

WIRAB Monthly Meeting

March 3, 2022



Introductions



Outline



- **WECC Activities**
 - WECC Update
 - Reliability Risk Priorities
 - Study Program Results
 - Impact of High Distributed Energy Resources
 - 2040 Clean Energy Scenarios
- **Upcoming WIRAB Meetings**



WECC Update

March 3, 2022

Kris Raper
VP of External Affairs

Board of Directors

- Next meetings:
 - Associated meetings on March 8
 - Board of Directors meeting on March 9
 - Register on WECC.org/calendar
- Board Risk Priorities Workshop on April 26



WECC Happenings

- Technical Committee Structure
 - The Reliability Risk Committee (RRC) met for the first time on February 15
 - The RRC welcomes new members to participate - members may join at any time
 - The Reliability Assessment Committee (RAC) met on February 16-17
- Reliability Risk Priorities
 - 2022 development process is underway



Contact:

Kris Raper

VP of External Affairs

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Reliability Risk Priorities

March 3, 2022

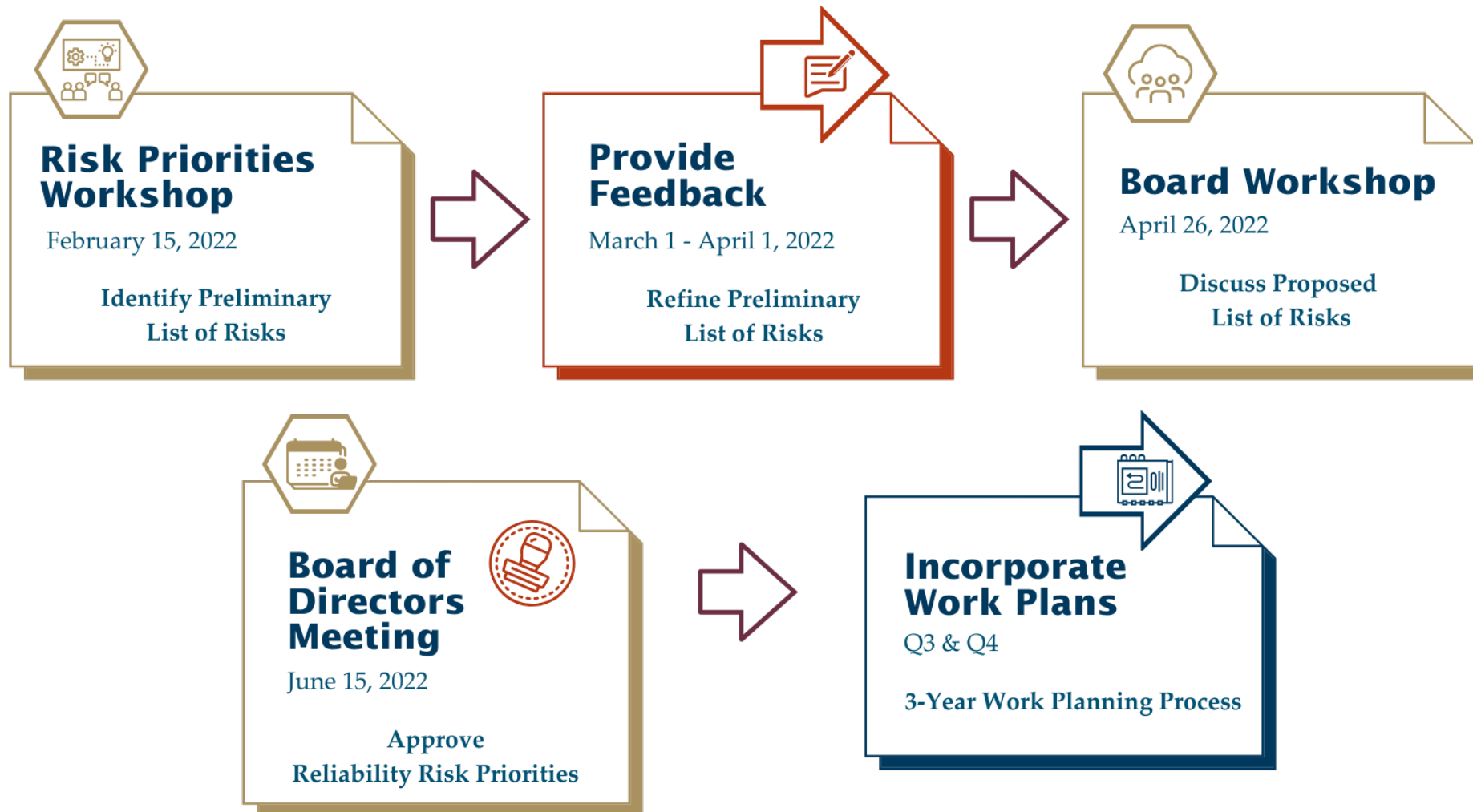
Victoria Ravenscroft
Sr. Policy and External
Affairs Manager

Reliability Risk Priorities

- Short list of priority risks WECC uses to focus the work of staff and technical committees
 - Issues with unique impact and importance to the Western Interconnection
 - Areas to which WECC can make a material contribution supporting the reliability and security of the Bulk Power System in the West



RRP Development Process 2022



Risk Priorities Workshop

- Discussed risks to the reliability and security of the BPS in the West
- Created a preliminary list of risk priorities to share with stakeholders for further comment



Preliminary List of Priority Risks (11)

Aging infrastructure

Control and protection systems complexity

Cybersecurity

Extreme natural events

Human performance and skilled workforce

Increasing electrification, especially in the transportation sector

Loss of situational awareness

Modeling and data

Regulatory uncertainty

Resource adequacy

Technology w/ different design and performance characteristics

What Happens Next?



Next Steps

- March 1 – April 1 public comment period
 - Comment on draft document
 - WECC.org
- WECC will use stakeholder input to refine “preliminary list” into the “proposed list” of risks

What Happens Next?



Next Steps

- April 26 Board Workshop on Risk Priorities
 - Discuss proposed list of risks
- June 15 Board of Directors Meeting
 - Anticipate approval of final risk priorities list



Contact:

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Impact of High Distributed
Energy Resources
&
2040 Clean Energy Scenarios

March 3, 2022

Enoch Davies
Manager, System Stability

Impact of High Distributed Energy Resources

Purpose

- Identify potential risks of high penetration of DER in the interconnection

Reliability Questions

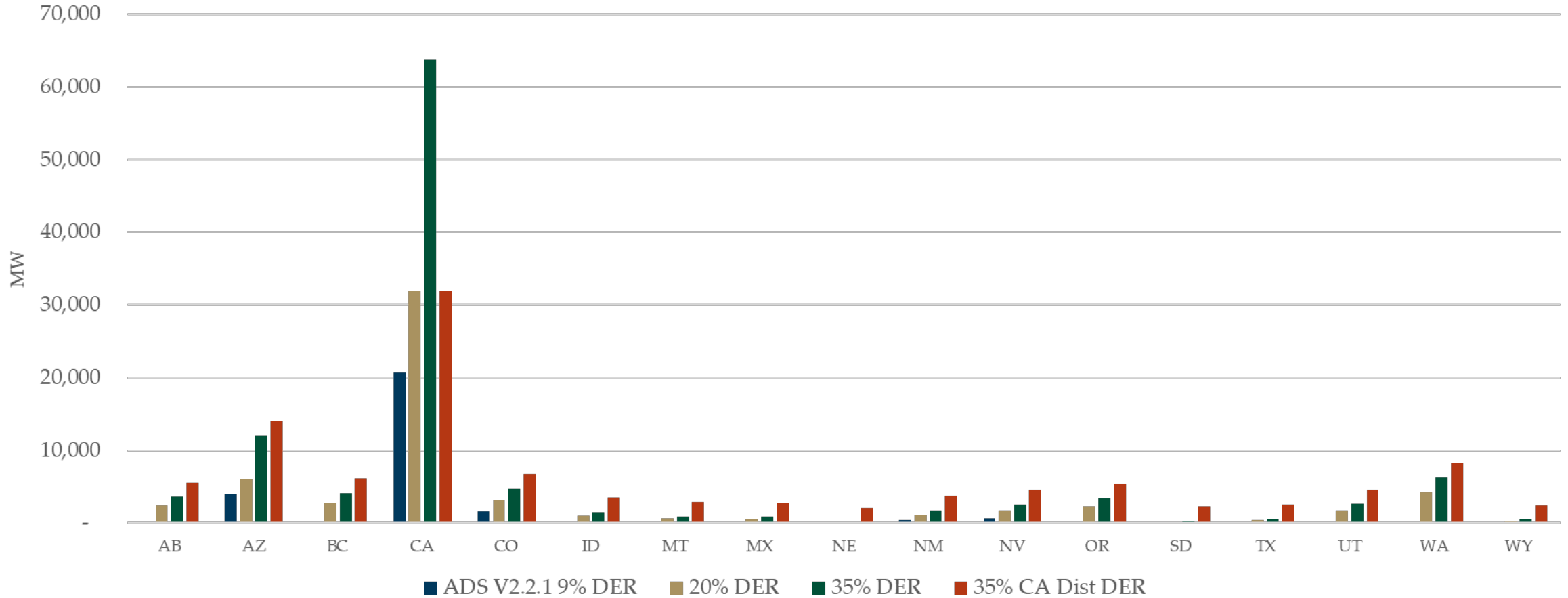
- Impacts of DER?
- What amount of DER causes concern?

Study Methods

- PCM cases DER capacity
 - 9% DER
 - 20% DER
 - 35% DER
 - 35% DER CA Distributed
 - 35% DER CA Distributed with battery
- PF case
 - 20% DER

