Control Number: 54335

Item Number: 38

December 9, 2022
Comments on Project No. 54335
Review of Market Reform Assessment Produced by Energy and Environmental Economics, Inc. (E3)

INTRODUCTION

The report fails to demonstrate the PUC favored PCM method will meet the stated goal of ensuring sufficient dispatchable generating resources to meet reliability needs in extreme weather conditions and net load variability. Its estimates of costs, highest risk scenarios, and competitive incentives are based on such broad or erroneous assumptions that report conclusions are unreliable. Unless adjustments are made, it is not advisable to use the report data to select between options or forecast reliability generating needs or costs. Use of the report will likely exacerbate grid reliability, not mediate it.

SINGLE YEAR SNAPSHOT VS IMPLEMENTATION AND FACILITY LIFE TIME LINE

Use of a single year snapshot cannot accurately forecast the effects of the PCM option over system transition or facility economic life. Therefore, it cannot be concluded the option can be implemented in a manner to meet goals or that future changes will not Invalidate the PCM design.

EXCLUDING OTHER SUCCESSFUL RELIABILITY SOLUTIONS

Limiting the analysis to the existing, failed, ERCOT basic market design adjusted only by the PUC selected options prevents understanding the fundamental issues with the existing ERCOT market and providing meaningful comparisons to other proven grid reliability solutions. The analysis provided clearly show the existing ERCOT market and PUC options are likely not capable of providing the market incentives and risk reduction needed to meet goals in a timely manner. By omitting reviews of outside grid market systems, the PUC is not meeting its obligation to protect the public's interests with optimum solutions. Adapting successful, outside reliability market designs, such as the PJM market, can save implementation time and reduce learning curve miss-steps.

KEEPING EXISTING MARKET DESIGN

By keeping the existing energy market features, the PUC perpetuates the reliability problem it wants to solve. The PUC proposes keeping a market that is driving the grid to failure, and to attempt operating an additional novel, untested, market to overcome the very conditions the PUC has mandated. The existing market penalizes reliable generators that underpin grid stability and reliability by using only price to award winning bids, without regard for renewable generation's intermittent generation. Using only price, the much lower operating cost for fueless, renewable generation allows undercutting every non-renewable generator bid and wins as much of the load as they have capacity to fill, even if only for a few hours. The non-renewable generators can only win the left overs. When the leftovers are too little to support profits, non-renewable generators fold. If too many non-renewable generators leave the market, grid reliability drops below acceptable limits. This makes the entire PUC plan dependent upon the PCM option's ability to create new, non-renewable generation capacity fast enough to offset existing reliable generation leaving the market plus meet new non-renewable generation needs created by expanding renewables. The PCM plan neither limits renewable generation growth nor explicitly regulates the amount of non-renewable generation connected to the grid. Favorable treatment in the ERCOT market has expanded renewable generation over 300% since 2011 and 2026 forecasts renewable connected generation will equal about 87% of summer total peak load. Non-renewable share of connected capacity is forecast to drop from 57% in 2022 to 43% on 2026.

38

NEW MARKET INCENTIVES UNLIKELY TO BE EFFECTIVE

It is unlikely the PCM market incentives will convince new generators to invest in non-renewable generation when ERCOT and PUC have demonstrated strong bias for low cost renewables and taken specific action to preserve renewable generation profits levels over non-renewables, even at the risk of lower grid reliability. It is more likely generators considering building new, reliable generation, will hesitate to commit 100's of millions of dollars now to new facilities that take 3 to 5 years to complete using forecast cash flows from an unproven market plan that also forecast credits, loads, and performance, with credits being paid 1 year in arrears. It would be less risky for investors to delay participation until more data is available and under build reliable generating capacity to mitigate new investment financial risk, gain more market influence, and increase profits through scarcity pricing. The report estimates 2026 PCM credits only slightly exceed 2026 scarcity pricing costs ($5.67 billion vs $5.21 billion). It would only take a 10% financial risk adjustment to make PCM credits and scarcity pricing financially equivalent, potentially making scarcity pricing more attractive than the PCM incentives.

