



## **Filing Receipt**

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TAYLOR  
2705 West Lake Dr.  
Taylor, Texas 76574  
T: 512-248-3000  
F: 512-225-7079

AUSTIN  
8000 Metropolis Dr.  
Bldg. E, Suite 100  
Austin, Texas 78744  
T: 512-225-7000  
F: 512-225-7079

ercot.com

August 21, 2023

Public Utility Commission of Texas  
Interim Chairman, Kathleen Jackson  
Commissioner Will McAdams  
Commissioner Lori Cobos  
Commissioner Jimmy Glotfelty  
1701 N. Congress Avenue  
Austin, TX 78711

Re: Project No. 54584, *Reliability Standard for the ERCOT Market*

Dear Chairman and Commissioners:

As requested at the July 20, 2023 Open Meeting, Electric Reliability Council of Texas, Inc. (ERCOT) submits the attached overview detailing the market initiative to establish a reliability standard, as well as the related Value of Lost Load (VOLL) study and the update of the Cost of New Entry (CONE).<sup>1</sup> This market initiative overview presents the history and background of efforts to develop a reliability standard, the scope of the standard as well as the studies being performed to inform it, key milestones proceeding from the development stage through approval, and a section containing current updates to provide the latest developments. A diagram is also included in the overview to show the initiative's development in a visual timeline. Following coordination with Commission Staff, this timeline presents ERCOT's current estimate of the anticipated timeframes to develop the reliability standard and to perform the VOLL and CONE studies, which may subsequently be revised as the initiative unfolds. ERCOT will continue to coordinate with Commission Staff and intends to maintain this overview throughout the development of the reliability standard and file periodic updates.

ERCOT has also been examining a variety of visual techniques to represent development process flows for market initiatives. An additional flow chart is attached as an example of one of the formats being assessed. ERCOT will work to analyze this and other options on the added value.

ERCOT appreciates any feedback that the Commission may have on the overview to develop the reliability standard and update VOLL and CONE at the August 24, 2023 Open Meeting.

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<sup>1</sup> Pursuant to 16 TEX. ADMIN. CODE § 22.71(i)(2)(C), this filing is submitted less than seven days in advance of the August 24, 2023 Open Meeting due to revisions to the market initiative overview based on recent developments with this initiative and is filed presently in order to ensure that the Commission has the most current information for consideration at the meeting.

Respectfully submitted,

*/s/ Chad Seely*

Chad V. Seely  
Senior Vice President and General Counsel  
Texas Bar No. 24037446  
(512) 225-7035  
chad.seely@ercot.com

Rebecca Zerwas  
State Policy Principal and Board Liaison  
(512) 248-7033  
rebecca.zerwas@ercot.com

## Background

### Reliability Standard

Section 18 of Senate Bill (SB) 3 (87<sup>th</sup> Leg.) requires ERCOT to establish “requirements to meet the reliability needs of the power region.” Although historically there has not been a *mandatory* reliability standard in the ERCOT region, ERCOT has long had a target reserve margin of 13.75% based on a 0.1 Loss of Load Expectation (LOLE) metric and a traditional dispatchable fleet of generators.

- Establishment of a standard has been considered since at least 2011 when the Public Utility Commission of Texas (Commission) opened Project No. 40000 to review resource adequacy needs. Operating reserves and scarcity pricing were discussed and the Commission considered adopting a mandatory reserve margin, but the project ultimately focused on the adoption of the Operating Reserve Demand Curve (ORDC) mechanism.
- A report released by the Brattle Group in January 2014 prompted discussion of whether a target reserve margin based upon a 0.1 LOLE was the most appropriate reliability standard.
- 0.1 LOLE limits the frequency of loss of load events such that load shed does not occur more than once in 10 years on a probability-weighted basis. That standard has been widely used in other power regions and was a useful metric when the majority of the generation fleet consisted of traditional dispatchable generation.
- In March 2014, the Commission opened Project No. 42302 to further assess a reliability standard. Options identified included: use of market equilibrium and economically optimal reserve margins, expected unserved energy, continued use of the 0.1 LOLE target, or a combination of multiple reliability metrics.
- The 0.1 LOLE target reliability standard was not removed, however the Commission directed ERCOT to regularly provide updates on the Economically Optimal Reserve Margin (EORM) and Market Equilibrium Reserve Margin.
- A 2018 study recommended an EORM of 9.0% and a subsequent 2021 study recommended 12.25%, which have often been referred to as indicators of resource adequacy.

