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Chairman Peter Lake
Commissioner Lori Cobos
Commissioner Will McAdams
Commissioner Jimmy Glotfelty

May 9, 2022

Public Utility Commission of Texas
1701 N. Congress Avenue, 7th Floor
Austin, Texas 78701

Re: Project No. 52373, Review of Wholesale Electricity Market Deign.

Dear Honorable Chairman and Commissioners,

At the March 9, 2022, meeting of the Texas State Senate Committee on Business and Commerce, members of the Committee asked several important questions regarding capacity, reliability, and efficiency. Of particular significance were questions about implementing a potential capacity market in ERCOT. Given the venue, and the panelists, the discussion was understandably at a relatively high level and lacked specificity.

However, slightly more than a month after the Committee Meeting, the Midcontinent Independent System Operator ("MISO") released the auction results for their capacity market for 2022-2023. The actual and timely results of the auction go to the core of many of the questions that were raised by the Committee and must be addressed by the Commission. The attached analysis explains the results, why they are relevant for Texas, and raises questions that need to be answered by the proponents of implementing a capacity market in Texas.

It is important to recognize that extra capacity as a commodity: (1) has no value as a standalone separate commodity, i.e., capacity that cannot produce electricity has no value – we only demand capacity because it can be transformed into actual electricity when we need it and as a result, (2) has little to no value above and beyond a certain level, i.e., the correct market price should approach zero when there is excess capacity above a certain level. Symmetrically, the market price should reach a very high level when there is insufficient capacity. Importantly, as we move from one extreme to the other, i.e., when we move from having excess capacity to not enough, there is no inherent reason for the price mechanism to respond until we are at or near the point of not having enough. There is either enough capacity or there isn't. Which is the same as saying there is either enough generation when we need it or there isn't. And that is exactly the point, capacity, as a separate physical commodity has an inherent Boolean characteristic and so too do the prices for capacity in capacity markets.

On its own, this specific characteristic is not necessarily unique to generation capacity. However, relative to almost all other commodities the demand for electricity, i.e., capacity that has been turned into energy, is in real time (still) highly inelastic with few, if any, available substitutes short of not consuming. Thus, the essence of any capacity market, is a mechanism that produces prices for a good that will ultimately be used to produce electricity with an inelastic demand, that oscillates between $0 and (potentially) $∞. Given this inherent characteristic, it is pertinent to ask the question of why we should expect a capacity market to be capable of efficiently allocating resources? Equivalently, it would be useful if the proponents of a capacity market explained exactly what problem(s) implementing a capacity market in ERCOT will solve along with how and why implementing such a market will produce the most efficient results.

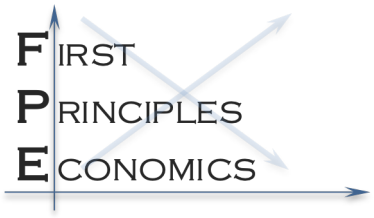
Sincerely,

/s/ Ron McNamara

Ron McNamara, PhD

Lessons and Questions for the PUCT and ERCOT arising from the Recent Results of the MISO Capacity Market

Ron McNamara, PhD*
May 9, 2022



From the Latin *Ab initio*, First Principles cannot be deduced from any other propositions – they are the only reliable foundation for discovery.

Executive Summary

On April 14, 2022, the Midcontinent Independent System Operator ("MISO") released a press release announcing the results of their annual Planning Resource Auction ("PRA") for 2022-2023. The PRA is the auction for capacity, i.e., the MISO capacity market, for the MISO footprint. The results of the auction are significant, educative, and relevant for the ongoing discussions taking place at the Public Utility Commission of Texas ("PUCT) around the Phase 2 Market Design proposals intended to create incentives to invest in and build new dispatchable generation that can meet the specific needs of the evolving ERCOT market in Texas, i.e., dispatchable generation that can be ramped up quickly in order to respond to fluctuating levels of customer demand (including price sensitive demand), highly variable weather conditions, or the intermittency of wind and solar. That is, generation capacity that is more agile, is tailored to meet the requirements of both reliable operation of the grid and a transparent well-functioning market, and that will create efficient outcomes now and in the future. Salient points for the PUCT and ERCOT arising from the recent MISO capacity market auction include:

- For the 2022-2023 planning year, the cost of capacity for seven of the ten zones in the MISO footprint reached the market cap set by the Cost of New Entry ("CONE"). That is, for most of the MISO footprint the capacity market achieved a capped price of $236.66 per megawatt day. Potomac Economics, as the MISO Independent Market Monitor ("IMM") validated the results and ensured there was no exploitation of market power. Thus, we should assume the outcome is the result of a so-called "properly functioning capacity market."

