



Independent Market Monitor (IMM) Report

Presented at:

ERCOT Reliability and Markets
Committee Meeting

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ERCOT IMM

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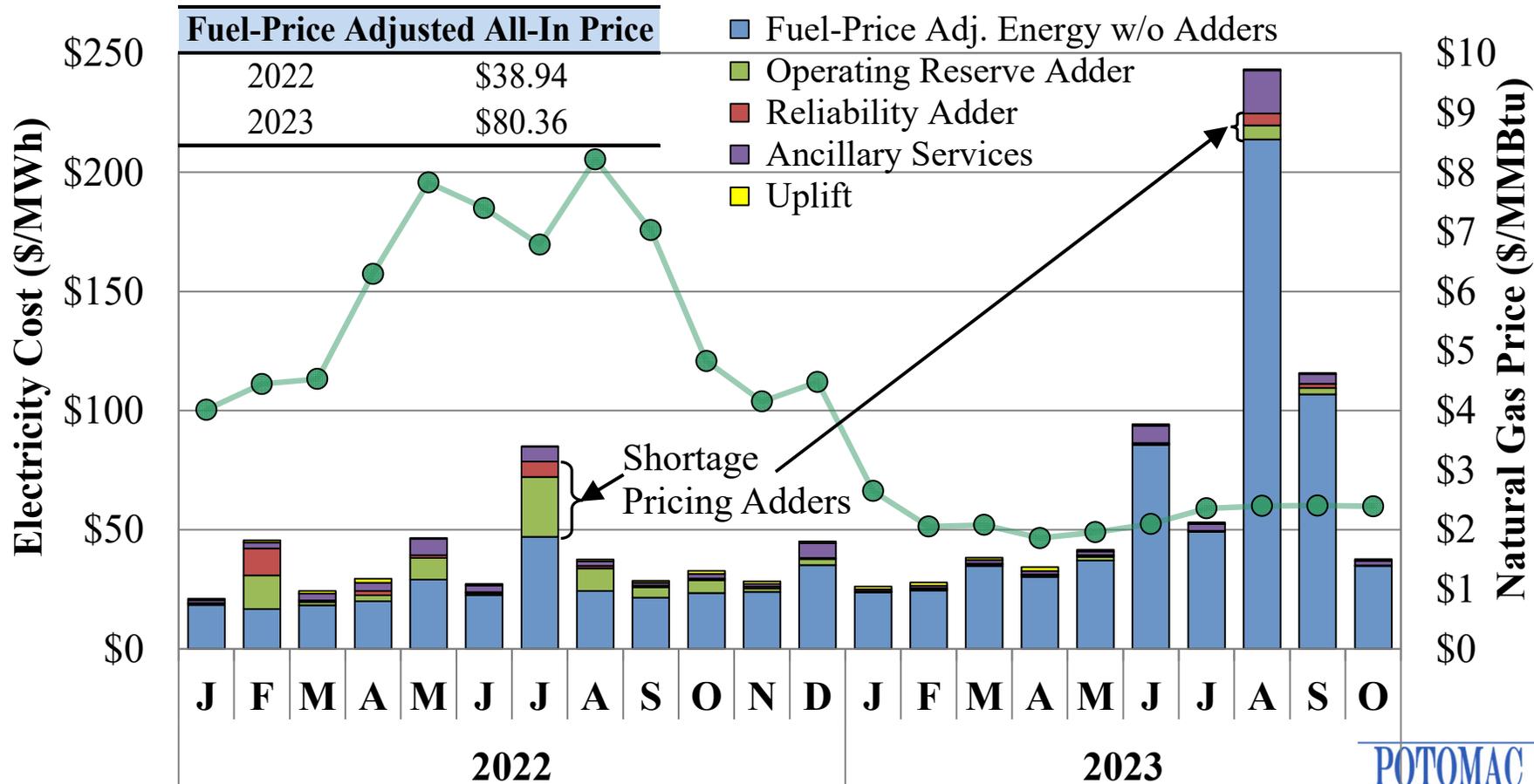


Introduction and Recent Market Results

- This report summarizes and discusses:
 - ✓ Recent market prices and outcomes; and
 - ✓ Serious concerns with ERCOT’s current and proposed ancillary services methodology.
- The first figure shows the “all-in” electricity price, which shows all of the market costs on a per MWh of load basis.
 - ✓ It also shows the monthly average natural gas prices, which fell 64 percent YTD in 2023 from the prior year.
 - ✓ Because gas-fired units set energy prices in most hours, we calculate a “fuel-adjusted” energy price based on recent prevailing gas prices.
- The second figure shows the “Peaker Net Margin” – the amount of net revenue a new peaker would have earned above its production costs.
 - ✓ This is key for evaluating the incentives for developers to invest in new dispatchable generation.

