



PacifiCorp's 2017 Integrated Resource Plan Update

Public Utility Commission of Oregon
Public Meeting - July 3, 2018





2017 IRP Update Highlights

- Energy Vision 2020 projects updated with the latest cost-and-performance information.
 - Per the 2017 IRP acknowledgement order, PacifiCorp will provide quarterly updates to the Commission and Staff as development of the projects chosen in the 2017R RFP and the transmission projects proceed (through the date the projects go into service). The first update will be provided early July 2018.
- With reduced loads and lower renewable resource costs, the updated preferred portfolio contains no new natural gas resources through the 20-year planning horizon.
- Through the end of 2036, the updated preferred portfolio includes over 2,700 MW of new wind resources, 1,860 MW of new solar resources, 1,877 MW of incremental energy efficiency resources, and approximately 268 MW of direct-load control resources.
- The updated preferred portfolio continues to assume a reduction in existing owned coal capacity of 3,650 MW through the end of 2036 with no incremental selective catalytic reduction (SCR) systems needed to satisfy regional haze compliance obligations.
- Coincident system peak load is down an average of 424 MW in the first ten years of the planning period.



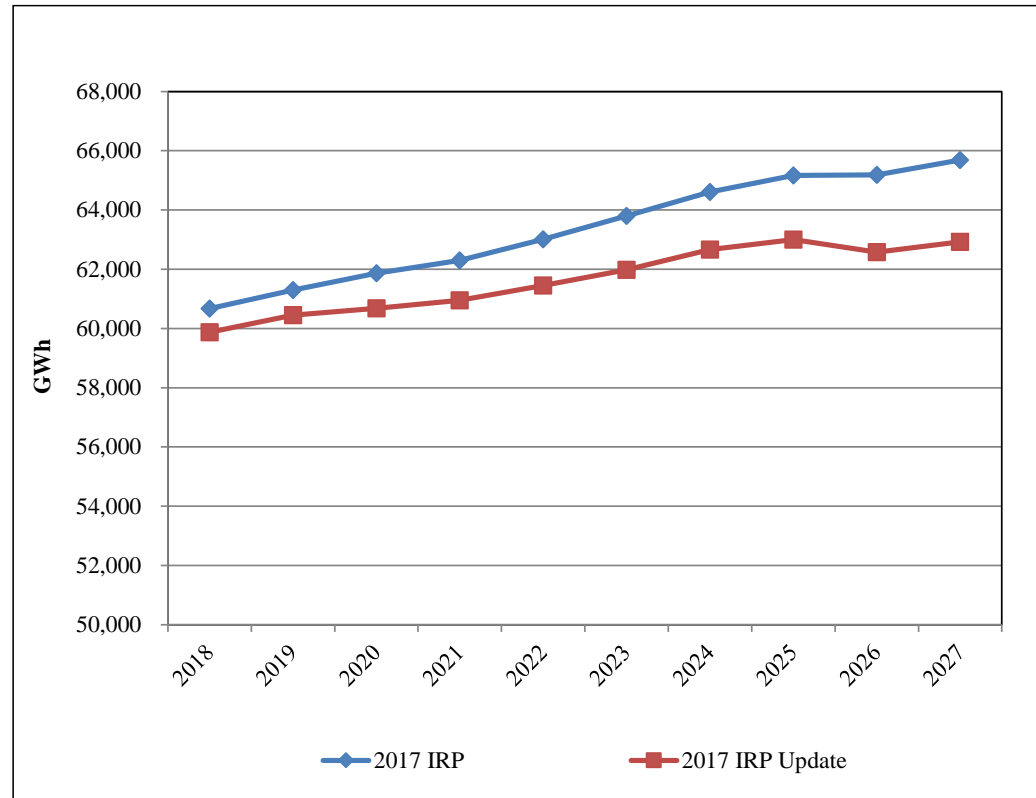
2017 IRP Order Requirements

2017 IRP OPUC Acknowledgement Order – Requirements for 2017 IRP Update	Reference to 2017 IRP Update
Update analysis of the Energy Vision 2020 projects as part of its 2017 IRP Update, including any changes resulting from the 2017R RFP or changes to critical assumptions, such as availability of tax credits corporate tax rate, then-current cost-and-performance data for repowered wind resources, cost-and-performance data from the 2017R RFP final shortlist, and cost assumptions for the transmission projects.	Chapter 7 – Energy Vision 2020 Update; updated assumptions and analysis.
