PacifiCorp
2017 Integrated Resource Plan

Washington Utilities and Transportation Commission

July 11, 2017




PACIFICORP
A BERKSHIRE HATHAWAY ENERGY COMPANY

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 Highlights

Renewable Resources and Transmission

- 905 MW of upgraded ("repowered") wind resources, all by the end of 2020
- 1,959 MW of new wind resources (1,100 MW by the end of 2020 with a new 500 kV transmission line in Wyoming)
- 1,040 MW of new solar resources.

Demand Side Management

- 2,077 MW ("nameplate") of incremental energy efficiency
- 365 MW of incremental direct load control

Wholesale Market Purchases

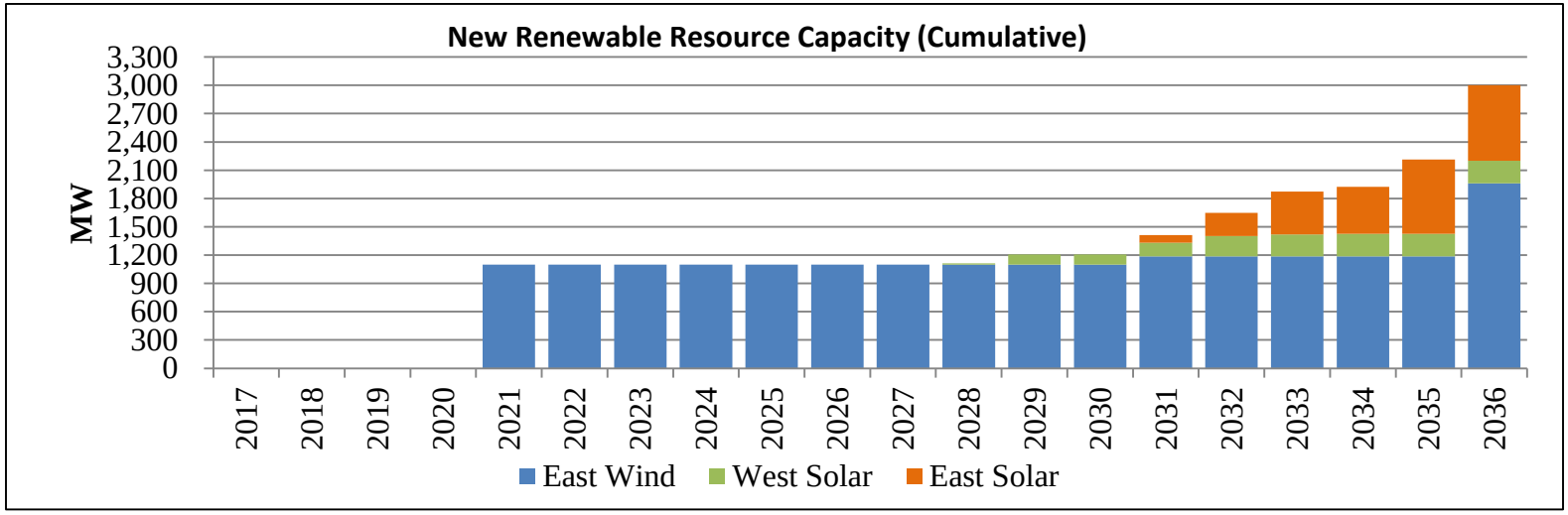
- Summer front office transactions average 817 MW per year, down 29 percent relative to the 2015 IRP Update preferred portfolio

Existing Coal and New Natural Gas Resources

- Assumed coal unit retirements total 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.

