



# 2023 & 2027 Final LCR Study Results for LA Basin and San Diego-Imperial Valley Areas

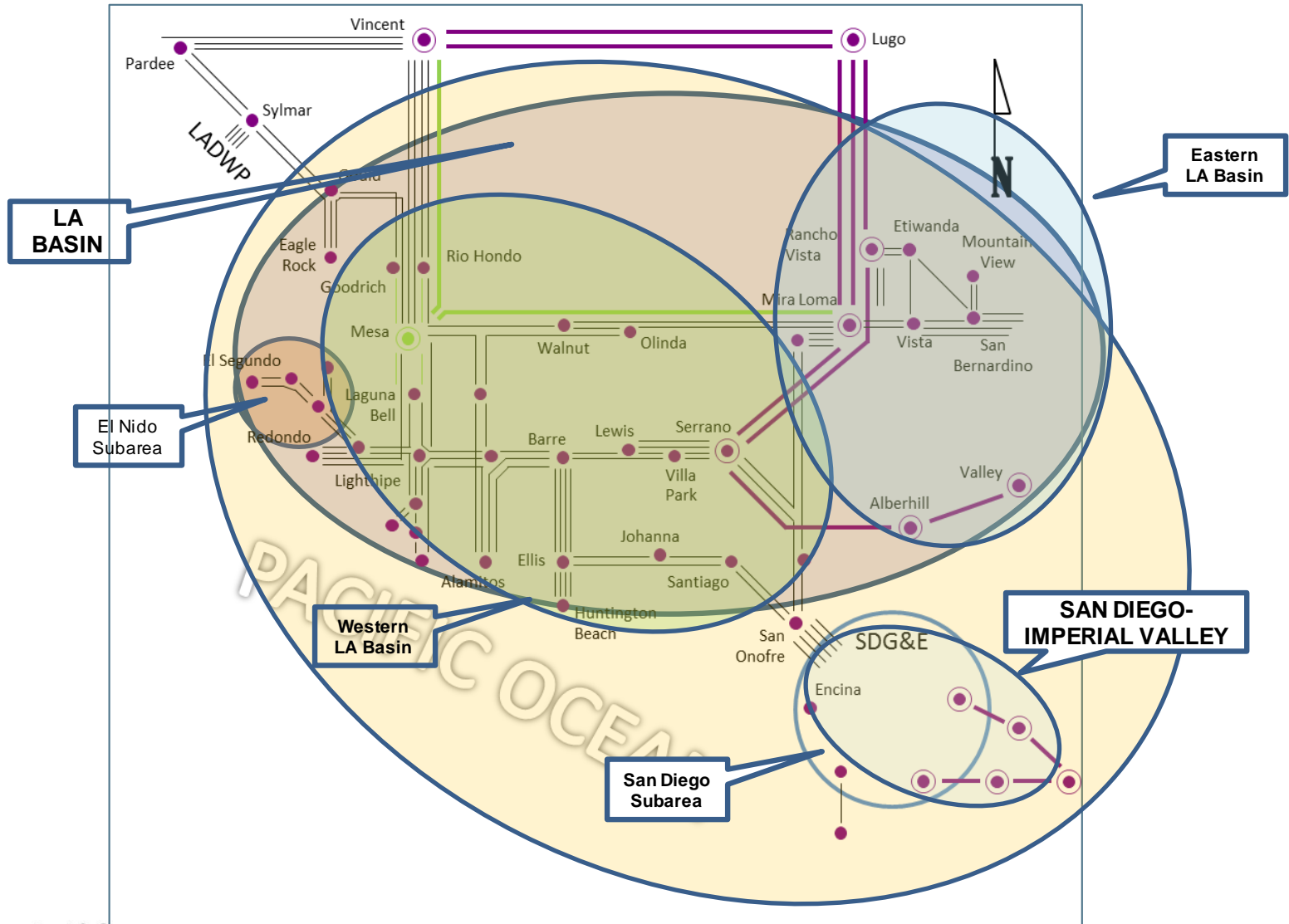
David Le  
Senior Advisor Regional Transmission Engineer

Stakeholder Call  
April 12, 2022

# Overview of the Final Study Results

- Providing final study results for the LA Basin and San Diego-Imperial Valley LCR areas and their bulk sub-areas
- Providing load shapes and estimated charging capability for energy storage for the LCR areas and sub-areas

# LA Basin and San Diego-Imperial Valley Areas



# Major New Transmission and Resource Assumptions

Project Name	Service Areas	Expected ISD	Modeled in 2023 LCR case	Modeled in 2027 LCR case
<b>New Transmission Projects</b>				
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	Q2 2023	√	√
Southern Orange County Reliability Enhancement	SDG&E	12/2023		√
Mesa – Laguna Bell 230kV Line Reconductoring	SCE	12/2023		√
Ten West Link Project (Delaney-Colorado 500kV Line)	APS/SCE	4/2024		√
<b>New Resource Projects</b>				
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 San Diego-Imperial Valley area	SDG&E	2022-2025	√	√

## LA Basin Area: Loads and Resources

Loads (MW)	2023	2027	Resources NQC* (MW)	2023	2027
Gross Load	20856	22158	Market, Net Seller, Wind, IFM Battery	8162	5960
AAEE	-158	-382	Muni	966	966
Behind the meter DG (production)	-1450	-2159	QF	114	114
<b>Net Load</b>	<b>19248</b>	<b>19617</b>	LTPP LCR Preferred Resources (BTM BESS, EE, DR, PV)	165	165
Transmission Losses	289	294	Existing Demand Response	243	243
Pumps	0	0	Solar generation	11	11
<b>Loads + Losses + Pumps</b>	<b>19537</b>	<b>19911</b>	<b>Total Qualifying Capacity</b>	<b>9661</b>	<b>7459</b>

\*August NQC for RA accounting purpose

# San Diego-Imperial Valley Area: Loads and Resources

<b>Loads (MW)</b>	<b>2023</b>	<b>2027</b>	<b>Resources NQC* (MW)</b>	<b>2023</b>	<b>2027</b>
Gross Load	4649	4924	Market, Net Seller, Wind	3763	3763
AAEE	-28	-66	Solar (production is "0" at 20:00 hr.)	396	396
Behind-the-meter DG	0	0	QF	2	2
<b>Net Load</b>	<b>4621</b>	<b>4858</b>	LTPP Preferred Resources	0	0
Transmission Losses	147	137	Existing Demand Response	26	26
Pumps	0	0	Battery, Hybrid Resources	1171	1601
<b>Loads + Losses</b>	<b>4768</b>	<b>4995</b>	<b>Total</b>	<b>5358</b>	<b>5788</b>

\*August NQC for RA accounting purpose

## El Nido Sub-area LCR (LA Basin)

Year	Category	Limiting Facility	Contingency	LCR (MW)	2022 and 2026 LCR (MW)
2023	P7	La Fresa-La Cienega 230 kV	La Fresa – El Nido #3 & 4 230 kV lines	294	356
2027	P7	La Fresa-La Cienega 230 kV	La Fresa – El Nido #3 & 4 230 kV lines	341	361

### Reasons for the changes in the LCR needs:

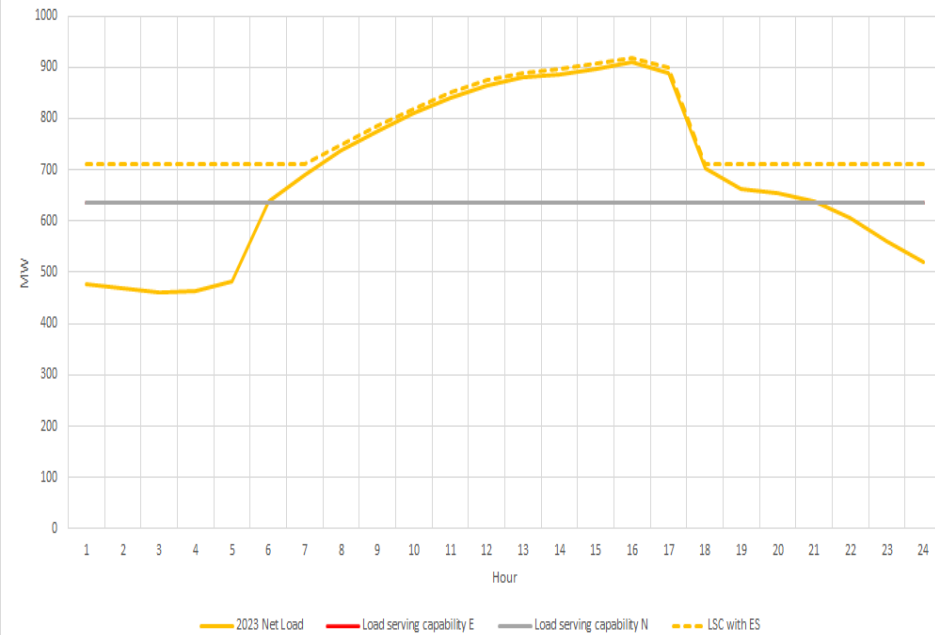
- LCR need decreases due to lower demand forecast for the El Nido sub-area (2023 and 2027)

