



CAISO's proposed TOU periods to address grid needs with high numbers of renewables

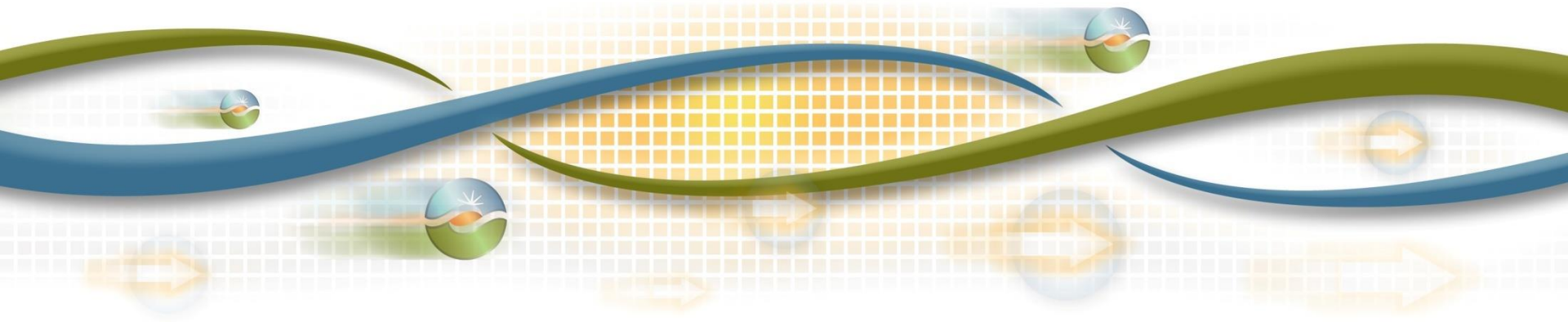
Clyde Loutan, Sr. Advisor, Renewable Energy Integration, CAISO

John Goodin, Regulatory Policy Manager, CAISO

Delphine Hou, Manager of State Regulatory Affairs, CAISO

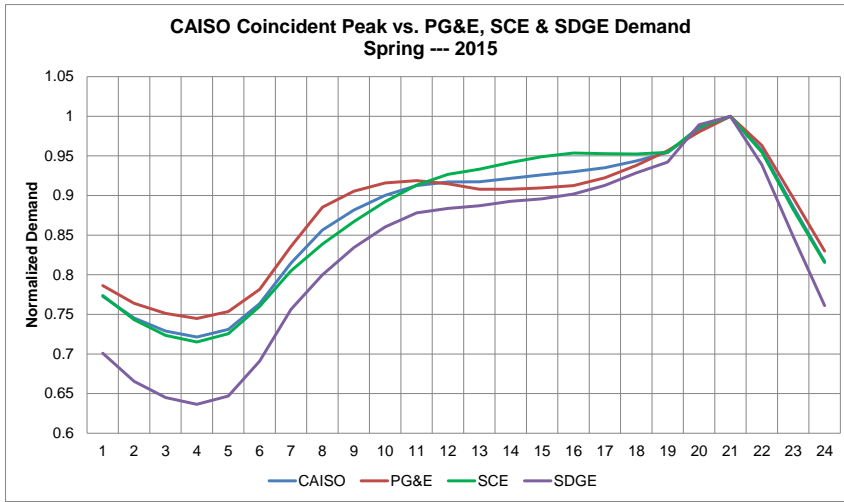
Jordan Pinjuv, Counsel, CAISO

May 5, 2016

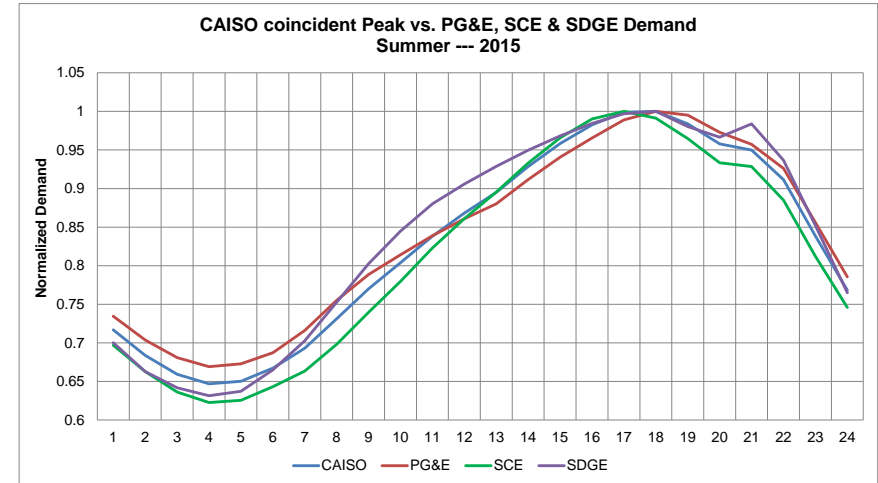


ISO's coincident peak vs. PTO's coincident peak

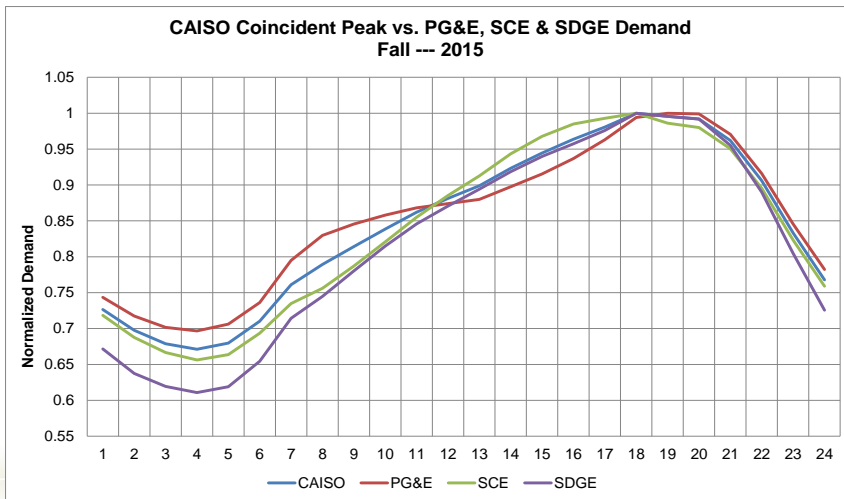
Spring: The ISO and three PTOs coincident peak occurs between 8 p.m. and 9 p.m.



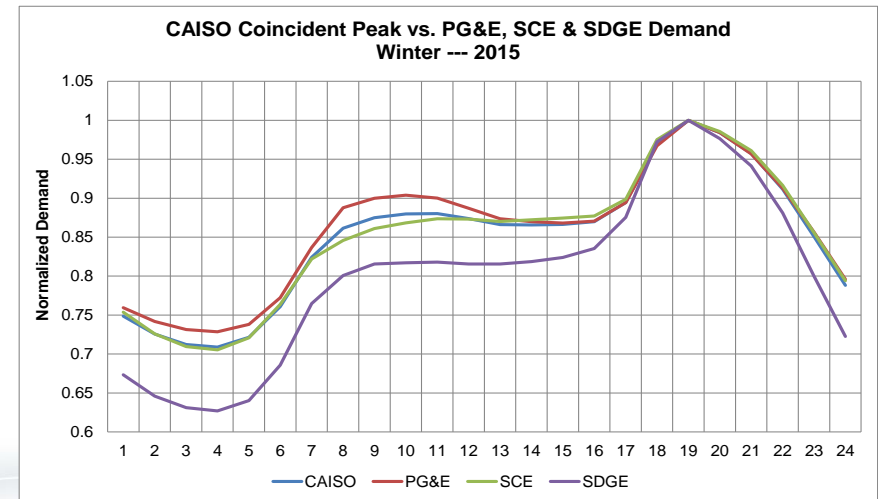
Summer: The ISO, SCE & SDGE coincident peak occurs between 4:00 p.m. and 5:00 p.m. PG&E is an hour later



Fall: ISO and three PTOs coincident peak occur between 7:00 p.m. and 8:00 p.m.



