

# PacifiCorp - Stakeholder Feedback Form

## Integrated Resource Plan

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

Date of Submittal 2024-09-12

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Public Meeting Date comments address: \_\_\_\_\_

Check here if related to specific meeting

List additional organization attendees at cited meeting: \_\_\_\_\_

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

Modeling of transmission upgrades in PAC's PLEXOS model

Check here if you want your Stakeholder feedback and accompanying materials posted to the IRP website.

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

### Current General Understanding of PAC IRP Transmission Planning

Below is a high-level description of the overall PAC TX planning process as RNW currently understands it. Please review and correct any of the statements listed below that are either inaccurate or incomplete.

- PacifiCorp (PAC) models two types of transmission upgrade options in its PLEXOS IRP model:
  - o Incremental (INC) transmission (TX) transfer capacity: Network upgrades that increase the transfer capacity between transmission regions (e.g., the exchange of electricity between the Wyoming East and Bridger transmission regions).
  - o Interconnection (CON) TX upgrades: Network upgrades that enable candidate generators and storage devices to interconnect within one of PacifiCorp's transmission regions (e.g., allowing a resource to interconnect in the Summer Lake transmission region).

**Reply:** The effect of the INC and CON distinction in the model is as described, however INC and CON transmission upgrade options are a categorization for IRP modeling only, and don't have any inherent tie to particular kinds of transmission studies or outcomes. For example, upgrades for ERIS interconnection may result in incremental transfer capability. Also, a transmission option that has incremental transmission between locations in the real world but is located completely within an IRP topology bubble will be represented in the modeling as a CON item.

### Figure 1: PacifiCorp Preliminary 2025 IRP Transmission Topology

- For the near-term planning horizon, both the INC and CON transmission upgrade options are derived from previous cluster studies conducted by PacifiCorp's transmission team.

\* Required fields

**Reply:** For the near-term planning horizon, previous cluster studies (or previous serial queue studies) conducted by PacifiCorp's transmission planning team generally provides the most up-to-date information, but because cluster study requests do not comprehensively cover PacifiCorp's system, transmission planning also provides estimates for locations not covered in cluster study results.

- PAC's IRP team gathers information from multiple Cluster Studies (e.g., 1, 2, 3, 4) and uses the latest available data from the most recent round of studies up until a specified cutoff date.

**Reply:** The IRP team generally relies on transmission planning to provide forecasted transmission upgrade options, though it has supplemented with more recent Cluster Study results at times in consultation with transmission planning.

- o Within each cluster study, a contingent facilities list is provided (for both ERIS- and NRIS-related upgrades) and specifies whether these facilities are binding for the projects under current evaluation.
- o If a listed contingent facility is binding, that associated TX work must be completed before any of the projects under current consideration can interconnect with PAC's TX system.

**Reply:** In general, contingent facilities must be in place before a resource can interconnect. However, Provisional Interconnection Service can allow for projects to interconnect early using unutilized interconnection capability. A separate request queue and process exists for this service. For example, one project in a cluster might be able to interconnect even though the cluster as a whole requires contingent facilities. Alternatively, if an earlier queued resource (from a prior cluster) has selected a later COD, interconnection capacity might be available without additional upgrades prior to that COD.

- Within each cluster study, the required TX upgrade projects can be categorized as either project-specific or shared costs.
  - o Charges related to interconnection facilities and station equipment are project-specific.
  - o Network upgrades are pooled expenses, with the amount assigned to each project allocated on a proportional basis according to the nameplate capacity of the requested POI.
- PacifiCorp's IRP PLEXOS model assigns TX upgrade-related constraints as a continuous variable (i.e., non-integer).
  - o As a result, the model can access a portion of the incremental INC or CON MWs that are enabled by the upgrade, paying only for a proportional share of the total project cost.

