

Comments of the Large-scale Solar Association on Proposed Additional Intermittent-Resource Interconnection Requirements

The Large-scale Solar Association (LSA) offers comments here on the following:

- **“Interim Interconnection Requirements for Large Generator Facilities Review Initiative – Draft Final Straw Proposal”** (“Proposal”) an April 26th document listing and describing CAISO-proposed additional interconnection standards changes for intermittent renewable generation (wind and solar plants), a.k.a. Variable Energy Resources (VERs); and
- **Discussions on an April 28th CAISO conference call** to discuss the Proposal.

We support the CAISO’s effort to review interconnection standards and assure adequate system performance as major changes occur in the composition of the generation fleet. We also appreciate the changes in several areas that the CAISO has made to address issues raised by the LSA and other stakeholders, including clarification of the proposed exemptions. However, we continue to have significant concerns.

We provide below an overview of our general comments, followed by a section on each major proposed standard area. In the individual sections, we first state our understanding of the current CAISO proposal, including exemptions, and then describe our specific concerns.

(Areas where we may misstate the current CAISO proposal, despite as thorough a review as the extremely expedited CAISO process has allowed, should indicate to the CAISO that additional clarification is needed.)

Note: The CAISO proposes exempting generators meeting these conditions from many of the new requirements, and we thus refer to them in the text below as the “Standard Exemptions:” (1) executed LGIAs; or (2) tendered LGIA before the CAISO Board approves new standards.

General comments

Reiteration of prior process-related objections: The CAISO is obviously not entertaining deferral of the proposed changes, as suggested by LSA and others. However, we briefly list our prior objections in this area to indicate that the Proposal changes do not mitigate our concerns.

- **The current extremely expedited CAISO stakeholder process has not allowed for reasoned consideration** of the elements in the Proposal.
- **The CAISO should not adopt its own standard**, ahead of:
 - The more reasoned NERC/WECC standards-development process; and/or
 - The release and review CAISO studies showing a need for these requirements.
- **The CAISO should not impose standards without consideration of whether market mechanisms would or could provide the same capability**, at potentially lower cost and/or greater efficiency.
- **The CAISO should not propose standards without consideration of the market mechanisms needed to implement them**, e.g., the conditions under which they would be used and the compensation mechanisms that could offset the potential revenue reductions to generators.

- **The CAISO should not impose new standards on projects that:**
 - **Have already executed PPAs**, since they have no opportunity to recover the cost of the new standards or the potential revenue impacts; or
 - **Are in the Serial Group but have not executed LGIAs**, since the CAISO/PTOs should have completed their interconnection studies over a year ago and thus these projects should already have executed LGIAs.
- **The CAISO should not propose standards without any details of how generator compliance will be measured** and/or how generator non-compliance will be penalized.

Proposed imposition of additional requirements on only intermittent generators:

The CAISO still appears to be proposing additional requirements only on asynchronous generators and/or VERs (though some expansion of one or two requirements on others might be contemplated – very unclear at this point). The illogic of this concept was clearly illustrated by the CAISO’s response to questions in this area on the conference call, where the CAISO said that:

- The system is “structured” to handle operating characteristics of other generator types; and
- Other generator types can “largely” comply with the proposed standards already.

We simply do not understand these responses. Either:

- **Other generators can already comply with the revised standards**, so it would not be onerous to impose the revised standards on those generators; or
- **Other generator cannot already comply with the revised standards**, so it would be both detrimental to system reliability (assuming that these requirements are as critical as the CAISO maintains) and unfair to intermittent generators to refrain from imposing the revised standards on those generators.

The CAISO cannot have it both ways. Either way leads to the inevitable, logical conclusion that the standards should be applied to all generators, not just VERs.

LGIA and effective dates for exemptions: The CAISO proposals related to LGIAs and effective dates for exemptions are problematic, for the two reasons listed below.

- **Enforcement of new rules before FERC approval:** The CAISO cutoff for many or most of the exemptions from the new standards would be CAISO Board approval of the new rules, not FERC approval of the rules and accompanying documents (e.g., new pro forma LGIA). In other words, the CAISO would seek to implement the new rules for non-exempt plants through LGIAs before FERC approval. This would be:
 - **A possible violation of the CAISO Tariff**, and the intent of a pro forma agreement. Developers willing to execute the CAISO pro forma LGIA would be forced to choose between either accepting conditions that FERC has not even approved yet or enduring a delay to wait for a FERC order. At the very least, any LGIA with the proposed new provisions should provide for later modification, at the developer’s option, to conform to any subsequent FERC ruling.
 - **A possible impediment to project development.** Incorporating the proposed standards revisions into the current pro forma LGIA would presumably require significant and material modification of that document, likely making the LGIA non-conforming.

