Integrated Resource Plan

2021 IRP Public Input Meeting

November 16, 2020




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Agenda

- 9:00am-9:15am pacific – Introductions
- 9:15am-10:15am pacific – Plexos Benchmark Result
- 10:15am-11:45am pacific – Modeling Assumptions Update
- 11:45am-12:30pm pacific – Lunch Break
- 12:30pm-1:30pm pacific – All-Source Request for Proposals Update
- 1:30pm-1:45pm pacific – Stakeholder Feedback Form Recap
- 1:45pm-2:00pm pacific – Wrap-Up/Next Steps

Plexos Benchmark Result




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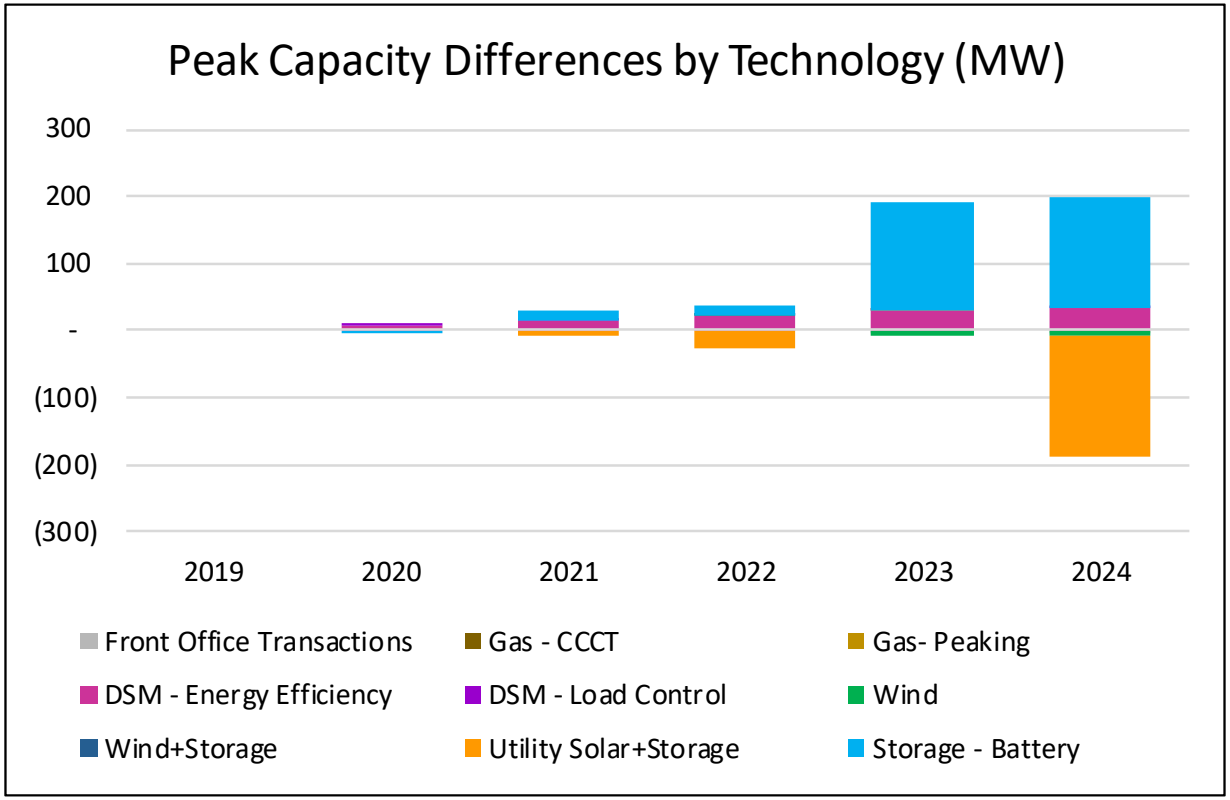
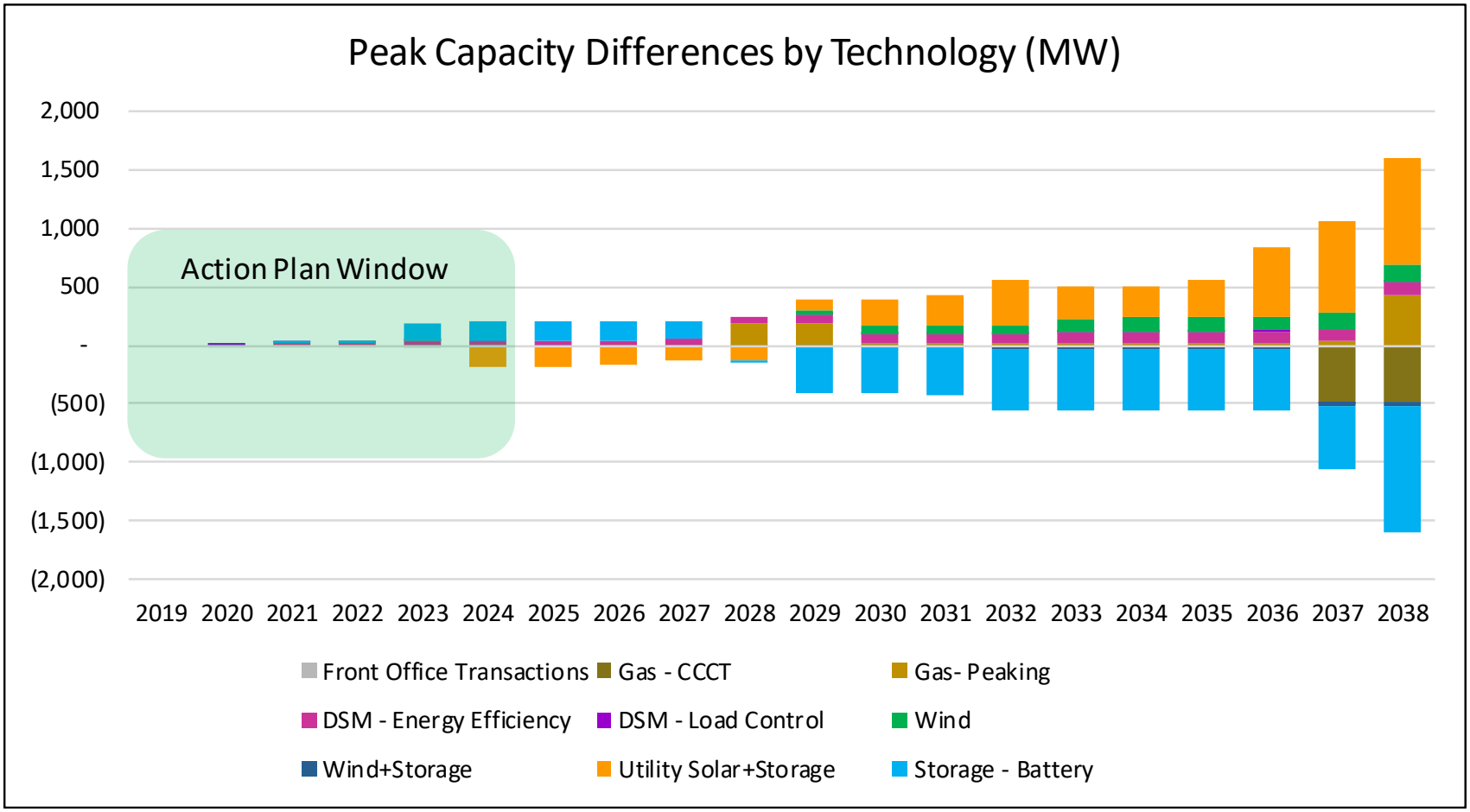
Plexos Benchmark Result Overview

