



California ISO

2019 & 2023 Final LCR Study Results LA Basin and San Diego-Imperial Valley Areas

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Stakeholder Call

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Major Transmission & Generation Assumptions

Assumptions for the 2019 LCR study case

- San Onofre synchronous condenser (240 MVAR)
- Encina generation retirement (946 MW)
- Carlsbad Energy Center (500 MW) in-service by Q4 2018 (*CPUC LTPP resource*)
- Imperial Valley phase shifting transformers (230/230kV 2x400 MVA)
- Sycamore – Penasquitos 230 kV transmission line
- Use of the existing 20-minute demand response in the LA Basin
- Partial implementation of long-term procurement plan (LTPP) for preferred resources that were approved by the CPUC for local capacity need in the western LA Basin (248 MW)
- Battery energy storage projects in San Diego area (78 MW)
- Bypassing series capacitors on the Imperial Valley-North Gila 500kV line, as well as the Sunrise and Southwest Powerlinks

Additional assumptions for the 2023 LCR study case

- Mesa Loop-In project (anticipated March 2022 in-service date at this time)
- Imperial Valley – El Centro 230 kV (“S” line) upgrades
- Alamitos, Huntington Beach and Redondo Beach generation retirement (for a total of 3,818 MW) by the end of 2020 timeframe to comply with the State Water Board’s OTC Policy
- Full implementation of long-term procurement plan (LTPP) for preferred resources that were approved by the CPUC for local capacity need in the western LA Basin (432 MW)
- Alamitos and Huntington Beach repowering (1284 MW) (*CPUC LTPP resource*)
- Stanton Energy Center (98 MW) with 10 MW battery energy storage system (*CPUC LTPP resource*)

LA Basin Area Loads & Resources

Loads

Year	A-bank Loads (MW)	Pump Loads	Transmission Losses (MW)	Total (MW)
2019	19,757	22	296	20,075
2023	19,754	22	296	20,072

The above total load for the LA Basin represents the geographic area load, which would correspond to the CEC demand forecast peak for the LA Basin, with Saugus substation load included.

Available Resources

Year	QF (MW)	Wind (MW)	Muni (MW)	Market (MW)	LTPP Preferred Resources (MW)	20-Minute DR (MW)	Mothballed (MW)	Maximum Qualifying Capacity (MW)
2019	279	124	1,164	8,295	248	321	435	10,866
2023	279	124	1,164	5,556	432	321	435	8,311

Available generation values for 2019 includes Etiwanda, which may be retired by June 1, 2018 per letter from NRG.

San Diego-Imperial Valley Area Load and Resources (MW)