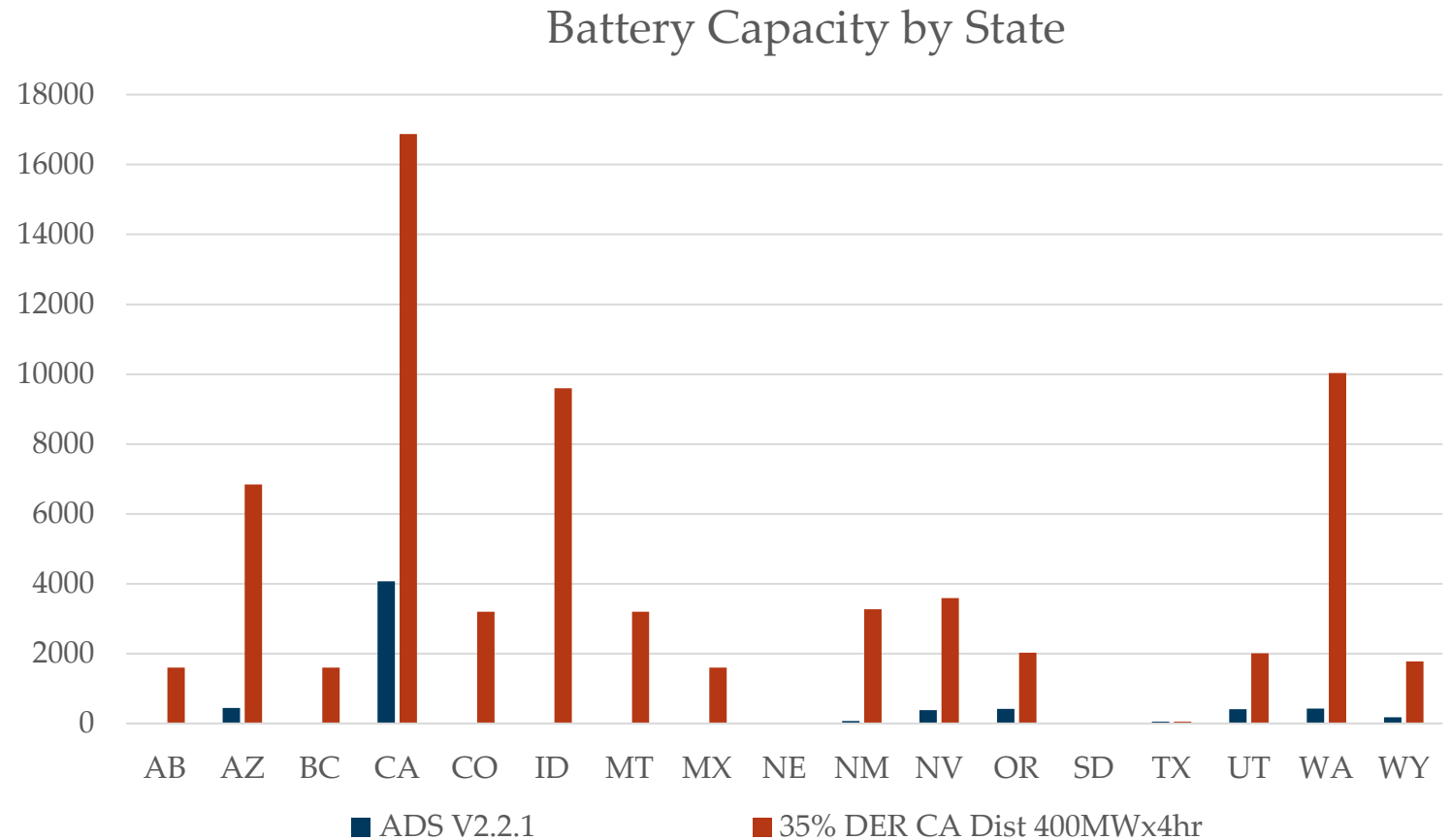
DER Capacity by State

DER Capacity

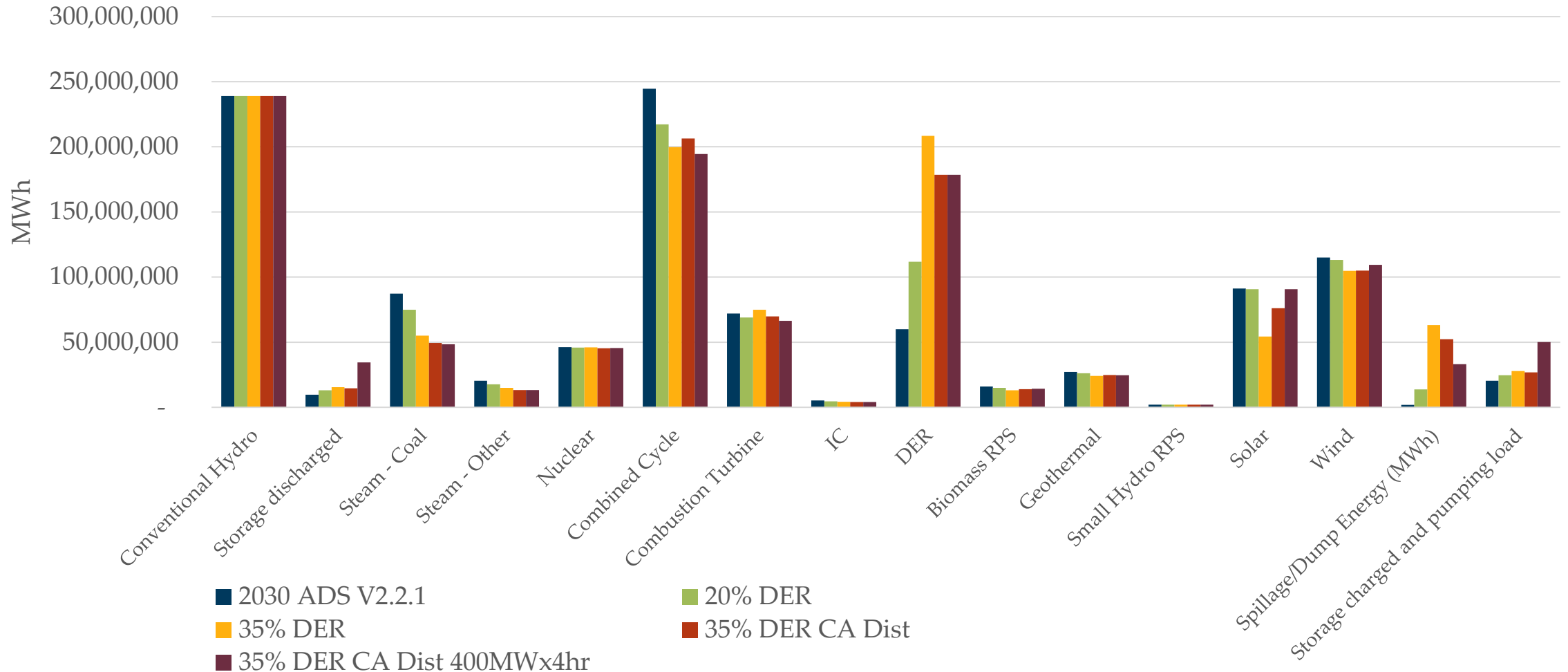


Batteries

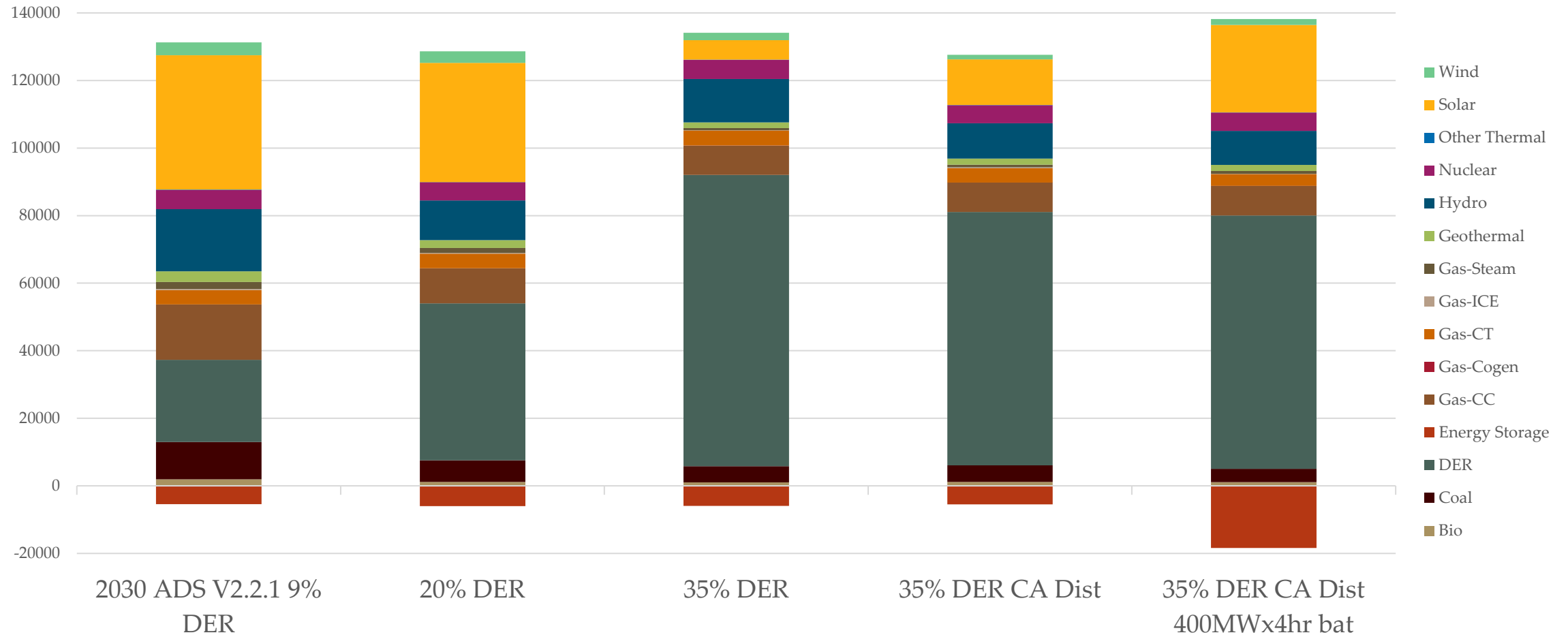
- Battery case
 - 400MWx4hr per area
- We experimented with other battery configurations
 - 200MWx4hr per area
 - 200MWx8hr per area



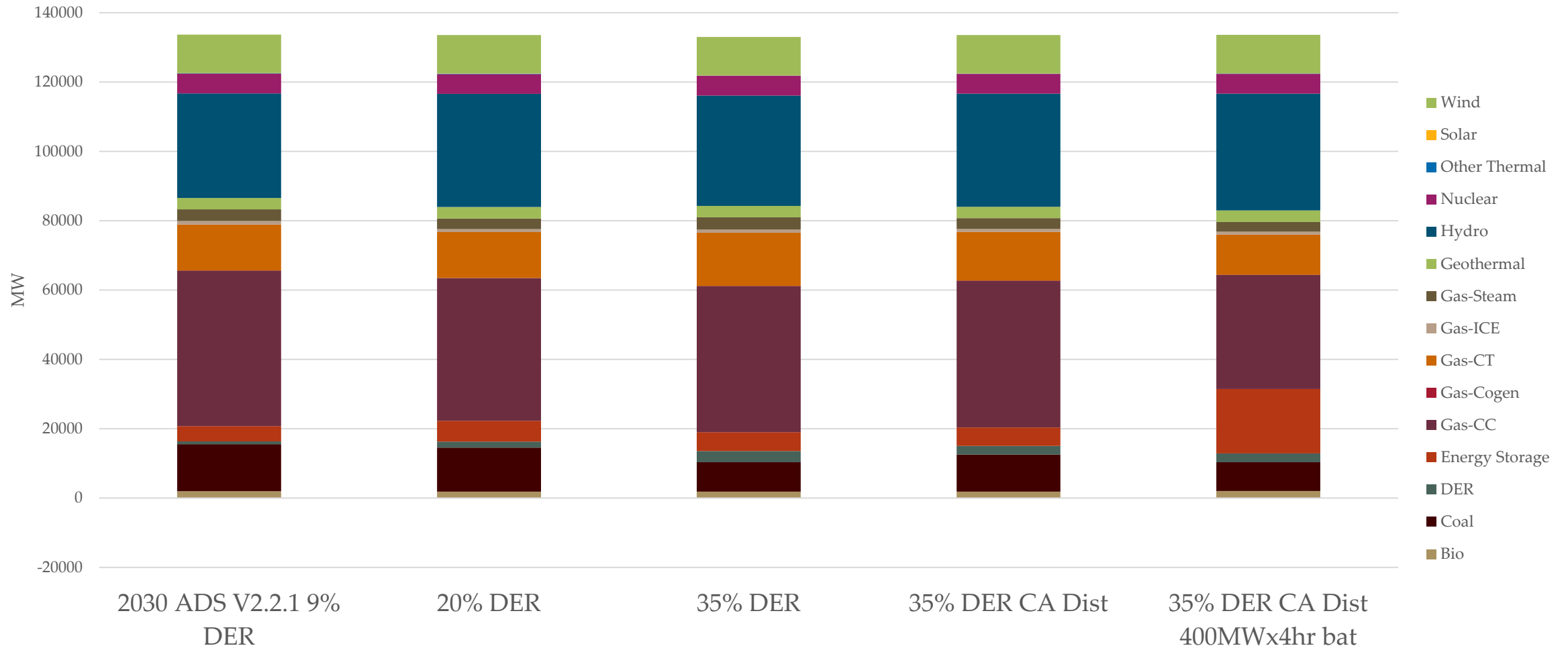
Annual Energy (MWh)



