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CleanSpark is grateful for the opportunity to submit comments on CAISO's Issue Paper and Straw Proposal titled "Reactive Power Requirements for Asynchronous Resources" dated March 5th 2015.

CleanSpark is generally in agreement with the statements from CAISO that asynchronous and intermittent renewable generation sources have created a recent need for reactive power support to maintain voltage stability on the electric grid. However, CleanSpark believes the methods proposed for mitigating this impact should be revisited and revised.

The current mitigation strategy sets a requirement for reactive power support from all asynchronous generation installed moving forward. The cost impact of this requirement was reviewed according to CAISO by discussing the impact with "inverter manufacturers such as General Electric and Siemens..." leading CAISO to the following conclusion.

Approximately 5 percent of total plant cost is attributable to inverters and associated equipment (e.g., transformer, controller). This is a sunk cost because all asynchronous resources must have inverters. Given the sunk costs, the incremental costs for adding reactive power capabilities are significantly less. (p. 22)

CleanSpark believes this conclusion is possibly misguided thanks to a potential conflict of interest. Consider the installation of a 20 megawatt (MW) of photovoltaic (PV) generation. A typical design utilized about 10% reduction of inverter equipment in comparison to the DC modules. If the system also needs to provide the .95 power factor (leading or lagging), the economic calculation for a return on investment will reduce the measurable production of the plant. It has been found that a 5% increase in rating and likely a subsequent 5% increase in cost for equipment will represent far more than 5% of a total project cost. In conjunction with the necessary automatic voltage regulation (AVR) equipment, this cost adder could be substantial. While the option to up-size an inverter might be the most economical solution given the requirement, it might not be the most economical solution for providing reactive power to the grid.

By establishing a new market for reactive power generation or absorption, CleanSpark believes a more economical solution could be realized. As an example, consider the inverters installed and in use today. Under the proposed requirement, reactive power output would be limited depending on the generation output.

...as the real power output decreases both the dynamic and continuous reactive capabilities also decreases. (p. 27)

Alternatively, with a reactive power market and proper incentive structures, solar generation facilities might continue to run their inverters for reactive power support providing up to their inverter rated VA capacity in VAR support at night or under cloud cover when previously not in use. Similarly, Wind generation facilities might provide daytime reactive power support when wind production is low. With

this methodology, a previously under-utilized asset might provide additional revenue for generation owners while providing valuable grid support. Requiring reactive power output below .95 power factor without compensation might be considered too onerous. Instead, if a compensation structure were assembled, generation owners might choose to operate their equipment below .95 power factor when generation output is low, no inverter sizing adjustment required.

It is CleanSpark's understanding that CAISO has considered the development of a voltage support market but to date has made no progress on the implementation of such program. Rather than imposing a mandatory cost on future renewable energy projects, benefiting inverter manufacturers, CleanSpark hopes to operate in a market environment where reactive power and voltage support is adequately compensated for the necessary grid benefits it produces.

References

California Independent System Operator (CAISO). (2015, March 5). Reactive Power Requirements for Asynchronous Resources, Issue Paper and Straw Proposal. California.