



APS RPAC Meeting

9/23/2022



MEETING AGENDA



Welcome & Meeting Agenda
Matt Lind
1898 & Co.



Load Forecast Revisited
Mike Eugenis
Manager, Resource Planning



2022 ASRFP Update
Matt Lind
1898 & Co.



ACC Updates
Elizabeth Lawrence
Manager, State Regulatory Strategy &
Compliance



Recent Events - California
Nick Schlag
E3



Next Steps & Discussion



Meeting Guidelines

- RPAC Member engagement is critical. Clarifying questions are welcome at any time. There will be discussion time allotted to each presentation/agenda item, as well as at the end of each meeting.
- We will keep a parking lot for items to be addressed at later meetings.
- Meeting minutes will be posted to the public website along with pending questions and items needing follow up. We will monitor and address questions in a timely fashion.
- Consistent member attendance encouraged; identify proxy attendee for scheduling conflicts.
- Meetings and content are preliminary in nature, and prepared for RPAC discussion purposes. Litigating attorneys are not expected to participate.



Following Up

- Action Items from previous meetings:
 - ✓ Provide 2023 IRP docket number
 - ✓ Provide updates as ASRFP evaluation progresses
- Ongoing Commitments:
 - Distribute meeting materials in a timely advance fashion (3 bd prior)
 - Transparency and dialogue





August Meeting Recap

- Discussion of Inflation Reduction Act (IRA) and potential impacts
- 2022 All Source RFP status update and a breakdown of the current participation
 - Comments on price increase compared to previous RFP
 - Timeline for the remaining steps
- APS Resource Acquisition review of market trends/impacts
- 2023 IRP timeline and projected next steps





2022 ASRFP Update



Proposed Technology Review

Resources Requested

Battery Storage

Thermal

Solar

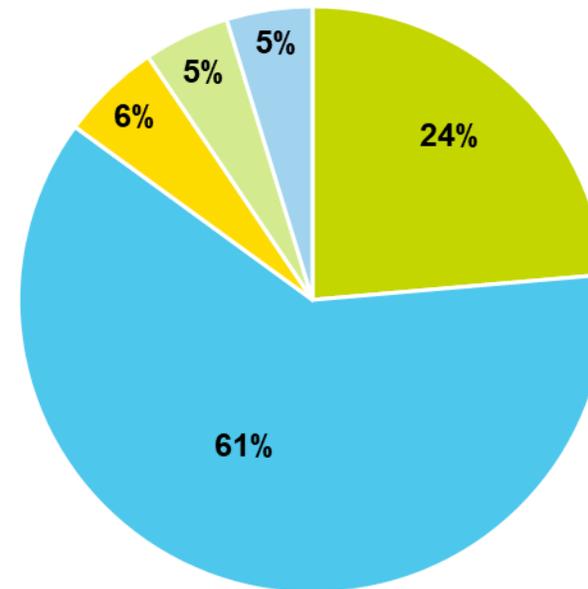
Wind

Hybrid

Energy Efficiency

Demand Response

Resource Received Breakdown

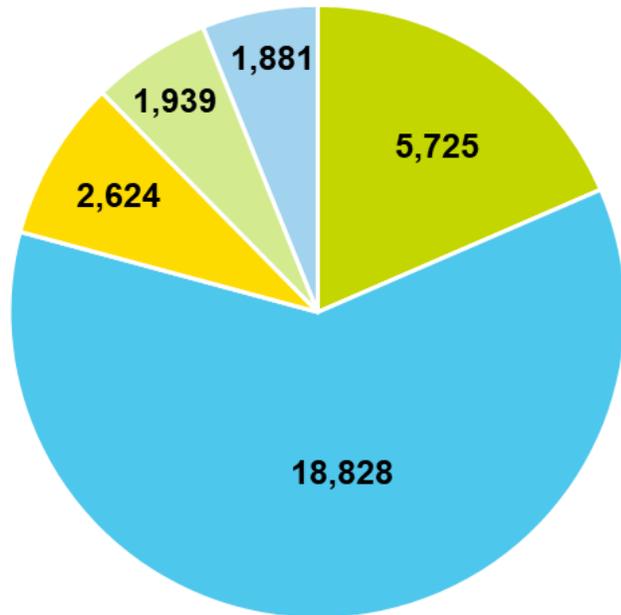


■ Storage ■ Hybrid ■ Thermal ■ Solar ■ Wind

Percentage based on resource count

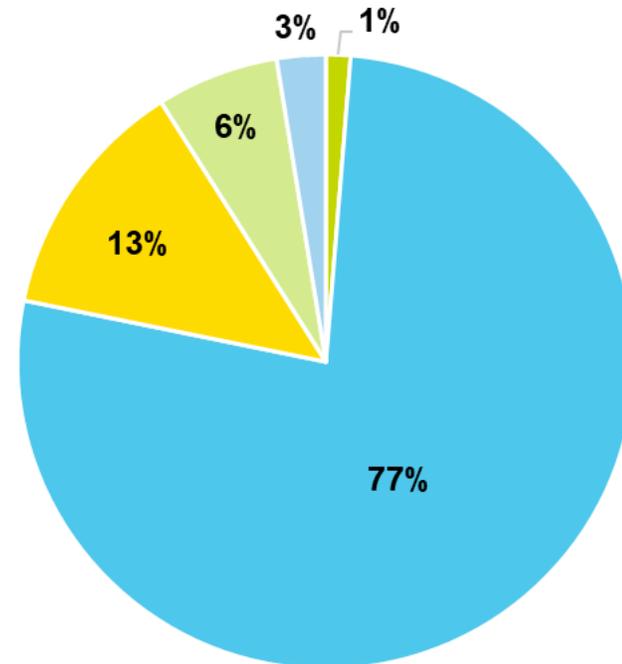
Proposal Information

Nameplate Capacity by Resource (MW)



■ Storage ■ Hybrid ■ Thermal ■ Solar ■ Wind

Hybrid Battery Duration



■ 1 Hr ■ 4 Hr ■ 5 Hr ■ 6 Hr ■ 12 Hr

Effective Load Carrying Capability (ELCC)

Battery Duration (Hrs)	Battery Storage ELCC Value (%)	Hybrid ELCC Value (%)
4	70	85
5	85	92
6	100	100
7 +	100	100

Proposal DRAFT Pricing Summary

This table does not reflect any Inflation Reduction Act price adjustments

Each technology category includes all proposals inclusive of price outliers

Pricing shown should not be interpreted as comprehensive qualitative/quantitative weighted scoring

Prices do not reflect final negotiations and subject to change

Technology	Commercial Structure	Average Term Length (years)	Proposal Volume (Count)	Average Nameplate Capacity (MW)	Capacity-weighted LCOE (2022\$/MWh)	Capacity***-weighted LCOC (2022\$/kW-year)
4 Hr Battery Storage	PPA/BTA	20	30	195		\$305
Hybrid* (PV+S)	PPA/BTA	20	78	240/197	\$42	\$195
Thermal	PPA	8	6	362	\$33**	\$131
Solar	PPA	20	6	323	\$35	
Wind	PPA	20	6	313	\$56	

* LCOE reflects solar cost, LCOC reflects storage cost

** Reflects Fuel Cost ONLY

*** Reflects ELCC-weighted assumption

Current/Ongoing Activity

- Qualitative/Quantitative scoring applied to all proposals meeting minimum requirements
- Reviewing shorter listing process with IM for feedback
- Will be moving forward a shorter list of proposals for further diligence, portfolio evaluations and negotiations

Remaining Steps

Completion Target

- Complete Quantitative/Qualitative Scoring Screen September
- Identify shorter list for Portfolio Evaluation screening and contract negotiations Sept – Dec
- Execute contracts with selected Proposals Q1 2023



Discussion & Questions



Recent Events - California

What's Been Going on in California?

