Service Date: October 11, 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 (*Consolidated*)
In the Matter of Amending, Adopting, and Repealing Rules in WAC 480-100-238, WAC 480-90-238, and WAC 480-107 Relating to Integrated Resource Planning	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 resulting from 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 biennial planning cycles, to improve the treatment of energy storage in IRPs. It noted two challenges that utilities faced in doing so; namely the lack of an organized market to set price signals for the services that energy storage provides and the lack of a transparent means by which a utility might monetize those services.[3] But the key issue preventing the utilities from following the Commission's direction, Staff concluded, was "the current modeling practices of the utilities, which to date have not identified or quantified the benefits associated with

[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 1.

energy storage. This precludes the IRP models from selecting energy storage, because without those offsetting benefits, energy storage remains cost prohibitive."[4]

3 The white paper then evaluated various policies that had been enacted or considered around the country to recognize the benefits of energy storage, and concluded that more structured direction would be beneficial for all parties. Staff recommended that the Commission provide such direction through a policy statement.[5]

4 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 and 23, 2015. PNNL designed the workshop for utility regulators and staff from the Pacific Northwest to understand recent advances in energy storage and discuss the technology's potential impact on grid operations.[6] Commissioners and staff from the states of Idaho, Montana, Oregon, and Washington participated in the workshop.

5 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.

6 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 rules in WAC 480-107.[7] Given the overlapping issues between the existing staff investigation and the rulemaking, the Commission determined that it would be appropriate to consolidate the dockets.

7 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 draft policy statement on energy storage early in 2017. Parties

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[4] *Id.* at 5.
[5] *Id*. at 11.
[6] 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).
[7] Docket U-161024.

generally stated that they were not opposed to consolidating the dockets as long as it did not delay the release of the policy statement.

8 The Commission released a draft policy statement for comment on March 7, 2017. Eighteen parties responded to the request for written comments. A summary of the comments and the Commission's response to them has been filed in these dockets.

II. STATUTORY AND POLICY FRAMEWORK

9 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.

10 Since 1998, the state legislature has enacted several laws and budget programs to encourage utility and private investment in renewable energy resources and new energy technologies, diversify existing energy resources, and develop more robust utility planning requirements. These include:

- Net energy metering (1998); [8]
- Voluntary programs for customers to offset some or all of their consumption with purchases of qualified alternative energy resources (2001); [9]
- Renewable energy production tax incentives (2005);[10]
- Requirements for all utilities to prepare IRPs that built on previous Commission rules for investor-owned utilities (2006); [11]
- Emissions performance standards for future generation sources (2007);[12]
- Creation of the Clean Energy Fund (CEF) that has helped fund various grid modernization efforts, including energy storage demonstration projects by Avista Corporation (Avista), Puget Sound Energy (PSE), and Snohomish County Public

[8] RCW 80.60. The legislature adopted net energy metering to "encourage private investment in renewable energy resources; … and enhance the continued diversification of the energy resources used in this state."
[9] Energy – Supply and Demand Management, Laws of 2001, ch. 214, §14. [RCW 19.29A.090].
[10] Renewable Energy Industries – Tax Credits, Laws of 2005, ch. 300, §3. [RCW 82.16.120].
[11] RCW 19.280. The Legislature's stated intent in passing the law was "to encourage the development of new safe, clean and reliable energy resources to meet demand in Washington for affordable and reliable electricity."
[12] RCW 80.80. The Legislature made the following finding in enacting the law: "it 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."

Utility District, as well as analytical work at PNNL to quantify the benefits of the projects and identify their economically optimal usage (2013); [13] and

- The possibility of incentive rates of return for investor-owned utilities that invest in certain electric vehicle infrastructure that benefits ratepayers (2015).[14]

11 Further, in 2006, Washington voters approved Initiative 937, the Energy Independence Act (EIA, codified in RCW 19.285), which requires larger electric utilities in the state to serve an increasing portion of their load with renewable resources and to pursue all cost-effective means of energy conservation. In its declaration of policy section, the initiative cited several goals: stable electricity prices, economic benefits and high quality jobs, the protection of clean air and water, and positioning Washington as a national leader in clean energy.[15]

12 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."[16] In 2015, Governor Inslee built on the order by directing the Department of Ecology to develop a rule to cap and reduce the state's greenhouse gas 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.

13 This suite of energy 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 in Washington. Through the course of this inquiry, we have come to better understand the impacts of these policy developments on utility operations and the potential for energy storage in addressing them, which has prompted this policy statement.

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[13] "Washington State Clean Energy Fund," http://www.commerce.wa.gov/growing-the-economy/energy/clean-energy-fund/. Accessed December 30, 2016.
[14] RCW 80.28.360. In the findings attached to the law, the Legislature determined that "state policy can 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," and that utilities "must be fully empowered and incentivized to be engaged in electrification of our transportation system."
[15] RCW 19.285.020.
[16] Executive Order 14-04, at 4.

