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DEPARTMENT OF ENERGY
FEDERAL ENERGY REGULATORY COMMISSION

18 CFR Part 35

[Docket No. RM15-24-000]

Settlement Intervals and Shortage Pricing in Markets Operated by Regional Transmission
Organizations and Independent System Operators

(Issued September 17, 2015)

AGENCY: Federal Energy Regulatory Commission.

ACTION: Notice of proposed rulemaking.

SUMMARY: The Federal Energy Regulatory Commission (Commission) is proposing to revise its regulations to require that each regional transmission organization (RTO) and independent system operator (ISO) settle energy transactions in its real-time markets at the same time interval it dispatches energy and settle operating reserves transactions in its real-time markets at the same time interval it prices operating reserves. The Commission also proposes to revise its regulations to require that each RTO/ISO trigger shortage pricing for any dispatch interval during which a shortage of energy or operating reserves occurs. Adopting these reforms would align prices with resource dispatch instructions and operating needs, providing appropriate incentives for resource performance.

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

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

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

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

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SUPPLEMENTARY INFORMATION:

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

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Independent System Operators

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NOTICE OF PROPOSED RULEMAKING

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UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

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(Issued September 17, 2015)

1. In this Notice of Proposed Rulemaking (NOPR), the Federal Energy Regulatory Commission (Commission) is proposing to address two existing practices that may fail to compensate resources at prices that reflect the value of the service resources provide to the system, thereby distorting price signals. In certain instances, this creates a disincentive for resources to respond to dispatch signals. The Commission proposes to require that each regional transmission organization (RTO) and independent system operator (ISO) align settlement and dispatch intervals by settling energy transactions in its real-time markets at the same time interval it dispatches energy and settling operating reserves transactions in its real-time markets at the same time interval it prices operating reserves.¹ The Commission is also proposing to require that each RTO/ISO trigger

¹ In this NOPR, the Commission sometimes uses the term “dispatch” as shorthand when describing how RTOs/ISOs acquire and price energy and operating reserves. We clarify that our proposal with respect to operating reserves refers to the intervals at which they are acquired and priced. For instance, the Commission does not use the term “dispatch” to refer to the four-to-five second signal sent to resources on Automatic Generation Control.

shortage pricing² for any dispatch interval during which a shortage of energy or operating reserves³ occurs.

2. The Commission requires that rates for jurisdictional electricity service be just and reasonable and not unduly discriminatory or preferential. This requirement extends to market- and cost-based rates. The Commission has taken action to correct rates that become unjust and unreasonable, and has done so not only when the rates do not reflect costs but also when the underlying features, rate design, or market design fail to align.⁴ It is paramount that resources have appropriate incentives to respond to an energy or

² Shortage pricing is triggered under two general scenarios: when the system operator does not have enough resources available to meet energy and operating reserve requirements, and when an RTO or ISO establishes a price above which it will choose to be deficient of operating reserves rather than procure resources that may be available to meet the minimum requirement, but cost more than the established price. Federal Energy Regulatory Commission, *Price Formation in Organized Wholesale Electricity Markets: Staff Analysis of Shortage Pricing*, Docket No. AD14-14-000, at 9 (Oct. 2014), available at <http://www.ferc.gov/legal/staff-reports/2014/AD14-14-pricing-rto-iso-markets.pdf> (Shortage Pricing Paper).

³ The Commission's regulations define an operating reserve shortage as "a period when the amount of available supply falls short of demand plus the operating reserve requirement." 18 CFR 35.28(b)(6).

⁴ See, e.g., *Frequency Regulation Compensation in the Organized Wholesale Power Markets*, Order No. 755, FERC Stats. & Regs. ¶ 31,324, at P 3 (2011), *order on reh'g*, Order No. 755-A, 138 FERC ¶ 61,123 (2012) ("requir[ing] RTOs and ISOs to compensate frequency regulation resources based on the actual service provided, including a capacity payment that includes the marginal unit's opportunity costs and a payment for performance that reflects the quantity of frequency regulation service provided by a resource when the resource is accurately following the dispatch signal").

operating reserve shortage and that each resource is compensated based on a price that reflects the value of the service it provides.

3. It has become apparent that there are instances in which certain current RTO/ISO practices may fail to reflect the value of providing a given service, thereby distorting price signals and failing to provide appropriate signals for resources to respond to the actual operating needs of the market. One such practice that the Commission has identified and proposes to reform occurs when RTOs/ISOs dispatch resources every five minutes but perform settlements based on an hourly integrated price.⁵ This misalignment between dispatch and settlement intervals may distort the price signals sent to resources and fail to reflect the actual value of resources responding to operating needs because compensation will be based on average output and average prices across an hour rather than output and prices during the periods of greatest need within a particular hour.

4. The Commission also preliminarily finds that a second problem occurs if there is a delay between the time when a system experiences a shortage of energy and operating reserves and the time when prices reflect the shortage condition. This can be particularly problematic when, for example, a shortage is required to last a minimum time period before shortage pricing is triggered. In this instance, short-term prices may fail to reflect potential reliability costs, as well as the value of both internal and external market resources responding to a dispatch signal.

⁵ Hourly integrated prices are equal to the average price of all the individual dispatch intervals across an hour.

5. To address the problems associated with differing dispatch intervals and settlement intervals, as well as with shortage pricing triggers, the Commission proposes to require that each RTO/ISO (1) settle energy transactions in its real-time markets at the same time interval it dispatches energy and settle operating reserves transactions in its real-time markets at the same time interval it prices operating reserves, and (2) trigger shortage pricing for any dispatch interval during which a shortage of energy or operating reserves occurs.⁶ The settlement interval and shortage pricing reforms proposed herein will help ensure that resources have price signals that provide incentives to conform their output to dispatch instructions, and that prices reflect operating needs at each dispatch interval.

⁶ Operating reserves refer to certain ancillary services procured in the wholesale market that have different definitions in each RTO/ISO. Operating reserves typically include:

- (a) Regulating Reserve, used to account for very short-term deviations between supply and demand (e.g. 4 to 6 seconds);
- (b) Spinning, or Synchronous Reserve, which is capacity held in reserve and synchronized to the grid and able to respond within a relatively short amount of time (e.g., within 10 minutes), to be used in case of a contingency, such as the loss of a generator; and,
- (c) Non-Spinning Reserve, capacity that is not synchronized to the grid and which can take longer to respond (e.g., within 10-30 minutes) in case of a contingency.

Federal Energy Regulatory Commission, *Price Formation in Organized Wholesale Electricity Markets: Staff Analysis of Shortage Pricing*, Docket No. AD14-14-000, at 3 n.7 (Oct. 2014), available at <http://www.ferc.gov/legal/staff-reports/2014/AD14-14-pricing-rto-iso-markets.pdf> (Shortage Pricing Paper).

6. In Docket No. AD14-14-000, the Commission initiated a proceeding to evaluate issues regarding price formation in the energy and ancillary services markets operated by RTOs/ISOs (price formation proceeding). The Commission stated that the goals of price formation are to (1) maximize market surplus for consumers and suppliers; (2) provide correct incentives for market participants to follow commitment and dispatch instructions, make efficient investments in facilities and equipment, and maintain reliability; (3) provide transparency so that market participants understand how prices reflect the actual marginal cost of serving load and the operational constraints of reliably operating the system; and (4) ensure that all suppliers have an opportunity to recover their costs.⁷

7. The action the Commission takes herein is the first step to advancing the goals of the Commission's price formation proceeding. The Commission expects to undertake further action addressing various price formation topics, including offer price caps, mitigation, uplift transparency, and uplift drivers. The proposed reforms in this NOPR advance at least two of the Commission's goals with respect to price formation. Specifically, the proposed reforms will help provide correct incentives for market participants to follow commitment and dispatch instructions, to make efficient investments in facilities and equipment, and to maintain reliability. The proposed reforms will also help provide transparency and certainty so that market participants

⁷ See Notice Inviting Post-Technical Workshop Comments, Docket No. AD14-14-000, at 2 (Jan. 16, 2015); Notice, Docket No. AD14-14-000 (June 19, 2014).

understand how prices reflect the actual marginal cost of serving load and the operational constraints of reliably operating the system. Price signals that reflect operating needs and system conditions would enhance incentives for resources to respond to dispatch instructions.⁸ In the long-term, the Commission expects that appropriate price signals would produce prices that consistently reflect operating needs and system conditions which, in turn, would help to encourage efficient investments in facilities and equipment, enabling reliable service.⁹

8. Requiring settlement intervals to match dispatch intervals would make resource compensation more transparent by, among other things, increasing the proportion of resource payment provided through payments of energy and operating reserves rather than uplift.¹⁰ Apportioning a greater proportion of a resource's revenue through

⁸ The Commission notes that the reforms proposed herein would further augment existing mechanisms in each RTO/ISO market that provide incentives to follow dispatch instructions, such as penalties for excessive or deficient energy and the allocation of commitment and dispatch costs to deviations from energy dispatch targets. *See, e.g.*, MISO, FERC Electric Tariff, §§ 40.3.3(a) (36.0.0) (allocating Revenue Sufficiency Guarantee costs to, *inter alia*, resources providing excessive or deficient energy), 40.3.4 (33.0.0) (charges for excessive or deficient energy deployment).

