Service Date: March 6, 2017

BEFORE THE WASHINGTON STATE
UTILITIES AND TRANSPORTATION COMMISSION

In the Matter of the Washington Utilities and Transportation Commission's Investigation into Energy Storage Technologies.	DOCKETS UE-151069 AND U-161024 DRAFT REPORT AND POLICY STATEMENT ON TREATMENT OF ENERGY STORAGE TECHNOLOGIES IN INTEGRATED RESOURCE PLANNING AND RESOURCE ACQUISITION

I. INTRODUCTION AND PROCEDURAL BACKGROUND

1 On May 18, 2015, regulatory staff of the Washington Utilities and Transportation Commission (Commission) initiated a staff investigation into the role of energy storage in electric utility planning and procurement.[1] Commission Staff (Staff) initiated the investigation based on a Staff white paper that identified barriers to energy storage created by the way that Washington's investor-owned utilities modeled such technologies in their integrated resource plan (IRP) documents.[2]

2 Staff's white paper discussed the Commission's guidance, issued in IRP acknowledgment letters to the utilities over the previous two planning cycles, to improve the treatment of energy storage in IRPs, then summarized the challenges that the utilities encountered as they endeavored to follow that guidance. The white paper concluded that more structured direction would be beneficial for all parties, and recommended that the Commission provide such direction through a policy statement.[3]

3 Members of the Commission and Staff attended an informational workshop on the topic of energy storage at the Pacific Northwest National Laboratory (PNNL) on July 22-23, 2015. The workshop was designed for utility regulators and staff from the Pacific

[1] Docket UE-151069.
[2] "Modeling Energy Storage: Challenges and Opportunities for Washington Utilities," Washington Utilities and Transportation Commission Staff, Docket UE-151069 (May 18, 2015), at 3-5.
[3] *Id*. at 11.

Northwest to understand recent advances in energy storage and discuss the technology's potential impact on grid operations.[4] Commissioners and staff from the states of Idaho, Montana, Oregon and Washington attended the workshop.

4 On August 7, 2015, the Commission issued a notice of a public workshop on energy storage modeling to be held on August 25, 2015, and a notice of opportunity to file written comments on the subject by September 25, 2015. The Commission received 16 public comments in response to the notice.

5 On September 6, 2016, during the pendency of Staff's investigation, the Commission initiated a rulemaking proceeding to consider revising its rules related to integrated resource planning in WAC 480-90-238 (natural gas) and WAC 480-100-238 (electric) and its resource acquisition rule in WAC 480-107.[5] Given the overlapping issues between the existing staff investigation and the rulemaking, the Commission determined that it may be appropriate to consolidate the dockets.

6 The Commission solicited another round of comments on energy storage in the notice initiating the IRP rulemaking and discussed the topic in the initial workshop on December 7, 2016. In the notice, the Commission communicated its intent to consolidate the dockets and issue a policy statement on energy storage early in 2017. Parties generally stated that they were not opposed to consolidating the dockets as long as it did not delay the release of the policy statement.

7 The Commission releases this draft policy statement for comment, and requests responses from interested persons to assist the Commission in developing a final policy statement that provides useful guidance to investor-owned utilities (IOUs), vendors seeking to promote energy storage for use by IOUs, and those interested in the use of energy storage on electric distribution systems.

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[4] At the Commission's request, PNNL staff subsequently presented a summary of the information from this informational workshop at a public workshop of the Commission. The presentation is available in docket UE-151069 ("Challenges and Opportunities Associated with Energy Storage: Assessing Financial and Technical Performance," filed August 21, 2015).

[5] Docket U-161024.

II. STATUTORY AND POLICY FRAMEWORK

8 Through a blend of citizen initiatives, legislation and executive action, Washington has constructed a policy framework intended to diversify the state's energy mix while reducing its impact on the environment. These policies, along with the rapid development of new technologies and reductions in per-unit costs, have helped drive market transformation within the electric industry that has accelerated development and adoption of new resource options.