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

El Nido Sub-area:

2023 projected pk day load profile & approx. LSC (trans + LCR Gen + ES)

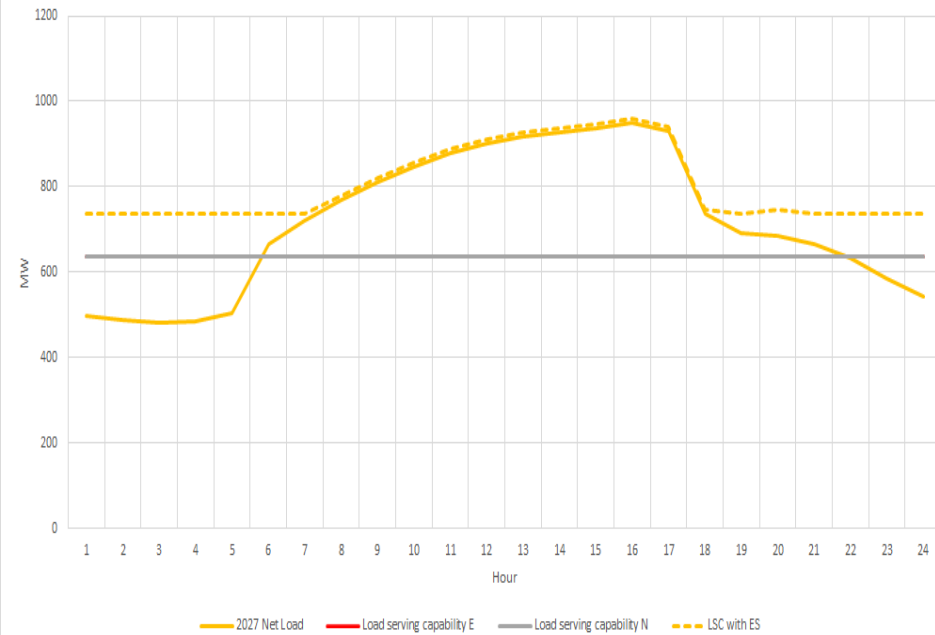
Approx storage size that can be added to this area from charging restriction perspective = 220 MW and 1489 MWh. Max 4-hr storage = 90 MW



El Nido Sub-area:

2027 projected pk day load profile & approx. LSC (trans + LCR Gen + ES)

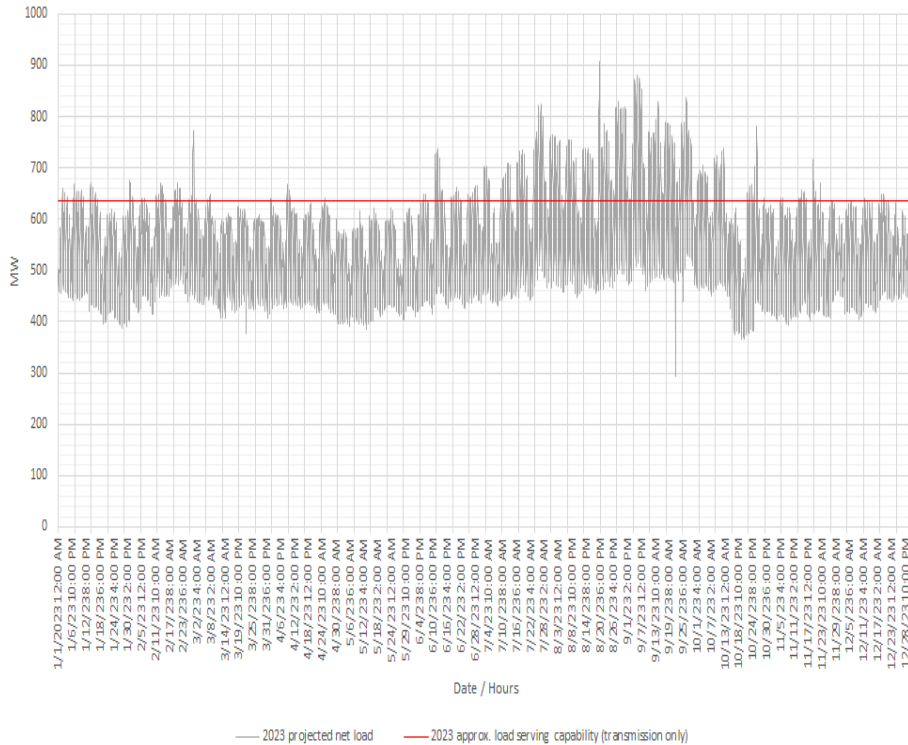
Approx storage size that can be added to this area from charging restriction perspective = 239 MW and 1609 MWh. Max 4-hr storage = 115 MW



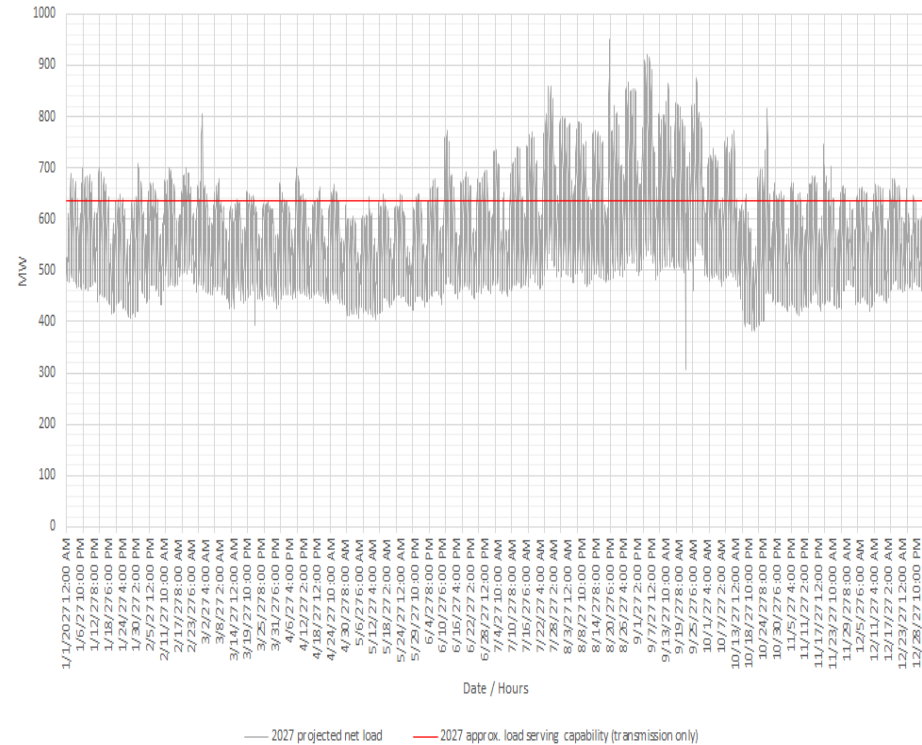


# El Nido Subarea Load Shape and Estimated Energy Storage Charging Capability Under Critical Contingency (cont'd)

El Nido Sub-area:  
2023 projected load profile & approx. load serving capability (transmission only)



El Nido Sub-area:  
2027 projected load profile & approx. load serving capability (transmission only)



# Western LA Basin Sub-area LCR

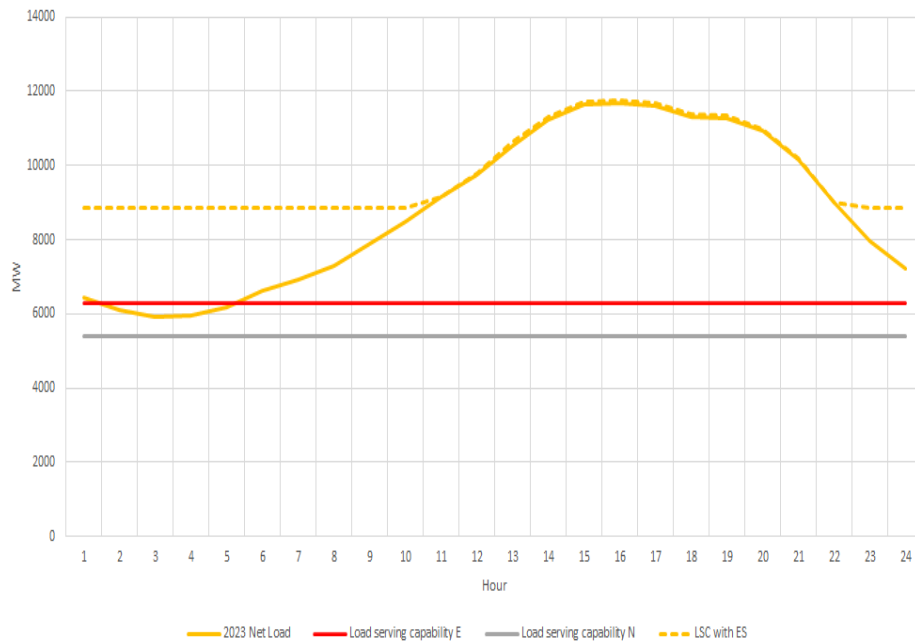
Year	Category	Limiting Facility	Contingency	LCR (MW)	2022 and 2026 LCR (MW)
2023	P7	San Onofre – San Luis Rey #1 230 kV line (line flow in the South to North direction)	San Onofre – San Luis Rey #2 and #3 230 kV lines	5487	4443
2027	P7	San Onofre – San Luis Rey #1 230 kV line (line flow in the South to North direction)	San Onofre – San Luis Rey #2 and #3 230 kV lines	3489	3865