- For comparison, the results of the PRA for the 2021-2022 planning year were that the cost of capacity for the same seven (of ten) zones was $5.00 per megawatt day. ***From 2021-2022 to 2022-2023 the cost of capacity in MISO rose $231.66 or 4,633% - in 1 year! This type of oscillation is more likely to be found in casino games rather than a well-designed and well-functioning market.*** The wider marketplace was absolutely shocked by these results.

- Following the PRA results for the 2021-2022 planning year, neither MISO Senior Management nor the Board of Directors issued a public statement alerting the market to the dramatic result they expected to happen the following year. Nor did Potomac Economics issue a public statement alerting the market of what was going to happen to the cost of capacity for the 2022-2023 planning year. However, upon release of the most recent PRA results, both MISO Senior Management and the IMM both stated the dire lack of capacity in the footprint – even going so far as to predict blackouts. In hindsight, MISO Senior Management and Potomac Economics, have two, and only two, possible explanations for their respective responses to the PRA results over the last two years: either neither of them fully understood how the market was going to actually operate, or alternatively if they did know how the market would operate then they knowingly and systematically mislead the Market Participants.

- The Load Serving Entity ("LSE") Obligation that has been proposed in Texas, while in both design and operation is a capacity market, is unlike the MISO capacity market in three very important ways; (1) each LSE, rather than ERCOT as the ISO, will be responsible for contracting for capacity based on their own individual forecast of their expected load, (2) it does not include a price cap, i.e., CONE, and (3) because it is a decentralized capacity market, there is no ability to monitor and mitigate possible abuse of market power by the sellers of capacity. Consequently, under the Load Serving Entity Obligation proposal the cost of capacity in Texas is free to rise far above the CONE. Furthermore, the LSE Obligation proposal shares the same intellectual heritage and is being promoted by the same perspective, and in some cases the same entities, that developed and continue to support the capacity market concept. Thus, the arguments being presented in Texas in favor of the LSE Obligation proposal are the same arguments that have been used for the last 15-20 years to support capacity markets in general and are only coincidentally, if at all, related to the situation in Texas.

- The oscillation of price between two extreme values in the MISO capacity market is entirely consistent with the notion of capacity – when it isn't needed, the price should approximate zero, and alternatively, when capacity is scarce the price should approach infinity.

- Of concern for Texas is that the results in MISO were tempered by slow load growth. In contrast, the peak load in ERCOT is expected to grow from roughly 75 gigawatts in 2021 to approximately 100 gigawatts in 2025. Thus, not only will substantial new capacity be required to meet generation retirements but also for significant expected load growth.

- Simply put, the price mechanism is not able to efficiently allocate resources when price oscillates between zero and infinity and the very recent and significant results from the MISO capacity "market" auction should be highly informative to the PUCT, as well as the supporters and developers of the LSE Obligation proposal.

It would come as no surprise at all if the debate about capacity markets provided the impetus for Albert Einstein when he reportedly wrote, "no problem can be solved with the consciousness that created it"

On April 14, 2022, the Midcontinent Independent System Operator ("MISO"), released the press release reprinted in its entirety on the right.[1] In the press release and again in the associated stakeholder presentation[2] given to the Resource Adequacy Subcommittee the following day, MISO explained that the outcome of their recently completed Planning Resource Auction ("PRA") was that the cost of generation capacity for the 2022-2023 planning year would be $236.66 per megawatt day, $86,381 per megawatt year, or $9.86 per megawatt for every hour of the year. That is, the cost of capacity – not actual energy – for a Load Serving Entity ("LSE") that does not have a contract for capacity, will be nearly $10 per megawatt hour for every hour of every day for the entire 2022-2023 planning year.[3]

