



PacifiCorp's 2019 Integrated Resource Plan (IRP)

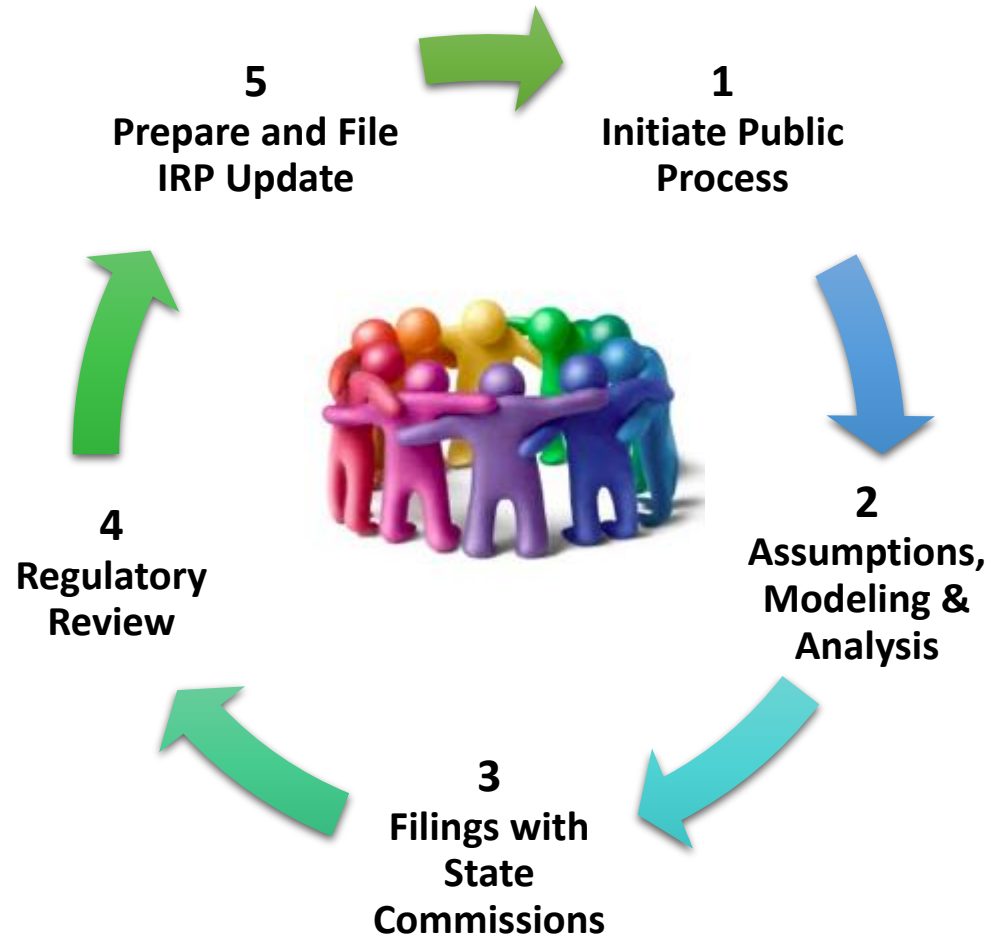
Docket No. 19-035-02 Technical Conference
Public Service Commission of Utah
December 10, 2019



2019 IRP Process Overview



- June 2018 through November 2019
- 18 public-input meetings
- Over 133 stakeholder feedback forms submitted and over 500 questions responded to
- Over 120+ resource portfolios modeled and analyzed
- Thousands of model simulations to evaluate cost, risk and reliability
- Filed with PacifiCorp's six state commissions - October 18, 2019



