Northwest **Power** and **Conservation** Council

May 9, 2017

MEMORANDUM

TO: **Power Committee**

FROM: **Shirley Lindstrom, Idaho State Staff**

SUBJECT: **Pacificorp IRP Presentation**

BACKGROUND:

Presenter: Ted Weston from Pacificorp

Summary: This presentation will summarize some key takeaways from the most recent Pacificorp Integrated Resource Plan (IRP) filed in April 2017

Relevance: The Pacificorp IRP discusses how they might meet resource needs over the planning horizon with a mix of energy efficiency, demand response, renewables, and a combination of other resources that are dispatchable and fulfill annual/seasonal capacity needs.

More Info: Link to Pacificorp 2017 IRP

Attached: Pacificorp IRP Action Plan

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Action Plan

The 2017 IRP action plan identifies specific resource actions PacifiCorp will take over the next two to four years to deliver resources included in the preferred portfolio. Action items are based on the type and timing of resources in the preferred portfolio, findings from analysis completed during the development of the 2017 IRP, and other resource activities described in the 2017 IRP. Table 1.4 details specific 2017 IRP action items by category.

Table 1.4 - 2017 IRP Action Plan

Action Item	1. Renewable Resource Actions
1a	**Wind Repowering** • PacifiCorp will implement the wind repowering project, taking advantage of safe-harbor wind-turbine-generator equipment purchase agreements executed in December 2016. – Continue to refine and update the economic analysis of plant-specific wind repowering opportunities that maximize customer benefits before issuing the notice to proceed. – By September 2017, complete technical and economic analysis of other potential repowering opportunities at PacifiCorp wind plants not studied in the 2017 IRP (i.e., Foote Creek I and Goodnoe Hills). – Pursue regulatory review and approval as necessary. – By May 2018, issue the engineering, procurement, and construction (EPC) notice to proceed to begin implementing the wind repowering for specific projects consistent with updated financial analysis. – By December 31, 2020, complete installation of wind repowering equipment on all identified projects.
1b	**Wind Request for Proposals** • PacifiCorp will issue a wind resource request for proposals (RFP) for at least 1,100 MW of Wyoming wind resources that will qualify for federal wind production tax credits and achieve commercial operation by December 31, 2020. – April 2017, notify the Utah Public Service Commission of intent to issue the Wyoming wind resource RFP. – May-June, 2017, file a draft Wyoming wind RFP with the Utah Public Service Commission and the Washington Utilities and Transportation Commission. – May-June, 2017, file to open a Wyoming wind RFP docket with the Public Utility Commission of Oregon and initiate the Independent Evaluator RFP. – June-July, 2017, file a draft Wyoming wind RFP with the Public Utility Commission of Oregon and file a Public Convenience and Necessity (CPCN) application with the Public Service Commission of Wyoming. – By August 2017, obtain approval of the Wyoming wind resource RFP from the Public Utility Commission of Oregon, the Utah Public Service Commission, and the Washington Utilities and Transportation Commission.

	– By August 2017, issue the Wyoming wind RFP to the market. – By October 2017, Wyoming wind RFP bids are due. – November-December, 2017, complete initial shortlist bid evaluation. – By January 2018, complete final shortlist bid evaluation, seek acknowledgement of the final shortlist from the Public Utility Commission of Oregon, and seek approval of winning bids from the Utah Public Service Commission. – By March 2018, receive CPCN approval from the Wyoming Public Service Commission. – Complete construction of new wind projects by December 31, 2020.
1c	**Renewable Portfolio Standard Compliance** • PacifiCorp will issue unbundled REC request for proposals (RFP) to meet its state RPS compliance requirements. – As needed, issue RFPs seeking then-current-year or forward-year vintage unbundled RECs that will qualify in meeting California renewable portfolio standard targets through 2020. – As needed, issue RFPs seeking low-cost then-current-year, forward-year, or older vintage unbundled RECs that will qualify in meeting Oregon renewable portfolio standard targets, deferring the currently projected 2035 initial shortfall after accounting for preferred portfolio renewable resources.
1d	**Renewable Energy Credit Optimization** • Before filing the 2017 IRP Update, evaluate potential opportunities to re-allocate RECs from Utah, Wyoming, and Idaho to Oregon, Washington, or California. • Maximize the sale of RECs that are not required to meet state RPS compliance obligations.
Action Item	**2. Transmission Actions**
2a	**Aeolus to Bridger/Anticline** • By December 31, 2020, PacifiCorp will build the 140-mile, 500 kV transmission line running from the Aeolus substation near Medicine Bow, Wyoming, to the Jim Bridger power plant (a sub-segment of the Energy Gateway West transmission project). This includes pursuing regulatory review and approval as necessary. – June-July 2017, file a CPCN application with the Public Service Commission of Wyoming. – By March 2018, receive conditional CPCN approval from the Wyoming Public Service Commission pending acquisition of rights of way. – By December 2018, obtain Wyoming Industrial Siting permit and issue EPC limited notice to proceed. – By April 2019, issue EPC final notice to proceed. – Complete construction of the transmission line by December 31, 2020.

