Generation from Irrigation

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RE: Modeling Energy Storage in Integrated Resource Planning
Docket UE-151069

Comments of Columbia Basin Hydropower

Columbia Basin Hydropower (CBHP, formerly known as the Grand Coulee Project Hydroelectric Authority) appreciates the opportunity to submit the following comments to the Washington Utilities and Transportation Commission (the Commission) as a follow-up to the Commission's August 25, 2015 workshop regarding modeling energy storage in integrated resource planning (Docket UE-151069) and the Modeling Energy Storage White Paper published by Commission Staff (Staff) on May 18, 2015. CBHP supports the concept that the Commission should establish a clear set of guidelines to the three electric utilities under its jurisdiction (the Utilities) regarding the inclusion and treatment of energy storage technologies in their respective integrated resource planning (IRP) processes, beginning with the 2017 IRP cycle.

CBHP, which is headquartered in Ephrata, WA., provides administrative, operations, and maintenance functions for hydroelectric generating facilities owned by the three Irrigation Districts that make up the Columbia Basin Irrigation Project. The Districts currently own seven projects, ranging in size from 2 MW to 94 MW with a total generating capacity of approximately 150 MW. Clean, renewable energy from five of these projects is delivered to two Washington State utilities (Seattle City Light and Tacoma Public Utilities) under long-term purchase power agreements. CBHP has obtained preliminary FERC permits for the development of several additional small hydro projects, as well as the development of a 500 MW – 1,000 MW hydroelectric pumped storage facility to be located near Grand Coulee Dam (the North Banks Lake Project, FERC License No. 14329).

With regard to energy storage issues, CBHP believes the two main challenges facing the Utilities (and many other Pacific Northwest (PNW) utilities as well) are: 1) a current lack of analytic tools to fully identify and quantify the short-term flexibility products/ancillary services available from energy storage devices and conventional generating resource alternatives, and 2) how to value such capabilities once they are quantified. CBHP believes the Commission can assist the Utilities and other interested stakeholders in overcoming these challenges by initiating a public process for the open discussion of these topics and in establishing a framework for how the Utilities should incorporate the costs and benefits of energy storage devices into their respective IRPs, beginning with the 2017 IRP cycle.

CBHP's specific comments that follow are organized around the four questions (labeled A thru D) that the Commission posed in its Notice of Recessed Open Meeting and Workshop and Notice of Opportunity to File Written Comments in Docket UE-151069.

Question A.

Modeling the Value Proposition of Energy Storage Devices

CBHP believes the Utilities can model the uses, benefits and value proposition of energy storage systems in much the same fashion as they currently do for supply-side and demand-side resources. For instance, virtually all of the generation-based and demand-side resource alternatives that the Utilities currently include in their respective least-cost IRP modeling processes have the capability to provide some (and in some cases all) of the nine potential uses for storage devices that are specifically identified by the Commission. What varies, however, is the exact *mix of the uses* that can be provided by each resource (generation, demand-side, and storage devices) and the *specific capabilities and limitations* of each resource.

In the past, the nine uses listed by the Commission (collectively referred to hereafter as "flexibility/ancillary services") likely comprised a relatively small percentage of the overall value of the resource alternatives being evaluated in the Utilities' least-cost least-risk IRP planning processes. In other words, the inclusion or exclusion of flexibility/ancillary services costs and benefits was unlikely to be a large enough to affect the choice of resources that comprised the Utilities' least-cost portfolios. However, with the recent addition of large amounts of renewable resources in the PNW region, the demand for flexibility/ancillary services has increased significantly, which in turn is driving up the value of these services. In addition, the ability for PNW utilities to manage their flexibility/ancillary services needs using the region's low-cost legacy hydroelectric resources has become limited; this development is causing several regional utilities to utilize thermal-based generating resources in order to meet a growing portion of their overall system flexibility needs.

Since flexibility/ancillary services value is likely to be a bigger driver in the choice of which specific new resources are included in the Utilities' least-cost portfolios going forward, the Commission should require the Utilities' to explicitly include this value component in their IRP modeling, similar to how capacity and energy components are already treated. This can be achieved by having the Utilities include energy storage devices as a new resource alternative on par with adding a new generating plant or implementing demand-side resources.

