BEFORE THE PUBLIC UTILITY COMMISSION

OF OREGON

UM 1751

In the Matter of PUBLIC UTILITY COMMISSION OF OREGON, Implementing Energy Storage Program Guidelines pursuant to House Bill 2193.	Staff Comments

I. Introduction

House Bill (HB) 2193 authorizes large electric companies to procure energy storage systems, subject to qualification by the Commission, that have capacity to store at least of five megawatts of energy. HB 2193 requires the Commission to adopt guidelines no later than January 1, 2017, related to criteria for qualification as a project that is eligible for procurement under the bill and the Commission's review of proposed projects.

House Bill (HB) 2193 (2015) empowers the Commission with the unique opportunity to develop energy storage. Staff notes the importance of Section 2(2)(b) whereby the Commission may waive the total capacity cap outlined in Section 2(2)(a). Staff notes the importance of this section in light of not only the legislative charge to advance energy storage but also in light of the legislative charge to establish guidelines and Section 3(D) whereby the Commission is charged with establishing a cost effectiveness methodology. Staff believes that the Commission guidance required under House Bill 2193 be provided in the context of long-term energy storage development, so there is an opportunity for progressive changes as the industry develops. Staff believes that there are essentially four phases in making a framework for storage resource development, which are outlined below. The initial guidelines developed by the Commission will help inform the tasks, goals and tools necessary for each phase of resource development. However, the guidelines may need to be updated as the Commission and stakeholders progress through the four phases and more is learned about development of this nascent industry.

Phase One:
Phase One is a conceptualization phase and is the current phase of the HB 2193 process. Questions posed here may not have complete answers. It is important that this phase create a framework that allows all stakeholders to understand the trajectory of the work undertaken, the goals of the process, the structure of the process, the tools to be developed (when and how), and any requirements that are developed.

Phase Two:
Phase Two is a pilot phase. This phase of development is characterized by identifying needs, studying use cases, business cases, analyzing performance and value, and finally initial tool development such as an avoided cost calculator. The data acquired during this stage informs the companies' Integrated Resource Plans (IRPs). Pilots are generally small, as envisioned by Section 2(2)(a) of HB 2193.

Phase Three:
Phase Three is a more familiar regulatory phase. Guidance developed in this phase becomes final. Staff would expect that an outcome of this phase is integration of energy storage into integrated resource planning. Tools developed in this phase of the framework include, business cases, use cases, and valuation. Development of tools and guidance in this phase should be done so collaboratively, leveraging the data and lessons learned from Phase Two.

Phase Four:
Phase Four is a deployment phase. Here we would expect to see applications for projects with the expectation that costs of successful projects would be included in rate base. Here the Commission would be enabled by the tool set created in the prior phases, the planning outlined in the IRP, and the lessons learned from the piloting phase. This phase incorporates traditional prudence review.

II. Staff comments to inform straw proposal

In her June 1, 2016 Ruling, the administrative law judge (ALJ) states that she is considering drafting a straw proposal and asks for comments regarding 25 questions to inform the straw proposal. The following are excerpts from the ALJ's Ruling, the questions, and Staff's comments.

> ***Section 3.2.b of HB 2193 requires the utilities to include with each proposal an evaluation of the potential to store energy in their systems. The bill specifies that the evaluation should include analysis of operations and system data and how storage would complement the utility's action plans, as well as identify areas with opportunity to incentivize energy storage. We are considering whether this evaluation should be prepared early in the process and filed ahead of individual proposals.***

1. Should the evaluation of storage potential be filed separately?

Yes. As described in the statute, a utility system evaluation of the energy storage potential is required and submitted concurrently with project proposals. Asking utilities to provide a draft system evaluation in advance of the proposals would allow stakeholders to take a holistic view of

energy storage potential and more precisely identify valuable projects. Providing stakeholders and the Commission a chance to offer feedback on the system evaluations would limit the risk that some good opportunities might be overlooked, essentially ensuring that a comprehensive system evaluation is completed prior to identifying projects.