**Reply:** Cost allocation for interconnection facilities and network upgrades are outlined in the PacifiCorp Open Access Transmission Tariff (OATT) Section 39.2.1. Currently, system network upgrades are allocated on a proportional basis according to the nameplate capacity, however, once FERC Order 2023 becomes effective system network upgrades will be allocated based on the proportional impact of each individual generation facility in the Cluster that relies on the need for a specific system network upgrade or set of upgrades. Station equipment costs can be shared if multiple requests are submitted for the same interconnection point. Station equipment costs have distinct allocation in the cluster study process and are classified either as direct assigned facilities or network upgrades. The station equipment classified as network upgrades are refunded to interconnection customers on the same basis as other network upgrades.

Transmission upgrades are intended to be modeled as integer decisions, for example, Gateway South and Boardman to Hemingway cannot readily be scaled down. PacifiCorp does recognize that certain upgrades could be reduced if a smaller quantity of resources was selected and the remaining requests were withdrawn, such that linear treatment might be realistic. Given the difficulty of modeling integer transmission upgrades, and the iterative nature of PacifiCorp's modeling, resolution of integer values for transmission upgrades may require variant analysis (with and without), and may be limited to major near-term projects.

#### General Questions Related to Cluster Studies / Transmission Modeling in the IRP

- Is it correct to assume that all CON-related TX options are derived from Energy Resource Interconnection Service (ERIS)-related required TX upgrades listed in PAC's cluster studies?

\* Required fields

- o If not, what is the source of PAC's assumptions for CON-related TX upgrade options, as defined in the PLEXOS model?
- Similarly, is it correct to assume that all INC-related TX options are derived from Network Resource Interconnection Service (NRIS)-related required TX upgrades listed in PAC's cluster studies?
- o If not, what is the source of PAC's assumptions for INC-related TX upgrade options as they are defined in the PLEXOS model?

**Reply:** The IRP model does not distinguish ERIS and NRIS interconnection options. Any transmission upgrades that do not result in incremental transfer capability in the IRP topology are categorized as "CON", and all others that do result in incremental transfer capability in the IRP topology are categorized as "INC". The IRP model reflects PacifiCorp Energy Supply Management's transmission rights, which it uses on behalf of its retail customers, plus the rights it could receive as a result of potential transmission upgrades. Transmission rights are managed through the transmission service request (TSR) process, which is distinct from interconnection. Interconnection, including NRIS, does not provide transmission service. The transmission topology and transmission upgrade modeling in the IRP is a significant simplification of these various processes, so as to facilitate proxy-based long-term planning.

- How are ERIS-enabled generator and storage resource options configured in the PLEXOS model?
- o Does this configuration differ at all for those resources that are NRIS-enabled? If so, how?

**Reply:** ERIS and NRIS are not distinguished in the IRP, though transmission upgrade options that are included in the IRP may have come from studies of either type. Because the NRIS study is intended to include costs for upgrades needed to transfer resources to load, it is more likely to receive an "INC" categorization.

- Are the line transfer capacities listed in the PLEXOS model - for both existing and incremental upgrade options - based solely on firm transmission service?
- o Does PAC's PLEXOS model include any non-firm, as-available transmission service for candidate INC upgrade projects?

**Reply:** The IRP model includes firm transmission capability and doesn't include any non-firm capability.

- Is there a separate configuration in PLEXOS for resources listed as Designated Network Resources (DWR) (which use network TX to transfer power from the facility site to PAC load centers) compared to non-DWR resources (which require point-to-point service to transfer power to load)?

**Reply:** IRP modeling does not distinguish the type of transmission service and includes both network and existing long-term firm point-to-point capacity rights held by PacifiCorp Energy Supply Management.

- Near-term TX upgrade options defined in PLEXOS - both INC and CON types - are sourced from PAC TX's cluster studies, but what is the source of these longer-term options that the PAC IRP team uses when defining these items in the model?
  - o Is it correct to assume that projects originating from PAC TX are exogenously prescribed in PLEXOS (i.e., not modeled as decision variables)?
  - o Will a complete list of all these manually specified TX upgrades be included in the 2025 IRP data disk, along with relevant data such as the first year of service and the regional incremental INC and CON MW amounts?
  - When porting over the TX options from the cluster studies into the PLEXOS model, how does the PAC IRP team account for the prerequisite TX upgrades associated with higher-priority interconnections listed in each cluster study?
  - o Are all the listed TX projects exogenously defined in PLEXOS, or are some of the upgrades treated as candidate options and thus represented by decision variables in the model?

