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January 30, 2024

MEMORANDUM

TO: Council Members

FROM: Annika Roberts and Dylan D'Souza

SUBJECT: Summary of Recent Resource Development and Comparison to 2021 Power Plan Recommendations

BACKGROUND:

Presenter: Annika Roberts and Dylan D'Souza

Summary: Staff will present a review of regional and WECC wide supply side resource acquisitions and retirements since the adoption of the 2021 Power Plan. This update will also include a forward look to resource trends, future builds, and influencing factors.

Relevance: The 2021 Power Plan tasked the region with developing at least 3500 MW of renewable resources by 2027. Also as part of the Plan development, the Council generated a WECC wide build-out to inform market prices used in our study. This update on resource acquisitions and retirements is meant to serve as a check-in on how regional actions align with or diverge from the 2021 Power Plan resource strategy and assumptions of the larger WECC. This update will inform the Council's 2021 Power Plan Mid-Term Assessment.

Workplan: A.1.2. Tracking and reporting on generating resource builds, both in region and across the WECC, as compared to the 2021 Power Plan analysis and strategy.

Generating Resource Updates Since the 2021 Power Plan

Annika Roberts & Dylan D'Souza

February 2024



Northwest **Power** and
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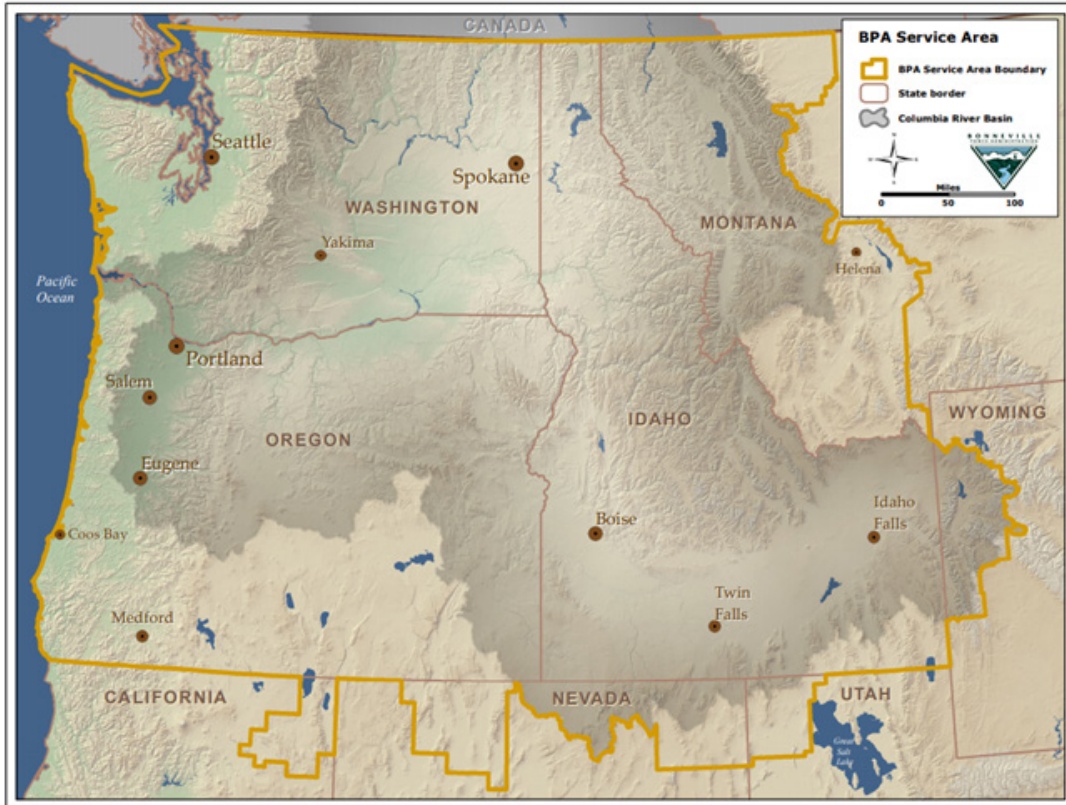
Outline

- Plan Context
- In-Region Generating Resource Update
- WECC-wide Generating Resource Update
- Broader Resource Landscape
 - National Generation
 - IRA Tax Credits
 - Future Generation & Trends



In-Region Generating Resources

Defining the region



- Includes:
 - All resource built in the region &/or that serve regional load
 - Geographically the region is easily defined but parsing those resources that serve regional load can get tricky
 - Some resources built *outside* the region that serve regional load:
 - Utilities with service territories outside of the region: PacifiCorp/Northwestern
 - We collaborate with those utilities to identify on a plant level which resources serve the region as best we can
 - Example:
 - N. Valamy: Located in Nevada, but Idaho Power 50% ownership → 50% generation, emissions etc allocated to the region

2021 Plan Resource Strategy: Renewables

- At least **3500 MW** additional renewable resources by 2027
- Additional recommendation for policymakers/utilities pursuing aggressive emissions reductions to evaluate adding more renewables as a means of displacing emissions both within their portfolio and in the broader market

PAGE 42 · RESOURCE DEVELOPMENT PLAN

Section 6: Resource Development Plan

How the Electric Sector Has Changed

The Council's 2021 Power Plan is significantly different than its Seventh Power Plan, adopted just five years ago. This is due to changes in the economics of renewable resources and the adoption of regional clean energy policies. The rapid cost reduction for solar and wind power technologies, when coupled with federal and state inducements, has provided an incentive for building large amounts of utility-scale solar and on-shore wind power across the region and put increased competitive pressure on thermal generators that operate at higher costs.³²

Along with this changing economic landscape, the plan also recognizes clean-energy policies and goals implemented at state, city, and regional levels, and interconnected jurisdictions.

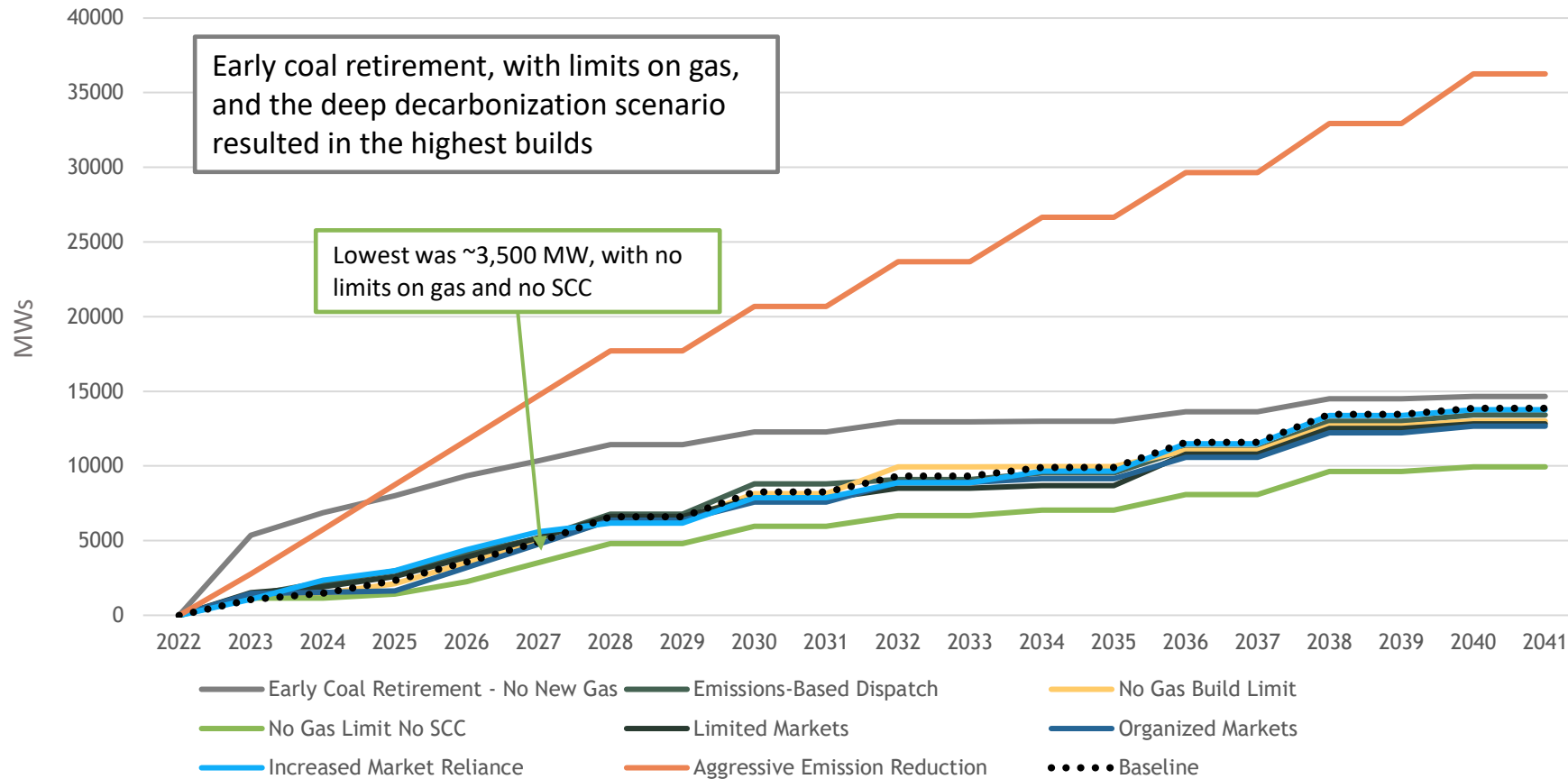
32 To this point, the region's electricity supply has led to a significant increase in the retirement of coal-fired power plants. 33 Uncertainty in the Seventh Power Plan regarding the future development of Centralia and other gas-fired power plants into the power

future development of significant renewable and non-carbon emitting resources. The combination of increased competitive pressure and clean energy policies has resulted in the early retirement of less efficient thermal generators, and increased thermal generator planned retirements during the initial five-year "action period" of the plan. This indicates that the capacity of coal-fired power plants in the region will be reduced by more than 60 percent over the next decade.³³ Furthermore, uncertainty remains over the role of existing natural gas-fired power plants beyond this decade, and the future development of new gas-fired generators within the region.

