

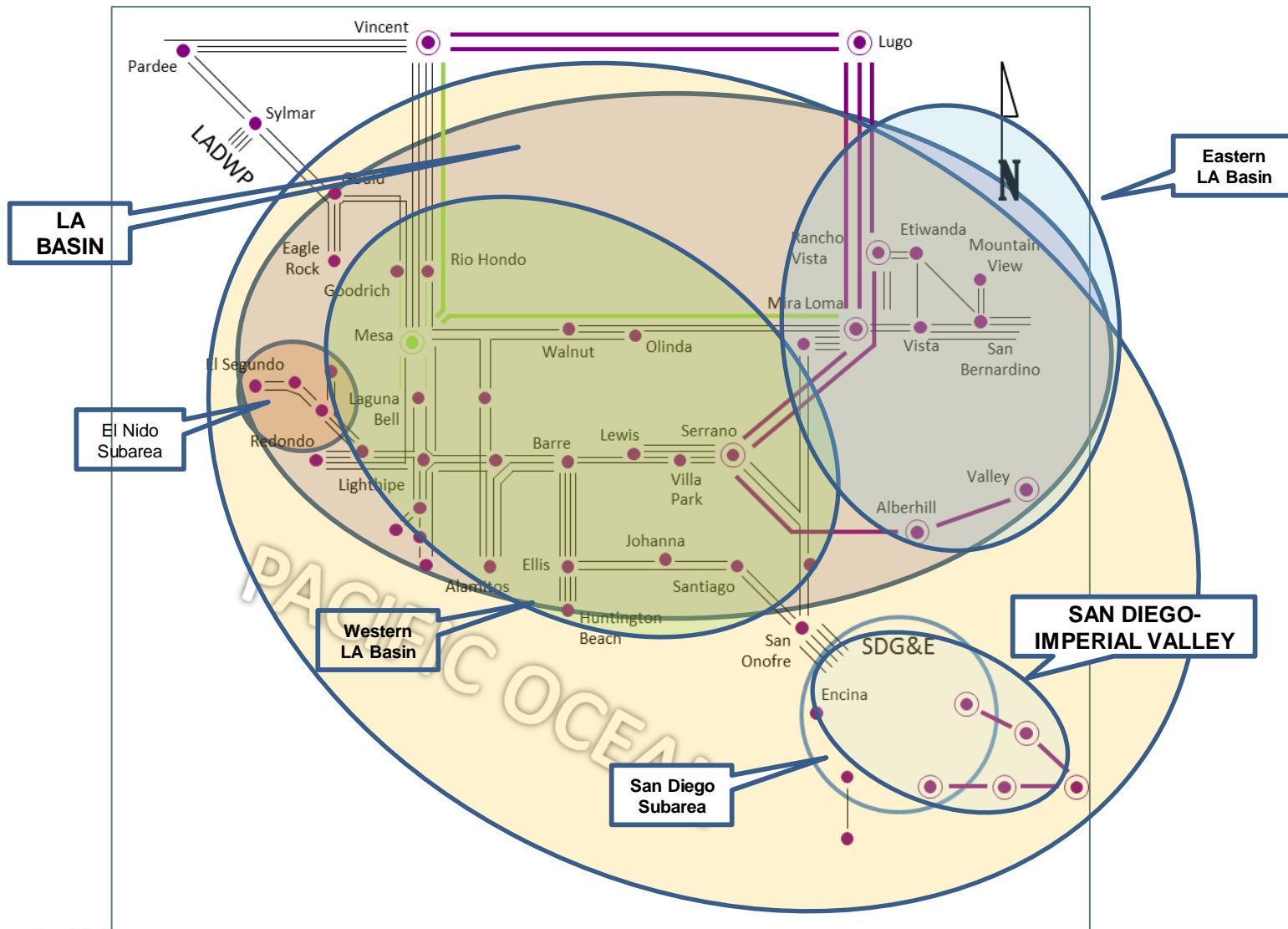


2024 & 2028 Final LCR Study Results for LA Basin and San Diego-Imperial Valley Areas

David Le
Senior Advisor Regional Transmission Engineer

Stakeholder Call
April 12, 2023

LA Basin and San Diego-Imperial Valley Areas



Major New Transmission and Resource Assumptions

Project Name	Service Areas	Expected ISD	Modeled in 2024 LCR case	Modeled in 2028 LCR case
New Transmission Projects				
Mesa Loop-In Project (230kV Loop-In)	SCE	6/1/2021	√	√
Mesa Loop-In Project (500kV Loop-In)	SCE	5/2022	√	√
West of Devers 230kV Lines Reconductoring	SCE	6/2021	√	√
Imperial Valley – El Centro 230 kV (“S” line) upgrades	IID / SDG&E	Q3 2023	√	√
Southern Orange County Reliability Enhancement	SDG&E	11/2024		√
Mesa – Laguna Bell 230kV Line Reconductoring	SCE	4/2024	√	√
Ten West Link Project (Delaney-Colorado 500kV Line)	APS/SCE	4/2024	√	√
New Resource Projects				
Alamitos Repowering Project	SCE	2/7/2020	√	√
Huntington Beach Repowering Project	SCE	2/4/2020	√	√
Stanton Energy Reliability Center	SCE	6/1/2020	√	√
Alamitos 100 MW Battery Energy Storage System	SCE	1/2021	√	√
Local Capacity Area Preferred Resources in western LA Basin (EE, DR, BTM BESS)	SCE	6/1/2021	√	√
Various battery energy storage system in SCE and San Diego-Imperial Valley areas	SDG&E	2022-2028	√	√

LA Basin Area: Loads and Resources

Loads (MW)	2024	2028	Resources NQC* (MW)	2024	2028
Gross Load	19943	20843	Market/Net Seller/Wind	5783	5783
AAEE & AAFS	-165	-244	Battery	624	624
Behind the meter DG (production)	-431	-550	Muni/QF	1179	1179
Net Load	19347	20049	LTPP LCR Preferred Resources (BTM BESS, EE, DR, PV)	175	175
Transmission Losses	290	301	Existing Demand Response	582	582
Pumps	0	0	Solar	10	10
Loads + Losses + Pumps	19637	20350	Total Qualifying Capacity	8353	8353

San Diego-Imperial Valley Area: Loads and Resources

Loads (MW)	2024	2028	Resources NQC* (MW)	2024	2028
Gross Load	4855	5179	Market/Net Seller/Wind	3753	3753
AAEE & AAFS	-52	-90	Battery/Hybrid	1425	1425
Behind-the-meter DG (0 at 7 p.m. PDT)	0	0	MUNI/QF	2	2
Net Load	4803	5089	LTPP Preferred Resources	0	0
Transmission Losses	105	132	Existing Demand Response	26	26
Pumps	0	0	Solar (production is "0" at 20:00 hr.)	182	182
Loads + Losses	4908	5221	Total	5388	5388

*August NQC for RA accounting purpose

El Nido Sub-area LCR (LA Basin)

Year	Category	Limiting Facility	Contingency	LCR (MW)	2023 and 2027 LCR (MW)
2024	P7	La Fresa-La Cienega 230 kV	La Fresa – El Nido #3 & 4 230 kV lines	302	294
2028	P7	La Fresa-La Cienega 230 kV	La Fresa – El Nido #3 & 4 230 kV lines	347	341

Reasons for the changes in the LCR needs:

- LCR need increases due to higher demand forecast for the El Nido sub-area.

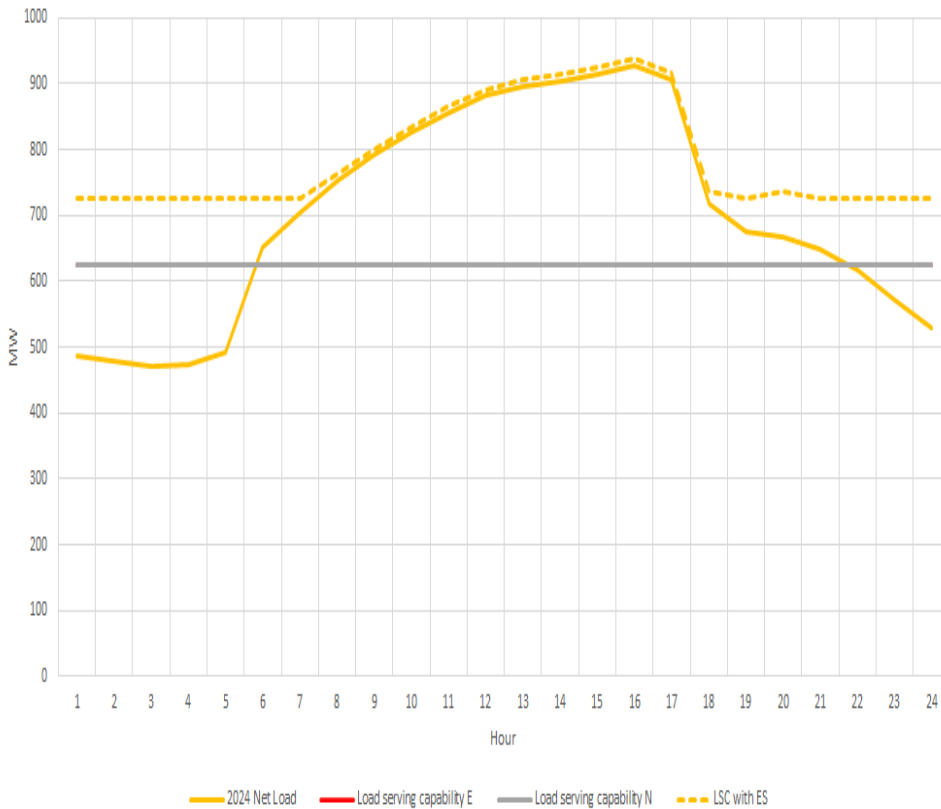
El Nido Subarea Load Shape and Estimated Energy Storage Charging Capability Under Critical Contingency