9 In 1998, the state Legislature passed a net energy metering statute to "encourage private investment in renewable energy resources; … and enhance the continued diversification of the energy resources used in this state."[6]

10 Three years later, in response to "energy supply and price instabilities" created by the Western energy crisis of 2001, the Legislature passed a law requiring Washington's electric utilities to offer voluntary programs for their customers to offset some or all of their consumption with purchases of qualified alternative energy resources.[7]

11 In 2006, Washington voters approved Initiative 937, the Energy Independence Act (EIA, codified in RCW 19.285). The act requires larger electric utilities in the state to serve an increasing portion of their load with renewable resources through a renewable portfolio standard (RPS) and to pursue all cost-effective means of energy conservation. In its declaration of policy section, the initiative cited among its goals stable electricity prices, economic benefits and high-quality jobs, the protection of clean air and water, and positioning Washington state as a national leader in clean energy.[8]

12 As rapidly developing technologies expanded the pool of viable energy resource options, the Legislature in 2006 enacted a statute requiring all electric utilities in Washington to develop IRPs. The law largely codified the UTC's existing IRP requirements for investor-owned utilities, and required consumer-owned utilities to engage in similar planning. In passing the law, the Legislature's stated intent was "to encourage the development of new safe, clean and reliable energy resources to meet demand in Washington for affordable and reliable electricity."[9]

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[6] RCW 80.60.005.
[7] Energy – Supply and Demand Management, Laws of 2001, ch. 214, §14.
[8] RCW 19.285.020.
[9] RCW 19.280.010.

13 In 2007, the Legislature built on the IRP statute by passing an emissions performance standard that would limit the emissions of future generation resources. Among the findings attached to the law, the Legislature stated that "(i)t is vital to ensure all electric utilities internalize the significant and underrecognized cost of emissions and to reduce Washington consumers' exposure to costs associated with future regulation of these emissions, which is consistent with the objectives of integrated resource planning by electric utilities under chapter 19.280 RCW."[10]

14 In 2013, the Legislature created the Clean Energy Fund (CEF) and appropriated $76 million to "support development, demonstration and deployment of clean energy technologies."[11] In 2015, the Legislature appropriated $100 million to the state capital budget for clean energy and energy efficiency projects, of which $40 million was targeted for Phase II of the CEF. The CEF has helped fund energy storage demonstration projects by Avista Corporation (Avista), Puget Sound Energy (PSE), and Snohomish County Public Utility District, as well as analytical work at PNNL to quantify the benefits of the projects and identify their economically optimal usage.

15 In 2014, Governor Jay Inslee issued Executive Order 14-04, Washington Carbon Pollution Reduction and Clean Energy Action. The order requested that the Commission "actively assist and support the reduction in the use of coal-fired electricity, within the scope of its jurisdiction and authority."[12]

16 Recognizing the role of transportation in the state's carbon reduction goals, the Legislature in 2015 passed a law allowing the Commission to grant incentive rates of return to investor-owned utilities that invest in electric vehicle infrastructure that benefits ratepayers. In its findings for the law, the Legislature stated that state policies could "achieve the greatest return on investment in reducing greenhouse gas emissions and improving air quality by expediting the transition to alternative fuel vehicles, including electric vehicles."

17 Also in 2015, Governor Inslee built on Executive Order 14-04 by directing the Department of Ecology to develop a rule to cap and reduce the state's greenhouse gas

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[10] RCW 80.80.005.
[11] "Washington State Clean Energy Fund," http://www.commerce.wa.gov/growing-the-economy/energy/clean-energy-fund/. Accessed December 30, 2016.
[12] Executive Order 14-04, at 4.

emissions. The Clean Air Rule, which went into effect on January 1, 2017, affects eight generation facilities in which Washington investor-owned utilities have an ownership interest and three other generation facilities, the output of which is potentially available to investor-owned utilities through market purchases.

