



Item 8.1.1: Development of Reliability Standard

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Reliability and Markets Committee Meeting

ERCOT Public

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Development of Reliability Standard: Overview

- **Purpose**

- Begin discussion with the R&M Committee on an ERCOT Reliability Standard to be developed by the Public Utility Commission of Texas (PUC)

- **Voting Items / Requests**

- No action is requested of the R&M Committee or Board; for discussion only

- **Key Takeaways**

- Senate Bill 3 mandated the creation of an ERCOT Reliability Standard by the PUC.
- PUC has created a Project to facilitate that work.
- On February 15, 2023, Commissioner McAdams filed a Memo requesting ERCOT work with PUC staff and stakeholders to begin the analysis.
- ERCOT has the Strategic Energy & Risk Valuation (SERVM) model and is trained in using that model to produce scenarios that can be used in this analysis.
- ERCOT requests Board Members review a proposed process to be used in the study.
- ERCOT recommends a standard defined by a three-part Framework that consists of the following limits.
 1. Limit on the magnitude of any single loss of load event
 2. Limit the frequency of loss of load events
 3. Limit the duration of any single loss of load event

Process Overview

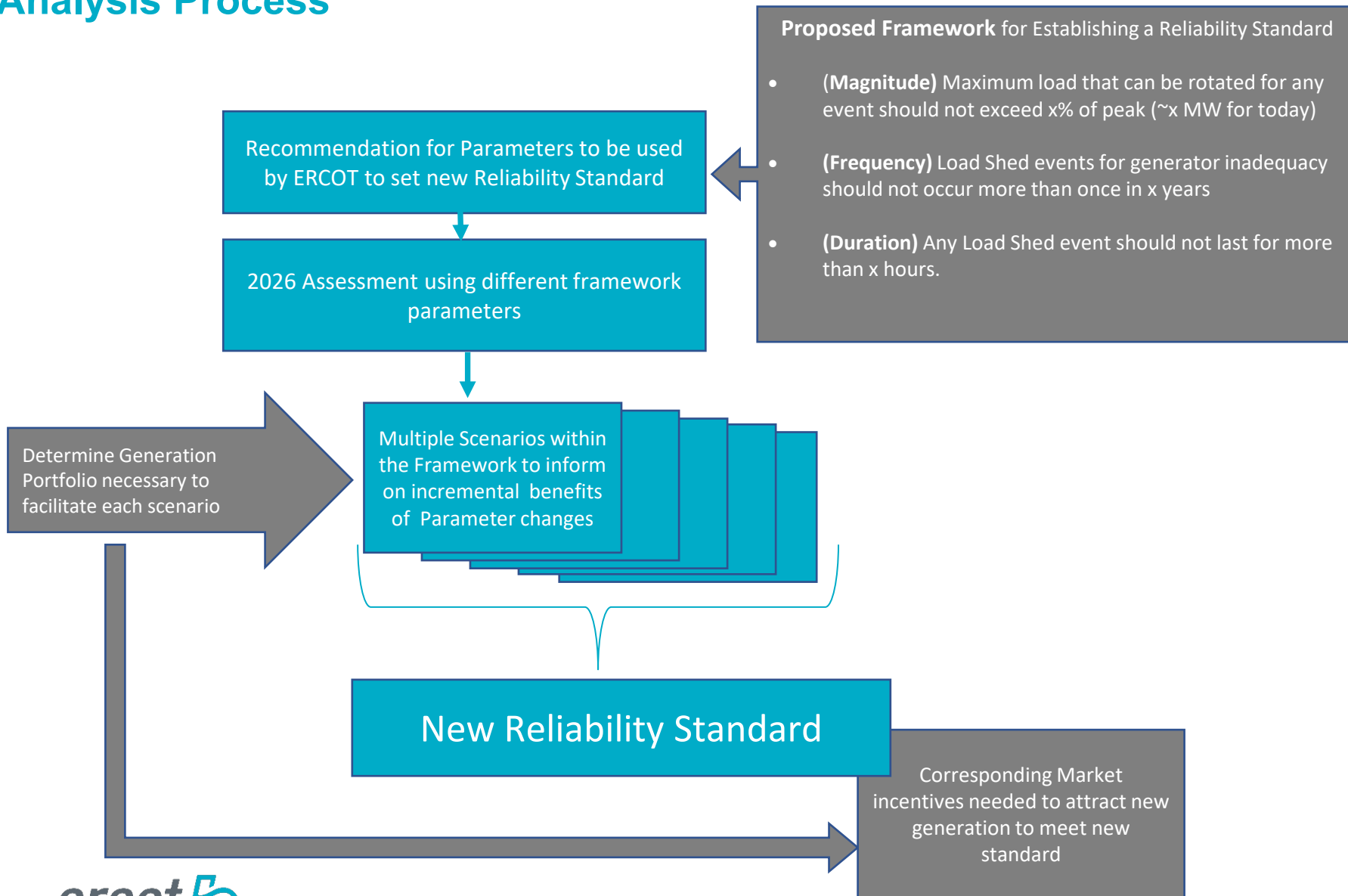
Establish the **Framework** for defining the Reliability Standard