All-In Prices Adjusted for Fuel Price Changes: 2022 – YTD 2023

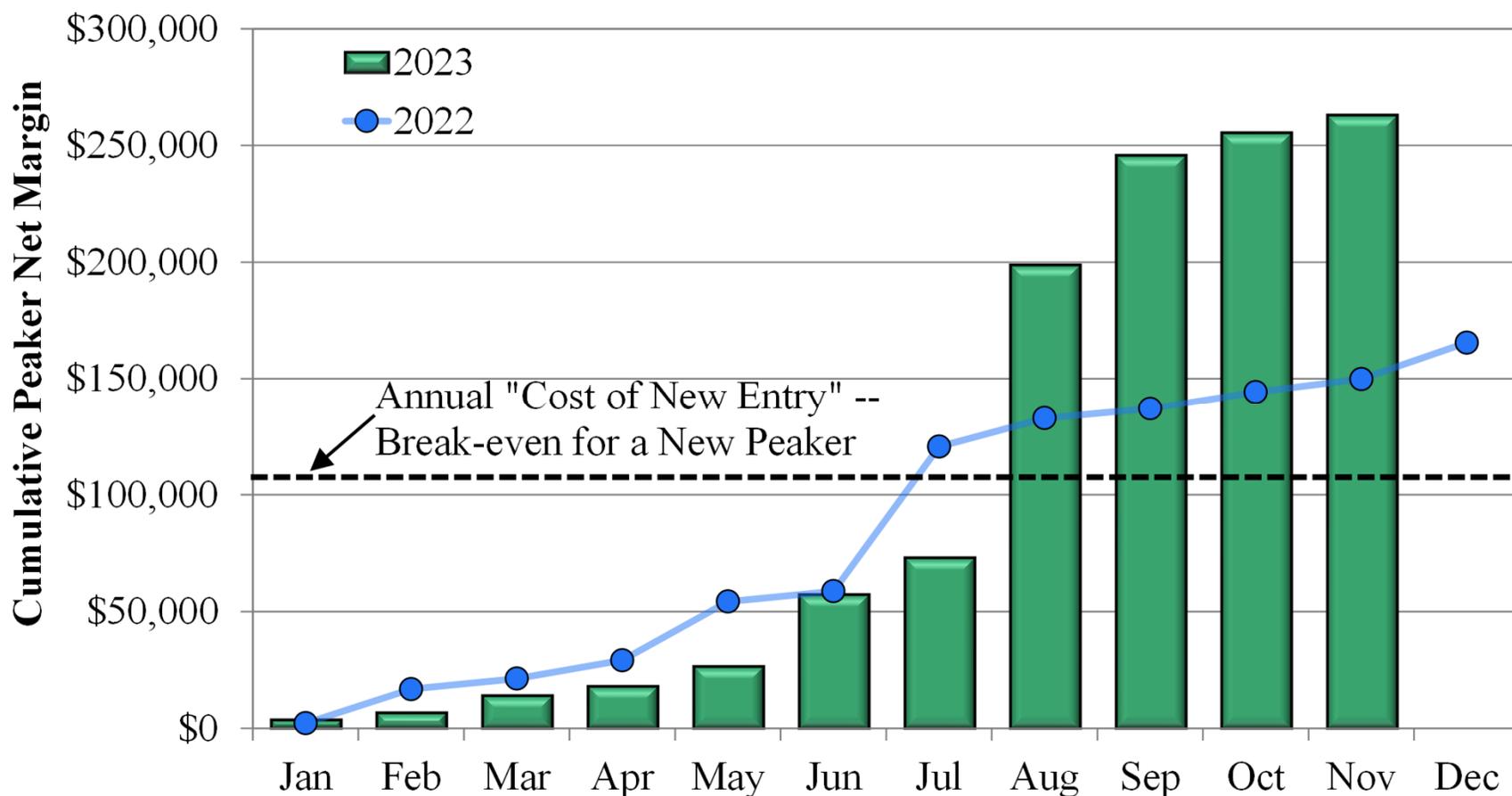
- The all-in price more than doubled in 2023, despite the tighter conditions in 2022 that led to higher shortage pricing under the ORDC.





