Settlement and Retail Operations

Retail Operations

ERCOT acts as the registration agent for Retail Electric Providers (REPs) and provides a centralized hub for retail transactions. TDSPs and Load Serving Entities (LSEs) submit Electronic Data Interchange (EDI) transactions for LSE services – *e.g.*, Move-In, Move-Out, Switch, and Drop to Provider of Last Resort (POLR). The ERCOT Electronic Service Identifier (ESI ID) registration system processes these transactions to establish and update ESI ID-relationship records. On a daily basis, additions and changes to ESI ID-relationship records within ERCOT's ESI ID-registration system are processed into the ERCOT Data Aggregation System (DAS).

Settlements Metering & Billing

ERCOT's responsibilities with respect to Settlement, billing, and financial transfer ensure that electricity production and delivery are accurately accounted for among Market Participants. These responsibilities include: (1) receiving, retrieving, and estimating energy production and consumption data from all points within ERCOT; (2) grouping the data by responsible Market Participant; (3) applying appropriate Load Profiles, loss factors, and Unaccounted for Energy (UFE) allocation mechanisms; and (4) producing the necessary billing determinants to settle the market for each 15-minute interval.

Meter data is submitted to ERCOT by TDSPs via Texas Standard Electronic Transactions (TX SET) for premises with standard Interval Data Recorder (IDR) or Non-Interval Data Recorder (NIDR) meters or LSE files for premises with advanced meters. Meter data for premises that utilize ERCOT Polled Settlement (EPS) meters are acquired via an MV-90 system that polls the meters remotely. ERCOT Protocols define methods for estimating consumption for ESI IDs where actual energy use data is missing or unavailable. Prior to each Settlement run for an Operating Day, the actual/estimated meter data is used in ERCOT's Data Aggregation process.

ERCOT calculates payments and charges to QSEs and CRRAHs using the results of the DAM, RTM, CRR market activities, and energy production and consumption. ERCOT settles RTM activity, DAM activity, and CRR Auction activity with registered CRRAHs and/or QSEs, as set forth in the ERCOT Protocols. Approximately 110 charge types are utilized to settle with QSEs and/or CRRAHs. These charge types are identified and calculated in accordance with the ERCOT Protocols.

Renewable Energy Credit Trading Program

ERCOT is the designated Program Administrator for the Texas Renewable Energy Credit (REC) Trading Program. By statute, the purchase and sale of RECs is voluntary, except that section 53 of HB 1500 in 2023 provides for the continuation by PUC rule of a mandatory REC program for certain solar RECs through 2025. RECs are awarded to renewable generators based on MWh of energy generated. As REC program administrator, ERCOT tracks the creation of RECs by renewable generators and facilitates the trading of RECs. The REC Trading Program will end on September 1, 2025.

Grid Coordination

Network Modeling Administration & Maintenance

ERCOT's Network Modeling Department receives, processes, and coordinates Market Participant model data. Engineers use cases based on the model to simulate the electric grid for the purpose of Transmission and Resource Planning, Energy and Market Operations, DAM activities, and CRR markets. For Transmission and Resource Planning, two sets of base cases are created each year in coordination with TDSPs. These cases are updated three times each year. Additionally, ERCOT's Network Modeling Department builds the base cases used for system protection and Geomagnetic Disturbance studies. A separate process produces weekly cases for energy and market operations and the DAM. The CRR market relies on monthly and annual cases that are produced in another process. Information for all these models is drawn from the Network Model Maintenance System (NMMS), which is maintained and validated by ERCOT staff.

Outage Coordination

ERCOT Outage Coordinators are primarily responsible for determining whether transmission and Resource Outages required for maintenance and operational reasons can be taken without compromising system reliability.

ERCOT receives and processes more than 100,000 Outage requests annually in accordance with ERCOT Protocols and procedures and NERC Reliability Standards. Various daily, internal reports developed by ERCOT Outage Coordinators are used by other ERCOT departments for planning and forecasting purposes. In processing an Outage request, ERCOT Outage Coordinators determine whether the Outage request contains all the required information; conduct appropriate security analysis studies of the ERCOT System for the relevant timeframe; approve, reject, accept, or withdraw the Outage request; and may re-coordinate the Outage, as necessary. If an Outage is determined to potentially cause a reliability issue, ERCOT Outage Coordinators will work with the necessary Market Participants to develop a mitigation plan to help ensure reliability within the ERCOT Region.

Resource Integration

The goal of ERCOT's Resource Integration Department is to provide non-discriminatory, open access to the transmission system, while maintaining the reliability of the ERCOT System. All newly proposed generation projects 1 MW and larger that connect to the ERCOT System are required to go through the ERCOT generation interconnection process, which facilitates the interconnection of new generation in the ERCOT Region by ensuring appropriate studies are conducted. ERCOT's Resource Integration Department performs feasibility studies (*i.e.*, security screening studies) for each new generation project as required under 16 TAC § 25.198. The Resource Integration Department also coordinates subsequent studies by TSPs as the interconnection process progresses for each generation project.

System Planning and Weatherization

Transmission Planning

Transmission Planning is one of ERCOT's core responsibilities, directly satisfying PURA section 39.151's requirements to maintain the reliability and adequacy of the ERCOT System. ERCOT is the only NERC-registered Planning Coordinator for the ERCOT interconnection. The key responsibilities for ERCOT's Transmission Planning Department include:

- Developing the annual Regional Transmission Plan;
- Undertaking Regional Planning Group (RPG) reviews;
- Developing ERCOT's Long-Term System Assessment; and
- Ensuring NERC Compliance.

ERCOT develops the annual Regional Transmission Plan in conjunction with TDSPs and the RPG. The plan identifies region-wide transmission needs and the planned improvements to meet those needs for the upcoming six (6) years. The ERCOT System is evaluated to determine transmission system improvements required to meet NERC and ERCOT reliability standards, as well as improvements to lower the overall cost of serving Demand in the ERCOT Region.

The RPG provides the primary forum for discussion, input, and comment on system planning issues and is led by ERCOT. The RPG allows members to review and comment on all major transmission projects.

ERCOT Protocols define the four levels (or "tiers") for which a transmission project is classified. Except for minor transmission projects that have only localized impacts, and projects that are directly associated with the interconnection of new generation, all transmission projects in the ERCOT Region undergo a formal review by the RPG to ensure an open and fair transmission planning process. This formal review process is facilitated by ERCOT and provides an opportunity for any interested party to comment or ask questions about proposed projects. For more expensive and projects or for projects that require a PUC-issued certificate of convenience of necessity, ERCOT's Transmission Planning Department performs an independent analysis of the need. The affirmative result of this review is formal endorsement of the project by ERCOT. Finally, the highest-tiered projects require additional endorsement by the ERCOT Board of Directors. Project endorsements are intended to support, to the extent applicable, a finding by the Commission that a project is necessary for the service, accommodation, convenience, or safety of the public within the meaning of PURA § 37.056 and 16 TAC § 25.101.

In each even-numbered year, ERCOT investigates the longer-term transmission needs of the ERCOT System in the Long-Term System Assessment (LTSA). This scenario-driven assessment looks 10 or more years into the future to see what transmission projects may be needed, and to assess the cost-effectiveness of larger projects in lieu of numerous smaller projects.

Resource Adequacy

ERCOT's Resource Adequacy Department is responsible for collecting and maintaining data and formulating reports and studies necessary to assess the adequacy of Resources in the ERCOT System, including:

- The Capacity, Demand and Reserves (CDR) reports, which are produced twice each year to document the derivation of annual Planning Reserve Margins (PRM) for the next 10 years;
- Monthly Outlook for Resource Adequacy (MORA) reports, which assess the likelihood of reserve deficiencies two months in advance;
- Special studies related to Resource adequacy (*e.g.*, analyses of the impact of new EPA regulations, natural-gas availability, or drought);
- Reserve margin criteria studies based on loss of Load analyses for determining the appropriate minimum reserve margin to meet established reliability standards;
- Monthly reports on the status of planned generation projects for which ERCOT interconnection requests have been made; and
- Information regarding Generation Resource, Load, and transmission planning data in the ERCOT System to assist NERC in developing its annual and seasonal reliability assessments.

Load Forecasting & Analysis

ERCOT's Load Forecasting and Analysis Department performs several functions that support overall grid planning and operations. These functions include:

- Load Forecasting – ERCOT uses econometric and neural network techniques to forecast Load based on historical observations of Load and weather and forecasted conditions for each Weather Zone.
    - The Long-Term Load Forecast is prepared annually covering the next 10 years.
    - The Mid-Term Load Forecast is prepared hourly for the next 7 days.
    - The Short-Term Load Forecast is prepared every 5 minutes for the next hour.
- Load Profiling – Load Profiles, created for use in the Settlement process, represent the estimated allocation of a Customer's actual energy use over 15-minute Settlement Intervals. The Load Forecasting and Analysis Department also works with stakeholders on the review process for Load Profiling.

Meteorology – ERCOT's meteorologist provides forecasts of weather patterns in the near term and long term. ERCOT's Load Forecasting and Analysis Department also monitors drought and lake levels and predicts seasonal outlooks. These services support the preparation of certain Resource adequacy reports and contribute to other reports and forecasting for reliability planning purposes.

Weatherization

ERCOT performs several important functions in support of the PUC's weatherization rule, 16 TAC § 25.55, which establishes summer and winter weatherization requirements for Generation Entities and TSPs.

Most importantly, ERCOT conducts inspections to evaluate whether Generation Entities and TSPs are complying with the rule's weatherization standards. These inspections include in-person facility visits and review of appropriate documentation. If the inspection reveals a potential violation of the rule's weatherization requirements, ERCOT provides an appropriate cure period for remediating the issue. If the Generation Entity or TSP fails to address the issue within the cure period, ERCOT must report the entity to PUC Staff. ERCOT also has responsibilities under the rule to notify Generation Entities and TSPs whose facilities may experience repeated or major weather-related failures so that the entity can contract with a qualified professional engineer to assess the entity's weather-related preparation measures and operations.

ERCOT also evaluates the declarations of weather preparedness that each entity is required by the rule to submit to ERCOT by June 1 (summer) and December 1 (winter) each year. The declaration must describe the activities undertaken by the entity in preparation for the upcoming season. ERCOT submits a report to the PUC identifying each entity that fails to correctly submit a declaration. Ahead of each summer and winter season, ERCOT also conducts workshops to review the PUC's weatherization rule and ERCOT's checklists for evaluating facility weatherization.

Finally, ERCOT conducts a study of historical weather data at least once every five years to inform the weatherization standards established in the rule.

Compliance

The ERCOT Compliance Department is responsible for preparing and maintaining ERCOT compliance with its reliability and security obligations to FERC, NERC, and the PUC.