## Reasons for the changes in the LCR needs:

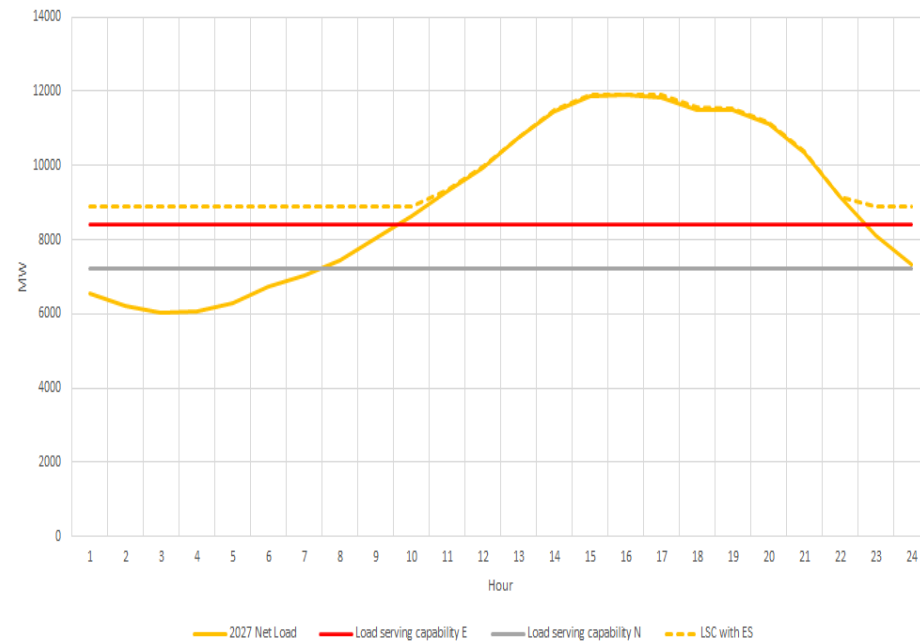
- 2023 - the 2023 LCR need is higher than 2022 LCR need due the following:
  - Higher demand forecast for the western LA Basin
  - New identified constraint due to higher demand as well as resources moving in the northbound direction to the LA Basin from San Diego
- 2027 - the LCR need is lower than the 2026 LCR and 2023 LCR need due to the following:
  - Higher peak demands in the San Diego area reduce flows northbound of San Onofre substation.
  - Implementation of the Mesa – Laguna Bell 230 kV line reconductoring, removing previously identified constraint.
  - Higher flows from east of Serrano substation into western LA Basin due to retirement of OTC generation as well as implementation of the Delaney-Colorado 500 kV line project (Ten West Link) that increases flow into southern California from the Southwest. This rebalances the flows into western LA Basin between flows from north of Mesa substation and flows from east of Serrano substation.

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

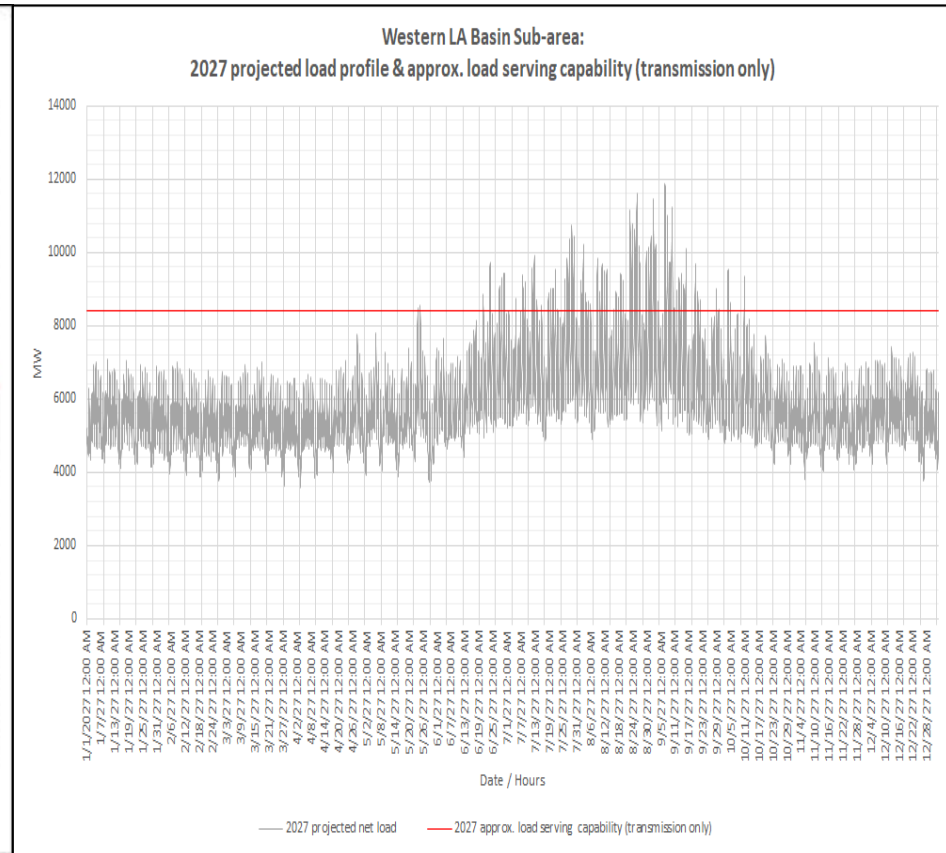
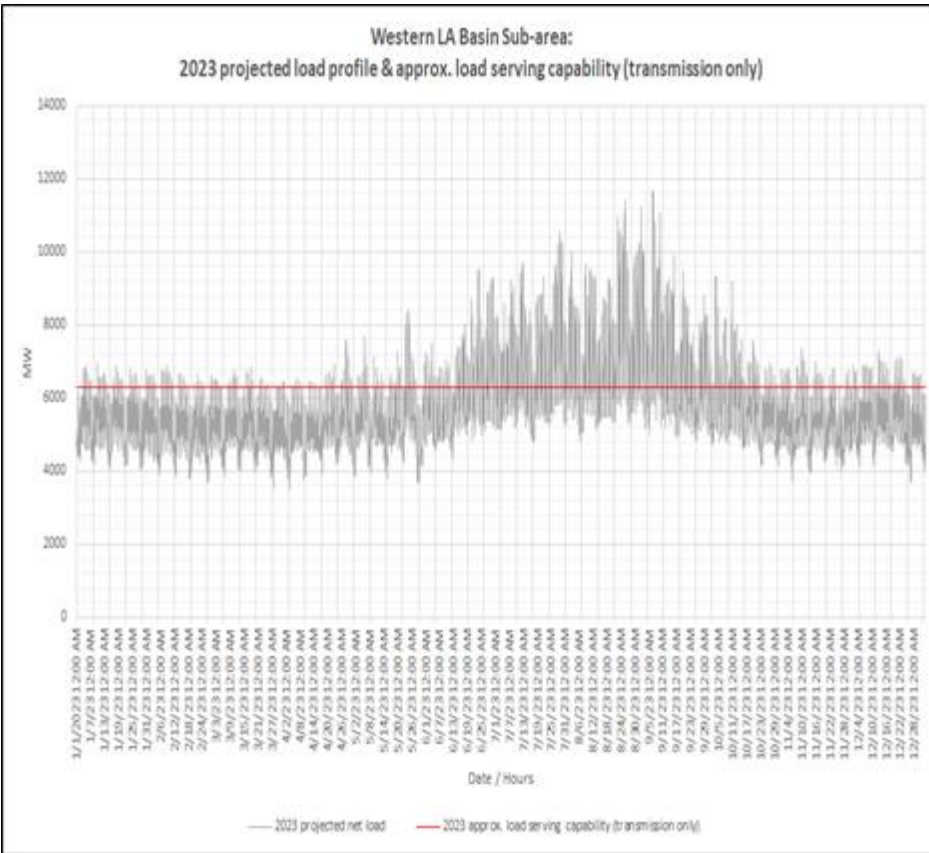
Western LA Basin Sub-area:  
 2023 projected pk day load profile & approx. LSC (trans + LCR Gen + ES)  
 Approx storage size that can be added to this area from charging restriction perspective =  
 2032 MW and 16553 MWh. Max 4-hr storage = 710 MW



