129 FERC ¶ 61,303
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Before Commissioners: Jon Wellinghoff, Chairman;
Marc Spitzer and Philip D. Moeller.

Midwest Independent Transmission System Operator, Inc.	Docket No. ER07-1372-014
Midwest Independent Transmission System Operator, Inc.	Docket No. ER09-1126-000

ORDER ON COMPLIANCE FILING AND STORED ENERGY RESOURCES PROPOSAL

(Issued December 31, 2009)

1. On January 22, 2009, the Midwest Independent Transmission System Operator, Inc. (Midwest ISO) submitted in Docket No. ER07-1372-014 proposed revisions to its Open Access Transmission, Energy and Operating Reserve Markets Tariff (Tariff)[1] to comply with the Commission's order conditionally accepting the Midwest ISO's compliance filing.[2] On May 12, 2009, the Midwest ISO filed under section 205 of the Federal Power Act (FPA)[3] in Docket No. ER09-1126-000 proposed revisions to the Tariff that accommodate Stored Energy Resources[4] (Stored Resources). In this order, we accept the Midwest ISO's compliance filing, and conditionally accept the Midwest ISO's proposed Tariff revisions in Docket No. ER09-1126-000, to be effective January 1, 2010, as requested, subject to further compliance.

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[1] FERC Electric Tariff, Fourth Revised Volume 1.

[2] *Midwest Indep. Trans. Sys. Operator, Inc.*, 125 FERC¶ 61,319 (2008) (December 18 Compliance Order).

[3] 16 U.S.C. § 824d (2006).

[4] Stored Resources are Resources capable of supplying Regulating Reserve, but not Energy or Contingency Reserve, through the short-term storage and discharge of electrical Energy in response to Setpoint Instructions. Midwest ISO FERC Electric Tariff, Fourth Revised Volume No. 1, Section 1.628, Second Revised Sheet No. 282.

I. Background and Description of Filings

2. On September 14, 2007, as amended on September 19, 2007,[5] the Midwest ISO filed in Docket No. ER07-1372, revisions and amendments to its currently effective Tariff to implement a centralized and co-optimized Energy and Ancillary Services Market within the Midwest ISO region. On February 25, 2008, the Commission issued an order conditionally accepting the Midwest ISO's Ancillary Services Market proposal, subject to several compliance, reporting, and certification requirements.[6]

3. The Ancillary Services Market Order's compliance requirements included a directive that, within 60 days of the date of the order, the Midwest ISO evaluate, through stakeholder discussions,[7] operational and procedural adjustments to remove barriers to the comparable treatment of "new technologies" as well as Demand Response Resources (DRRs), and to submit a report thereon and any proposed Tariff revisions.[8] On April 25, 2008, the Midwest ISO submitted its 60-day compliance filing, which proposed provisions on the use of Stored Resources for Operating Reserve products effective June 1, 2009.

4. On December 18, 2008, the Commission issued an order, which among other things, conditionally accepted the April 25, 2008 compliance filing's proposed provisions on Stored Resources.[9] In that order, the Commission generally found the Midwest ISO's proposal to use Stored Resources for Regulating Reserve,[10] as well as Contingency

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[5] The September 14 and 19 filings shall be collectively referred to herein as the Ancillary Services Market proposal.

[6] *Midwest Indep. Trans. Sys. Operator, Inc.*, 122 FERC ¶ 61,172 (2008) (Ancillary Services Market Order), *order on reh'g*, 123 FERC ¶ 61,297 (2008).

[7] Consistent with the Commission's compliance directives, the Stored Resource proposal resulted from a series of discussions with representatives of Beacon Power. Ancillary Services Market Order, 122 FERC ¶ 61,172 at P 365 and n.134.

[8] *Id.* P 365.

[9] December 18 Compliance Order, 125 FERC ¶61,319, at P 26-27, 31, 34, 42-45 (2008).

[10] Regulating Reserves are frequency responsive Generation Resource, External Asynchronous Resource, Stored Energy Resource or Demand Response Resource – Type II capacity held in reserve for the purpose of providing Regulating Reserve Deployment in both the up and down direction. Midwest ISO Tariff, section 1.549, Second Revised

(continued…)

Reserves,[11] to be consistent with the requirements of the Ancillary Services Market Order. However, the Commission directed certain additional 30-day compliance measures and an informational report related to the Stored Resources proposal.[12]

5. On January 22, 2009, in Docket No. ER07-1372-014, the Midwest ISO filed proposed revisions to its Tariff (January 22 Filing) to comply with the 30-day compliance filing directives set forth in the Commission's December 18 Compliance Order. Some of these changes on compliance have been overtaken by the Midwest ISO proposal to revise its Tariff in Docket No. ER09-1126-000, as noted below.

6. In the January 22 Filing, the Midwest ISO proposes certain revisions so as to: (1) limit the self-scheduling of Stored Resources to the Regulating Reserve requirement; (2) clarify that Stored Resources will not qualify as Capacity Resources under Module E of the Tariff; and (3) clarify that Stored Resources cannot be used to satisfy zonal Operating Reserve requirements. Consistent with the Commission's order, the Tariff was also modified to provide that Stored Resources will only be permitted to self-schedule Operating Reserves in the Day-Ahead Energy and Operating Reserve Market, and that Stored Resources will be allowed to economically offer and set prices in the five-minute Real-Time Energy and Operating Reserve Market. Also consistent with the December 18 Order, Midwest ISO proposes revisions to Module D of the Tariff to make Stored Resources subject to the same market monitoring and mitigation provisions that are applicable to other Resources in the Ancillary Services Market. Further, section 64.1.4.d of the Tariff includes a proposed method developed by the Independent Market Monitor (Market Monitor) for calculating the Reference Level for a Stored Resource.

