CRA Insights

CRA Charles River Associates

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An early view of the impact of COVID-19 reactions on electric load

In this *Insights*, we review the impact of responses to the COVID-19 virus on electric demand in the month of March. Examining trends from the UK and several jurisdictions in the US, we observe declines in electric demand and changing demand patterns, reflecting sweeping shifts in personal and economic behavior stemming from the pandemic response. We expect the shifts in load shape will continue to evolve throughout the crisis and beyond, though the lasting effects of the current crisis on electric demand will not be known for some time. We close by raising several areas that we will be monitoring in the coming months and years that will affect stakeholders in the electric utility space.

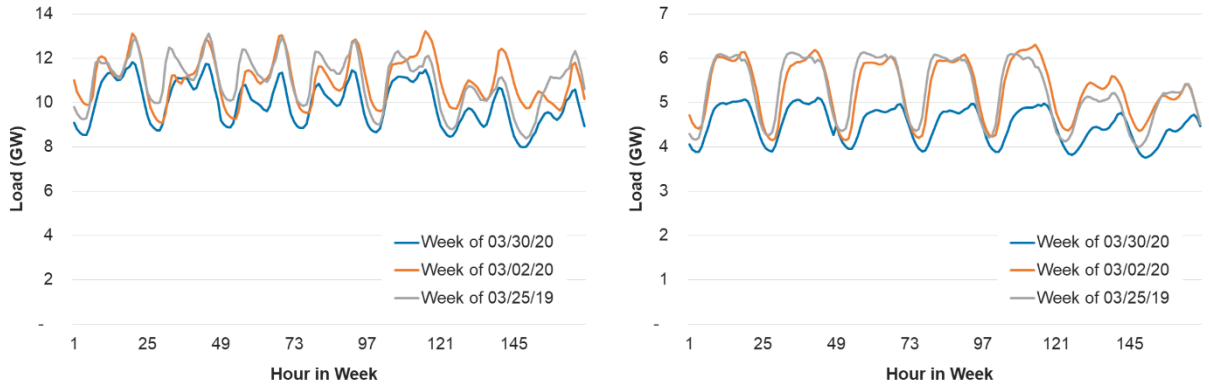
Pandemic response and electric demand

In this *Insights*, we focus on how electric load patterns are changing as industry slows, commercial activity shifts into the home where possible – and diminishes, where not – and residential demand becomes a round-the-clock affair.

To examine impacts to load, we focused on jurisdictions that have taken extensive action towards mandated quarantine in response to the COVID-19 crisis. 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 temperature as a rough proxy. Thus, we present data from weather-similar weeks. Also, in an effort to examine the effects on various types of economic activity, where possible, we show differences between cities and broader market areas.

For New York, we examine the impacts on the NYISO market (excluding NYC) and New York City specifically, as defined by NYISO Zone J. We select three weather-similar weeks: the week of March 30, the week of March 2, and a weather-similar week from 2019 (see Figure 1). These weeks are within 4° F as measured at Albany airport and within 2° F as measured at LaGuardia. Across New York State, we observe a decline in all-hours average load of 9% with the impact appearing to present across all hours. The impact on weekends is particularly pronounced, potentially indicating declines in discretionary commercial activity. In New York City, the all-hours average load shows a 15% decline compared to both reference weeks. The reduction in daytime load is more pronounced than during off-peak weekday hours, showing the stark decline in non-residential working hours activity. As with the broader NYISO footprint, we observe that weekend activities are both diminished and shifted later in the day.

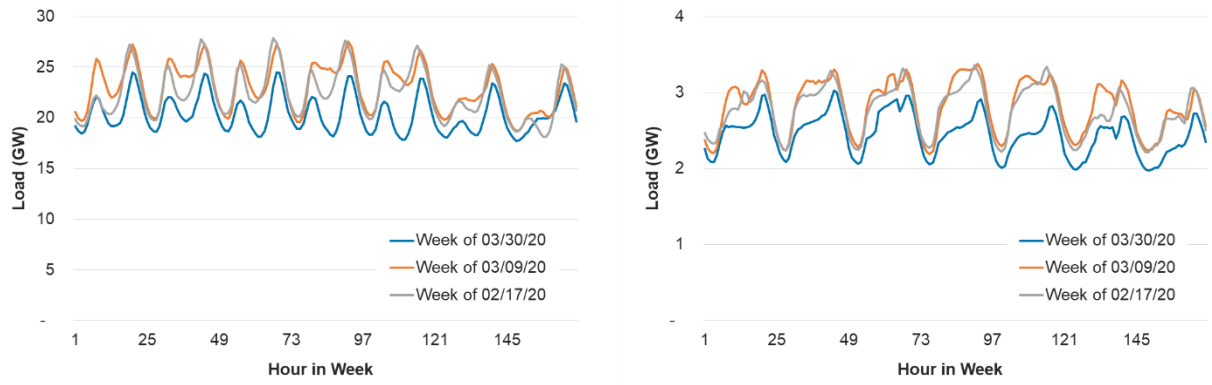
Figure 1: NYISO non-NYC load (left, excl. zone J) and NYC load (right, zone J only)



