California Independent System Operator

Comments of the
California Wind Energy Association and American Wind Energy Association
on the CAISO Revised Straw Proposal on Reactive Power Requirements and Financial Compensation
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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") Reactive Power Requirements and Financial Compensation Revised Straw Proposal dated October 8, 2015 ("Revised Straw Proposal"). The Revised Straw Proposal incorporates the ideas presented in the CAISO's May 22, 2015 Issue Paper and CAISO's August 13, 2015 Straw Proposal that presented the notion of the "universal" provision of reactive power and voltage control capabilities by asynchronous generators that interconnect to the CAISO grid in the future.

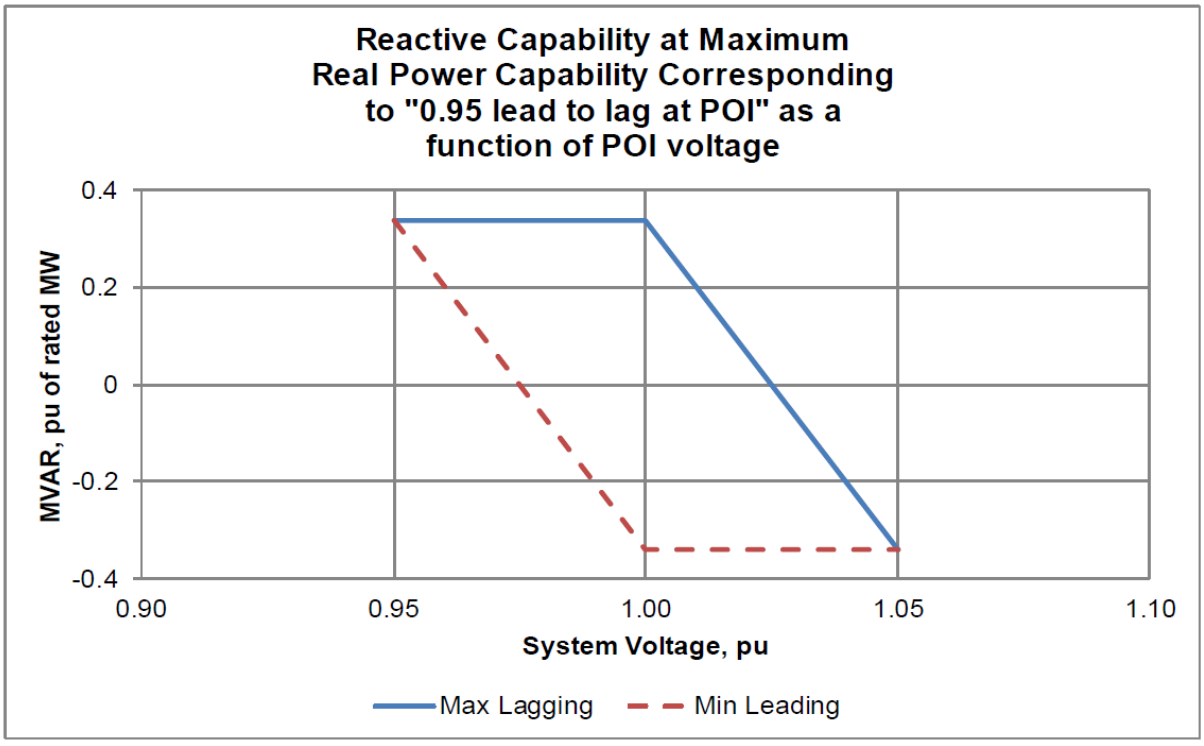
Before presenting our specific comments on the Straw Proposal, CalWEA and AWEA would like to express our severe disappointment in CAISO's complete backtracking on its reactive support capability payment provision in its Revised Straw Proposal (more on that later). At the same time, we would like to acknowledge the improvements in the technical area of the CAISO's universal reactive power provision proposal in response to stakeholders. More specifically:

- Further clarifying the prospective nature of the universal reactive power policy by clearly specifying that the requirement will apply to "resources entering the queue

during Cluster 9 and beyond";

- Allowing asynchronous generators to select their point of voltage control (POI versus inverter terminals); and
- Agreeing with CalWEA and AWEA that the reactive power capability curve requirement for an asynchronous generator (Figure 2 of the Revised Straw Proposal, shown below) should be clarified by changing the caption to read: "Reactive Capability at Maximum Real Power Capability Corresponding to "0.95 lead to lag at 'POI' as a function of POI voltage." This change corrects a major ambiguity about the reactive power requirement level at times when the real power output of the asynchronous generator is less than its rated power.

Figure 2: Proposed reactive power capability at different voltage levels



CalWEA and AWEA offer the following specific comments on the CAISO Revised Straw Proposal. These comments are complementary to those we offered in our comments of

March 20, June 11 and September 3 of 2015 on this CAISO initiative and repeats only those concerns that we believe have not been adequately or properly addressed by the CAISO as it has modified its proposal.

1. Prospective Application of the Reactive Power Requirements

CalWEA and AWEA acknowledge and support CAISO's clarifications that universal application of a reactive power requirement would apply only to Cluster 9 and beyond and "exempt all projects already in the ISO interconnection process and existing individual generating units of an asynchronous generating facility that are, or have been, interconnected to the ISO controlled grid at the same location from these new requirements for the remaining life of the existing generating unit." However, CAISO goes on to state: "The ISO proposes that any generating units that are replaced or repowered must meet these new requirements."