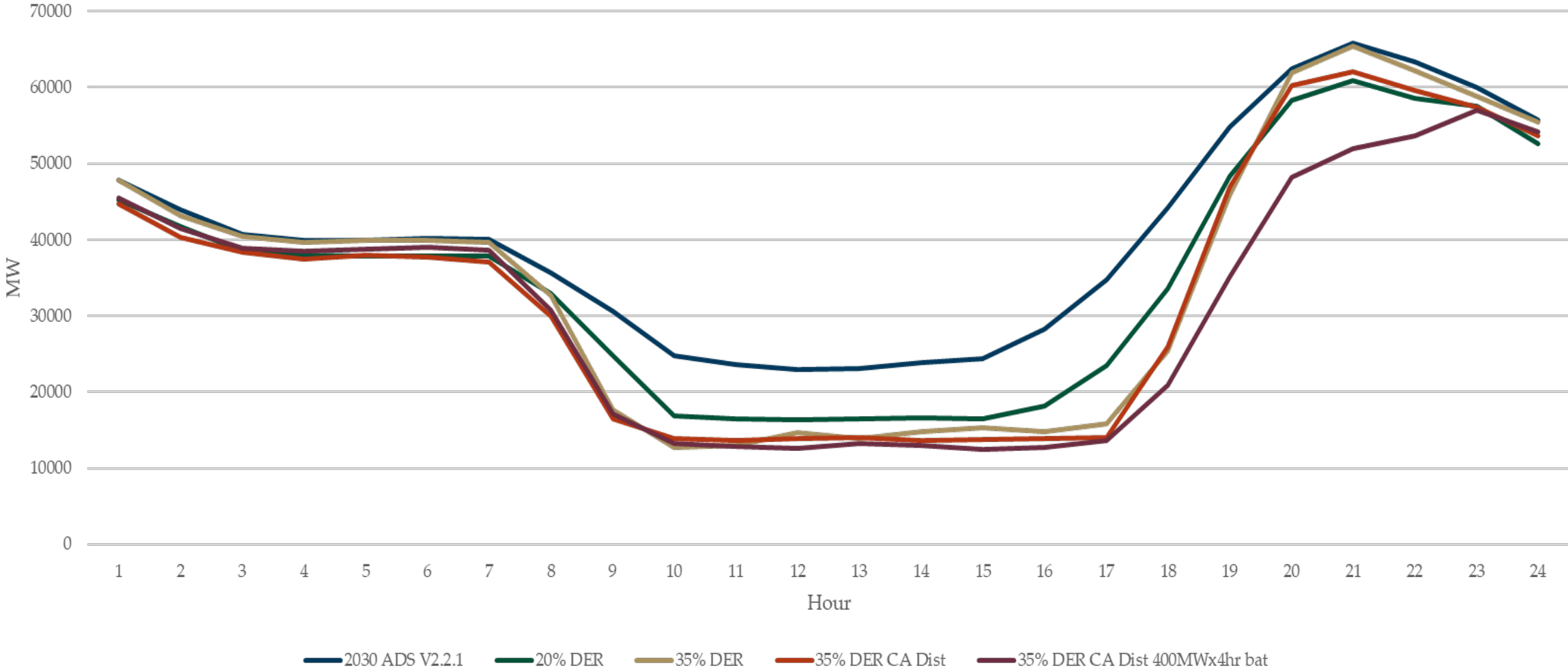
Hourly Generation 8/18/2030, Hr. 13



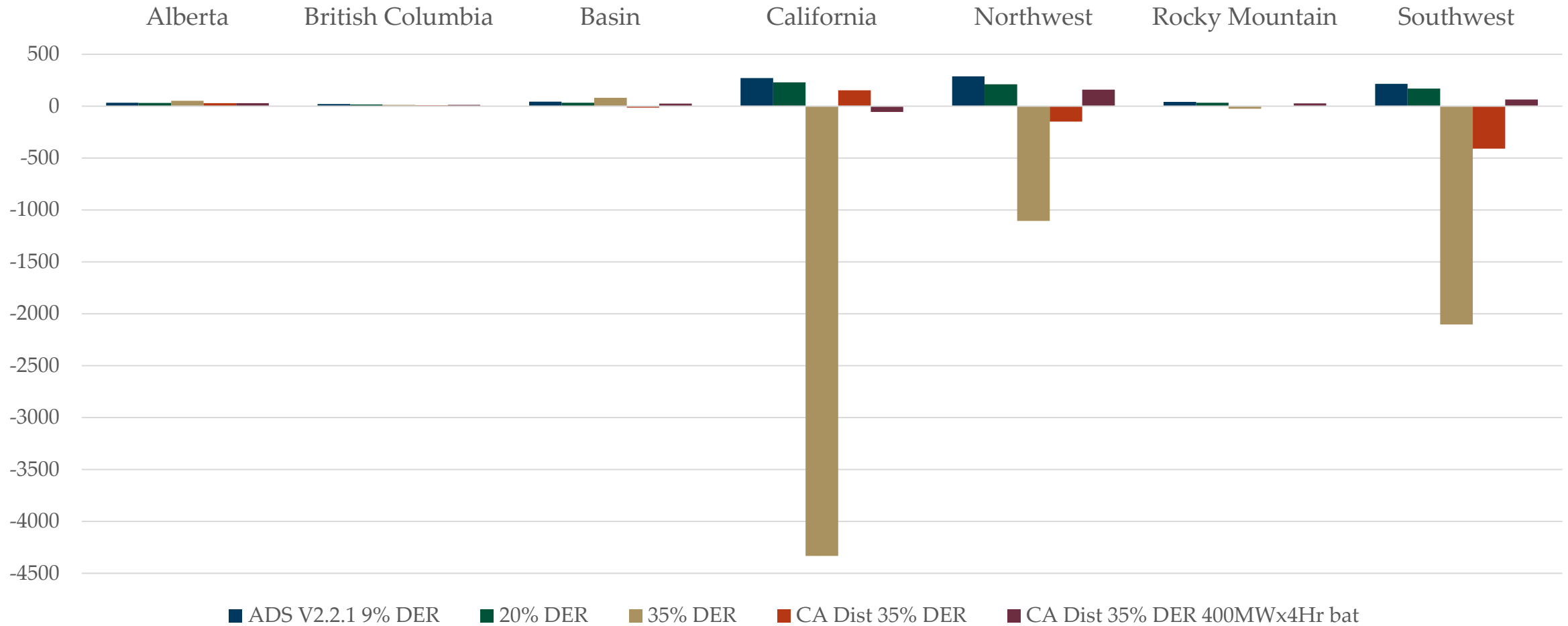
Hourly Generation 8/18/2030, Hr. 20



Gas Units Ramping



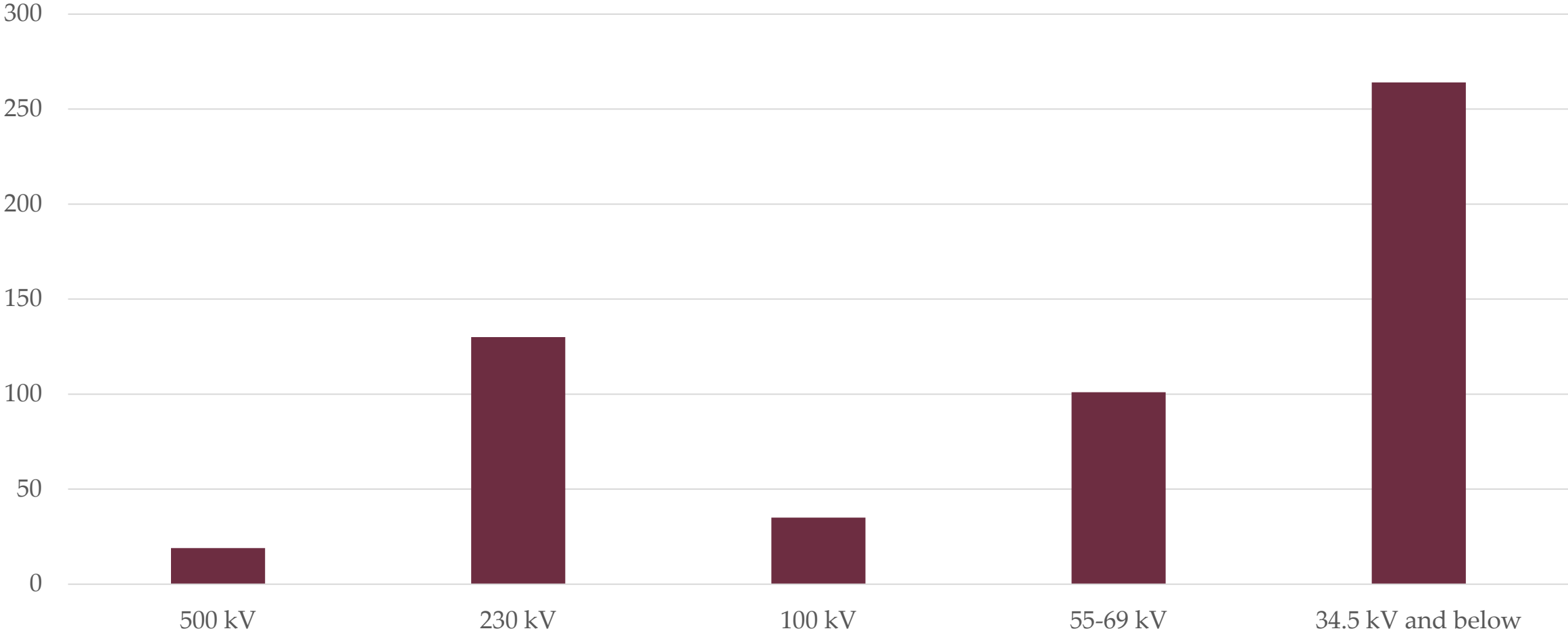
Average LMP for Generators (\$/MWh)