18 These policies, coupled with similar policies in neighboring states and at the federal level, have driven rapid market transformation for renewable and distributed energy resources. The cost of residential and commercial solar photovoltaic (PV) systems has fallen by about 60 percent since 2009, making the technology available to a growing number of home and business owners.[13] In Washington, multiple utilities have reached the statutory cap for their net energy metering (NEM) programs in the past year,[14] and the state has one of the highest market penetration rates for electric vehicles in the nation.[15]

19 During the pendency of this proceeding alone, the price of utility-scale lithium ion batteries decreased by a range of 11 to 24 percent, depending on the application; the trend of rapid cost declines for lithium ion and other forms of energy storage is expected to continue into the future.[16]

20 These reductions in cost have created a strong economic signal for investment in these technologies, reinforced state and national policy direction, and increased adoption by utilities and customers. Annual energy storage deployments in the United States increased from 46 MW in 2013 to approximately 260 MW in 2016, and are forecast to reach more than 2,000 MW by 2021.[17] In Washington, utility deployments of energy storage have occurred on a voluntary basis, without a legislative mandate, due in large part to a collaborative approach based on traditional IRP modelling and procurement, and targeted federal and state grants.

III. STATEMENT OF THE REGULATORY ISSUE TO BE ADDRESSED

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[13] National Renewable Energy Laboratory, "U.S. Solar Photovoltaic System Cost Benchmark: Q1 2016" at v.
[14] PLAN Washington, "The State of Solar in Washington." Available at http://planwashington.org/blog/archive/the-state-of-solar-in-washington/. Accessed February 28, 2017.
[15] U.S. Department of Energy, "Plug-In Electric Vehicle Penetration by State, 2014." Available at https://energy.gov/eere/vehicles/fact-876-june-8-2015-plug-electric-vehicle-penetration-state-2014. Accessed February 2, 2017.
[16] Lazard, "Lazard's Levelized Cost of Storage Analysis 2.0 – Key Findings" at 3.
[17] GTM Research, "U.S. Energy Storage Monitor." Available at https://www.greentechmedia.com/research/subscription/u.s.-energy-storage-monitor. Accessed February 2, 2017.

21 Collectively, the energy policies that Washington has enacted in the last 20 years have driven energy diversity and greenhouse gas emission reductions through three general approaches: discouraging the use of fossil-fueled generation resources, encouraging the use of renewable generation resources, and facilitating customer adoption of distributed technologies such as solar photovoltaics and electric vehicles.

22 In practical terms, these policies have required electric utilities to reduce their reliance on dispatchable fossil-fired baseload resources and increase their reliance on non-dispatchable, variable renewable resources that are more difficult to model and forecast. When the Pacific Northwest experienced a flurry of wind power development in the years after states passed voluntary renewable energy and RPS statutes, the task of integrating most of the new wind energy fell to the region's largest transmission operator, the Bonneville Power Administration (BPA). After wind developers challenged BPA's initial wind integration policies, the parties negotiated procedures for wind generation curtailment during periods of high hydro runoff.

23 In response to the wind integration challenges, the Legislature amended the IRP statute in 2013 to require utilities to address explicitly renewable resource integration and over-generation events in their IRPs.[18]

24 Regionally, PacifiCorp and the California Independent System Operator (CAISO) sought to address the challenge of variable resource integration by establishing the Western Energy Imbalance Market (EIM). The EIM coordinates resource dispatch across multiple balancing areas to enhance flexibility through economic resource sharing. The EIM sends dispatch signals every five minutes, which enables utilities to better integrate sub-hourly variable resources, such as wind and solar, while providing an opportunity to establish multiple values of storage across a much larger footprint in the Western Interconnection. PSE and Arizona Public Service recently joined the EIM in October 2016, and several other utilities are now in the planning stage to join the EIM.

25 Collectively, these developments are fundamentally altering electric system operations, simultaneously requiring utilities to adapt quickly and offering new solutions for them to do so. Where utilities historically served generally predictable customer loads with a predictable portfolio of generation resources, current policies and recent technological advances have introduced unpredictability on both sides of the supply and demand

[18] RCW 19.285.010.

equation. Energy storage, with its ability to act as either load or generation, is a flexible resource uniquely suited to address these challenges from both sides of the equation. The regulatory issue before the Commission, then, is to identify the barriers that remain for energy storage and develop policies to overcome them.

