# OREGON PUBLIC UTILITIES COMMISSION

## Independent Evaluator's Updated Status Report on PacifiCorp's 2020AS RFP

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# EXECUTIVE SUMMARY

The purpose of this report is to provide an Updated Status Report related to findings from PA Consulting's (PA) review of PacifiCorp's (PAC) scoring of bids submitted in response to PAC's 2020 All Source RFP (RFP or the Solicitation).[1] While the purpose of this report is not to report on the Initial Short List (ISL), PA's review of PAC's bid scoring, among other key activities, is interrelated to the determination and ultimate publishing of the ISL.

PAC is currently conducting the RFP under the oversight of two Independent Evaluators (IE). PA has been retained by PAC on behalf of the Public Utility Commission of Oregon (Oregon Commission or OPUC) as required by Oregon Administrative Rules § 860-89-2008. PA has been involved in the development of the RFP and provision of oversight to ensure the RFP process is conducted in a fair and reasonable manner. PA has also been participating in discussions between PAC and bidders throughout the RFP process.

## Main IE activities since PA's initial Status Update report

Since issuing a Status Update report on September 15, which provided an update on the number of bids received, their composition, and the process of determining compliance against the RFP's minimum eligibility criteria, PA has conducted the following activities:

- Reviewed and provided input to PAC regarding the circumstances related to bids with executed Large Generator Interconnection Agreements (LGIA)
- Identified and came to agreement with PAC on the inclusion of additional bids which otherwise would have been excluded from the ISL and from PacifiCorp Transmission's Transition Cluster Study
- Conducted independent scoring of bid price and non-price factors from a sample of bids as well as all Build Transfer Agreement (BTA) bids
- Reviewed PAC's list of ISL-eligible bids and compared PAC's price and non-price scores against PA's independent scoring
- Investigated and reconciled bid model results and model mechanics between PAC's and PA's respective models
- Conducted working sessions with PAC to review specific mechanics and components of the various bid scoring models

[1] In discussions of RFP conduct, scoring and bid selection, references in this report to PAC are to PacifiCorp's merchant function which operates independently of PacifiCorp Transmission under FERC's Standards of Conduct for Transmission Providers.

## Primary observations

The purpose of PA's bid review and independent scoring effort was to evaluate whether PAC's bid scoring methodology and results were fair and free of bias across all bids and bidders. Through PA's assessment and auditing of PAC's models and scoring process as well as its own independent scoring of approximately 25% of the total eligible bids, PA has not observed evidence of bias. Other observations include:

- PA's independent price-based scores were generally within 5% of PAC's scores for the same bids;
- PA's independent non-price-based scores were generally within 15% of PAC's scores for the same bids;
- The scoring variances identified by PA's review were determined to be immaterial and in all cases PAC was receptive to revisions and in many cases republished models and scores after discussions with PA;
- Whether or not a bidder currently holds an executed LGIA was not a factor in the scoring of individual bids. However, the existence of the LGIAs ultimately restricted some bids from projects without an LGIA from being initially included in the ISL candidate list. Following analysis by the IEs and discussion with PAC, additional bids (without executed LGIAs) which otherwise would have been candidates but for the existence of the executed LGIAs were added to the ISL;
- Bids structured as Power Purchase Agreements (PPA) consistently resulted in greater projected net benefit than BTA equivalents, except for some wind resources; and
- PAC's IRP includes a goal of increasing its pumped hydro storage portfolio and pumped hydro storage bids were permitted in the RFP; however, those bids scored poorly in comparison to wind and solar bids and were subject to displacement by bids with earlier online dates.

Figures ES 1 and ES 2 below provide a summary comparison of PAC's bid scoring results and PA's independent score results for bids PA modelled.

**Figure ES 1. Comparison of bid pricing scores**

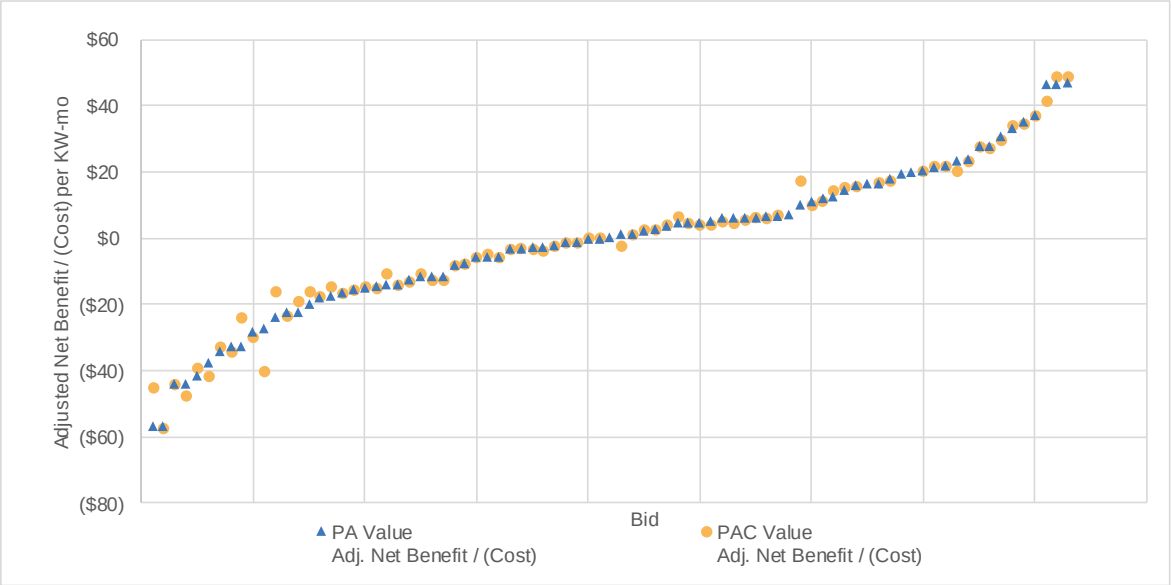
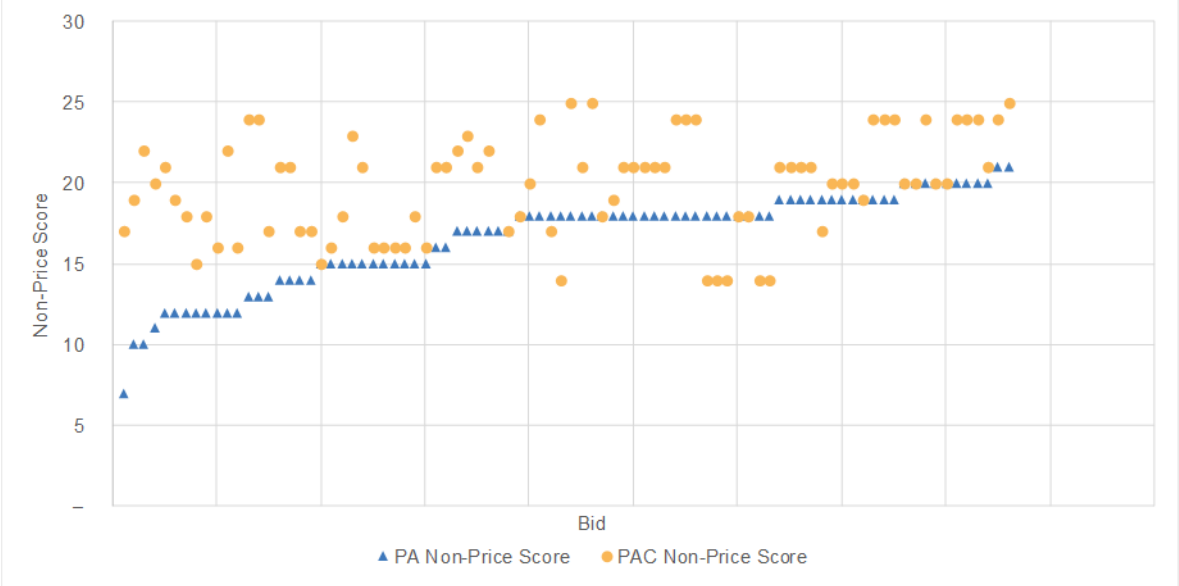



**Figure ES 2. Comparison of non-price scores**



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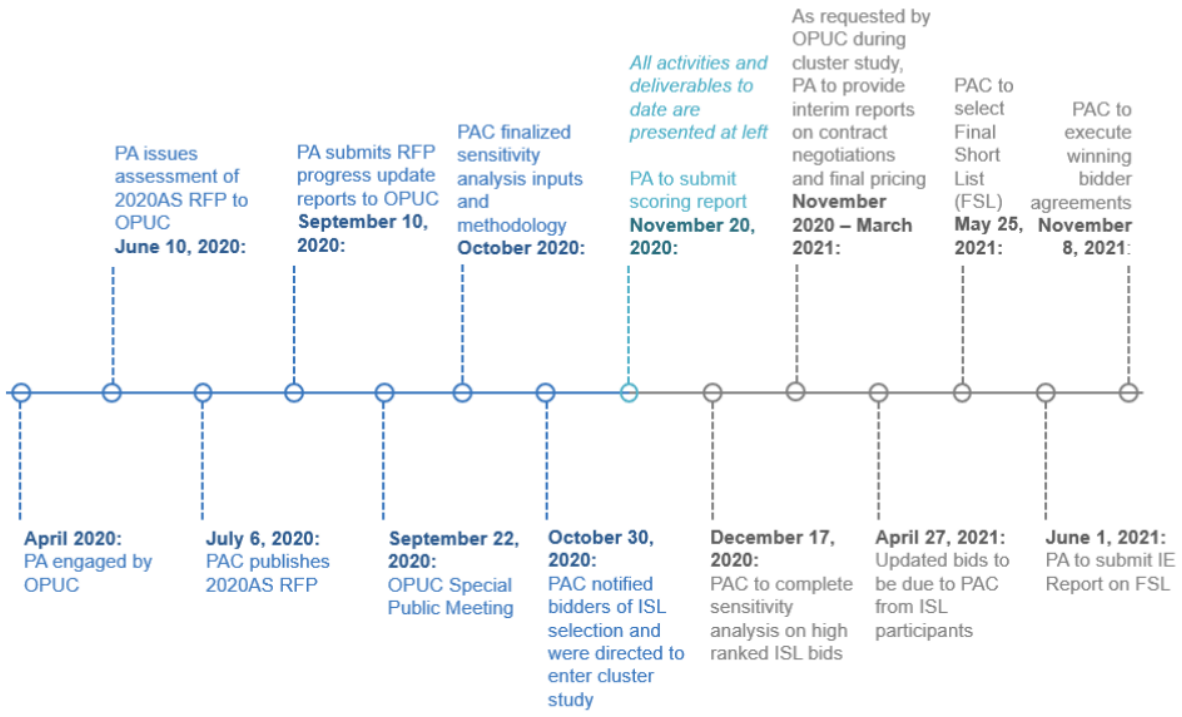
# 1 INTRODUCTION

The purpose of this report is to provide PA's findings from its independent bid scoring review process, PA's observations of PAC's modelling, and a discussion of other considerations pertinent to the development of the ISL. In discussions of RFP conduct, scoring and bid selection, references in this report to PAC are to PacifiCorp's merchant function, which operates independently of PacifiCorp Transmission under FERC's Standards of Conduct for Transmission Providers.

## 1.1 Scope of work and timing

PA's scope of work from the time of the Status Update report has evolved to become more pointedly focused on the review and critique of PAC's scoring models and results. As anticipated, PA and PAC spent substantial time conducting working sessions, interpreting findings, and evaluating both the results and the inner workings of the bid models. PA's work going forward will include evaluation of PAC's sensitivity analysis on the ISL and resolving any remaining issues and concerns related to the modelling process prior to development of the Final Short List (FSL). Excepting the review of the upcoming sensitivity analysis, PA does not expect to conduct further quantitative analysis until the FSL evaluation in Spring 2021.

The following timeline represents the currently anticipated set of milestones for the duration of the RFP process:



# 2 IE BID SCORE REVIEW PROCESS

The primary purpose of PA's bid scoring review was to assess the quality of the rankings produced by PacifiCorp's model and fairness in how each bid was valued and scored. While certain issues were identified in this review, none of the issues were determined to be material to the resulting ISL selection, nor were any issues evidence of bias for or against any bid or class of bid.

## 2.1 Process overview

To conduct the bid review analysis and independent scoring of bids, PA applied the same methodology to scoring that was presented in the RFP and in subsequent presentations to bidders which governed how the ISL was to be determined. In summary, the ISL is the output of two stages of analysis by PAC and review by the IEs. First, each bid's projected net benefits produced a price-based score which was combined with the qualitative assessment of each bid's non-price score to determine an overall score and rank. The second step was to run the highest-ranking bids by technology and transmission constraint "bubble" through PAC's IRP model (System Optimizer, or SO) to determine an optimal combination of resources on the basis of system reliability and cost.

PA conducted an independent scoring analysis of a subset of bids to validate PAC's use of its scoring model and identify any scoring anomalies. In doing so PA evaluated the drivers of bid valuation and any assumptions that may have caused certain bids to be over or under valued. Further, PA reviewed the input and output files for the SO model to seek clarity on how this model interacted with the bid scoring models.

During the bid scoring review, PA independently modelled nearly 100 bids representing a sample of the total population of compliant bids diversified across bid geography, technology, contract type, and bidder. When identified, PA logged divergences of model inputs, assumptions, methodology, and outputs and worked with PAC to resolve or reconcile differences. Of the issues identified, PA generally characterizes them as resulting from the large variety of bids which required PAC to implement minor adjustments to model mechanics to allow for certain bid models to function accurately.

Over the course of this work, PA did not identify significant positive or negative bias in the scoring model or in the use of data submitted by bidders in the scoring model, nor did PA identify material impacts from resolving the identified scoring model divergences.

As discussed in Section 2.5 of this report, when comparing PA's modelling results with PAC's, a number of issues were highlighted that PAC subsequently addressed and in turn provided revised models to the IEs. Additionally, PA determined that the SO model was potentially not fully accounting for the storage capacity represented by a particular, and atypical, combination of bid characteristics, and that the third-party StorageVet valuation tool was not properly constraining the joint production of generation and storage facilities sharing an interconnection. These circumstances are discussed in more detail in Section 2.5.

The following section discusses the process that PA followed in its own independent scoring of bids.

## 2.2 Price-based score review

As presented by PAC during the Special Public Meeting on September 22, 2020, the ISL is the result of a series of modelling steps beginning with the creation of a proxy capacity contribution and resource shape, which is then used to value the capacity and energy production of each bid. The highest ranking bids were then evaluated by the IRP models, which assessed and selected bids based upon regional capacity constraints, economics, and reliability. As part of PA's effort to evaluate the bid

scoring, PA conducted its own price and non-price scoring of a sample of 44 bids, as well as all of the BTA bids and compared the resulting scores to PAC's.[2] The purpose of this effort was to ensure PAC's consistent application of its valuation methods across bids, check for bias for or against bid characteristics such as technology or structure, and to identify and evaluate any potential material variations between PAC's results and PA's.

