



# SUMMER

## OUTLOOK-2023





# Summer Outlook—2023

## Grid Operations

April 27, 2023

Travis English  
Sr. Training & Outreach  
Specialist



# RESOURCE ADEQUACY

DISCUSSION SERIES



# State of the Interconnection (SOTI)





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# Antitrust Policy

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# Overview and Briefing

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- Welcome and Introduction
- Microgrid Spotlight
- Wildfire Preparations Discussion
- Summer Operations Panel



# Summer Outlook—2023

## Welcome and Introduction

April 27, 2023

Vic Howell  
Director Reliability Risk  
Management WECC





# SUMMER

## OUTLOOK-2023





# Summer Outlook—2023

## Microgrid Spotlight

April 27, 2023

Jana Ganion  
Sustainability and Government Affairs  
Director  
Blue Lake Rancheria

# Microgrids for Resilience *for the grid and critical infrastructure*



WECC Summer Outlook 2023

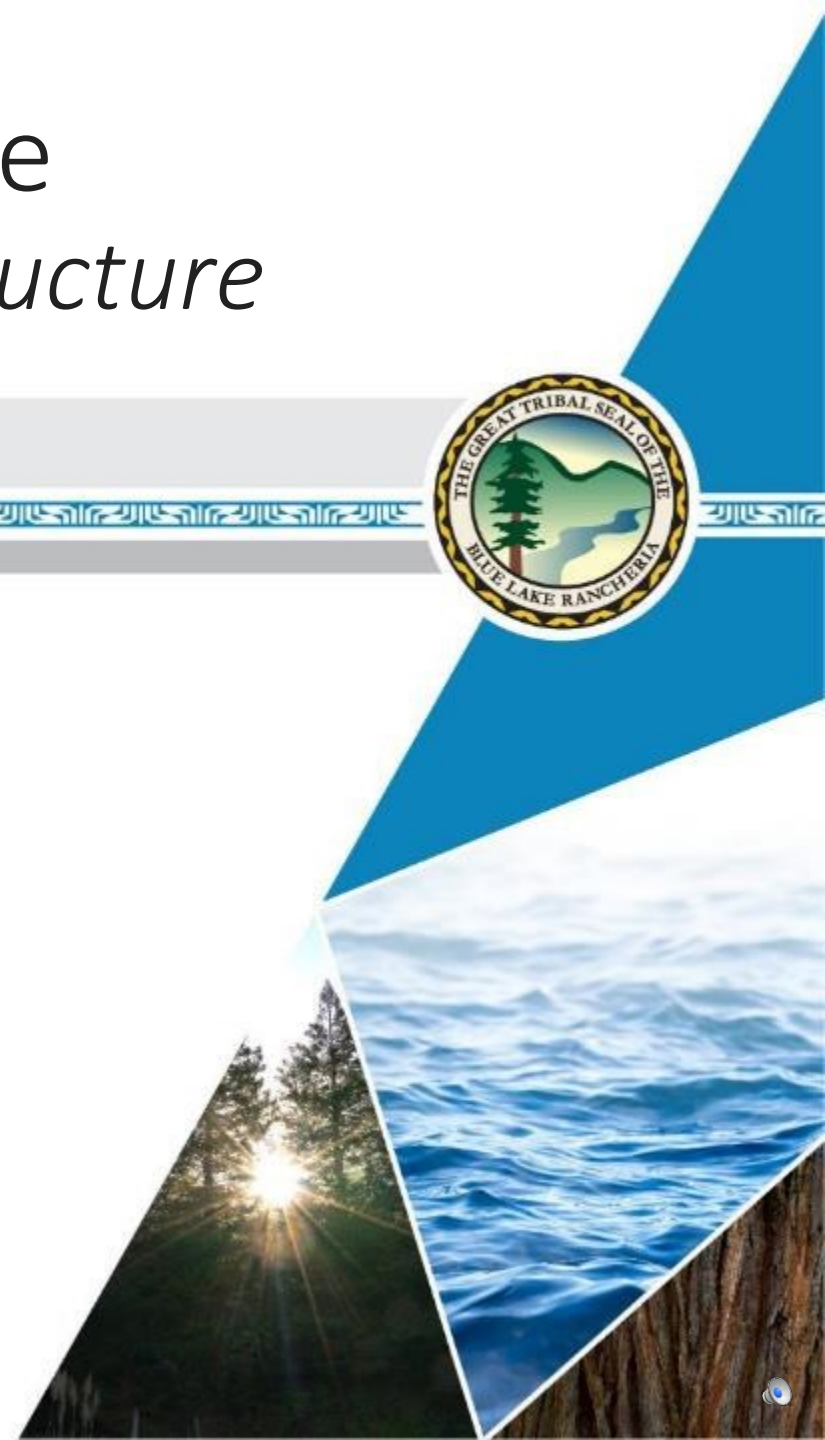
4/27/2023

Jana Ganion, Sustainability and Government Affairs Director

[jganion@bluelakerancheria-nsn.gov](mailto:jganion@bluelakerancheria-nsn.gov)

**BLUE LAKE RANCHERIA**

*A Federally Recognized Tribal Government*





- **Blue Lake Rancheria Tribe**
  - Federally recognized tribal government; nation; community
- Federally recognized 1908; terminated 1958; restored 1988; rebuilding
- Governed by elected, five-member Tribal Council
- ~100 acres of trust land spanning the Mad River (Baduwa't)
- Top 10 employers in rural Humboldt County (~400 employees)
- Formed Tribal Utility Authority (2013)

# Climate Resilience – Global to Local

- Global climate change *amplifies and cascades into* local conditions

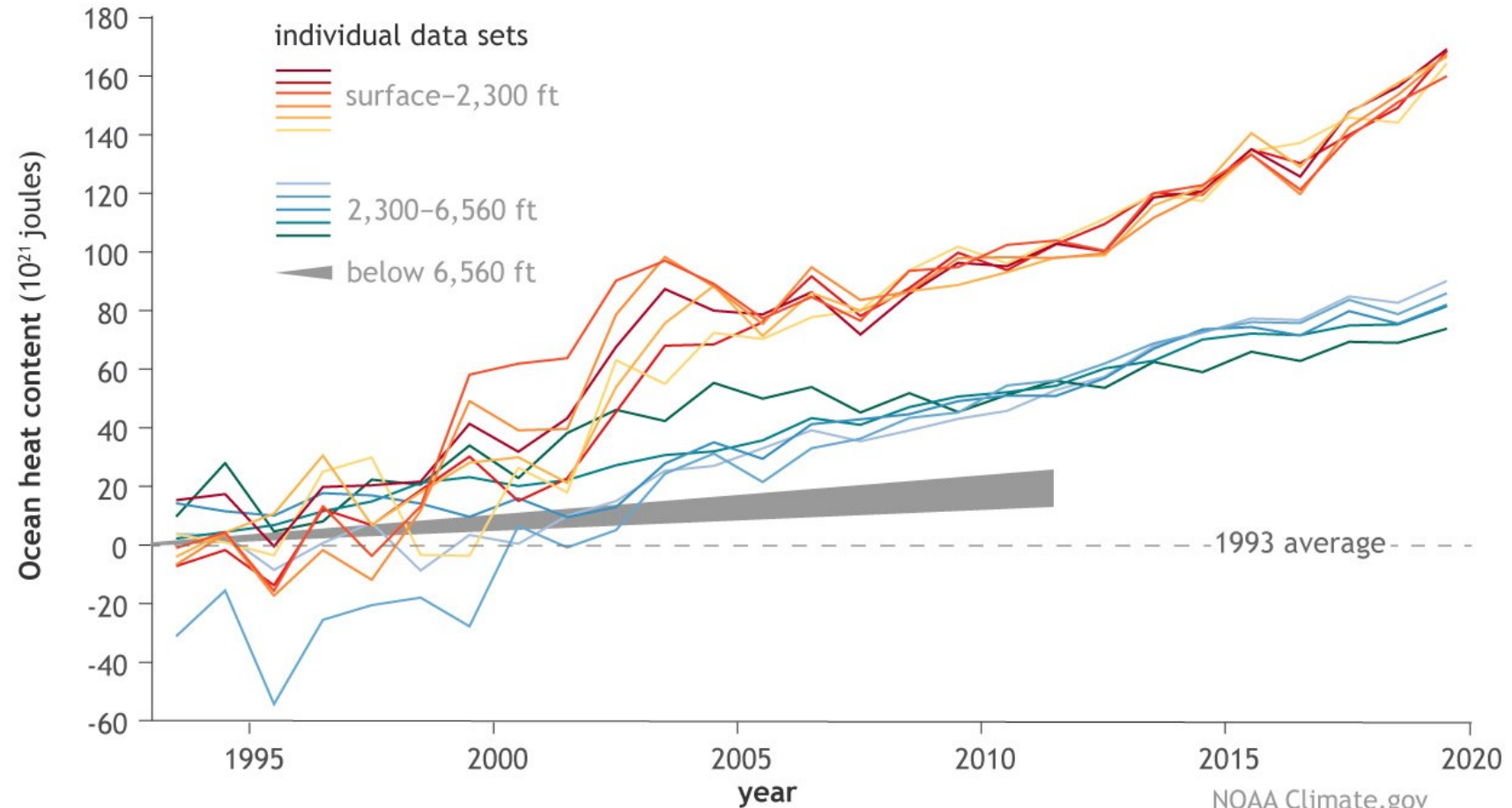
- Increasing temperatures on land and in oceans

- Pacific ocean “warm blobs” in 2014, 2019, 2022
- Oceans absorb ~90% of warming
- Oceans absorb CO<sub>2</sub>
- Warmer oceans hold less O<sub>2</sub> + loss of plankton = deoxygenation

- Creates volatile weather, wildfire, extreme heat and storms

- Nuisance power outages are common, and worsening

Annual ocean heat content compared to average (1993-2019)