El Nido Sub-area:

2024 projected pk day load profile & approx. LSC (trans + LCR Gen + ES)

Approx storage size that can be added to this area from charging restriction perspective =

200 MW and 1507 MWh. Max 4-hr storage = 46 MW

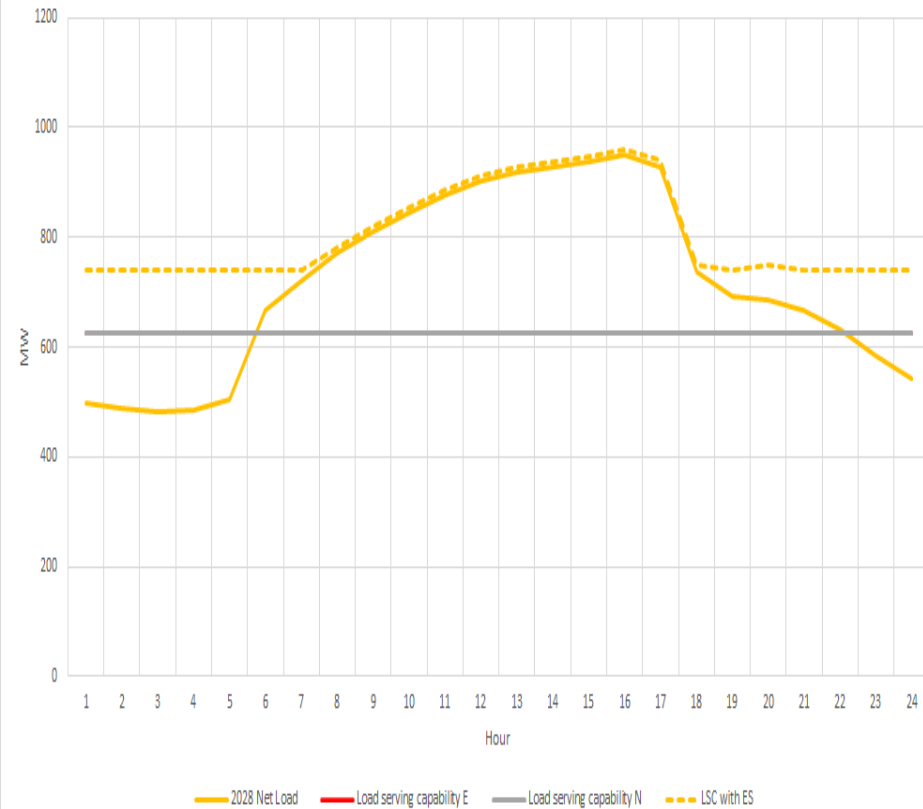


El Nido Sub-area:

2028 projected pk day load profile & approx. LSC (trans + LCR Gen + ES)

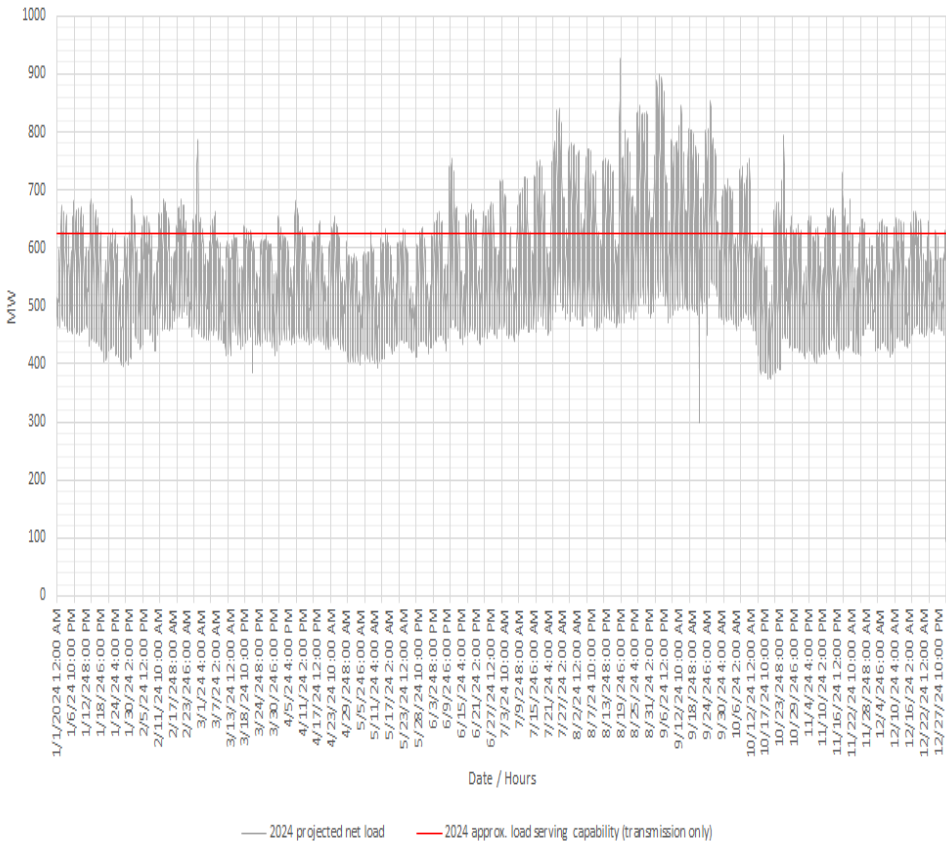
Approx storage size that can be added to this area from charging restriction perspective =

233 MW and 1602 MWh. Max 4-hr storage = 104 MW

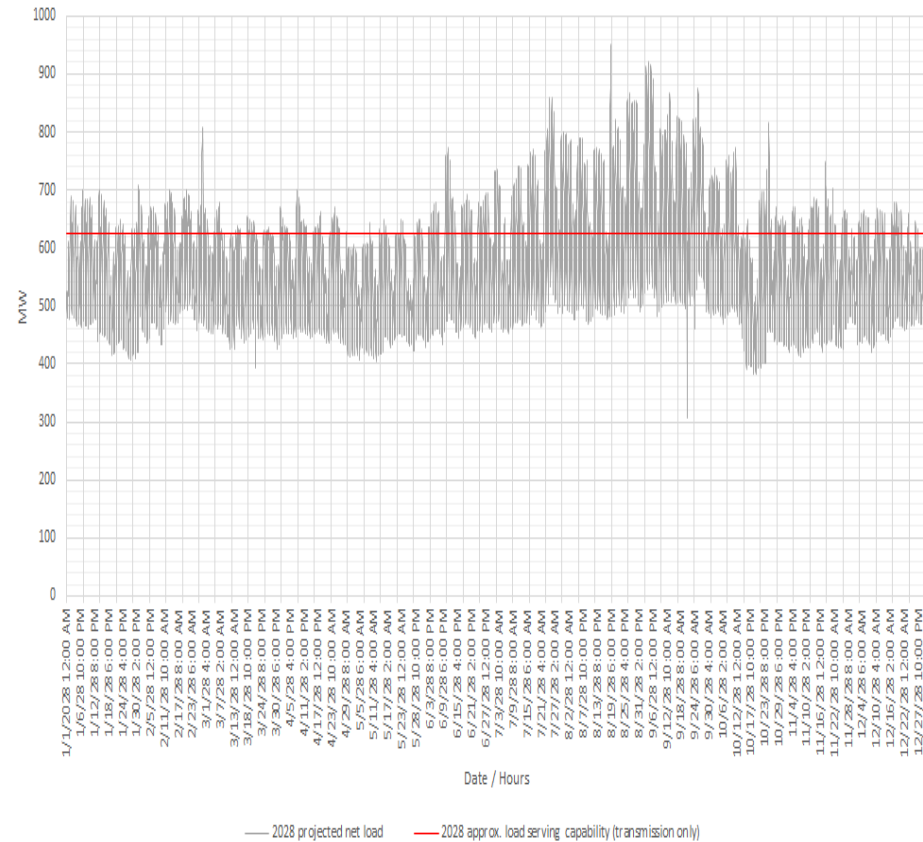


El Nido Subarea Load Shape and Estimated Energy Storage Charging Capability Under Critical Contingency

El Nido Sub-area:
2024 projected load profile & approx. load serving capability (transmission only)



El Nido Sub-area:
2028 projected load profile & approx. load serving capability (transmission only)



Western LA Basin Sub-area LCR

Year	Category	Limiting Facility	Contingency	LCR (MW)	2023 and 2027 LCR (MW)
2024	P6	Serrano 500/230kV Transformer Bank #2	Serrano 500/230kV Transformer Banks #3, followed by #1 (or vice versa)	3250 (5045)*	5487
2028	P6	Serrano 500/230kV Transformer Bank #2	Serrano 500/230kV Transformer Banks #3, followed by #1 (or vice versa)	4130	3489

Notes: *The LCR need for the Western LA Basin subarea may need to increase by an additional 1795 MW (for a total of 5045 MW) if the planned Laguna Bell – Mesa 230 kV #1 line rating increase project is delayed beyond June 1, 2024 (please see next page and final report for further details).