Thus, Staff suggests that utilities be directed to submit in Docket UM 1751, by March 1, 2017, a draft system evaluation plan. During the stakeholder review and comment period Staff anticipates that utilities would begin work on program proposals and would share some of these early ideas with stakeholders. If a stakeholder review and comment period were to run six months this would still give the utilities four additional months to continue developing project proposals. The utilities would submit both their final system evaluation and program proposal to meet the 2018 statutory timeline.

2. What guidance, if any, should we provide about the analyses to be conducted?

The statute specifies that the "analysis shall be used to identify areas in the electric utility system where there may be opportunities to incentivize the value potentially derived from energy storage systems."[1] Guidance from the Commission on how to meet this objective could be helpful. Specifically, Staff recommends clarifying the definition of "areas" and "value" as well as establishing a minimum level of detailed analysis that is expected within the evaluations. Each system evaluation should state high level goals and activities over a long planning horizon. The utilities' system evaluation should show how with each project the utility is being consistent in its approach to energy storage.

Staff suggests defining "areas" as the following five system perspectives or installation locations; behind the meter (BTM), distribution, substation, transmission, and at the generator. "Value" should be specified in terms of energy services that storage can provide. The services should be identified and well defined and the functionality specified. For example in the case of a residential hot water heater storage project that can offer ancillary services, the service is easy to identify and though its functionality will be initially defined, it may not be fully understood. Therefore we may identify and quantify a preliminary value but that value, or methodology used to assess that value, may be adjusted as our understanding of the resource matures. Analyses should align with the most recent IRP assumptions such as time horizon and load forecasts, and include assumptions for preferred portfolio resource additions. Energy storage may enable deferral of some resource needs, for example and that "service" should be identified within the evaluation.

Staff also suggests that the Commission issue guidance on the use of "de rate factors" for energy storage projects. Staff recommends de rate factors not be used in evaluating the potential value of storage resources until more is known about the deployed technologies' applied capabilities.

3. Should utilities systematically identify and rank order the areas of opportunity?

Utilities should systematically identify areas for opportunity within the evaluation. A comprehensive look at the system would result in this identification of opportunity. Staff feels that a diversity of services and use cases is necessary to understanding value. HB 2193 does not

[1] HB 2193, Section 3(b)(A).

require the utilities to submit more than one project proposal. As such, diversity of services and multiple uses case becomes ever more important to understanding the various operational values and market values of energy storage resources. Thus if the goal of HB 2193 is to study energy storage Staff believes any ranking should emphasize a diversity of services and use case to identify and inform our assessment of value. In order to protect ratepayer investments in energy storage the Commission should seek to approve projects that have the shortest timeline to used and useful. The Commission should secondarily be informed in their decision to approve a project based on cost, timing of system need, project timeline, technology maturity, potential future applications and ease of implementation.

Any ranking undertaken by the utility should be rationalized by the findings of the system evaluation in concert with the utilities storage use goals and the need to invest in a project that represents the shortest timeline to used and useful system assets.

4. ***What guidance, if any, should we provide about the details of the evaluation report filed with the Commission?***

Commission guidance regarding the details of the evaluation report could be limited to describing overall expectations on content for the report, as noted in question 2, without providing too many specific process related requirements. Again Staff suggests that the evaluations be guided by clear goals, identified-use cases, and value of project deployment and utilization.

5. ***What should the evaluation report include and in what detail?***

The evaluation report should identify, by system area (behind the meter, distribution, substation, transmission, generation), a high level estimate of the magnitude of technical potential for energy storage to supply identified services. Similar to other resource assessments, the technical potential by service and system level could be further refined to account for practical market barriers, but not limited by cost. Specifically what energy storage technologies would best provide those services is likely to be beyond the scope of what's useful at this stage for the evaluation. Determining details of technology and cost will be a part of the project identification and proposal stage.

6. ***What process, if any, should we use for the review and comment on the analysis results? For example, should the utilities prepare a draft report for stakeholder and Commission review and comment?***

Staff agrees that a draft system evaluation filed for review and comments would be ideal. The review and comment period would give stakeholders and the Commission the opportunity to assess whether any opportunities were overlooked. If filed early enough in 2017, the utilities could incorporate any suggested changes into the final versions filed with the project proposals by January 1, 2018. Many stakeholders are familiar with resource assessments for generation resources and energy efficiency but less so with assessments for energy storage technologies. The review would be geared toward offering productive ideas for improvement with the understanding that this is an evolving process for all parties.