A lot has changed since California's blackouts in August 2020:

- + Progress update towards CPUC Mid-Term Reliability (MTR) procurement order
- + A close call for reliability on September 6, 2022
- + Continuing changes to clean energy policy
- + A lifeline for Diablo Canyon



Progress Towards CPUC's Mid-Term Reliability Procurement Targets

MTR Order requires 11.5 GW of Net Qualifying Capacity from New Resources:

+ 9.5 GW total must be online by Summer 2025

- 2023: 2 GW | 2024: 6 GW | 2025: 1.5 GW | + 2.5 GW any year before 2025 (for Diablo Canyon)
- All resources must be “zero-emissions”
- No new fossil generation is allowed
- Demand Response qualifies if it meets additional requirements

+ 2 GW online by Summer 2026*

- 1 GW “firm, zero-emitting resources”
 - Cannot be weather or use-limited (storage does NOT qualify)
 - Minimum capacity factor of 80%
- 1 GW long-duration storage (min. 8 hours)

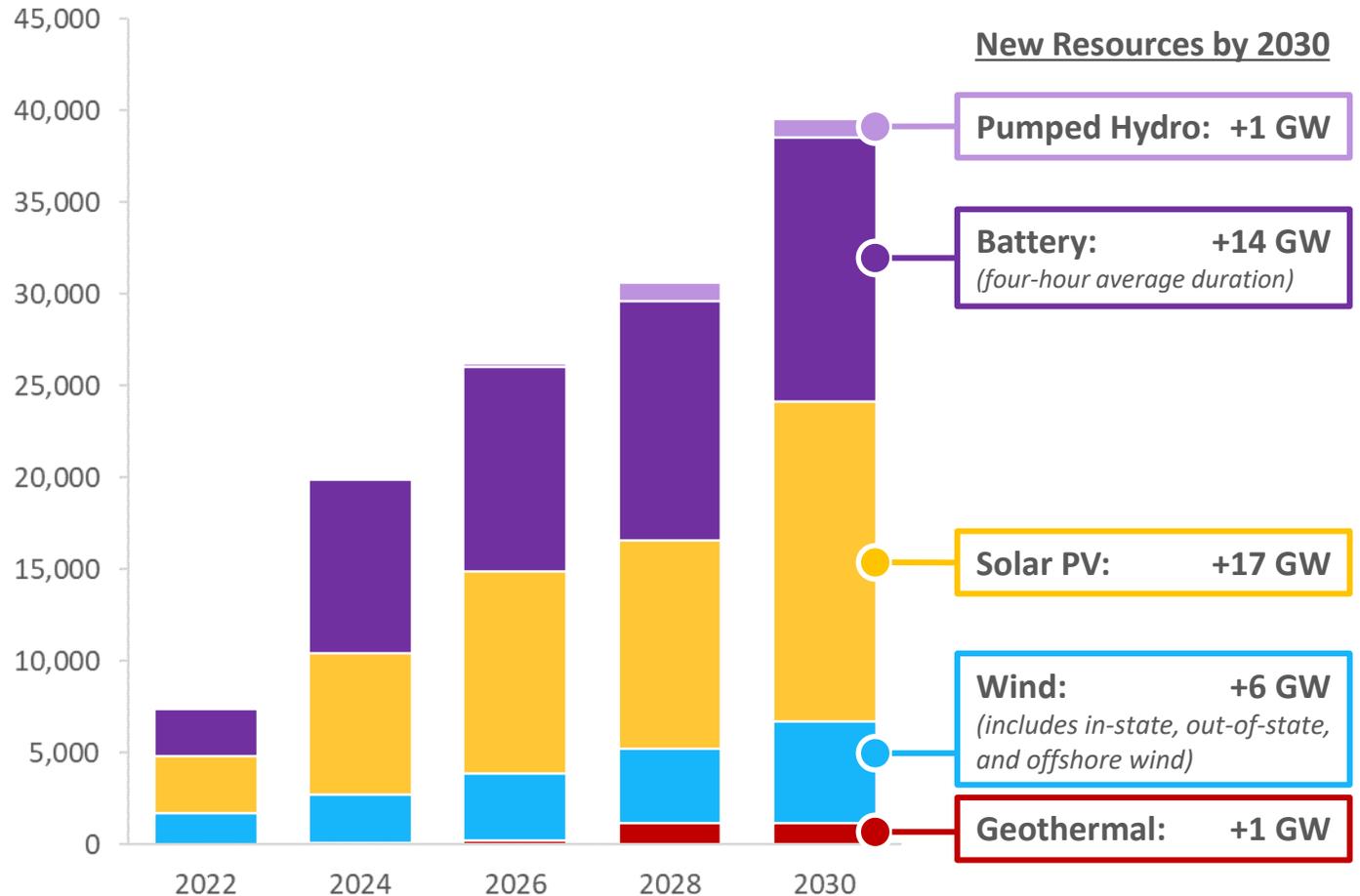
+ MTR is in addition to 3.3 GW procurement order in 2019



Significant New Resources Needed to Meeting Reliability and Greenhouse Gas Reduction Goals

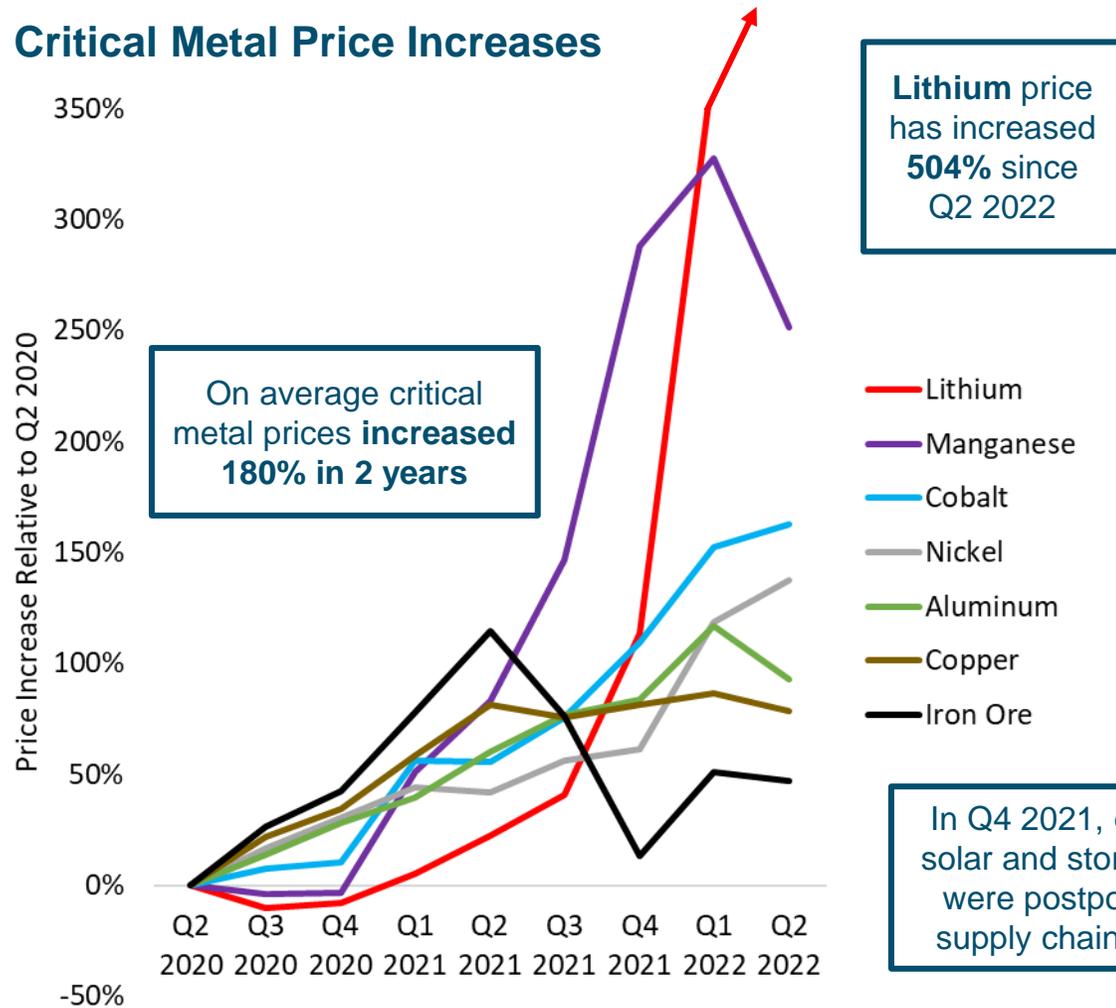
- + “Preferred System Plan” reflects the collation of IRP filings submitted by California IOUs and Community Choice Aggregators (CCAs)
 - Reflects capacity requirements of MTR order (predominantly fulfilled by battery storage)
 - Includes new renewables – mostly solar – that bring utilities’ portfolios to 70% RPS by 2030
- + Requires new capacity additions at a rate of roughly 5 GW per year through 2030