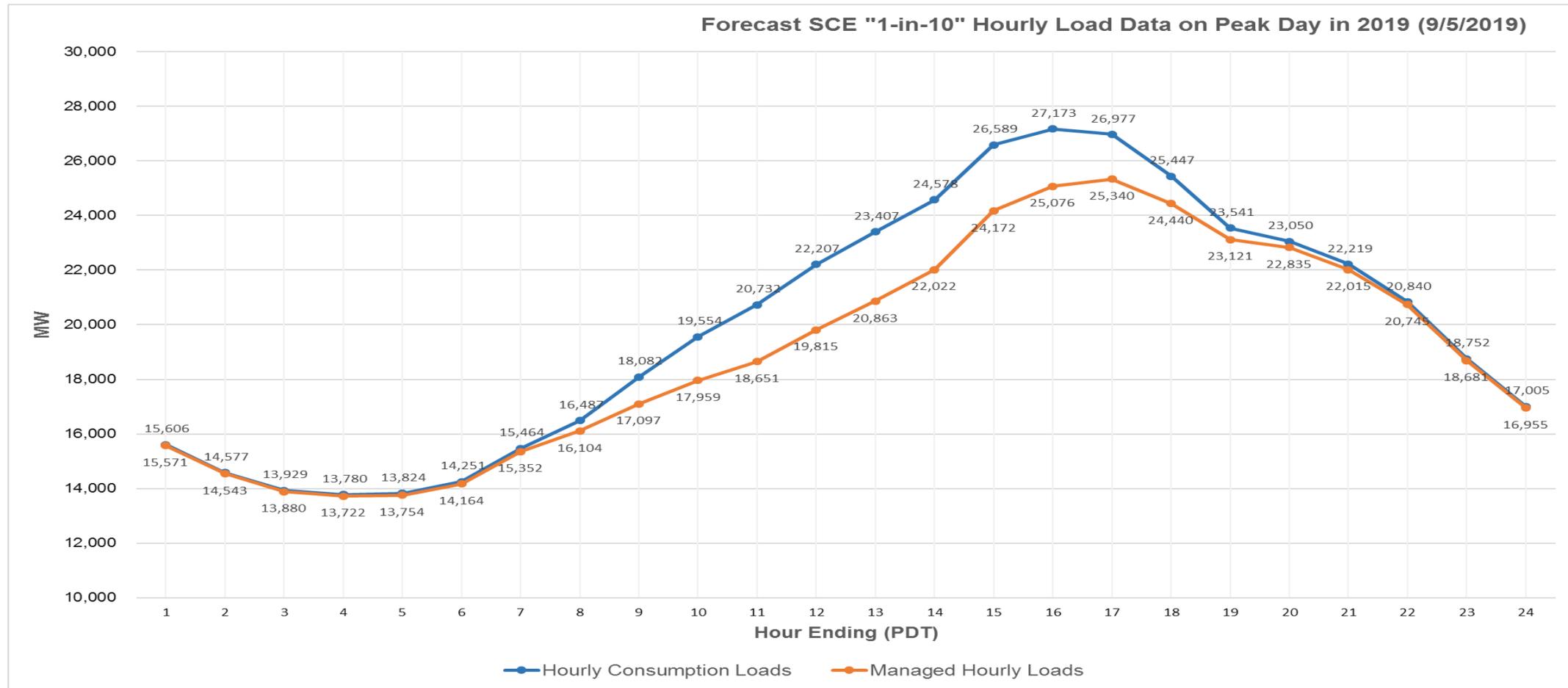
Loads

Year	Managed Peak Load (MW)	Pump Loads	Transmission Losses (MW)	Total (MW)
2019	4,295	0	117	4,412
2023	4,420	0	115	4,535