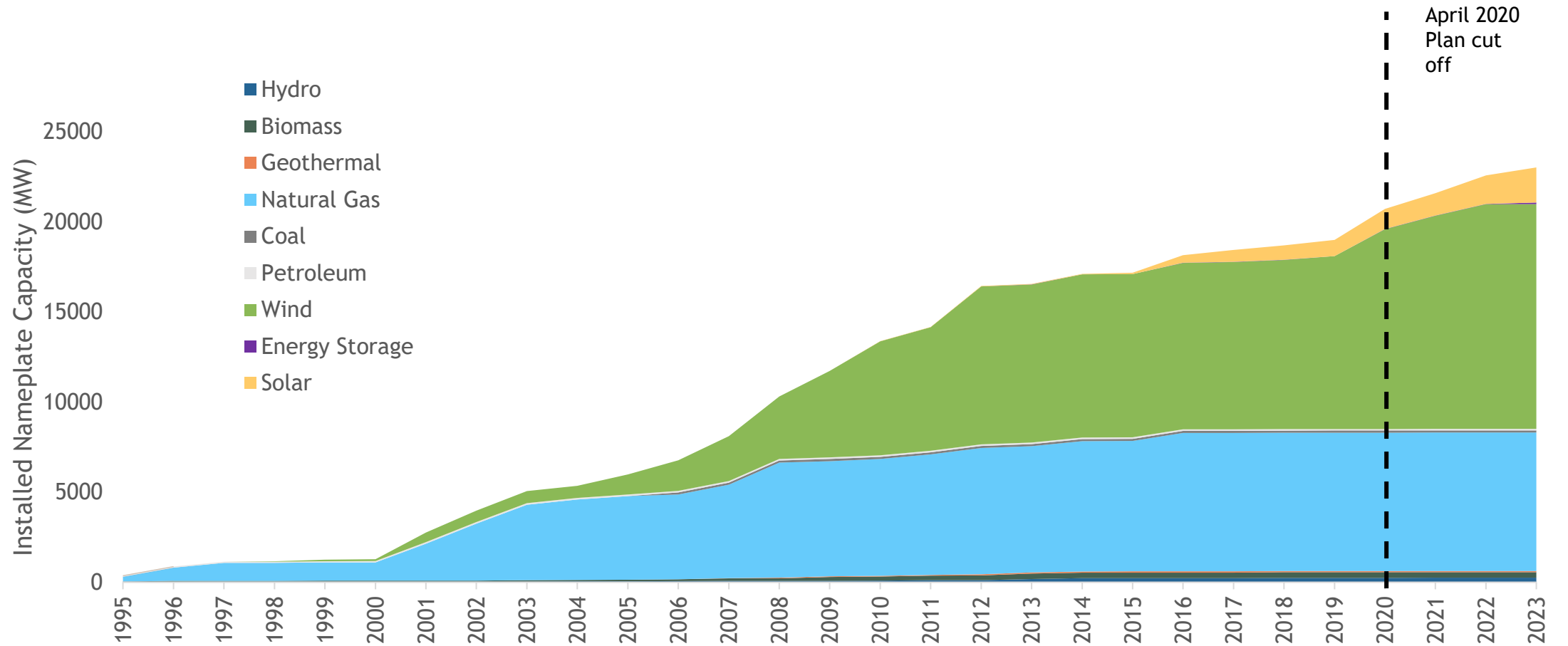
Perhaps even more uncertain is the extent to which clean energy policies will affect other sectors of the economy and the demand for

For generation resources, the Council recommends the region acquire at least 3,500 megawatts of renewable resources by 2027, as a cost-effective option for meeting energy needs and reducing emissions.

