

DOCKETED

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Summer Stack Analysis

May 20, 2021

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Energy Assessments Division



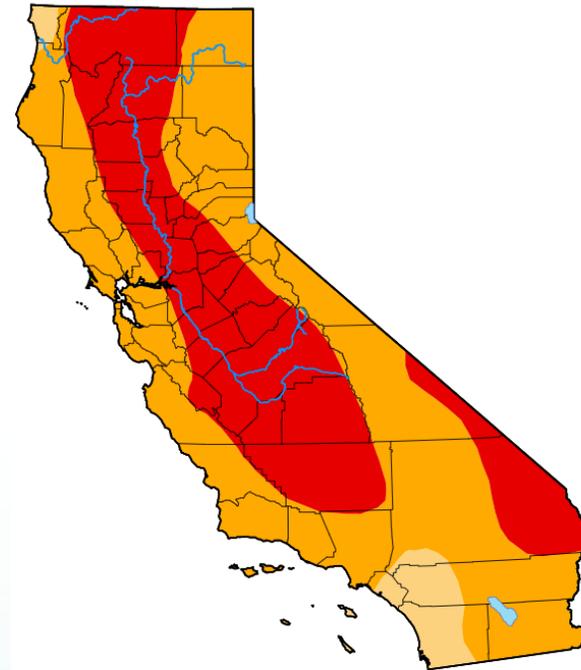
Summer Stack Analysis

Purpose:

- Assess average and extreme conditions
- Inform need for contingencies

Considers extreme conditions:

- High demand days like summer 2020
- High levels of unplanned outages
- Low import availability
- Drought impacts on hydro



Map released: Thurs. April 28, 2022

Data valid: April 26, 2022 at 8 a.m. EDT

Intensity

None
D0 (Abnormally Dry)
D1 (Moderate Drought)
D2 (Severe Drought)
D3 (Extreme Drought)
D4 (Exceptional Drought)
No Data

Authors

United States and Puerto Rico Author(s):
Brad Rippey, U.S. Department of Agriculture

Pacific Islands and Virgin Islands Author(s):
Richard Heim, NOAA/NCEI

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.



Planning Reserve Margin

15% PRM – Average Conditions

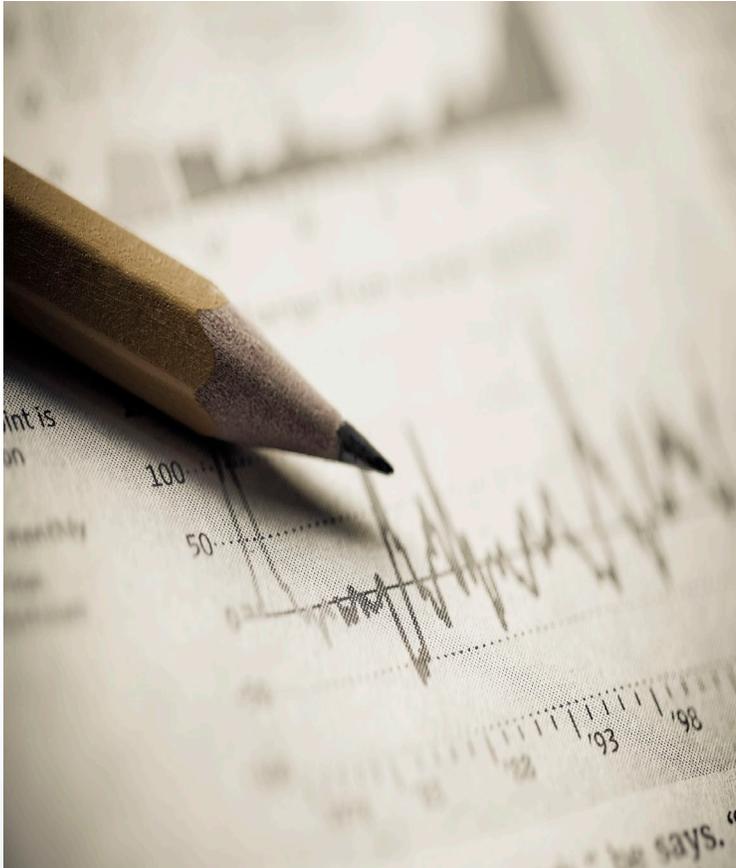
- 6 % Operating Reserves
- 5 % Unplanned Outages
- 4 % Demand Variability

22.5% PRM – Extreme Conditions

- 6 % Operating Reserves
- 7.5 % Unplanned Outages
- 9 % Demand Variability



Background

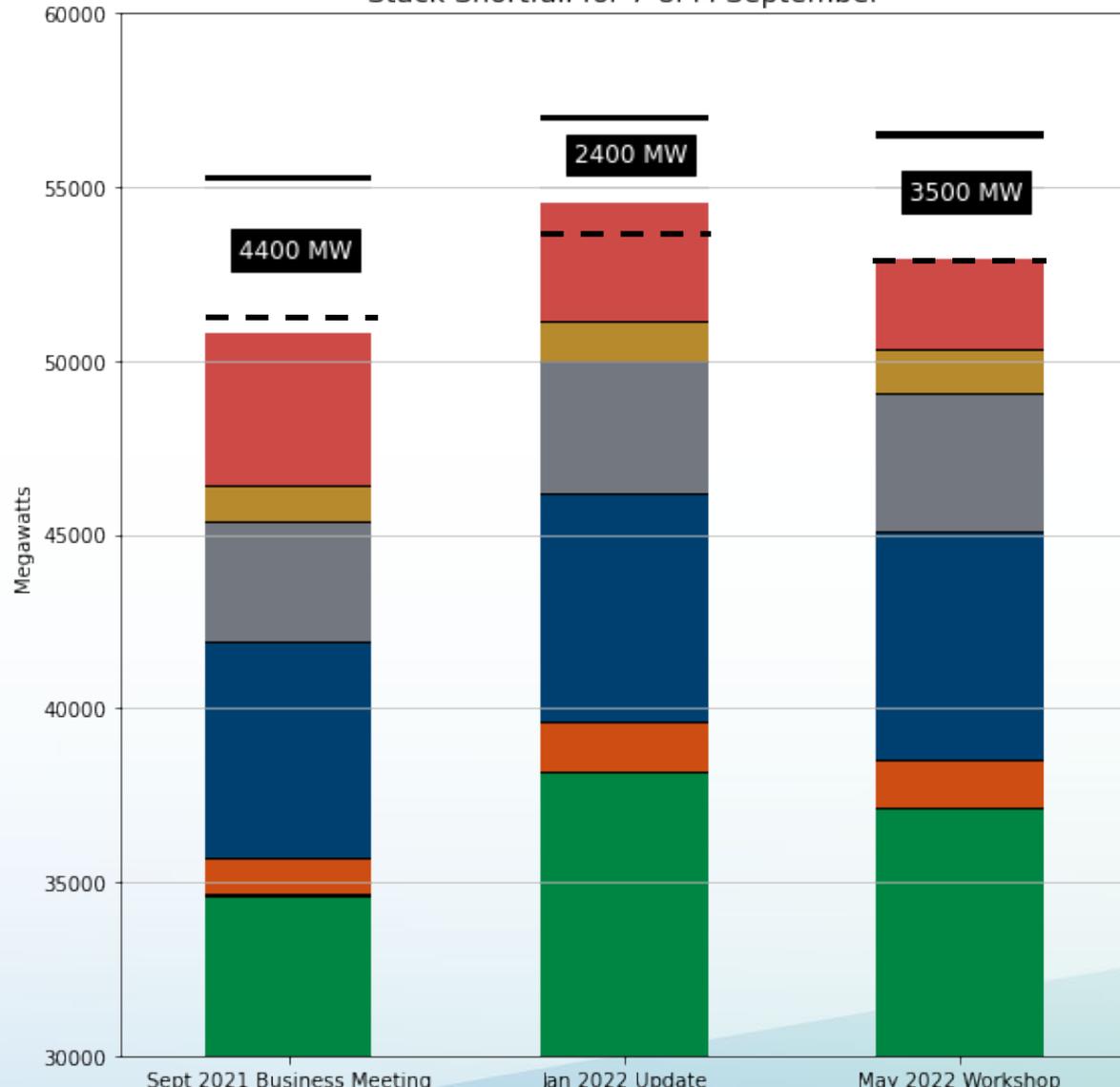


- Developed in 2021 in response to Root Cause Analysis
- Inputs and assumptions developed in collaboration with CPUC, DWR and CAISO
- Preliminary summer 2022 results first presented at the reliability workshop in July 2021 and a preliminary version was adopted in September 2021
- Last update was in January 2022