Reasons for the changes in the LCR needs:

- 2024 - the 2024 LCR need is lower than 2023 LCR need due the following:
 - Different transmission constraint
 - Laguna Bell – Mesa 230kV line rating increase project planned to be in-service
- 2028 - the 2028 LCR need is higher than 2027 LCR need due to the following:
 - Different transmission constraint
 - Higher demand forecast for year 2028 from the CEC
- Dispatch of energy storage resources that are hybrid or co-located in SCE renewable resource areas outside of LCR area to meet overall system demand

Western LA Basin Sub-area LCR

(sensitivity study with Laguna Bell – Mesa 230 kV #1 line rating increase project delay scenario)

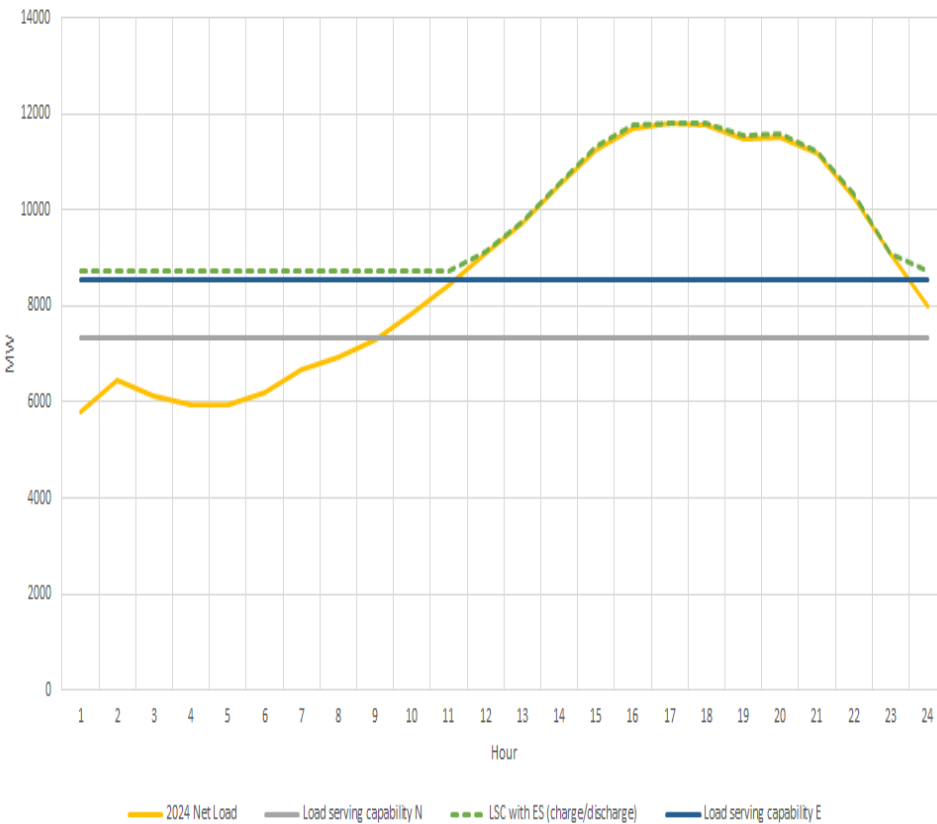
Year	Category	Limiting Facility	Contingency	LCR (MW)	2023 LCR (MW)
2024	P6	Laguna Bell – Mesa #1 230 kV line	Mesa – Redondo 230 kV line, followed by Mesa – Lighthipe 230 kV line, or vice versa	5045	5487

Western LA Basin Subarea Load Shape and Estimated Energy Storage Charging Capability Under Critical

Western LA Basin Sub-area:

2024 peak day load profile & approx. LSC (transmission+LCR Gen + ES)

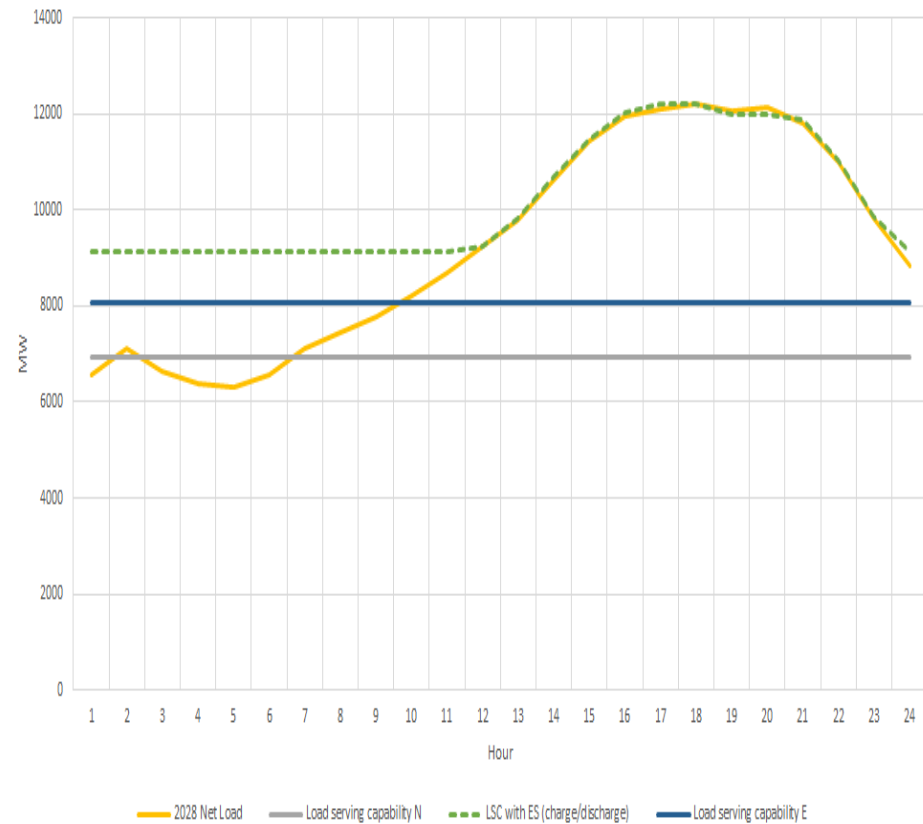
Approx. amount of storage that can be added to this area from charging restriction perspective = 1871 MW and 15619 MWh. Approx. max 4-hr storage = 414 MW



Western LA Basin Sub-area:

2028 peak day load profile & approx. LSC (transmission+LCR Gen + ES)

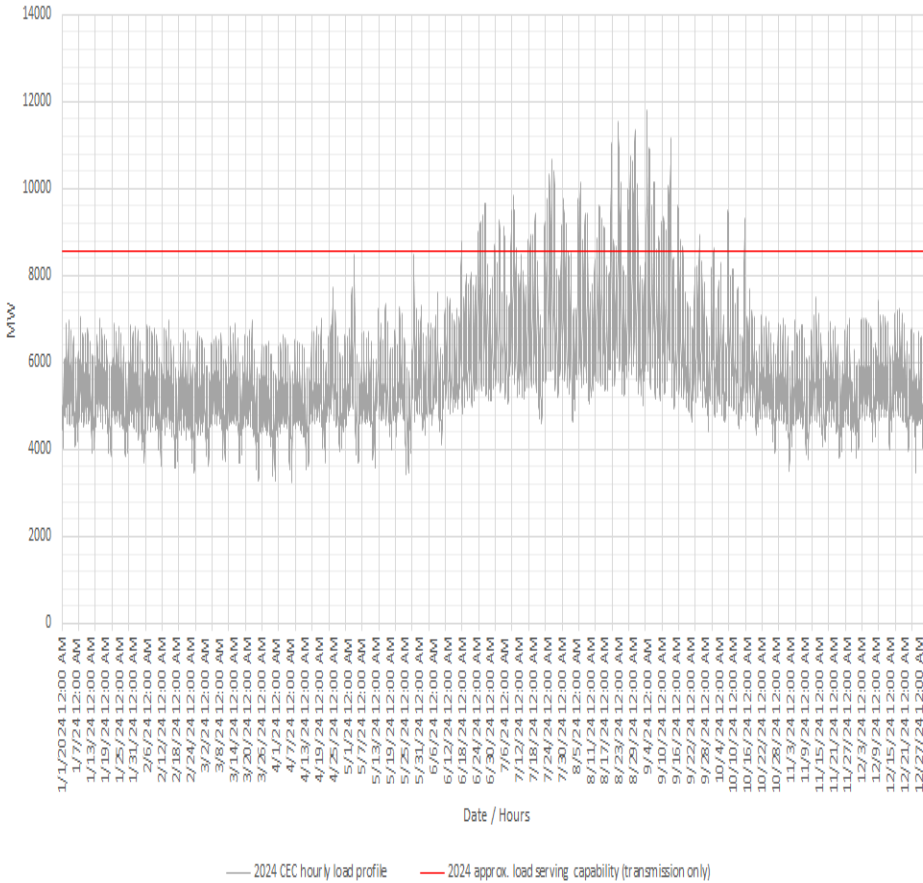
Approx. amount of storage that can be added to this area from charging restriction perspective = 1929 MW and 15676 MWh. Approx. max 4-hr storage = 447 MW



Western LA Basin Subarea Load Shape and Estimated Energy Storage Charging Capability Under Critical Contingency