ERCOT's role in reliability oversight matters is linked to the following:

- The obligation to maintain reliability involves real-time monitoring of Protocol compliance as part of its Real-Time operations function;
- Support obligations for the reliability- and market-oversight functions of the PUC and the Independent Market Monitor (IMM);
- Oversight of Market Participant performance metrics under the ERCOT Protocols;
- Reporting obligations under the NERC Reliability Standards;
- Investigations related to NERC Compliance Monitoring and Enforcement Program proceedings and obligation to respond to NERC inquiries related to such matters;
- Investigation and reporting obligations under the NERC Events Analysis Program;
- Investigation and reporting obligations under the DOE requirement to report electric system emergencies and disturbances; and
- Investigations related to direct FERC oversight of reliability matters and obligation to respond to FERC inquiries related to such matters.

PUC Compliance

Consistent with PURA, the PUC Substantive Rules require ERCOT to maintain the reliability of the electric grid. In addition to this general obligation, ERCOT supports the PUC's reliability-oversight function. 16 TAC § 25.503 governs the Commission's oversight functions, which include markets and reliability. In addition to market oversight, 16 TAC § 25.503(a)(9) establishes that ERCOT shall have a role in overseeing compliance with reliability-related rules (*e.g.*, Protocols and Operating Guides) in the ERCOT Region. 16 TAC § 25.503(j) sets forth ERCOT's role in enforcing operating standards. In this role, ERCOT is required to maintain records of all instances of material noncompliance. Additionally, ERCOT must provide information to, and cooperate with, the designated reliability monitor.

Section 8 of the ERCOT Protocols establishes performance metrics for certain reliability and market services. ERCOT is responsible for monitoring compliance with these metrics and reporting violations to the PUC. ERCOT's administration of Section 8 necessarily requires interaction with third parties to investigate performance metric issues and provides ERCOT discretion for requesting corrective action plans and relevant disqualification or suspension based on performance and investigations.

NERC Compliance & Monitoring

ERCOT is registered with NERC to serve in the following capacities:

- Reliability Coordinator (RC);
- Balancing Authority (BA);
- Planning Coordinator (PC);
- Resource Planner (RP);
- Transmission Service Planner (TSP); and
- Transmission Operator through Coordinated Functional Registrations (TOP CFR).

ERCOT adheres to the NERC Reliability Standards and demonstrates compliance as outlined in the NERC Rules of Procedure and the NERC Compliance, Monitoring, and Enforcement Program (CMEP). Compliance and Monitoring includes:

- Scheduled audits;
- Spot checks;
- Self-reporting;
- Event analyses;
- Self-certification;
- Enforcement program and Settlements;
- Requests for Information (RFIs);
- Compliance Investigations;
- Organization registration and certification; and
- Reliability readiness evaluation and improvement.

Reliability Monitor

ERCOT serves as the PUC-designated Reliability Monitor for the ERCOT region. ERCOT has established an independent unit to manage these functions called the "ERCOT Reliability Monitor (ERM)." The ERM monitors and investigates instances of potential non-compliance with PUC and ERCOT rules impacting grid reliability. If the ERM determines that an entity has violated PUC or ERCOT rules, it will refer the entity to the PUC for enforcement.

Attachment F

Risk Management Plan

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Attachment G

Crisis Communications Procedures

Crisis Communications: Principles, Roles & Responsibilities

Implementation of Crisis Communications Activities

The VP of Public Affairs will coordinate with the Executive Team to begin and end Crisis Communications Team activities.

Executive Alignment Process

At the beginning of Crisis Communications Team activities, the Communication Leader for the shift (see "Roles & Responsibilities" section below) will meet with the CEO, Operations, and others as needed to establish the communications cadence for the day, depending on the significance, severity, and anticipated duration of an event. The VP of Public Affairs will then notify the Executive Team of the planned cadence. These meetings will also occur at 8:30 a.m. and 8:30 p.m. each day until the need for team activities is over. If for any reason these meetings do not occur, the cadence on the previous day will be used.

Priority of Crisis Communications Messages

During a crisis, all message development that routinely occurs throughout ERCOT for various key audiences, such as employees and legislators, will be suspended in favor of a centralized process for all audiences. However, internal relationship owners will continue to review and edit all messages. This will prioritize timely and consistent messages across all channels and audiences.

External Resources

At the Communication Leader's direction, the Support Team and Communications Coordinator will develop content and supply key messages for use and distribution to key audiences, including but not limited to legislative, regulatory, news media, the public, and employees.

Message Discipline

ERCOT messages should be clearly aligned with both current and crisis ERCOT communications strategies.

Roles & Responsibilities

These are the communications roles and responsibilities during a crisis event. Each of these roles will rotate to a different group of team members every 12 hours.

The Crisis Communications Teams will ensure that all internal groups are provided key communications material to ensure message consistency for the duration of the issue or crisis. Internal groups, besides the Executive Team, include, but are not limited to, Operations, Compliance, Security, IT, HR, Legislative, Legal, and Regulatory. Those groups, in turn, are responsible for communicating to important external groups, including but not limited to, FERC, NERC, TDEM, PUC, OPUC, RRC, TCEQ, IMM, TRE, and the ERCOT Board of Directors.

Communication Leader
This is the primary communications interface to ERCOT leaders, including the CEO, Operations, HR, and PUC Relations. Ensures that accurate and timely messages are developed, and that the communications cadence is maintained. Responsible for ensuring key audience communication, including news media, legislators, market participants, and employees through news releases, web updates, news conferences, social media, and other channels.

Media Specialist
Media spokesperson responsible for media inquiry response, interviews, and news conferences. This includes the logistics of hosting news conferences or briefings by phone/video.

Communication Coordinator
Document and triage all incoming media inquiries. Develop key messages, draft news releases, provide updates, and write answers to frequently asked questions. Responsible for all approvals prior to releases/updates.

Legislative Liaison
Responsible for identifying critical information, setting up and hosting conference calls with Texas elected leaders, Texas legislative leadership/ committees/members, and Congressional delegation and staff, responding to specific requests, and summarizing areas of concern/needs. This position will closely coordinate with PUC Relations.

Web Communicator
Responsible for all internet site posts/changes, mobile app updates, and social media updates/posts. Review real-time analytics and website searches to decide placement of information and identify future communications needs.

Support Team
Communications team employees or outside contractors will provide content as needed with approval of the Communication Leader. They will provide the majority of legislative/regulatory one pagers as well as in depth situation and media analysis, white papers, and development of all anticipated media content.

Client Services
Provide support for Market Participants. Public exposure to calls will be minimized by having Client Services provide data and information to the crisis team about questions and comments being received.

Crisis Communications Team Assignments
At the launch of the Crisis Communications activities, the Public Affairs department will be divided into three teams, each with assigned responsibilities and assigned work times. The teams and work times will not change during the event, except for substitutions.

ERCOT Comms Crisis Team

December 18, 2024

Team A, which works from 8 a.m. to 8 p.m., is primarily responsible for communicating to key audiences, including but not limited to, news media, market participants, elected officials, and employees. This team executes the strategy/documents/distribution planned by Team B.

Team A	
Leader	Gilbert Hughes
Media Specialist	Christy Penders
Communications Coordinator	Julie House
Support Team	Charlotte Schuster
Web	Amy Lofton
Client Services	Ted Hailu
Legislative	Oscar Garza

Team B, which works from 8 p.m. to 8 a.m., is primarily responsible for developing the materials needed the following day for Team A, as well as data analysis to support a strategic communications plan recommendation.

Team B	
Leader	Mark Miner
Media Specialist	Trudi Webster
Communications Coordinator	Olga Finneran
Support Team	Penney Christian
Web	Priyanka Parthasarathy
Client Services	Art Deller
Legislative	Zach Tufenkjian

Team C members are "on call" to occasionally assist Team A, but they are primarily responsible for remaining ready to substitute for other members of the team during an extended event to allow those members to rest.

Team C	
Communications Coordinator	Position to be filled soon
Support Team	Shad Chancey
Web	Olha Lyakhovets
Client Services	Debbie Lightener

ERCOT Comms External Cadence

During a crisis event, frequent communication is critical both internally and externally. While ERCOT representatives will have ongoing communications with the internal priority communications groups, ERCOT must also engage the news media and other stakeholders as a primary way to help inform Texans of a grid event, and the actions they need to take to stay safe.

ERCOT will provide regular updates through news releases, social media, and other communications channels. Media briefings will be hosted as needed. The frequency of communications is subject to change based on a number of factors, including input from the PUC, TDEM, Governor's Office, and severity of the event.

Attachment H

Assessment of Reliability and Adequacy of the ERCOT System during Extremely Cold or Extremely Hot Weather Conditions

Extreme Weather Reliability Assessment

(H) An assessment of the reliability and adequacy of the ERCOT system during extremely cold or extremely hot weather conditions, including information regarding steps to be taken by power generation companies and utilities to prepare their assets for extreme weather events.

Overview

After the widespread loss of generation during the February 2021 winter storm, the 87th Texas Legislature passed Senate Bill 3, which, among other things, required the Public Utility Commission of Texas (PUC) to establish reliability standards to ensure an adequate supply of electric generation during weather emergencies. In September 2022, the PUC revised 16 Texas Administrative Code (TAC) § 25.55 (the Rule) to establish the second phase of requirements to help provide continuous reliable electric service throughout the winter and summer peak demand seasons. The revised rule requires generation entities and Transmission Service Providers (TSPs), by June 1 and December 1 of each year, to complete specific weather preparations and submit a declaration of weather preparedness (Declaration) summarizing the activities performed to implement weather emergency preparation measures reasonably expected to ensure the sustained operation of all hot/cold weather critical components during summer/winter weather conditions. The rule also contains provisions that required market participants, by June 1 and December 1, 2023, to create lists of hot and cold weather critical components and complete any weather emergency preparation measures in addition to those that had previously been required, that could reasonably be expected to ensure sustained operation at weather zone specific summer and winter conditions established in ERCOT's historical weather study. ERCOT commenced use of a new online weatherization and inspection software portal on May 1, 2024 after a series of Market Participant training sessions held in April. Declarations have now been successfully submitted via this portal during both the May and November periods prescribed by the Rule.

The Rule also requires ERCOT to inspect generation resources and TSP facilities and allows ERCOT to prioritize those inspections based on factors enumerated in the Rule. In June through September of 2024, in accordance with provisions of 16 TAC § 25.55, ERCOT conducted its second summer of weatherization inspections done under the rule. In December 2024 and again in accordance with the Rule requirements, ERCOT started its fourth consecutive year of winter weatherization inspections. ERCOT must inspect, at least once every three years, every generation resource interconnected to the ERCOT power region. Since program inception in December 2021 and by the end of September, 2024 ERCOT had completed more than 1900inspections of generation resources. These included all the generation resources that were fully commissioned prior to June 30, 2024. Newly commissioned resources entered ERCOT in 2024 at a rate close to one resource per week.