The Peaker Net Margin in 2023 vs. 2022

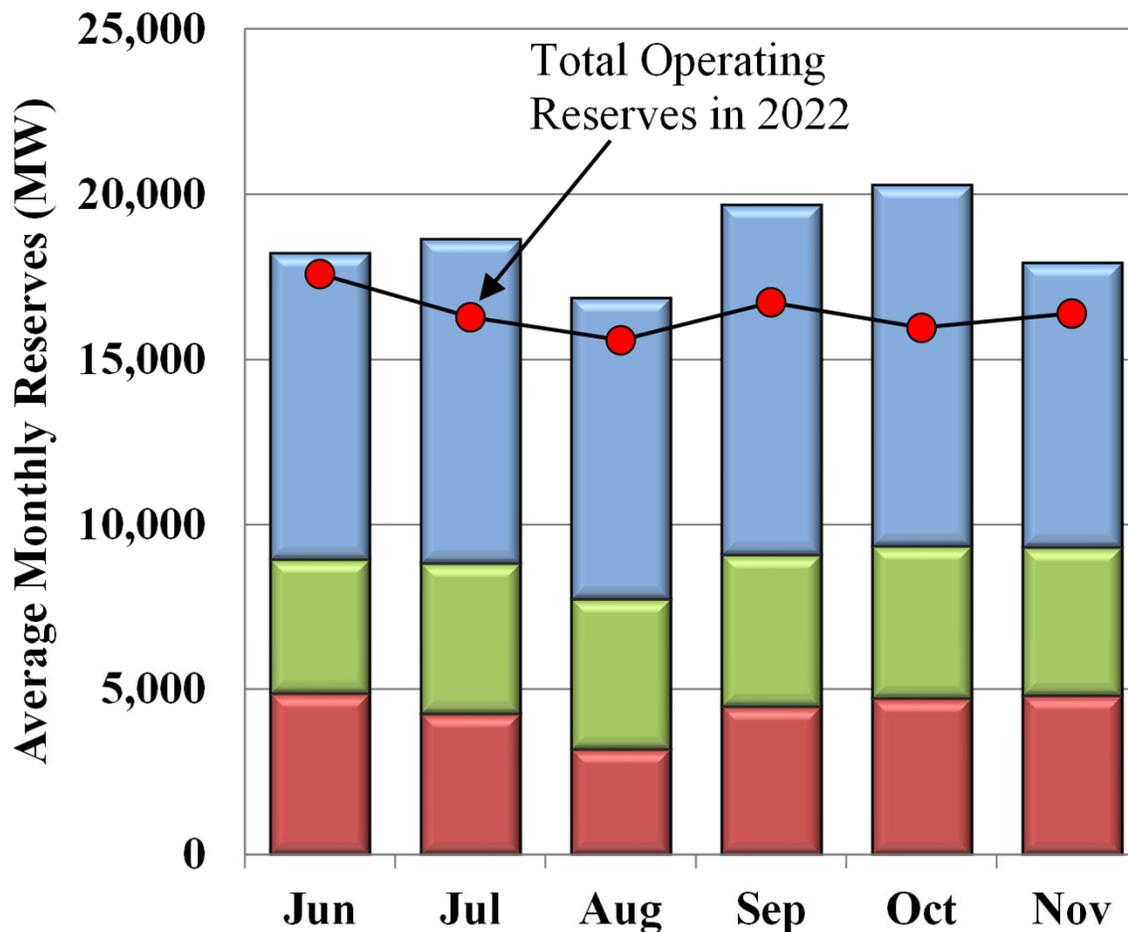
- The very high prices in 2023 led to a Peaker Net Margin of **\$263K** as of Dec. 1 – approaching 3 times the cost of building a Peaker.





Should These Results Concern You?

- **Yes** – as ERCOT reported in its summer review, the market was *less* tight and reserve levels were *higher* in 2023 than in 2022.



- ✓ Reserve levels are the most accurate measure of market tightness and the basis for ERCOT's shortage pricing (ORDC adder).
- ✓ Prices should have been *lower* in 2023 – more excess supply & lower nat. gas prices.

■ 30-Min Offline Reserves
■ 10-Min Reserves
■ Other Online Reserves



IMM's Concerns with Proposed AS Methodology: Introduction

- ERCOT's AS procurements can substantially affect the market outcomes, prices and the costs borne by ERCOT's customers.
- The AS methodology should establish requirements that balance reliability objectives with the costs of satisfying the requirements.
- We have evaluated the proposed AS methodology and find that it:
 - ✓ Is not based on sound reliability criteria;
 - ✓ Has led to excessive reserves procurements that far exceed the operating reserves held by other RTOs.
 - ✓ Generated artificial shortages that produced massive inefficient market costs, totaling more than \$12 Billion in 2023; and
 - ✓ Diminished reliability by withholding units that are needed to manage transmission congestion.
- We discuss these findings in this presentation and provide our recommendations to address these concerns.



Impact and Recommendation

- ERCOT's AS requirements have substantial market implications partly because most AS capacity is withheld from the real-time energy market.
 - ✓ These effects have never been more apparent than after ERCOT's implementation of the ERCOT Contingency Reserve Service (ECRS).
 - ✓ ERCOT decided to nearly double the amount of required 10-minute reserves after implementation of ECRS.
 - ✓ This decision led to the adverse market effects described above.
- We recommend that the Board consider the following:
 - ✓ Request that ERCOT revise the methodology based on sound reliability modeling; or
 - ✓ Make short-term adjustments in the methodology for 2024 to mitigate the resultant inefficient costs.