RISK IDENTIFICATION INCOMPLETE

The report fails to recognize the fundamental loss of reliability between a grid with primarily independent generators (natural gas, coal, nuclear) and a grid with a majority of intermittent generation (solar and wind) dependent on a minority share of non-renewable generation to meet load. The original ERCOT market plan did not deal with large renewable generation contributions, and was able to enhance reliability by building independent, reliable surplus generating capacity that had similar downtime rating as the generation serving base load. With similar downtime risk, the surplus capacity achieved an order of magnitude improvement in the probability of keeping an amount of generation equal to the surplus online. This is achieved by the surplus capacity being independent of the base generation, making the risk of loss of both base and surplus generation equal to the product of the two sources' downtime probability (e.g. a 95% uptime facility has a 0.05 probability of going offline, 0.05probability of base going down X 0.05 probability of surplus going down = 0.0025 probability that both are lost simultaneously). Due to the intermittent nature of solar and wind generation, they cannot be treated as independent of base non-renewable generation. The non-renewable base is always needed to make up shortfalls as weather and day/night cycles take renewable generator contributions to as low as zero, requiring all three sources online simultaneously to meet load. For dependent generation like this, the probability of downtime is the sum of individual probabilities. For example 0.05 probability of losing non-renewables base + 0.05 probability of losing solar contribution + 0.05 probability of losing wind contribution = 0.15, or 3 times the probability of loss of the original non-renewable generation. When ERCOT added dependent solar and wind generation to non-renewable generation, it tripled ERCOT's original risk of not meeting total load.

The benefit of building surplus generation is also reduced with dependent generation since intermittent generation that is not available all the time cannot be used for surplus generating capacity for all three sources of power. Consequently, only non-renewable surplus is reliably available to act as reserve for all sources of generation. As solar and wind increase their share of total generating capacity, reliable surplus reserves dwindle away.

The PUC preferred option incorporates the original ERCOT market plan without any adjustments for this increase in risk or for the loss of effective surplus generation. The report omits any discussion of the increased risks.

SINGLE COPPER SHEET UNACCEPTABLE ASSUMPTION

Assuming a "single copper sheet" for distribution of power across the entire ERCOT area introduces unacceptable error in estimated costs and forecast needs. Due to the impedance losses in transmission wires, it is impossible for one kilowatt of power generated in Beaumont to run an air conditioner in Amarillo. This makes it impossible to assume generation can be built anywhere in the state to solve grid capacity issues everywhere in the state. ERCOT, by necessity, currently separates itself into 3 geographical regions. The report is unacceptable if regional variations in load, generator mix, seasonal affects, transmission bottlenecks, and available construction sites, are not reviewed.

EXCLUDES TRANSMISSION BOTTLENECKS AND CONSTRUCTION COSTS

The risk that transmission and generator capacities are not kept in balance is real, as shown by the City of Dallas reluctance to accept ONCOR proposed rate increases needed to build new transmission facilities. New generating capacity with nowhere to plug it in is pointless. Synchronizing generation and transmission construction is essential to reliability.

ELIMINATING SCARICITY PRICING INVALID ASSUMPTION

Even though the PCM option is new and unproven, and both the report and the PUC question if the 1 loss of load occurrence in 10 years is an appropriate reliability guideline, the report assumes their implementation will totally eliminate $5.21 billion annual cost in scarcity payments in 2026. This contradicts ERCOT year 2022 historical data where scarcity pricing has occurred several times, despite reliability 3 times greater than the suggested 1 occurrence in 10 years guideline (E3 calculated 2022 reliability as 0.03). EIA national grid data shows wide spread use of the 1 in 10 guideline produces an average 1.3 occurrences each year, or 13 times the 1 in 10 design. Removing the $5.21 estimated scarcity pricing offset against $5.67 billion reliability credits makes the LSERO, FRM, and PCM options the highest cost, and BRS lowest cost among options reviewed. Without the scarcity pricing offset, the estimated $5.61 billion credits represents a 20% added cost for LSERO, FRM, and PCM options over the energy only option.

1 IN 10 LOLE NOT APPROPRIATE MEASURE

The 1 outage in 10 years reliability criteria is a misleading measure that may not be useful in preventing grid emergencies like February 2021. LOLE is a measure developed for total grid performance, including transmission lines and repair resources. Since the report ignores transmission issues and repairs, LOLE is inappropriate for judging generating reliability. The report calculated 2022 Texas grid LOLE of .03, or about 3 times better than 1 in 10, but as stated by PUC chairman Peter Lake in December 2022, there has been 8 "...avoided emergency conditions or blackouts..."in the last 18 months. In May 2022, it was necessary for ERCOT to ask for voluntary load reduction from the public to avoid rolling blackouts. If a grid with 3 times better reliability than the guideline averages a near emergency action every 2 months, it is questionable if the guideline can work.

The horrendous cost of the February 2021 grid failure in lives and property is not one we should bear again. A reliability approach that utilizes continuous scrutiny and actions to minimize the risk of catastrophic grid failure to as near to zero as practical seems the most desirable goal. Every large grid operator in the US except ERCOT has implemented market designs requiring all generators (including all renewables) to participate in guaranteeing the minimum amount of generating capacity needed to avoid grid crash. To facilitate achieving near zero risk at least cost, other grid operators limit guaranteed generating capacity to the smallest amount possible and use competitive bidding to award capacity to the best providers. ERCOT's plan does not do this, and the report does not compare how such a system used by other grid operators performs in reliability and cost against the PUC's preferred PCM option. This is a serious enough omission to invalidate the report's

conclusions. From my own experience in February 2021, designing for no more than 2 hours on 2 hours off rolling blackouts would protect lives and property,

INDEPENDENT REVIEW

An independent third party review of the report with a Texas Professional Engineer certification should be used to confirm calculations and conclusions.

