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ERCOT Solar Set to Climb

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Data Sources Used in This Publication
ERCOT
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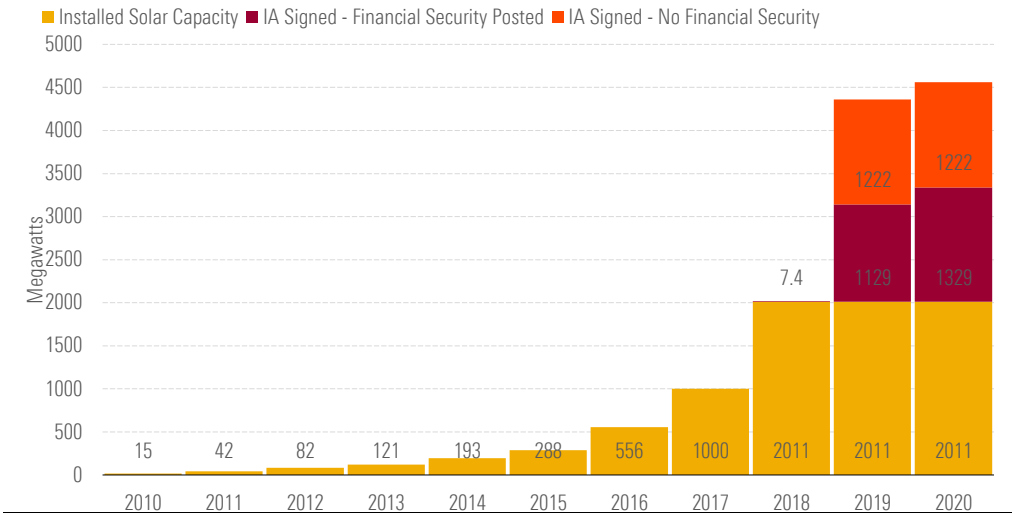
Solar Dampens Volatility

This summer, the Electric Reliability Council of Texas, or ERCOT, gave power markets some excitement as reduced coal capacity inserted considerable volatility. The capacity outlook for summer 2019 looks far less unsettled. Additional solar capacity is coming online in a market where this resource was near nonexistent just a couple of years ago. This new renewable capacity will likely put a dent in upper-end speculation and reduce the afternoon spike potential over the next few years.

Solar Additions

The latest October 2018 ERCOT generator interconnection status, or GIS, report shows the solar capacity already in place (Exhibit 1). So far this year, ERCOT has doubled solar capacity and could do so again next year. While it remains to be seen just how much materializes into the stack, renewable requests in the GIS report are substantial with over 32,000 megawatts of solar at various stages in the process in addition to over 40,000 MW of wind. While the majority won't likely make it to market, there are already interconnection agreements in place for nearly 4,000 MW not currently attached to the grid.

Exhibit 1 ERCOT Installed & Projected Solar Capacity

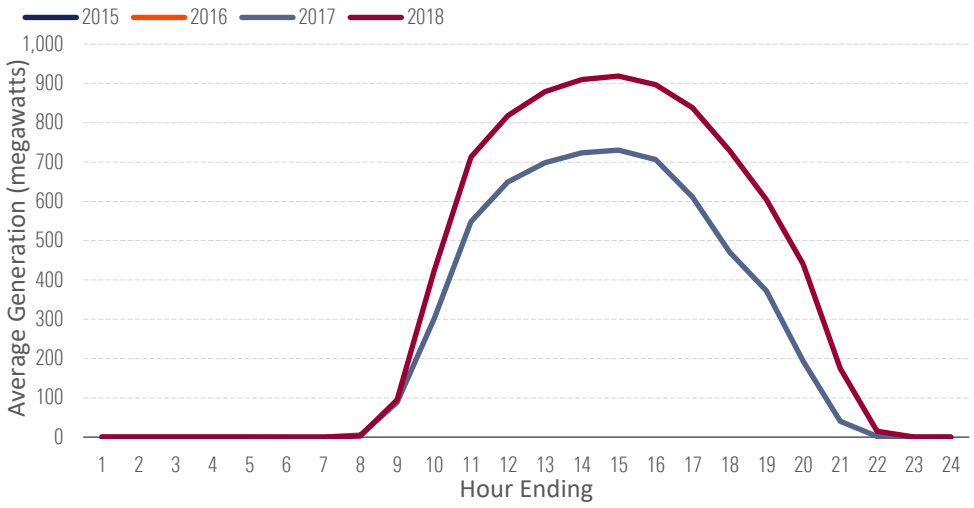


Source: ERCOT

Added Capacity Equals Added Generation

ERCOT only recently started to report its use of solar generation as capacity was previously too little to warrant separate itemization. Last year, solar generation breached 1 gigawatt of capacity and it has already jumped to over 2 GW in 2018 (Exhibit 2). Another doubling of capacity is likely next year, or with a couple of project delays by 2020 at the latest, with continued additions planned. Another doubling will result in average solar generation jumping and making a sizable imprint to net demand.