26 This requires us to look not just at the bulk power system that is the subject of integrated resource plans, but at the distribution grid, where state policies and declining technology costs are likely to both create challenges and offer solutions over time. Customer-sited generation facilities and growing demand to charge electric vehicles, while limited in Washington at present, have the potential to alter customer usage patterns dramatically and require distribution system upgrades to provide the flexibility needed to meet those changing demands.

27 Where distribution system upgrades were once a relatively simple question of building additional wires, poles, and transformers, distributed energy resources now allow utilities to apply the resource portfolio approach historically used in integrated resource planning to distribution planning. Despite that point of commonality, however, resource planning on the distribution system remains a fundamentally different process than integrated resource planning. Where an IRP considers the costs and benefits of resources at a system or portfolio level, more granular distribution planning analyzes the costs and benefits of resources on a locational basis, with the potential for hundreds of finite locations with different characteristics. IRP models are not designed to do the type of locational analysis that distribution planning requires, and attempting to incorporate the myriad additional variables associated with various locations on the distribution system into an IRP model is simply infeasible.

28 We therefore intend to address the question of energy storage modeling on two levels. In this policy statement, we identify IRP modeling refinements and competitive procurement practices to ensure that energy storage is fairly evaluated and procured alongside other resources at the system level. In the IRP rulemaking, we intend to develop rule language to ensure that energy storage is fairly evaluated and procured alongside other resources – such as demand response, energy efficiency, distributed generation and infrastructure upgrades – at the distribution level.

IV. SUMMARY OF STAKEHOLDER COMMENTS

29 During the course of this proceeding, the Commission held two formal workshops and solicited two rounds of written comments. Those comments provided a wealth of information upon which the Commission has relied to develop this policy statement. Commenters have generally agreed throughout this proceeding that current IRP models are inadequate for properly modeling energy storage technologies, and that it would be helpful for the Commission to provide guidance on how utilities should address this shortcoming.

30 In the initial public workshop on August 25, 2015, parties discussed recent developments in energy storage and the resulting challenges in trying to capture its growing technological capabilities in resource modeling efforts. Representatives from PNNL shared their recent work to increase the performance of flow batteries and develop use cases for storage to aid the utilities that were installing storage demonstration projects through the Clean Energy Fund. Representatives from Avista related their early experiences in operating the vanadium flow battery that it installed in Pullman, Washington, with the support of Clean Energy Fund monies in 2015.

31 IRP managers from the three investor-owned utilities generally concurred that existing IRP models were not able to capture the benefits of storage, and that some other tool would be needed. Representatives of the Electric Power Research Institute (EPRI) described the work that EPRI was doing to help utility resource planners in California develop a tool for identifying cost-effective storage projects pursuant to the state's energy storage mandate. They concluded that energy storage must be analyzed using stacked benefits – an optimization of the various services that storage can provide – and added that EPRI hoped to further develop its tool to be more generally applicable.

32 In their written comments filed subsequent to the initial workshop, several parties suggested a framework for evaluating storage that generally consisted of using a tool for identifying the stacked benefits of a storage project, and then deducting the net present value of those benefits from the storage resource's capital cost in the IRP model.[19] PSE stated that energy storage resources could provide a range of services, but not as cost effectively as other resource options, and that the company hoped to gain a better

[19] The comments of Avista, Pacific Power, and Renewable Northwest generally supported this construct.

understanding of the benefits of energy storage through its Clean Energy Fund demonstration project at a substation in Glacier, Washington.

33 The Energy Storage Association (ESA) and Renewable Northwest stated in their comments that sub-hourly production cost models are commercially available and argued that utilities should be using them to capture fully the benefits of energy storage. Avista stated that its proprietary Avista Decision Support System (ADSS) tool is capable of capturing sub-hourly benefits. Similarly, PSE stated that it was working to improve the modeling of sub-hourly flexibility in its IRP.