ERCOT must also inspect at least ten percent of substations or switchyards providing transmission service at least once every three years. Since program inception in December 2021 and by the end of September, 2024 ERCOT had completed over 990 TSP facility inspections at more than 820 unique substations or switchyards. There are approximately 5,500 substations or switchyards in the system, so nearly 15% or well over the required 10% have been inspected prior to the end of

the first three years. The inspections performed so far confirm that, by and large, the facilities meet the PUC rule requirements.

Winter Weatherization Inspections

In accordance with the Rule, ERCOT prioritizes weatherization inspections utilizing the following criteria:

- For generation resources:
  - Newly commissioned
  - That have not been inspected previously
  - With known or potential weather-related issues during cold weather last winter
  - That provide black start service
  - That provide Firm Fuel Supply service
  - Deemed most critical for system reliability due to their high MW output or having multiple resources at a single site
  - That are nearing a three-year period since their last inspection

- For TSP sites:
  - Deemed most critical for system reliability by ERCOT System Operations
  - From newly registered TSPs
  - With known or potential weather-related issues during cold weather last winter
  - Associated with transmission constraints
  - Length of time since their last inspection
  - With other vulnerabilities related to weather emergency conditions

For all winter inspections, ERCOT's primary objective is to verify each applicable entity conducted the weatherization preparations required by the Rule.

In accordance with that rule, ERCOT's winter inspections of generation resources include the following items:

- Reviewing measures taken to ensure sustained operation of cold weather critical components during winter weather conditions, including:
  - Installation and maintenance of adequate wind breaks for resources susceptible to outages or derates caused by wind
  - Installation and maintenance of insulation and enclosures for all cold weather critical components
  - Inspection of existing thermal insulation and associated forms of waterproofing for damage or degradation, and repair of damaged or degraded insulation and associated forms of waterproofing
  - Arrange and provide for the availability and appropriate safekeeping of sufficient chemicals, auxiliary fuels, and other materials necessary for sustained operations during a winter weather emergency
  - Plan for and maintain the operability of instrument air moisture prevention systems

- Maintenance of freeze protection equipment for all cold weather critical components, including fuel delivery systems controlled by the generation entity, and testing or verifying the functionality of freeze protection equipment prior to and monthly during the winter season
- Monitor all cold weather critical components, including circuitry that provides freeze protection or prevents instrument air moisture
- Implement weather emergency preparation measures in addition to those previously required, that could reasonably be expected to ensure sustained operation of the resource at the 95th percentile minimum average 72-hr wind chill temperature reported in ERCOT's historical weather study, for the weather zone in which the resource is located
- Review the adequacy of staffing plans for a winter weather emergency and revise the staffing plans, as appropriate
- Train relevant operational personnel on winter weather preparations and operations
- Create a list of all cold weather critical components, review the list at least annually prior to the beginning of the winter season, and update the list as necessary.

ERCOT's winter inspections of TSP facilities included the following similar set of items:

- Confirmation of the operability of all systems and subsystems containing all cold weather critical components
- Confirmation the sulfur hexafluoride gas in breakers and metering and other electrical equipment is at the correct pressure and temperature to operate safely during winter weather emergencies, and perform annual maintenance that tests sulfur hexafluoride breaker heaters and supporting circuitry to assure that they are functional
- Confirmation of the operability of power transformers and auto transformers in winter weather emergencies by:
  - Inspecting heaters in the control cabinets
  - Verification that main tank oil levels are appropriate for actual oil temperature
  - Inspecting bushing oil levels
  - Inspecting the nitrogen pressure, if necessary
  - Verification of proper oil quality such that moisture and dissolved gases are within acceptable ranges for winter weather conditions
- Implement weather emergency preparation measures in addition to those previously required, that could reasonably be expected to ensure sustained operation of the TSP's transmission facilities at the 95th percentile minimum average 72-hr wind chill temperature reported in ERCOT's historical weather study, for the weather zone in which the resource is located
- Review the adequacy of staffing plans for a winter weather emergency and revise the staffing plans, as appropriate
- Train relevant operational personnel on winter weather preparations and operations
- Create a list of all cold weather critical components, review the list at least annually prior to the beginning of the winter season, and update the list as necessary.

Summer Weatherization Inspections

In accordance with the Rule, ERCOT prioritizes summer weatherization inspections utilizing the following criteria:

- For generation resources:
  - Newly commissioned
  - That have not been inspected previously
  - With known or potential weather-related issues during hot weather last summer
  - That may have critical cooling systems requiring adequate water supplies
  - Deemed most critical for system reliability due to their high MW output or having multiple resources at a single site
  - That are nearing a three-year period since their last inspection

- For TSP sites:
  - Deemed most critical for system reliability by ERCOT System Operations
  - From newly registered TSPs
  - With known or potential weather-related issues during cold weather last winter
  - Associated with transmission constraints
  - Length of time since their last inspection
  - With other vulnerabilities related to weather emergency conditions.

For all summer inspections, ERCOT's primary objective is to verify each applicable entity conducted the weatherization preparations required by the Rule.

In accordance with that rule, ERCOT's summer inspections of generation resources include the following items:

- Reviewing measures taken to ensure sustained operation of hot weather critical components during summer weather conditions, including:
  - Identification of regulatory and legal limitations of cooling capacity, water withdrawal, maximum discharge temperatures, and rights for additional water supply
  - Arrange and plan for the provision and storage of adequate water supplies for cooling towers, reservoirs, heat exchangers, and adequate cooling capacity of the water supplies used in the cooling towers, reservoirs, and heat exchangers
  - Arrange and plan for the provision and storage of availability and appropriate safekeeping of adequate equipment to remove heat and moisture from all hot weather critical components
  - Arrange and provide for the availability of sufficient chemicals, coolants, auxiliary fuels, and other materials necessary for sustained operations during a summer weather emergency
  - Maintenance of all hot weather critical components, including air flow or cooling systems, and verifying the functionality of all components prior to and on a monthly basis during the summer season

- Implement weather emergency preparation measures in addition to those previously required, that could reasonably be expected to ensure sustained operation of the resource during the greater of the maximum ambient temperature at which the resource has experienced sustained operations or the 95th percentile maximum average 72-hour temperature reported in ERCOT's historical weather study, for the weather zone in which the resource is located
- Review the adequacy of staffing plans for a summer weather emergency and revise the staffing plans, as appropriate
- Train relevant operational personnel on summer weather preparations and operations
- Create a list of all hot weather critical components, review the list at least annually prior to the beginning of the summer season, and update the list as necessary.

ERCOT's summer inspections of TSP facilities included the following similar set of items:

- Implement weather emergency preparation measures that could reasonably be expected to ensure the sustained operation of all hot weather critical components during summer weather conditions. Such measures include, as appropriate for the facility:
  - Inspecting transformer cooling systems prior to and on a monthly basis during the summer season
  - Cleaning transformer cooling systems prior to and on a regular basis during the summer season
  - Verifying proper functioning of cooling fans and pump controls
  - Arrange and provide for the availability of sufficient chemicals, coolants, and other materials necessary for sustained operations during a summer weather emergency
  - Confirmation that sufficient chemicals, coolants, and other materials necessary for sustained operations during a summer weather emergency are protected from heat and drought
- Implement weather emergency preparation measures in addition to those previously required, that could reasonably be expected to ensure sustained operation of the TSP's transmission facilities during the greater of the maximum ambient temperature at which the facility has experienced sustained operations or the 95th percentile maximum average 72-hour temperature reported in ERCOT's historical weather study, for the weather zone in which the facility is located
- Review the adequacy of staffing plans to be used during a summer weather emergency and revise the staffing plans, as appropriate
- Train relevant operational personnel on summer weather preparations and operations
- Create a list of all hot weather critical components, review the list at least annually prior to the beginning of the summer season, and update the list as necessary.

Compliance Reports on Submission of Declarations of Weather Preparedness

Pursuant to the Rule, on June 20 and December 20, 2024, ERCOT filed with the commission a compliance report addressing whether each generation entity and TSP submitted the seasonal Declarations required by the rule. In June, 487 generation entities and 58 TSPs submitted Declarations on time, 13 and 1 respectively were late, and there were none that were required to

submit but failed to do so. In December, 519 generation entities and 54 TSPs submitted Declarations on time, 9 and 3 respectively were late, and there were none that were required to submit but failed to do so.

