

Control Number: 47199



Item Number: 86

Addendum StartPage: 0

2018 FEB -8 PM 2:53

FILED BY CLERK

OPEN MEETING COVER SHEET

MEETING DATE: February 15, 2018

DATE DELIVERED: February 8, 2018

AGENDA ITEM NO.: 20

CAPTION: Project No. 47199 – Project to Assess Price-Formation Rules in ERCOT’s Energy-Only Market

ACTION REQUESTED: Discussion and possible action

- Distribution List:
- Commissioners’ Office (9)
 - Lloyd, Brian
 - Whittington, Pam
 - Gleeson, Thomas
 - Phillips, Michael
 - Central Records
 - Rogas, Keith (2)
 - Pemberton, Margaret (5)
 - Corona, Connie (3)
 - Journey, Stephen
 - Burch, Chris
 - Tietjen, Darryl (2)
 - Long, Mick (2)
 - Benter, Tammy (4)

Public Utility Commission of Texas

Memorandum

2018 FEB -8 PH 2:53

FILED
FILING CLERK

TO: Chairman DeAnn T. Walker
Commissioner Brandy Marty Marquez
Commissioner Arthur C. D'Andrea

FROM: Julia Harvey, Competitive Markets Division *JH*
Mark Bryant, Competitive Markets Division
Stephen Mack, Legal Division

DATE: February 8, 2018

RE: **Open Meeting Agenda Item No. 20** – Project No. 47199 – *Project to Assess Price-Formation Rules in ERCOT's Energy-Only Market* – Memorandum

Having conducted a workshop and received written comment on the proposals set forth in the *Priorities for the Evolution of an Energy-Only Electricity Market Design in ERCOT* Report,¹ Commission Staff provides this memorandum to summarize feedback from parties and outline potential next steps.² This memorandum will focus on proposals related to (1) the Operating Reserve Demand Curve (ORDC) and (2) Reliability Unit Commitment (RUC) pricing. Longer lead-time recommendations, including co-optimization and marginal losses, are currently under study by ERCOT and are not brought forward for consideration at this time.

As discussed more fully below, Staff recommends that the Commission, at its February 15, 2018 open meeting:

- Consider removing RUC and Reliability Must-Run (RMR) capacity from the ORDC;
- Defer ordering any changes to the Loss of Load Probability (LOLP); and
- Direct Staff to open a new project to assess RUC pricing, with an emphasis on the Extended LMP (ELMP) concept.

¹ William W. Hogan and Susan L. Pope, *Priorities for the Evolution of an Energy-Only Market Design in ERCOT* (May 9, 2017) (Hogan/Pope Report).

² Staff received written comment in this project from Rainbow Energy Marketing Corporation (REMC), Golden Spread Electric Cooperative, Inc. (GSEC), the Environmental Defense Fund of Texas, Inc. (EDF), Vistra Energy Corp. (Vistra), South Texas Electric Cooperative, Inc. (STEC), Texas Advanced Energy Business Alliance (TAEBA), Direct Energy, LP (Direct), ERCOT Steel Mills, Texas Competitive Power Advocates (TCPA), the Lone Star Chapter of the Sierra Club (Sierra Club), NRG, Calpine Corporation (Calpine), Exelon Corporation (Exelon), Texas Energy Association for Marketers (TEAM), Shell Energy North America (US), L.P. (Shell), Dynegy Inc. (Dynegy), Invenergy, LLC (Invenergy), Lower Colorado River Authority (LCRA), The Wind Coalition, Texas Industrial Energy Consumers (TIEC), Texas Solar Power Association (TSPA), Tenaska, Austin Energy, the Steering Committee of Cities Served by Oncor (Cities), and the Independent Market Monitor (IMM).

In the following sections of this memorandum, Staff provides an overview of the relevant proposals from the Hogan/Pope Report, a summary of arguments for and against the proposals as detailed in written comment, and potential next steps.

1. ORDC Modifications

The ORDC was implemented by the Commission as a mechanism to transparently set prices during reserve scarcity based on consumers' willingness to pay. By design, the ORDC allows prices to reflect the economic value of operating reserves in terms of their incremental contribution to reliability.