In addition to the cost data, the press release included a quote from John Bear, the CEO of MISO, highlighting the need for "more capacity flexibility to reliably generate and manage uncertainty during" the "transition to the changing energy landscape." MISO's President and COO weighed in by adding that "the reality for the zones that do not have sufficient generation to cover their load plus their required reserves is that they will have increased risk of temporary, controlled outages to maintain system reliability." Clearly MISO senior management is forcefully signaling that there is

Some parts of the region fall short of their Resource Adequacy requirements

For Immediate Release **Media Contact**
April 14, 2022 Brandon D. Morris

CARMEL, Ind. — The Midcontinent Independent System Operator (MISO) released the results of its 2022-2023 annual Planning Resource Auction (PRA) indicating capacity shortfalls in both the north and central regions of MISO. This encompasses parts of 11 states in the Midwest. MISO remains committed to continue its work with members and state regulators to maintain grid reliability across the entire 15-state MISO footprint.

"We have anticipated challenges due to the changing energy landscape and have communicated our concerns through the Reliability Imperative. We have prepared for and projected resource fleet transformation, but these results underscore that more attention is required to offset the rate of acceleration," said MISO Chief Executive Officer John Bear. *"These results do not undermine our ability to meet the immediate needs of the system, but they do highlight the need for more capacity flexibility to reliably generate and manage uncertainty during this transition."*

The Local Clearing Requirement – capacity required from within each zone – was met for the entire MISO Region, but Zones 1-7 cleared at the Cost of New Entry (CONE).

- *Zones 1-7 (parts of Illinois, Indiana, Iowa, Kentucky, Michigan, Minnesota, Missouri, Montana, North Dakota, South Dakota and Wisconsin) all cleared at $236.66/MW-day.*
- *Zones 8-10 (parts of Arkansas, Louisiana, Mississippi and Texas) cleared at $2.88/MW-day.*

Load Serving Entities (LSEs) that entered the MISO auction without enough owned or contracted capacity to cover their requirement (load plus reserves) will pay these prices for the amount of capacity they are 'short'. The cost impact to consumers of those LSEs with a shortfall will depend on the amount they are short and the LSE's retail rate arrangement with their state regulator. LSEs that entered the auction with sufficient capacity to cover their requirement will not need to purchase capacity at these prices.

"The reality for the zones that do not have sufficient generation to cover their load plus their required reserves is that they will have increased risk of temporary, controlled outages to maintain system reliability," said Clair Moeller, MISO's president and chief operating officer. "From a consumer perspective, those zones may also face higher costs to procure power when it is scarce."

MISO's Independent Market Monitor (IMM) has reviewed the offers and results of the 2022/2023 PRA and agrees with the results. This includes reviews of all offers to ensure that all attempts to exercise market power are appropriately mitigated as specified in Module D of the Tariff. This year's results amplify the need for, and MISO's efforts around, resource availability and market redefinition as outlined in the Reliability Imperative. This includes the recent FERC filing to enhance MISO's current Resource Adequacy construct. (emphasis added).

[1] https://www.misoenergy.org/about/media-center/misos-annual-planning-resource-auction-results-underscore-the-reliability-imperative/
[2] https://cdn.misoenergy.org/2022%20PRA%20Results624053.pdf
[3] This does not include customers who still receive electricity from a regulated utility.

a shortage of capacity in the MISO footprint. Moreover, the shortage is, in part, in the form of "capacity flexibility."

Finally, the Independent Market Monitor ("IMM") for the MISO market provided their seal of approval that the results are correct, that the aforementioned prices were not caused by the exercise of unmitigated market power. Furthermore, Potomac Economics as the IMM states that "this year's results amplify the need for, and MISO's efforts around resource availability, i.e., capacity.

Nowhere in the press release or the associated Stakeholder Presentation does MISO or Potomac Economics state or even allude to anything that would suggest the results of the 2022-2023 PRA were an anomaly or unexpected. The MISO results are significant, educative, and relevant for the PUCT, ERCOT and the State of Texas for several reasons.