PacifiCorp is to report back in its 2017 IRP Update as to the current and forecasted use of front office transactions through 2036 and any changes in assumptions impacting front office transaction use from the initial filing of LC 67 in April 2017.	Table 1.1 – Comparison of 2017 IRP Update with the 2017 IRP preferred portfolio; Chapter 5 – Modeling and Assumptions Update; no changes to FOT assumptions and Chapter 10 – Action Plan Status Update (item 3a).
In the IRP Update PacifiCorp will explain the reasons for the (sometimes) low correlation in the short-term forecast.	Chapter 5 – Modeling and Assumptions Update; description and examples.
In the IRP Update PacifiCorp will model natural gas and storage for meeting flexible reserve study needs.	To be addressed when Flexible Reserve Study is updated in 2019 IRP; not updated for 2017 IRP Update.
PacifiCorp, Staff and parties should discuss a potential study of the capacity value of renewing QFs, and Staff shall bring this issue to a public meeting before the 2017 IRP Update.	Due to timing of the 2017 IRP acknowledgement order, PacifiCorp will address in the 2019 IRP.



Load Forecast Comparison (GWh)

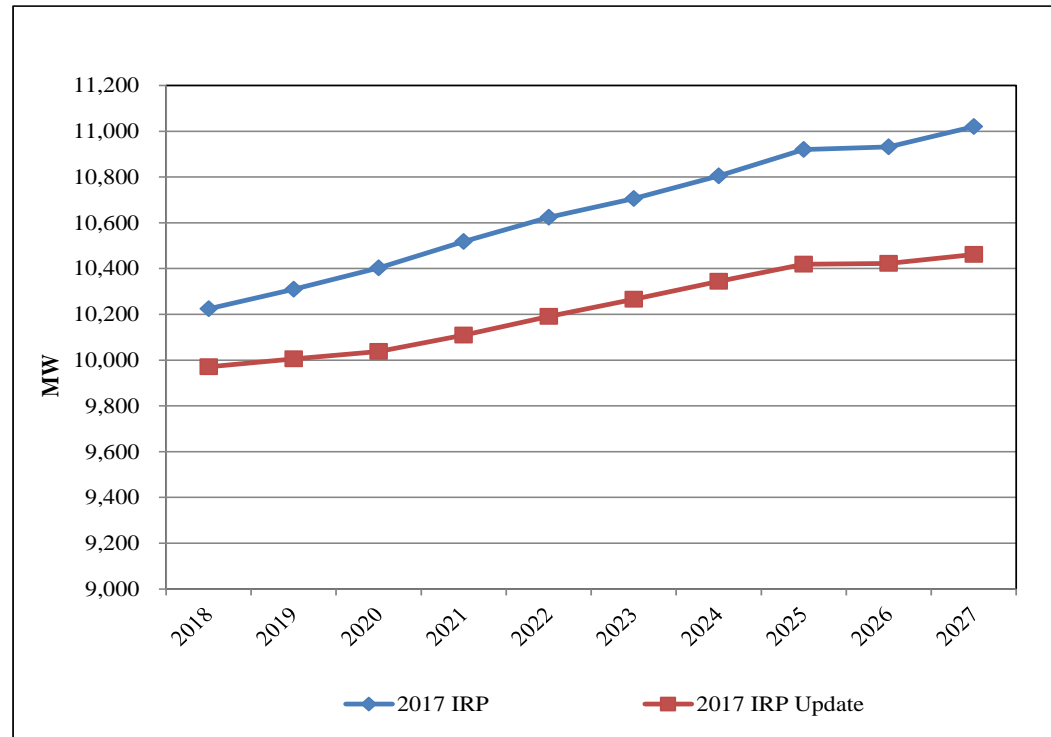
- Relative to the load forecast prepared for the 2017 IRP, PacifiCorp's 2027 forecasted energy requirement decreased in all jurisdictions other than Oregon and Idaho.
- Overall, the PacifiCorp system energy requirement decreased approximately 4.2 percent.
- These data exclude projected load reductions from new energy efficiency measures (Class 2 DSM).