Non-conforming LGIAs are extremely problematic for developers. There is no set timeline for FERC approval of non-conforming LGIAs, and thus plants with such agreements on file generally cannot proceed with financing and other crucial development activities.

- **Non-conforming LGIAs after FERC approval of new pro forma LGIA:** The Proposal states explicitly that developers availing themselves of applicable exemptions for at least the Power Management requirements must do so through a non-conforming LGIA. (It’s not clear whether other similar exemptions would also require non-conforming LGIAs.)

We do not understand this proposal. Exemptions approved by FERC would be in the Tariff and, therefore, should also be reflected in the new pro forma LGIA.

There is no reason why a project eligible for an approved exemption should be required to execute a “non-conforming” LGIA. Effectively, such a requirement would force any developer facing deadlines for ARRA funding or PPA milestones to choose between delays caused by foregoing the exemption and delays from the non-conforming nature of the LGIA, and that is not the intent of the exemption.

Proposed Power Management Requirements

Proposed requirements

CAISO PROPOSAL	EXEMPTION AND TRANSITION RULES
<p>Require all VERs (synchronous & asynchronous) to install “active power management,” including ability to:</p> <ul style="list-style-type: none"> • Limit ramp rates, to 5-20% of rated capacity per minute (10% default setting), from Pmin to Pmax, “except for downward ramps resulting from loss of wind or sun” – activate upon CAISO dispatch instruction receipt • Respond to over-frequency conditions, incl. meeting WECC 5% droop criteria, subject to ≤0.036 Hz deadband • Receive/respond to CAISO Automated Dispatch System (ADS) instructions & other Tariff-required communication 	<p>Standard Exemptions, but the LGIAs would have to be filed as non-confirming, i.e., could not take effect until FERC explicitly rules</p> <p>Exempt generators with unexecuted LGIAs filed at FERC</p> <p>Exempt asynchronous VERs that “demonstrate significant financial commitment” to buy non-compliant equipment by date CAISO Board OKs new standards; “non-conforming” LGIA required in those cases</p> <p>Exempt solar thermal generators from ramp-rate limits</p> <p>Capability to use ramp-rate limits to be activated later, e.g. at the:</p> <ul style="list-style-type: none"> • Conclusion of stakeholder processes on how limits will be used; or • Later of 1/1/2012 or generator COD

LSA comments

- **Commercial availability:** The CAISO believes that equipment that would meet this standard is “currently available from multiple” Original Equipment Manufacturers (OEMs), or will be by the 2012 date. We do not believe that this is true, and we challenge the CAISO to reveal the names of the vendors from which it has received this information and the equipment they can or will supposedly provide by 1/1/2012 that will meet these requirements (as well as the cost). Alternatively, the vendors themselves should come forward with this information.

There are two reasons why this issue is so critical:

- **Developers generally must order their equipment 18-24 months in advance of their Commercial Operation Dates (CODs).** There are a large number of plants expecting to come on-line in the 2012-2013 timeframe, and thus the required equipment effectively must be available in 2011 or before for in order to meet the deadline.

- **There will be many developers seeking to buy this equipment within a very short period**, given the size of the interconnection queue. Thus, multiple vendors are critical, for competitive-pricing reasons and also simple sufficiency of supply.

Generally, lack of an adequate vendor pool (at least 3 suppliers) at the time when equipment must be procured for a project – i.e., if procuring compliant equipment would delay the project – should be grounds for an exemption.

- **“Significant financial commitment:”** The CAISO has not determined yet how this will be defined. In response to questions on this week’s conference call, the CAISO said that:
 - It will include situations where an equipment change could delay generator development “significantly;” and
 - It will depend on the cost relative to the overall project cost, not just on the magnitude of the dollars that would be lost (e.g., forfeited deposits or cancellation charges). For example, a penalty of “20% of 4% of the project” might be a lot of money, but it would only be a small part of the project cost and probably wouldn’t qualify.

