APPENDIX 2:

CalWEA's Testimony in Extreme Weather Proceeding (R.20-11-003)

Rulemaking No.: 20-11-003
Exhibit No.: _____
Witness: Dariush Shirmohammadi

PREPARED TESTIMONY OF DARIUSH SHIRMOHAMMADI

ON BEHALF OF THE CALIFORNIA WIND ENERGY ASSOCIATION

California Wind Energy Association
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September 1, 2021

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Establish Policies, Processes, and Rules to Ensure Reliable Electric Service in California in the Event of an Extreme Weather Event in 2021.	R. 20-11-003

PREPARED TESTIMONY OF DARIUSH SHIRMOHAMMADI

ON BEHALF OF THE CALIFORNIA WIND ENERGY ASSOCIATION

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On behalf of the California Wind Energy Association

September 1, 2021

I. Introduction and Qualifications

Q. Please state your name, affiliation and business address.

A. My name is Dariush Shirmohammadi. I am the Executive Vice President and Chief Engineer at the consulting firm GridBright, Inc. I serve as Technical Director for the California Wind Energy Association (CalWEA) on whose behalf I am submitting this testimony. My business address is 160 Alamo Plaza #830, Alamo CA 94507.

Q. Please state your qualifications.

A. I have a PhD in Electric Power Engineering from the University of Toronto. In addition, I am a Licensed Professional Engineer and a Life Fellow of the Institute of Electrical and Electronic Engineers (IEEE). I have worked in the electric power industry for over 45 years (since 1975), including tenures as a transmission planning, design and operations engineer at Hydro Quebec, Ontario Hydro, Pacific Gas and Electric Company (PG&E), and the California Independent System Operator (CAISO). I have continued my work on transmission system planning, design and operation, particularly as relates to renewable resources interconnection and integration, since 2007 in my current consulting responsibilities. I have also worked in distribution grid planning and optimization while at PG&E and in distribution grid planning, design and operation in my current consulting work. My current work responsibilities primarily focus on interconnection and integration of renewable generation resources, as well as planning for increased penetrations of renewable energy on electrical grids within North America and in California, in particular.

Q. What other relevant experience do you have to these proceedings?

A. As the Director of the CAISO's Regional Transmission South division, part of my responsibility involved day to day operations as well as long-term planning for the CAISO-controlled grid, which included a host of renewable generation resources. After leaving the CAISO in 2007, I started my consulting practice whereby I have continuously provided renewable integration and planning consulting services to CalWEA and many renewable resource developers across North America. I have been a member of the leadership team for the North American Electric Reliability Corporation's ("NERC") Integration of Variable Generation Task Force and served as one of a handful of non-utility members in the NERC's Essential Reliability Services Task Force. All these major industry initiatives were set up to deal with reliable interconnection and operation of large penetration of renewables in North America's

Electric Power Grid. Finally, as part of my responsibilities at the CAISO as well as various consulting responsibilities, I have extensively worked with and applied long-term production simulation tools for studying the economic and reliability aspects of the electric power system particularly for California and the Western Electricity Reliability Council.

Q. What has been your involvement with resource planning models?

A. As CalWEA's Technical Director, I have regularly reviewed the RESOLVE and SERVM modeling that has been conducted in the Commission's Integrated Resource Planning proceeding and have engaged in related technical workshops and discussions.

II. Testimony

Q. What is the focus of your testimony?

A. My testimony is focused on the Commission's consideration of structural reforms to its Resource Adequacy (RA) program in Rulemaking 19-11-009 and the possibility that an early Commission decision regarding the level of deliverability that is needed for RA resources under the reformed RA program could enable a substantial amount of RA capacity to materialize by the summer of 2023. Alternatively, in the present summer reliability proceeding, the Commission could adopt certain immediate reform measures for assessing deliverability which would also facilitate resources coming online by summer 2023.

Q. Please explain what you mean by "level of deliverability".

A. Currently, to qualify as an RA resource, generation and storage resources must obtain Full Capacity Deliverability Status ("FCDS") or Partial Capacity Deliverability Status ("PCDS") from the CAISO. The assessment methodology that the CAISO uses to determine whether a resource qualifies for FCDS or PCDS is exceedingly conservative. It is therefore very difficult for resources to obtain this status absent costly network transmission upgrades that must be financed by the developer and require significant lead time; as a result, seeking deliverability status is typically avoided altogether. If the methodology were to be reasonably relaxed, consistent with the purpose of the structural reforms being pursued by the Commission, I believe that it would remove a major hurdle that could enable a substantial number of projects – those that are in advanced stages in their other aspects of development – to complete their development by summer 2023. In addition, existing projects with Energy Only ("EO") status could attain the deliverability status that they deserve.