7. On February 25, 2009, in Docket No. ER09-769-000, the Midwest ISO submitted a section 205 filing to defer the effective date of the Stored Resource Tariff provisions to January 1, 2010, to provide sufficient time for the development of systems needed to

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Sheet No. 258.

[11] Contingency Reserves are Spinning Reserves and Supplemental Reserves provided by Resources available to the Transmission Provider to use in the event of a system contingency as specified in Schedule 5 – Spinning Reserve and Schedule 6 – Supplemental Reserve of the Tariff. Midwest ISO Tariff, Section 1.86, Original Sheet No. 102.

[12] *Id.* P 27, 31, 34, 45 (requiring: (1) a compliance filing within 30 days of the order to make certain Tariff revisions and (2) an informational report on any Stored Resource-related reliability issues within 180 days from the Stored Resources implementation date).

accommodate Stored Resources, and to facilitate additional stakeholder consultations regarding Tariff revisions. In that filing, the Midwest ISO proposed a stakeholder process schedule and committed to file revisions on May 8, 2009, in the form of final revised Tariff sheets. A Delegated Order was issued in Docket No. ER09-769-000, *et al.* on May 26, 2009 accepting the proposed change of the implementation date for Stored Resources from June 1, 2009 to January 1, 2010.

8. On May 12, 2009 in Docket No. ER09-1126-000, the Midwest ISO filed proposed modifications to provisions in its currently effective Tariff (May 12 Filing). These modifications were done to tariff sheets in Module A, Module C, Module D, Schedule 27, and Schedule 29. The changes characterize Stored Resources as short-term storage devices where Stored Resources would be limited to offering Regulating Reserves, and not Energy or Contingency Reserves, in the Midwest ISO markets. This filing also describes the method for dispatching a Stored Resource, where unlike other Resource types the Energy dispatch on a Stored Resource is not to be included in the co-optimization algorithm, but instead, the Energy dispatch will be determined in a way that maximizes the Resource's capability to provide Regulating Reserve. These proposed provisions represent revisions to the Stored Resources proposal submitted in the January 22 Filing.

II. Notice of Filing and Responsive Pleadings

9. Notice of the January 22 Filing in Docket No. ER07-1372-014 was published in the *Federal Register*, 74 Fed. Reg. 6149 (2009), with interventions and protests due on or before February 12, 2009. Indianapolis Power & Light Company (IPL) and Beacon Power Corporation (Beacon Power) submitted comments. The Midwest ISO filed an answer. Notice of the May 12 Filing in Docket No. ER09-1126-000 was published in the *Federal Register*, 74 Fed. Reg. 23687 (2009), with interventions and protests due on or before June 2, 2009. Exelon Corporation and Wisconsin Electric Power Company filed motions to intervene. Ameren Services Company (Ameren); Beacon Power; and Xcel Energy Services Inc. (Xcel) filed motions to intervene and comments. The Midwest ISO and Beacon Power filed answers. Duke Energy Corporation (Duke) filed a motion to intervene out-of-time.

III. Discussion

A. Procedural Matters

10. Pursuant to Rule 214 of the Commission's Rules of Practice and Procedure, 18 C.F.R. § 385.214 (2009), the timely, unopposed motions to intervene serve to make the entities that filed them parties to the proceeding in Docket No. ER09-1126-000. Pursuant to Rule 214(d) of the Commission's Rules of Practice and Procedure, 18 C.F.R § 385.214(d) (2009), the Commission will grant Duke's late-filed motion to intervene in

Docket No. ER09-1126-000 given its interest in the proceeding, the early stage of the proceeding, and the absence of undue prejudice or delay.

11. Rule 213(a)(2) of the Commission's Rules of Practice and Procedure, 18 C.F.R. § 385.213(a)(2) (2009), prohibits an answer to a protest unless otherwise ordered by the decisional authority. We will accept the Midwest ISO's and Beacon Power's answers because they provided information that assisted us in our decision-making process.

B. Substantive Matters

12. We conditionally accept the Midwest ISO's proposed revisions to its Tariff in Docket No. ER09-1126-000, to be effective January 1, 2010, as requested, subject to further compliance, as discussed further below. In addition, as discussed further below, we accept the Midwest ISO's compliance filing in Docket No. ER07-1372-014 because it satisfies all of the Commission's requirements.

1. Compensation and Comparability of Stored Resources

a. Midwest ISO May 12 Proposal

13. Based on stakeholder discussions and a re-evaluation of its Stored Resources program, the Midwest ISO proposes in the May 12 Filing to revise its Tariff so that Stored Resources are redefined to be resources capable of supplying Regulating Reserves, but not energy or Contingency Reserves,[13] through the short-term storage and discharge of electrical energy in response to setpoint instructions. The Midwest ISO states that Stored Resources will not be eligible to provide Contingency Reserves because the Midwest ISO Tariff requires a 60-minute deployment period for a Resource to be capable of providing Contingency Reserves. The Midwest ISO explains that although this requirement is achievable by a Stored Resource,[14] it would limit the capacity of the resource to provide other products because the capacity of a Stored Resource is inversely related to the time over which it provides a product or products.