In developing its policies regarding energy storage devices, the Commission should consider the fact that some energy storage technologies are highly site-specific with regard to both installation costs and the benefits that can be produced. For instance, installation costs on a $/KW basis for hydro pumped storage facilities can vary widely, however the overall value that a specific project can produce is also variable based upon the specific design characteristics and limitations (e.g. environmental, recreation, geography, reservoir capacities, operational) of the facility. In other words, an apparently high $/KW installation cost for a particular energy storage facility could be fully offset by a higher level of value produced relative to other (lower installation cost) facilities. Given this situation, CBHP recommends that the Commission expand the design of its energy storage criteria to include the valuation of the services provided, and not limit it to installation costs alone. This can be achieved by having the Utilities consider energy storage devices in their least-cost portfolio analysis in the exact same fashion as other supply-side and load-side resource alternatives. In other words, energy storage devices should not be evaluated by the Utilities in isolation from the rest of the power system, but rather they should be considered as one of many different resource alternatives that could comprise the Utilities' least-cost, least-risk portfolio.

Question B.

The Utilities' Existing Technical Modeling Capabilities

CBHP believes the Utilities' already possess some, if not many, of the modeling capabilities that are required to more fully incorporate energy storage devices into the IRP least-cost planning process. For

instance, all of the Utilities currently own and operate hydroelectric generating facilities that have large storage reservoirs. These existing hydro facilities are essentially energy storage devices in their own right. The ability of such plants to shift energy in time - one of the key attributes of energy storage devices - is already incorporated into the Utilities' IRP planning processes, as is the ability of these resources to provide firm capacity to the system. What the Utilities' current models may lack, however, are the specific features needed to fully value and optimize the flexibility/ancillary services capabilities of such resources.

Expanding/Improving the Utilities' Modeling Capabilities

While the region's electric utilities have made significant strides in recent years in attempting to incorporate aspects of system flexibility impacts into their respective IRP modeling processes, many of the value components at issue can only be fully evaluated using modeling time increments of less than one hour in duration. In addition, as the electric utility industry moves towards utilizing sub-hourly scheduling periods, the modeling tools being used by PNW utilities to evaluate system flexibility needs and associated costs and benefits will need to be modified to reflect the actual operating practices being utilized in the region, which could entail the use of scheduling periods as short as five minutes in duration.

Creating new IRP models (or expanding existing ones) that incorporate sub-hourly time increments should be a priority for the Utilities, since such modeling capabilities are required in order to fully evaluate the costs and benefits of *any* resource - including energy storage devices - that is capable of providing flexibility/ancillary services. While CBHP recognizes that defining and developing such capabilities in an IRP planning context could involve a significant amount of effort on the part of the Commission, the Utilities, and stakeholders, it's important to note that the Utilities (as well as most other PNW electric utilities) *are already* having to develop and implement such modeling tools in order to make short-term system dispatch decisions. What is currently missing is an analytical mechanism to translate these real-life operating conditions and decision-making process into a form that can be incorporated into the Utilities' IRP least-cost portfolio models.

Question C.

Quantifying and Valuing the Flexibility/Ancillary Services Provided by the Utilities

CBHP believes it would be beneficial for the Commission to establish a public process whereby the Commission, Staff, the Utilities, and interested stakeholders can openly discuss and define the set of flexibility/ancillary services that the Utilities are currently capable of providing, and are expected to provide in the future. As the capabilities of the Utilities' more flexible resources (usually hydro) used to provide ancillary services become fully utilized, the Utilities will increasingly need to rely upon other resource types - which could include energy storage devices - to meet their overall system needs. While it remains to be seen if the Utilities can identify exactly which existing resources supply which specific flexibility/ancillary services, discussing these types of questions in an open and transparent forum will help inform the Commission and stakeholders as to the real-life challenges faced by the Utilities and how operational considerations might be more fully incorporated into the IRP modeling process.

