March 20, 2015

To: CAISO at InitiativeComments@caiso.com

From: Rachel Gold and Susan Schneider for LSA

RE: Comments of the Large-scale Solar Association on Reactive Power Requirements for Asynchronous Resources – Issue Paper & Straw Proposal

The Large-scale Solar Association (LSA) appreciates the opportunity to comment on the CAISO's March 5, 2015 document, Reactive Power Requirements for Asynchronous Resources – Issue Paper & Straw Proposal (Proposal), and the discussion of the Proposal on a March 13 stakeholder conference call.

LSA supports the CAISO's effort to review interconnection standards and assure adequate system performance as major changes occur in the generation-fleet composition. Where there is a demonstrated need for additional CAISO grid-management tools and capabilities to accommodate those changes, it is in the interest of all CAISO grid users to ensure that the CAISO has them.

Any grid-reliability obligations assigned to generators should be fair, clear, achievable, and provide for least-cost means of achieving those objectives. LSA agrees with the CAISO that many things have changed since the CAISO's 2010 proposals in these areas, and LSA is pleased to see the exclusion of some of the more controversial aspects of those earlier proposals – e.g., ramp-rate controls and retroactive imposition on generators already in the interconnection process – from the Proposal.

However, LSA has several concerns about the content and process of the Proposal that may impede its ability to support it. Those concerns are described below.

- **The Proposal should recognize NERC/WECC efforts toward more uniform standards across the West and nationally**, and it should not preempt adoption of such standards. The applicable rules should not be more stringent than applicable standards eventually adopted by NERC/WECC, unless the CAISO can show that its stronger requirements are needed for the CAISO Controlled Grid.
- **The Proposal does not demonstrate that the interconnection-study approach mandated by FERC Order 661-A is not adequate to meet its needs.** The Proposal states that its current interconnection-study approach already results in about 75% of asynchronous generation being required to meet the reactive power requirement and, if all of the synchronous generation can do so (see below), then the overwhelming majority of generation on the system even at high-renewables production times would have such capability. The Proposal does not explain why this widespread capability under the current methodology would be insufficient to meet CAISO needs.

In addition, the Proposal does not show a need for dynamic voltage response. If such a standard is needed, it is not clear why the CAISO could not use the same kind of "limited" study-based approach that seems to be working well for power-factor requirements.

- **The Proposal does not consider all aspects of potential generator compliance costs in concluding that those costs would be de minimus.** Inverters on the market today may enable generators to meet the proposed standards at the inverter terminals, but additional equipment would often be necessary to meet the proposed standards at the POI. The Proposal does not address these additional equipment costs or the opportunity costs to do so[1].

  While – as stated in the Proposal – it is true that many generators seek to oversize their inverter capability, that desire relates to the need to better meet production targets to for real power to meet Power Purchase Agreement (PPA) requirements. For example, a 200 MW project would require about 60MVARs of reactive power at maximum output level, which would add significant costs.

- **The Proposal should consider financial compensation as a central issue.** LSA strongly agrees with comments on the stakeholder conference call that financial compensation needs to be concurrently addressed as part of this initiative. LSA notes that the recent PJM proposal does provide for compensation, through: (1) the ability of resources providing reactive power and voltage control to recover cost of service under the PJM Tariff by filing a rate schedule with FERC; and (2) a PJM payment of the difference between locational marginal price for the unit location and the unit's offer price[2].

  This issue is especially important for solar and wind generators. PPAs for synchronous generators typically include capacity payments that may not be impaired by the reduction in real-power production required to provide reactive power. Most PPAs for asynchronous generators, on the other hand, provide payments based only on production and also contain minimum production levels (and sometimes Net Qualifying Capacity (NQC) guarantees that must be met through real-power production.

  The acceptability of the proposed framework will depend heavily on the financial impact, including both direct and opportunity costs, so LSA urges the CAISO to incorporate financial compensation as a central aspect of this initiative, and not leave is as a later phase or afterthought.

  LSA understands and shares the CAISO's concerns that the new rules be in place before the Cluster 9 application window opens in April 2016. However, we believe that there is sufficient time to address this critical issue properly in the context of the main proposal.

