

ERCOT System Planning:

2018 Long-Term System Assessment

Study Scope and Process

**Version 1.0**

Document Revisions

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# Introduction

The Long-Term System Assessment (LTSA) is a planning study conducted by ERCOT System Planning per its obligation under PURA Section 39.904[[1]](#footnote-1) and the ERCOT Planning Guide. The LTSA analyzes system conditions 10 to 15 years in the future and uses a scenario-based approach to transmission planning, in which ERCOT Planners study the economic and reliability needs of the system across a wide range of scenarios.

Planners may use the bases cases developed in this study to evaluate large transmission additions to the ERCOT System. Additionally, the study will help facilitate communication and understanding of long-term transmission needs among stakeholders.

# Scope

The 2018 LTSA shall analyze the long-term steady-state transmission needs of the ERCOT system. The study shall develop DC study cases for years 2028 and 2033, covering a wide range of scenarios.

ERCOT shall facilitate stakeholder-driven workshops to identify potential scenarios and drivers to be studied as part of the 2018 LTSA. The 2018 LTSA is expected to identify up to four scenarios to describe a range of possible futures in regards to ERCOT generation, load, and transmission for 2028 and 2033.

LTSA Scenario Development participants shall take measures to develop a broad spectrum of scenarios by considering drivers that include, but are not limited to, economic conditions, environmental regulations and energy policies, fuel prices, end-use/markets, weather conditions etc. One of these scenarios shall assume “current trends” or “business as usual” conditions. ERCOT shall develop a scenario-specific load forecast, generation expansion plan and transmission expansion plan for each scenario. The 2018 LTSA may also include sensitivities for selected scenarios as deemed necessary through the study process.

# Input Assumptions

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## Transmission Topology

The final year case from the most recently completed Regional Transmission Plan (RTP) study shall serve as the start case for 2018 LTSA.

### Ratings and Interface Limits

All System Operating Limits (SOLs), including Stability SOLs, will be respected in accordance with the latest ERCOT System Operating Limit Methodology. All Extra-High Voltage (EHV) (>300 kV) transmission lines and transformers (excluding generator step-up transformers) will be monitored in both reliability and economic analyses. All other transmission lines and transformers with voltages 100 kV and above may be monitored if deemed significant to the analysis.

In both reliability and economic analyses, Rate A (continuous ratings) will be used for monitoring pre-contingency conditions and Rate B (two-hour emergency ratings) will be used under post-contingency conditions. The rating information will be retained from the input RTP case.

Appropriate scenario-specific interface limits may be considered while performing economic and reliability analyses.

### Contingency Definitions

Contingency conditions considered for the LTSA reliability and economic analyses include P1 and P7 (100 kV and above) as defined in Table 1 of NERC Standard TPL-001-4, as well as ERCOT common-tower contingencies (two circuits that share structures for more than half a mile) as defined in 4.1.1 of the ERCOT Planning Guides. In addition to these contingencies, for reliability analysis, planners may also consider other sensitivities such as the loss of a large generator, or impact of generators sited as part of the generation expansion process.

## Generation

### Generation Additions and Retirements

ERCOT Planners shall develop a generation expansion plan for each scenario based on the assumptions specified in each scenario. Generation shall be added and retired from the start cases based on the inputs from the scenario-specific generation expansion plan. The generation expansion plan, along with the ERCOT LTSA Generation Resource Siting Process shall be used to identify potential sites for the new generation.

### Generation Dispatch

In the reliability analysis, generation dispatch of conventional units will be set based on Security-Constrained Optimal Power Flow (SCOPF) results. Wind, solar and hydro generation output level will be dispatched at the following levels for the reliability analysis.

* For a Wind Generation Resource, the maximum dispatch level is the Seasonal Peak Average Wind Capacity as a Percent of Installed Capacity as defined in Protocol Section 3.2.6.2.2, Total Capacity Estimate.
* For a Generation Resource, the maximum dispatch level is the Seasonal Peak Average Wind Capacity as a Percent of Installed Capacity as defined in Protocol Section 3.2.6.2.2, Total Capacity Estimate.
* Solar plants in the summer peak reliability cases will be dispatched at based on average solar unit capacity as defined in Protocol Section 3.2.6.2.2, Total Capacity Estimate.
* Hydro-electric Generation Resources in the reliability cases will be dispatched based on a review of historical dispatch information available to ERCOT.

In economic analysis, Solar, Wind, and Hydro-electric generation will be dispatched based on a review of historical dispatch data and Vendor supplied 8760-hour profiles, when applicable.

### Switchable Generation and Exceptions

Unless specified in the scenario descriptions, Switchable Generation Resource parameters used in the LTSA cases will be updated to appropriately reflect the amount of switchable generation available to ERCOT.

### DC Ties

Unless specified in the scenario descriptions, for both reliability and economic analysis, all of the existing DC ties will be set based on the assumptions used in RTP.

### Reserve Requirements

Unless specified by the scenario descriptions, the reliability analysis will be performed based on a reserve requirements defined in the most recent RTP.

