



PacifiCorp's 2019 Integrated Resource Plan (IRP)

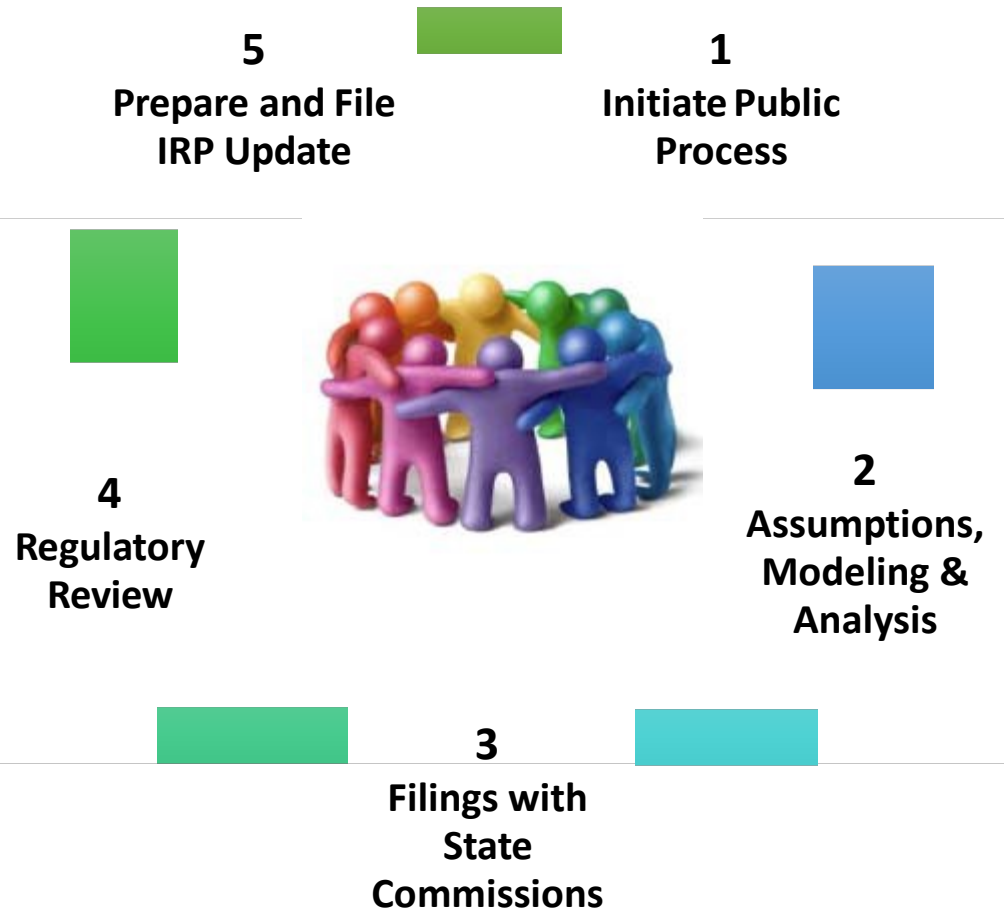
Docket LC-70
Public Utility Commission of Oregon
December 17, 2019



