

Memorandum

To: Energy Imbalance Market Governing Body

From: Keith Casey, Vice President, Market & Infrastructure Development

Date: August 30, 2017

Re: **Decision on extending the option to EIM entities to use generator contingency and remedial action scheme modeling**

This memorandum requires EIM Governing Body action.

EXECUTIVE SUMMARY

Management proposes to enhance the real-time market's security constrained economic dispatch models, used for the western energy imbalance market, to include the potential loss of individual generators and to model remedial action schemes. Remedial action schemes are designed to automatically disconnect generators or load in the event of an unexpected loss of service of a transmission line to prevent system overloads.

Currently, the real-time market models the potential unexpected loss of transmission lines to ensure that electrical flows do not exceed transmission system limits, but does not model the potential unexpected loss of a generator. The real-time market currently only has limited means to account for remedial action schemes and does not explicitly model them. As a result, grid operators must manage the potential for generator contingencies and remedial action schemes mostly through manual actions.

Management's proposal to include the unexpected loss of a generator and remedial action schemes in the ISO market models will improve the market dispatch, decrease out-of-market actions, and appropriately price each generator's contribution to congestion in the market. The proposed enhancements will also allow the market to more fully utilize generation that is part of a remedial action scheme.

Management proposes to apply this functionality to the ISO balancing area and to provide EIM Entities the option to use this functionality in their respective balancing areas. Therefore, Management is seeking approval from the EIM Governing Body under its primary authority to allow EIM entities the option of using the new functionality. The EIM Governing Body also has the option to provide advisory input to the ISO Board of Governors regarding the general design of the proposed real-time market modeling enhancements.

Management proposes the following motion:

Moved, that the EIM Governing Body approves the proposal to allow EIM Entities to have the option to have the ISO model generator contingencies and remedial action schemes in their respective balancing areas; and

Moved, subject to Board of Governors' consent, that Management is authorized to make all necessary and appropriate filings with the Federal Energy Regulatory Commission to implement the proposed tariff change.

BACKGROUND

ISO and EIM balancing area operators must plan in order to meet unscheduled changes in system configuration and generation dispatch in accordance with North American Electric Reliability Corporation (NERC) and Western Electricity Coordinating Council (WECC) requirements. Generators must be operated at output levels that ensure that transmission lines are not overloaded if generation or transmission is unexpectedly lost. The ISO and EIM balancing area operators accomplish this by establishing and operating within system operating limits to ensure system security.

A secure transmission system is able to withstand the unexpected loss of transmission or generation, including generation loss resulting from remedial action scheme operation. Remedial action schemes are network upgrades that detect and automatically disconnect generation or load on the system in the event of a transmission contingency.

Currently, the potential for generator contingencies are not considered by the real-time market's security-constrained economic dispatch. This requires ISO and EIM balancing area grid operators to constantly monitor the potential for generator contingencies that could result in electrical flows exceeding operating limits. Grid operators take manual actions to prepare the system so that electrical flows do not exceed limits in the event of a generator contingency. These manual actions consist of out-of-market interventions based on offline studies and manual review and analysis. Similarly, the current market does not model remedial action scheme operation.

Remedial action schemes are becoming more common in the ISO and energy imbalance market balancing areas because they enable the transmission system to relatively inexpensively accommodate new renewable generation. Remedial action schemes enable new generation without having to increase transmission capacity because they typically are designed to trip-off the generator if a transmission line it is connected to is unexpectedly lost. Consequently, no additional redundant transmission capacity is needed to ensure electrical flows are not exceeded if there is a transmission contingency. Remedial action schemes involve approximately 19,800 MW of generation within the ISO balancing area alone.

Because the real-time market currently has only limited means to account for remedial action schemes, it tends to overly constrain the output of the generators connected to them.

This requires grid operators to manually dispatch these generators above the market dispatch to take full advantage of the remedial action schemes.

PROPOSAL

Management proposes enhancements to include potential generator contingencies and remedial action scheme operation into the real-time market model.

The ISO will select the specific generator contingencies and remedial action schemes to model as required to reliably manage its balancing area as based on engineering analyses and outage studies. EIM Entities would have the option to select the potential generator contingencies or remedial action schemes that the real-time market will model in their balancing area, but would not be required to do so. This is consistent with their existing authority to determine specific transmission constraints that the market models in their respective balancing areas.

These enhancements will enable the market models to calculate how electrical flows will change if one of these events occurs. This modeling will ensure electrical flows will not exceed transmission limits by reflecting the potential change in flows in locational marginal prices, which will ensure generators are dispatched to appropriate output levels. Other independent system operators and regional transmission operators employ similar methods to account for the loss of generation in their markets.

If a generator unexpectedly trips off, frequency responsive devices on the other generators throughout a balancing area automatically increase the output of these other generators to replace the lost generation. Management's proposed enhancements will calculate the change in electrical flows on the transmission system, given this automatic response, and determine the appropriate amounts of transmission capacity to reserve to account for this potential change in flows. This modeling uses the same methodology that grid operators currently use as part of manual studies.

The proposed enhancements incorporate the impact of these potential changes in electrical flows into the congestion component of locational marginal prices. For example, if additional transmission capacity needs to be reserved to account for the potential changes in electrical flows when a generator is lost, the congestion component of the generator's locational marginal price will increase, decreasing the generator's locational marginal price. This will result in the market dispatching the generator to a lower output than it otherwise would have, which frees up additional transmission capacity to prepare for the potential unexpected loss of the generator.

As described above, the proposed enhancements will also account for generators that are connected to remedial action schemes that automatically trip the generator off when transmission is lost. Transmission generally has multiple lines so transmission capacity remains if an individual line is lost. Secure grid operation typically requires generators to be operated at output levels that will not instantaneously overload transmission if an individual

line is lost. Since a generator that is part of a remedial action scheme will automatically trip-off if transmission is lost, the enhanced modeling will not reserve capacity on transmission connected to the remedial action scheme to account for this generator's output. This will decrease the congestion component of the generator's locational marginal price, increasing the generator's locational marginal price. This will result in the market dispatching the generator to a higher output than it otherwise would have, more fully accounting for the remedial action scheme in the market.

The enhanced modeling will also account for any load that is also connected to the remedial action scheme.

POSITION OF THE PARTIES

Stakeholders generally support Management's proposal because it will reduce out-of-market actions by modeling generation contingencies and remedial action schemes in the market. The only comments received from EIM participants involved requests to clarify implementation details.

The Market Surveillance Committee provided a formal opinion on Management's proposals, which is included as Attachment A.

CONCLUSION

Management requests the EIM Governing Body approve allowing EIM Entities the option to use the generator contingency and remedial action scheme modeling proposal described above in their respective balancing areas. This new modeling functionality will improve the energy imbalance market dispatch, decrease out-of-market actions, and appropriately price each generator's contribution to congestion in the market.