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Public Comments on Proposed PUC/ERCOT Electrical Pricing Market Redesign

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As an independent citizen of Texas and a retired professional engineer, I respectfully submit the following comments and observations on the proposed pricing policy revisions for the ERCOT power grid that are currently under consideration.

The basis for my comments is the report authored by the consultant Energy and Environmental Economics "*Assessment of Market Reform Options to Enhance Reliability of the ERCOT System*" issued November 2022. My comments are in response to the Texas PUC news release of 11/10/22 soliciting comments.

Executive Summary:

1) The PUC's preferred redesign option of the Performance Credit Mechanism (PCM) has serious flaws, and pricing policy alone cannot be expected to reverse the current investment trends for electrical power capital additions. The overwhelming predominance of wind and solar investments in ERCOT since 2007 has resulted in an inherently unreliable grid. If the PCM option is selected, it must be accompanied by additional mandatory guardrails. These new guardrails should include capping renewable capacity additions without co-current additions of dispatchable power facilities.

2) The recommended PCM strategy represents only minor changes to the existing energy-only pricing policy that fails to differentiate between the true value of intermittent weather-dependent power and dispatchable power. The PCM mechanism will not prevent the shutdowns of current dispatchable power resources fed with coal and natural gas, a trend that is driven by federal policies. While it may induce some new peaking plant investments, it will not offset likely shutdowns. Since 2007, the energy-only pricing policy has resulted in the exclusive addition of wind and solar to the grid and the continuing degradation of grid reliability, a trend that strongly continues.

3) Contrary to the Texas governor's directive of July 6, 2021, under PCM suppliers of wind and solar power are not assigned the costs that intermittent power incurs. Instead, these costs are assigned to Load Serving Entities and will eventually be passed on to all grid customers. The full costs of renewables are a result of their inherent intermittent, variable, and non-dispatchable nature.

4) I assume that the proposed pricing mechanisms reviewed in the E3 study attempt to establish a level playing field for all power sources. However, this is impossible with current federal intervention into the market that includes production tax credits and investment tax credits. International systems such as carbon offset policy administered by the UN provide additional support for wind and solar that does recognize the inherent need for system reliability. ERCOT is not an independent competitive market.

5) As more variable wind and solar power is added to the ERCOT grid, the ability for these sources to feed into the grid on an "as-available" basis will result in untenable swings in operational rates for thermal power that are required to balance the grid on an hourly and daily basis. This is a direct result of the extreme daily variability of both wind and solar, and the lack of any requirement for hourly power output leveling through the use of batteries or other storage means. In addition, the practice of daily energy-only pricing provides premium pricing for renewable energy even when it is not required such as during mid-day peak solar and low load conditions.

6) The PCM pricing strategy appears to be designed to incentivize investment in low-efficiency peaking plants that will primarily operate during hours of tight supply and demand during the early evening. Due to their lower thermal efficiency and intermittent operations, these plants will necessarily be of higher cost and higher pricing will be needed to justify their capital outlays. In effect, the very existence of these peaking plants is necessitated by the huge amount of planned wind and solar additions. This represents a transfer of dollars from the average grid rate payer to the wind and solar industry. If addition of many peaking plants is the correct engineering solution, then the wind and solar industries need to pay for the problems and costs associated with the basic nature of their weather-dependency.

Comments on the Environmental and Energy Economics Study

1) I do not think that the reliability estimates (Loss of Load – LOL estimates) in this study are even close to realistic. The primary reason is that the assumption of "weather impacts" only include the increase system load associated with peak demand during hot summer conditions or high winter load. In reality, the most important "weather impact" are the not-infrequent wind droughts that often last for days at a time. These droughts are typically associated with stationary high pressure weather systems in both the summer and the winter. All areas of the globe experience these droughts. Since the ability to generate power from wind is a strong function of the wind velocity, prolonged periods of low wind velocity of under 10 mph result in a major decrease in wind power output. This was a significant factor during winter storm Uri in 2021.

This study neglects analysis of the Responsive Reserve calculations for its proposed scenarios. We believe that the 2026 scenario will not come close to the suggested 15% NERC guideline.