Staff believes collaboration has greater value and may speed resource development faster than reacting to a final system evaluation filing in 2018. Requiring the submittal of draft system evaluations by March 2017 will grant stakeholders an opportunity to shape and inform and be informed by utility analysis. Staff suggests the Commission outline a process and timeline working back from January 1, 2018.

We recognize that the utilities may issue requests for information (RFIs) to test vendors and projects.

7. ***Should the utilities report on the outcome of RFIs? Should the results of such RFIs be included in the evaluation report?***

Staff suggests that results of utilities' requests for information (RFIs) be reported at a summary level in the form of a description of the market landscape within the final system evaluation report and program proposal due in 2018. Information shared should include; number of responses received, the respondents' experience with energy storage systems, whether respondents are expanding into energy storage from another main technology, and so forth. Sharing these insights would help all stakeholders understand the potential market barriers for advancing energy storage and may provide supporting information for future project proposals.

8. ***If yes, what action, if any should we take on the report?***

No specific action related to the RFI responses seems necessary. However, utility project proposals should be informed by and consistent with the findings of the report. If not consistent, the project proposals should include reasoning for the inconsistency.

The Commission may require utilities to follow competitive bidding guidelines.

9. ***Should we establish guidelines for competitive bidding for storage projects?***

Yes, the Commission should establish some requirement for ensuring a competitive process is followed when utilities procure any new energy storage systems within the Commission-prescribed process.

10. ***If yes, what guidelines should we prescribe? To what extent should the existing competitive bidding guidelines serve as the model?***

The level of rigor and process requirements should be much less prescriptive and onerous than the existing competitive bidding guidelines and better tailored to the magnitude of investment anticipated in this process and the maturity of the energy storage technology market. Utilities should demonstrate that they did not do sole source procurement but followed a transparent, fair request for proposals (RFP) process. Staff suggests that guidance on competitive bidding is generally procedural in nature and as such, the current competitive bidding guidelines are properly informative but need not be wholly applied here. The Commission's current competitive bidding guidelines are likely appropriate for energy storage resource procurement at some point in the future. However, for now, Staff feels that utilities should demonstrate that they did not do sole source procurement but followed a transparent, fair RFP process.

11. What role, if any, should we have in reviewing bid results?

Review of individual bid results is not needed but utilities should have the burden of demonstration of a fair, competitive process.

Staff does not believe that competitive bidding guidelines are necessary. However it should be noted that in 2008 MidAmerican Energy Company, the parent company of PacifiCorp, purchased 225 million shares, representing approximately a 10 percent interest, in BYD Company Limited (1211.hk). The investment is valued at 1.8 billion HK dollars, or approximately 230 million U.S. dollars. BYD's corporate focus is researching, developing, manufacturing and selling rechargeable batteries (Li-ion, Nickel batteries), automobiles, electric automobiles and related products.

The initial cap placed on utility investment in storage is 1% of the utility's 2014 peak demand or roughly 39MW for PGE and 26MW for PacifiCorp. This investment cap is well below the competitive bidding guidelines for major resources. The energy storage market is not mature, and all procurements will be at the pilot phase of resource development. However, as noted prior in this discussion, if the commission exercises its discretion under Section 2(2)(b) to waive the investment limit of 1% of 2014 system peak load, then the Commission should revisit whether competitive bidding guidance are necessary.

Section 3.1.b of HB 2193 directs us, in developing the guidelines, to consider ways in which to encourage utilities to invest in different types of energy storage systems.

12. How should we encourage investment in different systems?

There are a number of ways in which utilities can be encouraged to seek diversity in project types. For example, in the guidelines, the Commission could do the following:

1. State that diversity of project types, use cases, and values is encouraged.

2. Specify that the Commission will be looking for a portfolio of ideas that cover multiple system service opportunities and use cases. In so doing, if multiple, similar projects are proposed the Commission may not consider that portfolio to be in the public interest if the system evaluation report identified a range of other plausible opportunities. Additionally, if a single project is proposed the utility should identify as many use cases and values as possible with that single system. Lastly but perhaps most importantly, Staff feels that the Commission should encourage projects that have the shortest timeline to being cost effective and truly used and useful.