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



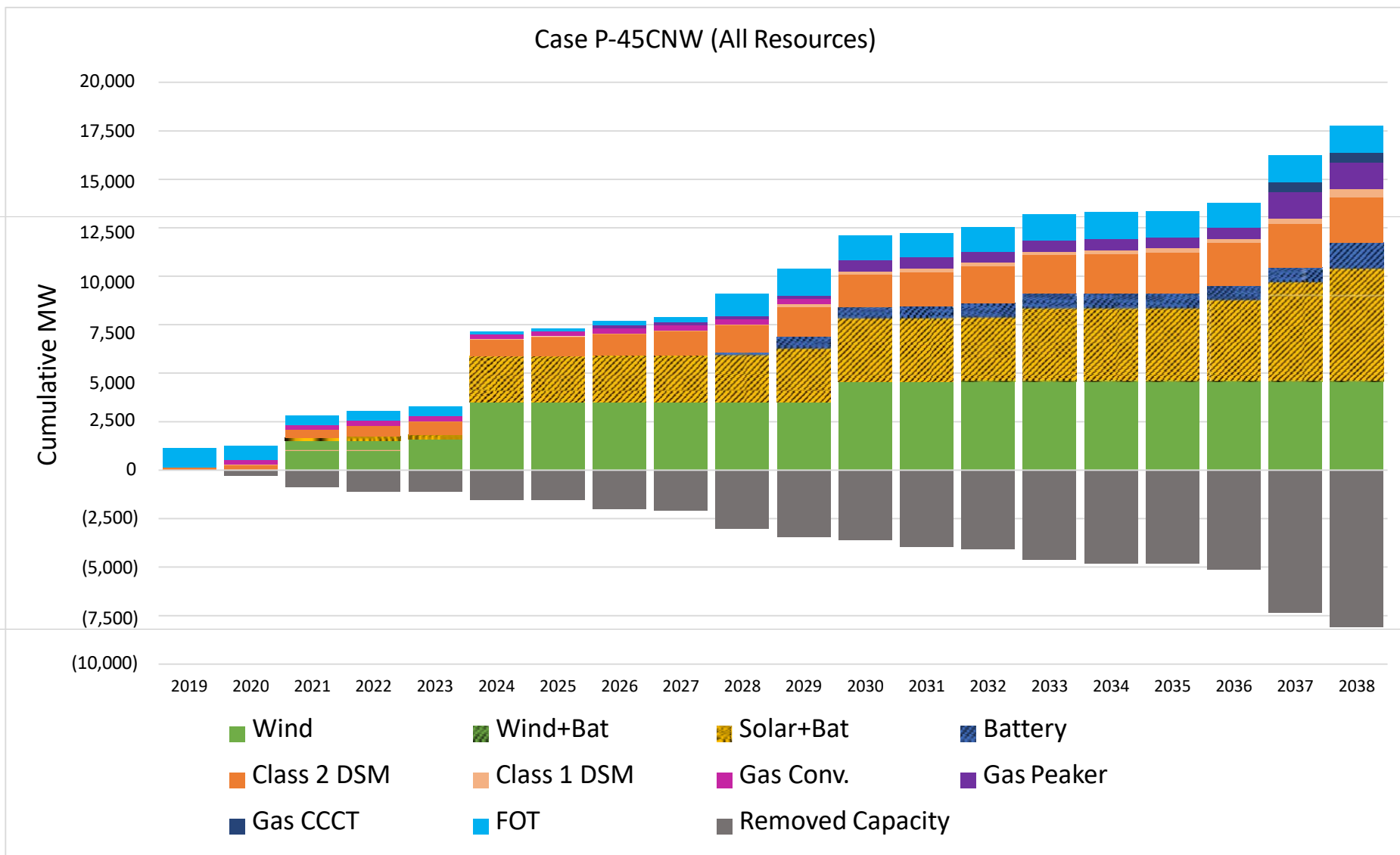
Key Elements of 2019 IRP Approach



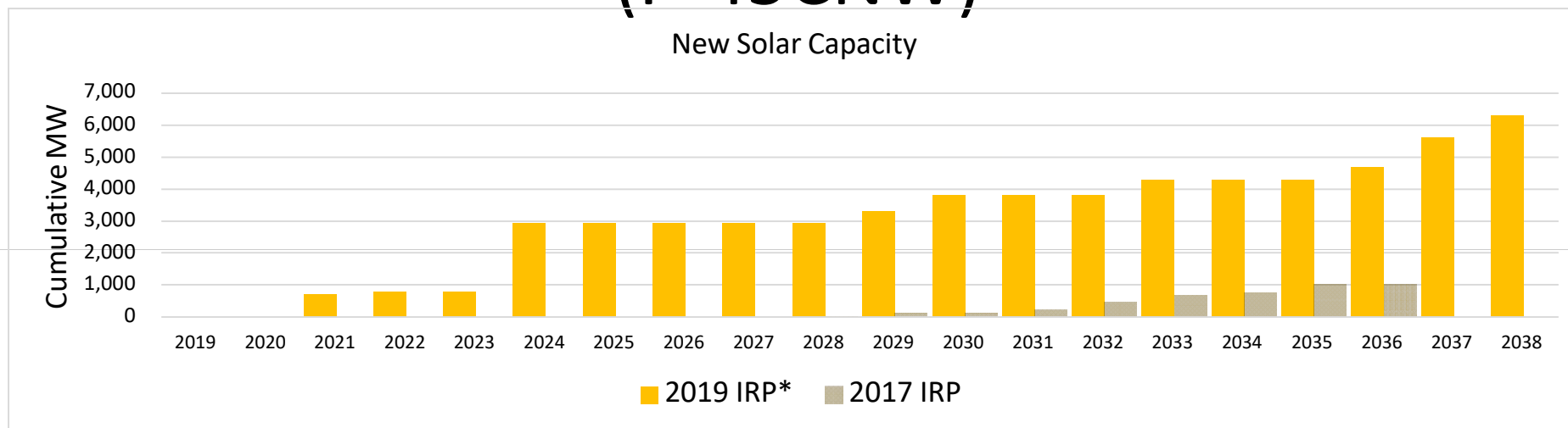