- The benchmarking exercise confirms that the 2019 IRP action plan would not have changed if Plexos were used to develop PacifiCorp's preferred portfolio
- Relative to the preferred portfolio, the Plexos portfolio accelerates less than 200 MW of peak capacity from 2024 into 2023
  - Selects stand-alone battery and DSM over additional solar
  - Allows battery to support the portfolio one year earlier
- On a peak-capacity basis, the benchmark load and resource balance is within 0.15% of the 2019 IRP preferred portfolio by 2024 and within 0.22% by 2038
- Endogenous transmission selections are unchanged in several key areas:
  - Energy Gateway South is selected in 2024 in both the benchmark and 2019 IRP preferred portfolio
  - Brownfield recovered transmission is the same in Utah and Bridger
- Differences in endogenous transmission selection include:
  - Selection of Walla Walla to Yakima 200 MW transmission in 2024
  - Acceleration of Yakima to Southern Oregon/California 400 MW from 2036 to 2030
  - Deferral of Goshen to Utah S 800 MW from 2030 to 2033

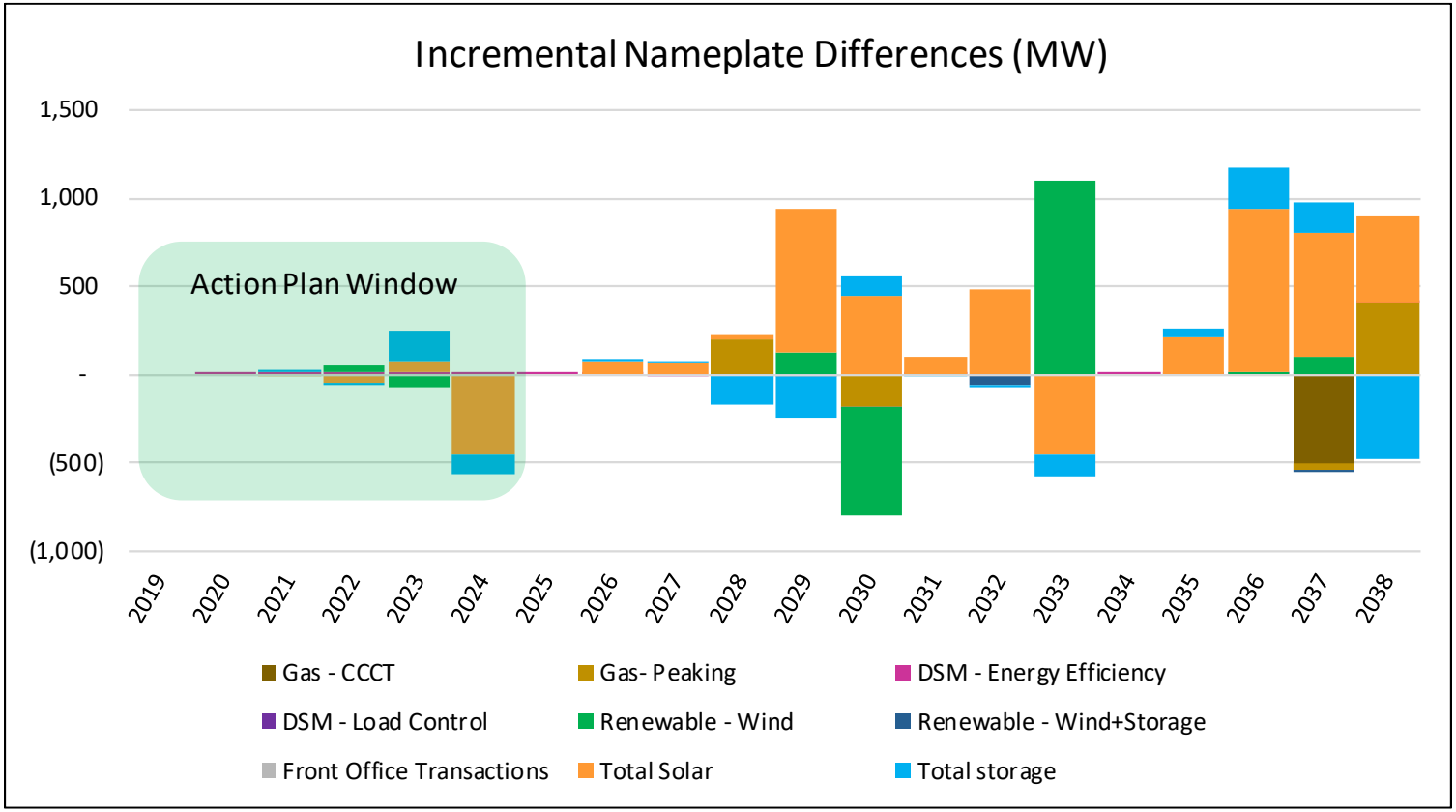
Plexos Benchmark to SO L&R Compare - Action Plan Window