Western LA Basin Sub-area:  
 2027 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 =  
 1820 MW and 14911 MWh. Max 4-hr storage = 570 MW



# Western LA Basin Subarea Load Shape and Estimated Energy Storage Charging Capability Under Critical Contingency (cont'd)



# Eastern LA Basin Sub-area LCR

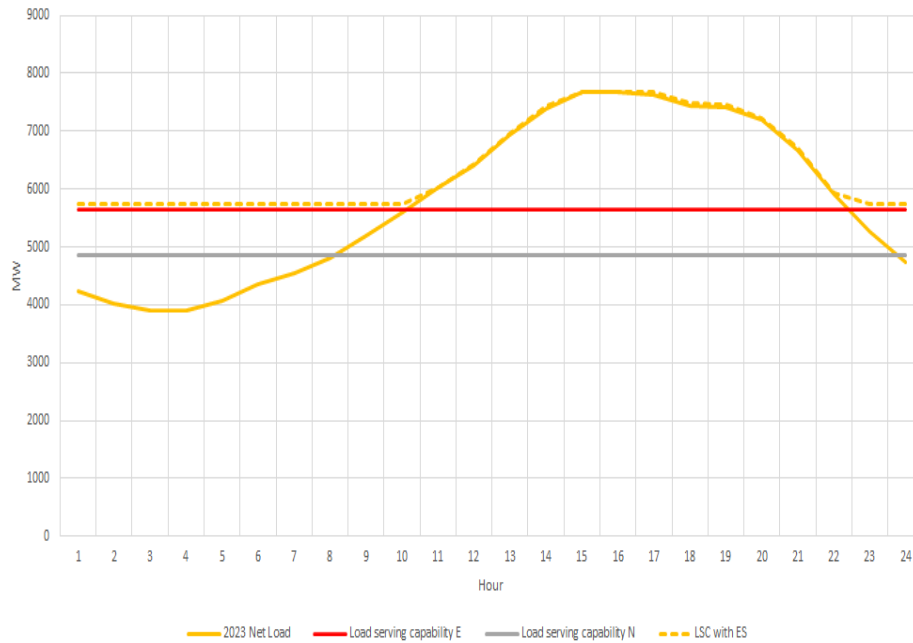
Year	Category	Limiting Facility	Contingency	LCR (MW)	2022 and 2026 LCR (MW)
2023	P7	San Onofre – San Luis Rey #1 230 kV line (line flow in the South to North direction)	San Onofre – San Luis Rey #2 and #3 230 kV lines	2042	2203
2027	P7	San Onofre – San Luis Rey #1 230 kV line (line flow in the South to North direction)	San Onofre – San Luis Rey #2 and #3 230 kV lines	2642	2494

## Reasons for the changes in the LCR needs:

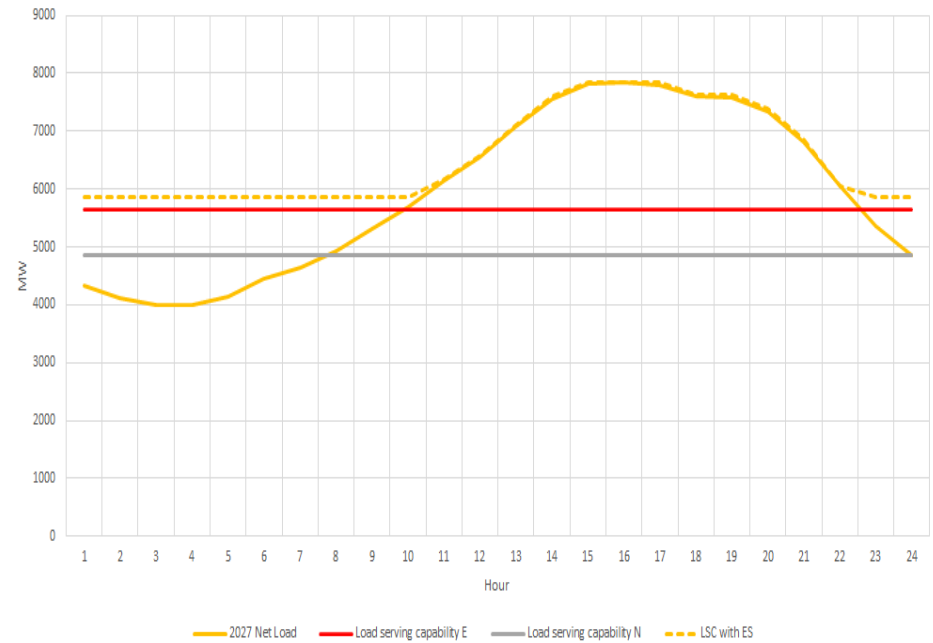
- 2023 - the LCR need for the eastern LA Basin is lower than the 2022 LCR due to the following:
  - Lower demand forecast for the sub-area
  - Different transmission constraint
  - Higher LCR need for the western LA Basin (see western LA Basin). Higher resource dispatch in the western LA Basin helps reduce the power transfer from the eastern to western LA Basin, thus reducing the LCR need in the eastern LA Basin.
- 2027 - the LCR need for the Eastern LA Basin is higher than the 2026 LCR due to the following:
  - Retirement of OTC generation in the Western LA Basin causes the need for additional dispatch in the Eastern LA Basin to help mitigate the constraint on the San Onofre – San Luis Rey 230kV line under contingency in the northbound flow direction.

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

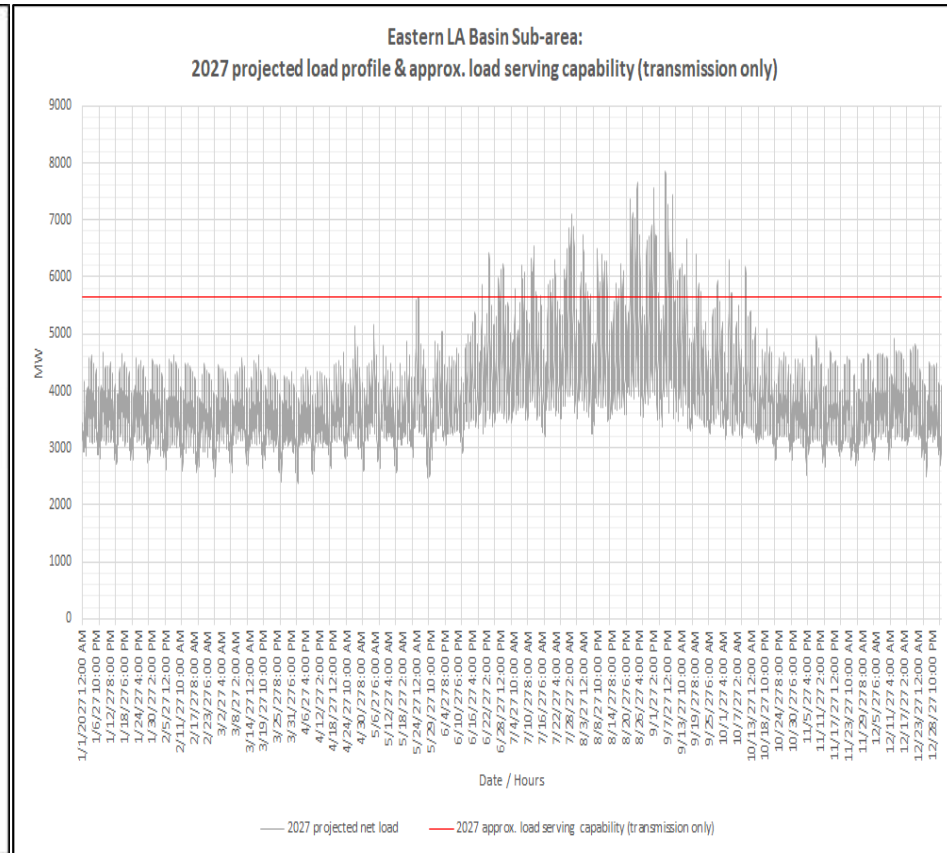
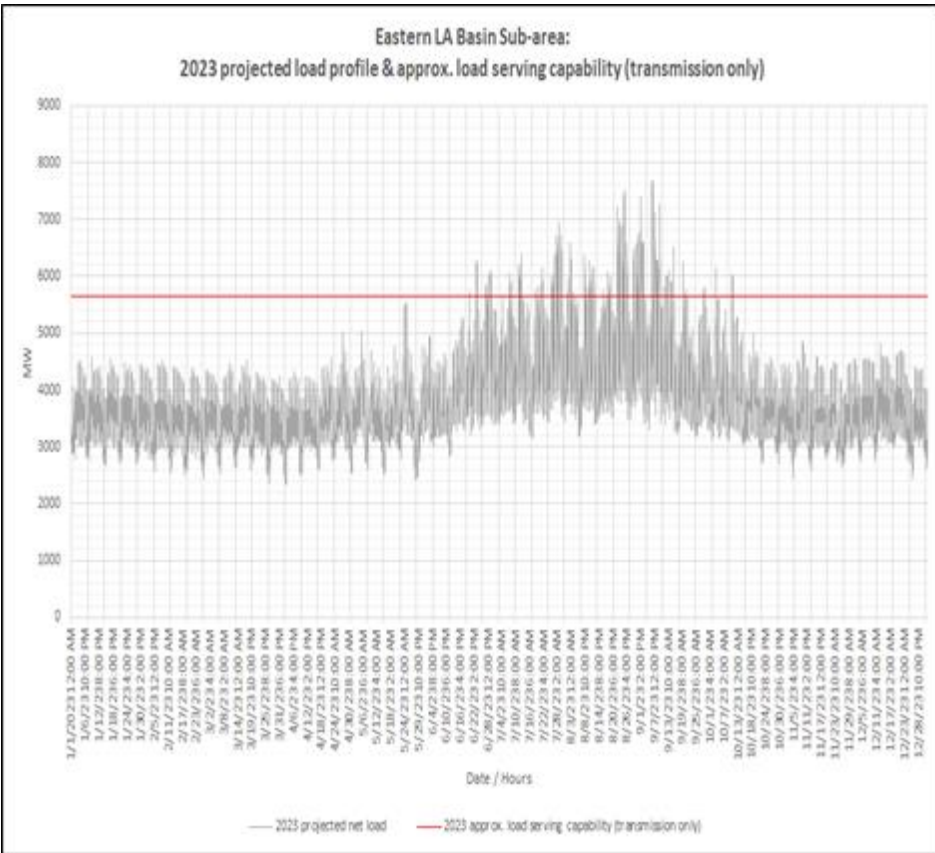
Eastern LA Basin Sub-area:  
 2023 projected pk day load profile & approx. LSC (trans + LCR Gen + ES)  
 Approx storage size that can be added to this area from charging restriction perspective =  
 1157 MW and 9577 MWh. Max 4-hr storage = 345 MW



