Transmission Constraint Relaxation Parameter Revision

ISO Straw Proposal

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California Independent System Operator
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1.0 Purpose

The ISO proposes to modify the real-time scheduling run transmission constraint relaxation parameter from $5,000 to $2,500. The ISO has determined that the $5,000 value uneconomically constrains the real-time dispatch (RTD) optimization thereby producing high shadow prices on congested and relaxed transmission constraints in real-time dispatch (RTD). This modification will allow for a more economic dispatch, while continuing to provide an operationally feasible solution.

2.0 Summary

The ISO has observed that high shadow prices on transmission constraints and corresponding high locational marginal prices (LMPs) in real-time, coupled with reduced limits of transmission constraints, are causing high real-time congestion offset (RTCO) cost. While resources are being dispatched at these high shadow prices, there is little or no materially meaningful reduction in overloads on a transmission constraint through such dispatches. Stated differently, high market costs are being incurred without providing any meaningful reduction of overloads on the congested transmission constraint that such pricing is designed to relieve. Generally, the RTD is sensitive to the impact of the transmission constraints relaxation parameter because it is constrained due to ramping and more limited dispatch options in the real-time given real-time system conditions.

To address these uneconomic outcomes, the ISO proposes to reduce the scheduling run parameter from $5,000 to $2,500. Analysis has shown that reducing this parameter reduces the high transmission constraint shadow prices while still maintaining effective flow mitigation through market optimization.

The ISO seeks to implement the proposed changes as soon as possible after completing this stakeholder process.

3.0 Background

When the market optimization attempts to meet the objective of balancing supply and demand subject to relieving a transmission constraint, there are times when operationally reasonable economic measures are exhausted, yet the flow on the transmission constraint cannot be resolved. In such cases, the optimization must rely on uneconomic adjustment parameters to produce a market solution. Prior to the start of the new market, the ISO conducted an extensive stakeholder process to establish the initial uneconomic adjustment parameters. On October 28, 2008, the ISO Board of Governors approved

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the policy related to these parameters. In approving the uneconomic adjustment parameter policy, the ISO committed to consider revising the parameter values only in the event the parameter was found to be causing a significant unintended consequence in terms of either software performance or market results.

“Once these values are published in the BPM and incorporated into the software the ISO would revise a parameter value only in the event that that parameter value is found to be causing a significant unintended consequence in terms of either software performance or market results.”

Ultimately, the uneconomic adjustment parameters were filed and, depending on the specific parameter, were approved by FERC and/or incorporated into the Market Operations BPM Section 6.6.5.

One of the uneconomic adjustment parameters established was the scheduling run transmission constraint relaxation threshold of $5,000/MW beyond which the software will relax a transmission constraint rather than continue to re-dispatch resources to relieve congestion. The pricing run parameter was established to match the bid cap; currently set to $1,000/MW. As described in the October 28, 2008 Board memo, the pricing run parameter established at the bid cap does not suppress economic solutions that occurred, resulting in an economic cost of relieving the constraint that could be between the pricing run parameter of $1,000/MW and the scheduling run parameter of $5,000/MW.

There are other parameters associated with adjusting a resource beyond its economic bid range to ensure the economic bids are used before price-taker self-schedules or higher priority self-schedules using existing transmission contract (ETC) rights or transmission ownership rights (TOR) are adjusted. The scheduling run parameter for adjusting price-taker self-scheduled supply is -$1,100 and between -$3,200 and -$4,500 for ETC/TOR self-scheduled supply. It is possible an ETC/TOR self-scheduled supply can be relaxed before a transmission constraint is relaxed. In reality, however, this may not happen due to low shift factors of intertie schedules. Procedural steps are available to manually adjust the intertie schedules if necessary. For the pricing run, the adjustment parameter for adjusting supply is established at the bid floor currently set at -$30. If and when the bid floor is modified, the parameter will be modified accordingly.