Conclusion

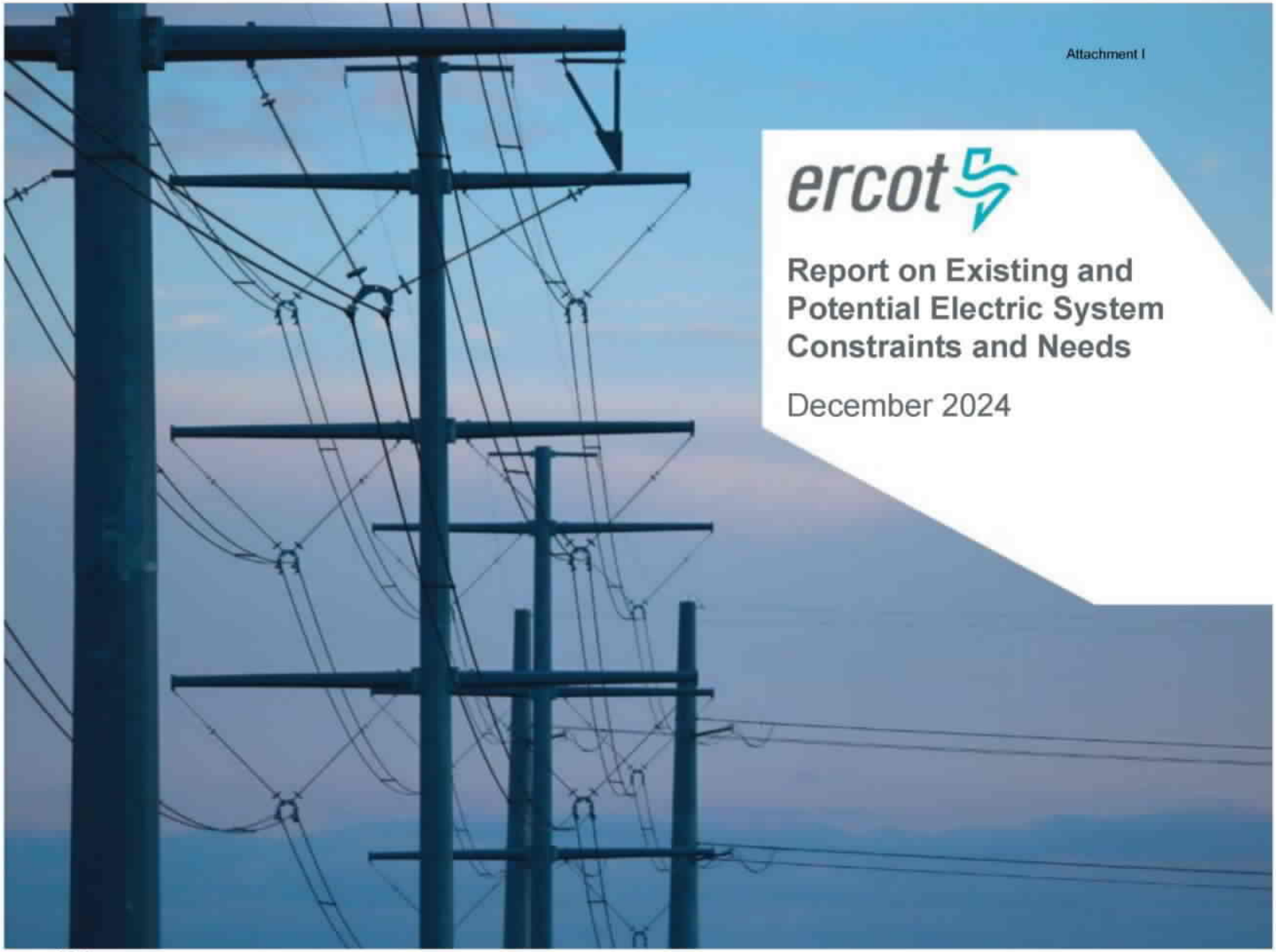
ERCOT uses a probabilistic capacity reserve risk model to determine the overall probability that energy emergency alerts will need to be declared for the peak load day during a given future month. The model accounts for a range of weather conditions including severe winter storm events. The model is used to develop the risk assessments reported in each Monthly Outlook for Resource Adequacy (MORA) report. The monthly risk assessments include scenario analysis focusing on winter storm events and periods with low wind generation. Future MORA reports will address summer 2025 generation capacity and reserve levels.

Because ERCOT's weatherization inspections are necessarily limited in scope, ERCOT has no opinion on whether the measures taken by any generation entity or TSP to meet the revised 16 TAC § 25.55 requirements suffice to prevent any outage of the generation resource or transmission facility during extreme weather conditions.

However, ERCOT's review of submitted Declarations and its inspections of generation resources and transmission facilities suggest generation entities and TSPs have taken significant steps to weatherize electric grid infrastructure. ERCOT expects that, in the aggregate, the bulk electric system is equipped to withstand extreme conditions.

Attachment I

Report on Existing and Potential Electric System Constraints and Needs



Attachment I

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Report on Existing and Potential Electric System Constraints and Needs

December 2024

Key Takeaways

ERCOT developed the **Permian Basin Reliability Plan Study** and filed it with the Public Utility Commission of Texas (PUCT) in July 2024. The plan identified both local transmission needs and imports needs, which included 345-kV, 500-kV, and **765-kV** import path options. PUCT issued an order approving the plan in October 2024. The PUCT will make a decision on use of 765-kV on a statewide basis by May 1, 2025.

The 2024 Regional Transmission Plan (RTP) developed both the traditional 345-kV plan and the **765-kV** plan to facilitate the statewide decision on Permian Basin Reliability Plan import path voltage level at the PUCT. ERCOT plans to file the comparison between the 345-kV plan and the 765-kV plan with the PUCT in January 2025.

House Bill (HB) 5066 (88th Leg.) introduced a new requirement to consider loads for which the electric utility has yet to sign an interconnection agreement, as determined by the electric utility responsible for serving the load. The unprecedented load growth and this new requirement resulted in more than **50 GW of additional forecasted load** (including large loads) incorporated in the 2024 RTP. This new view shows unprecedented and rapid load growth, which is creating **new challenges and opportunities** for the ERCOT System.

The ERCOT System continues to evolve with significant **load growth**, increased thermal generation **retirement**, rapid growth in transmission-connected **wind**, **solar** and **energy storage** development, and distributed generation. ERCOT is critically evaluating planning processes and pursuing changes necessary to meet challenges associated with the **evolving grid**.

Table of Contents

About ERCOT Transmission Planning

ERCOT supervises and exercises comprehensive independent authority over the planning of transmission projects for the ERCOT System as outlined in the Public Utility Regulatory Act (PURA) and PUCT rules. PUCT rules further require ERCOT to evaluate and make a recommendation to the PUCT as to the need for any transmission facility over which ERCOT has comprehensive transmission planning authority.

ERCOT examines the need for proposed transmission projects based on ERCOT planning criteria and North American Electric Reliability Corporation (NERC) Reliability Standards. Once a project need has been identified, ERCOT evaluates project alternatives based on cost-effectiveness, long-term system needs, and other factors.

The ERCOT Protocols and Planning Guide describe the practices and procedures through which ERCOT meets its requirements related to system planning under PURA, PUCT rules, and NERC Reliability Standards.

ERCOT annually performs a planning assessment of the ERCOT Transmission Grid that is primarily based on two sets of studies:

- The Regional Transmission Plan (RTP) addresses region-wide reliability and economic transmission needs and includes the recommendation of specific planned improvements to meet those needs for the upcoming six years. The public version of the 2024 RTP report is posted on the ERCOT website at: https://www.ercot.com/gridinfo/planning.
- Stability studies are performed to assess the angular stability, voltage stability, and frequency response of the ERCOT System. Due to the security-related sensitive nature of the information contained in these study reports, they are not published on the ERCOT website.

ERCOT also conducts the biennial Long-Term System Assessment (LTSA) and the first biennial Grid Reliability and Resiliency Assessment (GRRA), which are completed in even-numbered years. The LTSA uses scenario-analysis techniques to assess the potential needs of the ERCOT System up to 15 years into the future. The role of the LTSA is to guide near-term planning decisions by providing a longer-term view of system reliability and economic needs. The GRRA assesses the system needs based on the resiliency criteria. The 2024 LTSA and GRRA reports are posted on the ERCOT website at: https://www.ercot.com/gridinfo/planning.

Recent Constraints

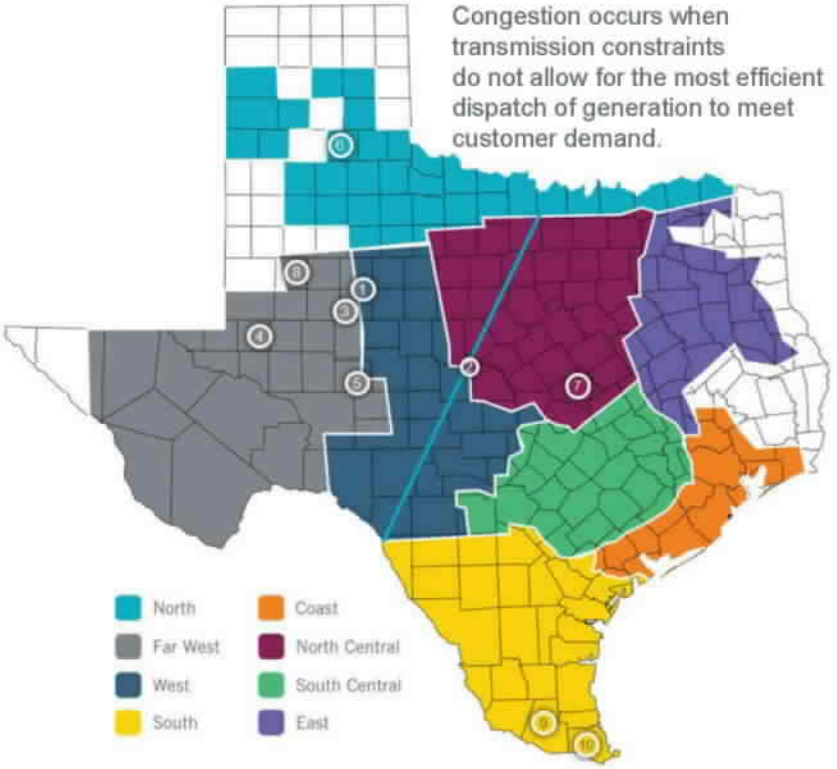
Top 10 constraints on the ERCOT System

Oct. 2023 to Nov. 2024, based on real-time data

Map	Monitored Element of Constraint	Congestion Rent*	Outage Related ?
1	Tonkawa Switch - Morgan Creek SES 345kV	$156M	
2	West Texas Export Interface	$148M	
3	Morgan Creek SES - Navigation Sub 138kV	$79M	
4	Odessa EHV Switch - Yarbrough Sub 138kV	$57M	Planned Outages
5	Hargrove - Twin Buttes 138kV	$55M	Planned and Forced Outages
6	Panhandle Interface	$49M	
7	Bell County - Salado Switch 138kV	$48M	
8	Lamesa - Jim Payne Poi 138kV	$46M	Planned Outages
9	North Edinburg to Lobo interface	$45M	
10	Burns Sub - Rio Hondo 138kV	$33M	

*Congestion rent indicates areas of the system where economic transmission projects may be beneficial. It is not an indication of whether a project to reduce specific congestion would or would not meet the ERCOT economic planning criteria.

Congestion occurs when transmission constraints do not allow for the most efficient dispatch of generation to meet customer demand.

