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Joint Solar Parties Comments on SB 100 Rpt

Additional submitted attachment is included below.

September 15, 2020

California Energy Commission Docket No. 19-SB-100

Re: Support for the Inclusion of Hybrid Solar plus Storage as a Discrete Candidate Resource to be Used in Future Modeling by the Joint Agencies for SB 100 Planning

The Large-scale Solar Association, the Solar Energy Industries Association, and Vote Solar ("Joint Solar Parties") write in support of including hybrid solar plus storage as a candidate resource to be used in SB 100 planning efforts. Candidate resources represent the list of new resource options that can be selected by the RESOLVE capacity expansion model to create an optimal resource portfolio to achieve California's decarbonization goals. The omission of hybrid solar plus storage as a discrete resource option that can be selected by RESOLVE will almost certainly result in a distorted resource portfolio that will appear to be more expensive and misaligned in the timing for resource procurement to address reliability and greenhouse gas reductions.

The Joint Solar Parties urge the Joint Agencies to place a high priority and near-term emphasis on correcting this deficiency. Hybrid solar plus storage projects account for over 30 gigawatts of projects currently in the CAISO interconnection queue. To illustrate the importance of hybrid solar plus storage projects for future procurement by load serving entities, the Joint Solar Parties have examined the CAISO queue for Riverside and San Bernardino Counties. There are 31 active solar, storage or solar plus storage interconnection applications in these two counties totaling 8,202 megawatts. Twenty-three of the projects are hybrid solar plus storage, five projects are standalone storage, and only three projects are solar without storage.

Hybrid solar plus storage projects have multiple features that make them different from standalone solar and standalone storage. Modeling solar and storage separately will not accurately capture the synergistic benefits of the hybrid projects. Hybrid projects can make use of solar energy that would otherwise be wasted or "clipped" in the inverter. Hybrid solar plus storage projects are more like conventional dispatchable power plants that can provide the full spectrum of energy and ancillary services essential for grid reliability. Hybrid solar plus storage projects can start instantly, have no limitation on how many times they can start during a day, have no minimum run time, can ramp down to zero output very quickly, and are dispatchable to the limit of their stored energy plus the available solar not used for charging. With a proper compensation structure they can provide fast frequency response, upward and downward regulation, load following services, and spinning reserves. Hybrid solar plus storage projects up to the limits of their stored energy are a much more flexible resource than natural gas power plants and can better support the grid operator in managing the "duck curve" and lowering

system operating costs. It is essential that capacity expansion and production cost modeling be improved to be able to emulate their performance.

In the most recent round of modeling for the CPUC's Integrated Resource Planning (IRP) process (also using RESOLVE), the CPUC attempted to address the lack of hybrids as candidate resources by running a sensitivity with the cost of stand-alone storage reduced as though the storage qualifed for the federal solar investment tax credit through pairing with solar. This was the least-cost case that the CPUC modeled among dozens of IRP scenarios, which illustrates one of the major benefits of hybrid resources. However, this work-around does not capture other benefits of hybrids such as their ability to capture additional solar output. Nor does it result in an accurate pairing of the build-out of solar and storage resources over time.

We understand that one reason for omitting hybrid solar plus storage from consideration currently is that the RESOLVE capacity expansion model that the Joint Agencies rely upon use information about capital cost and performance from NREL's Annual Technology Baseline data base. We also understand that the CPUC has a preference for using data about costs that are in the public domain.

The Joint Solar Parties offer, as an alternative source of publicly accessible data, the annual report produced by the Lawrence Berkeley National Laboratory (LBNL) entitled "Utility-Scale Solar: Empirical Trends in Project Technology, Cost, Performance and PPA Pricing in the United States." The most recent report is for 2019. However, the 2020 Report should be available soon.

The 2019 LBNL Report notes that interest among utility off-takers for medium-duration storage (i.e., 2-5 hour) has grown and many utilities are now encouraging all solar proposals to include a storage option. Many project developers are now making it standard practice to provide a storage option when responding to a utility solicitation. LBNL reports that there were more than 55 gigawatts of PV hybrid projects within interconnection queues across the United States at the end of 2018.

The LBNL Report included 36 projects in the data base they used for their 2019 report. The mean storage duration for the projects was 3.8 hours with an overwhelming majority having 4.0 hours of storage capacity. The data base had sufficient information on 23 solar plus storage projects to enable a calculation of a storage adder. All 23 of the projects include 4 hours of battery storage. Based on that sample the LBNL report concluded that a 4 hour battery that is sized at 25% of the solar capacity adds about $4/MWH to the overall PPA price. As the battery capacity increases in proportion to the solar capacity, the levelized storage adder increases linearly. For a battery that is sized at 50% of the solar capacity, which is a typical configuration under development, the adder is around $10/MWH.

The costs of hybrid solar plus storage projects are expected to decline further. Since the 2019 LBNL Report utilities in Arizona, Nevada, New Mexico, Oregon and Utah have executed or indicated their commitment to execute power purchase agreements (PPA) with developers of hybrid solar plus storage projects. Likewise the Los Angeles Department of Power and Water has recently executed a PPA for a large hybrid solar plus storage project.

SB 100 requires the Joint Agencies to submit a report to the Legislature by January 1, 2021. There is limited time to adjust the RESOLVE model the Joint Agencies use to incorporate hybrid solar plus storage as a candidate resource into that Report. However, the Joint Agencies should consider how they can assess the impact of hybrid solar plus storage projects in their planning before the next report to the legislature is submitted. This should include the CPUC's Integrated Resource Planning process.

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