New Resource Additions in CPUC 2022 Preferred System Plan
(Nameplate MW)

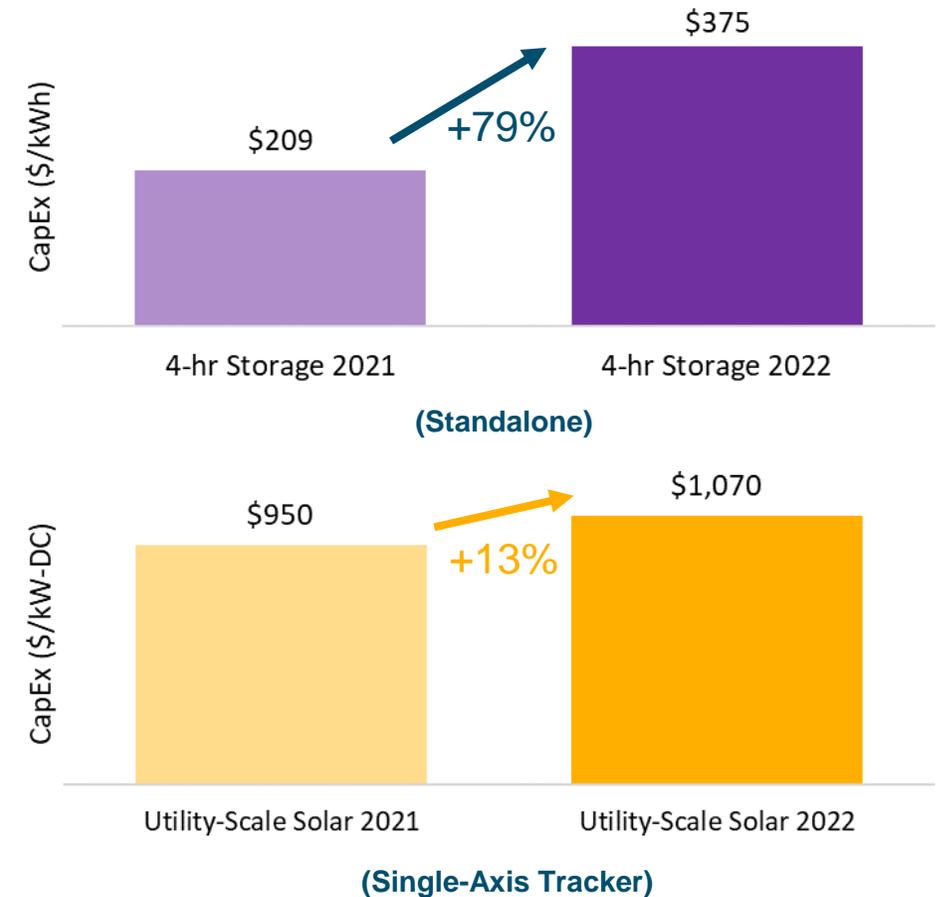


Tight Supply Chains Increase Solar and Storage Costs

Critical Metal Price Increases



Utility-scale Solar and Storage Capex (2021 vs. 2022)



Sources: Utility Dive, <https://www.utilitydive.com/news/solar-storage-delays-price-supply-chain/620537/>; Wood Mackenzie, U.S. Solar Market Insight, Executive Summary, Q3 2022, Executive Summary, <https://www.woodmac.com/industry/power-and-renewables/us-solar-market-insight>; IMF Quarterly Data as of 9/7/2022, <https://data.imf.org/?sk=471DDDF8-D8A7-499A-81BA-5B332C01F8B9&sl=1390030341854>.

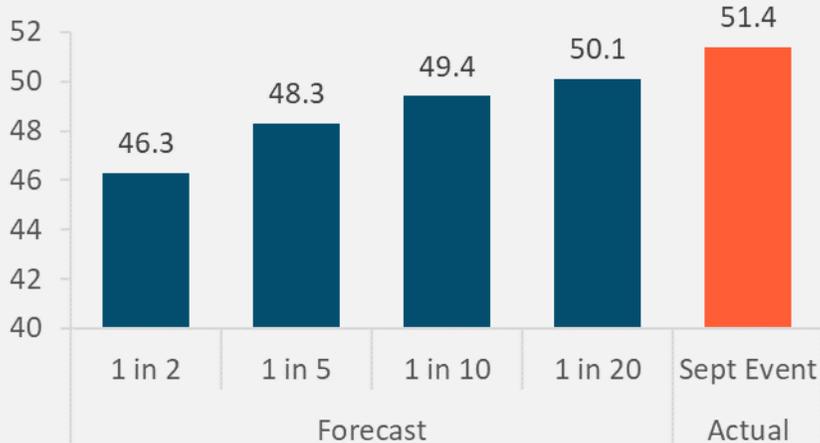
Sept 6, 2022: Extreme Weather, High Loads, and Customer Response

+ Heat wave in 2022 September drove electricity demand in California to all-time high levels

- Significantly higher than loads during August 2020 blackout events

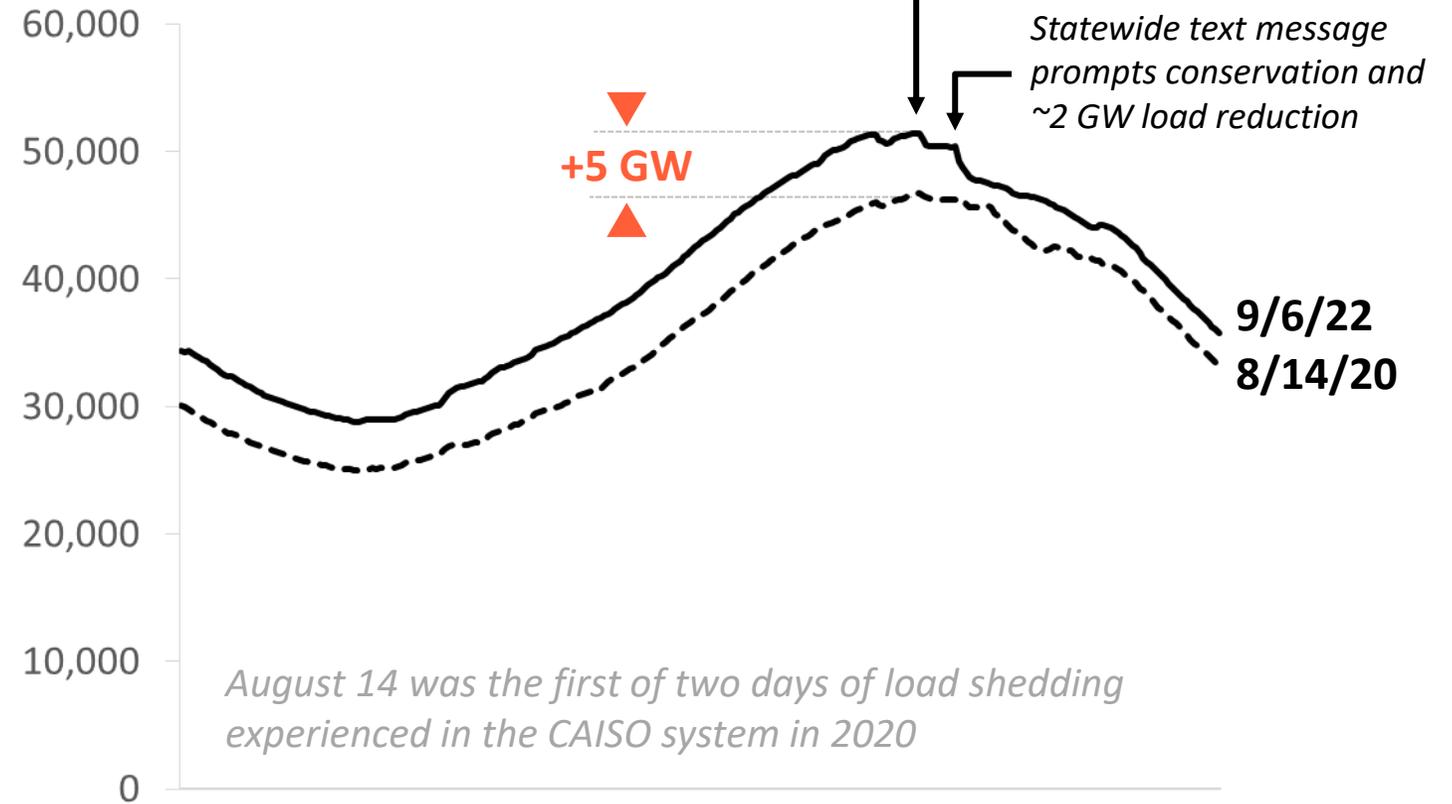
+ California's peak demand forecast – even under extreme weather – did not capture magnitude of this event