2b	**Energy Gateway Permitting** • Continue permitting for the Energy Gateway transmission plan, with the following near-term targets: – For Segments D1, D3, E, and F, continue funding of the required federal agency permitting environmental consultant actions required as part of the federal permits. – For Segments D, E, and F, continue to support the projects by providing information and participating in public outreach. – For Segment H (Boardman to Hemingway), continue to support the project under the conditions of the Boardman to Hemingway Transmission Project Joint Permit Funding Agreement.
3c	**Wallula to McNary 230 kV Transmission Line** • Complete Wallula to McNary project construction per plan with a 2018 expected in-service date. Continue to support the permitting and construction process for Walla Walla to McNary.
4d	**Planning Studies** • Complete planning studies that include proposed coal unit retirement assumptions from the 2017 IRP preferred portfolio and two other scenarios. • Summarize studies in the 2017 IRP Update.
Action Item	**3. Firm Market Purchase Actions**
3a	**Front Office Transactions** • Acquire economic short-term firm market purchases for on-peak summer deliveries from 2017 through 2019 consistent with the Risk Management Policy and Commercial and Trading Front Office Procedures and Practices. These short-term firm market purchases will be acquired through multiple means: – Balance of month and day-ahead brokered transactions in which the broker provides the service of providing a competitive price. – Balance of month, day-ahead, and hour-ahead transactions executed through an exchange, such as Intercontinental Exchange (ICE), in which the exchange provides the service of providing a competitive price. – Prompt month-forward, balance-of-month, day-ahead, and hour-ahead non-brokered transactions.

<table>
<tr><th>Action Item</th><th>4. Demand Side Management (DSM) Actions</th></tr>
<tr><td>4a</td><td><u>Class 2 DSM</u>
• Acquire cost-effective Class 2 DSM (energy efficiency) resources targeting annual system energy and capacity selections from the preferred portfolio as summarized in the following table. PacifiCorp's state-specific processes for planning for DSM acquisitions is provided in Appendix D in Volume II of the 2017 IRP.
<table>
<tr><th>Year</th><th>Annual Incremental Energy (GWh)</th><th>Annual Incremental Capacity* (MW)</th></tr>
<tr><td>2017</td><td>646</td><td>154</td></tr>
<tr><td>2018</td><td>559</td><td>128</td></tr>
<tr><td>2019</td><td>571</td><td>131</td></tr>
<tr><td>2020</td><td>527</td><td>122</td></tr>
</table>
*Class 2 DSM capacity figures reflect projected maximum annual hourly energy savings, which is similar to a nameplate rating for a supply-side resource.</td></tr>
<tr><th>Action Item</th><th>5. Coal Resource Actions</th></tr>
<tr><td>5a</td><td><u>Hunter Units 1 and 2</u>
• The EPA's final Regional Haze Federal Implementation Plan (FIP) for Utah requires the installation of selective catalytic reduction (SCR) on Hunter Units 1 and 2 in 2021 and is currently under appeal by the state of Utah and other parties in the U.S. Tenth Circuit Court of Appeals.
• As influenced by the litigation schedule and outcomes, PacifiCorp will update its economic analysis of alternative Regional Haze compliance strategies for the units, as applicable, and will provide the associated analysis in a future IRP or IRP Update.</td></tr>
<tr><td>5b</td><td><u>Huntington Units 1 and 2</u>
• The EPA's final Regional Haze FIP for Utah requires the installation of SCR on Huntington Units 1 and 2 in 2021 and is currently under appeal by the state of Utah and other parties in the U.S. Tenth Circuit Court of Appeals.
• As influenced by the litigation schedule and outcomes, PacifiCorp will update its economic analysis of alternative Regional Haze compliance strategies for the units, as applicable, and will provide the associated analysis in a future IRP or IRP Update.</td></tr>
<tr><td>5c</td><td><u>Dave Johnston Unit 3</u>
• The EPA's final Regional Haze FIP requires the installation of SCR at Dave Johnston Unit 3 in 2019 or a commitment to shut down Dave Johnston Unit 3 by the end of 2027. PacifiCorp's commitment to the latter must be included in a permit before the 2019 compliance deadline.
• PacifiCorp will update its analysis of the commitment to shut down Dave Johnston Unit 3 by the end of 2027 as part of its 2017 IRP Update.</td></tr>
</table>