Key Elements of 2019 IRP Approach

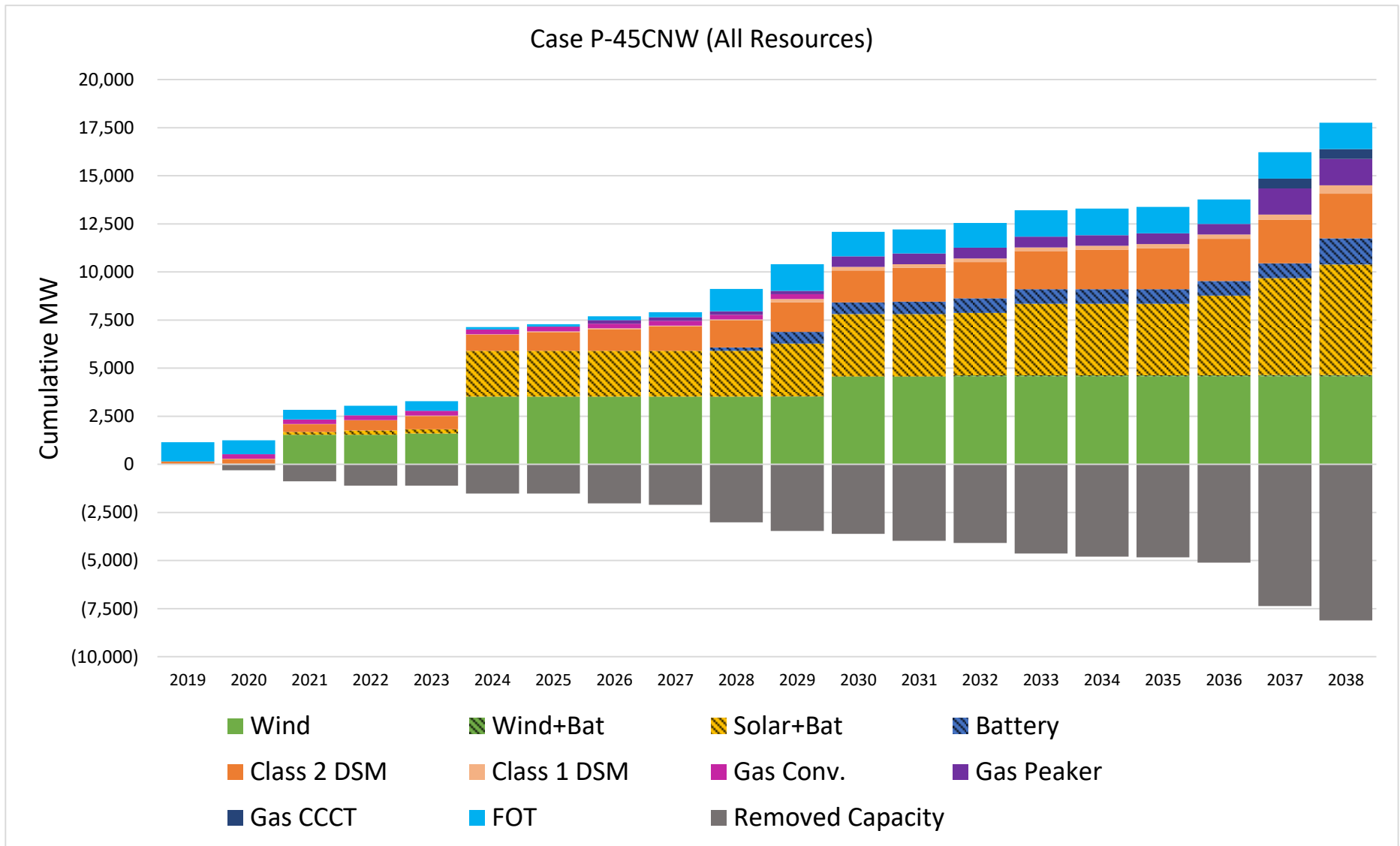


2019 IRP Modeling Improvements:

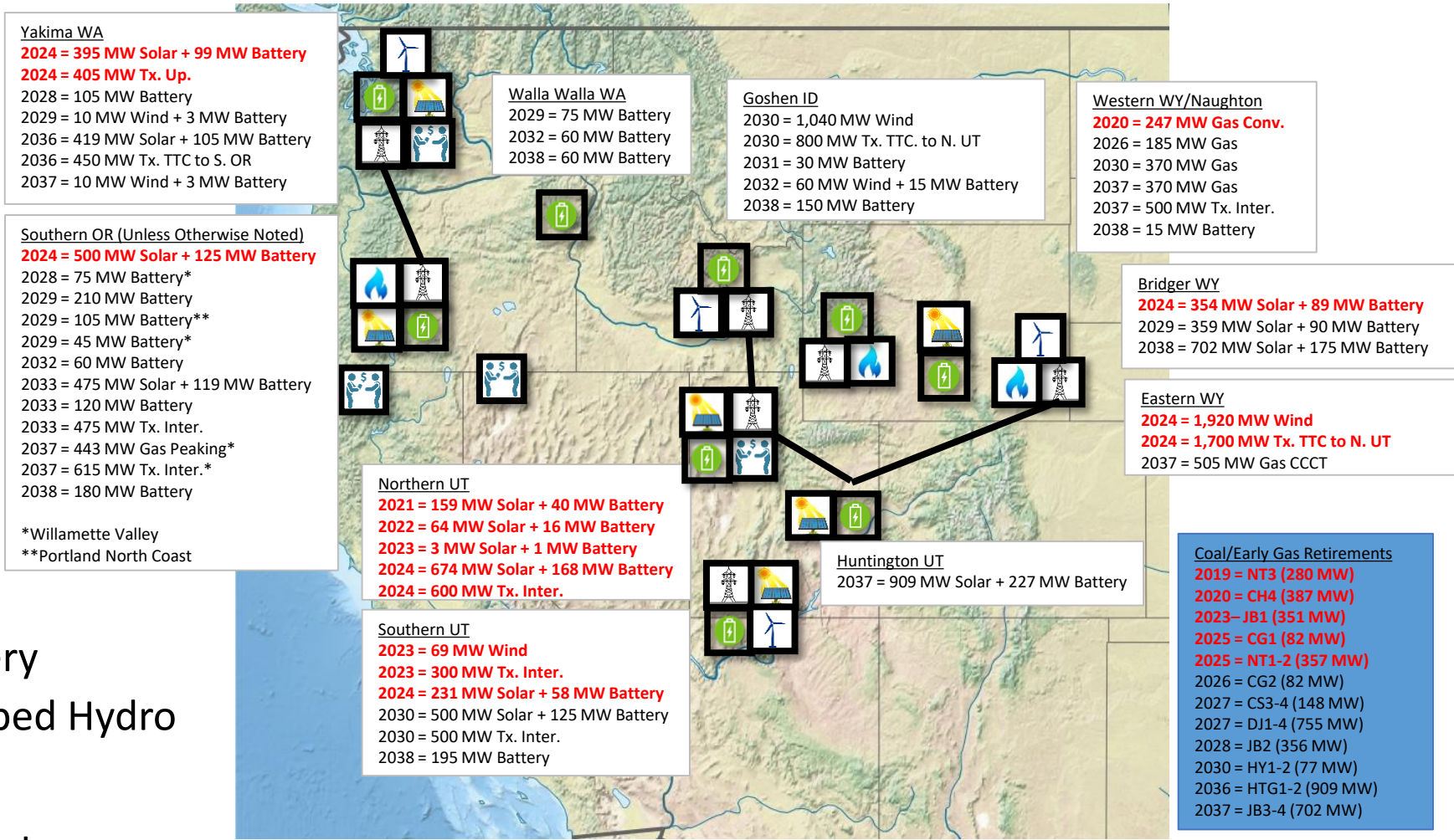
- Coal studies
- Endogenous modeling of transmission upgrades
- Targeted portfolio reliability analysis
- Improved storage modeling