Plexos Benchmark to SO Portfolio L&R Compare – 20 Year Planning Period



Plexos Benchmark to SO Nameplate Comparison



- Nameplate differences in the Plexos benchmark are largely outside of the action plan window
- 446 MW of nameplate solar + storage reduction includes 112 MW of battery
- 180 MW “increase” in 2023 battery nets to a 68 MW increase

Plexos Next Steps

- Currently testing stochastic modeling
- Portfolio development for the 2021 IRP

Modeling Assumptions Update

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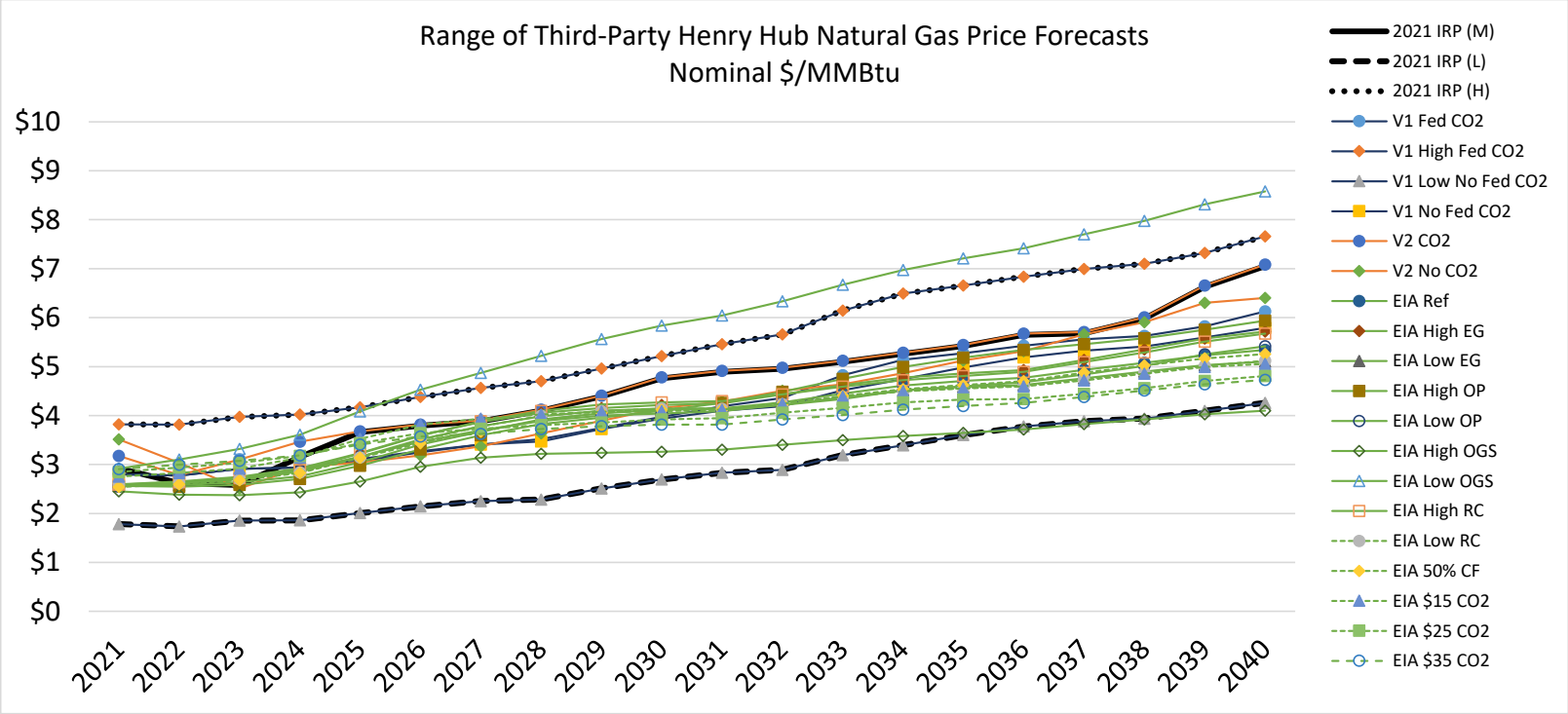
Price-Policy Scenarios

Scenario Short Name	Gas Price	CO2 Cost	Power Price
MM	Medium	Medium	Under Development
MN	Medium	None	Completed
HH	High	High	Under Development
LN	Low	None	Under Development
SCC-GHG	Medium	Social Cost of Green House Gases	Under Development

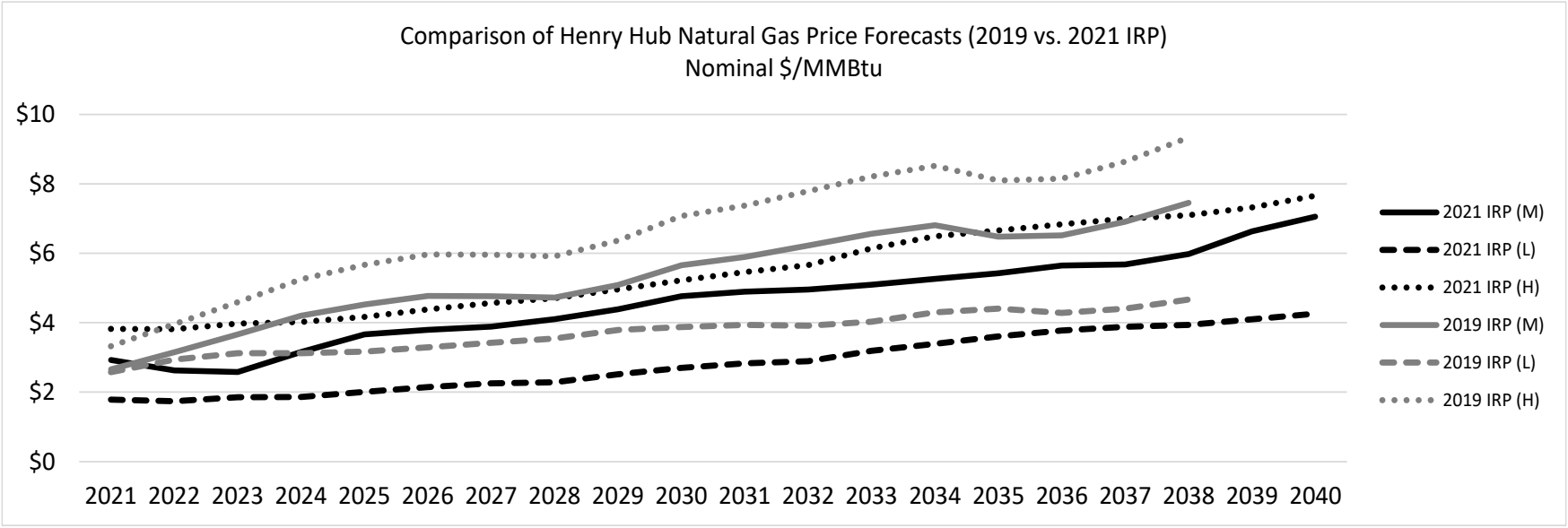
- Price-policy scenarios encompass the application of specific assumptions for natural gas prices, CO_2 costs, and power prices.
- Power prices are produced using Aurora and incorporate as inputs the gas price and CO_2 cost assumptions for a given price-policy scenario.
- All but the MN price-policy scenario is under development.
- Price-policy scenarios being developed for the 2019 IRP are intended to capture a reasonable range of variables that will reasonably capture how these assumptions might influence resource outcomes during the portfolio development phase of the IRP.
- Price-policy scenarios also help inform the acquisition path analysis, which identifies how future resource procurement might be influenced by changes in the planning environment.