Average Regional Renewable Builds Across Various Sensitivities

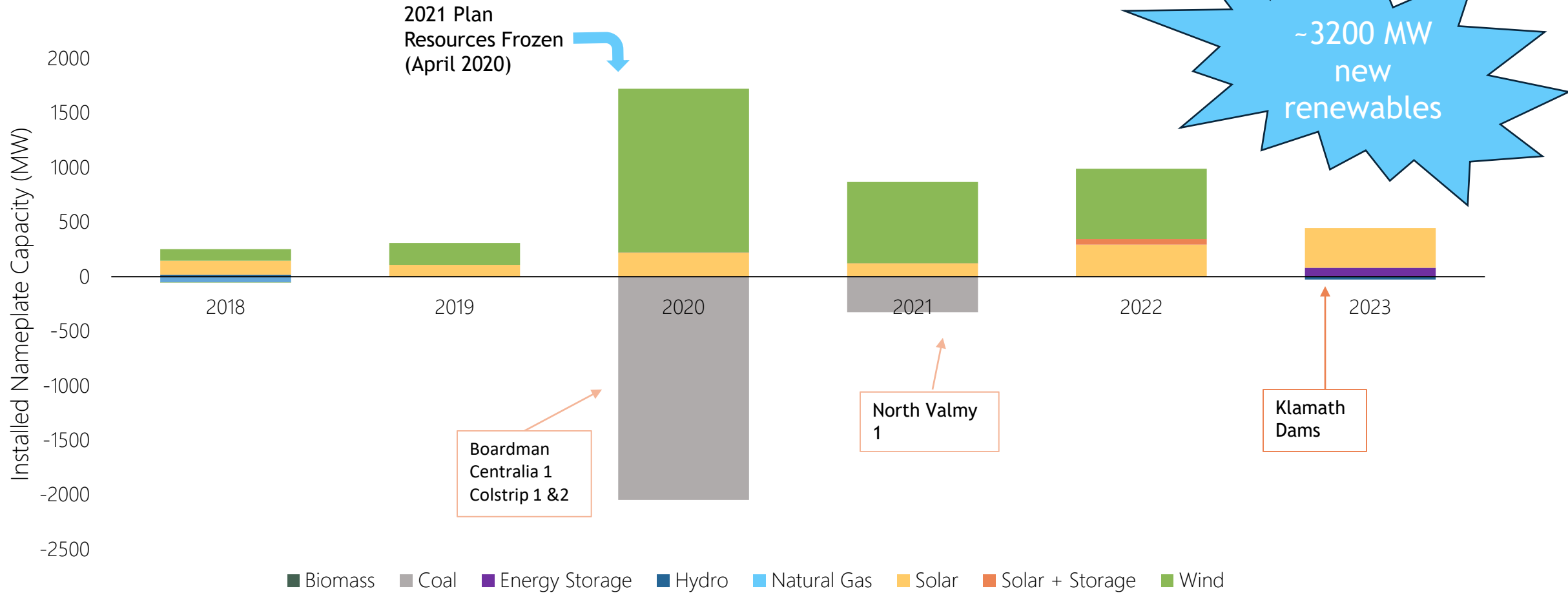


PNW Cumulative Resource Additions: 1995-2023

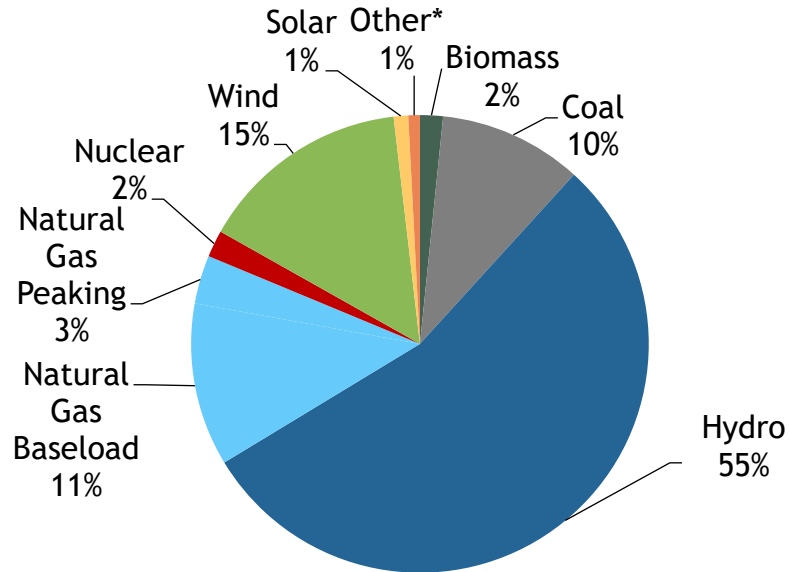


Obviously built on top of a huge baseline of hydro generation

Resource changes since 2021 Power Plan



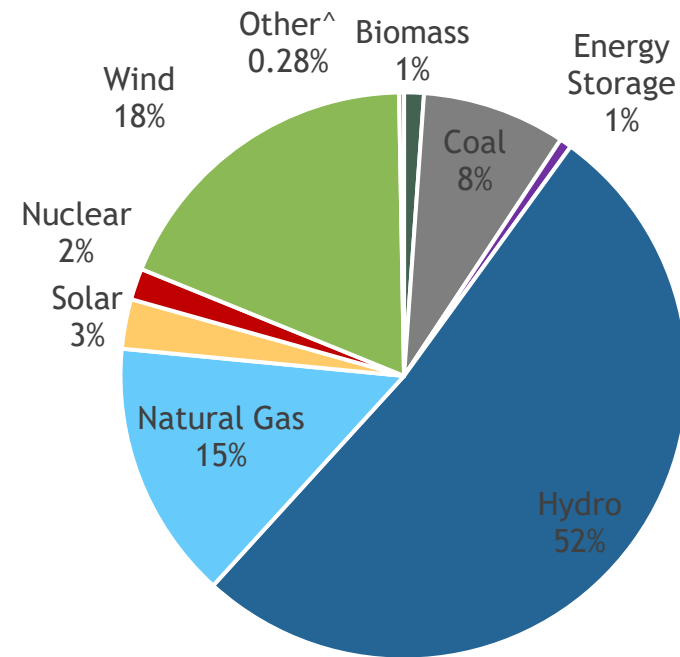
2021 Power Plan (April 2020) vs. Today (February 2024)



Installed Nameplate Capacity - 63,301 MW

April 2020

*Other - Geothermal, Petroleum, Energy Storage (Pumped Hydro + Battery)

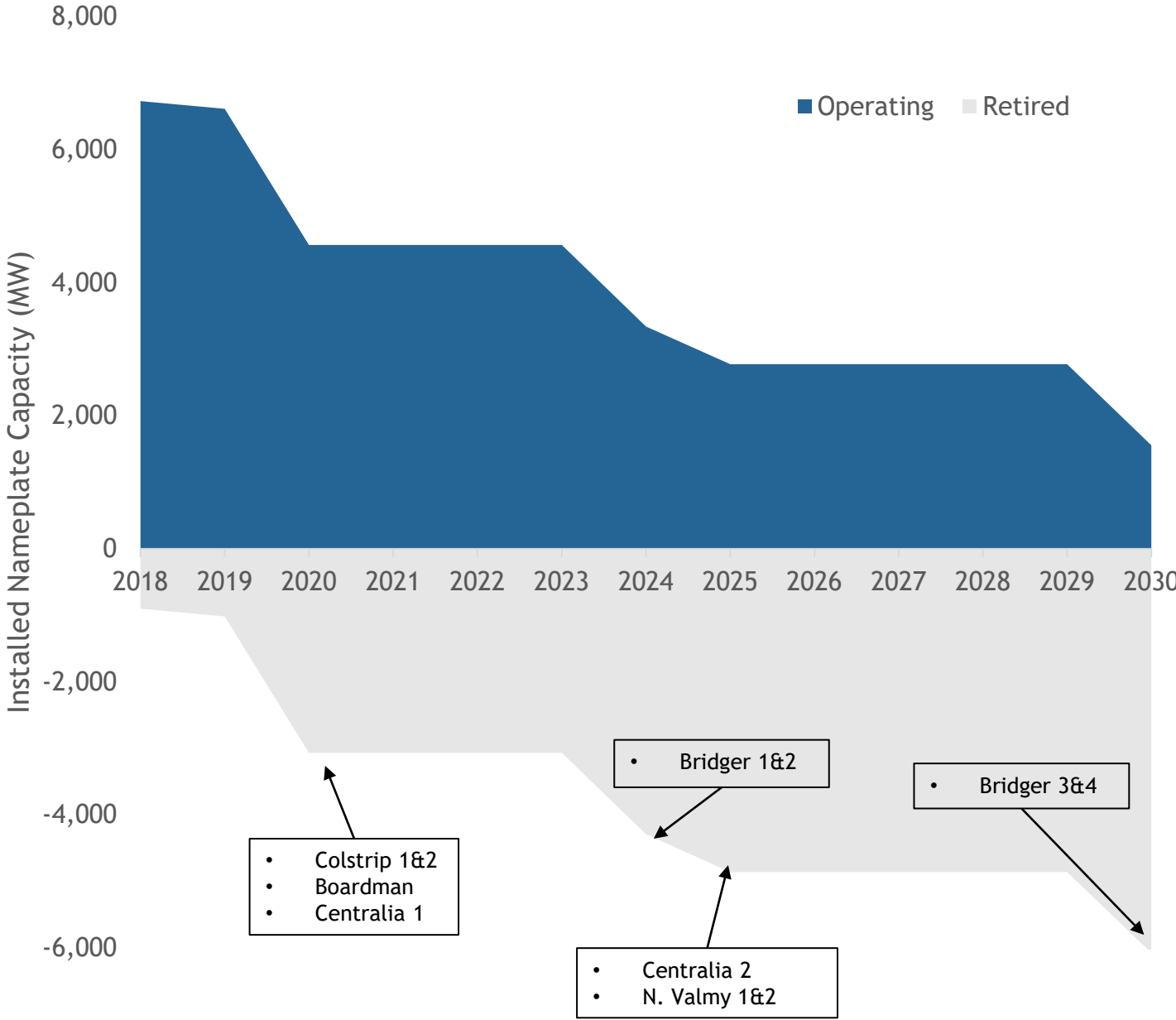


Installed Nameplate Capacity - 67,188 MW

Jan 2024

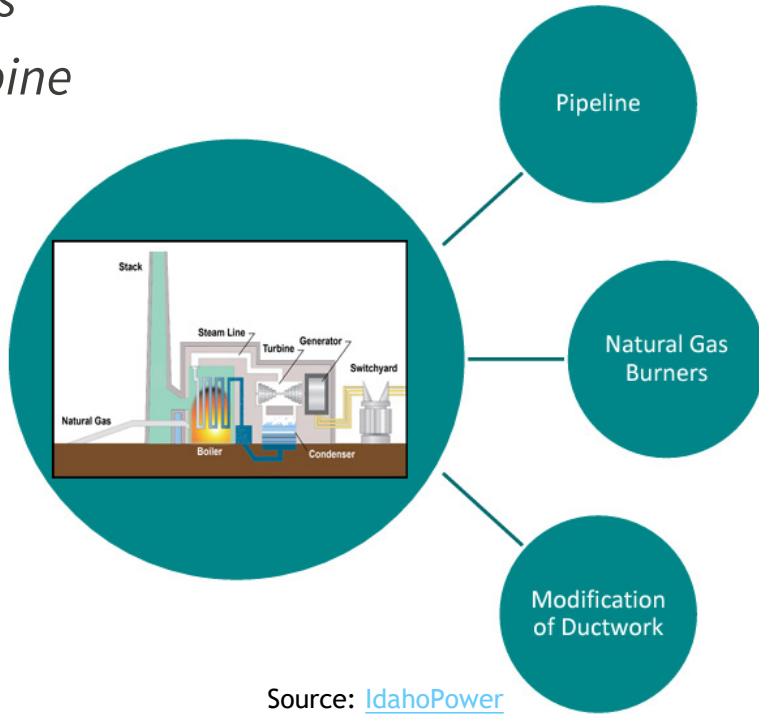
^Other - Geothermal, Petroleum,

| Coal Unit | Nameplate Capacity (MW) | Planned Retirement (Feb 2024) | Planned Retirement (2021 Plan) |
|---------------|-------------------------|-------------------------------|--------------------------------|
| Colstrip 1 | 358 | 2020 | 2020 |
| Colstrip 2 | 358 | 2020 | 2020 |
| Boardman | 601 | 2020 | 2020 |
| Centralia 1 | 730 | 2020 | 2020 |
| Jim Bridger 1 | 608 | 2024* | 2023 |
| Jim Bridger 2 | 617 | 2024* | 2028 |
| Centralia 2 | 730 | 2025 | 2025 |
| North Valmy 1 | 277 | 2025 ^x | 2021 |
| North Valmy 2 | 289 | 2025 ^x | 2025 |
| Colstrip 3 | 778 | - | - |
| Colstrip 4 | 778 | - | - |
| Jim Bridger 3 | 608 | 2030* | - |
| Jim Bridger 4 | 608 | 2030* | - |