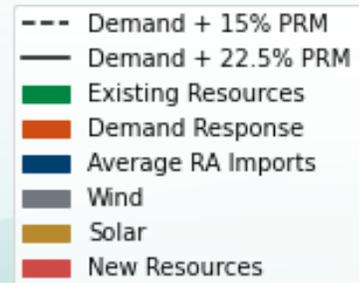


Changes to Stack for September 2022

Stack Shortfall for 7-8PM September



- Stack has been updated as new information becomes available
- Continue to foresee a need for significant contingency resources at net peak in September



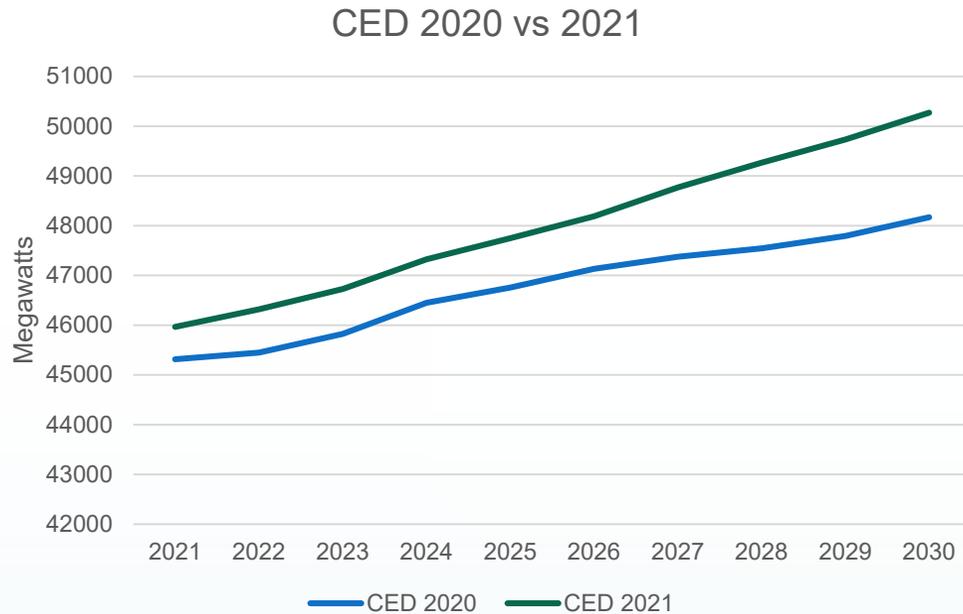


Changes for Final May Version

- Supply-side changes since the January Update for 2022:
 - New resources revised down due to delays
 - CDWR released forecast for drought impacts to summer generation and pumping
 - Emergency procurement resources moved from Stack Analysis to contingencies
 - Hourly profiles applied to new wind, solar, and batteries



Changes for Final May Version cont.



- CED 2021 shows higher annual peak demand compared to CED 2020
- Actual weather normalized 2021 was ~800 MW higher compared to previous forecast
- Other differences are largely the result of changes in economic drivers and the impacts of demand modifiers on peak timing and magnitude



Basic Assumptions

- Demand
 - Peak day of each month from the CED Adopted 2021 hourly forecast, adjusted downward due to reduced pumping need
- Supply
 - Final Net Qualifying Capacity list published by CAISO in October 2021
 - CPUC estimates of additional procurement
- Imports
 - Average RA showings from 2016-2021 and LD contracts for POUs

Megawatts	July	August	Sept
Demand at 7-8PM	44,110	45,480	46,040
NQC List	48,170	46,380	43,950
Average RA Imports	6,010	6,440	6,560
New Supply 2022 (NQC)	1,651	1,699	2,581
New Supply 2023 (NQC)	5,350	5,436	5,996



Supply Modifications

- Wind and solar
 - Hourly profiles based on generation on high-load days from 2014-2021
- Batteries
 - Discharge limited to 4 hours across peak hours
- Hydro
 - Derated based on CDWR projections
- Demand response
 - From CPUC DR Allocations, adjusted by Load Impact Protocol and distribution loss factors
 - Increased by 6% since operating reserves aren't carried for reduced load

Megawatts	July	August	Sept
Solar MW at 7-8PM	610	130	0
Wind MW at 7-8PM	2,450	2,130	1,230
Hydro Capacity with Derate	4,940	4,730	4,120
Demand Response with DLF/Reserve	1,360	1,420	1,420



New Resources

- New resources for 2022-2023 based on procurement status forms filed with and compiled by CPUC staff
- Resources for 2024-2026 based on procurement orders from 2019 and 2021 using Preferred System Plan ratios.
- 2024-2026 assume OTC plants and Diablo Canyon retire as scheduled.

Megawatts	2022	2023	2024	2025	2026
Other	20	50	50	80	2,080
Wind	500	640	1,020	1,760	1,840
Solar	970	2,090	3,690	5,710	5,810
Batteries	2,450	5,870	8,250	10,220	10,350



Online Resources

- New resources continue to come online at a record pace
- About half the storage expected between October and September came online by April; most solar is already here

Nameplate Capacity	November 2020-October 2021	October 2021-April 2022	Total
Energy Storage	1,230	1,130	2,360
Solar	1,380	796	2,500
Wind	340	580	920
Geothermal	12	0	12
Small Hydro	15	0	15



Hourly Wind and Solar Shapes

- Based on historic generation on the 5 highest load days of each month from 2014-2021, for a total of 40 days per month
- The hourly shapes are weighted with 80% of the weight going to the median generation and 20% of the weight going to the 20th percentile.

Wind (MW)	July	August	Sept
ELCC Tech Factors	1,390	1,270	910
Stack Analysis Values at 5-6 PM (peak)	2,240	1,640	810
Stack Analysis Values at 7-8PM (net peak)	2,450	2,130	1,230

Solar (MW)	July	August	Sept
ELCC Tech Factors	4,290	2,990	1,580
Stack Analysis Values at 5-6 PM (peak)	6,430	5,540	3,770
Stack Analysis Values at 7-8PM (net peak)	610	130	0