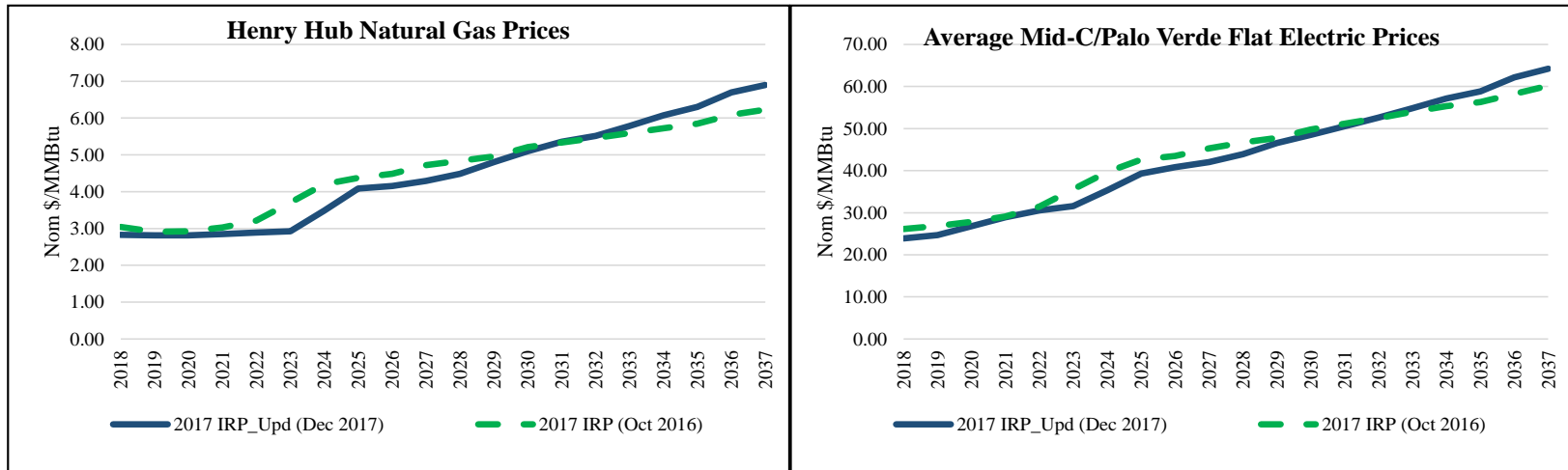
Coincident System Peak Load

- Coincident system peak is decreased by roughly 424 MW on average across the first ten years of the planning period relative to the 2017 IRP. Contributing factors include:
 - Less favorable outlook for the industrial segment
 - Adoption of more efficient appliances by residential customers
- These data exclude projected load reductions from new energy efficiency measures (Class 2 DSM).





Power and Natural Gas Price Comparison



- Forecasted natural gas and energy prices have declined in the 2017 IRP Update from the 2017 IRP through roughly the 2030-2031 time frame.
- Domestic gas price forecasts continue to be driven down by growth in unconventional shale-gas plays. This in turn (combined with lower forecasted regional loads) impacts forward market power prices.