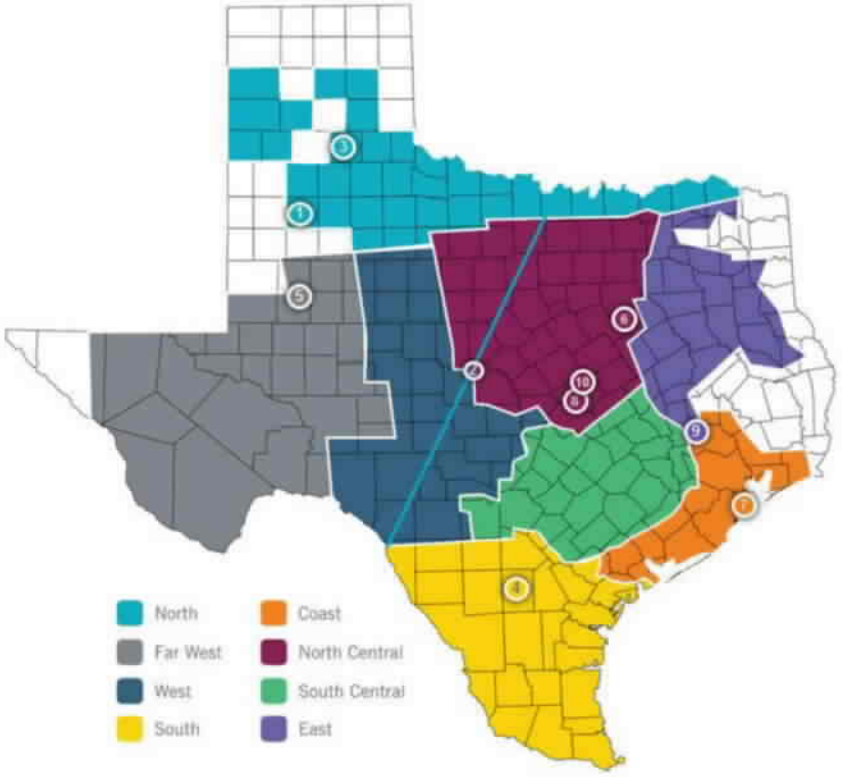


Projected Constraints

Top 10 projected constraints on the ERCOT System for 2026 and 2029

Based on economic analysis conducted for the 2024 RTP

Map	Constraint	Congestion Rent*	
		2026	2029
1	MacKenzie Substation - Northeast Substation 115-kV Line	$15M	$181M
2	West Texas Export Interface	$178M	$49M
3	Panhandle Interface	$139M	$100M
4	Fowlerton - Tilden 138 Sub 138-kV Line	$108M	$19M
5	Farmland - Wett Long Draw 345-kV Line	$19M	$64M
6	Navarro - Richland 69-kV Line**	$62M	-
7	Meadow - PH Robinson 345-kV Line	$54M	$42M
8	Stagecoach - Killeen Elm 138-kV Line	$49M	$24M
9	North - Houston Interface	$46M	$34M
10	Temple North - Pepper Creek Switch 138-kV Line	-	$40M



*Congestion rent indicates areas of the system where economic transmission projects may be beneficial. It is not an indication of whether a project to reduce specific congestion would or would not meet the ERCOT economic planning criteria. Planned transmission outages were not included in the analysis.
**A placeholder RTP proposed project (2023-NC39) was recommended in 2023 RTP to resolve the reliability issue on Navarro - Richland 69-kV Line in 2028.

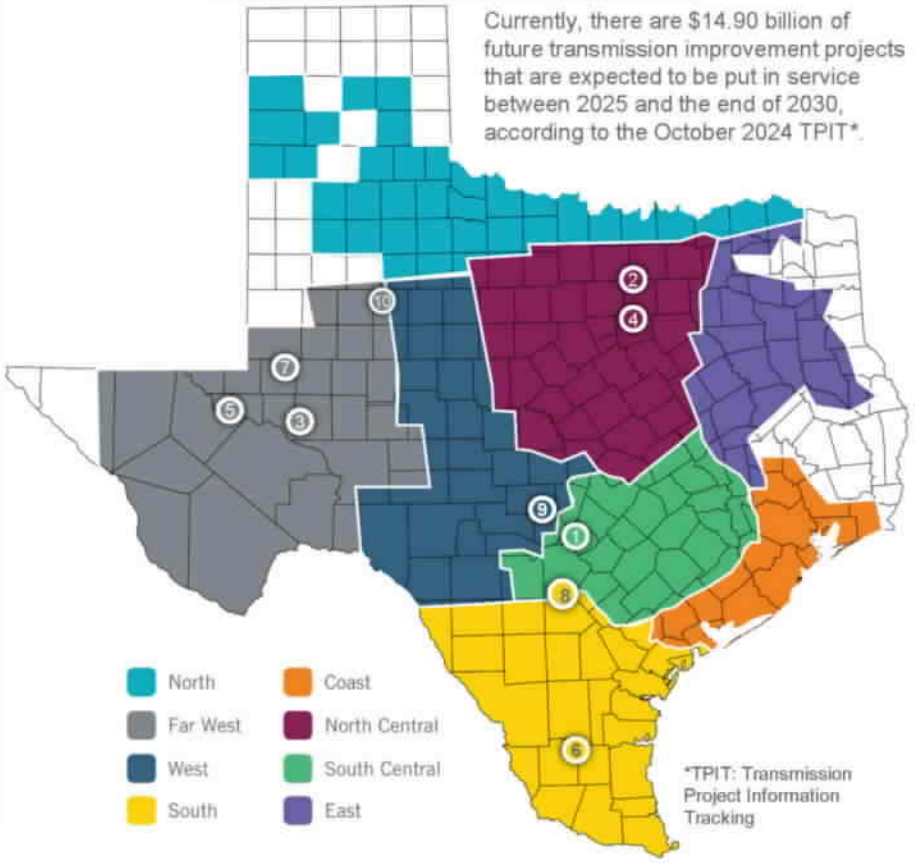
Planned Improvements

Top 10 significant improvements on the ERCOT System

Projects planned for completion within the next six years

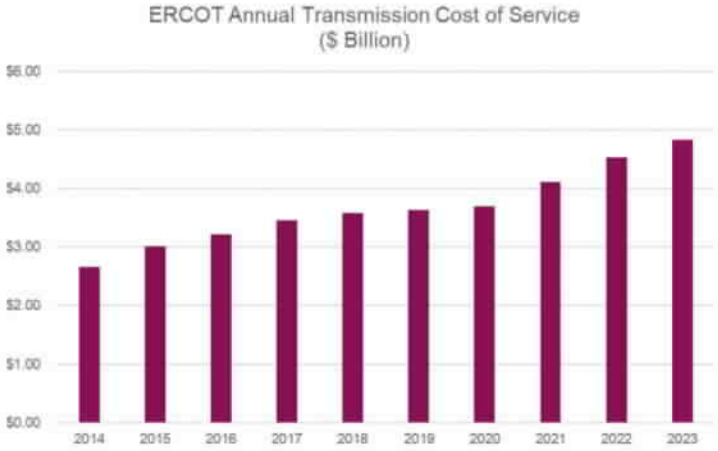
Map	Transmission Improvement	In-Service
1	Hays Energy - Kendall Corridor Transmission Line Rehabilitation Projects	2025
2	Roanoke Area Upgrades Project	2025
3	Bearkat - North McCamey - Sand Lake 345-kV Transmission Line Addition Project	2026
4	Arlington Reliability Enhancement Project	2026
5	Pecos County Transmission Improvement Project	2026
	Silverleaf and Cowpen 345/138-kV Stations Project	2027
6	Lower Rio Grande Valley System Enhancement Project	2027
7	Synchronous Condenser Project	2027
	West Texas Synchronous Condenser Project	2027
	Bakersfield Dynamic Reactive Substation Upgrade	2027
8	San Antonio South Reliability Project	2027
	San Antonio South Reliability II Project	2029
9	Temple Area Project	2028
10	West Texas 345-kV Infrastructure Rebuild Project	2028

Currently, there are $14.90 billion of future transmission improvement projects that are expected to be put in service between 2025 and the end of 2030, according to the October 2024 TPIT*.

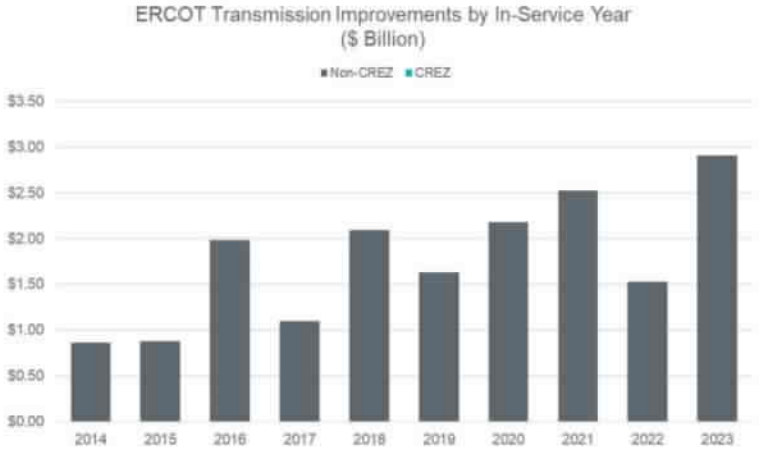


*TPIT: Transmission Project Information Tracking

Transmission Investment Trend



For the ERCOT Region, the total Transmission Cost of Service[1] (TCOS), which reflects investment in transmission improvements, has increased in the past several years along with TCOS per MWh.[2]



1. TCOS values are based on ERCOT's Yearly Wholesale Transmission Service Charges filed with PUCT
2. Total MWh Energy Use values are based on ERCOT's Demand and Energy Report published in ERCOT Market Information System (MIS)

The Changing Grid – Generation

> 7,300 MW

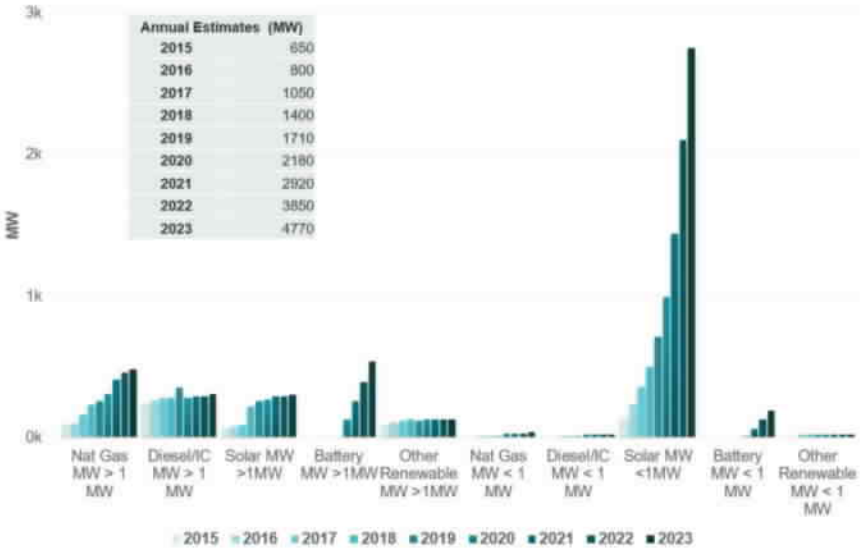
Thermal Generation Retirements (2018-2023)

- ERCOT continues to experience a rapid shift in the type and location of generation available to serve demand.
- Robust growth of inverter-based resources (IBR) has continued. More than 102 GW of transmission-connected wind, solar, and battery energy storage capacity is expected to be installed by the end of 2025. Total IBR capacity has the potential to exceed 140 GW in 2027.
- Over 7,300 MW of coal and natural gas generation has retired since 2018.
- The change in generation mix has also resulted in increased distance between generation sites and demand centers. Retired coal and gas generation were closer to large cities, whereas the most abundant wind and solar resources tend to be in more distant locations.