Renewable Resources and Transmission

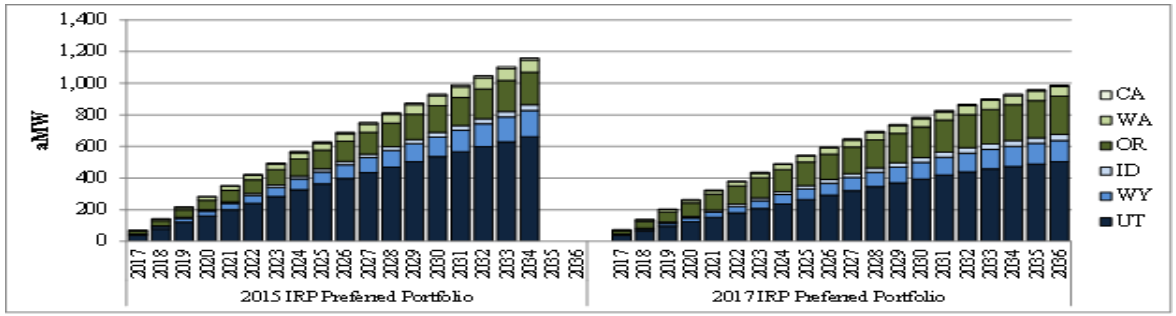
- Repowering of at least 905 MW of existing wind capacity by the end of 2020, will provide production tax credit (PTC) benefits for ten years, increase energy production, and extend the asset life of these facilities, resulting in significant cost savings for customers.
- A new 144 mile, 500 kV transmission line in Wyoming with 1,100 MW of new low-cost wind resources added by the end of 2020, will relieve transmission congestion for existing resources and provide additional zero-emission energy while providing all-in economic benefits for customers.
- 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 totals 1,040 MW (239 MW in the west and 801 MW in the east).



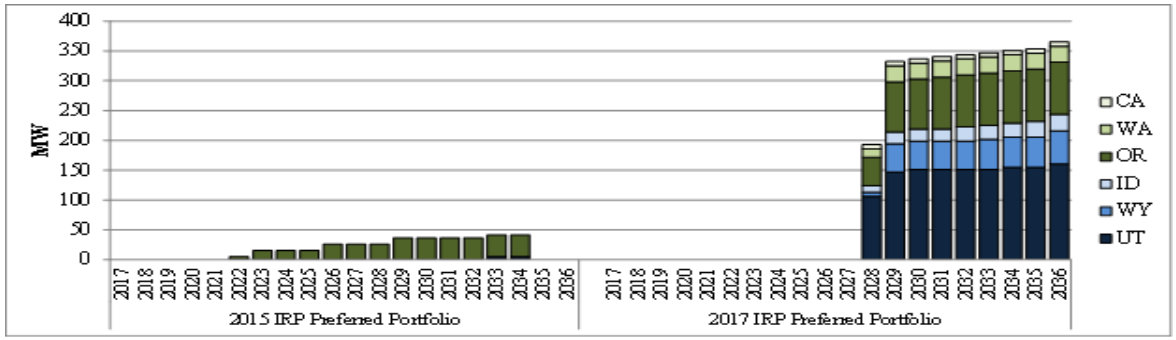
Demand Side Management

- Energy efficiency meets 88% of forecasted load growth (up from 86% in the 2015 IRP).
- Decreased energy efficiency relative to the 2015 IRP is driven by reduced loads, reduced costs for wholesale power, and renewable resource alternatives.
- Additional direct load control capacity coincides with assumed coal unit retirements.