As part of this effort, PA conducted multiple working sessions with the PAC team responsible for modelling the bids to better understand and assess the underlying mechanics of PAC's models. Throughout the process of modelling the sample bids, PA queried PAC on bid specific items which were identified as either deviations from bidder provided input or potential issues with a given bid model's mechanics which needed clarification or resolution. Through PA's scoring process, PA found that on average, PAC's bid models and PA's were within an acceptable range and where greater variation occurred, PA notified PAC and worked toward reconciling our respective scores.

The specific steps that PA took in assessing the price-based scoring are as follows:

1. Review and assess the core models used by PAC for scoring. This process entailed the review of two categories of models: the Location Capacity Contribution (LCC) models and the bid valuation models[3]
    a. In reviewing these models, PA assessed the core mechanics of how each model worked and the underlying inputs and drivers which remained constant across all bids (such as the calculation of terminal value for BTA bids)
2. Identify differences between the template models (models provided by PAC to PA in July 2020) and the models used by PAC to value individual bids
    a. This process required a step by step identification of differences between the models and discussion with PAC to ensure that such differences both were appropriate and were consistently applied across all bid models
    b. In conducting this comparison, PA identified a small number of differences between the template models and the individual bid models used for valuation purposes. Many of the changes reflected more efficient means to model the same result, while other changes were due to changes in the spreadsheet mechanics in order to incorporate the nuances of particular bids.
3. Model each bid within the sample set of bids
    a. In conducting this independent scoring of bids, PA made use of the template models, updated those models according to the universal changes identified in step 2, gathered the relevant qualitative and quantitative inputs as transmitted by bidders, and populated and executed the models necessary to calculate both the adjusted and unadjusted net benefit of each bid.
    b. This effort required the following steps to be conducted in order:
        i. Gather the most current bidder data provided in each bidder's submittal, primarily via the RFP's Appendix C-2 spreadsheet file
        ii. Review email correspondence to determine whether a given bidder's original C-2 file as delivered with each bid was revised or alternatively if there was correspondence which indicated a necessary revision to the C-2 files without the bidder actually providing an updated file

[2] The OPUC had a particular concern with potential bias toward BTA bids, as a successful BTA project would become a utility investment yielding profit to PacifiCorp's shareholders. See OAR 860-089-0450.

[3] The LCC and bid evaluation (or bid scoring) models are discussed in detail in PA's initial Status Update report, filed in OPUC Docket No. UM 2059 on September 15, 2020

iii. Use the C-2 data to populate the LCC model with each bid's 8760-hour generation profile, project location, degradation profile, and technology capacities.

iv. Based upon these inputs, determine each bid's annual capacity contribution through the life of the project and correlated hourly capacity based upon PAC's 2018 proxy profiles

v. Use the results of the LCC model to populate the capacity contribution inputs of the valuation model

vi. Use the bid C-2 file to populate the bid valuation model with other relevant bid data

vii. Make manual updates to each bid model according to the technology type, contract type, and location of each bid

viii. For bids including storage, generate the inputs for, execute, and populate outputs from the StorageVet program for storage related charge and discharge profiles, costs, and revenues

ix. Compare the resulting individual categories of cost and value for each bid as relevant, such as the value and cost of generation and of storage, integration, tax, and O&M expenses, as well as revenue requirement and terminal values to PAC's model

x. Compare the net benefit, the capacity factor adjustment, and the capacity contribution adjusted net benefit on a $/kW-mo basis to PAC's model

xi. Log any adjustments made to the LCC model, the bid model, or any variations identified between the bidder C-2 supplied documentation and the comparable data as represented in PAC's versions of the respective bid model and LCC model

xii. Address such identified adjustments to PAC, review responses, receive and review updated models from PAC (if necessary) and restart from step iii. In many cases PA identified adjustments required by PAC in its bid models; in other cases, PAC clarified adjustments to PA, who then adjusted its models accordingly

4. Comparison of PAC's price base score and PA's score

    a. Across the sampled bids, the average difference and standard deviation of that difference in adjusted net benefit between PA's models to PAC's models was 2.3% and 12.4% respectively

See Appendices B and C for detailed comparison of bids scores.

### 2.2.1 Review of key price scoring value drivers

As part of the scoring analysis, PA conducted independent modelling of all submitted BTA bids. In due course of this evaluation, in addition to the modelling steps discussed above, PA took the following steps as it pertains to BTA bids specifically in order to test for fair treatment:

- Conduct cross comparison of otherwise identical BTA and PPA bids and identify the drivers of value differentiation
- Conduct a thorough review of the components and mechanics within PAC's models driving the calculation of terminal value, the revenue requirement, and operating costs

Through the process of this analysis, PA was able to confirm that the application of the model mechanics and inputs which determined the primary differences of value between a BTA and an equivalent PPA were consistent. Further, throughout this evaluation process, PA worked to establish an independent perspective on the validity of these calculations. This effort was critical to PA's overall

view that PAC has treated all bids, regardless of technology, geography, or bid contract type in an equal and fair manner.

For purposes of illustration, the following section provides an illustrative comparison of a solar PPA with an otherwise identical BTA bid.

### 2.2.2 Solar PPA vs. BTA Example

Following multiple conversations with the team at PAC responsible for modelling each bid as well as individuals who are responsible for PAC's financial reporting, PA has developed the following assessment of the primary causes of valuation differences between BTAs and PPAs.

As shown in Table 1 below, 100% of the value attribution of a PPA is via the value of generation (in a solar only bid) compared to a BTA bid, which in this instance reflects 6.5% of total value on a present value basis. Given that the generation profiles and all other attributes of this comparison are identical, the terminal value inherent to a BTA provides for a greater present value than a PPA. The differences related to storage value are discussed further below.

**Table 2-1. Comparison of PPA and BTA valuation composition**

| % Contribution | PPA | BTA |
|---|---|---|
| Value of Generation | 100.0% | 93.5% |
| Value of Storage | – | – |
| CapEx Terminal Value | – | 6.5% |
| **Total Value** | **100.0%** | **100.0%** |
| | | |
| Cost of PPA | 97.0% | – |
| Cost of Storage | – | – |
| Revenue Requirement | – | 77.5% |
| O&M Costs | – | 16.7% |
| Integration Costs | 3.0% | 1.5% |
| Other Costs | – | 4.3% |
| **Total Cost** | **100.0%** | **100.0%** |

### 2.2.3 Terminal value

The calculation of terminal value is based on three primary components: the initial asset investment amount, the associated non-transmission infrastructure, and the development rights. Given that at this stage of the RFP, real development value and non-transmission asset value are subject to determination, PAC made use of operating projects to inform the allocation across these categories.

The terminal value of the initial investment is representative of the fully depreciated asset value adjusted for inflation and decommissioning expenses. Given that PAC models all owned resources as being sold or salvaged at the end of their useful life and therefore fully depreciated with only the remaining decommissioning cost, this first component of terminal value is negative.

The calculation of the terminal value of non-transmission infrastructure follows the same calculation, however in this case, carries a useful life of 30 years. However, these assets (such as roads) retain terminal value as such costs would not be duplicated by the subsequent owner. As a result, for a

generation resource with a useful life of 25 years for example, the asset basis of the non-transmission infrastructure will not be fully depreciated and therefore hold positive value upon sale. Based upon operational history, this component of the terminal value represents roughly 6% of the total.

The final component of terminal value are the development rights. Based upon multiple conversations with PAC on this subject, the development rights represent an estimated value that a future developer would be expected to pay for the rights to develop a similar project in the future. To be certain, this does not represent any form of future cashflow in perpetuity but is simply an estimate of the how valuable the access to the land right, the permitting, and the insolation or wind is, among other considerations of value. In present value terms, the development rights of a BTA are nominal and they are highly subjective. PA does observe that the same assumptions are used regardless of state or other qualitative characteristics of the resource which in reality will certainly affect the valuation of such rights. However, PA also acknowledges that this component of value is immaterial in present value terms and represents an estimate based upon actual operations, which PA does not believe indicates a form of bias, but simply a representation of uncertainty. PAC provided an explanation of this same calculation in its filing to Docket No. UM 2059 on June 26, 2020.

PAC also did not attribute any operational value to fully depreciated BTA resources. They did not assume a “run-to-failure”, life extension or other operational strategy, instead assuming the plant would be decommissioned at the end of its useful life, realizing “brownfield” terminal value. In recent years PA have observed utilities and owners of Qualifying Facilities following life extension and recontracting strategies in favor of decommissioning. This may mean that PAC underestimated the value of the extension option. Such a change of assumption may cause differences in rankings between BTA bids; however, due to the time value of money and the lifespan of such assets, such a change would not be expected to meaningfully make BTAs more valuable than comparable PPAs.

### 2.2.4 Revenue requirement

The most substantial points of differentiation between PPAs and BTAs lie on the cost side of the equation. In lieu of the contracted price offered by a bidder under a PPA, which is reflective of the resource’s construction, financing, taxes, and production costs, as well as on-going maintenance among other ancillary expenses as well as the inherent required return on investment, a resource under a BTA bid entails a number of different cost considerations.

First, a resource owned by PAC will be entered into PAC’s revenue requirement calculation, which, for the purpose of evaluating the net benefit of a resource for ratepayers, is counted here as a cost of the project.

The annual capital revenue requirement is composed of the following inputs:

1. Annual depreciation
2. Allowed rate of return
3. Current and deferred taxes
4. Gain or loss on sale
5. Amortization of any investment tax credit

Depreciation, for the purposes of the revenue requirement, is based upon the straight-line depreciation schedule reflective of the resource’s useful life adjusted for an annual allocation of residual value. For example, a 25 year life resource with an in-service capital cost of $100 million and a residual value of $5 million (or 5% of total in service capital), will result in an annual depreciation expense of $100mm*(1/25)*(1+0.05%) or ~$4.2 million. Further adjustments are made depending on the actual payment schedule and the timing of capital expenses being put into service.

The allowed rate of return is simplistically calculated as PAC's allowed rate of return multiplied by an average monthly value[4] of the rate base, which in turn is determined as the period beginning plant-in-service amount less accumulated depreciation and deferred taxes. Given that the calculation of the rate base is done on a book basis, the monthly rate of return remains constant over the life of the asset with minor variations to account for differences in the number of days per month.

The gain or loss on the residual sale in present value terms accounts for a nominal component of the overall revenue requirement value, given that this cashflow takes place at the end of the resource's useful life. This value is calculated as the residual value of the asset net of the book basis of the asset[5]. In sample models evaluated, the result was a net gain on the residual sale resulting in a reduction of the total revenue requirement expense.

The final component of the revenue requirement is the investment tax amortization. In the case of the Investment Tax Credit (ITC), PAC is required to return the ITC ratably – an equal amount of the original credit each year – even though the company receives the ITC in a front-loaded fashion. That means that the present value of the ITC received by ratepayers is less than the present value of the ITC received by the utility. One assumes that a PPA bidder would compute its bid assuming that its costs are reduced by the ITC when received. Therefore, because the bid scoring model evaluates resources based on the discounted cost to ratepayers, the ITC has less beneficial impact on the score of a BTA bid that it would on the score of a PPA bid. Note, that for wind BTAs, PAC is able to monetize Production Tax Credits.

PA reviewed the logic and the formulaic calculations for revenue requirements and observed that all BTA bids were consistently modelled by PAC. PA also requested that OPUC similarly review PAC's methodology as Commission staff should have greater specific understanding of PAC's revenue requirement computation. After conducting this assessment of each BTA bid and comparing the bids to equivalent PPAs, there was no evidence of bias for or against either type of bid structure. The result of the combination of PAC's revenue requirement on top of a bidder's own return hurdles, compounded by PAC's inability to account for ITC benefit at a resource level resulted in greater total costs for BTAs against only slightly greater total benefits. It is worth noting that wind resources which can make use of the PTC in some cases had more projected value than comparable PPAs.

### 2.2.5 O&M expenses

The final major area of differentiation between BTAs and PPAs is with regard to the calculation of O&M expenses. Under a PPA, the bid price is reflective of the bidder's anticipated O&M costs and as such, while it is likely that further revision of such expenses will take place through the contract negotiation phase of the RFP, the method by which O&M costs are estimated differs between the contract types and therefore deserved further review.

Per PAC's methodology, O&M costs are defined as the costs incurred directly to operate and maintain the generating plant itself and exclude payments such as property taxes, insurance, land royalties, performance bonds, various administrative and other fees, and overhead. O&M costs include supervision and engineering, maintenance, rents, and training.[6] O&M costs are further separated into storage operating costs (if applicable) and generation operating costs with further differentiation depending on the type of resource technology. If the resource employs storage, such costs are adjusted per operational data and scaled proportionally to the size of the storage capacity, which is then converted to a $/kwh basis and escalated monthly through the term of the project. Generation operating costs use a combination of bidder inputs (such as the land lease rent expense, royalties,

[4] The calculation of the average differs based upon the geographic state of the resource.

[5] Book basis is equivalent to the capital value less accumulated depreciation.

[6] As described in the footnotes contained in PacifiCorp's template bid models dated July 28, 2020.

and auxiliary costs) and benchmark inputs of representative solar[7] and wind resources[8] for the fixed cost (the fixed cost generally accounting for ~70% of total O&M costs). The benchmark fixed operating costs were applied uniformly as baseline expense to all solar BTA bids, and this baseline was then adjusted according to geographic and technological considerations (such as tracker maintenance and vegetation management). Finally, these costs were then allocated according to the production profile and adjusted for inflation.[9]

PAC's methodology for determining costs for resources with storage (not represented in Table 2-1 above which describes a solar-only breakdown of value), entails the use of StorageVet, a publicly available, open source storage valuation tool developed by the Electric Power Research Institute[10] as well as the use of the fixed O&M cost data as presented in PAC's 2019 IRP.[11]

PA recognizes there is likely a difference in the level of confidence between the costs presented by a bidder and PAC's estimation of operating costs based upon resource characteristics and third-party inputs. Given the fact that at the time of the ISL, bidders were requested to provide redlines and issue lists to the template O&M agreements which would then be followed with a period of negotiation to reach executable agreements, there would be natural and expected divergences between quoted prices and the value of generation net of all O&M costs under a BTA. Further, since the cost of the PPA reflects the bidder's required return on investment and potentially a margin on O&M fees, comparison of PPA O&M costs against BTA O&M costs is imperfect. As a result, PA's assessment of the O&M costs relied on review of PAC's inputs and methodology for determining BTA O&M costs, which PA views as a commercially reasonable and defensible approach to estimating such expenses.

## 2.3 Non-price based score review

PAC provided a non-price scoring matrix for which a bid can earn up to 25 percentage points. The scoring matrix is broken into three non-price factors: 1) Conformity to RFP Requirements, 2) Contract Conformance, and 3) Project Readiness and Deliverability. Each of the non-price factors has subcategories for which the bid can earn points. The subcategories are summarized as follows:

1. Conformity to RFP Requirements (up to 5 points available):
    a. The bid provided all required RFP information accurately, as set forth in the RFP instructions
    b. The bid is compliant with technical and operating specifications
2. Contract Conformance (up to 10 points available):
    a. The bidder provides relevant appendices with redline and comments for the bid
3. Project Readiness and Deliverability (up to 10 points available):
    a. The bidder's previous development and construction experience
    b. The bidder demonstrates site control, consistent with PacifiCorp Transmission's Site Control definition, for the bid being scored
    c. Bid is able to demonstrate ability to meet the project's environmental compliance, studies, permits, and equipment procurement needs (represented by progression through required permits and studies)

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[7] Benchmark costs per: *Utility Scale Solar, Empirical Trends in Project Technology, Cost, Performance, and PPA Pricing in the United States* –2019 Edition, Lawrence Berkeley National Laboratory.

