (RegDown).

3. In Order No. 755, the Commission recognized that regional transmission organizations (RTOs) and independent system operators (ISOs) deploy a variety of resources to meet Regulation needs and that these resources differ in both their ramping ability, which affects their ability to increase or decrease their output when providing Regulation service, and the accuracy with which they can respond to the system operator's AGC signal. The Commission issued Order No. 755 to ensure just and reasonable compensation for the provision of Regulation service in RTOs and ISOs by implementing a two-part rate design. Specifically, the Commission regulations implementing Order No. 755 require:

Each Commission-approved independent system operator or regional transmission organization that has a tariff that provides for the compensation for frequency regulation service must provide such compensation based on the actual service provided, including a capacity payment that includes the marginal unit's opportunity cost and a payment for performance that reflects the quantity of frequency regulation

³ *Frequency Regulation Compensation in the Organized Wholesale Power Markets*, Order No. 755, FERC Stats. & Regs. ¶ 31,324, at P 4 (2011) (Order No. 755), *order on reh'g*, Order No. 755-A, 138 FERC ¶ 61,123 (2012). AGC is defined as: "Equipment that automatically adjusts generation in a Balancing Authority Area from a central location to maintain the Balancing Authority's interchange schedule plus Frequency Bias. AGC may also accommodate automatic inadvertent payback and time error correction." See *Glossary of Terms Used in NERC Reliability Standards*, North American Electric Reliability Corporation (NERC Glossary), www.nerc.com/files/glossary_of_terms.pdf.

⁴ ACE is the "instantaneous difference between a Balancing Authority's net actual and scheduled interchange," taking into account the effects of Frequency Bias and correction for meter error. NERC Glossary, www.nerc.com/files/glossary_of_terms.pdf.

service provided by a resource when the resource is accurately following the dispatch signal.⁵

4. In compliance with Order No. 755, PJM requires Regulation resources to submit a two-part offer, consisting of a capability offer (a price associated with the amount of regulation capability available) and performance offer (a price associated with the amount of work provided by each unit). We address in more detail the market-clearing and compensation mechanisms of PJM's Regulation market, including PJM's use of historical accuracy metrics and a mileage component in clearing and compensating Regulation resources, in an order issued concurrently with this order in Docket Nos. ER18-87-000, *et al.*, addressing a PJM proposal to reform its Regulation market design.⁶

5. As relevant here, PJM explained in its Order No. 755 compliance filing that it employs two different types of Regulation signals.⁷ PJM uses a traditional signal, called RegA, to dispatch slower, sustained-output resources such as steam and combustion resources. PJM uses a faster signal, called RegD, to dispatch faster, dynamic resources, such as battery storage.⁸ PJM originally designed its RegD signal to be unconditionally energy neutral, meaning that the amount of RegUp provided by a RegD resource would match the amount of RegDown provided by the same resource, converging to neutrality within 15 minutes.⁹ This feature of PJM's RegD signal reduced the likelihood that an energy storage resource would have insufficient energy to respond to a signal, negatively

⁵ 18 C.F.R. § 35.28(g)(8) (2017).

⁶ *PJM Interconnection, L.L.C.*, 162 FERC ¶ 61,295 (2018).

⁷ PJM, Compliance Filing Transmittal at 7, Docket No. ER12-1204-000 (Mar. 5, 2012).

⁸ The RegA and RegD signals are not resource-type dependent, as any resource that can follow a given signal can qualify to provide Regulation service using that signal. PJM Answer at 6.

⁹ *See* PJM Answer, Hsia Aff. at P 8.

affecting compensation¹⁰ and the ability of an energy storage device to provide Regulation in a future interval. However, the energy neutrality feature of the RegD signal is not set forth in the PJM Tariff.

6. PJM also uses a “benefits factor” curve in its Regulation market-clearing process to reflect the operational relationship between the RegA and RegD signal.¹¹ The purpose of the benefits factor curve is to establish the tradeoff between RegA and RegD resources at various combinations so that the Regulation market’s clearing engine can consider them on a comparable basis. PJM calculates a unit-specific benefits factor for each RegD resource in the Regulation bid stack based on the benefits factor curve, which PJM maintains in the PJM manuals rather than in the PJM Operating Agreement or Open Access Transmission Tariff (Tariff).¹² The values on the benefits factor curve range from 2.9 to 0.0, with a benefits factor of 1.0 representing the point where one megawatt from RegD resources is treated as providing the same value as one megawatt from RegA resources. RegD resources assigned a unit-specific benefits factor of greater than 1.0 provide more benefit than a RegA resource, and are thus more likely to clear, whereas RegD resources assigned a unit-specific benefits factor of less than 1.0 provide less

¹⁰ See *PJM Interconnection, L.L.C.*, 139 FERC ¶ 61,130, at P 29 (2012) (May 2012 Order). The Commission does not require signals to be energy neutral. In Order No. 755, the Commission rejected as outside the scope of that proceeding requests to require reporting on “drift” or energy neutrality in the Regulation signal, as well as the suggestion that RTOs use different Regulation signals for different resources. See Order No. 755, FERC Stats. & Regs. ¶ 31,324 at P 184.

¹¹ See May 2012 Order, 139 FERC ¶ 61,130 at P 12; see also *PJM Interconnection, L.L.C.*, 141 FERC ¶ 61,134, at PP 27-30 (2012) (November 2012 Order).

¹² PJM, Compliance Filing Transmittal at 11, Docket No. ER12-1204-001 (Aug. 15, 2012); see PJM Tariff Attachment K-Appendix and Operating Agreement, Schedule 1, § 3.2.2(j). In its Order No. 755 compliance proceeding, PJM explained that it would determine the benefits factor based on the expected impact of a fast-responding resource on PJM’s ability to comply with North American Electric Reliability Corporation (NERC) reliability criteria, based on: (i) off-line models, (ii) analysis of the regulation signals; and (iii) historical operational data, which would be given increasing weight to the benefits factor determination over time. November 2012 Order, 141 FERC ¶ 61,134 at P 28.

benefit and are less likely to clear. Traditional RegA resources have a unit-specific benefits factor equal to 1.0.¹³

B. Regulation Market Changes Implemented by PJM

7. Following PJM's implementation of market rule changes in compliance with Order No. 755, in May 2015, PJM states that it observed operational challenges in its Regulation market associated with RegD resources¹⁴ and what PJM characterizes as a suboptimal mix of RegA and RegD resources.¹⁵ Because the RegD signal was designed to be energy neutral over a 15-minute period, it was possible that RegD resources were operating contrary to ACE control needs when being brought back to energy neutrality at the end of an interval.¹⁶ According to PJM, at times hundreds of megawatts of RegD resources were performing in a way that respected their energy neutrality but inhibited PJM's ability to control ACE.¹⁷

8. PJM took a series of steps to address these operational challenges. Relevant to the Complaints, in December 2015, PJM revised the benefits factor curve so that RegD resources could make up no more than 40 percent of the resources procured to meet PJM's Regulation requirement. Under the original benefits factor curve, this cap was set at 62 percent.¹⁸ In addition, PJM prohibited RegD resources with a benefits factor of less

¹³ PJM Tariff Attachment K-Appendix and Operating Agreement, Schedule 1, § 3.2.2(j).

¹⁴ PJM Problem Statement, Fast Response Regulation (RegD) Resources Operational Impact (Problem Statement), available at <http://www.pjm.com/-/media/committees-groups/committees/oc/20150526-rpi/20150526-item-02-problem-statement.ashx>; see ESA Complaint at 10-11 & n.28 (citing Problem Statement).

¹⁵ PJM Answer at 10.

¹⁶ See Problem Statement (“This issue is caused by the RegD control signal moving in the opposite control direction than desired by dispatch. The reason for this is that the RegD signal is programmed to integrate to zero to accommodate the state of charge for energy-limited resources participating in the Regulation Market.”).

¹⁷ PJM Answer at 10-11.

¹⁸ PJM Manual 11, Energy & Ancillary Services Market Operations (PJM Manual 11), § 3.2.7 (Regulation Market Clearing) & Revision History (noting that version 78, effective December 14, 2015, “[r]evised the Benefits Factor Curve to a more steeper [*sic*] slope intersecting x-axis at 40 (from 62)”; see also PJM Answer at 9-10 (explaining that RegD resources could never account for more than 62 percent of the effective Regulation

than 1.0 from clearing the Regulation market during certain morning and evening “excursion hours,” which effectively capped the amount of RegD resources that could be procured, such that RegD could make up no more than 26.2 percent¹⁹ of the resources procured to meet PJM’s Regulation requirement.²⁰

9. In January 2017, PJM also implemented software changes that altered the design of its RegA and RegD signals (January 2017 signal redesign).²¹ According to a PJM staff white paper, the Regulation signals as originally designed were flawed because they did not allow for coordinated ACE control between the two types of Regulation resources, the RegA signals could exceed resource expectations, and the unconditional neutrality aspect of the RegD signal sent resources, at times, in the opposite direction of ACE control.²² PJM revised the calculations underlying its AGC software to, among other things, cause the RegA and RegD signals to move together in the direction that minimizes ACE (previously, the signals were generated independently) and alter the RegD signal to be conditionally neutral.²³ PJM describes “conditional neutrality” as an approach under which managing ACE is PJM’s first priority, and neutrality for energy-limited resources such as storage resources is honored when system conditions permit.²⁴

requirement because at greater amounts PJM would experience an overall decrease in ACE control).

¹⁹ See PJM Answer, Hsia Aff. at P 11.

²⁰ PJM Manual 11, Revision History (noting that version 78, effective December 14, 2015, “[u]pdated business rules to recognize hours of the day with need for more sustaining regulation (RegA) and where RegD with benefits factor less than 1 will not be considered in the regulation clearing because of its reduced benefits”).

²¹ See generally Implementation and Rationale for PJM’s Conditional Neutrality Regulation Signals, PJM Staff (Jan. 17, 2017) (Signal White Paper) (included as Exhibit A to the PJM Answer), available at <http://pjm.com/~media/committees-groups/task-forces/rmistf/postings/regulation-market-whitepaper.ashx>.

²² Signal White Paper at 6.

²³ *Id.* at 4, 6.

²⁴ PJM Answer at 14.

PJM also adjusted the signals such that the RegA signal was no longer accelerated during large changes in ACE.²⁵

C. PJM Regulation Proposal in Docket No. ER18-087-000, et al.

10. On October 17, 2017, PJM filed in Docket No. ER18-87-000, pursuant to FPA section 205,²⁶ a package of PJM Tariff revisions to reform its Regulation market design (PJM Regulation Proposal), which featured four primary components: (1) replacement of the benefits factor curve with the Regulation Rate of Technical Substitution Curve; (2) adjustment of performance scoring; (3) revisions to the Regulation settlements equation, including elimination of the mileage ratio and replacing it with the marginal Regulation Rate of Technical Substitution Curve value; and (4) revisions to lost opportunity cost calculations. PJM asserts that all components of the PJM Regulation Proposal are necessarily dependent, and a change in one area will affect other areas.

II. The Complaints

11. The ESA Complaint challenges PJM's December 2015 change to the benefits factor curve and implementation of a "cap" on RegD resources during excursion hours; and PJM's January 2017 signal redesign. ESA argues that PJM lacked the authority to implement this suite of changes without filing tariff revisions pursuant to FPA section 205. The RESA/Invenergy Complaint challenges only the signal redesign. As discussed more fully below, both ESA and RESA/Invenergy assert that PJM's January 2017 signal redesign has had a significant and negative impact on RegD resources, and was a symptom of the broader problem that PJM misuses Regulation resources to reduce generation on its system for sustained periods of time.²⁷

A. ESA's Challenge to PJM's 2015 Benefits Factor Changes

12. ESA asks the Commission to direct PJM to file for review under FPA section 205 the revisions PJM made to its benefits factor calculation methodology and to justify their

²⁵ See Signal White Paper at 4, 22 ("[T]he Regulation A acceleration function present in the controller provided signals that could exceed resource expectations. . . . The new controller design slowed the Regulation A signal relative to the previous controller. . .").

²⁶ 16 U.S.C. § 824d (2012).

²⁷ ESA Complaint at 16-18; RESA/Invenergy Complaint at 11, 13-14; RESA/Invenergy Answer at 5.

reasonableness.²⁸ If the Commission determines that FPA section 205 filing requirements do not apply, then ESA asks the Commission to direct PJM to cease practices that unduly discriminate against RegD resources.²⁹

13. ESA argues that leaving the rules governing the calculation of the benefits factor in a business practice manual, outside of the PJM Tariff, violates the Commission's requirement that practices that significantly affect the rates, terms, and conditions of service must be reflected in a tariff accepted by the Commission rather than in business practice manuals.³⁰ ESA asserts that the PJM Tariff must include practices that were previously deemed appropriate for a manual but that, over time, become significant enough to trigger the filing requirements of the FPA.³¹ ESA points out that the benefits factor adjusts the prices submitted by Regulation resources, directly affecting the rates paid to resources that clear the market; this, ESA claims, is akin to other RTO tariffs that provide for the adjustment of offers in accordance with tariff parameters.³² ESA argues that the details underlying the calculation might be appropriate for a manual, but the governing methodology is not.