Natural Gas Price Forecasts



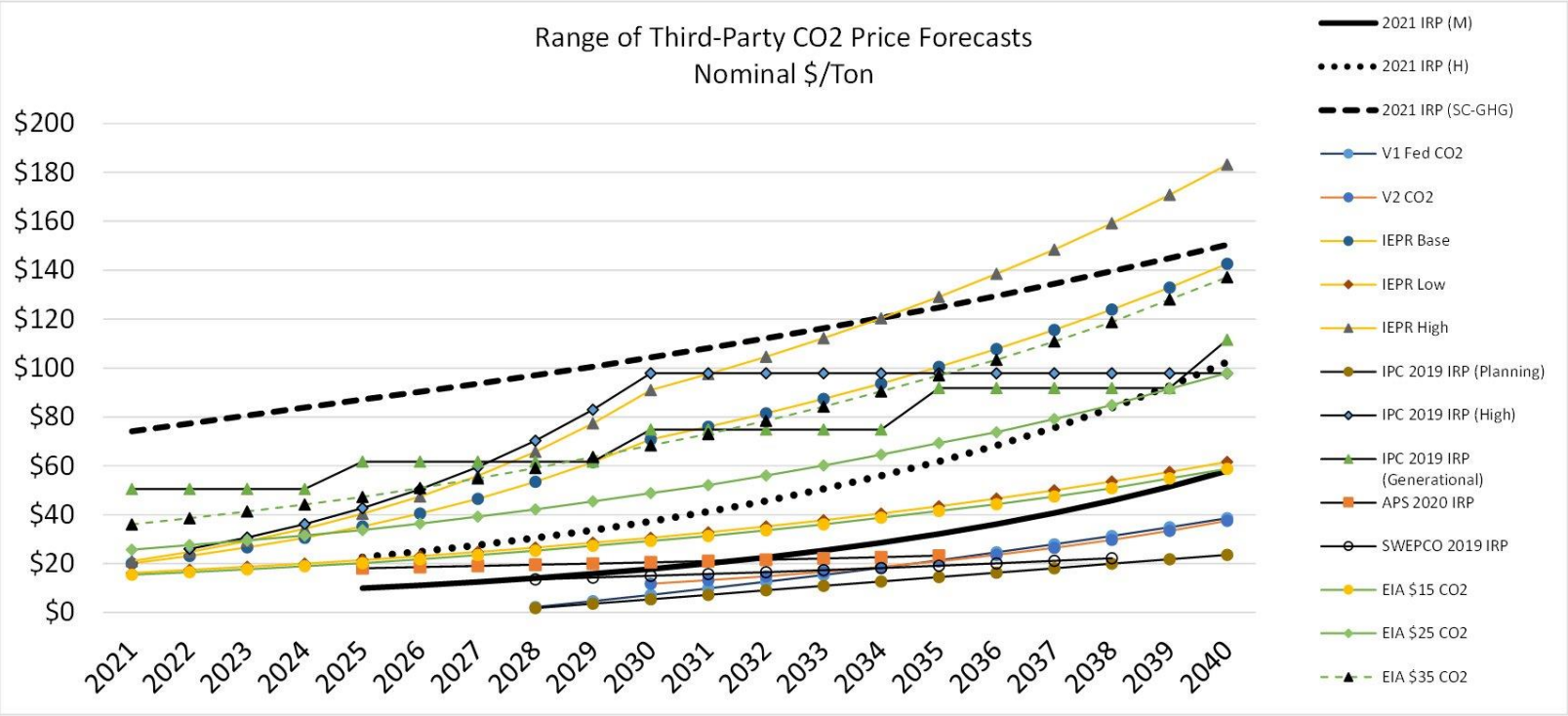
- Henry Hub natural gas prices from two third-party vendors (vendor 1 = “V1” and vendor 2 = “V2”) and from the 2020 Annual Energy Outlook published by the U.S. Department of Energy's Energy Information Administration (EIA) are shown.
- EIA scenarios include: high and low economic growth (“High EG” and “Low EG”, respectively); high and low oil prices (“High OP” and “Low OP”, respectively); high and low oil & gas supply (“High OGS” and “Low OGS”, respectively); high and low renewable cost (“High RC” and “Low RC”, respectively); a 50% carbon free case (“50% CF”); and three different CO_2 price cases (“$15 CO2”, “$25 CO2”, and “$35 CO2”).
- The medium, low and high gas price scenarios for the 2021 IRP are within the range of forecasts provided by these entities.
- Gas price assumptions are being used to generate an accompanying power price forecast using Aurora.

