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
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
Average Regional Renewable Builds Across Various Sensitivities

Early coal retirement, with limits on gas, and the deep decarbonization scenario resulted in the highest builds.

Lowest was ~3,500 MW, with no limits on gas and no SCC.
PNW Cumulative Resource Additions: 1995-2023

Installed Nameplate Capacity (MW)

- Hydro
- Biomass
- Geothermal
- Natural Gas
- Coal
- Petroleum
- Wind
- Energy Storage
- Solar

Obviously built on top of a huge baseline of hydro generation

April 2020 Plan cut off

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Resource changes since 2021 Power Plan

- Installed Nameplate Capacity (MW)
- 2021 Plan Resources Frozen (April 2020)
- ~3200 MW new renewables

- Biomass
- Coal
- Energy Storage
- Hydro
- Natural Gas
- Solar
- Solar + Storage
- Wind

- 2018
- 2019
- 2020
- 2021
- 2022
- 2023
2021 Power Plan (April 2020) vs. Today (February 2024)

Installed Nameplate Capacity - 63,301 MW

- Biomass: 2%
- Coal: 10%
- Hydro: 55%
- Natural Gas Baseload: 11%
- Nuclear: 2%
- Wind: 15%
- Solar: 1%
- Other*: 1%

Installed Nameplate Capacity - 67,188 MW

- Biomass: 1%
- Coal: 8%
- Energy Storage: 1%
- Hydro: 52%
- Natural Gas: 15%
- Nuclear: 2%
- Solar: 3%
- Wind: 18%
- Other*: 0.28%
- Other**: Geothermal, Petroleum, Energy Storage (Pumped Hydro + Battery)

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

UPDATE
<table>
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<tr>
<th>Coal Unit</th>
<th>Nameplate Capacity (MW)</th>
<th>Planned Retirement (Feb 2024)</th>
<th>Planned Retirement (2021 Plan)</th>
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<td>Jim Bridger 4</td>
<td>608</td>
<td>2030*</td>
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*Planned conversion to natural gas announced in PacifiCorp’s draft IRP
x Planned conversion to natural gas per NV Energy IRP amendment—also plans to replace generation and help meet Nevada’s RPS mandates of 50% by 2030 with a 400-MW solar/storage plant

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Coal → Natural Gas Conversions

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

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.

- 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

Build Size in Nameplate Megawatts

- Pumped Storage
- Storage
- Offshore Wind
- Solar Plus Battery
- WND
- NG
- SUN

2024
Additions Across the WECC (2020-2023)

- Solar: 16,845 MW
- Battery: 12,386 MW
- Wind: 10,128 MW
- Solar Plus: 1734 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

- UR
- Pumped Storage
- Storage
- Solar Plus Battery
- NG
- WND
- SUN

2024
WECC Buildout Forecast: 2022 Market Price Study, Global Instability Scenario

Persistent Global Instability Buildout

- UR
- Offshore Wind
- Pumped Storage
- Storage
- Solar Plus Battery
- NG
- WND
- SUN

2024
Global Instability Scenario Forecast Versus Actuals

2022 - 2023 Forecast

- Solar: 18%
- Battery: 19%
- Wind: 15%
- Solar + Battery: 42%
- Pumped Storage: 0%
- Gas: 6%
- Other: 0%

27,468 MW

2022 - 2023 Actuals

- Solar: 43%
- Battery: 33%
- Gas Turbine: 5%
- Wind Turbine: 14%
- Solar + Battery: 4%
- Hydro: 0%
- Geothermal: 1%
- Other: 0%
- Pumped Storage: 0%
- Gas: 6%
- Other: 0%

30,336 MW
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

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**US utility scale power plant capacity added in 2023**

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

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**Annual change in U.S. electric power sector capacity and generation by source (2020–2025)**

- Change in capacity (gigawatts)
- Change in generation (billion kilowatt-hours)

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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**
  - 2022 history: projections
    - 3,000
  - 2025: 5,000
  - 2030: 10,000
  - 2050: 20,000

**Low Uptake**
- 2022 history: projections
  - 3,000
  - 2025: 2,500
  - 2030: 2,000
  - 2050: 1,500

**Reference**
- 2022 history: projections
  - 3,000
  - 2025: 2,500
  - 2030: 2,000
  - 2050: 1,500

**High Uptake**
- 2022 history: projections
  - 3,000
  - 2025: 2,500
  - 2030: 2,000
  - 2050: 1,500

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/transferability, 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
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