[8] Benchmark wind fixed operating costs per operational data scaled up or down based upon the size and number of wind turbines in the project.

[9] See Docket UM 2059, Order 20-228, pages 5-6 regarding the rationale for applying this assumption.

[10] For more information about StorageVet, see: https://www.storagevet.com/

[11] 2019 IRP Volume I, Table 6.2, page 137.

d. Documentation included to show whether the bid qualifies for a full or partial federal tax credit.

PA followed PAC's scoring matrix for completing the non-price scoring sampling and BTA non-price scoring. In doing so, PA used PAC's definitions and maximum points per subcategory to complete the non-price scoring sampling. However, in using this process, PA found some areas of ambiguity where a judgement call would be needed in order to assign points for a subcategory. These areas of ambiguity include:

- How to assign points for Category 2, Contract Conformance. Per PAC's definition, partial points can be awarded if comments were provided but no redline was provided. However, no definition was provided for instances where redlines were provided but no comments were made. Additionally, in some instances, redlines were provided but the bidder also stated they would provide comments upon selection. In each of these cases, PAC's definition left ambiguity on whether 0 percentage points or 5 percentage points were to be awarded to the bid.
- How to evaluate the points related to environmental compliance, studies, permits, and equipment procurement needs (Category 3 above), as it has an ambiguous definition for points to be awarded. The definition for point breakdown is based upon how many major studies and permits have been completed. However, a prescriptive list of major studies and permits or other typical project development stage-gate definitions were not employed. Moreover, zero points are to be awarded if major studies and permits are not started and two points are to be awarded if 50% of the major studies and permits are complete. It is not apparently clear if one point could be awarded if some, but not all, major studies and permits are started but not yet complete. Additionally, it is not clear if all necessary permits and studies are considered major permits and studies.
- How to evaluate the appropriate documentation to receive federal tax credit. Up to 2 percentage points could be awarded for this category. In some instances, bidders were relatively clear in stating their eligibility for federal tax credits.
- How to assess a bidder's development and construction experience when they did not provide clear information on the amount of MW currently under operation. Some bidders did not provide information on how many MW is under their operation. Furthermore, there were instances in which a bidder would describe how many MW are under construction now but not how many MW is already operating. As the non-price scoring matrix definition for this category is dependent on the amount of MW in operation, it leaves some ambiguity as to how many points these bidders should be awarded in these situations.
- How to asses site control when part of the site is under a lease or purchase option and the other part of the site is already owned or fully leased by the bidder. The non-price scoring matrix assigns 1 percentage point if there is a lease option on the full site and assigns 2 percentage points if there is a lease or purchase agreement for the full site. However, in some bids, part of the site would be under lease option while the rest of the site would be under a purchase or lease agreement. In these instances, it is unclear if the full 2 points should be awarded as the bidder has site control but does not have a lease or purchase agreement for the full site.

In areas where ambiguity existed and a judgement call was needed to complete the non-price score sampling, PA assumed the lower point value would be awarded given PacifiCorp's definitions.

## 2.4 IE independent scoring

In conducting the independent scoring analysis, PA modelled two separate sets of bids: a diversified sample of bids out of the total population of compliant bids and separately all compliant BTA bids. Both sets of bids were evaluated by PA using the same price and non-price scoring methodology. The following section pertains to how the sample set of bids was identified.

### 2.4.1 Bid Sample Development

As with the compliance sampling, PA undertook a multi-step approach to select a sample from the total bid population. The sampling entailed:

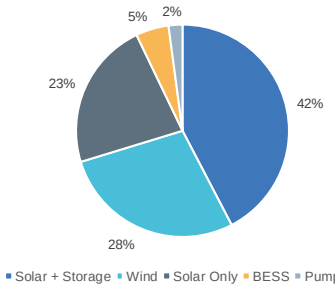
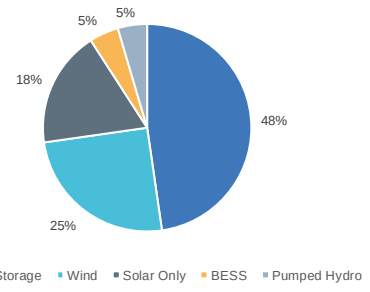
- Defining the population according to those compliant with the RFP's minimum eligibility criteria as agreed upon by PAC following the 8/31/2020 non-compliance discussion between the IE's and PAC
- Ensuring the proportional ratio of the number of bids was determined according to each transmission region, contract type, and resource type. For example, it was determined that 23% of all compliant bids were solar only, so 23% of PA's sample includes solar only bids. This method was applied for each technology, transmission region, and contract type. By identifying a mutually exclusive combination of attributes (such as a solar only PPA in NE Wyoming), PA's aim was to select a sample representative of the overall bid population.
- Ensuring that at least one bid from each bidder was sampled
- Determining which bids satisfied the population samples and using a random number generator to select individual bids if multiple matched the attribute criteria, as to ensure there was no bias in PA's bid sample selection process for or against certain bids

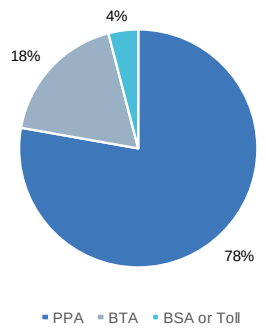
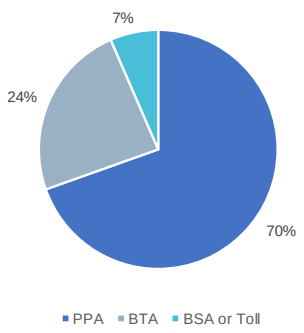
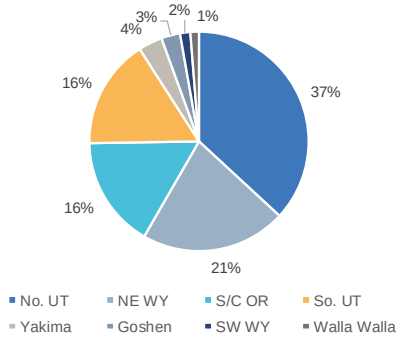
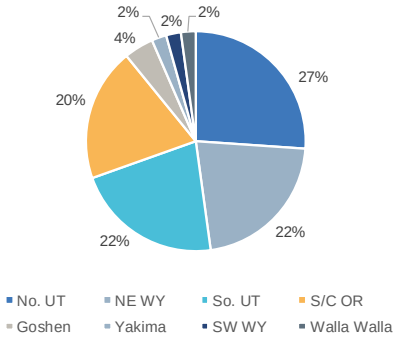
The sample was composed of 44 bids, including both base and alternate bids, from the nearly 400 total eligible bids. PA modelled these to ensure the bid scoring by PAC was consistent and didn't present any bias. In doing this modelling, PA identified any models that needed updating from PAC, none of which ultimately changed the ranking of the bid. Certain changes that PA identified, and PAC agreed with, resulted in changes to more bids than just those sampled by PA. A summary of bid model issues identified and resolved is provided in Section 2.5.

PA also modelled and completed non-price scoring of all the BTA bids which were not in the sample, totalling nearly 85 bids which were independently scored by PA.

Figure 2-1 below provides a comparison of the total compliant bid population to the sample bids on which PA conducted its independent scoring (the sample does include some BTAs but does not include the all of the additional BTAs modelled by PA). Note also that certain proportions between the compliant bid population and the sample differ due to other constraints on the sample that all geographies and all bidders are represented.

**Figure 2-1. Comparison of compliant bids and sample bids**

| | Compliant Bid Composition (% of total bid count) | Sample Bid Composition (% of total bid count) |
|---|---|---|
| Bids by Technology |  |  |

| | | |
|---|---|---|
| Bids by Contract Type |  |  |
| Bids by Geography |  |  |

### 2.4.2 BTA Bids Scored

In accordance with OAR 860-089-0450, in addition to conducting independent scoring of a sample of the total compliant bids, PA also conducted price and non-price scoring of all compliant BTA bids resulting in PA's independent scoring of an additional 54 BTA bids.

PA's review of the BTA bids relates to much of the valuation differences between BTAs and PPAs discussed in Section 2.0; however, in developing scores for each BTA, PA was in turn able to identify additional model related issues that otherwise may not have been resolved by only reviewing the smaller number of BTAs contained in the sample set.

## 2.5 Sample model review

As discussed previously, the purpose of PA's independent scoring was not to challenge the ranking and selection of bids to the ISL, but rather to ensure that there was no bias inherent in PAC's models which could skew the ultimate scoring and selection of bids to both the ISL and FSL. This differentiation is important in that while PA did compare its independent scores to PAC's, the purpose of comparison was not to determine if the result was correct, but instead serve as an indicator of whether an interim step in the model or an input may be causing a materially different result, and further, to determine if such indicators were single instance errors or more problematic and persistent flaws. Based upon PA's scoring and review of nearly 100 bids, as well its own internal QC process, PA did not find evidence of the latter case. Where PA found potential instances of error or differences of assumptions, PA took steps to raise these to the PAC RFP team, determine in conjunction with PAC whether a correction was needed, and if so, whether the correction caused a material change of the result or required a similar change to other models. In no instance did PA find an error which caused a material change in valuation and from PA's review of the ranking, nor did the nominal changes in valuation cause a change in a bid's candidacy to be considered for the ISL.

The following section discusses the model issues identified during PA's scoring and review of PAC's models and internal QC process. The models reviewed included the Locational Capacity Contribution model, different forms of the bid scoring models for wind or solar PPAs (with or without storage), wind

or solar BTAs (with or without storage), battery storage BSAs, and pumped hydro storage tolling bids. Further, PA also assessed certain complications related to the use of EPRI's StorageVet storage valuation software which is used in conjunction with the valuation of bids which include a storage resource. Certain components of these models did draw upon databases and programs maintained by PAC, such as the computation of gross benefit curves for each region, which were not reviewed by PA.

Below is a summary of issues identified during PA's review:

**Table 2-1. Model review issue summary**

| Model | Issue | Determination |
|---|---|---|
| LCC | A bidder could report a nameplate (installed) capacity greater than could actually be delivered resulting in overvaluing of their capacity contribution | In instances where this issue was identified, it was determined not to have caused a material change to valuation. However, nameplate and interconnection capacity reconciliation should be undertaken between ISL and FSL |
| LCC | The loss of load probability inputs are populated from an external source by PAC and remain fixed across bids | These inputs were determined to be held constant across all bids. PA did not audit the determination of these values |
| LCC | The 8760-hour profile used in certain solar plus storage models incorrectly included both generation and storage capacity | The capacity contribution calculations were corrected by PAC and new models were published |
| Valuation models | Gross benefit curves are populated from an external source by PAC and PA copied the curve over from PACs models respective to each region | These inputs were hardcoded dependent upon the region. PA was unable to model variations of the benefit curves due to differences in bid start dates, however this was determined not to be a material impact on value |
| Valuation models | Compared with the template bid scoring models which PA used for independent scoring and the models PAC employed for each bid, there were minor variations in inflation rate inputs | While PA used what appears to be an outdated inflation rate, the difference of roughly 7bps was not material to value |
| Valuation models | Certain bid model inputs were incorrectly used from alternative forms of the bids, such as the degradation profile of an un-augmented bid being switched for an augmented bid | This issue was identified in one bid model and corrected by PAC |
| Valuation models | Formula errors triggered by non-uniform commercial operation dates (e.g. mid-month dates) | PAC revised the formulas in the models to account for bids which did not have operation dates at month end |
| Valuation models | PAC revised certain bid start dates to be the first day of a year instead of the last day of a preceding year due to formulaic issues in the model dealing with partial periods | The difference of one day was not material and the only instance in which it would have proven problematic was as it relates to valuing the Production Tax Credit for wind bids; PA did not identify any instances where this took place but flagged the potential issue to PAC |

| | | |
|---|---|---|
| Valuation models | Discrepancies between bidder inputs for pumped storage bids and the pumping and discharging capacities modelled by StorageVet | PA and PAC had a number of discussions regarding the valuation of pumped hydro bids. PAC's hydro engineering team questioned whether certain capacity values as bid were realistic. PAC re-ran the models using only bidder inputs and the projects remained uneconomic and did not alter the ISL decision. Further discussion of pumped hydro bids is provided in Section 6.2 of this report. |
| Valuation models | The BTA models made use of warranty expiry dates as the trigger for subsequent fixed O&M costs, however in certain models these expiry dates were hardcoded and formulas in others | Final confirmation in models for the FSL that confirm formula driven links to warranty inputs |
| StorageVet | StorageVet does not have the capability to limit the number of battery cycles per year as such a bid with 4 cycles per day maximum may be interpreted differently than 365 cycles per year | Limiting the number of daily cycles to correspond to the maximum annual number of cycles was used as a proxy to differentiate between the 365 annual cycle limit and the 200 annual cycle limit bids |
| StorageVet | StorageVet does not clip battery output, as such the attributed value for storage resources above 50% of the generation resource are likely to exceed the inverter capacity and overstate value | There was one bid which was added to the ISL due to its capacity factor being under-represented. While StorageVet was overstating value the data transfer to the SO model applied the "clipping" in such a way as to convert that to an understatement of value; PAC's SO model partially counteracted this with the granularity adjustment. This matter with StorageVet is to be resolved in advance of the FSL determination. |

As can be seen from these examples, as well as others encountered during PA's scoring process, the breadth of issues related to modelling generally related to nuances of specific bids where the template models required customization or from inconsistent or inaccurate bidder inputs. On the former, PAC made clear to PA that adjustments to models were being done over time and as such models that were done earlier in the process needed to be re-run in tandem with the addressing the issues identified by PA. On the latter, inconsistencies of input highlight the weakness of allowing bidders to populate spreadsheets and risk potential misinterpretation or differences of technical definitions between PAC and bidders. While the latter point did apply to a number of bids, PA did observe that PAC took effort to seek clarity and input revisions from bidders and was also responsive in addressing the additional discrepancies identified by PA.