On January 19, 2023, in accordance with SB3, the Commission issued an Order in Project No. 53298 requiring that a project be opened to evaluate and establish an appropriate reliability standard.

- On January 20, 2023, the Commission opened Project No. 54584 to facilitate establishment of a reliability standard.
- The industry standard LOLE metric only accounts for the frequency of load shed events and not their potential severity. Due to the increasing amounts of intermittent Resources (wind and solar), ERCOT filed a letter on March 6, 2023 proposing that the reliability standard be developed using a three-part framework to take into account the duration and magnitude of any single loss of load event in addition to the frequency of event occurrence. The three-part framework is intended to better quantify the risks associated with a LOLE when a large percentage of the generation fleet consists of intermittent Resources.

### **Value of Lost Load (VOLL)**

VOLL represents a customer's willingness to pay for reliable electricity service. The Commission has identified the fundamental role of an updated VOLL to inform the establishment of a reliability standard.

- In 2013 as part of Project No. 40000, ERCOT engaged London Economics to perform an analysis of VOLL for the ERCOT Region. London Economics performed a literature review and submitted a report recommending that a comprehensive customer survey process be conducted to identify an accurate estimate of VOLL. However, no survey was initiated and the Commission administratively set VOLL at \$9,000 per MWh.
- Under the former 16 Tex. Admin. Code (TAC) § 25.505, VOLL was set to be equal to the System-Wide Offer Cap (SWOC). With the Commission's approval of the Proposal for Adoption (PFA) in Project No. 52631 on December 2, 2021, the High SWOC (HCAP) was decreased from \$9,000 per MWh to \$5,000 per MWh and this had the effect of also decreasing VOLL to \$5,000 per MWh.
- With the Commission's approval of the PFA in Project No. 53191 on April 29, 2022, the VOLL was decoupled from the SWOC by eliminating the rule that they be set equal.
- The Commission's January 19, 2023 Order authorizing the development of the Performance Credit Mechanism (PCM) included a decision point to determine whether changes should be made to VOLL based on the implementation of PCM.
- At the March 23, 2023 Open Meeting, the Commission directed ERCOT to issue a Request for Proposal (RFP) to engage a consultant to conduct an updated analysis of VOLL, which will include a customer survey.
- In June 2023, Lawrence Berkeley National Labs (LBNL) contacted ERCOT to explore coordinating on the VOLL study. In coordination with the U.S. Department of Energy, LBNL developed the Interruption Cost Estimate (ICE) Calculator tool to estimate the costs of load interruptions and the benefits associated with reliability improvements. LBNL is currently in the process of a nationwide update of the ICE Calculator data and has partnered with AEP Texas to conduct customer surveys in that service area. ERCOT is coordinating with LBNL to identify synergies between the ICE Calculator 2.0 Update and the VOLL study for the ERCOT Region.

### **Cost of New Entry (CONE)**

CONE is an estimate of the annualized net revenue that a new generation resource would need in order to recover its capital investment and fixed costs, traditionally a new combustion turbine generation facility.

- ERCOT currently uses a CONE value of \$105,000 per MW-year, which was developed in a 2012 study. The Commission's consultant, E3, assumed a CONE of \$93,500 per MW-year in their Assessment of Market Reform Options to Enhance Reliability of the ERCOT System report to the Commission in November 2022. The Independent Market Monitor's (IMM) 2022 State of the Market Report included CONE values ranging from \$80,000 to \$117,000 per MW-year.

- Among its uses, CONE supports capacity reserve margin studies and the calculation of the Peaker Net Margin (PNM), which is used to trigger the HCAP transition to Low SWOC (LCAP).
- House Bill (HB) 1500 § 23 includes a requirement in PURA § 39.1594(d)(1) that ERCOT must complete an assessment that includes an evaluation of CONE as a precondition to implementation of the PCM.
- At the July 20, 2023 Open Meeting, the Commission directed ERCOT to move forward with hiring a consultant to assess and update CONE.