The Changing Grid – Distributed Generation (DG)

- ERCOT continues to improve DG integration processes under increasing DG penetration.
  - Distribution Generation Resource (DGR) and Settlement Only Distribution Generator (SODG) modeling processes are largely finalized, and these facilities are explicitly included in the Steady State Working Group (SSWG) and Dynamics Working Group (DWG) cases.
  - HB3390 introduced a requirement for Transmission Distribution Service Providers (TDSPs) to provide unregistered DG information to ERCOT via their Transmission Service Providers (TSPs). ERCOT is currently working on a Nodal Protocol Revision Request (NPRR) and associated Revision Requests to establish processes for collecting data from TDSPs and explicitly modeling aggregated unregistered DG (e.g., residential rooftop solar).

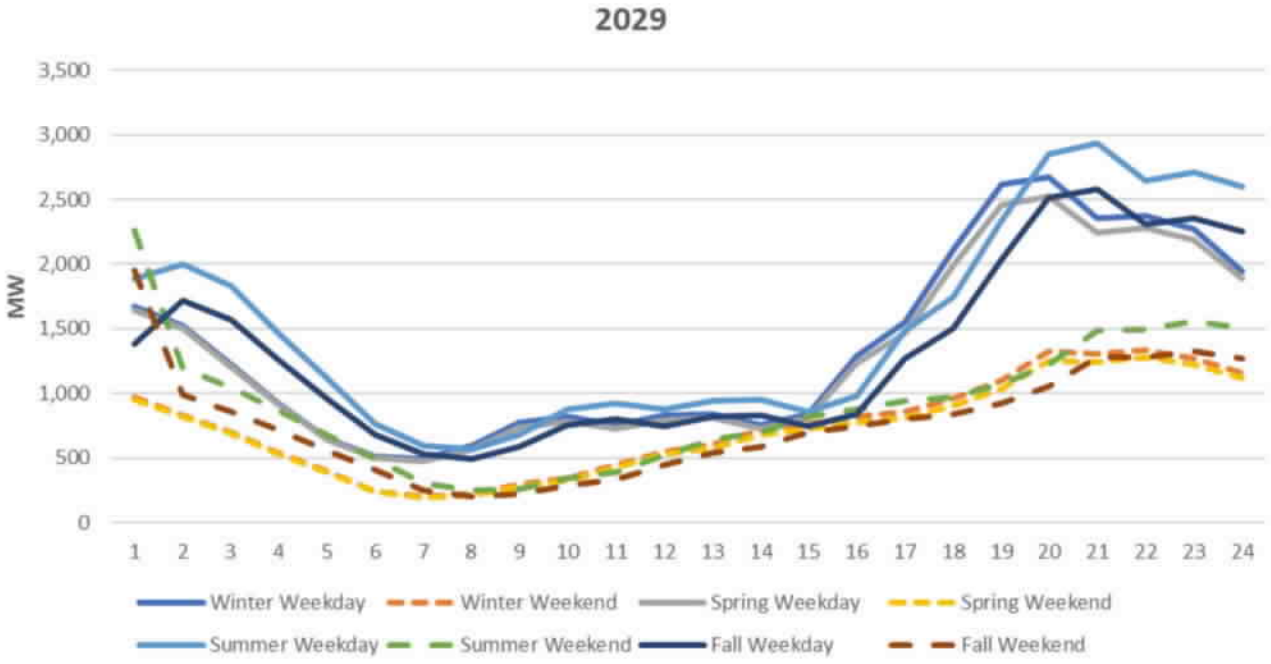
ERCOT Estimated Total DG Growth 2015-2023 (MW)



- Projects are in process at NERC to incorporate Distributed Energy Resources (DER) into relevant Reliability Standards (MOD-032, TPL-001, FAC-001/002, MOD-031) and SARs being proposed for others (PRC-006, EOP-004, EOP-005).
- ERCOT participates in the NERC System Planning Impacts from Distributed Energy Resources Working Group (SPIDERWG), which has published several Reliability Guidelines, White Papers, and Technical Reference documents to facilitate transmission planning, modeling, and analysis under increasing DER penetrations.

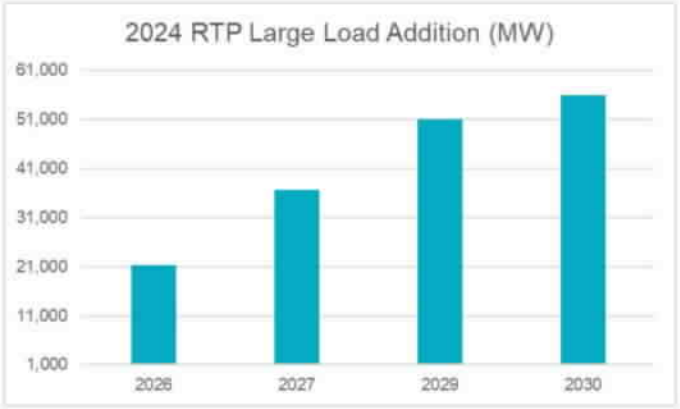
The Changing Grid – Electrical Vehicles (EV)

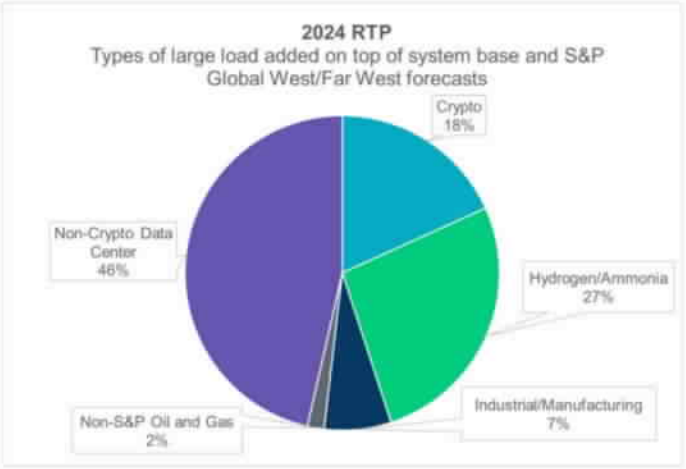
- The EV load impacts are incorporated into the ERCOT 2024 near-term and long-term Transmission Planning assessment (RTP and LTSA) using the methodology developed by the Brattle Group.
  - By 2039 the total number of EV is estimated to be 6.44 million with the total energy consumption of 46 terawatt hours (TWh).



The Changing Grid – Demand*

- HB5066 (88th Leg.) introduced a new requirement to consider loads for which the electric utility has yet to sign an interconnection agreement, as determined by the electric utility responsible for serving the load.
- This new requirement and the unprecedented economic growth in Texas resulted in more than 50 GW of additional forecasted load (including large loads) incorporated in the 2024 RTP.
- Most of the large loads are concentrated in certain areas of the system and are expected to maintain constant electricity consumptions regardless of season, day, or time.



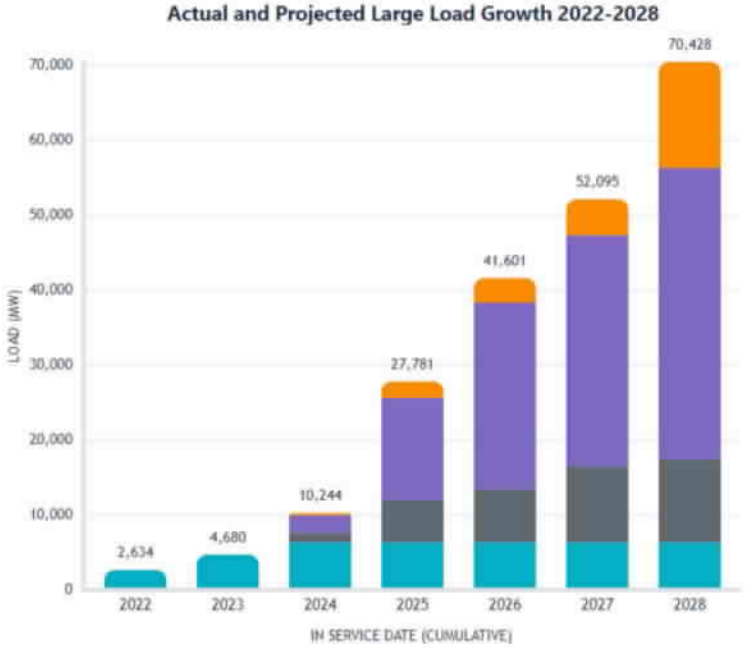


*All information is as of May 2024 and based on the 2024 RTP.

The Changing Grid – Interconnection of Large Loads*

- ERCOT continues to track nearly 70.5 GW of large load interconnection requests.
- 6,297 MW approved to energize since January 2022.
- The interim large load interconnection process, developed in 2022 to reliably integrate these load additions in a timely manner, continues to be used pending the approval of large load Revision Requests.
- ERCOT has proposed NPRR1234 and PGRR115 to formalize the interconnection process for large loads and establish operational standards to maintain reliability.
- ERCOT continues to work with stakeholders to address the challenges associated with the unprecedented volume and characteristics of the current large load interconnection request.

Project Status	2022	2023	2024	2025	2026	2027	2028
No Studies Submitted	-	-	300	2,170	3,295	4,805	14,202
Under ERCOT Review	-	-	2,391	13,620	24,901	30,825	38,802
Planning Studies Approved	-	-	1,256	5,694	7,108	10,168	11,127
Approved to Energize	2,634	4,680	6,297	6,297	6,297	6,297	6,297
Total (MW)	**2,634**	**4,680**	**10,244**	**27,781**	**41,601**	**52,095**	**70,428**



*All information is as of December 11, 2024.