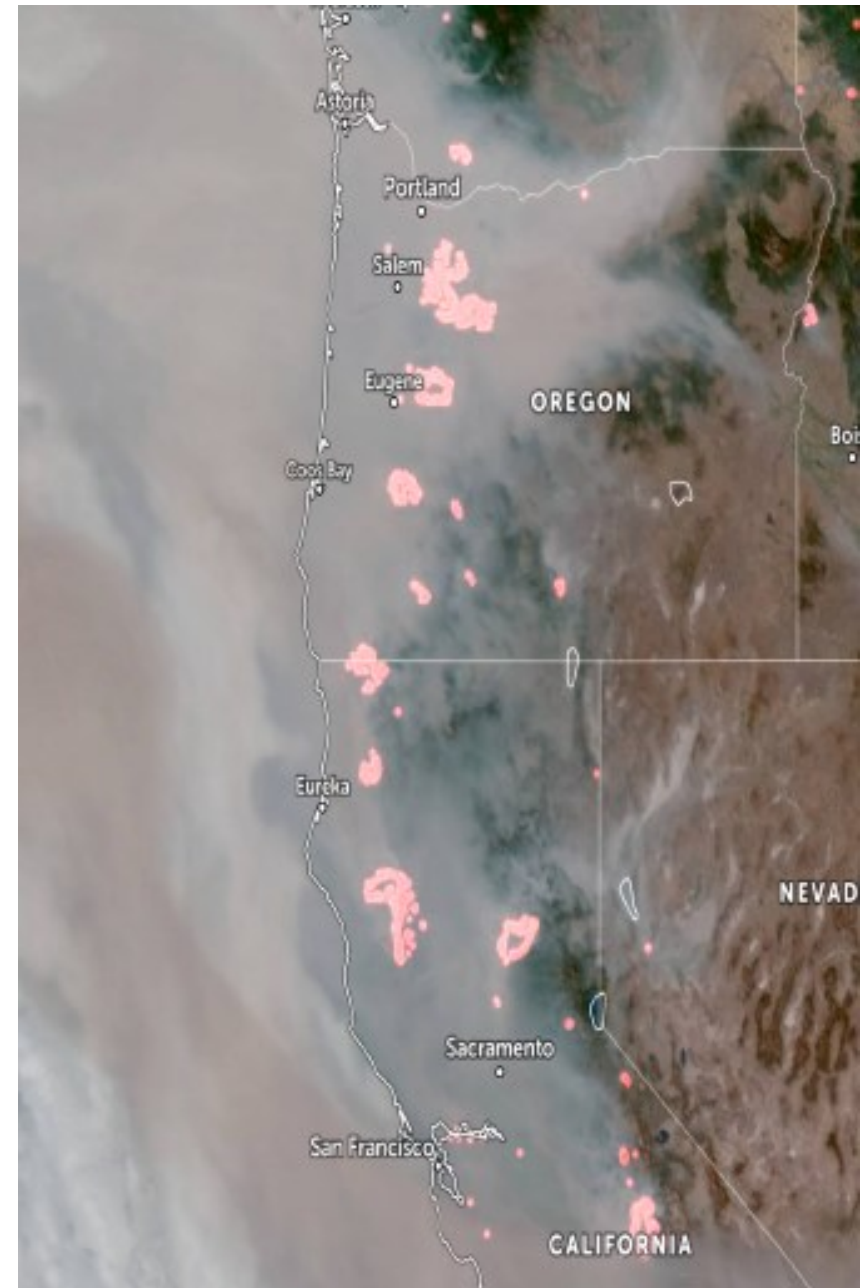
NOAA Climate.gov  
Adapted from SOTC 2019



# Climate Resilience - Regional

- ❖ Increased wildfires and air pollution – wildfire smoke – in new areas, almost year round
- ❖ “Public Safety Power Shutoffs” (PSPS)
  - ❖ Planned outages to prevent wildfires from electrical grid
  - ❖ Projected to last 2-10 days; PSPS events in 2019, 2020
  - ❖ Projected to be needed for the next 10 years
- ❖ Historic drought
- ❖ Extreme heat days and ‘heat domes’ over entire western U.S. / Canada in 2020, 2021, 2022
  - ❖ Portland, Oregon – 116 degrees, several days
  - ❖ Lytton, British Columbia – 121 degrees for several days
  - ❖ + Wildfires
  - ❖ Less night cooling

Image credit: zoom.earth  
9/11/2020





# Climate Resilience - Local

- ❖ Sea Level Rise (SLR), Groundwater Inundation, and Flooding
- ❖ **Humboldt County is experiencing the fastest rate of SLR on the Pacific Coast**
  - ❖ Combination of land subsidence and warming temperatures causing water to expand, melting of polar ice caps and glaciers
- ❖ Impacts to local infrastructure
- ❖ Threatens anchor natural gas power plant
- ❖ Threatens local nuclear waste repository



Photo Credit: Tim and Rose Hanan

# Electrical Grid Details

## ❖ Tenuous connections to **Electrical Grid**

- ❖ Region is served by a single transmission line
  - ❖ With one redundant line
- ❖ Runs through high risk wildfire and landslide areas
- ❖ Imports restricted to 70 megawatts, ~half the local use
  - ❖ Humboldt's typical use is 140-180 megawatts
  - ❖ Natural gas power plant provides most *actual* electrons
    - Clean energy use is largely contractual, not actual
- ❖ Need cleaner and more resilient local grid
  - ❖ **Humboldt "island"** created in 2020 >>>
  - ❖ A temporary fix