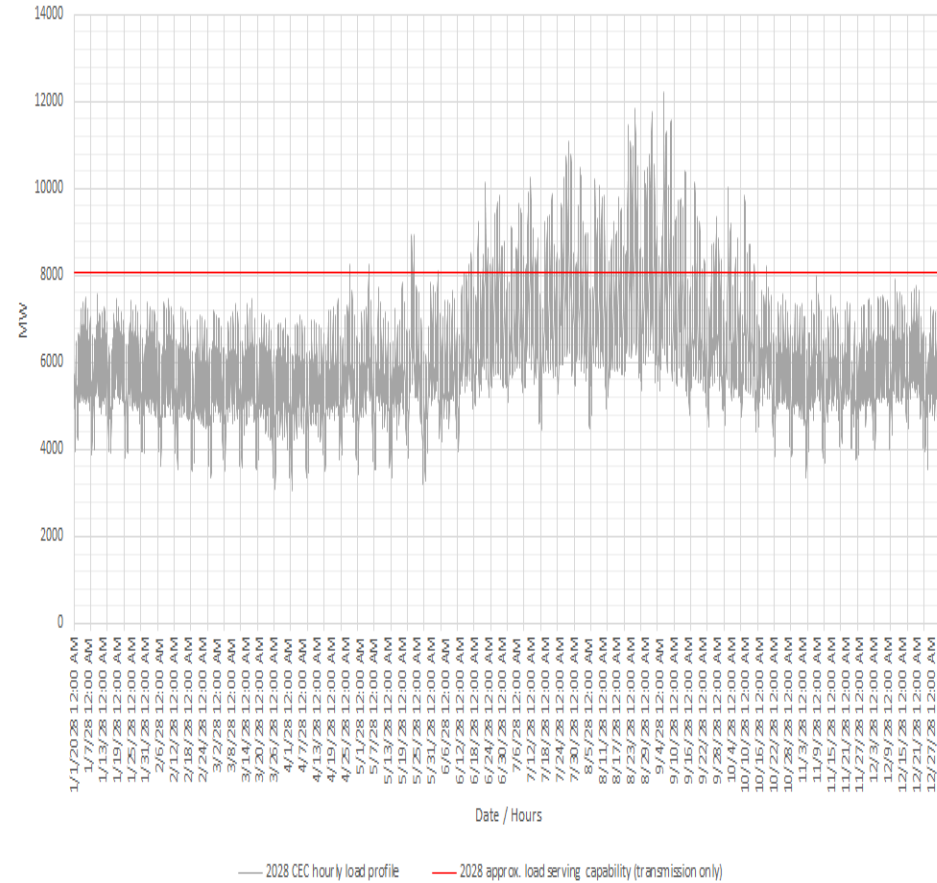
Western LA Basin Sub-area:

2024 CEC hourly load profile & approx. load serving capability (transmission only)



Western LA Basin Sub-area:

2028 CEC hourly load profile & approx. load serving capability (transmission only)



Eastern LA Basin Sub-area LCR

Year	Category	Limiting Facility	Contingency	LCR (MW)	2023 and 2027 LCR (MW)
2024	P1 & P7	Voltage stability	Lugo – Rancho Vista 500 kV line, followed by N-2 of Lugo – Mira Loma #2 and #3 500 kV lines (common structure)	1163 (1337)*	2042
2028	P1 & P7	Voltage stability	Lugo – Rancho Vista 500 kV line, followed by N-2 of Lugo – Mira Loma #2 and #3 500 kV lines (common structure)	1810	2642

Notes: * Results with TenWest Link project implementation delay scenario

Reasons for the changes in the LCR needs:

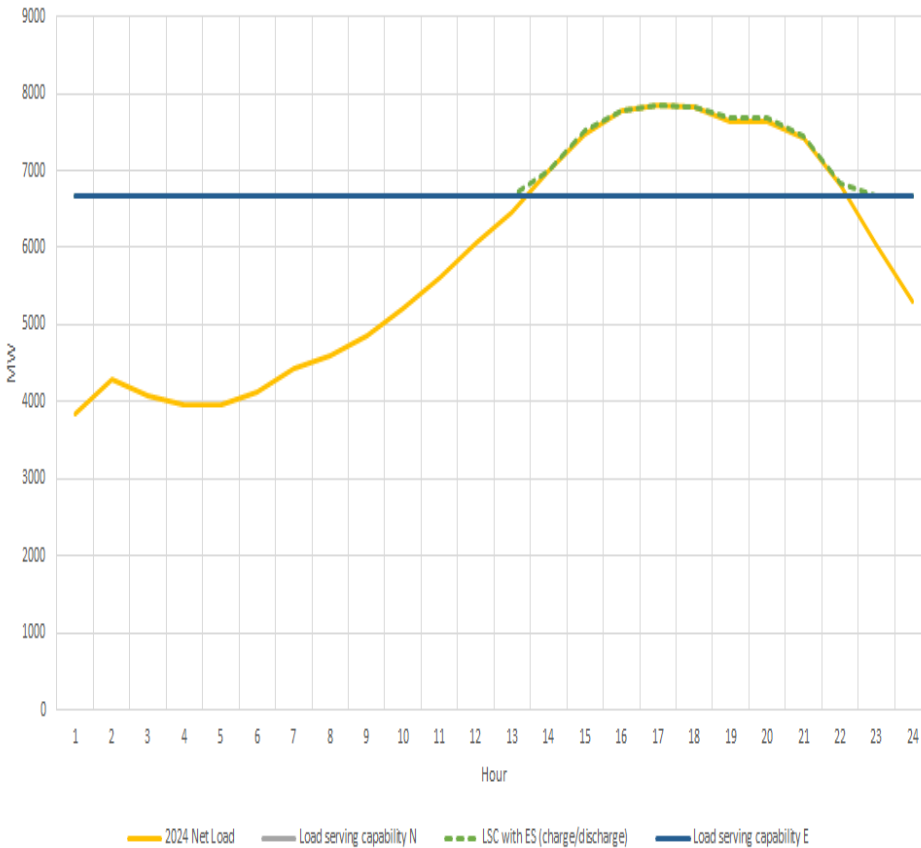
- The LCR need for the eastern LA Basin is lower due to the following:
 - Different transmission constraint
 - New bulk transmission addition (Delaney-Colorado River 500kV line) planned to be in-service
 - Dispatch of energy storage resources that are hybrid or co-located in SCE renewable resource areas outside of the LCR area to meet overall system demand

Eastern LA Basin Subarea Load Shape and Estimated Energy Storage Charging Capability Under Critical Contingency

Eastern LA Basin Sub-area:

2024 peak day load profile & approx. LSC (transmission + LCR Gen + ES)

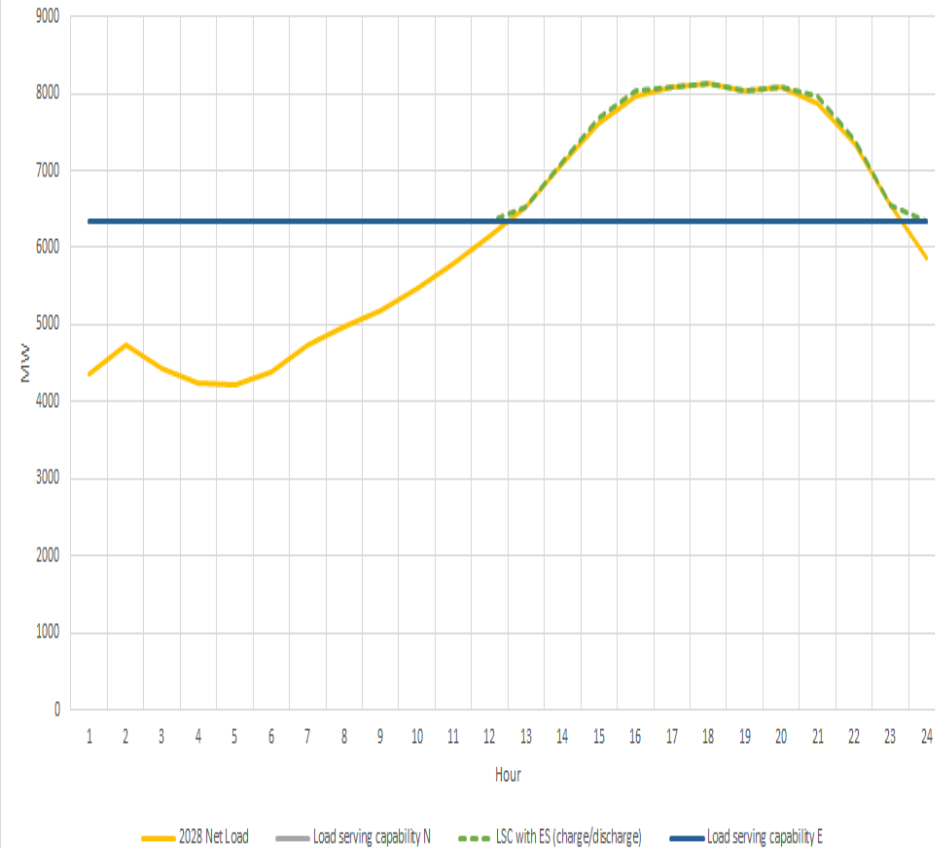
Approx. amount of storage that can be added to this area from charging restriction perspective = 1160 MW and 7503 MWh. Approx. max 4-hr storage = 290 MW



Eastern LA Basin Sub-area:

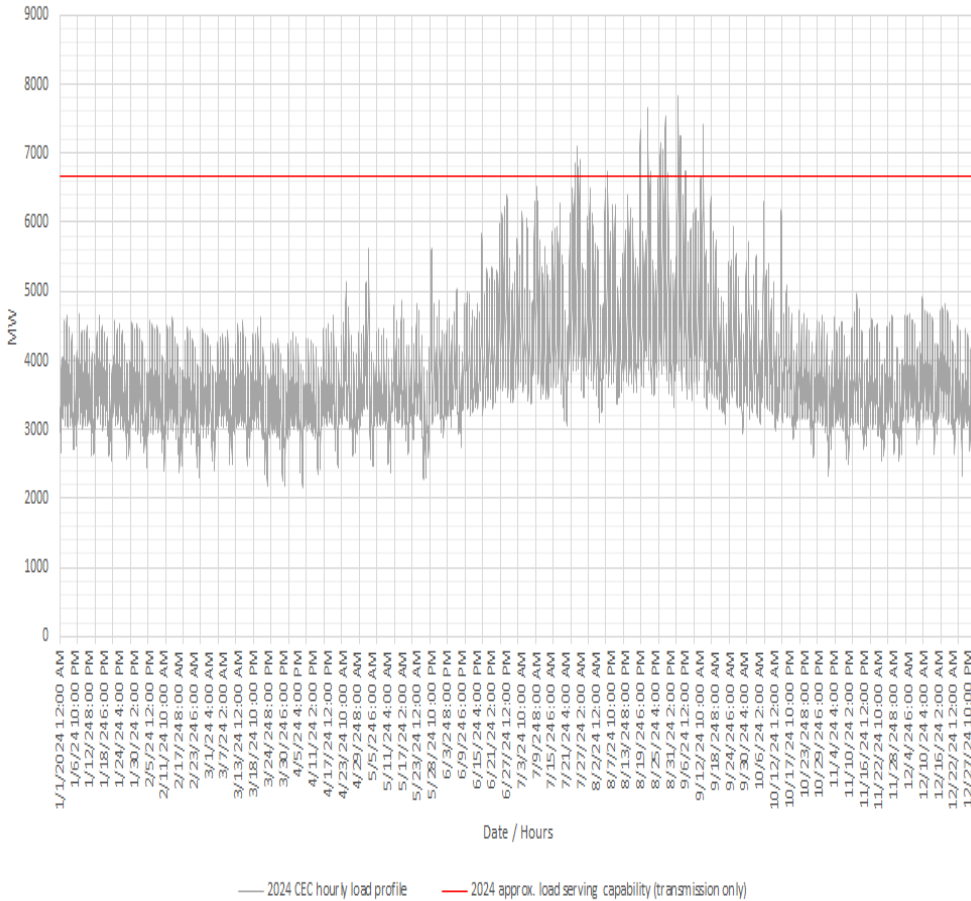
2028 peak day load profile & approx. LSC (transmission + LCR Gen + ES)

Approx. amount of storage that can be added to this area from charging restriction perspective = 1810 MW and 14026 MWh. Approx. max 4-hr storage = 170 MW

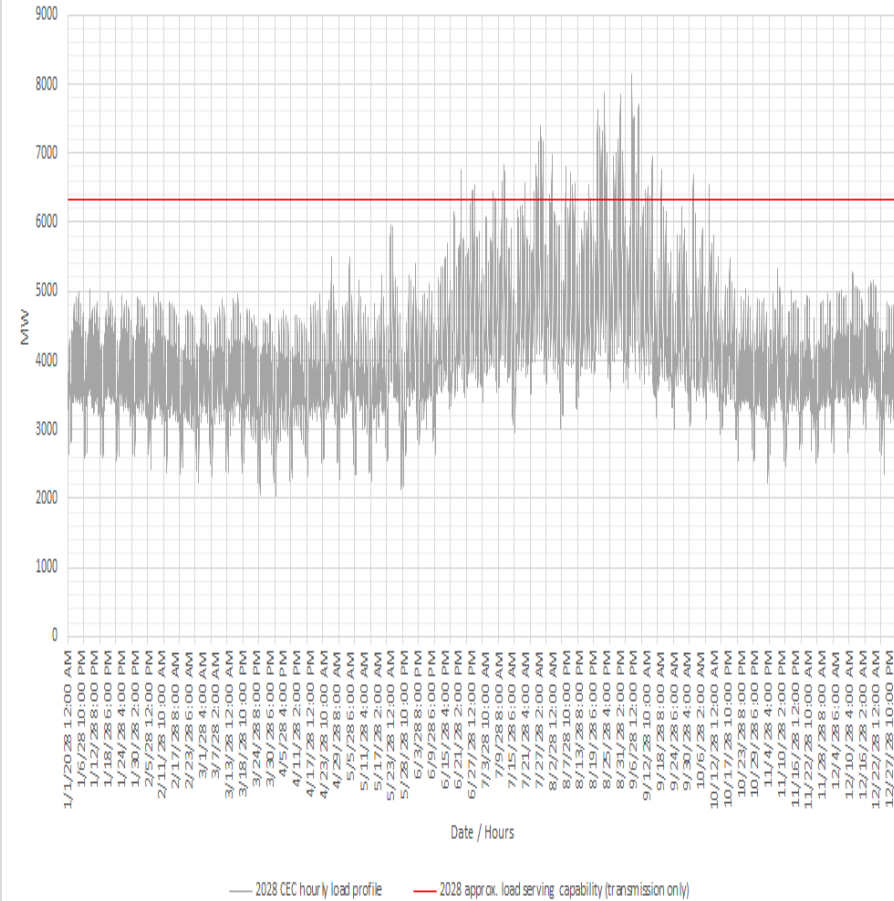


Eastern LA Basin Subarea Load Shape and Estimated Energy Storage Charging Capability Under Critical Contingency

Eastern LA Basin Sub-area:
2024 CEC hourly load profile & approx. load serving capability (transmission only)



Eastern LA Basin Sub-area:
2028 CEC hourly load profile & approx. load serving capability (transmission only)



Overall LA Basin LCR Need

Year	Limiting Facility	Limiting Facility	Contingency	LCR (MW)	2023 and 2027 LCR (MW)
2024	Sum of Western and Eastern LA Basin LCR needs	See Western and Eastern LA Basin LCR results	See Western and Eastern LA Basin LCR results	4413 (4586)* (6208)** (6381)***	7529
2028	Sum of Western and Eastern LA Basin LCR needs	See Western and Eastern LA Basin LCR results	See Western and Eastern LA Basin LCR results	5940	6131

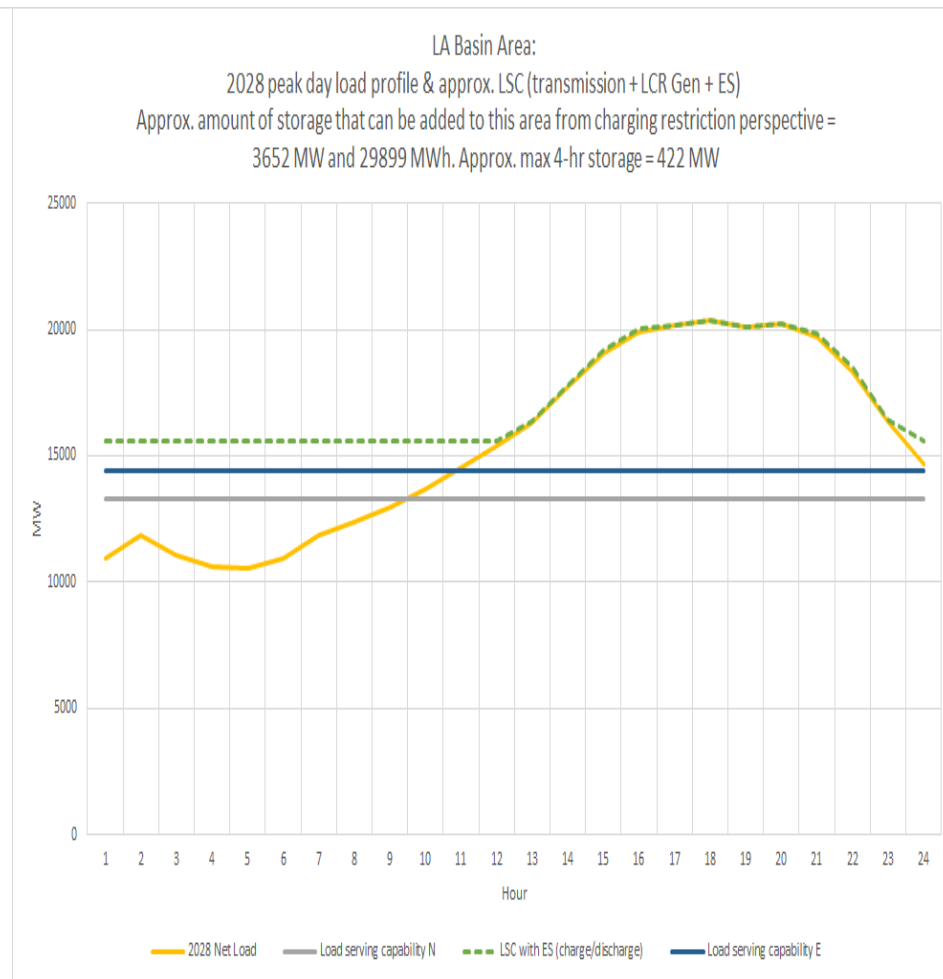
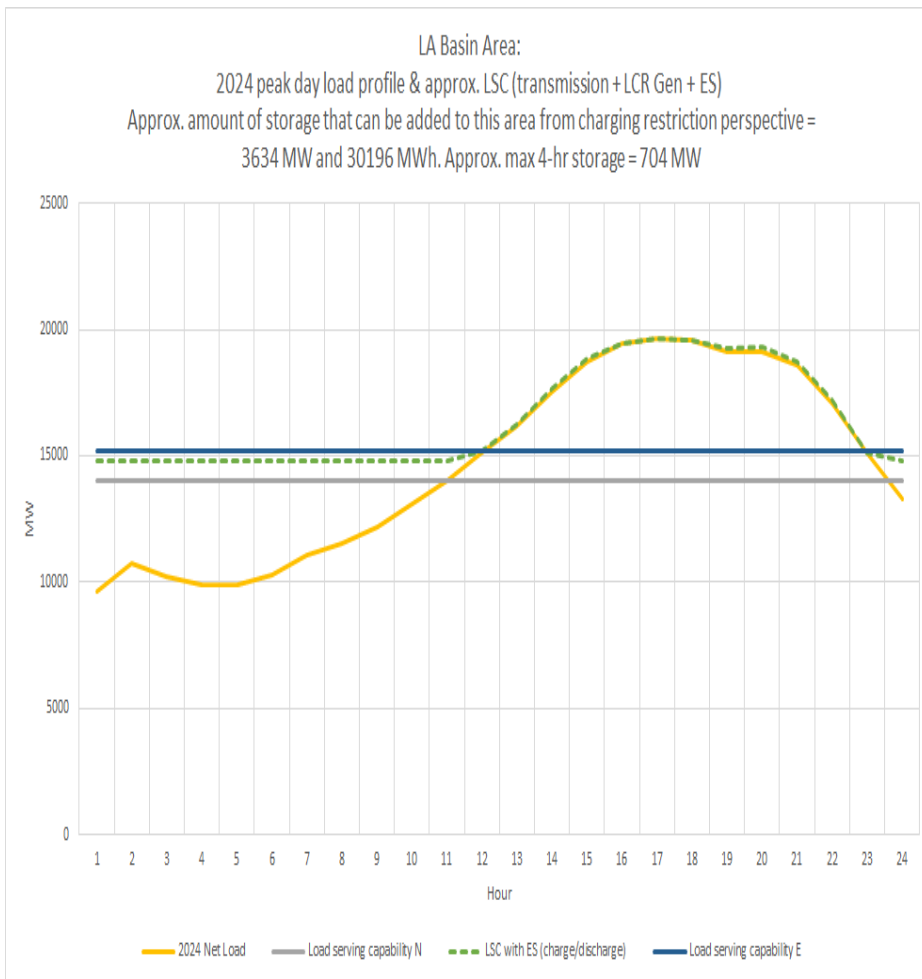
Notes: * Results with TenWest Link project implementation delay scenario.

