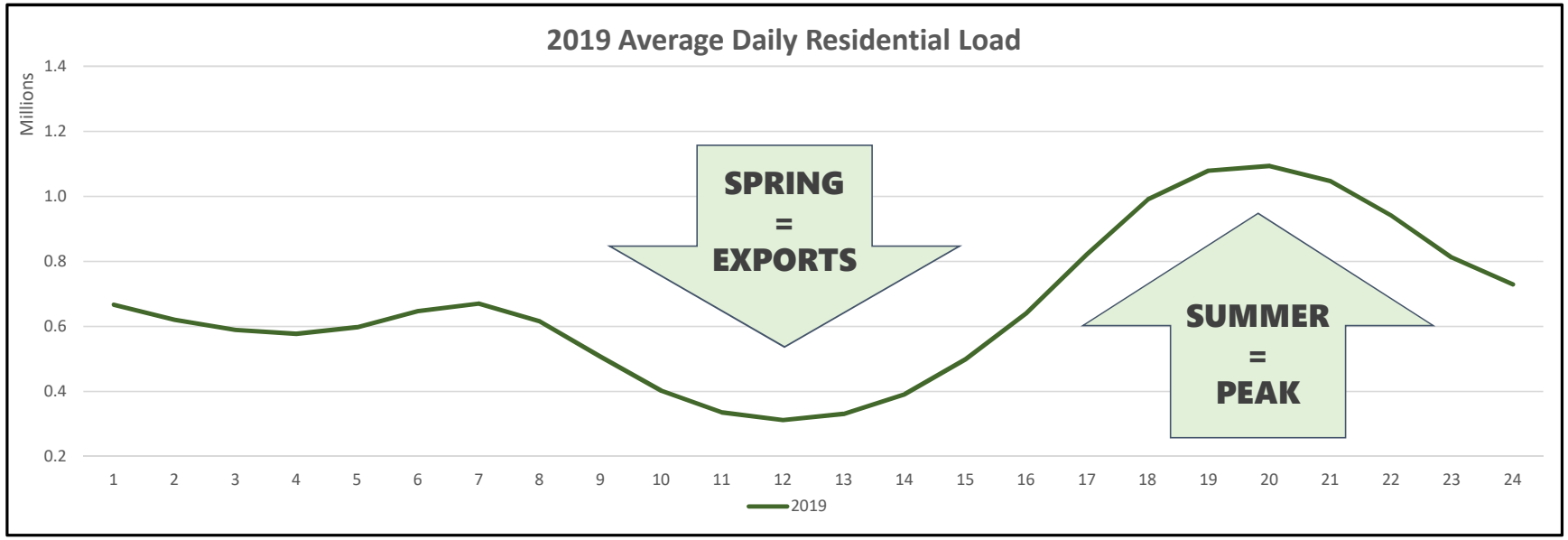
Analyzing the Effects of COVID-19 on Residential Electric Consumption