Coal → Natural Gas Conversions

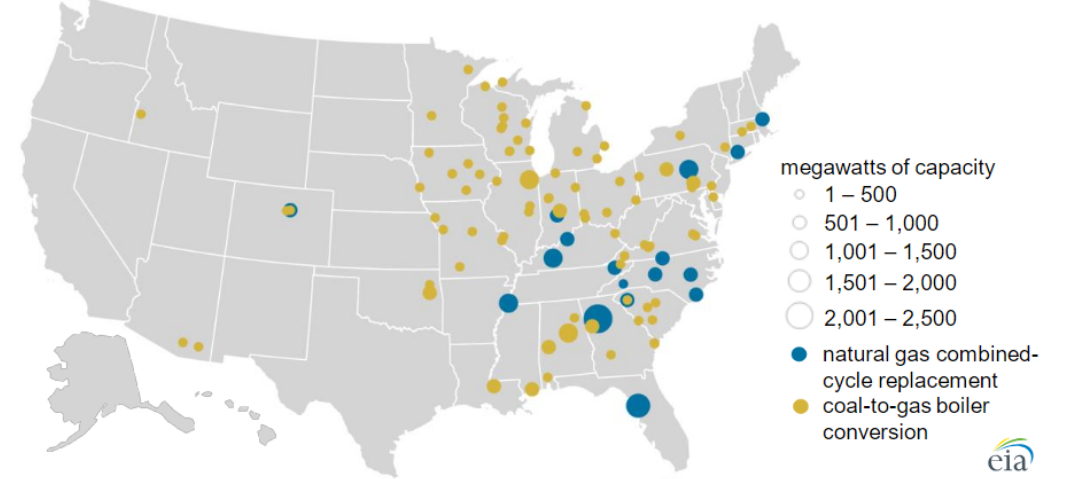
- 100% fueled with natural gas
- Existing boiler with new natural gas burners
- Existing steam turbine
- Existing generator



Source: [IdahoPower](#)

This is just one way that existing coal can be converted to natural gas, but it is how Idaho Power is representing Bridger's planned conversion

U.S. coal-to-natural gas plant conversions by conversion type and capacity (2011-2019)



Source: U.S. Energy Information Administration, *Annual Electric Generator Report* and *Preliminary Monthly Electric Generator Inventory*

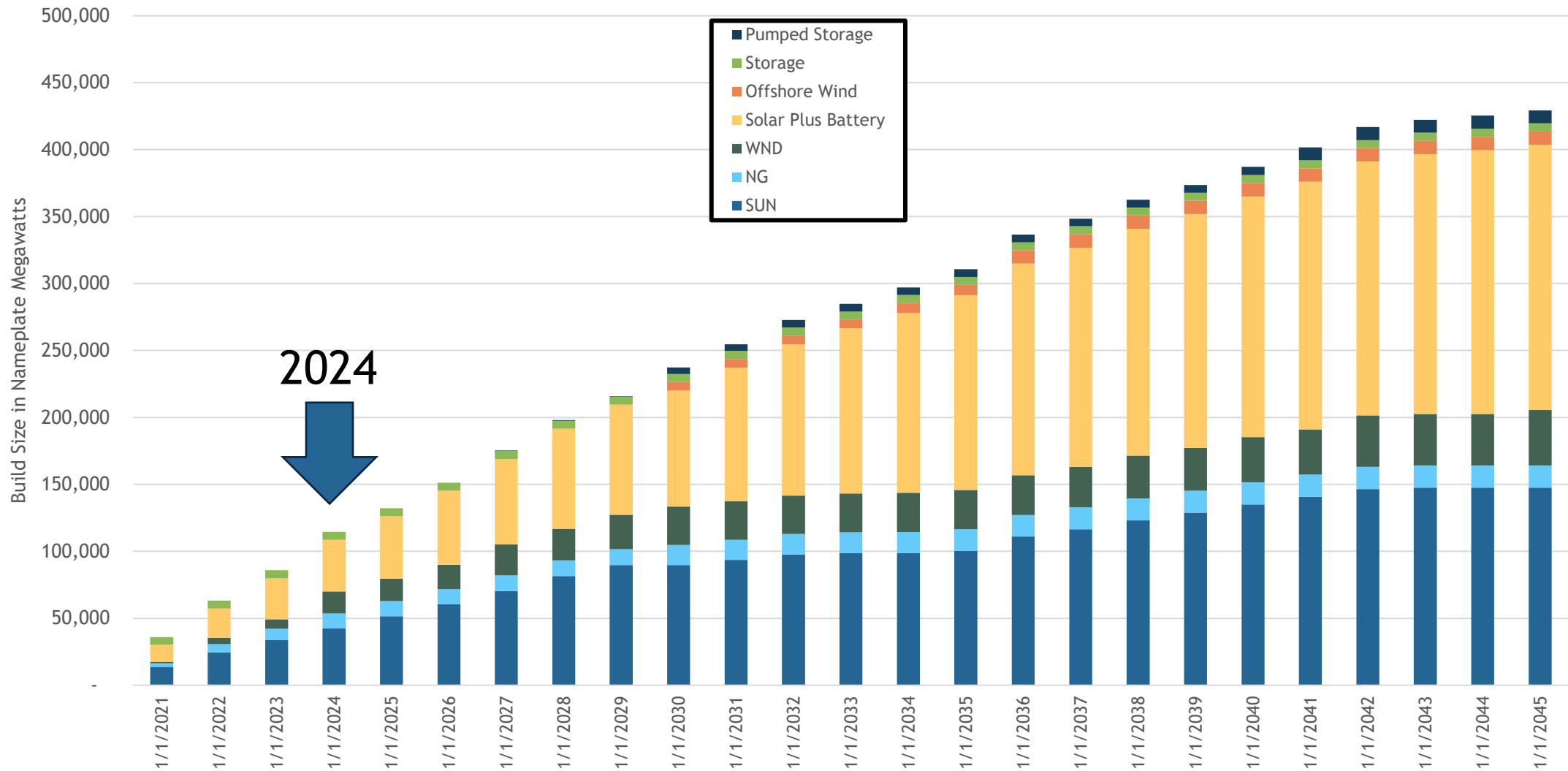
Source: [EIA](#)

- Historically, much of the coal to gas conversion in the country has happened on the east coast
- However, 6 of the PNW's coal units are slated for natural gas conversion by 2030

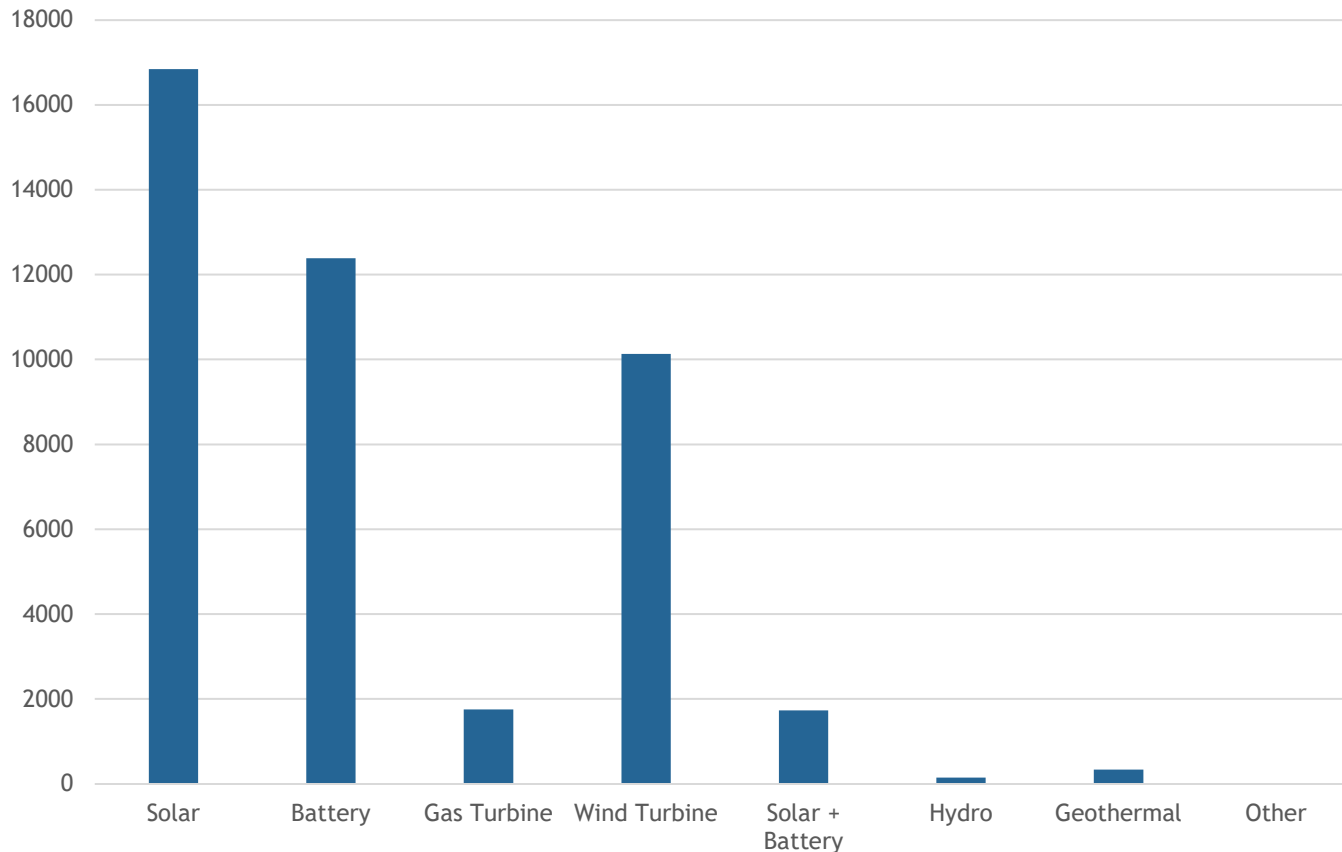


WECC-Wide Generating Resources

WECC Buildout Forecast from 2021 Plan



Additions Across the WECC (2020-2023)