14. ESA acknowledges the Commission accepted PJM's proposal to calculate the benefits factor in accordance with PJM manuals, but argues the Commission's prior acceptance of that approach does not relieve PJM of its filing obligations when they are triggered.³³ ESA claims that PJM abused its ability to adjust the benefits factor without Commission review by failing to provide sufficient analysis or justification to support the December 2015 change,³⁴ and by failing to update the benefits factor to reflect the

²⁸ ESA Complaint at 24.

²⁹ *Id.* at 33-34.

³⁰ *Id.* at 20-21 (citing *Cal. Indep. Sys. Operator Corp.*, 116 FERC ¶ 61,274, at P 1370 (2006); *Demand Response Coalition v. PJM Interconnection, L.L.C.*, 143 FERC ¶ 61,061, at P 17 (2013); *PJM Interconnection, L.L.C.*, 155 FERC ¶ 61,282, at P 76-81 (2016); *PJM Interconnection, L.L.C.*, 144 FERC ¶ 61,121, at P 23 (2013)).

³¹ *Id.* at 21 (citing *ANP Funding I, LLC v. ISO New England, Inc.*, 110 FERC ¶ 61,040, at P 22 (2005)).

³² *Id.* (citing *Cal. Indep. Sys. Operator Corp.*, 141 FERC ¶ 61,237, at P 35 (2012)).

³³ *Id.* at 22.

³⁴ *Id.* at 22-23. ESA claims that PJM only publicly offered as support for the change the simulation of a single, non-representative hour that did not measure NERC reliability criteria. *Id.* (citing Proposed Revision to the Adjusted Total Cost Formulation

January 2017 signal redesign and the new obligations imposed on RegD resources as a result.³⁵ ESA argues that PJM must justify the reasonableness of its benefits factor calculations with analysis that “meaningfully considers the impact of Regulation resource commitments on system control metrics used to monitor compliance with [North American Electric Reliability Corporation (NERC)] reliability standards.”³⁶

15. ESA also asks the Commission to find that the cap on the level of RegD resources that can be procured during excursion hours, which PJM set at 26.2 percent, contradicts the PJM Tariff and to direct PJM to eliminate the cap.³⁷ According to ESA, the cap on RegD resources contradicts the plain language of the PJM Tariff, which ESA claims requires PJM to apply the benefits factor to the offers of *each resource* in clearing the Regulation market.³⁸ According to ESA, there is no ambiguity in the PJM Tariff that a resource can clear the market if it is the lower cost resource, taking into account the benefits factor and historical performance, even if it has a benefits factor of less than 1.0.³⁹ ESA asserts that in PJM’s Order No. 755 compliance proceeding, the Commission requested, and PJM provided, documentation on how such resources would be cleared.⁴⁰ ESA claims that PJM’s categorical ban has caused ESA members harm and is contrary to

and the Benefits Factor Curve, PJM Operating Committee Materials, at 8-14 (Aug. 17, 2015)).

³⁵ *Id.* at 23.

³⁶ *Id.* at 24.

³⁷ *Id.* at 24, 27. ESA also notes that it would be possible for the Commission to open an investigation of PJM’s tariff violations and distribute any resulting penalties to RegD resources that were unlawfully precluded from participating in the market. *Id.* at 27 n.79.

³⁸ *Id.* at 25 (quoting PJM Tariff Attachment K-Appendix and Operating Agreement, Schedule 1, §§ 3.2.2(g)-(h)).

³⁹ *Id.*

⁴⁰ *Id.* at 25-26 & nn.73-74 (citing the deficiency letter issued on September 12, 2012 in Docket No. ER12-2391-000, and PJM’s September 17, 2012 deficiency response).

the PJM Tariff, despite the rule that a manual must comply with the tariff.⁴¹ ESA asserts that RegD resources have suffered harm from the benefits factor changes and cap.⁴²

B. Challenges to the January 2017 Signal Redesign

16. ESA asks the Commission to “direct PJM to submit revisions to its Tariff that set forth the parameters governing the design of its RegD signal,” and asks the Commission to find that the January 2017 signal redesign is unduly discriminatory and to “direct PJM to revert to its prior RegD signal until such time as it receives Commission approval for any changes.”⁴³ RESA/Invenergy similarly ask the Commission to find that the signal redesign violates Commission precedent and to direct PJM to revert to its prior Regulation signals.⁴⁴

17. ESA asserts that the PJM Tariff and manuals are silent regarding the parameters governing the formation of Regulation signals. ESA concedes that the Commission effectively accepted PJM’s use of the RegD signal without corresponding tariff provisions when it accepted PJM’s Order No. 755 compliance proposal.⁴⁵ However, like PJM’s 2015 benefits factor change, ESA argues that the design of the RegD signal should be set forth in the PJM Tariff rather than a business manual or other document because it is now apparent that the RegD signal significantly affects the rates, terms, and conditions of Regulation service.⁴⁶ ESA compares the RegD signal to PJM’s capacity performance requirements or required response times for synchronized and non-synchronized reserves, both of which are parameters set forth in the PJM Tariff, because they “define the very service being provided to PJM.”⁴⁷ ESA cites to Commission precedent explaining that “[i]f technical detail is needed to complete a definition or process, it must be included in

⁴¹ *Id.* at 26 (citing *Midwest Indep. Transmission Sys. Operator, Inc.*, 115 FERC ¶ 61,108, at P 30 (2006)).

⁴² *Id.* at 23-24, 26-27 (citing Smith Aff. at 5).

⁴³ *Id.* at 33.

⁴⁴ RESA/Invenergy Complaint at 15.

⁴⁵ ESA Complaint at 27 (citing May 2012 Order, 139 FERC ¶ 61,130 at P 12 & n.11).

⁴⁶ *Id.* at 28 (citing *Demand Response Coalition v. PJM Interconnection, L.L.C.*, 143 FERC ¶ 61,061, at P 17; *PJM Interconnection, L.L.C.*, 155 FERC ¶ 61,282 at PP 76-81; *PJM Interconnection, L.L.C.*, 144 FERC ¶ 61,121 at P 23).

⁴⁷ *Id.* at 28.

the tariff,”⁴⁸ and argues that the RegD signal design completes the rate design for limited-energy resources’ compensation for Regulation service, and thus the parameters for the RegD signal design—but not the detailed calculations underlying the signal—must be included in the PJM Tariff.⁴⁹

18. Both Complaints assert that PJM’s January 2017 signal redesign is contrary to Commission precedent. They rely on the Commission’s rejection of ISO New England Inc.’s (ISO-NE) proposal to eliminate a dispatch methodology that used a Regulation signal tailored to alternative technologies and to replace it with a single dispatch system.⁵⁰ The complainants contend that even though PJM maintains separate RegA and RegD signals, it has jettisoned the aspect of the RegD signal that respected RegD resources’ limited-energy characteristics, which inherently discriminates against RegD resources and is contrary to the Commission’s determinations in *ISO New England*.⁵¹

19. The complainants claim that PJM’s Regulation market structure is built around an energy-neutral RegD signal, as reflected in PJM’s Order No. 755 compliance filings.⁵² The complainants assert that market participants developed storage projects to reflect the energy neutrality of the RegD signal and in light of representations PJM made about the signal.⁵³ RESA/Invenergy assert that batteries were specifically designed to maintain Regulation performance while providing up to 7.5 minutes of input and 7.5 minutes of output.⁵⁴

⁴⁸ *Id.* at 29 (citing *Cal. Indep. Sys. Operator Corp.*, 123 FERC ¶ 61,288, at P 38 (2008)).

⁴⁹ *Id.* at 29 & n.85 (explaining that ISO New England Inc. sets forth the general signal parameters in its tariff).

⁵⁰ ESA Complaint at 30-31; RESA/Invenergy Complaint at 12-14 (discussing *ISO New England, Inc.*, 147 FERC ¶ 61,135 (2014) (*ISO New England*)).

⁵¹ RESA/Invenergy Complaint at 13; ESA Complaint at 31.

⁵² ESA Complaint at 6-7; *see also* RESA/Invenergy Complaint at 7; *see* May 2012 Order, 139 FERC ¶ 61,130 at P 43 (“We agree with PJM that providing an energy-neutral dynamic regulation signal to an energy-limited resource makes it unlikely that such a resource will become constrained and unable to provide an adequate response.”).

⁵³ ESA Complaint at 6 (citing Smith Aff. at 4; Buie Aff. at 3); RESA/Invenergy Complaint at 2, 8-9 (citing Ma Aff. at 2-3; Oliver Aff. at 2).

⁵⁴ *See* RESA/Invenergy Complaint at 9-10.

20. The complainants report that, after PJM's implementation of the January 2017 signal redesign, RegD resources began to be directed to operate outside of their design parameters,⁵⁵ exposing RegD resources to more difficulty in responding to the RegD signal, resulting in performance and efficiency issues, reduced compensation, and adverse impacts on the equipment.⁵⁶ According to ESA, RegD resources are being subjected to almost daily pegging, mostly in the RegDown position—in other words, they are effectively directed to charge at full power, sometimes for up to or approaching one hour.⁵⁷ ESA highlights an alleged pegging event on March 2, 2017, during which ESA alleges the RegD signal was effectively pegged for 59 minutes.⁵⁸

21. RESA reports that, before the January 2017 signal redesign, its projects were within 10 percent of net neutral 75 percent of the time; after the signal redesign, they were within 10 percent of net neutral only 10 percent of the time, and have experienced a decreased performance score of approximately 11 percent, which reduces their compensation.⁵⁹

22. ESA claims that the “almost daily pegging of the RegD signal” illustrates that PJM is using Regulation service, instead of redispatch or commitment adjustments, to “address persistent and predictable over-commitment of generation,” which is inconsistent with the intended purpose of Regulation service.⁶⁰

23. RESA/Invenergy characterize PJM's actions as “clearly discriminatory insofar as PJM would not require a RegA generator . . . to operate outside its design parameters,” and that RegD resources have been “disproportionately affected by the change in the

⁵⁵ ESA Complaint at 15-16. ESA asserts that following the signal redesign, RegD resources were subject to “almost daily pegging.” *Id.* at 15 (citing Smith Aff. at 6-14, which presents quantitative analyses of alleged pegging events January through March 2017).

⁵⁶ RESA/Invenergy Complaint at 10, 13-14 (citing Ma Aff. at 3; Oliver Aff. at 2-3); *see also id.* at 13-14 (alleging reduced compensation and financial harm); ESA Complaint at 15 n.45.

⁵⁷ ESA Complaint at 15 (citing Smith Aff. at 6-14).

⁵⁸ *Id.* at 16 (citing Smith Aff. at 11).

⁵⁹ RESA/Invenergy Complaint at 10 (citing Oliver Aff. at 2-3; Ma Aff. at 3).

⁶⁰ ESA Complaint at 17-18.

RegD signal as compared with other technologies.”⁶¹ They claim that “[i]f PJM continues to make the RegD signal harder for energy-neutral storage resources to operate, the complainants will need to either modify their technology at significant and very likely prohibitive cost, or no longer participate in the regulation market – the market for which they were specifically designed.”⁶² ESA argues that PJM discriminated in favor of RegA resources by slowing down the ramp rate embedded in the RegA signal to better match the physical characteristics of traditional RegA resources, while at the same time redesigning the RegD signal so that it did not match the physical characteristics of those resources.⁶³ According to ESA, this fundamentally altered the relative value of RegA and RegD resources because offers and compensation are directly impacted by resources’ performance scores. ESA contends that PJM cannot have it both ways: either both the RegA and RegD signals should be tailored to resources’ operational characteristics, or neither should.⁶⁴

24. Though RESA/Invenergy acknowledge the inherent risk of being an early market entrant, they assert that they developed the most efficient and economic assets they could in accordance with the Regulation market design per PJM’s Order No. 755 compliance. They characterize PJM as providing “relatively little notice and no transition period or attempt to mitigate the impact” of what is a “holistic overhaul of the scheduling, dispatch, and settlement processes to its frequency regulation market.”⁶⁵

III. Notice and Responsive Pleadings

25. Notice of the ESA Complaint in Docket No. EL17-64-000 was published in the *Federal Register*, 82 Fed. Reg. 18,641 (2017), with answers, interventions, and comments due on May 15, 2017. Notice of the RESA/Invenergy Complaint in Docket

⁶¹ RESA/Invenergy Complaint at 11.

⁶² *Id.*; *see also id.* at 14.

⁶³ ESA Complaint at 31-32 (citing Regulation Signal and Requirement Update, Presentation of Eric J. Endress, at 5 (Jan. 24, 2017), *available at* <http://www.pjm.com/~media/committees-groups/task-forces/rmistf/20170124/20170124-item-04-signal-implementation-review.ashx>). ESA asserts that while the RegA signal became better matched to RegA resources’ capabilities, the RegD signal became more volatile. ESA Complaint at 32 (citing Buie Aff. at 4; Smith Aff. at 9).

⁶⁴ ESA Complaint at 32-33.