Eastern LA Basin Sub-area:  
 2027 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 =  
 1194 MW and 9864 MWh. Max 4-hr storage = 350 MW



# Eastern LA Basin Subarea Load Shape and Estimated Energy Storage Charging Capability Under Critical Contingency (cont'd)





## Overall LA Basin LCR Need

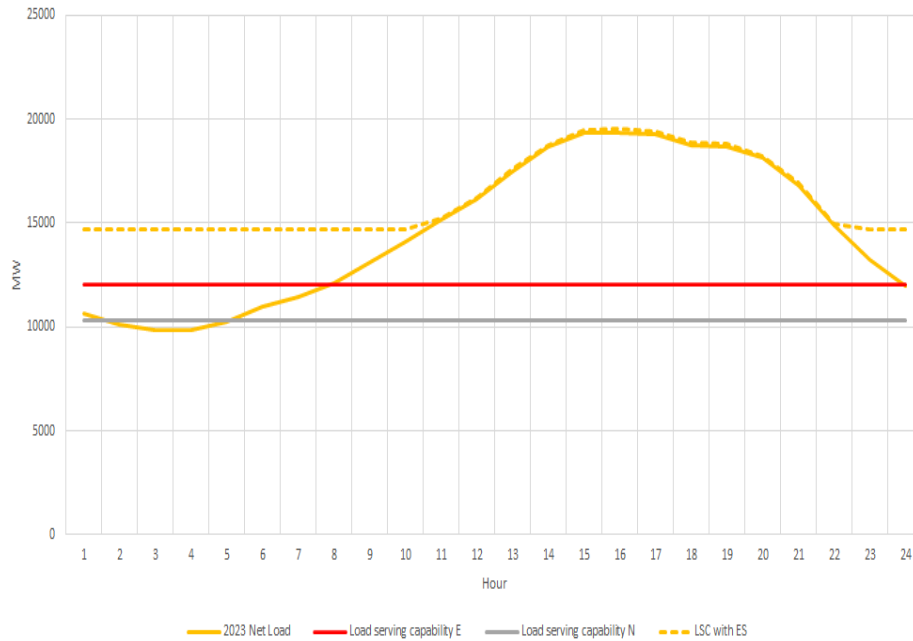
Year	Limiting Facility	Limiting Facility	Contingency	LCR (MW)	2022 and 2026 LCR (MW)
2023	Sum of Western and Eastern LA Basin LCR needs	See Western and Eastern LA Basin LCR results	See Western and Eastern LA Basin LCR results	7529	6646
2027	Sum of Western and Eastern LA Basin LCR needs	See Western and Eastern LA Basin LCR results	See Western and Eastern LA Basin LCR results	6131	6359

- 2023 – higher overall LA Basin LCR need is driven by new identified constraint due higher demand forecast in the LA Basin and higher San Onofre northbound flows into LA Basin.
- 2027 – lower overall LA Basin LCR need due to implementation of the Ten West Link project and higher West of River flows. This translates to higher flows from eastern LA Basin to western LA Basin and helps rebalancing the flows into western LA Basin, as well as reducing San Onofre northbound flows.

