October 27, 2009

To: Jim Blatchford, CAISO
Fr: Nancy Rader, Dariush Shirmohammadi – CalWEA
cc: Susan Schneider
Re: Comments on CAISO Fleet Study

Following are CalWEA's comments on the CAISO's Fleet Study plans, which is part of the larger IRRP effort. We have made these comments previously in the IRRP process, but since we have not received responses from CAISO (either incorporating our suggestions or rejecting them with explanation), we repeat these concerns here again, as they apply as well to the Fleet Study.

- **Ramping vs. Regulation needs:** Make sure that Ramping needs are distinguished from Regulation needs as the former needs can be more readily addressed by less-costly and more-effective measures especially with the sophisticated optimization features of the new MRTU markets.
- **Regulation vs. Spinning Reserve:** The ISO production simulation-based methodology to determine future Regulation needs should be consistent with the methodology for determining Regulation needs that is used in actual operations. Specifically, the penalty prices used to sequence allowed reliability criteria violations in the study optimization should reflect the MRTU optimization order, i.e., meeting Regulation criteria should have a higher value than meeting Spinning Reserve, rather than the opposite relative order as used in ISO studies to date. This would avoid portraying what would really be Spinning Reserve deficiencies in actual operations as Regulation deficiencies. Spinning Reserve deficits would likely be less of a concern, because the market for the service is generally deeper and more competitive than that for Regulation, and deficiencies would be less costly to remedy.
- **Consider the vast geography of renewables-intensive areas** when assessing the potential for rapid variations in intermittent generation output. It is well documented in the literature that spreading wind resources over large areas, such as all wind-resource areas statewide, will significantly smooth fast variations of individual wind turbine outputs. ISO studies to date have only considered some areas of Tehachapi and Solano, which is inconsistent with the significant development of wind resources throughout California and in neighboring states, including northern Mexico. Continuation of such assumptions will produce incorrect results.

  Recent presentations by the CAISO indicate that CAISO is planning to consider wind-energy development in most of the RETI identified areas when developing wind generation output profiles. CalWEA supports the proposed reference locations; however, additional reference locations should be added for the Lassen area, where significant potential wind

resources have been identified, and also possibly for the Santa Barbara area. Furthermore, we believe that capturing the interrelationship in the fast variation of wind resources in the diverse wind areas noted here and between the fast variation of wind resources and the fast variation of load and solar resources through a simplified stochastic analysis can over- or understate the requirement for regulation resources.

- **Consider the likely development of large amounts of solar generation in the ISO area.** We support CAISO's plan to consider solar-energy development in most of the areas identified in the RETI effort in developing solar-generation output profiles. Here again, we would like to caution that a simplistic approach for capturing the interrelationship in the fast variation in the output of solar and wind resources and load can over- or understate the requirement for regulation resources.
- **Consider controllability of intermittent-resource generation**, especially for the Type 3 and 4 wind turbines that are expected to constitute virtually all future new wind generation. Various CAISO studies to date have assumed that intermittent resources are simply "uncontrollable negative loads," leading to overly conservative results. Future, CAISO studies should include consideration of output controllability for renewable generators such as wind feathering and solar de-focusing. Assuming even limited controllability of output could have a significant impact on mitigating Regulation capacity needs, particularly for Regulation Down.
- **Clearly state how many hours in a year significant additional levels of upward and downward Regulation capacity are expected to be needed.** This information will help determine whether the need for large amounts of Regulation can be better mitigated by simply controlling more intermittent-resource output for those hours.
- **Fully reflect the complementary nature of wind and solar generation profiles.** Wind and solar outputs are often complementary – wind generation decreases in the morning as solar output is rising, and wind output rises in the late afternoon as solar generation is waning. Earlier studies have found that the impacts of the combination of intermittent wind and solar generation on load following and regulation requirements generally were modest. Failure to incorporate this relationship fully in the upcoming analysis may overstate the need for additional load-following and Regulation resources.
- **Reflect realistic resource minimum-generation assumptions.** CalWEA has repeatedly requested additional information on ISO assumptions for different supply sources in the past, but the ISO has yet to explain its assumptions. Those assumptions should not be duplicated here in yet another study without additional examination, specifically in these areas:
    - **Minimum gas-fired generation levels**, which should reflect ISO Master File entries;

- **Minimum import levels**;
- **Maximum export levels**;
- **Minimum QF generation levels**, which should reflect any contract provisions allowing for limited curtailments each year; and
- **Minimum hydro generation levels**; there should not be any built-in assumption that it is worse to "spill" wind or insolation than water, i.e., minimum generation here should reflect only other factors like physical capabilities, environmental requirements, etc.

More generally, minimum generating capability assumptions for all generators should be examined. As the incentives for lowering minimum generation levels becomes greater, both existing and new plants are likely to find ways to lower those minimum levels.

