

141 FERC ¶ 61,110
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Before Commissioners: Jon Wellinghoff, Chairman;
Philip D. Moeller, John R. Norris,
Cheryl A. LaFleur, and Tony T. Clark.

ISO New England Inc. and
New England Power Pool

Docket No. ER12-1643-000

ORDER ON COMPLIANCE FILING

(Issued November 8, 2012)

1. On April 30, 2012, ISO New England Inc. (ISO-NE) and the New England Power Pool (NEPOOL) Participants Committee (together, the Filing Parties) submitted a compliance filing including revisions to ISO-NE's open access transmission tariff (tariff)¹ to establish a revised compensation methodology governing the provision of frequency regulation service, as required by Order No. 755.² For the reasons discussed below, we will reject the proposed tariff revisions and require ISO-NE to submit another compliance filing within 90 days of the date of this order.

I. Background

A. Frequency Regulation Service

2. Frequency regulation is an ancillary service, as required under the Commission's *pro forma* open access transmission tariff (*pro forma* OATT).³ It is relied upon by

¹ The Filing Parties submitted the entire filing pursuant to section 205 of the Federal Power Act (FPA), 16 U.S.C. § 824d (2006).

² *Frequency Regulation Compensation in the Organized Wholesale Power Markets*, Order No. 755, 137 FERC ¶ 61,064 (2011) (Order No. 755), *reh'g denied*, 138 FERC ¶ 61,123 (2012).

³ *See Promoting Wholesale Competition Through Open Access Non-Discriminatory Transmission Services by Public Utilities and Recovery of Stranded Costs by Public Utilities and Transmitting Utilities*, Order No. 888, FERC Stats. & Regs.

(continued...)

system operators to control both actual and anticipated frequency deviations. A frequency deviation is caused when the supply of dispatched generation, or demand response resources, as measured in Hertz, fails to equal the amount of electricity actually consumed (i.e., load plus losses), at a given moment. When such a deviation exceeds an acceptable range, the system can be impaired, with major deviations causing generation and transmission equipment to disconnect from the grid. In the worst case, a blackout can be triggered.

B. Order No. 755

3. In Order No. 755, the Commission found that the resources relied upon by regional transmission operators (RTOs) and independent system operators (ISOs) to provide frequency regulation service differ in both their ramping ability and the accuracy with which these resources can respond to the system operator's dispatch signal.⁴ Order No. 755 further found that current compensation policies fail to acknowledge these operational differences. Specifically, Order No. 755 found that existing RTO/ISO compensation methods result in rates that are unjust, unreasonable, and unduly discriminatory or preferential, given that resources are compensated at the same level even when providing different amounts of frequency regulation service.⁵ Order No. 755 further found that paying a uniform clearing price that includes opportunity costs would send efficient price signals reflecting the true cost of providing frequency regulation service.⁶

4. To accomplish this objective, Order No. 755 required each RTO/ISO to use market-based mechanisms to select and compensate frequency regulation resources based on a two-part payment methodology. First, Order No. 755 required that a capacity payment be made to a resource to keep its capacity in reserve in the event that it is needed to provide real-time frequency regulation service.⁷ Second, Order No. 755 required that

¶ 31,036 at 31,705 (1996), *order on reh'g*, Order No. 888-A, FERC Stats. & Regs. ¶ 31,048 (1997), *order on reh'g*, Order No. 888-B, 81 FERC ¶ 61,248 (1997), *order on reh'g*, Order No. 888-C, 82 FERC ¶ 61,046 (1998), *aff'd in part and rev'd in part sub nom. Transmission Access Policy Study Group v. FERC*, 225 F.3d 667 (D.C. Cir. 2000), *aff'd sub nom., New York v. FERC*, 535 U.S. 1 (2002).

⁴ Order No. 755, FERC Stats. & Regs. ¶ 31,324 at P 1.

⁵ *Id.* P 64.

⁶ *Id.* P 99.