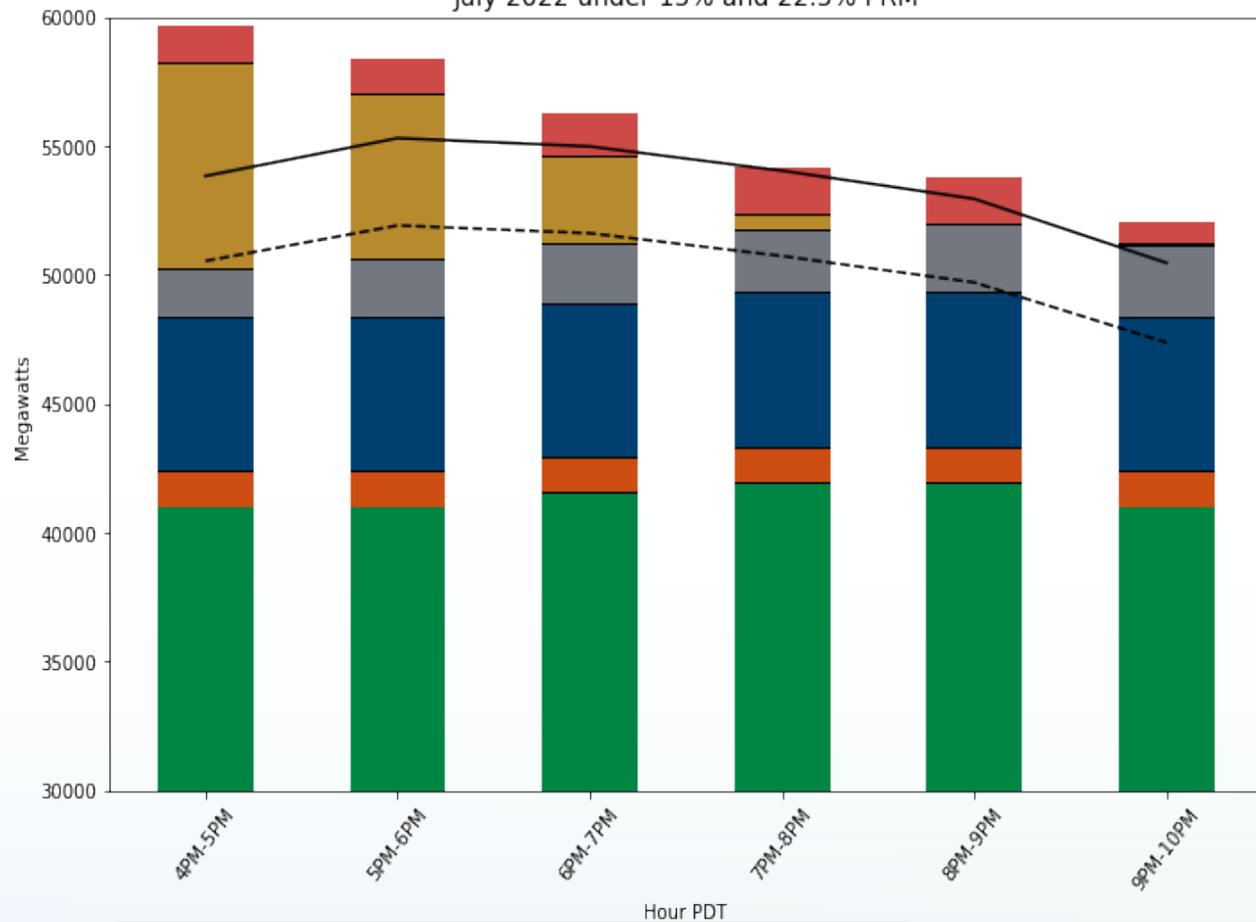


Results

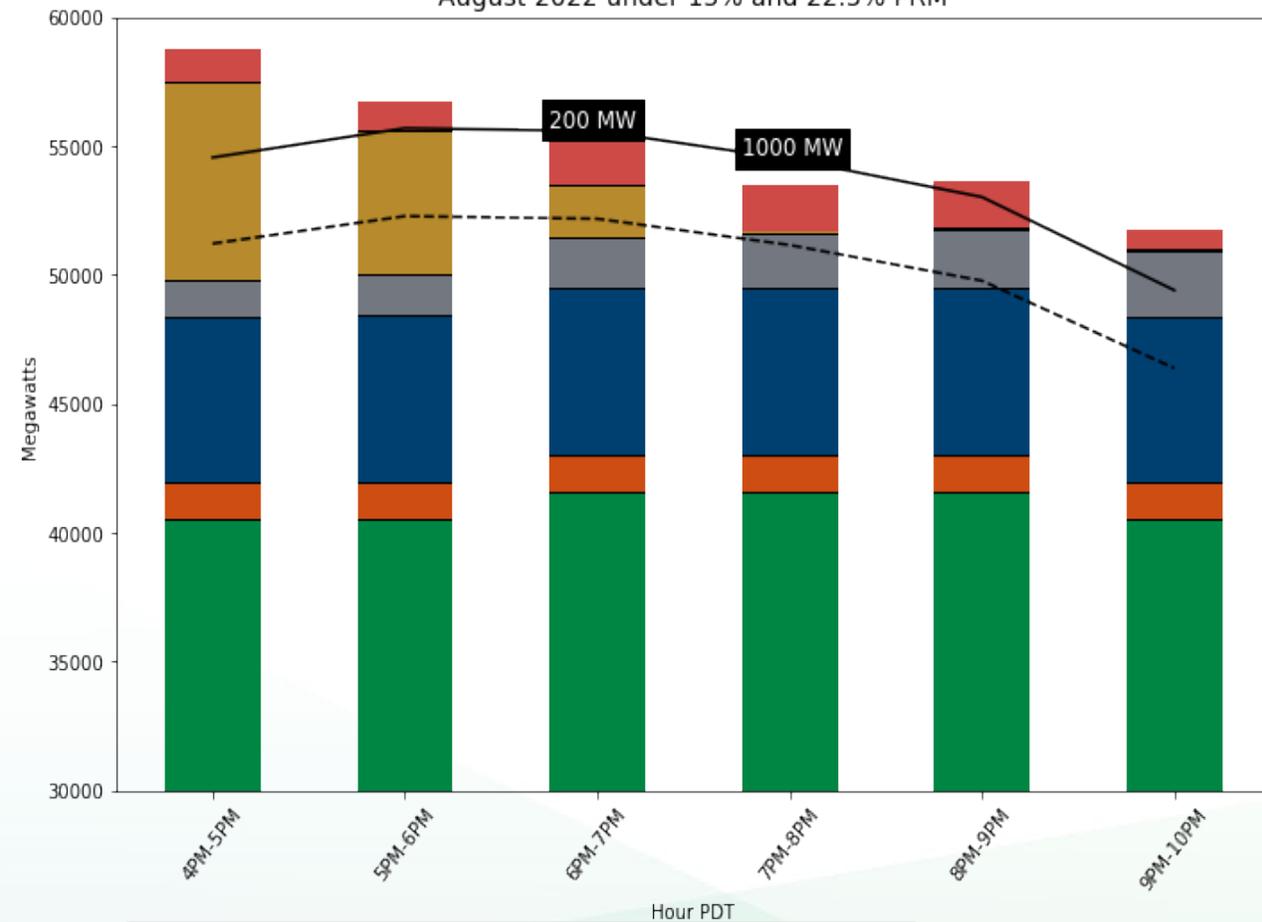


July and August 2022

July 2022 under 15% and 22.5% PRM



August 2022 under 15% and 22.5% PRM



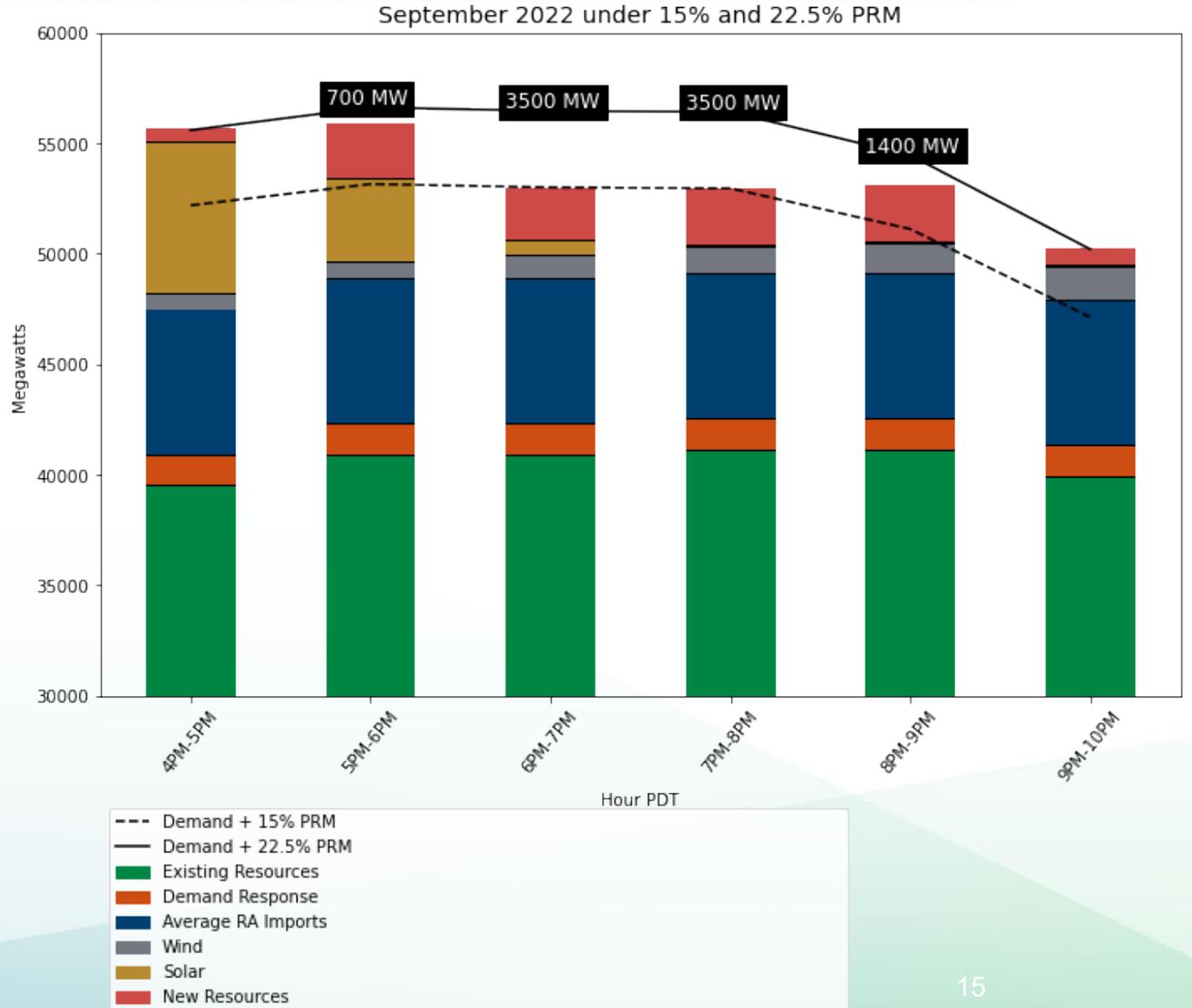
- Demand + 15% PRM
- Demand + 22.5% PRM
- Existing Resources
- Demand Response
- Average RA Imports
- Wind
- Solar
- New Resources

