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Docket No. 15-MISC-05 - Comments of Brookfield Renewable Energy Partners L.P.

Attached please find comments on behalf of Brookfield Renewable Energy Partners L.P. regarding the November 20th workshop investigating issues concerning bulk energy storage. If you have any questions please feel free to contact me directly.

Additional submitted attachment is included below.

December 18, 2015

California Energy Commission
Dockets Office, MS-4
1516 Ninth Street
Sacramento, CA 95814-5512

RE: Brookfield Renewable Energy Partners L.P. Comments Regarding Barriers to Bulk Energy Storage, Docket No. 15-MISC-05

Dear Commissioners:

I am writing on behalf of Brookfield Renewable Energy Partners L.P. (Brookfield Renewable) regarding the joint California Energy Commission (CEC) and California Public Utilities Commission (CPUC) workshop investigating issues concerning bulk energy storage.

Specifically, Brookfield Renewable offers these comments to provide insights on current challenges to the development of new long-duration, large-scale storage, and recommendations necessary to enable long-duration storage to assist in California's pursuit of a lower-carbon electricity grid.

Brookfield Renewable operates one of the largest publicly-traded, pure-play renewable energy platforms globally. Its portfolio focuses on hydropower and wind generation, totals over 7,300 megawatts (MWs) of installed capacity, and the company has more than 100 years of experience as an owner, operator and developer of hydroelectric power facilities. Brookfield Renewable's California portfolio currently includes several hundred MWs of wind capacity located in Kern and Riverside Counties and a 30 MW hydroelectric facility in Lassen County. In addition, Brookfield Renewable is currently developing the 280 MW Mulqueeney Ranch Pumped Storage project near the City of Tracy, California. Brookfield Renewable has significant experience with large-scale pumped hydro storage, including joint ownership and full operating responsibility since 2005 for 600 MW of pumped storage in New England.

I. The Potential Need for Long-Duration Storage Supports Near-Term Action

On July 21, 2015, the California Independent System Operator (CAISO) sent a letter to the CPUC Commissioners indicating that changes in net demand experienced in spring of 2015 had been more severe than anticipated. Citing the significant amount of incremental renewable generation planned over the next several years, CAISO's letter expressed a need for California to be prepared to enact solutions that enable the continued reliable operation of the electricity grid and, in particular, highlighted pumped storage as a key technology capable of providing necessary, new ramping capability to the system while also assisting in mitigating over-generation events. CAISO's letter coupled with its recent analysis¹ provides clear justification for the need to begin positioning California for the potential procurement of new long-duration storage, especially when considering the lead time required to develop pumped storage projects from the initial feasibility analysis phase through commercial operation.

Accordingly, Brookfield Renewable believes an appropriate consideration in the near-term is for the CPUC, as the agency responsible for overseeing generation planning and procurement authorization for California's investor-owned utilities (IOUs), to authorize the IOUs to proceed in the near-term with a request for offers (RFO) for long-duration bulk storage. Brookfield Renewable understands there may be hesitance to act prior to completing the effort currently underway to ensure appropriate modeling scenarios and assumptions are relied upon in future Long-Term Procurement Plan (LTPP) proceedings, and we support that additional analysis required to fully understand potential gaps in system planning – particularly analysis which considers the implications of the passage of SB 350 requiring a 50% RPS by 2030; however, it must be recognized that benefits and services provided to the grid by large-scale pumped hydro storage are very project specific.

¹ Prior CAISO modeling for Phase 1a of the CPUC's 2014 LTPP showed 1) the potential for significant hours of renewable curtailment under a 40% RPS with unlimited renewables curtailment and 2) the potential for significant over-generation events and ramping capability needs under a 40R RPS with no renewables curtailment. Recent CAISO modeling using the 2014 LTPP 40% RPS in 2024 Scenario with unlimited renewable curtailment included the addition of a 500 MW pumped storage facility and found the additional pumped storage reduced curtailment, CO₂ emissions, production costs and renewables overbuild.

It is commendable that the state has proceeded with a 1.3GW distributed storage mandate, recognizing the need for action on storage outside of current market signals. However, this mandate is limited by its exclusion of bulk storage resources, i.e. storage resources larger 50MW, which has already been identified by CAISO as being an important part of system reliability in the future, particularly under a 50% RPS that is forthcoming. New bulk storage requires similar procurement mechanisms to be successfully developed, but also adapted to its unique characteristics and development timeframes.

Moving forward with an RFO in the interim will offer a more complete picture for any future modeling and needs authorizations by providing the IOUs and the CPUC the ability to better understand proposed long-duration storage projects, resource capabilities and pricing expectations. The RFO can be contingent in nature, with flexibility inherent in the structure to recognize the potential for system conditions to change, thus allowing the CPUC to continue to evaluate the need for long-duration storage throughout, as well as to provide the CPUC with information that will be helpful to secure commercial offtake for a “right-sized” amount of long-duration storage going forward. It should also be recognized that these types of bulk storage projects require significant up-front development work and extended construction periods that are longer than most other resource types. Therefore, this approach would ensure that the IOUs, the CPUC and project developers are well-positioned to act in a timely manner to meet a mid-term (5-10 years) need for long-duration storage if it is found to be beneficial for the system.

II. Procurement of Long-Duration Storage Must Account for All Benefits Provided to System, Across Multiple Beneficiaries

As discussed during the joint workshop, a major hurdle to the development of large-scale pumped hydro storage in California today is the lack of a procurement mechanism that accounts for all benefits provided to the grid, and allows investment across multiple off-takers. Because the size and capabilities of a single large-scale pumped hydro storage facility will typically exceed the needs of a single IOU service territory, and because a single resource can also provide significant benefits at the system level, it is necessary to create a procurement framework that considers all – or at the very least, the most significant – beneficiaries, including multiple IOUs and the CAISO, as necessary. By implementing a joint-procurement design (which allocates

requirements across multiple parties according to needs, and costs according to beneficiary) the deployment of large-scale pumped hydro storage could avoid the IOU concern of “free-ridership” whereby a single utility must entirely pay for services that also provide benefit for neighboring loads and the overall California system.

