



California ISO

Reactive Power Requirements and Financial Compensation

Response to Comments on Proposed Tariff Language Relating to Automatic Voltage Regulation System

Stakeholder	Comment	Response
CalWEA	<p>Why is the tariff change related to the reactive power provision by asynchronous generators only addresses one component of the reactive power provision reform enacted by the Board? Other changes on the location, magnitude and the characteristics (dynamic vs. static) of the reactive support are not reflected in the attached tariff change.</p>	<p>The ISO is addressing other aspects of reactive power interconnection requirements for asynchronous resources in a filing to comply with Order No. 827 and in its business practice manuals.</p>
CalWEA	<p>Regarding the second sentence of section 8.4.1.3, CalWEA states this provision should become a characteristic for providing reactive support and applicable to all types of generation.</p>	<p>The ISO agrees. This language would generally apply to all generating units providing reactive power capability unless their interconnection agreements specify different requirements</p>
CalWEA	<p>Why is the ISO proposing a requirement for only asynchronous resources to have an AVR system having both voltage regulation and net power factor regulation operating modes and requiring that the default mode of operation be voltage regulation? Should this requirement apply to all resources?</p>	<p>The ISO expects all resources to operate in voltage regulation mode and will make a change to section 8.4.1.3 to clarify this rule.</p>

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CalWEA	<p>The language that requires the AVR to automatically control the net reactive power of the Asynchronous Generating Facility within the required limit to regulate to the scheduled voltage, compensated to the Point of Interconnection, as assigned by the Participating TO or ISO, is too vague. Will CAISO/PTO schedule voltage at the high side of the generator step-up transformer (the point normally controlled by the asynchronous generator) or will they want the asynchronous generator to monitor and control the point of interconnection voltage remotely.</p>	<p>The PTO or ISO will issue voltage schedules at the point of interconnection. Resources will need to control voltage remotely understanding any impedance between the high side of the step-up transformer and the resource's point of interconnection. The resource will need only to control reactive power within the constraints of the facility, including the design requirements to provide 0.95 leading/lagging reactive power capability at the high side of the step up transformer.</p>
CalWEA	<p>Why does the prohibition against disabling voltage regulation controls, without the permission of the CAISO, apply only to Asynchronous Generating Facilities? This should be a universal requirement.</p>	<p>This language mirrors existing language that applies to asynchronous resources that are required to provide reactive power. See Appendix EE of the ISO tariff, Appendix H thereto at section A.iii: "The Interconnection Customer shall not disable power factor equipment while the Asynchronous Generating Facility is in operation." The ISO will clarify that this requirement applies to all resources providing reactive power capability.</p>

Stakeholder	Comment	Response
EDF Renewables	The posted tariff language should be modified to clarify that the new AVC requirements only apply going forward, and not to existing generation assets except in specific circumstances.	The ISO will revise the tariff language to clarify that for Asynchronous Generating Facilities the requirements will also apply to Generating Units subject to the requirement to provide reactive power capability pursuant to Order 827.
EDF Renewables	The ISO has not demonstrated the need for AVC requirements, considered the unique, additional costs the requirements would impose on wind generation or provided any Tariff means for recovery of these extra costs.	Consistent with Board direction, the ISO is proposing a uniform requirement for asynchronous resources required to provide reactive power capability to also provide automatic voltage regulation. This is consistent with the requirements of NERC Reliability Standard VAR-002-4.
EDF Renewables	The CAISO has not adequately incorporated consideration of grid-level alternatives in this initiative. There is no formal consideration in the Interconnection Study process or annual Transmission Planning Process (TPP) of whether single or multiple large Static Var Compensators (SVCs) in the transmission grid – i.e., transmission assets – would be a more efficient means of addressing voltage insufficiency than the proposed AVC requirements. Reactive power is a service needed to support the CAISO grid; thus, it would be just and reasonable to consider grid alternatives to address	Consistent with Board direction, the ISO is proposing a uniform requirement for asynchronous resources required to provide reactive power capability to also provide automatic voltage regulation. This is consistent with the requirements of NERC Reliability Standard VAR-002-4. The ISO's transmission planning process will address additional reactive power needs beyond those provided by resources interconnecting to the ISO grid.

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	<p>this need and not push the cost onto independent asynchronous generation.</p>	
<p>EDF Renewables</p>	<p>The CAISO proposal does not include any compensation for the additional costs to install and operate AVC. CAISO provides no compensation, at all, for reactive supply capability provided by synchronous and asynchronous generation. EDF Renewables brought this to CAISO's attention in recent comments during this initiative. That is unjust and unreasonable. CAISO's AVC proposal and proposed Tariff language will add costs to asynchronous generation and beyond what FERC addressed in order No. 827, also uncompensated. Indeed, CAISO has not discussed the cost impact to all types of asynchronous generation to include AVC. Wind generation projects, for example, would need to address this additional cost requirement in connection complex and sometime lengthy collector feeder lines.</p> <p>The lack of compensation to install AVC (for a reactive supply capability) in these situations is contrary to the State's intention to attract new wind resource development.</p>	<p>Consistent with Board direction, the ISO is proposing a uniform requirement for asynchronous resources required to provide reactive power capability to also provide automatic voltage regulation. This is consistent with the requirements of NERC Reliability Standard VAR-002-4. In the ISO's balancing authority area, resources generally recover the fixed costs of equipment associated with interconnecting a resource to the ISO grid as part of financing their project.</p>

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	<p>Moreover, voltage-support needs are largely driven by load need. FERC cost-causation policy and precedent requires that load (beneficiary) pays for this service. The lack of any CAISO-provided means for asynchronous generators to recover AVC capital and operating costs (and all reactive supply capability costs) renders the CAISO AVC proposal unjust and unreasonable.</p>	
<p>Large Solar Assn.</p>	<p>The CAISO should revise the posted tariff language as shown in the attachment to this document to clarify that the AVC requirements would apply only going forward.</p>	<p>The ISO will revise the tariff language to clarify that for Asynchronous Generating Facilities the requirements will also apply to Generating Units subject to the requirement to provide reactive power capability pursuant to Order 827.</p>
<p>Large Solar Assn.</p>	<p>LSA believes that the tariff language should include more of these details about how the CAISO would instruct generators to operate via AVC if the voltage control mode (Vmode) were not available, and that this sequence should include using reactive power control (Qmode) before resorting to power factor control. These changes are also reflected in the Attachment to this document. LSA believes that this is the most efficient sequence, and it is also supported in NERC rules (see, e.g., NERC VAR-001-</p>	<p>The ISO expects all resources to operate in voltage regulation mode and will make a change to section 8.4.1.3 to clarify this rule. The ISO believes this approach is consistent with NERC Reliability Standard VAR-002-4. The ISO may explore other rules associated with the operation of automatic voltage regulators in its Business Practice Manuals.</p>



California ISO

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	4.1 - Voltage and Reactive Control and NERC VAR-002-4 - Generator Operation for Maintaining Network Voltage Schedules).	