14. The Midwest ISO proposes that Stored Resources not be eligible to satisfy zonal Regulating Reserve requirements because product substitution is not allowed on their

[13] Revisions have been proposed, in Module C of Midwest ISO's Electric Tariff, Fourth Revised Volume No. 1 (Tariff), to incorporate Stored Resources and Stored Resource Offers into the Midwest ISO Day-Ahead and Real-Time markets.

[14] The Midwest ISO requires that Stored Resources be capable of supplying regulating reserves for a minimum continuous duration of 60 minutes.

cleared Regulating Reserves and because the continued ability of the Stored Resource to provide energy beyond the regulation response time would be dependent on supplying energy to the Stored Resource from outside of the reserve zone.

15. The Midwest ISO also proposes to revise its Tariff regarding the method for dispatching a Stored Resource so that the energy dispatch on a Stored Resource will not be included in the co-optimization algorithm. Instead, a constraint has been added to the list of Day-Ahead and Real-Time formulation constraints to ensure the supply of Regulating Reserves cleared on Stored Resources is less than or equal to the market-wide Regulating Reserve requirement. The Midwest ISO explains that the proposed revisions to its Tariff regarding the treatment of short-term Stored Resources in the Midwest ISO markets are necessary to address sustainability, deployment, and pricing issues that it found likely to occur under the initial design.

16. The Midwest ISO also proposes to revise its Tariff to include Stored Resources in calculations of Day-Ahead Margin Assurance Payment (DAMAP) for Day-Ahead committed resources accordingly, since Stored Resources could now have a Day-Ahead schedule for Regulating Reserves. The Midwest ISO contends that the proposed revisions will result in the best use of short-term Stored Resources and their Regulating Reserve capabilities to maximize overall system benefits.

17. Finally, the Midwest ISO proposes that the Day-Ahead and Reliability Assessment Commitment processes will not include Revenue Sufficiency Guarantee Credits associated with Stored Resources. The Midwest ISO states that costs incurred by a Stored Resource during start-up and its non-incremental costs of operation are small when averaged over the expected duration of operation of a Stored Resource and they are also small when compared with the incremental costs of operation of a Stored Resource. Since Stored Resources' start-up and no load costs are not considered in the commitment processes, and because Stored Resources are price-takers for any net Energy, the credits received will always be greater than the costs a Stored Resource incurs when cleared to provide regulating reserve. For these reasons, Midwest ISO considers Revenue Sufficiency Guarantee Credits therefore to be unnecessary.

b. Comments/Protests

18. Xcel proposes modifications to ensure that Stored Resources are not paid for Regulating Reserves that they cannot provide. Xcel provides illustrations showing how Stored Resources may be paid for regulation that they do not actually supply. In the circumstance of a Stored Resource being at full capacity, Xcel claims that a Stored Resource may be compensated for Regulating Reserves it does not provide because the Stored Resource is unable to provide Regulating Reserves in the down direction in a period of excess supply. Likewise, in the opposite circumstance of the Stored Resource being fully discharged, the Stored Resource would be inappropriately compensated for

providing Regulating Reserves that it cannot provide when the Midwest ISO needs Regulating Reserves in the up direction.

19. Xcel argues that in such situations a Stored Resource could be dispatched in the opposite direction from the needed Regulating Reserves, thus increasing the burden of non-Stored Resource regulating resources. Xcel states that this would result in a Stored Resource receiving compensation for Regulating Reserves it did not supply unless language like the following is added to the Midwest ISO's Tariff: "The Dispatch Target for Energy for a Stored Energy Resource will never be in the direction opposite to the deployed Regulating Reserve for the reserve zone in which the Stored Energy Resource resides."

20. Ameren requests clarification from the Midwest ISO about the requirement that Stored Resources provide 60-minute continuous operation for Regulating Reserves. If Stored Resources are excluded from this requirement, Ameren proposes that a Stored Resource be compensated on a prorated basis if its maximum continuous deployment is less than 60 minutes such that Stored Resources are paid based on their maximum capability to provide continuous megawatt-hours of single-directional Regulating Reserves. Ameren contends that failure to adopt such a proration mechanism would result in unduly discriminatory outcomes.

21. Ameren requests further clarification on whether Stored Resources are subject to the same 10-minute response time requirement as other resources.[15] Ameren argues that if they are not, Stored Resources are not comparable to conventional regulating resources, are less valuable, and should not receive comparable compensation.

22. Ameren also objects to the fact that Stored Resources will be paid the same prices as other resources on a market-wide basis when resources providing zonal reserves would be paid a lower market-clearing price. Ameren argues that if the Midwest ISO's entire Regulating Reserve requirement were met by Stored Resources, then the market-clearing price for Spinning Reserves and Supplemental Reserves could be higher than the price received for Regulating Reserves. Ameren states that this outcome would change the ranking of reserve prices, under which Regulating Reserves receive the highest price.

23. Ameren requests clarification on the maximum amount of Regulating Reserves that Stored Resources can provide. If Stored Resources can provide the entire amount of Regulating Reserves, Ameren has concerns about system reliability.

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[15] Ameren also recommends that the Midwest ISO should modify its proposal to require that Stored Resources be required to be capable of supplying Regulating Reserves in either the up or down direction within the current response time.

