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Summer 2023 Reliability Outlook

Summer Reliability Workshop

May 17, 2023

CEC Summer Stack Analysis

Purpose:

- Deterministic approach
- Assess average and extreme conditions
- Inform need for contingencies

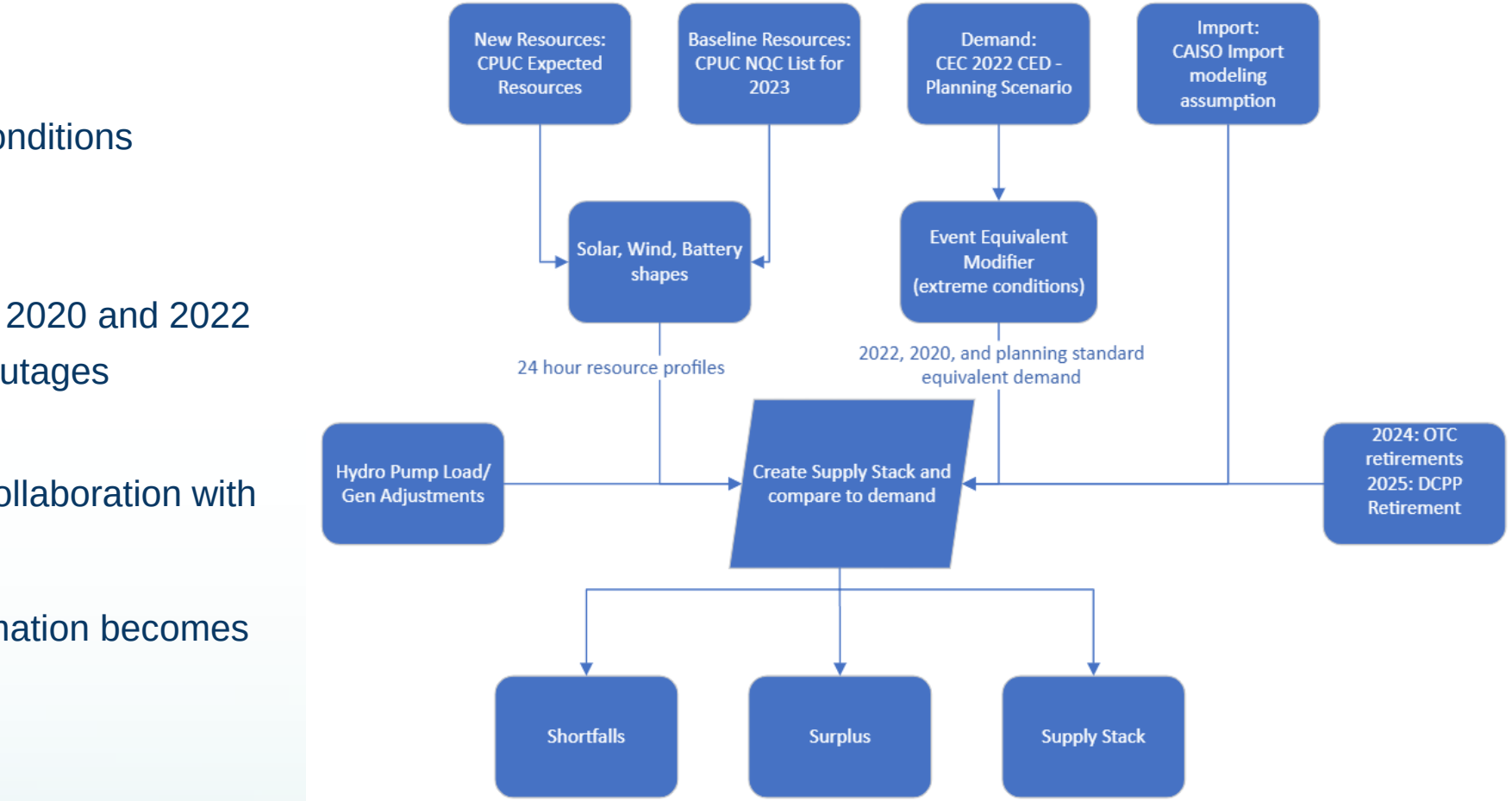
Considers extreme conditions:

- High demand days like summer 2020 and 2022
- Increased levels of unplanned outages
- Import availability

Inputs and assumptions developed in collaboration with

CPUC, DWR and CAISO

Stack analysis is updated as new information becomes available



Source: CEC

Demand Percent Margins

Condition Relative to 1-in-2 Forecast	Operating Reserves	Outages	Demand Variability	Coincidental Fire Risk	Notes
Current RA Planning Standard – 17%	6%	5%	6%		16% for 2023 & 17% beginning 2024
2020 Equivalent Event: Additional capacity needed to weather heat event like 2020	6%	7.5%	9%	4,000 MW	9% higher demand over median, and 2.5% higher levels of outages
2022 Equivalent Event: Additional capacity needed to weather heat event like 2022	6%	7.5%	12.5%	4,000 MW	12.5% higher demand over median, and 2.5% higher levels of outages

Source: CEC

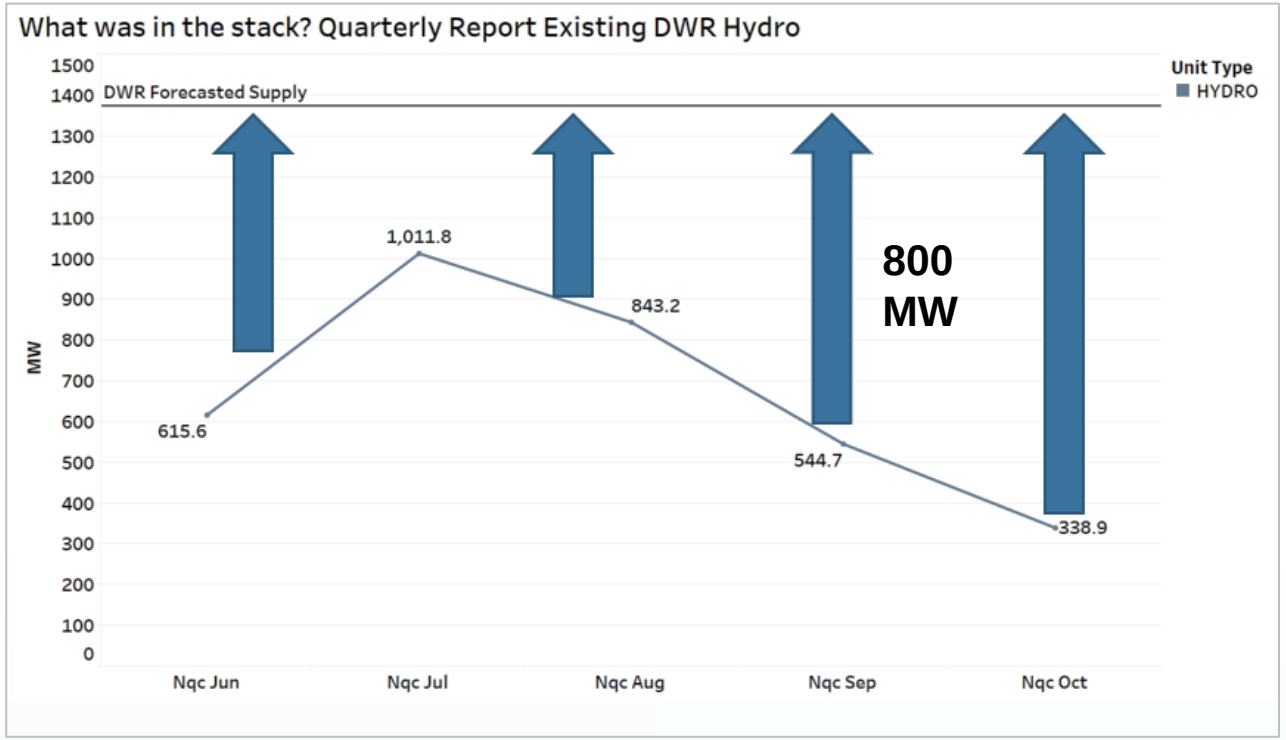
Supply Modifications

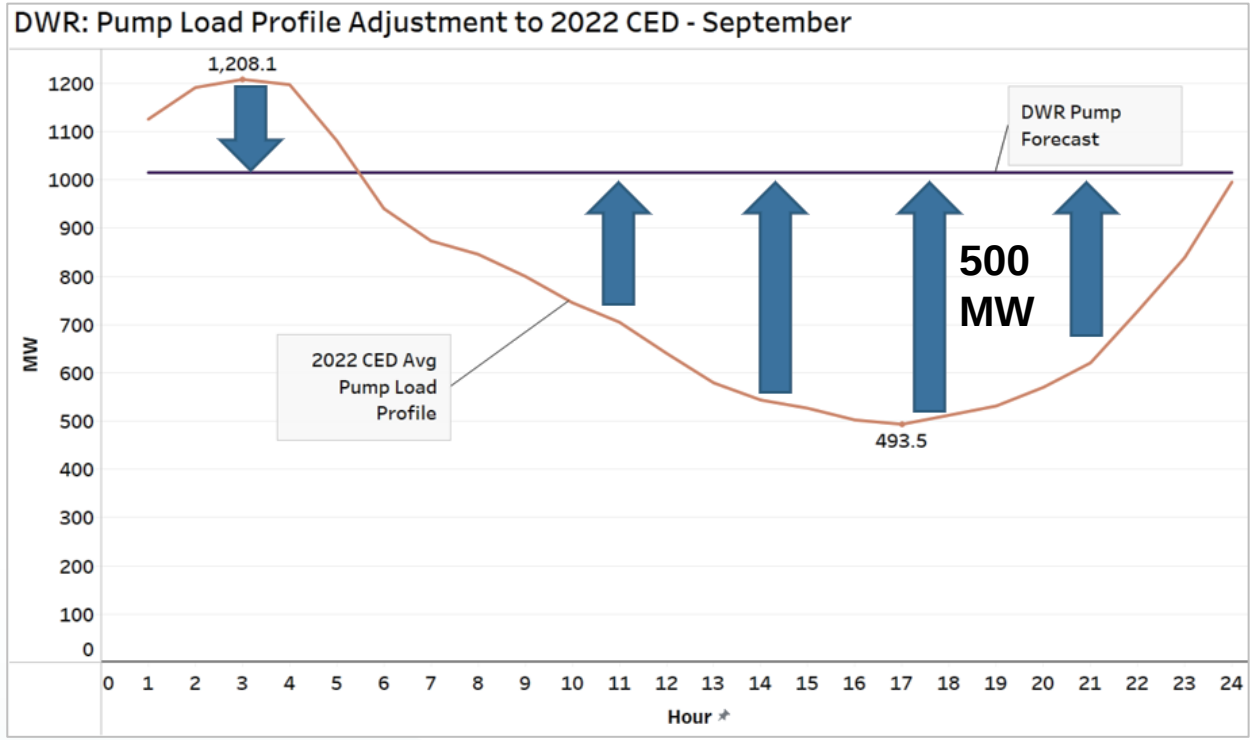
- Wind and solar
  - Hourly profiles based on generation on high-load days from 2014-2022
- Batteries
  - Discharge limited to 4 hours across peak hours
- Demand response
  - From CPUC DR Allocations, adjusted by Load Impact Protocol and distribution loss factors
  - Increased by 6% since operating reserves aren't carried for reduced load
- Hydro
  - adjustments based on CDWR projections