⁹ *See, e.g.*, Scarcity and Shortage Pricing, Offer Mitigation and Offer Caps Workshop, Docket No. AD14-14-000, Tr. 42:13-19 (Oct. 28, 2014).

¹⁰ RTOs and ISOs provide make-whole payments, or uplift payments, to resources whose commitment and dispatch resulted in a shortfall between the resource's offer and the revenue earned through market clearing prices. *See, e.g.*, Federal Energy Regulatory Commission, *Price Formation in Organized Wholesale Electricity Markets: Staff Analysis of Uplift in RTO and ISO Markets*, Docket No. AD14-14-000, at 2 (Aug. 2014), available at <http://www.ferc.gov/legal/staff-reports/2014/08-13-14-uplift.pdf> (Uplift Paper).

payments for energy and operating reserves, rather than through uplift payments, increases transparency to the market by reflecting the costs of meeting system needs in settlement prices that are factored into a market price. In contrast, uplift payments bundle together a multitude of costs that are not factored into a market price. This increased transparency, in turn, better informs decisions to build or maintain resources and enhances consumers' ability to hedge. The benefits summarized above and discussed in detail below would ultimately help to ensure just and reasonable rates.

9. Implementing shortage pricing for any dispatch interval during which a shortage of energy or operating reserves occurs would provide an incentive for resources to ensure that they are available to respond to high prices, which should help alleviate shortages and avoid shortage pricing during subsequent dispatch intervals. This reform would also ensure that resources operating during a shortage are compensated for the value of the service that they provide, regardless of whether the shortage is short-lived.

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

I. Background

11. The Commission has addressed price formation in organized markets on prior occasions. In Order No. 719, the Commission addressed shortage pricing¹¹ and required

¹¹ *Wholesale Competition in Regions with Organized Electric Markets*, Order No. 719, FERC Stats. & Regs. ¶ 31,281, at PP 192-194 (2008), *order on reh'g*, Order No. 719-A, FERC Stats. & Regs. ¶ 31,292, *order on reh'g*, Order No. 719-B, 129 FERC ¶ 61,252 (2009).

RTOs/ISOs to develop and implement shortage pricing rules that would apply during operating reserve shortages to “ensure that the market price for energy reflects the value of energy during an operating reserve shortage.”¹² The Commission required such rules out of concern that inappropriate price signals during an operating reserve shortage would provide an insufficient incentive for market participants to take appropriate actions.

12. On June 19, 2014, the Commission initiated the price formation proceeding. In initiating that proceeding, the Commission stated that there may be opportunities for the RTOs/ISOs to improve the energy and ancillary service price formation process. The Commission explained that locational marginal prices (LMPs) used in energy and ancillary services markets ideally “would reflect the true marginal cost of production, taking into account all physical system constraints, and these prices would fully compensate all resources for the variable cost of providing service.”¹³ The Commission directed staff to conduct outreach and to convene technical workshops on the following four general issues: (1) use of uplift payments; (2) offer price mitigation and offer price caps; (3) scarcity and shortage pricing; and (4) operator actions that affect prices.¹⁴ During the fall of 2014, staff convened technical workshops and issued reports on these

¹² *Id.* P 194.

¹³ Notice, Docket No. AD14-14-000, at 2 (June 19, 2014).

¹⁴ *Id.* at 1, 3-4.

topics. In one of those reports, issued in October 2014, staff analyzed shortage pricing issues.¹⁵

13. In its January 2015 Notice Inviting Comments, the Commission invited comments on specific questions that arose from the price formation technical workshops.¹⁶ In response, among other price formation issues, commenters addressed settlement intervals and shortage pricing, as detailed below.

II. Discussion

14. In the following section, for each of the two proposals, the Commission first summarizes the views of commenters in the price formation proceeding on settlement intervals and triggers for shortage pricing. The Commission then explains the need for the reform set forth in the proposal and describes the proposed reform in detail. To remedy the potential unjust and unreasonable rates that are based on the use of hourly integrated prices for settlement as well as on restrictions on shortage pricing discussed more fully herein, the Commission proposes, pursuant to section 206 of the Federal Power Act (FPA),¹⁷ to require that each RTO/ISO (1) settle energy transactions in its real-time markets at the same time interval it dispatches energy and settle operating

¹⁵ See Shortage Pricing Paper.

¹⁶ Notice Inviting Post-Technical Workshop Comments, Docket No. AD14-14-000 (Jan. 16, 2015). A list of commenters and the abbreviated names the Commission will use for them in this document appears in Appendix A.

¹⁷ 16 U.S.C. 824e.

reserves transactions in its real-time markets at the same time interval it prices operating reserves, and (2) trigger shortage pricing for any dispatch interval during which a shortage of energy or operating reserves occurs.¹⁸

A. Settlement Intervals

15. Some RTOs/ISOs do not settle resources at the same intervals at which they dispatch resources in their real-time energy markets.¹⁹ Rather, they settle resources based on hourly average prices, as shown below.

¹⁸ The Commission is not at this time proposing to change the price paid by any RTO/ISO when shortage pricing is triggered.

¹⁹ California Independent System Operator Corporation (CAISO), New York Independent System Operator, Inc. (NYISO), and Southwest Power Pool, Inc. (SPP) currently use a settlement interval that matches the dispatch interval. ISO New England Inc. (ISO-NE) and Midcontinent Independent System Operator, Inc. (MISO) are considering moving to five-minute settlements. PJM Interconnection, L.L.C. (PJM) has stated that PJM settles hourly and does not currently anticipate proposing to move to a different interval. *See Scarcity and Shortage Pricing, Offer Mitigation and Offer Caps Workshop*, Docket No. AD14-14-000, Tr. 52:21-53:1, 53:11-54:11, 54:22-55:10 (Oct. 28, 2014).

Table 1: RTO/ISO Dispatch and Settlement Intervals

	Real-Time Dispatch ²⁰	Real-Time Settlement ²¹
CAISO	5 minute	5 minute
ISO-NE	5 minute	hourly average
MISO	5 minute	hourly average
NYISO	5 minute	5 minute
PJM	5 minute	hourly average
SPP	5 minute	5 minute

1. Comments on Settlement Intervals

16. In the price formation proceeding, commenters discussed using shorter settlement intervals (i.e., sub-hourly) and provided implementation and transition recommendations.

17. Commenters in support of sub-hourly settlements describe general benefits, as well as specific related improvements, from the adoption of sub-hourly settlements.

Commenters from a broad range of the industry state that sub-hourly settlement intervals

²⁰ See CAISO, eTariff, § 34.5 (17.0.0); ISO-NE, Transmission, Markets and Services Tariff, Market Rule 1, § III.2.3 (15.0.0); MISO, FERC Electric Tariff, § 40.2 (34.0.0); NYISO Markets and Services Tariff, § 4.4.2.1 (17.0.0); PJM OATT, Attachment K, Appendix, § 2.3 (2.0.0); SPP, OATT, Sixth Revised Volume No. 1, Attachment AE, § 6.2.2 (1.0.0).