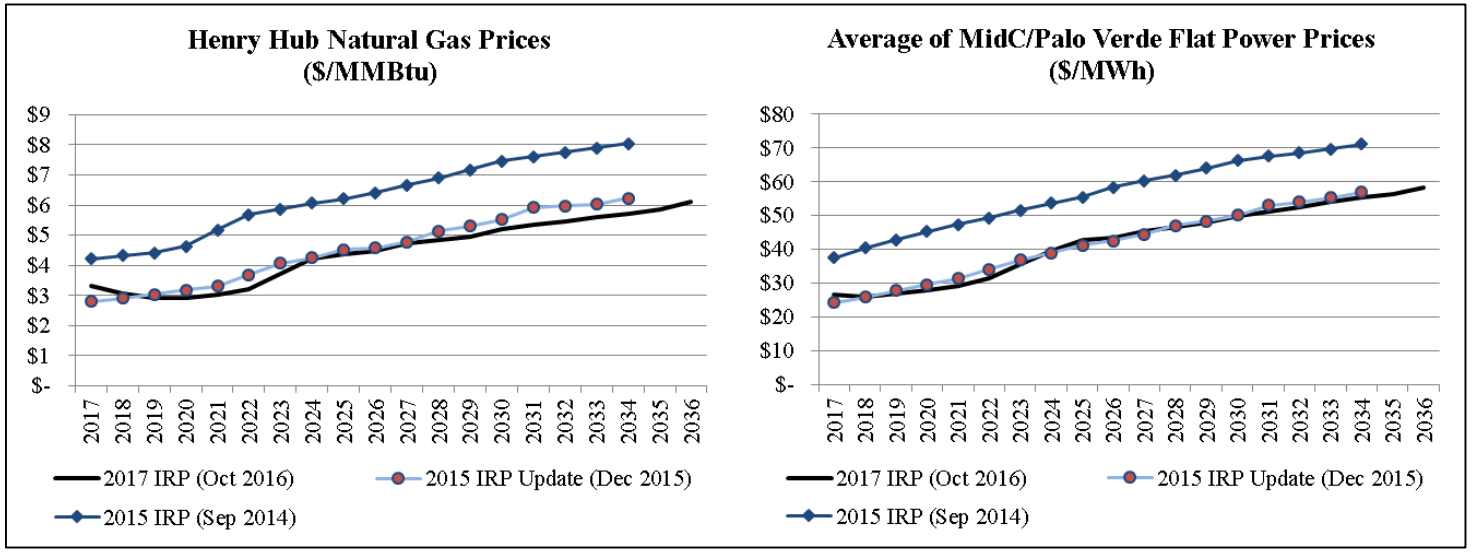
Comparison of Total Energy Efficiency Savings between 2017 IRP and 2015 IRP