Solar: 16,845 MW

Battery: 12,386 MW

Wind: 10,128 MW

Solar Plus: 1,734 MW

Gas: 1,751 MW

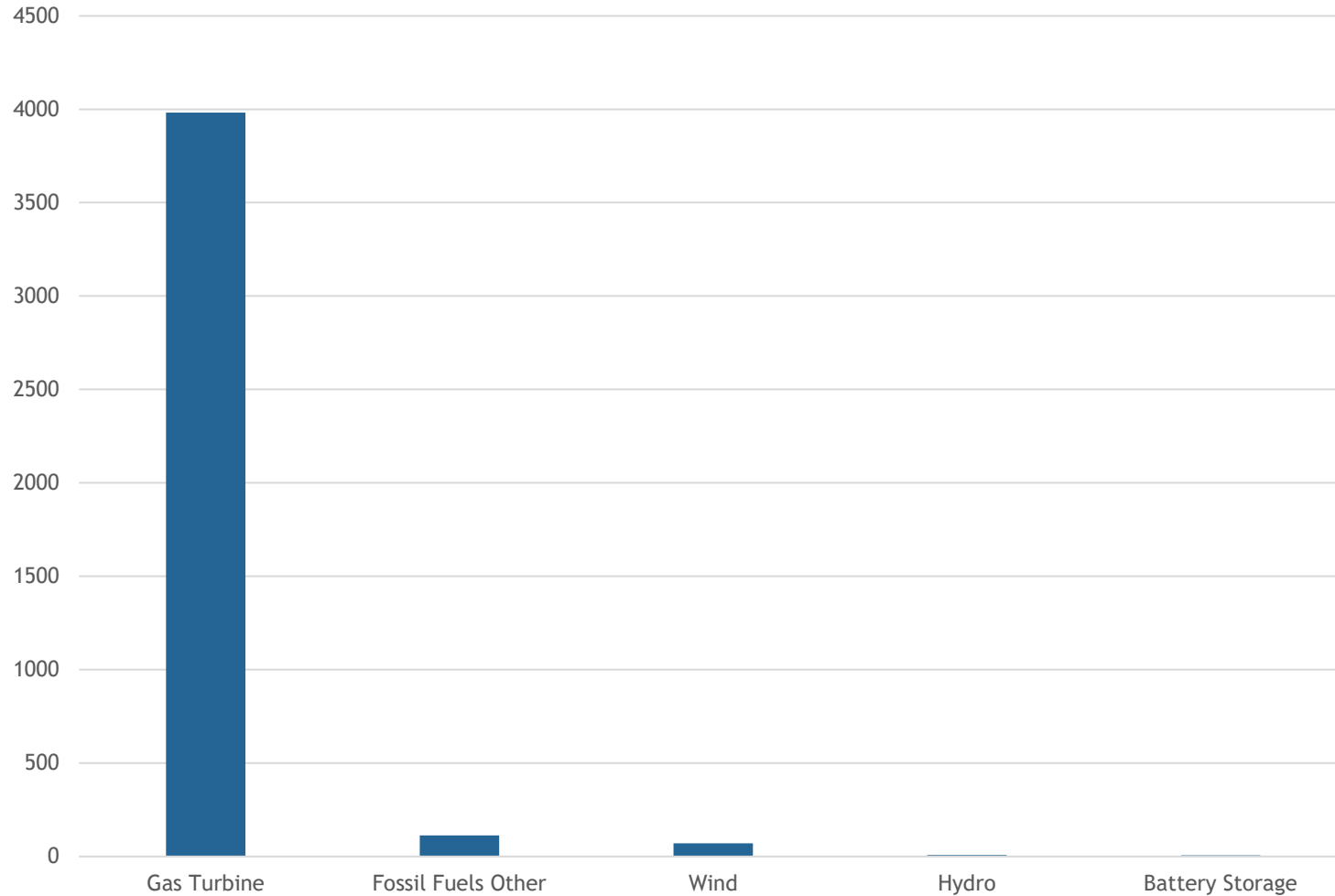
Hydro: 148 MW

Geothermal: 336 MW

Other: 13.1 MW

Total: 42,342 MW

Retirements Across the WECC (2020-2023)