RINA TEFIKU • ELECTRIC LOAD RESEARCH • WLRA SPRING 2021

Approach

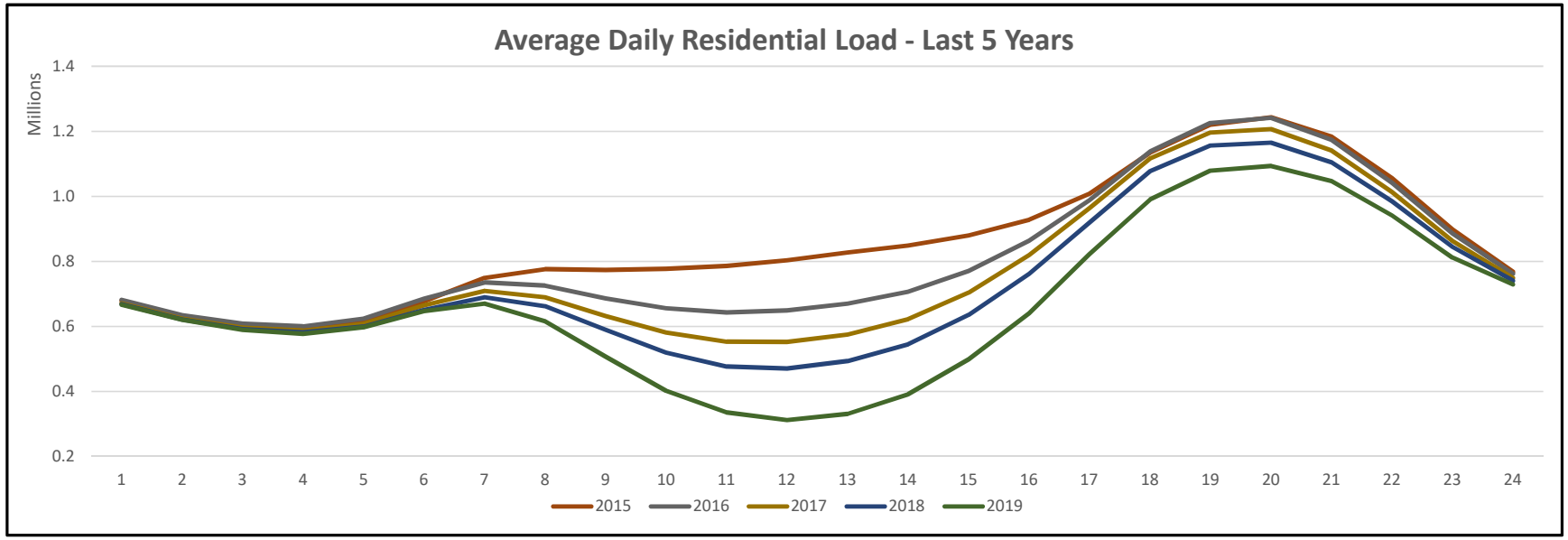
- ✓ Weekly reports on Residential, Small Commercial, Medium and Large C&I and System consumption.
- ✓ Dynamic Load Profile data is to be used: hourly, public, readily available and already aggregated by class.
- ✓ Directed to compare current usage to 2019 for easy bill comparison for the stakeholder.

2019 Residential Consumption (Pre-COVID)



Pre-COVID the average daily Residential load shape looked like the typical duck curve. During the spring when it is sunny with mild temperatures, excess generation from solar customers will be the highest and there will be a deeper dip in the midday hours. During the summer