5d	**Jim Bridger Units 1 and 2** • The Wyoming Regional Haze State Implementation Plan (SIP) and EPA's final Regional Haze FIP for Wyoming require the installation of SCR on Jim Bridger Units 1 and 2 in 2021 and 2022. • PacifiCorp will update its economic analysis of alternative Regional Haze compliance strategies for the units and will provide the associated analysis in its 2017 IRP Update.
5e	**Naughton Unit 3** • PacifiCorp will update its economic analysis of natural gas conversion in its 2017 IRP Update.
5f	**Wyodak** • Continue to pursue PacifiCorp's appeal of the portion of EPA's final Regional Haze FIP that requires the installation of SCR at Wyodak, recognizing that the compliance deadline for SCR under the FIP is currently stayed by the court. • If following appeal, EPA's final FIP as it pertains to installation of SCR at Wyodak is upheld (with a modified schedule that reflects the final stay duration), PacifiCorp will update its evaluation of alternative compliance strategies that will meet Regional Haze compliance obligations and provide the associated analysis in a future IRP or IRP Update.
5g	**Cholla Unit 4** • EPA has approved the Arizona SIP incorporating an alternative Regional Haze compliance approach that avoids installation of SCR with a commitment to cease operating Cholla Unit 4 as a coal-fueled resource by the end of April 2025, with the option of natural gas conversion thereafter. • PacifiCorp will update its evaluation of Cholla Unit 4 alternatives that meet its Regional Haze compliance obligations and provide the associated analysis in a future IRP or IRP Update.
5h	**Craig Unit 1** • EPA is yet to approve the Colorado SIP incorporating an alternative Regional Haze compliance approach that avoids installation of SCR with a commitment to cease operating Craig Unit 1 as a coal-fueled resource by the end of 2025, with an option for natural gas conversion. • PacifiCorp will update its evaluation of Craig Unit 1 alternatives that meet its Regional Haze compliance obligations and provide the associated analysis in a future IRP or IRP Update, as required.

PacifiCorp
2017 Integrated Resource Plan

The Northwest Power and Conservation Council

Power Committee Meeting

May 16, 2017




PACIFICORP
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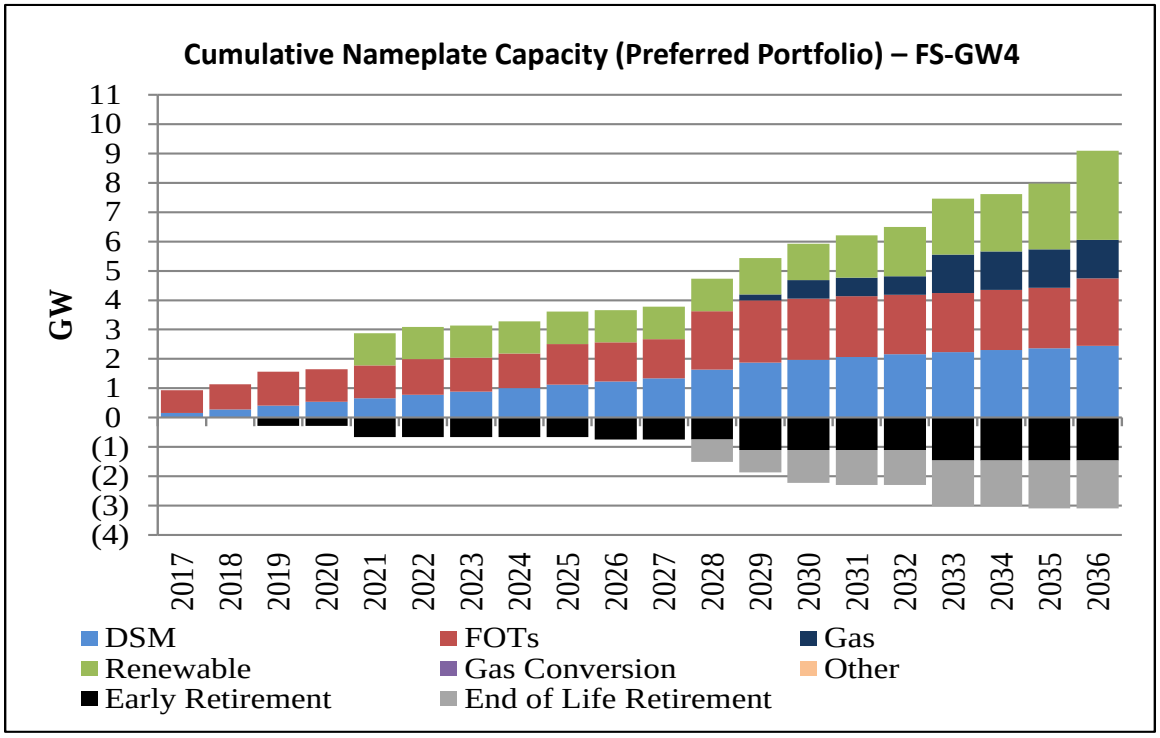
2017 IRP Activities and Milestones

- 7 Public Input Meetings
  - Initiated June 21, 2016
  - 5 of the 6 meetings scheduled as two-day sessions
  - One phone conference
- 5 state-specific Meetings
  - Held over the course of June 2016
- Portfolio Modeling
  - 7 Regional Haze Cases
  - 8 Core Cases
  - 24 Sensitivity Cases
  - 10,000+ simulations
- Stakeholder Feedback Forms
- Updated/New Studies
  - Demand-Side Resource Assessment Study
  - Private Generation Study
  - Flexible Reserve Study
    - Wind integration costs
    - Solar integration costs
  - Planning Reserve Margin Study
  - Wind & Solar Capacity Contribution Study
  - Stochastic Parameter Study
  - Western Resource Adequacy Assessment
  - Load and Resource Balance
- File Date: April 4, 2017