⁷ *Id.* P 198.

performance payments be made, that reflect the amount of work each resource performs in real-time in response to the system operator's dispatch signal.⁸ Order No. 755, however, gave each RTO and ISO discretion in identifying the manner by which it would implement Order No. 755's required two-part payment methodology.⁹ Order No. 755 also acknowledged that the market rule revisions required by Order No. 755 contemplate fundamental changes to the way RTOs and ISOs procure and compensate frequency regulation services and that these rule changes may render existing RTO and ISO market power rules insufficient for purposes of addressing market power concerns.¹⁰ Accordingly, Order No. 755 required each RTO/ISO to submit revised market power mitigation provisions, as appropriate to their redesigned frequency regulation markets, or explain how their current mitigation methods are sufficient to address market power concerns.

C. ISO-NE's Existing Rules

5. Frequency regulation is currently procured in ISO-NE using a one-dimensional market design where resources offer a single, bundled offer – including the resource's capacity and service costs – into the frequency regulation auction. ISO-NE's current Automatic Generation Control (AGC) dispatch algorithm dispatches accepted resources to rapidly minimize Area Control Error, which means that all accepted resources are dispatched based on relative response rates, instead of economics. Resources are selected in merit order determined by each resource's bundled offer, and the last accepted offer sets the market clearing price.¹¹

6. Selected resources are compensated based on the capacity and service they provide, after applying an administratively determined 10:1 capacity-to-service ratio. More specifically, selected resources are paid 100 percent of the regulation clearing price for the capacity they provide and 10 percent of the regulation clearing price for their

⁸ *Id.* P 199.

⁹ *Id.* P 185.

¹⁰ *Id.* P 136.

¹¹ *See* Cramton Test. at 11-12 (Cramton Testimony); *see also* section III.1.11.5 of Market Rule 1.

delivered mileage.¹² Resources are also compensated for their own individual energy opportunity costs.¹³

D. Proposed Tariff Revisions

7. Under the proposed tariff revisions, the Filing Parties' seek to implement a Vickrey auction design to comply with the requirements of Order No. 755.

8. The Vickrey auction design consists of four steps. First, each supplier submits a regulation offer for each of its resources. The regulation offer consists of: (1) a capacity offer (\$/MW); (2) a mileage offer (\$/MW of instructed movement); (3) the regulation range (MW); and (4) the ramp rate (MW/minute). Second, ISO-NE selects the resource or combination of resources that will "minimize expected cost while satisfying the regulation requirement."¹⁴ Participants will submit regulation offers to provide regulation capacity for a standard period of one hour.¹⁵ Third, resources are dispatched by AGC. The fourth and final step of this process is financial settlement.

9. During the settlement process, ISO-NE will split the financial settlement into two components – the incremental system cost savings and the realized cost. ISO-NE will calculate the incremental system cost savings provided by a particular resource at the time of resource selection, rather than after the fact, using the following methodology. First, resources will be selected to yield the optimal cost for the ISO-NE system. Next, for each selected resource, ISO-NE will calculate the optimal system cost with that resource available, then run the same optimization algorithm, but with that particular resource removed from the system. ISO-NE states that removing the resource will yield a higher total cost for the system. The system cost savings for a particular resource is then the difference between the minimal cost without the resource and the minimal cost with the resource. The second component of the financial settlement is the realized cost of the resource, which includes both the actual mileage cost and the capacity cost,

¹² For example, if the last resource accepted for regulation has an offer of \$10/MW, then the capacity price would be set at \$10/MW and the mileage price would be set at \$1/MW.

¹³ Cramton Test. at 12.

¹⁴ Cramton Test. at 27.

¹⁵ Resource can be selected, however, for shorter selection intervals such as 15 minutes, or as needed in response to a system change. In these instances, the offer price will be pro-rated for the actual duration of the selection interval.

including the realized energy opportunity cost. According to the Filing Parties, calculating the resource cost after the fact, based on the realized mileage and opportunity costs, guarantees that the resource is fully compensated for all as-bid costs.¹⁶

10. As noted by the Filing Parties, the Vickrey auction design does not produce uniform clearing prices. Rather, the expected payment to a regulation resource under the Vickrey auction design will be a bundled capacity and mileage payment that is equal to the resource's bid cost (capacity offer, energy opportunity cost and mileage offer) plus the additional cost the system would incur if the resource were not available. In other words, a regulation resource will be paid its cost plus the cost savings to the system – the resource's inframarginal rent.¹⁷ The final payment amount will be based on the actual capacity and mileage that the resource supplies.