2019 IRP Modeling Improvements:

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

Preferred Portfolio Resources



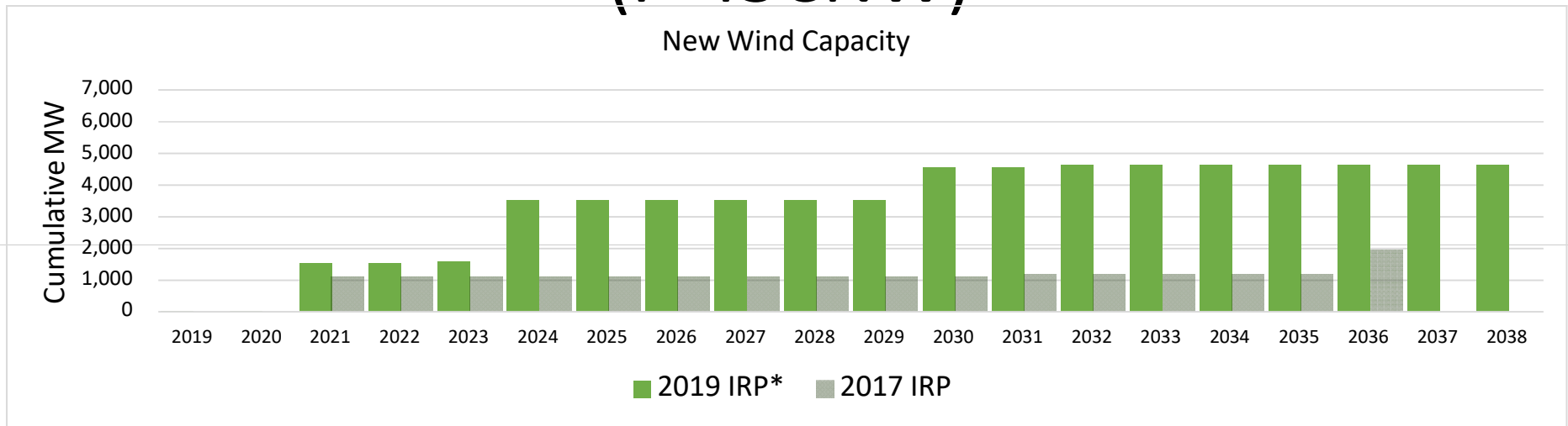
Solar Resources (P-45CNW)



