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Submitted by email to phase2ri@caiso.com

**RE: Comments of the Large-scale Solar Association on the Revised Straw Proposal for Renewable Integration Phase 2**

The Large-scale Solar Association (LSA) submits these comments in response to the CAISO's request for stakeholder views on its **Revised Straw Proposal on Renewable Integration Phase 2** (Paper), the August 29th document continuing the CAISO's Renewable Integration: Market and Product Review, Phase 2 (RIMPR-2) effort. Our comments here build on our two sets of prior comments in this initiative.[1]

The Paper introduces new elements on the following topics that are of particular relevance to LSA:

- A revised framework for the timing of market design enhancements, proposing a more incremental approach to such enhancements than the prior papers implied;
- Introduction of cost causation as a guiding principle for design enhancements; and
- New proposals for mid-term market products, VER forecasting, and PIRP rules.

Large-scale solar plants are valuable clean energy producing generation facilities whose production profiles largely correlate with annual peak loads in California. Thus, they will offer high energy and capacity value and will be important capacity resources for the future power system. LSA members see opportunities to provide viable solutions to minimize renewable-integration costs through technology development.

While solar energy is both an excellent energy and capacity resource, LSA recognizes that the market is likely to require additional ancillary services and operating capability as the number of variable resources in the market increases. CAISO's approach in addressing integration should be to identify the specific operational requirements, examine the potential options to meet those requirements, and then design the required market product(s) to minimize procurement costs through the efficient commitment of resources.

If California policy goals are achieved, renewable energy could at times be the majority of energy produced in some hours of the day by 2020. Increased market participation by renewable resources can reduce both market clearing prices and emissions, to the benefit of consumers and the environment.

[1] LSA comments on Discussion and Scoping Paper, RI-MPR Phase 2, April 29, 2011; LSA comments on Initial Straw Proposal, RI-MPR Phase 2, July 29, 2011.

As we noted in our prior comments, renewable resources have historically been largely passive in the CAISO bid-based markets, treated as non-dispatchable price-takers. To maximize economic efficiency and increase the supply of low marginal cost energy in the market, the markets should be designed to induce such market participation and accommodate the unique fuel sources inherent with variable resources.

In the future, these resources can and should become active market participants, helping to resolve operational constraints and reliability needs. Creating defined reliability products and added incentives to submit energy and ancillary service bids could, if properly designed and implemented, encourage renewable resources to provide additional operational capabilities. These improved operational capabilities, both of the energy-producing equipment itself or enhancements such as storage or hybridization with other fuels, would allow renewable resources to obtain additional value from and provide additional value to the markets over time.

Hence, this initiative offers the opportunity to carefully evaluate how best to adjust wholesale power markets designs to the characteristics of the high-renewables power supply and to fully understand the implications of any potential market design changes given other regulatory considerations. We support the CAISO in its careful approach to bringing together market, planning, and operational information to support this transition.

**Statement of Purpose**

LSA supports the more-incremental approach to market design changes proposed in the Paper. This incremental approach will also provide sufficient time to fully understand the principles of market design being addressed, such as "cost causation," and to better align market and regulatory processes.

LSA urges the CAISO to work with the other agencies, particularly the California Public Utilities Commission (CPUC), and stakeholders to establish a process for inter-agency consultation to examine how the purpose, principles, and market enhancements of this initiative should be coordinated with relevant CPUC proceedings and investor-owned utility (IOU) renewables procurement. A joint-agency stakeholder meeting would be useful to allow for stakeholder review and input into the process and substance of agencies' coordination effort.

Please refer to our prior comments for additional views on the need for inter-agency coordination.[2]

**Guiding Principles**

LSA appreciates the CAISO's efforts to identify guiding principles, and to revise these principles in response to stakeholder recommendations. We focus here on the most recent modification of the principles to include cost causation.

LSA recognizes that different renewable technologies have different impacts on system integration. We support any efforts by the CAISO, the CPUC and renewable portfolio standard (RPS) buyers to foster a portfolio approach towards clean energy generation that will lead to a

[2] LSA comments, April 29, 2011, pgs. 3-4.

generation portfolio at the lowest net system cost (costs minus benefits) while maintaining reliable system operations.

LSA, however, does not agree that "cost causation" should be a principle of market design under the current regulatory and market framework. First, CAISO's current operating-reserve procurement is not governed by cost causation, and treating variable generation differently for the purpose of cost causation is discriminatory. Second, even assuming a larger move toward cost causation, there are recognized challenges to calculating integration costs and allocating them costs according to cost causation principles in a way that creates the appropriate incentives to entities with control over the desired outcome. Finally, allocating integration costs in a way that does not provide incentives to entities that can best manage variability will likely lead to higher costs to consumers.

