

PG&E's comments on the information CAISO presented at the January 13, 2009
Integration Studies Stakeholder Conference Call

PG&E appreciates the opportunity to comment on the information presented at the January 13 conference call.

With respect to the Existing Fleet Study and its draft findings, PG&E would like to better understand the input assumptions that were used to arrive at the draft findings, including historic 2006 and 2007 loads, hydro's generation and ancillary service contribution, and historic imports. Some of the questions we have are:

- How were 2006 and 2007 hourly loads extrapolated to 2012? Were the 2006 and 2007 loads extrapolated to match 2012 expected or 1-in-2 peak and energy loads?
- What level of planning reserve margin is implied by the set of load and resources used in the simulations, and how does it compare to the current required planning reserve margin?
- Was weather uncertainty (say, the probability of load exceeding a 1-in-2 peak demand because of warmer than normal weather) considered in the stochastic analysis of Step 2?
- Does PLEXOS commit resources to cover day-ahead and hour-ahead forecast errors of load and intermittent generation? If so, what level of forecast error (say 2/3 or 95% of forecast errors)?
- Was 2006 hydro contribution to ancillary services used for both 2006 and 2007? Was this the only portion of hydro used for ancillary services?
- How were imports/exports modeled between CAISO and other CA Control areas (e.g. SMUD, TID/MID, LADWP?) and associated ancillary service transfers/capability?
- What assumptions were made about the ancillary service/load following capability of dispatchable resource categories (e.g. how much reg-up/reg-down, ramp rate, spin/non-spin capability)? Specifically, more insight is needed regarding:
 - o Assumed combined cycle unit ancillary service capability since it comprises a large segment of the dispatchable resources
 - o Monthly hydro ancillary service capability
- How were ancillary service balanced between NP26 and SP 26?

As an additional deliverable from the existing fleet study, PG&E recommends that the study quantify the impact on the need for and costs of increased regulation and other ancillary services by different RPS technologies, at different penetration levels, rather than analyze a single aggregated RPS portfolio. This information would be useful to determine the sensitivity of the study findings, and will be more useful to load serving entities to implement and procure resources to meet a selected RPS target.

With respect to the 2009 Integration Studies, PG&E encourages the CAISO to proceed with the study expeditiously as it is important the study remain on track to inform the

CPUC's 33% RPS Implementation Study and the Long-Term Procurement Plan (LTPP) Proceeding's need determination and procurement filings. Because of the leadtime needed to build and permit new resources, the 2010 LTPP decision should account for the need for new resources for the next ten years to meet both reliability and operating requirements as these requirements increase to integrate higher RPS levels. Specific objectives of the CAISO's 2009 integration study should include:

1. Quantify the impact of increased intermittent resources on the CAISO operating requirements for regulation, load following, day-ahead commitment, and ramping by technology and different penetration levels.
2. Recommend type and amounts of operationally flexible resources needed to integrate intermittent resources for different technologies and penetration levels.
3. Estimate integration cost for different technologies and penetration levels.
4. Develop tools and data useful for utilities and others in the industry to quantify these impacts, and help guide their procurement decisions
5. Estimate the impact of proposed once-through cooling regulation on the ability of existing resource fleet to reliably integrate intermittent resources availability of integration requirements. Scenarios could be developed to estimate the impact of shutting down different units at different times.
6. Quantify impact of new Frequency Response Requirements on ancillary service requirements and capability.
7. Assess ability of the WECC interconnected systems to contribute to the increase in California RPS requirements. Estimate the increased operating needs or costs, and potential opportunity costs from, for example reserving transmission for integration purposes. Recommend changes to ace sharing, shaping and increased ramping contribution from interconnected systems.
8. Assess impact of today's contractual constraints on operating flexibility and recommend contract flexibility attributes needed to accommodate increased intermittent resources. Identify contracts changes or flexibility needed in resource contracts, and in fuel supply contracts to facilitate intermittent resource integration.
9. Assess operational feasibility of re-dispatch of dispatchable thermal resources (e.g. number of starts/stops) and potential resulting increase in maintenance costs.
10. Assess impacts to energy and capacity market clearing prices from increased renewable penetration.
11. Estimate the inventory of system ancillary service capability by resource types on a monthly basis under a range of hydro conditions.
12. Assess the impact on California's natural gas transmission system of increased penetration of intermittent resources.

PG&E supports the working group approach the CAISO proposes to use for its 2009 integration work. PG&E will participate and contribute to the study to extent possible.

We encourage the CAISO to clearly define deliverables, responsibilities, and deadlines to ensure timely completion of the study. Working group members should have the technical expertise or capability to contribute to the tasks planned by the working group.

As noted before, PG&E has been working to develop simple tools to estimate the integration requirements and costs of incremental intermittent resources for different levels of wind and solar penetration. At a future working group session, PG&E would like to demonstrate a prototype tool and show preliminary results, and obtain feedback from other working group members.

Please call Antonio Alvarez at (415) 973-3594 for questions regarding these comments.