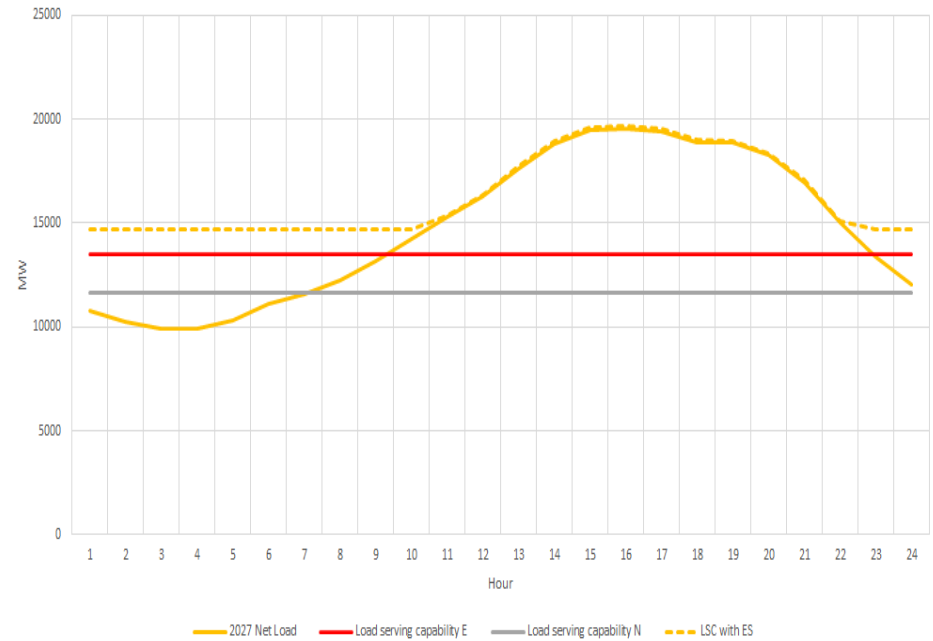


# Overall LA Basin Area Load Shape and Estimated Energy Storage Charging Capability Under Critical Contingency

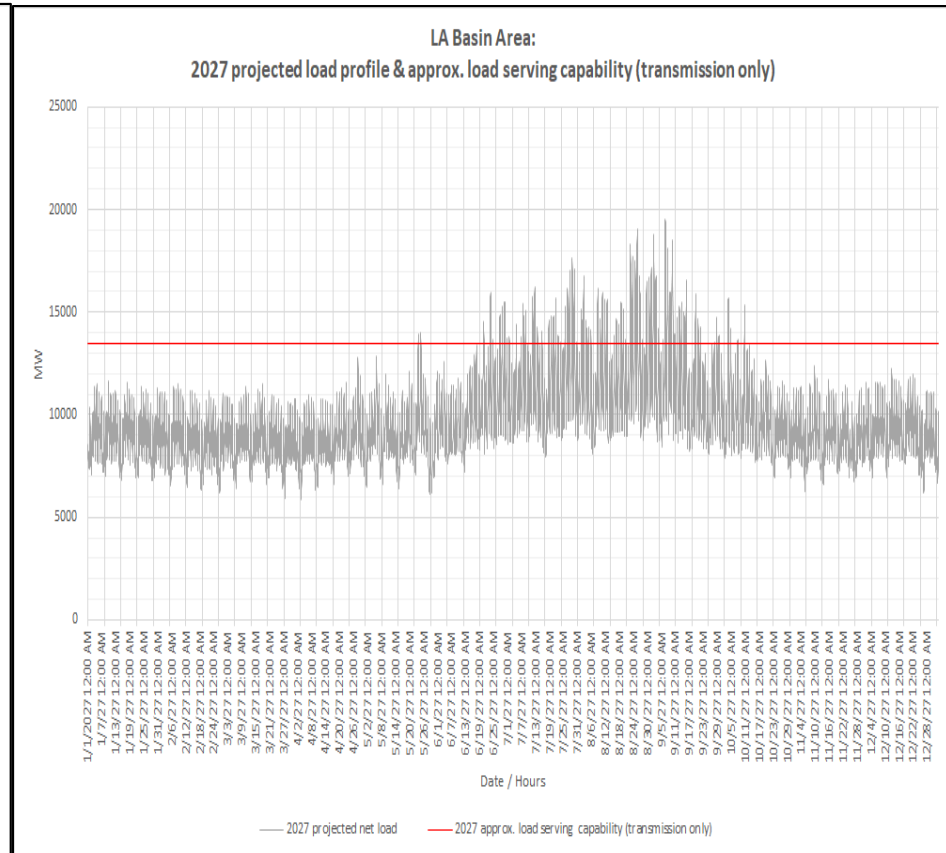
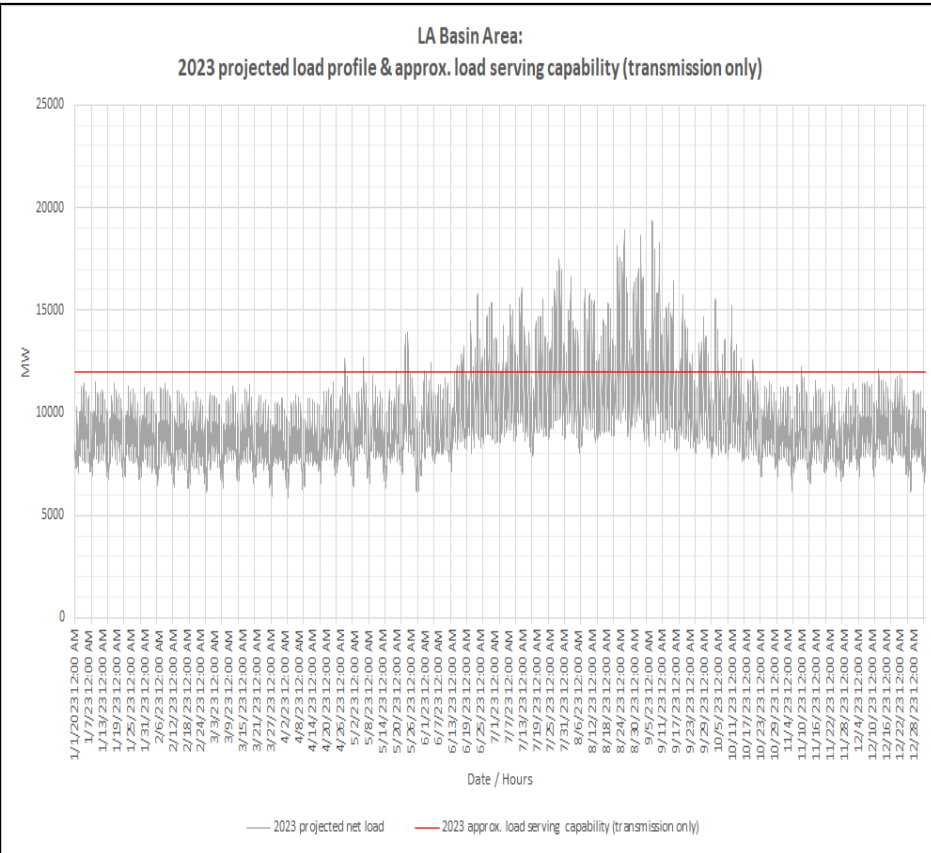
LA Basin Area:  
 2023 projected pk day load profile & approx. LSC (trans + LCR Gen + ES)  
 Approx storage size that can be added to this area from charging restriction perspective =  
 3200 MW and 26191 MWh. Max 4-hr storage = 1120 MW



LA Basin Area:  
 2027 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 =  
 3120 MW and 25779 MWh. Max 4-hr storage = 1085 MW



# Overall LA Basin Area Load Shape and Estimated Energy Storage Charging Capability Under Critical Contingency (cont'd)



# San Diego Bulk Sub-area LCR

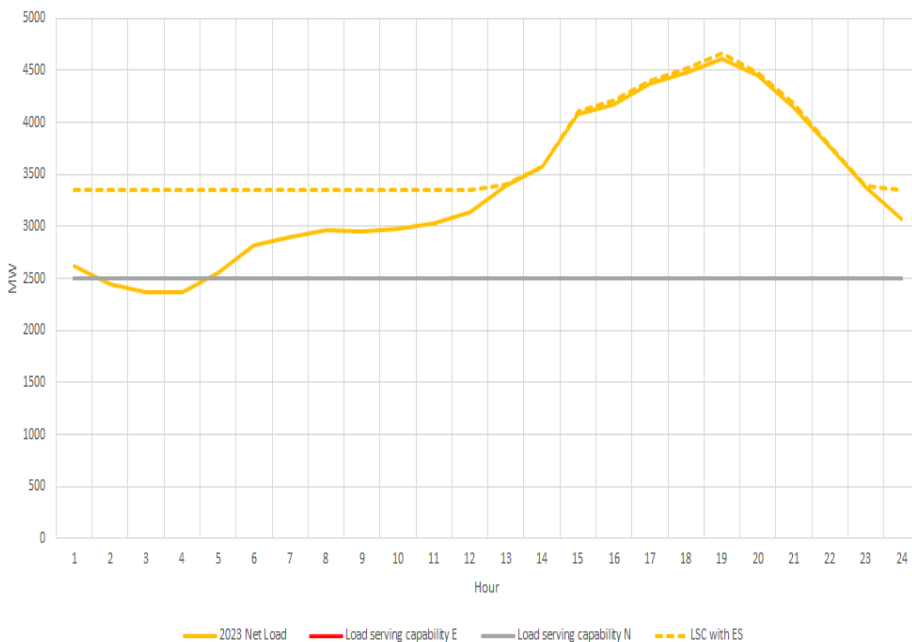
Year	Category	Limiting Facility	Contingency	LCR (MW)	2022 and 2026 LCR (MW)
2023	P6	1. Remaining Sycamore-Suncrest 230 kV line 2. Tijuana – Otay Mesa 230 kV line	ECO-Miguel 500 kV line, system readjustment, followed by one of the Sycamore-Suncrest 230 kV	2659	2097
2027	P6	Remaining Sycamore-Suncrest 230 kV line	ECO-Miguel 500 kV line, system readjustment, followed by one of the Sycamore-Suncrest 230 kV	3369	2790

## Reasons for the changes in the LCR needs:

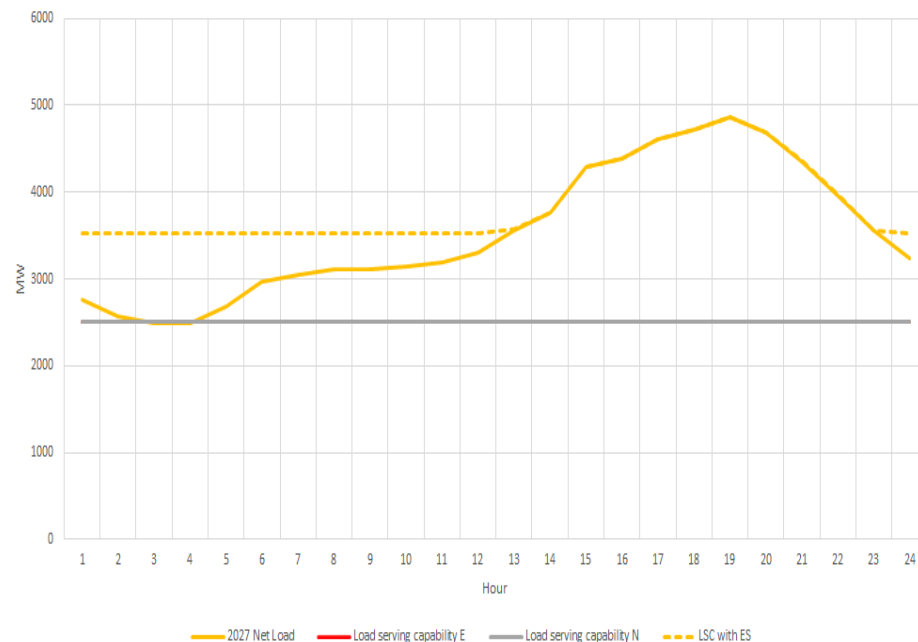
- 2023 - the LCR need is higher due to higher demand forecast from the CEC for the San Diego area.
- 2027 - the LCR is higher due to higher demand forecast.