Exhibit 2 ERCOT Average Solar Generation



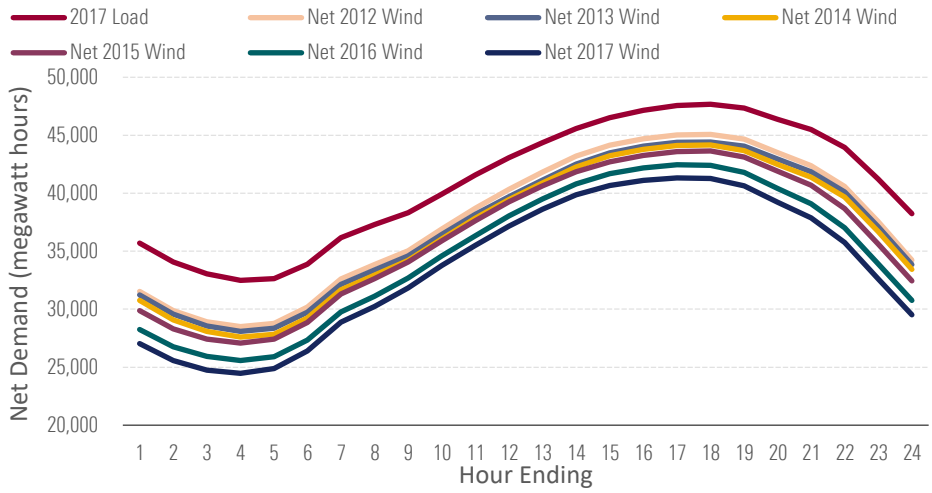
Source: ERCOT

The impact of solar generation on daily demand will differ from ERCOT's experience with increased wind generation in recent years. Wind delivers stronger generation in the off-peak hours and is often missing during high demand summer days with hot and muggy conditions. On the other hand, solar generation is typically cranking during the peak afternoon heat when it directly reduces overall demand..

Net Generation

Renewables reside at the bottom of the generation stack and reduce the total load that traditional fossil fuel plants were built to meet. This net demand is seen in the impact of wind in ERCOT over the last seven years (Exhibit 3). Taking 2017 average load as the baseline and removing the average daily wind pattern produces a net load curve. The data shows the sizable demand reduction caused by the addition of wind generation each year leaving a successively smaller market share for coal and natural gas generators.

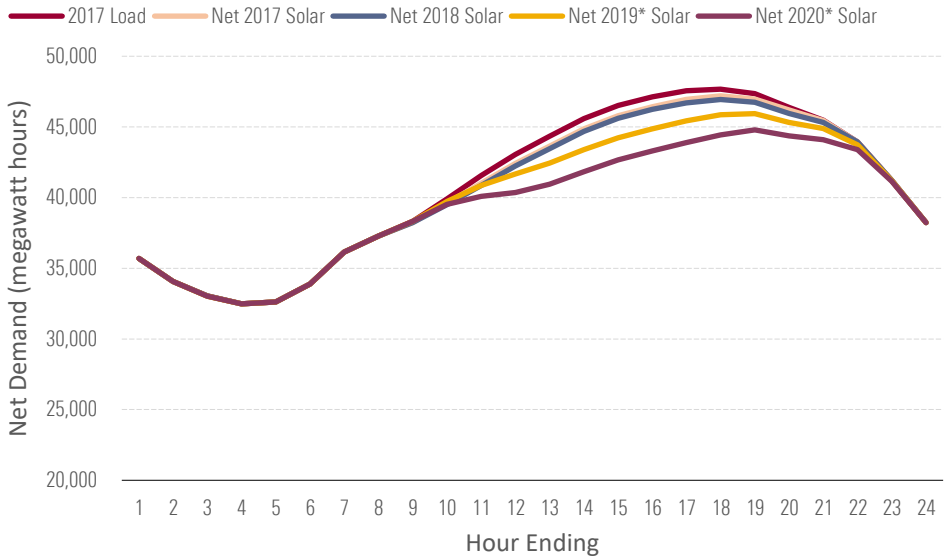
Exhibit 3 ERCOT Average Reference Load and Load Net Wind Generation



Source: ERCOT

Applying this same analysis, as solar installations increase over the next two years will show the expected shift of net demand (Exhibit 4). This anticipated ERCOT hourly demand shape exhibits some similarities with the classic duck curve now common in California's CAISO market but, as we discuss next, there are important differences.

Exhibit 4 ERCOT 2017 Average Reference Load and Load Net Solar Generation



Source: ERCOT

ERCOT Duck Curve?