Emissions Policies and Pricing

Clean Power Plan (CPP)

- On March 28, 2017, President Trump issued an Executive Order directing the U.S. Environmental Protection Agency (EPA) to review the Clean Power Plan (CPP) and, if appropriate, suspend, revise, or rescind the CPP, as well as related rules and agency actions.
- On October 10, 2017, the EPA issued a proposal to repeal the CPP and the EPA took comments on the proposed repeal until April 26, 2018.
- In addition, the EPA published in the Federal Register an Advance Notice of Proposed Rulemaking December 28, 2017, seeking public input on, without committing to, a potential replacement rule. The public comment period for the Advance Notice of Proposed Rulemaking concluded February 26, 2018.

Modeling Assumptions

- PacifiCorp will continue to follow activities related to the CPP; however, the company has not included the CPP in its assumptions for the 2017 IRP Update. Rather, the 2017 IRP Update includes a medium CO2 price assumption starting in 2030 to reflect possible regulatory changes in the future.



Resource Portfolio

Renewables

- PacifiCorp's 2017 IRP Update preferred portfolio includes updated cost-and-performance information for the Energy Vision 2020 projects
 - 1,311 MW of new wind
 - Repowering just over 999 MW of existing wind capacity
 - New 140-mile, 500 kilovolt (kV) Aeolus-to-Bridger/Anticline transmission line in Wyoming.

Demand Side Management

- 1,877 MW of incremental energy efficiency resources, and approximately 268 MW of direct-load control resources.

Thermal

- With reduced loads and lower renewable resource costs, the updated preferred portfolio contains no new natural gas resources through the 20-year planning horizon. This is the first time an IRP has not included new fossil-fueled generation as a least-cost, least-risk resource for PacifiCorp.



2017 IRP Update Preferred Portfolio

2017 IRP Update

Resource	Capacity (MW)																				10- year Total	
	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2017-2036	
Expansion Options																						
Gas - CCCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gas- Peaking	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DSM - Energy Efficiency	150	119	126	122	105	99	96	95	100	96	90	90	84	88	87	75	70	63	61	61	1,877	
DSM - Load Control	-	-	-	-	-	-	-	-	-	-	-	-	68	-	-	-	50	48	90	12	268	
Renewable - Wind	-	-	-	911	400	-	-	-	-	-	-	-	-	121	-	-	800	-	333	149	2,713	
Renewable - Geothermal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Renewable - Utility Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	651	95	132	976	-	6	-	1,860	
Renewable - Biomass	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Storage - Pumped Hydro	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Storage - CAES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Storage - Other	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	
Front Office Transactions - Summer *	402	319	624	463	395	445	419	428	538	499	500	1,247	1,575	1,575	1,575	1,575	1,575	1,564	1,575	1,544	942	
Front Office Transactions - Winter *	253	308	303	296	303	305	310	304	317	330	343	357	758	794	809	776	868	924	1,031	1,486	559	
Nuclear	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
IGCC with CCS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Existing Unit Changes																						
Coal Early Retirement/Conversions	-	-	(280)	-	(387)	-	-	-	-	(82)	-	-	(354)	-	-	-	(359)	-	-	-	(1,463)	
Thermal Plant End-of-life Retirements	-	-	-	-	-	-	-	-	-	-	-	(762)	-	(357)	(77)	-	(358)	-	(82)	-	(1,635)	
Coal Plant Gas Conversion Additions	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Turbine Upgrades	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total	805	746	774	1,792	815	848	825	827	954	843	934	933	2,132	2,871	2,489	2,559	3,623	2,599	3,014	3,252		