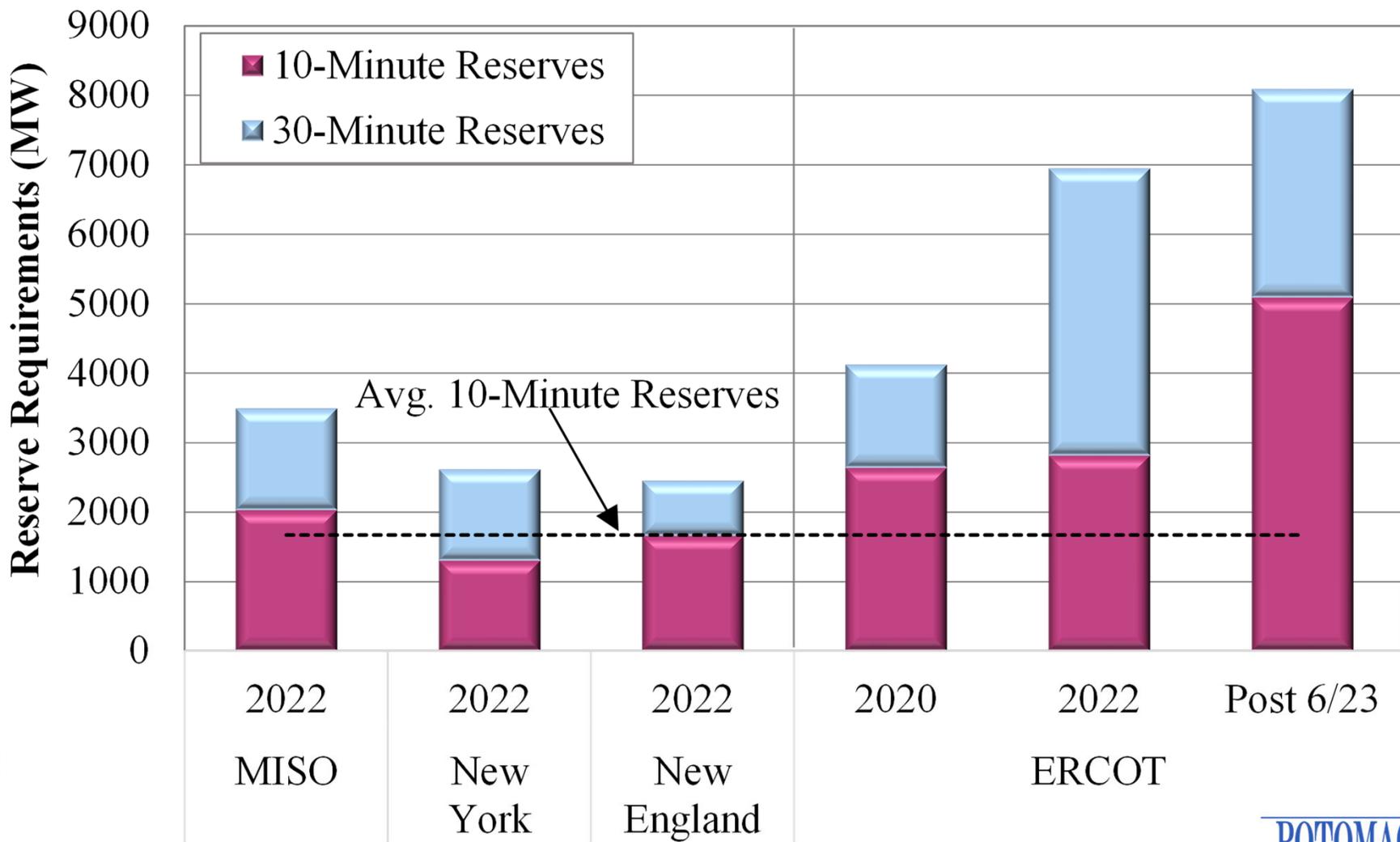


Benchmarking ERCOT's Operating Reserve Requirements

- Given the costs, AS requirements should be based on valid reliability objectives – unfortunately, this is not the basis of the current or proposed AS methodology.
- We monitor a number of other RTOs markets that each establish AS requirements for similar 10-minute and 30-minute reserve markets.
 - ✓ These RTOs establish requirements based on the size of contingencies and other factors that create reliability risks.
 - ✓ Their reliability objectives are comparable to those in ERCOT.
- The figure compares ERCOT's AS requirements to other markets we monitor.
 - ✓ It shows that ERCOT's recent changes cause its requirements to be out-of-line with all other RTOs.
 - ✓ ERCOT's 10-minute reserve requirements deviate most, which is most concerning since these resources are withheld from the market.