This initiative will support a portfolio of market enhancements by establishing a standard that best ensures reliability and resource adequacy using updated inputs and baselines.

## Scope

These market initiatives will implement a mandatory Reliability Standard and determine updated input values for VOLL and CONE to inform that Standard. The initiative will guide development of and adjustments to other market enhancements, such as the PCM, to ensure appropriate incentives and penalties are in place within the ERCOT Region to support system reliability and resource adequacy.

### Reliability Standard

- Public Utility Regulatory Act § 39.159(b), established by SB3, requires that, “the commission shall ensure that [ERCOT]: (1) establishes requirements to meet the reliability needs of the power region.”
- As directed by the Commission, the Reliability Standard will utilize a three-parameter framework based on the expected frequency, duration, and magnitude of loss of load events.
  - ◆ Duration: maximum number of hours that any single event will last
  - ◆ Magnitude: maximum amount of load shed (in MW) at any time during any single event
  - ◆ Frequency: number of events that should occur within a given number of years
- Each of the three parameters will be defined and measured by a reliability metric.
- ERCOT recommended incorporating, and the Commission directed ERCOT to use, an exceedance probability in the Reliability Standard, meaning the likelihood that the magnitude and duration of an event will be higher than a given risk tolerance threshold. Exceedance probability is a methodology to calibrate the Reliability Standard to discount a designated level of outlier, low probability events.
- ERCOT is in the process of conducting a Reliability Standard study to provide data to the Commission to inform the Reliability Standard rulemaking. ERCOT is using the Strategic Energy & Risk Valuation (SERVM) model, produced by the vendor Astrape, to run simulations of a range of resource portfolio scenarios in the ERCOT Region for future years in order to assess a range of reliability outcomes. The study is an iterative process and

ERCOT has been providing results of each iteration to the Commission to receive feedback on model and scenario refinements.

- The Commission opened Project No. 54584 to conduct a rulemaking to establish the Reliability Standard.

#### **VOLL Study**

- As directed by the Commission, ERCOT will engage a consultant to conduct an updated analysis of VOLL and report such findings to the Commission in early 2024.
- This analysis will include performance of a survey of customers throughout the ERCOT Region, as well as a macroeconomic analysis and literature review, to determine an updated region-wide VOLL value and a VOLL value for each customer class (residential, small commercial, large commercial and industrial).
- In addition to engaging its own consultant, ERCOT intends to capitalize on LBNL's current effort to update its ICE Calculator by leveraging LBNL's nationwide experience with valuation of service reliability.

#### **CONE Study**

- In accordance with HB 1500 § 23 and as directed by the Commission, ERCOT will hire a consultant to assess the CONE value currently being used and determine an update.
- The CONE will consist of the updated total net revenue on an annualized basis in dollars-per-MWh that a new combined-cycle combustion turbine generation resource would require to recover its capital investment and fixed costs.

## **Key Milestones<sup>1</sup>**

### **Development stage**

- **January – February 2023**
  - ◊ The Commission issued an Order in Project No. 53298 requiring that a Reliability Standard be assessed and established and that a VOLL update be considered. At Open Meetings, the Commissioners discussed moving these initiatives forward.
  - ◊ Commission Staff opened Project No. 54584 to facilitate a Reliability Standard rulemaking.
- **March 2023**
  - ◊ On Mar. 6, ERCOT filed a report in Project No. 53298 affirming readiness to begin the RFP process to engage a consultant to perform the VOLL study and proposing a three-part framework for the Reliability Standard to capture more than just the expected frequency of loss of load events.
  - ◊ On Mar. 7, Commission Staff filed Questions for Comment to solicit feedback on potential Reliability Standard frameworks and metrics. Stakeholders subsequently filed responsive comments to help identify appropriate metrics and other features of a Reliability Standard for consideration.

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<sup>1</sup> Projected milestones are subject to change.