34 EQL Energy and RES Americas argued that in order for utilities to accurately identify opportunities for cost-effective energy storage projects on their systems, they would need to engage in distribution resource planning. Avista questioned the ability of storage to avoid transmission and distribution infrastructure development, while PSE argued that such considerations are outside the scope of an IRP.

35 Several parties addressed the question of ancillary services in their comments. Renewable Northwest, the Northwest Energy Coalition, EQL Energy and RES Americas supported Staff's suggestion that utilities file an avoided ancillary services cost tariff, which would identify the utility's costs for providing its required ancillary services. PSE opposed the suggestion, arguing that ancillary services are outside the scope of the IRP, while Avista stated that assigning separate values to each ancillary service would require additional, extensive analysis.

36 In response to the notice of opportunity to file written comments issued in the IRP rulemaking docket on September 6, 2016, 10 parties filed comments addressing energy storage. The three utilities generally opposed the Commission's proposal to merge the existing energy storage docket with the rulemaking out of concern that doing so would further delay the storage policy statement. Several other parties tentatively supported the proposal, but only on the condition that it not delay the policy statement.

37 PSE further stated that additional guidance through a policy statement would be helpful, but discouraged the Commission from establishing an energy storage mandate or requiring the use of a specific analytical tool. The company argued that storage may be cost effective for transmission and distribution investments, which would not be evaluated in an IRP, suggesting the Commission evaluate the company's decision framework for selecting storage in a general rate case proceeding, rather than in the IRP.

38 ESA argued that utilities should be moving toward commercially available modeling tools with sub-hourly modeling capability. In the meantime, utilities should be using a net cost approach, in which they use a tool to identify all of the operational and locational benefits of a storage project, then subtract the net present value of those benefits from the project's modeled capital cost in the IRP model. ESA also argued that utilities need to ensure that they use the most recent available cost information for storage and that models apply learning curves to account for forecasted cost declines.

39 Other parties raised discrete issues. Climate Solutions urged the Commission to consider vehicle-to-grid storage opportunities and the use of second-life batteries from the transportation industry. UniEnergy Technologies argued that models must account for the varying performance characteristics and degradation factors of different storage technologies. The Pacific Northwest Distributed Energy Resource Parties urged the Commission and utilities to consider the role of distributed resource aggregators and to evaluate storage based on all of a utility's avoided costs, not just energy and capacity. The Sierra Club recommended that storage analyses use a stacked benefit approach.

40 In the IRP Rulemaking Workshop on December 7, 2016, Staff clarified its intent to have a draft version of the energy storage policy statement ready for stakeholder review in early 2017, as the first deliverable of the IRP rulemaking process. After clarifying this point, no stakeholders expressed opposition to the proposed consolidation of the two dockets.

V. STATEMENT OF COMMISSION POLICY

41 Through the body of actions discussed above, the State of Washington has given clear directives to electric utilities to diversify and decarbonize the state's energy resource mix. It is the Commission's statutory responsibility to ensure that as investor-owned utilities comply with state laws and policies, they do so in a manner that promotes the public interest while minimizing cost and risk. It is therefore the policy of this Commission that energy storage is a key enabling technology for utilities to comply with the state's energy policies, and that Washington's investor-owned utilities should be diligently working to identify and pursue cost-effective opportunities to incorporate energy storage into their systems.

42 In this policy statement, we identify and discuss three policy principles related to energy storage: changing planning paradigms, providing modeling guidelines, and identifying principles for regulatory treatment of energy storage investments.