AS Procurements ERCOT vs. Other Markets



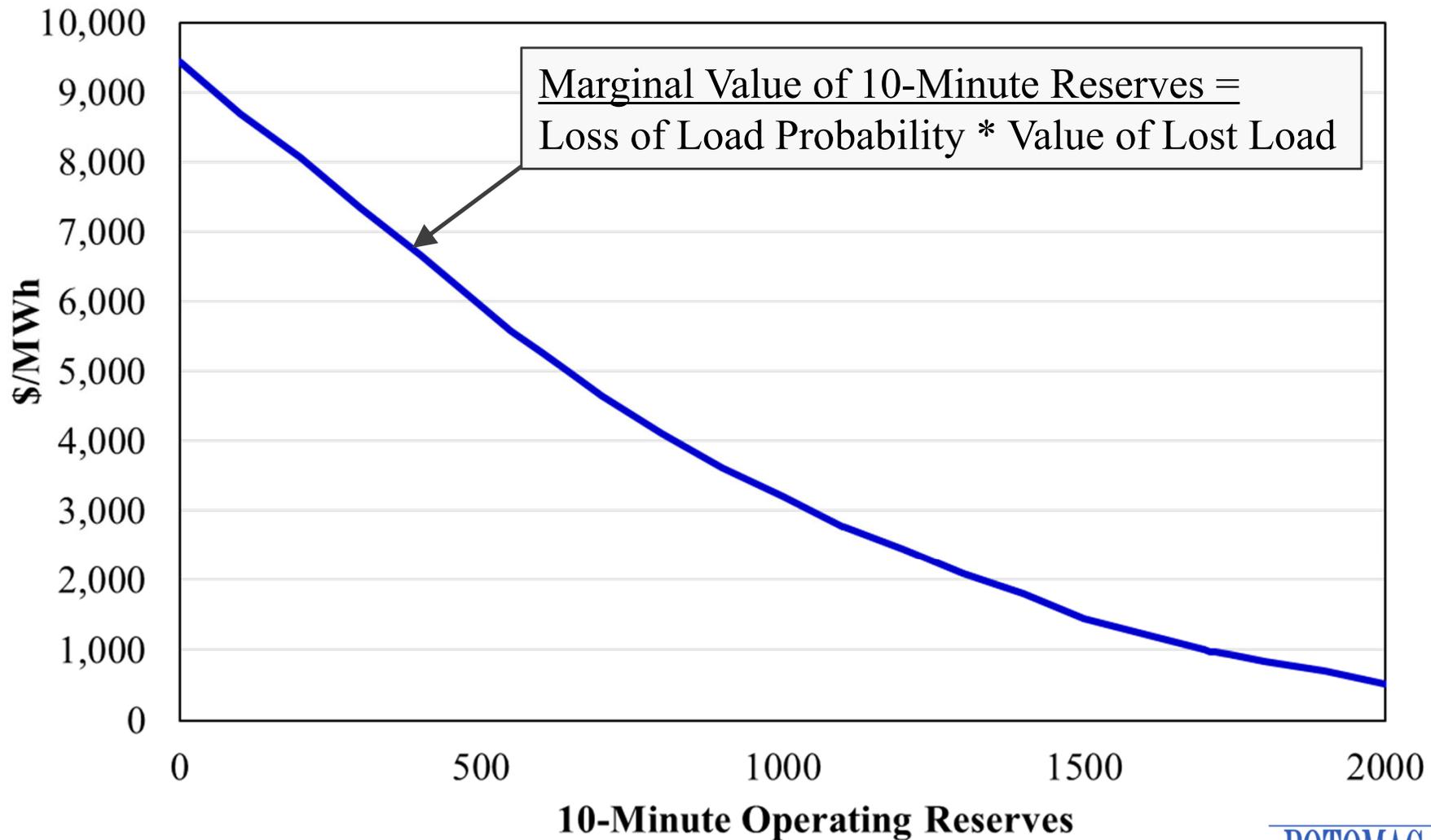


Determining the Value of Operating Reserve Requirement Levels

- The AS methodology should be based on quantifiable reliability risks.
 - ✓ Reliability risks are caused by system contingencies and uncertainties.
 - ✓ Reliability risk is measured by a “loss of load probability” produced by a probabilistic analysis (stochastic) of contingencies and uncertainties.
 - ✓ Reasonable AS requirements must be based on their value =
*loss of load probability (LOLP) * value of lost load*
 - ✓ The LOLP drops as more reserves are procured – MISO’s last MW of reserves is worth ~\$500/MW assuming a \$20,000 VOLL.
- ERCOT’s AS methodology does not employ a probabilistic analysis of contingencies and uncertainties, but instead:
 - ✓ Relies on historical values of factors that may indirectly lead to shortages (e.g., net load forecast errors).
 - ✓ This is not consistent with a reasonable analysis of reliability risk.