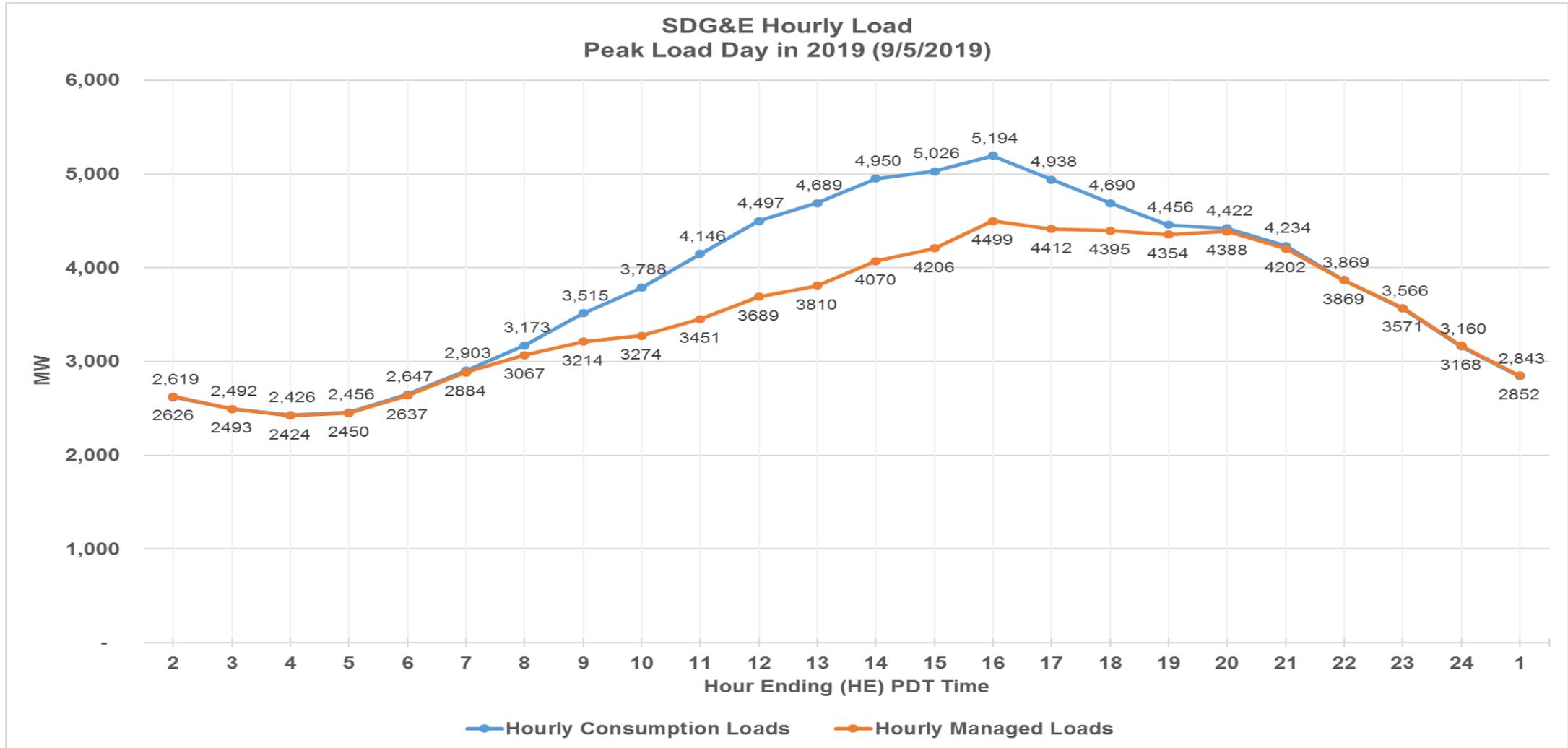
Available Resources

Year	QF/Self-gen (MW)	Wind (MW)	Market (MW)	Battery Storage (MW)	20-Minute DR (MW)	Maximum Qualifying Capacity (MW)
2019	106	187	4,001	78	19	4,391
2023	106	213	4,104	78	19	4,520