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

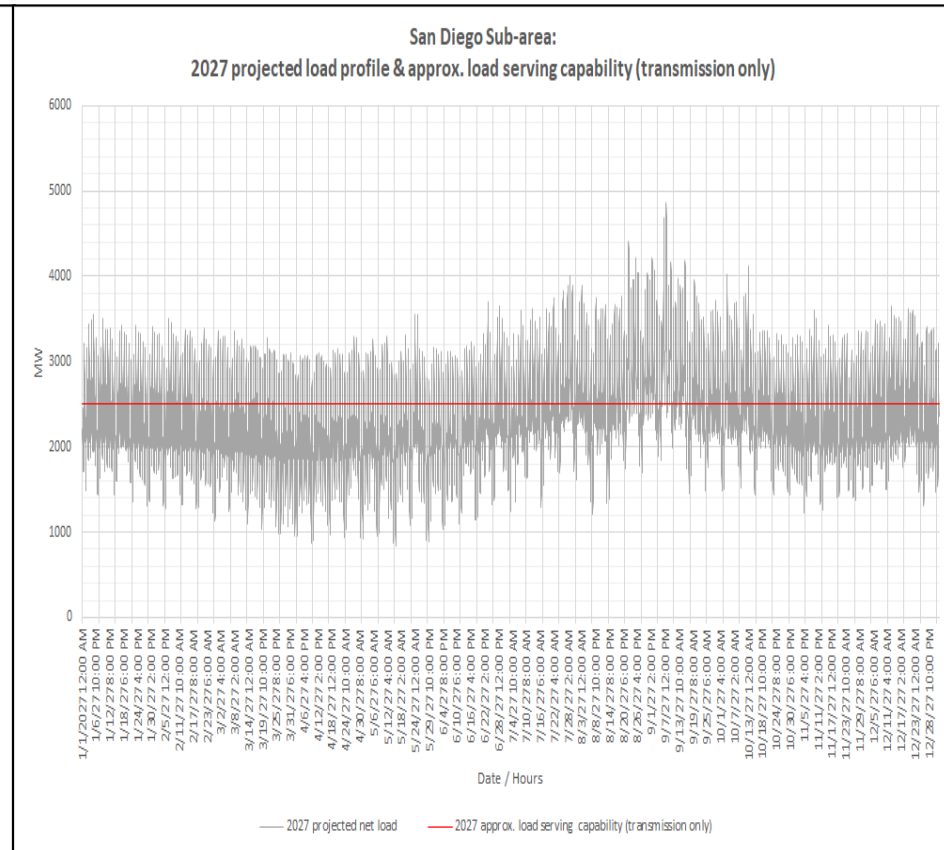
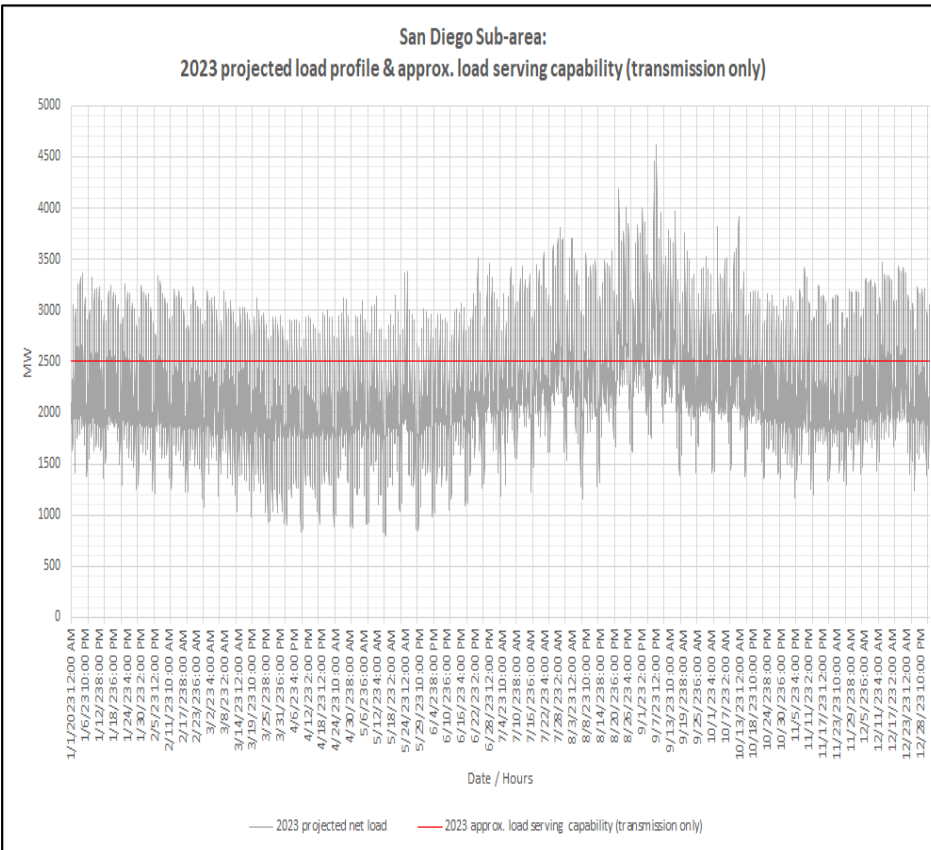
San Diego Sub-area:  
 2023 projected pk day load profile & approx LSC (trans+LCR Gen+ES)  
 Approx storage size that can be added to this area from charging restriction perspective=1353MW and 7814MWh. Max 4-hr storage=850 MW



San Diego Sub-area:  
 2027 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=1634.5MW and 8076MWh. Max 4-hr storage=991.5 MW



# San Diego Bulk Subarea Load Shape and Estimated Energy Storage Charging Capability Under Critical Contingency (cont'd)



# Overall San Diego – Imperial Valley Area LCR

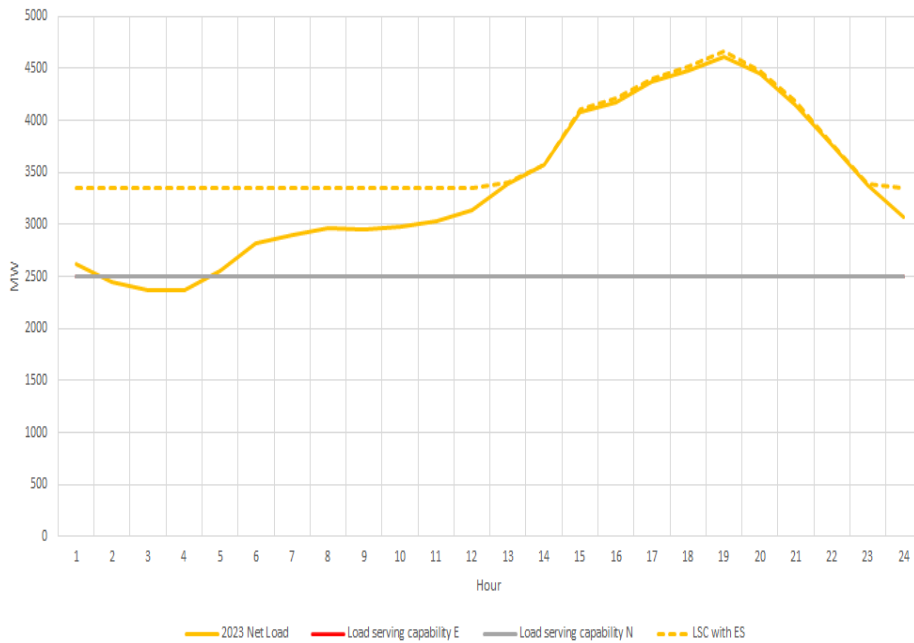
Year	Category	Limiting Facility	Contingency	LCR (MW)	2022 and 2026 LCR (MW)
2023 (with S Line upgrades)	P3	1. Yucca-Pilot Knob 161 kV line, Pilot Knob-EI Centro 161 kV line, Yucca 161/69 kV transformers 2. Calipat-CSF Tap 92 kV	G-1 of TDM generation, system readjustment, followed by Imperial Valley-North Gila 500 kV line (N-1)	3332	3993
2023 (Sensitivity with S Line upgrades delayed )	P3	Imperial Valley – EI Centro 230kV line (S line)	G-1 of TDM generation, system readjustment, followed by Imperial Valley-North Gila 500 kV line (N-1)	3855	3993
2027	P6	Same constraint as in the San Diego bulk subarea	Same contingency as in the San Diego subarea	3369	3394

