IRP and Local Transmission System Plan




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Planning Processes and Study Horizons

- **Local Transmission System Plan (OATT Attachment K)**
  - Evaluate limiting conditions on equipment (e.g., transformers, transmission lines, circuit breakers)
  - Seasonal peak and minimum load conditions, 20% exceedance
  - Meet specific system performance criteria for peak and credible stressed conditions (TPL-001-4)
  - 1, 5 and 10 year horizon
  - Does not evaluate economic dispatch of resources or interconnection requests.

- **Long term resource planning (IRP, etc.)**
  - Average system peak loads, 50% exceedance
  - Ensure ability to meet adequacy requirements in all hours, not just credible extremes
  - 20 year horizon
  - Economic dispatch of resources to serve load across Company
  - Existing generators, generators with executed LGIAs and transmission service requests are considered "in-service" for modeling purposes

- **Generation and Load Interconnection**
  - Evaluate customer requests for interconnection.
  - Annual generation interconnection cluster study.
  - Serial queued load interconnection studies.
  - Seasonal peak and minimum load conditions, 20% exceedance
  - Meet specific system performance criteria for peak and credible stressed conditions (TPL-001-4)

FERC Order 1000 and PacifiCorp's Attachment K

PacifiCorp conducts a biennial transmission planning cycle under Attachment K of the Open Access Transmission Tariff, consistent with FERC Order 1000.

Local Transmission System Plan

- Addresses transmission planning and cost allocation
- Requires cost allocation to beneficiaries
- 10 year planning horizon, planning timeline

Planning Requirements

- Open to stakeholders
- Transparent transmission planning process
- Requires stakeholder input and review of transmission planning and plans
- May include representatives from other utilities, state energy offices, resource and transmission development interests, environmental groups.
- Requires regional and interregional planning coordination
- Quarterly stakeholder meetings.

Local Transmission System Plan Projects and Drivers

Transmission Line and Substation Projects

- TPL Assessment and Five Year Study
- Large load and resource requests with executed interconnection/service agreements
- Neighboring utilities
- Enhance system capacity
- Improve system reliability

Replacing Equipment (transformers, circuit breakers, disconnect switches)

- TPL Assessment and Five Year Study
- Existing or New customer load growth
- Aging or obsolete equipment
- Neighboring utilities
- Modernize grid

Biennial Local Transmission System Plan Cycle

PAC BIENNIAL TRANSMISISON PLANNING CYCLE 2020-2021				
	Quarter	Date	Technical Studies Activities	Economic Studies Activities
Year 1 -2020	Q1	Jan - Mar	Data Collection	Data Collection for Economic Studies
	Q2	Apr - Jun	Reference Case Development	Reference Case Development
	Q3	Jul – Sep	Technical Studies to determine System Adequacy	Economic Studies to Identify Congestion
	Q4	Oct – Dec	Draft Report on System Adequacy	Draft Reporting
Year 2 - 2021	Q5	Jan – Mar		Data Collection for Re-Study • Re-Study Requests • Economic Study Second Year Requests
	Q6	Apr – Jun	Draft Report Review	Draft Re-Study Review
	Q7	Jul – Sep	Final Report and Review	
	Q8	Oct – Dec	Final Transmission Plan approval	

PacifiCorp 2020 TPL-001-4 Assessment

- Over 1.8 million contingencies evaluated (P1- P7 category events)
  - Six Seasonal Base Cases in PACW System:
    - Year 2 Heavy Summer
    - Year 2 Heavy Winter
    - Year 2 Light Spring
    - Year 5 Heavy Summer
    - Year 5 Heavy Winter
    - Year 10 Heavy Summer
  - Four Seasonal Base Cases in PACE System:
    - Year 2 Heavy Summer
    - Year 2 Light Winter
    - Year 5 Heavy Summer
    - Year 10 Heavy Summer

- Five new projects identified. Initial scoping and project budget proposals in Q1-Q2 2021
  - Lone Pine-Sage Road 69 kV Line 49-1 conversion to 115 kV (Oregon) – Proposed 2025 ISD
  - BPA Roundup 230 kV Capacitor Banks (Oregon) – *BPA Project*, proposed 2022 ISD
  - Reterminate 90th South-Oquirrh 138 kV line to East Terminal Bus (Utah) – Proposed 2030 ISD
  - Update Lakeside I RAS (Utah) – 2021 ISD
  - Construct new 138 kV source to Park City Area (Utah) – Proposed 2030 ISD

- Completed December 22, 2020. Results will be reflected in Attachment K Q5 update to biennial Local Transmission System Plan