3. Require that the utilities identify system "problem areas" where energy storage technology may address the issue. By bidding the problem and allowing the market to offer energy storage solutions, the chance of project type diversity seems more likely. This concept was raised at the first stakeholder workshop.

13. **Should we require utilities to submit proposals for multiple storage projects that test the use of storage in different applications, test different ownership structures, demonstrate promising new uses and technologies, or test some other critical differentiating factor among projects?**

Staff suggests the Commission not *require* that utilities submit multiple projects. HB 2193 allows utilities to propose a single project. However, the Commission should encourage a portfolio of project types that test various applications and ownership structures. For example, behind the meter storage would possibly test a number of factors including ownership structure, specific rate structure, utility control vs customer control, etc.

And, Staff suggests the Commission require the utilities to demonstrate strategic thinking and strategic planning. Staff believes that the utilities should demonstrate to the Commission through its system evaluation and project proposals a plan for storage testing and development and how each project fits within a broader strategy. Each project should fit within the overall context of the utilities stated energy storage strategy within the context that arises from the utilities' system evaluations.

14. ***What differences in storage projects should be promoted (e.g. different use cases, different technologies, and different ownership structures)?***

Staff recommends the Commission not promote different technologies, use cases, or ownership structures. The desirability of certain characteristics should be addressed by the utilities and stakeholders through an application process as utilities connect their project proposals to the resource potential evaluation report.

Utilities should know that bringing forward a project application that is similarly constructed to a prior approved program would likely be unacceptable to the Commission. The utilities should be free to present various storage use cases and technologies they perceive viable and that meet the needs identified in the system evaluation. It is then up to stakeholders to challenge the assumptions if appropriate, and help the Commission determine if proposals lack diversity of projects, technologies, or use cases.

However, Staff does recommend promoting diversity on services. In doing so, the combination of services or use cases would differ as would the technologies that are identified to best meet those services. For example, a range of services from frequency or voltage regulation to energy shifting should lead to the need for a range of systems with a variety of discharge time period characteristics.

15. ***To what extent should the goal be to test and prove new and innovative applications or technologies?***

Ratepayer funds should not be used to test and prove new technologies. The development and testing of new technology is highly risky as a majority of new technologies fail to deliver. The federal government and the State of Oregon through the Oregon Department of Energy offer grant funding of new and emerging technology.

The goal of testing how energy storage can meet a variety of services should take precedence over proving new technologies and innovative applications. Innovative applications of storage technology are not beyond the scope of HB 2193. Staff anticipates that utilities and the Commission will come to a better understanding of the many use cases, operational capabilities, and energy products and services offered by storage resources. It therefore follows that utilities and stakeholders will be looking to apply this technology to different challenges and needs.

The Commission should encourage the utilities to demonstrate multiple use cases and to develop questions and theories of the operational and system benefits of the proposed resource. Any proposal should inform the Commission about what the utility plans to study, what tool development will be undertaken, and how the activity will inform tool development. While it may not be unreasonable for a utility to propose only one project, the utility should nonetheless be leveraging that project to learn as much as possible about the capabilities of the representative resource and its place in the utility resource stack.

Section 3.2.c of HB 2193 details the information and analysis to be included with a proposal, such as technical specifications, estimated capital and output costs, and system benefits.

16. ***What, if anything, should the guidelines add, clarify, or otherwise address as to these requirements?***

Staff suggests that the guidelines provide direction in the following areas;

- Evaluation plans – Each project submittal will include an estimate of the value of benefits, to the extent that those values can be quantified. To inform and improve understanding of valuing services, utilities should provide an evaluation plan stating how they plan to review system performance and the quantified values they identified in the project proposal and report back to the Commission and stakeholders on those findings through the IRP process. The plans should note specific data points that will be collected related to the system performance that will enable this assessment of values.

