

**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA**

Order Instituting Rulemaking to Integrate and Refine
Procurement Policies and Consider Long-Term
Procurement Plans.

Rulemaking 13-12-010
(Filed December 19, 2013)

**COMMENTS OF
BROOKFIELD RENEWABLE ENERGY PARTNERS LP ON PRELIMINARY
SCOPING MEMO**

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Pursuant to Rule 14.3 of the California Public Utilities Commission (“Commission” or “CPUC”) Rules of Practice and Procedure, Brookfield Renewable Energy Partners LP (“Brookfield”) respectfully submits the following comments on the Order to Institute Rulemaking (“OIR”) for the 2014-1015 Long-Term Procurement Planning (“LTPP”).

Brookfield has more than 100 years of experience as an owner, operator and developer of hydroelectric power facilities. Brookfield’s power generation operations located in North America and South America total approximately 6,000 MW, of which more than 3,400 MW are in the United States. Brookfield’s generating assets are predominantly renewable energy resources (hydro and wind). Within California, Brookfield owns and operates 430 MW of wind capacity as well as the 30 MW Malacha hydroelectric facility. Brookfield is also developing the 280 MW Mulqueeney Ranch Pumped Storage Project located in Livermore, California which is the motivation behind these comments to the OIR. Brookfield’s comments to the OIR recommend the following:

- Evaluation of pumped storage hydro over 50 MW is legitimately within scope of this proceeding as it was explicitly excluded from the storage targets defined in D.13-10-040 and has not been addressed in any other proceeding. The Commission expressed support in D.13-10-040 for procurement of large-scale pumped storage hydro in other proceedings. Brookfield requests the requirement for utilities to evaluate and procure if cost effective, pumped storage hydro larger than 50MW be added to the Scoping Memo in Section 3.1(3).

- In response to a directive from the Storage Proceeding, a pumped storage hydro workshop was held on January 16, 2014 where an abundant exchange of information took place regarding benefits that pumped storage hydro can provide to the market as well as barriers to procurement. As further discussed below, Brookfield requests that the output from the pumped storage hydro workshop be compiled into a report and entered into the record of the LTPP proceeding to provide an initial basis for discussion and further evaluation of these projects.
- As mentioned in Section 3.3 of the Scoping Memo, long-term planning studies conducted in this proceeding will affect utilities' future procurement activities. Pumped storage hydro is omitted from the proposed 2014 LTPP Planning Assumptions and Scenarios that will provide the basis of analysis for future procurement needs, **even though in many instances it could be the key to achieving the RPS and greenhouse-gas ("GHG") goals in a way that is cost-effective to ratepayers.**

It is clear that large-scale pumped storage hydro will ultimately be needed to support renewable integration and to meet carbon reduction targets in California post-2020. The time to begin evaluating the need for these projects to ensure they are on-line to provide the necessary products and services to California's electric grid is now. Therefore, as described further in these comments, Brookfield requests the Commission incorporate the evaluation and procurement of large-scale pumped storage hydro into the 2014-2015 LTPP.

A. The inclusion of the evaluation of large-scale pumped storage hydro projects in the 2014-2015 LTPP is consistent with recommendations provided by the Commission in the Decision from the Storage Proceeding.

In the final decision from the Storage Proceeding the Commission recognized the value of large-scale pumped storage hydro and made clear that they should be given due consideration in LTPP proceedings:

We emphasize that our decision to limit the size of pumped storage projects in the decision is not to discourage large-scale pumped storage projects. On the contrary, these types of projects offer similar benefits as all of the emerging storage technologies targeted by this program; it is simply their scale that is inappropriate for inclusion here. We strongly encourage the utilities to explore opportunities to partner with developers to install large-scale pumped storage

projects where they make sense within the other general procurement efforts underway in the context of the LTPP proceeding or elsewhere¹.