Draft 2020-2021 Local Transmission System Plan - PACE

Draft LTSP as of Attachment K, Q4, December 17, 2020

- ENERGY GATEWAY – ALL SEGMENTS
- CAMP WILLIAMS - OQUIRRH 345 KV REBUILD WITH HIGH TEMPERATURE CONDUCTOR
- GOSHEN 345/161 KV 700 MVA #3 TRANSFORMER
- GOSHEN – SUGARMILL - RIGBY NEW 161 KV LINE
- JIM BRIDGER 345/230 KV #2 TRANSFORMER UPGRADE TO 700 MVA
- NAPLES 138-12.5 KV SUBSTATION IN EAST UTAH
- 90TH SOUTH – TERMINAL LINE 345 KV LINE LOOP INTO MIDVALLEY
- OQUIRRH - TERMINAL 345 KV # 3 AND #4 DOUBLE CIRCUIT LINE
- SPANISH FORK 345/138 KV TRANSFORMER UPGRADE
- ST GEORGE SUBSTATION INSTALL 345/138KV TRANSFORMER AND EXPAND YARD
- CAMP WILLIAMS 345-138 KV TRANSFORMER AND 138 KV YARD ADDITION
- HARVEST 138 KV SUBSTATION
- PATH C TRANSMISSION SYSTEM IMPROVEMENTS
- SIPHON TAP – PINGREE JUNCTION 138 KV RECONDUCTOR
- NIBLEY 138/25KV TRANSFORMER AND NIBLEY - HYRUM CITY REBUILD
- CENTRAL UTAH HIGH VOLTAGE MITIGATION
- THIRD WEST MORTON COURT NEW 138 KV LINE

Draft 2020-2021 Local Transmission System Plan - PACW

Draft LTSP as of Attachment K, Q4, December 17, 2020

- KLAMATH FALLS TO SNOW GOOSE #2 230 KV LINE
- LONE PINE TO WHETSTONE 230 KV LINE
- ROUNDUP 230-69 KV CAPACITY INCREASE AND 69 KV BUS RECONFIGURATION
- SAMS VALLEY 500-230 KV SUBSTATION
- BURNS 500 KV SERIES CAPACITOR BANK REPLACEMENT
- DRISCOLL (BPA) SUBSTATION NEW 230-115 KV TRANSFORMER
- OUTLOOK – PUNKIN CENTER 115 KV LINE #2
- OUTLOOK 230-115 KV TRANSFORMER CAPACITY INCREASE
- OCHOCO 230-115 KV CAPACITY INCREASE
- MERIDIAN RAS EXPANSION
- HAZELWOOD SUB – EXPAND YARD & INSTALL RING BUS
- CONSER TAP – RECONFIGURE TO THREE TERMINAL LINE

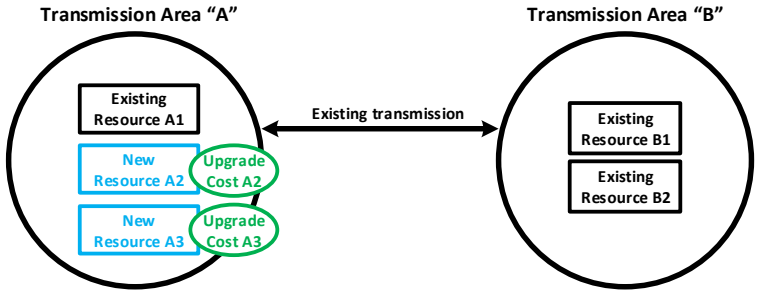
Non-Wires Alternatives in the IRP

- Non-wires alternatives include investments and operating practices that can defer or replace the need for specific investment in transmission/or distribution projects including demand response, distributed generation, energy efficiency, storage, load management and rate design.
- PacifiCorp's IRP includes non-wires alternatives in its modeling:
  - Energy efficiency and demand response resources compete as supply-side resources in the optimization model against other proxy resources including transmission.
  - Private generation is incorporated into the load forecast assumptions and a high and low private generation and a high and low load sensitivity is conducted.
  - Known customer-sited, large scale storage projects are included in modeling.
- Other non-wires alternatives would be considered on a case-by-case basis or inform specific load or resource assumptions for the IRP.