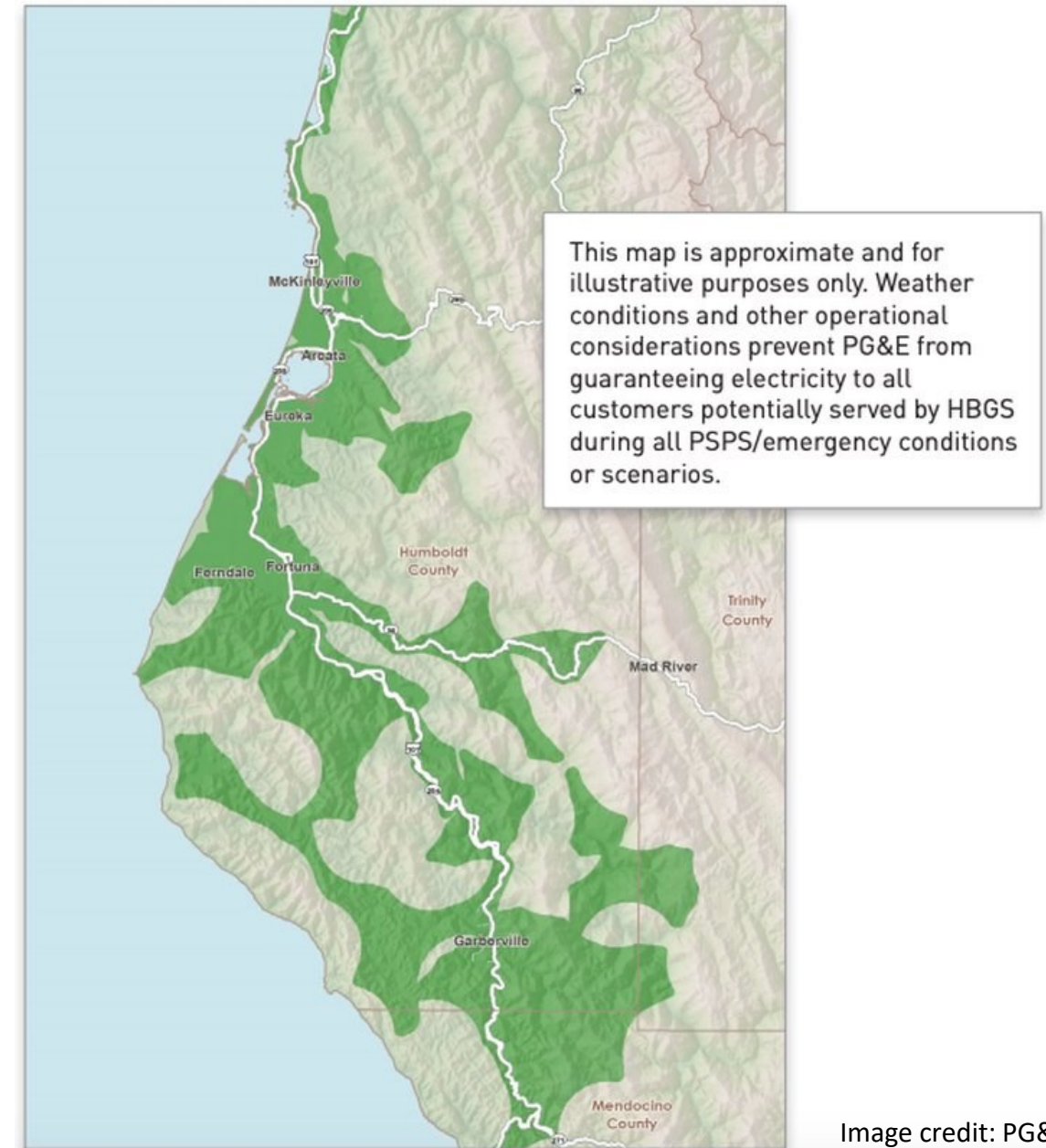


Image credit: PG&E



# Natural Gas Grid Details

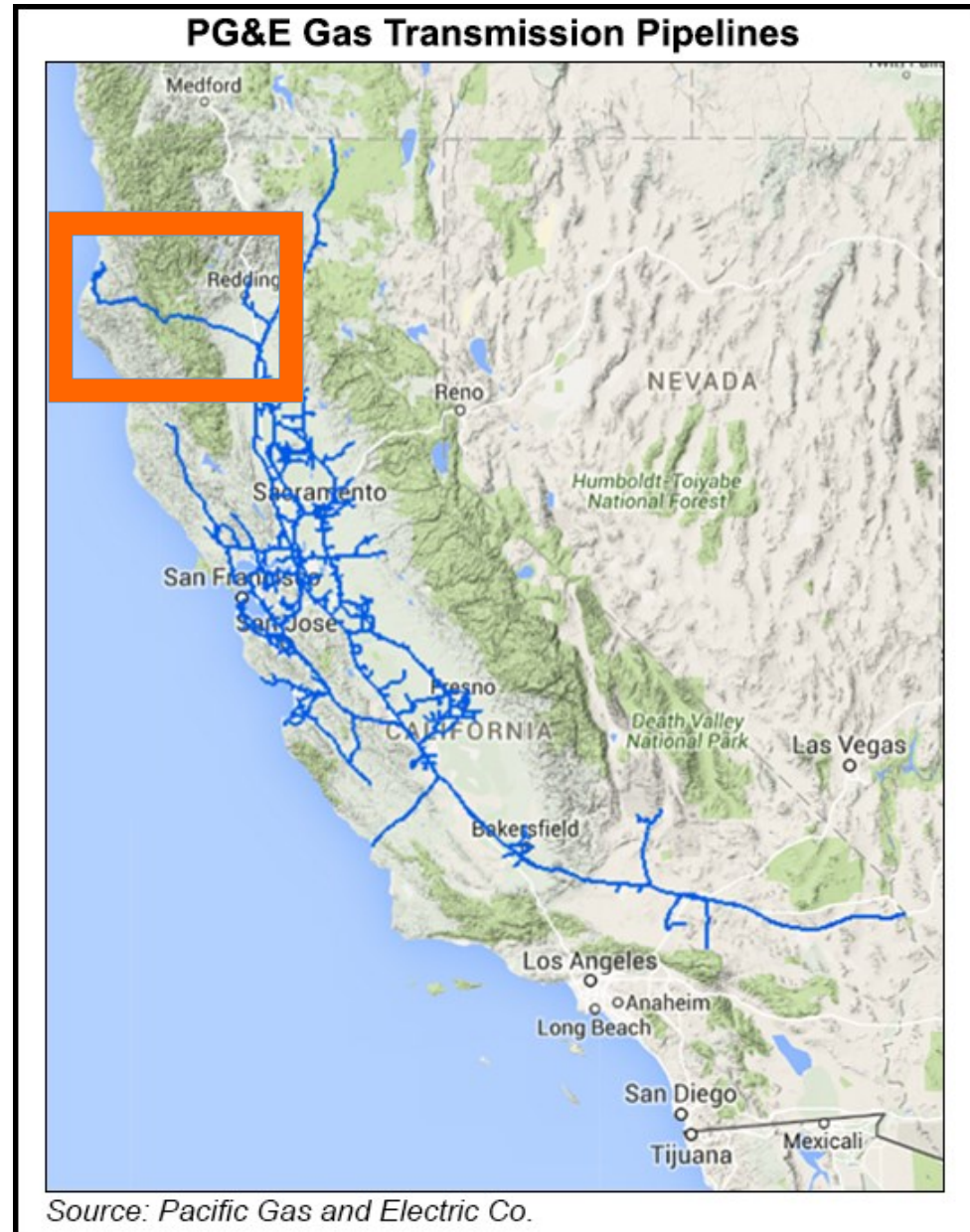
## ❖ Tenuous Connection to **Natural Gas Grid**

### ❖ Region served by one 10" natural gas pipeline

- ❖ Runs through seismically unstable landscape

### ❖ Serves region's sole anchor natural gas power plant

- ❖ Provides most of our *actual* electrons used here
- ❖ Located directly across from the mouth of Humboldt Bay, vulnerable to earthquake and tsunami
  - Single point of failure, example Dec. 20, 2022 earthquake, immediate regional outage
- ❖ Power plant site will be inundated by sea level rise *and* groundwater intrusion from sea level rise by ~2050-2070





# Blue Lake Rancheria (BLR) Low-carbon Microgrids

- Behind the meter (BTM) microgrids
- Community scale – 2017
- Facility scale – 2020
- Campus scale – 2022, w/ residences
- New facility scale at Toma Resilience Campus (in operation ~2024)
- Latest project: connecting all microgrids into “nested microgrid” ecosystem
- Multiple microgrids allow for ongoing reliability and grid benefit studies



# BLR Community Scale Microgrid

- Public/private partnership - Schatz Energy Research Center, PG&E, CEC, Siemens, Tesla, CPUC, Idaho Nat'l Lab
- Funded by Tribe, CEC EPIC R&D grant
- Powers tribal government offices, economic enterprises, lifeline sectors
- Seamless islanding / reconnect to grid
- Solar PV; battery storage; gensets
- EV charging stations
- Cost savings ~\$200,000/year
- GHG reductions ~200 tons /year

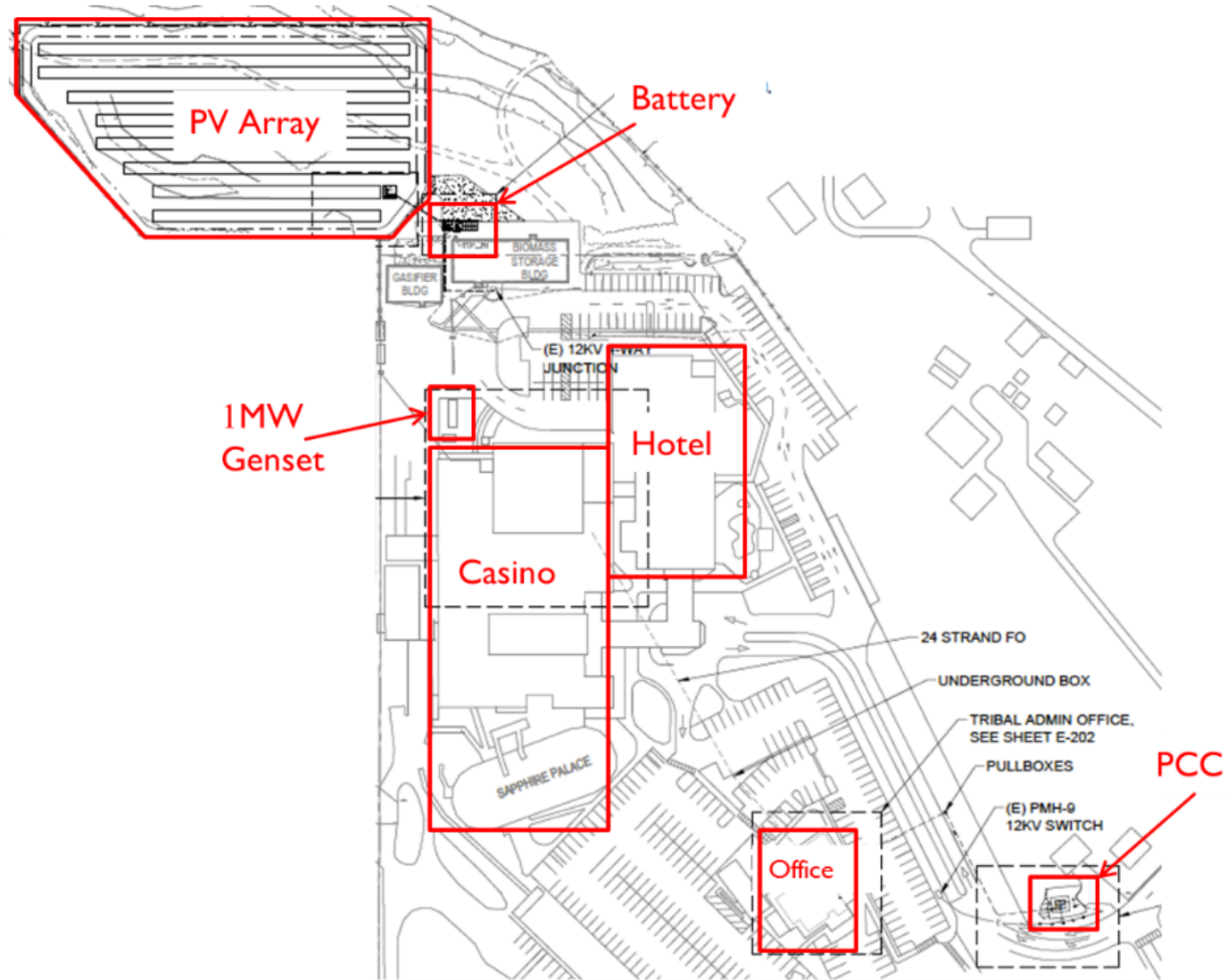


Image courtesy of:  Schatz Energy Research Center



# BLR Facility Scale Microgrid “Solar+”

- ❁ Public/private partnership - Schatz Energy Research Center, PG&E, SunPower, Tesla, CEC, Lawrence Berkeley National Lab, others
- ❁ Funded by the Tribe and a CEC EPIC R&D grant
- ❁ Supports fuel station / convenience store complex
- ❁ Can seamlessly island and reconnect to grid
- ❁ Solar PV (60kW) + storage (106kw/169kwh), legacy diesel genset
- ❁ Advanced building controls (increased efficiency)
- ❁ EV charging stations
- ❁ Replicable, low-carbon ‘resilience package’ for small/medium commercial buildings
- ❁ Blue sky: lower costs (~\$20k/yr), GHGs (50 tons/yr)
- ❁ In emergencies: lifeline sectors - very important where these kinds of facilities are the only resource.



Photo: Solar+ at Blue Lake Rancheria, EV chargers at bottom, Covid-19 Testing Center (pink structure) at top left.