This recommendation was further outlined in the Conclusion of Law 9² that:

“Pumped storage projects larger than 50 MW should be evaluated by utilities in their generation solicitations for new capacity in other proceedings”

Furthermore large-scale pumped storage hydro can be utilized to meet most, and in some cases all, of the electricity system needs outlined in Sections 3.3 (and 3.1(3) of the Scoping Memo. As explicitly stated in the Memo, “These needs will be the primary drivers for any need for new resources identified in this proceeding.” Specific to the electricity needs outlined in the Scoping Memo, large-scale pumped storage hydro can offer the following:

- An effective, proven and cost-effective way to achieve the State’s 2050 climate objectives of 80% carbon reduction from 1990 levels as defined in California Air Resources Board’s October 2013 AB 32 Scoping Plan Update Discussion Draft³ when coupled with high renewable penetration. Not anticipating the need for large-scale pumped storage hydro undermines the goal of reducing emissions of GHG and other criteria pollutants as significantly more zero-carbon energy will be required post-2020.
- A cost effective alternative for both flexible capacity and balancing services that will be in needed in increasing amounts to run the electric grid with a high penetration of intermittent generation. The renowned “duck chart” produced by the CAISO illustrates the overgeneration problem and multiple steep ramps that will affect the operation of the electric grid 2017 and beyond due to the increasing volumes of intermittent generation that will comprise California’s energy supply portfolio. Large-scale pumped storage can provide a utility scale solution to these problems and store renewable generation during periods of overgeneration. Large-scale pumped storage will provide one of the few carbon free alternatives to meeting the CAISO’s flexible capacity requirements. Absent large-scale pumped storage, fossil fuel fired generation provides the most viable solution

¹ D.13-10-040 p.36

² D.13.10-040 p. 74

³ See <http://www.arb.ca.gov/cc/scopingplan/scopingplan.htm>

to meet the fast-ramping, flexible capacity needs of electric grid which will not allow California to meet 2050 carbon reductions goals defined under the AB32 Scoping Plan.

- Avoidance of major curtailments of installed renewable resources and reduction in instances of negative LMPs during periods of over-generation and transmission congestion. Curtailments of renewable energy not only deprive the State of the direct environmental benefits but also risk damaging the financial viability of those generation projects, since most of them are paid on the basis of the energy that they produce and deliver to the grid.

The evaluation of large-scale pumped storage hydro is squarely within scope of the 2014-2015 LTPP proceeding due to these prior directives from the Commission, explicit exclusion from procurement targets resulting from the Storage Proceeding and its ability to meet specific defined electric system needs. Brookfield requests that the requirement for utilities to evaluate pumped storage projects larger than 50MW be explicitly added to Paragraph 3.1(3) of the Scoping Memo and for this requirement added to each utility's procurement plan.

B. Outputs from the January 16, 2014 pumped storage hydro workshop must be entered into the record of the 2014-2015 LTPP to provide a basis for further analysis and evaluation of these projects

The pumped storage hydro workshop was held in response to a directive from the Commission included in D. 13.10.040. The workshop provided pumped storage hydro developers and others that have performed specific analysis on the topic to further educate Commission staff and other interested parties as to the benefits provided by pumped storage hydro as well as the barriers to market entry. It also provided an education on the details of the viable pumped storage hydro projects that exist today but possibly will not come to fruition due to the lack of the existence of an effective procurement channel.

Large-scale pumped storage hydro, despite the proven benefits it can provide, faces significant barriers to entry into the marketplace. While large-scale pumped storage hydro has been in operation for many years, the facilities that exist in California were built under a different paradigm prior to the establishment of the competitive market environment that exists today.

Brookfield, in its prior comments to the Storage Proceeding⁴, outlined a number of regulatory and structural barriers. These barriers, in addition to others were also discussed at the pumped storage hydro workshop⁵.