# 3 BID SCORING RESULTS

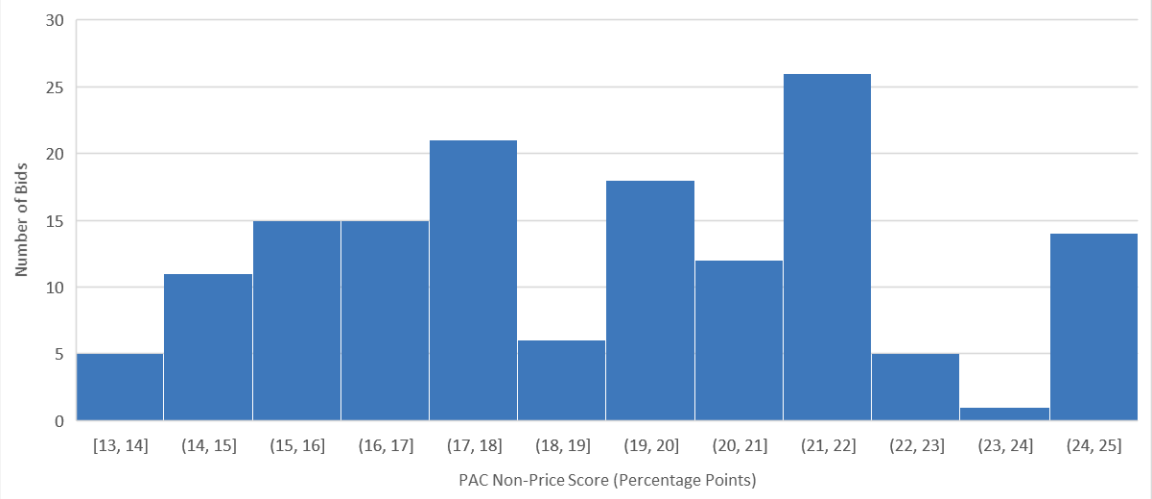
The following section provides a graphical representation of the results from PAC's price and non-price bid scoring processes and a comparison PAC's results with PA's independent scores.

## 3.1 PacifiCorp's scoring results

### 3.1.1 PAC's Non-Price Score Results

Non-price scores awarded a maximum of 25 points with each point awarded in whole point intervals. PAC's non-price scores are summarized below. Figure 3-1 provides a histogram of the non-price scores of base bids (it does not include scores for alternate bids, which should reflect those of the corresponding base bids). The median score was 20 and there is a sizeable group of bids which PAC scored near perfect or perfect for non-price scores.

**Figure 3-1. Summary of PAC's non-price scores**

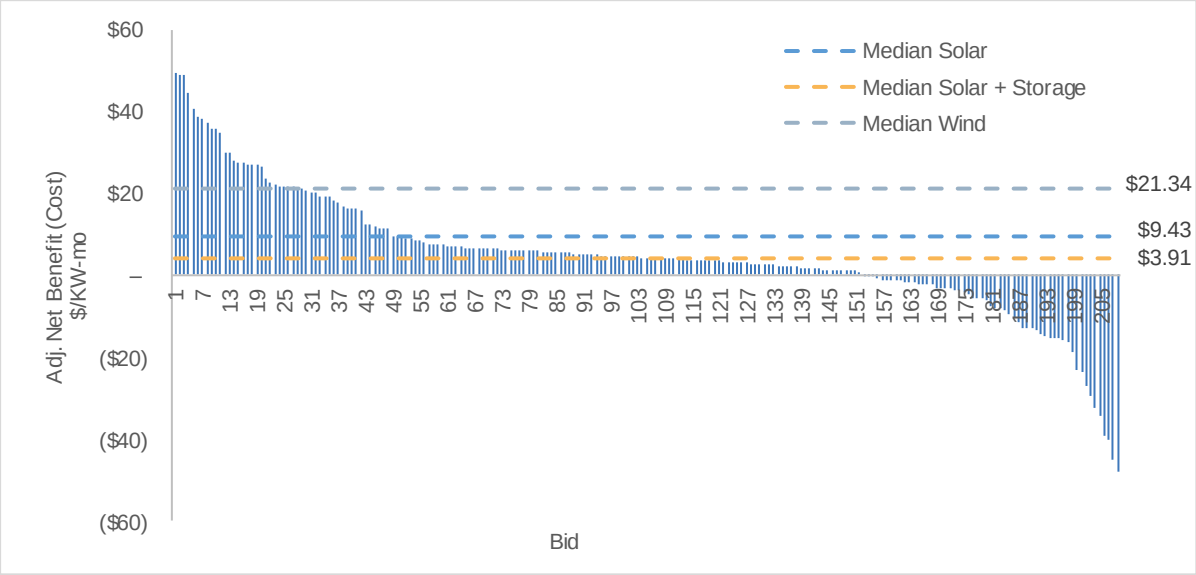



### 3.1.2 PAC's Price Score Results

Price based results are produced from PAC's bid scoring models. These models, which are specific to the technology and contract type combination, incorporated bidder input data and produced bid valuations on a levelized dollars per kW-mo basis. Values are calculated on both an unadjusted and capacity contribution adjusted basis, with the latter informing the ultimate score of each bid. The representations of the bid scores throughout this report reflect the dollar value outputs. The corresponding scores for each bid on a 0 to 75 point scale within each region and technology are not shown here for the reason that beyond confirming that the force ranking calculation was uniform across all bids, the core of testing for fair treatment resides in the calculation of bid valuation.

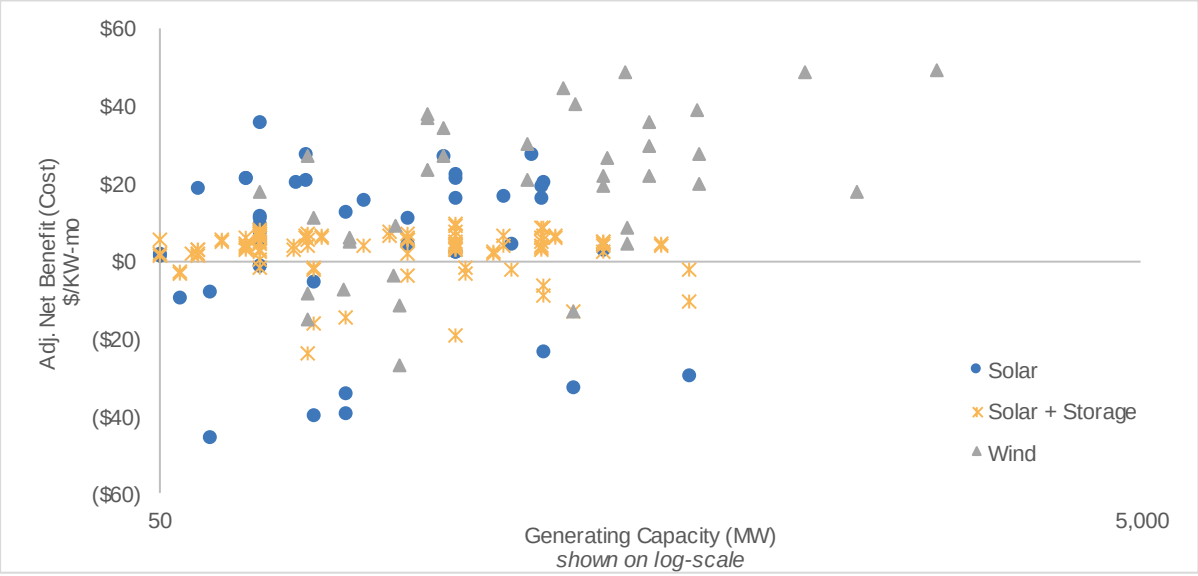
Figure 3-2 provides a graphical representation of the set of bid valuations across the bids eligible for the ISL.

**Figure 3-2: Summary of PAC's bid valuation**




When evaluating the scoring process and results, PA also analysed the scores to evaluate the cost / benefit trends across technology types. Figure 3-3 below provides a graphical representation of the adjusted net value of each compliant generating bid (including base and alternate bids but excluding standalone storage for purposes of comparison) sorted by nameplate capacity and segmented by technology.

**Figure 3-3. Distribution of PAC's bid values by technology**




PA made the following observations from these results:

1. With median adjusted net benefit of $3.91/kWh and a standard deviation of ~$6/kWh, solar + storage bids represent the least valuable resource on average but exhibit the smallest variation of value across the range of bid capacity. Further, solar + storage resources in certain regions (such as Utah South and Oregon) are materially more valuable than standalone solar alternatives.
2. Standalone solar bids exhibit substantially more variation of value; however, the six out of the eight outliers (in terms of economics) are located in Oregon whereas standalone solar outside of the Oregon region is generally shown to be more valuable than solar + storage (on a capacity contribution adjusted basis). This suggests that the increase in capital cost for the added storage

is not overcome by the increased capacity contribution, at least for storage capacity which is 25% of the solar capacity (the most common ratio among bids).

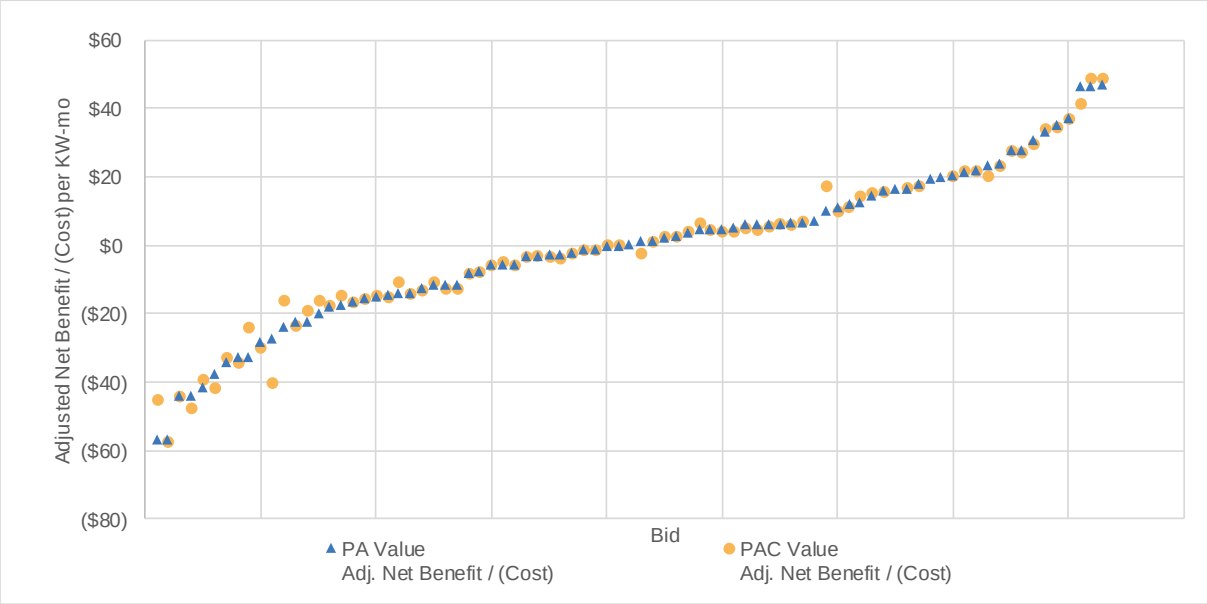
3. Wind bids produce the most consistent net benefits according to PAC's scoring while there appears to be little benefit to scale (note that this excludes interconnection costs).

## 3.2 Price based valuation from IE's sampling

As discussed in Section 2, PA conducted independent scoring of a sample of the total eligible bid population as well as all BTA bids. Overall, PA's resulting valuations were in line with PACs.

Figure 3-4 below illustrates the comparison of PAC's scores and PA's (representing only those bids which PA modelled):

**Figure 3-4. Comparison of PAC's bid values vs. PA's independently scored values**




As shown above, PA's resulting price-based scores were on average +/-5% (equivalent to ~$1.41/kW-mo in absolute terms) of PAC's scores with a standard deviation of ~12%. A number of PACs bid models were revised after multiple discussions and reviews between PAC's and PA's modelling teams. However, such deviations between PA and PAC models were generally categorized as being 1) the result of different interpretations of bidder supplied information; 2) incorrect translation of data from bidder documentation into the models; or 3) related to additional clarifying communications between PAC and bidders to which PA was not party. After scrutiny of these deviations as well as PA's internal QC process, variances were resolved, and revised models were published by PAC to the IE's when necessary.

## 3.3 Non-price-based scores for IE's sampling

PA completed non-price scoring for the group of sample bids and also all other BTA bids. The IE non-price score for each bid can be seen compared to PAC's non-price score for the same bids on the chart below. From this, the trend is observed that PAC's non-price scores tend to be higher than the IE non-price score. This is confirmed in a comparison of the median IE and PAC non-price score for the sample + BTA bid group. PAC's median non-price score is 20 whereas the IE median non-price score is 18. In very few instances did the IE give a non-price score higher than PAC had assigned.

There were a few sizable differences between PAC's and the IE's non-price scoring. These differences are likely due to the ambiguities discussed in Section 2.3. Specifically, the observed main variations in scores appeared to occur for the following reasons:

- Contract conformance
- Completion of major studies and permits
- Site control

Regardless of contract or technology type, PAC's non-price scores were consistently higher than the IE's non-price scores. This is an understandable difference as PAC was probably able to devote more resources to reviewing bidder documents to assign non-price scores whereas PA took a more conservative view based on the definitions provided in the non-price scoring matrix. The IE's lower non-price sample scores are also consistent with the approach PA took of defaulting to the lower possible score per category in areas where ambiguities existed due to the non-price scoring matrix definitions.

For example, a 9-point difference between the IE non-price score and PAC's non-price score is plausible. A 9-point spread would likely occur when assigning 5 points for contract conformance and 0 points for major studies and permits not being complete. This score would be assigned for contract conformance when no redlines are provided and when at least 50% of all major studies and permits are not complete. If full redlines and comments were provided then 10 points would have been awarded and if all major permits and studies were complete an additional 4 points would be awarded, for a total of 14 points between these two categories. In this example, a 9 point difference between the IE's non-price score and PAC's non-price score could be due to the IE scoring the contract conformance and studies and permits sections conservatively due to the ambiguity of the definitions outlined prior. Figure 3-5 below provides a comparison of PAC's and PA's non-price scores.

**Figure 3-5. Comparison of PAC's non-price scores vs. PA's independently scored non-price scores**

# 4 IMPACT OF LGIAS AND ADDITIONAL PROJECTS

During the process of receiving bids, modelling each bid, and evaluating the ISL process, PA and PacifiCorp had several discussions regarding the modification of the evaluation or sequence of evaluations, described in the 2020AS RFP, to account for the presence of bids from many projects with executed Large Generator Interconnection Agreements. During these discussions, PAC and the IEs developed a range of potential solutions and ultimately on the following approach regarding LGIAs, the effect of those LGIAs, and the impact on the overall RFP process. PA recognized that a number of bidders and rate payer advocates, as well as the OPUC, expressed concern that specifically limiting capacity from bids without LGIAs may result in a sub-optimal portfolio and that otherwise competitive bids would be excluded from the process. From PA's review and following PAC's agreement with this approach regarding the inclusion of additional projects, PA believes that the ISL addresses both concerns of optimization and cost competitiveness.

## 4.1 Overview

It is PA's understanding that an executed LGIA may be considered as a license or option to interconnect to the PacifiCorp Transmission system with an identified cost. For projects that executed LGIAs through PacifiCorp Transmission's prior serial queue process, the assumed cost for system reliability upgrades, as well as any timing estimate in the LGIA, was based on the assumption that projects with LGIAs earlier in the queue would already be present. Existing LGIAs all came from the queue process.

PacifiCorp Transmission is transitioning to a cluster process for interconnection, in which multiple interconnection requests will be considered simultaneously, and each studied request will be assigned a share of the costs of the system reliability upgrades for which it is partly responsible. Note that the determination of required upgrades assumes that all projects that obtained LGIAs from the queue projects, including those whose LGIAs have been (temporarily) suspended, are already online, and that the associated upgrades had already been constructed.