It appears that the Astrape computer program that has been traditionally employed in performing LOLe calculations has not been properly updated to consider the true impact of weather variability. Perhaps the Monte Carlo method that is employed needs to be updated to show consecutive days of low wind velocity due to weather impacts. Days of low wind velocity are not independent of each other, but instead are highly correlated. In other words, when a high pressure front moves over an area, it tends to stay for days at a time. These weather fronts are associated with low wind velocity and thus poor power output. Without adequate dispatchable backup power in the future, it is probable that the LOL events will greatly surpass the current frequency.

2) The use of average power output for renewables, calculated both daily and monthly, is inappropriate in calculating adequate reserve capacity to cover unusual weather situations. What is critical is hourly and minute-by-minute power generation and reserve capacity. Many experts in the power sector believe that wind and solar should be backed up with an equivalent of 100% of their output if overall grid reliability is to be assured.

3) The E3 study omits any reference to grid frequency control which is strong function of spinning reserve or inertial power from thermal units. As wind and solar (non-inertial) power additions are added to the grid, and thermal power (coal and gas) is reduced, the critical control of voltage frequency is compromised. Not to consider this issue is a major shortfall for this study.

4) If the intent of a market redesign is to incentivize dispatchable power and improve grid stability, all of the current proposals fail. There is no inherent additional value given for dispatchable power, all power inputs are priced the same. This strongly favors the highly variable power sources that are less valuable and should be heavily discounted under a proper pricing strategy.

5) In this study, battery capacity is stated nameplate terms. However, capacity from fully loaded to fully discharged is nominally on the order of two hours maximum. Battery capacity should not be included in reserve capacity balances.

6) The E3 study does not make clear what capacity factor assumptions for individual power sources are used to come up with grid power balances. With Uri as a guide, wind power output should not be assumed to be more than 10% of nameplate capacity.

7) While the E3 study provides focus on the power supply/demand gap typically seen in the later hours of the afternoon, fixing this problem is only a minor issue in overall grid reliability. I and others have estimated that the current shortage of dispatchable thermal power for the ERCOT grid is currently around 10GW. This was plainly demonstrated during winter storm Uri in 2021. However, the potential reduction of 13.3GW of coal and 4.5 GW of gas power capacity, and the growth of average demand of near 10GW by 2026, this shortage will likely triple to over 35GW. Fixing a minor 3GW shortage seen late in the typical day will not even come close to fixing the grid reliability problem.

8) One significant factor that the Texas PUC and the Texas legislature need to consider is the current federal war on fossil fuels. President Biden has publicly stated that his intent is to completely shut down coal power by 2030 at the latest. My analysis of the 2021 Uri event indicated that if the 13GW of coal capacity seen during that event was totally unavailable, a major grid event and the required black start would have certainly been required.

9) If Federal policy makers are successful in achieving Biden's Paris Agreement targets for CO2 reductions, the likely outcome will be the total shutdown of coal-based power in ERCOT by 2030. This needs to be a specific case that the E3 study should have modeled.

In Table 1 below, I show my estimates for a 2026 potential worst-case scenario that includes the assumptions of a wind drought, no solar power that is associated with nighttime conditions, and no effective long-term battery storage. The result is a power dispatchable power deficit of 35-40GW. This result puts society at risk and should be unacceptable to the Texas PUC and Texas Legislature.

Table 1: ERCOT Grid Capacity and Demand Projections, 2026e

	Base Case for 2026 Grid Capacities			Realistic Worst Case		
	Base	High Renewables	Change	Utilizatior	Base	High-Renew
Nuclear	4,973	4,973	0	95%	4,724	4,724
Coal	7,396	0	(7,396)	80%	5,917	0
Gas	43,283	37,359	(5,924)	90%	38,955	33,623
Hydro	372	372	0	50%	186	186
Biomass	163	163	0	50%	82	82
Wind	40,605	60,907	20,302	5%	2,030	3,045
Solar	39,347	58,537	19,190	0%	0	0
Batteries	7,411	17,011	9,600	0%	0	0
Other	12,134	13,345	1,211	50%	6,067	6,673
Total MW	155,684	192,667	36,983		57,961	48,333
Demand (GW)					92.7	92.7
Excess (GW)					(34.8)	(44.4)

Source: Assessment of Market Reform Options to Enhance Reliability of the ERCOT System, Nov 2022 Energy and Environmental Economics, pg 67; My analysis of power availability during worst case conditions