CRA Insights

CRA Charles River Associates

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An update on the impact of COVID-19 reactions on electric load

This *Insights* follows up on an **analysis of March data** in which we reviewed data on the impact of COVID-19 on electric demand across different market regions. Here, we refresh our analysis with April data and review a full calendar month in which much of the country was under stay-at-home orders. Examining recent trends from New York, California, and the UK, we observe that demand destruction caused by pandemic response efforts persists. However, the severity of the demand impact appears to have tapered, or even decreased, potentially indicating that there is reason to expect some rebound in demand as quarantine measures ease. We also observe expected seasonal trends as the weather warms and spring progresses. We close by highlighting several areas that we will monitor in the coming months that will affect stakeholders in the electric utility space.

COVID-19 and Electric Demand in April

In this *Insights*, we turn our attention to how—or whether—observed changes to electric load patterns persist as the COVID-19 pandemic wears on. In April, industrial activity slowed in many parts of the US and UK and remote working became the new normal for many of those with office jobs. Millions of others lost the opportunity to work at all, as orders limiting public gatherings continue and restaurants, gyms, and other public spaces remained closed across much of the world.

We examine the ongoing impact on load in the same jurisdictions as our initial paper (New York City, Rest of NYISO, CAISO, England and Wales). These regions have taken extensive action responding to the COVID-19 crisis and are reasonably geographically defined. We also selected markets where we could potentially isolate cities from more rural areas.

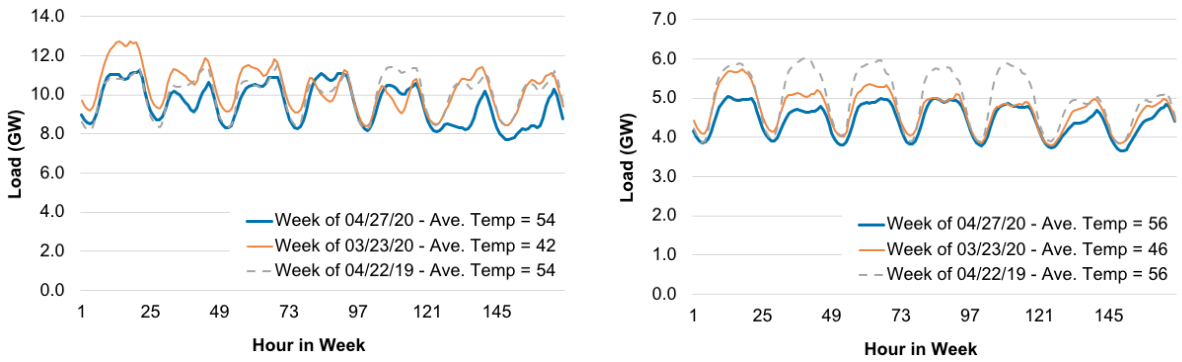
In each market region we provide two analyses. First, we pick up where our last analysis left off and evaluate the development of load from late March into late April. This period marks, in our view, a full calendar month of widespread COVID-19 response in the US and UK. Second, we compare the data from late April to a weather-similar week from either 2018 or 2019, depending on which offered the best historical analog. We again note that numerous factors affect daily demand patterns, including time of year and various elements of weather. To keep things simple, we only attempted to subjectively control for weather, using average weekly temperature as a rough proxy.

For New York, we again evaluate the impacts separately for New York City (defined as NYISO Zone J) and the rest of the NYISO system (excluding NYC). We selected the last week of April (starting Monday April 27), the last week of March (starting Monday March 23), and used a weather-similar week to the last week of April, which in this case was the week of April 22, 2019 (see Figure 1). The weather-similar weeks are within 1 °F as measured at both Albany airport and LaGuardia, and the end of April was on average 10 °F warmer than the end of March.

	Load decline from "normal" during weather-similar weeks		Load decline between weeks
	Analysis of April Data	Analysis of March Data	March 23 & April 27
NYISO (ex. NYC)	5%	9%	8%
NYC	11%	15%	6%

Across New York State and in New York City, we observe a decline in all-hours average load between the end of March and end of April. This is to be expected as temperate spring weather reduces space conditioning demands.[1] Load destruction caused by COVID-19 response measures between weather-similar weeks was less severe in late April than observed in late March. After qualitatively controlling for weather, this potentially indicates a reduction in the impact of the virus on electric load. We speculate this could be a result of some relaxing of quarantining behavior or increased load as new routines become common during the pandemic period. Qualitatively, we observe that weekend electricity use in late April of the pandemic shows considerable decline, and that in non-NYC NYISO the pandemic response appears similar—from an electric demand standpoint—to ambient temperatures being 12 °F more moderate. As we noted in our previous **Insights**, changes in consumption patterns are more pronounced during working hours than during off-peak periods, and in NYC we see the impact of weekday pandemic response likely driving large shifts in commercial load.