**Reply:** Longer-term options are forecasts provided by PacifiCorp Transmission. Generally, the upgrades have previously been identified in a cluster study, though withdrawn requests may have eliminated particular upgrades. The forecast can also cleanly cut off the megawatt quantities once a particular upgrade is fully utilized, whereas the cluster study identifies requirements for the entire cluster and has to round up to the next major upgrade even if it is only needed in part. In general, the IRP only models transmission options, and does not track costs for

contingent facilities or upgrades that are required regardless of the model selections, as this is not required as part of the optimization.

Unless the study is a transmission-related sensitivity, all available options are the same for every study. These options have been presented in the 2025 public input meeting series and will be presented in the filed 2025 IRP. In addition, each LT model's accompanying outcome file reports transmission options selected for the relevant portfolio, including the selected in-service year for the upgrade.

- o Does the PAC IRP team embed any dependency logic in their PLEXOS model to ensure all upstream requirements are fully resolved before a candidate TX upgrade project is eligible for selection by the model?

**Reply:** Yes. Transmission upgrades are generally cumulative and each successive upgrade in a location is subject to a constraint in PLEXOS requiring the previous upgrade(s) in that location to have been completed. Some upgrades are required for multiple areas or later upgrade options.

- Does the affected system information listed in each cluster study have any impact on PAC's IRP modeling process?

**Reply:** If impacts on affected systems are known, it could be reflected by the timing of the earliest in-service year of an upgrade option. Unless there are known costs for affected systems, costs only reflect the impacts on PacifiCorp's system.

- In the June Stakeholder meeting, there was a discussion on the interaction between PAC TX's long-term projects and PAC IRP's long-term plans. As a follow-up to that conversation, can you please address the following questions:

- o Is the overall amount of CON and INT TX service across PAC's entire TX topology updated to reflect the impacts of these projects at their assumed in-service dates?
- For each of these long-term projects sourced from the company's TX group, will the 2025 IRP data disk include the incremental CON and INT regional capacities associated with each of these discrete projects?

**Reply:** All of the transmission upgrade options for the 2025 IRP are sourced from PacifiCorp Transmission. Given the lead time for major transmission upgrades, if a major transmission option is included in PacifiCorp Transmission's long-term plan, particularly in the next few years, the IRP is likely to model it as available starting in the identified in the plan as it is difficult to compress existing timelines that have already been developed and for which planning is underway. The IRP model would still be allowed to select a later date. The timing of later upgrades in the plan may be more flexible and the IRP model can evaluate earlier dates if they are feasible. Transmission upgrade options do not need to be part of PacifiCorp Transmission's long-term plan to be considered in the IRP.

The available options have been presented in the 2025 public input meeting series and will be presented in the filed 2025 IRP. In addition, each LT model's accompanying outcome file reports transmission options selected for the relevant portfolio, including the selected in-service year for the upgrade.

- o What reliability and cost-benefit analysis does PAC Transmission conduct when determining which projects to move forward with?
- Is any of this information available to external IRP stakeholders interested in learning more?
- o Is it correct to assume that none of the costs associated with these projects will be assigned to any of the candidate generator or storage objects defined in the PLEXOS IRP model?

**Reply:** Transmission upgrades that are required are typically not modeled in the PLEXOS model, as it would not impact the optimization. If later upgrades are contingent upon the required upgrade, its timing could impact the options that are modeled. If a required upgrade enables interconnection capability, the capability could be modeled at zero cost (or reduced cost if there are additional project-specific requirements).

Because the transmission options for both CON and INC provided for use in the PLEXOS model are generally derived from interconnection studies and not associated with transmission upgrades that are otherwise required to

meet NERC and WECC reliability standards and criteria, the cost-benefit and reliability analysis is conducted through the IRP models in deriving the least-cost, least-risk resource portfolio, balancing both cost and reliability.