Wind				Solar				Battery			
Time PDT	Jul	Aug	Sep	Time PDT	Jul	Aug	Sep	Time PDT	Jul	Aug	Sep
4PM-5PM	0.38	0.28	0.17	4PM-5PM	0.71	0.72	0.64	4PM-5PM	0.39	0.31	0.00
5PM-6PM	0.45	0.34	0.21	5PM-6PM	0.57	0.55	0.41	5PM-6PM	0.39	0.31	0.64
6PM-7PM	0.48	0.40	0.24	6PM-7PM	0.33	0.26	0.10	6PM-7PM	0.60	0.95	0.83
7PM-8PM	0.51	0.44	0.29	7PM-8PM	0.07	0.03	0.00	7PM-8PM	1.00	1.00	1.00
8PM-9PM	0.52	0.49	0.34	8PM-9PM	0.00	0.00	0.00	8PM-9PM	1.00	1.00	1.00
9PM-10PM	0.55	0.51	0.32	9PM-10PM	0.00	0.00	0.00	9PM-10PM	0.61	0.43	0.54

Source: California Energy Commission staff with California ISO data

Accounting for DWR Improved Hydro Conditions





Source: California Energy Commission staff with DWR and CPUC data

- Adjusted DWR hydro generation up, based on DWR forecasted generation
- Adjusted 2022 CED Avg Pump Load Profile, based on DWR forecasted pump load

Resource Mix Comparison

- Improvements
  - DWR forecasts greater hydro generation, which contributes 800 MW
  - Average Resource Adequacy imports increased, contributing 500 MW
- Demand Adjustments
  - Updated hydro conditions result in 500 MW of pump load added at peak hours

	September 2023- February Update (MWs)	September 2023- May Update (MWs)	Change (MWs)
Supply			
Demand Response	1,274	1,274	– **0**
Existing Resources	44,817	45,646	▲ **829**
New Batteries (Nameplate)	1,759	2,106	▲ **347**
New Hybrid (Nameplate)	1,061	1,452	▲ **391**
Resource Adequacy Imports	5,500	6,000	▲ **500**
Total	**54,411**	**56,478**	▲ **2067**
Demand			
2022 Forecasted Peak Demand	**46,827**	**46,829**	▲ **2**
Pump Load Adjustment at Net Peak	**0**	**500**	▲ **500**
Shortfalls/Surplus			
Planning Standard	1,538	2,348	▲ **810**
2020 Event Equivalent	-1,038	-228	▲ **810**
2022 Event Equivalent	-2,676	-1,867	▲ **809**

Results are for CAISO for September 2023

Results Summary

Overall improved outlook for the summer under all scenarios due to:

- Improved hydro
- Increased imports

	Projected September Surplus or Need for Contingencies	
	February Update	May Update
Under Expected Demand	1,538	2,348
2020 Equivalent Event	-1,038	-228
2022 Equivalent Event	-2,676	-1,867

Green is surplus, Red is shortfall

Shortfalls do not include coincident catastrophic fire risk

Note: Going into summer 2022, the forecasted shortfalls under **2020 and 2022 equivalent** event would have been **3,000 and 7,000 MW**, respectively.

Contingencies

Type	Contingency Resource	MW Available			Note
		July	August	September	
SRR	DWR ESSRRP*	148	148	148	Recent update
	Demand Side Grid Support	315	400	450	Recent update
	Distribute Energy Backup Assets (under development)	0	0	0	Recent update
CPUC	Ratepayer Programs (ELRP, Smart Thermostats, etc.)**	905	964	984	Recent Update
	Imports Beyond Stack	300	250	250	Recent Update
	Capacity at Co-gen or Gas Units Above Resource Adequacy	518	499	160	Recent Update
DWR	DWR SWP***	0	0	0	Pending
Non-Program	Balancing Authority Emergency Transfers	500	500	500	Recent update
	Thermal Resources Beyond Limits: Gen Limits	60	60	60	Recent update
	Thermal Resources Beyond Limits: Gen Limits Needing 202c	25	25	25	Recent update
	Total	**2,771**	**2,846**	**2,577**	

**Does not include additional 144 MW of projects that are not online yet but expected to be available for summer.*
***Does not reflect actual 2022 ELRP performance. More discussion is needed to project forecasted available MWs.*
****These resources are projected one week ahead, but given current hydro forecasts, several hundred MWs are expected.*

Thank you!