Preferred Portfolio: Composition

- In the first ten years of the planning horizon, PacifiCorp's incremental resource needs are met with additional renewable resources, demand side management (DSM) resources, and front office transactions (FOTs).
- In the second ten years, there is an increased need for renewable resources, DSM, FOTs, and natural gas-fired generation to meet incremental load growth with assumed coal unit retirements.



Preferred Portfolio: Highlights

Renewable Energy

- Repowering 905 MW of existing wind resources by the end of 2020 will provide production tax credit (PTC) benefits for ten years, increase energy production, and extend the asset life of these facilities, and have significant cost savings for customers.
- An additional 1,100 MW of low-cost wind resources are added by the end of 2020, providing additional zero emission energy and PTC incremental benefits for PacifiCorp's customers.
- By the end of the 20-year planning horizon, the preferred portfolio includes an additional 859 MW of new wind and 1,040 MW of new solar between the 2028-2036 timeframe.

Wholesale Market Purchases

- Summer front office transactions average 817 MW, down 29 percent relative to the 2015 IRP Update preferred portfolio.

Existing Coal and New Natural Gas Resources

- The resource mix reflects a cost-conscious transition that is increasingly less reliant on coal generation without major incremental emission control retrofits; focused on alternative compliance outcomes.
- Assumed coal unit retirements total 749 MW by 2025 and 3,650 MW by the end of 2036.
- By the end of the planning horizon, natural gas-fired capacity totals 1,313 MW, a reduction of 1,540 MW relative to the 2015 IRP preferred portfolio.
- By the end of the planning period, system CO_2 emissions are projected to fall by 24.5 percent.

Wind Repowering

Benefits of Wind Repowering

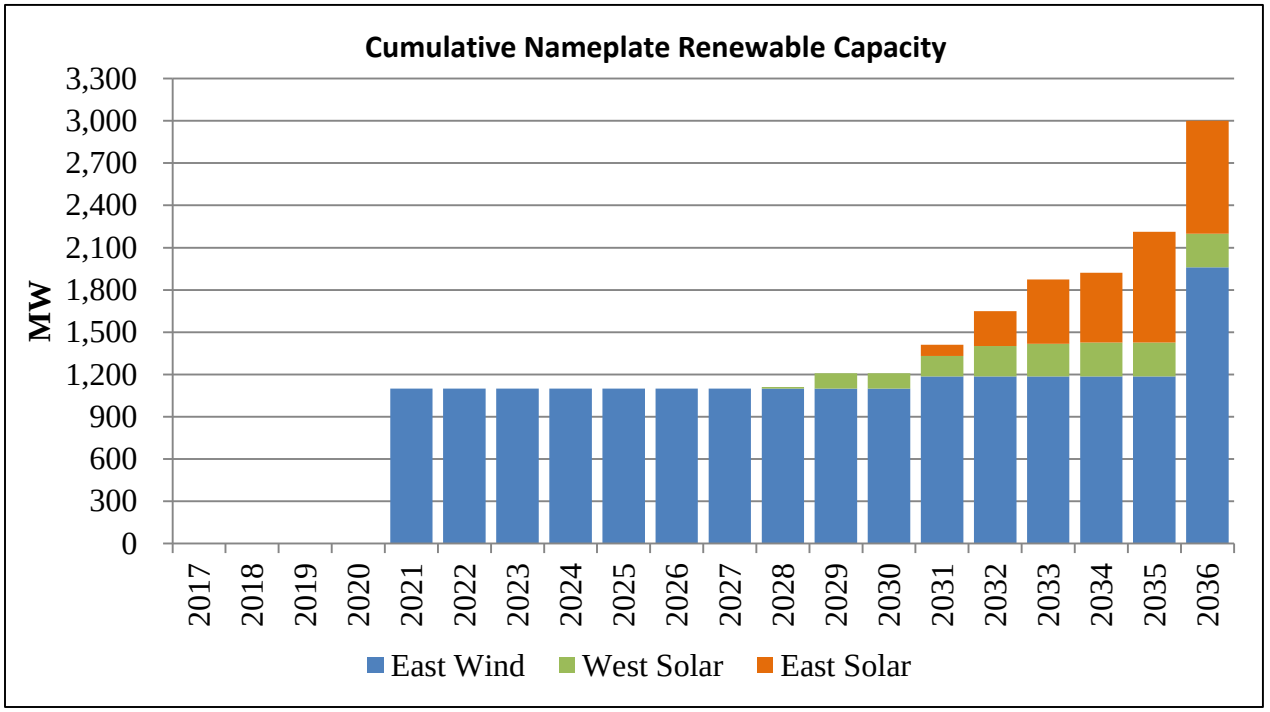
- Projects capture an additional 10-years of production tax credits (PTCs) for the full output of each repowered facility—these savings are passed through to customers.
- Modern technology and longer blade lengths increase annual energy production by an estimated 11% to 32%, depending upon the project.
- Existing foundations and towers are utilized, resulting in minimal environmental impact and permitting requirements.
- New equipment reduces future operating costs.
- Re-sets assumed 30-year project life.