24. Xcel raises issues concerning what it characterizes as the lack of comparability between Stored Resources and conventional resources in connection with Excessive/Deficient Energy Deployment (EDE) Charges. It maintains that since the equation for calculating these charges is based on total energy volume (Actual Energy Injection) and Stored Resources' Actual Energy Injection is zero because they do not offer energy, the EDE penalty for Stored Resources that do not follow dispatch is less severe. Xcel proposes replacing "Actual Energy Injection" with the phrase "Actual Energy Injection or total cleared regulating reserve volume, whichever is greater for a stored energy resource, as the case may be."

c. Answers

25. The Midwest ISO explains in its answer that while energy and Regulating Reserves are cleared simultaneously, they are used for different purposes. The Midwest ISO explains that energy is cleared to solve load balance requirements whereas Regulating Reserves are cleared to moderate frequency deviations in interchange imbalances. The Midwest ISO further explains that because of these differing purposes for clearing energy and Regulating Reserves, Regulating Reserves can be cleared in the down direction when additional energy is being cleared during a load pickup period.

26. The Midwest ISO states that the Stored Resource's ability to clear Regulating Reserves will be reduced, potentially to zero, in order to manage transmission constraints, maintain operating reserve requirements, satisfy energy demand and/or maintain reliable operating conditions. The Midwest ISO provides illustrations of how the output of Stored Resources can be managed to ensure they can be charged or discharged and still effectively address Area Control Error.[16] The Midwest ISO asserts that the ability of Stored Resources to shift Regulating Reserve responses quickly, while sending stable energy targets to the most economic energy resources, demonstrates the benefits of Stored Resources in the Midwest ISO Energy and Operating Reserve Markets.

27. The Midwest ISO notes that Xcel's observation that the energy dispatch for Stored Resources does not correspond to changes in load is true, and applies equally to all resources. The Midwest ISO explains that any resource could be chosen to provide economic energy by moving up to satisfy an upcoming load increase and at the same time clear Regulating Reserves.

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[16] Area Control Error is the instantaneous difference between net actual interchange and net scheduled interchange, taking into account the effect of frequency bias, including a correction for meter error, expressed in MW. Midwest ISO Tariff, First Revised Sheet No. 82.

28. Beacon Power adds that Xcel fails to recognize that generators and demand resources are occasionally scheduled this way for Regulating Reserves.[17] According to Beacon Power, Xcel's proposed language would contradict the purpose of the Ancillary Services Market by requiring generators to supply regulation in the up direction and demand response to supply only regulation in the down direction. Beacon Power asserts that there are instances where imbalances occur in both directions over a 5-minute interval, and a Stored Resource's ability to switch from up to down with frequency makes it uniquely suited for such situations. Beacon Power also asserts that Stored Resources are only paid for the Regulating Reserves that they provide and provides illustrations showing how Stored Resources and generation resources provide Regulating Reserves comparably.

29. The Midwest ISO clarifies for Ameren that all resources are held to the same standard of being capable of deploying Regulating Reserves in either the up or down direction for the full amount of Regulating Reserves cleared and they must be capable of deploying over the Regulation Response Time of five minutes. Midwest ISO asserts that the Stored Resources market design ensures that a Stored Resource will be capable of meeting the deployment requirement.

30. With regard to Ameren's pricing concerns, the Midwest ISO clarifies that a zonal Regulating Reserve clearing price will be greater than or equal to the system-wide non-zonal Regulating Reserve clearing price, providing additional compensation to those resources capable of providing Regulating Reserves to a specific zone. Under circumstances when a Reserve Zone Regulating Reserve Requirement is binding, Regulating Reserves on Stored Resources will be compensated on a lower marginal-clearing price than Regulating Reserves cleared on resources that are capable of providing zonal Regulating Reserves. The Midwest ISO further explains that in general it should be expected that the Regulating Reserve marginal-clearing price would be higher than the Spinning Reserve price. However, in the current market design, irrespective of the inclusion of Stored Resources, it is possible for a zonal Spinning Reserve marginal-clearing price to be greater than the market-wide Regulating Reserve marginal-clearing price when Regulating Reserves are plentiful but there is a shortage of Regulating Reserves and Spinning Reserves in a zone which has a Spinning Reserve requirement.

[17] As an example, Beacon states that a generator ramping up to supply both energy and regulating reserves may be ordered to increase its Energy Dispatch Target while its 4 second regulation signal may be to decrease output to reconcile the real-time imbalance.

31. Responding to Ameren's reliability concerns, the Midwest ISO asserts that it is confident that Stored Resources will not jeopardize system reliability for the following reasons: (1) the Stored Resource market design ensures that the Regulating Reserves are deployable within the required response times; (2) a portion of the market-wide Regulating Reserve requirement will be cleared on other resources since Stored Resources cannot satisfy zonal requirements; and (3) Regulating Reserves provided by Stored Resources will be limited when other resources are not available to provide the energy needed to charge or discharge the Stored Resources.

32. Beacon Power answers Ameren's proposal for prorated payments by referring to Mr. Ramey's testimony in Midwest ISO's filing[18] in which he explains that the term deployment is meant to require a resource to be capable of providing Regulating Reserves over a certain amount of time, *not* at a certain quantity. Beacon Power explains that Mr. Ramey's testimony shows that both Stored Resources and other resources are required to supply Regulating Reserves for the full hour in which they bid. Beacon Power also contends that Stored Resources are capable of supplying continuous Regulating Reserves.