- **Reflect realistic A/S import assumptions*:*** Unless the amount of imported A/S is only de minimis (information that has not been provided), it makes no sense to assess A/S resource sufficiency under different scenarios without considering imports.
- **Reflect likely ISO forecasting improvements*:*** The ISO is currently conducting a vendor assessment process to improve ISO intermittent-generation forecasting ability, which should allow the ISO to more accurately commit or dispatch ramping and Regulation capacity and to reduce or avoid potential over-generation conditions by addressing them in the Day Ahead and/or HASP timeframe. It's not clear that the Straw Proposal assumes any forecasting at all, which would clearly overstate reserve requirements.
- **Assume likely replacement of inflexible Department of Water Resources (DWR) contracts with more responsive generation as the contracts expire in the coming years.**

- **Integration costs:** CalWEA supports including an estimation of integration services costs as a study output but, as noted above, we believe that impacts and costs should be assessed by at least considering the geographic and technology diversity that is actually likely to occur, especially the complementary profiles of wind and solar technologies. In addition, any cost estimates for scenarios with higher renewables requirements should net out the benefits of any investments or operational changes made to accommodate those requirements. CalWEA is particularly concerned about separately estimating wind, solar PV, and solar CSP impacts using separate simulations for each, absent an aggregate estimate of all resources combined. This type of analysis would be unrealistic and exaggerate the true impacts of the complete portfolio of new renewables expected to be operational over the study time horizon specifically, it will overstate intermittent renewables' impacts on

morning and evening ramps, intra-hour load following, and Regulation requirements, as well as the resulting costs.

- **GHG dispatch adder*:*** CalWEA supports the use of GHG adders in assessing the cost effectiveness of renewable generation, but the ISO should explain its proposal to use this adder in the dispatch simulations.
- **Export assumptions:** The ISO should explain its position that exports would be based on historical data but "not allowed during over-generation in base assumptions." The historical reference is clear, but why would use of those data not be "allowed" in over-generation periods when such exports will likely increase during those times? Instead, CAISO should not only use historic exports in its analysis, but it should use historic exports during over-generation periods when the simulations indicate that over-generation is occurring. In other words, CAISO should reflect the likely actual market response to zero or negative ISO market prices by assuming the high levels of exports that this would likely trigger.
- **Likely transmission and generation additions that could mitigate over-generation and increase ISO ability to manage intermittent resources, e.g.:**
    - **The proposed Central California Clean Energy Transmission Project (C3ETP),** which should allow better use of off-peak generation to increase availability of the Helms units in on-peak hours as well as facilitate better coordination of renewable resources that are mostle located in Southern CA and hydro resources that are mostly located in Northern CA; and
    - **Other large pumped storage plants** in the ISO generator interconnection queue.
    - **More frequent import/export scheduling on the interties**, including intra-hour scheduling and dispatch of flexible resources outside the ISO area that could help ISO manage intermittent resources on its system.
    - **New storage technologies and off-peak loads**, e.g., flywheels, compressed-air storage, plug-in hybrid vehicles, and off-peak cooling.
    - **New demand-side technologies**, like Plug-in Hybrid Electric Vehicles (PHEVs) and Demand Response resources (e.g., building pre-cooling), which can play a major role in increasing off-peak demand.
    - **ISO market changes that could allow intermittent resources to help resolve problems**, e.g., lowering the decremental-energy bid floor below the -$30 level. A lower bid floor would allow price-responsive bids low enough to compensate for both foregone contract energy payments and loss of tax credits for the resulting

reduced output. (This should be accompanied by PPA modifications allowing for payment for foregone production, rather than the MWh-based payments in most current intermittent-resource contracts.) These changes would also encourage investments to increase operating flexibility by both new existing generation, e.g., to lower minimum-load set points and lower the cost of start-ups and shut-downs.

- **Examine market-rule and related changes to remove barriers to participation in existing ISO markets, including increased flexibility for the existing/expected fleet and participation by the range of likely new technologies (e.g., energy storage and demand response).** *Estimate the additional response that the market might provide as a result. As the ISO has recognized, these rules should be technology-neutral.*
- **Develop additional market products & processes to meet any gaps remaining.** Generally, this produce development should emphasize "carrots," not "sticks" – if the ISO imposes flexibility, rather than paying for it, it will simply push the costs onto other parties.
- **Include economic analyses for different alternative solutions, where practicable.** This information, from an objective source like the ISO and considering stakeholder input, can inform the decisions of policymakers and regulators. The CPUC will need an integration-cost estimate of for its renewables procurement program, and the ISO, with support from GE (see above), is in the best position to supply this information. At a minimum, the ISO should provide the technical integration requirements for various renewable energy scenarios, and make costing data available for the CPUC to use. In addition, we want to add a note of support for ISO work on opportunities for inter-BAA cooperation and coordination, including ACE- and reserve-sharing and increased use of dynamic scheduling. These "no-lose" measures have been shown to improve system reliability and reduce the cost of integrating intermittent generation into electric-system operation.
- **Changing the Counting Rule used to determine the resource adequacy (RA) value of intermittent renewable resources in California.** One of CalWEA's most important concerns is that CAISO is using the unscientific and yet recently adopted "counting rule" for determining the resource adequacy (RA) value of intermittent renewable resources in its IRRP studies. This change in the RA counting rule for intermittent renewables replaces the existing rule based on the average generation of a wind or solar resource during the on-peak hours of noon to 6 p.m. on weekdays. The new rule uses a "70% exceedance" method, which would set the RA value of a wind or solar project at the output that is exceeded in 70% of the 1 p.m. to 6 p.m. on-peak hours each day, plus an adjustment that attempts to capture the geographic and temporal diversity of the output of wind and solar resources. The change adopted in

the CPUC's decision will result in a significant reduction (i.e. de-rating) in the RA capacity of the wind and solar resources on which California expects to rely to meet its environmental goals and its future energy needs. CalWEA has articulated its reasoning as to why it believes that the new counting rule is erroneous in its comments submitted to CPUC and it will not repeat of those reasons. However, we would like to underline the point that the new unscientific RA counting rules for renewable resources will significantly increase the requirements for non-renewable generation in the system.