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

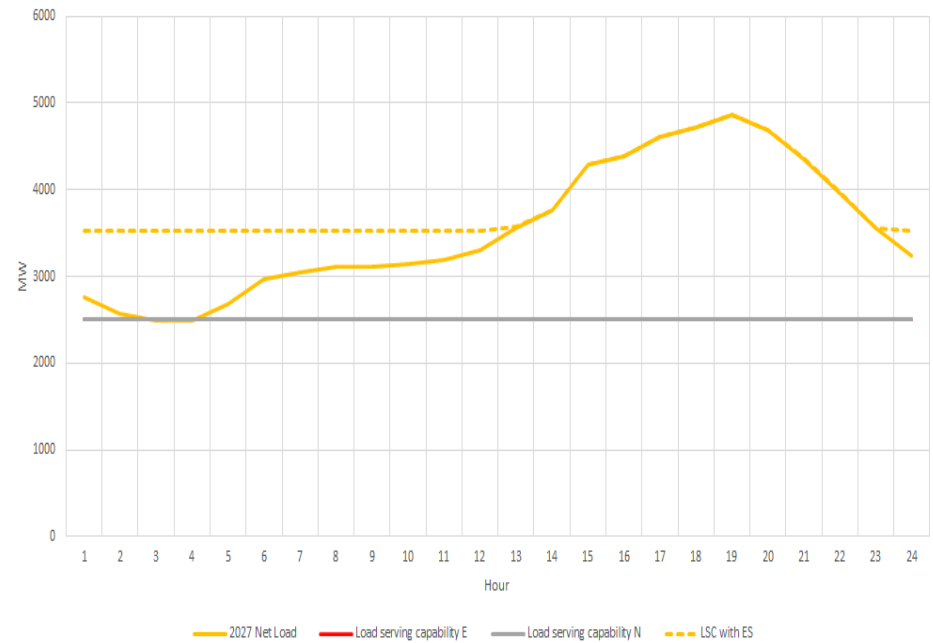
- 2023 – the LCR for the area is lower due to: (a) implementation of the S-line upgrade project; (b) transmission upgrades in IID (i.e., addition of EI Centro 230/92 kV Bank #2); and (b) utilization of APS and WAPA RAS/protection schemes for the Yucca and Gila 161/69kV transformers under contingency condition.
- 2027 – the LCR need for the overall San Diego-Imperial Valley area is the same as the LCR need for the San Diego bulk sub-area. The dispatch of battery energy storage system located in effective locations, coupled with existing conventional resources in the San Diego bulk sub-area, also meets the LCR need for the overall San Diego-Imperial Valley area.

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

San Diego-Imperial Valley Area:  
 2023 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=1353MW and 7814MWh. Max 4-hr storage=850 MW

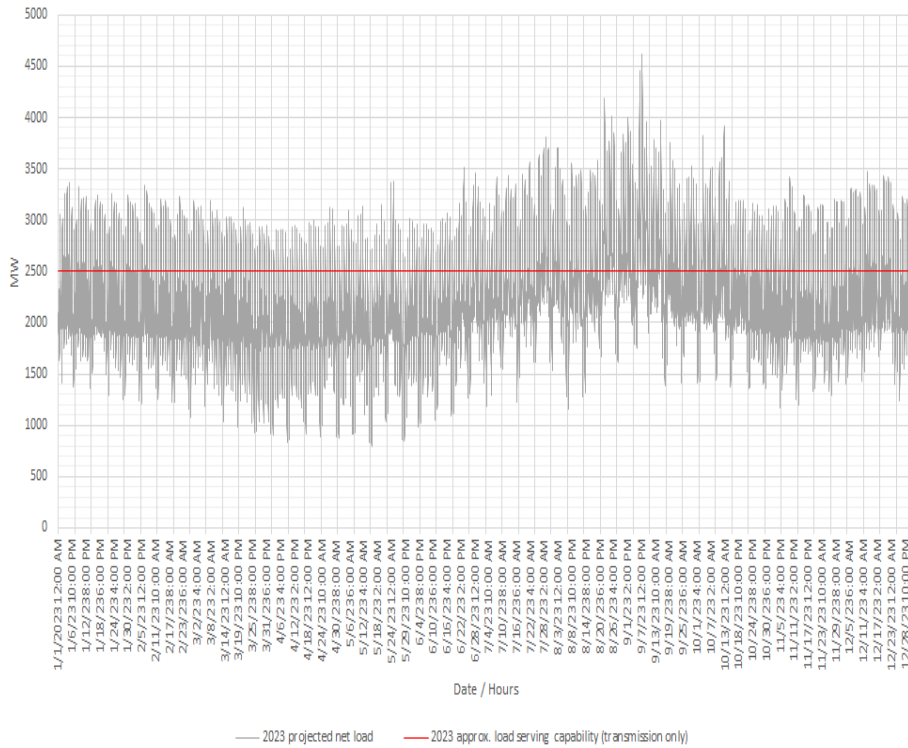


San Diego-Imperial Valley Area:  
 2027 projected pk day load profile & approx LSC (trans+LCR Gen+ES)  
 Approx storage size that can be added from charging restriction perspective=1634.5MW and 8076MWh. Max 4-hr storage=991.5 MW

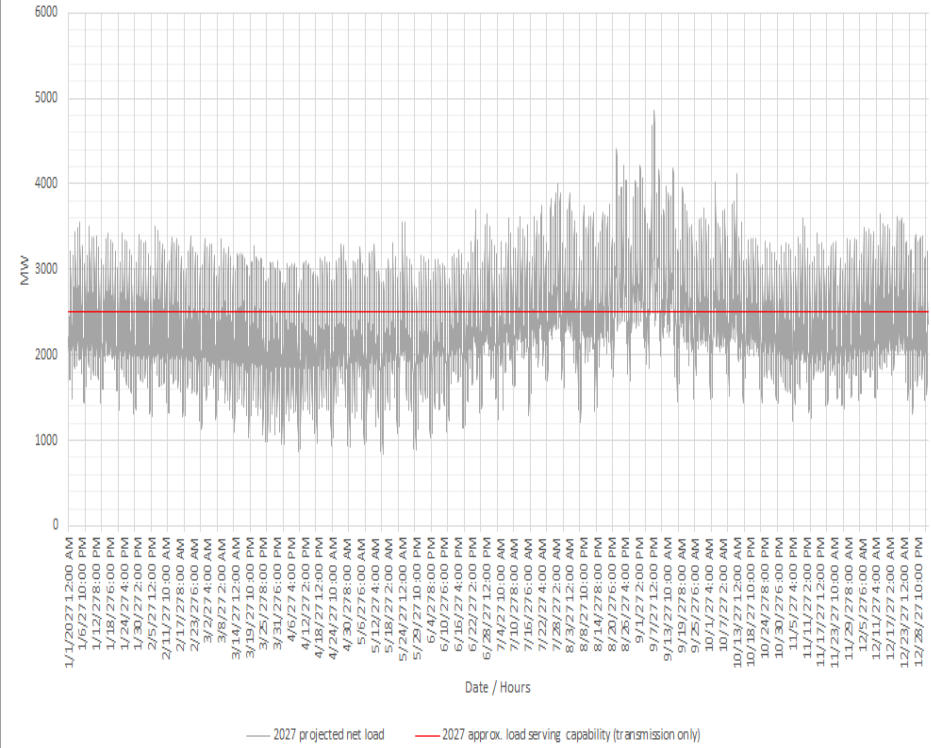


# Overall San Diego-Imperial Valley Area Load Shape and Estimated Energy Storage Charging Capability Under Critical Contingency (cont'd)

San Diego-Imperial Valley Area:  
2023 projected load profile & approx. load serving capability (transmission only)



San Diego-Imperial Valley Area:  
2027 projected load profile & approx. load serving capability (transmission only)





# Changes Compared to Previous LCR Requirements

Subarea	2022		2023		2026		2027	
	Load	LCR	Load	LCR	Load	LCR	Load	LCR
El Nido	969	356	909	294	978	361	950	341
Western LA Basin	11166	4443	11675	5487	11130	3865	11888	3489
Eastern LA Basin	7758	2203	7687	2042	8016	2494	7850	2642
Overall LA Basin	18924	6646	19537	7529	19146	6359	19911	6131
San Diego Subarea	4580	2097	4768	2659	4707	2790	4995	3369
Overall San Diego – Imperial Valley Area	4580	3993	4768	3332	4707	3394	4995	3369

- Please see the sub-areas and LCR area study result slides for further discussion on the reasons for the changes in LCR needs.