LSA noted the need to ensure consistency among regulatory and market-based cost allocation – and the potential for higher overall costs if these allocation schemes are not aligned – in its prior comments.[3] LSA requests that CAISO further examine how renewable integration "costs" might be imposed on the system, how these costs should be balanced against renewable energy benefits, and what changes are needed to align regulatory and market structures (for renewable and other resources) if cost causation is deemed a principle of pricing and cost allocation.

As NREL found in its recent report on this subject, calculating integration costs and designing a cost-causation approach for renewable resources is difficult to execute and requires a thorough look at how all resources affect system flexibility.[4] Undertaking a cost-causation approach without fully considering the contribution of other (non-VER) resources would be neither cost effective nor efficient.

If the CAISO is truly interested in overhauling operating reserve cost allocation, it should do so for all the ancillary services procured through its market. Currently, the CAISO's procurement of operating reserves is not governed by cost causation.

Singling out variable resource for differential cost causation treatment is both discriminatory and bad for consumers. Other resources and technologies impose costs that are not recognized under the current market structure. For example, generating resources that comprise the "largest single contingency" in some areas may increase operating reserve or Resource Adequacy requirements in those areas. Dispatchable but slow-ramping resources impose substantial Bid-Cost Recovery uplift costs that are not allocated to those resources.[5]

The CAISO's operating practices and market rules have always had implicit accommodations for the characteristics of specific fuel types and power plant designs. Therefore, principles of cost causation, non-discrimination, and technology agnosticism must be viewed with an eye to the whole system. For example, long startup times and minimum run times of conventional thermal generation impose significant costs to the system, as those plants must be operating when their

[3] LSA comments, April 29, 2011, pgs. 3-4, 8-11.

[4] Cost-Causation and Integration Cost Analysis for Variable Generation, M. Milligan, E. Ela, B. Hodge, B. Kirby and D. Lew, National Renewable Energy Laboratory with C. Clark, J. DeCesaro and K. Lynn, U.S. Department of Energy, NREL Technical Report TP-5500-51860, June 2011

[5] Allocating Costs of Ancillary Services: Contingency Reserves and Regulation, E. Hirst and B. Kirby, prepared by Oak Ridge National Laboratory, Report No. ORNL/TM-2003/152, June 2003.

power is not needed and their dispatch forces other more flexible plants offline even when such flexibility would be valuable to the CAISO, yet there is no discussion of allocating those costs to those generating plants.

Under a cost-causation framework, allocating integration costs on a resource-by-resource basis would inefficiently place the cost responsibility on the individual generator and likely lead to higher overall costs to consumers. Currently, renewable resource owners enter the California market through RPS mandates. By regulation and statute, most of these RPS commercial transactions are long-term in nature (e.g. 20-25 year terms).

To the extent that the CAISO intends to allocate integration charges to variable resources, suppliers will be forced to attempt to forecast such a liability over the lengthy contract term in order to recover the cost under the contract. Given the challenge of forecasting such costs so far into the future and the unknown market design changes that can happen in that timeframe, suppliers will be conservative in estimating those costs. Moreover, as others have said, the consumer will ultimately pay for any integration charges, regardless of the original allocation.

The critical issue is how to minimize those costs and assign them in a way that incents behavior from entities that can make technology investments and provide the desired operational characteristics at the lowest cost. Moving forward, we encourage the CAISO to work with other agencies, as part of the inter-agency consultation recommended above, to further evaluate how different allocation schemes will ultimately affect the price consumers pay for energy and how market price signals can incentivize investment in the operational features required to provide integration services. This should be done by creating the desired product and price signals, rather than penalizing variability.

Transparent integration charges would allow Load Serving Entities to include the charges in their procurement decisions. These buyers could then assess different resources' integration costs in the procurement process. Further, with transparent integration charges and an understanding of how these will translate into the procurement process, variable resource sellers will be explicitly incentivized to take cost-effective steps to reduce those charges and make investments in technology to increase dispatchability and improve energy-production forecasts.

In summary, applying "cost causation" as a market principle and allocating integration costs only to variable renewable resources, without ensuring that resources subject to those costs can provide economic solutions or considering costs imposed by other resource types, is discriminatory and would likely inflate renewable energy costs and result in suboptimal technology investments. Further, if the costs are allocated to individual variable generators that may have no economically viable way to respond, then the CAISO has missed the opportunity to provide a useful signal to incent the management of variability by the entities that can respond in a cost-effective manner.