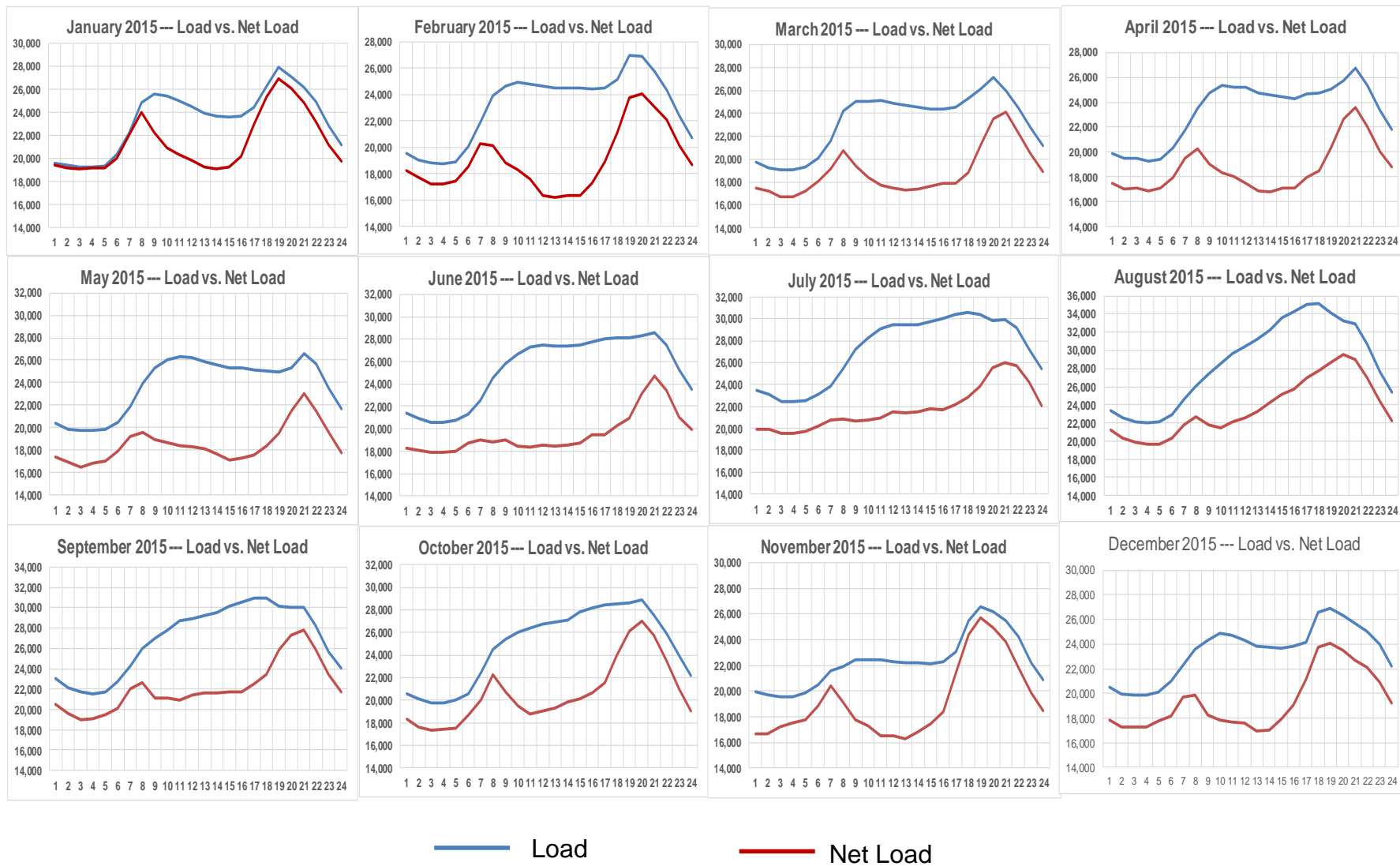
Winter: ISO and three PTOs coincident peak occur between 6:00 p.m. and 7:00 p.m.