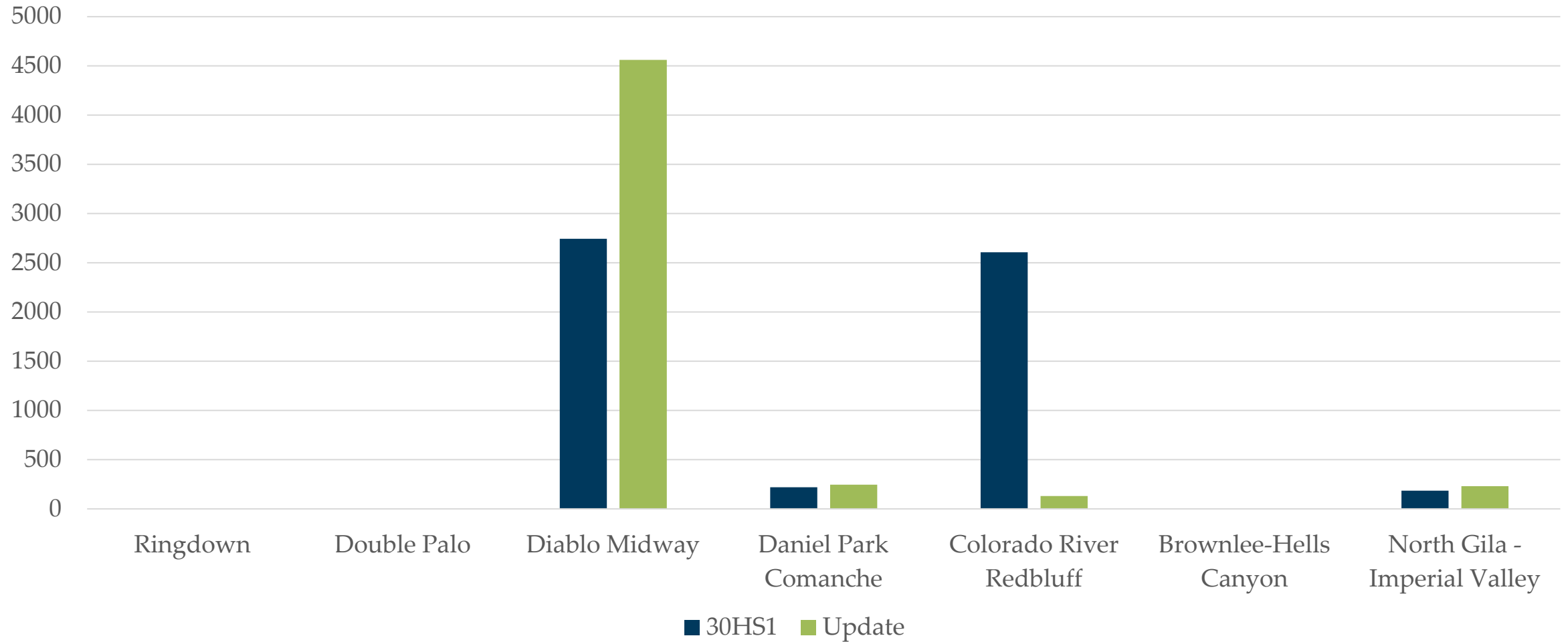
Power Flow Details

- Two cases were used—
 - Original 2030 HS1 —baseline
 - 2030 HS1 updated with 40 GW DER
- Inverter representations (dynamics)
 - Three different datasets