11. Because the Vickrey auction design substitutes resource-specific bundled regulation payments for two separate capacity and mileage payments, ISO-NE proposes to calculate and post approximate prices that reflect the relative rewards to mileage and capacity rather than posting each resource's actual, bundled payment. The approximate mileage price will be calculated by first finding the hourly system marginal cost of mileage in \$/MWh, and then measuring the increase in system cost from a 1 MW increase in realized mileage. According to the testimony of Mr. Peter Cramton, attached to the proposed tariff revisions, the capacity price will be calculated differently because the method for determining the approximate mileage price does not work for capacity. Typically, the system cost of increasing the capacity requirement by 1 MW is zero because the small size of New England's regulation market means that supply is lumpy,¹⁸ few resources are selected for regulation each hour, and each of the selected units supplies significant quantities of both capacity and mileage. Therefore, the capacity price is simply the difference between the mileage payment and the total regulation payment.¹⁹ These approximate prices will be posted on the ISO-NE website each hour.²⁰ The Filing Parties believe that requiring the publication of detailed market results, including the

¹⁶ *Id.* at 28.

¹⁷ *Id.* at 21.

¹⁸ The term “lumpy,” as used in ISO-NE's Filing, means that there is an abundance of supply of resources that can provide frequency regulation, while there is very little demand for the excess supply.

¹⁹ Cramton Test. at 33.

²⁰ Filing Parties Transmittal at 6.

approximate prices, following each operating day will provide market transparency comparable to that provided by utilizing uniform clearing prices. Mr. Cramton states that gathering and reporting this information is easy and low cost, while guaranteeing that all selected resources will receive, at least, their *ex post* costs, including their energy opportunity costs.²¹

12. Further, Mr. Cramton explains that the expected bundled payment reflects the system opportunity cost, although the actual payment will depend on the specific capability offered by the resource. The payment is therefore resource-specific because the avoided cost that a resource provides depends on the capacity and ramping capability of the resource. However, Mr. Cramton posits that the resource-specific payment is non-discriminatory, as required by Order No. 755, because identical resources that deliver identical performance will receive the same payment.²² Likewise, resources that clear greater capacity and provide more mileage than others will receive a higher payment.

13. In order to comply with the Order No. 755's requirement that compensation should reflect the accuracy with which a resource follows the AGC dispatch instruction, the Filing Parties assert that the proposed tariff revisions provide "pay for performance." A resource that is non-performing during a 4-second AGC cycle is not compensated for regulation capacity during that cycle. The criteria for determining whether a resource is or is not performing during a specific cycle includes a grace period for a resource to begin moving to a new AGC SetPoint, a tolerance for the actual response rate as a percentage of the offered Automatic Response Rate, and a tolerance around achieving the AGC SetPoint as a percentage of the offered regulation capacity.²³ The Filing Parties note that ISO-NE may modify the duration of the grace period and tolerance percentages as the mix of resources available to provide regulation changes, particularly as new technologies with fast response rates increase their market penetration.

14. The Filing Parties assert that the Vickrey auction both complies with Order No. 755 and has several attributes that support its particular use in New England.²⁴ First, the overall auction structure is simple: suppliers bid their costs and each resource earns a payment based on the overall system opportunity cost. Second, the auction provides strong incentives for suppliers to fully express their true costs through their two-part bids,

²¹ Cramton Test. at 33.

²² *Id.* at 29.