Natural Gas Price Scenarios



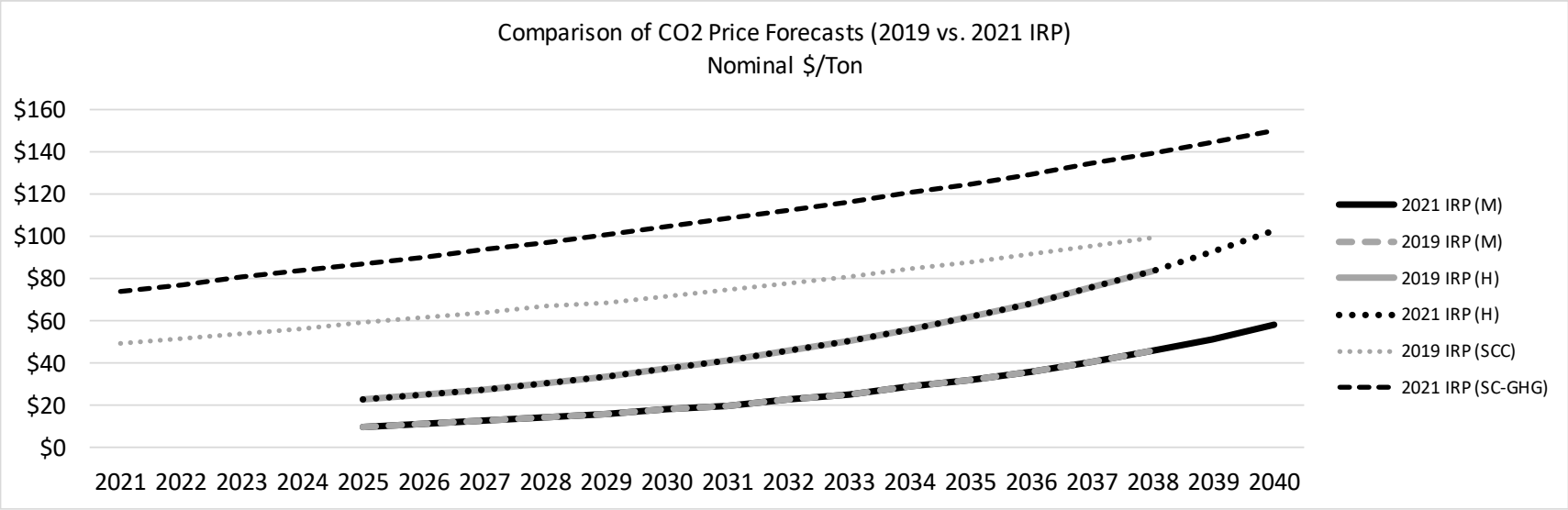
- Gas price scenarios for the 2021 IRP are lower than those assumed in the 2019 IRP.
  - Medium case levelized price from 2021-2038 = $4.02/MMBtu, down about 18% relative to the $4.88/MMBtu levelized price from the 2019 IRP
  - Low case levelized price from 2021-2038 = $2.46/MMBtu, down about 30% relative to the $3.52/MMBtu levelized price from the 2019 IRP
  - High case levelized price from 2021-2038 = $4.90/MMBtu, down about 20% relative to the $6.11/MMBtu levelized price from the 2019 IRP

CO_2 Cost Forecasts



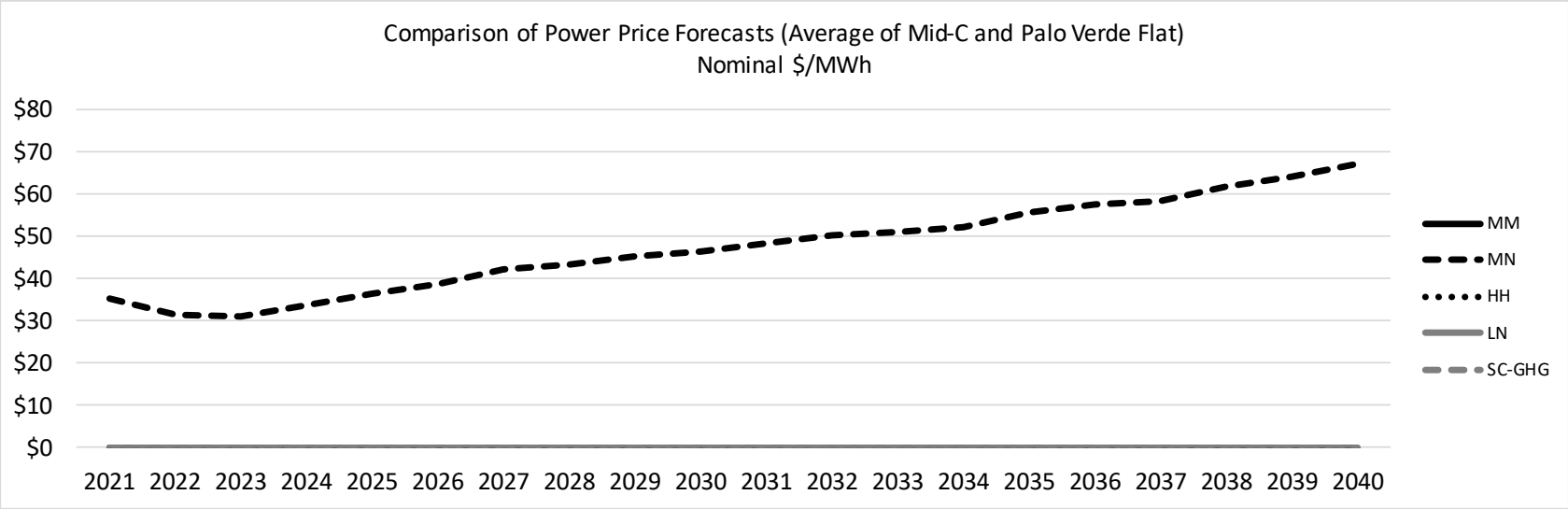
- CO_2 price assumptions from two third-party vendors (vendor 1 = "V1" and vendor 2 = "V2"), the Integrated Energy Policy Report ("IEPR") prepared by the California Energy Commission, other utility IRPs (Idaho Power or "IPC", Arizona Public Service or "APS", and Southwestern Electric Power Company or "SWEPCO"), and from the 2020 Annual Energy Outlook published by the U.S. Department of Energy's Energy Information Administration (EIA) are shown.
- The medium, low and high gas price scenarios for the 2021 IRP are within the range of forecasts provided by these entities and are reasonable for planning purposes (note, not shown, PacifiCorp will continue to analyze a zero CO_2 scenario).
- CO_2 price assumptions are being used to generate an accompanying power price forecast using Aurora.

CO_2 Cost Scenarios



- Based on third-party forecasts, the medium and high CO_2 price assumptions from the 2019 IRP remain reasonable and are unchanged.
- The social cost of carbon (SCC) assumption has been updated to align with the Technical Support Document developed under the Interagency Working Group on the social cost of Greenhouse Gases using the 2.5% discount rate as required under Washington's Clean Energy Transformation Act or "CETA"—the 2019 IRP used prices aligned with a 3.0% discount rate.
- The social cost of carbon (SCC) has also been relabeled as social cost of greenhouses gases (SC-GHG) consistent with the data source and with recent language emphasis in legislative rules.