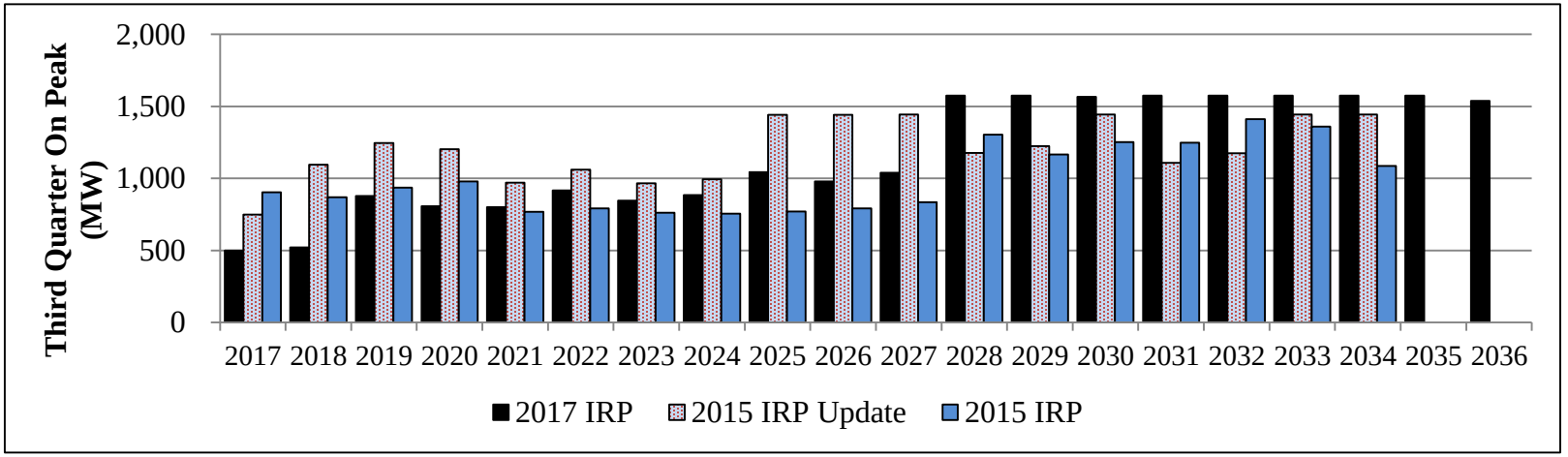


Comparison of Total Direct Load Control Capacity between 2017 IRP and 2015 IRP



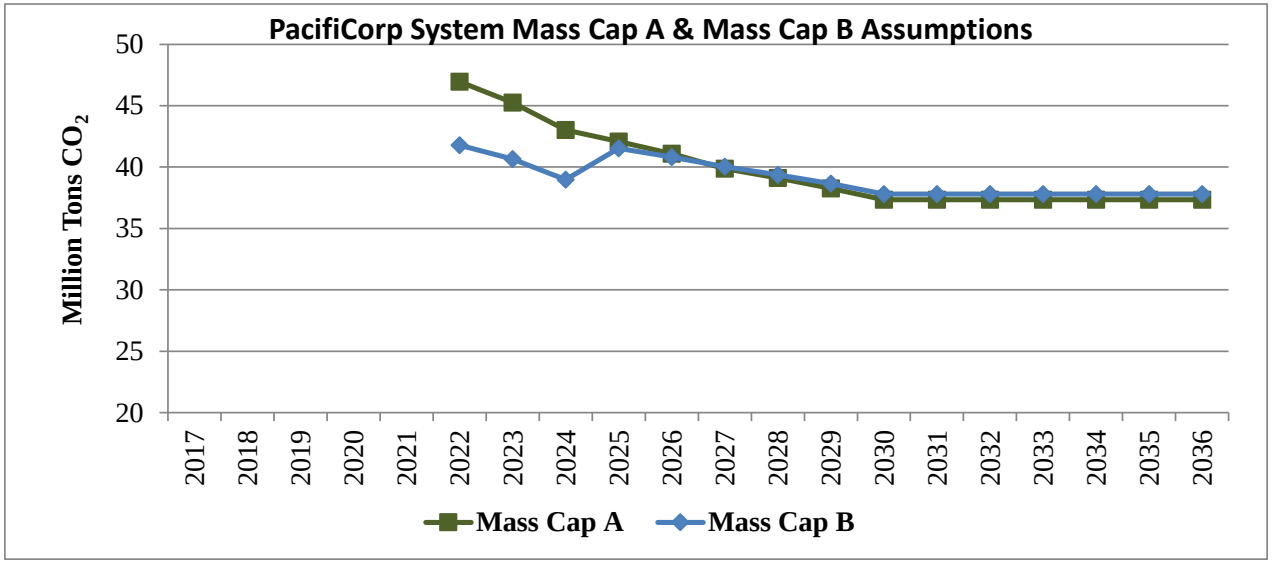
Wholesale Power Market Purchases





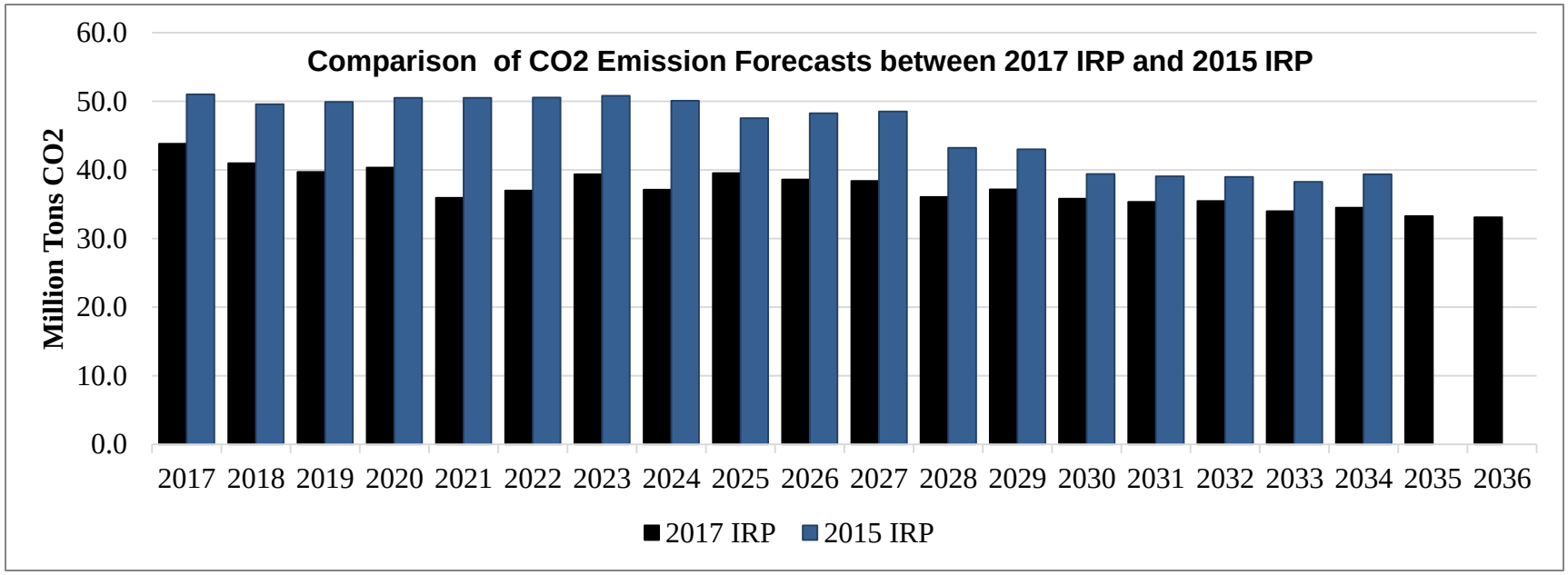
Price-Emissions Scenarios

- Six price-emissions scenarios defined for the 2017 IRP, representing combinations of two emissions policy scenarios multiplied by three natural gas price scenarios (low, base, high).