- ◇ On Mar. 15, ERCOT held a technical workshop to engage stakeholders regarding ERCOT's proposal to use a three-part Reliability Standard framework for duration, magnitude, and frequency. ERCOT subsequently filed a report to the Commission noting that stakeholders were generally in favor of this framework and proposing to perform a resource mix scenario analysis to assess reliability metrics.
  - ◇ At the Mar. 23 Open Meeting, the Commission directed ERCOT to proceed with an initial Reliability Standard scenario study using the SERVM model to assess a range of reliability outcomes using both industry standard and ERCOT-specific model inputs. The Commission also indicated that ERCOT should initiate the RFP process to engage a consultant to conduct a VOLL study, including a customer survey.
- **April – May 2023**
  - ◇ On Apr. 10, ERCOT issued an RFP for a consultant to perform the VOLL study.
  - ◇ ERCOT used the SERVM model to conduct scenario simulations of resource mixes.
- **June – July 2023**
  - ◇ LBNL and ERCOT initiated communications to explore coordinating the VOLL study with LBNL's ICE Calculator 2.0 update.
  - ◇ ERCOT interviewed respondents to the VOLL study RFP.
  - ◇ On June 13, ERCOT filed preliminary results with the Commission from the SERVM reliability analysis, which simulated 24 different reserve margin levels ranging from 9% to 28% with 2026 selected as the simulation year.
  - ◇ At the June 15 Open Meeting, the Commission confirmed that ERCOT should continue to analyze the proposed frequency, magnitude, and duration framework for defining the Reliability Standard and directed ERCOT to continue its SERVM modeling analysis. ERCOT explained the need to include an exceedance probability.
  - ◇ On June 27, ERCOT filed a Reliability Standard study update proposing to model 48 generation portfolio scenarios and, after reviewing the results, modeling an additional 42 scenarios for a total of 90 scenarios.
  - ◇ At the June 29 Open Meeting, the Commission agreed that ERCOT should move forward with modelling the proposed scenarios for analysis.
- **August – October 2023**
  - ◇ ERCOT is in the process of conducting an RFP to engage a consultant to perform a CONE update study.
  - ◇ ERCOT will file a partial SERVM scenario iteration update by Sept. 7 and will present those results to the Commission for feedback at the Sept. 14 Open Meeting. Additional iteration results are expected to be filed for presentation at the Sept. 28 Open Meeting.
  - ◇ Development of VOLL customer survey by ERCOT's selected consultant, followed by development of the pool of customers for survey outreach and setup of the survey website architecture, is anticipated for late September to October.
- **November 2023 – March 2024**
  - ◇ Anticipated timeframe for consultant performance of CONE update study.

- ◊ ERCOT anticipates running at least one additional iteration of scenarios to report reliability and capital cost impacts of setting frequency, magnitude, and duration at certain levels and the impacts of resource mix and capacity retirement assumptions. Additional iterations to be run as necessary and in accordance with Commission feedback based on results.
- ◊ Conducting the VOLL customer survey and translating the results is expected to be performed from Q4 2023 and into Q1 2024, with the macroeconomic analysis and literature review being conducted in parallel.
- ◊ ERCOT anticipates filing a preliminary update on the VOLL study in December 2023 to present the results of the macroeconomic analysis and literature review. Depending on the status of the customer survey responses at that time, some preliminary survey result data may be included as well.
- ◊ A final VOLL study report will be filed in Q1 2024 and for presentation to the Commission at Open Meeting(s).

### Approval stage

- **Fall 2023** Commission Staff is anticipated to file a Proposal for Publication (PFP) in Project No. 54584 to propose a Reliability Standard rule informed by ERCOT's Reliability Standard study and prior stakeholder comment filings. Stakeholders may file comments addressing the PFP and Commission Staff will assess those comments in subsequently developing a PFA.
- **Q1 2024** The Commission will consider whether to approve the PFA to adopt the rule.