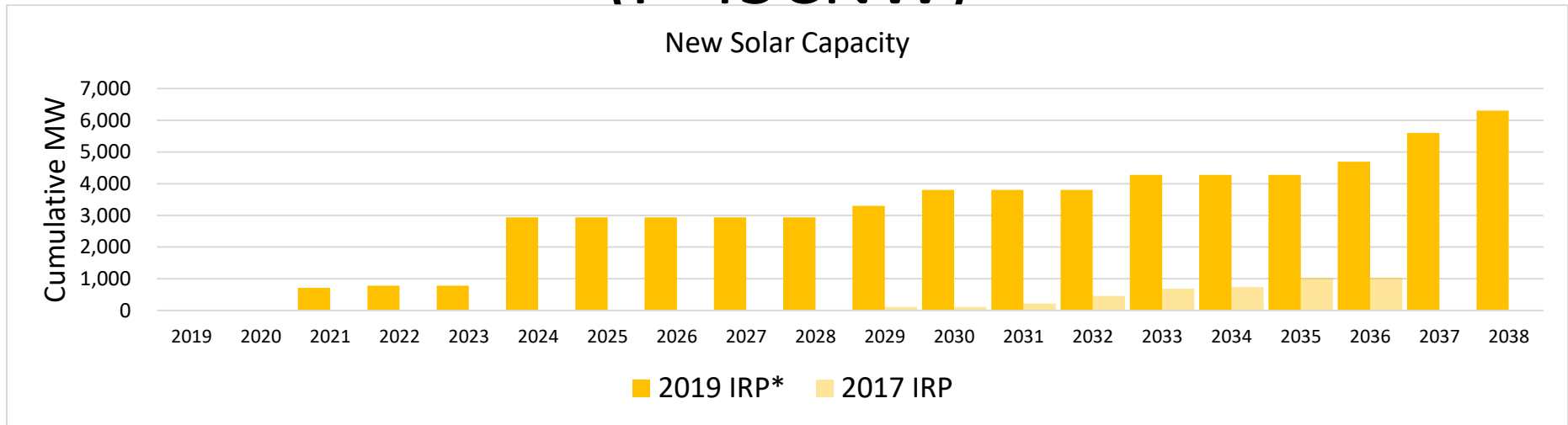
Preferred Portfolio Resources



Preferred Portfolio Generating Resources (Case P-45CNW)



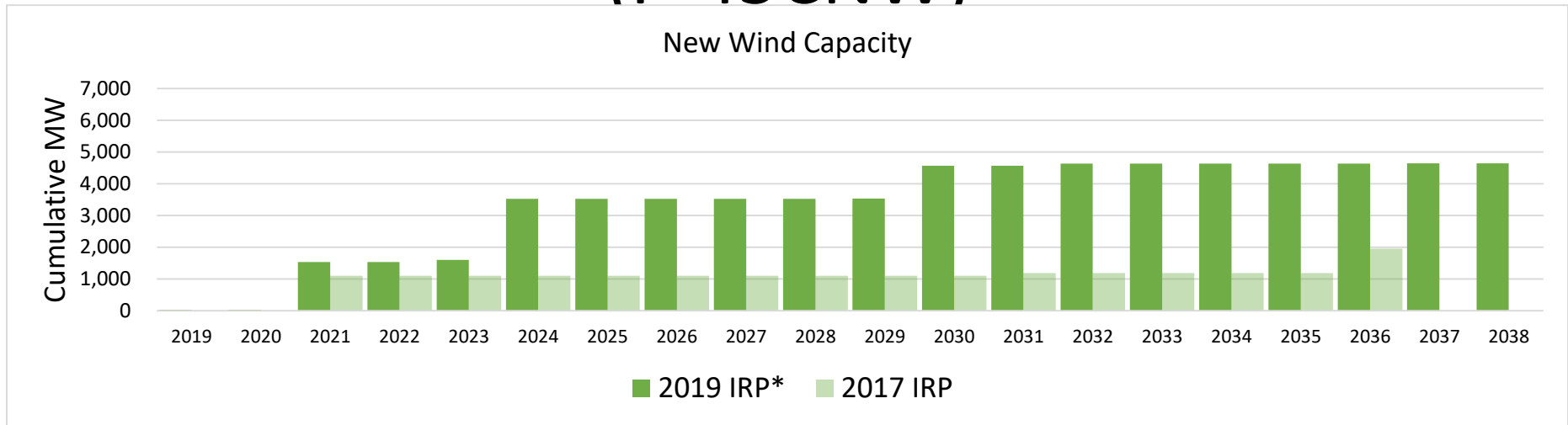
Solar Resources (P-45CNW)