III. STATEMENT OF THE REGULATORY ISSUE TO BE ADDRESSED

14 The evolution of Washington's energy policies is reflective of the rapidly evolving energy industry, which is undergoing change at a truly fundamental level. Where utilities once planned for linear dispatch from predictable facilities to serve predictable loads, an increased reliance on variable generation and the growth of distributed resources have disrupted both sides of the supply and demand equation, introducing new dynamics to grid operations. As customer demands and resource options change, so do utility needs – becoming more flexible, granular, and locational. It is that changing nature of utility need that prompted the Commission to initiate both the energy storage investigation and the IRP rulemaking.

15 In the IRP rulemaking, we intend to update our rules to ensure that utility planning and procurement activities can adapt to these changes. But we start with energy storage because storage, as a scalable resource that can act as either supply or demand, as generation or delivery, is fundamentally a new class of resource that warrants more detailed guidance. The regulatory issue before the Commission, then, is to identify the barriers that prevent energy storage from being fairly considered in resource planning and develop policies to overcome them.

16 Throughout these proceedings, parties have been invaluable in helping the Commission to better understand those barriers. The Commission's current IRP rule requires utilities to identify "the lowest cost mix of resources determined through a detailed and consistent analysis of a wide range of commercially available sources."[17] In these proceedings, we have learned that the primary obstacle to energy storage, from a planning perspective, is that a traditional IRP model only considers the costs of storage, while failing to capture most of the benefits – precluding the type of "detailed and consistent analysis" required by rule. Many of the benefits of energy storage, particularly in the Pacific Northwest, are related to providing fast, sub-hourly responses to changing grid conditions and providing distribution and ancillary services to support the grid.[18] These services, while tangible and valuable, cannot be reflected in traditional IRP models that only consider the load/resource balance and only do so on an hourly basis.

17 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

[17] WAC 480-100-238(2)(b).
[18] Patrick J. Balducci and Vince L. Sprenkle, "Challenges and Opportunities Associated with Energy Storage: Assessing Financial and Technical Performance," Docket UE-151069 (Aug. 21, 2015) at 17.

costs are likely both to 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.

18 Where distribution system upgrades were once a relatively simple question of building additional wires, poles, and transformers, distributed energy resources now require utilities to apply the IRP's portfolio approach to distribution planning, to ensure that all options are fairly considered, and that resulting investment decisions appropriately balance cost and risk. 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.

19 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

20 During the course of this proceeding, the Commission held two formal workshops and solicited three 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.

21 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.

22 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.

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

24 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.

25 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

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

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.

26 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.

27 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.

28 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.

29 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.

30 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.

31 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.

32 In their comments on the draft statement, the investor-owned utilities were generally concerned with the draft policy statement's discussion on prudence determinations – both the requirement that utilities demonstrate that they analyzed storage in all resource acquisition decisions and the language around the Commission giving weight to non-quantifiable benefits of energy storage projects.[20] Utility comments also expressed reservation regarding distribution planning requirements and the use of sub-hourly models in the core IRP process.

33 Other parties generally encouraged the Commission to provide more specific guidance for the cost assumptions and benefits that utilities model in their energy storage analyses, and to establish firmer expectations for how utilities consider energy storage in transmission planning activities. A more detailed comment summary and the Commission's responses to specific suggestions has been filed in these dockets.

V. STATEMENT OF COMMISSION POLICY

34 Through the body of actions identified in Section II, 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. Given the unique characteristics of energy storage identified in Section III – its multiple potential uses and its scalability – it is therefore the policy of this Commission that energy storage is a key enabling technology for utilities to accomplish the goals of the state's energy policies, and that

[20] Public Counsel expressed similar concerns regarding the consideration of non-quantifiable benefits.

Washington's investor-owned utilities should be working diligently to identify and pursue cost-effective opportunities to incorporate energy storage into their systems.

35 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

36 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. This appears to be one likely reason that past IRPs have not determined energy storage technologies should be included in a utility's resource mix.[21] 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.

37 At its core, the IRP process is the basis for utilities to plan for and procure resources to meet system load. To that end, utilities must be able to demonstrate in any prudence determination for a new resource acquisition that their analysis of resource options included a storage alternative. In such analyses, 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. This policy applies to investments in generation and distribution projects, as well as transmission projects that have not been selected for regional cost allocation through a regional transmission planning process pursuant to the Federal Energy Regulatory Commission's Order 1000. While we provide this exemption for regional lines, we note that regional planning processes are guided by utilities, and we expect that Washington utilities will encourage the analysis of storage and other non-wires alternatives where feasible in such processes.