The Reliability Value of 10-Minute Reserves: MISO Example



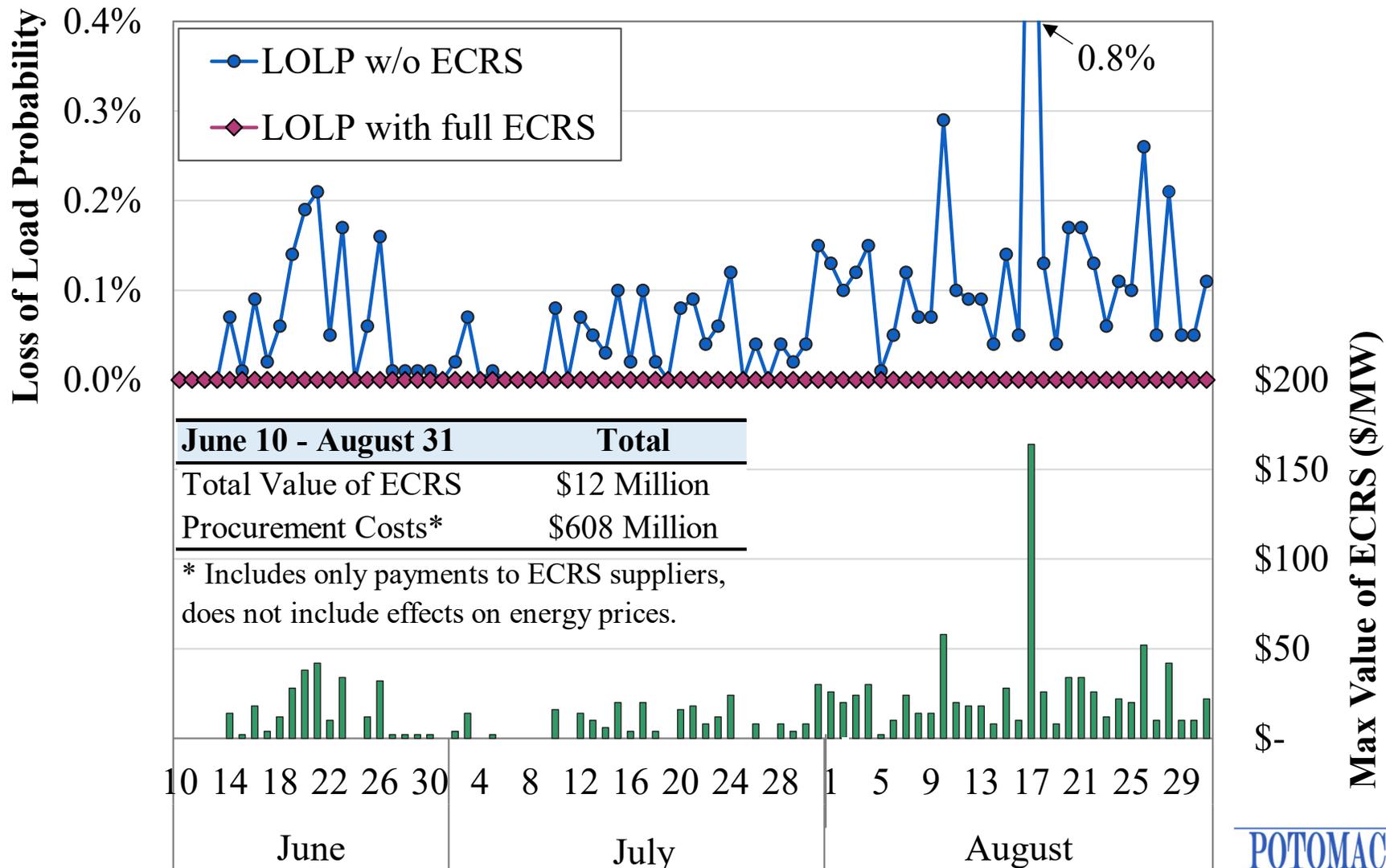


Establishing Reliability-Based ECRS Requirements

- To evaluate ERCOT's AS methodology, we used a stochastic model and ERCOT data on generation and forecast errors to quantify:
 - ✓ The loss of load probability; and
 - ✓ The value of ECRS assuming no purchases and full ECRS purchases.
- The next figure shows these values assuming a VOLL of \$20,000 per MW, which indicates:
 - ✓ There were no material risks of load shedding this summer, despite the hot weather and high load.
 - ✓ Modest amounts of ECRS address loss of load probabilities generally ranging from 0 to 0.2%, producing values averaging \$16/MWh.
 - ✓ The marginal value of the full ECRS procurement is close to zero.
 - ✓ The costs of the ECRS procurement alone (\$0.6 Billion) was 50 times higher than their estimated value (\$12 million).
- The results indicate that ERCOT's ECRS procurements are excessive – consistent with the comparison to other RTOs' requirements.