State	2019 IRP Preferred Portfolio Solar (2019-2024)	2019 IRP Preferred Portfolio Solar (2025-2038)
Utah	2021 = 337 MW + 122 MW (contracted) 2021 = 159 MW (with 40 MW battery) 2022 = 64 MW (with 16 MW battery) 2023 = 3 MW (with 1 MW battery) 2024 = 904 MW (with 226 MW battery); 331 MW of the 904 MW is customer preference	2030 = 500 MW (with 125 MW battery) 2037 = 909 MW (with 227 MW battery)
Wyoming	2024 = 354 MW (with 89 MW battery)	2029 = 359 MW (with 90 MW battery) 2038 = 702 MW (with 175 MW battery)
Oregon	2021 = 100 MW (contracted) 2024 = 500 MW (with 125 MW battery)	2033 = 475 MW (with 119 MW battery)
Washington	2024 = 395 MW (with 99 MW battery)	2036 = 419 MW (with 105 MW battery)

- Resources highlighted **blue** in the table represent resources that meet assumed customer preference targets.

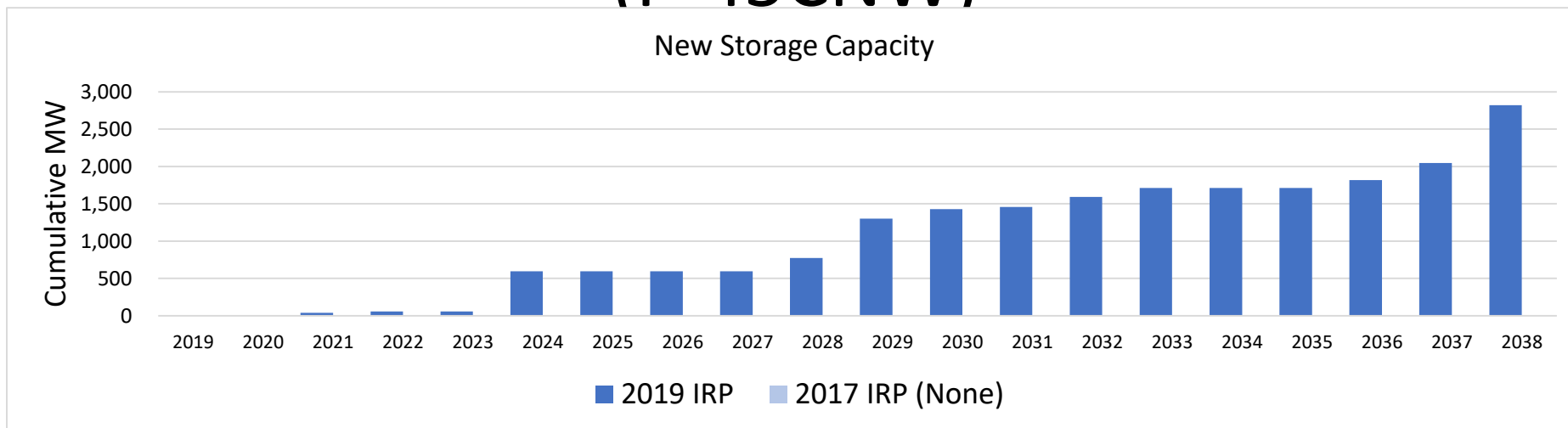
Wind Resources (P-45CNW)



State	2019 IRP Preferred Portfolio Wind (2019-2024)	2019 IRP Preferred Portfolio Wind (2025-2038)
Wyoming	2020 = 23 MW (repowering) 2021 = 1,510 MW (under construction) 2024 = 1,920 MW	n/a
Idaho	n/a	2030 = 1,040 MW 2032 = 60 MW (with 15 MW battery)
Utah	2023 = 69 MW	n/a
Washington	n/a	2029 = 10 MW (with 3 MW battery) 2037 = 11 MW (with 3 MW battery)