Figure 1: NYISO non-NYC load (left, excluding zone J) and NYC load (right, zone J only)



Source: CRA analysis, Energy Velocity

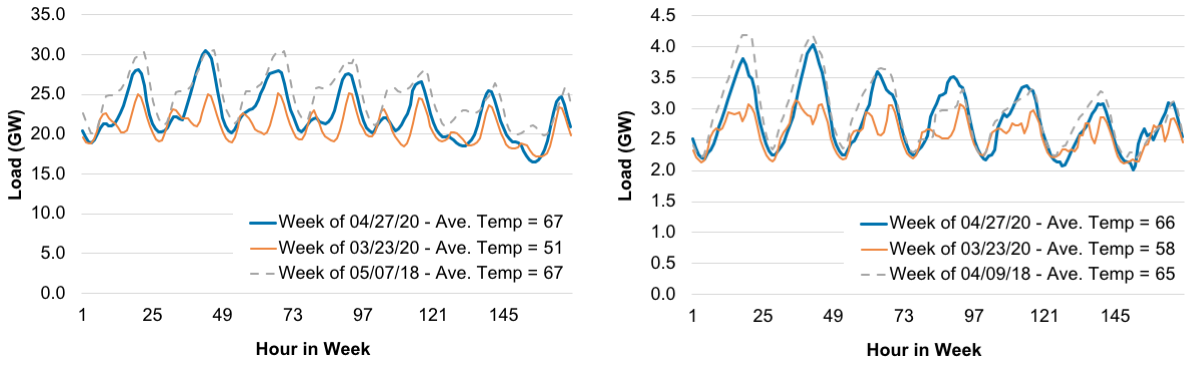
[1] The correlation between temperature and load generally "bottoms out" around 55–60 °F. See, for example, PJM, Zone Load vs Temperature Scatter Plots for March/April 2017-2020, **https://www.pjm.com/-/media/committees-groups/subcommittees/las/2020/20200505/20200505-zone-load-vs-temperature-plots-post-meeting.ashx**

Moving west, we observe the impacts in the California Independent System Operator (CAISO) footprint to those in the Los Angeles Department of Water & Power (LADWP) balancing area. We again select the last week of April and the last week of March to show change across the pandemic period (see **Figure *2***). To illustrate the impact on weather-similar weeks, we select the week of May 7, 2018, for CAISO, and April 9, 2018, for LADWP. As measured at Sacramento Executive Airport and at Los Angeles International Airport, the CAISO and LADWP weather-similar weeks averaged within 2 °F, while the average temperature increased 10–15 °F between late March and late April.

	Load decline from "normal" during weather-similar weeks		Load decline between weeks
	Analysis of April Data	Analysis of March Data	March 23 & April 27
CAISO	9%	9–11%	(9%)
LADWP	5%	11–13%	(8%)

As in New York, we observe that the decline between "normal" demand conditions and weather-similar pandemic conditions was less pronounced in late April than in late March. Considerably higher temperatures in late April also significantly drove load up, resulting in an absolute increase in demand, despite demand still being at lower levels than it would be under historically normal conditions (controlling for temperature). Interestingly, in Los Angeles it appears that peak load has been largely unaffected by the pandemic despite the decline in total demand. This may indicate continued space conditioning regardless of whether buildings are in use or not, and warmer weather drives higher late morning and early afternoon demand. The same is not true in the broader CAISO market, where we observe lower demand across the working day with the largest differences in the late morning and late evening. We expect that observations of load in California may be skewed by the impact of cloud cover given the high penetration of rooftop solar panels.