Repowering Overview

- PacifiCorp executed wind turbine generator (WTG) equipment purchases in December 2016 with General Electric and Vestas.
- These “Safe Harbor” equipment purchases support repowering of the Wyoming wind fleet (Glenrock, Rolling Hills, Seven Mile Hill, High Plains, McFadden Ridge, and Dunlap), the Marengo project in Washington, and the Leaning Juniper project in Oregon by the end of 2020, enabling the projects to qualify for 100% of PTCs.
- PacifiCorp continues to assess other repowering opportunities.
- Repowered WTGs must meet the Internal Revenue Service 80/20 test, meaning that the retrofitted WTG qualifies for PTCs if the fair market value of the retained property (i.e., tower and foundation) is no more than 20% of the facility’s total value after installation of the new property (i.e., nacelle and blades).

Preferred Portfolio: Renewables

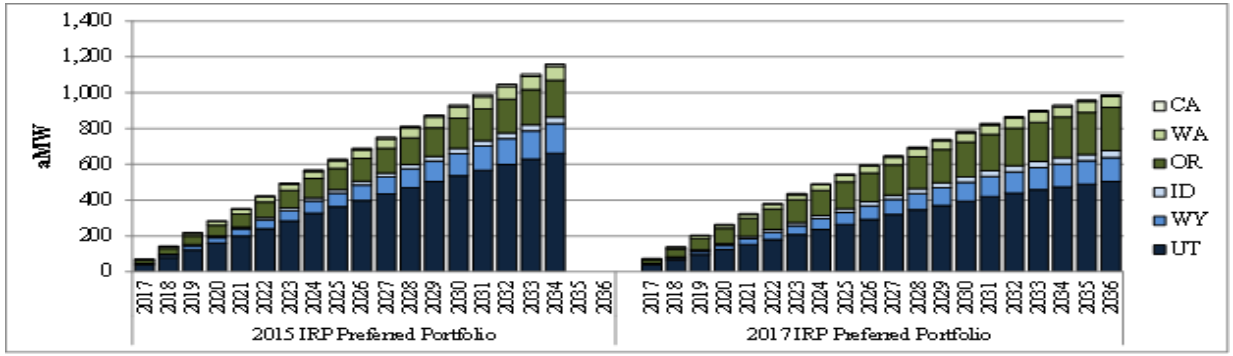
- In addition to repowered wind, the preferred portfolio includes 1,100 MW of new wind in 2021 (proxy for year-end 2020) in Wyoming.
- By 2036, new wind capacity totals 859 MW (85 MW in Wyoming in 2031 and 774 MW in Idaho in 2036) and new solar capacity of 1, 040MW (239 MW in the west and 801 MW in the east).



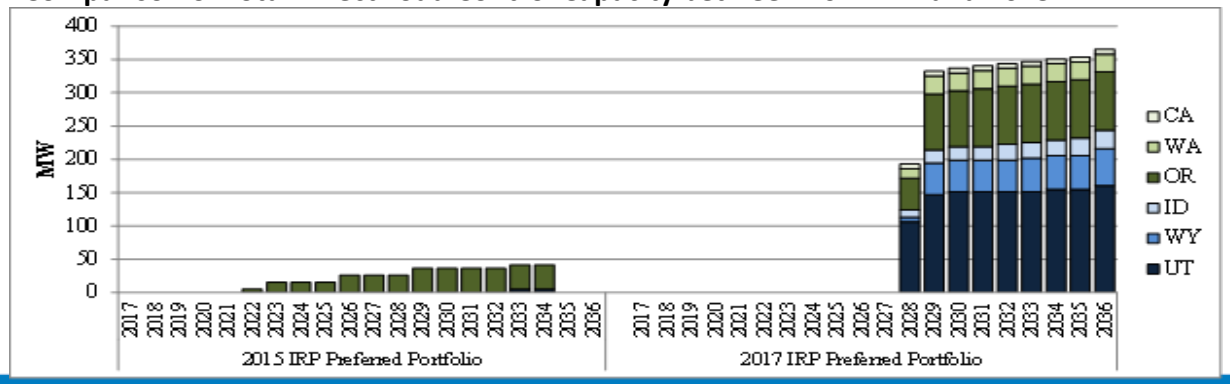
Preferred Portfolio: DSM

- Energy efficiency meets 88% of forecasted load growth (up from 86% in the 2015 IRP).
- Decreased selection vs. 2015 driven by reduced loads, reduced costs for wholesale power, and renewable alternatives.
- Direct load control (DLC) increase is largely coincident with coal retirements, emphasizing transitional role.