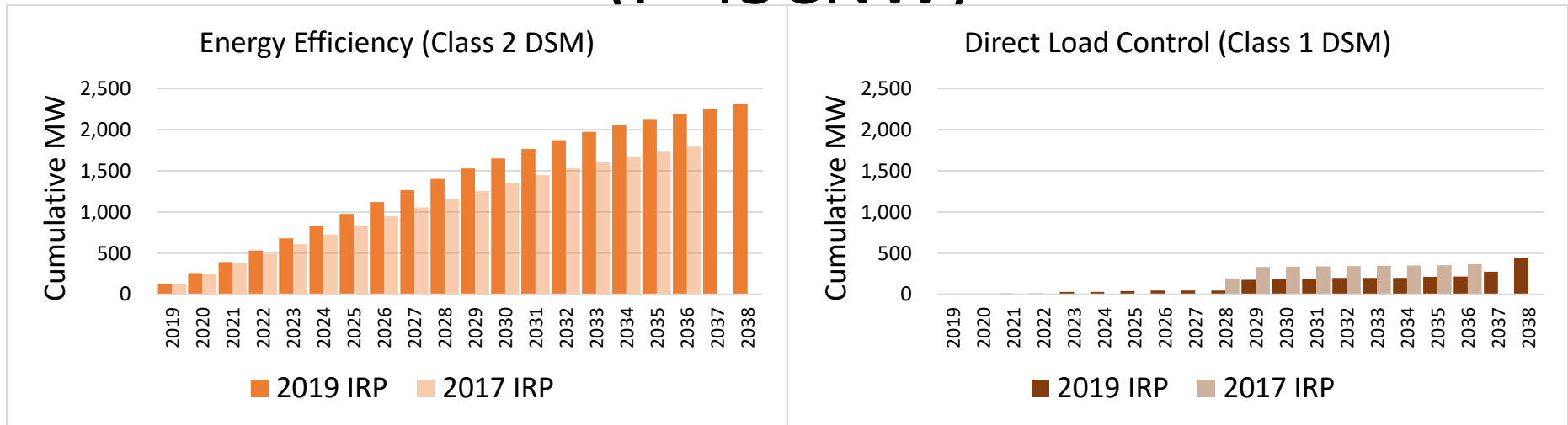
- Resources highlighted **blue** in the table represent resources that meet assumed customer preference targets.

Storage Resources (P-45CNW)



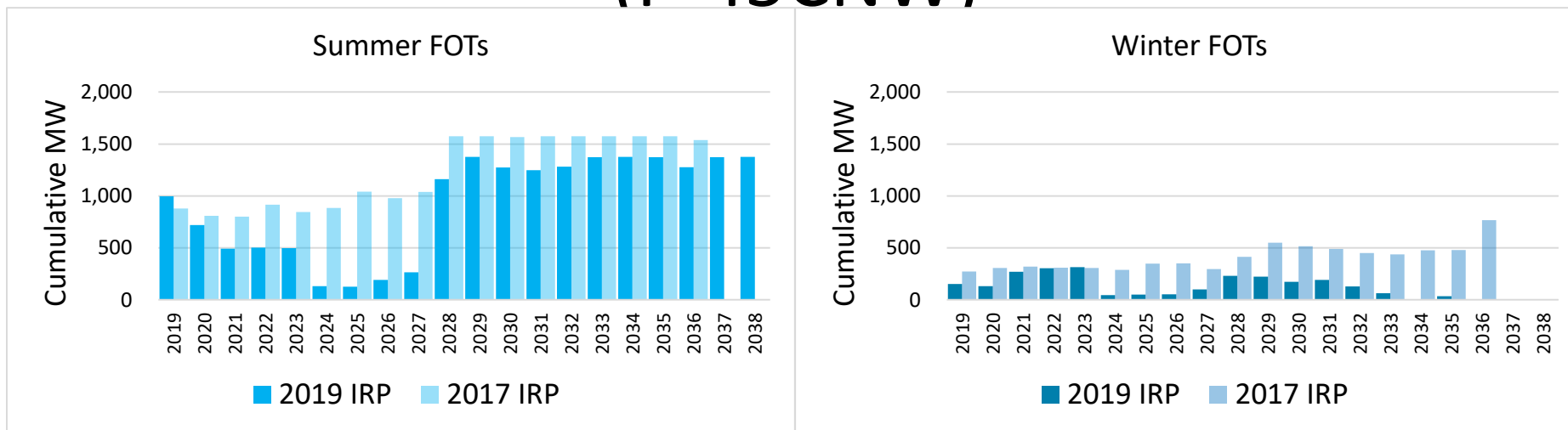
State	2019 IRP Preferred Portfolio Storage (2019-2024)	2019 IRP Preferred Portfolio Storage (2025-2038)
Utah	2021 = 40 MW (with 159 MW solar) 2022 = 16 MW (with 64 MW solar) 2023 = 1 MW (with 3 MW solar) 2024 = 226 MW (with 904 MW solar)	2030 = 125 MW (with 500 MW solar) 2037 = 227 MW (with 909 MW solar) 2038 = 195 MW
Wyoming	2024 = 89 MW (with 354 MW solar)	2029 = 90 MW (with 359 MW solar) 2038 = 175 MW (with 702 MW solar), +15 MW
Oregon	2024 = 125 MW (with 500 MW solar)	2028 = 75 MW 2029 = 360 MW 2032 = 60 MW 2033 = 119 MW (with 475 MW solar) 2038 = 180 MW
Washington	2024 = 99 MW (with 395 MW solar)	2028 = 105 MW 2029 = 3 MW (with 10 MW wind), +75 MW 2032 = 60 MW 2036 = 105 MW (with 419 MW solar) 2037 = 3 MW (with 11 MW wind) 2038 = 60 MW
Idaho	n/a	2031 = 30 MW 2032 = 15 MW (with 60 MW wind) 2038 = 150 MW