33. Beacon Power responds to Ameren's compensation concerns by noting that if the Midwest ISO schedules a Stored Resource in real-time for a lower quantity than the resource cleared in the day-ahead market, the Stored Resource must buy out of its day-ahead position. Beacon Power asserts that Stored Resources, like other resources, will only be paid based on the actual Regulating Reserves deployed in each real-time five minute interval.

34. Beacon Power addresses Ameren's argument that Stored Resources do not abide by the requisite regulation response time of 10 minutes by explaining that Stored Resources are actually designed to provide Regulating Reserves in 4 seconds or less.

35. Addressing Ameren's concern that Stored Resources will receive higher market-wide prices than other resources providing zonal reserve products, Beacon Power asserts that the opposite is true. Beacon Power explains that the Tariff is designed such that when there is not enough Regulating Reserves within a specific Reserve zone, even if there is enough Regulating Reserves market-wide, the clearing price will increase in order to clear more Regulating Reserves in that zone. The price for zonal Regulating Reserves would, if anything, be higher than the market-wide price for Regulating Reserves because the system is designed to attract Regulating Reserves by increasing the clearing price if they are inadequate in a zone.

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[18] May 12 Filing, Testimony of Mr. Ramey at 10.

36. Beacon Power disagrees with Ameren's conclusion that supplying the entire market-wide Regulating Reserve through Stored Resources would decrease system reliability. Beacon Power explains that the speed of Stored Resources, their lack of direct emissions, and their use of recycled electricity to respond to system imbalances make them more effective and less costly than conventional generation. Beacon Power states that the amount of operating reserves that may be supplied by Stored Resources will be restricted to supplying the Hourly Market-Wide Regulating Reserve requirement and that other resources will supply all other operating reserves.

37. Beacon Power disputes Ameren's assertion that Stored Resources may be less valuable than a conventional generator. It maintains that the unique characteristics of Stored Resources make them ideally suited for providing Regulating Reserves. Beacon Power asserts that Stored Resources are especially capable of handling Regulating Reserves more efficiently because of their ability to charge and discharge rapidly, something that is necessary when there are a growing number of renewable resources.

38. Responding to Xcel, the Midwest ISO submits that Stored Resources should not be required to pay the EDE penalty for their cleared Regulating Reserve revenue, as cleared Regulating Reserves do not represent a regulation burden. The amount a Stored Resource deviates from its instructions instead represents the regulation burden and is best represented as "'the Resource's Actual Energy Injection or Actual Energy Withdrawal for a Stored Energy Resource, as the case may be.'"[19] The Midwest ISO further notes that Stored Resources and generation resources are inherently different to the extent that generation resources generally receive the majority of their revenue from energy, while the majority of Stored Resources revenue comes from cleared Regulating Reserves. Using the standard of "the Resource's Actual Energy Withdrawal for a Stored Energy Resource, as the case may be" would be inequitable because the first part of the charge is based on regulation burden causation.

39. Beacon Power disputes Xcel's assertion that Stored Resources are less likely to pay EDEs than a conventional generator and thus would be less deterred from straying from an energy dispatch target. Beacon Power asserts that the relatively small quantities of energy dispatch requested from Stored Resources means that any EDE would have a much greater proportional effect than in the case of a larger conventional generator.

d. Commission Determination

40. As an initial matter, we note that the Midwest ISO proposal is intended to implement a specific technology, the fly-wheel technology developed by Beacon Power,

[19] Midwest ISO Answer at 9 (citing Xcel Comments at 11).

so that it can provide a specific reserve product, regulating reserves. While we appreciate the need to integrate this new technology into the operations of the Midwest ISO in a timely manner, as the Midwest ISO proposes, we do not want to foreclose the consideration of other storage technologies and the use of those technologies for other reserve products, such as contingency and spinning reserves. It is for this reason that we are requiring the Midwest ISO to evaluate other storage technologies for all reserve products, as discussed further below.

41. We conditionally accept the Midwest ISO's proposed revisions to its Tariff regarding Stored Resources.[20] We expect that the proposed tariff revisions will allow the fly-wheel technology to participate in the Midwest ISO regulating reserve market as Stored Resources on a comparable basis to other resources that provide regulating reserves.

42. We consider the operating requirements proposed by Midwest ISO for Stored Resources to be comparable to other resources providing Regulating Reserves because they must be deployable in a manner comparable to other resources and they must perform within the same response times as other resources. We also consider their compensation to be comparable to other resources. As the Midwest ISO details in its answer, Stored Resources are paid for providing Regulating Reserves, whether the reserves are provided in the regulation up or regulation down mode. Therefore, Stored Resources are paid based on the reserves they provide in the same way other reserve providers are compensated for the Regulating Reserves provided.

43. To ensure that market participants better understand how this new technology will be integrated into the Midwest ISO markets, we require that the Midwest ISO provide the clarifications requested by Ameren[21] with respect to how the Hourly Regulation Limits, Hourly Maximum Energy Storage Level, Hourly Maximum Energy Charge Rate and Hourly Minimum Energy Discharge Rate are included in Stored Resource Regulating Reserve Offers in a compliance filing to be submitted within 30 days of the date of this order.