- Is it correct to assume that PAC doesn't define a [Min Capacity Reserve Margin] requirement in PLEXOS for each TX region during the long-term (LT) portion of the model run?
  - o Similarly, is it correct to assume that PLEXOS' [Firm Capacity] property is also not defined, either for existing or candidate resources?
  - o I ask these questions because I am wondering if PacifiCorp allows for any capacity sharing across TX regions during a PLEXOS LT run.

**Reply:** Correct, the Min Capacity Reserve Margin and Firm Capacity properties are not defined in PLEXOS for the IRP. For the 2025 IRP, PacifiCorp is developing constraints that are similar to these properties to represent the Western Resource Adequacy Program (WRAP), including the associated planning reserve margin requirements and resource-specific qualifying capacity contribution values (QCCs). This was discussed at the June 26-27, 2024 public input meeting. PacifiCorp expects to comply with WRAP as a single system, but may need to account for limitations on transfers between the east and west side of its system. Capacity sharing within each side of the system is allowed implicitly.

### Sample Use Cases

In this section I walk through are two examples to ensure I understand how PacifiCorp's IRP modeling team uses information from PAC's cluster studies to define eligible transmission system upgrades.

#### Sample Walk through Example #1

Table 1 lists the projects that were modeled in Cluster 2 – Cluster Area 13. Included in the table is a record of the projects that were studied in the initial cluster study and the first restudy. Table 2 provides a summary of the total amount of MWs evaluated in each cluster study, broken out by technology type.

Table 1: Candidate Projects from Cluster Study 2-Cluster Area 13

Nov 2022	Aug 2023	Project MW	Type	POI	COD	Requested Service	
x	C2-134 57.5	Solar & Battery Storage	Clear Lake substation		12/1/2026		NR/ER
x x	C2-179 40	Geothermal	Black Rock substation		12/31/2029	ER	
x	C2-202 90	Solar & Battery Storage	Pavant substation		12/15/2026		NR
x	C2-211 49.9	Solar & Battery Storage	Brush Wellington-Pavant transmission line				2/11/2025
	NR/ER						

Table 2: Summary of Candidate Projects By Technology Type for Cluster Study 2-Cluster Area 13

Cumulative Availability	Aug-22 Study	Nov-23 Study
Solar & Battery Storage	197.4	0
Geothermal	40	40

Table 3 lists the project-specific and shared costs for TX work required for the successful interconnection of these projects onto PAC's system.

Table 3: TX-Related Expenses Assigned to Each Project for Cluster Study 2-Cluster Area 13

Cost Category	Project	Nov 2022 Study (\$k)	Aug 2023 Study (\$k)
Interconnection Facilities	C2-134	1,390	
Station Equipment	C2-134	5,700	
Network Upgrades (ERIS)	C2-134	19,008	
Total	C2-134	26,098	
Interconnection Facilities	C2-179	750	750
Station Equipment	C2-179	5,080	5,080
Network Upgrades (ERIS)	C2-179	13,223	10,420
Total	C2-179	19,053	16,250
Interconnection Facilities	C2-202	1,600	
Station Equipment	C2-202	10,500	

\* Required fields



Network Upgrades (ERIS)	C2-202 29,752
Total	C2-202 41,852
Interconnection Facilities	C2-211 1,310
Station Equipment	C2-211 8,940
Network Upgrades (ERIS)	C2-211 16,496
Total	C2-211 26,746

Request for Confirmation:

- Were the PAC IRP team to represent Cluster Area 13 after the November 2022 study (but before the commencement of the August 2023 restudy), candidate generator and battery storage resources would be instantiated in the PLEXOS model for the Southern UT topology region.
  - o The TX region would encompass only two technology types: hybrid solar and geothermal projects.
  - o PLEXOS would allow for a maximum of 197.4 MW of hybrid solar-storage and 40 MW of geothermal capacity to be selected by the model, with project start dates defined by the respective CODs listed in Table 2.
  - o The PLEXOS model would also include constraints to account for applicable CON and INC TX network upgrade options required to interconnect these resources to PAC’s system.
- Upon completion of the August 2023 restudy, the PLEXOS model would be modified to reflect only the option for 40 MW of new geothermal capacity located in the Southern Utah region.
  - o If PLEXOS opts for the full 40 MW of geothermal, it will also incur \$16.25 million in transmission-related upgrade charges.
  - o Since PLEXOS models TX upgrade constraints as a continuous variable, the model can also opt for a portion of the generation (e.g., 20 MW) and incur a proportional share of the TX-related expense. In this case, \$8.125 million.
  - o TX-related upgrade costs are annualized (i.e. \$/kw-yr) prior to being entered into PLEXOS model. PacifiCorp assigns the appropriate financing assumptions to convert this overnight CAPX expense into an annuity calculation.