²¹ See CAISO, eTariff, §11.5 (2.0.0), Appendix A, Settlement Interval (2.0.0); ISO-NE, Transmission, Markets and Services Tariff, Market Rule 1, § III.2.2(b) (15.0.0); MISO, FERC Electric Tariff, §§ 40.3 (32.0.0), 40.3.1 (32.0.0), 40.3.3 (36.0.0); NYISO, NYISO Tariffs, NYISO Markets and Services Tariff, §§ 4.4.2.1, 4.4.2.8 (17.0.0); PJM, Intra-PJM Tariffs, OATT, Attachment K, Appendix, §§ 2.5(e), (4.0.0), 3.2.1(e), (f) (28.0.0); SPP, OATT, Sixth Revised Volume No. 1, Attachment AE, §§ 8.6, 8.6.1 (2.1.0). The above-tariff citations refer to internal transactions. CAISO settles its intertie interchange transactions on fifteen-minute intervals. See CAISO, CAISO eTariff, HASP Block Intertie Schedule (0.0.0).

would provide significant benefits to the market by compensating resources fully for their flexibility and ability to follow dispatch instructions. According to these commenters, sub-hourly settlement intervals would permit resources to be rewarded for their ability to perform by earning greater revenues when prices fluctuate, which in the long run should induce more flexibility from new and existing resources and eventually lower dispatch costs and improve reliability.²²

18. Commenters detail other potential benefits to sub-hourly settlement in the real-time market. PJM Utilities Coalition notes that sub-hourly settlement would address price distortions and uneconomic incentives to produce power caused by the use of hourly settlements.²³ PJM Utilities Coalition also states that sub-hourly settlement would

²² See, e.g., ANGA Comments, Docket No. AD14-14-000, at 3-4 (Mar. 6, 2015); Brookfield Comments, Docket No. AD14-14-000, at 8 (Mar. 6, 2015); Calpine Comments, Docket No. AD14-14-000, at 11-12 (Mar. 6, 2015); Entergy Nuclear Power Marketing Comments, Docket No. AD14-14-000, at 12 (Mar. 6, 2015); Exelon Comments, Docket No. AD14-14-000, at 19 (Mar. 6, 2015); GDF SUEZ Comments, Docket No. AD14-14-000, at 9-10 (Mar. 6, 2015); ISO-NE Comments, Docket No. AD14-14-000, at 20-22 (Mar. 6, 2015); MISO Comments, Docket No. AD14-14-000, at 16-17 (Mar. 6, 2015); New York Transmission Owners Comments, Docket No. AD14-14-000, at 9 (Mar. 6, 2015); NYISO Comments, Docket No. AD14-14-000, at 12-13 (Mar. 6, 2015); PJM Comments, Docket No. AD14-14-000, at 11-12 (Mar. 6, 2015); Potomac Economics Comments, Docket No. AD14-14-000, at 10 (Mar. 6, 2015); PSEG Companies Comments, Docket No. AD14-14-000, at 19-22 (Mar. 6, 2015); Wisconsin Electric Comments, Docket No. AD14-14-000, at 8 (Mar. 6, 2015); *see also* Xcel Comments at 4-5 (supporting sub-hourly settlement intervals but requesting that the Commission not require reporting sub-hourly settlement data in the Electric Quarterly Reports and if need be, direct the RTOs/ISOs to report that data).

²³ PJM Utilities Coalition Comments, Docket No. AD14-14-000, at 10-11 (Mar. 6, 2015).

solve the problem of dispatching resources just before or after the clock hour and the resulting implications of averaging output during the clock hour.²⁴ Wartsila states that the transition to sub-hourly settlements provides valuable price signals to flexible capacity and notes that internal combustion engines in SPP have seen a three-fold increase in their capacity factor since SPP adopted sub-hourly real-time settlements, thus increasing compensation to those resources and lowering overall system costs.²⁵

19. PSEG Companies state that the inefficiencies of hourly settlements in PJM's real-time market are evident when the LMP becomes relatively high during the first few dispatch intervals.²⁶ PSEG Companies add that internal resources will ramp up to respond to the price signal and other resources and external suppliers will also schedule interchange into PJM to capture the higher prices; when demand falls off in the subsequent intervals, however, resources will not reduce output in response to the lower prices (because they know they will be compensated at the hourly average prices), which has led to operational problems.²⁷ EPSA supports sub-hourly real-time market settlement in order to better align dispatch with price.²⁸

²⁴ *Id.*

²⁵ Wartsila Comments, Docket No. AD14-14-000, at 1-2 (Mar. 6, 2015).

²⁶ PSEG Companies Comments, Docket No. AD14-14-000, at 20 (Mar. 6, 2015).

²⁷ *Id.* at 20-21.

²⁸ EPSA Comments, Docket No. AD14-14-000, Attach. A, Post-Technical Conference Questions for Comment: EPSA Responses, at 28 (Mar. 6, 2015).

20. At the Scarcity and Shortage Pricing, Offer Mitigation and Offer Caps Workshop held on October 28, 2014, representatives from RTOs/ISOs discussed the effect of settlement intervals on appropriately compensating resources based on actual performance, on providing an incentive for resources to follow dispatch signals, and on reducing uplift.²⁹ At the Uplift Workshop held on September 8, 2014, the representative from Potomac Economics asserted that settling transactions on an hourly price, when dispatch instructions change every five or fifteen minutes, has caused flexible units in MISO to operate inflexibly in order to obtain a higher hourly price. According to this panelist, this disparity between settlement and dispatch intervals has prompted development of a class of uplift payments meant to hold inflexible generators harmless for following dispatch instructions and to ensure generators' flexibility. This panelist suggested that aligning settlement and dispatch intervals could eliminate such uplift payments.³⁰

21. In its comments, CAISO indicates that it uses both fifteen-minute and five-minute settlement intervals in its real-time market and that these intervals provide a dynamic price signal to reflect grid conditions. According to CAISO, fifteen-minute intertie schedules and prices provide an incentive for variable energy resources to offer economic

²⁹ *See, e.g.*, Scarcity and Shortage Pricing, Offer Mitigation and Offer Caps Workshop, Docket No. AD14-14-000, Tr. 52:16-55:10 (Oct. 28, 2014).

³⁰ Uplift Workshop, Docket No. AD14-14-000, Tr. 45:4-23 (Sept. 8, 2014).

bids into the CAISO market, which can reduce variable energy resources' exposure to the difference between day-ahead and five-minute real-time prices.³¹

22. Commenters in the price formation proceeding express caution about implementation and costs resulting from RTOs'/ISOs' adoption of sub-hourly settlements—costs both to RTOs/ISOs and market participants. SPP states that its sub-hourly settlement rules cost more to implement due to increased data storage and validation requirements.³² ISO-NE and GDF SUEZ state that the one impediment to implementing sub-hourly real-time settlements in the ISO-NE market is the need for five-minute revenue quality metering; ISO-NE states that, according to stakeholders, it could take several years to implement and cost up to \$20 million to install the necessary equipment, software, and data systems.³³ PJM similarly states that moving to sub-hourly settlements will require it to make software and hardware changes to multiple applications and systems at a cost that is anecdotally comparable to a moderately complex market integration proposal.³⁴

23. Several commenters stress that, while sub-hourly settlements can bring benefits and efficiencies to the real-time market, transitioning to that settlement structure would

³¹ CAISO Comments, Docket No. AD14-14-000, at 18-19 (Mar. 6, 2015).

³² SPP Comments, Docket No. AD14-14-000, at 4 (Mar. 6, 2015).

³³ ISO-NE Comments, Docket No. AD14-14-000, at 23 (Mar. 6, 2015); GDF SUEZ Comments, Docket No. AD14-14-000, at 10 (Mar. 6, 2015).

³⁴ PJM Comments, Docket No. AD14-14-000, at 12 (Mar. 6, 2015).

require significant expenditures. Some RTOs/ISOs assert that there will be significant costs to make the necessary upgrades to metering equipment, software, hardware, and data systems, and that some of these upgrades could take several years to implement. As a result of these expenditures, some commenters note that action to align the settlement and dispatch interval may not occur absent a Commission directive.³⁵ Other commenters observe that load-serving entities might incur significant costs associated with telemetry and related equipment upgrades; increases in RTO/ISO administrative charges; and additional costs to meter, transfer, and store the data and to process settlements in accordance with RTO/ISO timelines.³⁶

24. Due to the anticipated costs, several commenters request that the Commission require cost-benefit analyses before adoption of sub-hourly settlements, or that the Commission leave the decision to adopt sub-hourly settlements to RTO/ISO stakeholders.³⁷ Some commenters assert that RTO/ISO stakeholders must vet the

³⁵ ISO-NE Comments, Docket No. AD14-14-000, at 23 (Mar. 6, 2015); PJM Comments, Docket No. AD14-14-000, at 12 (Mar. 6, 2015). GDF SUEZ echoes ISO-NE's statements about cost and timing to implement sub-hourly settlements in the ISO-NE market and requests that the Commission provide direction to overcome the lack of incentives facing meter readers to implement sub-hourly settlements. GDF SUEZ Comments, Docket No. AD14-14-000, at 10 (Mar. 6, 2015).

³⁶ PJM Utilities Coalition Comments, Docket No. AD14-14-000, at 11 (Mar. 6, 2015); TAPS Comments, Docket No. AD14-14-000, at 16-17 (Mar. 6, 2015).