2022 CAISO Managed Peak
GW



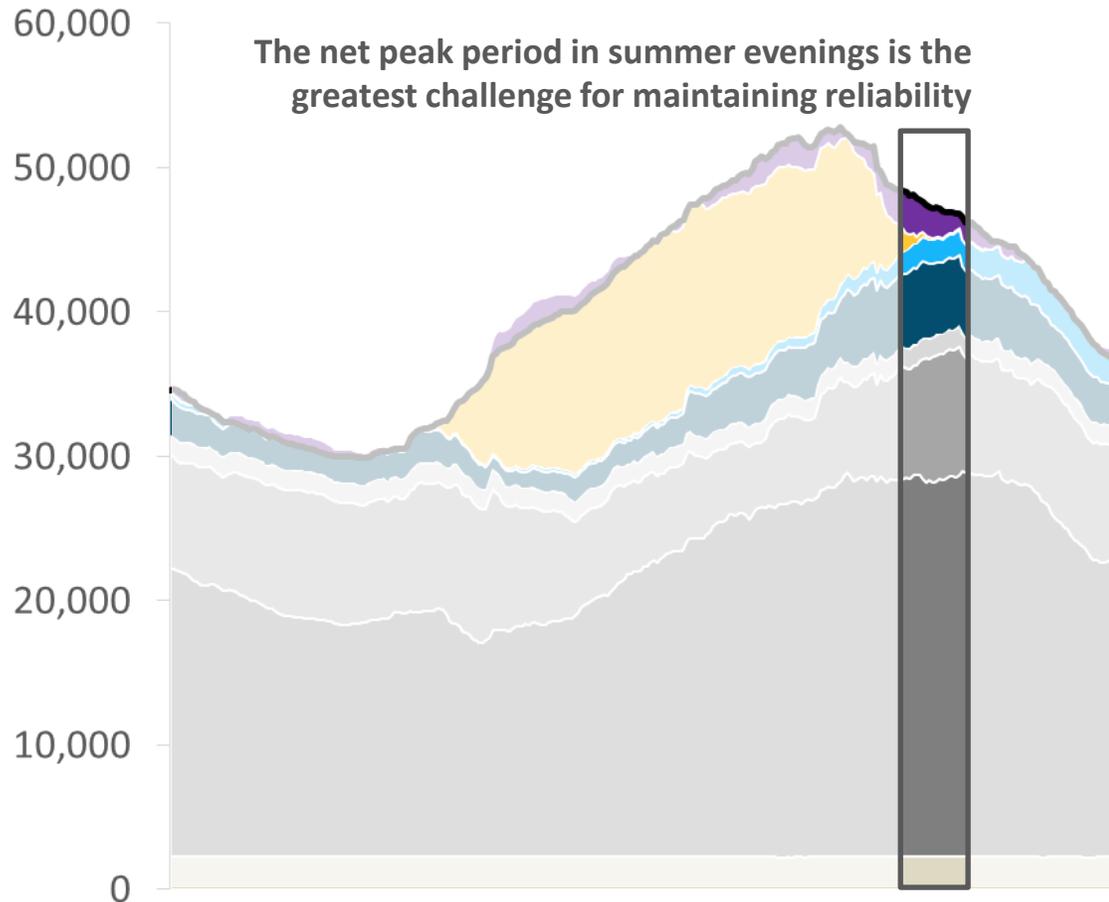
Total CAISO Load Served

Aug 14, 2020 vs. Sept 6, 2022
(MW)

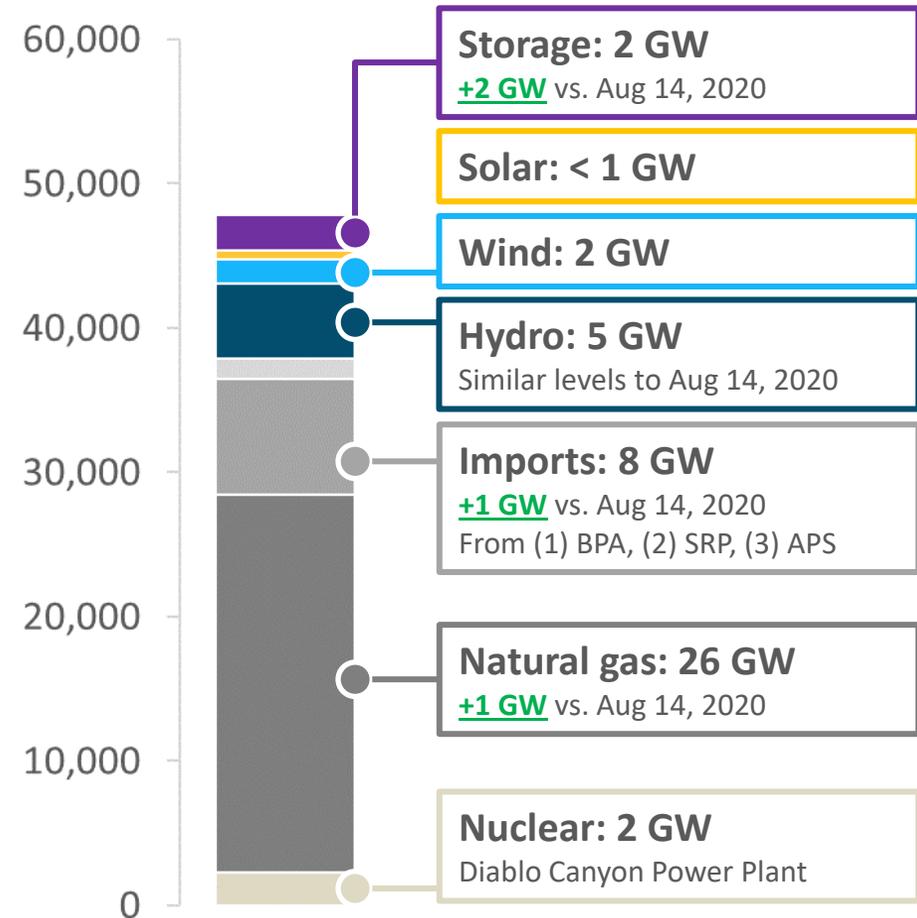


Sept 6, 2022: Resource Performance During Net Peak

CAISO System Operations on September 6, 2022
(MW)