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)

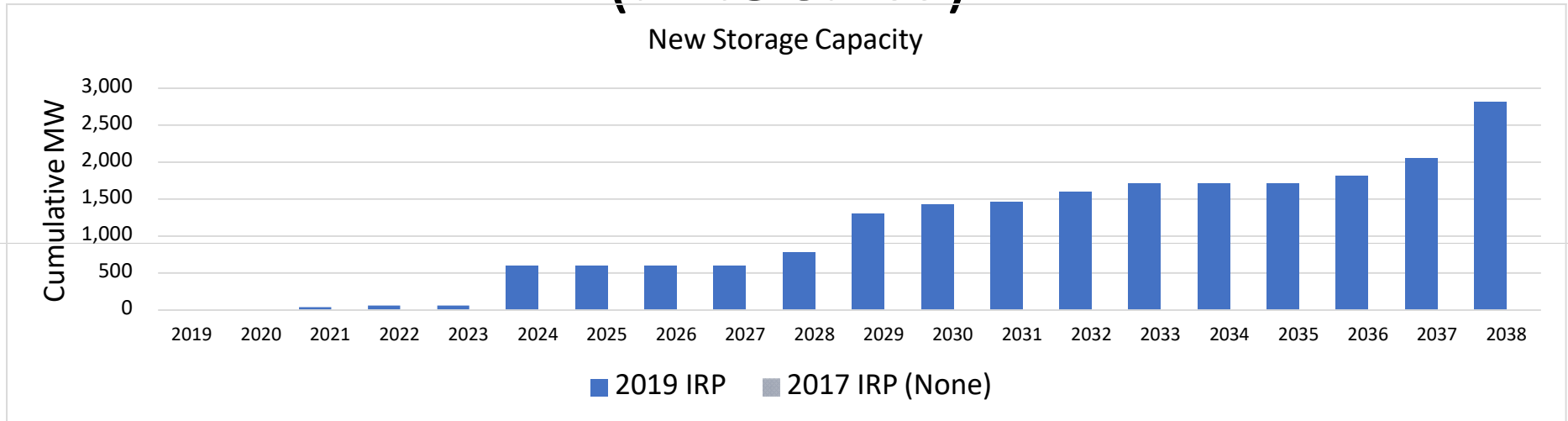


State	2019 IRP Preferred Portfolio Wind (2019-2024)	2019 IRP Preferred Portfolio Wind (2025-2038)
Wyoming	2020 = 23 MW (repowering) 2021 = 1,510 MW (under construction) 2024 = 1,920 MW	n/a
Idaho	n/a	2030 = 1,040 MW 2032 = 60 MW (with 15 MW battery)
Utah	2023 = 69 MW	n/a
Washington	n/a	2029 = 10 MW (with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