Use of Ancillary Services Rates/Prices in Organized Electricity Markets

While it may be generally instructive for the Commission to gather information regarding the pricing of flexibility/ancillary service products in organized electricity markets outside of Washington State, CBHP does not recommend that such prices should be used by the Commission in developing a set of "proxy" values for such products in Washington. First, two of the three organized electricity markets in the United States that are located nearest to Washington State – the Southwest Power Pool (SPP) and ERCOT – are located in the Eastern Interconnection. Furthermore, SPP and ERCOT are thermal-based systems while the Utilities' systems (and the PNW overall) contain significant amounts of hydro

resources. Second, several ancillary services – such as black start capability and reactive power support – are highly locational in nature based upon physical power system operating conditions. Lastly, some ancillary services – most notably regulation and load/generation following – require the use of dynamic transfer capability on the transmission system. Market prices for these products in the CAISO's ancillary services markets, for example, would only be a valid price indicator in the PNW/Washington area if: 1) there was sufficient dynamic transfer capability available at California/Oregon and Nevada/Oregon boarders to meet the entire needs of both regions (which is not currently the case), and 2) the cost of the transmission service and associated losses were included in the price computations.

Identifying and Valuing the Opportunity Cost Components of Flexibility/Ancillary Services

CBHP agrees with the Commission that there are opportunity costs associated with the provision of some of the identified flexibility/ancillary services and that the quantification of such costs is a key component in identifying: 1) the flexibility needs of the Utilities, and 2) the value proposition of the resources - including energy storage devices - that can provide such services. For example, the provision of regulation and load/generation following services requires that the Utilities reserve certain amounts of flexible resource capacity based upon the maximum amount of the service that may be required during the appropriate scheduling period. Such reserved capacity cannot be used for other purposes during that same schedule period, even if it turned out (on an after-the-fact basis) that the full amount of reserved capacity was not actually needed for that specific purpose.

Question D.

Unique and Site-Specific Characteristics of Energy Storage Systems

As the Commission moves forward in determining how the Utilities should incorporate energy storage devices in their respective IRP's, CBHP recommends that the Commission consider the fact that some energy storage technologies are highly site-specific in nature with regard to both installation costs and the benefits that can be produced. For instance, installation costs on a $/KW basis for hydro pumped and compressed air storage facilities can vary widely, however the overall value that a specific project can produce is also variable based upon the specific design characteristics of the facility. In other words, an apparently high $/KW installation cost (relative to other resource alternatives) for a particular energy storage facility could still turn out to be a least-cost solution once its overall value (including flexibility/ancillary services value) is fully factored into the analysis. Therefore, as the Commission gathers additional information regarding the costs of different energy storage technologies, it is equally important that the Commission also identify the specific operational characteristics associated with each storage system being evaluated.

In addition, CBHP points out that information available on different energy storage technologies may, in some cases, need to be adjusted in order to provide a direct "apples to apples" comparison of costs and benefits in the Utilities' IRPs. For instance, the cost of all ancillary equipment needed to fully integrate the storage device should be included in the least-cost analysis, as should all fixed and variable operations and maintenance costs (which could include related items such as personnel training). Also, since the useful lifespan of energy storage devices can vary widely, the Utilities should perform a full levelized life-cycle analysis such that storage devices with relatively high installation costs but relatively long life spans are not disadvantaged when compared against other resource alternatives that have shorter life spans. Finally, energy storage devices are capable of providing flexibility/ancillary services in both charging and discharging modes; this has the effect of significantly reducing the per unit cost of such devices when expressed in terms of the *flexible capacity* that they can provide to the system.

Establishing Avoided Ancillary Services Cost Rates

In its Modeling Energy Storage White Paper, Staff recommended that the Commission require the Utilities to develop and file a set of avoided ancillary service costs that would form the basis of the

compensation to be paid to independent energy storage projects that interconnect with the Utilities. While CBHP is generally supportive of the avoided cost concept for ancillary services, CBHP points out that many different types of electric resources – not just energy storage devices - are capable of providing flexibility/ancillary service products to the Utilities' power systems. Therefore, to the extent that the Commission requires the Utilities to develop sets of avoided ancillary service costs, these costs/values should be applied to all potential resources that the Utilities consider in the development of their IRP least-cost portfolios.

In conclusion, CBHP appreciates this opportunity to submit these comments and we look forward to working with the Commission, the Utilities and other interested stakeholders in removing barriers to the development and operation of new energy storage resources for the benefit of Washington State electricity customers.

Sincerely,

Tim Culbertson
Secretary Manager