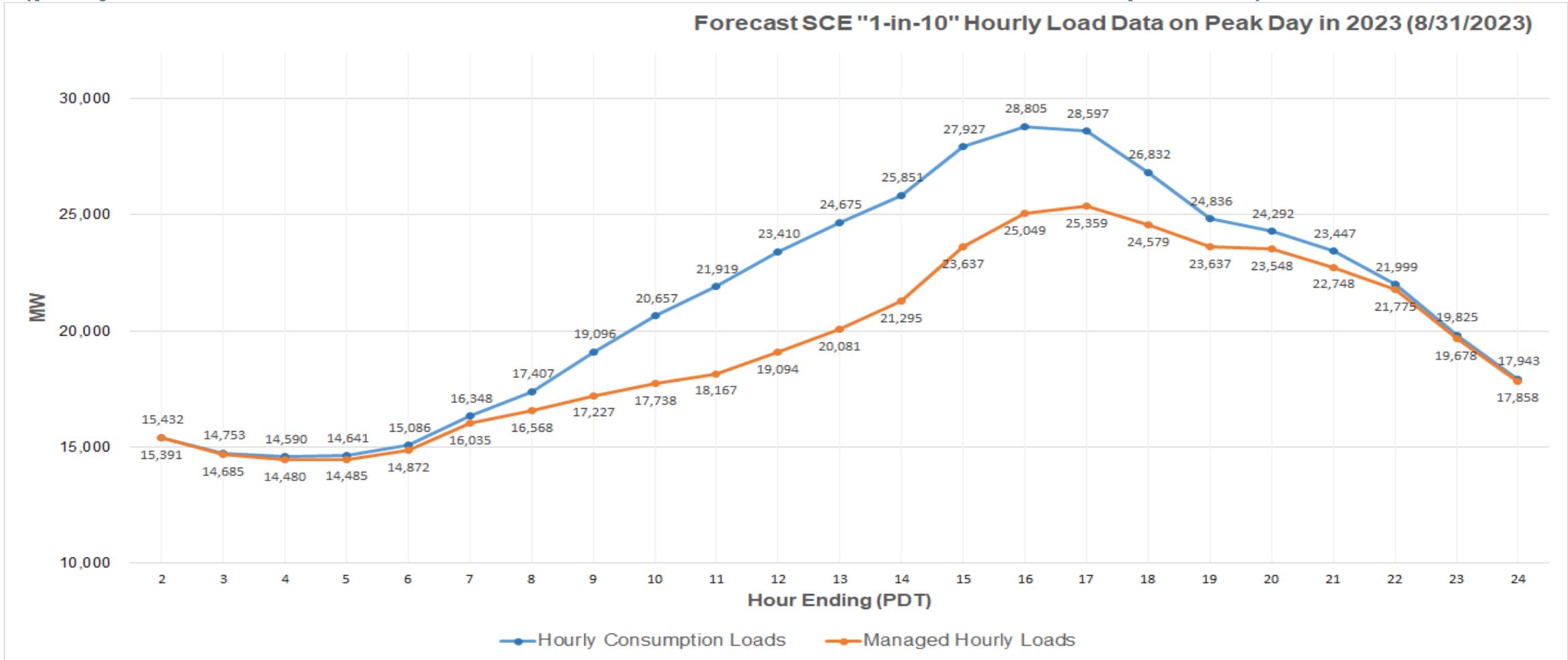
Hourly demand forecast for SCE service area on the peak day in 2019 (projected 1-in-10 load based on 1-in-2 load forecast profile)