²³ Lowell Test. at 19-20

²⁴ Filing Parties Transmittal at 5.

and mechanisms for updating those bids frequently. Suppliers may include inter-temporal opportunity costs in their capacity offers and will be able to adjust those offers during the day to reflect any changes in their opportunity costs. Regulation suppliers will be able to adjust their Regulation Capacity Offers and Regulation Service Offers at any time during the day prior to the initiation of a new selection process, rather than submitting offers only on a daily basis, as occurs today.²⁵ Third, the auction results are efficient because the least-cost set of regulation resources that meets the regulation requirement is selected and dispatched. Fourth, the auction results are non-discriminatory, to the extent that identical resources providing the same amount of service receive the same payment.

15. Moreover, the Filing Parties assert that the Vickrey auction design is the only method identified by Mr. Cramton that addresses what he believes are challenges unique to the New England territory. Mr. Cramton states that, after evaluating several potential approaches to complying with Order No. 755,²⁶ he determined that the Vickrey auction design best accounts for the small size of ISO-NE's regulation market – which he estimates at \$13.3 million or 0.2 percent of the electricity cost in 2011. According to ISO-NE, its small market is “lumpy,” characterized by an overabundance of supply resources that can provide frequency regulation yet very little demand for it.²⁷ According to Mr. Cramton, because there is lumpy supply in the New England market, a design with linear prices, e.g., the other four approaches he considered in his analysis, would send the wrong price signals. Mr. Cramton argues that the Vickrey design – which requires that

²⁵ Filing Parties Transmittal at 5; Lowell Test. at 9-10.

²⁶ The Cramton Testimony also explored: (1) ISO-NE's current one-dimensional design; (2) a simple two-part bidding design that treats capacity and mileage as if they were separate products; (3) a linear scoring design that maps two-part bids into a score used for resource selection; and, (4) a sequential design used in some reserve markets in which resources are selected for regulation based on the capacity offer, and then selected resources are dispatched based on the mileage offer.

²⁷ ISO-NE states that, while it has 70 resources that regularly provide regulation service, in 28 percent of the hours, its system requires only one or two regulation resources; in 52 percent of the hours, three or fewer resources are required; and, in 90 percent of the hours, no more than five resources are dispatched in the system to provide regulation service. According to ISO-NE, from 2006 to 2012 there was an average regulation supply surplus of about 500 MW, compared with a regulation requirement ranging from 30 MW to 150 MW. In 2011, the average regulation requirement was 60 MW and, in 77 percent of hours, the requirement was 50 MW or less.

the payment to a resource be equal to the system opportunity cost – is the only approach that appropriately handles lumpy supply and retains the principles of truthful bidding and efficiency (least-cost supply).²⁸

16. The Filing Parties note that the New England stakeholders voted unanimously, with two abstentions, to support the proposed tariff revisions at the April 13, 2012, NEPOOL Participants Committee Meeting.²⁹

II. Request for Extension of Implementation Date

17. As noted by the Filing Parties, Order No. 755 required each RTO and ISO to implement its compliance tariff changes within 180 days of the date of its compliance filing.³⁰ The Filing Parties request an extension of the implementation date and propose to make the proposed tariff revisions effective on or after January 1, 2014, with two weeks' notice of the actual effective date.³¹ The Filing Parties acknowledge that this timeline does not comply with the deadline imposed by Order No. 755, but they argue that the additional time is necessary due to the number of projects that ISO-NE is currently undertaking, the substantial software changes required to implement the proposed tariff revisions, and the limited resources of ISO-NE's energy management system vendor.³²

III. Notice of Filing and Responsive Pleadings

18. Notice of the filing was published in the *Federal Register*, 77 Fed. Reg. 27,046 (2012), with interventions and protests due on or before May 21, 2012. Timely-filed motions to intervene were filed by ENBALA Power Networks (USA), Inc., NRG Companies, and Northeast Utilities Services Company. The Electricity Storage Association (ESA) and Beacon Power, LLC (Beacon) submitted timely motions to intervene and comments.

²⁸ Cramton Test. at 30.

²⁹ Filing Parties Transmittal at 13.

³⁰ Order No. 755, FERC Stats & Regs. ¶ 31,324 at P 201.

³¹ Filing Parties Transmittal at 8.

³² *Id.* at 8-12.