Transmission Modeling History

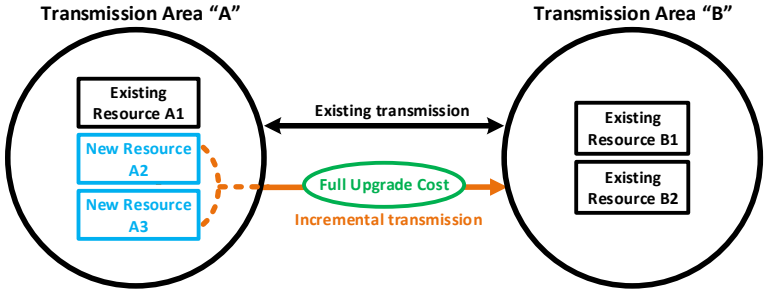
2017 IRP and prior:

- No direct transmission-based resource build limits
- Indirect build limits included integration costs, existing transmission constraints
- Resources could not use implied new transmission
- Post-model true-up of integration costs was required
- Key options were modeled as sensitivities



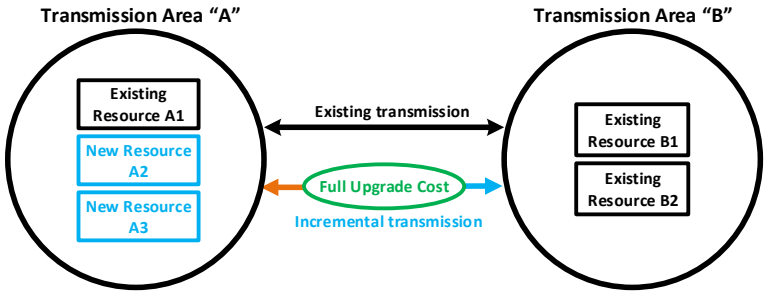
2019 IRP:

- Direct and indirect transmission build limits
- Only new resources could use new transmission in SO
- One-directional in SO
- Special coding and tools were required to move selected options into PaR
- Complex options with multiple affected paths were modeled as sensitivities



2021 IRP:

- Direct and indirect transmission build limits
- All resources can use transmission appropriately
- No special tools required
- Complex options modeled endogenously



2021 IRP Transmission Modeling

Model Selection:

- Plexos modeling allows endogenous selection of incremental transmission construction to connect areas with resource surplus to meet load
- The model selects transmission options on the basis of all relevant modeled factors, including:
  - Transmission projects costs
  - Locational differences
  - Increased interconnection capability for new resources
  - Increased incremental transmission capability across topology bubbles
  - Enabled new resource project costs and benefits
  - The potential use of new transmission by existing resources
  - Potential changes in the usage of existing transmission
  - Retirement impacts
- Transmission options compete on a least-cost basis with all other potential portfolios
- If a transmission option does not contribute to achieving a least-cost portfolio, the model will not select it.

Transmission modeling includes consideration of:

- Existing generators, generators with executed LGIAs and transmission service requests are accounted for in the IRP modeling
- Scopes and costs for incremental transmission upgrade options are high level planning estimates
- OATT Credit of 20% applied to costs based on PacifiCorp ESM share of monthly coincident peak network load of approximately 80%
- Wheeling revenues are not accounted for in the IRP modeling as the IRP is a long-term load service plan

Transmission Integration Cost by Location and Capacity Increment (PACW)

IRP Bubble	Added Resource MW		IRP Year	Description of Integration	Affected Topology Path(s)		
	Min	Max			Incremental Capacity (if any)	From Bubble	To Bubble
Portland/N. Coast	1	130	2026	Portland area local reinforcement	-	-	-
	131	580	2032	Portland area (Troutdale) to Albany area 230 kV transmission	450	Portland	Willamette
Willamette	1	615	2026	Albany area local reinforcement	-	-	-
Yakima	1	405	2023	Yakima area local reinforcement	-	-	-
	406	585	2027	Yakima area 230 kV transmission	-	-	-
	586	685	2027	Yakima area 230 kV transmission	-	-	-
	686	835	2032	Yakima area to Bend area 230 kV transmission	1500	Yakima	Central Oregon
	836	1490	2037	Bend area to Willamette Valley 230 kV transmission	1500	Central Oregon	Willamette
Walla Walla	1	100	2030	Walla Walla area to Yakima 230 kV transmission	200	Walla Walla	Yakima
Southern Oregon	1	500	2023	Medford area 500-230 kV and 230 kV reinforcement	-	-	-
	501	960	2027	Medford area 500-230 kV and 230 kV reinforcement	-	-	-
Central Oregon	1	140	2023	Central Oregon area local reinforcement	-	-	-
	141	240	2027	Central Oregon area local reinforcement	-	-	-

The scope and cost of transmission upgrades are planning estimates. Actual scope and costs will vary depending upon the interconnection queue, the transmission service queue, the specific location of any given project and the type of equipment proposed for any given project.