⁶⁵ RESA/Invenergy Complaint at 15.

No. EL17-65-000 was published in the *Federal Register*, 82 Fed. Reg. 18,758 (2017), with answers, interventions, and comments due on May 4, 2017. On April 26, 2017, the Commission issued a notice extending the deadline to submit answers, interventions, and comments in Docket No. EL17-65-000 to May 15, 2017.

26. Timely motions to intervene in both proceedings were filed by AES Corporation (AES); Alevo USA, Inc. (Alevo); American Electric Power Service Corporation (AEP);⁶⁶ American Municipal Power, Inc.; Beacon Power, LLC; Dayton Power and Light Company; Dominion Resources Services, Inc.;⁶⁷ EDF Renewable Energy, Inc. (EDF); Exelon Corporation; GlidePath Power, LLC; Monitoring Analytics, LLC, in its capacity as the independent market monitor for PJM (IMM); NextEra Energy Resources, LLC (NextEra); NRG Power Marketing LLC and GenOn Energy Management, LLC; and PJM Industrial Consumers Coalition. The Public Utilities Commission of Ohio filed a notice of intervention in both proceedings.

27. Timely motions to intervene in Docket No. ER17-64-000 were filed by Invenergy; LS Power Associates, L.P.; PSEG Companies; and RESA. The Delaware Public Service Commission and the Maryland Public Service Commission filed notices of intervention in Docket No. EL17-64-000. ESA and Duke Energy Corp. (Duke)⁶⁸ and filed timely motions to intervene in Docket No. EL17-65-000.

28. On May 15, 2017, PJM filed an answer and motion to consolidate in both proceedings (PJM Answer). AEP, AES, Alevo, Duke, the IMM and NextEra filed comments in both proceedings. EDF filed comments in Docket No. EL17-65-000.

29. On May 31, 2017, and June 2, 2017, complainants each filed answers to the PJM Answer. On June 9, 2017, the IMM filed an answer to ESA's Answer (IMM June Answer). On June 27, 2017, PJM filed an answer to the answers of RESA/Invenergy and ESA (PJM June Answer).

⁶⁶ AEP intervened on behalf of its affiliates, Appalachian Power Company, Indiana Michigan Power Company, Kentucky Power Company, Kingsport Power Company, Ohio Power Company, Wheeling Power Company, and AEP Generation Resources.

⁶⁷ Dominion Resources Services, Inc. intervened on behalf of Virginia Electric and Power Company.

⁶⁸ Duke intervened on behalf of its franchised public utility affiliates, Duke Energy Ohio, Inc., Duke Energy Kentucky, Inc., Duke Energy Indiana, LLC, Duke Energy Carolinas, LLC, and Duke Energy Progress, LLC.

30. On June 25, 2017, complainants each filed a motion requesting settlement judge procedures (Settlement Judge Motions). On August 9, 2017, PJM filed comments in response to the Settlement Judge Motions, stating that PJM does not oppose settlement discussions on certain issues, but asserting that settlement procedures were premature due to PJM's plans to amend the compensation structure of the Regulation market. On August 21, 2017, RESA/Invenergy filed an answer to PJM's comments regarding the Settlement Judge Motions. On August 30, 2017, AES filed comments in support of the Settlement Judge Motions.

A. PJM's Answer and Motion to Consolidate

31. PJM characterizes the complainants as seeking "to obtain revenue certainty at the expense of impeding necessary operational changes made by an RTO."⁶⁹ PJM asserts that its actions to update its benefits factor curve and improve its signals complied with the Commission's rule of reason. According to PJM, it appropriately placed in its manuals the "implementation details that inform stakeholders how the organization conducts business under its tariff," including "instructions . . . which *guide internal operations* and inform market participants of how [the RTO] conducts its *operations* under [its Tariff]."⁷⁰ PJM characterizes changes to the benefits factor curve, and the underlying calculations and code that form the Regulation signal, as implementation details that are properly excluded from its filed rate.⁷¹

32. PJM asserts that if it were required to file tariff revisions prior to changing protocols necessary to control ACE, there would be "long delays between PJM identifying changes needed to control ACE and being able to make such changes," and if it cannot effectively control ACE, potential consequences are "voltage control issues, damage to generators' electrical equipment, and even load shedding events."⁷² PJM

⁶⁹ PJM Answer at 3.

⁷⁰ *Id.* at 15 (quoting *Midwest Indep. Transmission Sys. Operator, Inc.*, 124 FERC ¶ 61,183, at P 145 (2008) and *Cal. Indep. Sys. Operator, Inc.*, 122 FERC ¶ 61,271, at P 16 (2008) (emphasis added)).

⁷¹ *Id.*

⁷² *Id.* PJM argues that "having changes to such protocols and technical details subject to notice and comment before the Commission, would mean that the effectiveness of PJM's dispatch decisions and operation of the bulk power system would be severely hampered because market participants with distinct economic agendas would have the ability to influence those dispatch practices in a way that may not be consistent with system reliability," which is an unreasonable result. *Id.* at 24.

insists that its actions have not implicated any rates, terms or conditions because PJM has only “1) changed the operating protocols and technical implementation details related to operating Regulation resources to better control ACE, and 2) updated the Benefits Factor curve to more accurately describe the operational tradeoff between RegA and RegD resources based on observed, changed operational conditions.”⁷³ PJM contrasts these actions with additional potential changes under consideration that relate to Regulation compensation, which PJM states would require Commission approval to go into effect.⁷⁴

33. PJM contends that its 2015 benefits factor adjustment is consistent with Order No. 755 and PJM’s Order No. 755 compliance filings, arguing that its compliance filings made clear that the benefits factor curve would be maintained in its manuals so that it could be subject to periodic update, and that PJM intended to update the PJM manuals through the stakeholder process to reflect operational changes.⁷⁵ PJM notes that PJM followed this exact process in 2015, and ESA members did not oppose the change.

34. PJM maintains that it did not impermissibly “cap” RegD resources, as ESA contends. Rather, PJM asserts that it adjusted the benefits factor curve during excursion hours when increased manual interventions and ACE variability had been observed. PJM asserts that in such hours the benefits factor curve “was defined at a Benefits Factor of 1 at 26.2%, where PJM would not procure additional RegD resources beyond that point given the observed heightened operational challenges.”⁷⁶

35. PJM similarly maintains that its January 2017 signal redesign is consistent with Commission precedent and the PJM Operating Agreement. PJM relies on Commission precedent providing PJM with discretion to “dispatch resources as necessary to meet load and ensure reliability depending on the circumstances,” and finding that PJM’s discretion when making dispatch decisions for reliability reasons “does not require prior stakeholder

⁷³ *Id.* at 16.

⁷⁴ *Id.* As discussed above, PJM’s proposal to reform Regulation market compensation was filed in Docket No. ER17-87-000, and is addressed in an order issued concurrently with this order.

⁷⁵ *Id.* at 17 (citing November 2012 Order, 141 FERC ¶ 61,134).

⁷⁶ *Id.* at 17-18.

approval or a demonstration that its dispatch strategy is better than other strategies.”⁷⁷ PJM points to its Operating Agreement, which requires PJM members to comply with all PJM determinations regarding the selection, scheduling or dispatch of resources in the energy market or to meet the operational requirements.⁷⁸ PJM asserts its signal redesign is a dispatch decision because the signals themselves determine the operational needs of the system in real time. PJM argues that the proprietary software and complex algorithms underlying the signals are technical details that should not be published, and making them public would violate commercial agreements.⁷⁹ PJM asserts that the relief that ESA seeks—filing the parameters governing the redesign of its RegD signal—should be denied as the equivalent of publishing proprietary software code.⁸⁰

36. PJM argues that its changes to the neutrality of the RegD signal did not violate filing requirements under section 205 of the FPA, as ESA asserts, because longstanding Commission precedent holds that technical implementation details and operational protocols need not be part of the filed rate. PJM points out that ESA cites no precedent to support that Regulation signal neutrality—much less unconditional neutrality—is a required feature of Regulation market design. PJM argues that requiring unconditional neutrality for Regulation services could undermine the core purpose of the service. PJM cites Order No. 755’s finding that issues related to RTOs’ signal neutrality and use of different signals were technical issues concerning dispatch, not compensation, and thus were outside the scope of the proceeding.⁸¹

37. PJM challenges ESA’s argument that the RegD signal design completes the rate design for compensation for Regulation service. PJM asserts that all information that significantly impacts the rates, terms, and conditions for Regulation service are

⁷⁷ *Id.* at 18 (citing *PPL EnergyPlus, LLC*, 117 FERC ¶ 61,338, at P 33 (2006), *Dominion Res. Servs. v. PJM Interconnection, L.L.C.*, 142 FERC ¶ 61,068, at P 32 (2013); *Big Sandy Peaker Plant, LLC v. PJM Interconnection, L.L.C.*, 154 FERC ¶ 61,216, at P 50 (2016)).

⁷⁸ *Id.* (citing PJM Tariff Attachment K-Appendix and Operating Agreement, Schedule 1, § 1.8.2).

⁷⁹ *Id.* at 19.

⁸⁰ *Id.* at 19-20. According to PJM, what ESA is requesting is akin to “requesting that the software code supporting the engine that clears Real-time Energy Market be filed in the Tariff,” which “would obviously be inappropriate, as such details are clearly technical in nature and should not be included in PJM’s filed rate.” *Id.* at 23.

⁸¹ *Id.* at 20-21 (citing Order No. 755, FERC Stats. & Regs. ¶ 31,324 at P 184).

enumerated in the PJM Tariff and Operating Agreement; in support, PJM identifies provisions that “describe how Regulation resources participate in PJM’s Regulation market” and “how they are compensated.”⁸² PJM emphasizes that the benefits factor curve and signal redesign are operational in nature, arguing that ESA appears to wrongly believe that dispatch decisions are part of a market’s rate design.⁸³

38. PJM also challenges ESA’s analogy that failing to have RegD signal parameters in the PJM Tariff is akin to having capacity resource performance requirements only in a manual, arguing that performance requirements for Regulation resources are documented in the PJM Tariff and Operating Agreement, with supplemental operational details contained in the Manuals.⁸⁴ PJM argues that the crux of ESA’s argument is that how RegD signals are operated impacts how they are compensated, thus operational changes must be detailed in the filed rate. PJM claims that complainants are attempting to lock-in practices that were beneficial to one set of resources but that were changed to protect system reliability.⁸⁵

39. PJM distinguishes its actions from the actions taken by ISO-NE in the *ISO New England* precedent cited by the complainants. PJM argues that, unlike in *ISO New England*, it did not move to a single dispatch system that internalized the capabilities of traditional generators, but rather made changes to more accurately reflect the operational tradeoff between RegA and RegD resources and to improve the coordination of the signals. PJM also argues it has continued to enable limited-energy resources “to participate in the Regulation Market to the fullest extent possible,” as required by the Commission in *ISO New England*—subject to the conditions that the operational tradeoff between RegA and RegD are properly reflected in the benefits factor, and that all Regulation resources perform to help PJM control ACE.⁸⁶

40. PJM argues that the complainants fail to recognize that the overriding purpose of the Regulation market is to control ACE. According to PJM, the January 2017 signal

⁸² *Id.* at 21-22 (listing Schedule 3 of the PJM Tariff, and Schedule 1 of the PJM Tariff Attachment K-Appendix and Operating Agreement at sections 1.7.18, 3.22, and 3.22A).

⁸³ *Id.* at 22.

⁸⁴ *Id.* at 22-23.

⁸⁵ *Id.* at 24-25.

⁸⁶ *Id.* at 26 (citing *ISO New England*, 147 FERC ¶ 61,135 at P 26).

redesign resulted in enhanced operational control and decreased manual interventions.⁸⁷ PJM asserts that resources can offer fewer megawatts of Regulation capability into the market if they are operating beyond their ideal capability.⁸⁸ PJM also claims that the majority of pegging instances since the January 2017 signal redesign have been for short durations, and that it has not observed a decrease in RegD participation.⁸⁹

41. PJM challenges RESA/Invenergy's arguments that PJM's signal redesign has harmed resources, explaining that it does not ask resources to operate outside of their parameters. Rather, market participants offer Regulation service at a set capability and represent that they can follow the signal to provide the service for which they are being paid. PJM also argues that market participants can take steps to avoid wear and tear on their resources through capital investments, reflecting true capability in the resource's Regulation offer, and reflecting their true cost of operations in their Regulation offers.⁹⁰ PJM points out that Order No. 755 established rules to reward high performance.

42. PJM also challenges RESA/Invenergy's arguments regarding regulatory certainty. PJM argues that the January 2017 signal redesign was implemented to maintain market integrity, after PJM engaged in a stakeholder process over the course of 2016. PJM argues that no market participant is entitled to being operated the same way at all times, and changes in dispatch of this nature do not undermine regulatory certainty.⁹¹ PJM also argues that the requested relief—reversion to the prior RegD signal—not only would harm reliability, but also would result in higher rates with no commensurate benefits, as it would prolong ACE correction and require the dispatch of more RegA megawatts, thereby increasing costs.⁹² PJM welcomes suggestions from stakeholders

⁸⁷ *Id.* at 26-27, Fig.3.