19. On June 5, 2012, ISO-NE filed a motion to answer and answer (ISO-NE Answer). On July 5, 2012, Beacon filed an answer to ISO-NE's answer (Beacon Answer); and, on July 23, 2012, ISO-NE filed an answer to Beacon's answer (ISO-NE Additional Answer).

A. Comments

20. Beacon and ESA assert that the proposed Vickrey auction design suffers from several infirmities: (1) inaccurate compensation for mileage, (2) lack of transparency, and (3) a delayed implementation date. First, Beacon and ESA state that the proposal does not accurately compensate for mileage because the payment is based upon an estimate of each resource's cost savings to the system. To correct the inaccuracy, Beacon and ESA request that ISO-NE be required to include a weekly true-up mechanism to compensate each resource for its actual mileage and system-wide cost savings. Beacon and ESA also request that ISO-NE be required to update mileage estimates for each resource on a monthly basis to prevent resources from being consistently under- or over-compensated.³³ Second, Beacon and ESA argue that the Vickrey auction design lacks market transparency, which, they assert, presents difficulties to investors in understanding the benefits of financing technologies that are designed to only provide frequency regulation service.³⁴ Beacon and ESA request that the Commission direct ISO-NE to provide market simulation data and analysis studies for companies considering investments in resources designed to participate in the ISO-NE frequency regulation market.³⁵ Finally, Beacon and ESA state that ISO-NE should implement the frequency regulation rule changes by October 27, 2012, as required by the Commission. Beacon and ESA state that to postpone implementation will continue discriminatory pricing and prevent the participation of non-generating resources in ISO-NE's regulation market.

B. Answers

21. In its Answer and Additional Answer, ISO-NE responds to Beacon's and ESA's suggestion for a weekly true-up mechanism by explaining that this suggestion misunderstands key aspects of the Vickrey auction approach. ISO-NE explains that "uncertainty regarding the actual mileage that will be provided is inherent in the market,

³³ ESA Comments at 7; Beacon Comments at 7-8.

³⁴ Beacon and ESA assert that Mr. Cramton's approach is based on an incorrect assumption "that participation in the market is low risk" for all resources. ESA Comments at 5; Beacon Comments at 6.

³⁵ ESA Comments at 4-6; Beacon Comments at 5-7.

cannot be eliminated by a weekly true-up as Beacon suggests, and is best addressed by continuously improving and updating the analytic methods used to estimate mileage supplied.”³⁶ ISO-NE states that Beacon’s proposal suggests that it supports the implementation of a linear pricing design, which, according to ISO-NE, the Filing Parties have shown to be economically inefficient. ISO-NE states that the appropriate time to determine a resource’s proper compensation is when resource selection decisions are made, based on the best possible information available.

22. Additionally, ISO-NE states that it understands the benefits of making additional market data and analysis available to current and future market participants, adding that it “would certainly consider providing similar information (subject to any limitations under the ISO New England Information Policy) reflecting the operation of the regulation market after the proposed tariff revisions have been implemented to aid potential market participants in their investment decisions.”³⁷ Finally, ISO-NE reiterates the time and resource requirements needed for the substantial software development and changes necessary to implement the proposed tariff revisions and reaffirms its requested effective date of January 1, 2014.

V. Discussion

A. Procedural Matters

23. Pursuant to Rule 214 of the Commission’s Rules of Practice and Procedure, 18 C.F.R. § 385.214 (2012), the timely, unopposed motions to intervene serve to make the entities that filed them parties to this proceeding.

24. Rule 213(a)(2) of the Commission’s Rules of Practice and Procedure, 18 C.F.R. § 385.213(a)(2) (2012), prohibits an answer to a protest and an answer to an answer unless otherwise ordered by the decisional authority. We will accept the answers filed by ISO-NE and Beacon because they assisted us in our decision-making process.

B. Substantive Matters

25. The issue before the Commission is whether the instant proposal complies with Order No. 755. We will reject the Filing Parties’ proposed tariff revisions because they fail to meet the requirements of Order No. 755. We will direct ISO-NE to submit a new compliance filing within 90 days of the date of this order.

³⁶ ISO-NE Answer at 8.