when temperatures are very high, there will not be as much of a pronounced dip and there will also be a much higher evening peak due to cooling load.

Residential Rooftop Solar



Understanding just how fast rooftop solar is being installed by residential customers is very important. Total installed capacity is growing by 20% every year, which can visually be seen in the progressive dip in the load shape during midday hours.

2019 Residential Consumption (Pre-COVID)

SDGE A Sempra Energy utility®

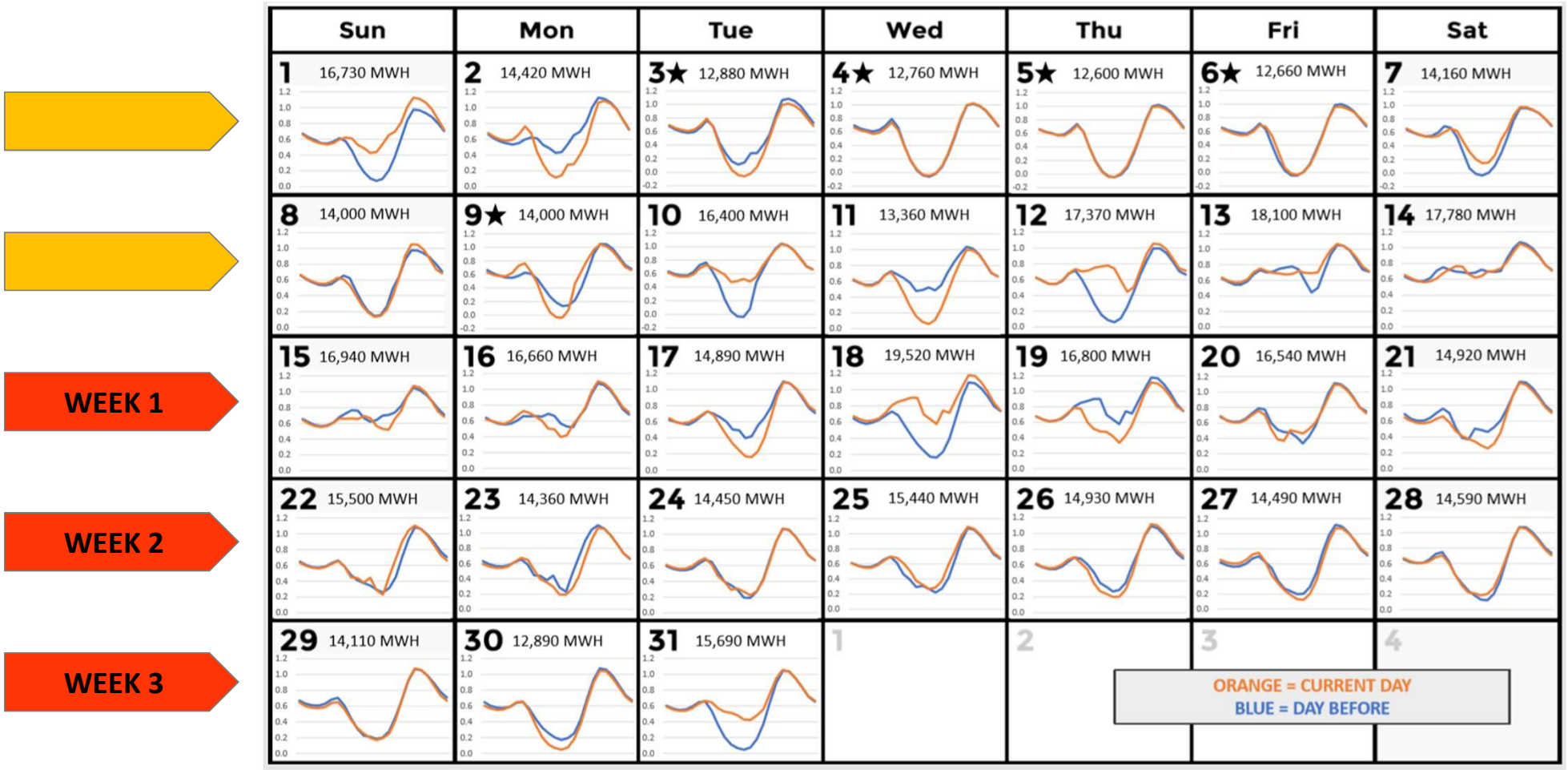
On April 10, 2019, Residential customers collectively exported enough excess rooftop solar generation that the class historically went negative for 3 hours during the afternoon hours.