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

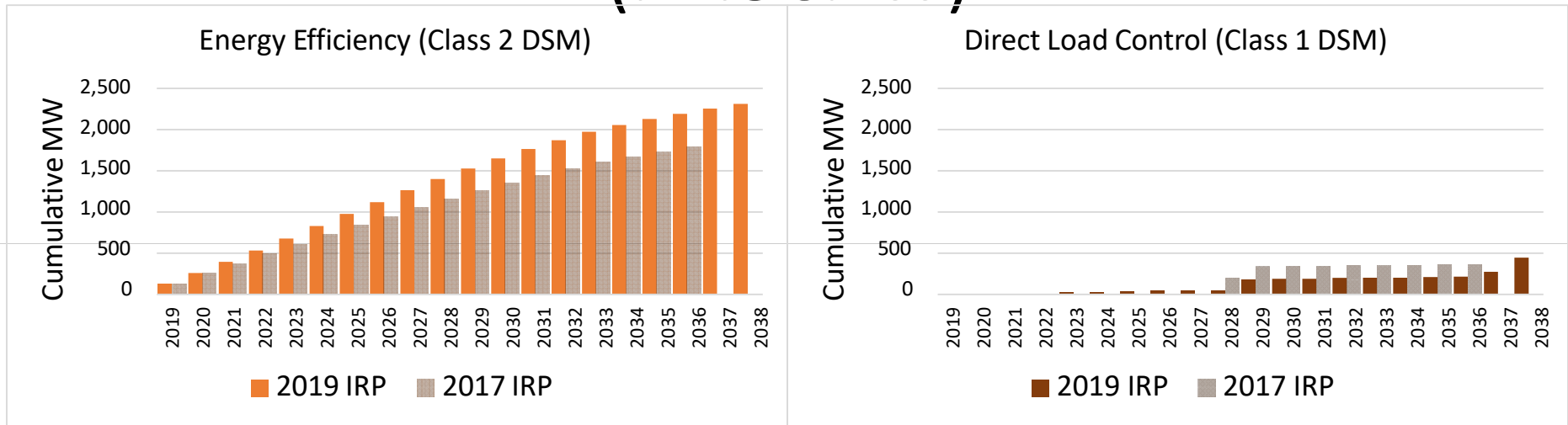
*Note: 2019 IRP wind shown in the graph includes 1,533 MW of contracted new wind (21% power-purchase agreements) that was either identified in the 2017 IRP and is under construction or that was not identified in the 2017 IRP and is under contract. These resources are treated as existing resources in the 2019 IRP preferred portfolio and will come on-line by the end of 2020. These resources are shown in the first full year of operation (the year after year-end onlinedates).

Storage Resources (P-45CNW)



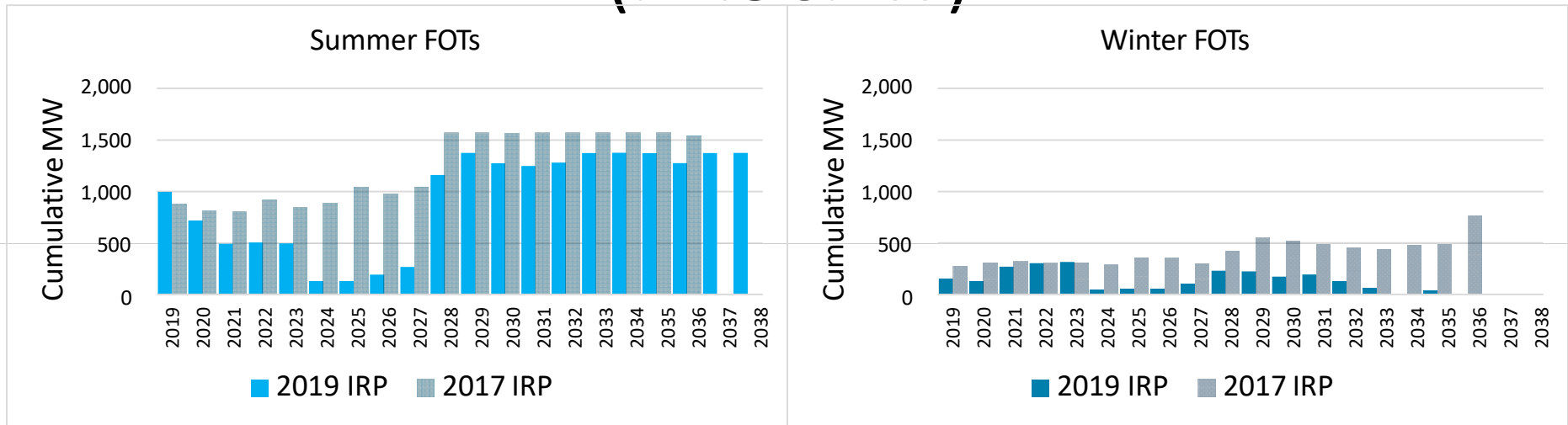
State	2019 IRP Preferred Portfolio Storage (2019-2024)	2019 IRP Preferred Portfolio Storage (2025-2038)
Utah	2021 = 40 MW (with 159 MW solar) 2022 = 16 MW (with 64 MW solar) 2023 = 1 MW (with 3 MW solar) 2024 = 226 MW (with 904 MW solar)	2030 = 125 MW (with 500 MW solar) 2037 = 227 MW (with 909 MW solar) 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)