Q. Please explain how the CAISO's deliverability assessment methodology is "exceedingly conservative" and why relaxing that methodology would be consistent with the purpose of the Commission's structural RA reforms.

A. The CAISO's current deliverability assessment methodology is designed around two operating scenarios. The first scenario, called High System Need ("HSN"), includes three system conditions that are assumed to be occurring simultaneously:

- an N-2 condition (where "N" represents normal operating conditions and "-2" represents two or more simultaneous failures of equipment, such as a transmission-line segment);
- system dispatch conditions where all generation in a particular area is operating at near-maximum Net Qualifying Capacity ("NQC"), and
- a "peak-net-load condition,"[1] an operating condition where the system is most likely to experience a generation shortfall. This condition has consistently been occurring during the summer evening hours.

The second operating scenario, called Secondary System Need ("SSN"), represents similar assumptions regarding system outages and generation dispatch but gross load is assumed to be at or near its peak level and energy production from both wind and, particularly, solar resources with FCDS and PCDS status are assumed to be significantly higher than their NQC levels and in the HSN scenario.

These assumptions are causing substantial and unnecessary roadblocks in building the evolving system that will be dominated by widely dispersed, relatively small, variable energy and storage resources. Essentially, the conservative deliverability assessment methodology, which is focused on a very few, highly unlikely hours, is preventing resources that could provide RA capacity during the vast majority of hours, including during the critical evening net-peak-load period represented in the HSN scenario (without network transmission upgrades) from interconnecting to the system and providing RA capacity. A premise of the Commission's structural RA reform initiative is that the RA program must evolve to ensure that energy needs are met in all hours, particularly in all evening peak hours, as well as under more extreme conditions.

[1] Net load at a moment in time is calculated as the gross load minus the sum of the output of all variable energy resources like wind and solar generation.

Q. What system conditions would be reasonable to assume for purposes of awarding RA credit?

A. This should be the topic of stakeholder discussions in the RA workshops that will occur this fall in R.19-11-009, however, some immediate measures could be addressed in workshops during this summer reliability proceeding. My overall recommendation for reform, however, is that generation should be awarded RA credit based on the following reasonable assumptions: an N-1 operating condition, reasonable system dispatch, and only the HSN study scenario. I will explain each in turn. (In general, these assumptions should be geared towards meeting load, not avoiding the curtailment of generators, which should be handled separately.)

First, an N-2 condition occurs extremely rarely. The criterion was established by NERC for purposes of avoiding loss of load, not generation curtailment. (Note that, with the availability of additional generation resources required under the PRM, if one or a group of generators are curtailed under the extremely rare N-2 condition, other generators in other parts of the system can be called upon to meet load.) For generation deliverability, an N-1 condition should be assumed, which is still relatively rare but is significantly more likely to occur than an N-2 condition.

Second, the system dispatch assumed in the deliverability assessment is not consistent with the way generation is dispatched, either historically or optimally. Instead of using such a unique dispatch scenario, historically based or optimum dispatch conditions should be assumed. In fact, CAISO is already using such reasonable system dispatch conditions for its off-peak deliverability assessment.

Third, using the SSN scenario, with its near-peak gross-load condition, for the deliverability assessment has much less to do with delivering resources to load at the time when RA capacity is really needed – during the evening net-peak-load condition (represented by the HSN scenario). The SSN scenario is, instead, focused on avoiding renewable generation curtailment during times of high gross system load and high production from variable energy resources when system need for this RA capacity is not critical. Hence, applying the SSN condition is preventing resources that could provide RA capacity at the time of real system need from attaining deliverability status based on potential resource curtailment during times when such curtailment is not a system concern.

Q. In what other way is CAISO's deliverability assessment methodology "exceedingly conservative"?

A. Reform is also needed for the process of granting resources local RA credit. Currently, a resource located in a Local Reliability Constrained Area ("LCRA") is required to qualify as a system RA resource before it is qualified to provide local RA. Qualifying as a system RA resource could require transmission upgrades to deliver energy from, say, a battery project in the Los Angeles Basin LCRA to the Bay Area LCRA, preventing it from providing local RA capacity in the Los Angeles LCRA.

Q. Which of the above reforms do you believe are reasonable to address in this summer reliability proceeding, and which should be addressed as part of the structural RA reforms in R.19-11-009?