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- Demand + 22.5% PRM
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September 2022 – Not Meeting 22.5%

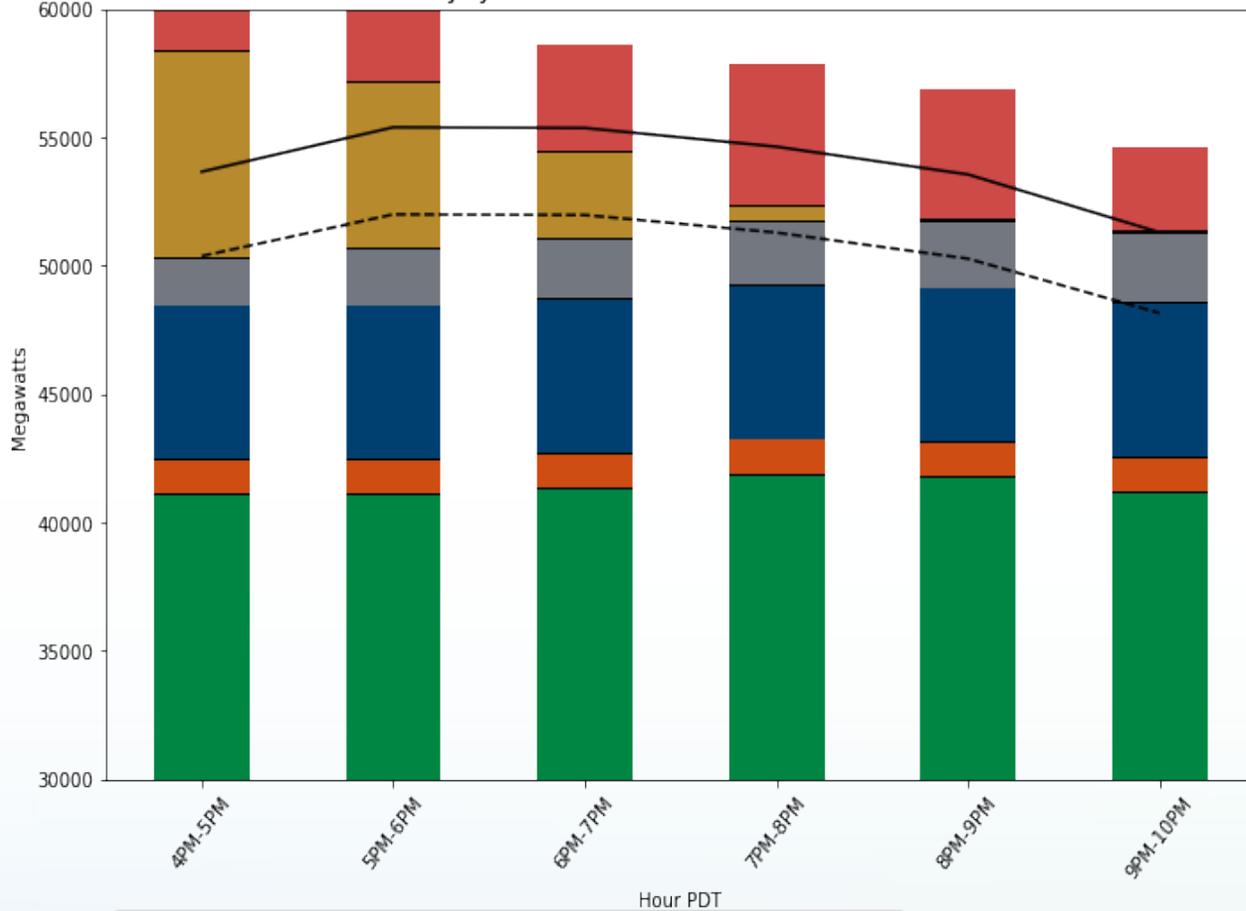
- Meeting 15% PRM in every hour
- Potential need for contingencies.