Questions Related to Cluster 2 Study Report: Cluster Area 13

- Upon completion of the November 2022 Cluster Study, is it correct to assume that if PLEXOS wants to select even 1 MW from any of the four project units listed in Table 1, a pro-rata share of all required network upgrades listed in the cluster study would also need to be completed?
  - o These pro-rata network upgrade costs would be in addition to any project-specific interconnection facilities and station equipment work that is also required, correct?
- In both the November 2022 study and the April 2023 study, it states, “No additional upgrades beyond those identified for ERIS are required for NRIS. All ERIS upgrades are required for NRIS.” Based on this statement, is it correct to assume that the geothermal unit will automatically qualify as an NRIS-eligible facility by completing all of the ERIS-related TX upgrades?
- What is the source for the transmission projects listed as “assumed to be in service” for Cluster Area 13? Do they originate from PacifiCorp’s long-term transmission plan? If so, are any costs associated with those projects assigned to the projects listed in Table 1?
- In the final Facilities Report for C2-179 , it is stated that the customer opted for ERIS service. How is this an available option if the network upgrades listed in the August 2023 restudy were already for ERIS interconnection service?

**Reply:** Because the IRP is intended to evaluate proxy resources, and not specific requests, it generally includes relatively little project-specific information and does not tie the results of a cluster study to individual requests in that study. The relevant transmission upgrade information used for modeling generally includes the following:

- IRP topology location
- Total amount of potential interconnection capability (in megawatts)
- Total transfer capability and point of delivery
- Total cost (for station equipment and network upgrades)
- First available in-service date
- Special considerations on available resource types. Solar and storage are generally available in most locations, and as they are inverter-based, have less complicated impacts on the transmission system. Geothermal and wind are generally only viable in a few locations. The presence of these resource types would indicate they are viable in that area, the absence of requests for those resource types in a given area could indicate they are not, or are at least less likely. There is flexibility in the interconnection process to modify the specific level of storage combined with solar, and surplus interconnection provides another means of creating hybrid resources. Given

that flexibility, PacifiCorp generally lets the model select any combination of available resources, so long as the actual generation remains within the interconnection limit in each hour.

### Sample Walk through Example #2

Table 4 lists the projects that were modeled in Cluster 2 – Cluster Area 7 for each round. In the initial cluster study , 15 projects were evaluated, totaling 2,607 MW. In the first restudy , 6 projects—comprising 1,418 MW of generation and storage options—were studied. Finally, the second restudy included 4 projects, totaling 1,098 MW.