## Key Documents and References

### Texas State Leadership

- [SB 3 § 18](#) (87th Leg.) – Reliability Standard
- [HB 1500 § 23](#) (88th Leg.) – CONE
- Public Utility Regulatory Act § 39.159(b)(1) – Reliability Standard

### Commission

- PUCT Project No. 53191, [Order Repealing § 25.505 and Adopting New 16 TAC §§ 25.505, 25.506, and 25.509 as Approved at the April 21 Open Meeting](#) (Apr. 29, 2022) – VOLL
- PUCT Project No. [53298](#)
  - ◊ [Order](#) requiring evaluation and establishment of an appropriate Reliability Standard and including a decision point to determine whether changes should be made to VOLL based on the implementation of PCM (Jan. 19, 2023) – Reliability Standard, VOLL
  - ◊ Commissioner McAdams' [Memorandum](#) providing background of VOLL, preferred reliability metric, and target reserve margin and recommending VOLL and reliability metrics studies (Feb. 15, 2023) – Reliability Standard, VOLL
  - ◊ ERCOT [Report](#) to Commission proposing three-part framework and addressing minimum deliverability criteria (Mar. 6, 2023) – Reliability Standard, VOLL
- PUCT Project No. [54584](#)

- ◇ Commission Staff's Memorandum and Questions for Comment summarizing history of Commission projects pertaining to the Reliability Standard and requesting stakeholder feedback (Mar. 7, 2023) – Reliability Standard
- ◇ ERCOT Report on Reliability Standard technical workshop, proposing an initial scenario analysis, and proposing to initiate an RFP process to engage a consultant to conduct a VOLL update study (Mar. 20, 2023) – Reliability Standard, VOLL
- ◇ ERCOT Comments in response to Commission Staff's Questions (Mar. 29, 2023) – Reliability Standard
- ◇ ERCOT Reply Comments in response to stakeholder comments to Commission Staff's Questions (Apr. 5, 2023) – Reliability Standard
- ◇ Commission Staff Memorandum summarizing comments and recommending developments to the Reliability Standard (Apr. 20, 2023) – Reliability Standard
- ◇ ERCOT Report presenting preliminary results of Reliability Standard study (June 13, 2023) – Reliability Standard
- ◇ ERCOT Report proposing an updated portfolio of resource mix scenarios for the Reliability Standard study (June 27, 2023) – Reliability Standard

## ERCOT

- ERCOT Workshop Presentation on three-part Reliability Standard framework (Mar. 15, 2023)
- ERCOT Presentation of Reliability Standard preliminary modeling results to ERCOT Board's Reliability and Markets Committee (June 19, 2023)

## Current Updates

### Reliability Standard

- ERCOT is in the process of procuring additional computing resources in order to shorten the time required to perform simulation runs.
- ERCOT continues to work iteratively to update and refine the SERVM model used to run the scenario simulations, including the following model updates made in July and August:
  - ◇ Incorporated unplanned thermal outage and weatherization standard impact modeling into the 10 Weatherization Zones. Also incorporated outages from Winter Storm Uri;
  - ◇ Updated the baseline for thermal resources to an 85% outage reduction rate to reflect the impacts of the Commission's weatherization standard;
  - ◇ Incorporated ERCOT's new Firm Fuel Supply Service (FFSS), which will have the effect of reducing fuel limitation-related outages; and
  - ◇ Incorporated a representation of the pending multi-step ORDC floor.
- ERCOT is working with Astrape to incorporate updated CONE and VOLL cost parameters into the model based on other recent studies (e.g., PJM's more recent CONE study), which should be completed the week of Aug. 21. ERCOT is also coordinating with the IMM on updates to CONE for the SERVM modeling.
- ERCOT will complete simulations for a portion of the next 48 resource mix scenarios to file by Sept. 7 and will present the results at the Commission's Sept. 14 Open Meeting. Results

from the additional simulations for the remaining scenarios will be filed upon completion for presentation at the Sept. 28 Open Meeting.