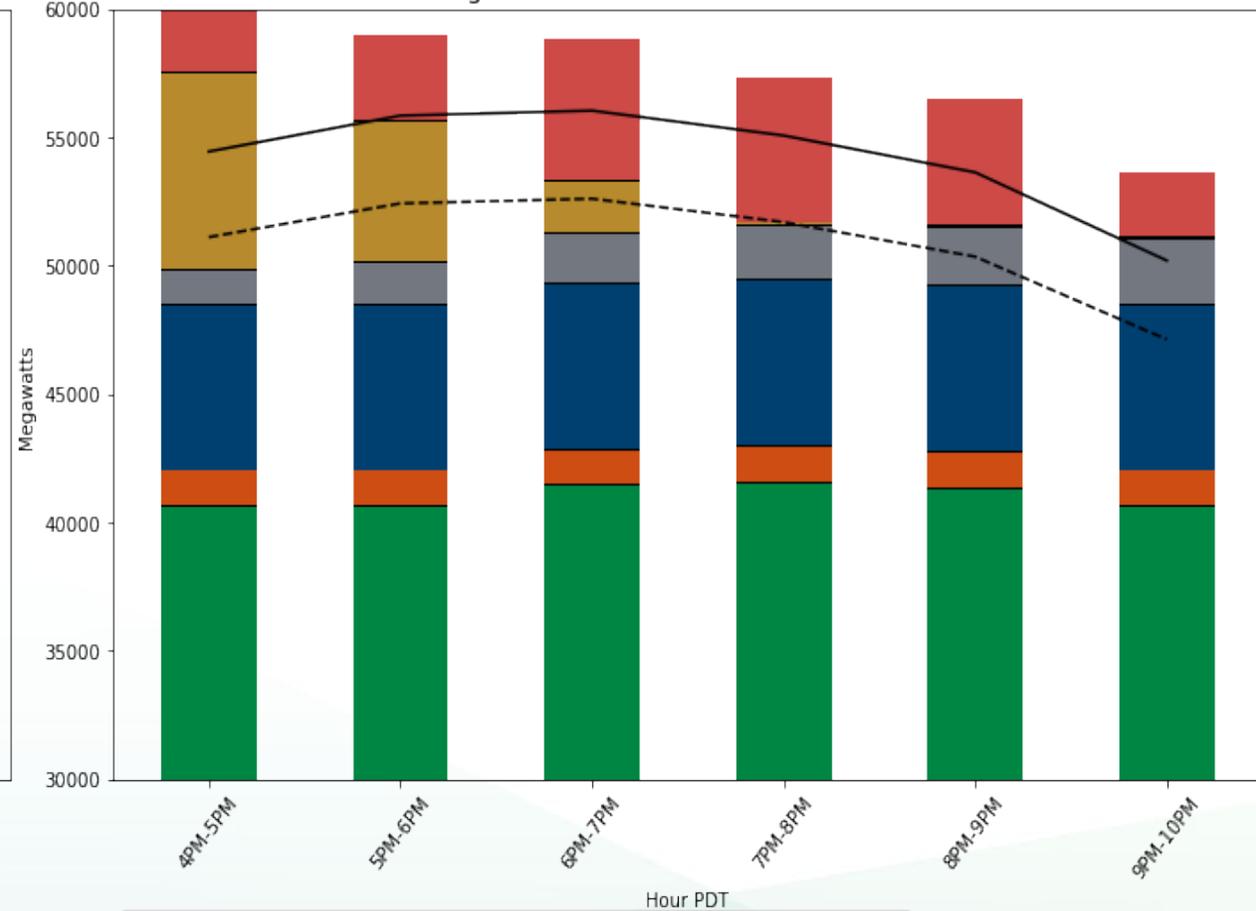


July and August 2023

July 2023 under 15% and 22.5% PRM



August 2023 under 15% and 22.5% PRM



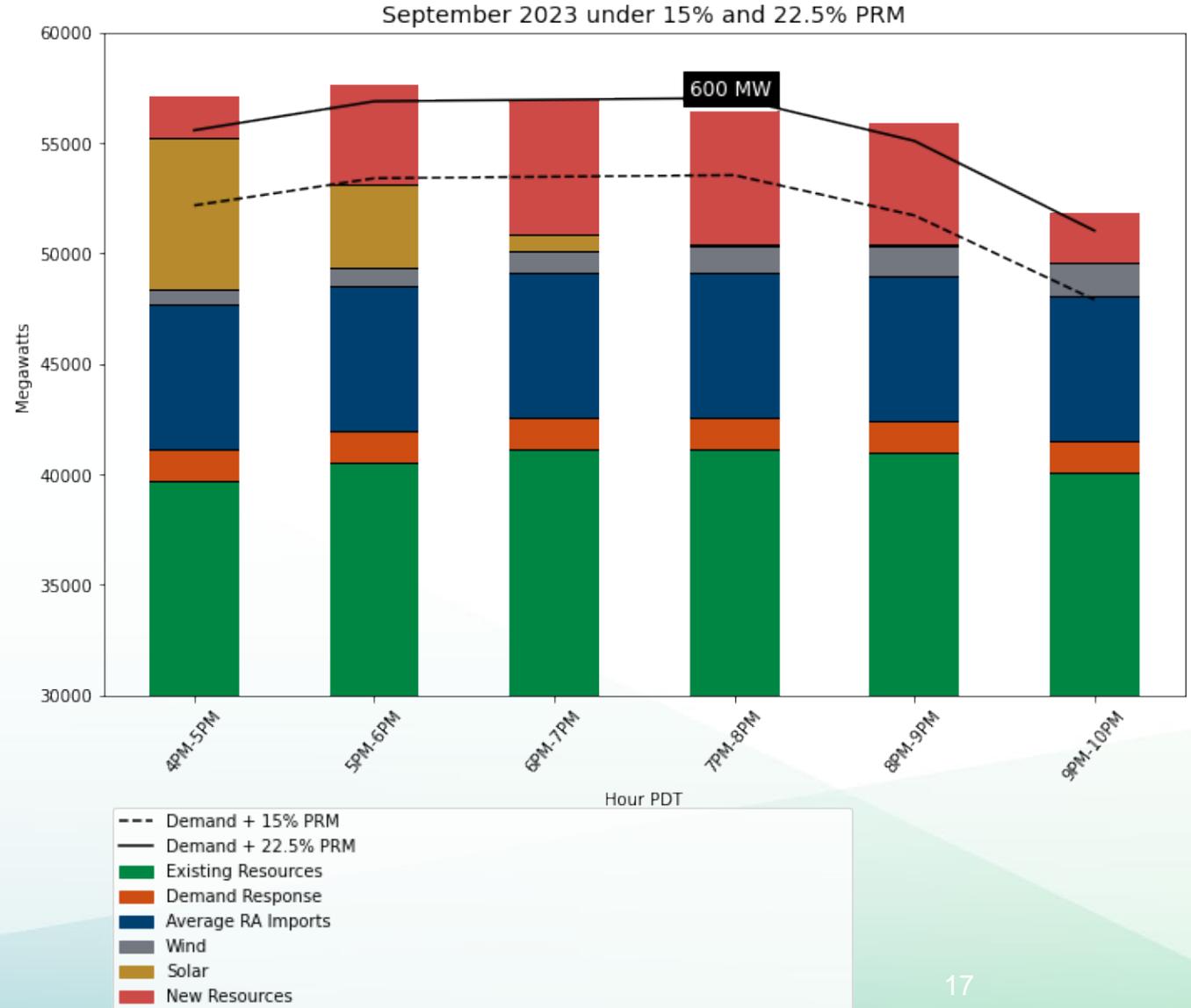
- Demand + 15% PRM
- Demand + 22.5% PRM
- Existing Resources
- Demand Response
- Average RA Imports
- Wind
- Solar
- New Resources

- Demand + 15% PRM
- Demand + 22.5% PRM
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- Demand Response
- Average RA Imports
- Wind
- Solar
- New Resources



September 2023 – Not Meeting 22.5%

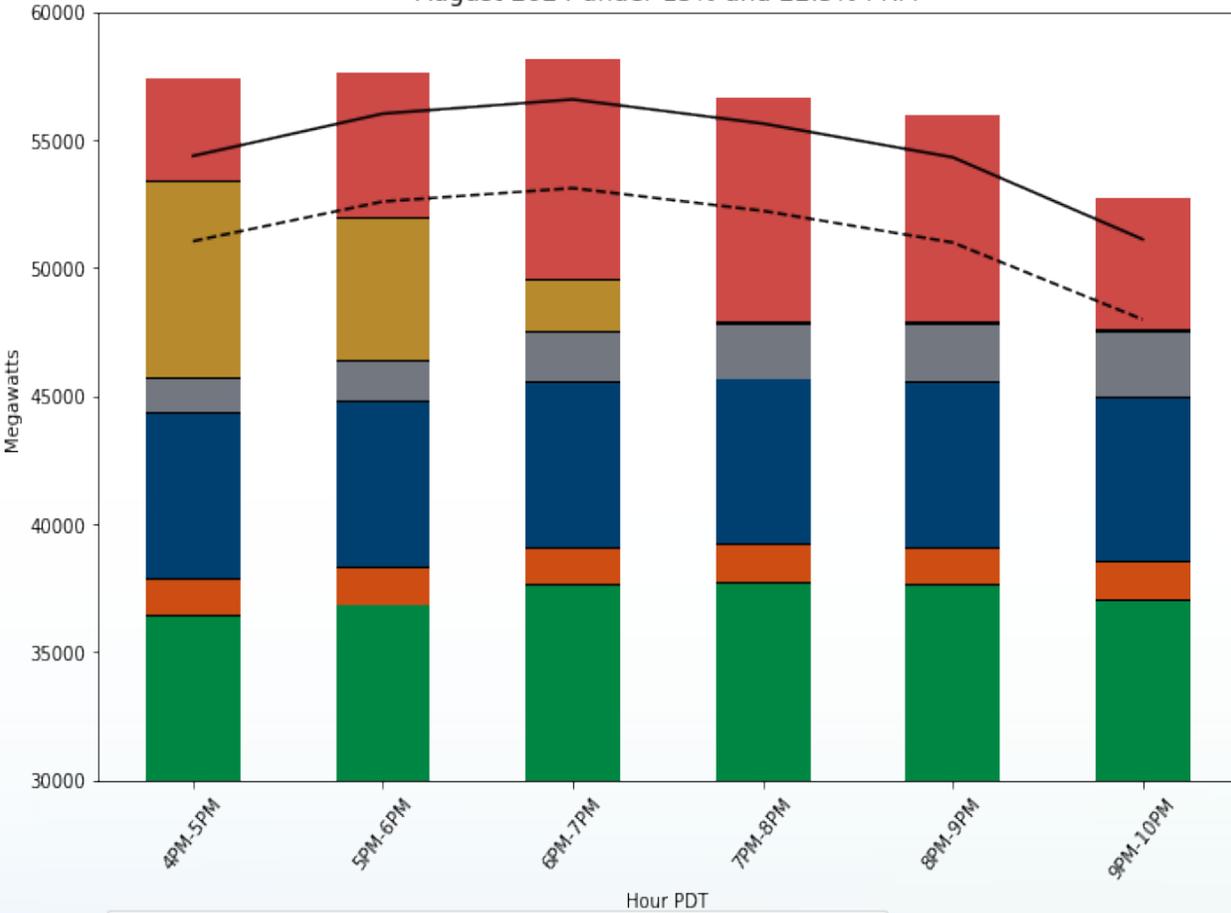
- Meets 15% PRM for all hours
- Potential need for contingencies at net peak