⁸⁸ *Id.* at 27-28.

⁸⁹ *Id.* at 28 (citing Hsia Aff. at PP 24, 28). PJM challenges the “expansive definition” of pegging offered by ESA, and defines pegging to mean instances where resources are dispatched at 99 percent of utilization in either a positive or negative direction. *Id.* at 27 n.80; *see* Hsia Aff. at PP 24-26. PJM also states that the new signal fully utilizes the RegD resources' offered Regulation capability, which at times can lead to pegging.

⁹⁰ *Id.* at 29.

⁹¹ *Id.* at 30.

⁹² *Id.* at 31 (citing Hsia Aff. at P 29).

regarding market improvements, and asserts that direction from the Commission to further develop a load-following ancillary service product would be beneficial.⁹³

43. PJM also moved to consolidate Docket Nos. EL17-64-000 and EL17-65-000, on grounds that the Complaints “raise nearly identical issues of law and fact,” complainants are represented by the same outside counsel, and RESA/Invenergy are members of ESA. PJM argues that consolidation will allow the evaluation of issues set forth in the Complaints in a more efficient and meaningful fashion.⁹⁴

B. Comments in Support of Complaints

44. AES, Duke, EDF, and NextEra filed comments in support of the Complaints. AES requests that the Commission order PJM to remove the December 2015 cap, reinstate the price signals in place prior to January 2017, and direct PJM to submit a filing under FPA section 205 to correct any perceived market design flaws without undue discrimination against battery-based storage facilities.⁹⁵ AES asserts that market rules should recognize the operating characteristics and limitations of existing battery-based storage facilities and that the results of an FPA section 205 proceeding could be a package of market rules resembling the rules effective prior to December 2015, or a different set of rules with a transition period for existing facilities.⁹⁶

45. AES asserts that the initial RegD market design was based on highly precise and accurate shorter-duration storage capabilities. AES states that companies like AES designed and brought online storage systems based on these market considerations.⁹⁷ AES states that it is unfair to create a payment construct that encouraged the investment in certain facilities and abruptly change the payment structure so that a fair return on that investment cannot be collected. AES asserts it may not have relocated or constructed battery-based facilities in 2011-2015 in PJM if the current market design were in place at the time.⁹⁸

⁹³ *Id.* at 32.

⁹⁴ *Id.* at 33.

⁹⁵ AES Comments at 13.

⁹⁶ *Id.* at 14.

⁹⁷ *Id.* at 5.

⁹⁸ *Id.* at 7.

46. AES argues that PJM's unilateral changes strand costs incurred in reliance on the RegD structure that PJM designed. AES contends that PJM's recently implemented changes in December 2015 and January 2017 present a challenge for continuous operation of existing energy storage facilities in the market.⁹⁹ AES asserts that PJM's unilateral Regulation signal modifications have unjust and unreasonable end-results and are unduly discriminatory against existing battery-based energy storage owners whose facilities are physically unable to discharge over the extended period of time that the new market rules induce.¹⁰⁰ AES states its concern under the current market structure is that shorter duration storage systems, which provide a large amount of value due to faster response, are being requested to also provide the energy content which leads to poorer performance and potential damage to equipment.¹⁰¹

47. AES argues that the changes implemented by PJM in its manuals in December 2015, without Commission review, were harmful to the economic viability of RegD resources, causing significant decreases in the price paid and quantity of services requested from RegD resources. AES further argues that the January 2017 signal redesign, which was not addressed in the PJM manuals or Tariff, eliminated the concept of energy neutrality for RegD facilities, causing physical damage to battery-based storage facilities due to being dispatched to run inconsistently with how they were designed.¹⁰² AES concurs with ESA that the 2017 signal redesign has resulted in PJM's requesting RegD facilities to discharge power continuously for 15 minutes or more on a daily basis.¹⁰³ AES asserts it is not physically possible for existing PJM energy storage facilities to operate in this manner at their rated capacity and, as a result, AES's battery storage facilities are now offered into the market with a significant derate in capacity.¹⁰⁴ Further, AES asserts that the lithium ion batteries installed were never designed to be

⁹⁹ *Id.* at 6.

¹⁰⁰ *Id.*

¹⁰¹ *Id.* at 5. AES notes that longer-duration systems with battery discharge of up to four hours have become possible with recent advances in capabilities, but that the market construct is not available in PJM to incent these longer-duration systems, and that existing facilities are physically incapable of providing longer durations of discharge.

¹⁰² *Id.* at 7-8.

¹⁰³ *Id.* at 8 (citing ESA Complaint at 15-17).

¹⁰⁴ *Id.*

repeatedly and continuously completely charged and discharged, which is what the current RegD signal imposes.¹⁰⁵

48. AES asserts that deviations from PJM's initial design will lead to an unplanned acceleration in battery cell degradation and poor performance. AES alleges that if the current market structure continues to exist, AES will not likely make additional investments within PJM to replace the battery cells, that all such new investments would be made in different markets, and that existing facilities might be relocated.¹⁰⁶ AES states its internal modeling shows that the combination of the changes will continue to reduce its future projected revenue within PJM markets.¹⁰⁷

49. AES agrees with the complainants that changes in technical rules affecting market outcomes of this magnitude should be reflected in the Tariff, not just a manual,¹⁰⁸ consistent with other Commission determinations in connection with PJM's Regulation market.¹⁰⁹ AES contends that because the purpose of PJM's changes was to alter market outcomes, the Commission should order PJM to reinstate prior market rules and make a FPA section 205 filing to propose tariff revisions.¹¹⁰

50. AES argues battery-based storage operators should not be assigned 100 percent of the costs of a solution to market problems created by a much larger group of market participants. AES contends that the cause of the problem here is not battery storage facilities designed to operate as energy-neutral over a 15-minute period. Rather, AES claims that the causes include: existing conventional generation that is unable to ramp-up output quickly; the artificial caps PJM placed on RegA and RegD volumes; and inadvertent and unscheduled interchange between PJM and other RTOs, including

¹⁰⁵ *Id.* at 8-9.

¹⁰⁶ *Id.* at 9.

¹⁰⁷ *Id.* at 9-10.

¹⁰⁸ *Id.* at 10-11 (citing *Demand Response Coalition v. PJM Interconnection, L.L.C.*, 143 FERC ¶ 61,061 at P 17).

¹⁰⁹ *Id.* (citing May 2012 Order, 139 FERC ¶ 61,130 at P 71 (finding that PJM's description in Manual 12 of certain components of the Regulation "accuracy score" was inadequate and that PJM should provide more detail in its Tariff); May 2012 Order, 139 FERC ¶ 61,130 at P 72 (requiring PJM to include certain information regarding the calculation of Regulation performance payments in its Tariff instead of its manuals)).

¹¹⁰ *Id.* at 11.

anticipated interchange that may or may not actually take place in the market.¹¹¹ Thus, AES contends that battery storage facilities' solely bearing the burden through significantly reduced revenues and penalties should not be the solution. AES states that PJM does not penalize a slowly-ramping coal fired or nuclear unit for failing to meet a market signal requesting full output sooner than the unit is physically capable of meeting.¹¹²

51. AES argues, at a minimum, PJM should have established a transitional rule. AES states that PJM did not provide a transition to battery-based storage providers to minimize the financial impact of the market changes, as PJM has previously done for other market rules where correct results were not produced.¹¹³ AES asserts that either grandfathering of 15-minute resources or a compensatory transition mechanism should have been provided to enable affected facilities to be made whole, and that the costs of such mechanisms should be borne proportionally by all market users. AES asserts further that the Commission should establish guidelines for compensation or initiate settlement proceedings to accomplish an equitable outcome.¹¹⁴

52. Duke, EDF and NextEra also filed comments supporting the Complaints. Duke states that PJM should be required to include the benefits factor change, cap on RegD resources, and signal redesign in its Tariff.¹¹⁵ Duke further states that it supports the complainants' request that PJM be directed to revert to the original RegD signal, and believes any changes to the RegD signal should be contained in the PJM Tariff as such provisions significantly affect jurisdictional rates and services under the "rule of reason" test.¹¹⁶

53. EDF asserts that the new RegD signal no longer respects the limited-energy nature of energy storage resources, such as EDF's McHenry Battery Storage facility. EDF's Director of Innovation and Commercialization provided an affidavit in support of the ESA complaint describing the effects of the changes in PJM's RegD signal on the

¹¹¹ *Id.* at 11-12.

¹¹² *Id.* at 12.

¹¹³ *Id.* at 12-13.

¹¹⁴ *Id.* at 13.

¹¹⁵ Duke Comments in Docket No. EL17-64-000 at 2-3.

¹¹⁶ Duke Comments in Docket No. EL17-65-000 at 2 (citing *Demand Response Coalition v. PJM Interconnection, L.L.C.*, 143 FERC ¶ 61,061 at P 17).

McHenry facility.¹¹⁷ EDF asserts that PJM's change to the RegD signal has caused the McHenry facility's performance score to decrease, its energy throughput to increase almost 200 percent of its original nameplate capacity, and its mileage ratio to double. EDF argues that this has put the McHenry facility at a competitive disadvantage relative to new market entrants, and the facility would require significant additional investment to meet PJM's new RegD signal. In addition, EDF asserts that PJM's new RegD signal significantly increases the amount of strain placed on the facility's battery components, thereby likely decreasing its life expectancy and compromising its Performance and Warranty contract with its battery supplier.

54. EDF expresses agreement with NextEra's comments, discussed below, on the following points: (1) the modifications fundamentally change how PJM's RegD products are currently used versus how they were intended to be used, and have caused long term damage to battery systems; (2) PJM's changes to the RegD signal are not necessary to maintain system reliability; (3) the changes to the RegD signal penalize RegD assets for not acting like RegA assets; and (4) increased mileage payments do not compensate for losses incurred.¹¹⁸

55. NextEra asserts that PJM has violated its FPA filing requirements, and requests that the Commission direct PJM to eliminate the December 2015 cap, submit tariff revisions setting forth the methodology for calculating the benefits factor, and revert to its prior RegD signal until the Commission approves the design of its new RegD signal.¹¹⁹

56. NextEra states that routine and persistent pegging of the Regulation signal is a misuse of Regulation resources.¹²⁰ NextEra concludes PJM is over- or under-committing generation in the 5-minute energy market and relying on the pegging of Regulation resources on an almost daily basis for up to 60 minutes at a time to manage ACE.¹²¹ NextEra argues that PJM could have developed a balancing or flexibility product, or procured a greater volume of Regulation service to address this problem, instead of implementing a series of changes that penalize RegD resources for their relative inability to sustain performance during pegging events.¹²² NextEra further argues that PJM's

¹¹⁷ EDF Comments at 2 (citing ESA Complaint, Attachment 2).

¹¹⁸ *Id.* at 3-5.

¹¹⁹ NextEra Comments at 5.

¹²⁰ *Id.*

¹²¹ *Id.* at 6 (citing Smith Aff. at PP 10-14).

¹²² *Id.* at 6-7 (citing ESA Complaint at 19).

changes are inconsistent with the pay-for-performance regime adopted in Order No. 755 because pegging resources at full RegDown or RegUp for long periods of time prevents them from being able to move in response to AGC and to be compensated based on the mileage associated with such movement.¹²³

57. NextEra disagrees with PJM that the changes were necessary to maintain reliability, arguing that PJM is leaning on Regulation resources to achieve load and generation balance not because of reliability, but because it is easier than making more appropriate changes in the energy market.¹²⁴ NextEra notes that PJM has admitted that changes in the energy market are necessary to manage power balance,¹²⁵ and has even linked needed energy market reforms to the pegging events observed by Regulation resources.¹²⁶

58. NextEra states that the relief requested by the Complaints would not preclude PJM from implementing any change to its Regulation market that is necessary to ensure reliability, but would only require PJM to file such changes with the Commission. NextEra argues that it is indisputable that the December 2015 cap, December 2015 benefits factor change, and January 2017 signal redesign each significantly affect the rates, terms and conditions for RegD resources and have materially impacted their compensation.¹²⁷ NextEra contends that each of the changes were one-time actions taken by PJM after months of discussions with stakeholders, and could have been submitted for Commission review and approval.¹²⁸ NextEra argues that each of the changes implemented by PJM is capable of specification and that PJM already has specified them

¹²³ *Id.* at 7-8 (citing Order No. 755, FERC Stats. & Regs. ¶ 31,324 at P 133; November 2012 Order, 141 FERC ¶ 61,134 at P 46).

¹²⁴ *Id.* at 8.

¹²⁵ *Id.* (citing Comments to Notice of Proposed Rulemaking of PJM Interconnection, L.L.C., Docket No. RM17-3-000, at 10-12 (filed Feb. 28, 2017)).

¹²⁶ *Id.* at 8-9 (citing PJM Interconnection Response to the 2016 State of the Market Report, at 8 (May 12, 2017), available at <http://www.pjm.com/~media/library/reports-notices/state-of-the-market/20170512-pjms-response-to-the-2016-state-of-the-market-report.ashx>).

