

PacifiCorp - Stakeholder Feedback Form

2019 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 2019 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	11/5/2018
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City: <u>Boise</u>	State: <u>ID</u>	Zip: <u>83702</u>
Public Meeting Date comments address: <u>11/1/2018</u>	<input type="checkbox"/> Check here if not related to specific meeting	
List additional organization attendees at cited meeting: _____	Click here to enter text.	

*IRP Topic(s) and/or Agenda Items: List the specific topics that are being addressed in your comments.
Capital and energy cost assumptions for pumped storage projects in 11/1 supply options table; capacity factor assumptions for gas turbines; storage+wind modeling.

Check here if any of the following information being submitted is copyrighted or confidential.

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.

(1) Pumped Storage Cost Figures: Gridflex is the proponent of several of the pumped storage projects profiled in the supply options matrix associated with the November 1 meeting. Some adjustment has been made to the total costs, but they remains considerably higher than what we anticipate. We are requesting clarification of the methodology that resulted in the November 1 table. For the Wyoming figure, we have provided the figure of \$2,318/kW as total capital cost, not including AFUDC. The figure in the table is \$3,255/kW, which is 40% higher. For the Utah figure, we provided a figure of \$2,230/kW total capital cost. The figure in the table is \$2,991, which is 34% higher. For the Idaho figure, we provided \$2,118. The figure in the table is \$2,680, which is 26.5% higher. AFUDC alone would be expected to account for perhaps 10-12%. We would thus request correction in order for a more realistic evaluation of supply options, or clarification.

PacifiCorp Response:

PacifiCorp used the specific figures provided by Gridflex Energy, LLC (Gridflex) and added allowance for funds used during construction (AFUDC), property tax, capital surcharge and escalation discounted back to mid-2018 dollars. No additional owner's contingency was added. AFUDC is based on confidential rates and a typical S-curve cash flow. The S-curve was scaled over the permitting and construction timeframe for each resource. The permitting and construction timeframes for each of the Gridflex projects are as follows: eight years for the Wyoming pumped hydro energy storage (PHES) project; six years for the Utah PHES project; and 12 years for the Idaho PHES.

(2) Pumped storage is assigned a fuel cost of \$27.14 to \$27.67/MWh. However, the Li-Ion 15x60 MWh option is not assigned any fuel cost. Since pumping typically will occur during times of lower value or surplus wind or PV production, and since generation typically will occur during times of higher energy cost, we would anticipate an energy cost CREDIT

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rather than a COST assigned to pumping energy. At the very least, a figure of \$0 should be used (as it was in the example of stand-alone Li-Ion).

PacifiCorp Response:

The fuel costs reported for storage resources (including batteries and pumped storage) are only used to report resource costs on a levelized dollar per megawatt-hour basis for *informational purposes*. PacifiCorp does not input levelized costs on a per megawatt-hour basis. The costs and benefits from charging and discharging storage resources are optimized dynamically within PacifiCorp’s models.

(3) The capacity factor assumed for gas turbines is 33%. This appears to be at least 3 times higher than what is typically found for gas turbines. This is an important number because a higher-than-realistic capacity factor for gas turbines lowers the calculated total cost of energy per MWh. We would request that Pacificorp use historically referenced levels, or an explanation for why the higher figure would be justified.

PacifiCorp Response:

The capacity factor stated for dispatchable resources is only used to report levelized resource costs on a dollar per megawatt-hour basis for *informational purposes*. PacifiCorp does not input levelized costs on a per megawatt-hour basis. The capacity factor of dispatchable resources is optimized dynamically within PacifiCorp’s models.

(4) The supply options table includes combinations of PV+batteries and Wind+batteries, but not combinations of pumped storage+PV or wind. The most realistic use case involves combinations of pumped storage with both wind and PV on the system to leverage the three-way combination in the most effective way. We realize that this is a complex calculus but suggest that it is an analysis that can provide the greatest value for all resources.

PacifiCorp Response:

The PV + batteries and Wind + batteries options listed in the supply side resource (SSR) table reflect instances where co-located resources have construction efficiencies and cost savings that may be realized by building both resources simultaneously in the same location relative to stand-alone construction of those resource options. The combined resources also have some limitations relative to stand-alone construction, for instance shared inverters and interconnection capacity. Only these cost savings and operational limitations are relevant for the combined resource and benefits as PacifiCorp’s models inherently account for the inter-related benefits of all resources in its portfolio. Due to the long development timeline for pumped hydro and compressed air energy storage and project-specific nature of these resources, it is unclear how simultaneous same-site construction would impact project costs or operational limitations for these resources.

(5) Some pumped storage projects would be located in areas where they can provide substantial benefits to transmission. As a specific example, the Wyoming project near Aeolus would likely allow for a significantly higher load factor on new Gateway transmission. This value should be credited to the project. Similarly, the Utah project could allow for existing transmission through Sigurd to accommodate a significantly higher level of solar in southwestern Utah.

PacifiCorp Response:

PacifiCorp’s models inherently account for the inter-related benefits of all resources in its portfolio, relative to load and transmission capability. In the 2019 Integrated Resource Plan (IRP), the system optimizer (SO) model is selecting resources and transmission upgrades endogenously, and accounts for transmission constraints. If Gridflex Energy, LLC. has transmission studies of specific projects that document benefits to PacifiCorp’s transmission system, the company will gladly review these studies and assess if and how such benefits might be able to be captured in IRP modeling.

Thank you for your continued thorough analysis.

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.](#)

*Required fields

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

Thank you for participating.

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