The parameters of the ORDC are set such that a minimum level of operating reserves (X) is specified to correspond with the point at which involuntary load shed is imminent. As the level of operating reserves declines toward this point, the ORDC allows prices to increase to the Value of Lost Load (VOLL). This is the price at which consumers, on average, are indifferent to having their electric service curtailed. Prices during scarcity, as defined by the ORDC, play an important role in determining short- and long-run market outcomes, incenting demand response, improving operational reliability, and providing signals to support continued investment in ERCOT.

The Hogan/Pope Report set forth two primary recommendations to adjust certain parameters of the ORDC. Staff describes these recommendations, summarizes feedback from interested parties, and outlines proposed next steps below.

a. Hogan/Pope Report Recommendation: Remove RUC and RMR Capacity from the ORDC Online Reserves Calculation

The ORDC assigns a value to operating reserves as a function of the available reserves on the system. The quantity of reserves considered in the calculation includes capacity from units brought online by ERCOT through the RUC process. The Hogan/Pope Report recommended that the full capacity of units brought online by a RUC instruction be removed from the available reserve capacity considered in the ORDC calculation. According to the Report, this change would ensure that out-of-market commitments do not impede accurate price formation during scarcity.³

Arguments in Favor of the Proposal: Proponents of this change argued that because RUC and RMR capacity is committed by the ERCOT system operator, rather than being brought online

³ Hogan/Pope Report at 40-41.

as a result of the economic decision-making of the resource owner, it should not affect or distort market outcomes. Commenters asserted that the inclusion of this capacity inappropriately increases the quantity of available capacity on the system, reducing the ORDC adder and interfering with the ability of the scarcity pricing mechanism to provide critical incentives needed to drive investment and maintenance decisions. According to proponents, this interference may increase the need for RUC and RMR units in the long run. Parties supporting this change recommended that the Commission direct ERCOT to remove this capacity from the ORDC as soon as possible to ensure that scarcity pricing is accurate and reflective of market dynamics.⁴

Arguments Against the Proposal: TIEC argued that removing capacity from the ORDC would serve to increase an already generous ORDC adder and thereby unjustly raise prices. TIEC pointed to the fact that the level of X is already set substantially above the point at which ERCOT orders firm load shed, resulting in an inflated adder.⁵

TIEC contended that numerous pricing adjustments have already been made through the stakeholder process to mitigate the impact of reliability deployments, including the institution of RUC price floors, pricing RMR units at the system-wide offer cap when deployed for capacity, and adopting a price adder to offset any price suppression that may occur when RMR or RUC units have been brought online. TIEC additionally argued that, when a unit is committed through a RUC instruction to resolve a transmission constraint, it in effect replaces another resource, and the net impact on available reserves of the RUC deployment may therefore be zero.⁶

In TIEC's view, the current ORDC accurately reflects the quantity of available online reserves. Certain reserves should not be deducted from the ORDC to achieve an alternate reality that could produce unintended consequences. TIEC pointed to the IMM's argument that RUC

⁴ See NRG Response to Request for Comment at 8, 21 (Dec. 1 2017) (NRG initial comments); Calpine Corporation's Comments at 11, 15-16 (Dec. 1, 2017) (Calpine initial comments); Calpine Corporation's Reply Comments at 10-11 (Dec. 22, 2017) (Calpine reply comments); Vistra Energy's Comments and Alternative Proposals at 4-6 (Dec. 1, 2018) (Vistra initial comments); REMC Response to Staff Request for Comments at 1 (Nov. 30, 2017); Sierra Club Comments at 4 (Dec. 1, 2017); Comments of Exelon Corporation at 24-29, 37 (Dec. 1, 2017) (Exelon initial comments); Shell Energy's Comments at 2, 5 (Dec. 1, 2017) (Shell initial comments); Comments of Dynegy Inc. at 3 (Dec. 1, 2017) (Dynegy comments); LCRA's Comments at 3 (Dec. 1, 2017); STEC's Reply Comments at 4, 15 (Dec. 22, 2017) (STEC Reply Comments); TCPA Response to Request for Comments at 4-5, 6 (Dec. 1, 2017) (TCPA initial comments); Comments from the Wind Coalition at 1 (Dec. 1, 2017) (Wind Coalition initial comments); Reply Comments of the TSPA at 1 (Dec. 27, 2017) (TSPA reply comments); Tenaska Reply Comments at 3 (Dec. 22, 2017) (Tenaska reply comments).