Buses with > 5% Change in Voltage

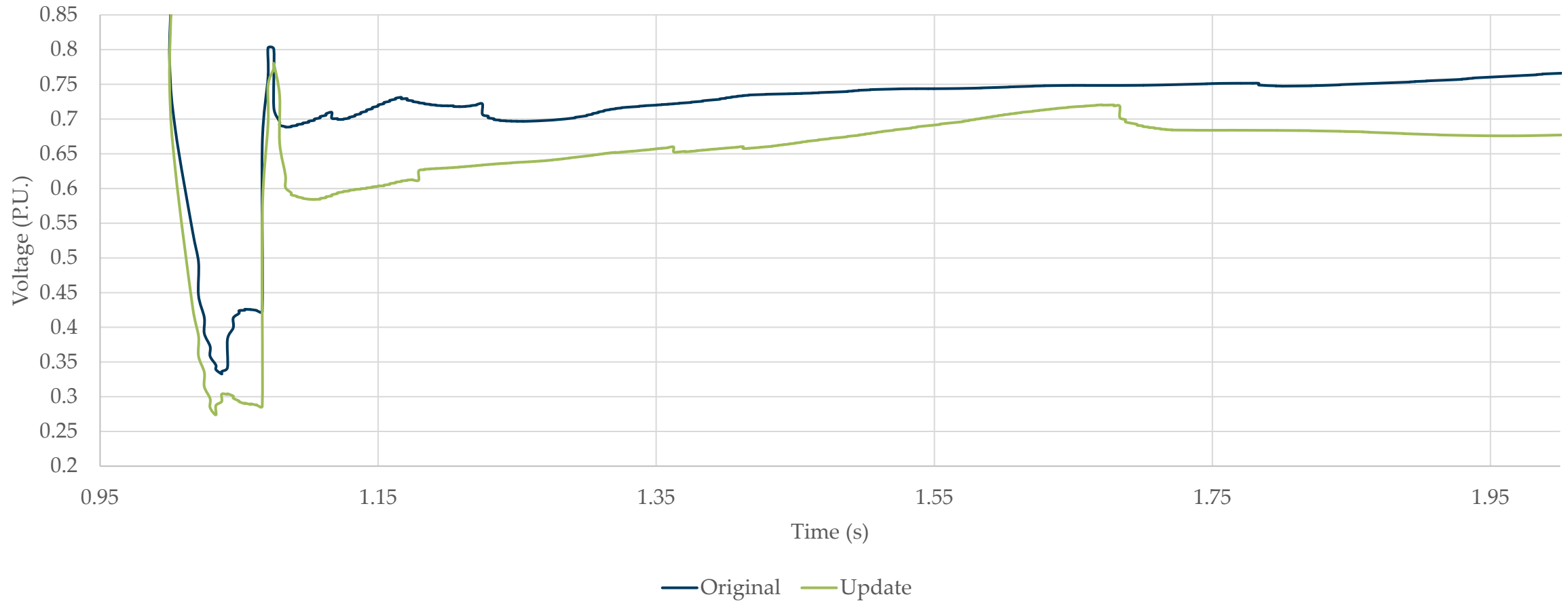


Load Lost due to Voltage in Composite Load Model



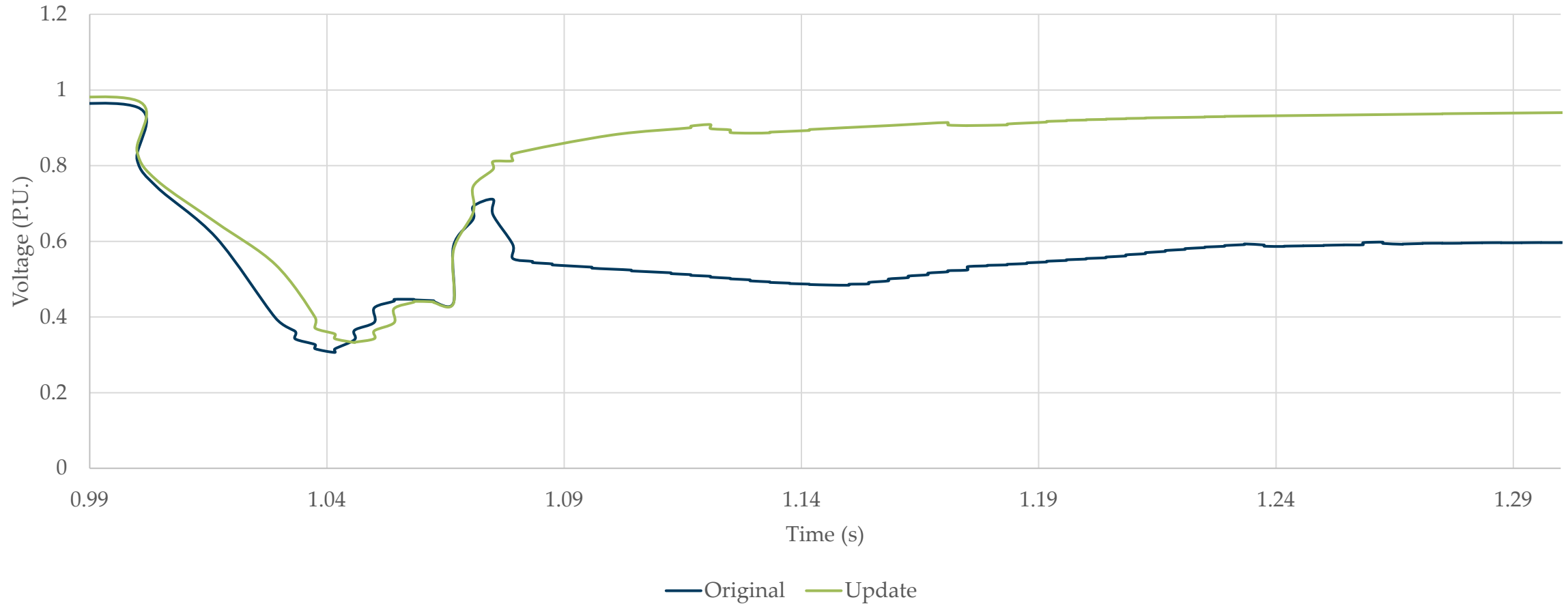
PF Voltage

Bus 30941 Load Voltage during Diablo-Midway Outage



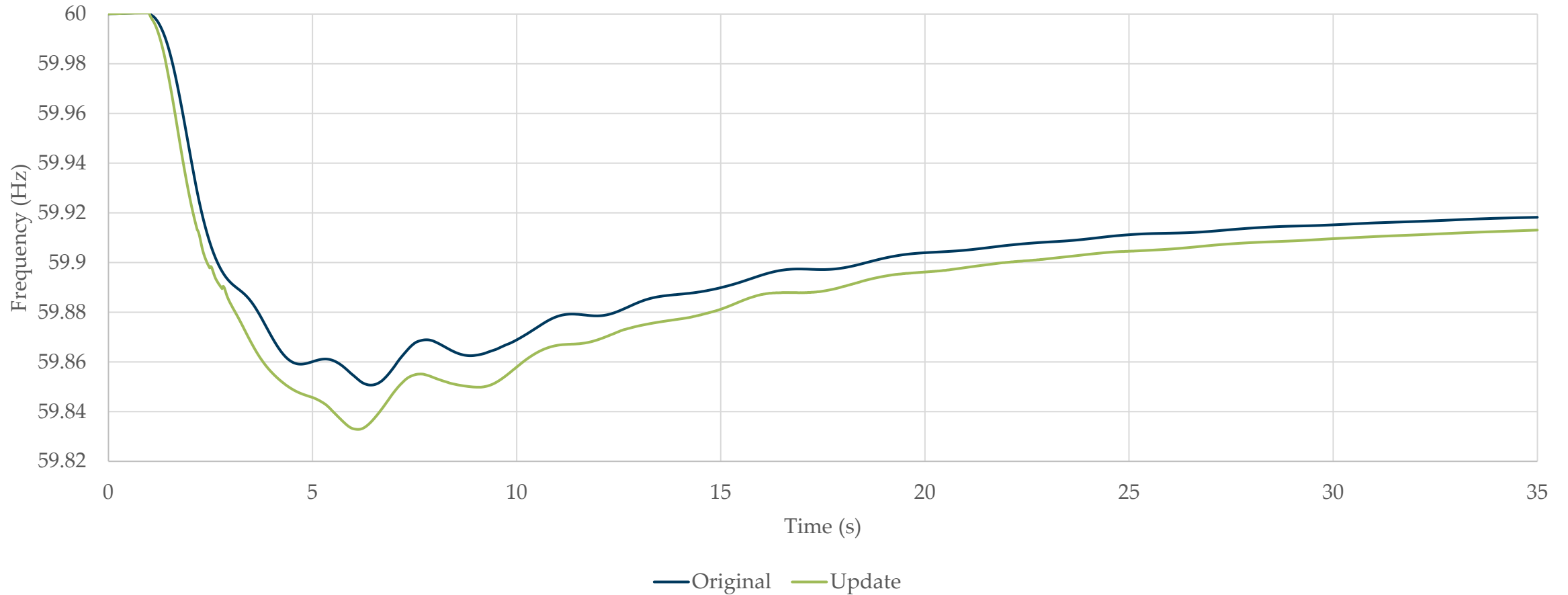
PF Voltage

Bus 24229 voltage during Colorado River-Redbluff Outage



PF Frequency

Malin 500 Frequency during Double Palo Verde Outage



Reliability Risks

- Resource adequacy and performance
- Changing resource mix
- Distribution system and customer load impacts on the transmission system

Findings and Next steps

- Additional study
- Increase availability of DER data
- Optimize use of BTM resources for Bulk Electric System

2040 Clean Energy Sensitivities Study

Purpose

- Reliability risks of 100% “clean energy” future

Reliability Questions

- What are the risks, opportunities, uncertainties, and challenges?
- What are the strategic decisions that needed to be made today?

Data

- 2030 Anchor Data Set is the foundation
- Extended to a 2040 horizon year with data largely from the national laboratories

Primary Observations

100% Clean Energy Considerations

- Need to balance resource/storage mix
- Cooperative coordination of planning efforts

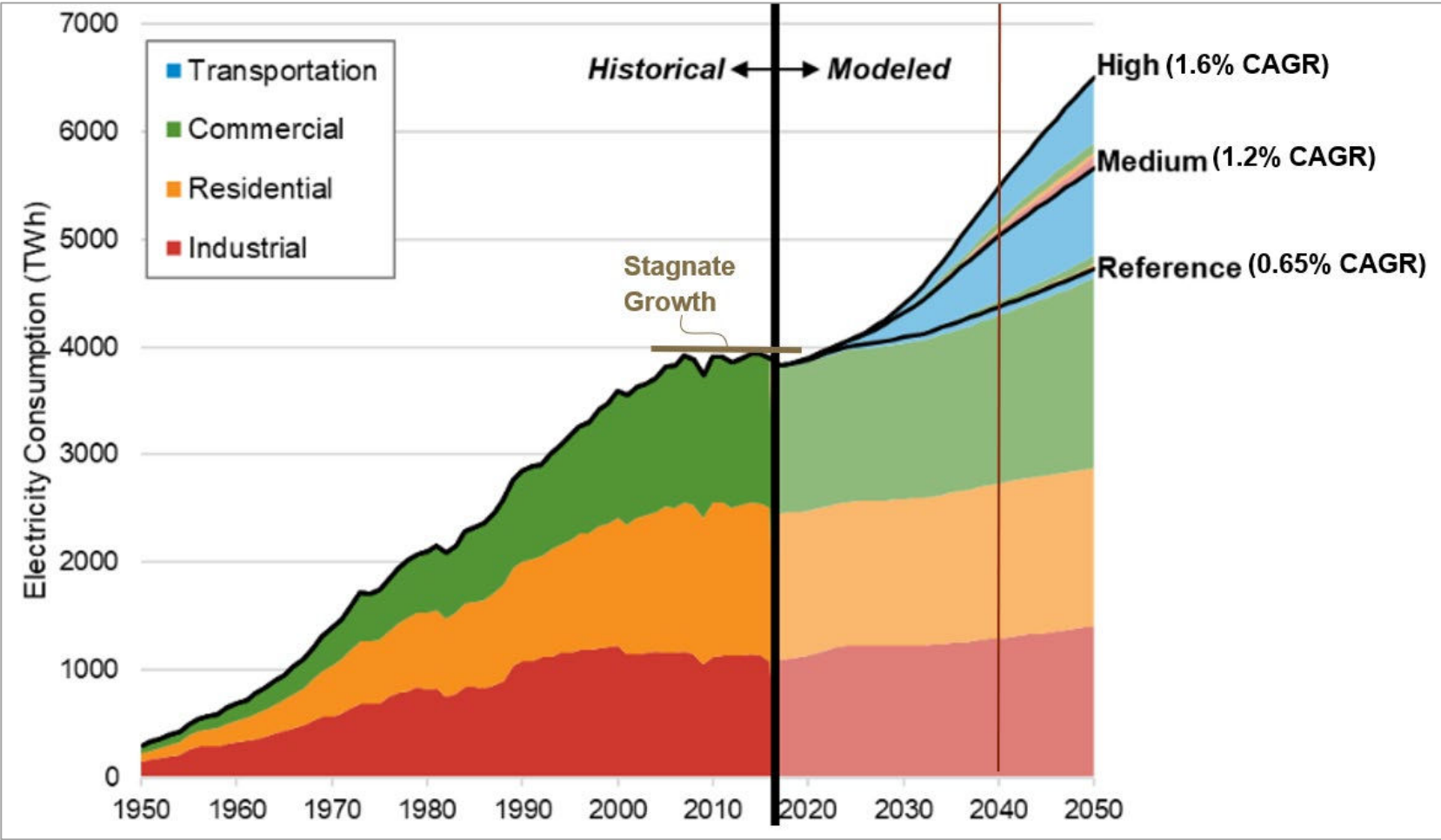
Solar, Wind, Battery Storage Limitations

- Saturation of solar, wind, battery storage

Need For Emerging Clean and Flexible Technologies (ECFT)

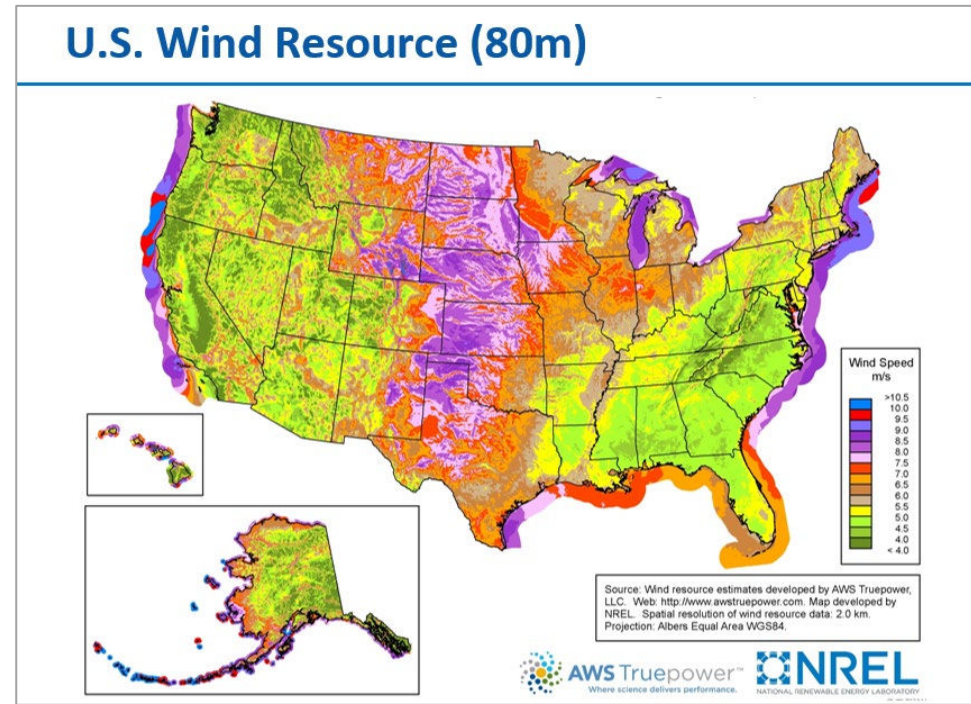
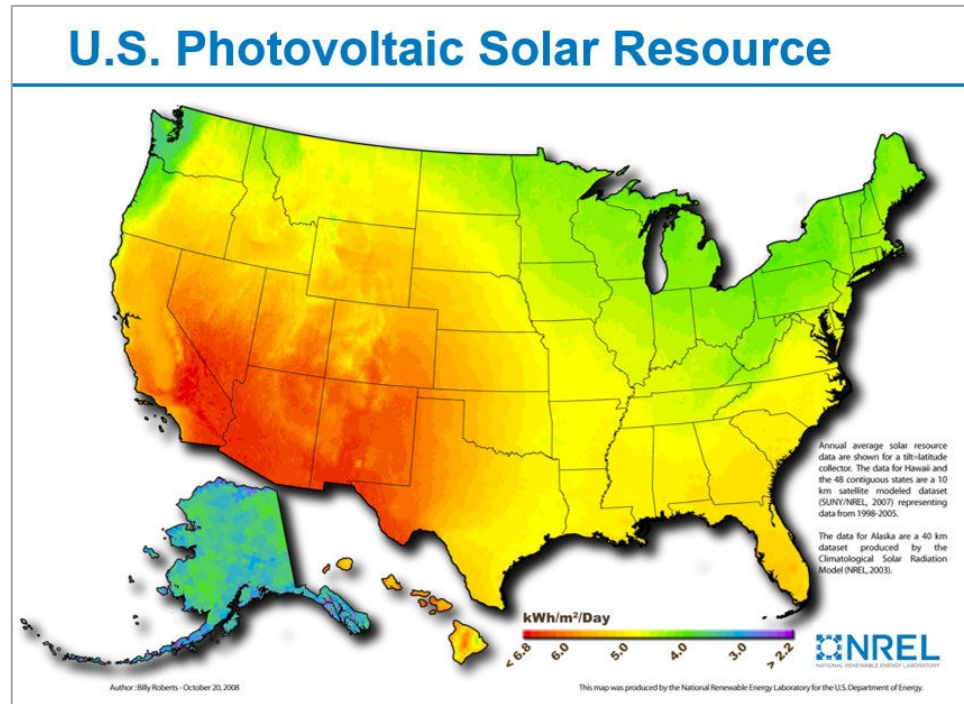
- Behave like gas resources with zero emissions providing resource flexibility.