Figure 2: CAISO load (left, excluding LADWP) and LADWP load (right)



Source: CRA Analysis, Energy Velocity

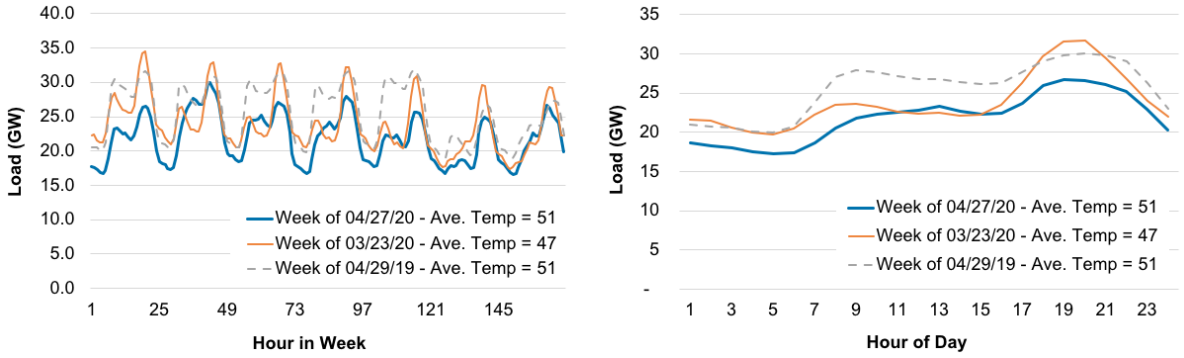
Finally, we review the effects on electric demand in England and Wales. As with the other jurisdictions, we assess the last week of March, the last week of April, and a weather-similar week to late April—in this case the week of April 29, 2019 (see **Figure *3***). The weather-similar weeks are within 1 °F of one another on a daily basis, and the weather in the UK has warmed by

approximately 4 °F on average between late March and late April. Weather data is the same as that used by the UK's National Grid.

	Load decline from "normal" during weather-similar weeks		Load decline between weeks
	Analysis of April Data	Analysis of March Data	March 23 & April 27
England and Wales	15%	17–18%	9%

The impact on load stemming from COVID-19 remains severe in the UK, though slightly less so in late April than in late March—similar to the observations in New York and California. More temperate spring weather has led to further absolute declines in electricity demand across the two-month period. We observe considerable moderation of the evening peak in the most recent data, as compared to the same from late March, potentially related to the warmer weather. Unlike other markets, the COVID-driven decline in electric load in the UK is more consistent, and results in "around the clock" demand reduction. Figure 3 below compares the week of April 27, 2020, to the weather-similar week from 2019. Load destruction of approximately 15%, on average, is observed in both the daytime and the evening throughout the week, but this is not seen in the weekend peak loads, which are similar between years.

Figure 3: England and Wales load weekly (left) and average hourly by week (right)



Source: CRA analysis, National Grid

Additional observations

Our analysis is based on observations from the first full month—following an analysis of a partial month, March—of what is likely a number of months of aggressive policy and social response aimed at slowing COVID-19. As noted in our prior *Insights* piece, we expect the effects on load to evolve as the economic ramifications of the pandemic continue to unfold, impacting the economy and personal behavior. We also expect that there will be lasting impacts to electric load during the recovery and return-to-normal period.

Beyond the expected macroeconomic slowdown and business interruptions, we will be watching commercial loads and their progress recovering to "normal" historical levels. A lingering reduction in daytime commercial load may persist as plans to work remotely are extended into the year and

remote working becomes the new normal.[2] Nighttime commercial loads may take even longer to recover as social venues remain empty due to lingering worries about health risks.

As we noted in April, the COVID-driven impacts on load patterns affect a range of stakeholders across the electricity sector. Shifting intraday consumption can impact expected power prices, affecting merchant developers and payback periods for distributed solar resource and other third-party energy services. Utilities may also experience cost-recovery shortfalls due to sustained decreased sales, in turn driving increased regulatory activity to reset rates. Extended energy and peak demand declines may also expose excess embedded capacity and trigger associated regulatory scrutiny. Finally, already distressed assets (e.g., coal units and inefficient peaking units) may accelerate retirements in the face of the low prices resulting from low demand. We plan to offer comment as these processes unfold and work with our clients to resolve related problems as they arise.

About CRA's Energy Practice

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[2] See, for example, Adedayo Akala, "More big employers are talking about permanent work-from-home positions," CNBC, May 1, 2020, **https://www.cnbc.com/2020/05/01/major-companies-talking-about-permanent-work-from-home-positions.html** and Rachel Lerman and Jay Greene, "Big Tech was first to send workers home. Now it's in no rush to bring them back," *The Washington Post,* May 18, 2020**,** **https://www.washingtonpost.com/technology/2020/05/18/facebook-google-work-from-home/**