

PacifiCorp - Stakeholder Feedback Form

2021 Integrated Resource Plan

PacifiCorp (the Company) requests that stakeholders provide feedback to the Company upon the conclusion of each public input meeting and/or stakeholder conference calls, as scheduled. PacifiCorp values the input of its active and engaged stakeholder group, and stakeholder feedback is critical to the IRP public input process. PacifiCorp requests that stakeholders provide comments using this form, which will allow the Company to more easily review and summarize comments by topic and to readily identify specific recommendations, if any, being provided. Information collected will be used to better inform issues included in the 2021 IRP, including, but not limited to the process, assumptions, and analysis. In order to maintain open communication and provide the broader Stakeholder community with useful information, the Company will generally post all appropriate feedback on the IRP website unless you request otherwise, below.

Date of Submittal 10/26/2020

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Public Meeting Date comments address: 10/22/2020

Check here if not related to specific meeting

List additional organization attendees at cited meeting:

None

***IRP Topic(s) and/or Agenda Items:** List the specific topics that are being addressed in your comments.

1. Performance Cost Summary 2. Plexos Benchmark Studies 3. Supply Side Resources - Energy Storage



Check here if you do **not** want your Stakeholder feedback and accompanying materials posted to the IRP website.

***Respondent Comment:** Please provide your feedback for each IRP topic listed above.

Please see the attached Word document titled "AGES PAC IRP Stakeholder Feedback_10-26-2020.docx"

1. Performance Cost Summary: Li-ion battery costs and related information

The costs presented in the Performance and Cost Summary tables for utility scale Li-Ion batteries are not reflective of current greenfield development costs. There is publicly available data that shows the costs for recently transacted utility scale (in front of the meter) projects throughout WECC that are generally below the Base Capital shown for a 50 MW four-hour duration BESS. These costs, specifically the initial capital costs, when normalized to this size and duration, are typically lower than what's presented in the table.

The attached file titled "Market data pricing points.xlsx" has pricing and related data for projects in NM and NV that are available through their Public Service Commission's websites, under dockets from PNM and NV Energy respectively, where both utilities have sought/are seeking approval for these projects from their Commissions.

Also attached is the Lazard Levelized Cost of Storage Analysis – Version 6.0. This annual analysis of the levelized cost of different storage technologies and applications was released on October 19, 2020. Along with Lazard's Levelized Cost of Energy Report, this report has become one of the industry's most relied upon sources of recent market and OEM data on the cost of deploying storage resources.

* Required fields

On page 15 in the Appendix of the Storage report, there is a breakdown of the initial and ongoing costs of Li-ion storage. Notable, Lazard lists the initial capital costs of a 100MW/400MWh system as \$73-\$140 MM, or \$730-\$1,400/kW. This compares to PacifiCorp's estimates for a 50MW/200MWh at \$1,828/kW. While some economies of scale are realized on the balance of plant costs going from 50MW/200MWh to 100MW/400MWh, this cannot explain the total difference in costs between Lazard's and PacifiCorp's estimates on a \$/kW basis.

Able Grid's goal in bringing this publicly available information to PacifiCorp's attention is to ensure PacifiCorp uses the most accurate, up to date initial and ongoing costs for Li-ion BESS in the 2021 IRP. This will ensure the model(s) select the appropriate amount of storage in the appropriate regions for the least cost/least risk portfolio that PacifiCorp chooses for your 2021 Action Plan, based on the costs and benefits that this system resource brings to PacifiCorp's customers and shareholders.

PacifiCorp Response:

Operational and cost information shown in the PacifiCorp Technology Assessment are screening level in nature and do not reflect guaranteed costs. The information provided in the Assessment is based on Burns & McDonnell's experience as an EPC contractor, design engineer, and consulting firm in the energy storage and renewable energy generation industries. Estimates concentrate on differential values between options and not absolute information. While it is fair to consider the Lazard Levelized Cost of Storage Analysis as one reference point among many for general market research, the cost ranges presented in that document are not necessarily directly comparable to the screening estimates provided to PacifiCorp. Certain scope, capital cost, and/or O&M cost assumptions/methodologies in the Lazard estimates are either unclear or different than those used for the PacifiCorp technology assessment.

2. Plexos Benchmark Modeling

Able Grid applauds the improvements in portfolio modeling available through the Plexos Benchmark model. In particular, the ability to run ST scenarios based on an hourly dispatch instead of four-hour blocks for representative days will help identify the benefits of fast reacting technologies as more VERs are deployed onto PacifiCorp's system.

PacifiCorp Response:

Thank you for your comment.

3. Supply Side Resources – Energy Storage

Statements from both Dan McNeil and Kelcey Brown during the October 22, 2021 IRP Stakeholder Meeting indicated that they are not knowledgeable as to what capabilities Li-ion BESS can bring to the PacifiCorp's integrated system. Able Grid's assumption is that this lack of knowledge applies across most of the merchant function's market facing roles, albeit unevenly. Able Grid would like to make the following recommendations:

- a) Burns and McDonnell have accumulated significant information and internal engineering experience on the engineering and construction of utility scale Li-ion BESS. They can provide information from different OEM's on the technical characteristics and capabilities of Li-ion BESS system. Able Grid recommends that PacifiCorp engage Burns & McDonnell to provide technical and related information to employees in the merchant function that will be managing BESS systems – either as hybrid or stand-alone systems – as they are integrated onto PacifiCorp's system

PacifiCorp Response:

Engineering and consulting services are contracted on a competitive basis. PacifiCorp expects Burns & McDonnell will continue to submit proposals to provide those services and therefore are likely to be considered for such services.

- b) Ascend Analytics is a software services company that focuses on energy analytics. They have extensive experience in modeling the deployment of BESS in both RTO and non-RTO markets. Ascend is supporting analytics and valuations on BESS projects, including testimony on behalf of utilities, for several WECC utilities

* Required fields

and PacifiCorp neighbors. They have also been retained by ISO-NE for their internal market monitor to validate expected energy storage performance and revenue.

Ascend provides both software and consulting services, and Able Grid recommends that PacifiCorp's trade floor and support functions engage with Ascend to see how BESS dispatch can provide valuable services across the energy dispatch spectrum, from fast response frequency regulation all the way to capacity.

PacifiCorp Response:

Thank you for your suggestions.

Data Support: If applicable, provide any documents, hyper-links, etc. in support of comments. (i.e. gas forecast is too high - this forecast from EIA is more appropriate). If electronic attachments are provided with your comments, please list those attachment names here.

[Click here to enter text.](#)

Recommendations: Provide any additional recommendations if not included above - specificity is greatly appreciated.

[Click here to enter text.](#)

Please submit your completed Stakeholder Feedback Form via email to IRP@PacifiCorp.com

Thank you for participating.