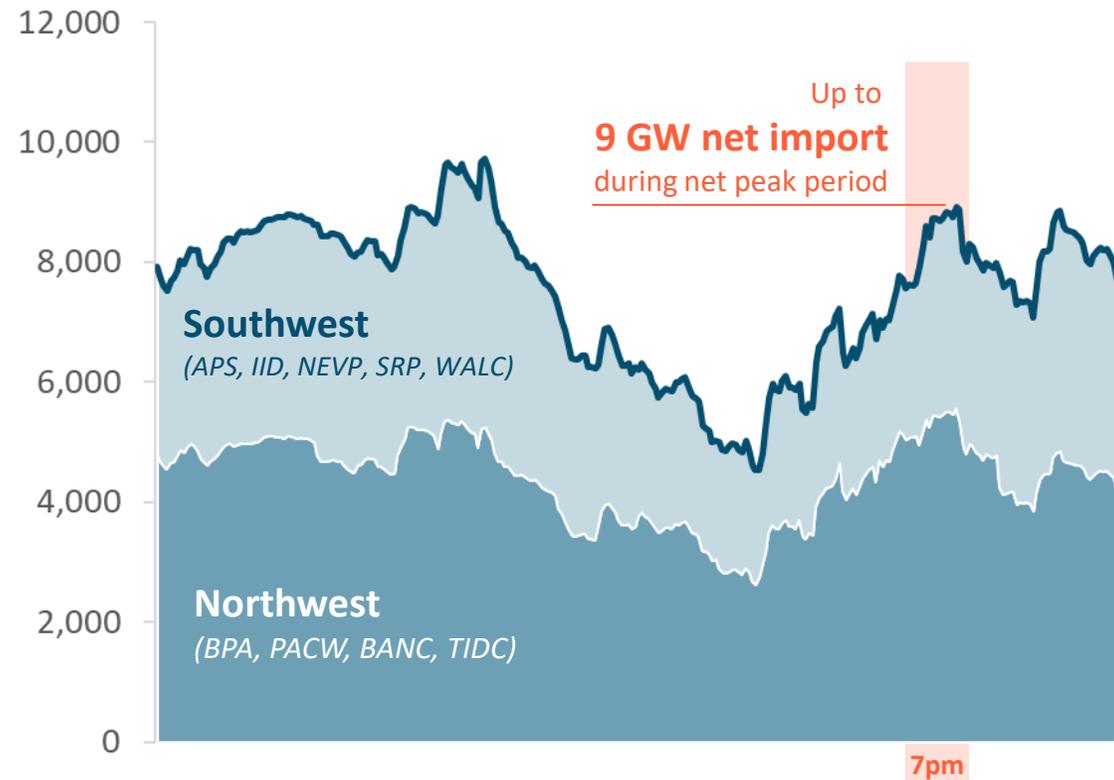
Generation During Hour of Highest Net Load (7pm)
(MW)



Sept 6, 2022: Imports from the NW and SW Were Critical

CAISO Net Imports, Sept 6, 2022

(MW)



Notes

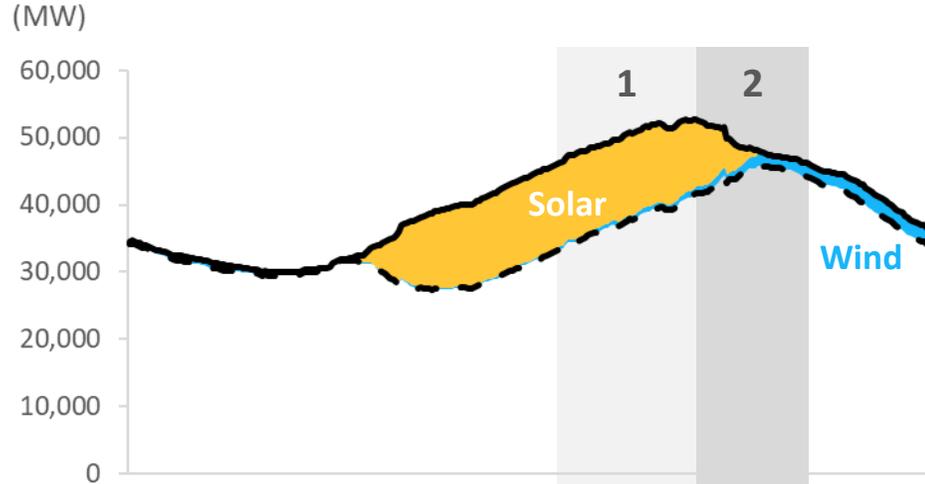
Total imports based on data reported by CAISO ([Today's Outlook](#))

Breakdown between NW and SW based on EIA [Electric Grid Monitor](#)

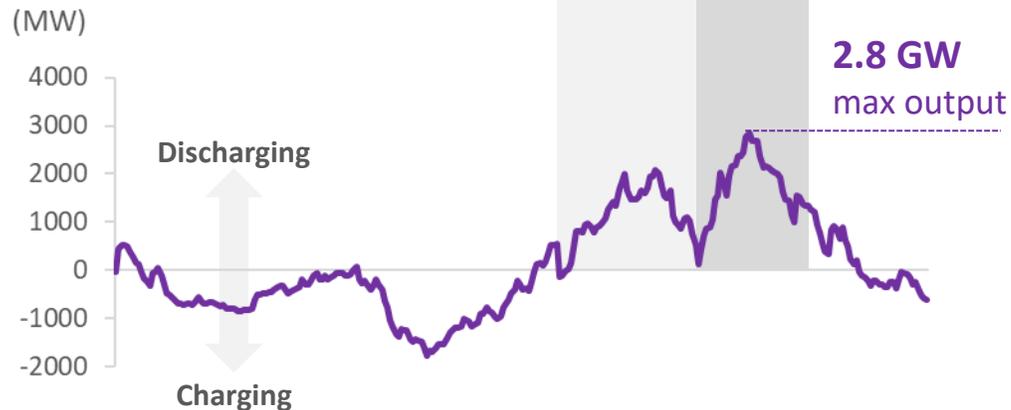
- + As in 2020, California relied heavily on surplus resources in the broader Western Interconnection to meet loads under critical conditions
- + Three largest sources of imports during net peak account for >90% of imports:
 1. BPA: 5.5 GW (primarily hydro generation; includes flows across Pacific DC Intertie via LADWP)
 2. SRP: 2 GW
 3. APS: 1 GW
- + Continuing retirements of aging coal and gas resources and a shift in the resource mix may reduce import availability in the future

Sept 6, 2022: A Hiccup in Storage Dispatch

CAISO Load & Net Load, Sept 6, 2022



Battery Dispatch, Sept 6, 2022



Batteries dispatched in two periods on Sept 6:

1. Late afternoon (before net peak), when prices in the real-time market increased to \$2,000/MWh (above RT storage bid cap of \$1,000/MWh)
2. Early evening (during net peak), likely because of schedules for batteries that were set in the day-ahead market

The “pre-dispatch” of batteries in the real-time market likely contributed to making system conditions tighter during the net peak period

This type of pattern highlights that we still have some learning to do on integration of battery storage into markets to support reliability

California Policies Continue to Raise the Bar Going Forward

+ New Clean Energy Targets adopted in SB 1020 (Laird, et. al.)