CAISO's duck curve hourly demand shape from solar generation became noticeable in day-ahead prices during 2014 with over 4,000 MW of solar capacity online. Comparing CAISO's smaller demand profile with peak loads close to 48,000 MW and ERCOT's summer demand peak of 70,000 MW, the solar installed capacity equivalent for ERCOT would be 5,800 MW—a number that should be in striking distance next year.

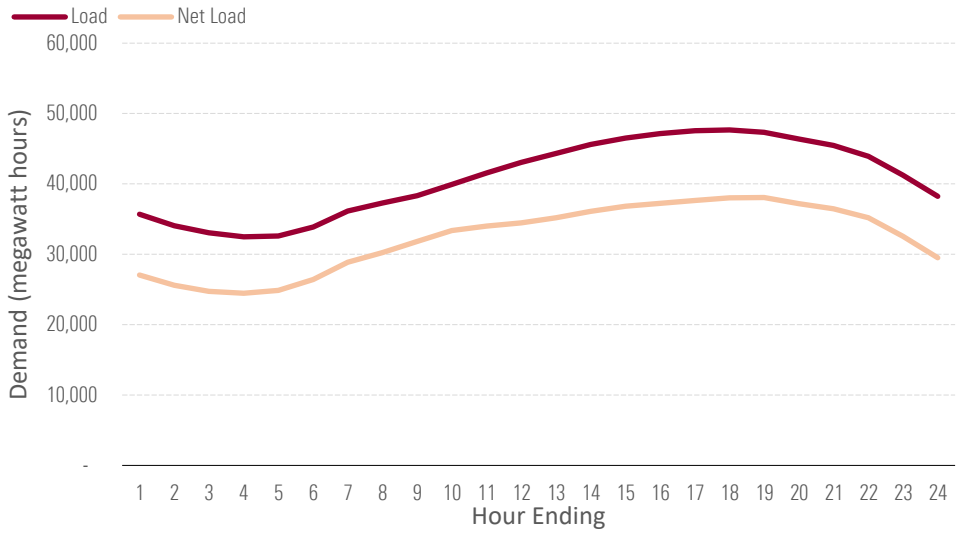
The classic duck curve is so called due to the bill looking shape of the hourly load profile. The first part of the duck curve is midday, which sees suppressed demand from high solar generation. The second part is increased load during the morning and evening ramp when sizable natural gas ramping is needed as solar capacity waxes and wanes.

ERCOT is unlikely to experience exactly this classic duck curve because Texas lacks the significant hydro generation California has available. As a result, ERCOT midday demand is much higher without hydro—meaning solar generation will need to have a more significant impact on net demand to move the needle. Although in mild winters, solar power could have a more pronounced impact.

However, the impacts of the duck curve noted on morning and evening peak net demand are already impacted by ERCOT's high wind generation. Texas has grown wind capacity in lockstep with CAISO's solar expansion. The result in ERCOT has been for wind to push power prices down during off-peak morning and evening ramp hours rather than at the midday peak as in California. In Texas, older generators have less flexibility to ramp up and down. If extremely windy conditions overnight lead to net load profiles falling below the generators' ability to ramp down, the effect is the same price suppression experienced during CAISO's midday.

A sizable solar or wind build-out by itself has created awkward-shaped net demand curves often causing ramping issues to slow start resources and have resulted in both extreme high to negative prices. When either solar or wind is generating at its highest prices go low and when they are at their lowest prices can spike. Exhibit 5 shows the combined effects of net load from current wind generation so far in 2018 and the projected solar generation we expect by 2020. On average, the net demand curve is not lopsided but shows wind generation complements solar generation. As the sun goes down and solar generation falls, wind generation picks up. On average, the impact will result in a flatter normal demand curve shifted down rather than a classic duck shape.

Exhibit 5 ERCOT Average Reference Load and Net Wind and Solar Generation



Source: ERCOT

Remaining Net Demand

Changes in ERCOT's stack in favor of wind and solar leave less and less room for legacy generation. Comanche Peak and South Texas nuclear facilities provide 4,500 MW of nuclear capacity, which also sits on the lower end of the supply stack. Access to cheaper natural gas from the Permian Basin will provide an additional test for the remaining coal fleet. Only 6,000 MW of coal capacity was built after 1990, with the remaining 9,700 MW of capacity built before. The addition of cheaper gas generators will surely increase coal retirements over the next few years.

Cheaper Future

This last summer could prove to have been a prime time to hedge out future positions over the next couple of years in ERCOT. Continued expansion in solar and wind generation, coupled with access to cheap natural gas will put increasing pressure on traditional fossil fuels like coal. Wind generation has already made a sizable impact on net load, and solar appears ready to make an additional dent. The coming years should see cheap prices across the board in the region.

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