2018 East Coast hurricanes cause lines at fuel stations. Photo: Theindychannel.com



# People Know Where Their Microgrids Are

- Public Safety Power Shutoff (PSPS) 10/9/2019
- BLR served ~10% of pop. (~10,000 people)
- Supplied general public & emergency response agencies for ~30 hours
  - ⊕ Saved several lives in the event – powered medical equipment and lodging
  - ⊕ Ice; refrigeration for food and medicines
  - ⊕ Fuels; EV chargers
  - ⊕ Internet / cellular connectivity, ATMs
  - ⊕ Wildfire smoke air filtration, HVAC
- The PSPS did its job – no wildfires
- Microgrids did their job – regional support



# Blue Lake Rancheria Microgrids in Grid Stress Events



- ❖ Western U.S. extreme ‘heat domes’ 2020, 2021, 2022
- ❖ Islanded all microgrids to ease grid pressure
  - ❖ Over 30 islanding events (~120 hours) in 2022 alone
- ❖ Helped avoid major state-wide disruptions.
- ❖ Learning-edge: how to optimize exports from BTM microgrid DERs in real time
  - ❖ Requires balancing onsite power supply with grid needs
  - ❖ Requires dynamic export agreements and telemetry

# Outages, Microgrids, Lessons Learned

- ❁ PSPS outages were relatively short; utilities, CEC, CPUC, worked to limit scope
  - ⚡ Grid segmentation also helps
- ❁ If outages lasted longer, cascading issues:
  - ⚡ Cellular / internet communications outages (started at the ~24-hour mark)
  - ⚡ Drinking water / wastewater systems failed (inadequate back up power)
  - ⚡ Economic and social disruption
- ❁ Tribe's COOP well-received
  - ⚡ Provided lifeline sectors (energy, water, food, communication, transportation)
  - ⚡ Improved relationships with emergency response agencies, others
  - ⚡ Performance increased interest in microgrids



12.20.2022 BLR Microgrid Photo (after earthquake)



# What's next: Microgrid 2.0

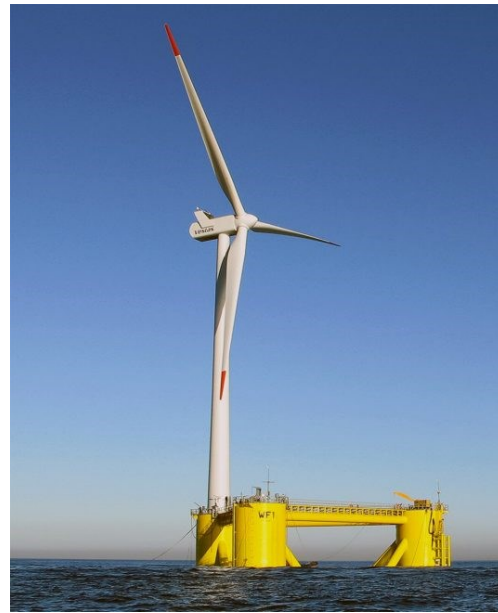
- ❖ Expand onsite solar PV and storage
- ❖ Work toward full electrification
  - ❖ With reliability in outages and blue sky conditions
- ❖ Build nested microgrids as a model for typical expansion within these systems
- ❖ Design BTM microgrids to be well-coordinated with distribution and transmission grids
  - ❖ More power to export in grid stress events
  - ❖ Resource adequacy
- ❖ Standardization for safety, affordability, lower O&M
- ❖ Innovative ownership and partnerships to optimize clean grid operations with Tribal utilities in the mix



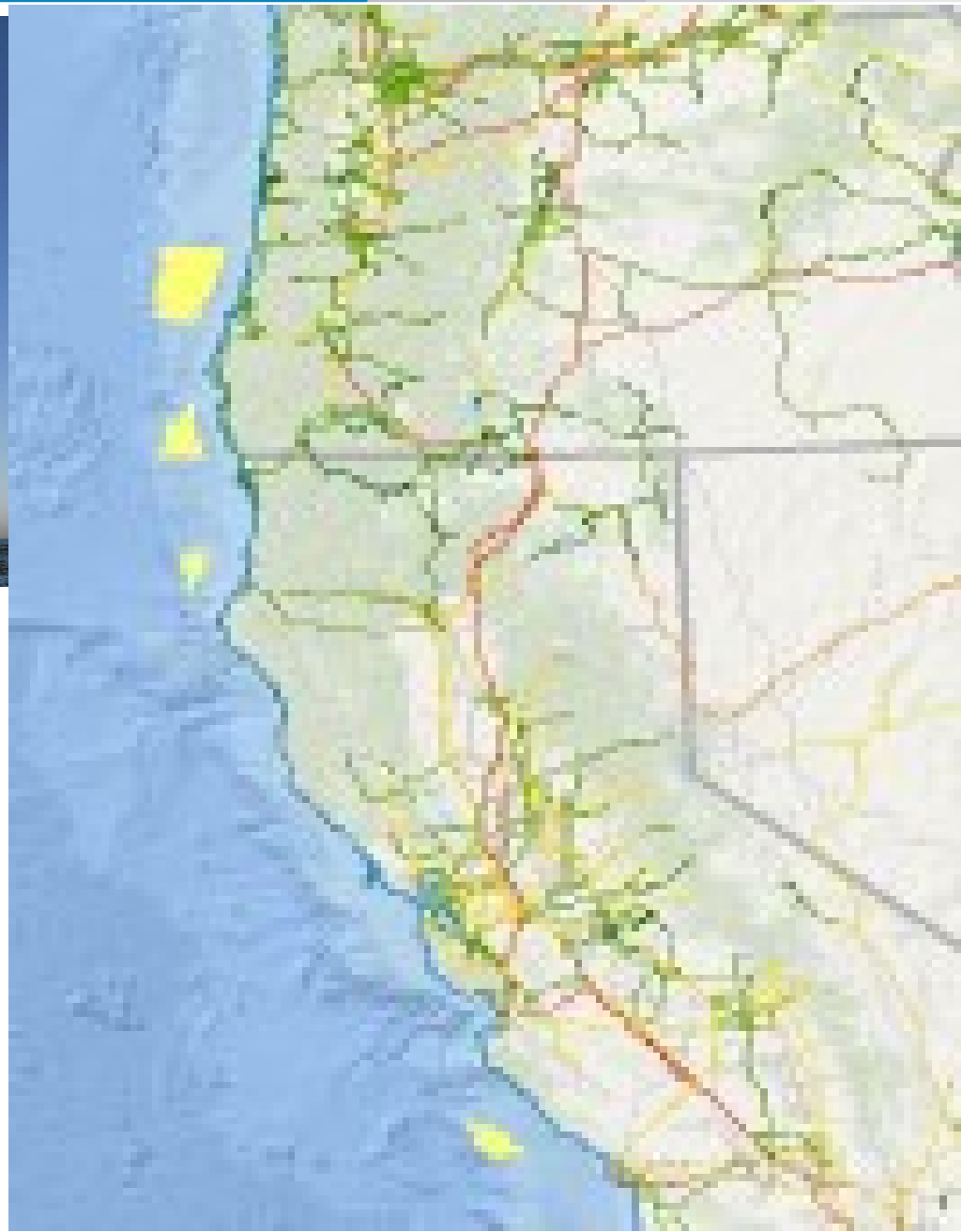
# Microgrids in context

- ❖ Offshore wind energy integration
  - ❖ Transmission upgrades
- ❖ Opportunities for energy equity
- ❖ Design microgrids + transmission + storage to rapidly improve regional resilience

Photo source: Redwood Coast Energy Authority



[Map Source: U.S. Dept. of Energy.](#) From south to north, in yellow: Morro Bay, Humboldt, Brookings, Coos Bay wind energy areas. Transmission line voltage increases from green to red.



# Final Thoughts

- ❁ Blue Lake Rancheria seemed to arrive “just in time” with resilience
- ❁ Due to governance, **strategic partnerships**, planning, investment.
- ❁ Centering climate science works.
  - Climate science, data, and models are proving correct, and *conservative*.
- ❁ Tribe is undertaking a manageable and just transition to a climate-resilient community.



## Select Recognition

["Honoring Nations" Award Harvard Project on American Indian Economic Development](#)

[FEMA John D. Solomon "Whole Community Preparedness" Award](#)  
["Climate Action Champion" White House and U.S. Department of Energy](#)



# Further Reading

- NASA Climate: <https://climate.nasa.gov/> NOAA Climate: <https://www.noaa.gov/climate>
- Technical reports on microgrids: <https://ww2.energy.ca.gov/2019publications/CEC-500-2019-011/CEC-500-2019-011.pdf> and <https://ww2.energy.ca.gov/2018publications/CEC-500-2018-022/CEC-500-2018-022.pdf>
- *T&D World* article on microgrid applications: <https://www.tdworld.com/grid-innovations/smart-grid/article/20971186/microgrid-serves-multiple-purposes>
- *Washington Post* Article [“Amid shut-off woes, a beacon of energy”](#)
- Intergovernmental Panel on Climate Change Special Report: <https://www.ipcc.ch/sr15/>
- [Blue Lake Rancheria Case Study, U.S. Climate Resilience Toolkit](#)
- Schatz Energy Research Center Offshore Wind Research & Resources: <https://schatzcenter.org/wind/>





# Summer Outlook—2023 Wildfire Preparations Discussion

April 27, 2023

Vic Howell  
Director Reliability Risk  
Management WECC

# Wildfire Preparations Discussion

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- Ray Fugere, Director Wildfire Safety, Southern California Edison
- Cameron McPherson, Principal Manager PSPS Operations, Southern California Edison
- Riaz Mohammed, Director of Resiliency and Environmental Policy, Edison Electric Institute
- Chris Potter, ACC Real Time Manager, AltaLink
- Chris Sanford, Director of Real-Time Operations, Bonneville Power Administration