A simplifying assumption is that the per-MW cost of reliability upgrades in a transmission zone increases with the amount of interconnected capacity. In other words, the upgrades whose costs had been allocated to projects with LGIAs were the "low-hanging fruit". Bids submitted to the cluster study from areas where a significant amount of interconnection had already been effectively promised through LGIAs could have significantly higher upgrade costs.

The ISL was selected without regard to transmission costs. PAC was concerned that selecting an ISL dominated by bids without LGIAs in those zones where there was a significant amount of capacity with executed LGIAs could have undesirable consequences for the eventual FSL portfolio. Bids that lacked LGIAs and were assigned high interconnection costs could withdraw, or even if their interconnection costs were reasonable, PacifiCorp Transmission might not guarantee interconnection soon enough for a 2023 or 2024 online date. PAC would then be left with a set of bids that did not achieve the capacity goal and would likely need to add back some of the projects with LGIAs, but without any guidance from the IRP models as to which projects (and bids) to add. While this sequence of events may be unlikely, PA agreed that it cannot be ignored and that such result may make it impossible to achieve a high level of certainty that the resulting portfolio represents the least cost option.

A variety of potential solutions were evaluated by PAC and the IEs. The following is PA's summary of those discussions, which PA feels are fundamental to the subsequent steps that were taken to ensure that the best available resources were not excluded as a result of LGIA status.

## 4.2 Approach and alternatives

On September 30, 2020, PAC presented its approach to the initial scoring and ranking of projects to the IEs. PAC stated that in each geographical bubble the cumulative nameplate capacity of bids for each technology type passed to the IRP models (SO) from bids without LGIAs would be at most the bubble limit defined in the 2020AS RFP Appendix H (generally 150% of the preferred portfolio capacity) less the total interconnection capacity of projects in that bubble that held executed LGIAs and had submitted a bid for any technology. Accordingly, bids would be passed to the IRP models from approximately 25 projects with signed LGIAs plus approximately 30 projects without LGIAs, collectively termed for the purpose of this report as the "Original ISL Candidate List".

The IRP models would then select bids from among the Original ISL Candidate List with a constraint to select from each bubble no more nameplate capacity than the bubble limit. The IRP models would be required to maximize bid value while selecting enough capacity to meet the planning reserve margin in 2030 ("capacity" here means capacity contribution, not nameplate). Further, the IRP models would select at most one bid from each project. While the Original ISL Candidate List was essentially a list of projects (including all bids from each project), the output from the IRP models represented a list of bids, termed here as the "Original ISL Bid List".

Further discussion was held regarding how to treat bids that had high initial scores but no executed LGIA, and were not passed to the IRP models. PA identified those bids with the five-step methodology described in 4.3. PA and the Utah IE suggested that PAC add these bids to the Original Candidate List (creating a "Revised Candidate List") and run that list of bids through the IRP models resulting in a "Revised ISL Bid List". In PA's view, this approach would be most faithful to the process described in the RFP. PAC's concern, as noted in 4.1, was that the added bids would be on the revised ISL list in place of some of the bids with LGIAs and, if they later withdrew, insufficient capacity would be available for selection to the FSL.

A "combined" approach discussed by PAC and PA would be to run both the original and revised candidate lists through the IRP models, creating both the original ISL and revised ISL bid lists, and then combine those lists to get a consolidated ISL. PAC agreed that this approach would address concerns with the first alternative and would include enough bids from projects with LGIAs to ensure the capacity target is met. The limiting factor of this approach was related to time – PAC determined that running both lists through the IRP models and conducting the cross analysis as suggested could not be achieved within the timeframe by which bidders needed to give notice to PacifiCorp Transmission of ISL selection and entry to the cluster study.

Ultimately, a simplification of the combined approach was taken in which PAC placed all the bids on the Original ISO Bid List, plus certain high ranked bids, on the ISL and allowed for the RFP to remain on schedule. The following explains this process and the results.

## 4.3 Impact Assessment

Both IEs reviewed the Original ISL Candidate List to assess the impact of LGIAs on PAC's determination of the ISL. PA identified 14 bids that would have been selected if bids had competed with no consideration of LGIA status. However, based on PA's discussions with PAC and the language in the OATT and FERC's May 12 order, it appears that any bids in the Eastern Wyoming region would be highly likely to be allocated prohibitively high interconnection costs in the transition cluster study and would not be competitive with bids having executed LGIAs. Therefore, PA understood PAC's decision to exclude these projects from the Original ISL Candidate List.

The IEs suggested that to be consistent with the RFP and to ensure that bids with prices attractive enough to potentially overcome their transmission upgrade costs could be recognized, 11 additional bids be included in the original candidate list. With the exception of two bids that PAC determined to be too large and uneconomical, PAC agreed to the inclusion of these bids on the ISL.

In order to determine which, if any, bids would have been included absent other bid's restriction on interconnection capacity due to LGIA status, PA undertook the following steps to analyse the impact:

4. Segment all bids by technology type and by region
5. Create rank orders of bids by type, by region, and by price score
6. Identify bids up to the interconnection limit by region for each technology type
7. Compare resulting list of bids that would have been eligible for SO modelling to the list of bids after interconnection capacity is reduced by LGIA capacity
8. Determine if the comparison from Step 4 identifies bids which are both more economic and would have fit the interconnection constraint than bids with LGIAs

Table 4-1 below provides a summary of the additional bids added to the ISL:

**Table 4-1. Additional bids added to the ISL**

| Bid | Technology | Transmission Bubble | Generator Capacity (MW) | Storage Capacity (MW) | Storage Duration (Hrs.) |
|---|---|---|---|---|---|
| Bid 1-A | Solar + BESS | Utah North | 302.4 | 75.6 | 4 |
| Bid 1-B | Solar + BESS | Utah North | 302.4 | 75.6 | 2 |
| Bid 2-A | Solar | Utah South | 80.0 | 0.0 | 0 |
| Bid 2-B | Solar + BESS | Utah South | 80.0 | 80.0 | 4 |
| Bid 3-A | Solar | Utah South | 200.0 | 0.0 | 0 |
| Bid 3-B | Solar + BESS | Utah South | 200.0 | 50.0 | 2 |
| Bid 4 | Solar + BESS | Utah South | 80.0 | 80.0 | 4 |
| Bid 5-A | Solar | Wyoming SW | 80.0 | 0.0 | 0 |
| Bid 5-B | Solar + BESS | Wyoming SW | 80.0 | 20.0 | 4 |
| Bid 6-A | Solar | Wyoming SW | 50.0 | 0.0 | 0 |
| Bid 6-B | Solar + BESS | Wyoming SW | 50.0 | 12.5 | 4 |

# 5 INITIAL SHORTLIST CHARACTERIZATION

This section contains a brief description of the progression from bid scoring and ranking to the determination of the ISL, followed by a summarization of the ISL itself.

## 5.1 Shortlist bid ranking process

The process that PAC took to determine the ISL mirrors that as detailed in the 2020AS RFP and then subsequently discussed during the September 22, 2020 Special Public Meeting. The overall process entailed conducting quantitative and qualitative assessment of all compliant bids received to determine the highest ranked bids limited to the highest scoring variant of each project (for example, the highest scoring variant between a 2 hour storage bid and 4 hour storage bid was selected, not both). This list of candidates in turn were modelled by PAC's SO model to produce the ISL. The specific steps that PAC took are as follows:

- Price and non-price scores were used to identify the highest-ranking bids and bid variants by technology and location while considering the total volume of capacity with signed LGIAs in relation to 2020AS RFP regional capacity limits.
- The cost and performance attributes of these highest-ranking bids by technology and location were loaded into the SO model, which was used to establish the least-cost combination of bids needed to reliably serve PAC's retail customers. The SO model was also configured with updated:
    i. Load forecast assumptions
    ii. Wholesale electric and natural gas price assumptions
    iii. Changes to new and existing resources (i.e., new contracts and contract terminations)

The output from PAC's SO model resulted in a binary, yes/no, decision whether any specific bid should be included on the ISL. While the SO model itself does produce additional outputs, there was no further ranking or scoring of bids subsequent to determining the ISL. The SO model selections do not reflect costs for interconnection network upgrades or completion status of either a system impact study or feasibility study.

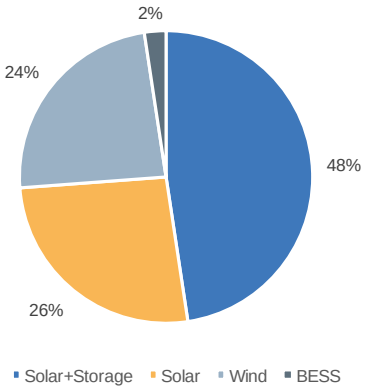
Second, in coordination with both IEs, and as discussed previously, additional bids were included on the ISL which did not have executed LGIAs, but otherwise ranked highly on price and non-price factors.

## 5.2 ISL overview

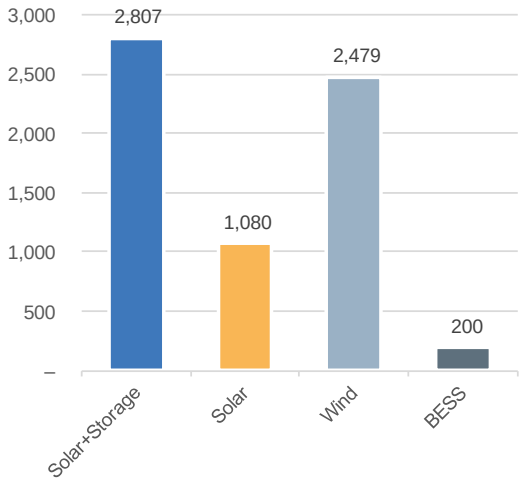
The ISL is made up of 42 total bids from 21 bidders representing 6,365MW of resources across eight transmission regions, inclusive of the additional bids identified as a result of the LGIA impact analysis discussed in Section 4. Figure 5-1 below summarizes the bid composition of the ISL:

**Figure 5-1. ISL Composition**

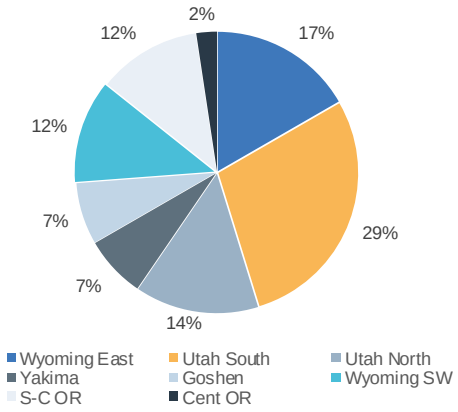
**ISL by Technology (Count)**



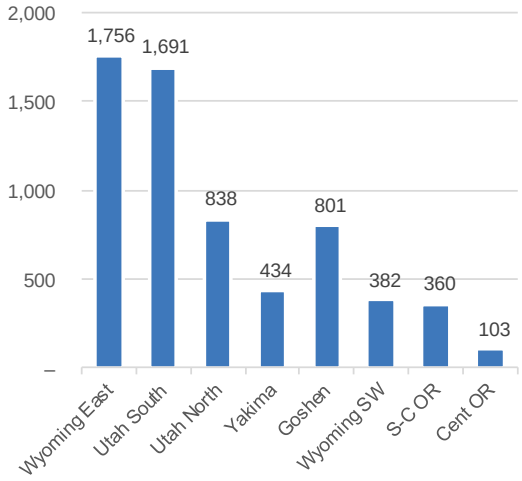

**ISL bids by Technology (Nameplate Capacity, MW)**




**ISL Bids by Region (% of Total Bid Count)**



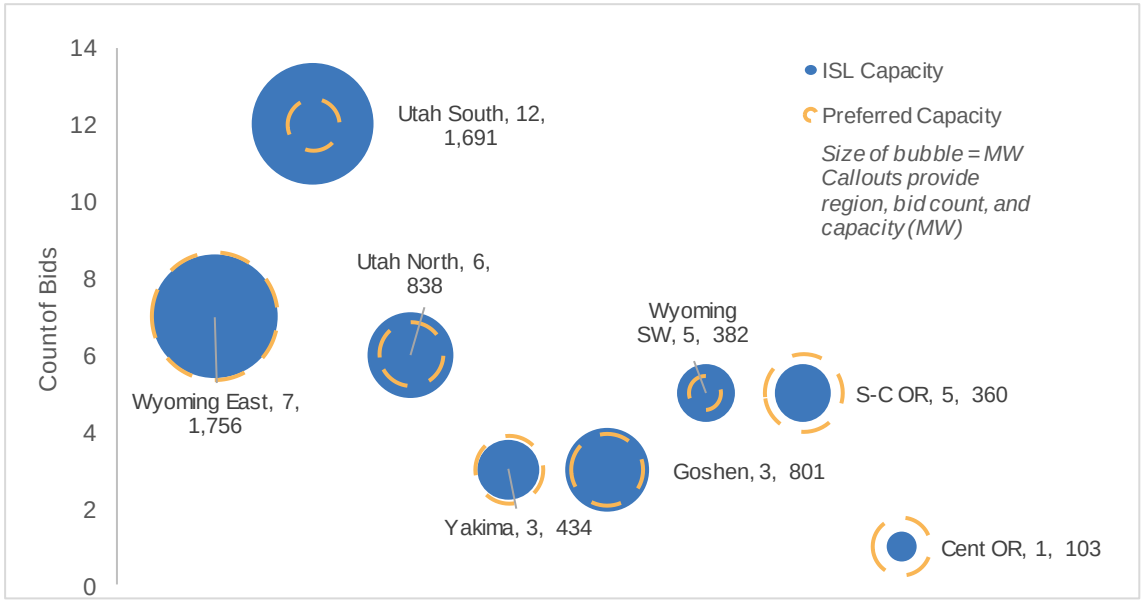

**ISL bids by Region (Nameplate Capacity, MW)**




## 5.3 ISL by transmission bubble

The ISL achieves or exceeds the interconnection capacity soft cap in half of the regional transmission bubbles. As discussed previously, the ISL has not been significantly impacted to the detriment of ratepayers by bids with LGIAs supplanting more competitive bids without LGIAs. However, as illustrated in the follow chart, by adding certain high scoring non-LGIA bids certain regions do have a greater amount of bid capacity on the ISL than was targeted in PAC's IRP. PA anticipates that through the transitional cluster study that some non-LGIA holding projects may be faced with substantial upgrade costs which cause the project developer to no longer participate. The evolution and impact of these costs on the overall resource needs and bid compositions will be a focal point for the IEs over the coming months.

**Figure 5-2. ISL capacity vs. IRP target capacity**



# 6 OTHER ONGOING RFP MATTERS

Ancillary to this report, there are certain RFP related topics which have continued to progress since PA's previous report. The most prominent of those topics is the sensitivity analysis that is to be performed by PAC in assessing the resiliency and selection of the FSL as a portfolio.

## 6.1 Sensitivity analysis

As discussed previously, the both the ISL and the FSL will be modelled against a combination of scenarios by running certain single or multi-variable sensitivities through PAC's IRP models and assessing whether the selection of bids would be materially different under different scenarios. This sensitivity analysis has continued to be refined in terms of the composition of the variables and curves to be used in each scenario as well as the expected interim steps and results expected to be produced from this analysis.