- First, pursuant to the mandates included in Senate Bill 3[4], i.e., those found in Section 18 (39.159), the legislature has required that sufficient capacity in the form of Dispatchable Generation is available in the ERCOT market.

- Second, in response to this legislative requirement a specific proposal – called the "Load Serving Entity Obligation" – has been put forward as a viable response/solution by specific ERCOT Market Participants. The essence of this proposal is that a Load Serving Entity ("LSE"), i.e., a Retail Electric Provider ("REP"), will be required to procure their anticipated load three years in advance. That is, every REP in ERCOT will be required to have generation capacity equal to their expected load under contract for every interval for the coming three years.

- Third, despite significant efforts by the proponents of the LSE Obligation to avoid having their proposal defined as a "capacity market" that is exactly what it is. The commodity being bought and sold is generic generation capacity and simply calling it an "LSE Obligation" and not a capacity market does nothing but obfuscate the essence of the proposal. The LSE Obligation is equivalent to a capacity market and the only fundamental difference is that the LSE Obligation proposal relies on a de-centralized capacity market in contrast to the centralized capacity market administered by MISO and other RTOs/ISOs in the United States. Despite some design differences that make the proposal worse than the MISO capacity market construct, the LSE Obligation proposal is, at its core, a specific articulation of the generalized capacity market that is currently found in MISO, PJM, NYISO, ISO-NE,[5] etc. Accordingly, the LSE Obligation proposal shares the same intellectual heritage and is being promoted by the same perspective, and in some cases the same entities, that developed and continue to support the capacity market concept. Thus, the arguments in favor of the LSE Obligation proposal are the same arguments that have been used for the last 15-20 years to support capacity markets proposal in general and are only coincidentally, if at all, related and applicable to the situation in Texas.

- Fourth, in order to make a generic capacity market construct "fit" into the context of Texas and ERCOT, the LSE Obligation proposal includes design elements that in all likelihood, should they be implemented, will create worse outcomes than the MISO capacity market. Specifically, the proposal includes several design elements that are extremely problematic: (1) requiring multiple entities to derive their own individual load forecasts from which to base their purchase of capacity cannot be as efficient as using a single aggregate load forecasts created by ERCOT, (2) having no administrative cap such as the cost-of-new-entry in the MISO (and other) capacity market means that Texas consumer are exposed to much higher prices than those achieved in the recent MISO PRA results, (3) the lack of any oversight with respect to market manipulation creates a further potential for higher capacity prices for Texas consumer than those achieved in the recent MISO PRA results and (4) the potential for uncapped and unmitigated capacity prices strongly incentivizes the continued trend for generation and retailing to vertically integrate.

- Fifth, like the MISO capacity market, the LSE Obligation makes no differentiation between types of capacity. Specifically, the LSE Obligation is not based on ensuring that capacity is in the form of "dispatchable generation" which is exactly what Section 18 of Senate Bill 3 requires.

- Sixth, the MISO results are both recent and actual – they are neither hypothetical nor from the distant past. The results show precisely how a capacity market works and what the PUCT and ERCOT should expect.

[4] https://capitol.texas.gov/tlodocs/87R/billtext/pdf/SB00003F.pdf#navpanes=0

[5] The PJM RTO, New York Independent System Operator, and New England Independent System Operator respectively.

- Seventh, the MISO capacity market design uses the Cost of New Entry or "CONE" as the upper bound, or cap, on the cost the auction can produce. That is, the cost of capacity in the MISO capacity market cannot exceed the administratively determined value for CONE. This is why the press release states the auction for Zones 1-7 cleared at the cost of new entry – the cost was prevented from going any higher. Importantly, the LSE Obligation proposal in Texas does not include any cap – there is no limit on how high the cost of capacity could rise.

- Eighth, unlike the MISO capacity "market", the LSE obligation proposal, because it is not a centrally administered market with a market clearing "price" lacks both the transparency and information content of the MISO construct. With potentially hundreds, if not thousands, of individual private contracts for capacity, there is neither a market clearing price nor any transparent information from which participants can make informed decisions regarding capacity.