- The two CO_2 emissions policy scenarios are defined by two differing interpretations of the Environmental Protection Agency's (EPA) Clean Power Plan (CPP).
    - CPP(a) (or Mass Cap A): Mass-based compliance approach with pro-rata allowance allocation to PacifiCorp based on historical generation with no set-asides and no new source complement.
    - CPP(b) (or Mass Cap B): Mass-based compliance approach with pro-rata allowance allocation to PacifiCorp based on historical generation with new source complement allowances allocated on a pro-rata basis, ***less*** the Clean Energy Incentive Program (CEIP), renewable and output-based set-asides. It is assumed that PacifiCorp does not receive any of these set-asides.



CO_2 Emissions

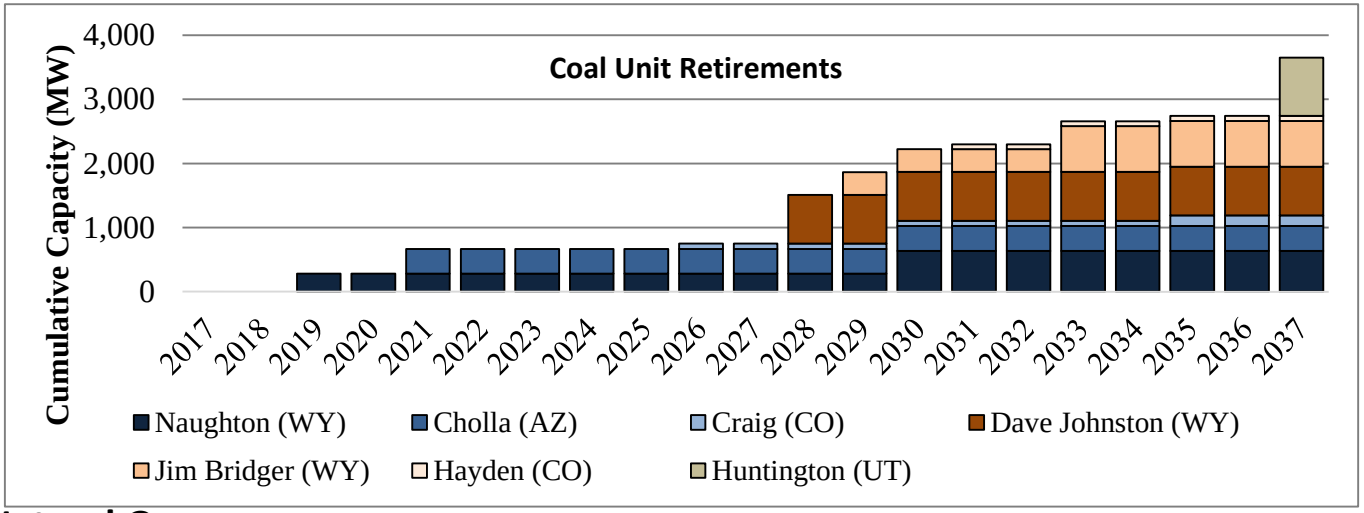
- Over the first ten years, average annual CO_2 emissions are down by 21% (10.5 million tons per year) relative to the 2015 IRP.
- By 2020, system CO_2 emissions are approximately 12% below 1990 levels (~46 million tons).
- By the end of the planning horizon, system CO_2 emissions fall by 24.5%.