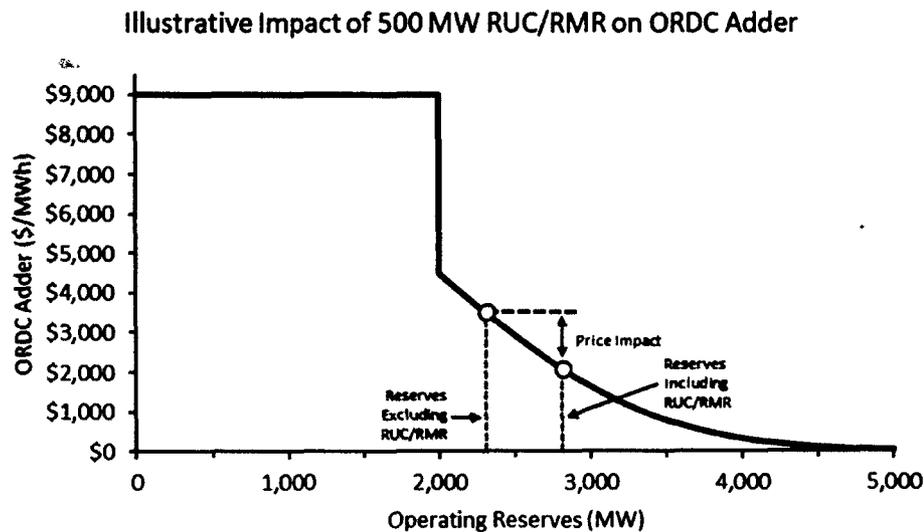
⁵ TIEC's Initial Comments at 3-4 (Dec. 1, 2017) (TIEC initial comments).

⁶ TIEC initial comments at 7; TIEC's Reply Comments at 6 (Dec. 22, 2017) (TIEC reply comments).

instruction can occur even if the unit is economic because suppliers may not have all the information necessary to voluntarily commit their units. In TIEC’s view, the occurrence of economic commitments made through RUC is evidence that not all RUC should be considered out-of-market.⁷ In sum, TIEC asserted that removing this capacity from the ORDC is unjustified and would inefficiently raise prices. The Steel Mills agreed that no compelling justification has been made to raise prices by adjusting the ORDC.⁸

Certain commenters cautioned against making immediate changes to the ORDC.⁹ These parties recommended that the Commission refrain from ordering substantial modifications to a market design that is not fundamentally broken, maintaining regulatory certainty and allowing the market to work without interference. Commenters noted that as additional operational experience is gained over time, a future re-examination of the market design may be appropriate.¹⁰

Effect of Removing RUC MW from the ORDC: Exelon offered the following illustrative example of the effect of removing RUC capacity from the ORDC calculation.¹¹



⁷ TIEC reply comments at 6; Comments of Potomac Economics at 5-6 (Sept. 15, 2017).

⁸ The ERCOT Steel Mills’ Joint Comments at 6 (Dec. 1, 2017) (ERCOT Steel Mills comments).

⁹ ERCOT Steel Mills comments at 3, 9, 12; Austin Energy’s Response to Request for Comments at 7 (Dec. 4, 2017); TIEC reply comments at 1-3; Reply Comments of Cities at 3-4 (Dec. 22, 2017); Comments of Direct Energy at 3 (Dec. 1, 2017); TEAM Comments in Response to Staff Questions at 2 (Dec. 1, 2017); Invenenergy LLC’s Reply Comments at 14-15 (Dec. 27, 2017) (Invenenergy reply comments); Comments of the Texas Advanced Energy Business Alliance at 9 (Dec. 1, 2017); Initial Comments of EDF in Response to Commission Staff’s Request for Comment at 7-8 (Dec. 1, 2017).