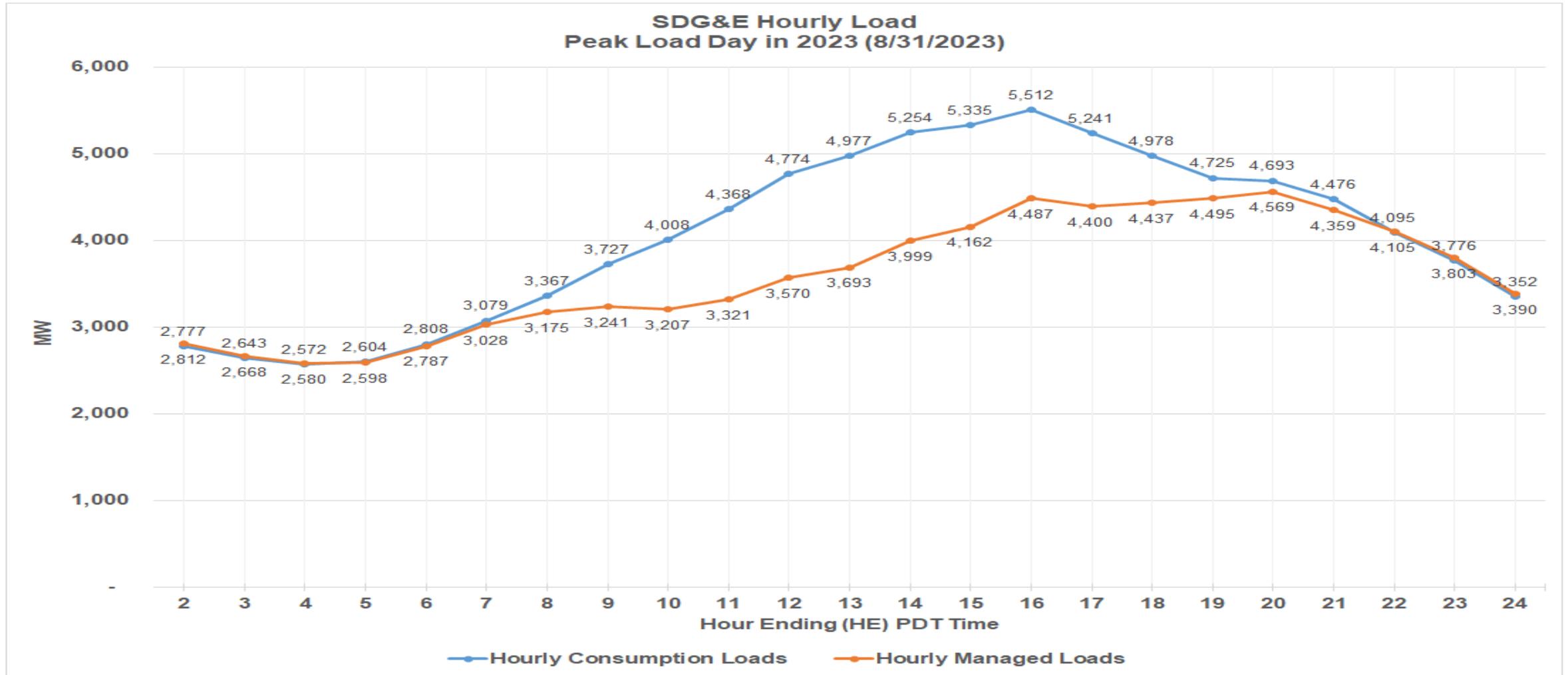
Hourly demand forecast for SDG&E service area on the peak day in 2019 (projected 1-in-10 load based on 1-in-2 load forecast profile)



Hourly demand forecast for SCE service area on the peak day in 2023 (projected 1-in-10 load based on 1-in-2 load forecast profile)



Hourly demand forecast for SDG&E service area on the peak day in 2023 (projected 1-in-10 load based on 1-in-2 load forecast profile)



Estimated derated factors to calculate simultaneous loads between SCE and SDG&E at each other's respective peak load hours

Year	SCE peak demand			SDG&E @ SCE peak demand			SDG&E peak demand			SCE @ SDG&E peak demand		
	Date/time (PDT)*	Hourly Managed Peak Demand (MW) from hourly plot	LSE/BA Table peak demand forecast (MW)**	Date/time (PDT)*	Hourly Managed Demand (MW) from hourly plot	% of own peak demand (from hourly managed demand plot)	Date/time (PDT)*	Hourly Managed Peak Demand (MW) from hourly plot (MW)	LSE/BA Table peak demand forecast (MW)**	Date/time (PDT)*	Hourly Managed Demand from hourly plot (MW)	% of own peak demand (from hourly managed demand plot)
2019	9/5/2019 17:00 hr.	25,340	25,410	9/2/2019 17:00 hr.	4412	98.07%	9/5/2019 16:00 hr.	4499	4,415	9/5/2019 16:00 hr.	25,076	98.96%
2023	8/31/2023 17:00 hr.	25,359	25,368	8/31/2023 17:00 hr.	4400	96.30%	8/31/2023 20:00 hr.	4569	4,554	8/31/2023 20:00 hr.	23,548	92.86%

Notes:

* All hour expressed in PDT hour ending (HE)

**Peak demand from the CEC posted 2017 CED Revised Forecast for LSE/BA Table for Mid Demand Level (1-in-10) with Low AAEE and AAPV