Set the **Parameters** used within the Framework for each Scenario

Compare the market impact of each **Scenario**

Decision on Reliability Standard

Proposed Reliability Standard Analysis Process



Background

- SERVM is a probabilistic Monte Carlo simulation tool that produces a distribution of expected reliability events and their costs based on many independent hourly chronological simulations (or trials).
- ERCOT has been using SERVM since 2014 to produce reserve margin studies as well as conduct probabilistic loss-of-load studies required by NERC.
- In Fall of 2022, ERCOT began training to enable staff to perform resource reliability studies previously performed by Astrape.
- The current phase of work consists of updating the SERVM model to include the latest ERCOT load forecast, the November CDR resources, and fuel price forecasts.
- Scenarios will represent a range of Reliability Standard metric threshold levels.
- The scenario portfolios will reflect new generation that is already expected to be built, likely retirements, and incremental levels of new dispatchable generation needed to meet the different levels of reliability defined for each scenario.
- Scenario outputs will be compared for:
 - Incremental amounts of additional dispatchable resources
 - Overall production cost
 - Cost to the Market

Next Steps

1. ERCOT will commission a study to determine the Value of Loss Load (VOLL) as requested by Commissioner McAdams' 2/15/23 Memo.
2. ERCOT will engage PUC staff and stakeholders for input concerning the process and Framework definition proposed to be used in the Reliability Standard study.
3. ERCOT will present the proposed Framework, the Parameters used in the Framework for each Scenario, and the number of Scenarios produced to the PUC for approval.
4. ERCOT will start the Scenario analysis upon receiving direction from the PUC.
5. An update on the progress will be made at the April 2023 R&M Committee meeting.

Supplemental: Reliability Standard Definitions

- An *LOL event* is defined as an hour during which firm load exceeds available generation capacity.
- An *LOL day* is defined as a day during which there is at least one LOL event; note that a day with one LOL event is equivalent to a day with two or more LOL events.
- The table below provides descriptions and calculation examples of the key probabilistic Reliability Standard metrics that should be considered by the Commission. For the measure calculation examples, it is assumed that there are 100 Monte Carlo simulation trials conducted for a given forecast year, and each trial has the same probability of occurrence, which is 1% (0.01).

Measure	Definition	LOL Attribute of Interest	Calculation Example
Loss of Load Hours (LOLH)	The expected number of LOL events for a given period. Alternatively, LOLH is the expected combined duration of LOL events for a given period.	Duration (number of hours)	There are 10 trials that had 2 LOL events, and 2 trials that had 4 hours of LOL. The remaining 88 trials had no LOL events: $\text{LOLH} = (10 \text{ trials} \times 2 \text{ hours/year} \times 0.01) + (2 \text{ trials} \times 4 \text{ hours/year} \times 0.01) = 0.2 + 0.08 = 0.28 \text{ hours/year}$
Loss of Load Expectation (LOLE)	The expected number of LOL days for a given period.	Frequency (number of days)	There are 6 trials that had one day with a single LOL event, and 4 trials that had two days with two LOL events during each day. The remaining 90 trials had no LOL events: $\text{LOLE} = (6 \text{ trials} \times 1 \text{ day/year} \times 0.01) + (4 \text{ trials} \times 2 \text{ days/year} \times 0.01) = 0.06 + 0.08 = 0.14 \text{ days/year}$ Note that the conventional definition of LOLE does not distinguish between a day with a single LOL event and a day with multiple LOL events.
Expected Unserved Energy (EUE)	The expected total magnitude (in MWh) of LOL events for a given period. A variant, Normalized EUE (NEUE), is EUE divided by the total annual energy.	Size (MWh)	There is one trial with 2,500 MWh of unserved energy and one trial with 1,000 MWh of unserved energy. The remaining 98 trials had no LOL events: $\text{EUE} = (1 \text{ trial} \times 2,500 \text{ MWh/year} \times 0.01) + (1 \text{ trial} \times 1,000 \text{ MWh/year} \times 0.01) = 25 + 10 = 35 \text{ MWh/year}$