Demand-Side Management Resources (P-45CNW)



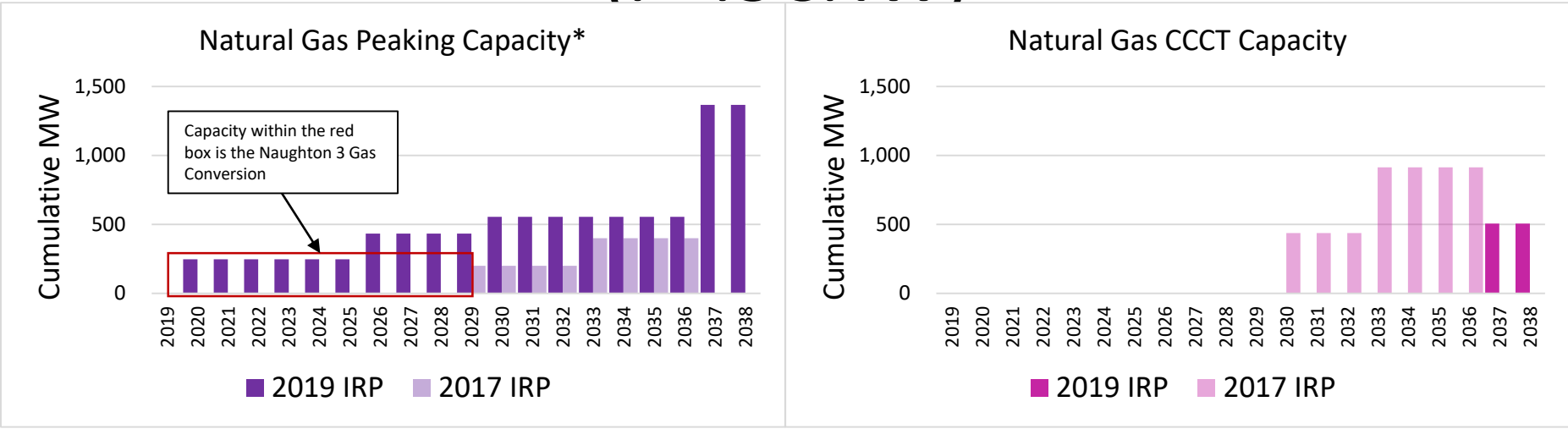
State	2019 IRP Preferred Portfolio DSM (2019-2024)	2019 IRP Preferred Portfolio DSM (2025-2038)
Utah	2019-2024 = 397 MW EE 2019-2024 = 29 MW DLC	2025-2038 = 662 MW EE 2025-2038 = 260 MW DLC
Wyoming	2019-2024 = 77 MW EE	2025-2038 = 171 MW EE 2025-2038 = 54 MW DLC
Oregon	2019-2024 = 242 MW EE	2025-2038 = 438 MW EE 2029-2038 = 32 MW DLC
Washington	2019-2024 = 66 MW EE	2025-2038 = 113 MW EE 2029-2038 = 45 MW DLC
Idaho	2019-2024 = 40 MW EE	2025-2038 = 77 MW EE 2032-2038 = 11 MW DLC
California	2019-2024 = 9 MW EE	2025-2038 = 23 MW EE 2037-2038 = 13 MW DLC

Front Office Transactions (FOTs) (P-45CNW)