- Ninth, the dramatic increase in the cost of capacity in MISO occurred in a mature market where expected load growth is much less than it is in ERCOT – where peak load is expected to grow from approximately 75 gigawatts in 2021 to roughly 100 gigawatts by 2025. The significant load growth expected within ERCOT will put even greater upward pressure on prices and increase the incentive for some to engage in market manipulation.

- Finally, because the MISO capacity market is centralized and administered by the MISO the operation of the market is subject to market monitoring by the Independent Market Monitor. In contrast the LSE Obligation, because it is decentralized and not administered by ERCOT, will not be subject to oversight or monitoring.[6] All capacity contracts will simply be private bilateral contracts that lie outside the purview of the PUCT and ERCOT.

In stark contrast to the response of MISO's senior management and Potomac Economics that the capacity market results were "correct", the wider market was, to say the least, decidedly less sanguine about the outcome. A sampling of headlines immediately after the announcement included:

- *"MISO's 2022/23 Capacity Auction Lays Bare Shortfalls in Midwest",*[7]
- *"Reeling from high-priced MISO capacity auction, stakeholders seek transparency",*[8]
- *"Midwest Annual Electricity Prices Skyrocket Amid High NG And Capacity Shortfall",*[9]
- *"Capacity prices jump across MISO's central and northern regions, driven by supply shortfall",*[10]
- *"MISO Capacity Hits A New High: All the way to $236.66/MW-day",*[11] *and*
- *"Stakeholders seek MISO action after capacity prices hit $236.66/MW-d in many zones".*[12]

Based on these sample headlines, it is clear that the expectation of the market with respect to the cost of capacity was orthogonal to the actual results arrived at by the recent MISO PRA. That is, the wider market was caught entirely off-guard by the PRA results for 2022-2023.

[6] In a market where the concentration of incumbent generators has a high Hirschman-Herfindahl index (as in ERCOT) the lack of market monitoring is extremely problematic

[7] https://www.rtoinsider.com/articles/29948-misos-22-23-capacity-auction-bare-shortfalls-midwest

[8] https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/electric-power/042022-reeling-from-high-priced-miso-capacity-auction-stakeholders-seek-transparency

[9] https://seekingalpha.com/article/4502417-midwest-annual-electricity-prices-skyrocket-amid-high-ng-and-capacity-shortfall

[10] https://www.utilitydive.com/news/capacity-prices-auction-miso-midcontinent/622186/

[11] Bank of America Global Research.

[12] Platts Megawatt Daily, April 18, 2022.

Adequate resources available for the 2021-2022 planning year

For Immediate Release **Media Contact**
April 15, 2021 Brandon D. Morris

CARMEL, Ind. — Today, the Midcontinent Independent System Operator (MISO) released the results of its 2021-2022 annual Planning Resource Auction (PRA), which indicate sufficient capacity for the planning year beginning June 1, 2021.

"This is the ninth annual Planning Resource Auction, and this year's results reflect adequate resource availability for the upcoming planning year," said Shawn McFarlane, executive director, Market Operations and Resource Adequacy. "MISO market participants continue to bring diverse and economic resources that support grid reliability."

Although offered capacity dropped by 0.7% from the previous year, the change was offset by a slightly lower Planning Reserve Margin Requirement reflective of lower load forecasts.

- *Zones 1-7 (Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Montana and Wisconsin) all cleared at **$5.00/MW-day**, whereas last year Zone 7 bound on its Local Clearing Requirement, which resulted in a clearing price of $257.53/MW-day*
- *Zones 8-10 (Arkansas, Louisiana, Mississippi and Texas) cleared at an historic low of **$0.01/MW-day** driven by increased supply and lower peak demand*
- *In addition to Zone 7, local capacity volumes exceeded zonal LCRs in all zones*

"The continued frequency of emergency events, including what MISO experienced in February, reinforce that the summer-focused Resource Adequacy construct will need to be modified to ensure resource availability, particularly with the continued evolution of the resource portfolio" said McFarlane. "Accordingly, a key piece of MISO's Reliability Imperative efforts is focused on aligning availability and need."