¹⁰ ERCOT Steel Mills comments at 9.

¹¹ Reply Comments of Exelon Corporation at 19 (Dec. 22, 2017) (Exelon reply comments).

Exelon's chart depicts the effect of removing 500 MW from the calculation. According to information recently released by ERCOT, in 2017 the average online capacity of units subject to RUC was 291 MW over 534 resource-hours, with RUC being issued for an expected capacity shortfall 12% of the time.¹² Staff notes that the impact of removing RUC capacity from the ORDC online reserves is sensitive to whether the RUC instruction occurs under normal or scarcity conditions. During normal conditions, when more reserves are available and the ORDC does not contribute to the price, removing capacity associated with a RUC instruction is not likely to have a significant effect. In contrast, during scarcity conditions, the price effect of removing this capacity could be substantial.

Potential Next Steps: If the Commission determines that RUC and RMR capacity should be removed from the ORDC, this change could be put in place by summer 2018, assuming the Commission provides such direction at the February open meeting. ERCOT has informed Staff that implementation could be accomplished 60 days after approval by ERCOT's Board of Directors. Direction provided by the Commission to ERCOT at the February open meeting could be presented to the Board of Directors at the April meeting and be in effect by July 1, 2018.

b. Hogan/Pope Report Recommendation: Shift the ORDC by Modifying the LOLP

A second ORDC change proposed in the Hogan/Pope Report involves shifting the mean of the probability distribution applied in deriving the LOLP, which is a key input to determining the ORDC price adder.¹³ The LOLP is currently derived from an analysis of the historical hourly reserve error. The reserve error is calculated by comparing hour ahead to actual system reserves during a study period. The Hogan/Pope Report contended that this historical perspective of reserve error underestimates the risk of volatility (and thus the risk of lost load) associated with an increased presence of intermittent renewable resources on the ERCOT system. The Report proposed shifting the mean of the LOLP distribution by a scaling factor of up to one standard deviation to reflect this increased risk.

¹² Annual TAC Review of the Market Impacts of Reliability Unit Commitments (Jan. 17, 2018). http://www.ercot.com/content/wcm/key_documents_lists/138435/13.ERCOT_Reports.zip. 81% of RUC instructions were issued for congestion and 7% were related to Hurricane Harvey.

¹³ See Hogan/Pope Report at 39-40; Vistra initial comments at 6; NRG initial comments at 8; TCPA initial comments at 3-4; Calpine initial comments at 11; Exelon initial comments at 4; Dynegy comments at 3; STEC reply comments at 8; Tenaska reply comments at 3; TSPA reply comments at 1; Wind Coalition initial comments at 1.

Arguments in Favor of the Proposal: NRG and Calpine concurred with the Hogan/Pope Report's contention that the ORDC underestimates the risk of reserve error associated with intermittent generation and recommended an LOLP shift to account for this risk.¹⁴

Exelon asserted that the Commission could shift the LOLP to achieve a certain level of installed capacity to improve reliability and support resource adequacy objectives. In Exelon's view, absent this change the ERCOT market will experience unacceptably degraded reliability.¹⁵ Exelon commissioned a study by the Northbridge Group that analyzed the equilibrium reserve margins resulting from various changes to the LOLP. Northbridge found that a shift of one standard deviation would result in an equilibrium of 13.1%, a shift of two standard deviations would result in an equilibrium of 15%, and a shift of three standard deviations would be required to approach a "1 in 10" standard, or approximately a 17% reserve margin in equilibrium.¹⁶

Certain commenters also argued that a shift in the LOLP would correct the steep increase in the current ORDC price adder that occurs as the level of available operating reserves approaches the minimum contingency level. According to the advocates of this reform, the price adder remains relatively low and increases slowly as the level of available operating reserves falls, then reaches a sharp discontinuity when reserves reach 2,000 MW, rising suddenly to the VOLL. Parties asserted that this aspect of the design undervalues reserves, does not reflect real world risk, and can result in large swings in the price with small changes in the underlying reserves.¹⁷