The sensitivity analysis will involve PAC's development of two market price forecasts in addition to its Base Case forecasts, and use these alternate market price forecasts to value each ISL (and ultimately the FSL) bid and calculate the projected Net Present Value of Revenue Requirements (NPVRR) associated with each bid. In addition to the NPVRR calculations, PAC will use the two market price forecasts as inputs into the SO models to determine if the resultant portfolio of resources materially differs from the ISL selected using Base Case assumptions.

The two market price forecasts are expected to project lower market prices due to a materially increased WECC-wide renewables buildout, lower loads and lower natural gas prices, among other assumptions.

The expected timing of this analysis has not changed substantially, with current expectations that PAC file results with OPUC by December 10, followed by a Special Public Meeting with the OPUC to discuss the results with PAC.

## 6.2 Pumped hydro storage bids

The RFP allowed for long lead pumped hydro projects to bid into the process, and PA observed certain challenges related to such bids. These observations were not indicative of unfair treatment of bidders, however, do indicate a potential mismatch between the purpose of this particular RFP and the nature of pumped hydro projects. A resource with a long lead time simply does not fit an evaluation geared towards projects with shorter construction times, which has a relatively short-term reliability target.

Through a series of discussions and investigations with the PAC RFP team, the following points were observed that PA recommends be considered for the next all-source RFP:

1. The engineering, design, and operational diligence required of large pumped hydro projects is substantially greater than is necessary for other renewable resource technologies. Conducting engineering diligence, for example, which informs operational limits, turbine degradation, and other factors which directly reflect on bid valuation is meaningfully more complex than similar reviews of solar or wind projects where PAC may have hundreds of thousands of operating hours from which to benchmark. Based upon input from PAC, the period of time from bid submission to ISL issuance was insufficient to conduct the work that was necessary to validate key assumptions.
2. Shared ownership or partial offtake of larger projects similarly requires substantial operational diligence which was critical to bid valuation. For instance, PA observed concerns regarding

operating assumptions around discharging and pumping times and capacities if PAC was the offtaker for a single turbine of a multi-turbine system and whether PAC's optimized dispatch would be restricted or influenced based upon another offtaker's. Such considerations can and should be addressed prior to dedicating substantial resources towards such projects, however, again, this RFP did not provide for sufficient time to do so.

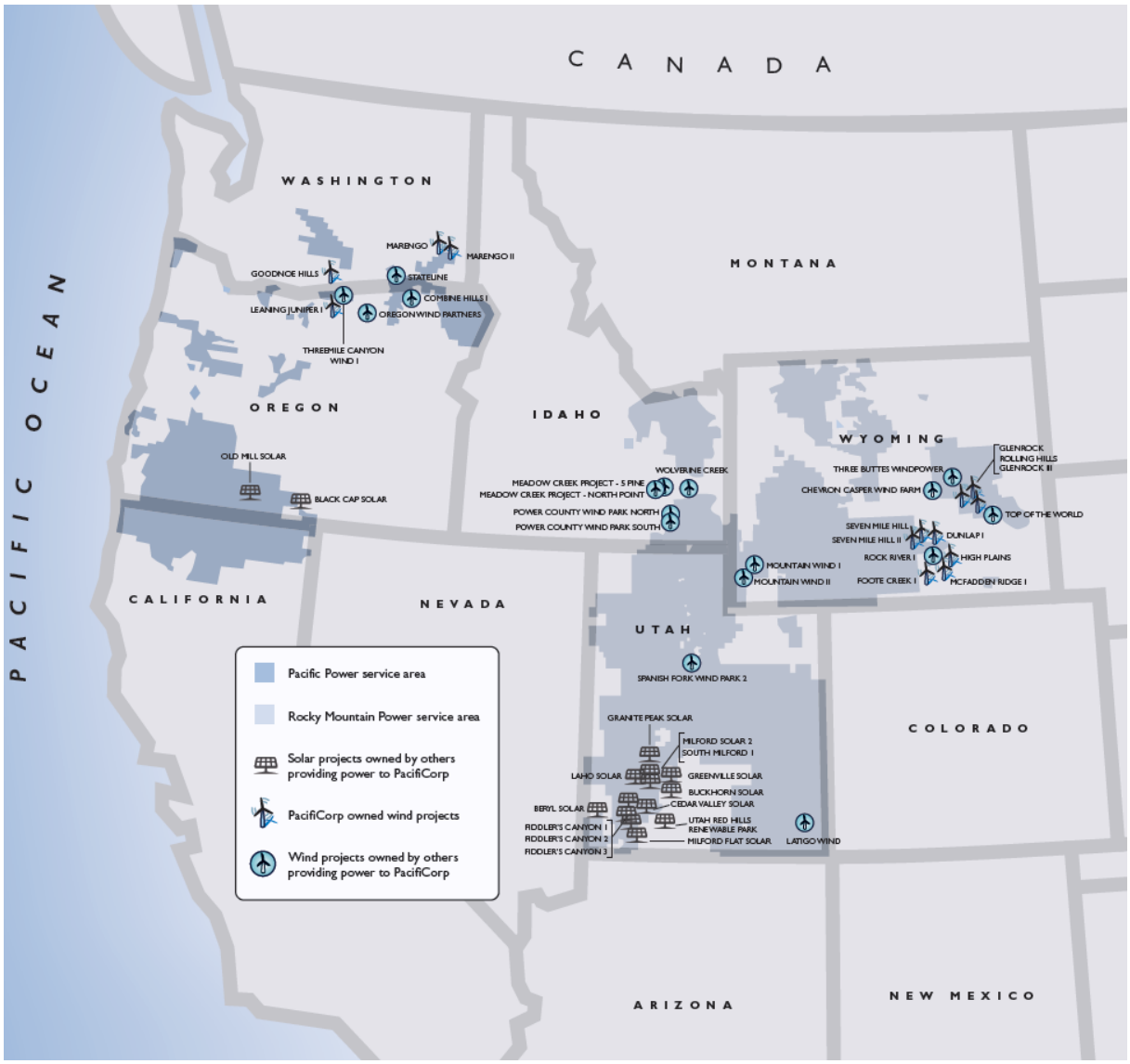
3. Through PAC's modelling and PA's independent scoring of these bids, it was observed that the StorageVet program did not provide sufficient documentation of how to adapt the program to account for the parameters of pumped hydro storage. PAC identified that there are better suited tools for valuing such projects, however alternatives were not internally vetted and approved for use at the time of the RFP.

Overall, PAC re-affirmed that pumped hydro resources are a meaningful component of the company's IRP goals, however the diligence required and the tools available did not correspond with the constraints of this RFP. All of these matters can and should be resolved prior to the next RFP process or a pumped hydro specific solicitation should be considered.

# APPENDIX A: PROXY RESOURCE MAP

The map below was provided by PacifiCorp as of November 16, 2020 and provides a view of the proxy resources used to adjust a bidder's identified hourly generation profile to better align with PacifiCorp's 2018 profile.

Note: the map does not include PacifiCorp owned, contracted or QF 2020 resources that may have recently been commissioned or will be commissioned by the end of 12/31/20.



# APPENDIX B: PA'S BID MODEL SCORE RESULTS

The following table provides a side by side comparison of PA's independent price and non-price results to PAC's for the 44 bids sampled out of the total eligible population of bids. Separate from this sample, PA also conduct price and non-price scoring of an additional 41 BTA bids. As referenced previously in this report, PA's and PAC's results from both the sample and the BTA bids were generally in alignment.

| # | Type | Technology | Generation Capacity (MW) | Region | PAC Adj. Net Benefit / (Cost) $ / KW-mo | PAC unAdj. Net Benefit / (Cost) $ / KW-mo | PA Adj. Net Benefit / (Cost) $ / KW-mo | PA unAdj. Net Benefit / (Cost) $ / KW-mo | PAC Non-Price Score | PA Non-Price Score |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | PPA | Wind | 1,037 | Wyoming East | $48.85 | $5.45 | $46.81 | $5.22 | 21 | 12 |
| 2 | PPA | Wind | 445 | Wyoming East | 48.75 | 5.32 | 46.61 | 5.09 | 19 | 12 |
| 3 | PPA | Wind | 332 | Wyoming East | 41.30 | 5.28 | 46.56 | 5.74 | 22 | 17 |
| 4 | PPA | Wind | 175 | Wyoming East | 37.11 | 7.05 | 37.05 | 7.05 | 22 | 12 |
| 5 | BTA | Wind | 500 | Wyoming East | 33.86 | 5.36 | 32.86 | 5.20 | 24 | 18 |
| 6 | BTA | Solar | 99 | Utah South | 27.77 | 1.93 | 27.89 | 1.94 | 25 | 18 |
| 7 | PPA | Solar | 190 | Utah South | 26.95 | 2.04 | 27.92 | 2.10 | 15 | 15 |
| 8 | BTA | Wind | 190 | Wyoming East | 23.23 | 4.12 | 23.85 | 4.23 | 21 | 19 |
| 9 | PPA | Solar | 200 | Utah South | 21.58 | 2.02 | 21.42 | 1.99 | 21 | 15 |
| 10 | PPA | Solar | 75 | Utah North | 20.13 | 1.70 | 20.40 | 1.72 | 16 | 12 |
| 11 | BTA | Solar | 500 | Wyoming East | 17.47 | 2.79 | 17.99 | 2.87 | 21 | 19 |
| 12 | BTA | Wind | 280 | Wyoming East | 16.95 | 2.14 | 16.58 | 2.09 | 24 | 20 |
| 13 | PPA | Solar | 161 | Utah North | 15.65 | 1.61 | 16.11 | 1.64 | 20 | 11 |
| 14 | BTA | Solar | 100 | Utah South | 15.34 | 1.33 | 14.20 | 1.23 | 25 | 18 |
| 15 | BTA | Wind | 103 | Wyoming East | 11.16 | 2.60 | 11.85 | 2.76 | 21 | 19 |
| 16 | BTA | Solar+Storage | 80 | Utah South | 6.84 | 6.04 | 6.76 | 5.97 | 21 | 17 |
| 17 | BTA | Solar+Storage | 107 | Utah North | 6.51 | 2.55 | 4.32 | 1.67 | 18 | 15 |
| 18 | BTA | Solar+Storage | 147 | Utah North | 6.36 | 2.47 | 6.22 | 2.42 | 18 | 15 |
| 19 | BTA | Solar+Storage | 320 | Utah North | 6.10 | 3.57 | 6.35 | 3.79 | 21 | 18 |
| 20 | BTA | Solar+Storage | 50 | Wyoming SW | 5.47 | 2.31 | 5.98 | 2.50 | 21 | 16 |
| 21 | PPA | Solar+Storage | 160 | Utah North | 5.03 | 2.50 | 5.83 | 2.94 | 17 | 14 |
| 22 | PPA | Wind | 450 | Goshen | 4.52 | 1.37 | 5.86 | 1.54 | 17 | 7 |
| 23 | PPA | Solar+Storage | 400 | S-C OR | 4.35 | 1.32 | 4.45 | 1.35 | 21 | 14 |
| 24 | BTA | Solar+Storage | 300 | Utah South | 4.30 | 1.26 | 3.62 | 1.07 | 20 | 18 |
| 25 | BTA | Solar+Storage | 525 | Utah North | 4.27 | 2.17 | 4.63 | 2.35 | 21 | 18 |
| 26 | BTA | Solar+Storage | 400 | Utah South | 3.96 | 2.00 | 4.92 | 2.49 | 18 | 12 |
| 27 | PPA | Solar+Storage | 94 | Yakima | 2.51 | 1.33 | 2.13 | 1.16 | 21 | 14 |
| 28 | PPA | Solar+Storage | 160 | Utah North | 2.49 | 1.48 | 2.81 | 1.68 | 17 | 14 |
| 29 | BTA | BESS | 200 | Utah North | (1.21) | (1.19) | (1.21) | (1.19) | 16 | 15 |
| 30 | BTA | Solar+Storage | 600 | S-C OR | (2.32) | (0.90) | (2.53) | (0.96) | 17 | 18 |
| 31 | BTA | Solar+Storage | 103 | S-C OR | (3.21) | (1.19) | (3.54) | (1.32) | 20 | 20 |
| 32 | PPA | Solar+Storage | 211 | Wyoming East | (3.30) | (2.51) | (3.19) | (2.41) | 19 | 18 |
| 33 | BTA | Solar+Storage | 160 | Utah North | (3.89) | (2.00) | (2.64) | (1.37) | 21 | 19 |
| 34 | BTA | Solar+Storage | 302 | Utah North | (4.59) | (1.42) | (5.82) | (1.81) | 18 | 18 |
| 35 | BTA | BESS | 515 | Goshen | (5.87) | (5.58) | (5.71) | (5.43) | 23 | 15 |
| 36 | BTA | Wind | 100 | Utah North | (7.53) | (1.58) | (7.59) | (1.60) | 23 | 17 |
| 37 | BTA | Solar+Storage | 600 | S-C OR | (10.62) | (4.56) | (14.31) | (5.07) | 15 | 12 |
| 38 | BTA | Solar+Storage | 348 | S-C OR | (12.85) | (4.55) | (11.45) | (4.06) | 14 | 18 |
| 39 | PPA | Wind | 41 | Walla Walla | (13.37) | (2.46) | (12.83) | (2.36) | 25 | 21 |
| 40 | BTA | Pump Storage | 395 | S-C OR | (14.08) | (14.08) | (14.08) | (14.08) | 24 | 13 |
| 41 | BTA | Pump Storage | 195 | S-C OR | (15.67) | (15.67) | (15.67) | (15.67) | 24 | 13 |
| 42 | BTA | Solar+Storage | 103 | S-C OR | (16.18) | (6.19) | (20.22) | (7.30) | 20 | 20 |
| 43 | BTA | Solar+Storage | 200 | Utah South | (19.02) | (5.77) | (22.38) | (6.76) | 18 | 18 |
| 44 | BTA | Solar | 103 | S-C OR | (45.35) | (7.08) | (57.16) | (8.75) | 24 | 21 |

# APPENDIX C: PAC BID MODEL RESULTS

The following tables provide summary results of PAC's price based scores by region. Note that these figures are shown as produced by PAC, specifically that PAC models generate valuation in terms of net cost. Prior examples shown in this report for comparison purposes reverse the sign such that the result is on the basis of net benefit. For example, the Solar+Storage bid in AP 2-1 below showing a net adjusted cost of $10.62 corresponds to bid #37 in Appendix 1 which shows a net adjusted benefit of ($10.62)