³⁷ Direct Energy Comments, Docket No. AD14-14-000, at 8 (Mar. 6, 2015); OMS Comments, Docket No. AD14-14-000, at 4 (Mar. 2, 2015); PJM Utilities Coalition Comments, Docket No. AD14-14-000, at 11 (Mar. 6, 2015); TAPS Comments, Docket No. AD14-14-000, at 16 (Mar. 6, 2015).

implementation of sub-hourly settlements to ensure that appropriate market power mitigation measures are in place.³⁸ Exelon states that, while sub-hourly settlements can improve market efficiency, the timing and prioritization of adopting sub-hourly settlements should be evaluated when RTOs/ISOs develop work plans to analyze the causes of uplift.³⁹

25. Commenters also provide the Commission with recommendations for implementation of sub-hourly settlement. PJM Utilities Coalition recommends that any move to sub-hourly settlements include at least one year notice of intent to allow for system readiness.⁴⁰ PJM Utilities Coalition suggests that RTOs/ISOs could first transition to fifteen-minute settlement intervals before moving to five-minute settlement intervals with stakeholders vetting the costs and benefits.⁴¹ ANGA recommends that, to the extent possible, five-minute settlement intervals be made consistent across different RTOs/ISOs. According to ANGA, inconsistencies across RTO/ISO boundaries can increase market and interchange volatility and result in large price fluctuations that are

³⁸ APPA and NRECA Comments, Docket No. AD14-14-000, at 38 (Mar. 6, 2015); *see also* PJM Utilities Coalition Comments, Docket No. AD14-14-000, at 11 (Mar. 6, 2015).

³⁹ Exelon Comments, Docket No. AD14-14-000, at 19 (Mar. 6, 2015).

⁴⁰ PJM Utilities Coalition Comments, Docket No. AD14-14-000, at 11 (Mar. 6, 2015).

⁴¹ *Id.*

not based upon market fundamentals and which could create an incentive for gaming between markets as market participants arbitrage distorted prices.⁴²

2. Need for Reform of Settlement Intervals

26. The Commission preliminarily finds that the use of hourly integrated prices for real-time settlement may have the unintended effect of distorting price signals and, in certain instances, contributing to markets failing to respond appropriately to operating needs. Specifically, hourly integrated prices for real-time settlement may (1) not accurately reflect the value a resource provides to the system; (2) discourage resources from following dispatch instructions; and (3) cause increased uplift payments. Therefore, the Commission preliminarily finds that the use of hourly integrated prices for real-time settlement may result in rates that are unjust and unreasonable.

27. First, because hourly prices are an integrated average of sub-hourly dispatch interval prices over an hour, the hourly price does not reflect system needs and costs within a dispatch interval; thus, resources are not necessarily paid a price that reflects the value of the service they provide to the system during the dispatch interval. For example, a resource providing energy during high-priced dispatch intervals, that is then paid based on a lower hourly integrated price, is not compensated based on a price that reflects actual market conditions or the price at which it was economic to dispatch this resource.

⁴² ANGA Comments, Docket No. AD14-14-000, at 4 (Mar. 6, 2015).

28. Real-time settlement using prices that are averaged over an hour cannot capture the varying value of the service resources provide over the hour, which decreases the efficiency of RTO/ISO operations because RTOs/ISOs require resources to move within the hour to address changing operating conditions. Such settlement prices become the prices made transparent to the market and, when they are averaged to the point of not reflecting operating conditions and resultant supply and demand conditions, they may be unjust and unreasonable. In Order No. 719, the Commission found that then-existing rules on shortage pricing “that do not allow for prices to rise sufficiently during an operating reserve shortage to allow supply to meet demand” may be unjust and unreasonable.⁴³ Similarly, the Commission preliminarily finds here that market rules that settle real-time transactions at hourly integrated prices may be unjust and unreasonable because they result in settlement prices that do not reflect actual operating conditions or the value of energy resulting from supply and demand.

29. Second, the use of hourly integrated prices for settling transactions can provide an unwarranted incentive for resources to disregard dispatch instructions. For example, PSEG Companies and PJM Utilities Coalition explain that high prices in the beginning of an hour can cause internal resources to ramp up and external transactions to schedule into PJM to capture higher prices; when demand and prices fall in subsequent intervals,

⁴³ Order No. 719, FERC Stats. & Regs. ¶ 31,281 at P 192.

however, hourly integrated prices create an incentive to continue producing or importing energy, regardless of dispatch instructions to reduce output.⁴⁴

30. As PSEG Companies illustrate by example, the use of hourly integrated prices for real-time settlement can create incentives that do not necessarily align with the system operator's dispatch instructions.⁴⁵ Consider a resource with \$100/MWh cost, and an LMP that is \$500/MWh for the first fifteen minutes of the hour (three intervals). Even if the LMP dropped to \$0/MWh for the remainder of the hour, the hourly integrated price (\$125/MWh) would still exceed the resource's cost of production. This settlement structure would provide an incentive to generate as much energy as possible, not only during the first fifteen minutes of very high prices, but during the entire hour, irrespective of the five-minute price thereafter. Studies have shown that, due to the incentives created by hourly integrated settlements, resources can earn significant additional payments by not following dispatch signals.⁴⁶

⁴⁴ PSEG Companies Comments, Docket No. AD14-14-000, at 20 (Mar. 6, 2015); PJM Utilities Coalition Comments, Docket No. AD14-14-000, at 10-11 (Mar. 6, 2015).

⁴⁵ PSEG Companies Comments, Docket No. AD14-14-000, at 20 & n.25 (Mar. 6, 2015).

⁴⁶ An analysis of actual LMP data showed how hourly settlement price signals can allow a resource to earn nearly twice the profit compared to if the resource is paid based on five-minute LMP price signals. See E. Ela *et al.*, National Renewable Energy Laboratory and Argonne National Laboratory, *Evolution of Wholesale Electricity Market Design with Increasing Levels of Renewable Generation*, at 62-66 (Sept. 2014), available at <http://www.nrel.gov/docs/fy14osti/61765.pdf>.

31. Failing to follow dispatch instructions can impair the ability of the system operator to manage dispatch costs. Specifically, failing to follow dispatch instructions can result in power imbalances that the system operator must address by taking action, such as increasing use of regulating reserves or committing additional resources, which may result in increased uplift. These actions result in additional costs that are ultimately passed on to consumers. Because hourly integrated prices can impair the ability of the system operator to manage dispatch and the costs of dispatch, the Commission finds preliminarily that hourly integrated prices for real-time settlement can lead to unjust and unreasonable rates.⁴⁷

32. Third, as MISO notes, dispatching resources within the hour based on their offers, but then compensating those resources based on a lower hourly integrated price can result in uplift costs because additional uplift payments are then necessary to enhance incentives for resources to follow dispatch instructions.⁴⁸ A study by Potomac

⁴⁷ In Order No. 764, the Commission similarly found that impairing the ability of the system operator to manage costs resulted in unjust and unreasonable rates; it determined a need for reform of scheduling practices and data reporting practices where “existing practices . . . impair[ed] the ability of public utility transmission providers and their customers to manage costs associated with [Variable Energy Resource] integration effectively.” *Integration of Variable Energy Resources*, Order No. 764, FERC Stats. & Regs. ¶ 31,331, at PP 21-22, *order on reh’g and clarification*, Order No. 764-A, 141 FERC ¶ 61,232 (2012), *order on clarification and reh’g*, Order No. 764-B, 144 FERC ¶ 61,222 (2013). It adopted reforms to those practices to “remedy undue discrimination and ensure just and reasonable rates through more efficient utilization of transmission and generation resources.” *Id.* P 22.

⁴⁸ MISO Comments, Docket No. AD14-14-000, at 17-18 (Mar. 6, 2015).

Economics shows that changes to sub-hourly settlement intervals can reduce uplift payments. Specifically, Potomac Economics estimates that, if MISO had implemented a real-time settlement interval that was equal to its dispatch interval (i.e., five minutes) in 2014, it would have reduced uplift payments by approximately \$6.6 million.⁴⁹

33. For these reasons, the Commission proposes to require that each RTO/ISO settle energy transactions in its real-time markets at the same time interval it dispatches energy and settle operating reserves transactions in its real-time markets at the same time interval it prices operating reserves. The Commission also seeks comment on two additional aspects of the proposal, relating to intertie transactions and to operating reserves.

3. Commission Proposal

34. To remedy any potentially unjust and unreasonable rates caused by the use of hourly integrated prices for real-time settlement, the Commission proposes, pursuant to section 206 of the FPA,⁵⁰ to require that each RTO/ISO settle energy transactions in its real-time markets at the same time interval it dispatches energy and settle operating

⁴⁹ Potomac Economics, 2014 State of the Market Report for the MISO Electricity Markets at 43-44 & Figure 19 (2015), *available at* <https://www.misoenergy.org/Library/Repository/Report/IMM/2014%20State%20of%20the%20Market%20Report.pdf>.