** Results with Laguna Bell – Mesa #1 230kV project implementation delay scenario.

*** Results with combined TenWest Link & Laguna Bell – Mesa #1 230kV projects implementation delay scenario.

- 2024 – lower overall LA Basin LCR need is driven by different transmission constraints in the western LA Basin and the eastern LA Basin; addition of new transmission additions to the LA Basin (i.e., Delaney – Colorado River 500kV line as well as new upgrade in the LA Basin (i.e., Laguna Bell – Mesa #1 230kV line upgrade)); dispatch of energy storage that is either hybrid or co-located in SCE renewable resource areas to meet system need demand.
- 2028 – slightly lower than the 2027 LCR need due to the reasons provided above; the reduction in the LCR need is partially offset by higher demand forecast.

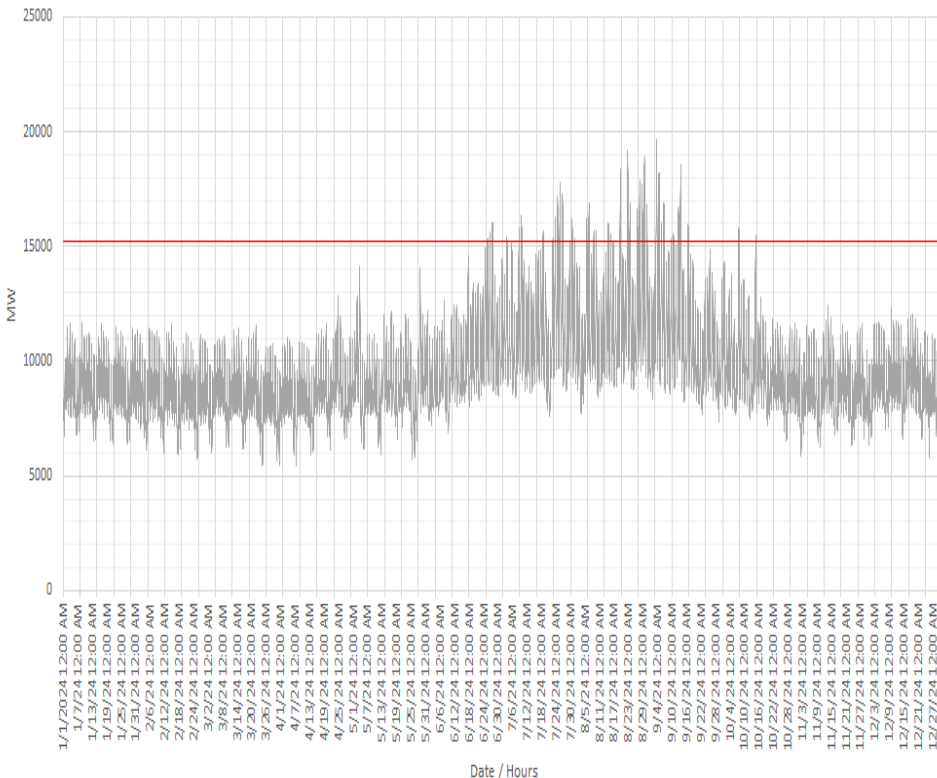
Overall LA Basin Area Load Shape and Estimated Energy Storage Charging Capability Under Critical Contingency



Overall LA Basin Area Load Shape and Estimated Energy Storage Charging Capability Under Critical Contingency

LA Basin Area:

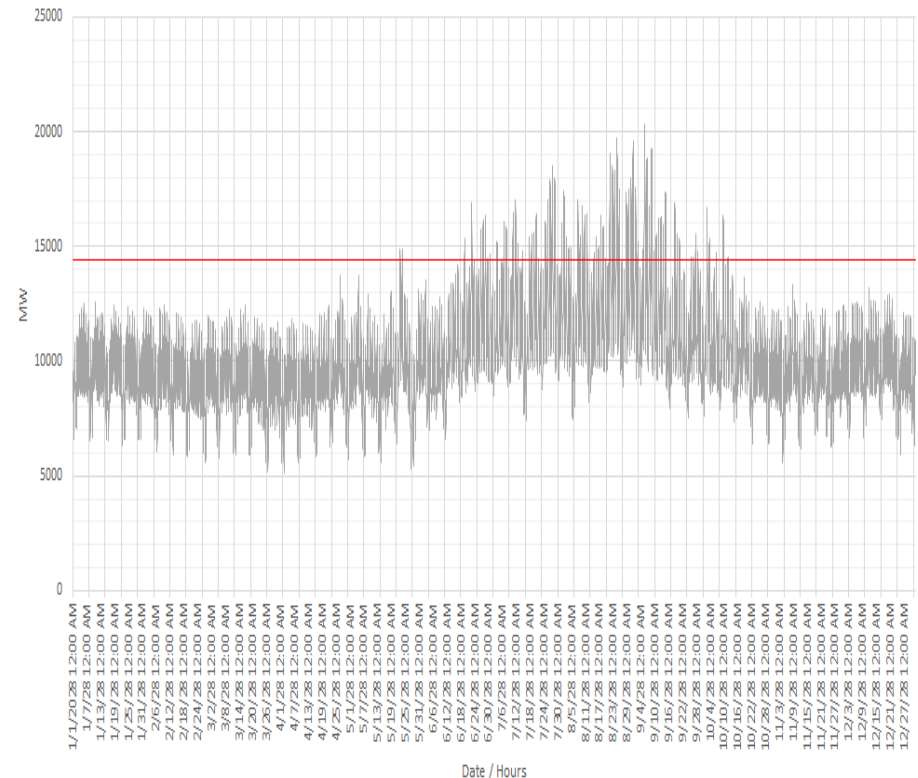
2024 CEC hourly load profile & approx. load serving capability (transmission only)



— 2024 CEC hourly load profile — 2024 approx. load serving capability (transmission only)

LA Basin Area:

2028 CEC hourly load profile & approx. load serving capability (transmission only)



— 2028 CEC hourly load profile — 2028 approx. load serving capability (transmission only)

San Diego Bulk Sub-area LCR

Year	Category	Limiting Facility	Contingency	LCR (MW)	2023 and 2027 LCR (MW)
2024	P6	Remaining Sycamore-Suncrest 230 kV line	ECO-Miguel 500 kV line, system readjustment, followed by one of the Sycamore-Suncrest 230 kV	2834	2659
2028	P6	Remaining Sycamore-Suncrest 230 kV line	ECO-Miguel 500 kV line, system readjustment, followed by one of the Sycamore-Suncrest 230 kV	3575	3369

Reasons for the changes in the LCR needs:

- The LCR need is higher due to higher demand forecast from the CEC for the San Diego area.