A. Changing Planning Paradigms

43 Historically, utility resource planning has taken place within the independent silos of generation, transmission, and distribution. Energy storage can act in any one of those functions, but the challenging corollary is that to generate sufficient benefits to offset its cost, it will most likely be required to act in more than one function. In a planning regime that narrowly looks at the functions separately, energy storage is unlikely to appear cost effective through the lens of any single function, which appears to be one likely reason that past IRPs have not determined energy storage technologies should be included in a utility's resource mix.[20] Utilities must move beyond the historical view of storage and adopt planning practices that break down the artificial barriers of traditional resource planning. A key goal of the IRP rulemaking is to facilitate that process by developing a new planning framework that more cohesively considers the relationship between generation, transmission, and distribution, allowing for a fair evaluation of hybrid resources such as energy storage.

44 To that end, utilities seeking a prudence determination for any new resource acquisition must be able to demonstrate that their analysis of resource options included a storage alternative. This policy applies to investments in generation and distribution projects, as well as transmission projects that have not been selected in a regional transmission planning process. In the analysis, utilities must demonstrate that they have reasonably considered all of the costs and benefits of each option, to allow for comparison on similar terms and planning assumptions.

45 As utilities work to adapt their business models and strategies to the changing industry, the Commission also encourages utilities to consider energy storage, when competitively procured, as a potential investment opportunity. We recognize that changing customer usage patterns, reduced load growth, and increasing competition from customer-sited generation are generally undermining the traditional utility business model and eroding earnings, prompting utilities to search for new sources of revenue. This has been a general theme of the utility industry in recent years, as well as in filings with this

[20] See Puget Sound Energy 2013 Integrated Resource Plan at 5-26; Avista 2013 Integrated Resource Plan at6-10.

Commission and many other Commissions around the country. Energy storage has the potential to help utilities manage the changing demands on the grid while offering a potential opportunity for new investments.

B. *Modeling Guidelines*

46 Several parties in this proceeding have mentioned the potential for utilities to adopt sub-hourly IRP modeling software, which would capture the flexibility benefits that energy storage can create for a utility's system. Utilities are beginning to explore sub-hourly models; Avista asserts that its ADSS model has sub-hourly capabilities and PSE has purchased the PLEXOS model. While neither utility is using a sub-hourly program for its core IRP model, these initial efforts provide an important learning opportunity for utility resource planners, Staff, and stakeholders.

47 The Commission recognizes that IRP modeling is a complex process, and that utilities have invested significant resources in training personnel on existing modeling software. However, based on what we have learned in these proceedings, it is evident that traditional hourly IRP models are becoming increasingly inadequate as utility needs change and the demand for flexible resources grows. And while sub-hourly IRP models remain limited in that they do not consider a resource's distribution and transmission benefits, they enhance a utility's ability to model the sub-hourly system flexibility that is required by the increased deployment of clean energy resources.

48 We recognize that transitioning to sub-hourly modeling software will be a challenging, resource-intensive and time-consuming process. However, it appears to be a feasible and increasingly necessary undertaking. In the IRP rulemaking, we intend to discuss with utilities a reasonable timeline for requiring the use of sub-hourly models and how to prepare for that transition.

49 In the meantime, we provide additional guidance for how utilities should model energy storage within the traditional construct of hourly IRP models. We adopt the general framework put forth by many parties to these proceedings, elucidated as the "net cost" method in ESA's initial comments in the IRP rulemaking docket. Under this approach, we expect utilities to use an external model capable of modeling the sub-hourly benefits of storage over the resource's useful life, including transmission and distribution benefits, then calculate the net present value of those benefits and deduct that value from the resource's modeled capital cost in the IRP. Based on the information provided in these

dockets, there are several viable energy storage modeling tools available, including the Battery Storage Evaluation Tool (BSET) created by PNNL and the StorageVet tool created by EPRI.

50 Where these tools are publicly available, utilities should share their modeling assumptions and results with their respective IRP advisory groups, allow interested parties to understand the utility's findings, and develop alternate scenario recommendations if needed. If a utility opts to use a commercially licensed storage model, it should ensure that advisory group members are given the opportunity to understand the model and request alternative model runs.