Comparison of Total Energy Efficiency Savings between 2017 IRP and 2015 IRP

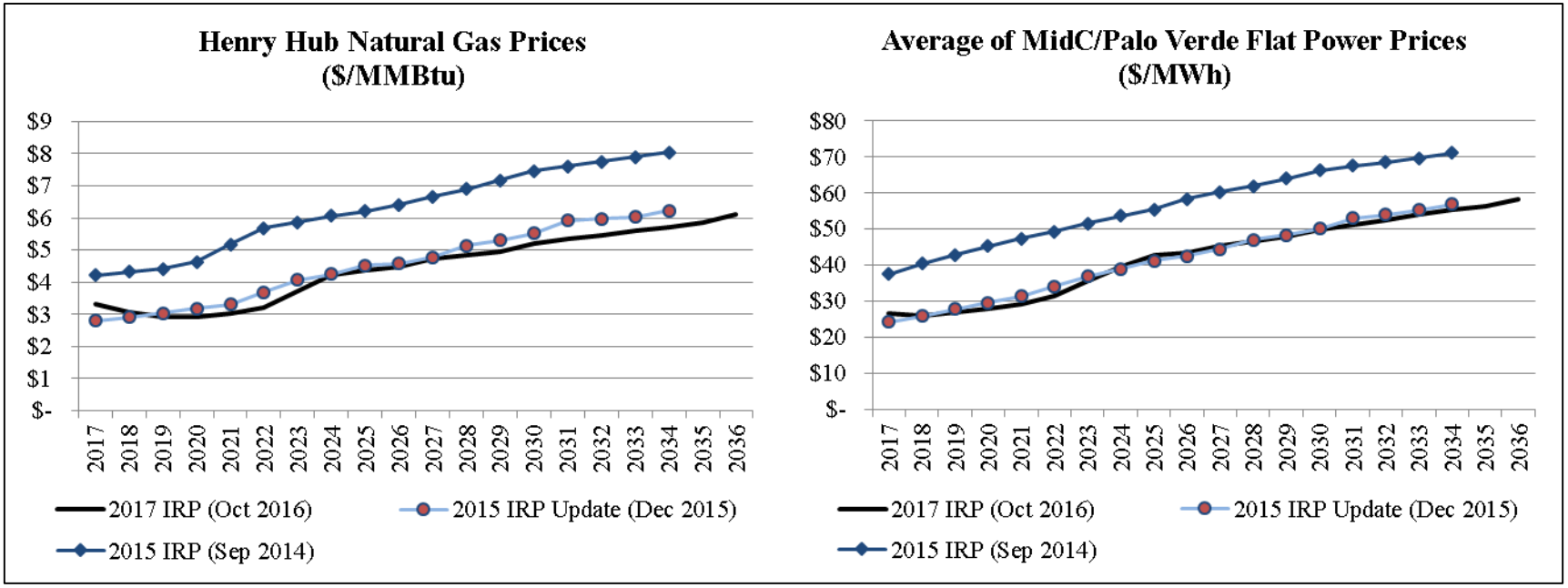


Comparison of Total Direct Load Control Capacity between 2017 IRP and 2015 IRP



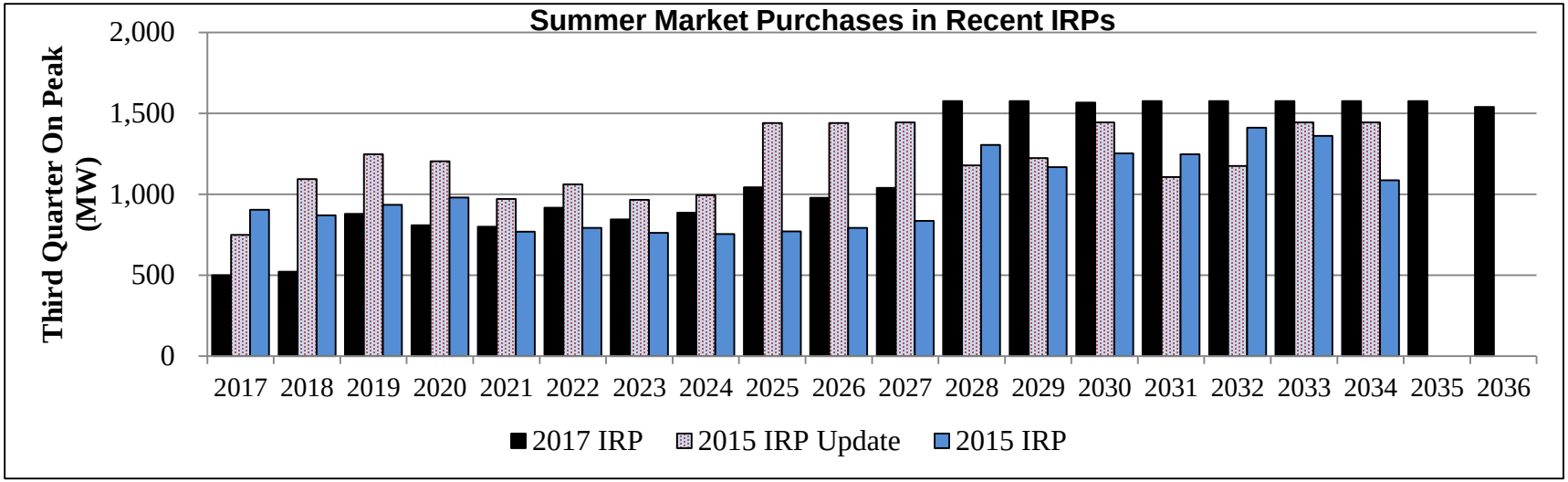
Preferred Portfolio: Market Prices

- Forecasted wholesale power prices and natural gas prices in 2017 IRP are lower than 2015 IRP.
- Growth in natural gas supplies, primarily from prolific shale plays in North America, have outpaced expectations.
- With continued decline in forward natural gas prices and on-going reductions in regional electric