San Diego Bulk Subarea Load Shape and Estimated Energy Storage Charging Capability Under Critical Contingency

San Diego Sub-area:

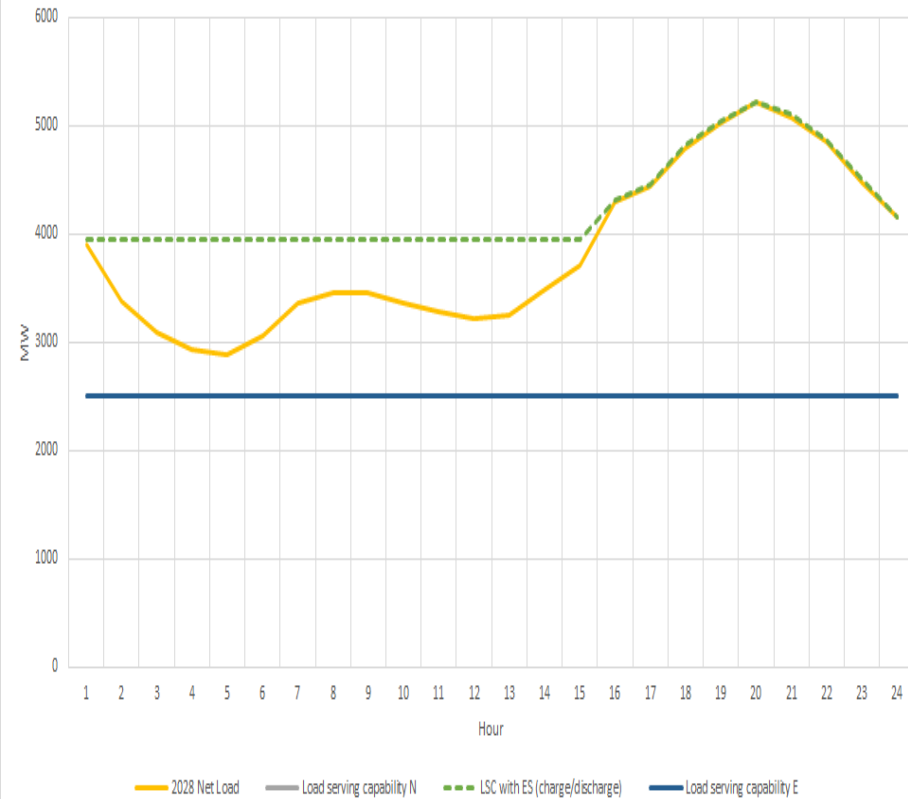
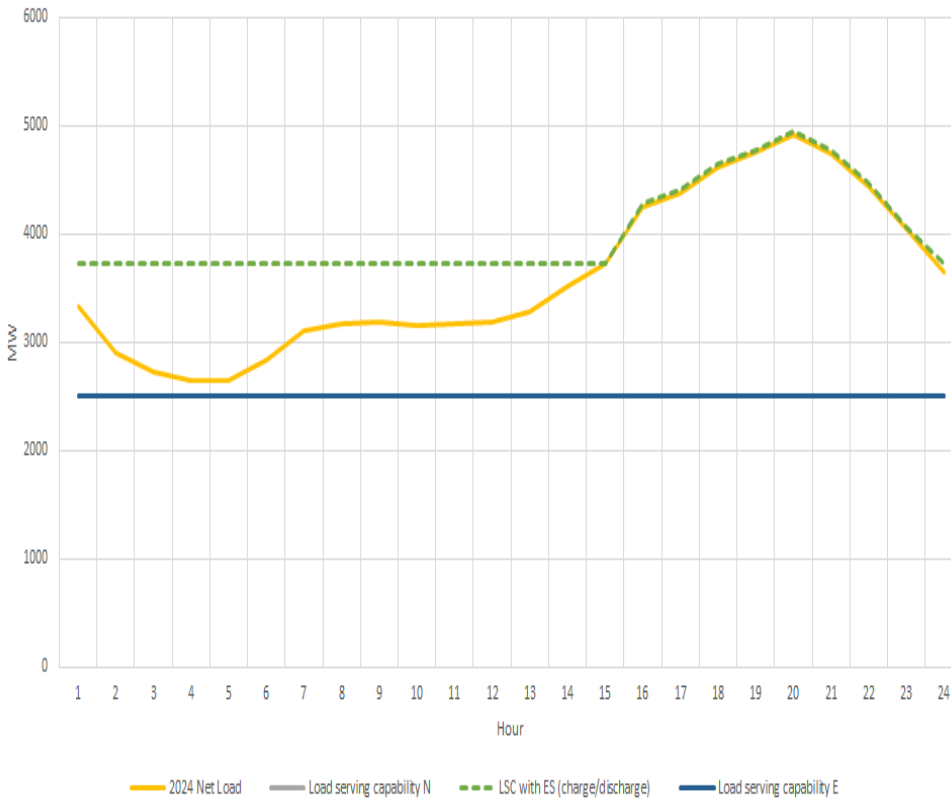
2024 peak day load profile & approx. LSC (transmission+LCR Gen + ES)

Approx. amount of storage that can be added to this area from charging restriction perspective = 1180 MW and 7694 MWh. Approx. max 4-hr storage = 1170 MW

San Diego Sub-area:

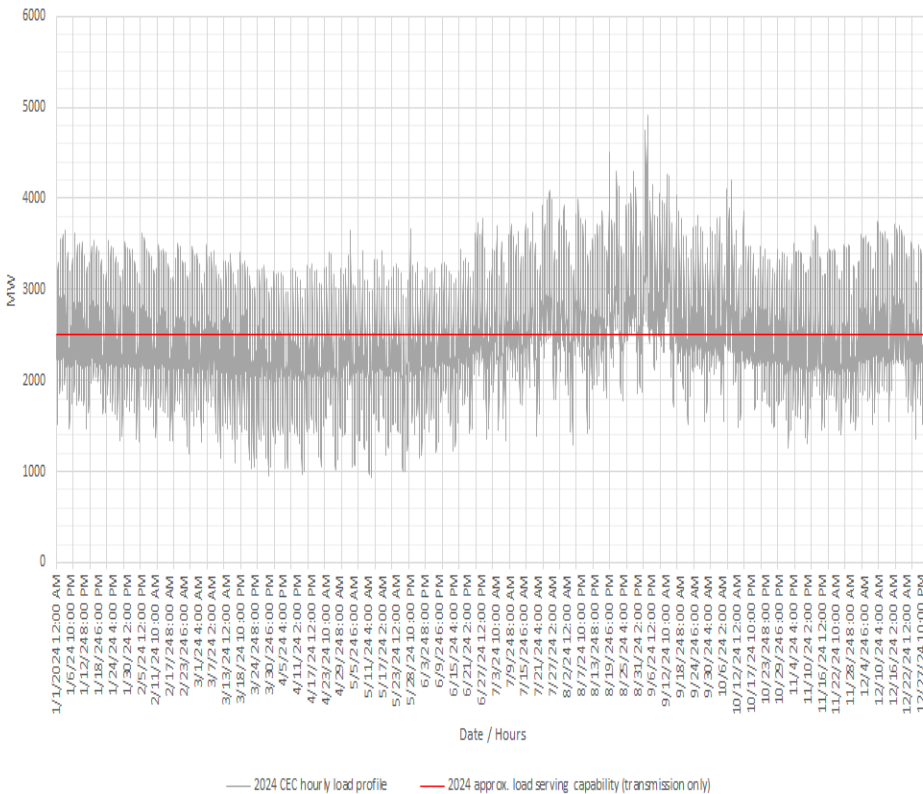
2028 peak day load profile & approx. LSC (transmission+LCR Gen + ES)

Approx. amount of storage that can be added to this area from charging restriction perspective = 1468 MW and 7679 MWh. Approx. max 4-hr storage = 963 MW

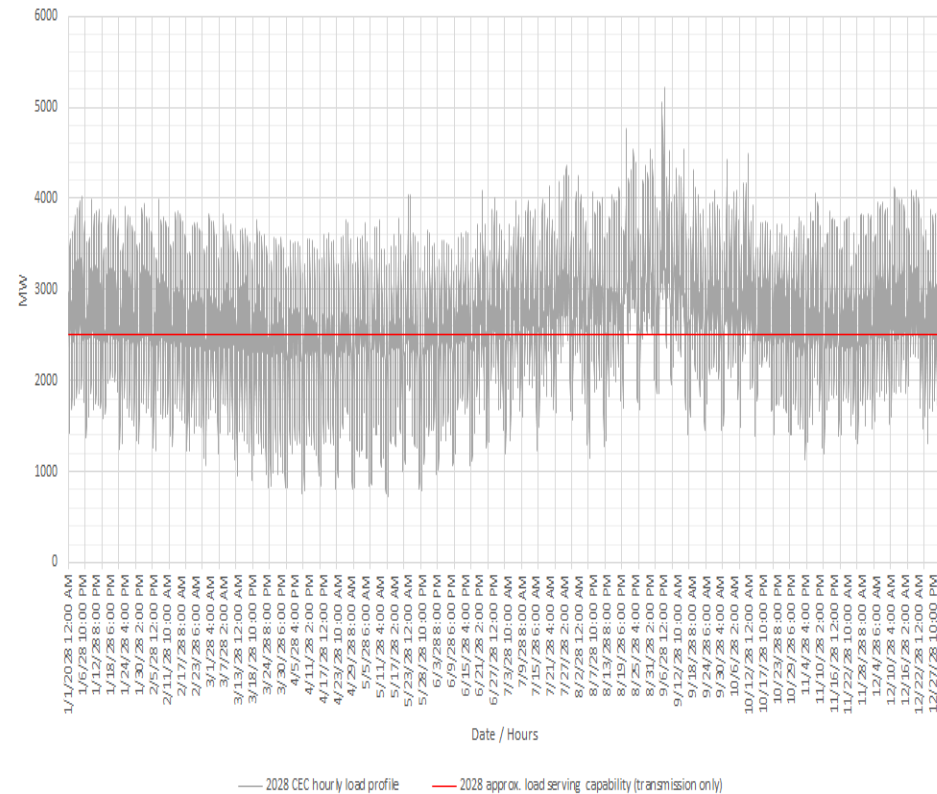


San Diego Bulk Subarea Load Shape and Estimated Energy Storage Charging Capability Under Critical Contingency