[21] See Puget Sound Energy 2013 Integrated Resource Plan at 5-26; Avista 2013 Integrated Resource Plan at 6-10.

38 We recognize that this increased emphasis on transmission and distribution planning is a departure from our historical application of the IRP statute and rules in this area. We also note the reservations that the utilities expressed regarding this approach. One of the primary goals of this proceeding is to adapt the IRP process to ensure that new technologies, such as distributed energy resources, are fairly considered alongside traditional resource options. Two significant developments since the 2006 adoption of the current IRP rule make it necessary for the Commission to revisit how distribution and transmission systems are considered in the IRP rule – the growth of distributed technologies and the removal of federal prohibitions against coordinated generation and transmission planning in 2008.[22] And while the purpose of this policy statement is to provide utilities guidance concerning the treatment of energy storage in their planning and procurement activities, we intend for the rulemaking to result in rule language that better defines the role of transmission and distribution planning in the IRP process, without being overly prescriptive.

39 Additionally, 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 placing pressure on 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 Commission and many other commissions around the country. Energy storage, with its ability to enhance a utility's flexibility and improve its ability to respond to changing customer needs – without increasing emissions – is the type of investment that utilities should be weighing as they endeavor to adapt to the changing industry.

B. Modeling Guidelines

40 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

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[22] *Standards of Conduct for Transmission Providers,* 73 Fed. Reg. 63,795, 63812, Order No. 717 (Oct. 16, 2008).

core IRP model, these initial efforts provide an important learning opportunity for utility resource planners, Staff, and stakeholders.

41 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. 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 and increased regional coordination.

42 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.

43 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.

44 We strongly encourage the use of publicly available modeling tools, as this will facilitate advisory group involvement in reviewing the utility's planning assumptions and recommending alternate scenarios 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.

45 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 storage technologies have 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 cost assumptions, but this has proven to be an uneven and, at times, highly inaccurate approach.[23] 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.[24]

46 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.

47 To ensure accuracy of cost data in modeling assumptions, we expect utilities to rely on current cost data provided by reliable, independent third parties. For example, PNNL and Sandia National Laboratory have compiled such data, and reputable industry analysts regularly release such reports.[25] 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.

48 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.

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[23] 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.
[24] *Id.*
[25] 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.

C. Regulatory Treatment

49 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 energy storage 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.[26]

50 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.[27]

51 In addition to following the modeling guidelines outlined above, a utility should be able to demonstrate strategies that minimize risk, particularly when ratepayer funds are used in funding new technology investments. Utilities are encouraged to pursue, where appropriate, energy storage funding opportunities such as the state's Clean Energy Fund and programs available through the U.S. Department of Energy, to minimize risk while evaluating a new product or service.

52 Finally, energy storage resources should be competitively procured. Utilities should issue request for proposal (RFP) documents that are technology neutral and that 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. Where a bid includes services beyond energy and capacity, negotiations and contract terms should include compensation for those

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[26] *WUTC v. Puget Sound Energy, Inc.,* Docket UE-031725, Order 12, ¶19 (April 7, 2004) (footnotes and related citations omitted).
[27] WAC 480-100-238(6).

services. We emphasize that specific and granular modeling should be pursued both in IRP planning and in RFP scoping and review.

53 When analyzing an energy storage resource, there are a number of benefits that may not be quantifiable. As energy 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 resilience 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 acknowledges there will be some degree of uncertainty around the calculation of benefits of an energy storage acquisition, but expects utilities to identify and quantify those benefits to the extent possible.

54 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.

55 We see this role playing out in three areas. First, utilities should 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.

56 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.

57 Finally, as utilities and customers respond to state policies and incentives to support investment in electric vehicles and electric vehicle infrastructure, we expect Washington's rate of EV penetration – already among the highest in the nation – will continue to rise. Each utility should monitor industry developments and EV penetration

in its service area, and develop programs, when appropriate, to leverage electric vehicles as distributed storage resources.

VI. CONCLUSION

58 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. A foundational component of utilities developing this increased flexibility is developing a clearer understanding of the different services that utilities provide and their associated value streams. Energy storage, with its ability to provide service across multiple value streams, is likely to play a key role in increasing utility flexibility.

59 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. Compared to day-ahead markets, it is potentially more difficult in the current vertically integrated utility environment to separate out the various value streams of storage and design an appropriate price, or tariff, for each of them. However, we also note that investor-owned utilities are uniquely situated to capture all of the benefit streams associated with energy storage, while regions with organized markets continue to struggle with the issue of compensation. We invite each utility to develop tariff proposals that would disaggregate the value streams of energy storage, including traditional ancillary services. 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.

Dated at Olympia, Washington, and effective October 11, 2017.

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

DAVID W. DANNER, Chairman

ANN E. RENDAHL, Commissioner

JAY M. BALASBAS, Commissioner