load growth expectations, forward power prices have also declined since the 2015 IRP.



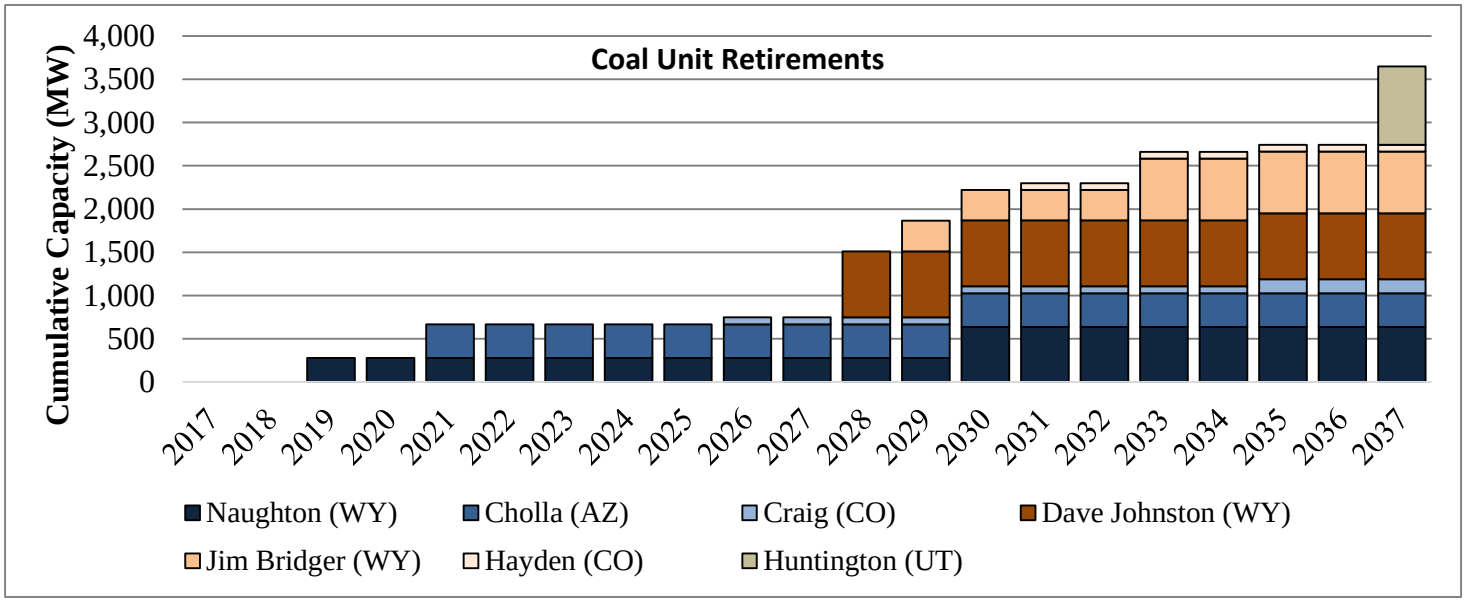
Preferred Portfolio: Front Office Transactions

- Through the first ten years of the planning horizon, summer front office transactions (FOTs) average 817 MW, down by 29 percent relative to the 2015 IRP Update preferred portfolio.
- Summer FOT purchases are primarily in west side markets (MidC, COB, and NOB).
- East side summer FOTs, which are generally priced at a premium to markets in the west, do not appear in the preferred portfolio until 2026.