- **90% clean electricity by 2035; 95% by 2040**
- State agencies: 100% clean electricity by 2035

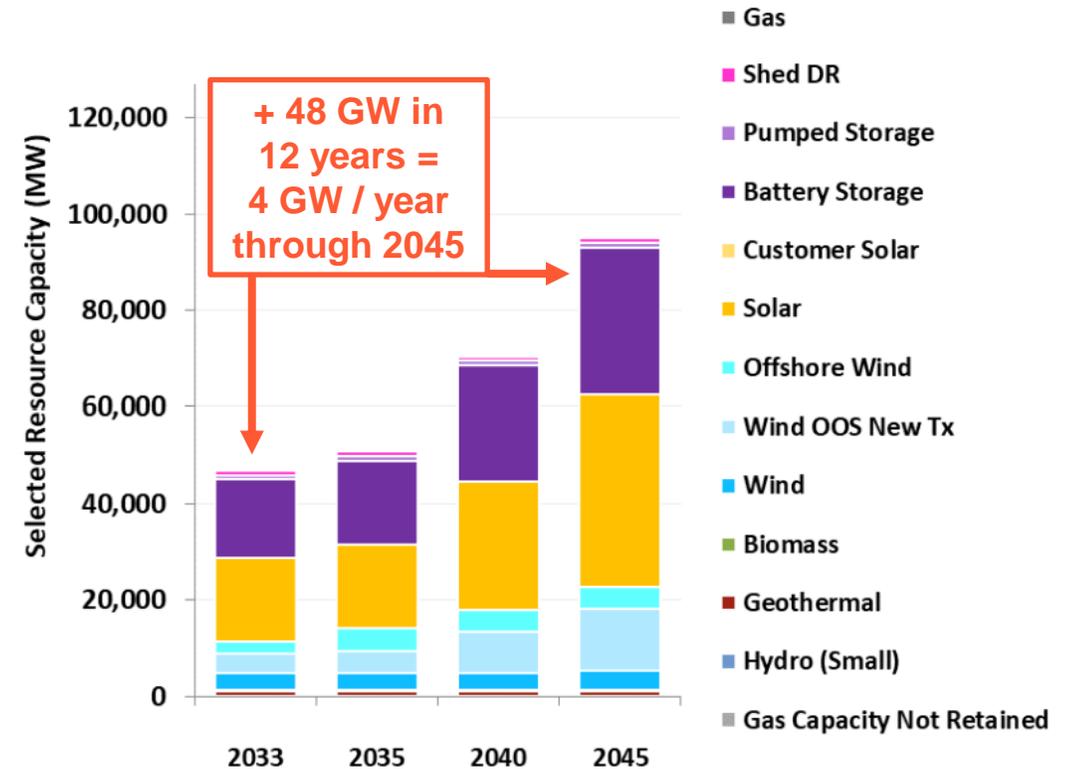
+ CEC & Gov. Newsom set Offshore Wind Targets

- [AB 545 report](#): examined the maximum feasible offshore wind capacity and set a planning target
- Gov. Newsom encouraged CEC to adopt more aggressive targets
- Nonbinding targets of 2-5 GW by 2030; 25 GW by 2045

+ CARB Advanced Clean Cars II

- New sales mandate for zero-emissions vehicles: 100% of new car sales by 2035 (battery electric, fuel cell, and plug-in hybrids)
- More stringent standards for gasoline-powered vehicles

Cumulative Installed Capacity by Year
38 MMT Portfolio for 2022 LSE Filing Requirements



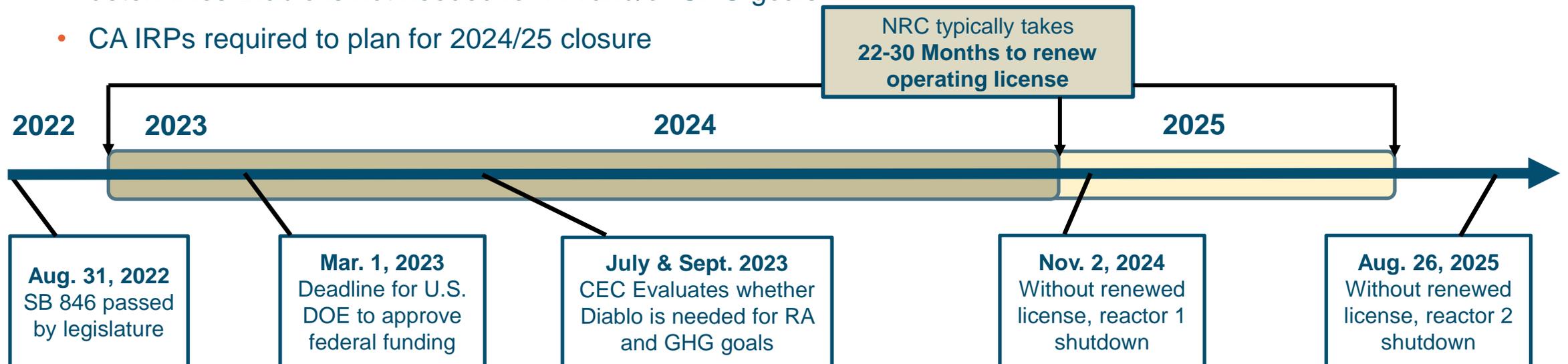
Diablo Canyon: What Happened and What's Next

+ SB 846 (Dodd) begins process to extend operations through 2029/30

- Legislature Loans **\$600 Million** initially, with the intention of loaning up to **\$1.4 Billion**
- Loan requires seismic and safety risk assessments; exempt from CA environmental review

+ Multiple hurdles remain including federal funding and NRC license extension

- License renewal must be filed with Nuclear Regulatory Commission soon...window is narrowing
- SB 846 requires the loan to be terminated if federal funding is not received, if costs exceed \$1.4 Billion, or if CEC determines Diablo is not needed for RA and/or GHG goals
- CA IRPs required to plan for 2024/25 closure



What Does This Mean For APS?

- 1. Accounting for extreme weather and climate impacts in load forecasts is crucial for effective planning**
 - Experience in California raises questions of whether peak demand forecasts are systemically low
- 2. We're still getting used to operating the resource mix of the future**
 - The “net peak” is now the main challenge for reliability
 - Storage dispatch patterns under constrained conditions leave room for improvement
 - Load impact of FlexAlert highlights potential of customer response – but without compensation is not a long-term solution
- 3. California remains on the cusp of load-resource balance, and reliability risks will likely remain**
 - Supply chain and other project development issues may present obstacles to meeting California's significant capacity needs
 - Continuing tight conditions in neighboring markets means spare capacity will continue to be in short supply





