

**FACT SHEET** May 2021



# An Explanation of Extreme Weather Power Outages and Price Spikes: Mandatory Capacity Constructs Would Not Have Helped

## Introduction

Facing extreme winter conditions, early in the morning of February 15, with over 30,000 megawatts (MW) of generation unable to operate, the Electric Reliability Council of Texas (ERCOT) initiated what were expected to be “rotating” outages. Instead, many customers remained without power for days as the offline generation reached 46,000 MW on February 17, about half of the installed nameplate capacity. Nameplate capacity generally represents the maximum output potential of a generating resource. ERCOT announced an end to emergency conditions on the morning of February 19.<sup>1</sup>

Two other regional transmission organizations or independent system operators (RTOs/ISOs), the Southwest Power Pool (SPP) and Midcontinent ISO (MISO) faced similar crises. SPP directed member utilities to implement controlled interruptions to reduce regional energy consumption by about 1.5 percent for 50 minutes on February 15 and by about 6.5 percent for a little more than three hours on February 16, reporting that generation capacity, including imports, fell 641 MW short of demand on February 15.<sup>2</sup> At the highest outage level, 45 percent of the total generating nameplate capacity and almost two-thirds of the natural gas generation nameplate capacity were out in SPP.<sup>3</sup>

With about 40 percent of the nameplate capacity out, MISO also directed load-serving entities to implement rolling outages, first on the morning of February 15 in the Texas portion of MISO-South and then in a broader portion of the South region for much of the day on February 16.<sup>4</sup>

As policymakers seek solutions to avoid such a winter crisis in future years, one possible alternative that may be considered is a mandatory capacity construct, similar to those in the PJM Interconnection (PJM), ISO New England (ISO-NE), and New York ISO (NYISO), also known as the “Eastern RTOs/ISOs.” (Because ERCOT is not regulated by the Federal Energy Regulatory Commission, or FERC, such a construct could only be implemented by the Texas Public Utilities Commission.)

But such a construct would not have addressed the causes of these outages, as is explained below. In fact, at a recent Senate hearing, Manu Asthana, President and CEO of PJM stated:

I think it’s easy to think, “Oh, if only Texas had a capacity market, this wouldn’t have happened.” I think Texas would have had a higher reserve margin perhaps, but it’s important to note that going into this winter, Texas had reported a reserve margin for this winter of 43 percent. And so it

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<sup>1</sup> ERCOT News Releases, February 15 and 17, 2021. Total winter capacity from the *Seasonal Assessment of Resource Adequacy for the ERCOT Region, Winter 2020/2021*.

<sup>2</sup> SPP Press Releases, February 15 and 24, 2021.

<sup>3</sup> Outage Data from *SPP Market Monitor Marketplace Update*, February 2021. Total nameplate capacity from the *SPP 2019 State of the Market Report*, SPP Market Monitoring Unit, May 2020, Figure 2-13, at 34.

<sup>4</sup> Overview of February 2021 Arctic Weather, MISO Markets Subcommittee, March 11, 2021; MISO News Releases, February 15 and 16, 2021 and MISO Twitter account.



was not a shortage of capacity, it was this incredibly cold weather for which the capacity was not prepared, and we think that could happen to us.<sup>5</sup>

A key focus of these events has been on ERCOT, where the outages imposed the greatest hardship. ERCOT is unique in that it does not require load-serving entities to own or contract for sufficient accredited capacity to meet a specified reserve margin, and instead relies on the theory that the “energy-only” market and scarcity pricing will ensure resource adequacy through financial incentives.

Accredited capacity generally represents the output potential of a generating resource under ambient conditions historically seen during periods of peak loads. MISO and SPP do subject load-serving entities to a reserve margin requirement, and while MISO uses a voluntary capacity market, SPP does not have such a construct. Most generation in MISO and SPP is owned or contracted for by utilities with an obligation to serve their customers and who are subject to a reliability standard in the form of their reserve margin requirement.