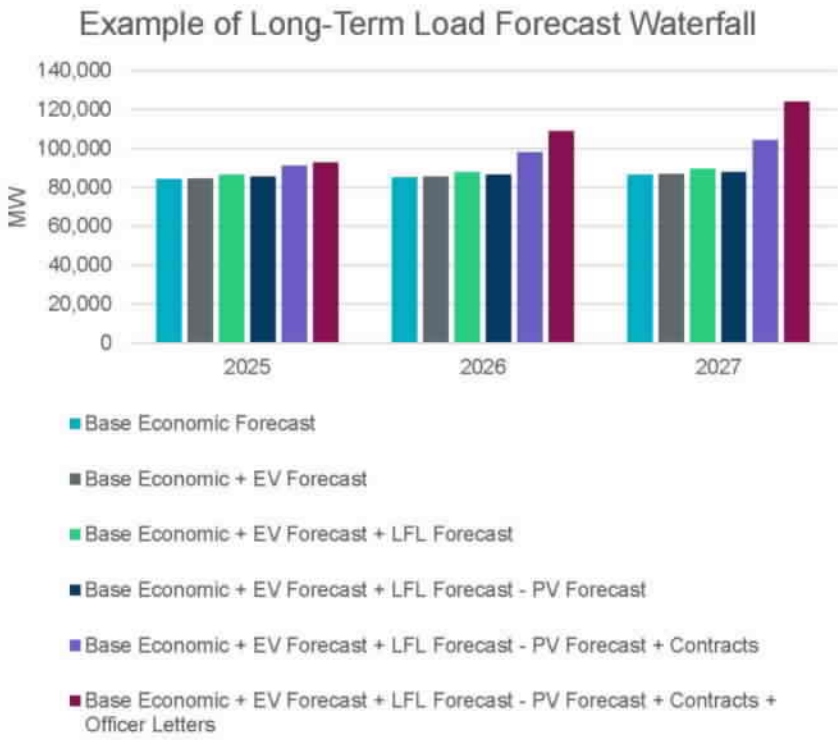
- **Approved to Energize** – Projects that have received Approval to Energize from ERCOT Operations. NOTE: not all MWs in this category have been observed to be operational.
- **Planning Studies Approved** – Projects that have received ERCOT approval of required interconnection studies. Any MWs that were not approved are reclassified as No Studies Submitted.

Under ERCOT Review – Projects that have studies under review by ERCOT.

No Studies Submitted – Projects that are tracked by ERCOT but that have not yet provided sufficient information for ERCOT to begin review. Additionally, MWs that were not approved by ERCOT after review of planning studies are included in this category until a path to interconnect these MWs is identified, or the customer cancels the interconnection request.

2024 Long-Term Load Forecast

- ERCOT expanded the scope of the 2024 Long-Term Load Forecast (LTLF) to incorporate additional new large loads without a signed contract with their TSP or DSP, but with a TSP or DSP officer letter.
- ERCOT adopted the waterfall methodology in the 2024 (LTLF):
  - To expand ERCOT's ability to provide forecasts for more scenarios.
  - To avoid double counting load by reconstitution.
  - To allow more visibility of peak load shifts.
  - To increase transparency.
- The waterfall methodology is comprised of:
  - Base (econometric model) forecast.
  - Roof-top PV forecast.
  - EV forecast, Large Flexible Load (LFL) forecast.
  - Large loads substantiated by signed contract or TSP officer letters.



LTLF = Base Economic Forecast + EV Forecast + LFL Forecast – PV Forecast + Contracted Loads + Officer Letter Loads

Permian Basin Reliability Plan

- In May 2023, the HB5066 was adopted requiring the PUCT to direct ERCOT to develop a reliability plan identifying the transmission upgrades which are needed to serve the existing and future load in the Permian Basin region.
- On December 14, 2023, the PUCT issued an order directing ERCOT to develop the Permian Basin Reliability Plan and to file the reliability plan with the PUCT by July 2024.
- ERCOT began development of the Permian Basin Reliability Plan in January 2024 for year of 2030 and 2038 (peak load of 2039 was studied) with substantial review and input from TDSPs and other stakeholders in the ERCOT Region through the Regional Planning Group (RPG).

	2019 Delaware Basin Study	2021 Permian Basin Study 2030 Case	2023 RTP Study 2029 Case	Permian Basin Reliability Plan 2030 Case	Permian Basin Reliability Plan 2038 Case
Permian Basin Total Load (MW)	9,771	10,527	16,577	23,659	26,400
Permian Basin Oil & Gas Load* (MW)	9,771	10,527	12,341	11,964	14,705
Additional Non-oil & Gas Load (MW)	0	0	4,236	11,695	11,695

* The Permian Basin oil & gas load from the S&P Global Permian Basin study includes residential and commercial load.

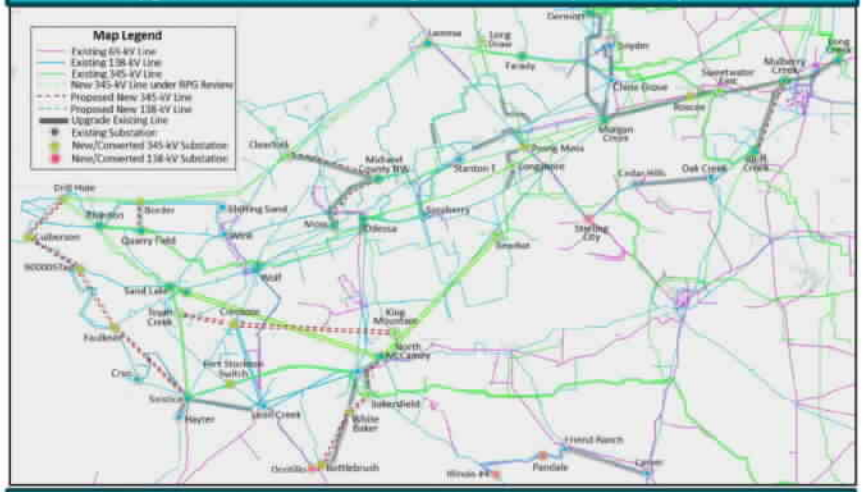
- In identifying the transmission needs, ERCOT divided the proposed transmission upgrades into two categories: local transmission upgrades and import paths. For the import paths, ERCOT evaluated three mutually exclusive options: 345-kV, 500-kV, and 765-kV.
- Cost Estimates: Total cost estimates are approximately $12.95 billion for 345-kV option and $13.77 billion for 765-kV option in 2038.
- PUCT approved the Permian Basin Reliability Plan in September 2024.
  - Approval of all the common local projects that are required to serve the ERCOT Region through 2038, irrespective of the voltage level that the PUCT approves for the import paths.
  - Authorization for TSPs to prepare Certificate of Convenience and Necessity (CCN) applications for all eight import paths, which include three 765-kV import paths and five 345-kV import paths.
  - ERCOT must work with the TSPs preparing the CCN applications for the eight import paths to identify the import paths that will be needed to serve load in 2030 so that the preparation of those CCN applications is prioritized by the applicable TSPs.
  - Authorization to file the CCN applications for the eight import paths is subject to the PUCT's decision on import path voltage level on a statewide basis by May 1, 2025.

	2038	
	345-kV Option	765-KV Option
Common Local Upgrades	4.02	4.02
Import Paths	7.69	9.06
Incremental Local Upgrades	1.23	0.69
Total	**12.95**	**13.77**

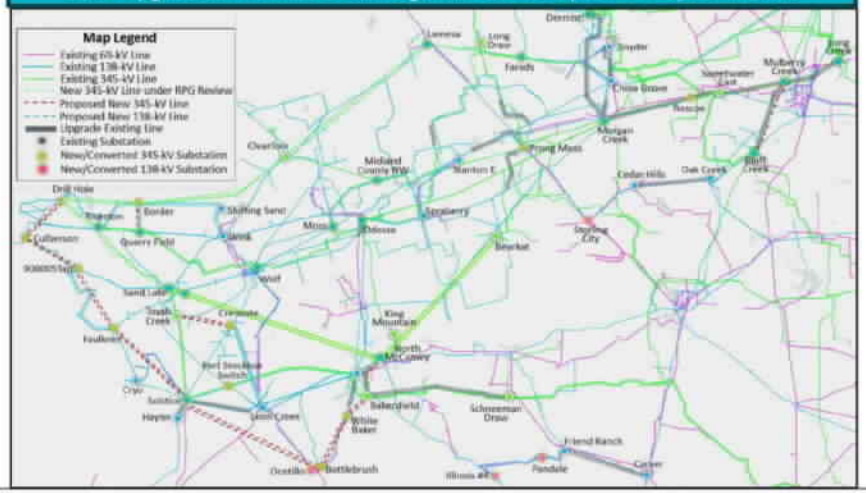
Permian Basin Reliability Plan – Local Transmission Upgrades

- Local transmission upgrades are transmission projects that are needed to interconnect and serve the projected load in the Permian Basin region assuming that power can be imported into the region.
- Common local transmission upgrades would be needed irrespective of the forecast horizon or the import path chosen, and include, among others:
  - The addition of approximately 174 miles of new 345-kV double-circuit transmission lines;
  - The upgrade of approximately 43 miles of existing 345-kV transmission lines and the addition of second circuits;
  - The upgrade of approximately 98 miles of existing 345-kV double-circuit transmission lines;
  - The addition of 8 new 345-kV/138-kV substations with 17 new 345-kV/138-kV transformers;
  - The addition of approximately 186 miles of new 138-kV transmission lines;
  - The upgrade of approximately 221 miles of existing 138-kV transmission lines;
  - The conversion of approximately 230 miles of existing 69-kV transmission lines to 138-kV; and,
  - The addition of approximately 3,600 MVAr of reactive power devices.

Local Upgrades in Permian Basin Region in 345-kV Import Path Option in 2038

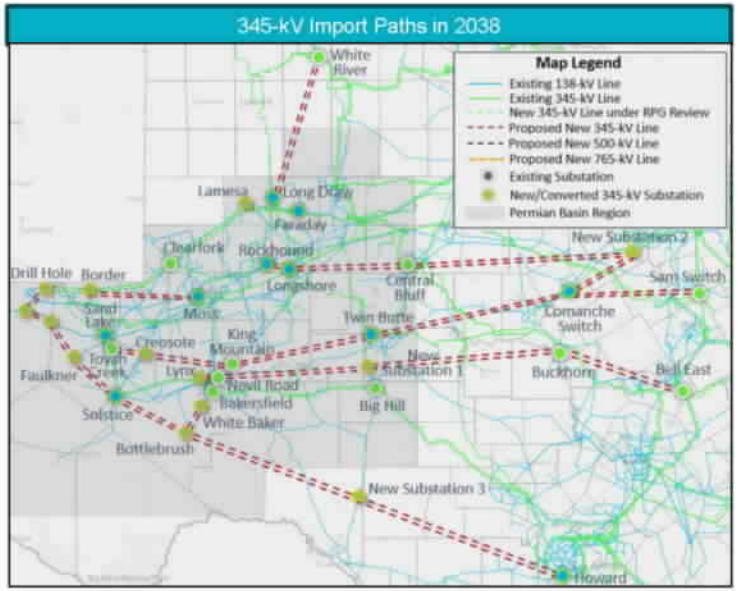


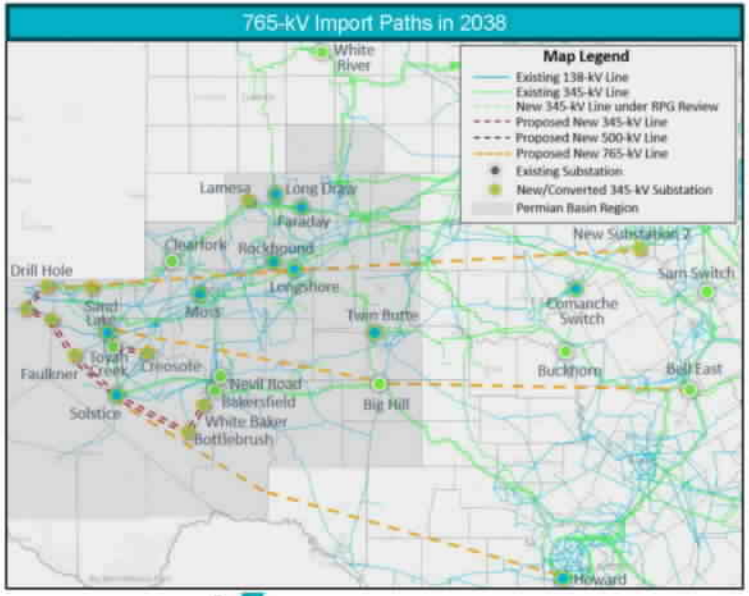
Local Upgrades in Permian Basin Region in 765-kV Import Path Option in 2038



Permian Basin Reliability Plan – Import Paths

- Import paths are those transmission projects needed to transfer power from other regions into the Permian Basin region to serve the projected demand.
- For the import paths, ERCOT evaluated three mutually exclusive options for 2038: 345-kV, 500-kV, and 765-kV. The 765-kV option will be part of a systemwide 765-kV study to be completed in December 2024.