Electrification Load Growth



National Renewable Energy Laboratory (NREL), "Electrification Futures Study (EFS)," 2021.

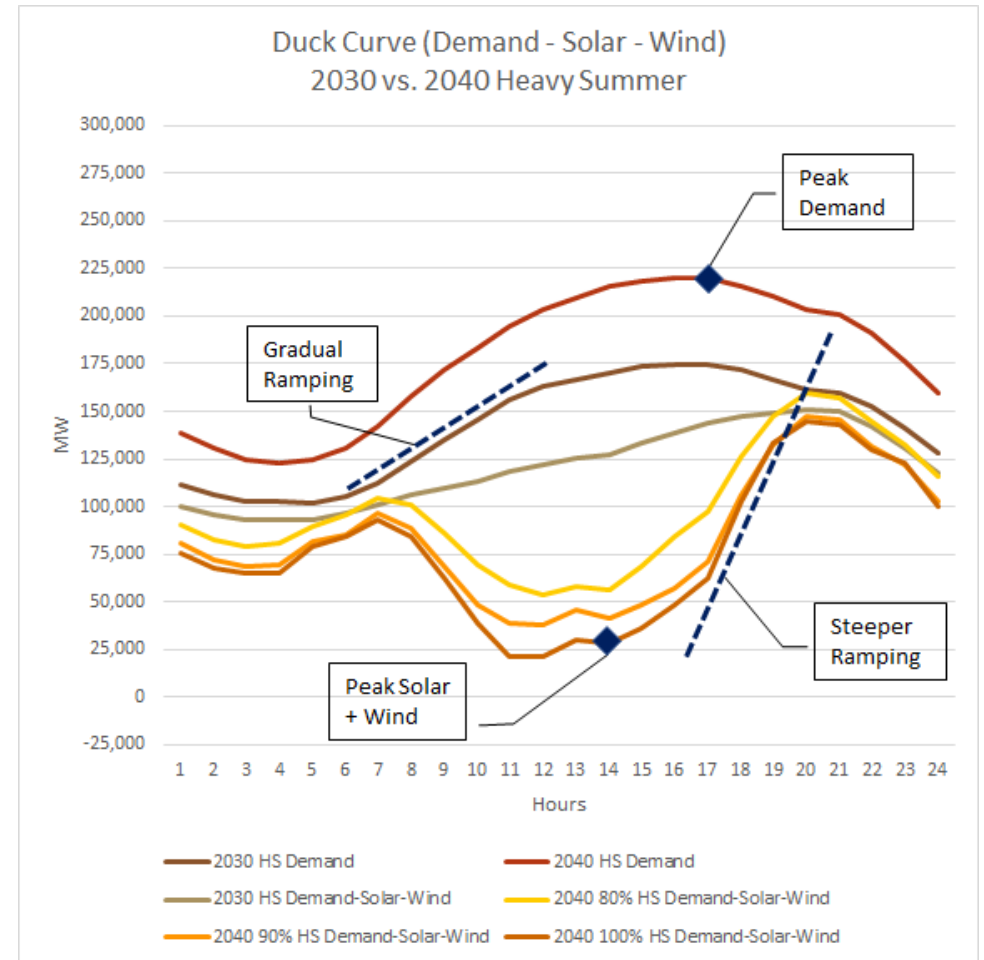
Renewable Potential in the West



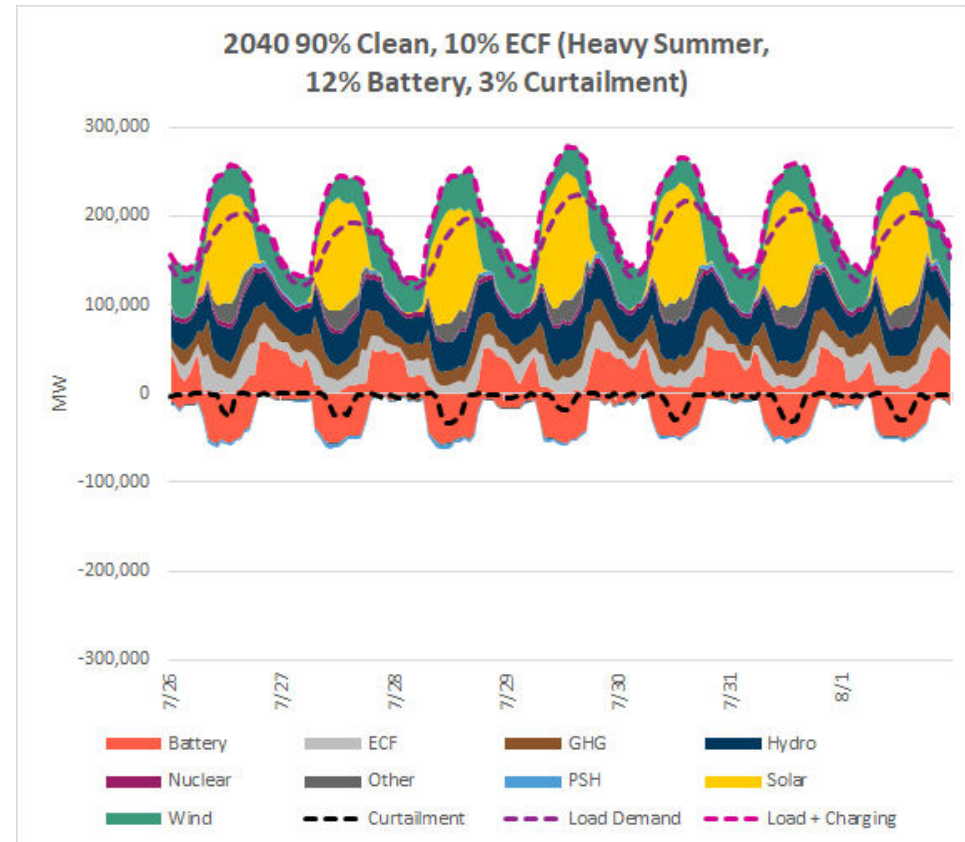
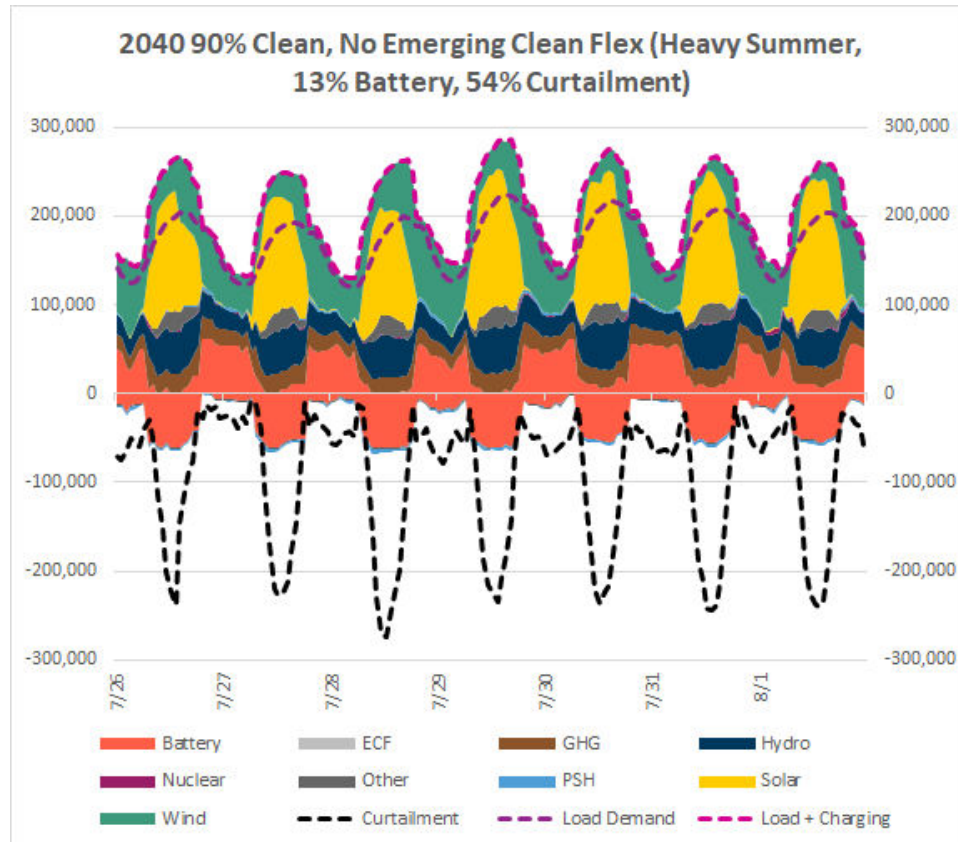
National Renewable Energy Laboratory (NREL), "Renewable Energy Technical Potential," 2021.