Although it does not have a reserve margin requirement, ERCOT can use the Reliability Unit Commitment (RUC) process to commit generation that was not dispatched by the market but is needed for reliability purposes — either to meet the system demand or because of a transmission constraint. RUC instructions are given both a day-ahead and an hour-ahead of the reliability need. Generators who comply with the RUC instruction are guaranteed to recover their costs but cannot receive market revenues. But if there is not sufficient generation available at the time of the reliability need, then the RUC process may not be sufficient to prevent outages. Ensuring that sufficient capacity is not only available, but also operating, is therefore essential — but a capacity market is not the solution to that problem.

## A Capacity Construct Is *Not* Needed for Reliability

The biggest question that has emerged from these winter events is how best to prevent future system-wide power outages. How best to ensure reliability is a separate question from whether an RTO/ISO has a mandatory or voluntary capacity market, an energy-only market, or neither. As has been noted above, having a capacity market similar to those in the Eastern RTOs/ISOs would not have prevented the events of February 2021.

All RTOs/ISOs except ERCOT require load-serving entities to comply with a reliability obligation requiring contracts for — or ownership of — sufficient accredited generating capacity to meet the projected peak demand plus a reserve margin. (Note that public power utilities in Texas also conduct detailed planning to ensure their generation resources meet future reliability and environmental policy goals, as determined by local preferences, among other factors.) ERCOT does, however, commission periodic analyses of the “market equilibrium reserve margin,” which is the reserve margin that would result from having suppliers’ costs recovered from projected market revenues, and the “economically optimum reserve margin,” which occurs when marginal supply equals marginal cost.<sup>6</sup> Moreover, ERCOT issues projections of reserve margins for the summer and winter several months in advance of each season which serve as an “early indicator of the risk that ERCOT may need to call an Emergency Alert Level 1.”<sup>7</sup> But none of these analyses serves as an obligation on any entity to have a sufficient amount of capacity in place.

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<sup>5</sup> Transcript of Senate Committee on Energy and Natural Resources Hearing on the Reliability, Resiliency, and Affordability of Electric Service, March 12, 2021.

<sup>6</sup> *Estimation of the Market Equilibrium and Economically Optimal Reserve Margins for the ERCOT Region - 2018 Update*, prepared for ERCOT by the Brattle Group, December 20, 2018. The authors note that “[t]his concept is relevant in ERCOT because, unlike all other electricity systems in North America, ERCOT does not have a resource adequacy reliability standard or reserve margin requirement.”

<sup>7</sup> Description of Seasonal Assessment of Resource Adequacy reports, Resource Adequacy section of ERCOT website.



With some of the extreme winter weather patterns in recent years, some RTOs/ISOs, especially MISO, have begun exploring whether reliability requirements should be seasonal in nature with separate reserve margin requirements for both summer and winter, and possibly spring and fall as well. Some utilities in the Southeast beyond RTO/ISO footprints are incorporating winter reserve margins into their Integrated Resource Plans.<sup>8</sup> Reliability requirements in this case can be defined as sufficient capacity to meet expected seasonal load plus a reserve margin.

A capacity market is not the same as having reliability obligations. Capacity markets are mechanisms to determine which generation and demand-side resources are selected to provide capacity over a specific time interval and to determine the prices to pay for that capacity. Other means exist to procure capacity, such as bilateral contracts and ownership of resources, but in RTOs/ISOs with mandatory capacity markets, all such resources must bid into and clear the auctions. In MISO, load-serving entities are not required to purchase resources from the capacity auctions to meet their reliability obligations. (For more details on capacity and other markets operated by RTOs/ISOs, see APPA's [Wholesale Electricity Markets Issue Brief](#).)

### Sufficient Capacity Is Not the Same as Resource Availability

The presence of reliability standards, regardless of a capacity market, does not necessarily mean that all generation used to meet that standard will be available. The generation outages during the February 2021 event reflected the unavailability of generation — not the absence of capacity itself. There was sufficient accredited capacity on the grid, but a substantial portion of it was not operational when it was most needed.