**Figure C-1. Central Oregon bid valuations**

| Project Technology | Generation Capacity (MW) | Storage Capacity (MW) | IRP Bubble | Net Cost/(Benefit) unadjusted by Cap Contr. ($/kW-mo) | Net Cost/(Benefit) adjusted by Cap Contr. ($/kW-mo) |
|---|---|---|---|---|---|
| BESS | – | 200 | Cent OR | 2.28 | 2.33 |
| Solar | 55 | – | Cent OR | 1.42 | 9.35 |
| Solar | 63 | – | Cent OR | 7.08 | 45.35 |
| Solar | 63 | – | Cent OR | 1.32 | 8.17 |
| Solar | 103 | – | Cent OR | 6.28 | 40.11 |
| Solar | 103 | – | Cent OR | 0.90 | 5.46 |
| Solar | 347 | – | Cent OR | 4.42 | 32.65 |
| Solar | 600 | – | Cent OR | 4.04 | 29.77 |
| Solar | 120 | – | Cent OR | 4.58 | 34.26 |
| SolarStorage | 55 | 14 | Cent OR | 1.11 | 3.03 |
| SolarStorage | 55 | 14 | Cent OR | 0.93 | 3.00 |
| SolarStorage | 103 | 26 | Cent OR | 6.19 | 16.18 |
| SolarStorage | 103 | 24 | Cent OR | 0.68 | 1.77 |
| SolarStorage | 103 | 26 | Cent OR | 1.19 | 2.29 |
| SolarStorage | 347 | 87 | Cent OR | 4.55 | 12.85 |
| SolarStorage | 600 | 150 | Cent OR | 4.56 | 10.62 |
| SolarStorage | 600 | 150 | Cent OR | 0.90 | 2.32 |
| SolarStorage | 120 | 31 | Cent OR | 5.26 | 14.58 |

**Figure C-2. Goshen bid valuations**

| Project Technology | Generation Capacity (MW) | Storage Capacity (MW) | IRP Bubble | Net Cost/(Benefit) unadjusted by Cap Contr. ($/kW-mo) | Net Cost/(Benefit) adjusted by Cap Contr. ($/kW-mo) |
|---|---|---|---|---|---|
| BESS | – | 515 | Goshen | 5.58 | 5.87 |
| BESS | – | 515 | Goshen | 5.29 | 5.57 |
| SolarStorage | 200 | 200 | Goshen | (2.83) | (3.14) |
| SolarStorage | 200 | 200 | Goshen | (2.46) | (3.52) |
| SolarStorage | 200 | 100 | Goshen | (2.21) | (5.14) |
| Wind | 151 | – | Goshen | (1.77) | (9.09) |
| Wind | 450 | – | Goshen | (1.37) | (4.52) |
| Wind | 450 | – | Goshen | (2.58) | (8.54) |

**Figure C-3. Southern Oregon bid valuations**

| Project Technology | Generation Capacity (MW) | Storage Capacity (MW) | IRP Bubble | Net Cost/(Benefit) unadjusted by Cap Contr. ($/kW-mo) | Net Cost/(Benefit) adjusted by Cap Contr. ($/kW-mo) |
|---|---|---|---|---|---|
| Pump Storage | – | 197 | S-C OR | 15.67 | 15.67 |
| Pump Storage | – | 295 | S-C OR | 15.64 | 15.64 |
| Pump Storage | – | 393 | S-C OR | 15.64 | 15.64 |
| Pump Storage | – | 720 | S-C OR | 0.69 | 0.69 |
| Solar | 400 | – | S-C OR | (0.36) | (2.66) |
| Solar | 40 | – | S-C OR | 7.30 | 47.87 |
| Solar | 40 | – | S-C OR | 0.76 | 4.65 |
| Solar | 50 | – | S-C OR | (0.23) | (1.74) |
| Solar | 200 | – | S-C OR | (0.32) | (2.39) |
| SolarStorage | 400 | 100 | S-C OR | (0.67) | (2.22) |
| SolarStorage | 400 | 100 | S-C OR | (1.32) | (4.35) |
| SolarStorage | 50 | 13 | S-C OR | (0.51) | (1.55) |
| SolarStorage | 160 | 40 | S-C OR | (0.56) | (1.69) |
| SolarStorage | 240 | 60 | S-C OR | (0.68) | (2.02) |
| SolarStorage | 240 | 60 | S-C OR | (0.80) | (2.31) |
| SolarStorage | 50 | 15 | S-C OR | (0.51) | (1.63) |
| SolarStorage | 200 | 50 | S-C OR | (1.03) | (2.88) |
| SolarStorage | 200 | 50 | S-C OR | (1.14) | (3.77) |
| SolarStorage | 60 | 60 | S-C OR | (1.13) | (1.62) |
| SolarStorage | 60 | 30 | S-C OR | (1.51) | (2.75) |

**Figure C-4. Utah North bid valuations**

| Project Technology | Generation Capacity (MW) | Storage Capacity (MW) | IRP Bubble | Net Cost/(Benefit) unadjusted by Cap Contr. ($/kW-mo) | Net Cost/(Benefit) adjusted by Cap Contr. ($/kW-mo) |
|---|---|---|---|---|---|
| BESS | – | 200 | Utah North | (1.25) | (1.27) |
| BESS | – | 200 | Utah North | (1.33) | (1.36) |
| BESS | – | 200 | Utah North | 0.11 | 0.11 |
| BESS | – | 200 | Utah North | 1.33 | 1.36 |
| BESS | – | 515 | Utah North | 3.49 | 3.67 |
| BESS | – | 515 | Utah North | 3.25 | 3.42 |
| BESS | – | 200 | Utah North | (1.25) | (1.28) |
| BESS | – | 200 | Utah North | (1.33) | (1.36) |
| BESS | – | 200 | Utah North | 0.07 | 0.07 |
| BESS | – | 200 | Utah North | 1.19 | 1.21 |
| BESS | – | 200 | Utah North | (1.19) | (1.22) |
| BESS | – | 200 | Utah North | (1.28) | (1.30) |
| BESS | – | 200 | Utah North | 0.11 | 0.11 |
| BESS | – | 200 | Utah North | 1.26 | 1.29 |
| Solar | 80 | – | Utah North | 0.16 | 1.34 |
| Solar | 302 | – | Utah North | 2.12 | 23.41 |
| Solar | 302 | – | Utah North | (1.71) | (20.28) |
| Solar | 300 | – | Utah North | (1.31) | (16.20) |
| Solar | 42 | – | Utah North | (1.49) | (16.37) |
| Solar | 33 | – | Utah North | (1.21) | (12.18) |
| Solar | 250 | – | Utah North | (1.32) | (16.95) |
| Solar | 130 | – | Utah North | (1.61) | (15.65) |
| Solar | 200 | – | Utah North | (0.16) | (2.48) |
| Solar | 80 | – | Utah North | (1.00) | (9.43) |
| Solar | 80 | – | Utah North | (1.38) | (7.59) |
| SolarStorage | 40 | 10 | Utah North | (1.22) | (3.24) |
| SolarStorage | 40 | 10 | Utah North | (0.93) | (3.54) |
| SolarStorage | 80 | 20 | Utah North | (1.71) | (4.49) |
| SolarStorage | 80 | 20 | Utah North | (1.35) | (5.04) |
| SolarStorage | 80 | 20 | Utah North | 0.50 | 1.63 |
| SolarStorage | 80 | 20 | Utah North | (0.01) | (0.10) |
| SolarStorage | 525 | 263 | Utah North | (1.96) | (3.87) |
| SolarStorage | 45 | 13 | Utah North | 4.73 | 13.10 |
| SolarStorage | 45 | 13 | Utah North | 4.68 | 15.43 |
| SolarStorage | 45 | 13 | Utah North | (1.53) | (3.77) |
| SolarStorage | 45 | 13 | Utah North | (1.19) | (4.21) |
| SolarStorage | 302 | 76 | Utah North | 1.59 | 6.31 |
| SolarStorage | 302 | 76 | Utah North | 2.68 | 8.76 |
| SolarStorage | 302 | 76 | Utah North | (2.00) | (6.61) |
| SolarStorage | 302 | 76 | Utah North | (2.15) | (8.77) |
| SolarStorage | 525 | 263 | Utah North | (2.17) | (4.27) |
| SolarStorage | 300 | 75 | Utah North | (2.51) | (8.38) |
| SolarStorage | 300 | 150 | Utah North | (2.43) | (4.78) |
| SolarStorage | 250 | 63 | Utah North | (1.16) | (3.91) |
| SolarStorage | 250 | 63 | Utah North | (1.54) | (6.42) |
| SolarStorage | 130 | 33 | Utah North | (1.65) | (4.10) |
| SolarStorage | 400 | 100 | Utah North | (1.56) | (5.19) |
| SolarStorage | 80 | 20 | Utah North | (2.59) | (8.08) |
| SolarStorage | 80 | 20 | Utah North | (2.92) | (7.29) |
| SolarStorage | 67 | 18 | Utah North | (1.99) | (5.08) |
| SolarStorage | 67 | 18 | Utah North | (1.54) | (5.62) |
| SolarStorage | 107 | 28 | Utah North | (2.55) | (6.51) |
| SolarStorage | 107 | 28 | Utah North | (1.80) | (6.10) |
| SolarStorage | 147 | 38 | Utah North | (2.47) | (6.36) |
| SolarStorage | 147 | 38 | Utah North | (2.85) | (7.31) |

**Figure C-5. Utah South bid valuations**

| Project Technology | Generation Capacity (MW) | Storage Capacity (MW) | IRP Bubble | Net Cost/(Benefit) unadjusted by Cap Contr. ($/kW-mo) | Net Cost/(Benefit) adjusted by Cap Contr. ($/kW-mo) |
|---|---|---|---|---|---|
| Solar | 99 | – | Utah South | (1.82) | (21.16) |
| Solar | 99 | – | Utah South | (1.93) | (27.77) |
| Solar | 95 | – | Utah South | (1.56) | (20.46) |
| Solar | 80 | – | Utah South | (2.70) | (35.96) |
| Solar | 300 | – | Utah South | (1.37) | (19.22) |
| Solar | 200 | – | Utah South | (2.02) | (21.58) |
| Solar | 200 | – | Utah South | (1.48) | (16.39) |
| Solar | 200 | – | Utah South | (1.84) | (22.39) |
| Solar | 75 | – | Utah South | (1.81) | (21.41) |
| Solar | 75 | – | Utah South | (2.14) | (21.57) |
| Solar | 60 | – | Utah South | (1.54) | (19.05) |
| Solar | 120 | – | Utah South | 3.69 | 39.20 |
| Solar | 120 | – | Utah South | (1.02) | (12.53) |
| Solar | 190 | – | Utah South | (2.04) | (26.95) |
| Solar | 285 | – | Utah South | (2.12) | (27.55) |
| SolarStorage | 99 | 50 | Utah South | (3.15) | (6.17) |
| SolarStorage | 99 | 50 | Utah South | (3.14) | (6.36) |
| SolarStorage | 58 | 58 | Utah South | (1.87) | (2.10) |
| SolarStorage | 100 | 25 | Utah South | 7.19 | 23.80 |
| SolarStorage | 100 | 25 | Utah South | (1.56) | (5.35) |
| SolarStorage | 100 | 25 | Utah South | (1.60) | (6.90) |
| SolarStorage | 200 | 100 | Utah South | (1.89) | (3.73) |
| SolarStorage | 200 | 100 | Utah South | (1.78) | (4.50) |
| SolarStorage | 400 | 200 | Utah South | (2.00) | (3.96) |
| SolarStorage | 400 | 200 | Utah South | (1.89) | (4.78) |
| SolarStorage | 80 | 80 | Utah South | (6.15) | (6.90) |
| SolarStorage | 80 | 80 | Utah South | (6.37) | (7.20) |
| SolarStorage | 160 | 136 | Utah South | (3.29) | (5.51) |
| SolarStorage | 160 | 80 | Utah South | (2.77) | (5.50) |
| SolarStorage | 100 | 25 | Utah South | (1.25) | (4.18) |
| SolarStorage | 160 | 136 | Utah South | (3.18) | (5.33) |
| SolarStorage | 160 | 80 | Utah South | (2.68) | (5.40) |
| SolarStorage | 200 | 50 | Utah South | (2.31) | (9.29) |
| SolarStorage | 200 | 100 | Utah South | (1.96) | (3.87) |
| SolarStorage | 200 | 100 | Utah South | (2.64) | (6.70) |
| SolarStorage | 75 | 38 | Utah South | (1.71) | (3.39) |
| SolarStorage | 75 | 38 | Utah South | (1.24) | (3.14) |
| SolarStorage | 75 | 38 | Utah South | (1.99) | (3.91) |
| SolarStorage | 75 | 38 | Utah South | (1.74) | (4.32) |
| SolarStorage | 60 | 30 | Utah South | (0.65) | (1.31) |
| SolarStorage | 60 | 30 | Utah South | (1.04) | (2.66) |
| SolarStorage | 160 | 80 | Utah South | 2.00 | 3.89 |
| SolarStorage | 320 | 272 | Utah South | (3.57) | (6.10) |
| SolarStorage | 320 | 160 | Utah South | (3.08) | (6.27) |
| SolarStorage | 200 | 50 | Utah South | 5.77 | 19.02 |
| SolarStorage | 200 | 50 | Utah South | (2.18) | (7.46) |
| SolarStorage | 200 | 50 | Utah South | (2.23) | (9.57) |
| SolarStorage | 300 | 75 | Utah South | (1.71) | (5.90) |

**Figure C-6. Walla Walla bid valuations**

| Project Technology | Generation Capacity (MW) | Storage Capacity (MW) | IRP Bubble | Net Cost/(Benefit) unadjusted by Cap Contr. ($/kW-mo) | Net Cost/(Benefit) adjusted by Cap Contr. ($/kW-mo) |
|---|---|---|---|---|---|
| Wind | 350 | – | Walla Walla | 3.61 | 13.03 |
| Wind | 41 | – | Walla Walla | 2.46 | 13.37 |
| Wind | 119 | – | Walla Walla | 2.20 | 7.56 |

**Figure C-7. Wyoming East bid valuations**

| Project Technology | Generation Capacity (MW) | Storage Capacity (MW) | IRP Bubble | Net Cost/(Benefit) unadjusted by Cap Contr. ($/kW-mo) | Net Cost/(Benefit) adjusted by Cap Contr. ($/kW-mo) |
|---|---|---|---|---|---|
| Solar | 80 | – | Wyoming East | (1.09) | (11.36) |
| Solar | 160 | – | Wyoming East | (1.09) | (11.36) |
| Solar | 160 | – | Wyoming East | (0.44) | (4.67) |
| SolarStorage | 80 | 20 | Wyoming East | (0.84) | (2.66) |
| SolarStorage | 80 | 20 | Wyoming East | (2.36) | (6.08) |
| SolarStorage | 80 | 20 | Wyoming East | (1.66) | (6.62) |
| SolarStorage | 75 | 19 | Wyoming East | (1.96) | (6.09) |
| SolarStorage | 160 | 40 | Wyoming East | (2.36) | (6.08) |
| SolarStorage | 160 | 40 | Wyoming East | (1.86) | (6.97) |
| SolarStorage | 211 | 150 | Wyoming East | 2.51 | 3.30 |
| SolarStorage | 211 | 150 | Wyoming East | 1.30 | 1.84 |
| SolarStorage | 300 | 300 | Wyoming East | (2.74) | (3.04) |
| SolarStorage | 300 | 300 | Wyoming East | (3.44) | (3.80) |
| SolarStorage | 300 | 150 | Wyoming East | (1.77) | (3.38) |
| Wind | 332 | – | Wyoming East | (5.70) | (44.60) |
| Wind | 176 | – | Wyoming East | (4.51) | (23.76) |
| Wind | 175 | – | Wyoming East | (7.05) | (37.11) |
| Wind | 176 | – | Wyoming East | (7.24) | (38.12) |
| Wind | 350 | – | Wyoming East | (7.73) | (40.72) |
| Wind | 280 | – | Wyoming East | (2.89) | (20.94) |
| Wind | 280 | – | Wyoming East | (4.33) | (30.07) |
| Wind | 101 | – | Wyoming East | (5.53) | (27.03) |
| Wind | 190 | – | Wyoming East | (6.14) | (34.57) |
| Wind | 190 | – | Wyoming East | (4.77) | (26.89) |
| Wind | 400 | – | Wyoming East | (3.37) | (21.75) |
| Wind | 400 | – | Wyoming East | (2.98) | (19.25) |
| Wind | 80 | – | Wyoming East | (2.02) | (18.04) |
| Wind | 500 | – | Wyoming East | (5.68) | (35.89) |
| Wind | 627 | – | Wyoming East | (2.43) | (20.12) |
| Wind | 407 | – | Wyoming East | (3.30) | (26.61) |
| Wind | 627 | – | Wyoming East | (3.32) | (27.45) |
| Wind | 1,321 | – | Wyoming East | (2.52) | (17.84) |
| Wind | 100 | – | Wyoming East | 1.25 | 14.93 |
| Wind | 500 | – | Wyoming East | (4.76) | (29.88) |
| Wind | 500 | – | Wyoming East | (3.52) | (22.10) |
| Wind | 1,928 | – | Wyoming East | (5.63) | (49.50) |
| Wind | 625 | – | Wyoming East | (5.25) | (38.86) |
| Wind | 445 | – | Wyoming East | (5.32) | (48.75) |
| Wind | 1,037 | – | Wyoming East | (5.45) | (48.85) |
| Wind | 103 | – | Wyoming East | (2.60) | (11.16) |