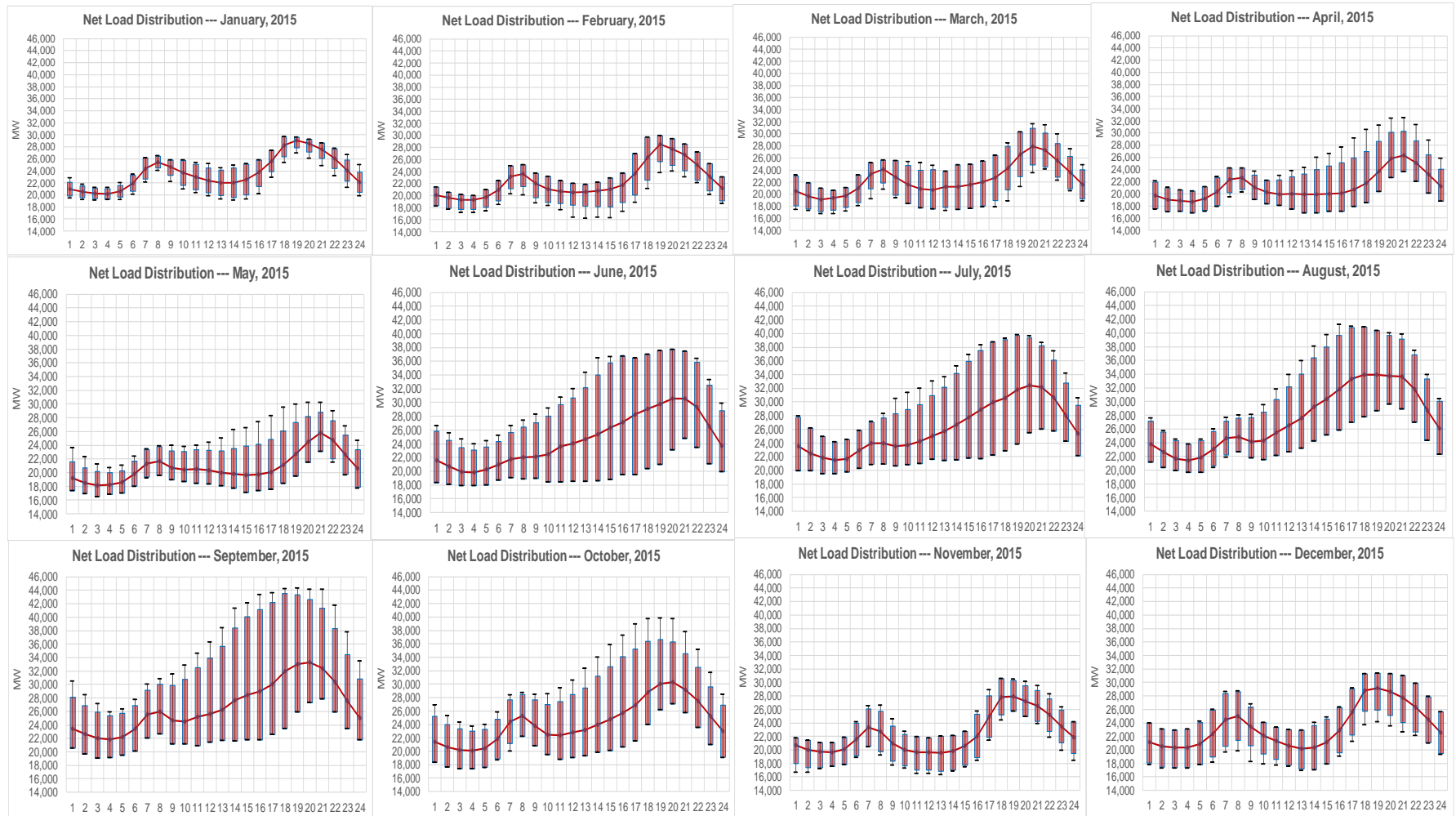
Thoughts on 2015 historical analysis

- 2015 net load shapes are similar to 2013 and 2014
- Compared to 2014, the ramps are generally the same or steeper and the minimum net loads are generally lower
- CAISO's proposed time-of-use periods are applicable to 2015 data
 - Period definitions continued to be driven by a combination of steep ramps and low net loads
 - In other words, a period designation may be driven by the steep ramp later in the day as opposed to the absolute minimum net load

2015 Monthly Minimum Hourly Load & Minimum Hourly Net Load Distribution --- Weekdays



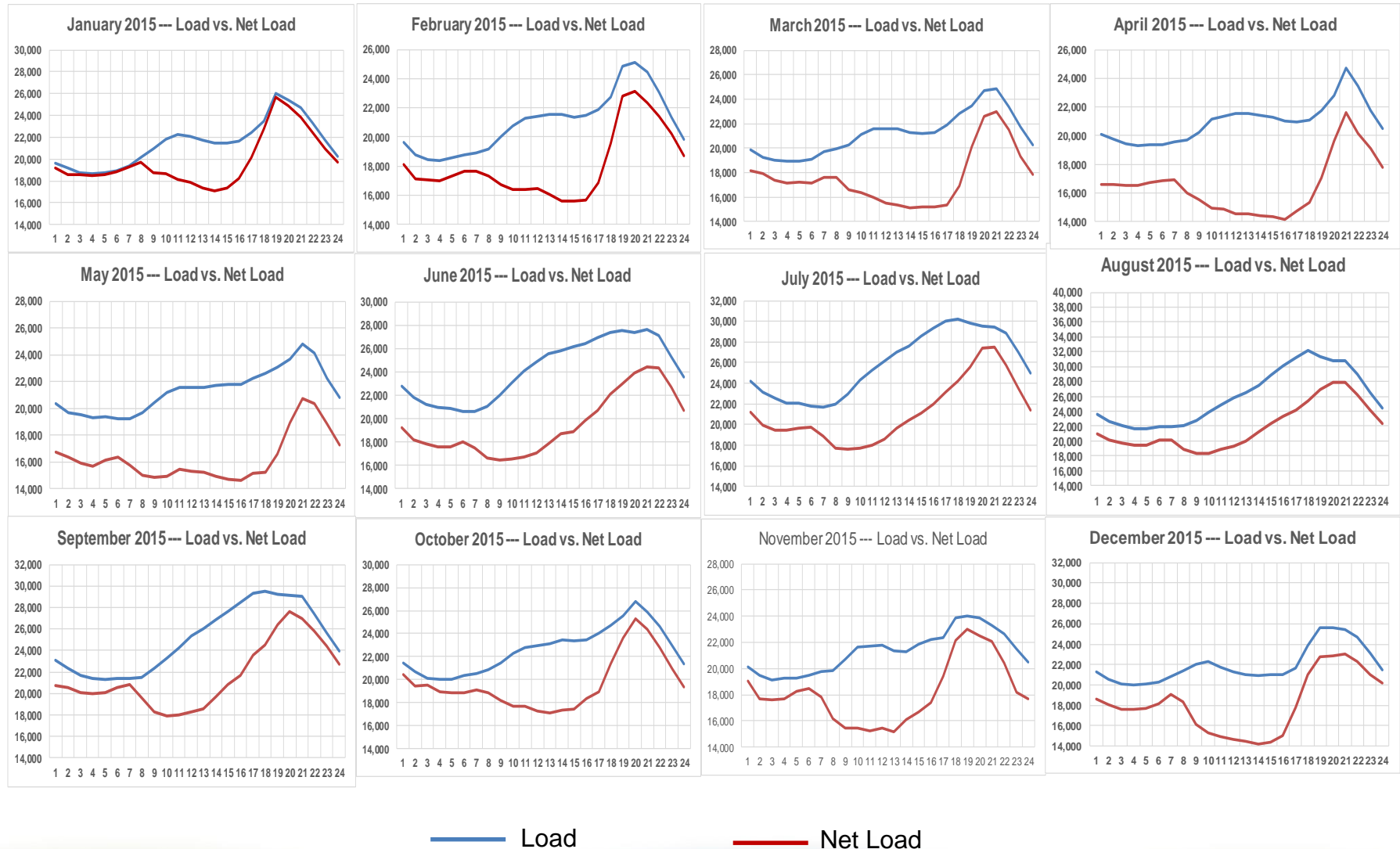
2015 Average Hourly Load & Average Hourly Net Load Distribution --- Weekdays