### 4.0 Recent Market Events (What has changed?)

In August and September 2012, real-time congestion shadow prices on some constraints were at $4,000/MW to $5,000/MW for a large number of intervals. High real-time

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shadow prices were caused by a combination of: 1) increased frequency of constrained conditions in real-time, 2) increased amounts of unscheduled flow, 3) operational margin, and 4) reduced or lack of controls to relieve the constraint.

The congestion that occurred in August and September was a result of system conditions that resulted in the increased real-time congestion, due to transmission being more constrained than in day-ahead. The ISO observed that real-time conditions were systematically more constrained due the following conditions:

- Unscheduled flow observed in real-time, not modeled in DA,
- Nomogram limits being more limiting in the real-time due to conditions observed outside the ISO that limit the simultaneous flow limits within the ISO,
- New constraints not previously observed before due to new studies, the outage of SONGS and transmission changes,
- Limitations of available dispatchable resources to relieve constraints due to fires,
- Intertie schedules being locked in HASP and unavailable to relieve congestion in real-time even though intertie adjustment may be the most effective adjustment.

The increased frequency of the high shadow priced congestion, coupled with a combination of reduced limits in real-time versus the day-ahead market, resulted in high real-time congestion offset costs in August. The total congestion offset in August was almost $50 million, which is ten times the normal $5 million a month.

As a result of the increased frequency and market impact as measured by the real-time congestion offset (Figure 1) costs observed in August and September, the ISO finds it necessary to review the transmission constraint relaxation parameters and propose changes where appropriate.
5.0 Proposal: To reduce transmission constraint relaxation parameter in real-time

Real-time transmission constraints appear more constrained than in the day-ahead or HASP price runs due to actual flow conditions, outages and operational margin. The available market options to relieve transmission constraints are significantly limited in real-time due to the reduced amount of resources. This is because there are no options to commit resources in real-time, meaning there is limited ramping available to relieve the constraint. In addition, many other potential options to relieve the constraint, such as adjusting intertie schedules, are no longer available in the economic range. As a result, the cost to relieve the transmission congestion in real-time is higher and occurs more frequently than in the day-ahead market.

The transmission constraint relaxation parameters are being utilized more frequently than originally anticipated, contributing to the higher real-time congestion costs. In order to reduce the financial impact of frequent high shadow price congestion occurring in real-time, the ISO proposes to reduce the real-time scheduling run shadow price from the current $5,000 to $2,500. This recommended change requires a change to section 27.4.3.1 of the tariff.
27.4.3.1 Scheduling Parameters for Transmission Constraint Relaxation

The internal Transmission Constraint scheduling parameter is set to $5000 per MWh for the purpose of determining when the SCUC and SCED software in the IFM and RTM will relax an internal Transmission Constraint rather than adjust Supply or Demand bids or Non-priced Quantities as specified in Sections 31.3.1.3, 31.4 and 34.10 to relieve Congestion on the constrained facility.

This proposed change will only be applied to real-time in recognition of more limited congestion relief available in real-time. The real-time transmission congestion is more susceptible to extreme outcomes because of the reduced controls available to relieve the congestion. The transmission constraint relaxation parameter for day-ahead and HASP will remain at $5,000.

While the proposed change to the real-time transmission constraint relaxation parameter can be expedited without changes to the software, other longer term modifications to the transmission constraint relaxation parameters that would require additional software enhancement should be considered. For example, a tiered approach based on voltage levels may be appropriate with 500 kV constraints having the highest relaxation cost and 60 kV the lowest, recognizing the reliability impact and available resources to mitigate congestion at different voltage levels. Another approach could be using a demand curve that recognizes operating impacts of different magnitudes of relaxations versus the current approach of one relaxation parameter.