51 The accuracy of the net cost method is highly dependent upon an accurate capital cost assumption for energy storage. Given the rapid cost declines that the technology has undergone in recent years and the general difficulty of obtaining specific project cost data in the highly competitive industry, pinpointing an accurate cost at a given point in time is an understandably challenging exercise. In recent IRP cycles, utilities have relied on consultants to provide them with a cost assumption, but this has proven to be an uneven and, at times, highly inaccurate approach.[21] Additionally, while storage resources are available in a wide range of physical characteristics (*i.e.*, pumped hydro, compressed air, and flywheel), battery chemistries (*i.e.*, lithium ion, vanadium redox, and sodium sulfur), and discharge durations, the utilities generally modeled a limited subset of these options.[22]

52 In our view, it is important that utilities analyze a range of storage options. Given the disparate characteristics and resource lives of different storage technologies, analyzing one or two types of storage is not sufficiently representative of the diverse range of capabilities. While it would be unreasonable to expect a detailed analysis of every possible storage technology and configuration, we expect utilities to work with their advisory groups to identify and analyze a reasonable, representative range of storage technologies and chemistries.

53 To ensure that utilities are using accurate cost data in their modeling assumptions, we expect utilities to rely on cost data provided by reliable, independent third parties. PNNL

[21] See Puget Sound Energy 2015 Integrated Resource Plan at D-40; Avista Corporation 2015 Integrated Resource Plan at 12-14; PacifiCorp 2015 Integrated Resource Plan at 98.
[22] *Id.*

and Sandia National Laboratory have compiled such data, and reputable industry analysts regularly release such reports.[23] Utilities should also apply a reasonable learning curve to storage costs to account for forecasted declines, and ensure that storage resources are modeled at a size sufficient to allow the IRP model to capture their impact.

54 Finally, as the growth of distributed energy resources increasingly affects distribution grid operations, we expect utilities to apply these same principles to evaluate distribution system projects on a more granular basis. Specifically, any analysis of a distribution system upgrade should include analyses of storage options that capture all of the locational benefits associated with the site in question.

C. Regulatory Treatment

55 Given that energy storage is a relatively new resource option, we recognize that utilities may be uncertain about how the Commission would view investments in the technology, and therefore may be hesitant to invest. We wish to address that concern by first clarifying that we will apply the same basic principles of prudence to resource acquisitions that we have previously identified, namely:

> The company must establish that it adequately studied the question of whether to purchase these resources and made a reasonable decision, using the data and methods that a reasonable management would have used at the time the decisions were made.[24]

56 As with any other resource acquisition, the prudence of an energy storage investment begins with the utility's planning process. A utility must demonstrate that it has adequately evaluated the resource against other options, according to the modeling guidelines above and information provided in the most recent, Commission-acknowledged IRP.[25]

57 In addition to following the modeling guidelines outlined above, a utility should be able to demonstrate that it has been actively pursuing, where appropriate, energy storage funding opportunities such as the state's Clean Energy Fund and programs available

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[23] For instance, Lazard issues its "Levelized Cost of Storage Analysis" report annually, and Energy Storage Association/GTM Research issue their "U.S. Energy Storage Monitor" publication quarterly.
[24] *WUTC v. Puget Sound Energy, Inc.,* Docket UE-031725, Order 12, ¶19 (April 7, 2004) (footnotes and related citations omitted).
[25] WAC 480-100-238(6).

through the U.S. Department of Energy. In early stages of technology development and adoption, cost sharing between a government agency grant and funding from ratepayers is an important and prudent strategy for a utility to minimize risk while evaluating a new product or service.

58 Finally, energy storage resources should be competitively procured. Utilities should issue request for proposal (RFP) documents that are technology neutral, clearly identify the suite of services that the utility expects the resource to provide, and the values of those services. We further encourage utilities to provide additional cost data, such as their Open Access Transmission Tariff (OATT) rates, so that bidders can identify the value of ancillary services on the utility's transmission and distribution system and better tailor their bids to fit the utility's specific needs. We emphasize that specific and granular modeling should be pursued both in IRP planning and in RFP scoping and review.