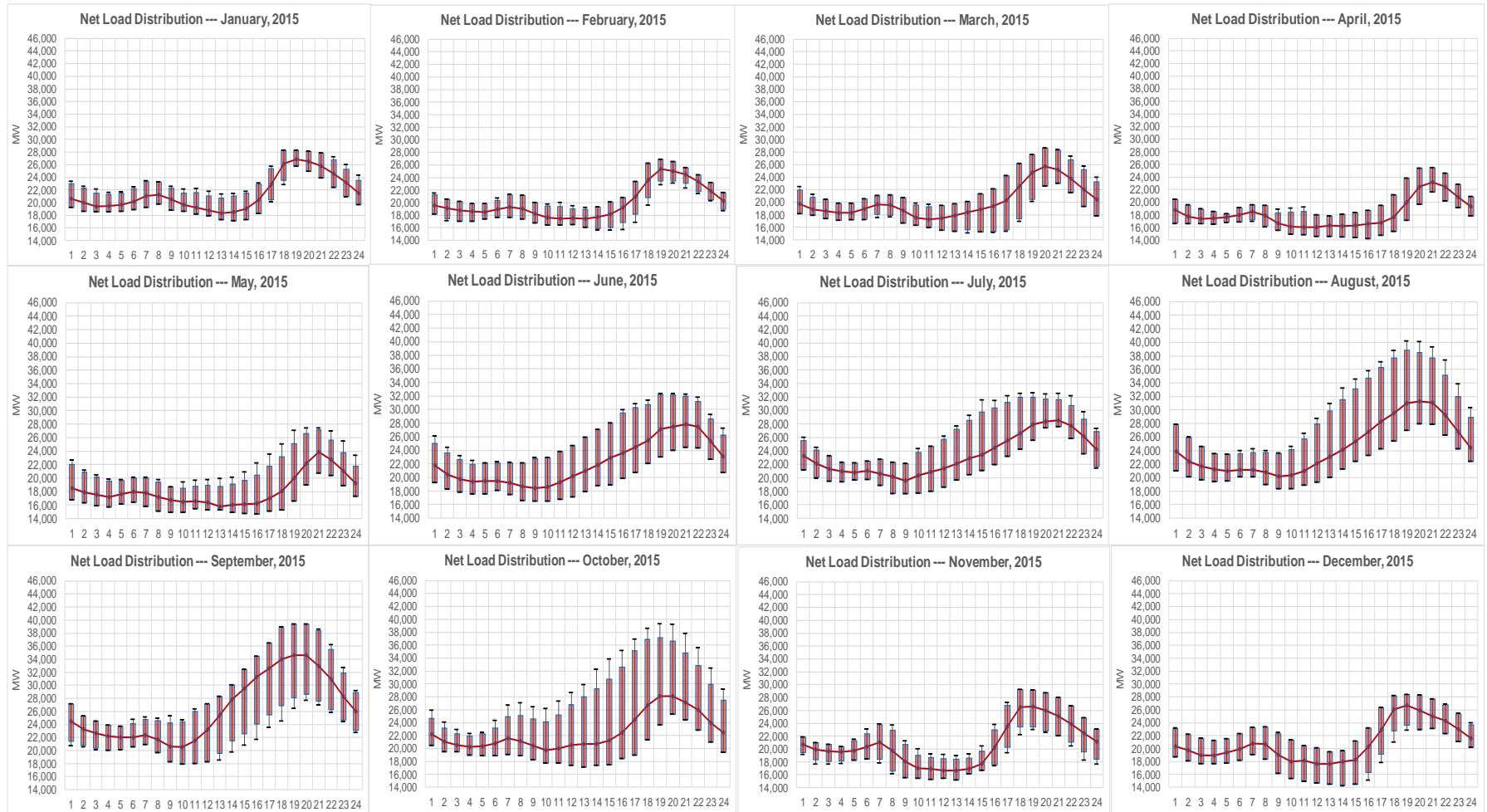
— Load

— Net Load

2015 Minimum Hourly Load & Minimum Hourly Net Load Distribution --- Weekends/Holidays

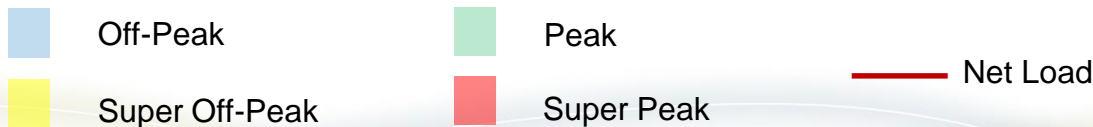


2015 Average Hourly Load & Net Load Distribution --- Weekends/Holidays

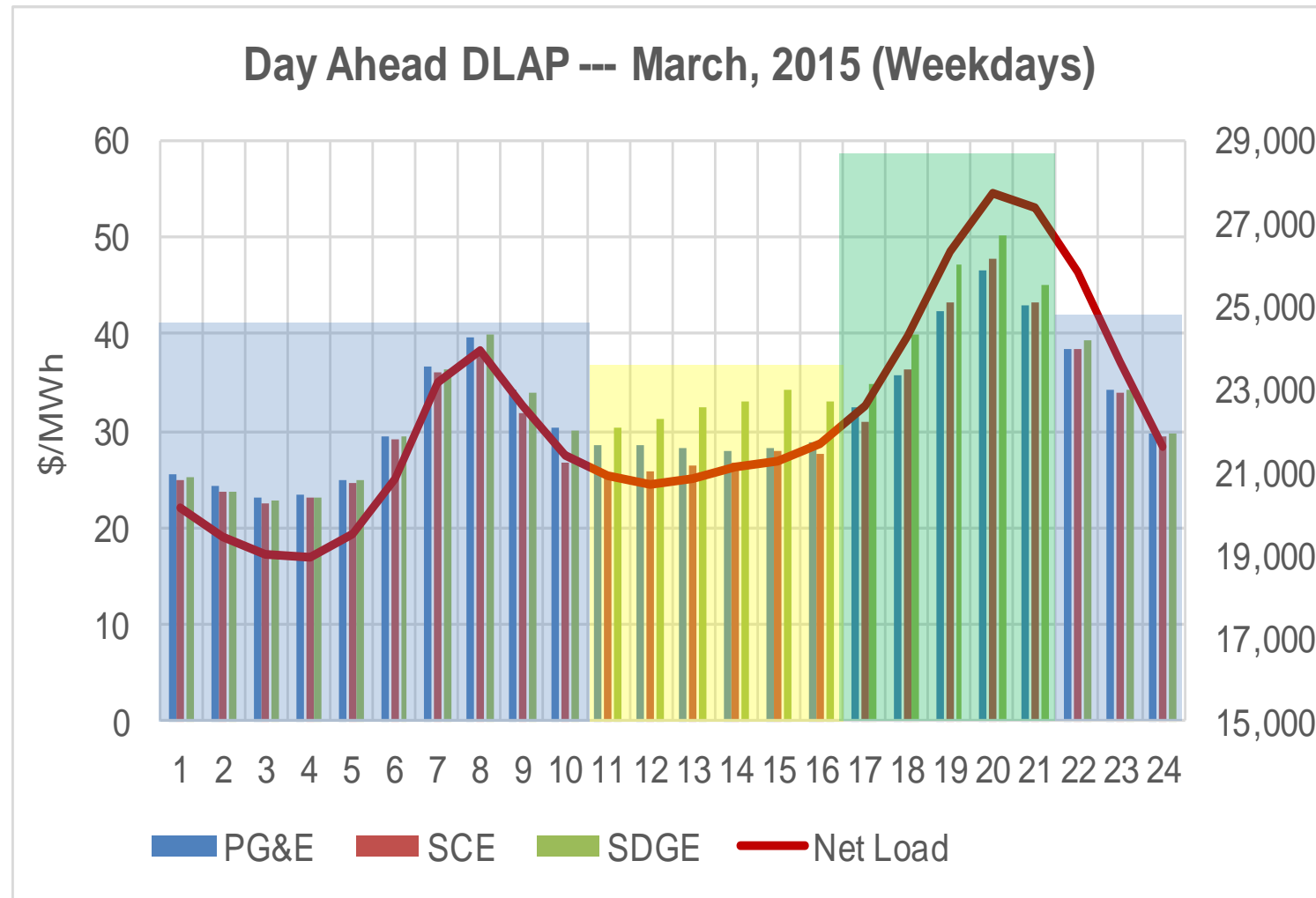


— Load — Net Load

2015 Average Hourly Net-Load vs. Average Day-Ahead energy prices --- Weekdays