- Existing market structures do not adequately compensate pumped storage hydro resources for the variety of services and benefits that they provide to grid operators. This is particularly evident in terms of providing incentive to build new resources with their commensurate development timelines and risk profiles.
- Long development and commercial timelines needed to realize these projects extend beyond the timelines accommodated through existing procurement processes, including the LTPP process. Currently, the scope of the LTPP process is too narrow to incorporate investments for 2050 climate goals which large scale pumped storage hydro is ideally situated to address.
- Consideration of the need for large-scale pumped storage hydro is completely ignored in the 2014-2015 LTPP Planning Assumptions and Scenarios.
- Costs and pricing for these projects cannot be fully and accurately estimated until a significant amount of upfront work is completed. As is the case with other large-scale grid infrastructure projects, commercial realities dictate that this work cannot be performed unless there is reasonable assurance of cost recovery and/or procurement approaches that recognize staged development processes. This type of procurement structure does not exist today.
- Due to the requirement for procurement approvals well in advance of project completion, the benefits that large-scale pumped storage hydro projects can provide may not be fully recognized in an evaluation of a project's cost-effectiveness.

⁴ See Brookfield's comments to September 3, 2013 Proposed Decision of Commissioner Peterman in R1012007.

⁵ See presentation by Eagle Crest Energy Company, at: <http://www.cpuc.ca.gov/NR/rdonlyres/3D7E0901-53DB-48F8-B0F0-BCDAFF07097B/0/EagleCrestPresentationatCPUCPumpedStorageWorkshop1162014.pdf>

The workshop also included an extensive discussion on the benefits pumped-storage hydro can provide to the electric grid under a variety of conditions. The results of a study, Modeling and Analysis of Value of Advanced Pumped Storage Hydropower in the U.S.⁶ which was funded by U.S Department of Energy and performed by Argonne National Laboratory was discussed and a number of benefits provided by pumped storage hydro that are relevant for California were highlighted. As shown below in screen shots from the study results, the California specific scenarios evaluated as part of the studies reflected significant reductions in annual system production costs under the Baseline (RPS mandate) of 3.36% and even more so under the High Wind scenario, 9.12%. Other scenarios reflected significant reductions in curtailments of renewable generation (91%) and reductions in CO2 and NOx emissions (.02% - 7%). All scenarios were based in 2022 and show results from fixed speed (FS) as well as adjustable speed (AS) pumped storage hydro.

⁶ See presentation by Vladimir Koritarov Modeling and Analysis of Value of Advanced Pumped Storage Hydropower in the U.S. at: http://www.cpuc.ca.gov/NR/rdonlyres/86FB9E26-5239-4AD7-8C51-DE70054F06E4/0/Koritarov_CPUC_PSHWorkshop_20140116.pdf

California: System Production Costs in 2022

■ Baseline RE scenario:

Base Renewable Scenario	Total Generation	PSH Generation	Production Cost	Annual Cost Reduction		Annual Cost Reduction per kW of PSH Capacity	
	GWh	GWh	\$ Million	\$ Million	%	Total PSH MW	\$/kw-year
No PSH	265,538	-	5,078	-	-	-	-
With FS PSH	267,001	2,725	4,967	111	2.18%	2626	42.10
With FS&AS PSH	269,374	5,313	4,907	171	3.36%	4425	38.60

Annual operating costs savings 

■ High-Wind RE scenario:

High-Wind Renewable Scenario	Total Generation	PSH Generation	Production Cost	Annual Cost Reduction		Annual Cost Reduction per kW of PSH Capacity	
	GWh	GWh	\$ Million	\$ Million	%	Total PSH MW	\$/kw-year
No PSH	253,872	-	4,120	-	-	-	-
With FS PSH	256,069	5,299	3,934	186	4.52%	2626	70.91
With FS&AS PSH	257,018	9,456	3,745	376	9.12%	4425	84.97

Significant cost savings 

California: Curtailments of RE Generation in 2022

■ Baseline RE scenario:

CA Renewable Curtailment in the Base Renewable Scenario			
Case	GWh	Renewable Curtailment Reduction	
		GWh	%
No PSH	155	-	0%
With FS PSH	46	108	70%
With FS&AS PSH	14	141	91%

With additional AS PSH, curtailments of RE almost eliminated

■ High-Wind RE scenario:

CA Renewable Curtailment in the High-Wind Renewable Scenario			
Case	GWh	Renewable Curtailment Reduction	
		GWh	%
No PSH	618	-	0%
With FS PSH	380	238	39%
With FS&AS PSH	275	343	55%

Brookfield is appreciative of the opportunity provided by the Commission in the technical pumped storage hydro workshop. However, we remain concerned as no specific actions have been committed to from this workshop to further the discussion and address the defined regulatory barriers. As it stands currently, despite identified and proven benefits and support from the Commission to further procurement efforts, large-scale pumped storage hydro is stranded in a no man’s land with no mechanism to be evaluated for cost effectiveness and no means to facilitate procurement.