**Figure C-8. Wyoming South bid valuations**

| Project Technology | Generation Capacity (MW) | Storage Capacity (MW) | IRP Bubble | Net Cost/(Benefit) unadjusted by Cap Contr. ($/kW-mo) | Net Cost/(Benefit) adjusted by Cap Contr. ($/kW-mo) |
|---|---|---|---|---|---|
| Solar | 80 | – | Wyoming SW | 0.20 | 1.18 |
| Solar | 80 | – | Wyoming SW | (0.63) | (5.26) |
| Solar | 50 | – | Wyoming SW | (0.10) | (1.31) |
| SolarStorage | 80 | 20 | Wyoming SW | (0.77) | (2.32) |
| SolarStorage | 80 | 20 | Wyoming SW | (2.08) | (6.15) |
| SolarStorage | 50 | 13 | Wyoming SW | (2.31) | (5.47) |
| Wind | 122 | – | Wyoming SW | (0.67) | (5.87) |
| Wind | 122 | – | Wyoming SW | (0.59) | (5.12) |
| Wind | 100 | – | Wyoming SW | 1.72 | 8.18 |
| Wind | 150 | – | Wyoming SW | 0.81 | 3.96 |

**Figure C-9. Yakima bid valuations**

| Project Technology | Generation Capacity (MW) | Storage Capacity (MW) | IRP Bubble | Net Cost/(Benefit) unadjusted by Cap Contr. ($/kW-mo) | Net Cost/(Benefit) adjusted by Cap Contr. ($/kW-mo) |
|---|---|---|---|---|---|
| Solar | 80 | – | Yakima | (1.42) | (11.88) |
| Solar | 260 | – | Yakima | (0.52) | (4.64) |
| SolarStorage | 94 | 47 | Yakima | (1.52) | (2.87) |
| SolarStorage | 94 | 24 | Yakima | (1.36) | (4.12) |
| SolarStorage | 260 | 65 | Yakima | 0.94 | 2.12 |
| Wind | 154 | – | Yakima | 7.01 | 27.22 |
| WindStorage | 154 | 46 | Yakima | 8.02 | 11.57 |

# APPENDIX D: BUBBLE-SPECIFIC LGIA IMPACT ASSESSMENT DETAIL

PA assessed which bids would have been ISL eligible if interconnection capacity was not constrained by signed LGIAs. The methodology for this analysis was to determine the best ranked bids by technology by region up to the soft cap limit and compare the results against the results when LGIA's restrict interconnection capacity. In a number of regions, the soft cap was exceeded by the addition of non-LGIA bids, however the cut-off point for this assessment was the marginal bid which caused the overage against the cap (e.g. if adding the "x" ranked bid to the ISL led to more capacity than the cap for that region, the "x+1" ranked bid and beyond would not be considered eligible).

This analysis was initiated by the IEs in response to concerns raised from bidders, advocates, as well as the OPUC. This analysis is separate and apart from PAC's process governed by the RFP. To be clear, this was done to assess ISL eligibility, not the ISL itself.

The following sections discuss the results of this analysis for each region. Note that those bids identified that would have not made the ISL except for the bid's LGIA status were not actually removed from the ISL. Those without LGIAs that otherwise would have made the ISL however were added to the ISL.

**Central Oregon**

Central Oregon did not see the addition of bids as a result of this analysis. The cause of this is due to the combination of the size of bids received and the capacity of the region (450MW). There was one 200MW standalone storage bid which was ISL eligible and not shown as in the table below.

**Figure D-1. Central Oregon LGIA summary**

| | Bid Rank | Bid Capacity | Bid Assessment | LGIA | Remaining Capacity |
|---|---|---|---|---|---|
| Solar | 1 | 103 | Included due to ranking, size, and LGIA | ✓ | 347 |
| | 2 | 63 | Included due to ranking, size, and LGIA | ✓ | 284 |
| | 3 | 55 | Included due to ranking, size, and LGIA | ✓ | 229 |
| | 4 | 600 | Eliminated due to size | × | 229 |
| | 5 | 120 | Included due to ranking, size, and LGIA | ✓ | 109 |
| | 6 | 33 | Included due to ranking, size, and LGIA | ✓ | 76 |
| Solar + Storage | 1 | 103 | Included due to ranking, size, and LGIA | ✓ | 347 |
| | 2 | 600 | Eliminated due to size | × | 347 |
| | 3 | 55 | Included due to ranking, size, and LGIA | ✓ | 292 |
| | 4 | 55 | Variant of 3rd ranked bid | ✓ | 292 |
| | 5 | 600 | Eliminated due to size | × | 292 |
| | 6 | 347 | Eliminated; low scoring alt of 2nd and 5th ranked bids | × | 292 |
| | 7 | 120 | Included due to ranking, size, and LGIA | ✓ | 172 |
| | 8 | 103 | Included due to ranking, size, and LGIA[(1)] | ✓ | 69 |

*1. Note: there were no additional bids in Central OR for solar + storage.*

**Southern Oregon**

Southern Oregon did not see the addition of bids as a result of this analysis. This region was a more challenging analysis however due to the presence of a large pumped hydro resource with an LGIA which accounted for nearly 80% of the preferred capacity (393MW out of 500MW) and over 50% of the soft cap (750MW). Absent the pumped hydro LGIA, there were two additional solar bids which

could potentially have been suggested as additional bids for inclusion. PA did not recommend these bids to PAC. While the bids' scores indicated they had relatively low economic value, PA acknowledges that there may have been a reasonable case for advocating for these bids to be included. The lowest ranked solar + storage bids were deemed eligible due to their LGIA status. These bids did not cause non-LGIA bids to be eliminated.

**Figure D-2. Southern Oregon LGIA summary**

| | Bid Rank | Bid Capacity | Bid Assessment | LGIA | Remaining Capacity |
|---|---|---|---|---|---|
| Solar | 1 | 400 | Eliminated due to economics and size | × | 750 |
| | 2 | 200 | Eliminated due to economics and size | × | 750 |
| | 3 | 50 | Included due to ranking, size, and LGIA | ✓ | 700 |
| | 4 | 40 | Included due to ranking, size, and LGIA | ✓ | 660 |
| | 5 | 40 | Included due to ranking, size, and LGIA | ✓ | 620 |
| Solar + Storage | 1 | 400 | Variant of 1st ranked solar bid | × | 750 |
| | 2 | 200 | Variant of 2nd ranked solar bid | × | 750 |
| | 3 | 200 | Variant of 2nd ranked solar bid | × | 750 |
| | 4 | 60 | Included due to ranking, size, and LGIA | ✓ | 690 |
| | 5 | 400 | Eliminated due to size | × | 690 |
| | 6 | 240 | Eliminated due to size | × | 690 |
| | 7 | 240 | Eliminated due to size | × | 690 |
| | 8 | 50 | Included due to ranking, size, and LGIA | ✓ | 640 |
| | 9 | 60 | Variant of 4th ranked bid | ✓ | 640 |
| | 10 | 160 | Included due to LGIA | ✓ | 480 |
| | 11 | 50 | Included due to LGIA | ✓ | 430 |

*1. Note: There were no additional bids in Southern OR for standalone solar or solar + storage after this bid.*

### Yakima

Of the seven bids received in the Yakima region, four of the bids were off system resources. The on-system resources had LGIAs. All bids fell within the 593MW soft cap. The singular wind and wind + storage bids were off-system and are not shown in the table below.

Analysis of the LGIAs resulted in no change of bids being determined as eligible, however the second ranked solar and third ranked solar + storage bids were deemed eligible without holding LGIAs.

**Figure D-3. Yakima LGIA summary**

| | Bid Rank | Bid Capacity | Bid Assessment | LGIA | Remaining Capacity |
|---|---|---|---|---|---|
| Solar | 1 | 80 | Eligible due to ranking, size, and LGIA | ✓ | 513 |
| | 2 | 260 | Eligible due to ranking and size | × | 253 |
| Solar + Storage | 1 | 94 | Eligible due to ranking, size, and LGIA | ✓ | 499 |
| | 2 | 94 | Variant of 1st ranked solar + storage bid | ✓ | 499 |
| | 3 | 260 | Variant of 2nd ranked solar bid | × | 499 |

### Goshen

All bids received were ISL eligible. All bids fell within the 675MW soft cap and therefore LGIAs had no effect in Goshen.

### Wyoming South

Wyoming South saw the addition of addition of four bids across two projects to the ISL as a result of the LGIA analysis. Prior to this assessment, no solar or solar plus storage bids would have been selected.

**Figure D-4. Wyoming South LGIA summary**

| | Bid Rank | Bid Capacity | Bid Assessment | LGIA | Remaining Capacity |
|---|---|---|---|---|---|
| Solar | 1 | 80 | *Add to ISL due to ranking and size vs. cap* | × | 70 |
| | 2 | 50 | *Add to ISL due to ranking and size vs. cap* | × | 20 |
| Solar + Storage | 1 | 80 | *Add to ISL due to ranking and size vs. cap* | × | 70 |
| | 2 | 50 | *Add to ISL due to ranking and size vs. cap* | × | 20 |
| Wind | 1 | 122 | Included due to ranking, size, and LGIA | ✓ | 28 |
| | 2 | 122 | Variant of top ranked wind bid | ✓ | 28 |
| | 3 | 150 | Eliminated due to size | × | 28 |
| | 4 | 100 | Absent LGIA, would have eliminated due to size | ✓ | (72) |

### Wyoming East

Wyoming East did not see any addition of bids as a result of this analysis. This is due to the fact that while there was substantial capacity (with a soft cap of 1,967MW), there were no non-LGIA solar or solar + storage bids which ranked higher than those bids with LGIAs. While the highest scoring wind bids were eliminated and could have fit under the interconnection cap, including such bids on the ISL in combination with the bids with LGIAs would have far surpassed the capacity limit and subsequently triggered interconnection costs far exceeding the expected benefits of these resources.

Wyoming East wind bid eligibility determination is an example how PAC made subjective, but informed and reasonable decisions which, from PA's perspective, is within their purview and a prudent approach to the risk of substantial upgrade costs particular to this region.

### Utah South

Utah South saw the addition of three projects and five bids to the ISL as a result of the LGIA analysis. Prior to this assessment, the effect of LGIAs would have eliminated all bid without LGIAs. The inclusion of additional bids does result in surpassing the soft cap (347MW) and may in turn trigger substantial interconnection costs, however it was decided amongst PAC and the IEs that the benefits of these highly ranked projects may outweigh the currently unknown interconnection costs to the benefit of ratepayers. The table below represents the summary analysis of these additions.

**Figure D-5. Utah South LGIA summary**

| | Bid Rank | Bid Capacity | Bid Assessment | LGIA | Remaining Capacity |
|---|---|---|---|---|---|
| Solar | 1 | 80 | *Add to ISL due to ranking and size vs. cap* | × | 267 |
| | 2 | 99 | Included due to ranking, size, and LGIA | ✓ | 168 |
| | 3 | 99 | Included due to ranking, size, and LGIA | ✓ | 69 |
| | 4 | 200 | *Add to ISL as variant of top ranked solar + storage bid* | × | 69 |
| Solar + Storage | 1 | 200 | *Add to ISL due to ranking and size vs. cap* | × | 147 |
| | 2 | 200 | Absent LGIA, would have excluded due to size(1) | ✓ | 147 |
| | 3 | 99 | Eligible due to ranking, size, and LGIA | ✓ | 48 |
| | 4 | 99 | Absent LGIA, would have excluded due to size | ✓ | 48 |
| | 5 | 80 | *Add to ISL due to economics potential to offset upgrades* | × | (32) |
| | 6 | 200 | Absent LGIA, would have excluded due to size(1) | ✓ | (32) |
| | 7 | 80 | *Add to ISL as variant of top ranked solar bid* | × | (32) |

*1. Capacity not reduced under hypothetical that this bid otherwise would not have been eligible due to size.*

### Utah North

Utah North saw the addition of one project and two bids to the ISL as a result of the LGIA analysis. The soft cap of region is 515MW.

This analysis resulted in the addition of the second ranked solar + storage bid plus one variant of that bid. There were no additions of solar only bids as the soft cap capacity was taken up by highly ranked LGIAs. There were no changes to stand alone storage bids. PAC received 12 bids representing 2,400MW of stand-alone storage capacity, however there were only three unique projects for 600MW. Two of these bids were not ISL eligible, not because of LGIA constraint, but because there was 600MW of higher ranked capacity.

**Figure D-6. Utah North LGIA summary**

| | Bid Rank | Bid Capacity | Bid Assessment | LGIA | Remaining Capacity |
|---|---|---|---|---|---|
| Solar | 1 | 302 | Two solar + storage variants of this bid added | × | 515 |
| | 2 | 300 | Eliminated due to size | × | 515 |
| | 3 | 42 | Eligible due to ranking, size, and LGIA | ✓ | 474 |
| | 4 | 250 | Eliminated due to size | × | 474 |
| | 5 | 130 | Eligible due to ranking, size, and LGIA | ✓ | 344 |
| | 6 | 33 | Eligible due to ranking, size, and LGIA | ✓ | 311 |
| Solar + Storage | 1 | 80 | Included due to ranking, size, and LGIA | ✓ | 435 |
| | 2 | 302 | *Add to ISL due to ranking and size vs. cap* | × | 133 |
| | 3 | 80 | Included due to ranking, size, and LGIA | ✓ | 53 |
| | 4 | 300 | Eliminated due to size | × | 53 |
| | 5 | 147 | Absent LGIA, would have eliminated due to size(1) | ✓ | 53 |
| | 6 | 302 | *Add to ISL as variant of second ranked bid* | × | 53 |

*1. Capacity not reduced under hypothetical that this bid otherwise would not have been eligible due to size.*

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