¹²⁷ *Id.* at 10.

¹²⁸ *Id.*

outside of the Tariff.¹²⁹ Moreover, NextEra states that the ESA Complaint only requested that the *methodology* to calculate the benefits factor and the *parameters* governing the design of the RegD signal be included in the PJM Tariff and granting this relief would leave PJM with flexibility to adjust the benefits factor or RegD signal as needed.¹³⁰

59. NextEra argues that while the energy neutrality of the RegD signal could at times cause those resources to work in the opposite direction of ACE control, the same is true for RegA resources because their ramp limitations cause them to regularly move against ACE control.¹³¹ NextEra states that separate signals exist to allow PJM to blend RegA and RegD in a way that optimizes system control while recognizing the different operational characteristics of each class of resource, and that PJM has even stated that “[a]ccommodation of the energy capability limitations of [RegD] resources is analogous to the accommodation of ramp capability in a traditional AGC formulation; this is necessary for effective control to ensure response meets control objectives.”¹³² NextEra argues that instead of blending these attributes, the changes implemented by PJM penalize RegD resources for not having the operational characteristics of RegA resources. NextEra states that RegD resources can only work against ACE when they must return to neutrality, which only occurs because PJM is leaning on Regulation resources to address balancing needs not resolved in the energy market.¹³³

60. NextEra states that when PJM implemented the January 2017 signal redesign, the RegD signal began to follow ACE correction without regard to the limited-energy constraints of RegD resources, resulting in increased mileage for RegD resources.¹³⁴ NextEra states that for some limited-energy resources, this has resulted in a higher level of mileage revenues, but that the increase in mileage has been more than offset by lower performance scores and lower capability payments.¹³⁵ Additionally, NextEra argues that

¹²⁹ *Id.* (citing, among other PJM documents, PJM Manual 11, Rev. 88, at 77 (specifying December 2015 Cap)).

¹³⁰ *Id.* at 10-11.

¹³¹ *Id.* at 11-12.

¹³² *Id.* at 12-13 (citing Signal White Paper at 9).

¹³³ *Id.* at 13.

¹³⁴ *Id.* at 14 (citing Smith Aff. at P 9).

¹³⁵ *Id.* (citing Smith Aff. at P 15; Buie Aff. at P 10; Oliver Aff. at P 7).

the increased mileage increases maintenance and operating costs,¹³⁶ and that on balance, the Regulation market changes implemented by PJM are resulting in lower total revenues for limited-energy resources,¹³⁷ contrary to PJM's statement that higher mileage payments help justify the changes.¹³⁸

C. Comments in Support of PJM

61. In support of PJM, AEP notes that the changes implemented by PJM were discussed over the course of more than a year in PJM's stakeholder process. AEP states that it supports the ability of PJM to make operational changes to enhance reliability and supports the specific changes implemented to improve Regulation service because the criteria were outdated and PJM must be able to keep up with advancing technology and dynamic system conditions. AEP also asserts that the changes will, in the long run, reduce costs to AEP's customers because the deployment of RegD will be more efficient. AEP concludes that the Commission should not interfere in a grid operator's stakeholder process and decision-making at the behest of a few market participants with a financial stake in the continued inefficient operation of the PJM Regulation Market.¹³⁹

D. Other Comments

62. Alevo filed comments partially supporting the complaints. Alevo supports ESA's request that the Commission direct PJM to seek authority for Regulation market changes under section 205 of the FPA.¹⁴⁰ Alevo agrees with ESA that this should include justifying the reasonableness of the benefits factor PJM and the parameters of the RegD signal. According to Alevo, the benefits factor calculation and parameters of the new signal should be evaluated as a continuation of PJM's compliance with Order No. 755, such that the Commission can ensure that, taken together, the benefits factor and new signal are just and reasonable, and not unduly discriminatory for energy storage resources providing Regulation service.¹⁴¹ Alevo also argues that the Commission should eliminate

¹³⁶ *Id.* (citing Buie Aff. at P 8; Oliver Aff. at P 7; Ma Aff. at 8.b).

¹³⁷ *Id.* (citing Smith Aff. at P 15; Buie Aff. at P 10; Oliver Aff. at P 7).

¹³⁸ *Id.* at 13 (citing Regulation Update, Presentation of Eric Hsia to PJM Operating Committee at 4 (Feb. 6, 2017), available at <http://www.pjm.com/~media/committees-groups/committees/oc/20170411/20170411-item-20b-regulation-update.ashx>).

¹³⁹ AEP Comments in Docket Nos. EL17-64-000 and EL17-65-000.

¹⁴⁰ Alevo Comments, Docket No. EL17-64-000 at 5.

¹⁴¹ *Id.*

the December 2015 cap set forth in PJM's manuals, which Alevo asserts is unnecessary now that PJM has a conditionally neutral signal.¹⁴²

63. Alevo agrees with ESA that PJM's unilateral changes violate the filed rate doctrine, given the scope of the changes made to the RegD signal.¹⁴³ Alevo argues having these market design parameters in the PJM Tariff will also ensure regulatory certainty and afford due process should PJM want to make changes in the future.¹⁴⁴ According to Alevo, energy storage projects are planned to last 10 years or more, and developers seeking to finance those projects require certainty that their costs can be recovered, and that they will have the opportunity to appeal market changes before they are finalized. Alevo asserts this will become more important as other RTOs/ISOs enhance their own market designs for energy storage resources.¹⁴⁵ Alevo asserts the Commission should set the precedent in this docket that design parameters for energy storage resources in PJM's Regulation market are no different from those utilized by generators in its capacity market and therefore must be included in RTO/ISO tariffs.¹⁴⁶

64. Although Alevo requests that the Commission grant relief in part, as discussed above, Alevo urges the Commission to partially deny complainants' request for relief from the new signal.¹⁴⁷ Alevo asserts that the Commission should grant relief regarding the increased duration of the new RegD signal because the unlimited duration is discriminatory and creates a barrier to the participation of limited-energy resources in the Regulation market.¹⁴⁸ Alevo argues the Commission should grant relief on this dimension of the signal because it impacts all energy storage resources equally, regardless of technology. Alevo contends the redesigned signal not only runs counter to

¹⁴² *Id.* at 6.

¹⁴³ *Id.* at 5 (quoting *City of Cleveland v. FPC*, 525 F.2d 845, 854 (D.C. Cir. 1976) (“The considerations underlying the [filed rate] doctrine . . . are preservation of the agency's primary jurisdiction over reasonableness of rates and the need to insure that regulated companies charge only those rates of which the agency has been made cognizant...”)).

¹⁴⁴ *Id.* at 6.

¹⁴⁵ *Id.*

¹⁴⁶ *Id.*

¹⁴⁷ *Id.* at 7.

¹⁴⁸ *Id.* at 8; Alevo Comments, Docket No. EL17-65-000 at 10.

RTO best practices on Regulation,¹⁴⁹ but also contradicts PJM's own statements regarding the definition of Regulation as a "moment-to-moment" service.¹⁵⁰ Alevo argues, taken together, it is clear that PJM is using Regulation to compensate for poor energy scheduling and the Commission should order PJM to either fix its energy scheduling issue or create a new product that achieves its goals.¹⁵¹

65. However, Alevo asserts that the Commission should deny relief based on the higher capacity requirement of the new Regulation signal, which only impacts battery technologies, not necessarily the entire class of energy storage resources. Alevo argues that, while ESA's complaint posits that the new RegD signal discriminates against energy storage resources because the signal "became more volatile, challenging thermal design limits and reducing service life of storage resources[,]” granting relief on such grounds would essentially create a carve-out for certain lithium-ion battery chemistries and discriminate against technologies that do not face the same thermal limits.¹⁵² Alevo contends a carve-out is against Commission precedent¹⁵³ and is not in the public interest because it would discourage innovation for the benefit of all electric customers.¹⁵⁴ Alevo argues that the Commission should reaffirm its precedent of technology-neutral market designs and let the market determine the optimal technology to respond to the higher throughput demands of PJM's Regulation signal.¹⁵⁵

¹⁴⁹ Alevo Comments, Docket No. EL17-64-000 at 8-9; Alevo Comments, Docket No. EL17-65-000 at 10 (noting that NERC defines Regulation on a 4-second to 5-minute basis).

¹⁵⁰ Alevo Comments, Docket No. EL17-64-000 at 9; Alevo Comments, Docket No. EL17-65-000 at 10 (citing PJM June 2016 Saturation Analysis at 4).

¹⁵¹ Alevo Comments, Docket No. EL17-64-000 at 9; Alevo Comments, Docket No. EL17-65-000 at 10-11.

¹⁵² Alevo Comments, Docket No. EL17-64-000 at 9-10 (citing ESA Complaint at 32); *see also* Alevo Comments, Docket No. EL17-65-000 at 7-8.

¹⁵³ Alevo Comments, Docket No. EL17-64-000 at 10; Alevo Comments, Docket No. EL17-65-000 at 8 (citing *Indianapolis Power & Light Co. v. Midcontinent Indep. Sys. Op., Inc.*, 158 FERC ¶ 61,107 (2017)).

¹⁵⁴ Alevo Comments, Docket No. EL17-64-000 at 10; *see also* Alevo Comments, Docket No. EL17-65-000 at 8.

¹⁵⁵ Alevo Comments, Docket No. EL17-64-000 at 10; Alevo Comments, Docket No. EL17-65-000 at 8.

66. Alevo further asserts that the capacity requirement of the new signal ensures that PJM secures the actual Regulation service that it needs without over procuring and overpaying. Alevo states that the old signal rarely called on the full rated capacity of energy storage resources. Alevo contends PJM's new signal now calls on the resources' full rated capacity, and better conforms with the intent of Order No. 755, ensuring alignment of resource bids and performance.¹⁵⁶

67. The IMM asserts that PJM does not correctly define the benefits factor, and does not correctly or consistently apply the benefits factor in optimizing, clearing, and settling the Regulation market.¹⁵⁷ The IMM claims that the resulting "perverse economic incentives and PJM operational problems" are being addressed through a stakeholder process to fix the market design.¹⁵⁸ The IMM characterizes PJM's benefits factor and signal change as interim measures to address immediate operational problems.

68. The IMM explains that, to determine the least-cost combination of RegA and RegD megawatts to meet Regulation requirements, RegD megawatts are substituted for RegA megawatts so long as it reduces total cost while maintaining a fixed level of control.¹⁵⁹ The IMM asserts that "the engineering based rate of substitution defines the marginal rate of technical substitution (MRTS) between RegA and RegD," and problems occur when the marginal benefits factor is not identical to MRTS. Moreover, the IMM asserts that the correct marginal benefits factor should be applied "throughout the market design, from optimization to settlement," in order "to ensure that PJM efficiently procures the optimal combination of RegA MW and RegD MW" and "to ensure that you get what you pay for."¹⁶⁰ The IMM also asserts that PJM's marginal benefits factor function "is incorrectly defined as the RegD MW as a percentage of the effective MW target requirement, rather than as the RegD MW as a percentage of the total regulation MW cleared (total of RegA and RegD combined)," causing "a mismatch between intended and realized proportions of RegD in the market clearing."¹⁶¹ The IMM contends that the market is cleared without confirmation that the resulting combinations

¹⁵⁶ Alevo Comments, Docket No. EL17-64-000 at 11; Alevo Comments, Docket No. EL17-65-000 at 9-10.

¹⁵⁷ IMM Comments at 3.

¹⁵⁸ *Id.* at 3-4.

¹⁵⁹ *Id.* at 2-3.

¹⁶⁰ *Id.* at 3.

¹⁶¹ *Id.* at 4.

of RegA and RegD are consistent with feasible market solutions, clearing too much RegD megawatts relative to RegA megawatts, which is “exacerbated by an increasing proportion of RegD offering at an effective price of zero.”¹⁶²

69. The IMM describes the changes PJM implemented in December 2015 as interim fixes designed not to correct the structure of the benefits factor function but “to reduce the purchases of RegD MW in all hours, based on the relative value of RegD, and to cap purchases of RegD MW during critical performance hours, when the relative and absolute over procurement of RegD caused the most severe operational issues.”¹⁶³ The IMM contends that the January 2017 signal redesign was intended to further improve system performance, but also did not address fundamental market design issues.¹⁶⁴

70. In response to the complainants’ allegations that the changes at issue in this proceeding require a tariff change and should not be left to the operational discretion of PJM, the IMM argues that changes to PJM’s Regulation signals were required for reliability. The IMM claims that the complainants mischaracterize the nature of the changes that PJM made, and further argues that the Commission already decided “how to properly house the rules under the rule of reason” in PJM’s Order No. 755 compliance proceeding.¹⁶⁵ Moreover, the IMM argues that the referenced changes were needed while tariff revisions to correct market design flaws were being developed.¹⁶⁶ The IMM asks the Commission to reject ESA’s requests that PJM be required to revert to the pre-January 2017 signal and eliminate the RegD cap, arguing that because no tariff provisions

¹⁶² *Id.* at 4-5.

¹⁶³ *Id.* at 5.