Duck Curve

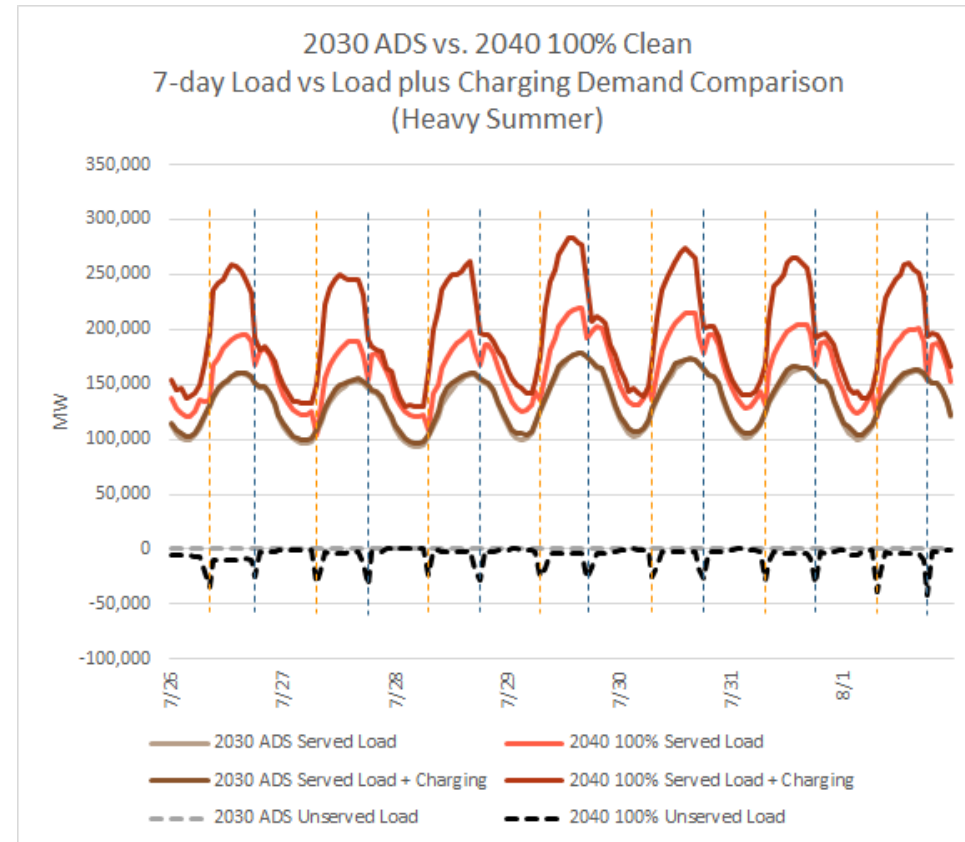
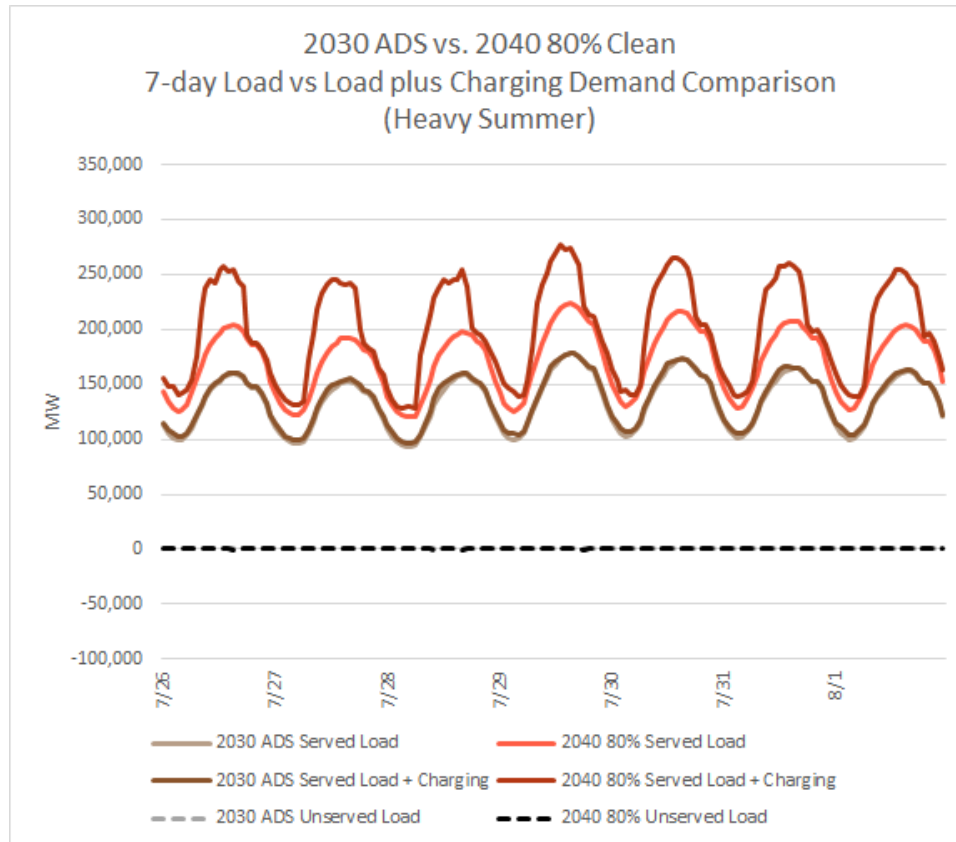
- Electrification is likely to increase – more electric vehicles, electrification of current gas uses.
- Misalignment between hourly VRE profiles and load profiles.
- VREs will increase ramping requirements at shoulder hours.
- Risk of curtailment greater during light load conditions.
- Increasing VREs will change inter-regional flows in the Western Interconnection.



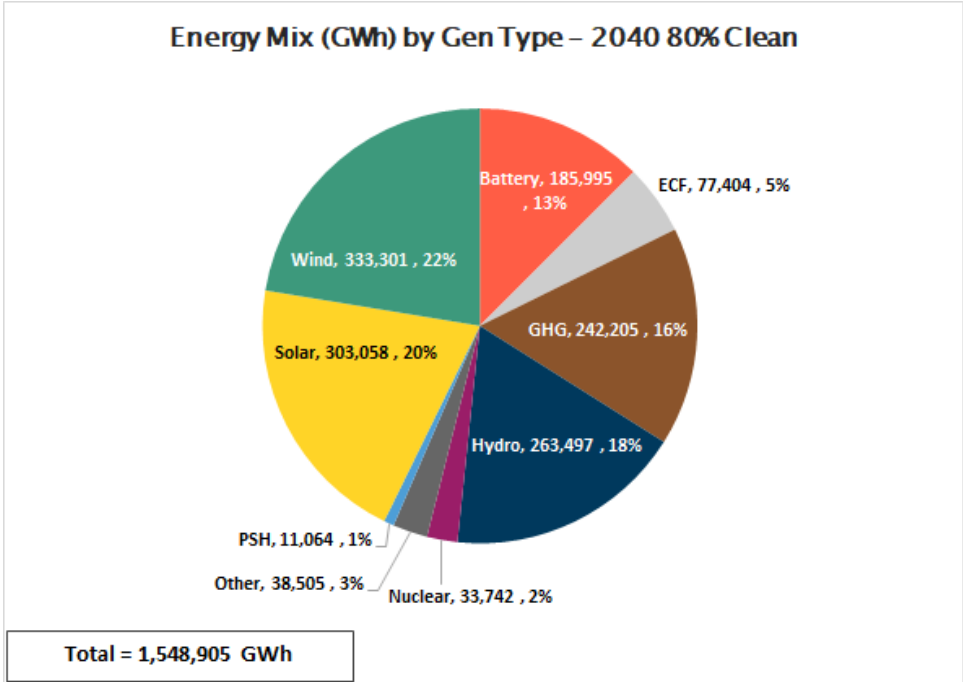
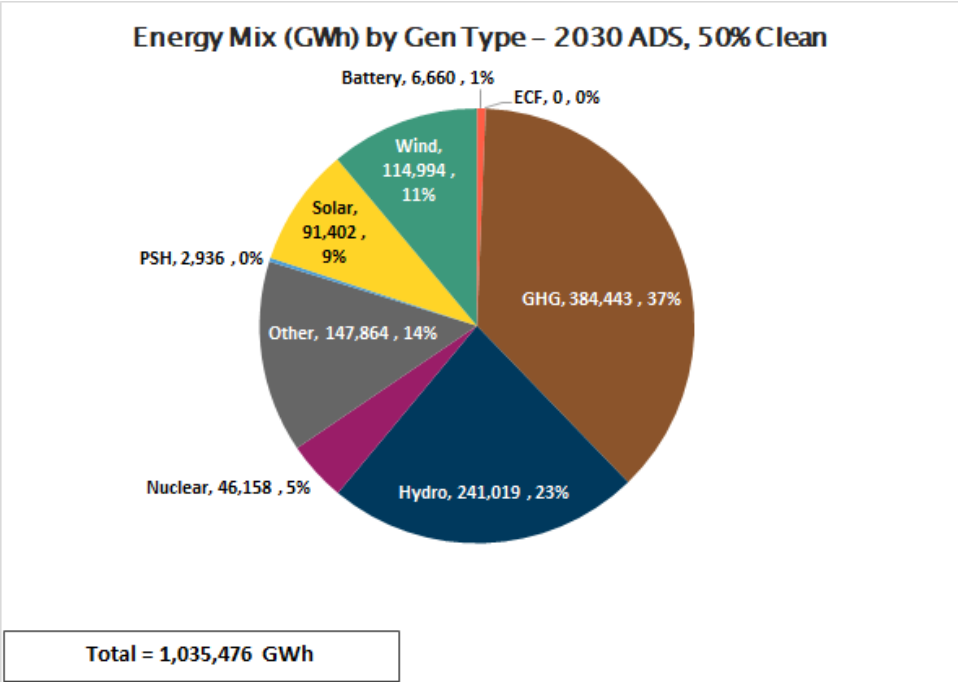
Balancing Energy Supply with Demand



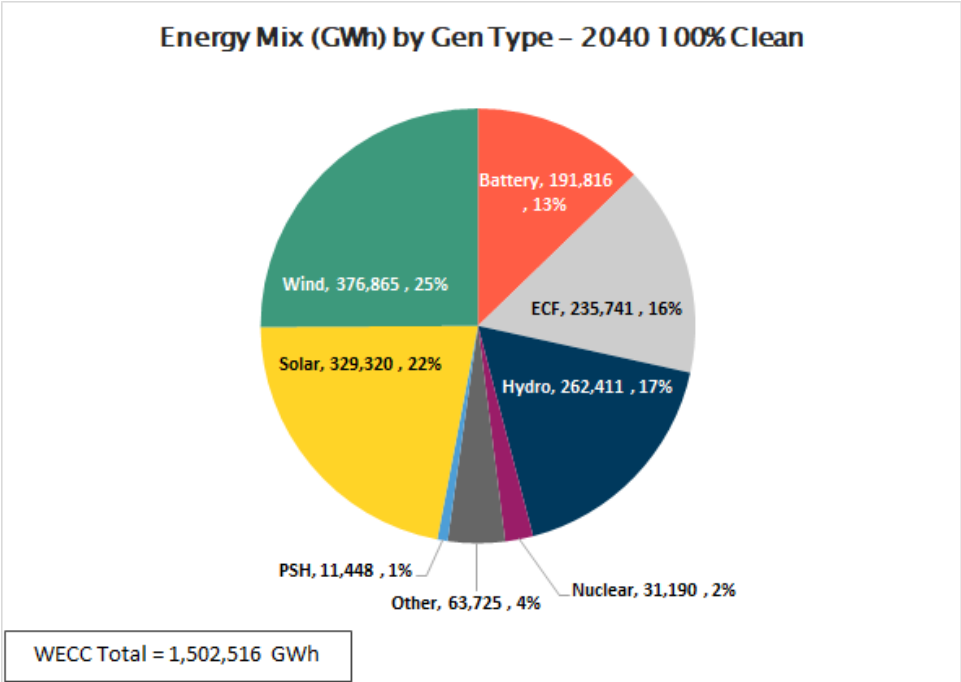
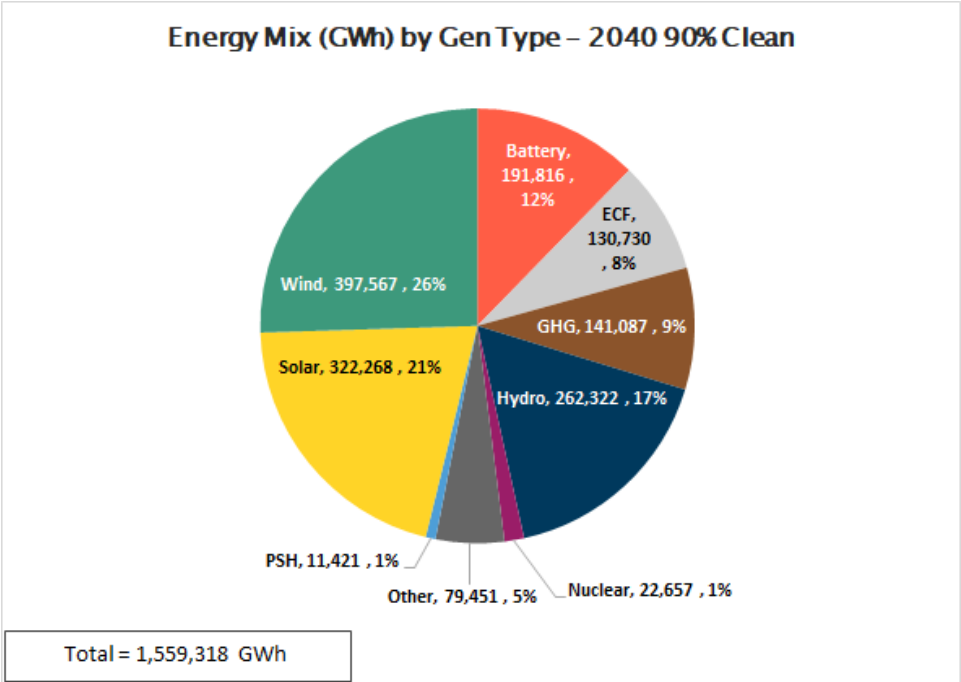
Saturation of Renewables and Battery