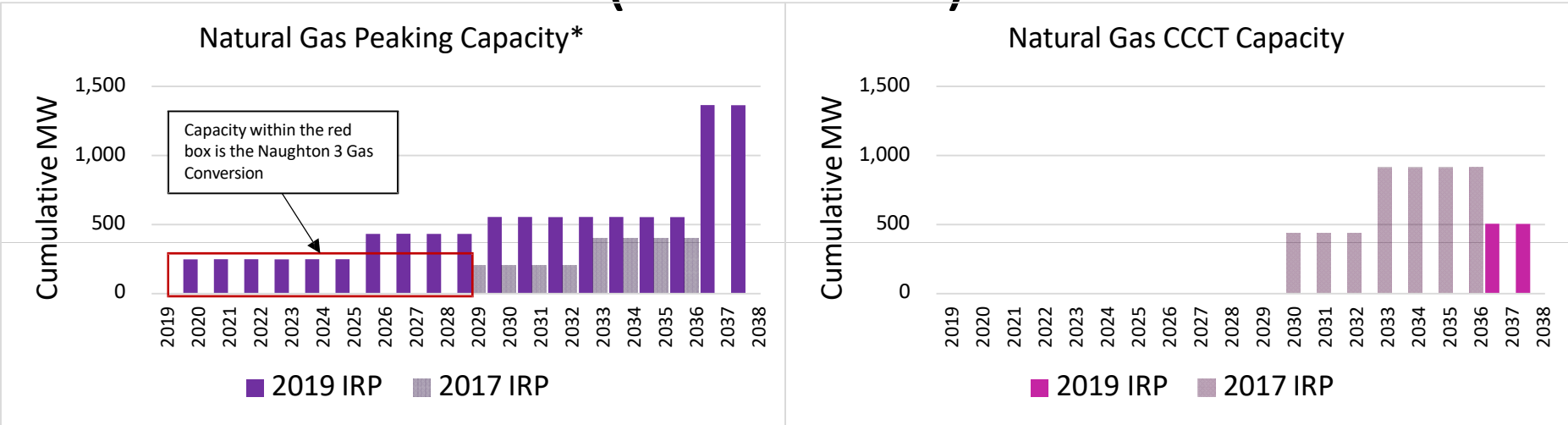
State	2019 IRP Preferred Portfolio DSM (2019-2024)	2019 IRP Preferred Portfolio DSM (2025-2038)
Utah	2019-2024 = 397 MW EE 2019-2024 = 29 MW DLC	2025-2038 = 662 MW EE 2025-2038 = 260 MW DLC
Wyoming	2019-2024 = 77 MW EE	2025-2038 = 171 MW EE 2025-2038 = 54 MW DLC
Oregon	2019-2024 = 242 MW EE	2025-2038 = 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)