San Diego Sub-area:
2024 CEC hourly load profile & approx. load serving capability (transmission only)



San Diego Sub-area:
2028 CEC hourly load profile & approx. load serving capability (transmission only)



Overall San Diego – Imperial Valley Area LCR

Year	Category	Limiting Facility	Contingency	LCR (MW)	2023 and 2027 LCR (MW)
2024	P6	Remaining Sycamore-Suncrest 230 kV line	ECO-Miguel 500 kV line, system readjustment, followed by one of the Sycamore-Suncrest 230 kV	2834	3855
2028	P6	Remaining Sycamore-Suncrest 230 kV line	ECO-Miguel 500 kV line, system readjustment, followed by one of the Sycamore-Suncrest 230 kV	3575	3369

Reasons for the changes in the LCR needs (for the main assumptions with the S Line Upgrades implemented):

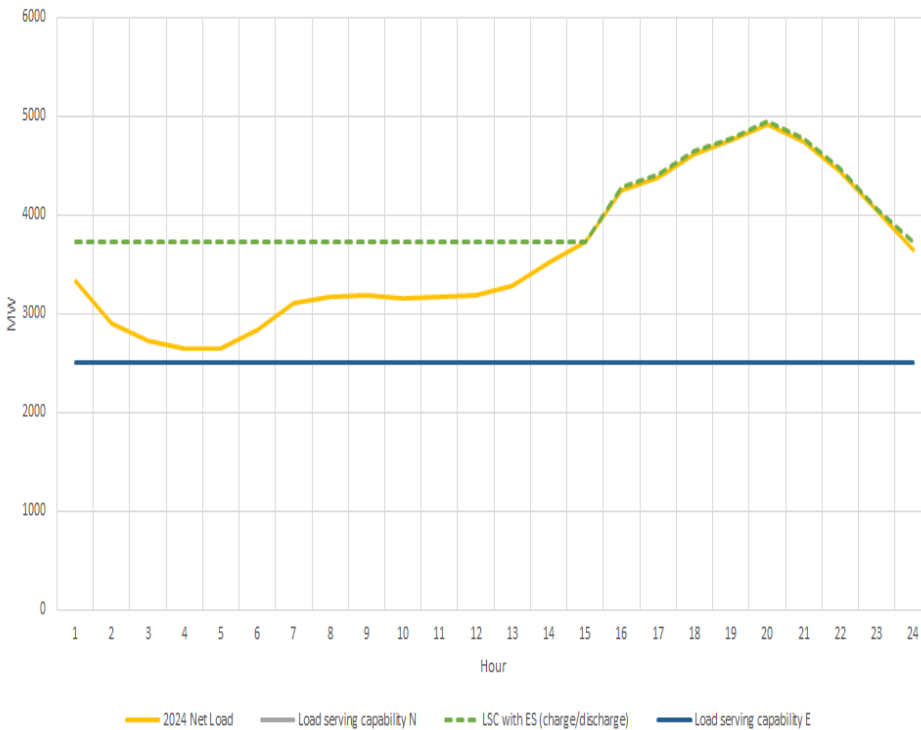
- 2024 – the LCR for the area is lower than 2023 LCR need due to implementation of the S-line upgrade; utilization of RAS schemes from APS and WAPA for the Yucca and Gila transformers.
- 2028 – the LCR need for the overall San Diego-Imperial Valley area is higher than the 2027 LCR need due to different transmission constraint and higher demand forecast from the CEC.

Overall San Diego-Imperial Valley Area Load Shape and Estimated Energy Storage Charging Capability Under Critical Contingency

San Diego-Imperial Valley Area:

2024 peak day load profile & approx. LSC (transmission + LCR Gen + ES)

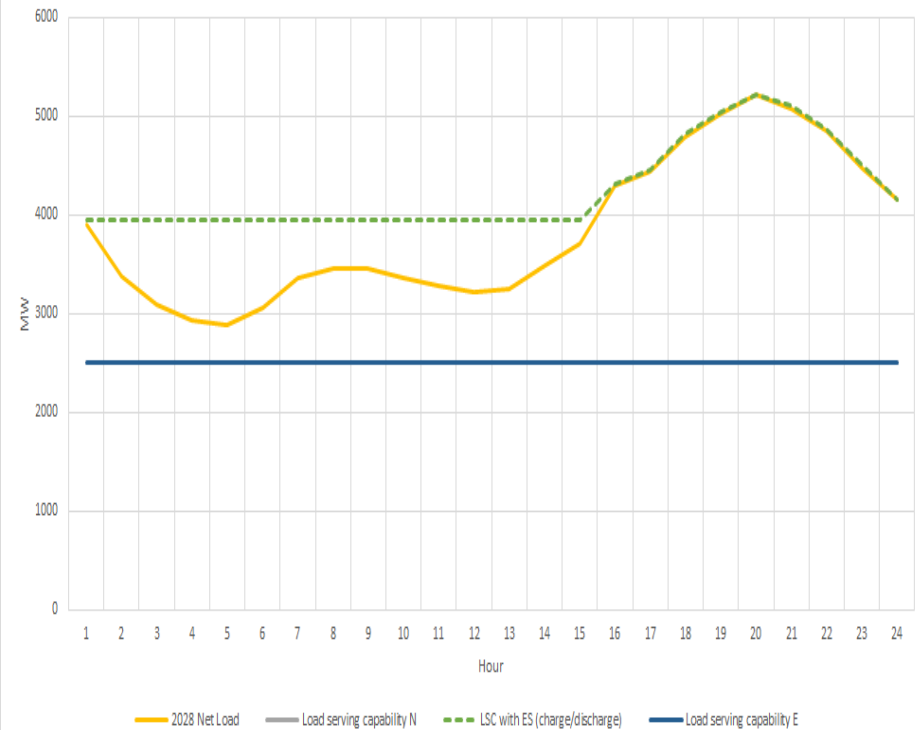
Approx. amount of storage that can be added to this area from charging restriction perspective = 1180 MW and 7694 MWh. Approx. max 4-hr storage = 117



San Diego-Imperial Valley Area:

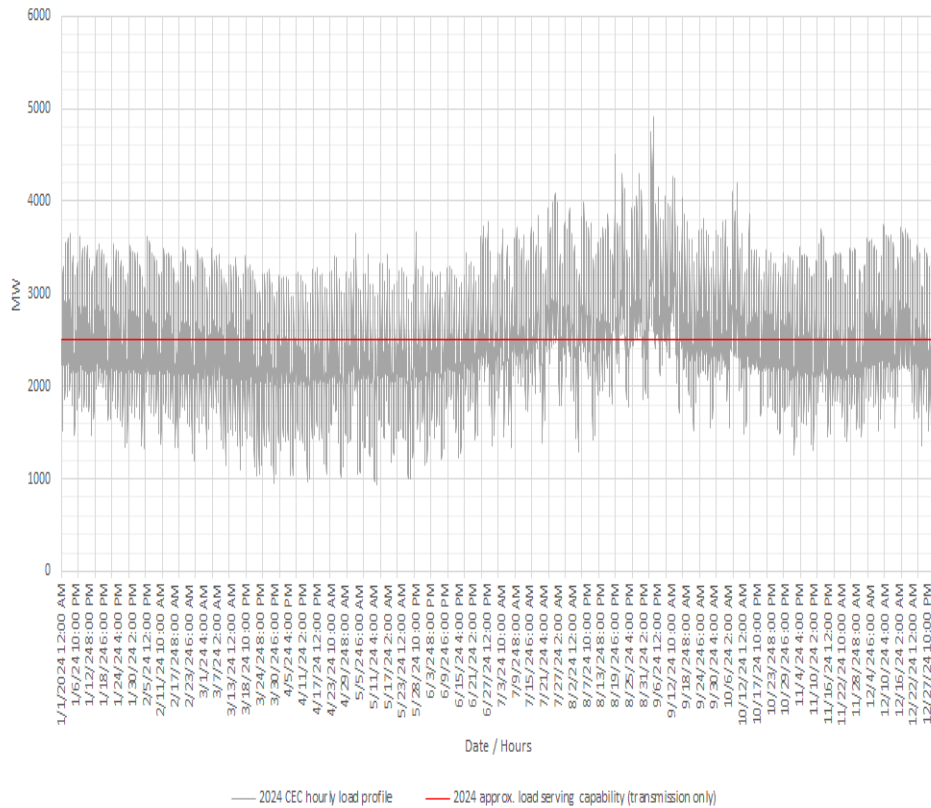
2028 peak day load profile & approx. LSC (transmission + LCR Gen + ES)

Approx. amount of storage that can be added to this area from charging restriction perspective = 1468 MW and 7679 MWh. Approx. max 4-hr storage = 963



Overall San Diego-Imperial Valley Area Load Shape and Estimated Energy Storage Charging Capability Under Critical Contingency

San Diego-Imperial Valley Area:
2024 CEC hourly load profile & approx. load serving capability (transmission only)



San Diego-Imperial Valley Area:
2028 CEC hourly load profile & approx. load serving capability (transmission only)