The Eastern RTOs/ISOs, which have mandatory capacity markets, are not immune to reduced generator availability during extreme weather events. Almost one-fourth of PJM's capacity was shut down during the 2014 Polar Vortex. A cold snap in early 2018, however, did not result in the same level of outages. While this was partly due to less severe weather than in 2014, PJM also attributes the reduction of outages to “enhancements PJM and its member companies have put in place in the years since the Polar Vortex, such as increased investment in existing resources, improved performance incentives, enhanced winterization measures and increased gas-electric coordination.”<sup>9</sup> Some of these efforts are unrelated to market rules, such as the development of a generator winter preparation checklist, recommended by the North American Electric Reliability Corporation (NERC) after the 2014 Polar Vortex, which PJM notes had a 98 percent response rate in advance of the winter of 2018.<sup>10</sup>

Performance penalties and incentives were developed by both PJM and ISO-NE as a means to incentivize capacity resources to be available during times of system stress. But mechanisms to impose penalties and incentives can be established without a capacity market. For example, SPP's market monitor has expressed concerns about growing generator outages and recommended that SPP implement stronger requirements and penalties for generator availability but has not recommended a capacity market.<sup>11</sup>

NERC's *2020-21 Winter Reliability Assessment* projected that all regions would have sufficient capacity above the planning reserve margin under “normal” conditions, regardless of whether the region is within an RTO/ISO footprint, or has a mandatory or voluntary capacity market.<sup>12</sup>

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<sup>8</sup> Alabama and Georgia Power Integrated Resource Plans.

<sup>9</sup> *PJM Cold Snap Performance Dec. 28, 2017 to Jan. 7, 2018, PJM Interconnection, Feb. 26, 2018*, at 2.

<sup>10</sup> *Id.* at 19.

<sup>11</sup> *SPP 2019 State of the Market Report* at 292.

<sup>12</sup> *2020-21 Winter Reliability Assessment*, North American Electric Reliability Corporation, November 2020, Figure 2 at 7.



Addressing extreme weather requires improved planning to ensure that resources are available even during the most extreme conditions – and that fuel can be supplied. The presence of installed capacity does not guarantee sufficient delivered energy. Texas also faced severe winter weather in early February 2011, when deratings or failures of generators in ERCOT caused one-third of the generating capacity to be unavailable during the peak of the outages.

FERC and NERC issued a *Report on Outages and Curtailments During the Southwest Cold Weather Event of February 1-5, 2011 in August of 2011*, that found generation owners “were generally reactive as opposed to being proactive in their approach to winterization and preparedness” and that many “failed to adequately prepare for winter...”<sup>13</sup> The report provided an extensive list of recommendations for improved winterization of generation facilities and recommended that the states in the region “examine whether Generator/Operators ought to be required to submit winterization plans, and should consider enacting legislation where necessary and appropriate.”<sup>14</sup> While these recommendations for such state actions were not universally implemented, many public power utilities that own generation did enhance their winterization efforts.

## Mandatory Capacity Constructs Can Impede State and Local Resource Planning

Throughout the country, states and local utilities, including public power, may determine through their planning processes that specific resource types are desired for environmental and other policy goals, including improving local reliability and fuel diversity.

For those states, including Texas, that implemented retail choice and restructured the investor-owned utilities, these utilities no longer have an obligation to serve customers or own generation assets. (Because public power within the retail choice states was not deregulated and retained an obligation to serve customers, these utilities have continued to own or contract for specific resources.) Within the Eastern RTOs/ISOs, however, many of the deregulated states have increasingly been exercising their rights to procure specific resource types, even if the utilities they regulate no longer own or have long-term contracts for generation. But these state actions in the Eastern RTOs/ISOs have led to the development of problematic “Minimum Offer Price Rules” in the capacity constructs that impede state and local procurement of needed resources. These capacity constructs have become unsustainable as a result and are currently undergoing careful scrutiny by the Eastern RTOs/ISOs and FERC and will likely be reformed.

The ability of states and local utilities to conduct resource planning and procure specific resource types provides a framework for determining a resource mix that enables greater resilience. Where such procurement occurs through bilateral contracts, the state or local regulatory authority may include winterization provisions or other requirements within the contract. For resources owned by regulated utilities, the state or a local authority can ensure that the resource undertakes the necessary steps to be prepared for weather extremes. Because these Minimum Offer Price Rules that have accompanied the Eastern mandatory capacity markets create barriers to state and utility procurement of resources, these constructs also could interfere with state and utility efforts to procure resources needed for grid resilience improvements.