¹⁶⁴ *Id.* at 6-7.

¹⁶⁵ *Id.* at 8-9 (citing November 2012 Order, 141 FERC ¶ 61,134 at P 30).

¹⁶⁶ *Id.* at 9. Although the IMM asks the Commission to reject ESA’s request for an order requiring PJM to include in the Tariff the benefits factor calculation methodology and RegD signal design parameters, the IMM claims that a forthcoming joint IMM-PJM proposal will address ESA’s issues and, setting aside substantive differences, the IMM “supports including as much of the rules in the tariff as possible.” *Id.* As discussed above, PJM filed, in Docket No. ER18-87-000, the PJM Regulation Proposal to reform its Regulation market design. The IMM filed comments in that proceeding in support of that filing. See *PJM Interconnection, L.L.C.*, 162 FERC ¶ 61,295 (2018) (addressing the PJM Regulation Market Proposal).

address these issues, there is no ripe issue implicating the Commission's rule of reason.¹⁶⁷ Moreover, the IMM argues that ESA fails to meet its burden to require non-tariff rule changes, as the revised rules were required for reliability, and if "purchasing the correct level of RegD resolves the operational issues, any financial impact on RegD resources is appropriate."¹⁶⁸

71. In response to RESA/Invenergy's claim that they experienced reduced compensation and incurred financial harm due to the signal design changes, the IMM argues that they "provide no evidence of financial harm," nor do they show that the alleged harm is the result of the market design revisions, nor do they address the fact that RegD resources are being overpaid under the current market design and the changes increased performance payments to RegD resources.¹⁶⁹ The IMM asserts that RESA/Invenergy's claim that the redesigned signals are inconsistent with the physical limitations of energy storage resources is false. According to the IMM, "RegD resources continue to successfully participate in the market," and have either adapted by modifying their offer parameters or have proven capable of longer duration operation.¹⁷⁰

72. The IMM agrees in part with ESA that the cap on RegD resources violates the Tariff and harms ESA, and that demand for RegD resources was artificially truncated. According to the IMM, "[t]o the extent that the [marginal benefits factor] does not reflect the relative value of RegA and RegD during excursion hours, PJM should propose a [marginal benefits factor] that does"¹⁷¹ The IMM explains that if PJM experiences operational issues when there is more than 26.2 percent RegD during excursion hours, the actual Benefits Factor value is not 1.0 at 26.2 percent RegD during excursion hours, but rather is 0.0, illustrating that the current Benefits Factor overvalues RegD relative to RegA during excursion hours.¹⁷²

¹⁶⁷ IMM Comments at 10.

¹⁶⁸ *Id.*

¹⁶⁹ *Id.*

¹⁷⁰ *Id.* at 11.

¹⁷¹ *Id.* at 12.

¹⁷² *Id.* at 12-13.

E. Subsequent Answers

1. RESA/Invenergy

73. RESA/Invenergy claim PJM has failed to show any reliability-based grounds for PJM's signal redesign and failed to show it was necessary for PJM to have acted in a discriminatory, damaging fashion.¹⁷³ RESA/Invenergy assert that PJM's January 2017 signal redesign does not accommodate the design and characteristics of many storage projects specifically constructed to accommodate PJM's RegD signal and procedures.¹⁷⁴ They claim that PJM unduly discriminates against fast-start storage facilities because, unlike with other resources, PJM does not take into account their design capabilities.¹⁷⁵ By comparison, RESA/Invenergy assert that PJM took steps to ensure that the redesigned signals would respect RegA facilities' ramping capabilities.¹⁷⁶

74. According to RESA/Invenergy, the principal causes of damage are that the redesigned RegD signal abandons energy neutrality over short periods of time and dwells for longer periods of time at high output/input levels.¹⁷⁷ RESA/Invenergy claim PJM is effectively "calling upon RegD resources to provide a load following or reserve service," which "PJM should be procuring through the energy and reserve markets."¹⁷⁸ RESA/Invenergy state that they do not object to new procedures, but argue that any new procedures must avoid damage to existing resources. According to RESA/Invenergy, it was unreasonable for PJM to implement changes that affected RegD suppliers that were in full compliance with PJM's directives and operating within their design parameters, in order to solve an operational problem—not a reliability problem.¹⁷⁹

¹⁷³ RESA/Invenergy Answer at 2.

¹⁷⁴ *Id.* at 3-5.

¹⁷⁵ *Id.* at 5.

¹⁷⁶ *Id.* at 12 (citing Regulation Market Issue Senior Task Force, Oct. 25, 2016 Presentation at 5, *available at* <http://www.pjm.com/~media/committees-groups/task-forces/rmistf/20161025/20161025-item-02rmistf-transition-proposal.ashx>).

¹⁷⁷ *Id.* at 4-5.

¹⁷⁸ *Id.* at 5.

¹⁷⁹ *Id.* at 9. They provide data showing increased daily average temperatures experienced by one storage project, which they assert shows PJM's new signal discriminatorily impacts RegD resources. *Id.* at 22-23.

75. RESA/Invenergy do not seek to lock in any operational practices. Rather, they argue that PJM should revert to its prior signal at least on an interim basis, absent a showing by PJM that it cannot address a specific reliability issue, and that PJM should be required to: (1) take immediate steps to prevent further equipment damage, (2) identify other options for addressing the need for manual interventions, and (3) “determine whether its management of the Regulation market in practice is serving to mitigate other operational problems or circumstances regarding which PJM should not have to look to the Regulation market to resolve.”¹⁸⁰ They claim PJM offers no reason to believe it was unsafe to rely on manual interventions until another non-damaging procedure could be implemented.¹⁸¹ RESA/Invenergy claim that PJM’s operational discretion has limits, asserting that PJM cannot simply adopt procedures that damage the equipment of one class of suppliers, without exploring other options to solve the operational problem.¹⁸²

76. RESA/Invenergy assert that PJM misleadingly claims that pegging (i.e., instances in which PJM dispatches battery resources at close to their full capability for extended time periods) under the new signal has typically been for short durations. RESA/Invenergy present evidence that for one of their projects, there were 117 total hours from January 9, 2017 through May 23, 2017 where the RegD signal requested 90 percent or more of the unit’s output continuously for more than 10 minutes.¹⁸³ They assert that the need to routinely peg RegD resources indicates a fundamental market problem—either that the energy price signals are wrong or not being received or that RegD is being relied upon as a reserve product.¹⁸⁴

¹⁸⁰ *Id.* at 10. RESA/Invenergy assert that recent Control Performance Standard and Balancing Authority ACE Limit scores have worsened since the signal redesign. *Id.* (citing IMM, 2017 State of the Market Report for the PJM: January through March at 442, Fig.10-31 (May 11, 2017)).

¹⁸¹ *Id.* at 13-14. RESA/Invenergy question whether the signal redesign was needed for reliability purposes, claiming that PJM failed to present facts that a reliability problem was likely, and failed to explain why a solution could be placed on hold during the two-plus-year stakeholder process.

¹⁸² *Id.* at 11-12, 15. If it had such discretion, they claim, “presumably such power would first have to be codified in PJM’s Tariffs or in some other FERC-approved filing.” *Id.* at 13.

¹⁸³ *Id.* at 16.

¹⁸⁴ *Id.* at 17.

77. RESA/Invenergy argue that even though PJM takes Regulation offers hourly, Regulation is intended to be a short-timeframe product, covering no more than 10 minutes.¹⁸⁵ According to RESA/Invenergy, the real problem is not whether or how to use Regulation to control ACE, but whether PJM poorly manages ACE, causing it to implement “long duration operation at close to full capability levels on an almost daily basis,” and whether that should be permitted.¹⁸⁶ They claim PJM offers no explanation for why it needs to lean on RegD resources for system control for durations longer than 10 minutes, and should not be permitted to treat Regulation as a reserve or energy product.¹⁸⁷ RESA/Invenergy dismiss as irrelevant the fact that, on occasion, RegD signals worked against ACE, explaining that all regulation signals work against ACE at some point, due to their different benefits and limitations.¹⁸⁸

78. RESA/Invenergy challenge PJM’s argument that granting the complaint would raise costs, arguing that the redesigned signal likely will raise costs because damage costs are passed on in supply offers, fewer megawatts are being offered, and developers will need to include significantly more battery cells.¹⁸⁹ RESA/Invenergy also challenge PJM’s arguments that RegD resources can simply offer less capacity, asserting that “derating resources to meet PJM’s new performance expectations presumes that those expectations are appropriate.”¹⁹⁰ They also argue that at lowered operating levels, revenues may not be sufficient for projects to meet their financial obligations incurred to meet PJM’s original specific RegD design parameters.¹⁹¹ RESA/Invenergy aver that, instead of providing an opportunity for increased mileage payments, the redesigned signal is causing lost revenue, and equipment damage costs overwhelm any increase in

¹⁸⁵ *Id.* at 19 (citing Brendan J. Kirby, *Frequency Regulation Basics and Trends* (Dec. 2004), available at <https://www.ferc.gov/EventCalendar/Files/20100526085937-Kirby,%20Frequency%20Regulation%20Basics%20and%20Trends.pdf>).

¹⁸⁶ *Id.* at 20.

¹⁸⁷ *Id.* at 20-21.

¹⁸⁸ *Id.* at 17-18.

¹⁸⁹ *Id.* at 21-22.

¹⁹⁰ *Id.* at 22.

¹⁹¹ *Id.* at 23.

mileage revenues.¹⁹² They question why future developers would view investments in PJM as prudent unless corrective actions are taken.

79. RESA/Invenergy challenge PJM's argument that its actions are distinguishable from the actions rejected in *ISO New England*, arguing that requiring energy-limited resources to meet long duration dispatch is precisely what the Commission rejected in that case.¹⁹³ RESA/Invenergy also challenge Alevo's comments that the Commission should deny the complaint to the extent the adverse impact is due to overheating from higher capacity requirements, in order to remain technology neutral. RESA/Invenergy argue that Alevo's comments implying that it "can build a better mousetrap" are inapposite, because the situation at issue in this proceeding is not that a new product entered the market and began to out-compete an older product; rather, here, storage resources specifically made investments in response to PJM's guidelines.¹⁹⁴ RESA/Invenergy contend they are not asking for a technology exemption, but seek to avoid being carved out of participating in the RegD market.¹⁹⁵

80. RESA/Invenergy oppose PJM's motion to consolidate, arguing that consolidation is not relevant if the Commission summarily directs PJM to revert to its original signal.¹⁹⁶ If the Commission requires further procedures, RESA/Invenergy still argue against consolidation, averring that the ESA and RESA/Invenergy complaints raise "fundamentally different issues (pricing rules and revenues vs. equipment damage)" and the RESA/Invenergy complaint calls for "immediate action to avoid further increased degradation rates and adverse operational temperatures."¹⁹⁷

2. ESA

81. According to ESA, PJM fails to explain its clear pattern of dispatching Regulation resources to absorb or provide energy for long periods of time on an almost daily basis,

¹⁹² *Id.* at 24.

¹⁹³ *Id.* at 24-25 (citing *ISO New England*, 147 FERC ¶ 61,135 at PP 16-17, 26).

¹⁹⁴ *Id.* at 26.

¹⁹⁵ *Id.* at 26-27. They question the relevance of Alevo's comments to issues raised in the complaints. *Id.* at 27.

¹⁹⁶ *Id.*

¹⁹⁷ *Id.* at 28.

offers inadequate and premature justifications for its actions, and misrepresents the harm caused to ESA and its members.

82. ESA first argues that PJM mischaracterizes the Regulation product and its proper use, arguing that Regulation service is not designed or intended to provide bulk energy over long periods of time. ESA explains that, because PJM defines pegging events to ignore short-term releases of the RegD signal, PJM obscures the true nature of its operations and minimizes the impact of the challenged market rule changes.¹⁹⁸

83. ESA also characterizes PJM's assertion that ESA members did not oppose the changes PJM made to the benefits factor as misleading. ESA claims it repeatedly raised concerns, but because the changes were billed as a temporary, good faith attempt to support a solution through the stakeholder process, ESA did not recommend its members formally oppose the December 2015 benefits changes. ESA asserts that, after PJM and stakeholders worked for over a year to attempt to develop a consensus solution, PJM decided to unilaterally move forward with the January 2017 signal redesign without a FPA section 205 filing.¹⁹⁹

84. ESA further argues that PJM's Tariff and Operating Agreement do not contain "performance requirements" for Regulation resources, as PJM alleges they do, and that the capability clearing price provision merely states that PJM shall calculate the benefits factor in accordance with the Manuals.²⁰⁰ ESA states that this lack of information is striking compared to the detail provided for other services, such as operating reserves.²⁰¹ While PJM argues that the benefits factor and Regulation signals are implementation details, which do not need to be in the Tariff or Operating Agreement, ESA claims that Commission precedent actually supports that they should be in the Tariff and distinguishes cases relied on by PJM.²⁰² ESA also underscores that it is only requesting

¹⁹⁸ ESA Answer at 4-7 (providing graphs comparing pegging events as defined by ESA to pegging events as defined by PJM).