³⁷ *Id.* at 4-5.

26. In Order No. 755, the Commission required that “the clearing performance price be paid uniformly to all resources cleared during the same settlement period.”³⁸ As the Filing Parties admit, the instant proposal does not produce uniform clearing prices to all resources that clear during the same settlement period, as required by Order No. 755.³⁹ As discussed above, the Vickrey auction design provides a bundled capacity and mileage payment that equals the resource’s as-bid cost plus the additional cost the system would incur if the resource were not available. Under this market design, the regulation payment for a resource is tied to the system opportunity cost, i.e., the cost savings to the system, which is different for each resource in the auction. As a result, each of the resources that clear during a given settlement period receives a different effective clearing price. This design directly conflicts with Order No. 755’s requirement. Therefore, we find that the Filing Parties’ proposal does not comply with Order No. 755 because it does not provide a uniform clearing price for performance.

27. Additionally, Order No. 755 required “all RTOs and ISOs to modify their tariffs to provide for a two-part payment to frequency regulation resources.”⁴⁰ The first part of the payment is for the capacity a resource keeps in reserve.⁴¹ The second part of the payment is for a resource’s performance and must reflect the actual amount of work the resource performed.⁴² Under the Filing Parties’ proposal, the expected payment to a resource is a bundled capacity and mileage payment.⁴³ As the Filing Parties admit, the system cost savings portion cannot be separated in any meaningful way into its constituent parts for capacity and performance in a manner that would be consistent across all resources. Thus, we find that the proposed tariff revisions do not comply with Order No. 755’s two-part payment requirement for both capacity and resource performance.

³⁸ Order No. 755, FERC Stats & Regs. ¶ 31,324 at PP 99, 131.

³⁹ Various parties stated in their comments during the Order No. 755 rulemaking that ISO-NE acknowledged the virtue of uniform clearing prices at its November 2010 NEPOOL Markets Committee meeting, stating that “uniform clearing price provides more efficient long run investment signals.” *See* Order No. 755, 137 FERC ¶ 61,064 at P 87; NEPOOL Markets Committee presentation, “Alternative Technology Regulation Pilot Program,” November 9, 2010.

⁴⁰ Order No. 755, FERC Stats & Regs. ¶ 31,324 at P 197.

⁴¹ *Id.* P 198.

⁴² *Id.* P 199.

⁴³ Cramton Test. at 34.

28. In the Final Rule, the Commission acknowledged that, due to the regional differences among RTOs and ISOs, “there could be more than one efficient way to compensate performance.”⁴⁴ However, this language merely provides flexibility in how an RTO or ISO calculates the performance and capacity payments; it does not grant RTOs and ISOs discretion to avoid the requirement to have uniform clearing prices for capacity and performance. Order No. 755 recognized the benefits of a uniform payment for both performance and capacity,⁴⁵ and while we acknowledge the arguments raised by ISO-NE that its regulation market has unique characteristics, we are not convinced that ISO-NE has made a showing that the present market conditions and characteristics warrant a deviation from Order No. 755’s requirements.

29. For the foregoing reasons, we reject the Filing Parties’ proposed tariff revisions. Within 90 days of the date of this order, ISO-NE must submit a new compliance filing that comports with the directives in Order No. 755. In rejecting the proposed tariff revisions, we also reject the Filing Parties’ request for an extension of time to January 1, 2014 to implement those revisions. We will establish a new effective date in a subsequent Commission order addressing the compliance filing that we require in this order.

The Commission orders:

(A) The Filing Parties’ proposed tariff revisions are hereby rejected, as discussed in the body of this order.

(B) ISO-NE is hereby directed to submit a compliance filing within 90 days of the date of this order, as discussed in the body of this order.

By the Commission.

(S E A L)

Nathaniel J. Davis, Sr.,
Deputy Secretary.

⁴⁴ Order No. 755, FERC Stats & Regs. ¶ 31,324 at P 132.

⁴⁵ *Id.* P 131 (finding that “a uniform clearing price sends an efficient price signal to all current and potential market participants”).