Critical Area Contingencies

El Nido Sub-area – Category C

Contingency: Hinson – La Fresa 230 kV line out followed by double-circuit tower line La Fresa - Redondo #1 and #2 230 kV lines

Limiting component: Voltage Collapse

- 2019 LCR need: 231 MW (including 12.5 MW of existing 20-minute DR, 23.7 MW LTPP preferred resources for LCR need)
- 2023 LCR need: 53 MW (including 12.5 MW of existing 20-minute DR, 23.7 MW LTPP preferred resources for LCR need)
 - ❖ Lower LCR requirements in 2023 due to implementation of the Mesa Loop-in Project

El Nido Sub-area – Category B

No requirements

Critical Area Contingencies

Western LA Basin Sub-area – Category C

Contingency (2019): Serrano – Villa Park #2 230 kV line, followed by Serrano – Lewis #1 or #2 230 kV line, or vice versa

- Limiting component: Serrano – Villa Park #1 230 kV line
- 2019 LCR need: 3,993 MW (including 162 MW of existing DR and 248 MW of CPUC-approved LTPP preferred resources for LCR need)

Contingency (2023): Mesa – Redondo #1 230 kV line, followed by Mesa - Lighthipe 230 kV line, or vice versa

- Limiting component: thermal loading on the Mesa-Laguna Bell #1 230kV line
- 2023 LCR need: 3,970 MW (this includes 162 MW of existing DR and 432 MW of CPUC-approved LTPP preferred resources for LCR need)

Western LA Basin Sub-area – Category B

Non binding – multiple combinations possible.

Critical Area Contingencies

Eastern LA Basin Subarea – Category C

Contingency (2019): Serrano-Valley 500kV line, followed by Devers – Red Bluff 500kV #1 and 2 lines

- Limiting component: post-transient voltage stability
- 2019 LCR need: 2,956 MW (including 159 MW of existing 20-minute DR)

Contingency (2023): Alberhill – Serrano 500 kV line, followed by an N-2 of Red Bluff – Devers #1 & #2 500 kV lines

- Limiting component: post-transient voltage instability
- 2023 LCR need: 2,702 MW (this includes 159 MW of existing 20-minute DR)

Observations:

- The Mesa Loop-in Project, implemented by March 2022, helps reduce the LCR need in the eastern LA Basin in 2023 as it balances the flow into the LA Basin from both direction: east and north.
- The LCR for the eastern LA Basin are higher than the previous 2018 and 2022 assessments due to higher CEC demand forecast for SCE service area

Combined Overall LA Basin and San Diego-Imperial Valley LCR Assessment

Combined Overall LA Basin and San Diego-Imperial Valley LCR Assessment

- Due to electrical interdependency, the overall LA Basin and San Diego – Imperial Valley area studies are closely coordinated in the LCR study.
- The San Diego-Imperial Valley area is evaluated first due to its position as the southernmost area and power flow typically flows in the north to south direction with the outages that isolate SDG&E system from major import tie lines connecting to the WECC system that lie east of San Diego. The San Diego-Imperial Valley LCR need will be determined based on the outages that affect this area.
- Once the preliminary LCR need is determined for the San Diego – Imperial Valley area, the LA Basin LCR need will be evaluated next based on the contingencies that would most affect the LA Basin.
- The ISO then checks for the San Diego – Imperial Valley area again to check for adequacy and to optimize its LCR need if possible.
- This effort goes back and forth several times until further LCR reduction can no longer be achieved for these two areas.