The CAISO simply must say what it means here. We agree that situations where an equipment change would impact development timing should be grounds for an exemption. Moreover, any financial-impact limit should consider, among other things, forfeited deposits, cancellation fees, order-change charges, losses from disposal of purchased but unneeded equipment, on-site design modifications, and/or similar compliance costs.

- **Ramp-rate limitation definition:** As discussed on the conference call, it does not appear possible for the CAISO to determine whether violation of a downward ramping limitation is due to an actual violation or an instance where the “fuel went away,” i.e., the clouds came over or the wind died down. The CAISO should therefore clarify that the proposed ramping limits will only be applied in an upward direction.

Moreover, if the main concern here is fast ramps in the early morning, late evening and off-peak hours, the CAISO should consider limiting the requirements to technologies likely to be generating and/or ramping in those hours.

- **Generator set-point compliance granularity:** It will be extremely difficult to control generator set points at a 1 MW granularity level – we do not believe that even most large gas-fired plants have this capability. The CAISO should thus consider resolution at the higher of 5 MW or 5% of nameplate capacity.
- **Basis for specific proposed ramp-rate limits:** Apparently, these were the result of a stakeholder process in Alberta (apparently, more extensive than the CAISO’s). The CAISO has not provided the information, considerations, or assumptions upon which the numbers are based, or whether the Alberta system differs from the CAISO system in ways that might materially impact the need for or content of these standards.

The CAISO should document thoroughly the justness and reasonableness of its proposed limits. This documentation should cite any FERC, NERC, or WECC standards that support the limits.

- **Response to CAISO dispatch instructions to activate this capability:** The CAISO said on the conference call that it envisions situation-specific activation of this capability as needed, with the limits based on the situation, subject to rules to be determined through a later stakeholder process (to begin by around late summer).

We know the CAISO does not want to discuss those rules here; however, it is fairly obvious that the CAISO is referring to an Exceptional Dispatch type of tool. The Tariff requires that the CAISO use all effective, available market mechanisms before issuing EDs, and we urge the CAISO to stop playing coy on this point and commit to using any capability provided by this standard only when mitigation is not available through the market. That would go a long way toward making developers, and financiers, more comfortable with these proposals.

In addition, the CAISO should make the common-sense clarification that the ability to respond to these CAISO dispatch instructions would only be required when the plant is able to generate energy, e.g., that solar plant owners “can go home at night.”

- **5% droop requirement:** This requirement has been around for over 30 years, but virtually no units in the WECC are compliant with this standard. Moreover, governor droop was intended for those generators with unloaded capacity to respond very rapidly (within 10 seconds) to an extremely rapid drop or increase in frequency, and as a first line of defense for a rapid frequency drop to prevent transient instability.

We essentially agree with CalWEA that any sustained deviation from 60 Hz (i.e., for over 30 seconds) should be met by AGC/regulation and not by governor droop.

- **Modification of interconnection applications (not):** The CAISO said on the conference call that changes to accommodate this capability (and the other standards changes) would not constitute a Material Modification, i.e., the changes would not impact the interconnection studies. That should be made explicit in the final CAISO proposal.

Proposed Power Factor Requirements

Proposed requirements

CAISO PROPOSAL	EXEMPTION & TRANSITION RULES
<p>Establish required power factors for new plants as follows:</p> <ul style="list-style-type: none"> • Asynchronous generators (asynchronous wind generators, solar PV): 0.95 lag/0.95 lead, at Point of Interconnection (unless , established as a default (i.e., justification in interconnection study not required (now req'd in LGIA Appendix H)); and • 0.90 lag/0.95 lead for other generators, at the generator terminal. <p>However, no reactive support required from asynchronous generators exporting <20% of maximum rated power to POI. Reactive support requirements for others will “be determined by the amount of power exported to the POI.”</p>	Standard Exemptions
<p>Standard can be met w/inverters, fixed or switched capacitors, static devices (e.g., STATCOM), or combo. of these methods</p>	Exempt Serial Group projects where System Impact Study did not indicate need for 0.95 lag/lead power factor*
<p>Asynchronous generators with 0.90 lag/0.95 lead PF in LGIA can comply with 0.95 lag/lead standard instead</p>	

* CAISO seemed to back away from this exemption during the conference call, and it's not clear what the proposal is.