READDATE	HOURS	AVG MW	TOT MW	# NEM	CAPACITY
4/10/2019	3	-23,347	-70,042	144,954	797
4/17/2019	2	-6,370	-12,740	145,326	799
4/23/2019	2	-1,434	-2,867	146,003	803
5/1/2019	2	-27,452	-54,905	146,553	806
5/3/2019	1	-11,692	-11,692	146,696	807
5/24/2019	2	-23,409	-46,819	148,190	816
5/28/2019	2	-28,553	-57,105	148,285	817
5/29/2019	2	-23,075	-46,151	148,368	817
5/30/2019	2	-6,680	-13,360	148,485	818
2/24/2020	2	-12,750	-25,500	173,083	959
2/25/2020	3	-29,178	-87,535	173,168	960
2/26/2020	3	-51,700	-155,100	173,282	961
3/3/2020	3	-59,220	-177,660	173,647	963
3/4/2020	3	-43,060	-129,179	173,806	963
3/5/2020	2	-53,662	-107,324	173,899	964
3/6/2020	3	-32,099	-96,297	173,987	964
3/9/2020	2	-45,956	-91,912	174,071	965

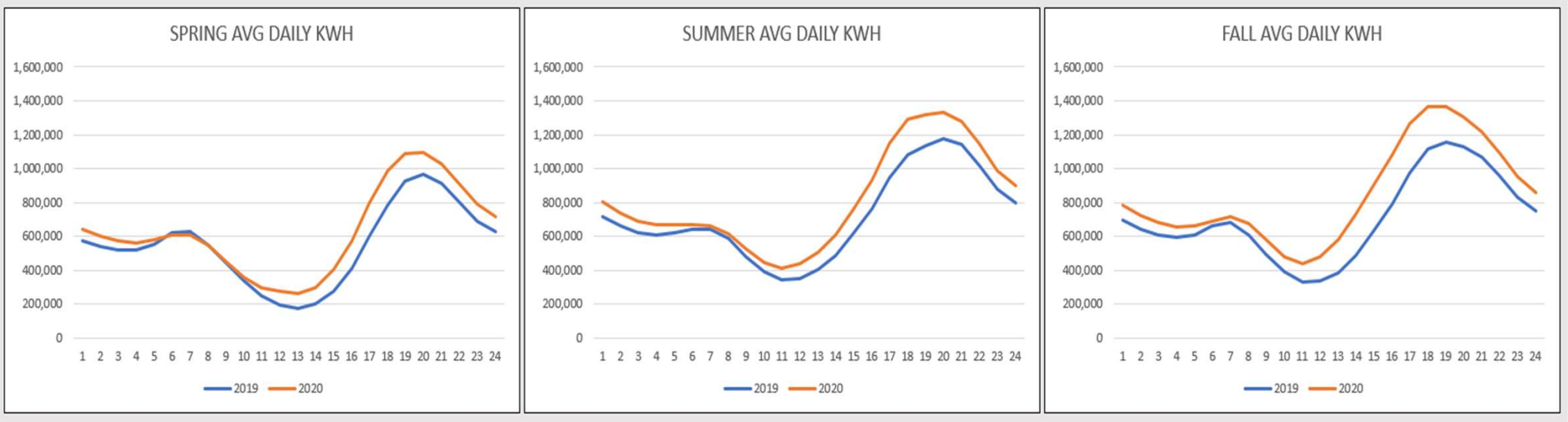
2019
9 negative days over 51 days

2020
8 negative days over 14 days

March 2020 – First Month of Quarantine



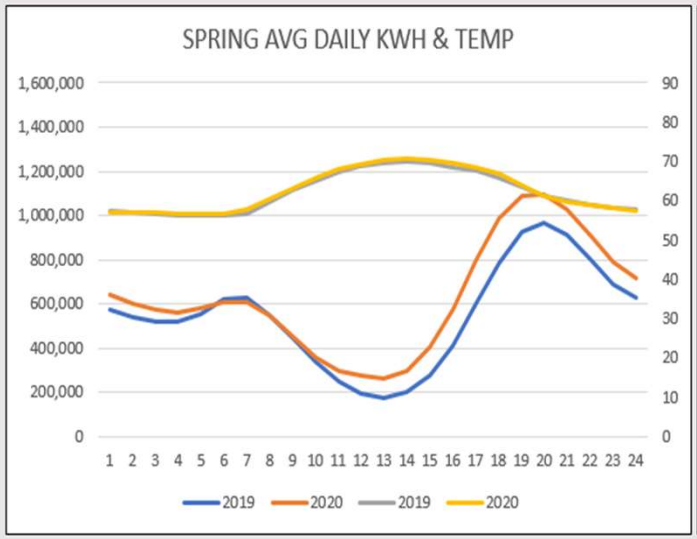
Spring-Summer-Fall Residential Consumption Patterns

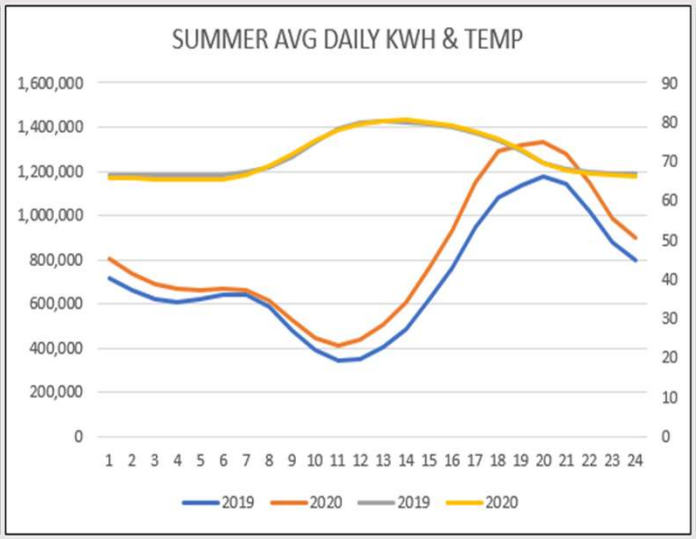


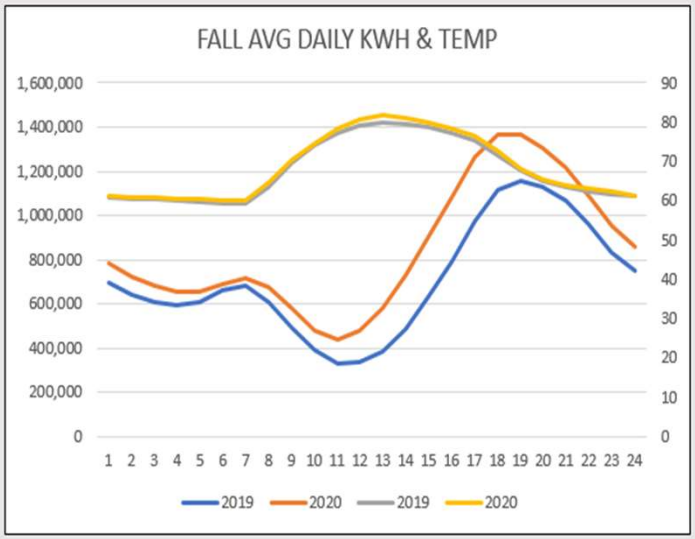
Key Changes in Consumption:

1. Elongated Morning Peak
2. Less Solar Exports
3. Much Higher Evening Peak

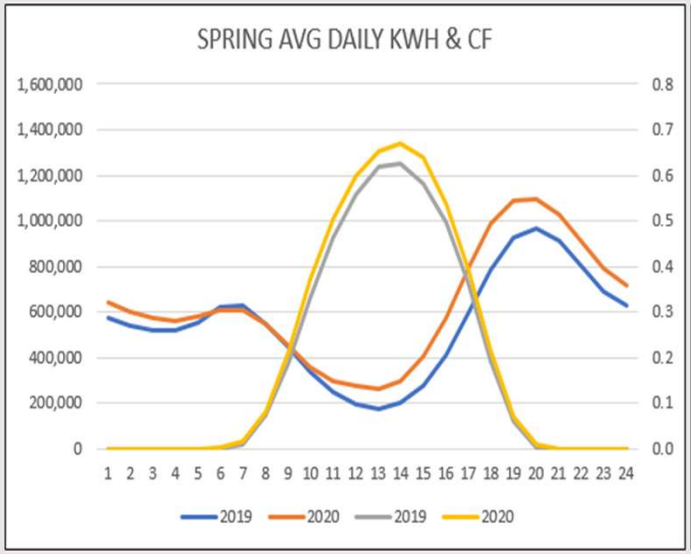
Deeper Comparison: Temperature

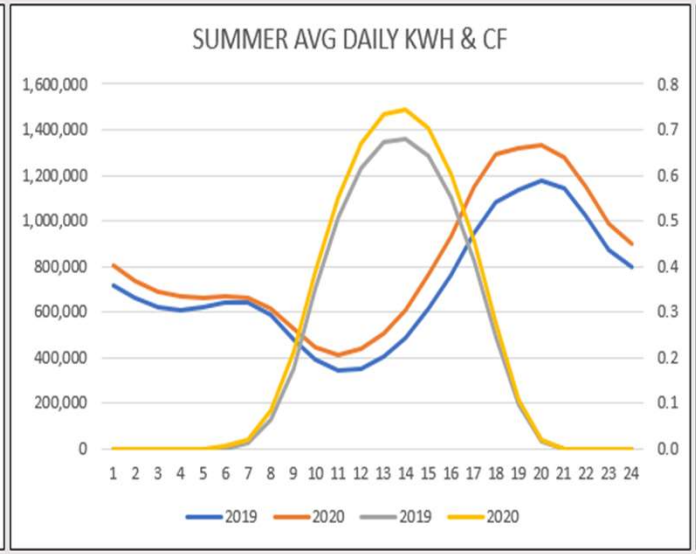


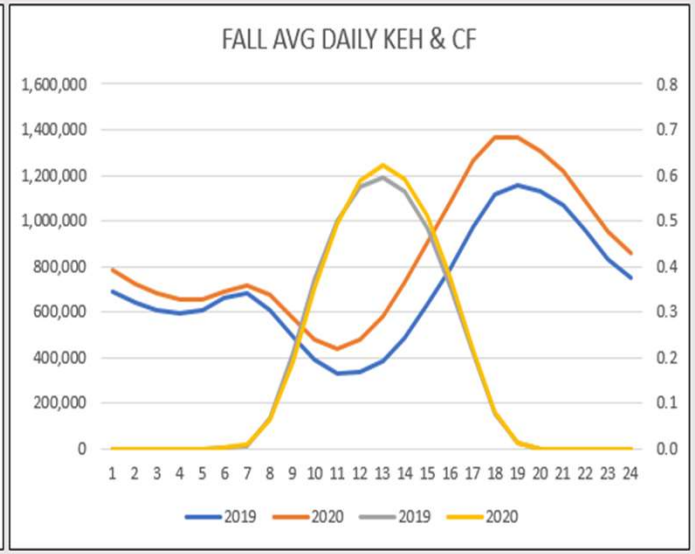




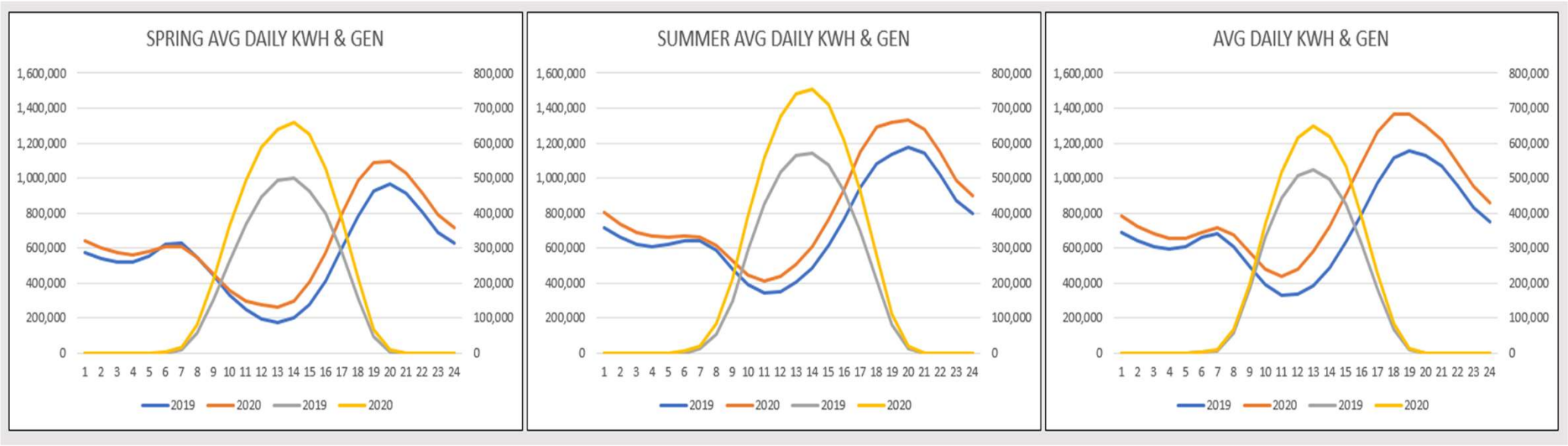