Overall San Diego-Imperial Valley Critical Contingencies

Category B & C

Contingency (2019): G-1/L-1 TDM, system readjustment, followed by Imperial Valley-North Gila 500kV line

- Limiting component: Imperial Valley – El Centro 230 kV line (“S” line) thermal loading
- 2019 LCR need: 4,026 MW (including 77 MW of battery energy storage)
 - Use of LA Basin 20-minute DR and CPUC-approved LTPP preferred resources as well as the Imperial Valley phase-shifting transformers to help lower the overall San Diego-Imperial Valley LCR need

Contingency (2023): G-1/L-1 TDM, system readjustment, followed by Imperial Valley-North Gila 500kV line

- Limiting component: El Centro 230/92 kV transformer thermal loading
- 2023 LCR need: 4,132 MW (including 78 MW of battery energy storage)
 - The CEC forecast higher peak demand for SDG&E service area for 2023 when compared to 2019 timeframe
 - Use of the latest available (i.e., 2018) net qualifying capacity (NQC) values (based on ELCC methodology) for the study as NQC values for future timeframe are not available
 - Use of LA Basin 20-minute DR and CPUC-approved LTPP preferred resources as well as the Imperial Valley phase-shifting transformers to help lower the overall San Diego-Imperial Valley LCR need

Overall San Diego-Imperial Valley Critical Contingencies (cont'd)

Observations:

- Lower solar NQC, based on the latest ELCC methodology, for resources located in the more effective areas causes the need to use more MWs from less effective resources for the most critical constraint.
- The S-line upgrades provide an estimated 260 MW of LCR reduction benefits.
- The 20-minute DR and CPUC-approved LTPP preferred resources in the LA Basin help lower the LCR need further in the San Diego-Imperial Valley area by up to an additional 200 MW.
- The use of the Imperial Valley phase-shifting transformers, in reducing the Imperial Valley – La Rosita 230 kV line flow to a minimum under contingency condition, also helps reducing the LCR need (about 96 MW) for the overall San Diego-Imperial Valley area.

San Diego Sub-area Critical Contingencies

Category C (2019 & 2023)

Contingency: N-1/N-1 ECO-Miguel 500 kV line, system readjustment, followed by one of the Sycamore-Suncrest 230 kV lines

Limiting component: Thermal loading concern on the remaining Sycamore-Suncrest 230 kV line

- 2019 LCR need: 2,417 MW
- 2023 LCR need: 3,002 MW

Observations:

- With the CEC's forecast for an increase in managed peak loads between 2019 and 2023 timeframe, the San Diego sub-area LCR need also increases.
- Thermal loading constraint on the underground portion of the Sycamore-Suncrest 230kV line is mitigated using a combination of RAS for generation tripping as well as utilization of the Imperial Valley phase shifters.

Overall LA Basin Critical Contingency (Category C for 2019)

Category C (2019)

Contingency: N-1/N-1 Lugo-Victorville 500 kV line, system readjustment, followed by Sylmar-Gould 230 kV line out

Limiting component: Eagle Rock – Gould 230 kV line

- 2019 LCR need: 8,116 MW (including 321 MW of existing DR and 248 MW of CPUC-approved LTPP preferred resources for LCR need)

Observations:

- Higher LCR need for the 2019 timeframe is related to higher demand forecast from the CEC.
- About half of SCE's LTPP LCR preferred resources are assumed to be implemented by June 1, 2019 based on inputs from SCE.
- This is the binding constraint for the overall LA Basin for 2019 as the LCR need is larger than the Category B LCR need (next slide)

Overall LA Basin Critical Contingency (Category B for 2019)

Category B (2019)

Contingency: G-1/N-1 of TDM power plant, system readjustment, followed by an outage of the Imperial Valley – North Gila 500kV line

Limiting component: Imperial Valley – El Centro 230kV line (the “S” line) thermal loading

- 2019 LCR need: 7,968 MW (including 321 MW of 20-minute DR and 248 MW of CPUC-approved LTPP preferred resources)

Observations:

- The Category B LCR need identified above is for informational purpose and is non-binding constraint for the overall LA Basin as the need is determined to be lower than the Category C LCR need (previous slide).