* FOT in resource total are 20-year averages



Regional Haze Cases

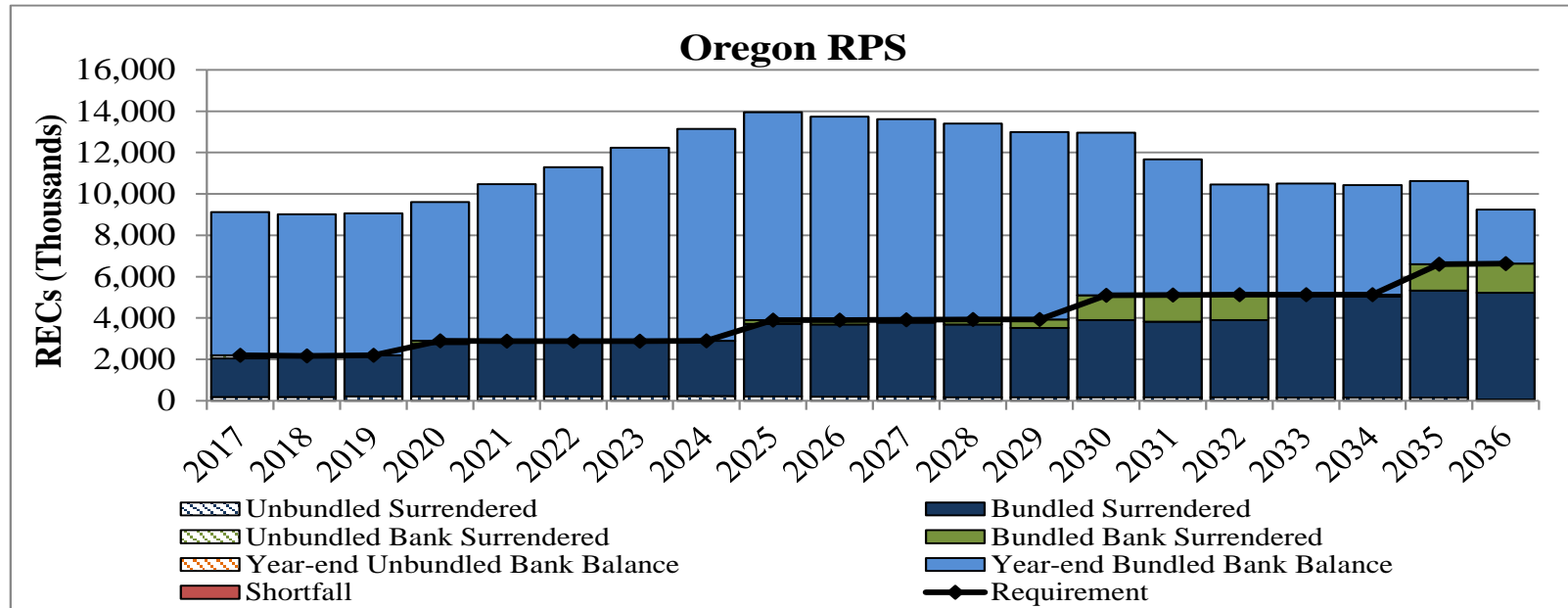
In accordance with action items in the 2017 IRP action plan, PacifiCorp completed four regional haze cases in the 2017 IRP Update that included studies for Naughton Unit 3, Cholla Unit 4, Dave Johnston Unit 3, and Jim Bridger Units 1 and 2.

- Consistent with the findings from these studies, the 2017 IRP Update continues to assume no incremental selective catalytic reduction (SCR) emission-reduction systems will be needed to satisfy regional haze compliance obligations.
- PacifiCorp continues to assume Cholla Unit 4 retires at the end of 2020, Dave Johnston Unit 3 retires at the end of 2027, and Jim Bridger Units 1 and 2 retire at the end of 2028 and 2032, respectively.
- The 2017 IRP Update assumes Naughton Unit 3 retires end of January 2019, shifted one month from the 2017 IRP that assumed retirement at the end of 2018.

PacifiCorp provided the Dave Johnston early retirement transmission analysis to the Commission and parties as required in the 2017 IRP acknowledgement order as part of the 2017 IRP Update work papers.



Oregon RPS Compliance Position



- Oregon RPS compliance is achieved through 2036. As shown in Figure 8.1 of the 2017 IRP Update, no additional REC purchases are required to achieve Oregon RPS compliance through 2036.