Natural Gas: 3,981 MW

Fossil Fuels Other: 113 MW

Wind: 70

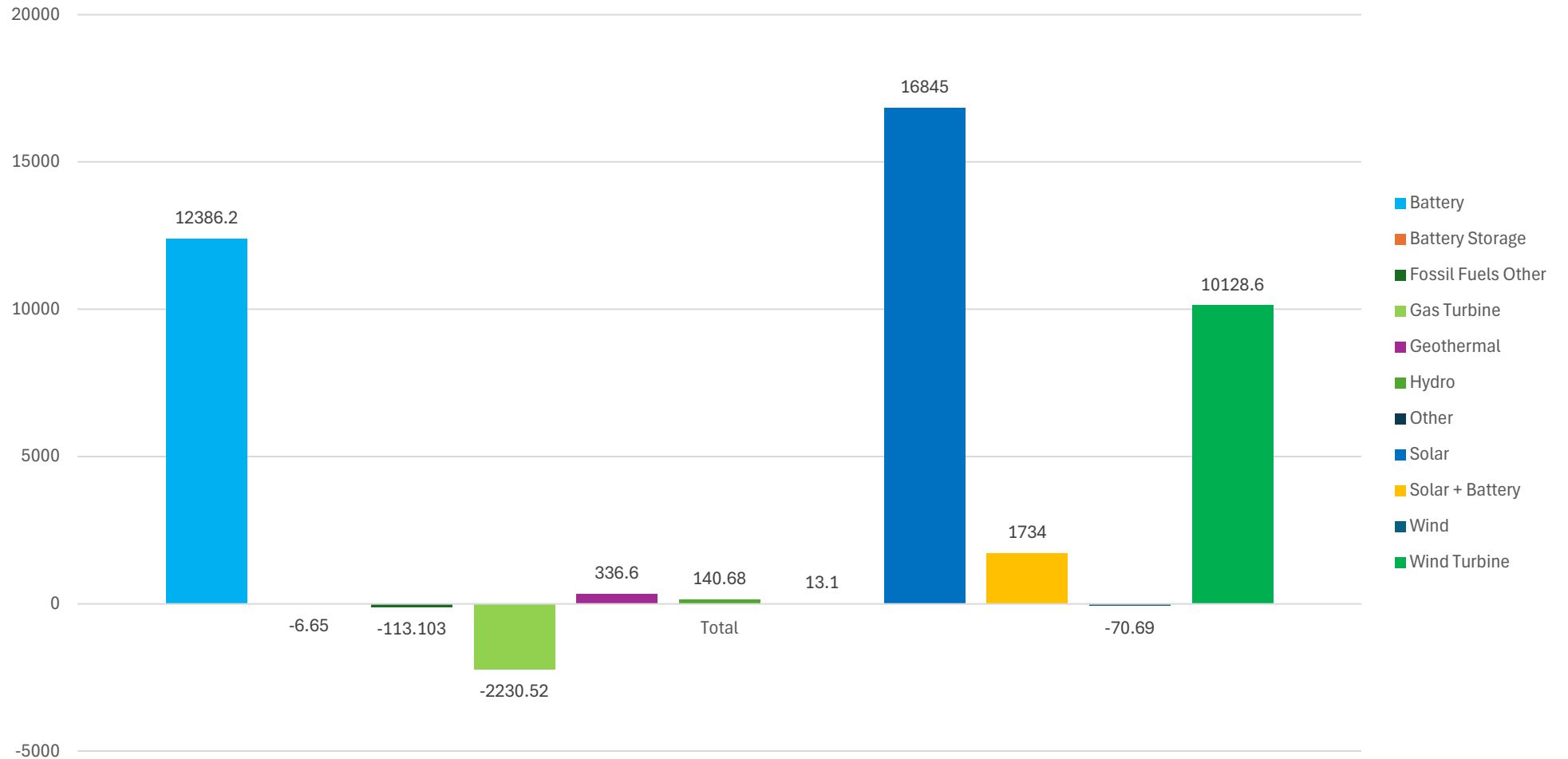
Hydro: 7.32 MW

Battery Storage: 6.65 MW

Total: 4,179.48 MW

Net Resource Changes Since the 2021 Plan

Overall Increase of **39,163 MW** in Generating Capacity

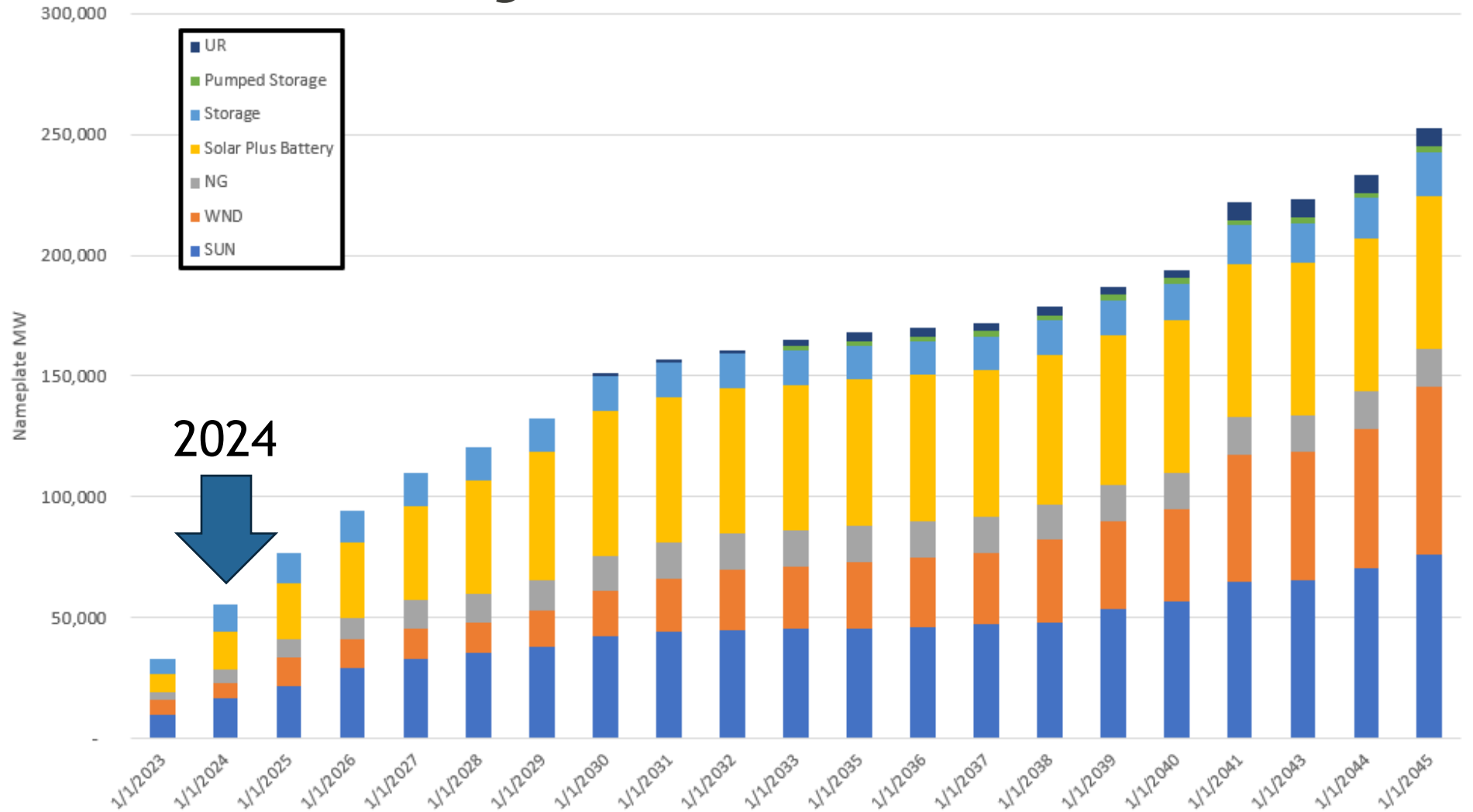


Wider-WECC Database and Market Studies

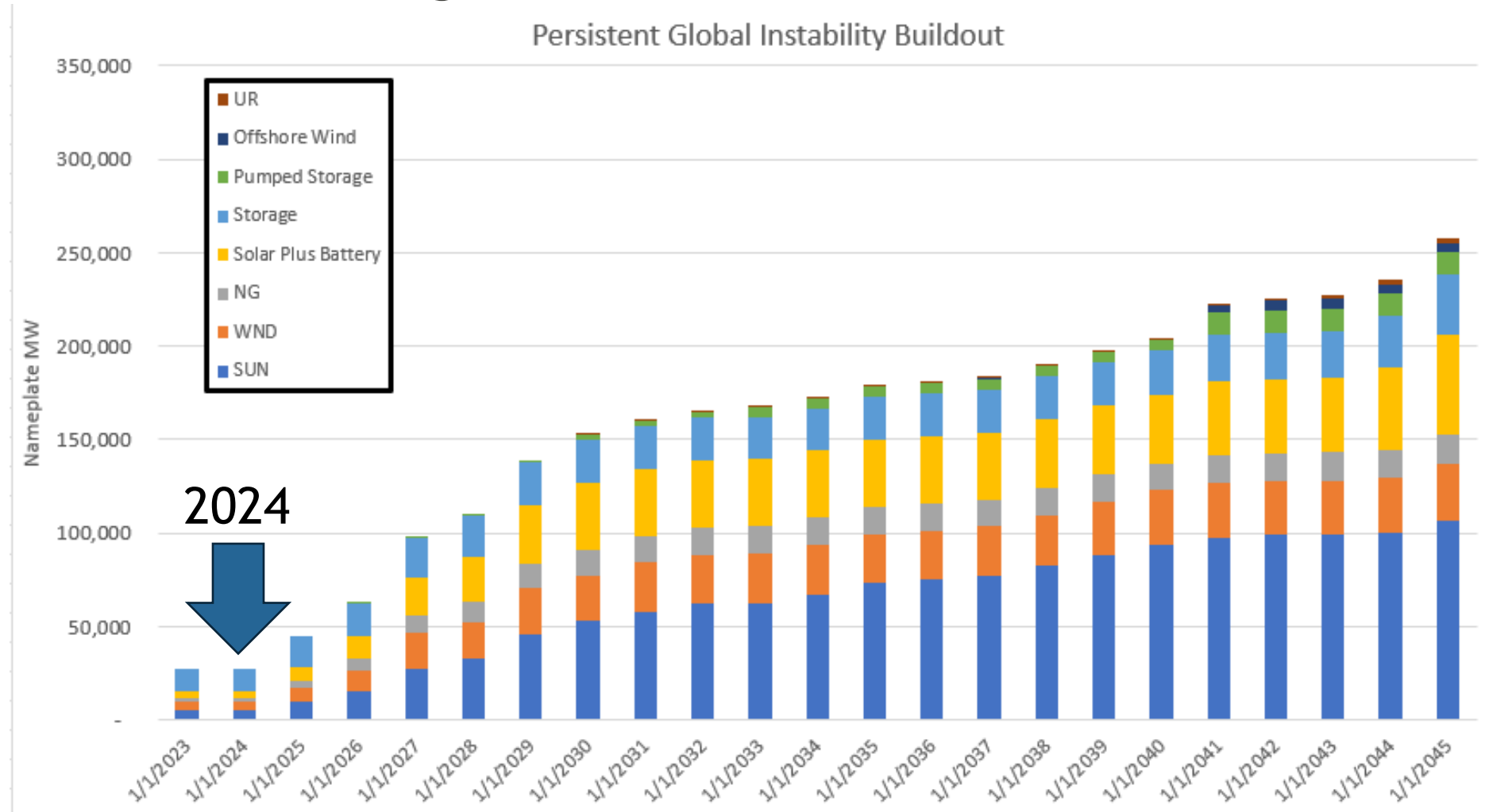
- The Council conducts the buildout forecast annually through our annual studies; specifically for the market price forecast.
- Forecast scenarios are updated as information and baseline inputs evolve.
- Baseline Scenario for the 2023 market price forecast.
 - This update had some key data inputs including California’s load forecast and the continuing low prices.
- Global Instability Scenario
 - Due to the 2020,2021 global supply chain issues, interconnection delays and other slowing economic conditions, this scenario is valuable to compare against the actual buildout.