⁵⁰ 16 U.S.C. 824e.

reserves transactions in its real-time markets at the same time interval it prices operating reserves.⁵¹

35. As explained further below, in the short term, the settlement interval reform proposed in this NOPR should improve incentives for resources to respond quickly to dispatch instructions, which should in turn lead to operators taking fewer out-of-market actions to ensure that supply meets demand. In the long-term, these reforms should provide more accurate price signals, which should provide, together with other market price signals, the appropriate incentives to build or maintain resources that can respond to an energy or operating reserve deficiency. In addition, where settlement and dispatch intervals are aligned, resources dispatched economically during high-priced periods would receive those high prices rather than an hourly average of the dispatch interval LMPs, thereby reducing the need to make uplift payments. Apportioning a greater proportion of a resource's revenue through payments for energy and operating reserves, rather than through uplift payments, would increase transparency to the market by reflecting the costs of resource dispatch in settlement prices that are factored into a market price. In contrast, uplift payments bundle together a multitude of costs that are not factored into a market price. This increased transparency, in turn, better informs decisions to build or maintain resources and enhances consumers' ability to hedge.

⁵¹ All RTOs/ISOs dispatch internal resources using five-minute intervals. *See supra* Table 1. Some RTOs/ISOs, however, such as CAISO, schedule external transactions, such as intertie transactions, on a different interval.

36. By improving resources' response to dispatch instructions, the settlement interval reform proposed herein would result in a more efficient use of generation resources to the benefit of all consumers. As described above, Wartsila explains that internal combustion engines have seen a three-fold increase in their capacity factor since SPP adopted sub-hourly real-time settlements, thus increasing compensation to those resources and lowering overall system costs.⁵²

37. As the Commission has concluded in the past, more efficient use of generation resources can ensure that jurisdictional services are provided at rates, terms, and conditions of service that are just and reasonable and not unduly discriminatory or preferential, in accord with the Commission's statutory obligations.⁵³

38. While the Commission expects that the settlement interval reform proposed in this NOPR should provide significant benefits, the Commission understands that modifying settlement systems can be a complex and costly endeavor.⁵⁴ Accordingly, the

⁵² Wartsila Comments, Docket No. AD14-14-000, at 1-2 (Mar. 6, 2015).

⁵³ Order No. 764, FERC Stats. & Regs. ¶ 31,331 at P 5 (reforms adopted "allow for the more efficient utilization of transmission and generation resources to the benefit of all customers. This, in turn, fulfills our statutory obligation to ensure that Commission-jurisdictional services are provided at rates, terms, and conditions of service that are just and reasonable and not unduly discriminatory or preferential.").

⁵⁴ See, e.g., ISO-NE Comments, Docket No. AD14-14-000, at 23 & nn.28-30 (Mar. 6, 2015) (citing Meter Reader Working Group, Sub-hourly Time & Cost Estimate, at slide 9 (July 10, 2014), *available at* <http://www.iso-ne.com/committees/markets/meter-reader>) (citing estimates from meter reader entities in New England that implementation of five-minute market settlements could cost more than \$20 million and take more than seven years).

Commission proposes to allow twelve months from the date of the compliance filings for implementation of reforms to settlement systems to become effective. Further, the Commission seeks comment on the potential cost and time necessary to implement the reforms proposed in this NOPR. Specifically, the Commission seeks comment on required software changes, increased data storage and validation, and required changes to market participant metering or other equipment that would result from implementing the reforms proposed in this NOPR. The Commission also seeks comment on whether the changes necessary to implement the settlement interval reform proposed in this NOPR would be necessary in whole or in part to implement other reforms planned by the RTOs/ISOs or sought by stakeholders. The Commission further requests comments concerning whether such a long implementation period is necessary and how that implementation period may be shortened.

39. The Commission also seeks comment on two aspects of the substance of the settlement interval proposal relating to external transactions and to operating reserves. First, the logic underlying our reforms to settlement of internal transactions appears to apply equally to intertie transactions. While the Commission does not propose to extend the reforms to intertie transactions, the Commission seeks comment on whether settlement reforms are appropriate for intertie transactions that are scheduled on intervals different from the intervals on which RTOs/ISOs dispatch internal real-time energy.⁵⁵

⁵⁵ The Commission clarifies that it is not proposing to modify the scheduling requirements adopted in Order No. 764.

The Commission also seeks comment on whether it is necessary to align the settlement interval for intertie transactions with external scheduling intervals, i.e., fifteen minutes.

40. Second, the Commission recognizes that dispatch and pricing of energy and operating reserves are closely linked through co-optimization in the real-time market. This co-optimization ensures that resources are compensated for following RTO/ISO instructions and are indifferent to providing either energy or operating reserves during periods of high energy or operating reserves prices. Despite the close linkage between energy and operating reserves, the Commission understands that some of the problems associated with the use of hourly integrated prices for settling energy transactions might not apply as fully to settling operating reserves transactions. Further, the Commission recognizes the set of resources that are paid the real-time operating reserve price are potentially much smaller than the set of resources that are paid the real-time energy price. The Commission understands that certain RTOs/ISOs acquire operating reserves on a different interval than these RTOs/ISOs dispatch energy. Accordingly, the Commission seeks comment on whether the Commission should require RTOs/ISOs to settle all real-time operating reserves transactions at the same interval as real-time energy dispatch and settlement intervals or whether a settlement interval that differs from an RTO's/ISO's real-time energy dispatch interval would be appropriate for some operating reserves transactions.

B. Shortage Pricing Triggers**1. Comments on Shortage Pricing Triggers**

41. Panelists at the October 28, 2014 Shortage Pricing/Mitigation Workshop and commenters in the price formation proceeding discussed shortage pricing triggers. Panelists and commenters were divided on whether all shortage events should trigger shortage pricing.⁵⁶ Some favored such a trigger. These panelists explained that triggering shortage pricing for any shortage would allow pricing to reflect fluctuations across the hour better and also to offer more granular and accurate compensation.⁵⁷ In contrast, the panelist from PJM was more hesitant in sending a shortage price signal when a combined-cycle turbine with a thirty-minute startup time took five additional minutes to come online, explaining that a shortage price signal during such an event would diverge from an operator's understanding that the system is not experiencing a shortage.⁵⁸

42. In its comments, EPSA argues that it is a high priority for all markets to establish shortage pricing based on operating reserves demand curves and co-optimized with the energy market.⁵⁹ New York Transmission Owners argue that if the electric system is

⁵⁶ See, e.g., Scarcity and Shortage Pricing, Offer Mitigation and Offer Caps Workshop, Docket No. AD14-14-000, Tr. 38:19-51:8 (Oct. 28, 2014).

⁵⁷ *Id.* at 46:1-47:17, 50:13-19.

⁵⁸ Scarcity and Shortage Pricing, Offer Mitigation and Offer Caps Workshop, Docket No. AD14-14-000, Tr. 48:13-49:7 (Oct. 28, 2014).

⁵⁹ EPSA Comments, Docket No. AD14-14-000, at 36 (Mar. 6, 2015).

short of resources, even for only five or ten minutes, that shortage should trigger shortage pricing.⁶⁰ Similarly, NYISO and Potomac Economics state that pricing each shortage, even a “transient shortage,” provides incentives to resources that have the capability to respond to brief-duration shortages.⁶¹

43. Several commenters favor triggering shortage pricing without any minimum duration for the event.⁶² Arguments in favor of triggering shortage pricing for any shortage rely on the need to send price signals that provide an incentive for resources to offer their full flexibility and for market entry by reflecting actual system conditions in real time.⁶³ EEI states that generators should be able to recover reasonable and supportable costs incurred in unexpected circumstances.⁶⁴ PSEG Companies maintain that, while the ISO-NE and NYISO markets’ rules (which price all shortages, no matter the duration) enable them to provide accurate price signals, PJM’s market rules (which

⁶⁰ New York Transmission Owners Comments, Docket No. AD14-14-000, at 23 (Mar. 6, 2015).

⁶¹ NYISO Comments, Docket No. AD4-14-000, at 28-29 (Mar. 6, 2015); Potomac Economics Comments, Docket No. AD14-14-000, at 26 (Mar. 6, 2015).