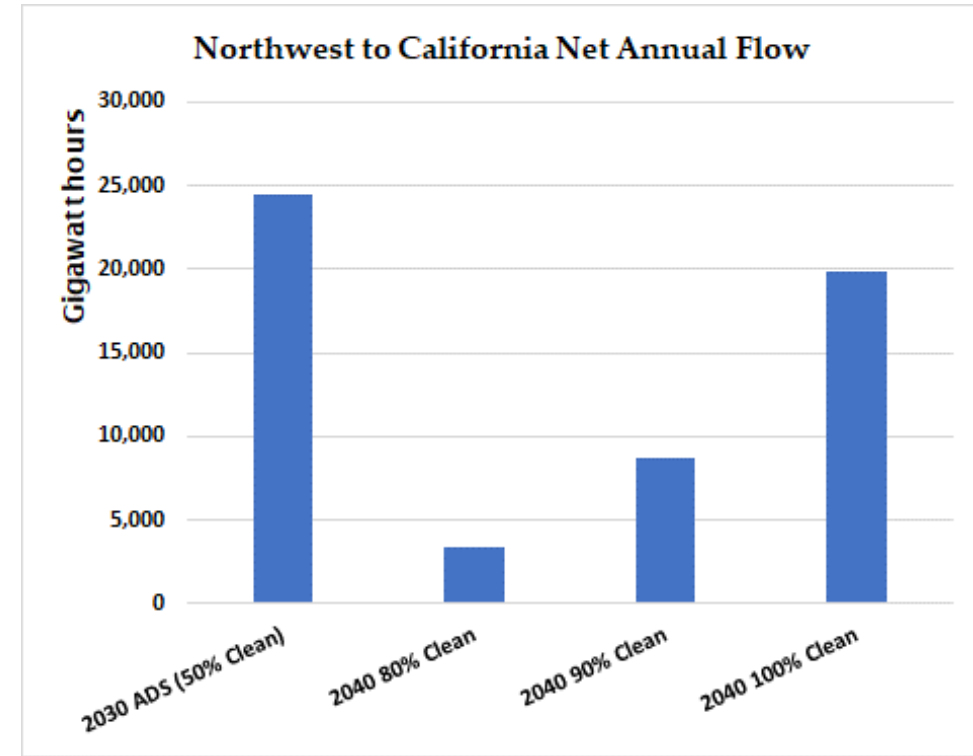
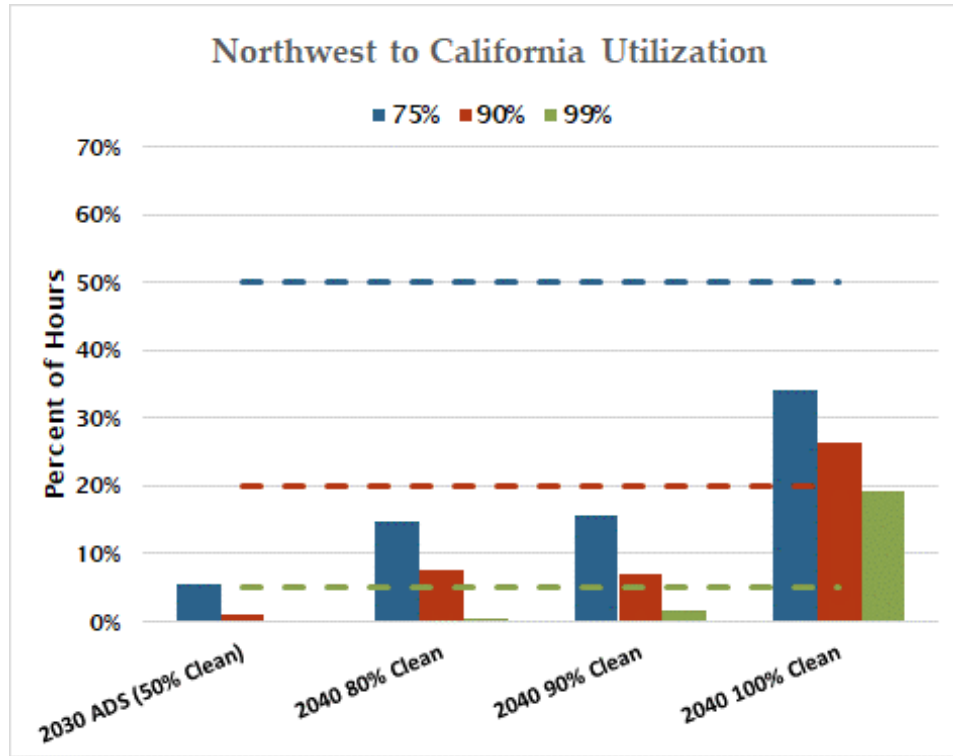
Energy Mix Comparison



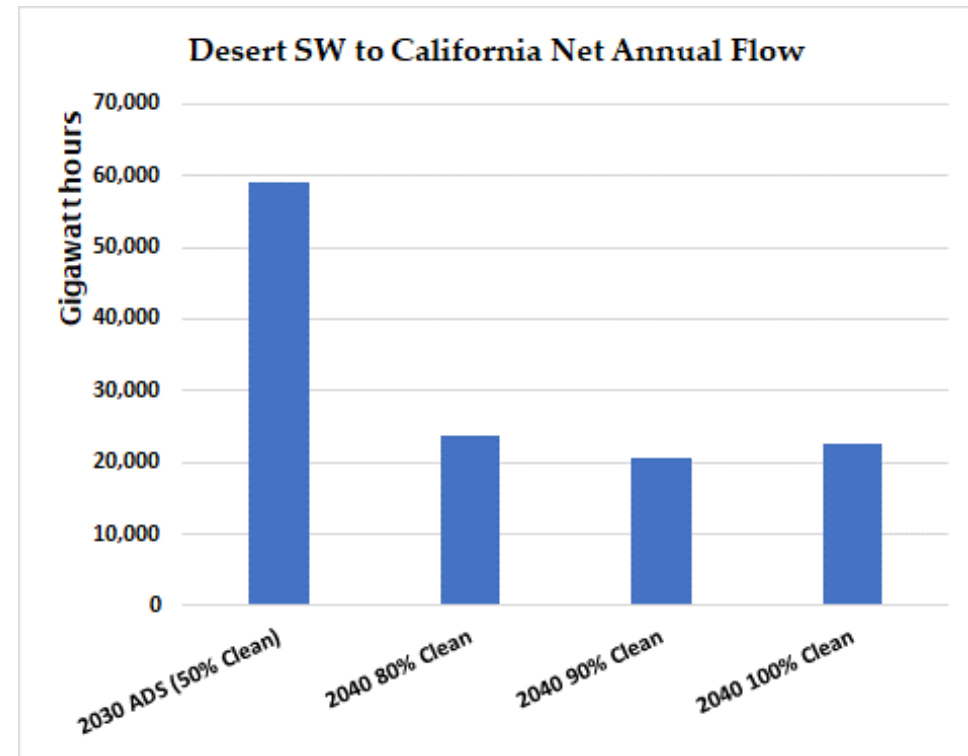
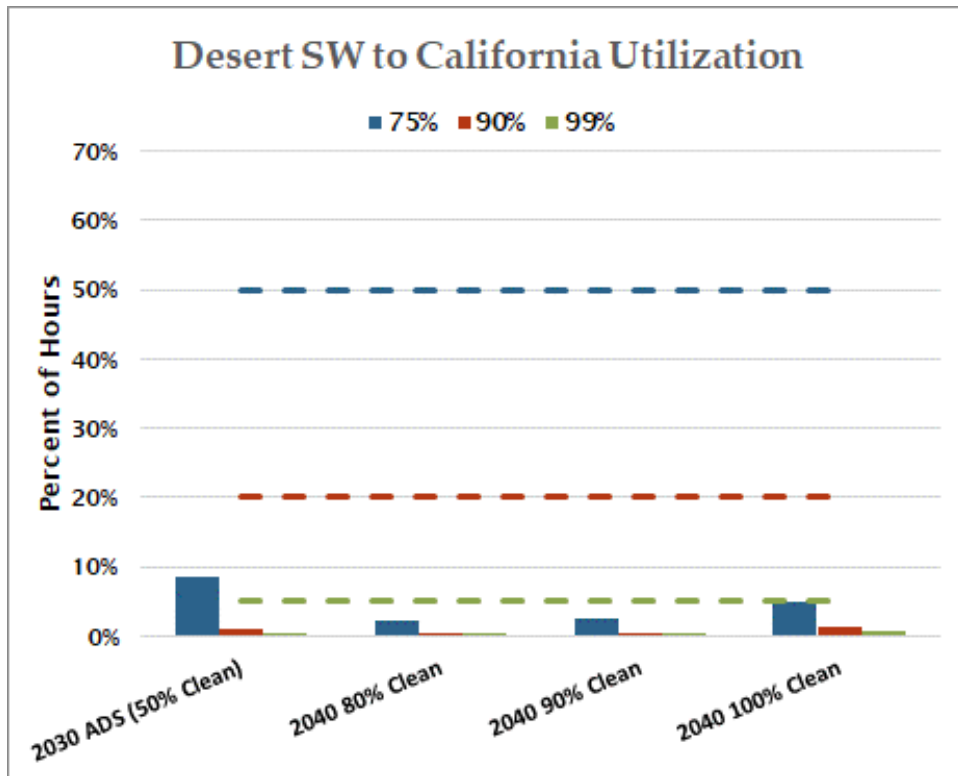
Energy Mix Comparison



Northwest to California Transmission



Desert Southwest to California Transmission



Observations

- Electrification Load Growth
- Distributed Power System
- Clean Energy Potential
- Variable Renewable Energy
- Battery Resource Benefits and Challenges
- Emerging Clean and Flexible Resource Need
- Balancing the Resource Mix
- Transmission
- Market Design
- Rate Design



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Upcoming Meetings



WIRAB Monthly Teleconference Meeting

First Thursday of every month at 11:00 AM MT

Next Meeting: April 7, 2022 at 11:00 AM MT

Spring 2022 Joint CREPC-WIRAB Meeting

May 2-4, 2022 in San Diego, CA

<https://westernenergyboard.org/>

Thank You!

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