6.0 Considerations

The first consideration is reliability. Therefore, the ISO believes it is necessary to ensure that the proposed parameter change still allows the market runs to reasonably dispatch all available effective resources to resolve any congestion on all modeled and enforced transmission constraints. To this end, sensitivity studies were performed for select cases to confirm that no reasonably effective resources are left out from dispatch because of the penalty value changes. The second consideration is market efficiency or cost. Through sensitivity studies, the ISO will assess the impact of the proposed reduced transmission constraint parameters on the market costs.

7.0 ISO/RTO transmission constraint relaxation practice review

All ISO/RTOs perform competitive transmission congestion management. As a result, all ISO/RTOs must have a similar type of parameters that establish the reasonable limit for market relief of congestion. Therefore, it is appropriate to compare and consider the transmission constraint parameter thresholds used at other ISO/RTOs.

PJM Interconnection

PJM transmission constraints can be relaxed by maintaining their shadow prices not exceeding so-called market based transmission constraint limits. At this time, we do not have information on how to set such limits for different transmission constraints and their
actual values. However, these values are used in the market runs for the determination of both the resource MW schedules and their locational prices.

NYISO

On April 2007, NYISO filed with FERC to establish a $4,000 shadow price to reflect their locational based marginal cost during transmission shortage. This value is used in the market runs for the determination of both resource MW scheduled and their locational prices.

MISO

The relaxation of constraints, including transmission constraints, in MW scheduling is governed by a set of configurable penalty prices, similar to the ISO scheduling run with the exception of regulating reserve and operating reserve for which their requirement violations are governed by a demand curve. The set of penalty price current values have not been found in their website. In the past, under penalty price constraint relaxation, the market prices were set by the maximum value of the supply curve, i.e. last economic signals. However, the shadow prices of the transmission constraints being set under each approach according to the MISO are too low and do not truly reflect the cost of reliability. Since February 2011, MISO used a new set of pricing values, called marginal value limits (MVL), to govern the shadow prices for transmission constraints that have been relaxed.

- $3,000 for IROL (Interconnection Reliability Operating Limit) 500 kV constraint
- $2,000 for SOL (System Operating Limit) constraint above or equal to 161kV
- $1,000 for SOL constraint below or equal to 131kV
- $500 for SOL constraint below or equal to 69kV

8.0 Market and Reliability Impacts

The ISO has re-run some cases that resulted in congestion shadow prices approaching $5,000/MW. When the transmission constraint relaxation was reduced from $5,000/MW to $2,500/MW, the amount of difference in flow relief observed was very small.

The cost of the limited relief was not significantly affecting reliability. If congestion cannot be relieved at a cost of $2,500/MW, it would be appropriate for the operators to consider other measures to relieve the congestion, including consideration of adjustment of intertie schedules, exceptional dispatch, transmission switching, or outage cancellation.

9.0 Conclusion

A $2,500 transmission constraint relaxation parameter is sufficient to exhaust reasonable operational dispatch solutions in real-time. If additional relief is necessary, the operators should consider other options beyond the market re-dispatch including, intertie schedule adjustment, exceptional dispatch, transmission switching or outage cancellation.
Due to the magnitude of the August and September real-time congestion offset, the ISO management decided to proceed with an expedited tariff modification with a shortened stakeholder review process with an aim to bring the tariff change to the ISO Board of Governors in November 2012. If an expedited tariff change is determined to be appropriate an immediate effective date could be requested so that the real-time scheduling transmission constraint relaxation parameter can be changed in the software immediately.

10.0 Next Steps

The ISO is proposing an aggressive schedule in order to allow us to file required tariff changes at FERC to be effective as early as possible.

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<tr>
<td>10/19</td>
<td>Post straw proposal</td>
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<tr>
<td>10/25</td>
<td>Stakeholder call 10 a.m. to 12 p.m.</td>
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<td>11/1</td>
<td>Comments due*</td>
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<td>11/6</td>
<td>Post draft final proposal</td>
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<td>Week of November 12</td>
<td>Board Approval</td>
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*Please submit comments to TransConstraint@caiso.com