⁶² *See, e.g.*, CAISO Comments, Docket No. AD14-14-000, at 40 (Mar. 6, 2015); Calpine Comments, Docket No. AD14-14-000, at 20 (Mar. 6, 2015); GDF SUEZ Comments, Docket No. AD14-14-000, at 19 (Mar. 6, 2015); NYISO Comments, Docket No. AD14-14-000, at 28 (Mar. 6, 2015); Potomac Economics Comments, Docket No. AD14-14-000, at 25 (Feb. 24, 2015).

⁶³ Calpine Comments, Docket No. AD14-14-000, at 20 (Mar. 6, 2015); NYISO Comments, Docket No. AD14-14-000, at 28-29 (Mar. 6, 2015); Potomac Economics Comments, Docket No. AD14-14-000, at 25-26 (Feb. 24, 2015).

⁶⁴ EEI Comments, Docket No. AD14-14-000, at 5 (Mar. 6, 2015).

restrict “transient shortage” events from triggering shortage pricing) can distort its market prices.⁶⁵

44. In contrast, Wisconsin Electric and PJM prefer that a shortage event last a minimum duration before triggering shortage pricing. Wisconsin Electric argues that there should be a minimum duration for invoking shortage pricing, and that this duration should allow flexibility to account for the nature of transmission limits and reserve levels in the operating environment, with shorter minimum intervals to invoke shortage pricing applicable under extreme load and temperatures.⁶⁶ PJM states that the minimum duration for shortage pricing should be at least as long as (and perhaps longer than) the settlement interval and that a minimum interval for triggering shortage pricing is required to stimulate investment.⁶⁷

45. Some commenters argue that a “transient” or relatively brief shortage is not a “real” shortage because either the shortage is merely a mathematical artifact of the modeling, or the shortage will soon be resolved before generators can respond to shortage prices, even though the system is technically short of resources.⁶⁸

⁶⁵ PSEG Companies Comments, Docket No. AD14-14-000, at 31 (Mar. 6, 2015).

⁶⁶ Wisconsin Electric Comments, Docket No. AD14-14-000, at 16 (Mar. 6, 2015).

⁶⁷ PJM Comments, Docket No. AD14-14-000, at 22 (Mar. 6, 2015).

⁶⁸ MISO Comments, Docket No. AD14-14-000, at 37 (Mar. 6, 2015); OMS Comments, Docket No. AD14-14-000, at 6 (Mar. 2, 2015); PG&E Comments, Docket No. AD14-14-000, at 6 (Mar. 6, 2015); PJM Comments, Docket No. AD14-14-000, at 22 (Mar. 6, 2015); SCE Comments, Docket No. AD14-14-000, at 7 (Mar. 6, 2015); TAPS Comments, Docket No. AD14-14-000, at 24 (Mar. 6, 2015).

2. Need for Reform of Shortage Pricing Triggers

46. Shortage prices send a short-term price signal to provide an incentive for the performance of existing resources and help to maintain reliability.⁶⁹ However, some RTOs/ISOs currently restrict the triggering of shortage pricing to shortages due only to certain causes, or they require a shortage to exist for a certain time, e.g., thirty minutes, before invoking shortage pricing.⁷⁰

47. As several commenters during the price formation proceeding noted, not invoking shortage pricing when there is a shortage (regardless of the duration or cause of that shortage) distorts price signals that are designed to elicit increased supply and to compensate resources for the value of the services they provide when the system needs energy or operating reserves. Moreover, prices in each dispatch interval should reflect the value provided by dispatched resources. In times of shortage, the value of services a resource provides increases because operating needs have increased. When shortage pricing is not applied when a shortage exists, the resulting price fails to reflect adequately the value that a resource provides to the system. This failure impairs efficient system dispatch and hinders appropriate incentives for resources to address an energy or

⁶⁹ See Shortage Pricing Paper at 4-5.

⁷⁰ See Scarcity and Shortage Pricing, Offer Mitigation and Offer Caps Workshop, Docket No. AD14-14-000, Tr. at 30:15-31:16 and 47:19-49:12 (describing PJM's practice); SPP, OATT, Sixth Revised Volume No. 1, Attachment AE, §§ 5.1.2.1 (1.0.0), 8.3.4.2 (0.0.0).

operating reserves shortage. Because of such effects, the Commission finds preliminarily that the resulting price is not just and reasonable.

48. In making this preliminary finding, the Commission's rationale here is similar to the rationale the Commission relied on in Order No. 719. In that order, the Commission required shortage pricing in RTOs and ISOs. The Commission reasoned that "rules that do not allow for prices to rise sufficiently during an operating reserve shortage to allow supply to meet demand are unjust, unreasonable, and may be unduly discriminatory."⁷¹ The Commission added: "In particular, [such rules] may not produce prices that accurately reflect the value of energy"⁷² For similar reasons, the Commission now believes that not invoking shortage pricing during a shortage may result in unjust and unreasonable rates because prices do not accurately reflect the value of energy during a shortage. Accordingly, the Commission preliminarily finds that restricting shortage pricing to shortages lasting longer than one dispatch interval, or not invoking shortage pricing during relatively brief shortages, even though a shortage exists, results in rates that may be unjust and unreasonable.

49. Commenters that do not support triggering shortage pricing during "transient shortages" argue that such shortages can be either merely a mathematical artifact of the modeling, or a shortage that will soon be resolved before generators can respond to

⁷¹ Order No. 719, FERC Stats. & Regs. ¶ 31,281 at P 192.

⁷² *Id.*

shortage prices, even though the system is technically short of resources.⁷³ The Commission, however, believes there are steps an RTO/ISO can take to mitigate seemingly artificial shortages, such as using the RTO's/ISO's look-ahead capability to prevent or minimize the occurrence of shortages that are caused by modeling or other operating deficiencies.⁷⁴ The Commission believes that reflecting the shortage in prices is still necessary even when a reserve shortage is so short-lived that resources may be unable to respond to the price signal, so that resources operating during the shortage are compensated for the value of the service that they provide. The Commission acknowledges that an RTO/ISO may need to calibrate administrative shortage prices to better reflect the value of the service.⁷⁵

⁷³ MISO Comments, Docket No. AD14-14-000, at 37 (Mar. 6, 2015); OMS Comments, Docket No. AD14-14-000, at 6 (Mar. 2, 2015); PG&E Comments, Docket No. AD14-14-000, at 6-7 (Mar. 6, 2015); PJM Comments, Docket No. AD14-14-000, at 22-23 (Mar. 6, 2015); SCE Comments, Docket No. AD14-14-000, at 7-8 (Mar. 6, 2015); TAPS Comments, Docket No. AD14-14-000, at 24 (Mar. 6, 2015).

⁷⁴ One panelist at the Scarcity and Shortage Pricing, Offer Mitigation and Offer Caps Workshop stated that a look-ahead process can position resources so that changing operating conditions do not lead to reserve shortages. *See Scarcity and Shortage Pricing, Offer Mitigation and Offer Caps Workshop*, Docket No. AD14-14-000, Tr. 43:23-45:3 (Oct. 28, 2014) (“One of the drivers of putting in our forward-looking dispatch tools, our dispatch tools are looking out 60 minutes in a time-link dispatch, so they see upcoming system events.”).

⁷⁵ *See, e.g., Scarcity and Shortage Pricing, Offer Mitigation and Offer Caps Workshop*, Docket No. AD14-14-000, Tr. 40:1-42:12 (Oct. 28, 2014) (“So now in MISO, most of those scarce, transient events are really very small shortages against their total requirement produces a much smaller pricing impact, but we still think it's important. A shortage is a shortage. We should try and make some estimation of what the marginal value of that shortage is and include that in pricing.”).

50. Based upon information gathered during the price formation proceeding and as discussed above, the Commission preliminarily determines that prices that result from a failure to trigger shortage pricing for any dispatch interval during which a shortage of energy or operating reserves occurs may be unjust and unreasonable.

3. Commission Proposal

51. In order to remedy the potentially unjust and unreasonable rates caused by restrictions on shortage pricing, the Commission proposes, pursuant to section 206 of the FPA,⁷⁶ to require that RTOs/ISOs trigger shortage pricing for any dispatch interval during which a shortage of energy or operating reserves occurs. The Commission seeks comments on this proposal.

52. The shortage pricing reform in this NOPR should ensure that a resource is compensated based on a price that reflects the value of the service the resource provides. Implementing the shortage pricing reform proposed in this NOPR would ensure that resources have appropriate incentives to address energy or reserve shortages. The Commission expects that if shortage pricing is triggered for all shortage events, then resources are expected to take actions to ensure that they are available to respond to high prices. Resources taking actions to ensure their availability should, in turn, alleviate shortages and avoid shortage pricing during subsequent dispatch intervals.

⁷⁶ 16 U.S.C. 824e.