The Reliability Value of 10-Minute Reserves



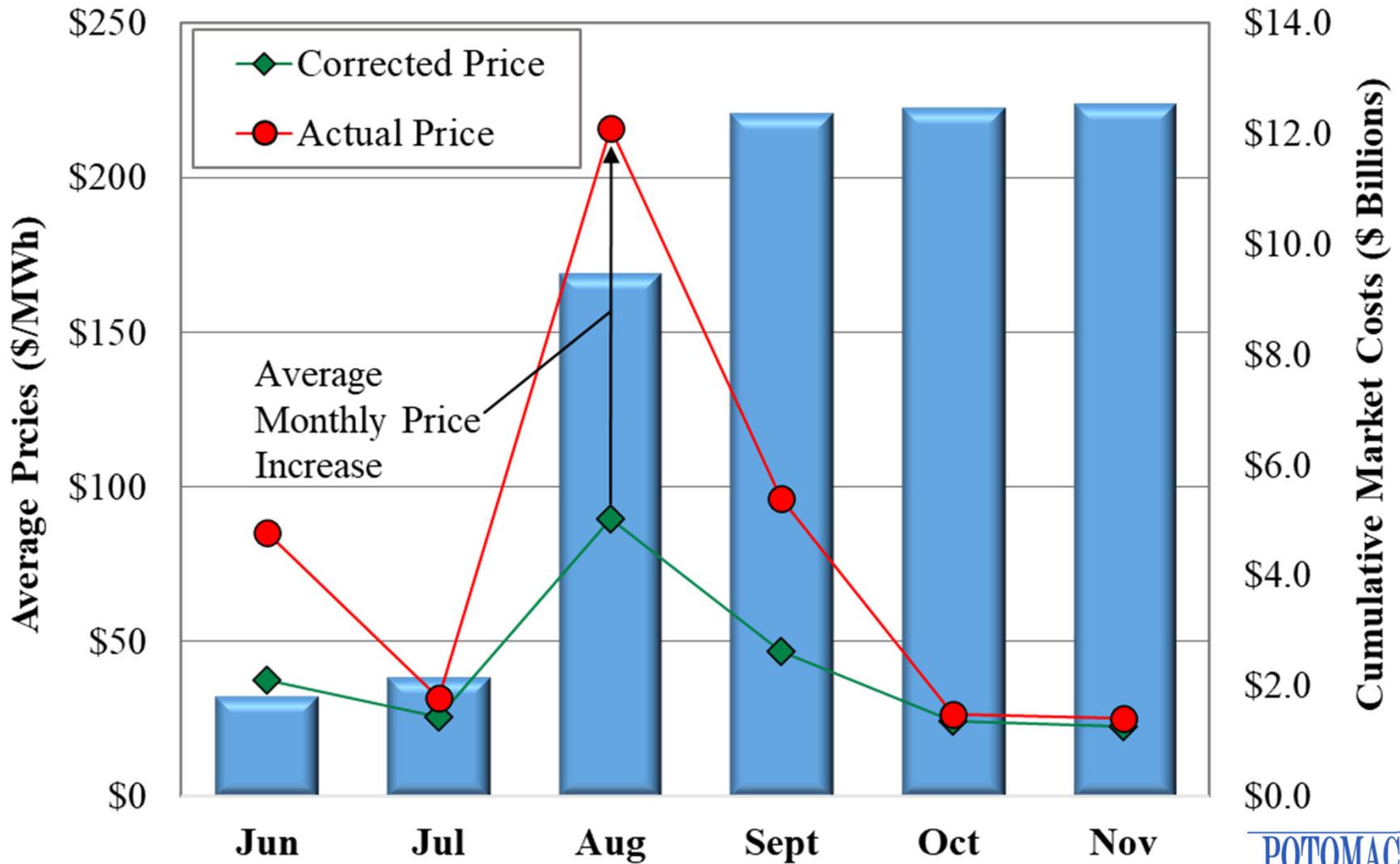


Estimating the Costs of Over-Procurement

- Because the 10-minute reserves (RRS and ECRS) are withheld from the market, procuring excessive quantities can:
 - ✓ Tighten the supply margin in the market; and
 - ✓ Raise prices and generate associated market costs.
- We estimated these effects by simulating the market prices and costs of making most of the withheld ECRS available to the market.
- The next figure shows these simulated results of the sharp rise in 10-minute reserve requirements occurring when ECRS was implemented.
 - ✓ The monthly average prices during this period rose from 8 to 140 percent.
 - ✓ The cumulative market costs of these increases exceeded \$12.5 Billion.
- Some have argued that high offers by storage resources are to blame.
 - ✓ Their high offers are the direct result of the artificial price spikes.
 - ✓ These offer prices include the “opportunity cost” of being dispatched now and losing the profit of selling energy later when prices spike.
 - *This is competitive and efficient behavior.*



Simulated Energy Cost Increases from Higher Online Reserve Procurements: June 10 – Nov. 27, 2023





Is the \$12.5 Billion Market Cost Real?