# Summer Outlook—2023 Summer Operations Panel

April 27, 2023

Tim McJunkin  
Distinguished Researcher  
Idaho National Laboratory

# Summer Operations Panel

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- Ryan Adelman, Vice President Power Supply, Idaho Power
- Steve Ashbaker, Reliability Initiatives Director, WECC
- Tim McJunkin, Distinguished Researcher, Idaho National Laboratory
- Mike Pfiester, TGO Manager, Grid Operations Support, Salt River Project



# 2023: WECC Summer Readiness

**Ryan Adelman**

**Vice President, Power Supply**

April 2023



# Idaho Power's Service Area

## Hydroelectric Facilities and Nameplate Capacities

|              |                  |                   |
|--------------|------------------|-------------------|
| 1            | Hells Canyon     | 391.5 MW          |
| 2            | Oxbow            | 190.0 MW          |
| 3            | Brownlee         | 675.0 MW          |
| 4            | Cascade          | 12.4 MW           |
| 5            | Swan Falls       | 27.2 MW           |
| 6            | C. J. Strike     | 82.8 MW           |
| 7            | Bliss            | 75.0 MW           |
| 8            | Lower Malad      | 13.5 MW           |
| 9            | Upper Malad      | 8.3 MW            |
| 10           | Lower Salmon     | 60.0 MW           |
| 11           | Upper Salmon     | 34.5 MW           |
| 12           | Thousand Springs | 6.8 MW            |
| 13           | Clear Lake       | 2.5 MW            |
| 14           | Shoshone Falls   | 14.7 MW           |
| 15           | Twin Falls       | 52.9 MW           |
| 16           | Milner           | 59.4 MW           |
| 17           | American Falls   | 92.3 MW           |
| <b>Total</b> |                  | <b>1,798.9 MW</b> |



## Thermal Facilities And Capacities

|               |                 |
|---------------|-----------------|
| ▲ Jim Bridger | 775.3 MW*       |
| ▲ North Valmy | 144.9 MW*       |
| <b>Total</b>  | <b>920.2 MW</b> |

## Natural Gas

|                    |                 |
|--------------------|-----------------|
| ▲ Bennett Mountain | 172.8 MW        |
| ▲ Danskin          | 270.9 MW        |
| ▲ Langley Gulch    | 318.5 MW        |
| <b>Total</b>       | <b>762.2 MW</b> |

## Diesel

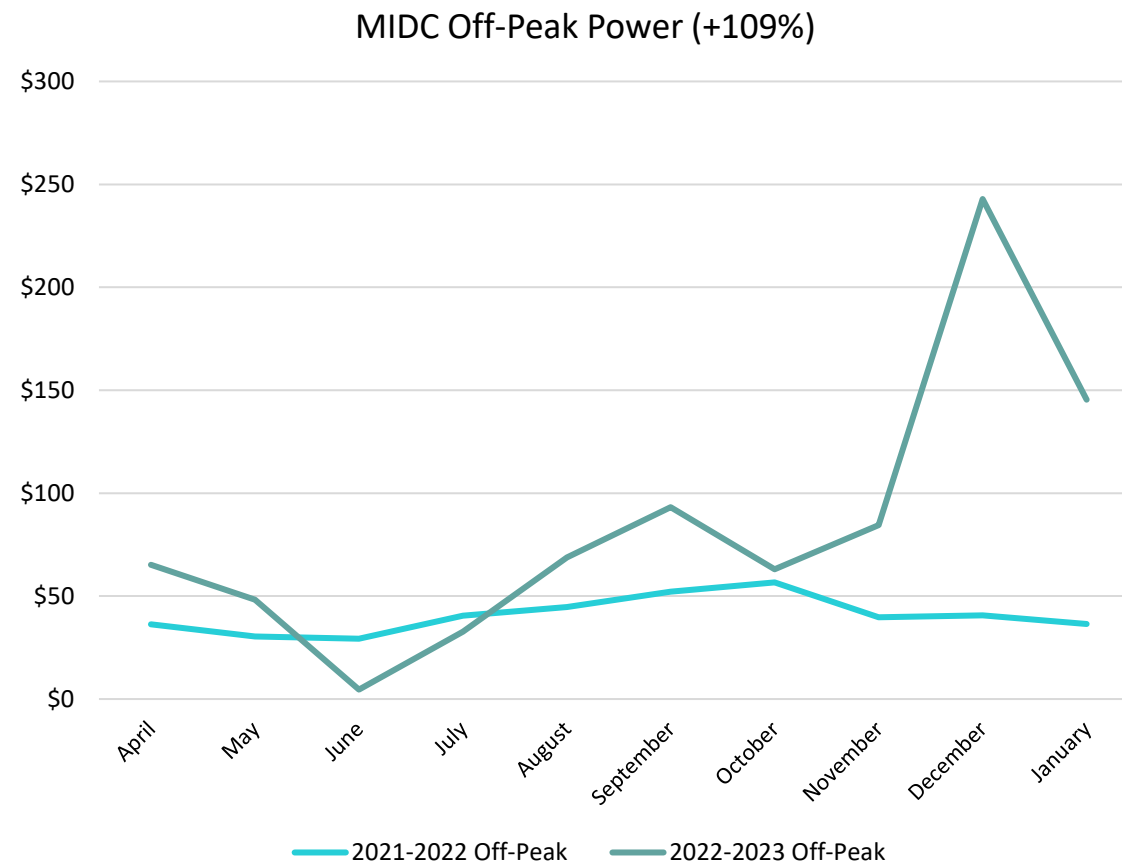
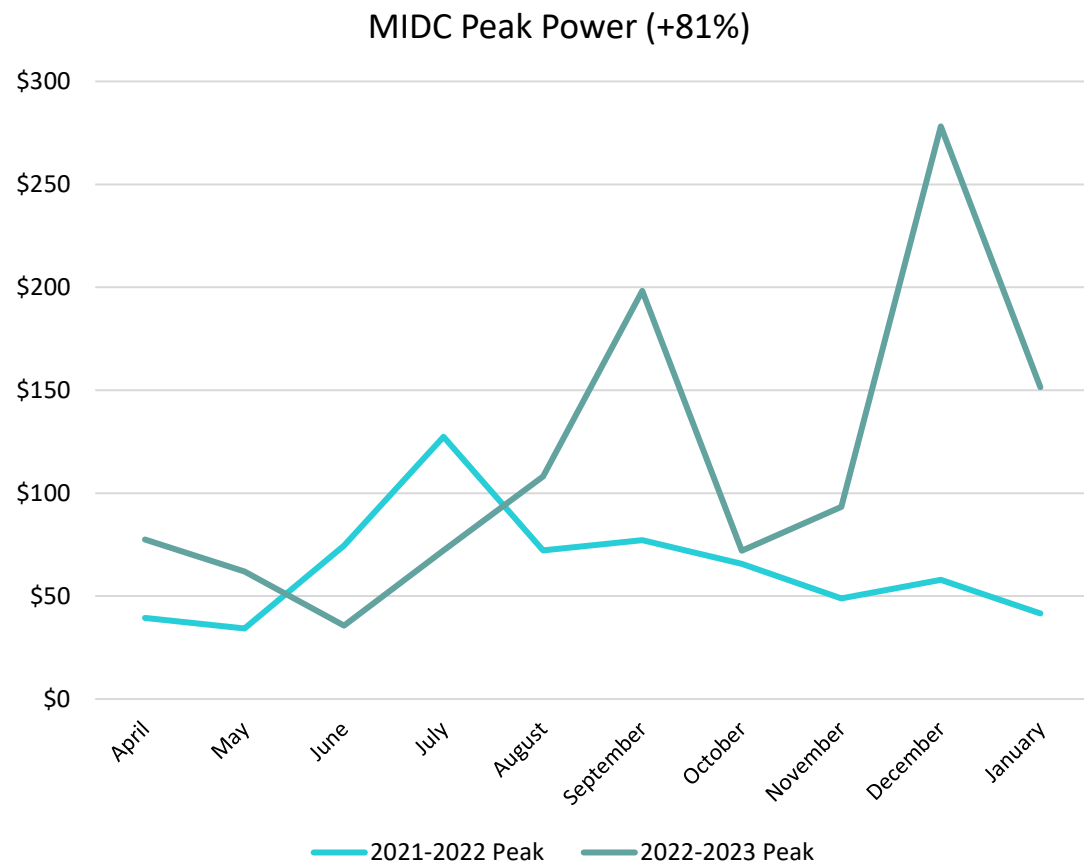
|                 |                   |
|-----------------|-------------------|
| ◆ Salmon Diesel | 5.0 MW            |
| <b>Total</b>    | <b>1,687.4 MW</b> |