**Timeframes for Market Design Enhancements**

LSA supports the CAISO's determination of the different time-frames for consideration of enhancements. However, there must be a robust process for research into integration requirements and market design alternatives that continues over this period. Such a process

should include continued surveys of CAISO operational needs and capabilities, as well as market design developments and renewable integration issues in other ISOs/RTOs and other countries. Market participants would benefit from timely production of such surveys to provide indicators about possible CAISO views on future system needs and associated market developments.

**Stakeholder Process for 2011 Revisions**

LSA supports the proposal to bring a vision and roadmap to the Board by December 2011. We offer specific comments on the market enhancement proposals in the following sections.

In addition, because system flexibility will be increasingly useful to the CAISO, we encourage the CAISO to continue evaluating transparent and direct ways to acquire services and incentivize desired attributes through the market. In particular, the CAISO should continue to evaluate the full range of options that will provide the needed operational capabilities over the long term.

**Short-term Market Enhancements**

LSA generally supports the set of short-term enhancements underway. Most of these enhancements have already been examined in stakeholder processes, several extensively, and they do not require further stakeholder comment. LSA members support most of these enhancements, because they could reduce integration costs by increasing market participation, meeting operational needs, and providing compensation for operational attributes as appropriate.

**Mid-term Market Enhancements**

The four mid-term market enhancements may be appropriate to the 2013-15 timeframe. However, better understanding of system conditions and integration needs is needed to determine whether they are the optimal tools to meet the CAISO's needs and whether they will be sufficient for that period.

*Flexi-ramp product*

The flexi-ramp product offers a possible stepping stone in the redesign of the markets to accommodate renewable integration, although LSA questions whether this product offers the most economic way to obtain dependable flexibility in the CAISO market. By allowing the flexi-ramp product energy to set real-time prices, the CAISO real-time markets may better signal the value of the product, but possibly not as efficiently as with a specific ramping product.

However, LSA is concerned that, despite its statements that it is taking a more measured approach to market reforms to accommodate increased VER penetration, the CAISO has apparently decided that the flexi-ramp product is the right tool to provide the flexibility it needs. However:

- The CAISO has not yet implemented the flexi-ramp constraint recently approved by the Board, so it does not know the extent to which that tool will meet its medium-term needs as well; and

- While CAISO has previously explored other options to provide the ramping capability it needs, such as the Real-Time Imbalance Service presented in the prior straw proposal, stakeholders are not fully clear on how and why the flexi-ramp product was selected for the mid-term phase of the initiative. In particular, the CAISO has not provided information on which options were considered originally and why these options were not selected for further examination.

The CAISO has indicated that it intends to start the flexi-ramp design effort as soon as next month, i.e., even before the Board has approved the roadmap and vision for this initiative. LSA is concerned that the CAISO does not yet have the information to know that this tool is the optimal approach and sees no reason why a more deliberate and rigorous analytical approach to elicit ramp capability through product or pricing design cannot be followed.

At a minimum, the flexi-ramp product costs and revenues must be analyzed carefully and with regard for unintended consequences. In particular, by obtaining the desired flexibility from the energy markets with a ramp product that can set prices, the market clearing price will tend to be increased and this, in turn, will result in additional payments to inflexible generators (i.e., payments for doing nothing). As discussed by the CAISO, to determine if the generator is actually responding to the CAISO's commands for deployment of their offered flexibility, complex changes and monitoring will also be required since these products are deployed through the real-time dispatch with tolerances around following the dispatch signal.

With respect to the time period for the flexi-ramp product, LSA notes that the CAISO's 20% RPS study already identified hours of the day in which the 5-minute dispatch capability, upwards and downwards, appeared to be close to or less than the hourly maximum load-following capacity requirement identified in the analysis. However, the results of that study did not demonstrate whether that load-following capacity requirement would ever be reached in 5 minutes. LSA recommends further analysis of this question through the CAISO's Phase 2 integration studies, as well as other studies.

As noted above, allocating the costs of renewable integration services like the flexi-ramp product on a cost-causation basis is premature, as regulatory structures may not support measures that could be taken by renewable technologies to reduce operational impacts and the CAISO has not considered integration and other costs imposed by other resources and resource types. Instead, the CAISO should first focus on how regulatory and market mechanisms can be better aligned to achieve operational objectives.