Source: CRA analysis, EnergyVelocity

Comparing the impacts in the California Independent System Operator (CAISO) footprint to those in the Los Angeles Department of Water & Power (LADWP) balancing area, similar patterns are evident. In the California areas, owing to consistent behavior across the 2020 spring, we examined three weeks at three-week intervals between mid-February and late March (see **Figure 2**). As measured at Sacramento Executive Airport and at Los Angeles International Airport, the CAISO and LADWP weather all averaged within 2° F on weekly basis. Across CAISO, average load declined from the reference weeks by 9-11%. Owing to the high penetration of solar resources, some daily variations are clearly a result of the impact of cloud cover on system load. However, there is strong evidence of broader declines in demand, particularly during working hours on weekdays and Saturdays; effects in the evenings and on Sundays are less dramatic. In the LADWP area, the average daily decline is observed on the order of 11-13%. The impact of distributed solar is less pronounced in the urban area (i.e., less “duck curve”), but the patterns are generally similar to those observed across California.

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

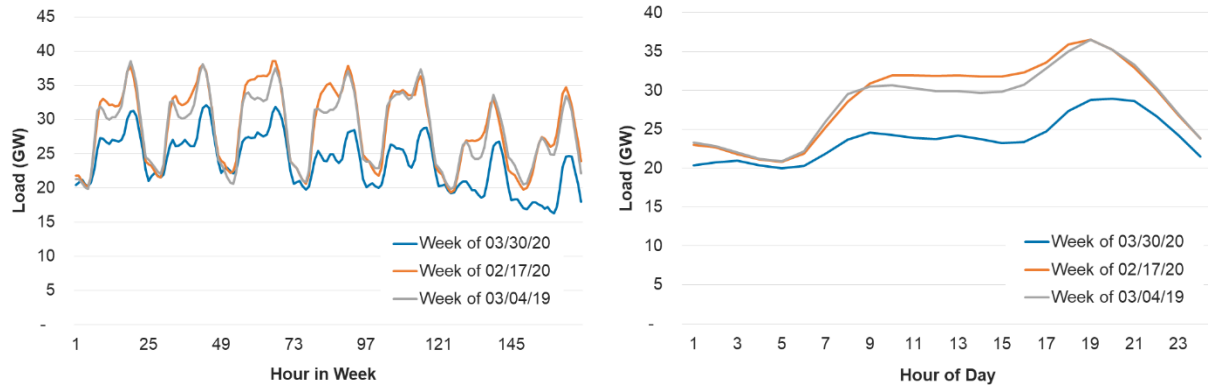


Source: CRA analysis, Energy Velocity

Looking to the UK, effects on electric demand in England & Wales are similar to those observed in the US, with the total impact appearing even more severe. For our analysis, we focus on the week of March 30, 2020 – with reference weeks from mid-February 2020 and a weather-similar week from March 2019 (see **Figure 3**). Based on weather data used by UK’s National Grid, all three weeks averaged within 1° F of one another on a daily basis. Average loads have declined 17-18% between the week of March 30 as compared with reference periods. This shift is consistent and pronounced

throughout the working day, starting mid-morning and lasting until the late evening. Weekend day declines are significant, with some daytime weekend loads falling below overnight levels of demand, as seen at the end of the week of March 30.

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



Source: CRA analysis, National Grid

Looking forward

Our observations here are based on responses from the first months of aggressive policy response aimed at slowing the COVID-19 virus. We expect the effects on load to evolve as the economic ramifications of the pandemic further permeate the economy and affect 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, for example, whether commercial loads recover to "normal" historical levels. A lingering reduction in daytime commercial load may persist if working remotely becomes the new normal. Nighttime commercial loads may also struggle to recover if social venues remain empty as people worry about lingering risks.

In aggregate, the long-term impacts on load patterns will 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 re-set 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 watch as these processes unfold and work with our clients to resolve related problems as they arise.

About CRA's Energy Practice

Charles River Associates is a leading global consulting firm that offers strategic, economic, and financial expertise to major corporations and other businesses around the world. CRA's Energy Practice provides services to a wide range of industry clients, including utilities, ISOs, RTOs, large customers, and investors. The Energy Practice has offices in Boston, New York City, Washington, DC, Toronto, and London. Learn more at **www.crai.com/energy**.

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