Arguments Against the Proposal: TIEC opposed the proposal to shift the LOLP, contending that such an adjustment has no rational economic basis, and is simply designed to transfer wealth from consumers to generators. TIEC pointed to the Economically Optimal Reserve Margin (EORM) analysis performed by the Brattle Group, arguing that the current design should produce an equilibrium reserve margin in excess of the EORM, and that the current ORDC thus causes customers to pay more for reserves than they would rationally choose to buy. TIEC noted that the Commission has long since evolved from the application of the archaic and arbitrary "1 in 10" standard that has no basis in economics or principled market design.¹⁸

¹⁴ Calpine reply comments at 11; NRG initial comments at 7-8.

¹⁵ Exelon initial comments at 8-16; Exelon reply comments 4-16.

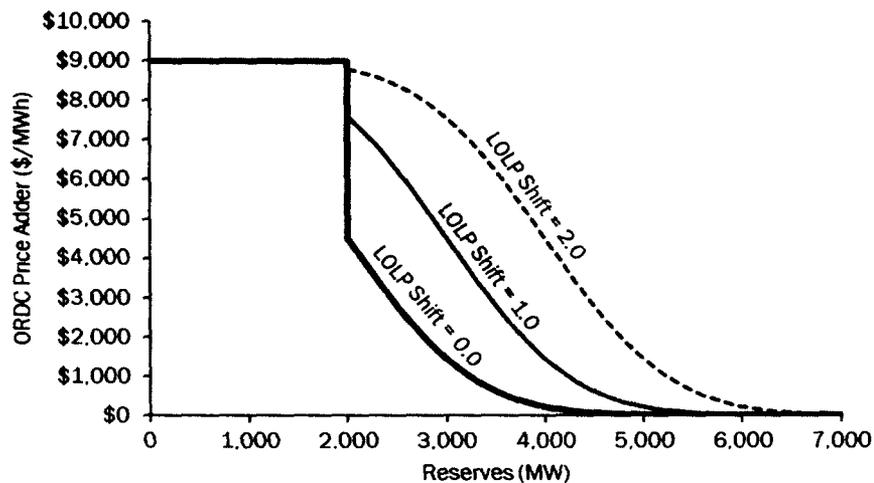
¹⁶ Exelon reply comments at 80.

¹⁷ Exelon initial comments at 19; Dynegy comments at 4; NRG initial comments at 8.

¹⁸ TIEC reply comments at 4-5.

With regard to the discontinuity in the ORDC that occurs as available reserves approach the value of X, TIEC notes that this is an artifact of the decision made by the Commission to set the value of X to 2,000 MW, which is above the level at which load shed actually occurs under ERCOT procedures at approximately 1,200 MW of operating reserves. TIEC argued that, had the Commission not increased the value of X to 2,000 MW, the ORDC curve would properly reflect an LOLP of 1 at 1,200 MW, and the discontinuity in the ORDC curve would not exist. The cure for the discontinuity, according to TIEC, is not to shift the curve, but to set X to 1,200 MW.¹⁹

Effect of Shifting the LOLP: To demonstrate the effect of shifting the LOLP by one or two standard deviations, Exelon provided the following chart.²⁰ Exelon’s chart depicts a large increase in the ORDC price adder even at high reserve levels.



Potential Next Steps: Staff recommends the Commission defer ordering ERCOT to implement any changes to the LOLP, pending additional observation of ORDC outcomes over a longer period of time. Additional observation would allow the Commission to determine whether, as asserted by commenters, the current design underestimates the volatility of intermittent generation and whether the vertical portion of the curve results in undesirable market outcomes. If valid, these claims should be discernible over time, particularly during the summer months when the ORDC is more likely to be contributing to the price. Additional time spent observing ORDC outcomes would provide the Commission with necessary data to support a decision to modify the LOLP calculation.