¹⁹⁹ *Id.* at 7-9.

²⁰⁰ *Id.* at 10-11 (citing PJM Tariff Attachment K-Appendix and Operating Agreement, Schedule 1, § 3.2.2).

²⁰¹ *Id.* at 11 (citing PJM Tariff Attachment K-Appendix and Operating Agreement, Schedule 1, § 3.2.3(o)).

²⁰² *Id.* at 11-12 (citing *California Indep. Sys. Operator*, 122 FERC ¶ 61,271, at PP 16, 23, 83 (2008) (rejecting CAISO's request to maintain certain requirements in its business manuals instead of the tariff, including a formula used to calculate heat rates for default energy bids)); *id.* at 12 n.37 (arguing that the *MISO* case PJM relies on "sheds no

that the Commission require the benefits factor methodology and RegD signal parameters be in the Tariff, which allows for details regarding the implementation of the methodology and parameters to be in manuals, as PJM indicates is appropriate.

85. ESA also challenges PJM's arguments that the January 2017 signal redesign is a dispatch decision. ESA expresses support for PJM's discretion to make dispatch decisions, but argues the *parameters* governing the RegD signal should be submitted for Commission review. ESA distinguishes the *Dominion Energy Resources* case on which PJM relies and in which the Commission affirmed PJM's flexibility to alter operating reserves dispatch practices; ESA asserts that the PJM Tariff and Operating Agreement have specific performance requirements for operating resources, but, here, the Tariff and Operating Agreement have no analogous performance requirements for Regulation service.²⁰³ ESA also distinguishes the *Big Sandy Peaker Plant, LLC* case on which PJM relies, arguing that case addressed PJM's discretion to determine the threshold eligibility of a resource to provide a service, whereas in the instant case PJM does not challenge the ability of limited-energy resources to provide Regulation service.²⁰⁴

86. ESA argues that PJM does not deserve deference on every decision once it waves "the reliability flag."²⁰⁵ ESA asserts there was no decline in compliance with NERC reliability metrics associated with the increased penetration of RegD resources.²⁰⁶ ESA argues that the reason for the RegD signal moving in the opposite direction of ACE control is that PJM has been consistently leaning on Regulation resources to address long-term imbalances. ESA also argues that PJM failed to show how placing the benefits factor methodology and RegD signal parameters in the Tariff or Operating Agreement would impair its ability to address a reliability need, because it would not alter the ability

light on application of the 'rule of reason' in the context of market rule changes affecting the clearing of and compensation for resources in the energy or ancillary services markets") (discussing *Midwest Indep. Transmission Sys. Operator, Inc.*, 124 FERC ¶ 61,183 (2008)).

²⁰³ *Id.* at 12-13 (citing *Dominion Resources Services, Inc. v. PJM Interconnection, L.L.C.*, 142 FERC ¶ 61,068).

²⁰⁴ *Id.* at 13 (citing *Big Sandy Peaker Plant, LLC v. PJM Interconnection, L.L.C.*, 154 FERC ¶ 61,216).

²⁰⁵ *Id.* at 15 (citing *PJM Interconnection, L.L.C.*, 147 FERC ¶ 61,108 (2014)).

²⁰⁶ *Id.* at 15-17.

of PJM operators to make real-time dispatch decisions or override Regulation signals as necessary to ensure reliability.²⁰⁷

87. ESA posits that PJM did not adequately support the December 2015 benefits factor changes, noting that PJM did not explicitly dispute ESA's assertion that PJM relied on a simulation of a single hour, and does not specify what the ratio of exchange between RegD and RegA resources should be, which would require an empirical analysis of RegA and RegD performance over a reasonable period of time, which PJM has not provided. ESA states that the IMM similarly does not provide empirical analysis to support its proposed alternative change to the benefits factor. In any event, ESA argues that the methodology used to calculate the benefits factor and the parameters of the RegD signal should be filed for Commission approval and addressed in a Commission proceeding.²⁰⁸ ESA argues that, notwithstanding PJM's argument that it has not implemented a cap on RegD resources, both the PJM Manuals and the IMM refer to it as a cap.²⁰⁹

88. ESA also argues that PJM misrepresents the harm to ESA members from the Regulation market changes by misrepresenting the total amount of RegD resources historically participating in the Regulation market. ESA explains that PJM compares average RegD participation for the year prior to the December 2015 change, which creates a low baseline because RegD participation grew significantly over the course of 2015. According to ESA, growth in the volume of RegD resources clearing the market abruptly stopped after the December 2015 cap and the effective megawatts of RegD resources cleared has been consistently limited by the cap since its implementation.²¹⁰ ESA also asserts that the megawatts of performance-adjusted RegD resources fell after the January 2017 signal redesign was implemented.²¹¹

²⁰⁷ *Id.* at 14-18.

²⁰⁸ *Id.* at 20-22.

²⁰⁹ *Id.* at 21 (citing IMM Comments at 12; PJM Manual 11, Rev. 86, at 77 (“A cap will be implemented at BF = 1 during these [excursion] hours.”)).

²¹⁰ *Id.* at 22-23 (presenting graphs based on PJM's Market-Based Regulation: Historical Market Data, <http://www.pjm.com/markets-and-operations/ancillary-services.aspx>).

²¹¹ ESA explains that the “raw” megawatt data PJM presents do not reflect adjustment for performance scores and the benefits factor, which drive compensation for RegD resources. ESA also notes that the raw megawatt data may have effectively remained unchanged because PJM lifted the cap on RegD resources when it implemented

89. ESA further contends that PJM’s assertion that any RegD resources impacted by the signal redesign can simply offer less capability into the market proves that the changes have significantly altered the performance requirements of the Regulation product and must be set forth in the Tariff or Operating Agreement. Like RESA/Invenergy, ESA argues that the changes implemented by PJM have the same result as the changes rejected by the Commission in the *ISO New England* case—namely, “only limited energy RegD resources are required to derate their facilities in order to participate effectively in the Regulation market”—and that PJM has failed to justify this discriminatory treatment.²¹²

90. ESA asserts that its requested relief of requiring PJM to submit the benefits factor methodology and RegD signal parameters for Commission review is not unreasonable, as PJM suggests. ESA states that PJM should be able to document the parameters governing the RegD signal design without publishing the proprietary algorithmic computer code used to implement those parameters.²¹³ According to ESA, though PJM asserts granting the complaint would increase costs, PJM does not provide any indication of how material any alleged cost impact might be. Finally, ESA opposes PJM’s motion to consolidate this proceeding with the RESA/Invenergy Complaint because the scope of each complaint and the remedies requested are distinct.²¹⁴

3. IMM Answer

91. In response to ESA’s argument that the new RegD signal causes resources to operate outside of design parameters, leading to equipment damage, the IMM reiterates its view that any damage is the responsibility of the resource owner, who voluntarily participates and is in control of its offer parameters.²¹⁵ According to the IMM, ESA’s real complaint is that resources cannot operate as they did prior to the signal redesign. The IMM points out that market participants are not guaranteed that market signals or the

the January 2017 signal redesign, though the higher cap did not offset the negative impacts. *Id.* at 24.

²¹² *Id.* at 25 (citing *ISO New England*, 147 FERC ¶ 61,135).

²¹³ *Id.* at 26. ESA points out that PJM already described these parameters in the Regulation White Paper attached to its answer.

²¹⁴ *Id.* at 26-27.

²¹⁵ IMM June Answer at 2.

market design will not change, and, with respect to the changes at issue here, ESA had years of warning.²¹⁶

92. In response to ESA's argument that the changes PJM implemented are discriminatory, the IMM asserts that the redesigned signal allows RegD resources to continue to provide Regulation service at current inefficient levels, and that "RegD as a class is being accommodated, supported and subsidized."²¹⁷ Regarding ESA's arguments that it is irrelevant that RegD resources sometimes work against ACE, as there are times that RegA resources, due to their lag, also move in the wrong direction, the IMM argues that the difference between the RegA and RegD signal is that a market made up solely of RegA resources could control ACE, while a market made up solely of RegD resources requiring 15-minute energy neutrality could not.²¹⁸

93. Regarding revenue-related arguments, the IMM contends that in the first quarter 2017, "total RegD revenue increased 12.1 percent per raw MW and 17.2 percent per performance adjusted MW" as compared to the first quarter 2016.²¹⁹ According to the IMM, ESA provides no evidence that its resources' margins are down due to increased costs. In any event, the IMM argues, RegD resources are being overpaid under the current market design because the marginal benefits factor is not used in settlement.²²⁰ Moreover, the IMM argues, reduced margins for RegD resources are not evidence that the market—which was designed to minimize the cost to provide Regulation via a combination of resources—is unjust and unreasonable.²²¹ Rather, because market participants can reflect their costs in their offers and are guaranteed their offer or better if they clear, market participants that cannot profit are uneconomic relative to their competitors.²²²

94. Responding to ESA's assertions that they may not have entered the market had they known of the potential for the significant structural Regulation market changes, the

²¹⁶ *Id.* at 3.

²¹⁷ *Id.* at 4.

²¹⁸ *Id.* at 4-5.

²¹⁹ *Id.* at 5.

²²⁰ *Id.* at 6. The IMM asserts that because the marginal benefit factor is generally less than one, RegD resources are generally overpaid on a per effective megawatt basis.

²²¹ *Id.* at 6-7.

²²² *Id.* at 6.

IMM asserts that Regulation market issues were identified and reported in 2012 and in every year since. According to the IMM, the market issues have been well documented and ultimately led to the creation of the Regulation Market Issues Senior Task Force, which has approved a redesign of the PJM Regulation Market expected to be filed in the near future.²²³

4. PJM Answer

95. In response to complainants' concerns about pegging, PJM asserts the complainants overlook the fact that Regulation is an hourly product in PJM,²²⁴ thus it is consistent with PJM's filed rate for PJM to require a Regulation resource to operate to its full offered capability for up to an hour. Nevertheless, PJM states that as a result of its process to continually evaluate its Regulation signal, and in response to concerns raised in the Complaints, PJM adjusted the Regulation signal on June 2, 2017. The adjustment was "aimed at reducing the instances in which PJM would need to operate RegD resources at close to the full output of such resources' offered capability for sustained periods of time," by modifying the Regulation controller to better optimize ACE control.²²⁵ PJM contends that these changes have already reduced the frequency of the pegging of RegD resources.

96. In response to ESA's contention that PJM has failed to explain its pattern of dispatching Regulation resources to absorb or provide energy for long periods of time on a daily basis, PJM refers to the Hsia Affidavit and contends that it clearly explained that it dispatches Regulation resources for longer periods of time when necessary to effectively control ACE given conditions on the bulk power system.²²⁶

97. PJM disputes ESA's claim that the underlying reason that the RegD signal moves against ACE control is PJM's consistent use of Regulation resources to address long-term energy imbalances. PJM asserts that, as it explained in its answer and in other PJM documents, the real problem was the uncoordinated and ineffective RegD signal design, which PJM has corrected.²²⁷ In response to ESA's claim that PJM failed to respond to

²²³ *Id.* at 7-8.

²²⁴ PJM June Answer at 2 (citing PJM Tariff Attachment K-Appendix and Operating Agreement, Schedule 1, §§ 3.2.2(a), 3.2.2(k); PJM Manual 11, § 3.1).

²²⁵ *Id.* at 3.

²²⁶ *Id.* at 4.

²²⁷ *Id.* at 5.

ESA's evidence that only one hour of performance data was presented to support the benefits factor change in December 2015, PJM discusses the evidence that it presented to the Task Force in 2016, and asserts that it presented "a thorough analysis of the RegD signal's impact on PJM's ability to control the bulk power system across a sample of hours, as well as demonstrative examples of how hypothetical shifts in the Benefits Factor curve would impact the amount of RegD resources clearing the Regulation market in given hours."²²⁸

98. PJM also disputes ESA's and RESA/Invenergy's claims that the changes to the RegD signal in January 2017 could not have been to address reliability concerns, given the lengthy stakeholder engagement. PJM rejects the implication that PJM may only take action related to reliability if there is an imminent risk of a reliability-related event. PJM counters that it does not wait for an imminent event to make operational changes to improve the reliability, and the fact that it engaged stakeholders does not mean that the reliability issues were not real.²²⁹ PJM closes by asserting that, "[a]s a matter of law, the manner in which PJM operates the bulk power system in order to meet its needs is a matter within PJM's discretion" and operational practices "should not be addressed through a litigious process before the Commission" but rather through the stakeholder process and other ongoing Commission proceedings, such as the Commission's notice of proposed rulemaking on fast-start resources.²³⁰

IV. Discussion

A. Procedural Matters

99. Pursuant to Rule 214 of the Commission's Rules of Practice and Procedure, 18 C.F.R. § 385.214 (2017), the notices of intervention and the timely, unopposed motions to intervene serve to make the entities that filed them parties to the proceedings in which they were filed.

100. Rule 213(a)(2) of the Commission's Rules of Practice and Procedure prohibits an answer to a protest unless otherwise ordered by the decisional authority. We will accept the answers because they have provided information that has assisted us in our decision-making process.