Existing Coal and New Natural Gas Resources

Existing Coal 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 retirements total 667 MW by the end of 2020, 2,222 MW by the end of 2030, and 3,650 MW by the end of 2036.

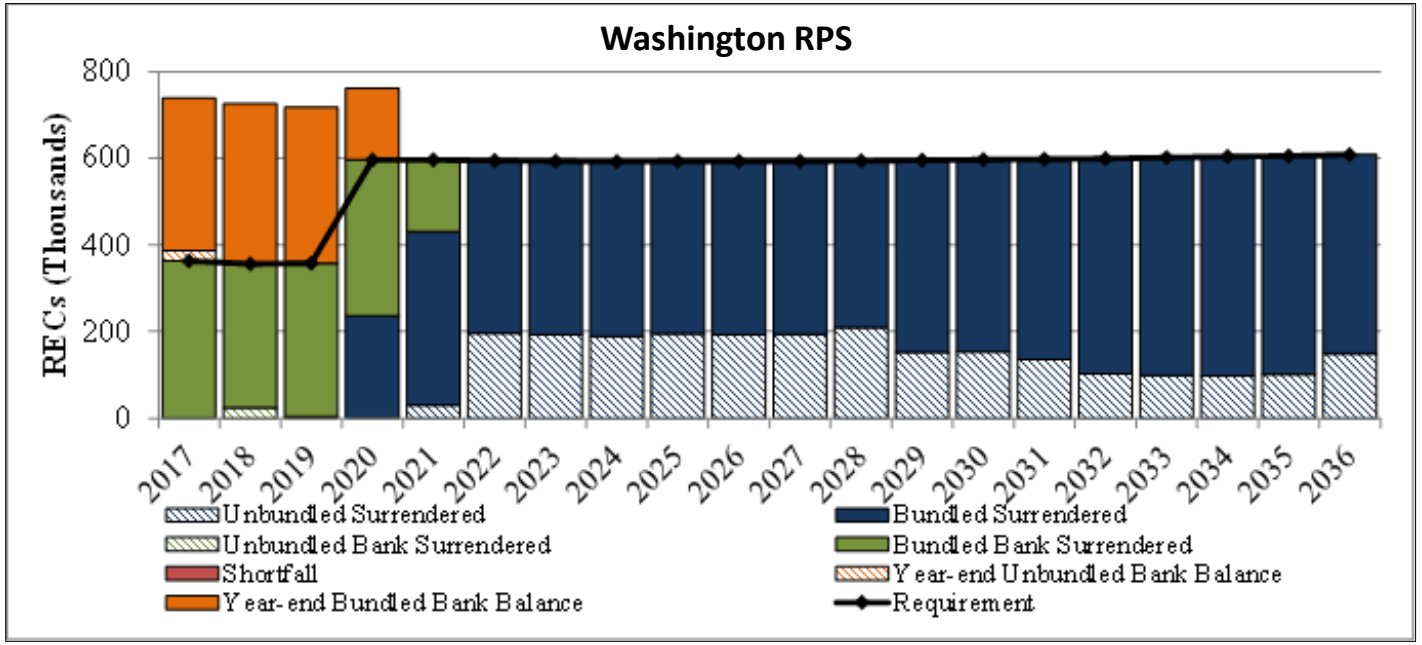


New Natural Gas

- The first SCCT natural gas resource is added in 2029, the first CCCT natural gas resource is added in 2030.
- Long-term supply alternatives, including potential for energy storage, will continue to be evaluated through on-going resource planning updates.

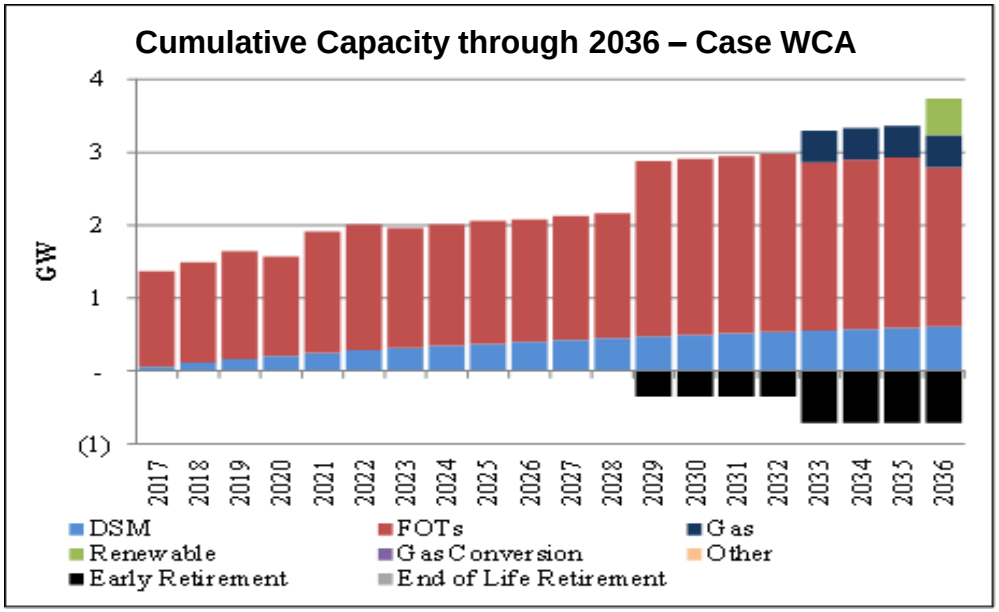
RPS Compliance

- The 2017 IRP complies with I-937 (2006) per WUTC implementation rules.
- Washington currently benefits from repowered wind assets located in the west control area.
- Washington could potentially benefit from repowered and new wind assets added to the system by end of 2020



East / West Split Sensitivities

- East/West split sensitivity (Case WCA):
  - Reliance on FOTs and incremental DSM through 2032
  - Natural gas CCCT added in 2033
  - 500 MW of west-side wind added in 2036
  - Increase in wholesale power market purchases (FOTs) over 20-year study period



- WCA sensitivity (WCA-RPS) assumed physical RPS compliance – results are similar to Case WCA with the addition of west-side wind added in 2021 and 2022 (70 MW).

East / West Split Sensitivities, continued

FOT Reliance

	Summer		Winter	
	10 year	20 year	10 year	20 year
WCA	26%	31%	23%	28%
WCA-RPS	26%	31%	23%	28%
System	9%	12%	10%	14%

PVRR Cost/(Benefit)

($ million)	PaR Stochastic Mean (Mass B, Medium Gas)
West (FS-REP)	$6,863
West (WCA)	$7,066
Change from FS-REP	$203

- In both sensitivities, additional resources are needed in the west BAA and system costs are higher when compared to WCA costs derived from an integrated system
- WCA reliance on FOTs as a percentage of peak load is nearly double that of the integrated system