California Independent System Operator

Comments of the California Wind Energy Association and American Wind Energy Association on the CAISO Issue Paper and Straw Proposal on Reactive Power Requirements for Asynchronous Resources

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The California Wind Energy Association ("CalWEA") and the American Wind Energy Association (AWEA) appreciate the opportunity to comment on the California Independent System Operator Corporation's ("CAISO") Issue Paper and Straw Proposal on Reactive Power Requirements for Asynchronous Resources dated March 5, 2015. The CAISO paper presents a straw proposal for the provision of reactive power and voltage control capabilities by asynchronous generators that will interconnect to the CAISO grid in the future.

Before we offer specific comments on the CAISO proposal, the wind industry reiterates its support for initiatives that reasonably and cost-effectively improve the reliability and efficiency of the electric power system. By participating in the development of all of the requirements of FERC Order 661A and the interconnection requirements of the CAISO and other transmission operators, the wind industry has consistently played its part in putting this support statement into action. The wind industry has also taken the initiative to provide needed reliability services, including meeting voltage and frequency ride-through standards that are more aggressive than can be met by most conventional generators. At the same time, it is important to evaluate whether the desired capabilities are optimally obtained by imposing

requirements on all generators, or whether a need may be better met with solutions that are less costly overall and less burdensome on market participants. In any case, we believe that generators should be properly compensated for any new technical requirements that are imposed to resolve system problems.

We offer the following three specific points on the CAISO's straw proposal.

1. Prospective Application of the Reactive Power Requirements

CalWEA and AWEA applaud the CAISO's clear intention to apply its proposed interconnection requirements on a prospective basis only. ("The ISO is proposing to adopt, on a going forward basis, a uniform requirement for asynchronous resources to provide reactive power capability and voltage control." CAISO Issue Paper at p. 4.) Prospective application of these requirements is essential because, among other reasons, wind turbine-generators historically were not designed with these inherent capabilities. For the same reason, the CAISO should clarify that the requirements will not apply to any existing asynchronous generator that seeks to convert its existing interconnection agreement to CAISO-compliant interconnection agreements or any existing asynchronous generator that is requesting an incremental increase in capacity or energy output using existing or refurbished hardware, except to the extent that the project is being repowered with new turbines. The requirement should not apply to existing turbines that remain in an otherwise repowered project, and should not apply to refurbished or replaced existing turbines (turbines remaining at the same capacity with essentially the same technology).

2. Automatic Voltage Regulation Requirement

CalWEA and AWEA are alarmed by one feature of the reactive power capability and voltage control proposals in the CAISO Issue Paper – the requirement that asynchronous

generators would be required to provide Automatic Voltage Regulation (AVR), and particularly that they would be required to provide AVR at the point of interconnection (POI). The POI for an asynchronous generator may be located many miles from the location of the generator at the end of the renewable plant collector system and typically a long gen-tie line. The impedance of those lines can severely inhibit the provision of reactive power and other voltage services at the POI. Under these circumstances, providing AVR service at the POI would not only be very costly and inefficient for the asynchronous generator, but could also be detrimental to the reliable operation of the transmission grid due to the potential voltage/reactive power "hunting" phenomenon.

Technical literature suggests that a better solution would be to provide asynchronous generators with reactive power schedules determined based on a central reactive power optimization algorithm, rather than the AVR requirement. If implementing such a solution proves too difficult, CAISO could consider imposing AVR requirements at the generator terminals rather than at the POI to avoid some of these concerns. At least one other grid operator is moving to impose AVR requirements for asynchronous generators at the generator terminals (high side of its main step transformer) rather than at the POI, as seen in the recent filing by PJM in FERC Docket ER15-1193-000. It is critical to note that imposing an AVR requirement at the generator terminals may not rid the system of reactive power/voltage hunting conditions if there are too many asynchronous generators in close proximity to one another.

Moreover, while broadly supporting this CAISO proposal, CalWEA and AWEA would like to note that requiring all asynchronous generators to provide AVR may not be the most cost-effective way to address this reliability need. It is conceivable that the system reliability need could be much more cost-effectively addressed closer to load centers with a solution planned and

deployed by the CAISO, rather than imposing requirements on dispersed resources interconnected at remote locations on the transmission grid. As a general matter, consumers are best off when system services are provided by the resource that has the lowest cost and best ability to provide that service. CAISO should ensure that it is not inefficiently using generators requirements to obtain what are really transmission service needs like reactive power.

We are, however, very encouraged that, during the March 13, 2015, stakeholder call on the straw proposal, the CAISO staff readily agreed with these concerns and suggested the formation of a "technical work group" to address the technical details of implementing the proposal before the proposal is finalized. CalWEA and AWEA look forward to participating in such a technical working group, and believe that a reasonable solution involving the changes discussed above can be reached.

3. Compensation for Providing Reactive Power Capability

It is well understood that adding the capabilities required by the CAISO will lead to additional costs for asynchronous generators. These costs normally consist of:

- The cost of additional control equipment, particularly in relation to providing AVR functionality (whether at the generator terminal or at the POI);
- The cost of additional equipment to be able to offer the reactive power at rated real power output; and
- The opportunity cost of forgoing real power generation in order to provide reactive power, particularly when generating close to rated real power.

CalWEA and AWEA believe that asynchronous generators must be compensated for the additional capital costs required to comply, and/or for the opportunity cost of the forgone real power generation when reactive power and voltage control are being provided. We would like to

draw the CAISO's attention to the compensation arrangement put forward by the PJM Interconnection in its own proposal to require asynchronous generators to provide reactive power capability and voltage control in the PJM footprint in FERC Docket ER15-1193-000, at page 8. PJM explains that "resources providing reactive power and voltage control are permitted to recover their cost of service through the PJM Tariff by filing a rate schedule with the Commission. In addition to the base cost of service "capability payment," PJM also pays market sellers that provide reactive services at the direction of PJM, based on the difference between locational marginal price and the unit's offer price, depending on whether the active energy out of the market seller's resource is reduced or raised." We believe that such a provision is a reasonable and efficient way to ensure that resources are compensated for providing services needed by the power system.

In its March 13 stakeholder phone conference, CAISO did not seem to object to the concept of compensating asynchronous resources for providing reactive power capability and voltage control; however, it offered that the issue of reactive power compensation would be addressed as part of a later stakeholder process. CalWEA and AWEA strongly believe that the compensation of asynchronous resources for their reactive power capability and voltage control function should be part and parcel of the final proposal for this initiative. We look forward to further discussions on this topic.