\* Idaho Power Co. Share

# Readiness Report



# Power Markets

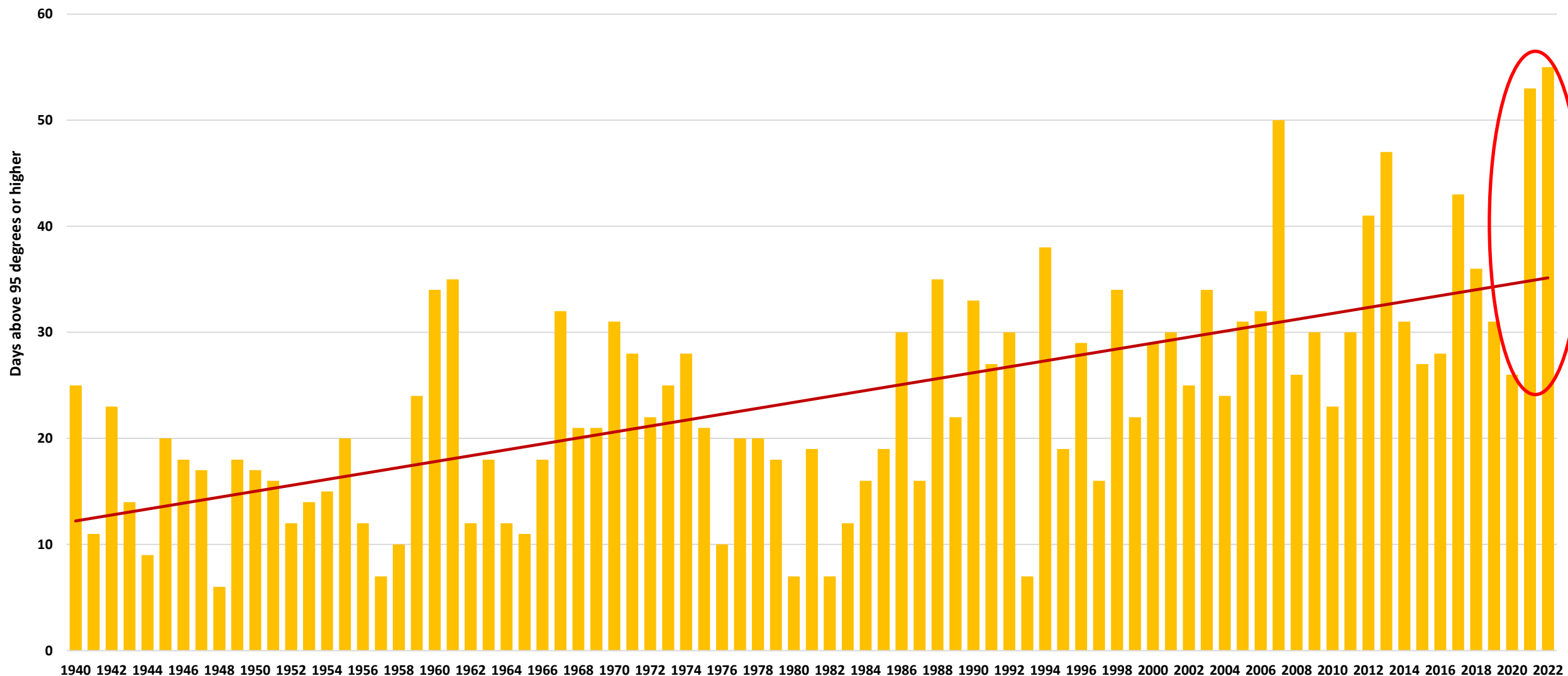


→ Actual Mid-Columbia power prices settlements increased ~95% year-over-year

→ Average monthly peak power prices increased from \$64 to \$116 (per MWh)