2015 Average Hourly Net-Load vs. Average Day-Ahead energy prices --- March Weekdays



Off-Peak



Super Off-Peak

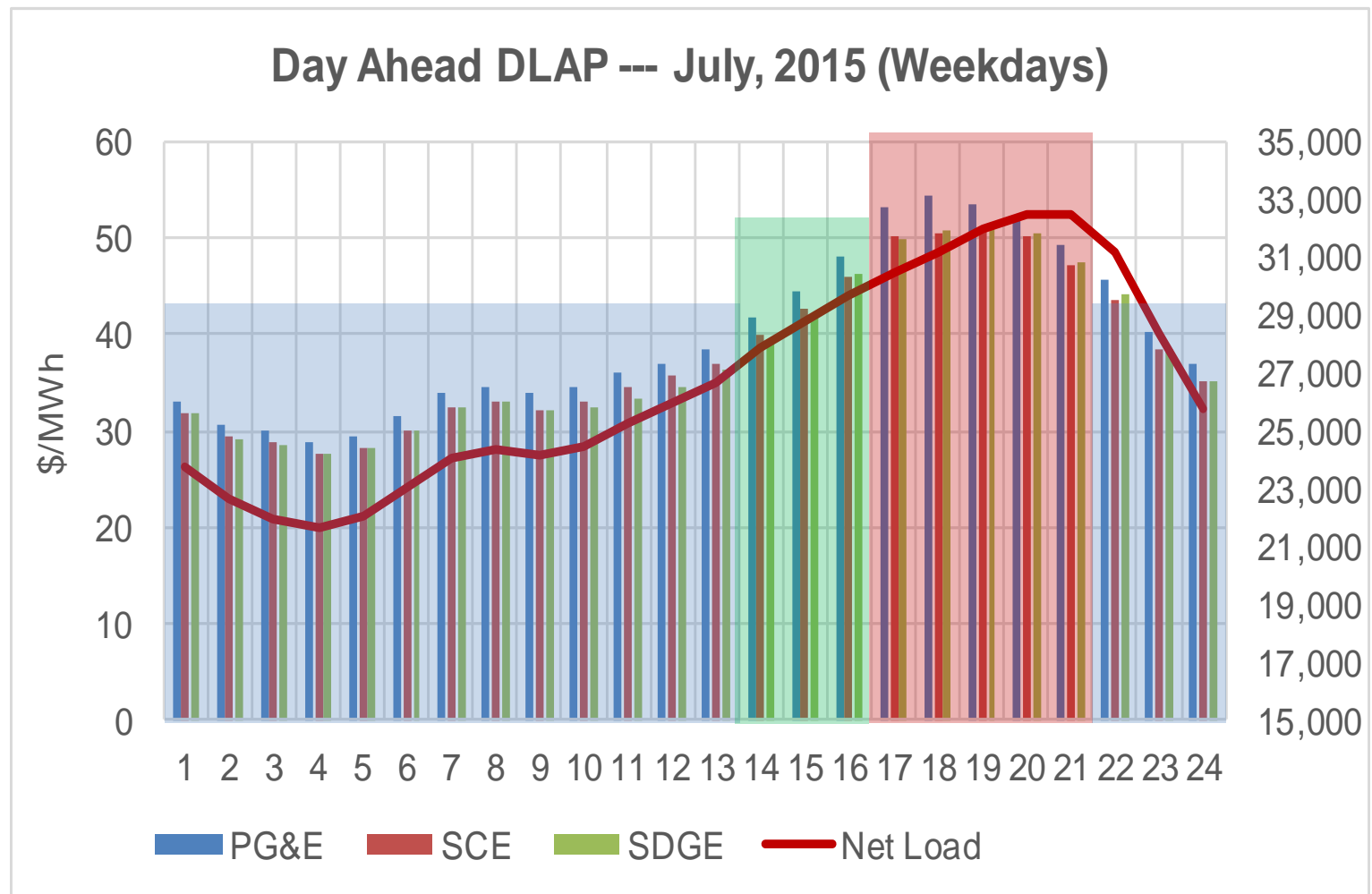


Peak



Super Peak

2015 Average Hourly Net-Load vs. Average Day-Ahead energy prices --- July Weekdays



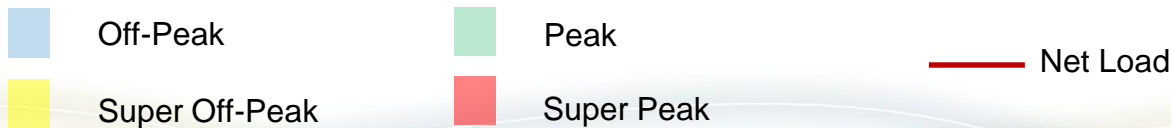
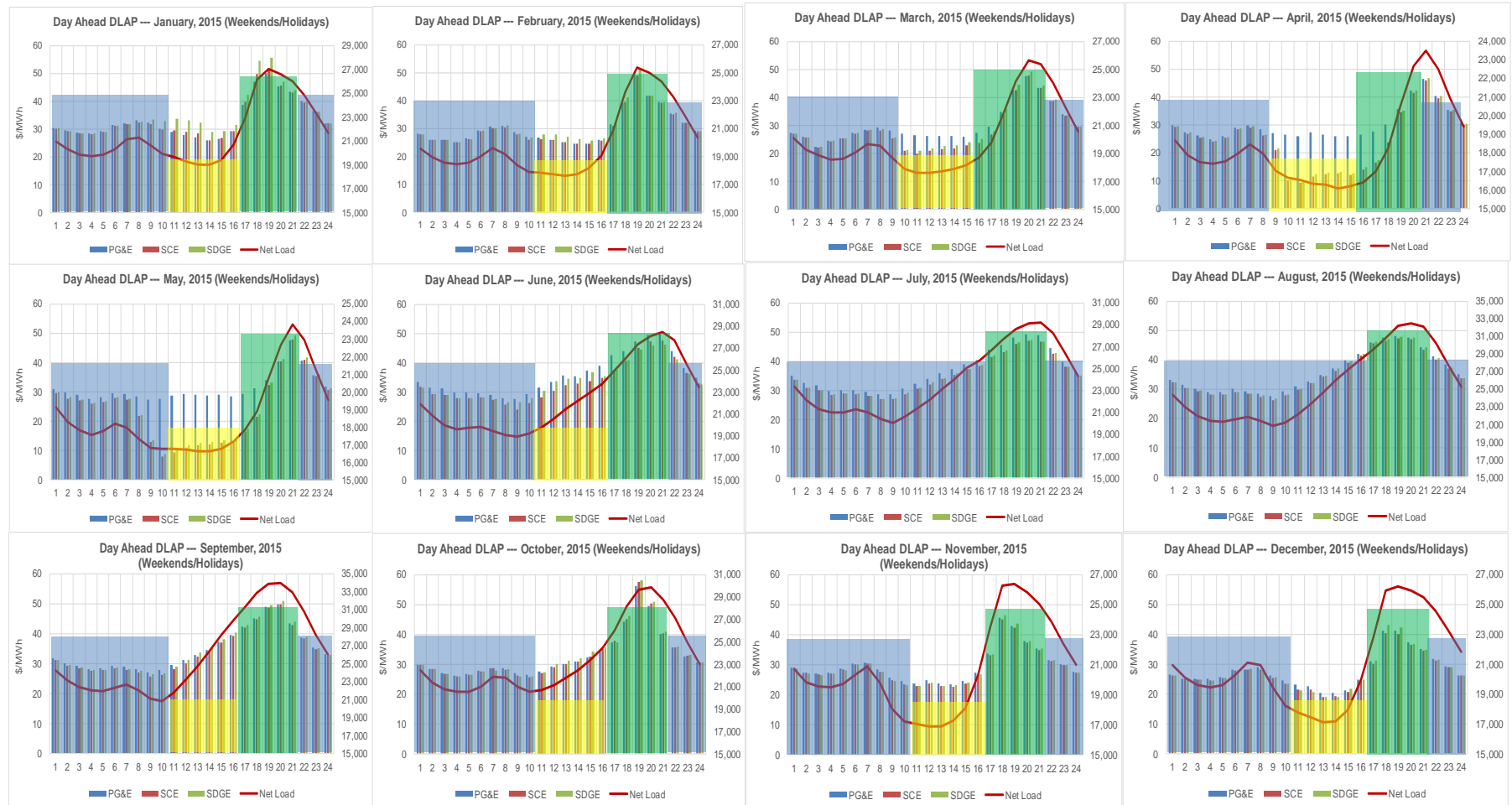
Off-Peak