53. The shortage pricing reform proposed in this NOPR addresses the trigger for invoking shortage pricing, not the shortage price. While the Commission asked commenters to address the level of shortage pricing in the price formation proceeding,⁷⁷ the Commission is not at this time proposing to change the price paid by any RTO/ISO when it triggers shortage pricing.

54. The Commission expects that implementation of the shortage pricing reform proposed in this NOPR would not be as complex as implementing the proposed settlement interval reform. The Commission therefore proposes that the deadline for full implementation of the shortage pricing reform be effective within four months from the date of the compliance filing in response to a final rule in this proceeding. The Commission seeks comment on whether that proposed compliance and implementation timeline would provide sufficient time for RTOs/ISOs to develop and implement changes to technological systems and business processes in response to a final rule adopting the proposed shortage pricing reform.

III. Compliance

55. The Commission proposes to require that each RTO/ISO submit a compliance filing within four months of the effective date of the final Rule in this proceeding to demonstrate that it meets the proposed requirements set forth in the final Rule. While the Commission believes that four months is a reasonable deadline for RTOs/ISOs to submit

⁷⁷ Notice Inviting Post-Technical Workshop Comments, Docket No. AD14-14-000, at 9 (Jan. 16, 2015).

compliance filings, the Commission understands that the proposed settlement interval reform could take more time to implement than the proposed shortage pricing reform due to the complexity of settlement systems. As discussed above, the Commission proposes (1) to allow twelve months from the date of the compliance filings for implementation of reforms to settlement systems to become effective and (2) to allow four months from the date of the compliance filings for implementation of reforms to shortage pricing to become effective.

56. The Commission seeks comment on the proposed deadline for RTOs/ISOs to submit the compliance filing four months following the effective date of the final rule in this proceeding. Specifically, the Commission seeks comment on whether the proposed compliance timeline would allow sufficient time for RTOs/ISOs to develop and implement changes to technological systems and business processes in response to a final rule.

57. To the extent that any RTO/ISO believes that it already complies with the settlement intervals and shortage pricing reforms proposed in this NOPR, the RTO/ISO would be required to demonstrate how it complies in the filing required four months after the effective date of the final rule in this proceeding. The proposed implementation deadlines would apply only to RTOs/ISOs to the extent they do not already comply with the reforms proposed in this NOPR.

IV. Information Collection Statement

58. The Paperwork Reduction Act (PRA)⁷⁸ requires each federal agency to seek and obtain Office of Management and Budget (OMB) approval before undertaking a collection of information directed to ten or more persons or contained in a rule of general applicability. OMB's regulations,⁷⁹ in turn, require approval of certain information collection requirements imposed by agency rules. Upon approval of a collection(s) of information, OMB will assign an OMB control number and an expiration date.

Respondents subject to the filing requirements of a rule will not be penalized for failing to respond to these collection(s) of information unless the collection(s) of information display a valid OMB control number.

59. The reforms proposed in this NOPR would amend the Commission's regulations to improve the operation of organized wholesale electric power markets operated by RTOs and ISOs. The Commission proposes to require that each RTO/ISO (1) settle energy transactions in its real-time markets at the same time interval it dispatches energy and settle operating reserves transactions in its real-time markets at the same time interval it prices operating reserves and (2) trigger shortage pricing for any dispatch interval during which a shortage of energy or operating reserves occurs. The reforms proposed in this NOPR would require one-time filings of tariffs with the Commission and potential

⁷⁸ 44 U.S.C. 3501-3520.

⁷⁹ 5 CFR 1320.

software and hardware upgrades to implement the reforms proposed in this NOPR. The Commission anticipates the reforms proposed in this NOPR, once implemented, would not significantly change currently existing burdens on an ongoing basis. With regard to those RTOs and ISOs that believe that they already comply with the reforms proposed in this NOPR, they could demonstrate their compliance in their compliance in the filing required four months after the effective date of the final rule in this proceeding. The Commission will submit the proposed reporting requirements to OMB for its review and approval under section 3507(d) of the Paperwork Reduction Act.⁸⁰

60. While the Commission expects the adoption of the reforms proposed in this NOPR to provide significant benefits, the Commission understands that implementation and modifying settlement systems can be a complex and costly endeavor. The Commission solicits comments on the accuracy of provided burden and cost estimates and any suggested methods for minimizing the respondents' burdens, including the use of automated information techniques. Specifically, the Commission seeks detailed comments on the potential cost and time necessary to implement aspects of the reforms proposed in this NOPR, including (1) hardware, software, and business processes changes; (2) increased data storage and validation; (3) changes to market participant metering or other equipment; and (4) processes for RTOs and ISOs to vet proposed changes amongst their stakeholders.

⁸⁰ 44 U.S.C. 3507(d).

61. The Commission also seeks comment on whether changes in settlement systems would disrupt existing contractual relationships and, if so, what burdens this might impose and how the Commission should address any potential issues resulting from such disruption.

Burden Estimate and Information Collection Costs: The Commission believes that the burden estimates below are representative of the average burden on respondents, including necessary communications with stakeholders. The estimated burden and cost⁸¹ for the requirements contained in this NOPR follow.⁸²

⁸¹ The estimated hourly cost (salary plus benefits) provided in this section are based on the salary figures for May 2014 posted by the Bureau of Labor Statistics for the Utilities sector (*available at* http://www.bls.gov/oes/current/naics2_22.htm#13-0000) and scaled to reflect benefits using the relative importance of employer costs in employee compensation from March 2015 (*available at* <http://www.bls.gov/news.release/ecec.nr0.htm>). The hourly estimates for salary plus benefits are:

- Legal (code 23-0000), \$129.87
- Computer and mathematical (code 15-0000), \$58.25
- Information systems manager (code 11-3021), \$94.55
- IT security analyst (code 15-1122), \$63.55
- Auditing and accounting (code 13-2011), \$51.11
- Information and record clerk (code 43-4199), \$37.50
- Electrical Engineer (code 17-2071), \$66.45
- Economist (code 19-3011), \$73.04
- Computer and Information Systems Manager (code 11-3021), \$94.55
- Management (code 11-0000), \$78.04

The average hourly cost (salary plus benefits), weighting all of these skill sets evenly, is \$74.69. The Commission rounds it to \$75 per hour.

⁸² The RTOs and ISOs (CAISO, ISO-NE, MISO, NYISO, PJM, and SPP) are required to comply with the reforms proposed in this NOPR. Three RTOs/ISOs (CAISO, NYISO, and SPP) currently align real-time energy settlement with their dispatch intervals

(continued...)

Data Collection FERC 516 (modifications in NOPR in RM15-24-000)	Number of Respondents	Annual Number of Responses per Respondent	Total Number of Responses	Average Burden Hours & Cost per Response	Annual Burden Hours & Total Annual Cost
	(1)	(2)	(1)×(2)=(3)	(4)	(3)×(4)=(5)
Tariff filings one-time in Year 1 For RTOs/ISOs that currently align real-time settlement with dispatch intervals	3 RTOs or ISOs	1	3	80 hrs; \$6,000	240 hrs; \$18,000
Tariff filings one-time in Year 1 For RTOs/ISOs that <i>do not</i> currently align real-time settlement with dispatch intervals	3 RTOs or ISOs	1	3	160 hrs; \$12,000	480 hrs; \$36,000
Related Burden Hours for Implementation of changes each year in Years 1 & 2 For RTOs/ISOs that currently align real-time settlement with dispatch intervals	3 RTOs or ISOs	1	3	550 hrs; \$41,250	1,650 hrs; \$123,750

and thus likely would be burdened less by that aspect of the reforms proposed in this NOPR.

Data Collection FERC 516 (modifications in NOPR in RM15-24-000)	Number of Respondents	Annual Number of Responses per Respondent	Total Number of Responses	Average Burden Hours & Cost per Response	Annual Burden Hours & Total Annual Cost
	(1)	(2)	(1)×(2)=(3)	(4)	(3)×(4)=(5)
Related Burden Hours for Implementation of changes each year in Years 1 & 2 For RTOs/ISOs that <i>do not</i> currently align real-time settlement with dispatch intervals	3 RTOs or ISOs	1	3	1,600 hrs; \$120,000	4,800 hrs; \$360,000

Cost to Comply: The Commission has projected the total cost of compliance as follows:⁸³

- Year 1: \$18,000 + \$36,000 + \$123,750 + \$360,000 = \$537,750
- Year 2: \$123,750 + \$360,000 = \$483,750

After Year 2, the reforms proposed in this NOPR, once implemented, would not significantly change existing burdens on an ongoing basis.