Discussion & Questions



Break

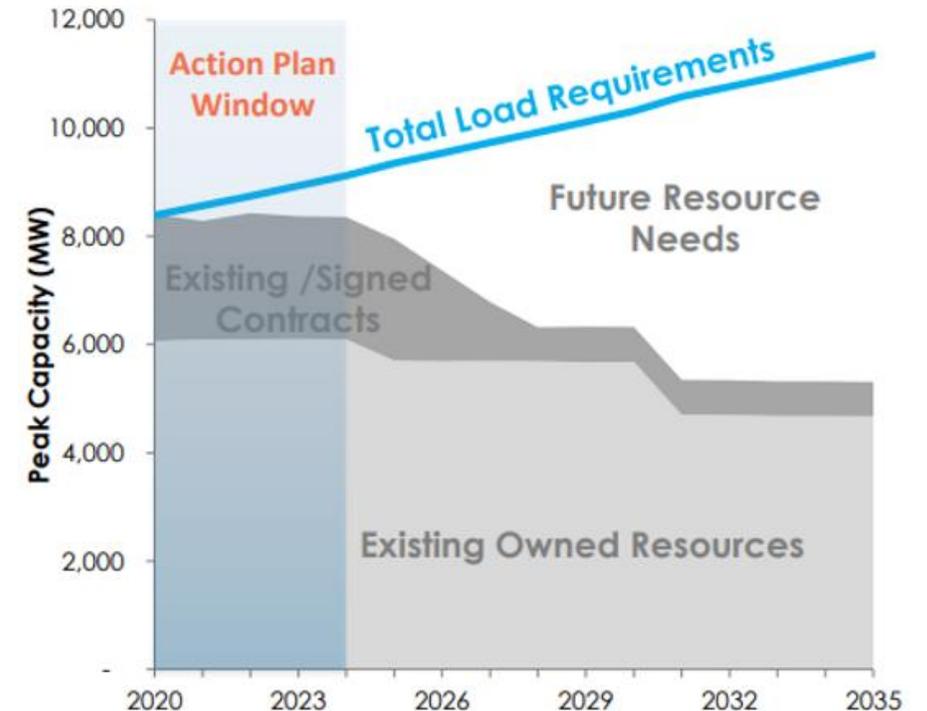


Load Forecast Revisited



Load Forecast in the IRP Revisited

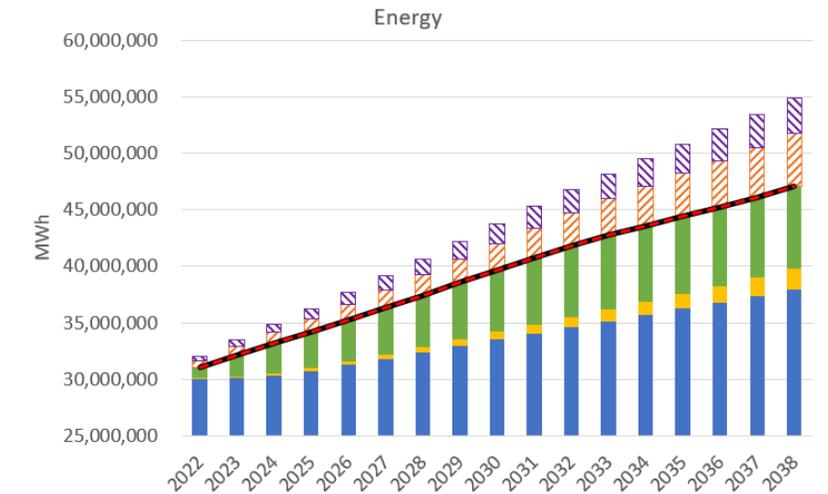
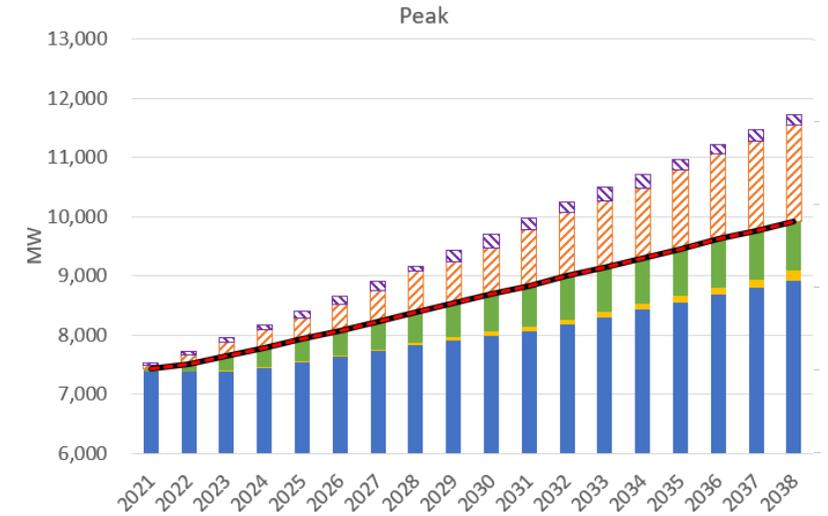
- Load forecast is a foundational component of the IRP
- APS accounts for customer programs in the load forecast
- Load forecast and Needs Assessment covers 15 years
 - Action Plan window requires decisions (5 years)
 - Allows for development of strategy for resource procurement into the future
- **Reliable, affordable energy production requires development of resources in advance**



APS Load Forecasting Tool

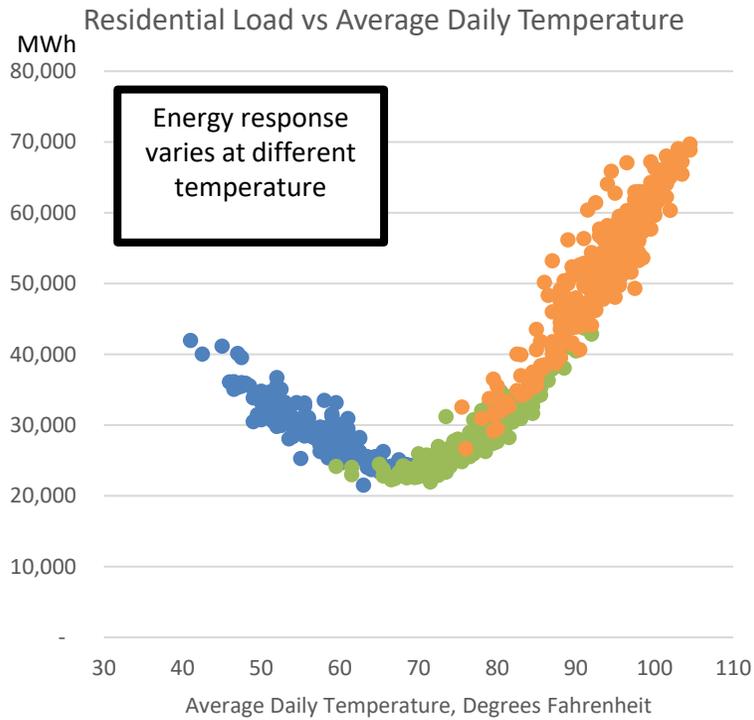
- The load forecasting tool was designed with sub forecast sensitivities (base, low, medium, high)
- Intended to narrow the key areas of the forecast that interest the RPAC
- Tool was envisioned to promote discussion amongst stakeholders
- Designed to compile subcomponents of the forecast and report on impacts to MW, GWhs, and associated growth rates