Power Price Scenarios



- The medium gas/medium CO_2 price-policy scenario is the only forecast that has been completed.
- The remaining forecasts are on track to be done before the December public-input meeting.

Modeling Assumptions Update – Transmission Topology

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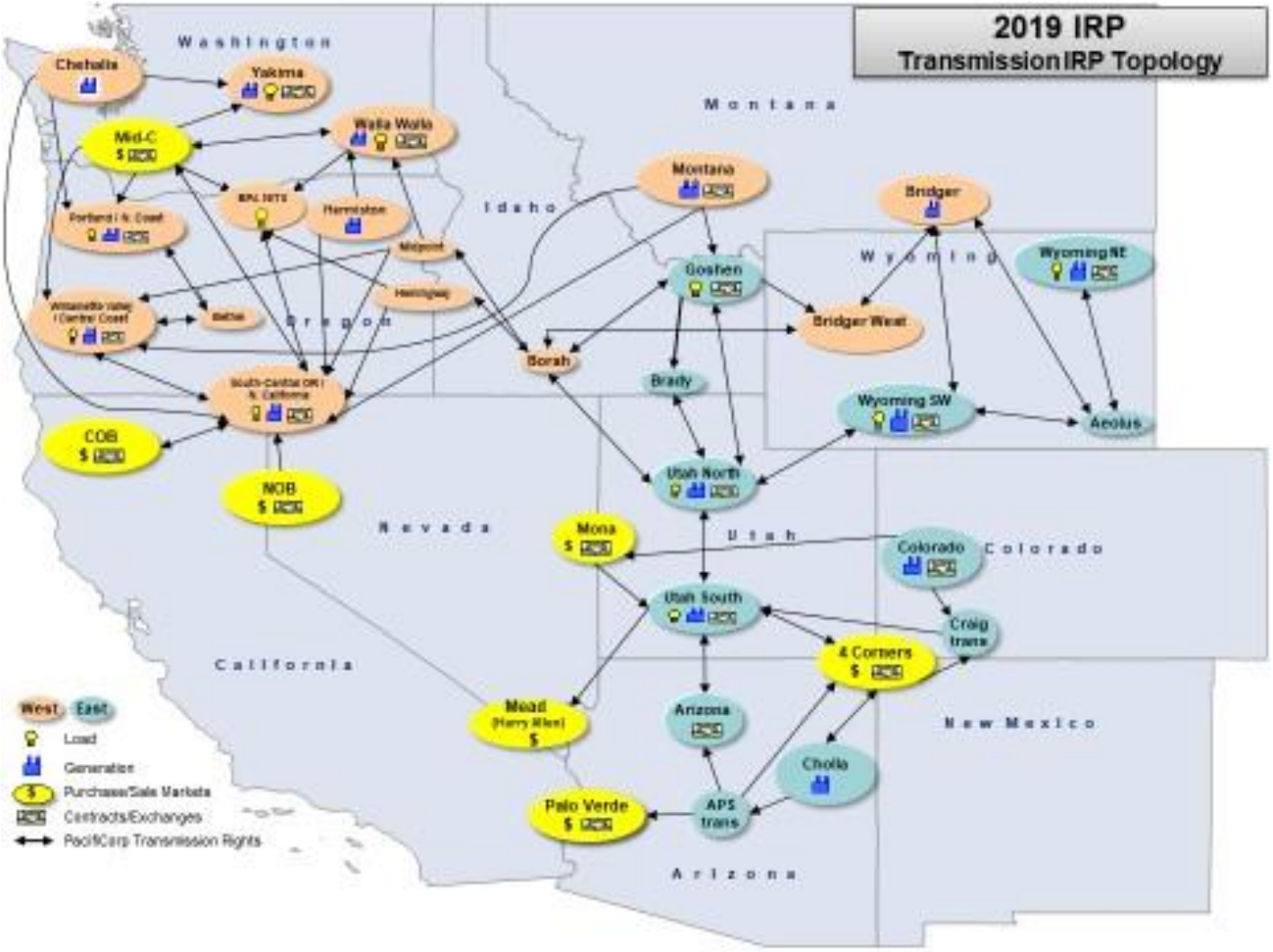
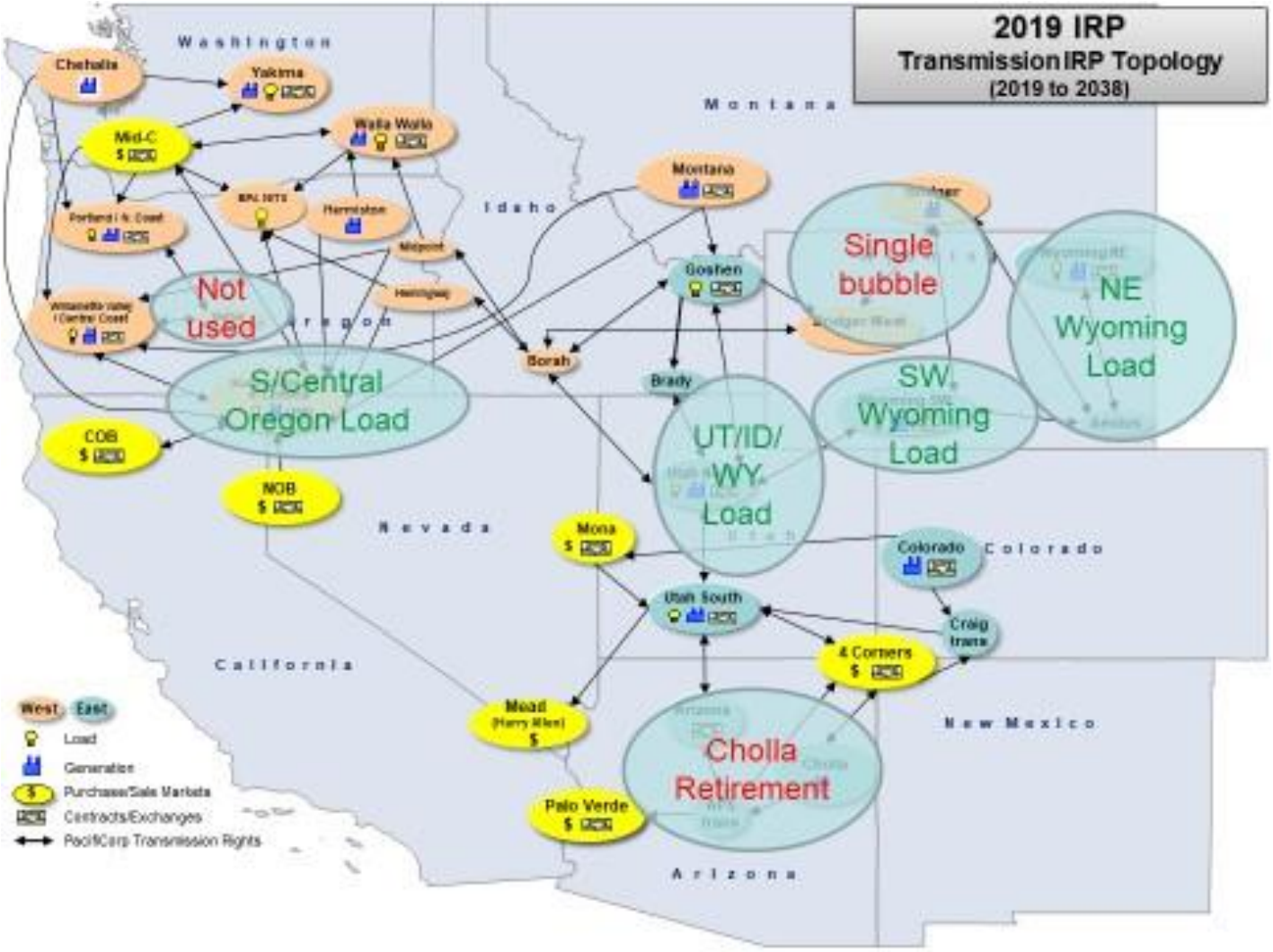
Transmission Topology Updates