Super Off-Peak

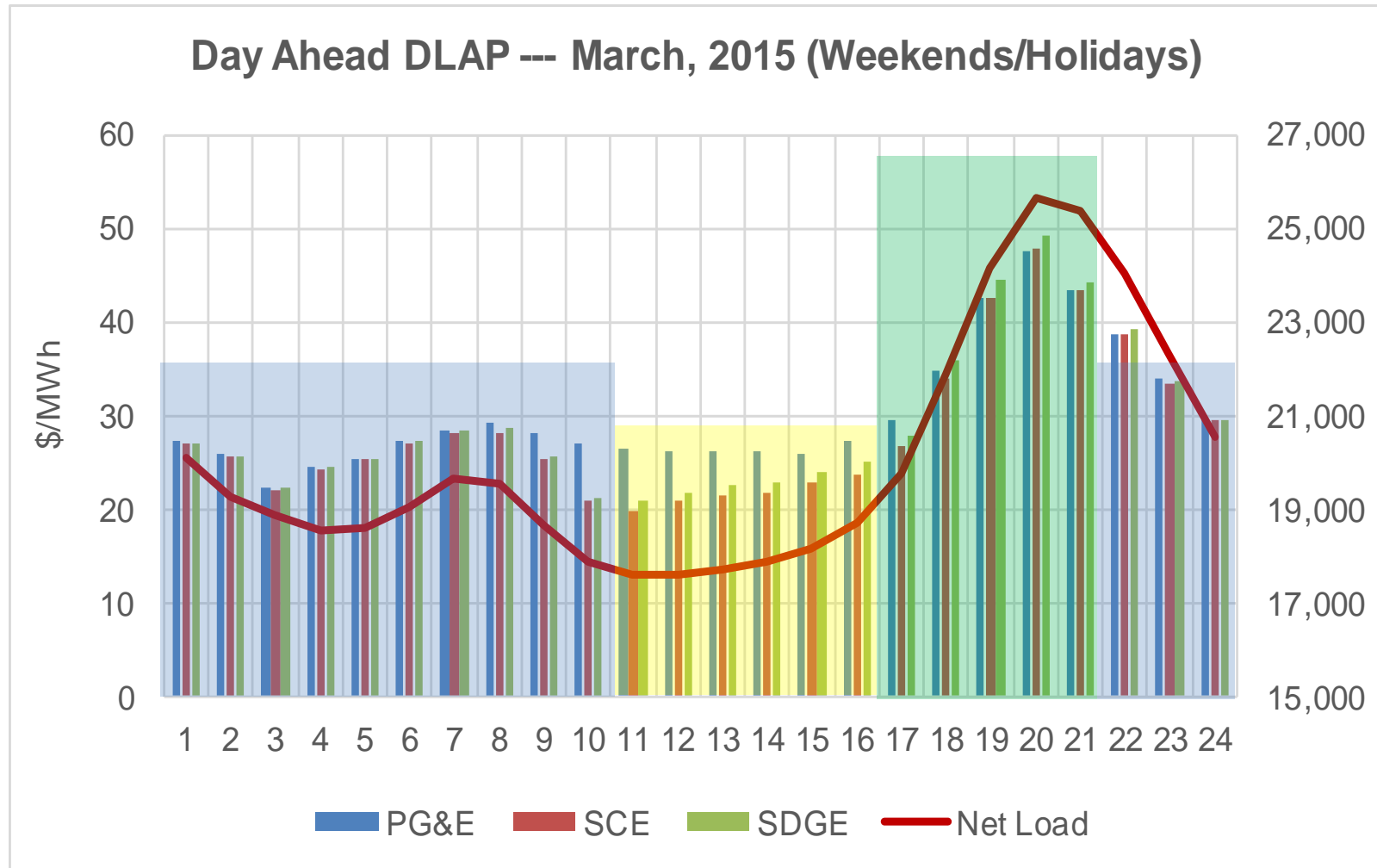
Peak

Super Peak

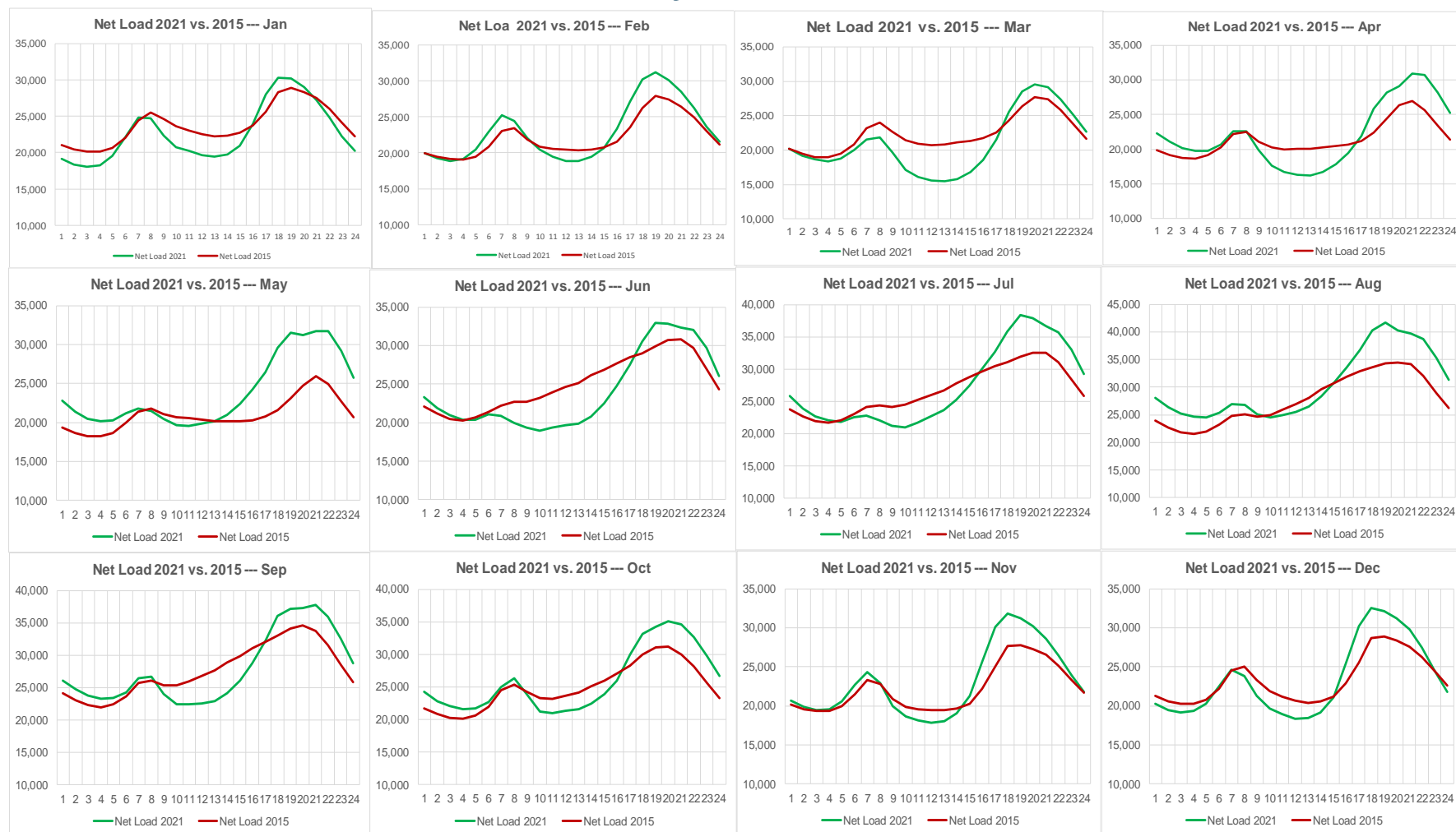
2015 Average Hourly Net-Load vs. Average Day-Ahead energy prices --- Weekends/Holidays