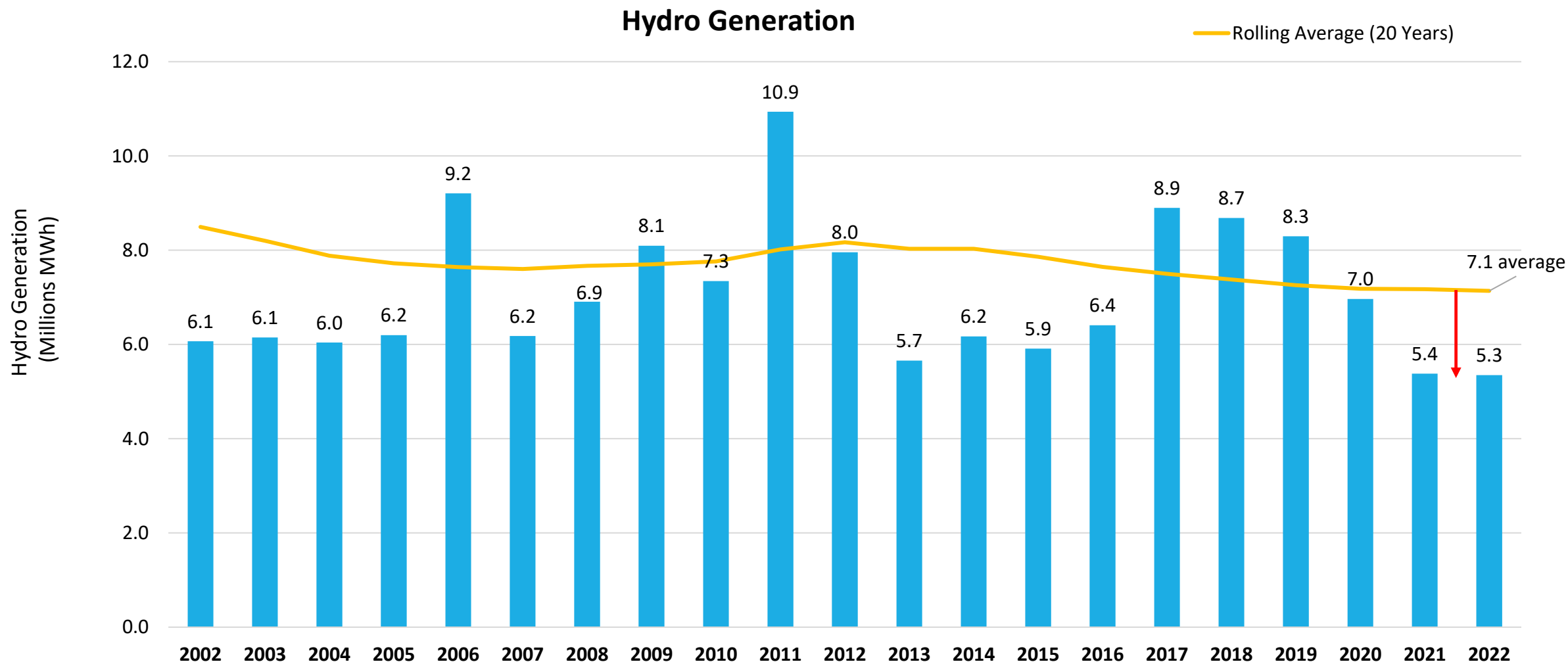
# Record Temperatures - Boise

# of Days Per Year with Max Temperature 95° or Higher



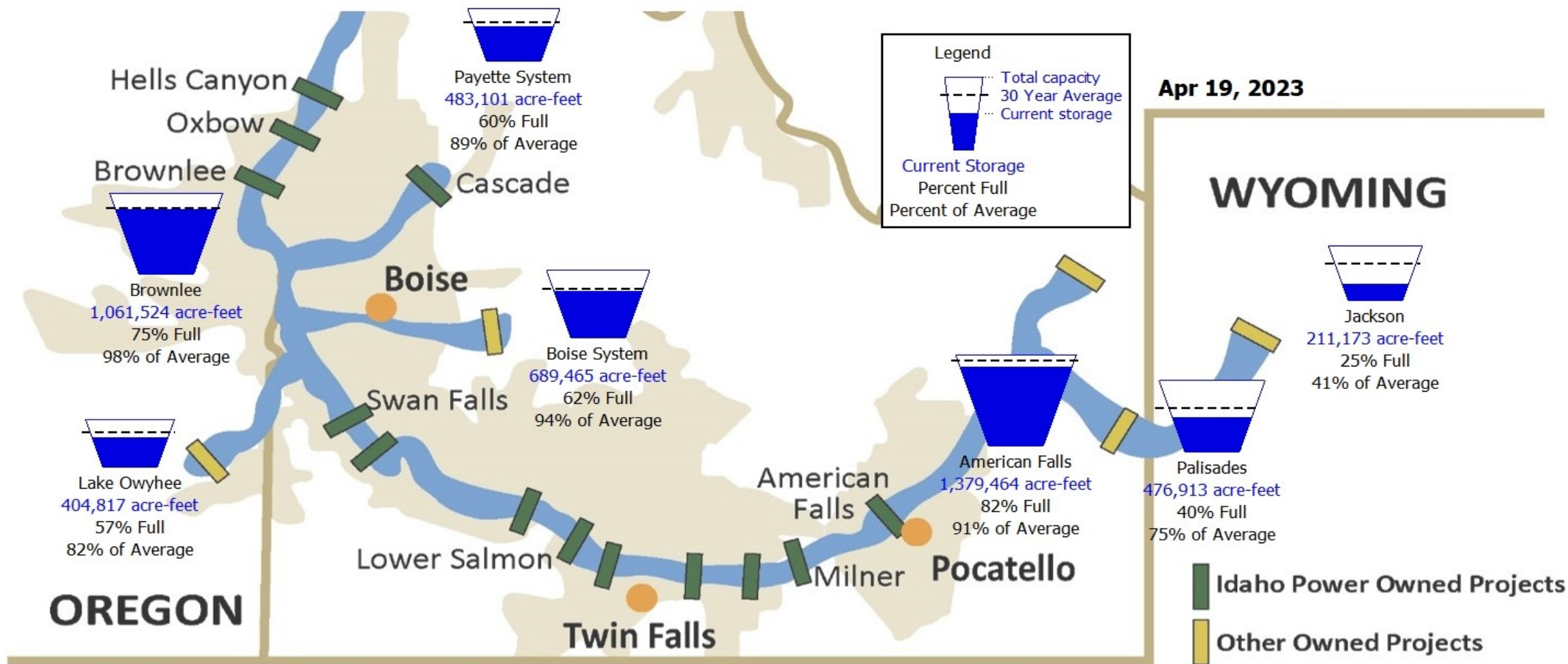


# Record Drought



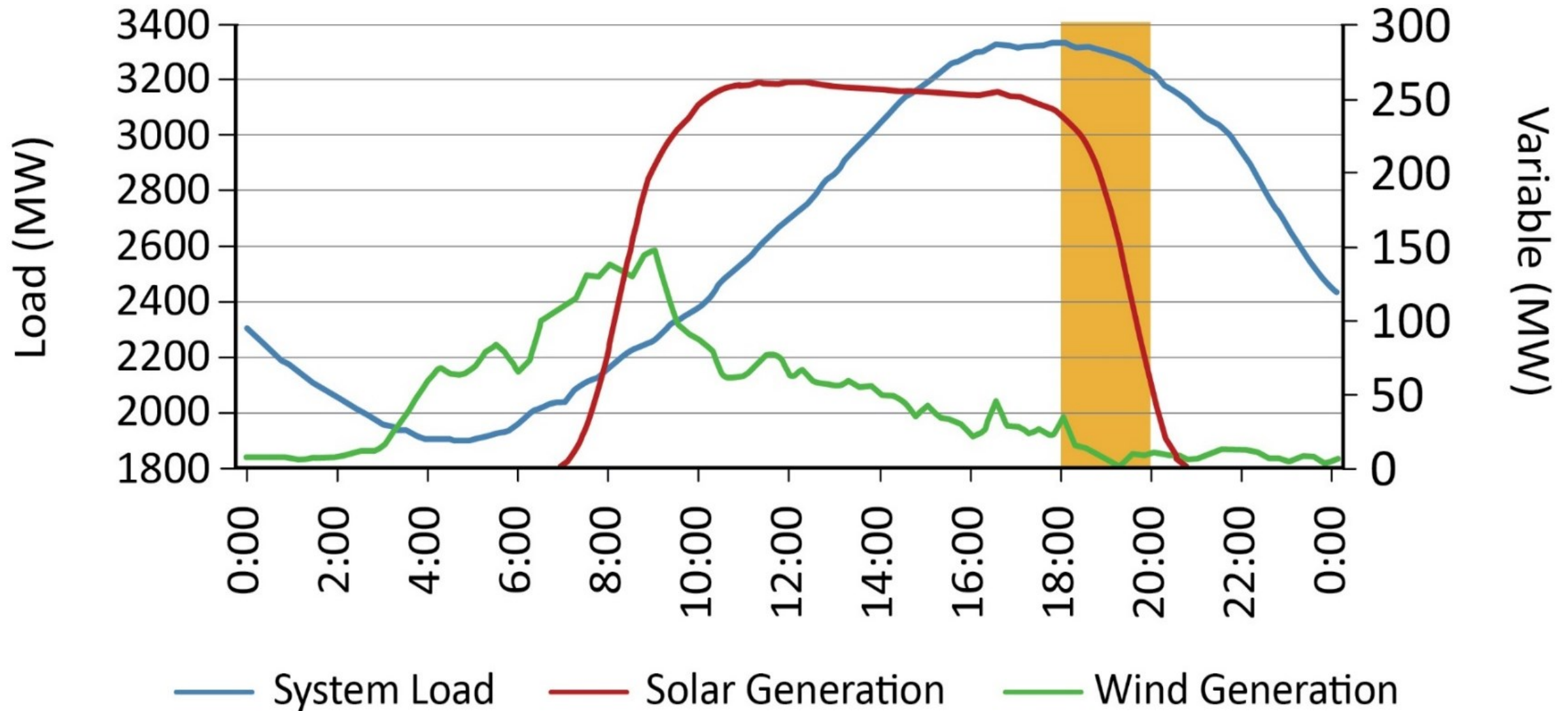
# Reservoir Conditions

## Snake River Basin Teacup Diagram



\*Brownlee Percent of Average is based on WY1992-2020 to reflect fall Chinook operations. All other reservoirs use a period of WY1991-2020.