At the same time, any cost-allocation mechanism for operational requirements caused by intermittent resources will be complicated, as it will have to isolate incremental impacts of only those intermittent resources and distinguish the individual contributions among them. For example, since RPS buyers are constructing portfolios of resources that presumably are intended to account for correlation of production among technologies and locations, it would be unfair to penalize a resource that was not intended to be producing independently of the full set of resources.

*VER availability updates*

LSA recognizes the potential value of either updating solar production forecasts on a sub-hourly basis or providing sub-hourly segments for the hour-ahead forecast.[6] It is not clear from the discussion in the paper whether these are mutually exclusive forecast options, or whether a particular resource can opt for one or both. We promote a structure that encourages generators to submit improved, more accurate information when decisions are being made. Improved forecasts could be provided for the HASP and prior to each 15 minute RUC investigation, and the CAISO should also examine moving the HASP bid submittal deadline closer to real time.

However, allowing updated solar forecasts or availability on a sub-hourly basis would not be a sufficient structural change to reduce or eliminate the need for PIRP unless the actual schedules from which imbalances are measured are also updated, i.e., if it would reduce imbalance-energy settlement risks. This is one weakness of the Dynamic Transfer framework cited by the CAISO in the proposal, which would only affect the split between Instructed and Uninstructed Imbalance Energy but not reduce the amount of imbalance energy for which schedulers of variable resources are financially responsible.

Updating the schedules in addition to the forecasts would give generators greater incentive to produce better forecasts. This would be on a timeframe (30 min to 2 hours) that could see some significant improvements in forecasting; while short term, the improved data should be meaningful and valuable to the grid operator.

Sub-hourly segments may be particularly useful for the solar ramp periods, and should be allowed any time that information is provided. Again, this would only be helpful for suppliers if the resource schedules from which imbalances are measured are also reset.

*Decremental bidding from PIRP Resources*

LSA, in conjunction with CalWEA, has supported economic bidding from PIRP resources for some time and is pleased that it has been proposed in this initiative. Overall, with a few exceptions, the concept is consistent with our prior proposals. We have the following initial specific comments.

The CAISO proposes the assignment of real-time prices rather than PIRP settlements to energy produced during intervals in which the resource has received a non-economic curtailment instruction for any output for which it has not submitted a bid. The CAISO is presumably concerned that, for PIRP resources, negative prices could be sufficiently diluted under PIRP settlements such that incentives to submit bids would be diminished. LSA is not opposed in principle to such an incentive but cannot support it pending further evaluation of its effects on different types of resources.

The CAISO suggested that a decremental bid would be measured off of the schedule or the most recent telemetry data (which could be many minutes away from the period of the dec bid). This approach could lead to substantial underpayment during period of solar ramping. Solar plants' lost energy (relative to total energy produced) during a period when dec bids were called, should be straightforward to calculate based on telemetry data required by EIRP certified facilities

[6] LSA Comments, July 29, 2011, pg 6.

**Long-term Market Enhancements**

This section of the paper is not sufficiently developed for stakeholders to provide comment, nor does this section provide the basis for a recommendation to the CAISO Board. However, we offer the following general observations and will provide further comment as additional details on the proposals become available.

Overall, the proposal does not seem consistent with CAISO's recommendation to the CPUC to begin considering integration capabilities in the Resource Adequacy program, which will be included in the scope of a forthcoming CPUC proceeding.[7]

Moreover, the paper does not reference the similar recent proposal by Southern California Edison in the CPUC's Long Term Procurement Plan (LTPP) proceeding, which predates this paper, to have the CAISO operate an auction for capacity needed to integrate renewables, as well as allocate some of those costs to intermittent renewables.[8] We thus infer that CAISO supports this proposal implicitly.

In short, although this section is presented very conceptually, there are already sufficient materials on this topic by CAISO and other entities that a fuller survey of options would be desirable before issuing a draft final proposal recommending this component of the initiative for further examination. Certainly, as with the flexi-ramp product, the CAISO should better define its needs and explore a full range of options to meet those needs before beginning an effort in the near future to design this market.

[7] California Public Utilities Commission, Commissioner Mark Ferron, Assigned Commissioner's Ruling Deferring Issues to Future Rulemaking, R.09-10-032, Sept. 07, 2011.

[8] Southern California Edison, Testimony of Southern California Edison Company on Track III Issues – Rules Track III Procurement Policy, prepared for CPUC Proceeding R.10-05-006, July 1, 2011, pgs. 4-8.