SUGGESTED CHANGES

1. Explicitly limit renewable generating capacity to an amount matched to available non-renewable reliable generating capacity. Do not allow unlimited renewable generation to connect to grid. Do not rely on market forces to build non-renewable generating capacity.
2. Require 24 hours of generating capacity for every bidder or group of bidders.
3. Define a minimum needed generation to guarantee no more than 2 hour on/2 hour off rolling blackouts
4. Revise market to have bidders with most reliable generation win bids. Facilitate partnerships between renewables and non-renewables to combine capacities. Competitive market is between most reliable partnerships bids. Avoid competition between renewable and non-renewables.
5. Provide a comparative analysis of the PJM market to the PCM option
6. Include transmission limits and construction impacts. Add new transmission construction costs to cost analysis.
7. Provide a time line analysis to identify if new construction of reliable capacity can keep up with renewables. Include transmission construction plans in time line.
8. Investigate ways to minimize amount of reliable capacity needed
    a. Allow a customer to opt out of reliable supply if they turn off load when requested. Put cost of reliability only on those who need it.
    b. Compare cost of efficiency gains in HVAC and insulation to cost of guaranteed supply. Mandate more strict new home and office building codes.
    c. Facilitate micro grid reliable supply with rule changes and funding
9. Identify critical measures that will trigger needed reviews and actions
    a. Lowest allowed ratio of non-renewable to renewables connected capacity
    b. Maximum allowed planned maintenance outages for available reliability capacity
    c. Demand response KW needed to match reliability needs
    d. Levels of forecast shortfalls that will trigger public communications
10. Texas Professional Engineer certification

Randy R. Irvin
3001 Dominion St.
Denton, TX 76209

EXECUTIVE SUMMARY December 9, 2022
Comments on Project No. 54335;
Review of Market Reform Assessment Produced by Energy and Environmental Economics, Inc. (E3)

The report fails to demonstrate the PUC favored PCM method will meet the stated goal of ensuring sufficient dispatchable generating resources to meet reliability needs in extreme weather conditions and net load variability. Its estimates of costs, highest risk scenarios, and competitive incentives are based on such broad or erroneous assumptions that report conclusions are unreliable. Unless adjustments are made, it is not advisable to use the report data to select between options or forecast reliability generating needs or costs. Use of the report will likely exacerbate grid reliability, not mediate it.

- Use of a single year snapshot cannot accurately forecast the effects of the PCM option over system transition or facility economic life. A time line must be added to confirm timely implementation is possible.
- It is impossible to assume generation can be built anywhere in the state to solve grid capacity issues everywhere in the state. At minimum, the three ERCOT regions must be applied and transmission issues identified.
- Limiting the analysis to the existing ERCOT basic market design plus PUC chosen options prevents reviews of outside successful grid market systems.
- The PUC proposes keeping a market that is driving the grid to failure, and to attempt operating an additional novel, untested, market to overcome the very conditions the PUC has mandated.
- It is unlikely the PCM market incentives will convince new generators to invest in non-renewable generation when ERCOT and PUC have demonstrated strong bias for low cost renewables and taken specific action to preserve renewable generation profits levels over non-renewables, even at the risk of lower grid reliability.
- The report omits any discussion of the increase in risk of running a single market grid that allows critical load to be met with interdependent sources of dispatchable and intermittent generation.
- The assumption scarcity pricing can be eliminated is indefensible and misleading.

ACTIONS

1. Explicitly limit renewable generating capacity. Do not rely on market forces to build critical, non-renewable generating capacity. Revise market to have bidders with most reliable generation win bids. Facilitate partnerships between renewables and non-renewables to combine capacities. Competitive market is between most reliable partnerships bids, not between renewables and non-renewables.
2. Provide a comparative analysis of the PJM market to the PCM option
3. Include transmission limits and construction impacts. Add new transmission construction costs to cost analysis.
4. Provide a time line analysis
5. Investigate ways to minimize amount of reliable capacity needed
6. Identify critical measures that will trigger needed reviews and actions, such as minimum ratio of reliable to renewable shares of load, maximum allowed maintenance outages per reliability generation capacity, demand response KW needed to match reliability needs
7. Levels of forecast shortfalls that will trigger public communications

Randy R. Irvin
3001 Dominion St, Denton, TX 76209