While CalWEA and AWEA generally agree with the intent of the above requirement for existing asynchronous generators, we seek clarification on the following critical, yet unclarified, points:

- The requirements should not apply to any existing asynchronous generator that is requesting an incremental increase or no increase in capacity or energy output using existing or refurbished hardware.
- While the requirement should apply to projects that plan to repower with new turbines, it should not apply to existing turbines that remain (or are simply refurbished) in an otherwise repowered project (turbines remaining at the same capacity with essentially the same technology).

2. Technical Requirements of Providing AVR Capability

CalWEA and AWEA continue to appreciate CAISO's willingness to address the voltage and reactive power "hunting" issue by allowing an asynchronous generator to choose to control the voltage at a point before its POI. However, while the earlier Revised Straw Proposal seems to unequivocally state that the choice of voltage control will be with the asynchronous generator ("the ISO will allow flexibility for resource owners to choose from which location they would control"), as requested by the wind industry, the proposal later takes that choice away from the generator by making the selection of voltage control point subject to CAISO and PTO permission ("The ISO, in coordination with the Participating TO, may permit the Interconnection Customer to regulate the voltage at a point on the Asynchronous Generating Facility's side of the POI"). We recommend that this discrepancy on choice be resolved in favor of the generator.

Furthermore, CAISO goes on to require that "all resources must be electrically compensated to the POI." The wind industry understands the need for this requirement but also believes that it could be interpreted in a multitude of ways and asks the CAISO to offer significantly more clarity on "compensated to the POI."

In regard to reactive power compensation to the POI, CalWEA and AWEA support the proposal by the Large-scale Solar Association (LSA) that asynchronous generators be allowed to opt for the same reactive power requirements that are applicable to synchronous generators whereby the generator is required to offer 0.9 lagging to 0.95 leading power factor at its terminals.

Finally, rather than further elaborating on its technically superior proposal in their Straw Proposal that would allow one or more interconnecting asynchronous generators to collectively offer reactive support, particularly for beyond-the-POI voltage regulation potentially by installing reactive support equipment at such points, CAISO fails to mention that proposal at all in its Revised Straw Proposal. CalWEA and AWEA encourage CAISO to include and further

flesh out this specific provision of the prior CAISO proposal as we believe that it will improve the technical capability and reduce the cost of providing the required reactive support.

3. Compensation for Providing Reactive Power Capability

CalWEA and AWEA are truly dismayed with CAISO's total backtracking on cost compensation for reactive power capability. CalWEA and AWEA continue to believe that reactive power capability support is similar to any other service offered by a generator in support of network reliability and, hence, its cost should be treated as part of the Reliability Network Upgrade (RNU) cost leading to its compensation under the same rules that apply to RNU cost (including the applicable cap) as part of the interconnection process. Explicit accounting for the reactive power capability cost in this fashion is not only accurate, fair and equitable, but also will lead to better optimization of resource procurement.

CalWEA and AWEA continue to recommend that asynchronous generators be compensated on a cost-based basis, which will ensure that the payments are fair as well as straightforward, and are consistent with general utility practices. We suggest the following simple approaches for calculating these costs and payments, which track the compensation method proposed by PJM that was supported by AWEA and has been conditionally accepted by FERC.

3.1 Reactive Power Capability Payment

This payment should cover the cost of retrofitting the generating facility to meet the reactive power and voltage control capability specified by the Revised Straw Proposal beyond the reactive support capability that would be naturally provided by the asynchronous generator as part of supplying its real power. The compensation should include:

- The cost of adding inverters and/or other reactive support devices to make it possible for the asynchronous generator to provide the required power factor range at full rated power;
- The cost of "upgrading" inverters and/or other reactive support devices to allow for specific dynamic performance requirements (e.g., the one-cycle response time, as noted in the CAISO presentation slides, or dynamic voltage response for the 0.985 lag/lead Power Factor range); and
- The cost of monitoring and controlling voltage to a pre-specified schedule.

3.2 Reactive Power Provision Payment

This payment should principally cover the opportunity cost to the asynchronous generator for withholding real power generation in order to provide the requested reactive power, which corresponds to lost revenue based on the Power Purchase Agreement (PPA) price and lost PTC, if any, rather than the generator's LMP. Only in this fashion would the true economic opportunity cost be captured for the asynchronous generator and properly incentivize the provision of reactive power.

4. Application of reactive power requirements to WDAT

CalWEA and AWEA would like to repeat the following additional point regarding the application of these rules to the wholesale distribution interconnection process (WDAT interconnection) administered by the PTOs, particularly Distributed Energy Resources (DERs). As we noted before, the best location to provide reactive capability is closest to where the reactive power is required. WDAT resources and particularly DERs are normally installed closest to the load centers where reactive power needs are the highest. In addition, DERs

generally draw their reactive power needs from the grid. Hence, supplying reactive power support at the location of WDAT resources and particularly DERs would be highly desirable. Furthermore, WDAT projects, including DERs, are normally studied as part of the same cluster studies that are used for transmission-interconnected projects. Hence, it only makes sense that the universal reactive power requirement be simultaneously applied to both transmission and distribution interconnection processes.