59 When analyzing an energy storage resource, there are a number of benefits that may not be quantifiable. As storage is still a developing industry, there are market transformation benefits associated with each incremental resource acquisition. Depending on the application, there may also be resiliency and reliability benefits. While we consider these to be real and tangible, even in the early stage of development, these benefits are difficult to quantify and may only indirectly benefit a utility's ratepayers in a traditional IRP analysis. The Commission is therefore willing to accept some degree of uncertainty around the benefits of an energy storage acquisition, and where a utility follows the guidance outlined in this policy statement, we will consider and give weight to an energy storage acquisition that is not the least-cost option, provided that it is reasonably competitive.

60 While the policies above are focused on utility-scale storage projects, we also wish to briefly address opportunities for behind-the-meter energy storage. Although the decision to install storage behind the meter ultimately belongs to individual customers, the Commission and utilities may have a role to play by establishing appropriate pricing through tariffs that provide an economic signal conducive to cost-effective storage applications located behind the meter.

61 We see this role playing out in two areas. First, the Commission is willing to consider rate design proposals for all customer classes that accurately reflect the cost of serving customers during high-demand periods. Such designs may create more accurate price signals for customers and may, over time, support cost-effective, behind-the-meter

storage investments. The Commission will consider such proposals alongside the traditional ratemaking principles of just and reasonable rates, gradualism, and intergenerational equity.

62 Second, to the degree that behind-the-meter storage resources may be used to reduce peak demand usage and benefit all customers by reducing the utility's need for high-cost peaking resources, we encourage utilities to work with Staff and other stakeholders to propose programs for further facilitating the deployment and potential aggregation of behind-the-meter storage resources in a manner that will benefit all ratepayers.

VI. CONCLUSION

63 Generally, we believe that more detailed work needs to be done to disaggregate the multiple value streams of energy storage and incorporate them into some type of tariff design. For the foreseeable future, we believe that our utility structure in Washington state will continue to be one of vertical integration of generation, transmission, and distribution. Compared to day-ahead markets, it is potentially more difficult in this environment to separate out the various value streams of storage and place an appropriate price, or tariff, on each of them. We invite each utility to bring forth tariff proposals that would reflect such an approach for disaggregation of the value streams of energy storage, including traditional ancillary services.

64 Factors such as new technologies, environmental imperatives, lower load growth, and more engaged customers will continue to apply pressure to the traditional utility model. Responding to these challenges will require utilities to become more flexible in their resource planning and procurement, and developing a clearer understanding of the different services that utilities provide and their associated value streams is a foundational component of developing that increased flexibility. Energy storage, with its ability to provide service across multiple value streams, is likely to play a key role in increasing utility flexibility.

65 To capture that range of value streams, utilities must move beyond the narrow, confining silos of traditional resource planning and use a stacked benefit approach when modeling a storage resource. Through the work of national laboratories and private firms, sub-hourly resource modeling software is becoming increasingly viable. We realize that such sub-hourly modeling may be complex and time consuming, but we believe that it can be accomplished over time. We also urge utilities to ensure that modeling software is

populated with reasonable learning curves for the various energy storage technologies and the most up-to-date cost and performance information in the IRP planning cycle.

66 Finally, the Commission is open to considering a utility's procurement of storage resources as a component of rate base, but that procurement should follow the guidance in this policy statement regarding planning, use cases, multiple stacked benefits, and more sophisticated sub-hourly modeling. Most importantly, storage resources must be competitively procured. We will continue to apply the traditional tests of cost-effectiveness and prudency when evaluating a utility's procurement of a storage resource. We acknowledge that a traditional cost-benefit analysis may not adequately include all of the potential values of energy storage, and therefore urge each utility to assess also the non-quantifiable benefits. We also note that it may be necessary to develop new tariff designs to reflect some of the unique aspects of energy storage resources both at the utility scale and behind-the-meter applications as well. We intend to continue to explore these issues in future IRP and tariff filings, and look forward to a continued dialogue with utilities and stakeholders on these matters.