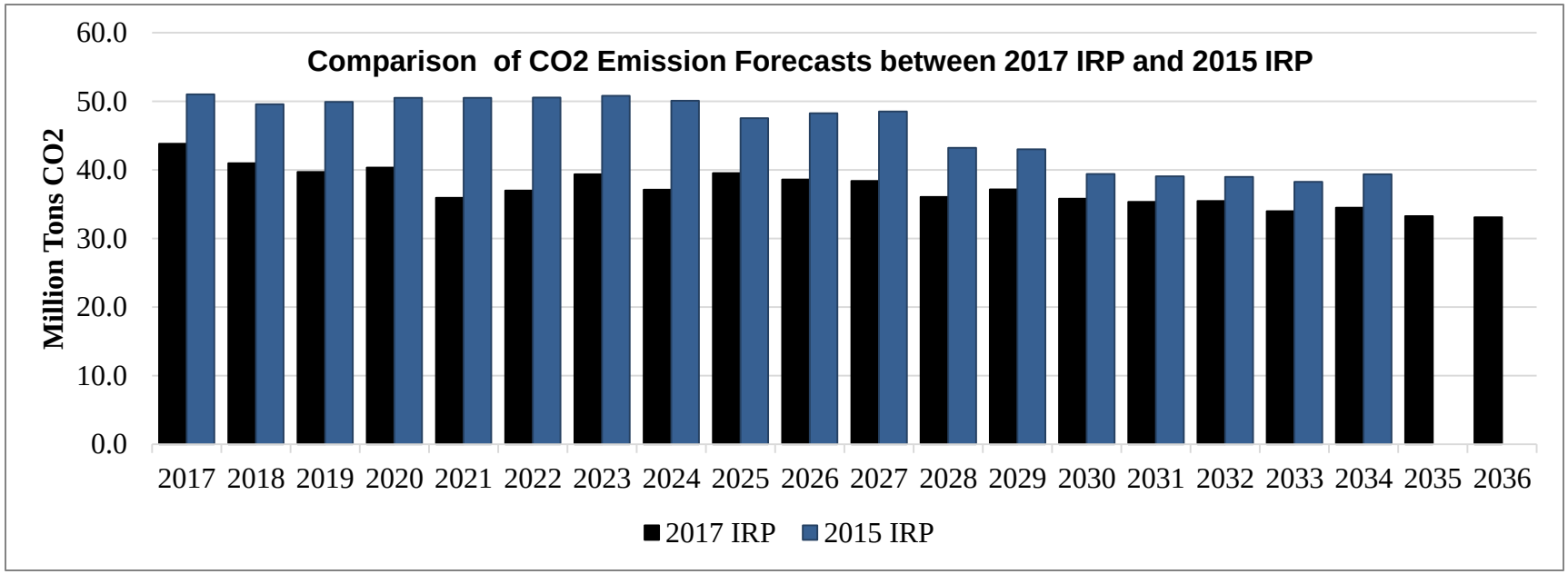
Preferred Portfolio: Coal Unit Retirements

- 749 MW of existing coal-fired generation retired by 2025 and 3,650 MW by the end of 2036 (including assumed coal retirements at the end of 2036 as shown below).
- PacifiCorp will continue to review emerging technologies, re-assess traditional gas conversion technologies and costs, and consider other potential alternatives that could be applied to Naughton Unit 3 and Cholla Unit 4 to allow continued operation beyond 2018 and 2020, respectively.
- The first SCCT natural gas resource is added in 2029 (one year later than in the 2015 IRP).
- The first CCCT natural gas resource is added in 2030 (two years later than in the 2015 IRP).



Preferred Portfolio: CO_2 Emission Forecasts

- Over the first ten years, average annual CO_2 emissions are down by 21 percent (10.5 million tons) relative to the 2015 IRP.
- By the end of the study period 2036, system CO_2 emissions are projected to fall from 43.8 million tons in 2017 to 33.1 million tons in 2036 – a 24.5 percent reduction.



Key Action Plan Items

Wind Repowering

- December 2016 – safe harbor equipment purchases
- September 2017 – complete technical and economic analysis
- May 2018 – issue engineering, procurement, and construction (EPC) notice
- December 2020 -- complete installation

Wind RFP

- 1,100+ MW Wyoming wind, 100% PTC, operational by December 31, 2020

Renewable Portfolio Standard (RPS) Compliance and REC Optimization

- Issuance of RFPs as needed
- 2017 – Optimize REC purchases and sales for compliance and customer benefit

Transmission

- December 2020 – build Aeolus to Bridger/Anticline (sub-segment D2)
- Energy Gateway continued permitting (other sub-segments)
- Complete Wallula to McNary Transmission Line
- Complete planning studies for the 2017 IRP Update

Key Action Plan Items (continued)

Front Office Transactions

- Acquire economic short-term firm for on-peak summer deliveries

DSM

- Acquire cost-effective Class 2 DSM (energy efficiency) resources per preferred portfolio

Year	Annual Incremental Energy (GWh)	Annual Incremental Capacity* (MW)
2017	646	154
2018	559	128
2019	571	131
2020	527	122

Coal Resource Actions

- Continued least-cost, least-risk assessment of retirements versus selective catalytic reduction (SCR)
- No SCR selected in the preferred portfolio
- Naughton 3 retirement end of 2018 indicated by preferred portfolio