Brookfield requests that the outputs from the pumped storage hydro workshop be compiled into a workshop report which can then be entered into the record of LTPP proceeding as a basis for further analysis and consideration of these projects as part of California’s larger supply portfolio. Due to the long-lead time for development and long lifespan of these facilities further analysis and modeling that will accurately model the benefits and evaluate cost effectiveness of large-scale pumped storage hydro over a longer time horizon in the future are needed.

C. The exclusion of large-scale pumped storage hydro from the 2014 LTPP Planning Assumptions and Scenarios is problematic as it fails to recognize the pivotal role that pumped storage can play in helping the State achieve its long-term climate objectives and maximize its substantial investment in renewable energy

The Scoping Memo outlines that the scenarios and assumptions will be decided through a later ruling from that of the Scoping Memo. However, since the planning assumptions and scenarios will lay the foundation for evaluation of future resource needs in this proceeding Brookfield believes it is appropriate to briefly reiterate the concerns outlined in the comments we provided to the Staff Proposal for the 2014 LTPP Planning Assumptions and Scenarios here.

Large-scale pumped storage hydro is not considered as part of the energy supply portfolio in either of the Commission's more aggressive planning scenarios. Specifically, the 40% RPS by 2030 and the Expanded Preferred Resources scenarios consider only the 700 MW of transmission-side energy storage that resulted from the Storage Proceeding procurement targets and anticipate no further growth in storage. The 700 MW number is based on the procurement targets established in the Storage Proceeding for emerging storage technologies. Those procurement targets, however, specifically exclude pumped storage hydro projects over 50 MW in size. The Commission excluded such projects, not because they **are unneeded, but because it** determined that including them in the targets would undermine the Commission's goal in that proceeding of promoting emerging storage technologies. In this new LTPP proceeding, on the other hand, it is important that the Commission's assumptions include consideration of all storage resources, including large-scale pumped storage hydro.

Considering the benefits outlined earlier in our comments which are further highlighted by studies discussed at the pumped storage workshop, it is reasonable to consider large-scale pumped storage hydro as a component of the larger solution to meet California's varied resource needs in the future in light of increasing penetration of intermittent renewable generation and GHG reduction goals that are being contemplated beyond 2020 which requires that California reduce emissions levels to 80% below 1990 levels. This was not the intent of the final decision in Storage Proceeding, which excluded pumped storage hydro only due to its large size, nor was it the intent of AB 2514⁷.

⁷ See text of Assembly Bill No. 2514 at: http://www.leginfo.ca.gov/pub/09-10/bill/asm/ab_2501-2550/ab_2514_bill_20100929_chaptered.pdf

D. CONCLUSION

The existing regulatory paradigm excludes pumped storage hydro from participating in any procurement process due to its unique development requirements and inability to quantify the benefits pumped storage hydro can provide over a longer (40 plus year) life span. For the reasons outlined herein the inclusion of the evaluation of large-scale pumped storage hydro is in scope for the 2014-2015 LTPP as outlined in the Scoping Memo. By continuing to exclude pumped storage hydro from procurement opportunities because it simply doesn't fit, and not identifying a clear channel through which it can compete, the Commission is inadvertently leaving barriers to development of these types of projects in place. This is not optimal given the substantial long-term benefits in the form of renewable integration, reduced reliance on fossil fuel fired generation and the reduction of green-house gases that pumped storage hydro can provide to the electric grid. Accordingly, Brookfield requests that the evaluation and potential procurement of large-scale pumped storage hydro be explicitly included in Section 3.1(3) of the 2014-2015 LTPP.

Respectfully submitted,

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