The auction results have been reviewed and certified by MISO's Independent Market Monitor (IMM). The IMM evaluates the auction to ensure that the results are reliable, and participants' offers are in line with tariff rules and procedures. (emphasis added)

To understand why the market was shocked by the results we need only go back to the equivalent PRA results for the 2021-2022 planning year. On the left is the equivalent press release from MISO announcing the results of the PRA for 2021-2022 – one year prior to the previous press release. For seven of the ten planning zones, the price of capacity was $5.00 per megawatt day and for the other three zones the price was $0.01 per megawatt day.

Noticeably absent from the press release are any quotes from either the CEO or COO of MISO nor Potomac Economics as the MISO IMM, on any impending capacity crisis. Not a single mention in the press release of challenges or blackouts. Admittedly, at the values generated by the auction process, it would have been impossible to argue that a crisis was on the horizon without calling into question the efficacy of the entire process.

Yet, one year later the cost of capacity for most of the MISO footprint jumped from $5.00 per megawatt day to $236.66 per megawatt day – an increase of $231.66! ***A rise of 4,633.2% in one year! A 4,633.2% increase in a single year for a commodity that is produced primarily by physical capital that requires years of lead time to build and commission.*** To provide some perspective, had Bitcoin enjoyed an identical monthly compound interest beginning in 2014 when the price per coin was $145, the current value of a single coin would now be in excess of $5,503,054. Given that the current value of a Bitcoin is ("only") roughly, $40,000, it would have been significantly more profitable for an investor to have been long MISO capacity beginning in 2021 than to have owned Bitcoin. Indeed, we have to go back to the 1630's and the Dutch tulip speculative bubble to find the sort of year-over-year price increase generated by the so-called MISO capacity market. The fact that on April 28, 2022, just two weeks after the results of the PRA for 2022-2023, MISO announced a potential shortfall for the upcoming summer of 5 gigawatts[13] is further evidence of just how flawed the market is – two weeks after completing and publishing the results of the capacity market for June 1, 2022 to May 31, 2023, results that were certified as correct by not only MISO Senior Management, but Potomac Economics as the IMM, MISO announced there will be an expected shortfall of capacity of 5 gigawatts in the coming summer. ***What could possibly have happened in the space of two weeks that would necessitate MISO announcing a likely 5-gigawatt shortfall in just a few months' time?***

[13] https://www.utilitydive.com/news/miso-prepares-for-worst-case-scenarios-heads-into-summer-with-insufficie/622932/?utm_source=Sailthru&utm_medium=email&utm_campaign=Issue:%202022-04-29%20Utility%20Dive%20Newsletter%20%5Bissue:41408%5D&utm_term=Utility%20Dive. Alternatively see page 29 of the presentation given by MISO at the Summer Readiness Workshop on April 28, 2022. The presentation can be found here: https://cdn.misoenergy.org/20220428%20Summer%20Readiness%20Workshop624245.pdf.

The results of MISO's PRA for sequential planning years (2021-2022 and then 2022-2023) raises several significant questions for the PUCT, ERCOT and the State of Texas, including:

- Why did the CEO and the COO of MISO, as well as Potomac Economics not raise the impending capacity problem following the low prices generated in the PRA for 2021-2022? How could they not have foreseen the issue given the time lag necessary to build capacity?
- What changed so significantly – in either the supply of or demand for capacity – in one year?
- Since capacity, both existing and new physical investment, is in no way hidden, why was the wider market shocked by the results?
- Why would anybody, absent compulsion, choose to participate in a market that generates these types of results?
- Why did the PRA produce a result that, in two weeks' time, was found to be potentially 5 gigawatts less than what would, in fact, be needed to meet the summer peak load?

Furthermore, the MISO result raises the relevant foundational question of whether a mechanism that produces a result like what the MISO capacity "market" produced a few weeks ago is, in any meaningful sense of the term, "a market" or whether it is better understood as a game of chance similar to what you might find at a casino. However, apparently unlike the MISO capacity market, in a game of Russian Roulette you can calculate the probability of losing. But similar to Russian Roulette it appears that there are only two ways to win in the MISO capacity market – either don't play or change the rules.[14]