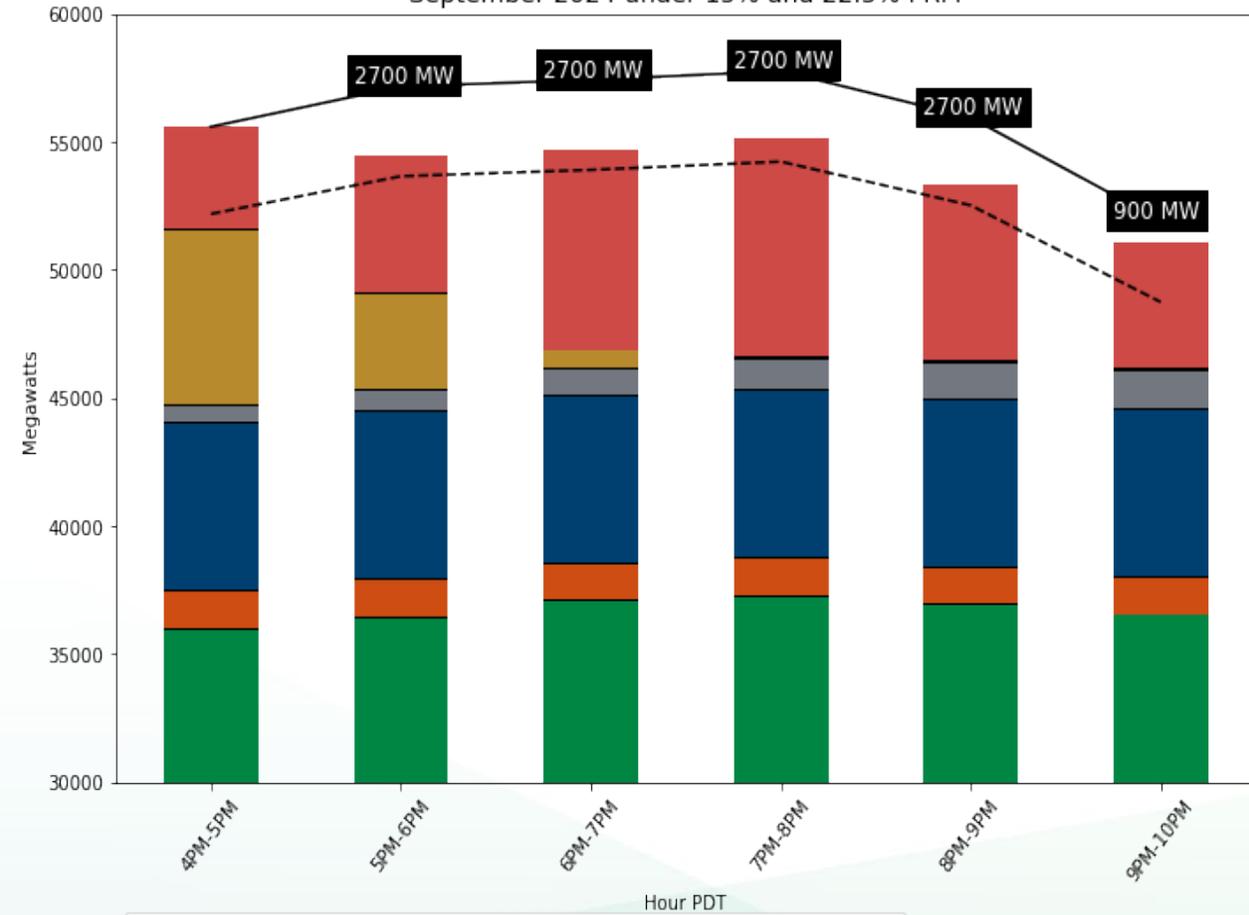
2024

August 2024 under 15% and 22.5% PRM



- Demand + 15% PRM
- Demand + 22.5% PRM
- Existing Resources
- Demand Response
- Average RA Imports
- Wind
- Solar
- New Resources

September 2024 under 15% and 22.5% PRM

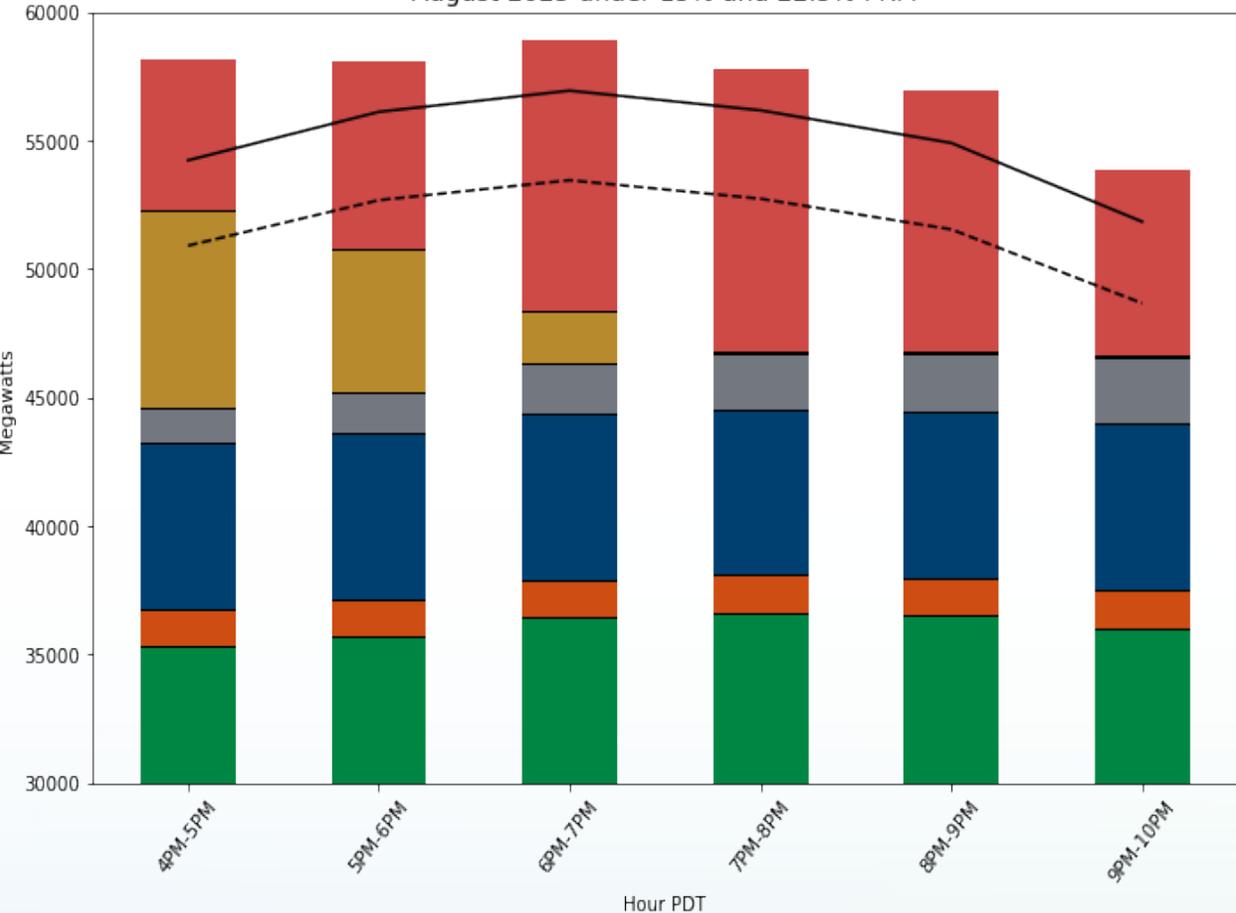


- Demand + 15% PRM
- Demand + 22.5% PRM
- Existing Resources
- Demand Response
- Average RA Imports
- Wind
- Solar
- New Resources

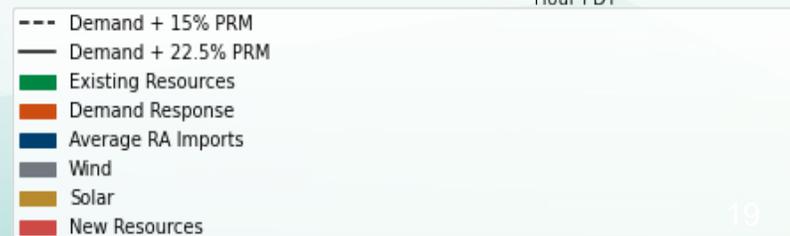
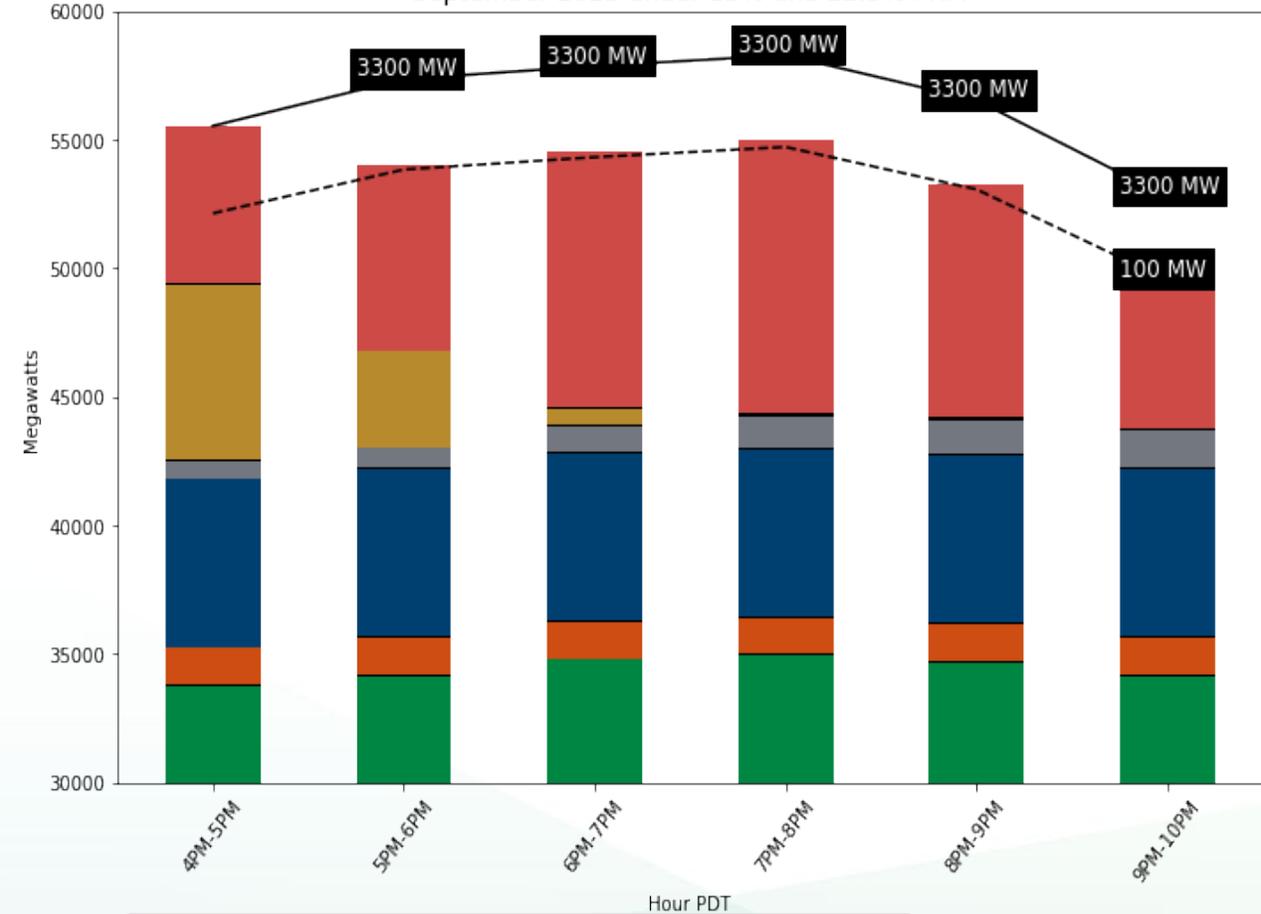