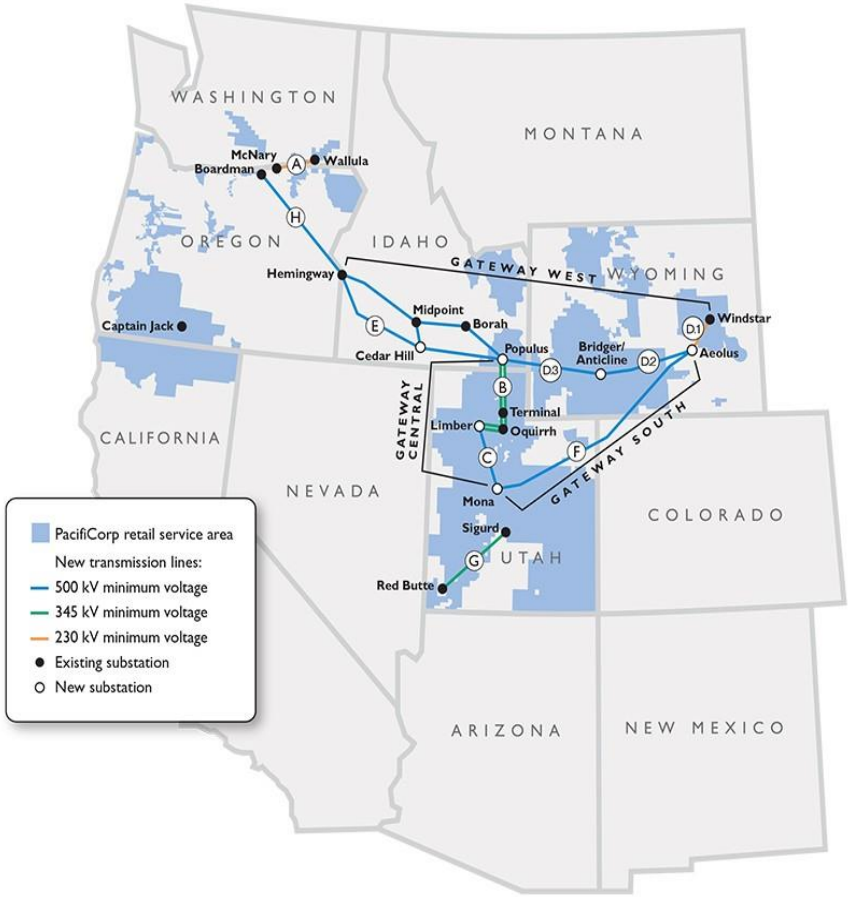
Transmission Integration Cost by Location and Capacity Increment (PACE)

IRP Bubble	Added Resource MW		IRP Year	Description of Integration	Affected Topology Path(s)		
	Min	Max			Incremental Capacity (if any)	From Bubble	To Bubble
Goshen	1	152	2023	Southern Idaho reinforcement	-	-	-
Wyoming East	1	1930	2024	Energy Gateway segments D.1 (Windstar - Shirley Basin 230 kV line) and F (Aeolus-Clover 500 kV transmission line)	1200	Wyoming East	Clover
Utah North	1	245	2023	Northern Utah 345 kV reinforcement	-	-	-
	246	730	2024	Northern Utah 345 kV reinforcement	-	-	-
Utah South	1	956	2024	Utah Valley area 345-138 kV and 138 kV local reinforcement	-	-	-
	957	1357	2031	Southern Utah 345 kV reinforcement	800	Utah South	Clover
B2H	1	600	2027	Segment H Boardman - Hemingway 500 kV	600	BorahPop	Hemingway
Gateway D3	1	350	2027	D.3 Anticline - Populus 500 kV18; supporting projects	1621	Wyoming East	BorahPop
Gateway Segment E	-	-	2028	Segment E POP - Hemingway 500 kV 20	1260	BorahPop	Hemingway

The scope and cost of transmission upgrades are planning estimates. Actual scope and costs will vary depending upon the interconnection queue, the transmission service queue, the specific location of any given project and the type of equipment proposed for any given project.

Energy Gateway

- Endogenous modeling of Energy Gateway in the 2021 IRP therefore includes:
- Gateway South, Segment F (Aeolus-Clover 500 kV transmission line)
- Segment D.1 (Windstar - Shirley Basin 230 kV line)
- Boardman to Hemingway, Segment H (B2H; 500 kV)
- Segment E (Populous - Hemingway 500 kV 20)
- The complete selection of Gateway West would include segments D1, D2, D3 and segment E.



This map is for general reference only and reflects current plans.
It may not reflect the final routes, construction sequence or exact line configuration.