LSA comments

- **“Default” requirement for asynchronous generators:** Any power-factor requirement placed on asynchronous generators should require a project-specific need determination, consistent with FERC Order 661-A. The CAISO claimed on the conference call that the need for this requirement was established in the November 2007 integration study (at 20% RPS, for the Tehachapis) and not-yet-released more recent studies (at 33% RPS).

However, the CAISO couldn’t cite a good reason why this requirement couldn’t be studied for a cluster and/or each project in the Phase 1 or Phase 2 interconnection studies. We urge the CAISO to avoid the fight on this point, especially since little justification appears to exist, and simply incorporate a needs demonstration into the regular interconnection studies.

- **Location for requirements:** Renewable generation facilities often are located in more remote sites that may require long tie-lines. It could be more difficult for such generators to meet a power-factor requirement at the POI than at the generator terminals.

Therefore, generators should have the option to either: (1) fund equipment at the POI to meet these requirements; or (2) meet the requirement at either the POI or the generator terminals. Otherwise, asynchronous generators would be disadvantaged compared to renewable generators with synchronous machines (which can meet the requirement at their terminals).

- **Clarification of requirement**

- The CAISO clarified on the conference call that static VAR capability, not dynamic capability, would be required. The CAISO said that its goal is not to dispatch units at a constant power factor, but to get help from the generator to help control voltage at the POI. This clarification should be stated explicitly in the requirements.
- The CAISO should also clarify that power-factor capability would be measured at nominal system voltage.

Proposed voltage requirements

Proposed requirements

CAISO PROPOSAL	EXEMPTION & TRANSITION RULES
<p>“Clarify” the requirement in LGIA Section 9.6.2 that all generators “maintain Voltage Schedules” to require all plants to:</p> <ul style="list-style-type: none"> • Install Automatic Voltage Regulation (AVR) to control all reactive power devices used to vary generator reactive power output to regulate POI voltage, within generator reactive capability; • Operate in voltage control mode as the default, with the ability to operate also in power factor control mode. • Coordinate w/PTO & CAISO for POI voltage schedule requirements 	<p>Standard Exemptions</p>
<p>Voltage must be controlled at POI, unless CAISO (in coordination with PTO) OKs voltage regulation on generator side of POI for reasons of efficiency and/or technical necessity</p>	

LSA comments

- **Generator capability:** The Proposal no longer contains the limitation that compliance should not violate voltage limits within the plant, which could happen given the system voltages. The CAISO should clarify that it does not intend for generators to operate beyond safe voltage limits, only that they help regulate voltage at the POI within their reactive capabilities.
- **Acceptable devices for voltage regulation:** We support the CAISO’s specification of the range of acceptable devices that can be used to comply with the proposed power-factor management requirements. However, we are concerned that this list is also not shown for voltage regulation. This section states only that the generator needs to meet a voltage schedule and says that the CAISO will determine the voltage schedule requirements.

Without an express reference back to the set of acceptable devices shown for voltage regulation, we are concerned that power-factor management will essentially require dynamic VAR support. The CAISO should clarify that automatic voltage regulation requirements can be met by automatic control of the reactive power sources used to comply with the reactive power/power factor requirements.

Proposed Frequency and Voltage Ride-Through requirements

Proposed requirements

TECH. AREA	CAISO PROPOSAL	EXEMPTION AND TRANSITION RULES
Frequency Ride-Through	Require all plants (incl. existing plants & synchronous generators) to comply w/current WECC Off-Nominal Frequency (ONF) rules, e.g., allow instantaneous trips only at/below 57 Hz or at/above 61.7 Hz, and require continuous operation between 59.4 and 60.6 Hz.	Standard Exemptions
		Exempt asynchronous VERs that “demonstrate significant financial commitment” to buy non-compliant equipment by date CAISO Board OKs new standards
Voltage ride-through	Require all asynchronous VERs to comply with Order 661-A Low-Voltage Ride-Through (LVRT) standard (now applicable to wind plants only), extended to zero voltage level; no High Voltage Ride-Through (HVRT) standard proposed at this time	Standard exemptions, for generators not already subject to Order 661-A requirements

LSA comments: We support the CAISO change to remove the earlier-proposed High Voltage Ride-Through standard. Consistent with this change, the discussion related to NERC PRC-024 should be moved to an appendix, to avoid confusion about the CAISO’s latest proposal.