While there is nothing inherently wrong with games of chance, nobody would sanely recommend basing the future performance and viability of the electricity system on a roll of the dice. The fundamental problem is that capacity is either worth nothing or approaches infinity. When you have enough capacity, including reserves, the value of any excess above that amount approaches zero – a result that describes the outcome of MISO's PRA for 2021-22. When you are short capacity, then the value of additional capacity approaches infinity – a result that describes the outcome of MISO's PRA for 2022-2023. This characteristic gives rise to the potential for the market to produce a price path that oscillates potentially between $0 and (potentially) $∞ (unless artificially capped at a lower value). Furthermore, the LSE Obligation, by mandating the procurement of peak load for three years, creates an inelastic 3-year demand curve for capacity – there is no tradeoff between price and quantity and, as a result no slope to the demand curve – with the implication that the position of the supply curve will be solely responsible for determining the so-called "price".

That the MISO capacity "market" performed as it did is not the real question. Rather the relevant question is whether implementing a capacity market is the optimal solution to the problem of ensuring both sufficient capacity as well as the right kind of capacity. The MISO results strongly suggest that a capacity market is not only not the best solution but is in fact a bad solution.

The capacity markets in operation in MISO, PJM, NYISO, ISO-NE and elsewhere in the United States are based upon legacy thinking and as such reflect the same paradigm that was developed by vertically integrated utilities in a regulated environment 60 years ago, i.e., that more capacity is better, and that excess capacity is synonymous with greater reliability, albeit with greater technical sophistication. This foundation may have been appropriate when thermal generation was on the margin, load was entirely passive, electricity was provided by vertically integrated utilities, and intermittent renewable non-dispatchable generation did not exist. However, that is no longer the world we live in, and a different reality most always demands a different approach – one that reflects the current state of the world rather than yesterday.

The results of the MISO PRA provide dramatic and convincing evidence that mandating a market mechanism for a commodity with Boolean price characteristics, i.e., either a price of zero or infinity, coupled with an inelastic demand curve in real time, cannot work and in fact has not worked. The price mechanism simply cannot allocate this type of commodity efficiently. And this observation has nothing to do with the actual details of the market design – a fact that is lost on all RTOs and ISOs. Rather than continuing down the wrong path, Texas needs to adopt mechanisms that are current. First, Texas solutions should be targeted and specific, precisely addressing the problem. This stands in stark contrast to the blunt, one-size fits all capacity market solution. Second, Texas solutions should align with how the price mechanism works in the real world. In particular, prices should rise and fall systematically and understandably rather than erratically jumping from zero to infinity and then back down to zero. Third, Texas solutions should allow for new and yet unknown technologies to be incorporated rather than creating a barrier to entry to anything new. Fourth, Texas solutions, should

[14] Taylor Pearson (https://taylorpearson.me/ergodicity/), "A Big Little Idea Called Ergodicity (Or The Ultimate Guide to Russian Roulette)"

allow for efficient risk management through both physical and financial instruments. Finally, and most importantly, Texas solutions should achieve demonstrably greater reliability at the lowest possible cost.

* Ron McNamara is an economist with over 30 years of experience in electricity and energy markets. A former academic economist at the University of Auckland (New Zealand), he was responsible for co-designing and then implementing, operating, and monitoring the New Zealand wholesale electricity market, which was the first nodal-based competitive wholesale electricity market in the world. The New Zealand nodal-based market design is the foundation for all the electricity markets in the United States as well as the markets in Alberta, Central America, Singapore, and the Philippines. Subsequently as the Vice President of Market Management and Chief Economist with the Midcontinent ISO ("MISO") market he was responsible for all aspects of designing and then operating the market. He served as a state regulator in Queensland, Australia with responsibilities over the electricity, natural gas, and ports sectors. In addition to his work in the United States, New Zealand and Australia, he has been involved in projects in Georgia (the country) the Philippines, Ghana, Nigeria, Pakistan, Turkmenistan, Kyrgyzstan, Afghanistan, East Africa (East Africa Power Pool), and Central America (CRIE/CDMER) and has advised government and industry officials from Italy, Georgia, Canada, China, Japan, Singapore, Malaysia, Indonesia, Viet Nam, Thailand, Lao PDR, Cambodia, the Philippines, Guatemala, Honduras, El Salvador, Costa Rica, and South Africa on open access and electricity market design, implementation, operation, regulation and monitoring.