Southern California Edison (SCE) appreciates the opportunity to comment on the California Independent System Operator (CAISO), June 11, Straw Proposal on Full Network Model Expansion\(^1\). Full Network Model (FNM) plays an important role as it provides a foundation for the CAISO to run the day-ahead market and the real-time market.

In general, SCE supports the CAISO efforts on improving modeling accuracy to better reflect physical conditions. As noted by the CAISO, expanding the FNM has the potential to increase the modeling accuracy and minimize the impact of loop flows\(^2\) on the market outcomes. However, the FNM expansion is a major step and should be carefully evaluated to avoid adverse impacts to the current system, the CAISO market, and commercial trading around the CAISO’s markets. Therefore, SCE’s support on this stakeholder process is contingent upon its further review of details of the CAISO proposal.

Below, SCE provides comments on specific items on:

- CAISO Proposed Activity 1: New scheduling point and load aggregation point definitions
- CAISO Proposed Activity 2: Enforcing constraints for both scheduled and physical flow
- CAISO Proposed Activity 3: Include variables in high voltage direct current transmission modeling
- Impacts to CRRs
- Impacts to the LMP calculation

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\(^2\) Page 6 of the straw proposal
(1) **CAISO Proposed Activity 1: New scheduling point and load aggregation point definitions**

The CAISO should clarify any impacts to today’s practice of submitting bids and scheduling power on interties, including the timeline to submit intertie bids, the mapping between today’s intertie points and expanded intertie points and the bid validation process. For example, parties currently schedule power to the CAISO at Palo Verde, will they have to change the way they scheduled (possibly to different or multiple scheduling points) under the CAISO proposal? The CAISO should clarify whether it intends to price in its market optimization all of, or a part of, the set of new scheduling points and load aggregation points outside the CAISO, and how a bid placed at a new generation aggregation point will get cleared and whether that requires the disaggregation of the bid involving generation distribution factors?

Regarding the CAISO statement on

“The expanded model will also allow scheduling coordinators to submit physical or virtual import or export bids at each of the new scheduling points”\(^3\),

While SCE understands that a possible outcome of this stakeholder process (i.e., FNM Expansion) is the modeling capability gained by the CAISO to accept convergence bids on new scheduling points, will such bids be allowed for points that are not part of the CAISO’s cleared and settled market? If yes, the policy question and the market impact of whether participants are allowed to place convergence bids on new interties should be addressed separately, perhaps even in a forum dedicated to this issue.

(2) **CAISO Proposed Activity 2: Enforce constraints for both scheduled and physical flow**

The CAISO proposes to use a dual approach to enforce both scheduled and physical flows on each ISO intertie. Since minimizing the impact of loop flows is one of the main goals of this stakeholder process, the CAISO should assess the marginal benefits on reducing loop flow impacts by enforcing both scheduled and physical flows.

The CAISO should clarify whether the expanded transmission portion (outside the CAISO, excluding interties) will be enforced in the model. In other words, will congestion outside the CAISO be modeled, and if yes, what are the impacts to the CAISO market? Further, we request details on how the

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\(^3\) Page 11 of the straw proposal
LMP congestion components are associated to scheduling limit and physical limit constraints on the same intertie.

In addition, the CAISO should clarify whether loop flows are estimated by AC load flow or DC load flow.

(3) **CAISO Proposed Activity 3: Include variables in high voltage direct current transmission modeling**

SCE believes further information is needed to understand how DC transmission is modeled in FNM, such as a specific example with schematic diagrams showing the modeling difference from the AC system. Without detailed information, SCE can’t comment on the impact or benefit (for example, to unit dispatch and market price) of including variables in DC transmission modeling as currently proposed by the CAISO.

(4) **Impacts to CRRs**

SCE requests the CAISO clarify potential impacts to CRRs. If an existing intertie point is terminated or replaced with new intertie points, how will a CRR, either sourcing or sinking at the existing intertie, will be settled? Is there any impact to a CRR for which the existing intertie is a mid-point along its path? More broadly, how the existing CRR holding with current FNM will be converted to the expanded FNM?

(5) **Impacts to the LMP calculation**

The LMP calculation requires detailed transmission topology information, as well as load distribution information. While the FNM Expansion may provide additional information about the topology and the load external to the CAISO, the CAISO should clarify how such information will be used in the market optimization and assess the impacts to the LMP calculation.

For instance, the system marginal energy component (SMEC) of LMPs today is the weighted average of the LMPs at individual P nodes that represent load internal to the CAISO. Similarly, the marginal congestion component (MCC) and the marginal loss component (MLC) at each node are
calculated based on shift factors with respect to the reference bus which is the distributed load bus\textsuperscript{4}. The transmission topology (e.g., a CAISO-only topology or an expanded transmission topology) can affect the calculation of shift factors as well. With the expanded FNM, the CAISO should identify any impacts to the selection of the reference bus, the shift factor calculation, and the LMP calculation. Depending on the impacts to the LMP calculation, the market impact can be assessed.

Also, how does the CAISO plan to model the output of generation outside of the CAISO? (Will the CAISO obtain information from generators – and if so how? Will the CAISO use “bids” and dispatch the generation economically? What will the CAISO do to model output of use-limited or restricted units such as hydro?) If external generation output is modeled, how will this interact with “contract path” bids at the CAISO boarders? Will modeling both external generation and contract-path schedules result in “double counting” flows on the interties (e.g. the flow from the contract-path schedule plus the flow contribution from the modeled external generation output)?

\textsuperscript{4} Under rare conditions, the CAISO may switch to the distributed generation bus as the reference bus.