### Fuel Price and Other Considerations

Wind and solar production costs will be $0/MWh in the economic analysis. The natural gas price and the effect of environmental regulations will be modeled based on the scenario descriptions. Furthermore, depending on the scenario description, additional considerations may include, but are not limited to, the impact of Green House Gas emissions (GHG), Mercury and Air Toxic Standards (MATS), Carbon tax, Cross State Air Pollution Rule (CSAPR), Production Tax Credit (PTC), and Investment Tax Credit (ITC).

## Demand

ERCOT will develop scenario-specific load forecasts based on assumptions and guidelines developed during the scenario-development workshops. These assumptions may include, but are not limited to, additional demand response, additional energy efficiency, and electric vehicle adoption. The forecast in the LTSA cases will be organized and evaluated by weather zones.

The reliability cases will use 90th percentile non-coincidental peak weather zone load forecast. Scenario-specific 8760-hour load forecasts will be created with a 50th percentile load assumption. These 8760-hour load forecasts, along with self-served load, will be used for generation expansion analysis and the economic portion of transmission analysis.

# The LTSA Process and Method of Study

Figure 4.1 shows the LTSA study process.

* + - 1. Long-term System Assessment Process
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## Scenario Development

ERCOT will facilitate stakeholder-driven workshops to review the drivers and scenarios considered for the 2018 LTSA. Experts from industry and academia may be invited to provide information on the latest trends and forecasts regarding various drivers. These drivers may include, but are not limited to, environmental regulation, natural gas prices, and development of renewable resources, energy efficiency, and demand-side management. These workshops will also be used to identify potential scenarios that may be considered for the 2018 LTSA. During the workshops, stakeholders and ERCOT staff will work together to develop scenario descriptions using updated information and lessons learnt from the 2016 LTSA.

For each scenario identified during the workshop, ERCOT and stakeholders will collaboratively develop inputs used to shape the assumptions for Generation Expansion and Load Forecasting stages of the workshop.

## Load Forecasting

The scenario descriptions will provide guidance to develop load growth assumptions that will be utilized to adjust the economic and weather variables used as an input in the ERCOT load forecasting methodology. These forecasts may be adjusted further to account for scenario-specific instructions on factors such as regional load growth, LNG terminals, energy efficiency, distributed generation etc. Unless specified otherwise, ERCOT will use the models developed for the 2017 Long-Term Demand and Energy Forecast (LTDEF) as a starting point for a majority of scenarios.

## Generation Expansion Analysis

The LTSA will use an hourly economic-dispatch model to determine the timing, location, and capacity of new entrants (generating units) likely to participate in the competitive electric energy market and those that may be economically retired. Capital costs, recovery period, and inflation rate will be used to calculate the amount to be added to the fixed costs. These costs will be used to evaluate whether the generation units considered in the study are economical. Additionally, the age of a unit may be considered when determining if a unit will retire.

In the RPG meetings or via email notifications, ERCOT will continue to share input assumptions and results of generation expansion and load forecasting.

## Reliability Analysis

### Case Conditioning

Any large transmission projects identified in the RTP, such as those categorized as Tier 1, that do not have necessary approval from RPG will be backed out of the start case. The generation and load levels in the case will be updated based on the guidelines set in Section 3 of this document. If the amount of incremental generation identified in the generation expansion process is not sufficient to meet the aggregate non-coincidental system load, loss, and reserve requirements, then the cases will be divided into study regions. The renewable resource dispatch and load levels outside each study region may be adjusted to aid the analysis.

### Study Approach

The reliability analysis will use a Linearized DC SCOPF to identify any unresolvable constraints under relevant contingencies. ERCOT will work with Transmission Planners (TPs) to identify potential upgrades to resolve constraints on the EHV network for each scenario. In addition to the EHV network, the analysis will also identify solutions for areas where the voltage levels are lower than EHV if deemed significant (e.g. system-wide reliability issue) to the analysis.

## Economic Analysis

The N-1 secure reliability cases for 2028 and 2033 with all necessary reliability improvements modeled will be used as the start case for economic analysis. The generation database and load forecast will be consistent with those used for generation expansion analysis. The economic start cases are updated using input assumptions relevant to economic analysis discussed in Section 3 of this document.

After completing a production-cost simulation, congestion in each case will be ranked by shadow price and congestion rent. Transmission improvements will be evaluated to see if they provide sufficient production cost savings to meet ERCOT’s economic planning criteria. The projects that meet the ERCOT economic planning criteria will be modeled in the final reliability cases.

# Deliverables

In the course of the analysis, the following information, at a minimum, will be shared with the stakeholders via MIS.

* Results of load forecasting and generation expansion analysis for each scenario analyzed.
* Steady-state DC base cases at yearly peak including all reliability and economic projects for the years 2028 and 2033.
* Binding constraints, proposed reliability, and economic projects as they become available.
* A final congestion table will be posted for each study year in the economic analysis.
* The final LTSA report will be made available no later than December 31, 2018.
1. Section 39.904(k) of the Public Utility Regulatory Act states that the commission and the independent organization certified for ERCOT shall study the need for increased transmission and generation capacity throughout this state and report to the legislature the results of the study and any recommendations for legislation. The report must be filed with the legislature not later than December 31 of each even-numbered year. [↑](#footnote-ref-1)