Table 4: Candidate Projects from Cluster Study 2-Cluster Area 7

Nov 2022	Aug 2023	Apr 2024	Project	MW	Type	POI	COD	Requested Service
			C2-30	199	Solar & Battery Storage	Bridgerland substation	12/31/2025	NR/ER
x	x	x	C2-32	500	Nuclear	Naughton substation	11/1/2030	NR
x	x	x	C2-48	48	Natural Gas	Naughton substation	5/18/2022	ER
x			C2-55	150	Battery Storage	Naughton-Treasureton transmission line	10/31/2024	NR
x			C2-63	220	Wind	Railroad substation	9/1/2026	NR/ER
x			C2-77	100	Solar & Battery Storage	Plymouth substation	12/31/2027	NR/ER
x			C2-84	150	Solar & Battery Storage	Plymouth substation	6/30/2025	NR/ER
x	x		C2-105	300	Wind	Monument substation	12/31/2025	ER
x	x	x	C2-106	400	Wind	Naughton-Ben Lomond #2 transmission line	12/31/2025	ER
x			C2-121	20	Solar	Cutler-El Monte Willard Pump Tap transmission line	12/1/2025	ER
x	x		C2-122	20	Solar	Ben Lomond-Honeyville transmission line	12/1/2025	ER
x			C2-130	199	Solar & Battery Storage	Plymouth substation	12/1/2026	NR/ER
x			C2-139	150	Solar & Battery Storage	Blue Rim-South Trona transmission line	12/1/2026	NR/ER
x			C2-143	90	Wind	Evanston-Anschutz transmission line	12/31/2026	NR/ER
x			C2-155	110	Solar & Battery Storage	Muddy Creek substation	12/31/2026	NR/ER
x	x	x	C2-205	150	Solar & Battery Storage	Bridgerland-Cache transmission line	10/31/2026	ER

Table 5 provides a summary of the projects studied in the second restudy, broken down by technology type, while Table 6 lists the corresponding network upgrades—both ERIS- and NRIS-related—required for those projects to interconnect with PAC’s bulk TX system.

Table 5: Summary of Proejcts from Cluster Study 2-Cluster Area 7 (Apr 2024 Restudy)

Cumulative Availability MW	
Solar & Battery Storage	150
Nuclear	500
Natural Gas	48
Battery Storage	0
Wind	400
Solar	0

Table 6: Shared Transmission Network Upgrades Costs (\$k) for Cluster Study 2-Cluster Area 7 (Apr 2024 Restudy)

Type	Location	Project	Apr 2024 Study (\$k)	
ERIS	Naughton substation	Install new 230 kV breaker	1,500	
ERIS	Naughton – Ben Lomond	345kV TX line	New approx. 88 miles of 230 kV TX line	349,500
ERIS	Ben Lomond substation	Seven (7) 230 kV breaker replacements	4,300	
ERIS	Plain City substation	breaker replacement	500	
NRIS	Jim Bridger substation	345/230kV 700MVA transformer	16,100	
NRIS	Ben Lomond - Plain City	Rebuild approx. 2 miles of 138kV TX line	3,800	
NRIS	Ben Lomand substation	Replace Ben Lomond-Plain City relay	300	
NRIS	Plain City substation	Replace Ben Lomond-Plain City relay	300	
NRIS	Ben Lomond - Cold Water	Rebuild approx. 9 miles of 138kV TX line	14,400	
NRIS	Plain City to West Ogden North Tap	Rebuild approx. 6.5 miles of 138kV TX line	8,600	

\* Required fields

NRIS	West Ogden North Tap to Midland West Tap	Rebuild approx. 2.5 miles of 138kV TX line	4,000
NRIS	Warren to West Ogden South Tap	Rebuild approx. 6.5 miles of 138kV TX line	8,500
NRIS	West Ogden South Tap to Midland East Tap	Rebuild approx. 2.5 miles of 138kV TX line	4,000
NRIS	Midland East Tap to Clinton East Tap	Rebuild approx. 5.5 miles of 138kV TX line	7,800
NRIS	Clinton East Tap to Syracuse	Rebuild approx. 3.5 miles of 138kV TX line	4,600
NRIS	Cold Water - El Montel	Rebuild approx. 5.5 miles of 138kV TX line	7,200
NRIS	Ben Lomond - Warren	Rebuild approx. 5 miles of 138kV TX line	6,900
NRIS	Ben Lomond - Birch Creek and Ben Lomond - Naughton sections	Rebuild approx. 8 miles of 230kV TX line	42,900
NRIS	Naughton substation	RAS work	300
	ERIS Network Upgrades (subtotal)		355,800
	NRIS Network Upgrades (subtotal)		129,700
	Network Upgrades (total)		485,500

Table 7 lists the project-specific and shared network upgrade costs for project C2-106, which is the construction of a 400 MW wind facility at a new substation located off the Ben Lomond-Naughton #2 transmission line. The \$198.1k listed for network upgrade costs in the Apr 2024 Study represents C2-106’s proportional share of the shared costs listed in Table 6. The pro-rata allocation of these shared expenses is based on the POI nameplate capacity for all projects listed as active in the April study.