WECC Baseline Buildout Forecast: 2022 Market Price Study

Buildout

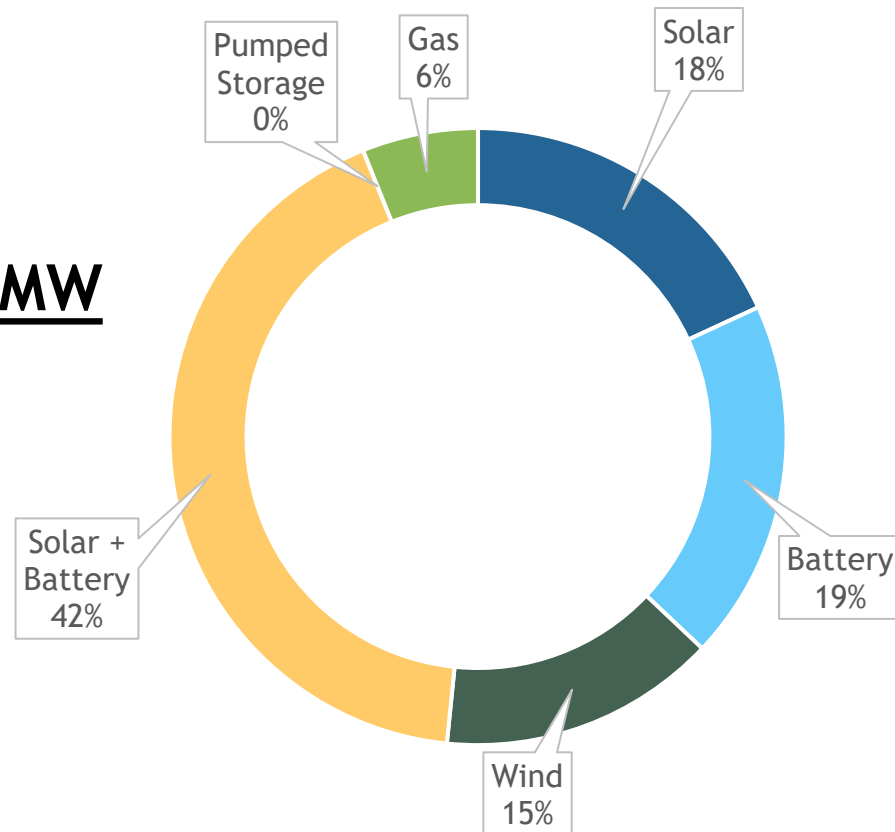


WECC Buildout Forecast: 2022 Market Price Study, Global Instability Scenario

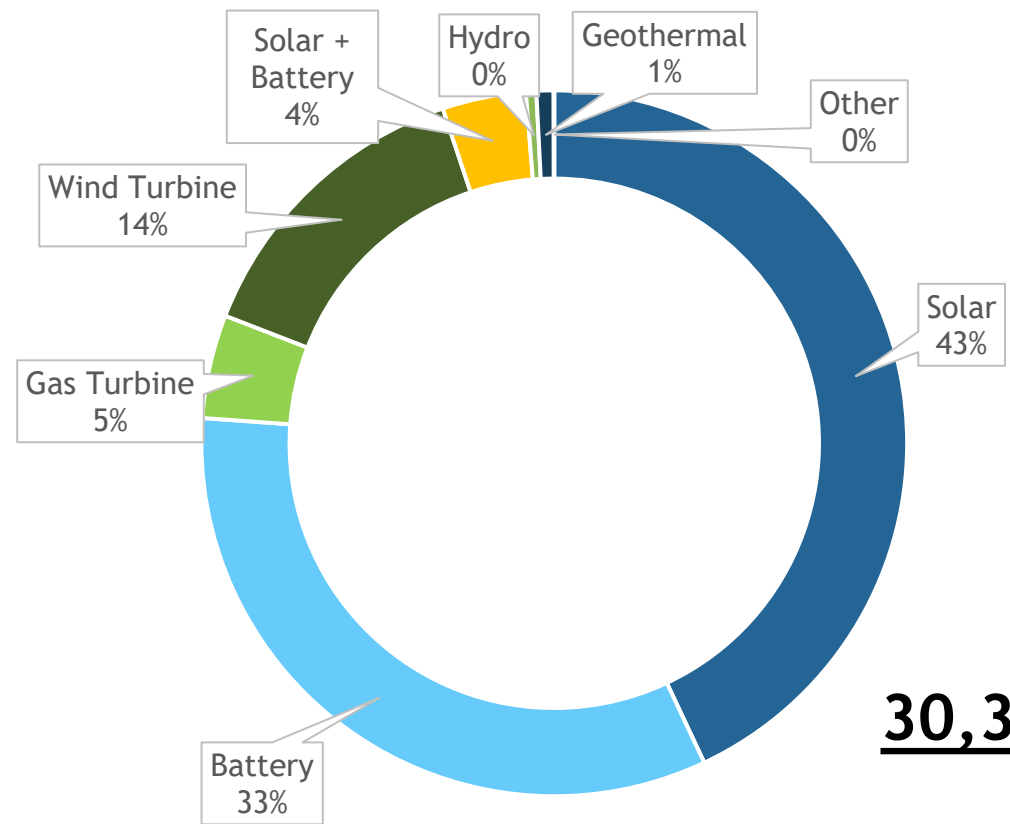


Global Instability Scenario Forecast Versus Actuals

27,468 MW



2022 - 2023 Forecast



30,336 MW

2022 - 2023 Actuals

WECC Wide Buildout Update Summary

- New builds across the WECC are 42,342 MW.
- This is a slower pace than assumed in the 2021 Plan analysis.
- Updated forecasts for our annual studies have also shown a slower pace than assumed in the plan
 - Baseline assumed 55,094 MW
 - Global Instability assumed 46,288 MW (27,468 MW)
- Mix of resources being built out is different:
 - Less Solar + Storage and more standalone Solar and Storage
 - Continuing supply chain hurdles and recent policy changes may see this trend continue.



Broader Resource Landscape

National Resource Trends

- Renewable capacity added in 2023
 - Lots of solar in 2023, similar to the region, which is expected to continue
 - 84% of added capacity was solar, wind & battery storage
- Capacity/generation difference
 - Continued/increased use of the thermal fleet to balance renewables

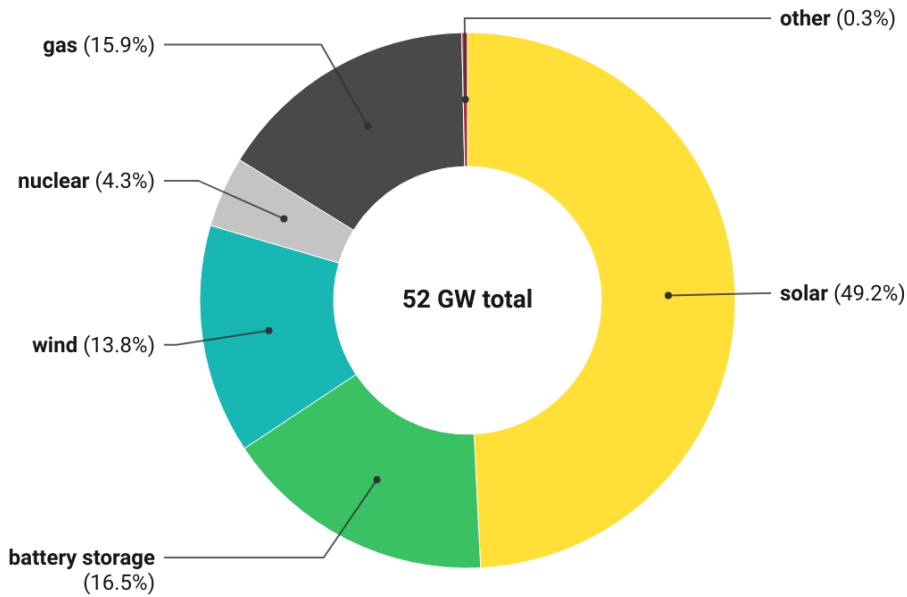
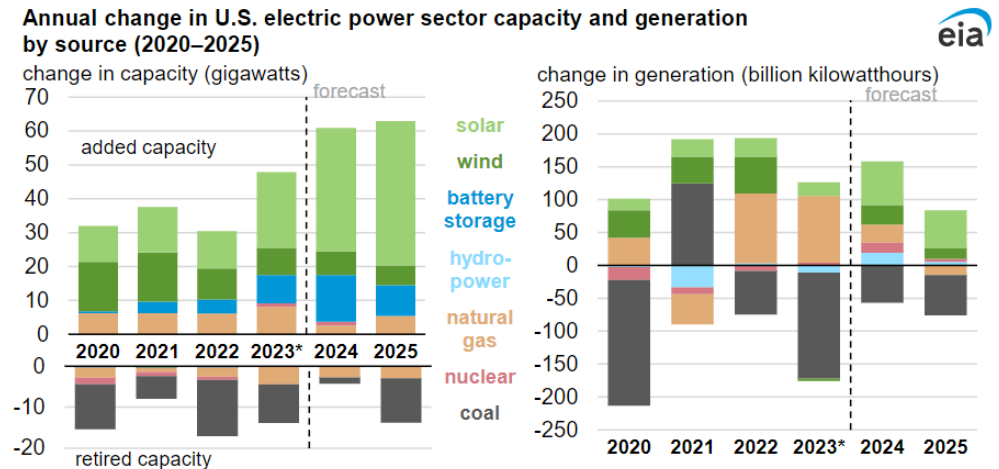


Chart: Canary Media • Source: Preliminary Monthly Electric Generator Inventory, January 2023 data

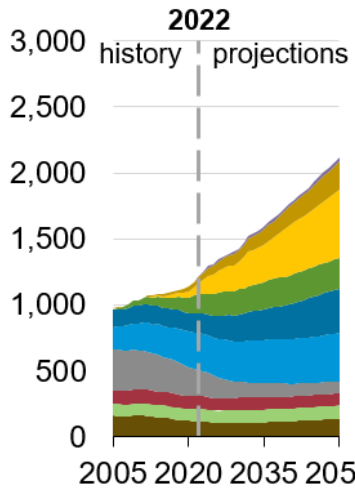
US utility scale power plant capacity added in 2023



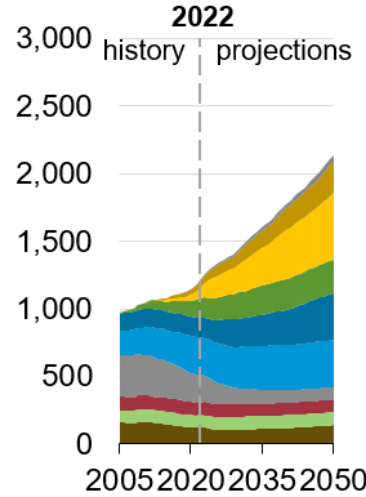
Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook*, January 2024
 Note: Values for 2023 reflect historical data through October and estimates for November and December.