2015 Average Hourly Net-Load vs. Average Day-Ahead energy prices --- March Weekends/Holidays



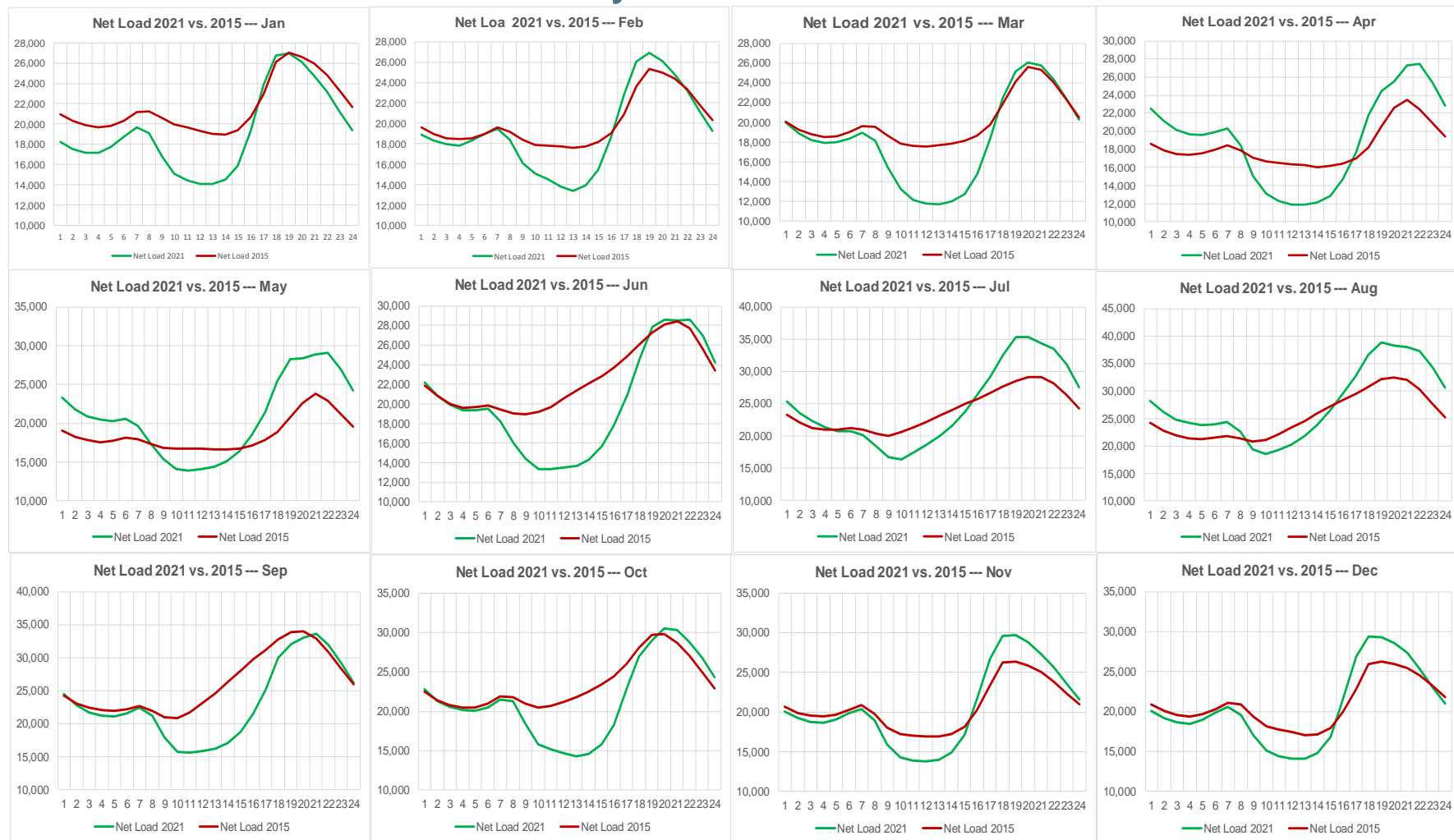
2015 Average Hourly Net Load vs. 2021 Hourly Average Net Load Distribution --- Weekdays