¹⁹ TIEC reply comments at 5.

²⁰ Exelon reply comments at 12.

2. ELMP and Other RUC Pricing Proposals

The Hogan/Pope Report outlined several concerns regarding pricing outcomes when ERCOT commits a unit through the RUC process to resolve local transmission constraints.²¹ Concerns arise in relation to pricing the minimum output of units subject to RUC and pricing the energy produced by these units when they are dispatched above the minimum level.²² Proposals to modify RUC pricing rules are premised on allowing the RUC instruction to result in a price that reflects the reliability need necessitating the commitment, which may not currently materialize due to mitigation for local market power or due to the price-taking nature of the unit's minimum output.²³ Parties provided comment on the proposals described in the Hogan/Pope Report and proposed alternatives. Recommendations include:

- Instituting an ELMP framework that considers the start-up and minimum energy costs of certain units in the pricing logic and relaxes the minimum dispatch level to allow the unit to set a price reflective of these costs if the unit is economic.²⁴
- Assigning a “scarcity value” to the commitment by deducting the minimum output of the unit from the capacity of the transmission constraint the unit is brought online to resolve.²⁵
- Relaxing mitigation or increasing the mitigated offer cap when a unit is marginal but mitigated to control for local market power.²⁶
- Minimizing the use of RUC by:
 - Re-evaluating the criteria used by ERCOT in the RUC process;²⁷
 - Incorporating dynamic transmission line ratings that reflect actual system conditions into the RUC determination;²⁸
 - Reflecting deployment of fast-start resources in the reliability deployment price adder, thus incenting resource owners to voluntarily commit resources;²⁹

²¹ Note the distinction between proposals related to RUC MW in the ORDC and proposals related to RUC pricing.

²² Hogan/Pope Report at 49-59.

²³ Hogan/Pope Report at 62-63.

²⁴ Reply Comments of Potomac Economics at 12-13 (Dec. 22, 2017) (IMM reply comments); NRG initial comments at 19; NRG reply comments at 11; Austin Energy comments at 4; STEC reply comments at 4-6; Vistra initial comments at 8.

²⁵ Hogan/Pope Report at 62; NRG initial comments at 19.

²⁶ Hogan/Pope Report at 62; NRG initial comments at 19-20; NRG reply comments at 11; STEC initial comments at 11; Calpine initial comments at 10; Calpine reply comments at 28; Shell initial comments at 4; Shell reply comments at 5; TIEC initial comments at 10; TIEC reply comments at 7-8; Tenaska initial comments at 2; STEC reply comments at 4.

²⁷ NRG initial comments at 10, 17; ERCOT Steel Mills comments at 7.

²⁸ ERCOT Steel Mills comments at 7.

²⁹ Shell initial comments at 4, 6; Shell reply comments at 2-3.

- Building more transmission to avoid transmission constraints necessitating RUC,³⁰ or
- Instituting a local reserve product to send a price signal to incent voluntary commitment.³¹

Potential Next Steps: Given the range and complexity of proposals relating to RUC pricing, Staff believes further study is necessary before any proposal is brought forward for Commission consideration. Additional information, including specific examples demonstrating the price effect of RUC instruction, would be helpful in assessing the need for changes to RUC pricing rules. Further, in Staff's preliminary view, the ELMP concept represents a possible improvement to the design that merits further review in a discrete project. A separate project with a distinct focus would allow Staff to develop a robust record for Commission deliberation.

If the Commission wishes to further consider RUC pricing proposals, Staff thus recommends that the Commission direct Staff to open a separate project to gather additional information pertaining to these proposals, with a particular emphasis on ELMP.

Staff thanks the Commission for consideration of this memorandum, and looks forward to further discussion at the open meeting. Please contact Julia Harvey at extension 6-7371 or Mark Bryant at extension 6-7279 with questions in advance.

³⁰ TIEC initial comments at 6, 10; Invenenergy reply comments at 9-10; Vistra initial comments at 6.

³¹ STEC reply comments at 6; IMM reply comments at 13-14.