Table 7: Project-Specific and Shared Transmission Network Upgrade Costs (\$k) for Project C2-106.

Cost Type	Project	Nov 2022 Study	Aug 2023 Study	Apr 2024 Study
Interconnection Facilities: Collector	C2-106	800	800	1,300
Interconnection Facilities: POI	C2-106	1,600	1,600	1,300
Station Equipment	C2-106	8,200	8,200	12,700
Network Upgrades (ERIS)	C2-106	122,131	110,141	150,893
Network Upgrades (NRIS)	C2-106	64,420	126,082	247,250
Network Upgrades (subtotal)	C2-106	186,552	236,223	398,142
Total		197,152	246,823	313,442

Questions Related to Cluster 2 Study Report: Cluster Area 7

- How does the PAC IRP team configure shared network upgrade costs across multiple projects in their PLEXOS model?
  - o Will the model have to absorb the entire costs of the projects listed in Table 6 before a MW from any of the technology options listed in Table 5 can be added to PAC’s system, or is there a proportional TX-related charge that gets applied based on how much generation PLEXOS wants to add in this TX region?
- According to queue information posted by PAC Transmission, project C2-106 requested ER interconnection service. Consequently, will the PAC IRP model reflect both ERIS- and NRIS-eligible wind resource options in the Wyoming region?
  - o If so, will the ERIS-eligible wind resource exclude the NRIS-related TX network upgrade expenses?
- In the August 2023 restudy, the Naughton–Ben Lomond 345 kV transmission line is listed in both the ERIS section (Section 9) and the NRIS section (Section 13). Is this an error, or is it correct?
  - o If correct, what are the grounds for a TX project to be listed as both an ERIS- and NRIS-related upgrade?
- How are TX expenses related to contingent facilities handled by PAC’s IRP team?
  - o Are any of these costs—triggered by cluster studies from previous years—assigned to the projects listed in Table 4?
  - o Is all the TX work required to resolve these contingent facilities approved and assumed to be in place by a certain date within the model?
  - o Conversely, if the TX work to resolve the contingent facilities is still under consideration by PAC TX, are there sequential INC and CON TX constraints that PLEXOS must navigate to access the generation and storage options listed in Table 4?

**Reply:** IRP modeling does not differentiate the costs specific to individual cluster requests - the total cost and total interconnection are modeled. Initial modeling allows this total to be considered on a linear basis. To the

\* Required fields



extent an integer determination (i.e. all of a particular upgrade or nothing) is needed in the final result, additional analysis would be performed.

With regard to contingent facilities, each of the successive upgrade options in a given location are assumed to be contingent on the prior upgrades unless they are known to be distinct. When upgrades are contingent on upgrades in other locations, constraints are used to ensure prior requirements are met. The modeled costs of all transmission network upgrades reflect PacifiCorp Energy Supply Management's share of the overall PacifiCorp Transmission customer base, which is around 80%, with PacifiCorp Transmission's other customers contributing the remainder. This is true for all network upgrades, whether triggered by reliability requirements, PacifiCorp Energy Supply Management requests, or those of other customers of PacifiCorp Transmission. Costs are generally not modeled for transmission upgrades that are required (not optional), as the cost would appear in every result and would not have any bearing on the optimization.

#### Questions Related to Surplus Interconnection

- Is there any significance associated with ERIS/NRIS designations in surplus interconnection studies?
  - o For example, is the surplus option configured differently if it's modeled at a location with existing ERIS compared to a facility qualified for NRIS?

**Reply:** ERIS/NRIS has no bearing on surplus interconnection studies and is not modeled differently.

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

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

#### **PacifiCorp Response:**

Thank you for the feedback. As discussed in the in-line responses throughout your request, the modeling in the IRP has significant simplifications relative to cluster study results and process.

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Please submit your completed Stakeholder Feedback Form via email to [IRP@PacifiCorp.com](mailto:IRP@PacifiCorp.com)

Thank you for participating.