  Options that could likely be implemented without major software changes include: (1) the PJM LMP-based framework; or (2) an opportunity-cost approach based on PPA payment levels, using the current arrangement with Potomac Economics for establishing Default Energy Bids (DEBs) to establish the proper payment level for each project.

[1] This is one important reason to consider application of the standards at the terminals instead of the POI, as PJM has proposed.

[2] The PJM proposal is posted at http://www.pjm.com/~/media/documents/ferc/2015-filings/20150306-er15-1193-000.ashx; see p.8 for an overview of payment provisions.

- **The Proposal should consider situations where the CAISO's needs could be more economically and/or efficiently met through grid-level investments** (e.g., shunt capacitors, Static VAR Compensators (SVCs), or synchronous condensers) instead of individual generator requirements, including the criteria for making that determination.

- **The Proposal should reconsider the CAISO's proposed BPM restrictions on inverter sizing.** Inverters can be configured to supply a total combination of real and/or reactive power up to their MVA ratings, and the most economical way for inverter-based generators to supply or absorb reactive power is to vary this combination as needed. However, the CAISO has just issued a proposal to limit inverter sizing to 110% of the GIA injection limit, even with control equipment to restrict real-power injection at the POI. The CAISO should consider raising this limit to at least 125%.

- **The Proposal should apply the same capability requirements to all generation technologies that are capable of meeting them**, including any synchronous generators not currently required to meet these standards. The CAISO stated this intent on the conference call, but it not clear that the Proposal actually accomplishes this objective, or whether this is being addressed separately.

  To be clear, it is not unreasonable for asynchronous generators to be subject to less-stringent standards, given that compliance with the new standards by the former could reduce production of clean, renewable resources with zero variable costs. However, requirements applied to asynchronous generators should certainly not be more stringent than those for synchronous generators.

  For example, LSA understands that synchronous generators can meet the applicable reactive power requirements at the generator terminal and not at the Point of Interconnection (POI), and a statement was made on the conference call that smaller synchronous generators may not be required to meet those standards at all.

  Since the reactive power provided by any generator would support the CAISO system to the same extent, it is unclear why synchronous generators should not be subject to the same standards as asynchronous generators. Either these generators must already comply with the proposed requirements – in which case there is no harm in making them formally applicable to them – or they don't, in which case the rationale for any differences is questionable.

  Thus, the next Proposal version should clearly describe the requirements applicable to synchronous generators and justify any differences that the CAISO proposes between generating technologies, including any differences in reactive power requirements and whether it applies at the POI or the generator terminals.

- **The Proposal should recognize that some flexibility should be applied where meeting the standard might be very difficult or complicated**, and exceptions or special arrangements should be explicit where possible. Some suggestions are provided below.

- **The Proposal should better define the potential ability to meet the standard at a point other than the POI, if the CAISO retains the POI requirement.** The Proposal states that this could be allowed but should specify the criteria for making that determination. For example, it may be extremely difficult and expensive to meet power-factor requirements at the POI if the POI is remote from the generator project site (which is much more common for asynchronous generators than synchronous generators).

  The aforementioned PJM proposal would allow generators to meet the standard at the generator terminals and, as noted above, that is LSA's understanding of the CAISO's current standard for synchronous generators. Adoption of the PJM approach would remove the need to provide for exceptions.

- **The Proposal should address other complex situations**, including those where:
  - Several generating projects could meet the requirement collectively, as described on the conference call;
  - Some facilities on shared gen-ties are subject to the new requirements while others are not;
  - Generators are interconnecting to busses where there is already a regulation device (i.e. either distribution interconnections or a device such as an SVC installed); or
  - A generating project cannot effectively control the transmission voltage, e.g., a small generator connecting to a stiff high-voltage system (i.e., where the project is small compared to the short-circuit MVA of the system).

- **The Proposal should better define various terms and conditions**, including:
  - Compliance measurement and penalties; and
  - The applicability of the new requirements to projects that are "replaced or repowered," including the CAISO's assurance on the conference call that these terms refer only to major overhauls, e.g., repowering of the entire project. The Proposal should explicitly state that the new requirements would not apply to lesser changes to existing projects like:
    - Replacement of a few inverters;
    - Increases in inverter capacity to meet PPA production guarantees or provide additional reactive power;
    - Small increases in power deliveries (e.g., less than 10%), for example by installing "power boost" options on existing hardware, or other generation profile changes.