- Standard nomenclature – The guidelines should include a list of key terms related to energy storage and their definitions.

- Standard services list – The guidelines should include a table listing specific services that energy storage projects may provide. When utilities propose projects, the project use cases will consist of a combination of services. This list will bring consistency in nomenclature to the definitions of use cases.

    - Staff offer this non-exhaustive list of standard services as an example:
        - Ancillary services
            - Spin, non-spin, regulation, black start
        - Transmission deferral
        - Distribution deferral
        - Frequency regulation
        - Variable resource firming

- Load following
- Electric energy time shift
- Voltage support
- Resource adequacy – electric supply capacity
- TOU energy management
- Demand charge management
- Electric service reliability – back-up power
- Electric service power quality

- Standard minimum expectation for analysis for valuation of services and "stacking" of values. Although Staff does not see value in requiring utilities to use one specific software tool to evaluate estimated system performance, setting a minimum expectation for following current best practice techniques, where possible, would be helpful. Operational benefits will differ by utility system and location within the system, but there are widely shared ideas for how each potential value stream from the applicable services can be evaluated.

17. What additional information should utilities provide with their proposals, and why?

- Acceptable methods for quantifying greenhouse gas (GHG) reduction due to energy storage projects. Staff suggests that utilities use the greenhouse gas quantification method consistent with that proposed by Staff in Docket No. UM 1744. Here Staff suggested that greenhouse gas quantification use the Northwest Power and Conservation Council's methodology, which is an emissions reduction equal to roughly 850-900lbs per megawatt hour. This will provide consistency across the many carbon mitigation strategies being employed throughout the energy sector in Oregon.

- Maturity of technology being deployed. Staff suggests that the Commission and stakeholders should be informed about the maturity of the technology being deployed. Although not conclusive, technology maturity is informative of project success.

- Whether other utilities have had experience with the vendor or technology. Utilities should seek to inform the Commission and stakeholders to the greatest extent possible. Therefore, utilities should report to the Commission and stakeholder whether the technology and approach advocated in their project proposal has been explored elsewhere by other utilities or end users.

- Functionality of the technology being deployed such as how, when and how many times the technology will be deployed during testing or project period. It is important that stakeholders and the Commission fully understand how the project will be used and how often the technology will be utilized to serve utility needs. An investment that is only utilized once is of no substantive value.

- Dispatch protocol. The utility should define under what conditions the resource will be dispatched and make assurances that the unit will be dispatched a minimum number of times to complete the goals of the program proposal. By assigning a dispatch protocol the utility is more likely to use the project as if it were an actual resource and not just a

study case. Additionally, if the dispatch protocol is shared with the Commission and stakeholders we will have better insight into how often and whether the resource will be used enough to meet the goals outlined in the utilities system evaluation.

- A description of what will be learned through installation of the proposed project.

18. How should we calculate cost effectiveness?

Cost effectiveness of the proposed projects should be evaluated as a comparison of total system costs to quantifiable benefits over the expected lifetime of the project. To the extent that the benefits exceed the costs, the project would be considered cost effective. Qualitative benefits should be identified.

19. How should the cost effectiveness of a proposal be compared to other proposals and to traditional non storage solutions?

The results of the cost effectiveness evaluation for multiple projects could be compared in terms of present value of net benefits as well as through benefit cost ratios (BCRs). The comparison of storage solutions to traditional solutions will be inherent in the benefit valuation where the system benefits will most likely be quantified as the avoided cost of meeting a particular system service through traditional means. Since an energy storage system may provide multiple benefits that are met through a combination of traditional sources, making a specific comparison for one energy storage system to traditional solutions would be challenging and likely not capture the whole range of benefits provided.

20. What information and assessments should we require with a proposal to demonstrate the utility has conducted a full quantitative and qualitative assessment?

The proposals should include a reference to the standard list of services provided in the guidelines and identification of the primary service and all secondary services. For each service the proposal should the estimated value and detail the methodology by which the estimated value was derived. The analysis and all work papers should be made available for review by Staff. In addition, the proposals should clearly state how potentially overlapping service values were considered to show that double counting of values has not occurred, and all potential service values were included.