A, Eliminating the SSN scenario for deliverability assessment and eliminating the requirement for local resources to attain system RA status is very straightforward – although local resources would need to be studied under a local deliverability scenario and obtain local RA capacity qualification. The Commission should invite the CAISO to consider these changes in the present proceeding.

Reforms to the other two conditions in the HSN scenario (system dispatch and N-2 contingency level) will require more deliberations, both at the Commission and the CAISO, and should be addressed in the structural RA reform proceeding. Reformed conditions could be used to determine deliverability for all resources for each of the time periods – or "slices" as they are termed under the Commission's adopted framework. (Under the Commission's newly adopted RA framework, the 8760 hours in a year will be divided into several seasonal and time-of-day "slices.") For each slice, the assessment methodology should reflect the expected net peak load (HSN) in that time period.

Q. How should extreme system conditions be addressed as part of this overall reform?

A. The rarest and most constrained system operating conditions could be considered for the most critical slice of day (one with the highest HSN net load) for a planning year. The PRM can be raised if necessary to ensure that there are sufficient RA resources on the system. (Note that increasing the PRM does not itself require transmission upgrades.) For bringing on resources for summer 2023, however, the issue is whether capacity can reach load over many hours, not whether load is being met under a system condition that is extremely rare, and so a more reasonable deliverability assessment methodology should be used for that purpose. For example, the CAISO, Commission and Energy Commission stated in the January 13, 2021, letter to the Governor regarding the rolling outages in August 2020, that "there was no single root cause of

the August outages, but rather, […] the three major causal factors contributing to the outages were related to extreme weather conditions, resource adequacy and planning processes, and market practices." There was no N-2 condition, unusual dispatch conditions or extensive resource curtailments – basically, there was a shortage of resources available in the evening hours which has rapidly become the most critical period for resource adequacy and should be studied via a relevant slice-of-day deliverability assessment. The bottom line is this: removing unreasonable criteria in the deliverability assessment methodology will help to add resources to the grid, which will help meet load.

Q. What would need to occur to realize the immediate measures that you recommend and to enable resources to come online by summer 2023?

A. The Commission should direct Energy Division, in partnership with the CAISO, to commence stakeholder workshops under the Summer Reliability proceeding to develop the immediate reform measures for assessing deliverability and to qualify for the RA program. The Commission should then request the CAISO to revise the current deliverability assessment methodology accordingly. These steps should be accomplished by Q1 2022, which would allow sufficient time for the CAISO to recalculate deliverability immediately for all queued as well as operating resources with PCDS and Energy-Only ("EO") status, by Q3 2022. The new methodology will "free up" deliverability capacity from existing FCDS projects which can be awarded to EO, PCDS and queued projects with imminent commercial operation dates. (Because the CAISO's deliverability methodology is not defined in its tariff in any detail, CAISO may not need to seek a major tariff change at FERC.) Those projects awarded FCDS status and that are in advanced stages of development (e.g., with site permitting in place) will thus have approximately a year to complete their development and come online by summer 2023.

Q. Do you have a sense of how much capacity could obtain deliverability status under the assumptions you describe?

A. Generally, most resources in areas of the grid that are strong would likely pass the new deliverability test that I recommend. In fact, each of the two reforms alone should free up a substantial amount of deliverability capacity and, as a result, RA capacity. Specifically, all or a portion of the more than 1,700 MW currently in the CAISO queue with EO status and more than 3,000 MW with PCDS that have commercial operation dates prior to Summer of 2023 could pass the new test, and potentially offer RA capacity by summer of 2023. In addition, there are

approximately 120 operating projects that have Energy-Only status and eight operating projects that have PCDS that total well over 1 GW. Those could obtain additional deliverability status, which could immediately count towards RA capacity requirements.

Q. Are there other benefits that would accrue from modifying the deliverability assessment criteria?

A. Yes, several. First would be the major economic benefit of making more efficient use of existing transmission assets, enabling a large volume of resources to interconnect and provide RA capacity without network upgrades. Second, by enabling a considerable amount of additional resources to enter the RA market, more competition would be created, which should lower the cost of RA and benefit ratepayers. Third, load-serving entities would be more likely to fulfill their RA requirements.

Q. With these reforms, which will encourage capacity additions on the system, how should curtailment concerns be addressed?

A. The SSN scenario should become part of the off-peak (non-HSN) deliverability assessment and be used to award variable energy resources Off-Peak Deliverability Status ("OPDS"), which would give them higher priority to the transmission deliverability capacity and lower curtailments.

Q. Does this conclude your testimony?

A. Yes, it does.