- PacifiCorp has refreshed its modeled transmission topology for the 2021 IRP
  - Removed obsolete elements
  - Updated transmission ratings
  - Breaking out areas with additional detail
- Retail load and DSM is modeled by state, even for areas w/ multiple states:
  - NUT: UT/ID/WY
  - Southern Oregon-N. California
  - Walla Walla: OR/WA
  - BPA NITS: OR/WA
- Transmission upgrade options for the 2021 IRP will be presented at a future public input meeting

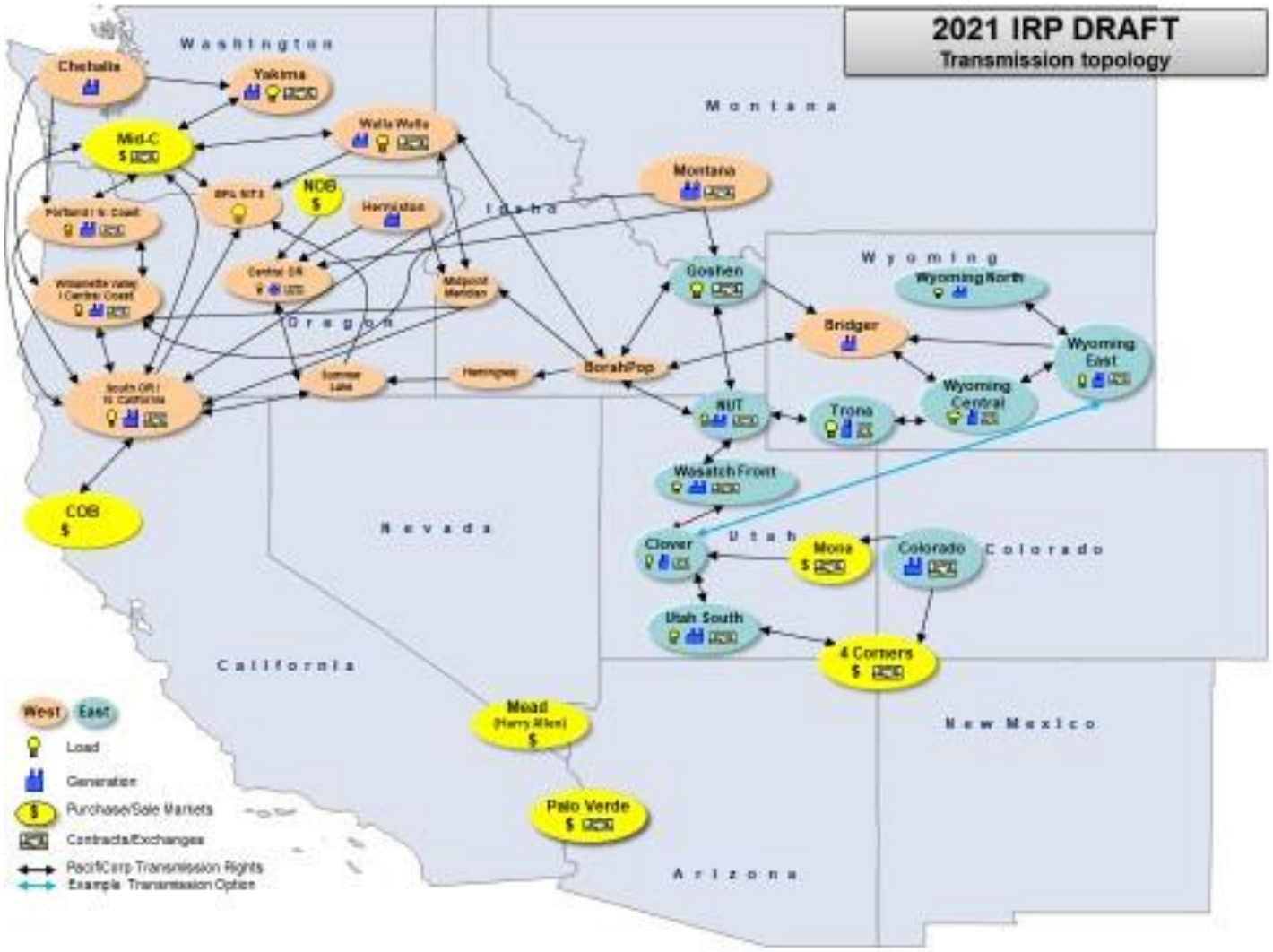
2019 IRP Topology



2019 IRP Topology Changes



2021 IRP Topology - DRAFT



All-Source 2020 Request for Proposals Update

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Introduction

- The 2020 All-Source Requests for Proposals (2020AS RFP) seeks to secure least-cost, least-risk resources consistent with the 2019 Integrated Resource Plan (IRP).
- The 2019 IRP preferred portfolio includes approximately 1,823 megawatts (MW) of new proxy solar resources co-located with 595 MW of new proxy battery energy storage system (BESS) capacity and 1,920 MW of new proxy wind resources by the end of 2024.
- Bids were accepted from new and existing resources that could achieve a December 31, 2024 on-line date—long-lead resources (i.e., pumped storage) could offer proposals having a later on-line date.
- 2020AS RFP bids were due August 10, 2020.
- Bidders were notified by PacifiCorp whether their bids were selected to the initial shortlist (ISL) on October 30, 2020.