— Net Load 2021

— Net Load 2015

2015 Average Hourly Net Load vs. 2021 Average Hourly Net Load --- Weekends/Holidays

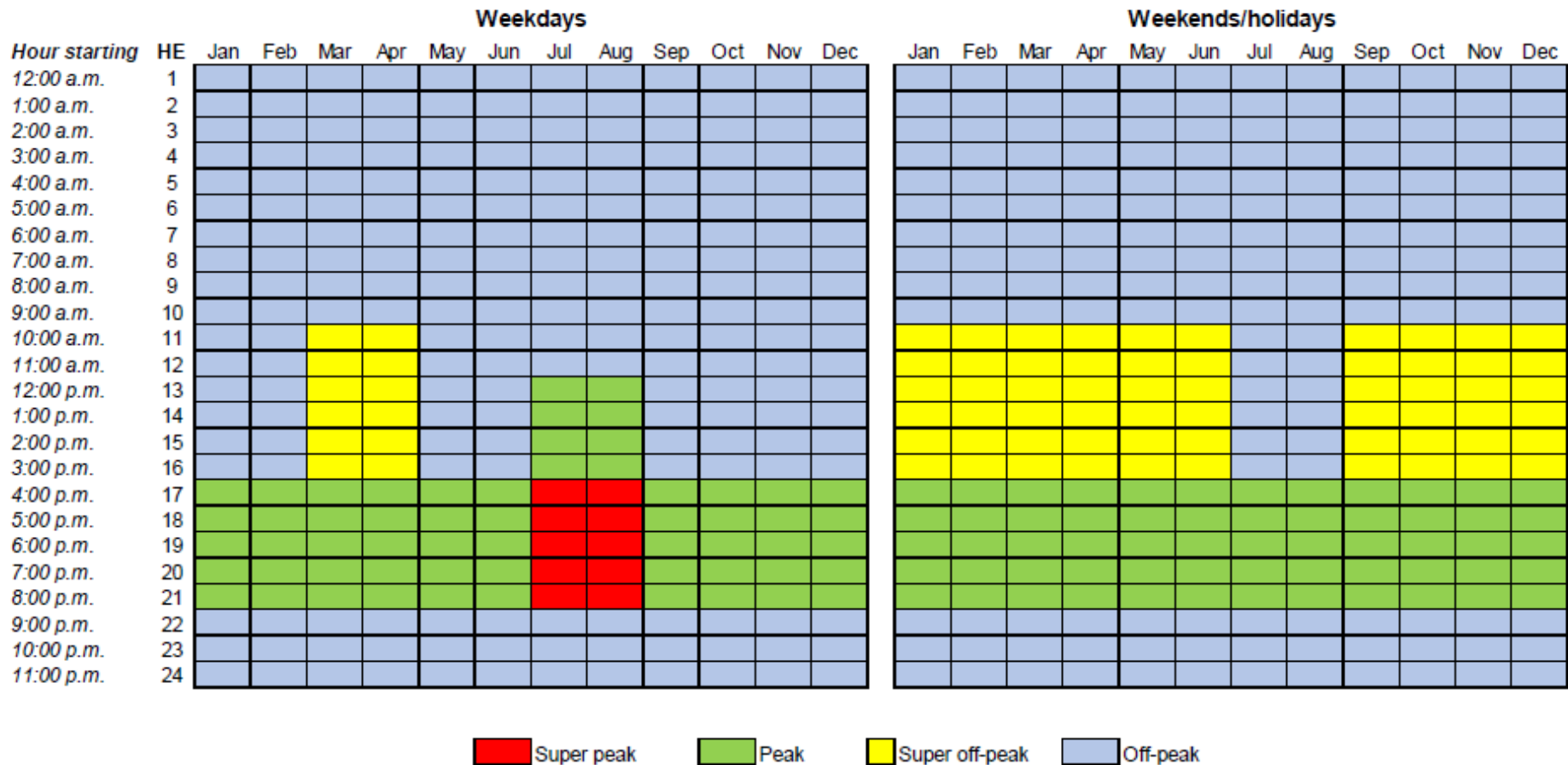


— Net Load 2021 — Net Load 2015

Proposed TOU Time Periods

Day-type	Months	Super Off-Peak	Off-Peak	Peak	Super Peak
Weekdays	Jan, Feb, May, Jun, Sep, Oct, Nov, Dec	—	Midnight – 4 PM 9 PM - Midnight	4 PM – 9 PM	—
	Mar & Apr	10 AM – 4 PM	Midnight – 10 AM 9 PM - Midnight	4 PM – 9 PM	—
	Jul & Aug	—	Midnight – Noon 9 PM - Midnight	Noon – 4 PM	4 PM – 9 PM
Weekends & Federal Holidays	Jan - Jun & Sep - Dec	10 AM – 4 PM	Midnight – 10 AM 9 PM - Midnight	4 PM – 9 PM	—
	Jul & Aug	—	Midnight – 4 PM 9 PM - Midnight	4 PM – 9 PM	—

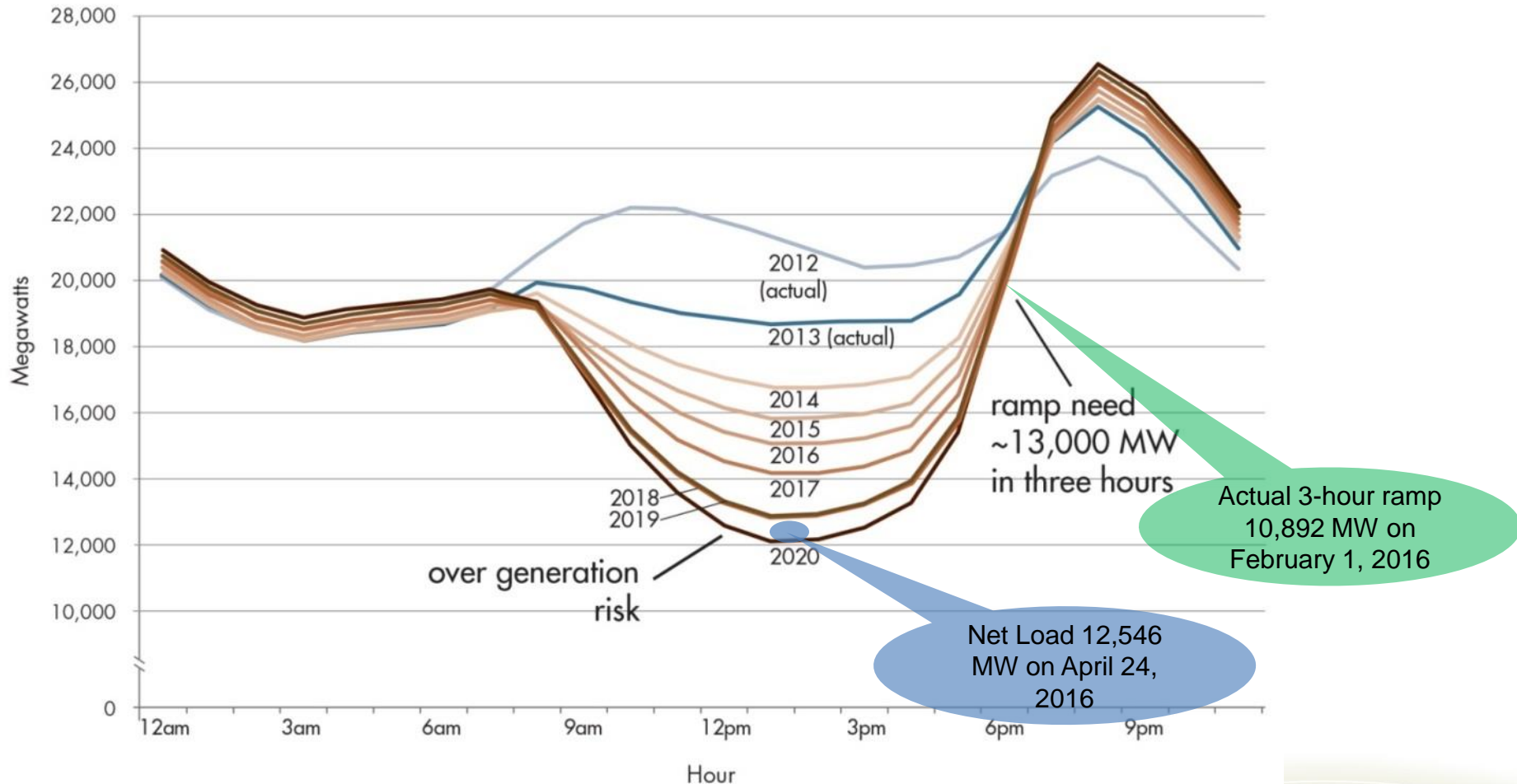
Proposed Weekday and Weekend TOU Periods



Periods were simplified to provide a CAISO system-wide uniform approach and limit variation in peak and off-peak periods.

Original estimate of net-load as more renewables are integrated into the grid

Typical Spring Day



A map of California is centered on the slide. Inside the map's outline is a photograph of a person's hands. One hand holds a blue pen, and the other is positioned over a spiral-bound notepad, appearing to be writing. The background of the slide is white with a grid pattern at the top and a blue wavy line at the bottom.

Questions!