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## Memorandum

To: CAISO 33% Renewable Integration Advisory Team  
From: Division of Ratepayer Advocates (DRA); Bob Fagan, Synapse Energy Economics, Inc.  
Date: September 23, 2011

### Re: CAISO 33% Renewable Integration Modeling Next Steps - Recommendations

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DRA and Synapse have two categories of recommendations. The first concerns the number and type of runs, and inputs used for Step 0, 1 and 2 processes under the current modeling framework. They are prioritized according to relative importance, based on their expected effect on modeling results. The second category addresses potential changes to the modeling framework itself, and suggestions for a Phase 2 framework.

#### Number and Type of Runs, and Updated Inputs to Step 0, Step 1 and Step 2 Processes

1. Discuss and determine the framework for the updated analysis to be completed by CAISO during September 2011 – March 2012. This includes, but should not be limited to a) whether to use the same structure (Step 0, Step 1, Step 2) as was used for the July 1, 2011 results filing, and 2) a determination of the number and the type of scenarios and sensitivities to run.
  - a. DRA recommendation: TBD.
2. Load-side inputs to reflect updated 2011 CEC forecast, based on the August 2011 preliminary CED report or more recent CEC updated information. The modeling assumptions for peak demand and energy demand should be fully transparent to the stakeholder community and well-documented.
  - a. Determine which base forecast is to be used – 50/50 (weather normalized), or 1-in-10 high temperature peak case, or some other basis.
  - b. Determine the level of EE resources to be used in the base case, using “committed” vs. “uncommitted” resources as the framework for discussion.
  - c. Establish if demand response resources are to be included as reduced demand, or as supply-side resources.
  - d. Provide comprehensive data and full transparency to allow for clear understanding of the options available for load-side inputs.
  - e. Full scenario vs. “sensitivity” – discuss differences and determine how many load-side cases will be utilized.
  - f. DRA recommendation: use mid-case 90/10 peak forecast, mid-case 50/50 energy forecast, with all committed and uncommitted energy efficiency, in alignment with State policy on procuring EE resources first.
3. Supply-side resource inputs to reflect LCR results, and other changes since July 1 filing.
  - a. Determine the IOU territory-specific incremental needs from the LCR analysis.



- b. Confirm or modify the use of the same OTC retirement scenarios as is present in the July 2011 testimony.
  - c. Confirm or modify the use of Trajectory case renewable supply portfolio. Compare w/ Joint IOU portfolio recommendation. Provide transparent comparison of differences, and discuss rationale for, and effects of, choosing between the two.
  - d. Discuss and document inclusion of any incremental supply resources not in place in July 1 analysis – e.g., Oakley CC unit.
  - e. DRA recommendation: use same Trajectory case renewable portfolio, use most recent updated information on likely new resources. Provide clear documentation of resource base use.
4. Step 1 Analysis Update
- a. Discuss Step 1 fundamentals, determine if changes are required.
  - b. Discuss impacts of solar, wind and load forecast error.
  - c. Discuss flexibility characteristics of existing resource base.
  - d. Discuss solar, wind and load profiles.
  - e. DRA recommendation: use improved forecast errors (vs. July 1 errors) associated with anticipated 30-minute scheduling window by 2020 in baseline new runs. Sensitivity using improved solar profiles.
5. Market structure changes. Consider and model, especially, shorter scheduling timelines (60 min. vs. 30 min. or 15 min.) and changes to self-scheduling rules, WECC-wide and within California / CAISO control area. Determine how Step 1 and Step 2 processes / inputs must change to reflect this. Consider and model the effect of long-term “market enhancements”. E.g., from the CAISO Phase 2 document:

“Another important element to inform long-term needs is what changes are happening in the wholesale markets in the west, particularly around interchange schedule timelines and tagging. With this experience and context, the ISO and its stakeholders can consider if fundamental changes to the market are necessary, including, for instance, implementing a 15-minute market as was discussed in the initial straw proposal.” (CAISO, Renewables Integration Market Vision and Roadmap, Revised Straw Proposal, Phase 2, 8/29/11, p40)

This includes:

- a. Comprehensive discussion of how these changes would/should affect the Step 1 and Step 2 processes.
  - b. Interchange scheduling timeline changes.
  - c. Broader changes to consider: possible west-wide Energy Imbalance market effects, and potential balancing area coordination / consolidation effects – in-state control areas, and between CAISO and out-of-state control areas.
  - d. DRA recommendation: Provide comprehensive assessment of the effect of these changes by 2020 and include in baseline new runs. Allow/specify correct model representation of a system with improved flexibility characteristics because of market structure modifications.
6. Transmission
- a. Discuss whether to include transmission that allows for all 3 Helms pumps to be available in 2020 (Fresno area reliability upgrades, or similar).



- b. Discuss other key transmission projects that affect this analysis and are likely to be approved, but are not in July 1 modeling.
- c. Consider as sensitivity – other transmission projects (e.g., Pacific Northwest – CA, and/or increased transfer from the Desert Southwest ) likely to have significant effect on resource need.
- d. DRA recommendation for core scenarios: at minimum, include transmission to allow 3 Helms pumps.

**Modeling Structure and Framework for Phase 2**

The stakeholder group should discuss and consider changes to the existing modeling structure. The set of analyses completed by CAISO used the PLEXOS model running hourly simulations, and included load following and regulation and operational ramp constraints determined through the Step 1 statistical modeling process. Alternative model structures could provide incremental value / flexibility, and/or could serve as a validation for results. For example:

- 5-minute dispatch modeling. Alter modeling structure. The existing real-time market uses a 5-minute energy dispatch. Omit load-following up and down constraints, modify net load inputs to reflect 5-minute values (determined in Step 0), and run select weeks using a 5 minute dispatch.
- 30-minute dispatch modeling. Retain same modeling structure. Revise Step 1 processes to develop 30-minute load following and regulation requirements. Loosen intertie scheduling to 30 minute timeframe.
- 15-minute dispatch modeling. Retain same modeling structure. Revise Step 1 processes to develop 15-minute load following and regulation requirements. Loosen intertie scheduling to 15 minute timeframe.

Phase 2 is intended to address the form of solutions that could meet the need determined in Phase 1. We suggest that the Fall/Winter 2011-2012 stakeholder process fully consider the option to have CAISO’s Step 2 process directly incorporate what would otherwise be Phase 2 alternatives such as DR and different types of storage, in addition to conventional CT resources. While the detailed costs for some of these options are uncertain, they are generally known at least to an order of magnitude that will suffice for this process. We recommend they be directly incorporated into Step 2 as a potential resource option.

Here is an initial suggestion for Phase 2 incremental resource types to include in the Step 2 analysis:

Resource Type	Description	Installed Costs	Key Characteristics
Demand Response I	Low Cost	TBD, range <\$300/kW	Limited duration
Demand Response II	Med Cost	TBD, range \$300-\$600/kW	Medium duration
Demand Response III	High Cost	TBD, range \$600-\$1200/kW	Long duration
Storage I	Flywheel	TBD – current industry knowledge.	Fast response / limited energy
Storage II	Battery	TBD – current industry knowledge.	Med. response / multi-hour energy
Storage III	Pumped Stor	Proxy – PG&E estimates	Med. response / multi-hour energy