⁸³ The costs for year 1 would consist of filing proposed tariff changes to the Commission within four months of a Final Rule plus initial implementation. The costs for year 2 would consist of any remaining implementation within the twelve months after the tariff filing is required.

The Commission notes that these estimates do not include costs for software and hardware. Based on comment from industry, current estimates of overall costs for software and hardware could be as high as \$20,000,000, for market participants and RTOs/ISOs combined, for each RTO/ISO that does not yet comply with the settlement interval reform proposed in this NOPR.⁸⁴ As stated above, the Commission requests comment on the estimated costs for any additional software and hardware needed to comply with the reforms proposed in this NOPR.

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

Action: Proposed revisions to an information collection.

OMB Control No. 1902-0096.

Respondents for this Rulemaking: RTOs and ISOs.

Frequency of Information: One-time during years one and two.

Necessity of Information: The Federal Energy Regulatory Commission proposes this rule to improve competitive wholesale electric markets in the RTO and ISO regions.

Internal Review: The Commission has reviewed the proposed changes and has determined that such changes are necessary. These requirements conform to the Commission's need for efficient information collection, communication, and

⁸⁴ ISO-NE Comments, Docket No. AD14-14-000, at 23 (Mar. 6, 2015); GDF SUEZ Comments, Docket No. AD14-14-000, at 10 (Mar. 6, 2015).

management within the energy industry. The Commission has specific, objective support for the burden estimates associated with the information collection requirements.

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

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

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

V. Regulatory Flexibility Act Certification

63. The Regulatory Flexibility Act of 1980 (RFA)⁸⁵ generally requires a description and analysis of rules that will have significant economic impact on a substantial number of small entities. The RFA does not mandate any particular outcome in a rulemaking. It

⁸⁵ 5 U.S.C. 601-12.

only requires consideration of alternatives that are less burdensome to small entities and an agency explanation of why alternatives were rejected.

64. This rule would apply to six RTOs and ISOs (all of which are transmission organizations). The average estimated annual cost to each of the RTOs/ISOs is \$89,625 in year 1, and \$80,625 in Year 2. This one-time cost of filing and implementing these changes is significant.⁸⁶ The RTOs and ISOs, however, are not small entities, as defined by the RFA.⁸⁷ This is because the relevant threshold between small and large entities is 500 employees and the Commission understands that each RTO and ISO has more than 500 employees. Furthermore, because of their pivotal roles in wholesale electric power markets in their regions, none of the RTOs/ISOs meet the last criterion of the two-part RFA definition a small entity: “not dominant in its field of operation.” As a result, the Commission certifies that the reforms proposed in this NOPR would not have a significant economic impact on a substantial number of small entities. The Commission does not expect other entities to incur compliance costs as a result of the reforms

⁸⁶ This estimate does not include costs for hardware and software, for which the Commission requests comment.

⁸⁷ The RFA definition of “small entity” refers to the definition provided in the Small Business Act, which defines a “small business concern” as a business that is independently owned and operated and that is not dominant in its field of operation. The Small Business Administrations’ regulations at 13 CFR 121.201 define the threshold for a small Electric Bulk Power Transmission and Control entity (NAICS code 221121) to be 500 employees. *See* 5 U.S.C. 601(3), citing to Section 3 of the Small Business Act, 15 U.S.C. 632.

proposed in this NOPR, but seeks detailed comments on whether other entities, such as load-serving entities, would incur costs as a result of the reforms proposed in this NOPR.

VI. Environmental Analysis

65. The Commission is required to prepare an Environmental Assessment or an Environmental Impact Statement for any action that may have a significant adverse effect on the human environment.⁸⁸ The Commission concludes that neither an Environmental Assessment nor an Environmental Impact Statement is required for this NOPR under section 380.4(a)(15) of the Commission's regulations, which provides a categorical exemption for approval of actions under sections 205 and 206 of the FPA relating to the filing of schedules containing all rates and charges for the transmission or sale of electric energy subject to the Commission's jurisdiction, plus the classification, practices, contracts and regulations that affect rates, charges, classifications, and services.⁸⁹

VII. Comment Procedures

66. The Commission invites interested persons to submit comments on the matters and issues proposed in this notice to be adopted, including any related matters or alternative proposals that commenters may wish to discuss. Comments are due [**60 days after publication in the FEDERAL REGISTER**]. Comments must refer to Docket

⁸⁸ *Regulations Implementing the National Environmental Policy Act of 1969*, Order No. 486, 52 FR 47,897 (Dec. 17, 1987), FERC Stats. & Regs., Regulations Preambles 1986-1990 ¶ 30,783 (1987).

⁸⁹ 18 CFR 380.4(a)(15).

Nos. RM15-24-000, and must include the commenter's name, the organization they represent, if applicable, and their address.

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

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

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

VIII. Document Availability

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

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

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

List of subjects in 18 CFR Part 35
Electric power rates
Electric utilities
Non-discriminatory open access transmission tariffs

By direction of the Commission.

(S E A L)

Nathaniel J. Davis, Sr.,
Deputy Secretary.

Regulatory Text

In consideration of the foregoing, the Commission proposes to amend Part 35, Chapter I, Title 18, *Code of Federal Regulations*, as follows:

PART 35 – FILING OF RATE SCHEDULES AND TARIFFS

1. The authority citation for part 35 continues to read as follows:

Authority: 16 U.S.C. 791a-825r, 2601-2645; 31 U.S.C. 9701; 42 U.S.C. 7101-7352.

2. Amend § 35.28 as follows:

- (a) Paragraph (g)(1)(iv)(A) is revised.
- (b) Add a new paragraph (g)(1)(vi).

§ 35.28 Non-discriminatory open access transmission tariff.

* * * * *

(g) *Tariffs and operations of Commission-approved independent system operators and regional transmission organizations.* * * *

(1) *Demand response and pricing.** * * *

(iv) *Price Formation during periods of operating reserve shortage.* (A) Each Commission-approved independent system operator and regional transmission organization must modify its market rules to allow the market-clearing price during periods of operating reserve shortage to reach a level that rebalances supply and demand so as to maintain reliability while providing sufficient provisions for mitigating market power. Each Commission-approved independent system operator and regional

transmission organization must trigger shortage pricing for any dispatch interval during which a shortage of energy or operating reserves occurs. * * * *

(vi) *Settlement intervals.* Each Commission-approved independent system operator and regional transmission organization must settle energy transactions in its real-time markets at the same time interval it dispatches energy and must settle operating reserves transactions in its real-time markets at the same time interval it prices operating reserves.

Note: The following appendix will not be published in the *Federal Register*.

APPENDIX A: List of Short Names/Acronyms of Commenters

Short Name/Acronym	Commenter
APPA and NRECA	American Public Power Association and National Rural Electric Cooperative Association
ANGA	America's Natural Gas Alliance
Brookfield	Brookfield Renewable Energy Marketing LP
CAISO	California Independent System Operator Corporation
Calpine	Calpine Corporation
Direct Energy	Direct Energy Business Marketing, LLC, Direct Energy Business, LLC and affiliated companies
EEI	Edison Electric Institute
EPSA	Electric Power Supply Association
Entergy Nuclear Power Marketing	Entergy Nuclear Power Marketing, LLC
Exelon	Exelon Corporation
GDF SUEZ	GDF SUEZ North America, Inc.
ISO-NE	ISO New England, Inc.
MISO	Midcontinent Independent System Operator, Inc.

NYISO	New York Independent System Operator, Inc.
New York Transmission Owners	New York Transmission Owners (Central Hudson Gas & Electric Corporation, Consolidated Edison Company of New York, Inc., Power Supply of Long Island, New York Power Authority, New York State Electric & Gas Corporation, Niagara Mohawk Power Corporation d/b/a National Grid, Orange and Rockland Utilities, Inc., and Rochester Gas and Electric Corporation)
OMS	Organization of MISO States
PG&E	Pacific Gas and Electric Company
PJM	PJM Interconnection, L.L.C.
PJM Utilities Coalition	PJM Utilities Coalition (American Electric Power Service Corporation, the Dayton Power and Light Company, FirstEnergy Service Company, Buckeye Power, Inc., and East Kentucky Power Cooperative)
Potomac Economics	Potomac Economics, Ltd.
PSEG Companies	PSEG Companies (Public Service Electric and Gas Company, PSEG Power LLC and PSEG Energy Resources & Trade LLC)
SCE	Southern California Edison Company
SPP	Southwest Power Pool, Inc.
TAPS	Transmission Access Policy Study Group

Wartsila

Wartsila North America, Inc.

Wisconsin Electric

Wisconsin Electric Power Company

Xcel

Xcel Energy Services Inc.