Furthermore, when evaluating proposals and structuring offtake, it is important to ensure that all benefits are well-defined, valued and, ultimately, appropriately compensated. To the extent that specific resource characteristics, ancillary services or intermittent resource integration benefits are deemed necessary for local or system reliability, there should be revenue streams established for each. This may include resource characteristics that are not fully valued within the current market structure, such as fast response and rapid up/down ramping capabilities. In addition, transmission and distribution deferrals and impacts on policy requirements should be quantified and valued, including costs associated with any mitigation of renewables curtailment or reductions to greenhouse gas emissions. These services should be factored into the evaluation of proposals, ultimately leading to the secure offtake of the “right-sized” amount of long-duration bulk storage.

III. Establish Contracting Terms that Match Resource Lifespan

In addition to the need to ensure the full suite of benefits pumped hydro storage provides is valued and compensated, it is also necessary to approve contracting terms that match the resource’s lifespan. Pumped hydro storage facilities are capable of providing unique benefits over the course of an operating life which extends many decades. However, current bilateral agreements are typically 10-20 year terms, and effectively favor lower capital cost resources with different operating characteristics – despite lifecycles far shorter in duration. To maximize ratepayer value, the valuation of, and contracts for, large-scale pumped hydro storage should consider the long-term nature of the asset, and, as described above, the full benefits expected throughout. Extending valuation methodologies and contracting terms to 30-40 years would generally align with the contract length typical for long-term hydroelectric projects,² as well as

² See for example British Columbia Clean Power Call hydro projects recently developed by independent power producers under 40 year contracts, including a 45 MW project by Brookfield Renewable.

greatly improve contract pricing and reflect the true value of the asset. The expected lifespan of such projects is in fact well beyond 60 years and can be much longer if the asset is properly maintained (as proven by many 100-year old hydro facilities operating across the US). As such, a 30-40 year offtake term still allocates risk to the developer while lowering contract prices for the IOU. At a minimum, if initial contract terms of 20 years are preferred due to concerns of whether the asset will be needed beyond 20 years, the contract should be inclusive of an option to extend for a pre-defined period beyond the first 20 years.

IV. Develop a Procurement Framework Specific to Long-Duration Storage

Brookfield Renewable certainly recognizes and appreciates the complicated environment California's regulators are faced with today: needs are not universally agreed upon, potential solutions are not fully known, and policy goals and reliability requirements must be balanced against ratepayer impacts. However, we caution against continued inaction on implementing components fundamental to facilitating the deployment of long-duration storage. We believe the need for long-duration storage is becoming increasingly more clear in light of recent analysis and the passage of SB 350, and waiting too long to establish a workable process may lead to sub-optimal cost, reliability and policy outcomes.

There are other procurement frameworks that can assist California in managing risk associated with changing system conditions. One option is a multi-staged procurement process which relies upon a binding competitive solicitation to determine the most viable project(s), followed by an agreement of initial terms between buyer(s) and seller. Thereafter, pre-determined development milestones would be met in stages, with the flexibility for the developer to make pricing adjustments at stages prior to construction, if deemed necessary. In addition, in recognition of the dynamic conditions facing regulators and IOUs, the design could also include off-ramps available at each milestone as a hedge to changing circumstances, including system conditions. Furthermore, the design may wish to consider some form of risk-sharing, if appropriate, as a means of reducing the cost of capital.

In any case, California should move forward with establishing the procurement framework for large-scale pumped hydro storage in parallel with the need assessment. Evaluation of projects should consider the broad range of benefits that bulk storage can provide the system, including transmission deferral, emissions reductions relative to gas combustion turbines, and ancillary services that are not currently fully valued such as fast ramping capabilities. Lastly, because a procurement process specific to long-duration storage is not necessarily dependent on the planning and procurement practices used today, the anticipated integrated resource planning mandated by SB 350 should simply be able to adopt this process as well.

V. Conclusion

Brookfield Renewable appreciates the work of the CEC and CPUC in holding this important workshop and we appreciate the opportunity to comment on the record to the CEC. In conclusion, we recommend that California:

1. Act now to develop a procurement framework for long duration bulk storage >50MW, recognizing the long lead-time and development timeframes for such resources.
2. Continue to establish the benefits of long duration bulk storage in parallel with industry and the CAISO, considering the full range of services provided including fast response, ramping, transmission deferral, over-generation, intermittent resources integration and emissions reductions relative to fossil fuel alternatives.
3. Solicit commercial bids for large-scale pumped hydro storage under a competitive RFO that enables the state to fully understand the project-specific characteristics of its actionable bulk storage resources. Do not delay such solicitation solely on the basis of evolving system conditions and need definition – rather, design a flexible process that enables actionable consideration of viable bulk storage resources that can adapt to system needs.
4. Ensure that the procurement process accounts for all benefits provided to the system as noted above, across all beneficiaries – including offtake across multiple utilities as necessary.
5. Ensure that contracting terms better reflect resource lifespan. For pumped hydro storage resources a more appropriate contract term is 30-40 years which will also improve overall pricing for such resources.

We also respectfully request that the CEC consider seeking the CPUC's approval to submit the record of this Docket to the CPUC's LTPP and Energy Storage OIR proceedings.

Sincerely,



Jon Norman
Vice President, Government Affairs
Brookfield Renewable Energy Group



Kim Osmars
Chief Operating Officer, Western Region
Brookfield Renewable Energy Group