BAU	DSM	DG	EV	Large Customers	Extreme Weather
Base	Base	Base	Base	Base	0° F

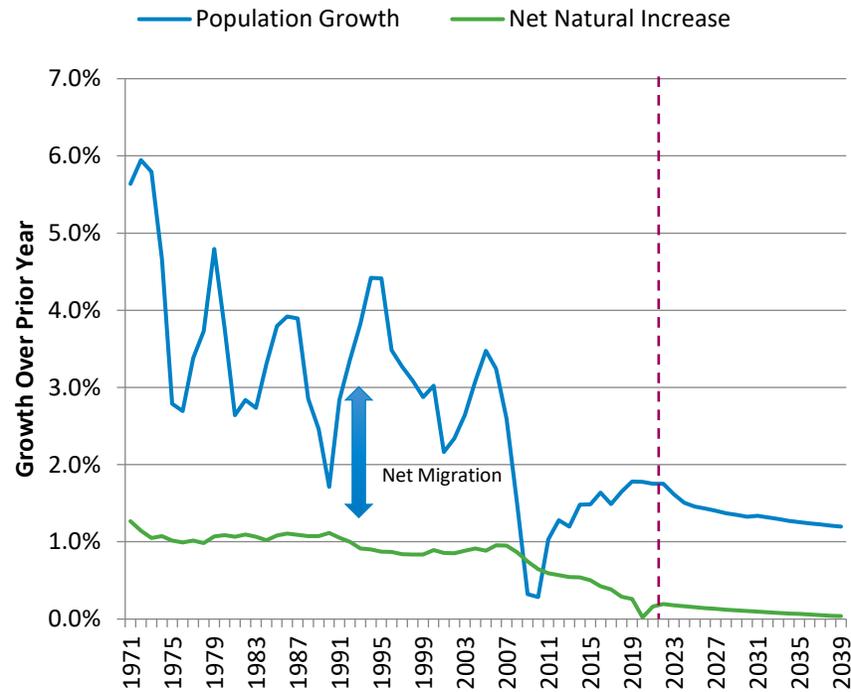


BAU Drivers

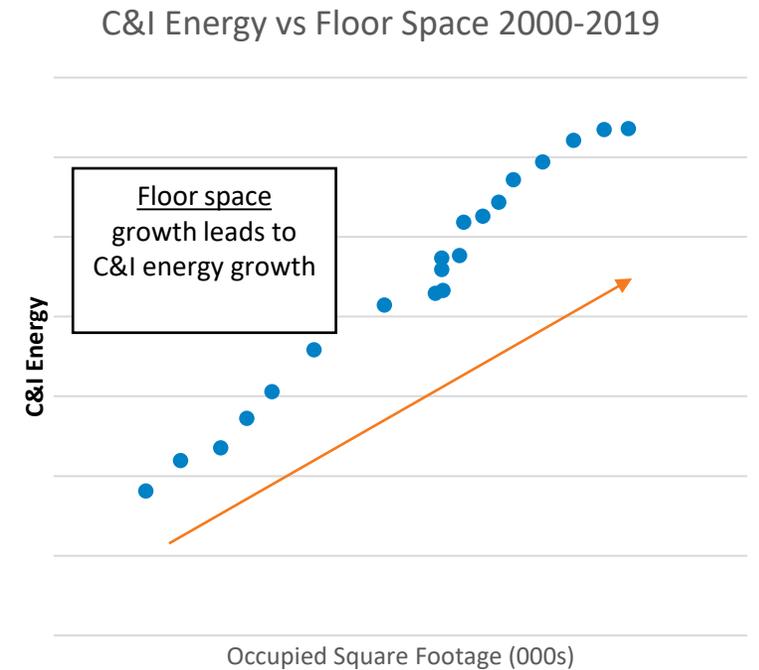
Weather



Population Growth



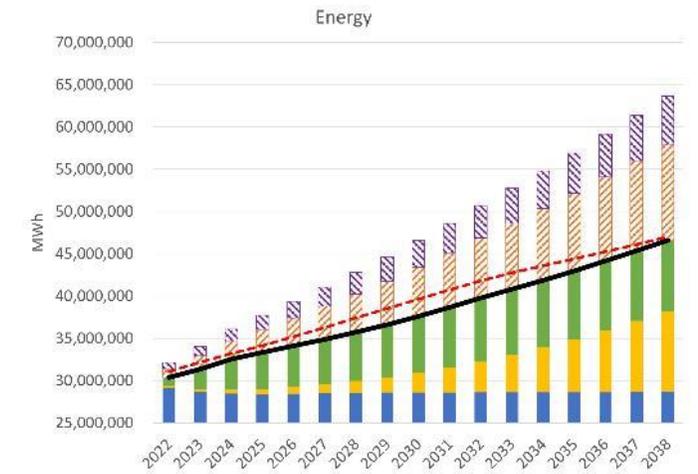
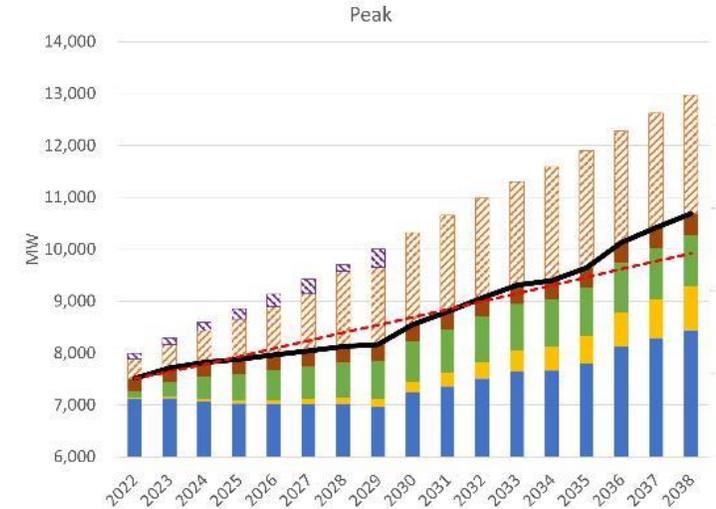
C&I Floor Space



RPAC Load Forecast Selection Results

- APS developed multiple forecasts and prepared base, high and low estimates of significant drivers in the forecast for RPAC discussion:
 - Demand side management (DSM)
 - Distributed generation (DG)
 - Electric vehicles (EV)
 - Economic development
 - Extreme weather/Temperature
- The RPAC was asked for opinions and discussion based on forecast options provided by APS to formulate an alternative forecast:
 - DSM: High Scenarios (1.8%)
 - DG: High scenario (18,000-25,000 systems per year)
 - EVs: High scenario (~2.3M vehicles by 2038)
 - Economic development: Base scenario (Moderate economic development)
 - Extreme weather: (degrees above normal weather assumption): 2° Fahrenheit scenario

BAU	DSM	DG	EV	Large Customers	Extreme Weather
Base	High	High	High	Medium	2° F



RPAC Load Forecast Going Forward

- Heading into the IRP, APS will be updating the APS load forecast
- APS will update the Base portion of RPAC Load forecast with up-to-date residential and C&I projections
 - RPAC assumptions from previous load forecast
- APS will work with RPAC on IRP assumptions going forward.



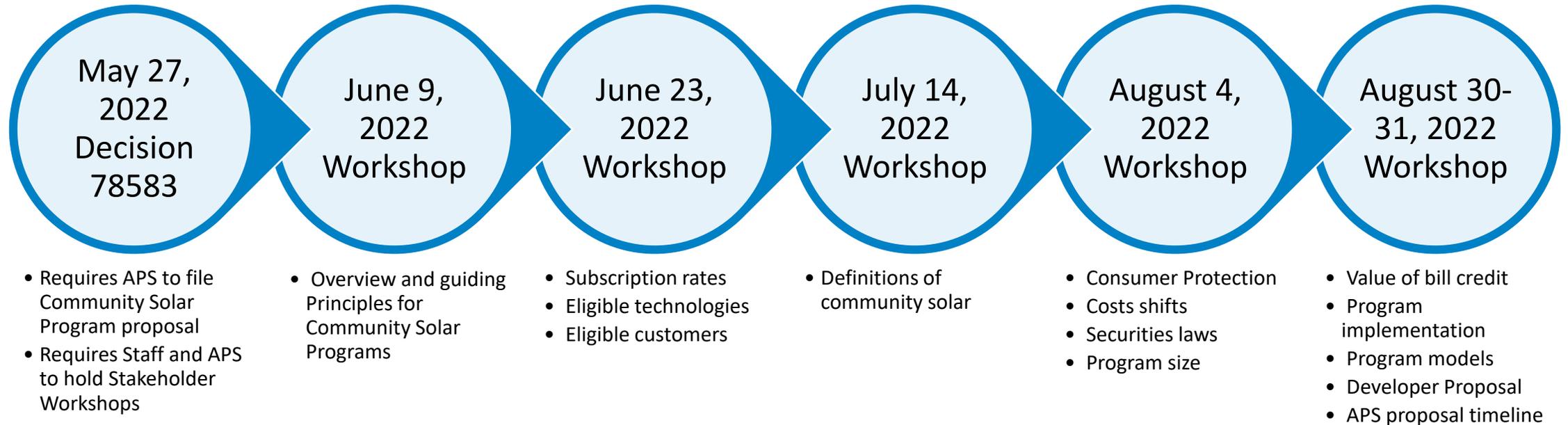


Discussion & Questions



ACC Updates

Community Solar



Next Steps

- APS will file a Community Solar Proposal
- Staff will review proposal and write proposed order
- Commission will vote on proposal



Rate Case

- APS will be filing application at the end of October, 2022
- The Test Year will be: July 1, 2021 through June 30, 2022
- The case will include:
 - Topics mentioned in the [Notice of Intent to File \(NOI\)](#)
 - Minimal residential rate design changes
 - Topics ordered in the last rate case
 - Testimony on other typical items seen in a rate case such as ROE and PTYP





Next Steps & Open Discussion