# Summer Load / VER Profile





# First Battery Project

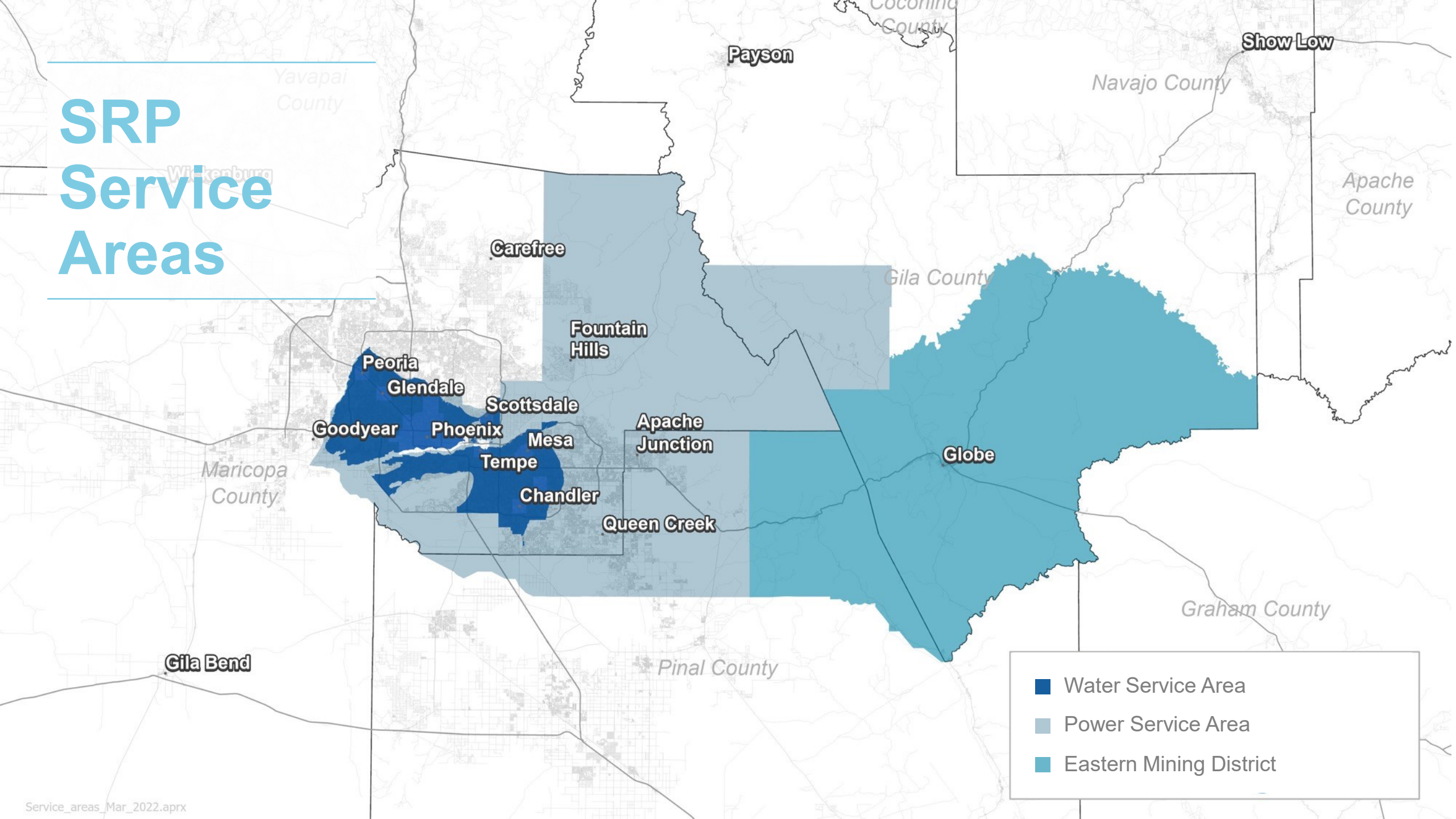









# Salt River Project

WECC – Summer Outlook| April 21, 2023

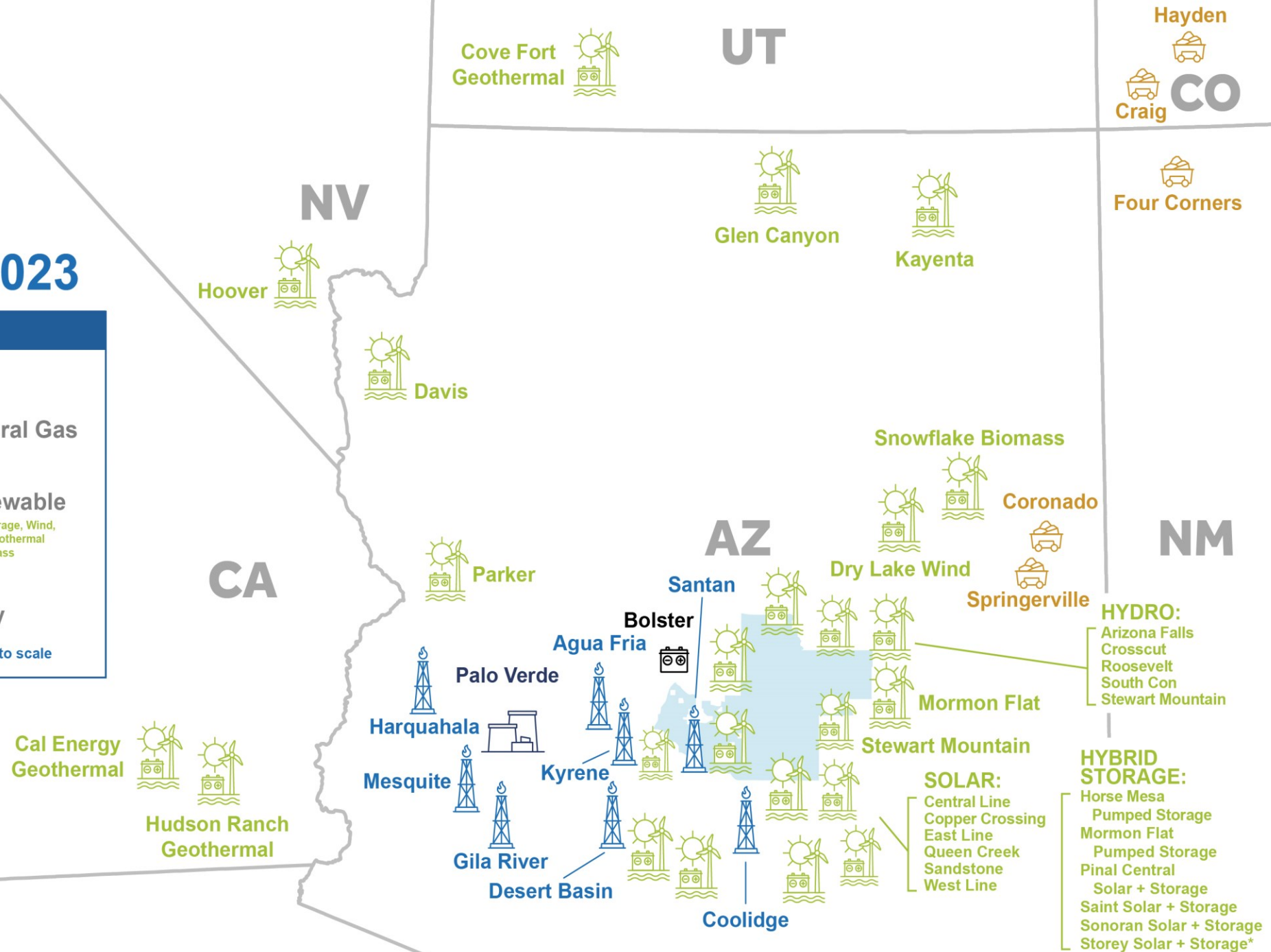
# SRP Service Areas



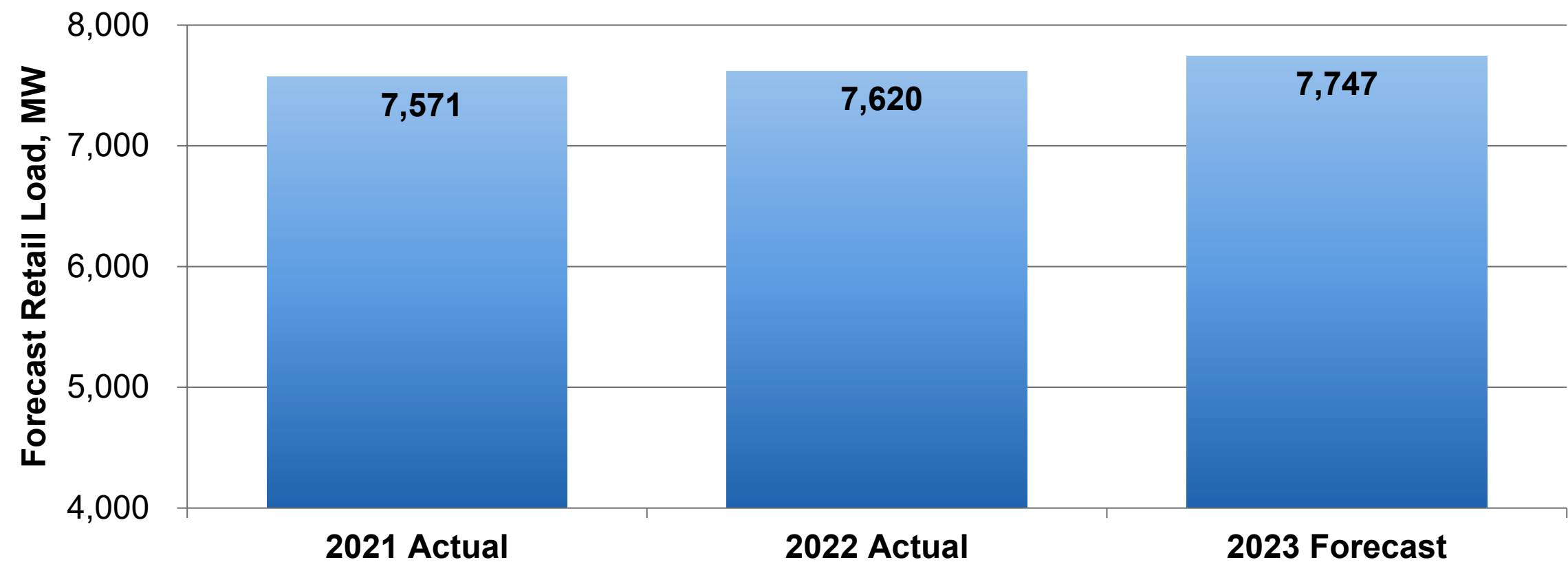
## LEGEND

|   |                           |   |   |
|---|---------------------------|---|---|
|  | <b>Coal</b>               |  | <b>Natural Gas</b>  |
|  | <b>Nuclear</b>            |  | <b>Renewable</b><br>Solar, Storage, Wind,<br>Hydro, Geothermal<br>and Biomass |
|  | <b>Standalone Battery</b> |   |   |

*\*Map locations and size are not precise, nor to scale*

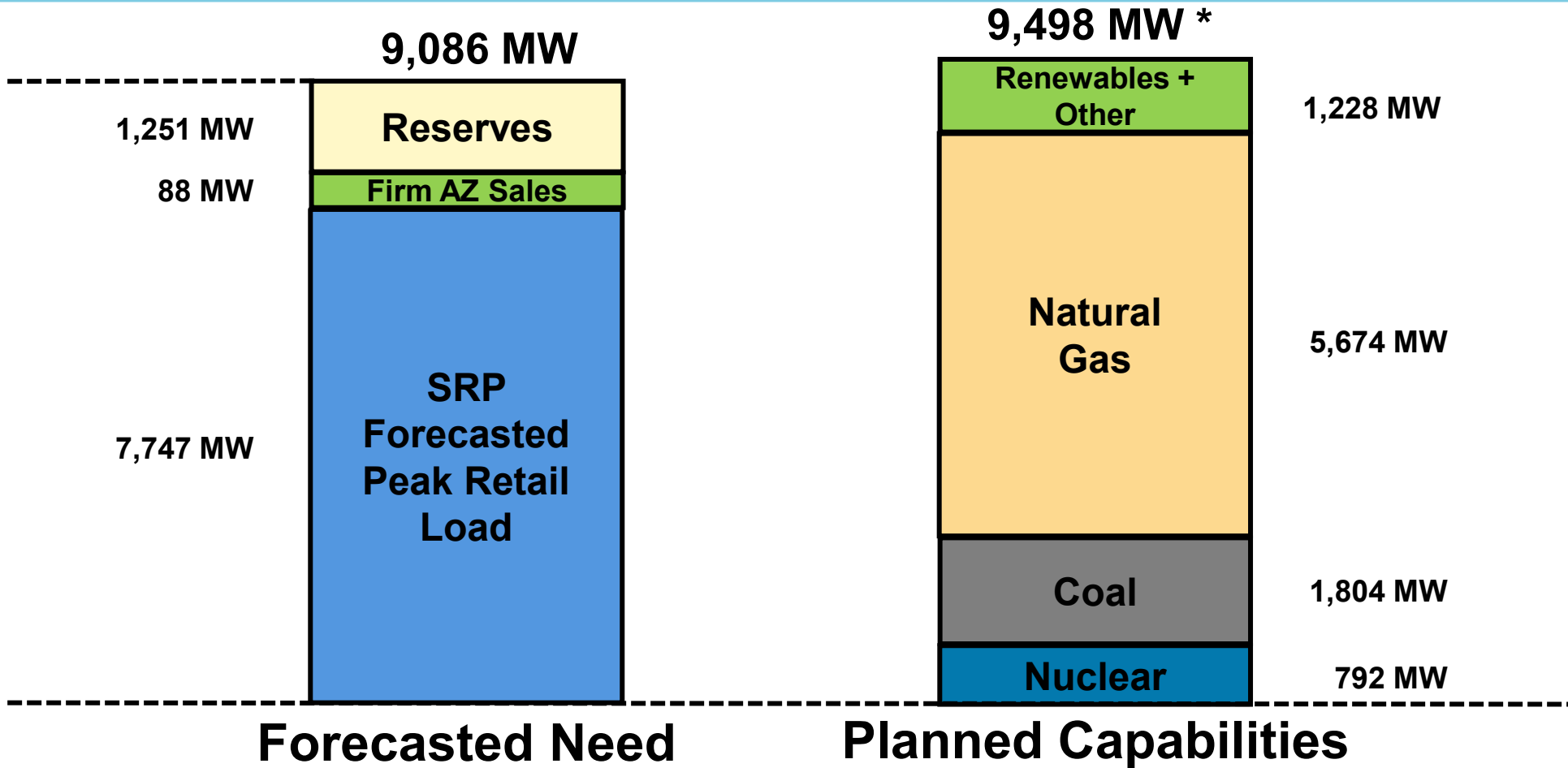


# Peak Hour Retail Load Forecast





# 2023 Outlook



\* X MW is at risk due to solar delays, supply chain constraints, interconnection challenges, and drought conditions

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# New Resources

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## Currently Operational:

- Palo Verde Nuclear Generating Station: 104 MW additional ownership
- West Line: 100 MW Utility-Scale Solar

## In Development for 2023:

- Sonoran: 260 MW Utility-Scale Solar and Storage
- Storey: 88 MW Utility-Scale Solar and Battery Storage
- Saint: 100 MW Battery Storage addition to existing 100 MW Utility-Scale Solar



# Expected Renewable totals by mid-summer

Solar – 540 MW

Battery – 485 MW

Wind – 126 MW

Geothermal – 162 MW

Biomass – 14 MW

Hydro – 255

Total – 1583 MW, ~ 21% of our peak load

# Typical Summer Challenges

- Adding renewables and the volatility, the summer timing of implementation, the resources we use to back
- Fuel constraints – coal delivery issues, high percentage of days with natural gas low line pack alerts
- Threat of wildfire and the limitations they can pose to our resources
- Weather – local forecast versus interconnection-wide
- Resource plan forecast versus reality - growth
- Unit performance – cycling
- New control room and video wall
- Fault current limitations on generating resources or mitigations placing portions of our system in a radial configuration



**thank you!**



# SUMMER

## OUTLOOK-2023