## Consumers Do Not Benefit from Capacity Constructs

Wholesale price spikes occurred in ERCOT, SPP, and MISO-South energy markets to varying degrees during the extreme weather period because of a combination of factors — decreases in available supply, extremely high natural gas costs, and scarcity or shortage pricing provisions that allow for adders to the locational marginal prices during times when generation supply is tight.

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<sup>13</sup> FERC/NERC 2011 Report at 196.

<sup>14</sup> *Id.* at 203.



The price spikes were significantly greater in ERCOT than in SPP and MISO. In ERCOT, Day-ahead locational marginal prices ranged between \$6,000 and \$9,000 per megawatt-hour (MWh) for most hours between the morning of February 15 and the afternoon of February 19. The highest sustained prices in SPP were about \$4,000/MWh and in MISO prices exceeded \$500/MWh in several regions.<sup>15</sup>

The theory of scarcity pricing is that price spikes will incentivize investments to ensure resource availability during times of tight supply, as well as greater demand response. But the events of February demonstrate that such incentives do not necessarily ensure generator availability during extreme weather conditions, especially where the state has implemented retail restructuring. Generators may determine that the uncertainty of receiving revenue from such extreme prices does not warrant making investments in reliability, or there may be factors outside of their control, such as the inability to obtain natural gas.

Moving to a mandatory capacity construct does not address the shortcomings of scarcity pricing, however. Consumers pay significant costs for the over-procurement of capacity, especially in PJM, and such capacity is designed to meet the summer peak without necessarily guaranteeing availability of generation during other times of the year. As noted earlier, penalties and incentives may provide additional motivation for generator preparation, but these do not require a capacity market and also may not necessarily be sufficient for extreme weather cases.

In his dissent on the order approving PJM's compliance filing on capacity performance incentives and penalties, former FERC Chairman Norman Bay noted that "[c]ompensation for capacity resources is so generous, and the penalties for non-performance are so weak, that resources can profit even if they are unable to perform when they are most needed, thereby undercutting the very purpose of the program."<sup>16</sup> PJM's Independent Market Monitor has also argued that the capacity construct exhibits structural market power, and in response to a complaint from the Market Monitor and other parties, FERC found that the current capacity price offer cap is set at a level that allows for the potential exercise of market power.<sup>17</sup> Consumers may therefore be spending more on capacity than needed without necessarily ensuring the availability of such capacity.<sup>18</sup>

## A Capacity Market Does Not Address Limitations on Transmission or Natural Gas Delivery

Additional factors contributing to the outages fall outside of the capacity constructs and will need to be addressed on their own. One of the most often-cited causes of these outages is ERCOT's limited transmission interconnections that would have allowed it to import power. This is a valid concern, but changes to the interties between ERCOT and other regions fall outside of the use of a capacity construct. In addition, the failure of natural gas production and delivery provide important lessons for improvements to natural gas industry oversight and regulation, as well as greater coordination between electricity generation and natural gas producers and pipelines. But such reforms would be unaffected by implementation of a capacity construct.

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<sup>15</sup> LMP Data from ERCOT, SPP and MISO websites.

<sup>16</sup> *PJM Interconnection, L.L.C.*, 155 FERC ¶ 61,157 (May 10, 2016), Chairman Bay Dissent at 1.

<sup>17</sup> *Independent Market Monitor for PJM v. PJM Interconnection, L.L.C.*, 174 FERC ¶ 61,212 (March 18, 2021).

<sup>18</sup> *Quarterly State of the Market Report for PJM: January through September*, Monitoring Analytics, LLC, November 2020, at 271.



## Conclusion

The events witnessed in ERCOT, SPP and MISO-South demonstrate that having sufficient capacity or even a surplus of resources may not prevent major outages if those resources are not available at the time they are most needed. As the Eastern RTOs/ISOs focus on reforming their problematic capacity markets, efforts to better prepare for future reliability needs must avoid consideration of capacity markets or similar constructs.

No market design or construct can fully address the needed preparation for extreme weather events, which will require a much broader consideration of reforms that will likely encompass winterization of electric generation, transmission planning, natural gas-electric coordination, and state-level regulatory policies. Moreover, there is no one-size-fits-all approach to such preparation and each RTO/ISO, as well as utilities outside of the RTO/ISO footprints, will need to examine their unique regional needs to better prepare for such extreme events.

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