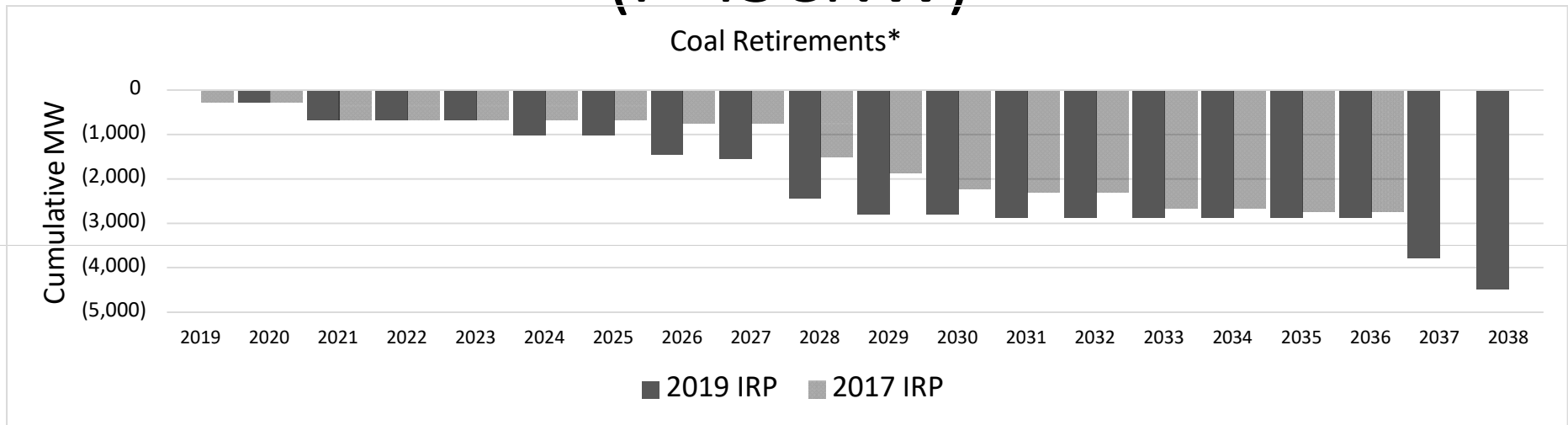
Location	2019 IRP Preferred Portfolio FOTs (2019-2024)	2019 IRP Preferred Portfolio FOTs (2025-2027)	2019 IRP Preferred Portfolio FOTs (2028-2038)
West	2019-2024 Avg. = 557 MW Summer 2019-2024 Avg. = 202 MW Winter	2025-2027 Avg. = 194 MW Summer 2025-2027 Avg. = 68 MW Winter	2028-2038 Avg. = 1,066 MW 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)



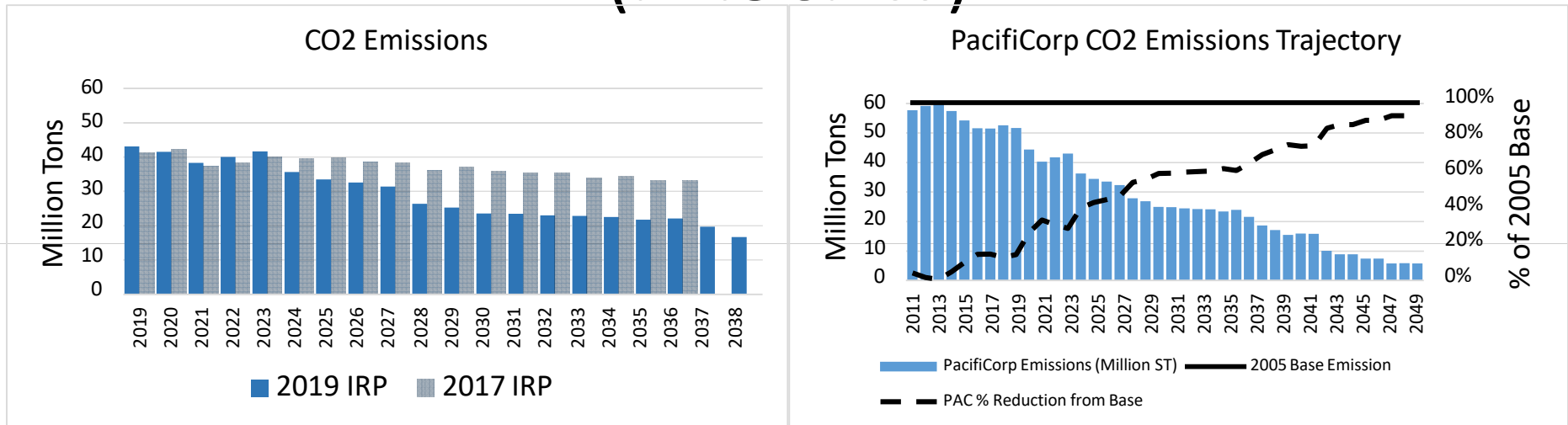
State	2019 IRP Preferred Portfolio Gas (2019-2024)	2019 IRP Preferred Portfolio Gas (2025-2038)
Wyoming	2020 = 247 MW (Naughton Unit 3 Conversion)	2026 = 185 MW peaking 2030 = 370 MW peaking 2037 = 370 MW peaking 2037 = 505 MW CCCT
Oregon	n/a	2037 = 443 MW peaking