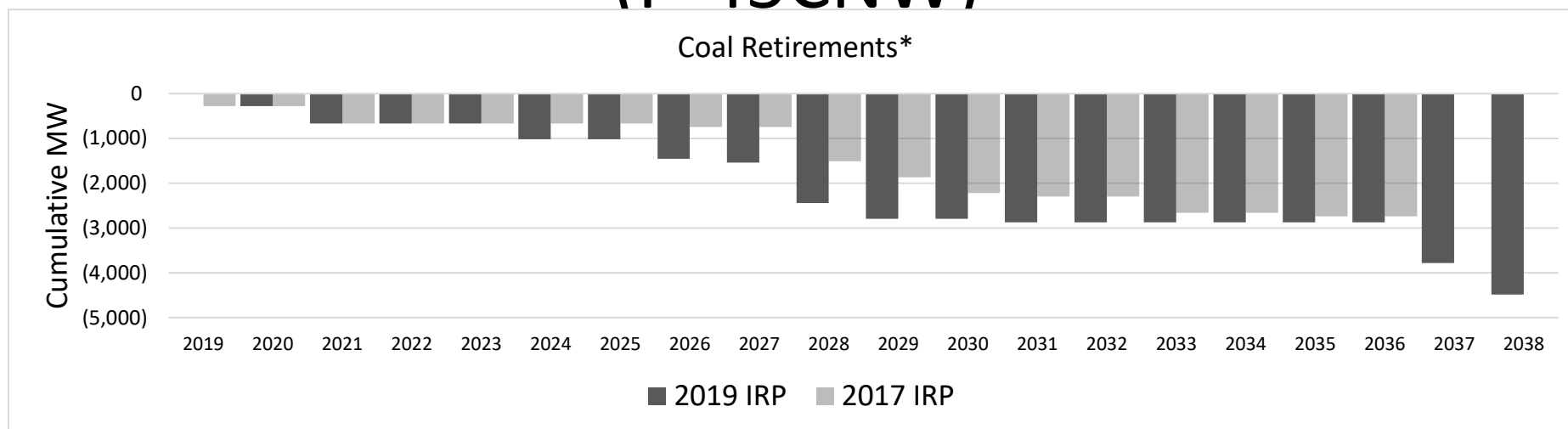
Location	2019 IRP Preferred Portfolio FOTs (2019-2024)	2019 IRP Preferred Portfolio FOTs (2025-2027)	2019 IRP Preferred Portfolio FOTs (2028-2038)
West	2019-2024 Avg. = 557 MW Summer 2019-2024 Avg. = 202 MW Winter	2025-2027 Avg. = 194 MW Summer 2025-2027 Avg. = 68 MW Winter	2028-2038 Avg. = 1,066 MW Summer 2028-2038 Avg. = 95 MW Winter
East	No Summer FOTs No Winter FOTs	No Summer FOTs No Winter FOTs	2028-2038 Avg. = 251 MW Summer No Winter FOTs

Natural Gas Resources (P-45CNW)



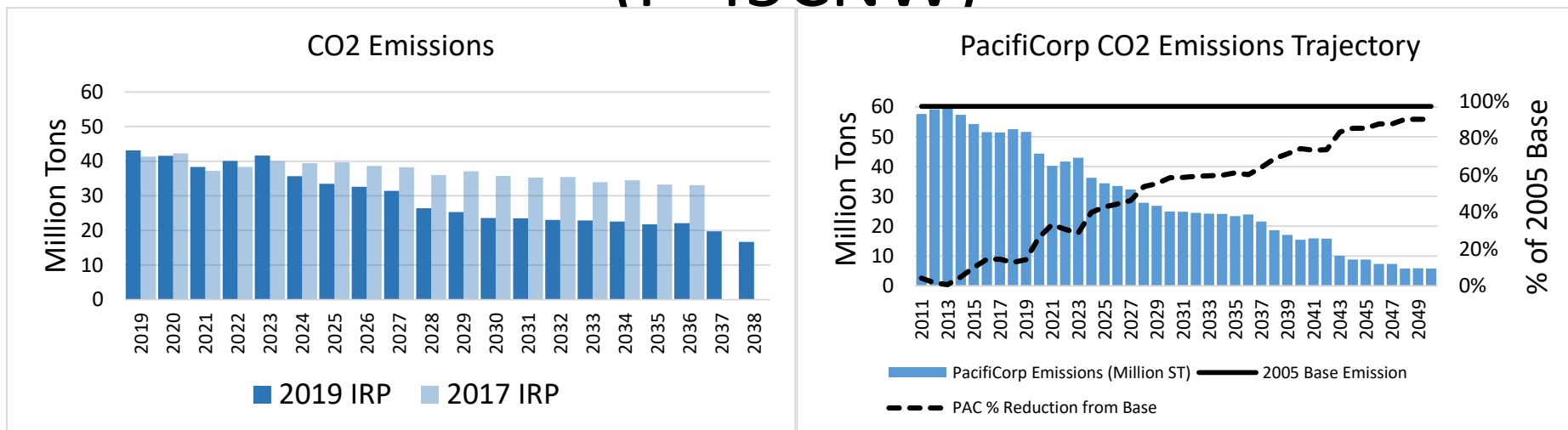
State	2019 IRP Preferred Portfolio Gas (2019-2024)	2019 IRP Preferred Portfolio Gas (2025-2038)
Wyoming	2020 = 247 MW (Naughton Unit 3 Conversion)	2026 = 185 MW peaking 2030 = 370 MW peaking 2037 = 370 MW peaking 2037 = 505 MW CCCT
Oregon	n/a	2037 = 443 MW peaking

Coal Retirements (P-45CNW)



Location	2019 IRP Preferred Portfolio Coal Retirements (2019-2025)	2019 IRP Preferred Portfolio Coal Retirements (2026-2030)	2019 IRP Preferred Portfolio Coal Retirements (2031-2038)
Wyoming	2019 = 280 MW (Naughton 3) 2023 = 351 MW (J. Bridger 1) 2025 = 357 MW (Naughton 1-2)	2027 = 755 MW (D. Johnston 1-4) 2028 = 356 MW (J. Bridger 2)	2037 = 702 MW (J. Bridger 3-4)
Arizona	2020 = 387 MW (Cholla 4)	n/a	n/a
Colorado	2025 = 82 MW (Craig 1)	2026 = 82 MW (Craig 2) 2030 = 77 MW (Hayden 1-2)	n/a
Montana	n/a	2027 = 148 MW (Colstrip 3-4)	n/a
Utah	n/a	n/a	2036 = 909 MW (Huntington 1-2)