Deeper Comparison: Capacity Factors



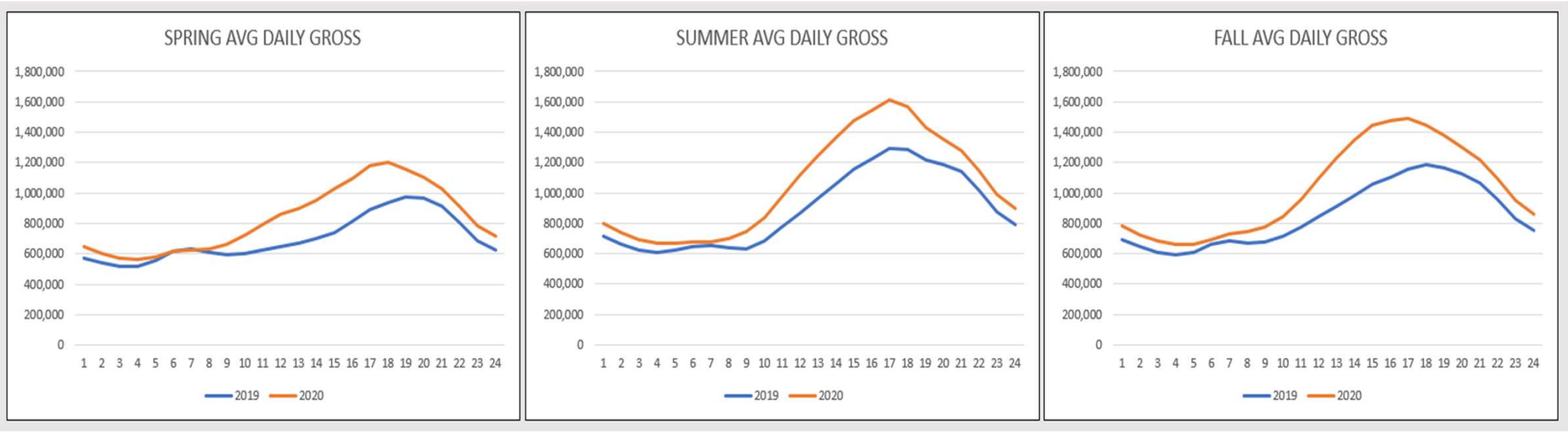




Deeper Comparison: Generation

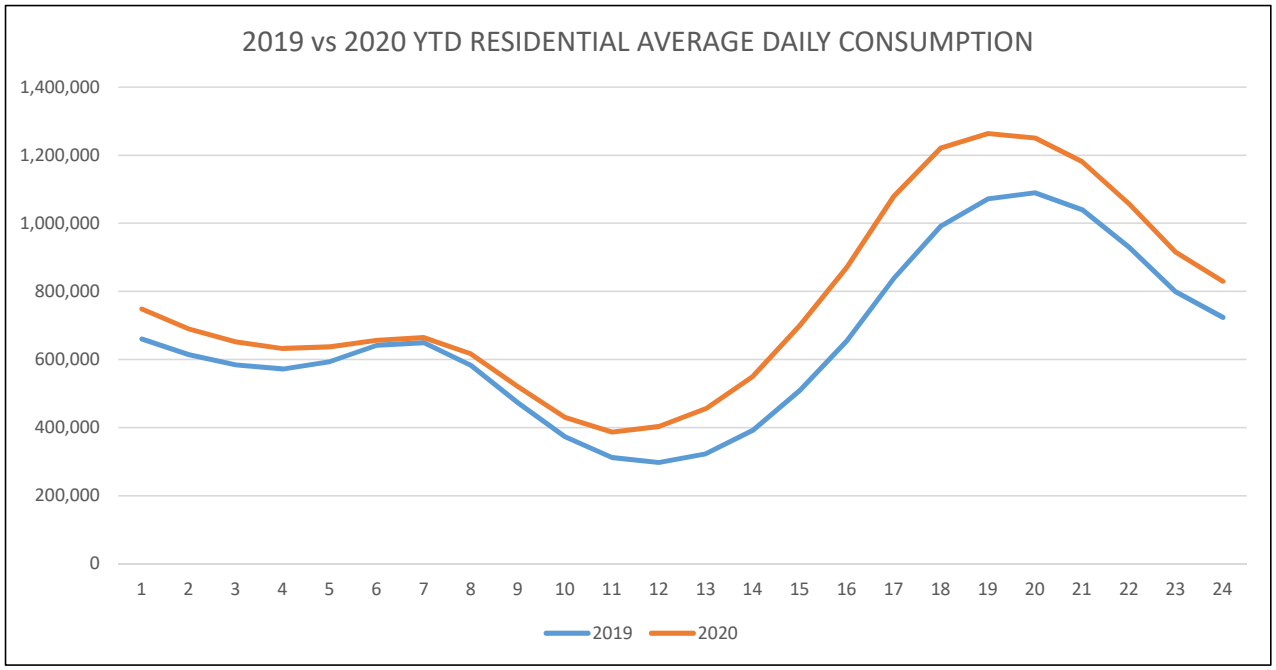


Gross Consumption – 'Solar Normalization'



Adding estimated generation back into the load shape allows