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2022 Summer Stack Analysis Update

January 14, 2021 – Staff Workshop

Hannah Craig Energy Assessments Division



Reliability Analysis Over Different Planning Horizons

Climate Goals Timeline (10	-25 years ahead)			\land
Climate Goals Timeline (10 <u>SB100 Reliability Studies</u> - RESOLVE built-in check - LOLE Analysis of portfolios - Based on Demand Scenarios	-25 years ahead) Planning and Procurement T IRP Studies - LOLE and ELCC studies - Industry standard is to plan to a LOLE not to exceed 0.1 (or no more than one outage event in 10 years) - Based on Hourly Demand Forecast - Does not guarantee elimination of outages CEC Reliability Asse - CEC's stochastic and analysis will develop outlooks (in progress)	Timeline (up to 10 years ahea Resource Adequacy Timelin Resource Adequacy Planning - Based on PRM & ELCC estimates - 15 to 17.5% PRM - Based on Peak demand forecast	ad) The (up to 3 years ahead) Operational Timeline (within a given year of interest) Hourly Net-Short Stack <u>Analysis:</u> estimate shortfall under potential extreme demand and supply scenarios & develop contingencies to help significantly reduce potential for a rolling outage <u>CAISO Summer Outlook:</u> inform shortfall probabilities for summer months under a real	
	event in 10 years) - Based on Hourly Demand Forecast - Does not guarantee elimination of outages CEC Reliability Asso - CEC's stochastic and analysis will develop outlooks (in progress)	- 15 to 17.5% PRM - Based on Peak demand forecast essments: alysis and net-short to multi-year	Analysis: estimate shortfall under potential extreme demand and supply scenarios & develop contingencies to help significantly reduce potential for a rolling outage CAISO Summer Outlook: inform shortfall probabilities for summer months under a real time operation paradigm. More precise than stack analysis	

Uncertainties in demand and supply assumptions reduce as we near a planning target date

Planning involves reducing the possibility for potential shortfall as we near a planning target date



Summer Stack Analysis

Purpose:

- Assess average and extreme conditions
- Inform need for contingencies

Considers extreme conditions:

- High demand days like summer 2020
- Low import availability
- Drought impacts on hydro









The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx

<u>Author:</u> Richard Tinker CPC/NOAA/NWS/NCEP



droughtmonitor.unl.edu

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



- Changes since the September Business Meeting Adoption:
 - Redondo retirement extended to December 31, 2023
 - Additional procurements from multiple CPUC proceedings
 - Updated to Final NQC list for 2022 (dated for October 2021)
- Potential additional changes in Final Stack Analysis:
 - Summer hydro conditions will be updated by DWR in April/May
 - Demand forecast may change before adoption
 - Estimates of new projects will improve as we get closer to summer



• Demand

 Peak day of each month from the CED Draft 2021 hourly forecast

Supply

- Final Net Qualifying Capacity list published by CAISO in October 2021
- CPUC estimates of additional procurement

Imports

Average RA filings from 2016-2021
and LD contracts for POUs

Megawatts	July	August	Sept
Demand at 7-8PM	44,600	45,030	46,460
NQC List	48,170	46,380	43,950
Average RA Imports	6,010	6,440	6,560
New Supply	2,720	3,380	3,380



- Wind and solar
 - Hourly profiles based on generation on high-load days from 2014-2020
- Hydro
 - Derated by 500 MW for all months as placeholder
- 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	540	110	0
Wind MW at 7-8PM	2,470	1,990	1,170
Hydro Capacity with Derate	4,600	4,360	3,820
Demand Response with DLF/Reserve	1,360	1,420	1,420

Hourly Wind and Solar Shapes

(peak)

Stack Analysis Values at 7-8PM

(net peak)

- Based on historic generation on the 5 highest load days of each month from 2014-2020, for a total of 35 days
- The proposed 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	1,590	750
Stack Analysis Values at 7-8PM (net peak)	2,460	1,990	1,170
Solar (MW)	July	August	Sept
ELCC Tech Factors	4,290	2,990	1,580
Stack Analysis Values at 5-6 PM	5 770	4 910	3 350

540

8

0

110



15% PRM

22.5% PRM

- 6 % Operating Reserves
- 5 % Unplanned Outages
- 4 % Demand Variability
- 7,000 MW Total at Net Peak (September 7-8PM)

- 6 % Operating Reserves
- 7.5 % Unplanned Outages
- 9 % Demand Variability
- 10,500 MW Total at Net Peak (September 7-8PM)











Contingencies

Import above 15% PRM

Contract and Resource Modifications (e.g., CHP call options & plant efficiency upgrades)

Increasing Generator Limits (CAISO)

Coordination with other BAAs (e.g., LADWP)

DWR Temporary Generators

Power Plant Beyond Operational Limits

Emergency Load Reduction Program

Other CPUC Programs – New & Expansions of Existing (e.g., smart thermostat programs and additional energy efficiency)

Flex Alert

Total estimated contingencies: minimum of 2,000 MW



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

Hannah Craig at <u>Hannah.Craig@energy.ca.gov</u> or Mark Kootstra at <u>Mark.Kootstra@energy.ca.gov</u>



Questions?



July 2022 – September Adopted and January Update





September 2021 Adopted Stack

January 2022 Stack Update

August 2022 – September Adopted and January Update





September 2021 Adopted Stack

January 2022 Stack Update

September 2022 - September Adopted and January Update



September 2022 under 15% and 22.5% PRM 60000 Triggers Use of Contingencies 1800 MW 2200 MW 40 MW 55000 Megawatts 20000 45000 40000 35000 7PM-8PM 5PM 6PM 7PM BPM-9PM Md 5PM-6PM-Hour PDT Demand + 15% PRM Demand + 22.5% PRM Existing Resources Demand Response Average RA Imports New Resources Solar Wind

September 2021 Adopted Stack

January 2022 Stack Update

Impact between Versions

Shortfall in the Stack Analysis adopted in September was 4.3 GW at 7-8PM. This table lists the approximate impact of each change made in the update. The most significant change is increased expectations of new resources to come online between September 2021 and July 2022.

	Previous Analysis	Update Outlook	Approximate Delta
Baseline Resources and New Expected Procurement	November 2020 NQC List + New Resources expected in July 2021	October 2021 NQC List + New Resources expected in December 2021	(+) 1400 MWs
Demand Forecast	2020 IEPR	2021 IEPR Draft	(-) 1700 MWs
Redondo	Retired	Available	(+) 850 MWs
Hydro Derate	Worse than 2021	Same as 2021	(+) 500 MWs
Demand Response	40% Haircut	None	(+) 400 MWs
Imports	2015-2020 RA Filings	2016-2021 RA Filings	(+) 300 MWs
Wind/Solar Treatment	NQC	Hourly adjustment	(+) 150 MWs

Hourly Wind and Solar Shapes

- Wind and solar profiles are based on historic generation on the 5 highest load days of each month from 2014-2020, for a total of 35 days.
- The proposed 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 Value, MW	July	August	September
ELCC Tech Factors	1,390	1,270	900
Median Generation at 7-8PM, all Days	2,970	2,820	2,010
Median Generation at 7-8 PM, High Load Days	2,690	2,080	1,290
20 th Percentile Generation at 7-8PM, High Load Days	1,577	1,646	672
Stack Analysis Values at 7-8PM	2,460	1,990	1,170

Stack Analysis Values = (0.2 x 20th Percentile) + (0.8 x Median)