Initial Shortlist Approach

- The 2020AS RFP ISL was established based on specific criteria.
  - 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 large generator interconnection agreements (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 System Optimizer (SO) model, which was used to establish the least-cost combination of bids needed to reliably serve PacifiCorp's retail customers.
- SO model selections do not reflect costs for interconnection network upgrades—these costs will be assessed after the transition cluster study process is completed and will be evaluated when determining the final shortlist (FSL).
- In accordance with ongoing discussions with the independent evaluators, the ISL also includes high-ranking bids (the "Additional Projects") that could trigger significant interconnection costs (based on planning assumptions used to develop the 2019 IRP)—these bids are included so that the FSL analysis can be used to determine whether such costs would eliminate them from the least-cost portfolio of bids after the transition cluster study process is completed.

Initial Shortlist Results

- 5,852 MW (SO model selections = 4,860 MW; Additional Projects = 992 MW); representing approximately 89% of the system-wide limit in Appendix H of the 2020AS RFP.
- 3,173 MW of solar or solar + storage projects (includes 1,330 MW of collocated storage capacity); 2,479 MW of wind projects; 200 MW of stand-alone storage.
- 5,140 MW offered as a power-purchase agreement/toll and 712 MW offered as build-transfer agreements.
- PacifiCorp anticipates that the final shortlist will include less total capacity relative to the ISL—network upgrade costs are expected to make some bids uneconomic.

Next Steps

- PacifiCorp Transmission is conducting its interconnection transition cluster study with an expected completion date of April 15, 2021.
- In parallel with the transition cluster study, PacifiCorp will have outside consultants review the energy performance report and capacity factor as well as additional due diligence on the ISL projects.
- PacifiCorp will begin review of pro-forma contract issues and contract development with the selected bidders during the transition cluster study window.
- Selected bids representing the 2020AS RFP final shortlist will be determined in May/June 2021 after the interconnection cost results from the PacifiCorp Transmission transition cluster study results are available and bidders have provided a bid update.
- PacifiCorp anticipates “projecting” bid selections for consideration in the portfolio development process by including ISL projects with estimates of network upgrade costs derived from projects that have interconnection studies—projects without studies will be assigned an estimate based on other projects that have studies posted on OASIS.

Stakeholder Feedback Form Update




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Stakeholder Feedback Form Update

- 59 stakeholder feedback forms submitted to date.
- Stakeholder feedback forms and responses can be located at pacificorp.com/energy/integrated-resource-plan/comments
- Depending on the type and complexity of the stakeholder feedback received responses may be provided in a variety of ways including, but not limited to, a written response, a follow-up conversation, or incorporation into subsequent public input meeting material.
- Stakeholder feedback following the previous public input meetings is summarized on the following slides for reference.

Summary - Recent Stakeholder Feedback Forms

Stakeholder	Date	Topic	Brief Summary (complete form available online)	Response (posted online when available)
Powder River Basin Resource Council (053)	Oct 24, 2020	Portfolio Development	Questions regarding how the second phase of regional haze planning will be modeled in the 2021 IRP.	Response provided.
Powder River Basin Resource Council (054)	Oct 24, 2020	Portfolio Development	Question regarding how PacifiCorp will incorporate risk, cost, and benefits regarding water use and water rights in the 2021 IRP for both coal plants planned to be early retired and those planning to run longer.	Response provided.
Able Grid Energy Solutions (055)	Oct 26, 2020	Plexos, Supply-side resources, Performance cost summary	Suggestions for market data and analytics sources for battery energy storage systems.	Targeted response the week of November 16.
Washington Utilities and Transportation Commission Staff (056)	Nov 3, 2020	October PIM	Questions regarding public participation, front office transaction limits, Plexos benchmark update, Conservation Potential Assessment results, energy efficiency bundling methodology, distributed energy resources, and recommended scenarios.	Targeted response the week of November 16.

Summary - Recent Stakeholder Feedback Forms

Stakeholder	Date	Topic	Brief Summary (complete form available online)	Response (posted online when available)
Oregon Public Utility Commission Staff (057)	Nov 6, 2020	October PIM, Front Office Transactions	Question regarding front office transaction limits.	Targeted response the week of November 16.
Wyoming Industrial Energy Consumers (058)	Nov 10, 2020	Business as Usual Cases	Recommendations for two business as usual cases to be modeled in the 2021 IRP.	Targeted response the week of November 23.
Oregon Public Utility Commission Staff (059)	Nov 10, 2020	October PIM, supply-side resources, DR, Regional Haze	Questions regarding October PIM, Conservation Potential Assessment, Demand Response, Regional Haze, and supply-side resources.	Targeted response the week of November 23.

Additional Information/Next Steps




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Additional Information

- Public Input Meeting and Workshop Presentation and Materials:
  - pacificorp.com/energy/integrated-resource-plan/public-input-process
- 2021 IRP Stakeholder Feedback Forms:
  - pacificorp.com/energy/integrated-resource-plan/comments
- IRP Email / Distribution List Contact Information:
  - IRP@PacifiCorp.com
- IRP Support and Studies:
  - pacificorp.com/energy/integrated-resource-plan/support

Next Steps

Upcoming Public Input Meeting Dates:

- December 3-4, 2020 – Public Input Meeting
- January 14-15, 2021 – Public Input Meeting
- February 25-26, 2021 – Public Input Meeting
- April 1, 2021 – File the 2021 IRP

**meeting dates are subject to change*