44. We find that the Midwest ISO proposal that Stored Resources can set market-wide regulating reserve prices in certain circumstances is reasonable. As the Midwest ISO

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[20] We note that the Midwest ISO's proposed tariff provisions incorporate many of the features of the New York Independent System Operator, Inc. proposal for integrating Stored Resources. *See New York Indep. System Operator, Inc.*, 127 FERC ¶ 61,135 (2009).

[21] Ameren at 7.

explains, Stored Resources would set prices if the clearing price for Stored Resources is less than the clearing price for non-Stored Resources, resulting in the entire market-wide Regulating Reserve requirement clearing on Stored Resources. We also consider the Midwest ISO's explanation that it is possible for the market-wide Regulating Reserve price set by Stored Resources to be less than zonal spinning reserve prices to be both reasonable and responsive to comments. We note that locational differences in reserve prices have been a feature of the Midwest ISO Ancillary Services Market since its inception. Zonal prices are by definition higher than market-wide prices since they represent prices in constrained zones. It is therefore possible and reasonable for market-wide regulation prices to be lower than zonal reserve prices.

45. We understand Ameren's concern to be that Stored Resources will be paid for providing 60 minutes of Regulating Reserves when, in fact, they are not providing Regulating Reserves over the entire hour. We do not expect this scenario will occur because Stored Resources will be compensated in the same way as other reserve providers. Therefore, if a Stored Resource was paid for providing 30 MW in the day-ahead market, and it then did not provide regulation down and regulation up service for every five-minute interval during the hour in the real-time market, the Stored Resource would have to buy back the deficiency.[22]

46. In response to Ameren, we do not expect that Stored Resources will negatively impact reliability since the Midwest ISO will reduce the dispatch of Stored Resources if that is necessary to manage transmission constraints, to maintain operating reserve requirements, and to satisfy energy demand and/or maintain reliable operating conditions.[23]

47. With regard to the issues concerning the Excessive/Deficient Energy Deployment Charge that Xcel raises, we do not expect that Stored Resources will pay reduced penalties compared to conventional resources. We consider a penalty that reduces the regulation credits received by Stored Resources for amounts above or below the tolerance band to be comparable to the penalties for conventional resources. Stored Resources will be providing only Regulating Reserves, and therefore a penalty that puts revenues from

[22] Market participants will be charged the Hourly Ex Post MCP for any negative difference between the time-weighted average of the real-time cleared amounts for regulating reserve in an hour and their day-ahead schedule for regulating reserve in that hour. Midwest ISO Tariff, section 40.3.3.b.iii, Third Revised Sheet No. 1107 and First Revised Sheet No. 1108.

[23] *See* Tariff revision provided in the May 12 Filing, Section 40.2.7A.a, Third Revised Sheet No. 1024.

Regulating Reserves at risk for deviations is comparable to assessing penalties on conventional resources based on their actual injections.[24]

48. We consider the Midwest ISO's explanation for not providing real-time revenue sufficiency guarantee credits to Stored Resources to be reasonable. We agree with the Midwest ISO that since revenue sufficiency guarantee credits are based on the start-up, no-load, and incremental costs of units committed in the Reliability Assessment Commitment processes, and since Stored Resources are not included in these costs, it is reasonable that Stored Resources not receive revenue sufficiency guarantee credits.[25]

2. Stored Resources Mitigation – Reference Level

a. Midwest ISO Proposal

49. The Midwest ISO proposes in the January 22 Filing a method the Market Monitor developed for calculating economic withholding reference levels for reserves that Stored Resources offer. This method calculates Stored Resource reference levels based on the marginal costs of the energy that Stored Resources consume to maintain stored energy. It measures those levels through the Hourly Energy Storage Loss Rate[26] multiplied by the

[24] With respect to the Midwest ISO's statement in its answer that it does not consider cleared regulating reserves to be a burden and therefore cleared regulating reserves are not an appropriate basis for determining deviations, we note that the currently-effective tariff calculates deviations for Stored Resources based on the sum of the energy dispatch and regulation deployment in each dispatch interval. Accordingly, to the extent that Stored Resources do not follow regulation deployment instructions, the Tariff makes these deviations part of the Excessive/Deficient Energy Deployment Charges. We therefore expect that the Midwest ISO will assess Excessive/Deficient Energy Deployment Charges based on the Tariff.

[25] After submitting its tariff revisions in Docket No. ER09-1126-000, Midwest ISO submitted tariff revisions in Docket No. ER09-1719-000. In the latter filing, Midwest ISO asserted that stored energy resources do not require start-up, no load, hourly economic minimum limit, or emergency minimum values and as such should not be included in the Reliability Assessment Commitment. On November 17, 2009, the Commission conditionally accepted Midwest ISO's revisions in *Midwest Indep. Transmission Sys. Operator, Inc*., 129 FERC ¶ 61,125 (2009). We note that certain tariff revisions submitted in this proceeding (see Second Revised Sheet No. 913) were subsequently further revised in Docket No. ER09-1719-000.

[26] The Hourly Energy Storage Loss Rate is defined as the amount of energy consumed in MWh over a five minute time period to maintain a Stored Energy Resource

(continued…)

LMP the owner must pay to consume that energy.[27] The proposed method then divides this cost for providing the ancillary service by the amount of the service offered to calculate the marginal cost per unit. Finally, the Market Monitor proposes to multiply the marginal cost by two to reflect the expectation that Stored Resources may not clear in all intervals during the hour because not all offers may be economic in the jointly optimized Energy and Ancillary Services Markets in every five-minute interval.