2025

August 2025 under 15% and 22.5% PRM



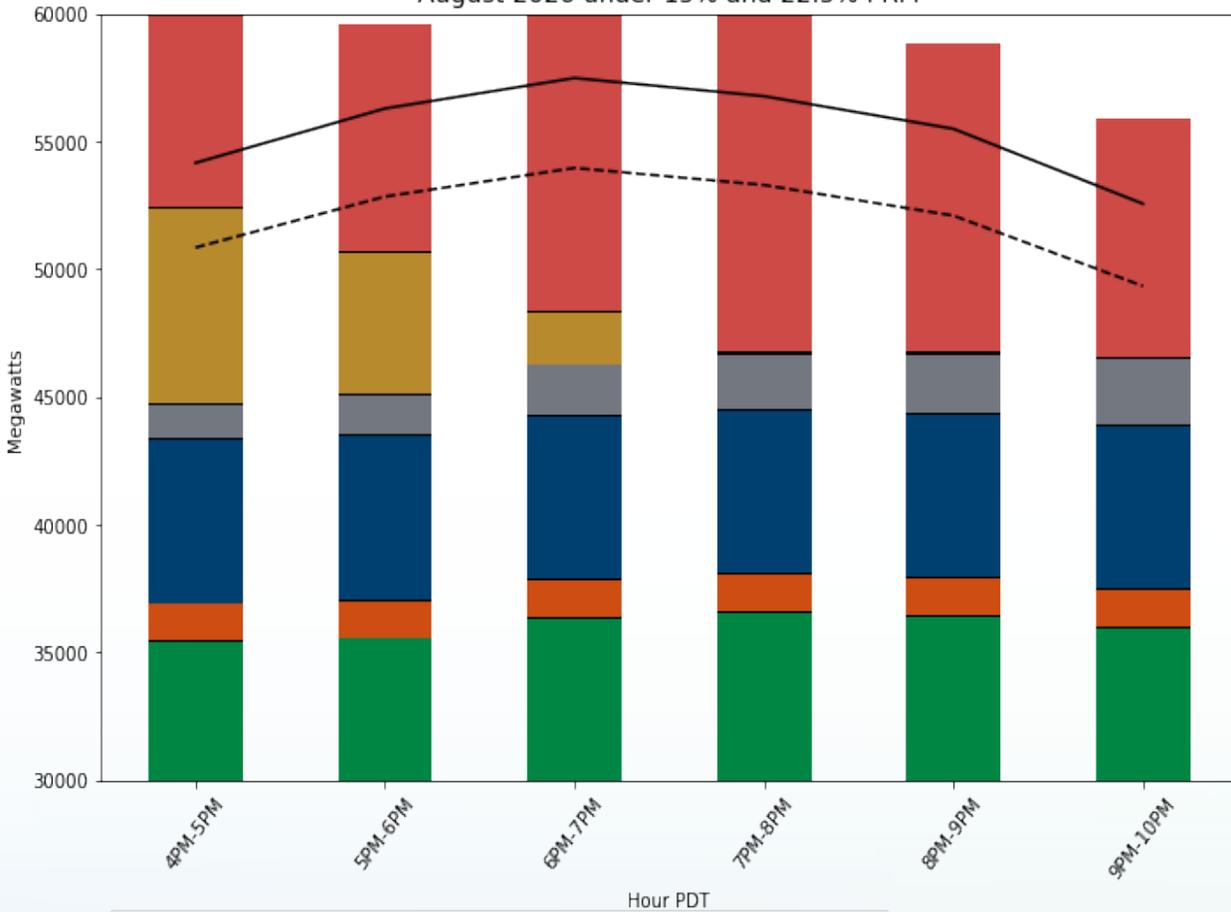
September 2025 under 15% and 22.5% PRM





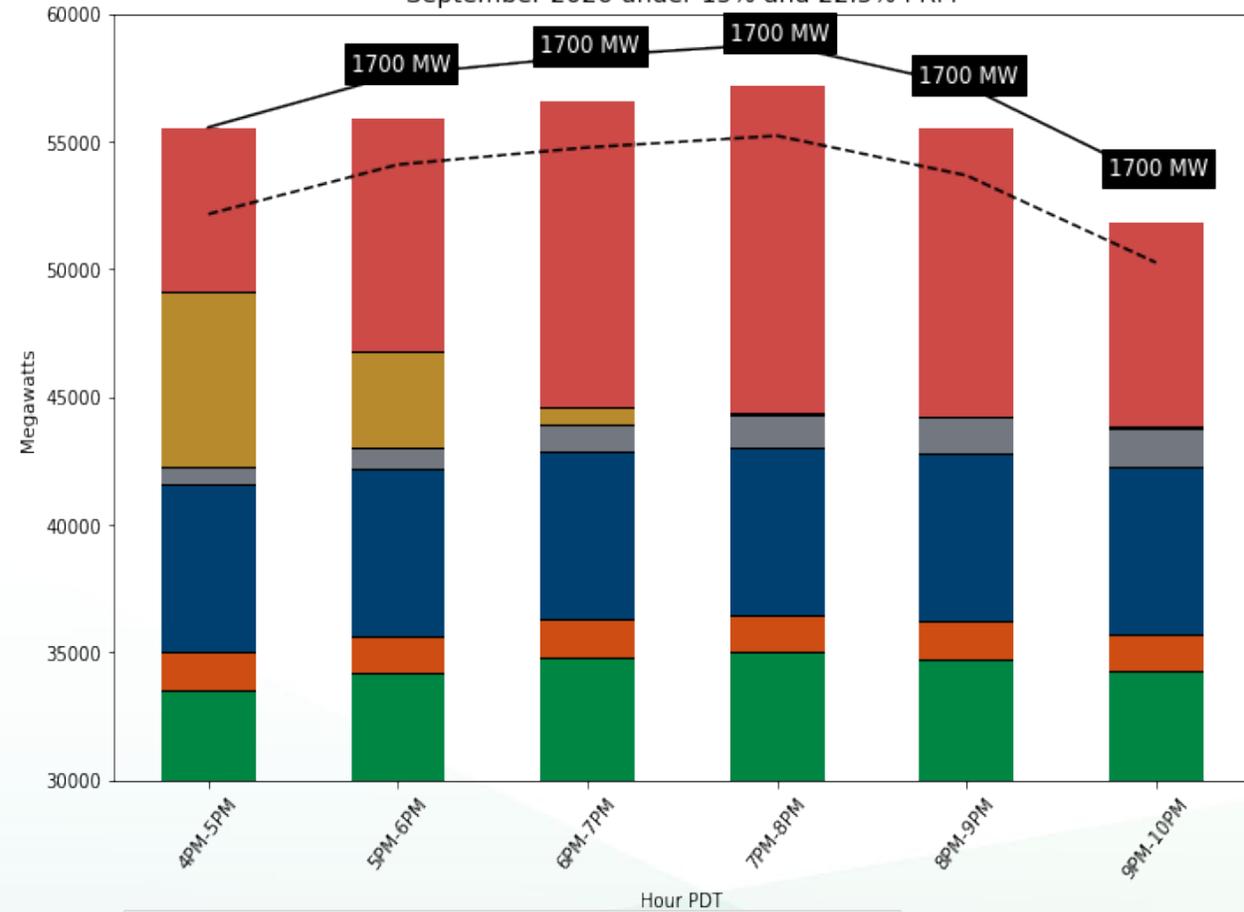
2026

August 2026 under 15% and 22.5% PRM



- Demand + 15% PRM
- Demand + 22.5% PRM
- Existing Resources
- Demand Response
- Average RA Imports
- Wind
- Solar
- New Resources