us to see the true effect of the stay-at-home order on Residential consumption. We call this "Solar Normalization".

The New Normal



**Only looking at March-November for both years*

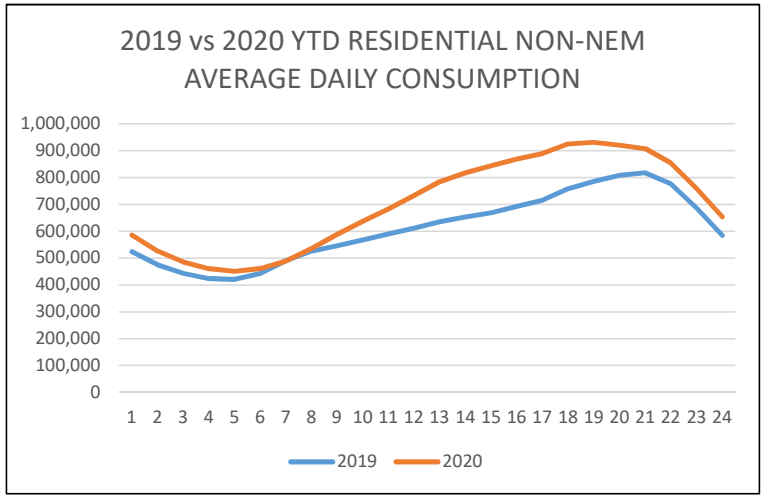
** Compared to 2019 with no adjustments*