Overall LA Basin Critical Contingency (Category B and C for 2023)

Category B and C (2023)

Contingency: G-1/N-1 of TDM power plant, system adjustment, followed by an outage of the Imperial Valley – North Gila 500 kV line

Limiting component: IID-owned El Centro 230/92 kV transformer thermal loading

- 2023 LCR need: 6,793 MW (including 321 MW of DR and 432 MW of CPUC-approved LTPP preferred resources for LCR need)

Observations:

- The LCR need for Category B (G-1)(N-1) is the same as Category C (N-1)(G-1).
- This LCR need is associated for the forecasted peak demand for the LA Basin.
- With the OTC generation retirement in the western LA Basin for the post 2020 timeframe, nearly all remaining generation in this area was dispatched to mitigate the overall LCR need. Most of these resources have long-term power contracts approved by the CPUC.

Overall LA Basin Critical Contingency (Secondary Category C for 2023)

Secondary Category C (2023)

Contingency: N-1/N-1 Mesa – Redondo 230 kV line, system readjustment, followed by Mesa - Lighthipe 230 kV line out

Limiting component: Mesa – Laguna Bell #1 230 kV line

- 2023 LCR need: 6,634 MW (including 321 MW of DR and 432 MW of CPUC-approved LTPP preferred resources)

Observations:

- The Mesa Loop-in Project, with a projected in-service date of March 2022, helps reduce the overall LCR need for the LA Basin.
- Full implementation of the CPUC-approved LTPP preferred resources for LCR need in the western LA Basin was assumed for the study.
- This is not the binding constraint for the overall LA Basin as the LCR need is lower than the need identified in the previous slide.

Changes

Since last year:

1. The CEC 2017 IEPR Revised Forecast's 2019 managed peak demand, which already includes peak shift impact in the forecast, for the LA Basin area increases by 854 MW compared to the 2018 demand forecast used for the 2018 LCR study.
 - The overall LA Basin LCR need for 2019 timeframe has increased by 591 MW compared to the 2018 LCR need primarily due to higher demand forecast.
2. The 2023 managed peak demand for the LA Basin area increases by 1,052 MW compared to the previous year's demand forecast for the 2022 LCR study.
 - The overall LA Basin LCR need for 2023 has increased by 771 MW compared to the 2022 LCR need primarily due to higher demand forecast.

Since last stakeholder meeting:

1. Update total resources with latest available NQC values (2018)
2. Update the overall LA Basin LCR need after updating the overall San Diego-Imperial Valley LCR requirement associated with utilizing the Imperial Valley phase shifters
 - The overall LA Basin LCR need increases by 25 MW while the overall San Diego-Imperial Valley LCR requirement reduces by 96 MW

Changes (cont'd)

Since last year:

- 1) The CEC's 2017 IEPR Revised Forecast's 2019 managed peak demand for the SDG&E service area decreases by 512 MW compared to the 2018 demand forecast used for the 2018 LCR study.
 - The overall San Diego-Imperial Valley LCR need for 2019 reduces by 6 MW compared to the 2018 LCR need.
 - Lower NQC values for solar generation (based on the new ELCC methodology) for projects located in the more effective location negatively affects the identified constraint.
 - However, the use of the Imperial Valley phase shifters, as well as the use of the existing 20-minute demand response and implementation of the CPUC-approved LTPP preferred resources in the western LA Basin helps counteract the increase in the the overall LCR need for the San Diego-Imperial Valley area.
- 2) The 2023 adjusted managed peak demand for the SDG&E service area decreases by 518 MW compared to the previous year's demand forecast for the 2022 LCR study.
 - The overall San Diego-Imperial Valley LCR need for 2023 decreases by 511 MW compared to the 2022 LCR need due to a combination of implementation of the IID's S-line upgrades as well as lower demand forecast for the SDG&E service area and the use of 20-minute demand response and CPUC-approved LTPP preferred resources in the western LA Basin.

THANK YOU

Your comments and questions are welcome.

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