### **VOLL Study**

- ERCOT has interviewed respondents to the RFP and expects to engage the selected consultant within the next few weeks.
- Because of LBNL's nationwide expertise developing the ICE Calculator tool, which estimates the cost of load interruptions and the benefits associated with reliability improvements, and LBNL's work with AEP Texas on the ICE Calculator 2.0 update, ERCOT is coordinating with LBNL to gain synergies for the VOLL study of the ERCOT Region.
  - ◊ ERCOT is working with LBNL to finalize an agreement to utilize modified versions of LBNL's ICE Calculator 2.0 Update customer surveys for the VOLL study. ERCOT is working with LBNL and the selected consultant to share such surveys confidentially with the selected consultant and expects to provide these surveys to ERCOT's selected consultant the week of Aug. 21.
  - ◊ LBNL will also provide the data that it collects for the ICE Calculator 2.0 Update from AEP Texas's service area to ERCOT in exchange for anonymized, aggregated data from the VOLL survey.
  - ◊ ERCOT anticipates that use of LBNL's surveys and the exchange of survey results will benefit the VOLL study by leveraging LBNL's nationwide experience with ERCOT Region-specific modifications by ERCOT's selected consultant.
- None of the survey data collected by ERCOT and its consultant will contain Proprietary Customer Information. The survey information will include, for example, the customer's experiences with power outages, how disruptive certain lengths of outages are to that customer, and the financial impact to the customer of such outages. Each survey response will be anonymous and will not include any customer contact or identification information. These anonymous survey responses will then be aggregated for use in the VOLL study and LBNL's ICE Calculator, respectively.
  - ◊ All VOLL survey data that ERCOT and its consultant receive are subject to ERCOT's security assessment protocol, which requires appropriate encryption of confidential information (in transit and at rest) as well as a review of the consultant's security policies, processes, and procedures, including cloud components.
- The VOLL surveys will be distributed to customers via an emailed hyperlink that links to a proprietary website hosting the survey.
  - ◊ ERCOT and its selected consultant are considering utilizing Transmission and Distribution Utilities (TDUs), Non-Opt In Entities (NOIEs), and/or Retail Electric Providers (REPs) throughout the ERCOT Region to assist in determining which customers to contact and may rely on the TDUs, NOIEs, and REPs to distribute the VOLL survey link to certain customers.
  - ◊ ERCOT expects to meet with these entities in the next few weeks to begin coordination of survey distribution efforts.

**CONE Study**

- ERCOT is preparing an RFP for a CONE update study. Consultant engagement is anticipated in Fall 2023.

# Timeline

Major Initiative Tasks and Milestones - Reliability Standard		2023												2024											
Task or Milestone	Owner	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		SB3, 87(R)-2021 Directs Establishment of Reliability Standard	TX Leadership																						
<b>Reliability Standard</b>																									
Study and Prepare Preliminary Results	ERCOT																								
Share Preliminary Results	ERCOT																								
Provide Feedback on Preliminary Results	PUC																								
Provide Feedback on Preliminary Results	Board																								
Run Scenario/Sensitivity Iterations	ERCOT																								
Include updated Cost of New Entry (CONE) in Iteration	ERCOT																								
Share Part 1 of Iteration Round Results	ERCOT																								
Provide Feedback on Part 1 of Iteration Round Results	PUC																								
Share Part 2 of Iteration Round Results	ERCOT																								
Provide Feedback on Part 2 of Iteration Round Results	PUC																								
Share Additional Iteration Results	ERCOT																								
Provide Feedback on Additional Iteration Results	PUC																								
Provide Feedback on Whether Other iterations are Needed	PUC																								
Open Rulemaking	PUC																								
Conduct Rulemaking	PUC																								

**Major Initiative Tasks and Milestones - Reliability Standard**

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Task or Milestone	Owner	2023												2024											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Value of Loss Load Study</b>																									
Conduct RFP Process	ERCOT																								
Initial Coordination of Survey Questions	ERCOT																								
Customer Sample Pool Development/Survey Set-up	ERCOT																								
Conduct VOLL Literature Search & Macro-economic Analysis	ERCOT																								
Conduct Survey/Translate Survey Data	ERCOT																								
Issue Preliminary Report on VOLL Analysis	ERCOT																								
Issue VOLL Report	ERCOT																								
Provide Briefing to PUC on VOLL Report	ERCOT																								
<b>Cost of New Entry (CONE) Study</b>																									
PUC Direction to Perform CONE Study	PUC																								
Conduct RFP Process	ERCOT																								
Perform CONE Study	ERCOT																								

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# Reliability Standard

Development

Texas State Leadership

PUC

ERCOT