CO₂ Emissions (P-45CNW)

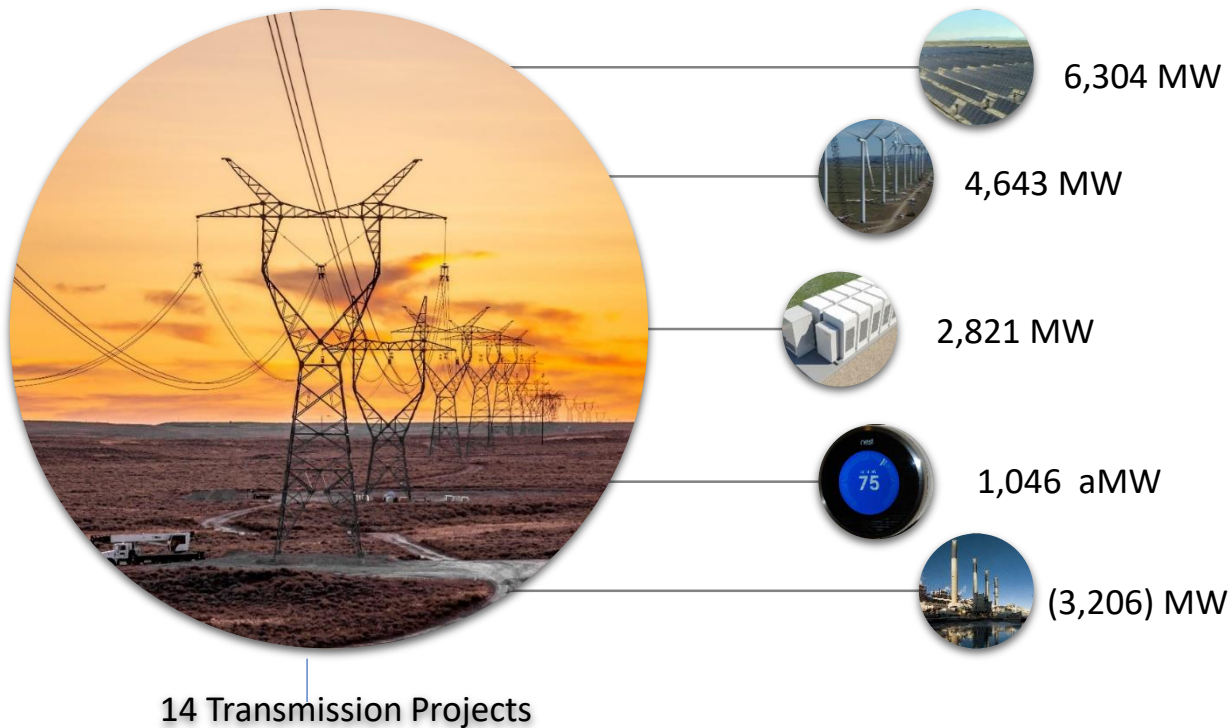


- The chart on the left reflects stack emissions over the IRP planning period for the 2019 IRP and 2017 IRP preferred portfolio.
 - There is no assignment of emissions to specified or unspecified purchases.
 - Relative to the 2017 IRP, emissions are down 16 percent in 2025, 34 percent in 2030, and 35 percent in 2035.
- The chart on the right reflects:
 - Actual emissions through 2018 from owned facilities, specified sources, and unspecified sources.
 - From 2019-2038, emissions reflect those from the 2019 IRP preferred portfolio (stack emissions) with market purchases assigned the CARB default emissions factor (0.4708 tons/MWh)—emissions from sales are not removed.
 - Beyond 2038, emissions reflect the rolling average emissions of each resource from the preferred portfolio through the life of the resource.
 - Relative to a 2005 baseline, emissions are down 43 percent in 2025, 59 percent in 2030, 61 percent in 2035, 74 percent in 2040, 85 percent in 2045, and 90 percent in 2050.

A Changing Resource Landscape



20-Year Outlook



Next Four Years

- All-source request for proposals
 - Nearly 5,000 MW of wind, solar, and battery capacity
 - Demand response
- Energy Gateway South
- Other transmission upgrades (UT & WA)
- Employee transition plans and community action plans



Additional Information

- 2019 IRP:
 - www.pacificorp.com/energy/integrated-resource-plan.html
- Public Input Meeting Presentation and Materials:
 - www.pacificorp.com/energy/integrated-resource-plan/public-input-process.html
- 2019 IRP Stakeholder Feedback Forms:
 - www.pacificorp.com/energy/integrated-resource-plan/comments.html
- IRP Email / Distribution List Contact Information:
 - IRP@PacifiCorp.com