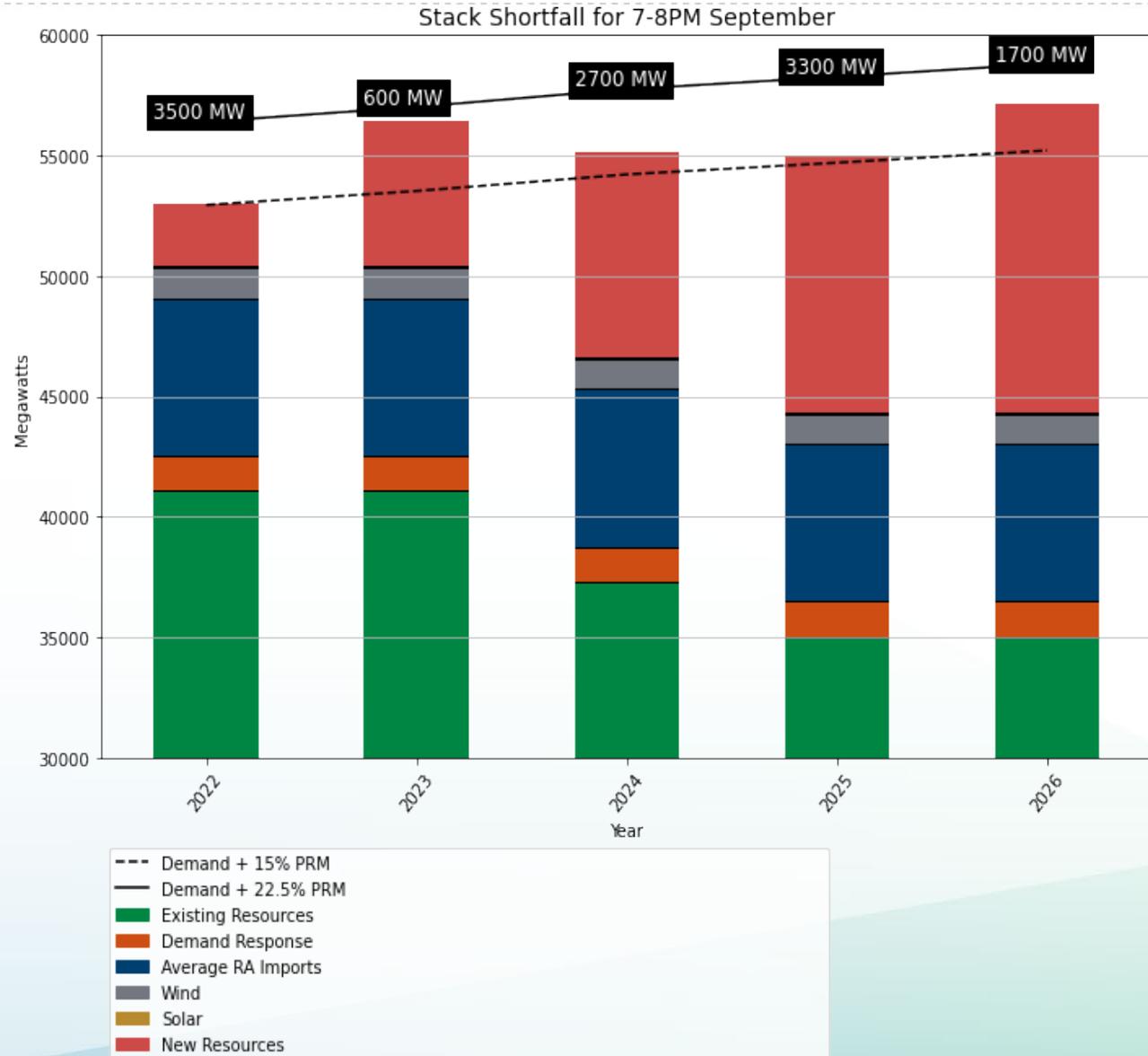
September 2026 under 15% and 22.5% PRM



- Demand + 15% PRM
- Demand + 22.5% PRM
- Existing Resources
- Demand Response
- Average RA Imports
- Wind
- Solar
- New Resources



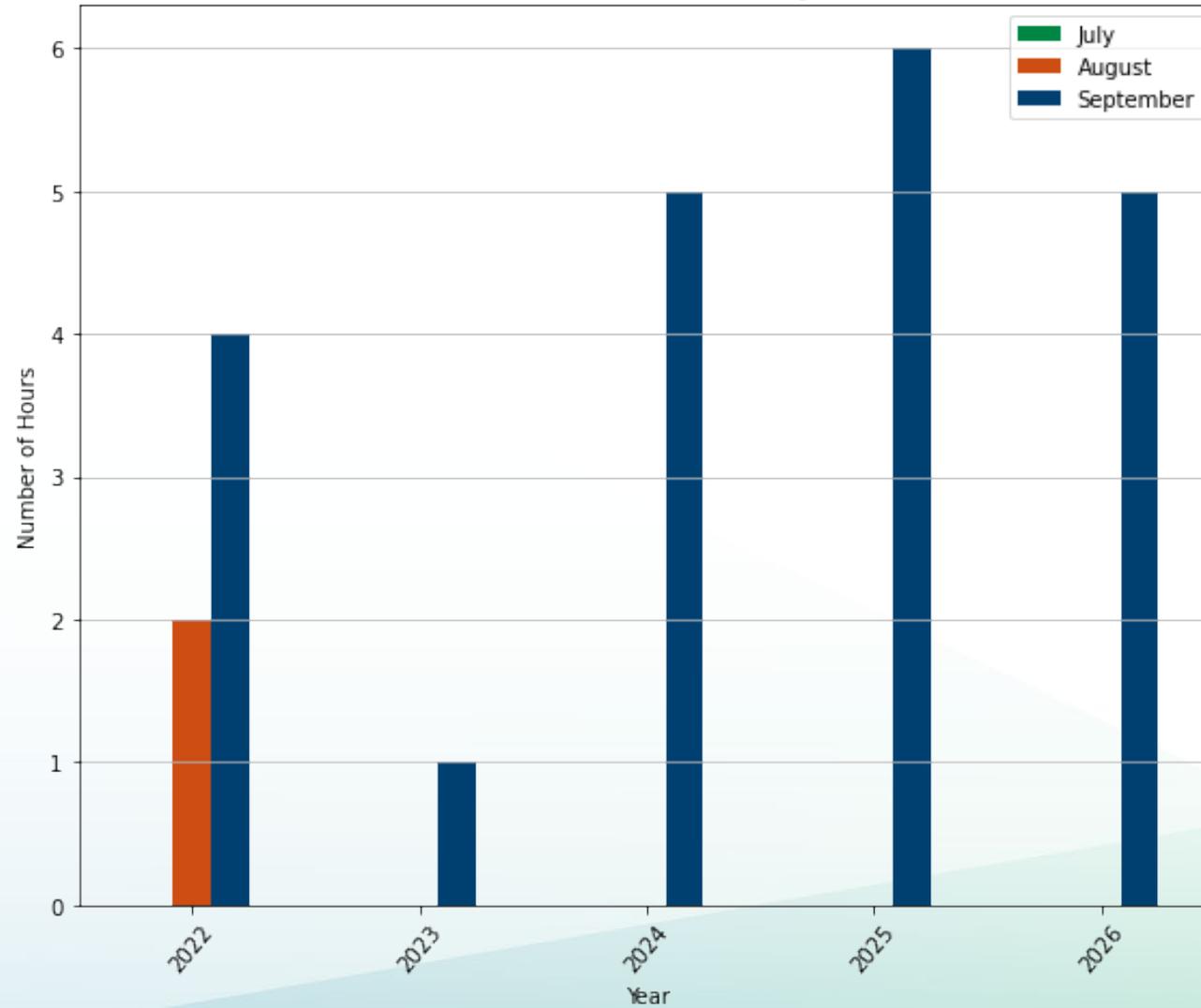
Summary





Summary

Number of Shortfall Hours by Month





Filing Comment

- Comments should be submitted by May 27, 2022 to docket 21-ESR-01 at <https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=21-ESR-01>
- Technical questions can be submitted to Hannah Craig at Hannah.Craig@energy.ca.gov



Questions?