50. The Midwest ISO proposes in its May 12 Filing to delete the reference to the Hourly Energy Storage Loss Rate from the Stored Resource reference level calculation and to replace it with the Reference Energy Storage Loss Rate, which is defined to be equal to the mean of the Hourly Non-Excessive Energy per MW of Regulating Reserve, in all hours in which the Resource was scheduled to provide Regulating Reserves in the prior 90-day period.

b. Comment/Protests

51. Beacon Power disagrees with the formula used to calculate Stored Energy Resources reference levels in the January 22 Filing. Beacon Power argues that the formula used to calculate the reference level for a Stored Resource will reflect an artificially low level of marginal costs and will subject the Stored Resource to unwarranted mitigation of its bid to enter the regulation market. Reference levels are intended to reflect the marginal cost of an energy resource, including its legitimate risk and opportunity costs or justifiable technical characteristics for physical offer parameters.

52. Beacon Power argues that the marginal cost of a Stored Resource can be influenced by two different costs: (1) the energy losses associated with maintaining a Stored Resource's maximum energy storage level while "idling" before being called upon to deploy energy, and (2) the energy losses incurred once a Stored Resource is deployed, which is the energy used to convert electricity from the grid into stored energy and vice versa. Beacon Power argues that only the former cost, called the Hourly Energy Storage Loss Rate, is used to calculate a Stored Resource's reference level in the January 22 Filing. In other words, when the Midwest ISO designed its "Reference Energy Storage Loss Rate," it failed to include the costs incurred to convert energy from the resource to the grid and vice versa.[28] Beacon Power argues that the Market Monitor

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at its maximum energy storage level assuming no operating reserve deployment.

[27] The proposal uses the highest day-ahead LMP for the operating day to reflect the fact the supplier does not know the real-time LMP at the time it formulates its offer.

[28] In the context of Regulation, Beacon claims that "conversion" is the cost incurred to transform electrical energy into stored energy and back to electrical energy in

(continued…)

mistakenly concluded that a Stored Resource's incremental production or consumption is zero on average.[29] Beacon Power asserts that this contradicts a primary tenet of thermodynamics: that energy cannot be stored or released without incurring conversion losses. As a result, Beacon Power suggests changing the formula at section 64.1.4(d) to include idling losses *plus* conversion losses when determining a Stored Resource's reference level.

53. Beacon Power approves of the revisions the Midwest ISO made in the May 12 Filing[30] to integrate Stored Resources more effectively into the Ancillary Service Market. Beacon Power had stated that the formula used to calculate the reference level for a Stored Resource would reflect an artificially low level of marginal costs and would subject the Stored Resource to unwarranted mitigation. Beacon Power states that the revisions ensure that Reference Levels are based on the true marginal cost of Stored Resources.

c. Commission Determination

54. We conditionally accept the Market Monitor proposal for mitigating Stored Resources, as modified in the May 12 Filing, including the setting of a reference level for Stored Resources economic withholding. We note that the formula used to calculate the Reference Level for a Stored Resource, as described in the May 12 Filing,[31] does not reflect the methodology explained by the Market Monitor in the January 22 Filing. Specifically the formula does not divide the Reference Level Storage Loss Rate and Expected Storage Loss Price product by the amount of reserves offered, and then multiply this amount by two, as the Market Monitor describes in the January 22 Filing.[32] We require the Midwest ISO to file this formula to reflect the specification provided in the January 22 Filing in the compliance filing to be submitted within 30 days of the date of this order.

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satisfaction of regulation market deployment instruction. For example, in the case of a flywheel, electrical energy is converted into mechanical kinetic energy and the cost of conversion losses significantly exceeds idling losses.

[29] *See* January 22 Filing Transmittal Letter at 4.

[30] *Id.*

[31] Midwest ISO Tariff, Second Revised Sheet No. 1409.

[32] January 22 Filing Transmittal Letter at 4.

55. We understand that this is a relatively new technology that requires more experience and data to determine whether the proposed Reference Level, which is based on the Market Monitor's assumption that Stored Resources will charge in one-half of the dispatch intervals in an hour, is appropriate. Accordingly, we direct the Market Monitor to file with the Commission, six months after the Stored Resource previsions are implemented, an informational filing that evaluates the actual operating characteristics of Stored Resources and that assesses whether the Reference Level continues to be appropriate in light of operational experience. If at any time before that date the Market Monitor finds that the Reference Level is resulting in unjust and unreasonable rates, the Market Monitor should inform the Midwest ISO and its stakeholders and the Midwest ISO should file revisions to the Reference Level.

3. Long Term Storage

a. Midwest ISO Proposal

56. Midwest ISO proposes in its May 12 Filing to specify that a Stored Resource is considered a short-term storage device that would only be able to provide Regulating Reserves and not Contingency or Capacity Reserves. This determination is made based on the characteristics of short-term storage devices.

b. Comments

57. Xcel protests the Midwest ISO's revised definition of Stored Resources in May 12 Filing. Xcel contends that limiting Stored Resources in this way does not eliminate barriers to entry for long-term storage technologies. It lists three categories of long-term storage technologies: large scale (>200 MW) capacity which can provide 6-12 hours of energy, smaller scale nickel batteries which provide 6-12 hours of energy, and aggregated battery storage from plug-in electric vehicles which have a number of advantages such as storing off-peak energy for peak demand use, the dispatchable nature of long-term storage technologies allowing them to supply energy, load, Regulating Reserves, and Spinning Reserves, and to supply energy in times of unexpected shortage to mitigate price volatility and other economic inefficiencies. Xcel asserts that incorporating long-term storage technologies into the Midwest ISO's SCED algorithm, would lower the total cost of energy.