IRA Tax Credits (ITC/PTC)

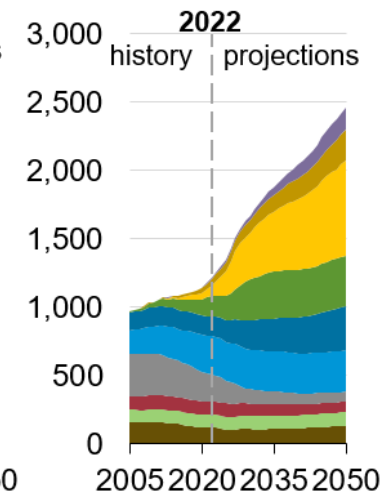
U.S. installed generating capacity by source
gigawatts
No IRA



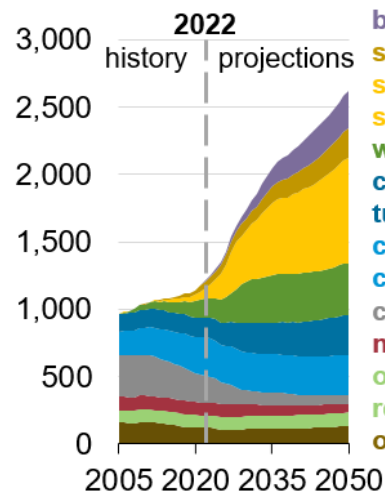
Low Uptake



Reference



High Uptake



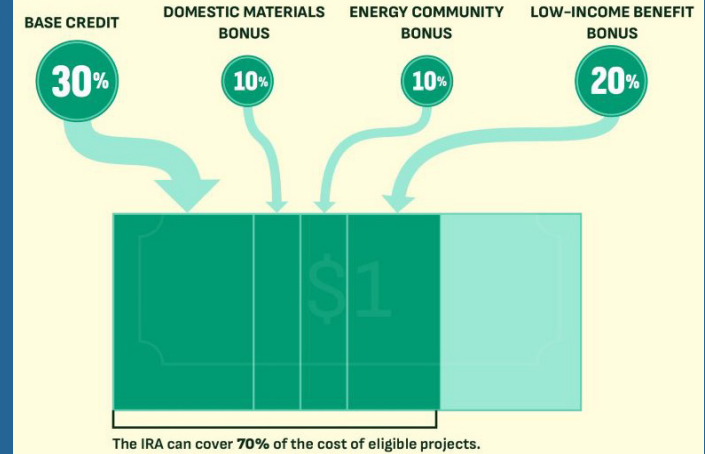
battery storage
solar, end-use solar, power sector^a
wind
combustion turbine^b
combined cycle^b
coal^c
nuclear
other renewables^d
other^e

Data source: U.S. Energy Information Administration, *Annual Energy Outlook 2023* (AEO2023)

- Production tax credit/Investment tax credit:
 - Built in labor standards (prevailing wage & apprentice requirement), direct pay/transferrability, technology neutral starting in 2025—extended through 2032, start to phase out only if GHG emission are below 25% of 2022 rates
- Bonuses: Domestic materials, energy community
 - Under 5MW projects located in a low-income community or on Tribal land

CLEAN ELECTRICITY INVESTMENT TAX CREDITS

For every dollar invested in installing clean electricity generation, the IRA pays tax credits of:



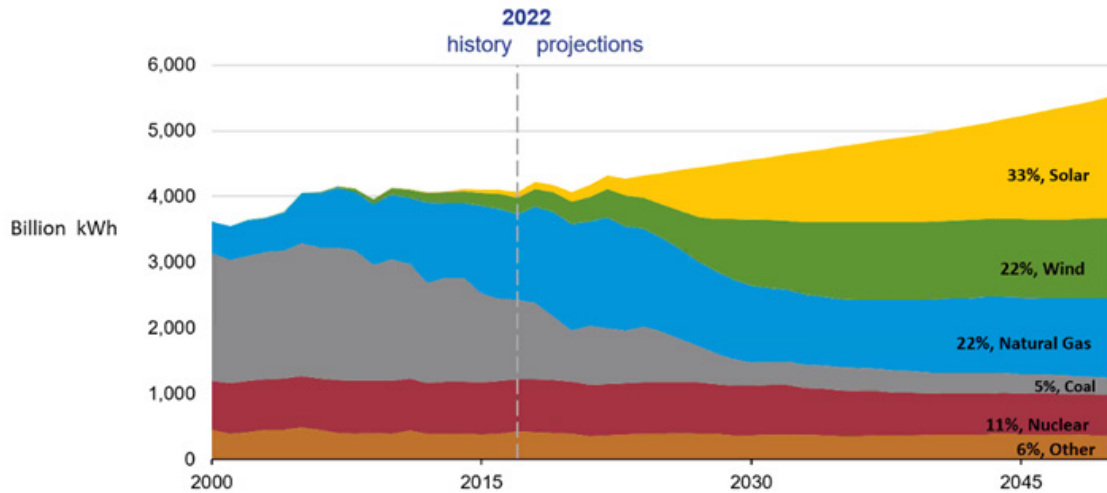
CLEAN ELECTRICITY PRODUCTION TAX CREDITS

For every kWh generated by a clean electricity project, the IRA pays tax credits of:



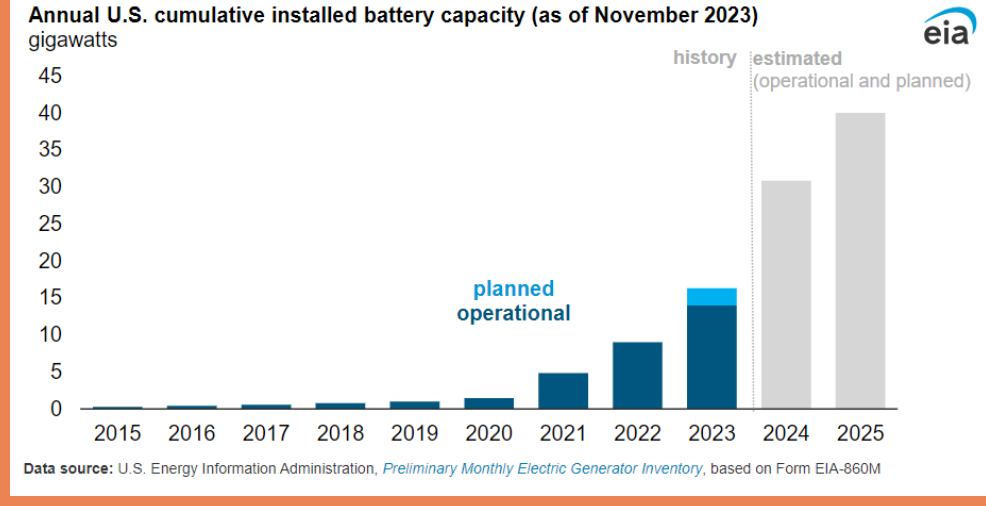
What's next

- More renewables, which is not a surprise, which renewables, how much and how fast is the piece that is in flux and that we're interested in
 - Solar, magnitude & speed
 - Storage, right on the cusp of big development expected

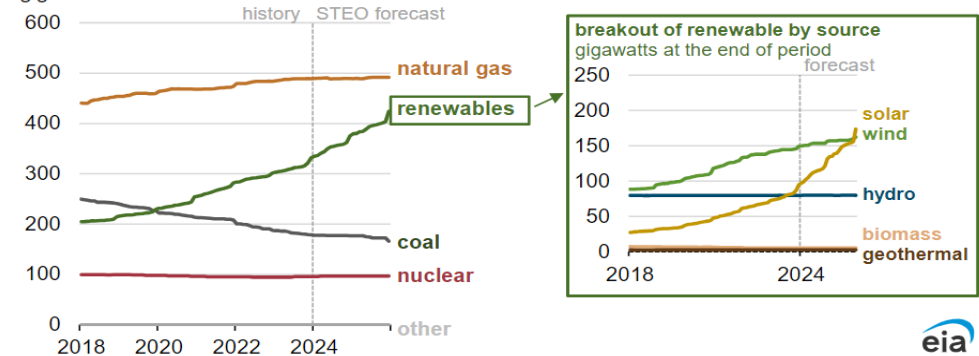


EIA projects that solar and wind will make up for 55% of the U.S. electricity generation mix by 2050

Source: U.S. EIA, *Annual Energy Outlook 2023*. - U.S. electricity generation from selected fuels



U.S. annual electric generating capacity (2018–2025)
gigawatts at end of December



Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook (STEO)*, January 2024

Source: [EIA Energy Outlook](#)



Questions?



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