²²⁸ *Id.* at 5-6 (citing PJM presentations).

²²⁹ *Id.* at 6-7.

²³⁰ *Id.* at 7.

101. We deny the motion to consolidate Docket Nos. EL17-64-000 and EL17-65-000. In general, the Commission consolidates proceedings only if a trial-type evidentiary hearing is required and there are common issues of law and fact.²³¹ We conclude that consolidation is not appropriate because we are not setting for hearing any issues raised in the Complaints. While we deny the motions to consolidate, we will consider the Complaints together for the purposes of reviewing issues raised regarding PJM's Regulation market.

B. Substantive Matters

102. As discussed below, we partially grant the ESA complaint and find that ESA has demonstrated that the PJM Tariff is unjust, unreasonable, unduly discriminatory, or preferential because it does not include the methodology for calculating the benefits factor (or other curve used to establish a common basis for clearing RegA and RegD megawatts in the Regulation market) and the parameters governing its RegD signal. We also find that the Complaints raise a number of issues related to the PJM Regulation market that warrant further examination. Thus, we direct Commission staff to establish a technical conference to explore those issues. Because we are establishing technical conference procedures, we defer action on the Settlement Judge Motions.

1. Application of the Rule of Reason

103. Decisions regarding whether an item should be placed in a tariff or in a business practice manual are guided by the Commission's rule of reason policy,²³² under which provisions that "significantly affect rates, terms, and conditions" of service, are readily

²³¹ See, e.g., *Duke Energy Corp.*, 136 FERC ¶ 61,245, at P 33 (2011); *Terra-Gen Dixie Valley, LLC*, 132 FERC ¶ 61,215, at P 44 & n.74 (2010); *Startrans IO, L.L.C.*, 122 FERC ¶ 61,253, at P 25 (2008).

²³² See, e.g., *Midcontinent Indep. Sys. Operator, Inc.*, 158 FERC ¶ 61,003, at P 69 (2017) (citing *PacifiCorp*, 127 FERC ¶ 61,144, at P 11 (2009); *City of Cleveland v. FERC*, 773 F.2d 1368, 1376 (D.C. Cir. 1985) (finding that utilities must file "only those practices that affect rates and service *significantly*, that are reasonably *susceptible* of specification, and that are not so generally understood in any contractual arrangement as to render recitation superfluous"); *Public Serv. Comm'n of N.Y. v. FERC*, 813 F.2d 448, 454 (D.C. Cir. 1987) (holding that the Commission properly excused utilities from filing policies or practices that dealt with only matters of "practical insignificance" to serving customers)); see also *Midwest Indep. Trans. Sys. Operator, Inc.*, 98 FERC ¶ 61,137, at 61,401 (2002), *clarification granted*, 100 FERC ¶ 61,262 (2002) ("It appears that the proposed Operating Protocols could significantly affect certain rates and services and as such are required to be filed pursuant to Section 205.").

susceptible of specification, and are not generally understood in a contractual agreement must be included in the tariff, while items better classified as implementation details may be included only in the business practice manual.²³³

a. Benefits Factor

104. We agree with ESA that, because the benefits factor curve is used to adjust the offer prices of RegD resources before PJM runs the Regulation market, it directly affects which Regulation resources clear the market and the market-clearing price, and thus significantly affects the rates, terms, and conditions of Regulation service. The PJM Tariff notes the use of the benefits factor for these purposes,²³⁴ but does not specifically address how the benefits factor curve is calculated. In PJM's Order No. 755 compliance proceeding, the Commission found that PJM's initial compliance proposal lacked sufficient information regarding how the benefits factor would be calculated and directed PJM to include in its Tariff "details describing how the benefits factor will be determined."²³⁵ The Commission accepted PJM's subsequent compliance proposal to incorporate new section 3.2.2(j) of Schedule 1 of the PJM Operating Agreement, which clarifies that PJM will calculate a unit-specific benefits factor in accordance with the PJM manuals and generally describes how resources are assigned a unit-specific benefits factor, but does not address the benefits factor curve calculation methodology.²³⁶ In response to PJM's subsequent compliance proposal, the parties to the compliance proceeding did not raise and the Commission did not address arguments regarding what the Commission's rule of reason policy requires with respect to the benefits factor curve calculation methodology.²³⁷

²³³ See, e.g., *Cal. Indep. Sys. Operator Corp.*, 122 FERC ¶ 61,271, at P 16 (2008).

²³⁴ See, e.g., PJM Tariff Attachment K-Appendix and Operating Agreement, Schedule 1, § 3.2.2 (c) & (j).

²³⁵ May 2012 Order, 139 FERC ¶ 61,130 at P 54.

²³⁶ PJM Tariff Attachment K-Appendix and Operating Agreement, Schedule 1, § 3.2.2(j) ("Each resource shall be assigned a unit-specific benefits factor based on their order in the merit order stack for the applicable Regulation signal. The unit-specific benefits factor is the point on the benefits factor curve that aligns with the last megawatt, adjusted by historical performance, that resource will add to the dynamic resource stack.").

²³⁷ See November 2012 Order, 141 FERC ¶ 61,134 at PP 28-30.

105. We find that experience by PJM market participants since that time, as described in the ESA Complaint and in comments filed in this proceeding, demonstrates that PJM's overarching methodology for establishing the benefits factor curve, including any differences that PJM implements in particular hours, such as the "cap" on RegD resources during excursion hours, should be included in the PJM Tariff because this information significantly affects the rates, terms, and conditions of Regulation service in PJM and is reasonably susceptible to specification.²³⁸ PJM's December 2015 adjustments to the benefits factor curve, including PJM's actions to implement through its manuals an entirely different curve that capped RegD participation in certain hours, illustrate how the methodology for establishing the benefits factor is not a mere implementation detail, but instead significantly impacts RegD resources' participation in the Regulation market and, ultimately, Regulation market clearing. Although we find that PJM must include the methodology for calculating the benefits factor curve in its Tariff, we agree with PJM that it must retain the operational flexibility to effectively control ACE without unnecessary delay. Requiring PJM to maintain the benefits factor calculation *methodology* in its Tariff permits PJM to set forth implementation and operational details, which may vary over time and may not be reasonably susceptible to specification, in PJM manuals.

106. We note that in its PJM Regulation Proposal in Docket No. ER18-87-000, PJM proposed to replace the benefits factor curve with a different substitution function called the Regulation Rate of Technical Substitution Curve. In an order issued concurrently with this order, the Commission rejects this PJM Regulation Proposal as inconsistent with Commission regulations adopted in Order No. 755.²³⁹ To the extent that PJM proposes in the future to replace the benefits factor with a different substitution function, the Commission's findings herein instruct that the substitution function calculation methodology should be set forth in the PJM Tariff.

b. Signal Parameters

107. We find that the parameters of PJM's Regulation signals define the service that Regulation resources following each signal will be called on to provide. Accordingly, we find that the signal parameters significantly affect the rates, terms, and conditions of Regulation service and are reasonably susceptible to specification, and thus must be

²³⁸ See, e.g., *ANP Funding I, LLC v. ISO New England, Inc.*, 110 FERC ¶ 61,040, at P 23 (2005) (“[A]s we gain experience with market rules and procedures and a better understanding of how operating procedures may actually affect rates or service, over time the Commission may need to exercise its discretion under the rule of reason differently.”).

²³⁹ *PJM Interconnection, L.L.C.*, 162 FERC ¶ 61,295 (2018).

included in the PJM Tariff. Although the Commission did not require energy-neutral signals as a feature of Regulation market design, PJM's use of two different signals, including the RegD signal featuring energy neutrality, was a defining feature of PJM's Regulation market as approved in the Order No. 755 compliance proceeding.²⁴⁰ PJM's decisions to alter the basic parameters of its Regulation signals, for instance, to replace an unconditionally energy-neutral RegD signal with a conditionally neutral model, alter the parameters under which resources, particularly electric storage resources, provide Regulation service and have affected the ability of numerous resources to continue to participate in the Regulation market. Thus, we find that the parameters of PJM's Regulation signals should be reflected in the PJM Tariff and subject to Commission review and approval.

108. Consistent with our findings above, we agree with PJM that it must retain the operational flexibility to effectively control ACE. Requiring PJM to include signal parameters in its Tariff does not preclude PJM from also maintaining implementation and operational details in its manuals—which may not be reasonably susceptible to specification—and need not reduce PJM's flexibility to take necessary actions to dispatch Regulation resources to ensure ACE control and reliably operate the PJM system. We also agree with PJM that the complex algorithms and proprietary software code underlying its signals are not appropriate for inclusion in its Tariff and will not require PJM to include such details in its Tariff.

109. Our findings herein are consistent with Regulation market tariff provisions governing ISO-NE's Regulation market, which features different dispatch signals for generating units and non-generating units. The ISO-NE Transmission, Markets, and Services Tariff sets forth the basic parameters of its dispatch signals.²⁴¹ In 2014, the Commission rejected a proposal by ISO-NE to revise its tariff to change its signal design, finding the proposal would “restrict the ability of limited-energy resources, such as storage devices, to participate in the Regulation Market to the fullest extent possible.”²⁴² To ensure that PJM's signal changes do not raise similar or other concerns, we require PJM to include in its Tariff a description of the parameters governing its Regulation signals.

110. As discussed below, we direct Commission staff to establish a technical conference to address the issues raised in the Complaints other than whether PJM must include the substitution function calculation methodology and Regulation signal

²⁴⁰ See May 2012 Order, 139 FERC ¶ 61,130 at P 29.

²⁴¹ See ISO New England, Inc., Markets and Services Tariff, Section III.14.6 (Delivery of Regulation Market Products) (9.0.0).

²⁴² See *ISO New England*, 147 FERC ¶ 61,135 at P 26.

parameters in its Tariff. We will not at this time direct PJM to submit a specific compliance filing, pending the outcome of the technical conference and a further Commission order.

2. Technical Conference

111. Upon consideration of the issues raised in the Complaints, other than whether PJM must include the substitution function calculation methodology and Regulation signal parameters in its Tariff, and responses thereto, we find that ESA and RESA/Invenergy and commenters raise a number of issues related to the PJM Regulation market that warrant further examination. In particular, the purposes for which PJM procures Regulation service from Regulation resources warrants further investigation, because procuring Regulation service for purposes other than moment-to-moment balancing could potentially be an inefficient use of Regulation service and could negatively affect the ability of RegD resources to fully participate in the Regulation market. We find that a staff-led technical conference is an appropriate vehicle to develop a more complete record concerning this issue and other remaining issues raised in the Complaints. Given the additional, related issues raised by PJM and intervenors in Docket No. ER18-87-000 regarding the PJM Regulation Proposal, we will also use the technical conference to examine PJM's two-signal Regulation market design with respect to the requirements of Order No. 755. Therefore, we direct Commission staff to establish a technical conference in Docket Nos. EL17-64-000 and EL17-65-000 to explore these issues. A separate notice will be issued to establish dates and technical conference details. In order to inform the technical conference discussion, the Commission further directs Commission staff to issue requests for data and information to PJM and the Complainants on these issues prior to the technical conference. Because we are establishing technical conference procedures, we defer action on the Settlement Judge Motions.

112. Section 206(b) of the FPA provides that upon the filing of a complaint, the Commission must establish a refund effective date that is no earlier than the date of the complaint and no later than five months subsequent to the date of the complaint. In such cases, in order to give maximum protection to customers, and consistent with our precedent, we have historically tended to establish the section 206 refund effective date at the earliest date allowed by section 206, and we do so here as well.²⁴³ That date is the date of the complaint in each of these proceedings, i.e., April 13, 2017 in Docket No. EL17-64-000 and April 14, 2017 in Docket No. EL17-65-000.

113. Section 206(b) of the FPA also requires that, if no final decision is rendered by the conclusion of the 180-day period commencing upon initiation of a proceeding pursuant to section 206, the Commission shall state the reasons why it has failed to do so and shall

²⁴³ See, e.g., *Idaho Power Co.*, 145 FERC ¶ 61,122 (2013); *Canal Elec. Co.*, 46 FERC ¶ 61,153, *order on reh'g*, 47 FERC ¶ 61,275 (1989).

state its best estimate as to when it reasonably expects to make such decision. Based on our review of the record, we expect that the Commission should be able to render a decision within twelve months of the commencement of the technical conference.

The Commission orders:

(A) The ESA Complaint is hereby granted in part, as discussed in the body of this order.

(B) Commission staff is hereby directed to convene a technical conference to explore issues related to the Complaints, to be held at a date specified in a subsequent notice, as discussed in the body of this order. Commission staff is hereby directed to issue requests for data and information prior to the technical conference.

(C) The refund effective date established in Docket No. EL17-64-000 pursuant to section 206(b) of the FPA will be April 13, 2017, as discussed in the body of this order.

(D) The refund effective date established in Docket No. EL17-65-000 pursuant to section 206(b) of the FPA will be April 14, 2017, as discussed in the body of this order.

By the Commission. Chairman McIntyre is not participating.

(S E A L)

Nathaniel J. Davis, Sr.,
Deputy Secretary.