The initial projects deployed by the utilities should not be required to be cost effective, as these should be considered pilot projects. However, these projects should develop information helpful to creating a cost effectiveness methodology for storage that can be applied consistently and transparently across utilities. Whether the development of a single tool to enable consistent and transparent application of the cost effectiveness methodology is done through a formal Commission process, an informal Staff-led process, or created by the utilities themselves in coordination or separately, is a decision for the Commission. However, Staff suggests beginning with an informal process led by Staff to produce a single, agreeable methodology in a relatively short amount of time. Any cost effectiveness methodology should be fully developed but not necessarily final prior to any investment beyond the cap placed by HB 2193.

In the interim, before a single, consistent tool is developed to properly assess cost effectiveness, Staff suggests that the Commission require the utilities to use or model their approach informed by the Pacific Northwest National Laboratory Protocol for Uniformly Measuring and Expressing the Performance of Energy Storage Systems, EPRI's Energy Storage Valuation Tool or the California Public Utilities Commission avoided cost model developed by E3.

Section 3.3 of HB 2193 requires us to consider each proposal and determine whether it is consistent with the guidelines, reasonably balances the value for ratepayers and utility operations and the costs of the project, and is in the public interest. After considering these factors we may authorize the utility to develop one or more of its projects.

21. What criteria should we use to evaluate and compare projects? Should different criteria be used for different types of projects (e.g. should the criteria for evaluating and ranking a transmission investment deferral project be different than the criteria for evaluating a project that tests an emerging use or technology?)

In addition to assessing the merits of each project such that they are consistent with the guidelines, in the public interest, and reasonably balance value and costs, the Commission may wish to evaluate the portfolio of project proposals as a whole. To the extent that utilities propose projects that exceed the cap of 1% of 2014 peak load or that the Commission sees value in approving the merits of reviewing all projects proposed by electric companies as a portfolio, comparison and ranking among projects will be needed.

22. Should we prioritize projects with immediate impacts, stress projects that hold promise of substantial benefits over the long run, or seek a balance between projects serving different ends?

Through encouraging utilities to provide a portfolio of projects that offer diversity in services, prioritizing one of the characteristics above is not necessary. However, if the Commission would like to emphasize one of the above areas, that preference should be clearly noted in the guidelines.

The Commission should seek the shortest path to used and useful storage investments. As storage technology matures, costs will lower and benefits greater and easier to identify. Therefore Staff suggests that the Commission stress submission of projects that can be used as proposed and that can be scaled to a larger application.

23. Should we give greater weight to certain kinds of projects (say projects with a higher benefit cost ratio) than to others?

Each project should be evaluated on its own merit, considering the costs, quantifiable benefits, and non-quantifiable benefits with no additional weighting needed.

The Commission should not try to give greater weight to certain kinds of projects. As previously stated the Commission is not the subject matter expert on storage and should allow robust opportunity for submission of a diverse range of projects and Staff and stakeholder review and input.

24. For a given use case, should we require utilities to evaluate alternatives to the use of storage?

As noted earlier in Staff comments, energy storage evaluation should be based on valuation, use cases, and whether the project or technology will be used and useful. As the utilities evaluate the value of each service provided by the energy storage system, the "avoided cost" of using another means to provide that service should be considered. Staff believes that energy storage technologies are capable of providing many different services and different uses. Thus the use cases can individually be evaluated against a resource capable of supplying the same service, but all services and use cases provided by the energy storage project should be evaluated holistically against the other comparative resources, the services they provide, and their costs.

25. How should we weigh non quantifiable benefits?

Utilities should include a list and discussion of all non-quantifiable benefits each project is anticipated to provide. Non-quantifiable benefits should be identified and tracked. When the Commission reviews each project for balance between cost and value, non-quantifiable benefits should be included in the review and assessed for their significance.

At this early stage, Staff does not recommend including those benefits as part of ranking process or to add merit to a proposed project. At this early point in development it will be difficult to define and identify the non-quantifiable benefits of various types of storage resources.

This concludes Staff's comments.

Dated at Salem, Oregon, this 22nd day of June, 2016

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