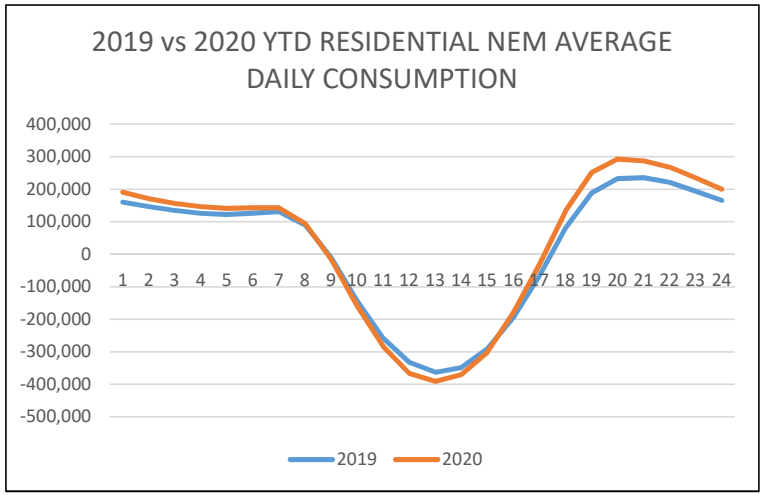
On average, aggregate Residential consumption ***increased by 17% ****

Solar vs Non-Solar

**Only looking at March-November for both years*

*** Compared to 2019 with no adjustments*





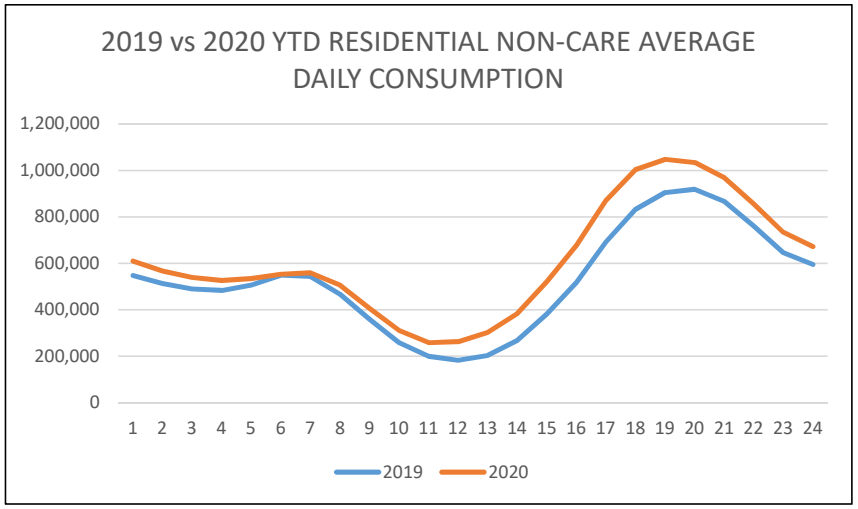
On average, Residential Non-NEM consumption ***increased by 15%***

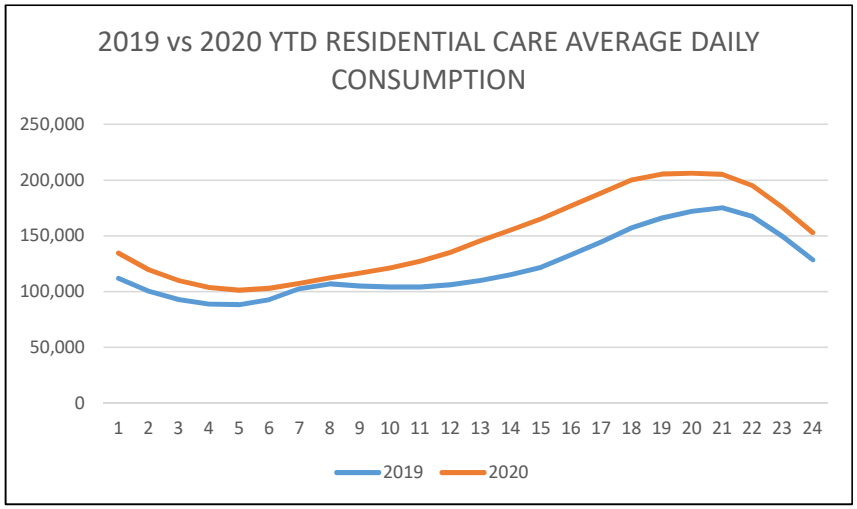
On average, Residential NEM consumption ***increased by 120%***

CARE vs Non-CARE

**Only looking at March-November for both years*

*** Compared to 2019 with no adjustments*





On average, Residential Non-CARE consumption ***increased by 16%***

On average, Residential CARE consumption ***increased by 21%***

Questions?