- ERCOT has issued a response recently asserting that:
Much has been made of the “cost” of ECRS to consumers. Numbers thrown about have ranged from \$8 billion to \$12 billion. These numbers are absolutely false. Electric consumers DID NOT pay \$8 - \$12 billion more for electricity in 2023 than they would have if ECRS were not purchased. These types of hyperbolic declarations...simply aren't true.
- This is a very disappointing statement – we have always reported these as wholesale market costs, *not* consumer costs.
 - ✓ In the short-term, consumers are partially protected from these costs by hedges and other contracts suppliers have to serve customers.
 - ✓ However, experts know that efficient wholesale prices are *essential* because they drive the prices for these hedges.
 - Forward prices for July and August 2024 rose 67% after ECRS
 - ✓ Therefore, consumers will see an increasing share of these market costs over time as supply contracts expire and are renewed.



AS Methodology Recommendations

- ERCOT should quantify the reliability risks to be addressed by the AS procurements by employing a stochastic reliability model.
 - ✓ This would address concerns that Non-spin, ECRS and RRS address overlapping frequency response, contingency and forecast error issues.
- Alternatively, concerns with the AS methodology can be mitigated by:
 1. Lowering the Non-Spin 6-hour ahead net load forecast error criteria to 2-hours ahead.
 2. Using 10-minute ahead net load errors for the ECRS requirement, which is more consistent with the actual use of the product.
 3. Further reducing the frequency recovery MW procurement for ECRS.
- After discussing these concerns, TAC did not initially endorse the methodology, but later endorsed it subject to its re-evaluation by 4/30.
 - ✓ However, we recommend the Board approve a modified AS methodology including at least Recommendations 1 and 2 – this will mitigate the exposure of the market to artificial shortages this winter.



Why Should the Board be Confident in Accepting Recommendation #1?

- ERCOT has published their rationale for rejecting these two recommendations and it reveals the flaw in the AS Methodology.
- In rejecting Recommendation #1, ERCOT stated:

6 Hour Ahead net load forecast errors reflect the magnitude of the uncertainty that Non-Spin would be relied upon to cover till offline resources can be committed, are online and ready for dispatch. 6 hours reflects lead times of typical resources that are offline and available for commitment on tighter days.
- This rationale is not aligned with reliability or system operations:
 - ✓ Non-spin is never used to address such forecast errors because operators cannot know a forecast error exists or how large it is 6 hours ahead.
 - ✓ Reality: during the operating day, if the system is tighter than expected, we expect suppliers to self-commit resources, which has been effective.
 - 30-min. reserves are committed closer to real-time when self-commits have been insufficient or 10-min. reserves must be replenished.
- Hence, shortening the net load forecasting error criteria to 2-hours ahead is better aligned with operations.



Why Should the Board be Confident in Accepting Recommendation #2?

- In rejecting shortening the net load forecast timeframe from the current 30 to 10 minutes for ECRS (10-min. reserves), ERCOT stated:
30 Minute Ahead net load forecast errors reflect the magnitude uncertainty that ECRS would be relied upon to cover till resources providing offline Non-Spin are online and ready for dispatch.
- Again, this rationale is not aligned with system operations:
 - ✓ Operators cannot know the size of the forecast error 30 minutes in advance and would not deploy 10-min ECRS to address it even if they could.
 - ✓ Reality: 10-minute ahead net load forecast errors can cause the market to dispatch less generation than necessary and may cause frequency drops.
 - First, Regulation and RRS would be deployed
 - If needed, ECRS can be deployed to replenish the RRS and Regulation
 - ECRS may also be deployed under tight conditions when withholding them from the market is costly – this is unrelated to net load forecast error.
- Hence, reducing the net load forecast error criteria in the methodology to 10 minutes ahead is much better aligned with operations.



Conclusions

- Based on these results, we urge the Board to:
 - ✓ Require ERCOT to develop improved reliability modeling to quantify its AS requirements, ideally prior to the summer of 2024.
 - We would be willing to assist in this effort, which would align with the TAC motion to revisit the methodology prior to April 30.
 - ✓ In the near-term, mandate that ERCOT implement recommendations #1 and #2 beginning January 1, 2024.
- The near-term recommendation is critical – the market will be exposed to substantial costs this winter under the proposed methodology.

Questions?