58. IPL comments that the January 22 Filing creates potential barriers to entry for new Stored Resource technologies. In addition to requesting a deferral of the effective date for the January 22 Filing until January 1, 2010 and a continuing stakeholder-involved analysis of Stored Resources and new technologies, IPL argues that the Tariff is not flexible enough to include new technologies in the Ancillary Service Market. IPL is concerned that the filing will pigeonhole technologies and prevent the most efficient utilization of their unique characteristics. It requests that a broader range of resources be allowed to register. IPL is primarily concerned with the designation of a battery as a

generation resource, demand response type-II, or a Stored Resource because some batteries may meet the criteria to be registered as one, some, or all of these designations.

59. IPL argues that determining payments to batteries from their hourly integrated base point, or midpoint, of the target set point results in insufficient compensation because batteries can charge and discharge onto the grid, and their midpoint is unlike traditional generators. IPL states that the base point of a target set point of 30 MW would be 15MW for a Generation Resource. Since batteries can charge *and* discharge onto the grid the base point for a battery with a target set point of 30 MW is 0 MW. In this example, the battery would receive $0 as the market clearing price. IPL argues that basing the payment on the market clearing price – the midpoint – is therefore unjust.

60. IPL discusses the transportability of batteries and the Midwest ISO's failure to recognize this fact in constructing the Ancillary Service Market. Transportability allows a battery (such as a plug-in hybrid electric vehicle) to regulate where it is needed most. IPL asserts that the business rules must be changed to allow flexibility for the entrance of new technologies with beneficial characteristics, like transportability, into the Ancillary Service Market.

61. IPL suggests caution when creating the software for incorporating Stored Resources into the Ancillary Service Market. While IPL views favorably anything that is accommodating to Stored Resources, it is concerned that future Stored Resources will be excluded and will be limited in their ability to improve efficiency if software is changed without giving full consideration of future developments.

c. Answers

62. The Midwest ISO states that it appreciates Xcel's suggestion that the Midwest ISO should broaden the scope of the Stored Resource program. As currently proposed, the program complies with the directives in the Commission's Ancillary Services Market Order as well as the Commission's December 18 Order. The Midwest ISO believes that the appropriate forum for pursuing the modifications that Xcel seeks is the on-going Midwest ISO stakeholder process.

63. The Midwest ISO states that deferral of implementation of the Stored Resource provisions until January 1, 2010 will allow continued stakeholder discussions in which IPL's concerns about barriers to entry for new technologies can be addressed.

d. Commission Determination

64. As discussed earlier in this order, we recognize that the tariff revisions proposed in Docket No. ER09-1126-000 are specifically designed for a specific technology that provides short-term Stored Resources only in the regulating reserve market. As discussed above, these provisions will aid the integration of this new technology.

However, we share Xcel's and IPL's concern that the specificity of these provisions may be insufficient to address barriers to the participation of other new technologies and storage devices, including those providing longer term storage, in the Midwest ISO's markets.[33] We understand that the Midwest ISO has had stakeholder discussions to consider concerns regarding long-term storage.[34] In the Ancillary Services Market Order, the Commission directed the Midwest ISO to "evaluate, through stakeholder discussions, adjustments to operating requirements and A[ncillary] S[ervices] M[arket] procedures that will remove barriers to comparable treatment of . . . new technologies in the regulating reserve markets."[35] Accordingly, we direct the Midwest ISO to submit an informational report to the Commission within 60 days of the date of this order on its efforts to incorporate long-term storage resources into its markets and its evaluation of barriers to the integration of these technologies into its markets. Consistent with the Ancillary Services Market Order, we also require the Midwest ISO to submit revised tariff sheets, if adjustments are proposed, in a compliance filing to be submitted concurrently with the 60-day informational filing.

The Commission orders:

(A) The Midwest ISO's January 22, 2009 compliance filing in Docket No. ER07-1372-014 is hereby accepted as discussed in the body of this order.

(B) The Midwest ISO's proposed tariff revisions in Docket No. ER09-1126-000 are hereby conditionally accepted, subject to further compliance, as discussed in the body of this order.

(C) The Midwest ISO is hereby directed to submit a compliance filing within 30 days of the date of this order, as discussed in the body of this order.

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[33] For example, the proposal removes existing provisions that could allow a Stored Resource to submit contingency reserve offers. We note that the Commission agreed with the Midwest ISO in a previous order that to the extent stored energy resources meet the eligibility requirements for regulating reserves, they should meet the requirements for providing contingency reserves. December 18 Compliance Order, 125 FERC ¶ 61,319 at P 26.

[34] Midwest ISO May 12, 2009 Filing, Docket No. ER09-1126-000, at 3.

[35] Ancillary Services Market Order, 122 FERC ¶ 61,172 at P 365.

(D) The Midwest ISO and the Market Monitor are hereby directed to make informational filings, as discussed in the body of this order.

By the Commission.

(S E A L)

Nathaniel J. Davis, Sr.,
Deputy Secretary.