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)

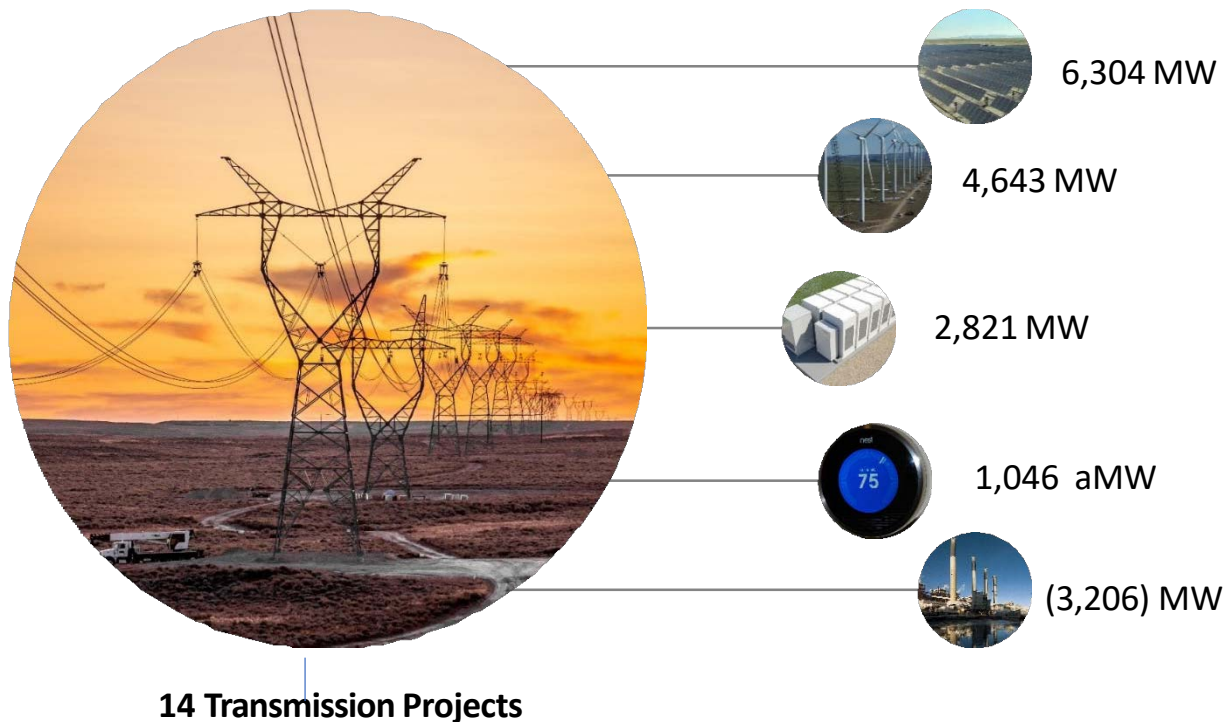


- The chart on the left reflects stack emissions over the IRP planning period for the 2019 IRP and 2017 IRP preferred portfolio.
 - There is no assignment of emissions to specified or unspecified purchases.
 - Relative to the 2017 IRP, emissions are down 16 percent in 2025, 34 percent in 2030, and 35 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