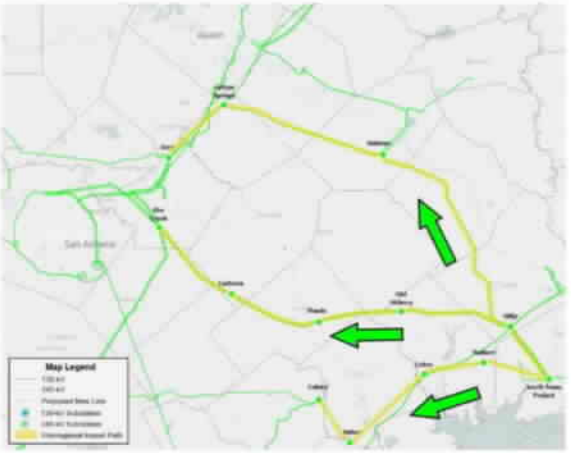


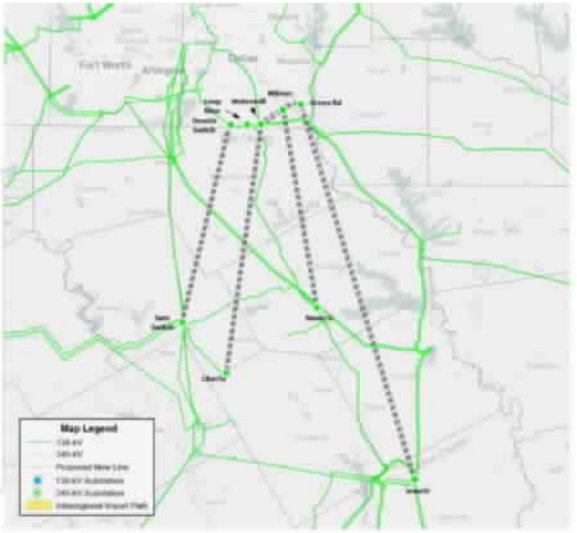


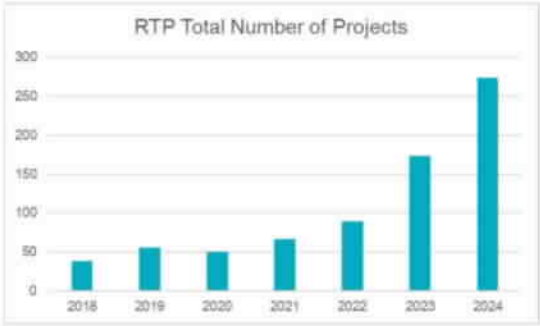
- 345-kV Option:
  - Four new 345-kV double-circuit import paths plus a short path from the Panhandle, total five 345-kV import paths
  - Approximately 1,676 miles of new 345-kV double-circuit transmission lines in total
  - Additional new dynamic reactive devices required
- 765-kV Option:
  - Three new 765-kV import paths
  - Approximately 1,255 miles of new 765-kV single-circuit transmission lines in total
  - Additional new dynamic reactive devices required

2024 RTP Highlights

- The unprecedented increase in forecasted load growth resulted in significant reliability needs in the ERCOT System.
- The significant increase in forecasted load resulted in a generation shortage in the 2024 RTP planning models which required adding generation beyond the normal planning guide assumptions.
- The 2024 RTP identified the needs of 274 transmission projects to reliably serve the forecasted load growth in the traditional 345-kV plan (in comparison 173 transmission projects identified in 2023 RTP).
- The reliability projects included both the new inter-regional pathways, enhancement of existing inter-regional pathways, and local transmission upgrades inside each region.
- While Central Texas remains as the area needing significant import capability, new flow patterns have emerged, with imports to Central Texas coming from north of Austin and the Coast Weather Zone due to the significant generation growth in the Coast Weather Zone and generation in the South Weather Zone now serving the large load additions in and around Corpus Christi.
- In total, approximately 580 circuit miles of new 345-kV import paths south of the Dallas-Fort Worth (DFW) metroplex, along with hundreds of miles of reinforcement to the existing 345-kV import pathways into DFW and 5,000 MVAr of reactive power support, were needed to reliably serve the projected load growth in the area.

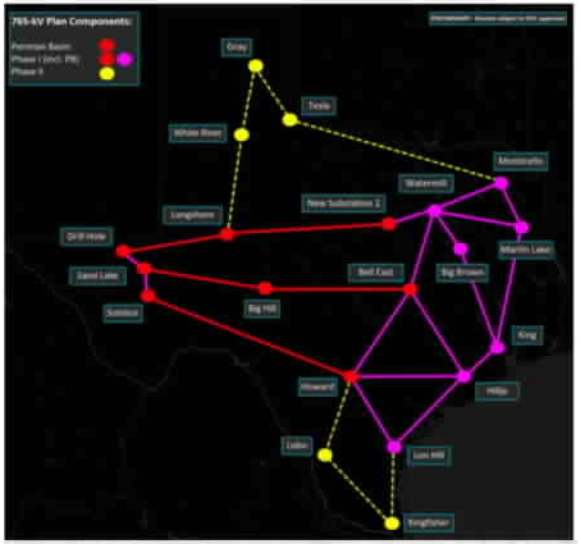






2024 RTP - 765-kV Plan

- The unprecedented 2024 RTP load growth prompted ERCOT to consider a 765-kV plan as an alterative to the traditional 345-kV plan to meet the future ERCOT System growth, reliability, and need for large power transfer between major generation locations and load centers.
- ERCOT began by developing a holistic 765-kV plan including two phases for future growth and then identified the critical components (core plan) needed by 2030.
- PUCT approved the Permian Basin Reliability Plan in October 2024, irrespective of the voltage level, and will make a decision on import path voltage level (765-kV or 345-kV) by May 1, 2025.
- ERCOT intends to file the 345-kV vs. 765-kV comparison plan based on the 2024 RTP together with the dynamic analysis and congestion analysis with PUCT in January 2025.



Geographic locations for proposed new lines are meant to demonstrate general electrical point-to-point connections. Specific routing of any new transmission infrastructure is determined by the Public Utility Commission as part of the CCN process with Transmission Service Providers.

Recent Planning Criteria and Rule Revisions

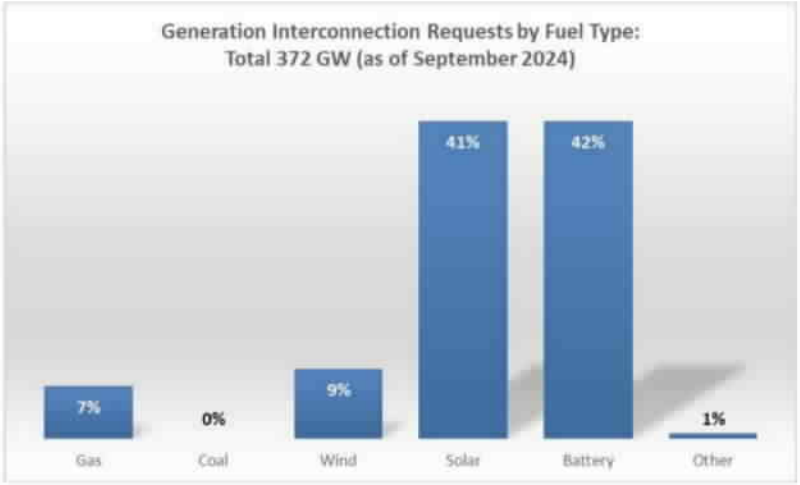
- Congestion cost savings test development for economic project evaluation
  - ERCOT Board of Directors recommended approval of NPRR1247 in December 2024 to incorporate the congestion cost savings test as recommended by Energy and Environmental Economics (E3).
- Resiliency
  - ERCOT submitted PGRR117 to define the resiliency criteria.
  - ERCOT intends to propose an NPRR to address the process for determining whether an upgrade that meets the proposed resiliency criteria provides sufficient benefit balanced with economic savings and/or reliability benefits, in accordance with 16 TAC § 25.101(b)(3)(A)(iii). This NPRR is currently under development and will be brought to the stakeholder process in 2025.
- HB5066
  - HB5066 requires consideration of load for which the electric utility has yet to sign an interconnection agreement, as determined by the electric utility with the responsibility for serving the load.
  - To facilitate the PUCT's consideration of projects that may be needed to serve this load, NPRR1180 and PGRR107 propose to incorporate this additional load into ERCOT's planning processes.
- Generation addition in planning models
  - While the new rules allow for the consideration of more load in the planning processes, the policy governing the inclusion of planned Generation Resources in the planning models remains unchanged.
  - Additional steps outside of the current planning practices were needed to create planning models capable of accommodating the unprecedented load growth in the 2024 RTP.
  - ERCOT is currently developing a PGRR to adjust the criteria for adding Generation Resources to the planning models and will initiate stakeholder discussions in 2025.

High Voltage Direct Current (HVDC) Transmission

- ERCOT currently has four asynchronous ties to other grids: two connections to the Eastern Interconnection with a total capacity of 820 MW, and two ties to the Mexican system with a total capacity of 400 MW. These ties allow ERCOT and the connecting grids to exchange power in emergencies and for entities to trade power between grids on a commercial basis.
- Southern Spirit Transmission has proposed building a 3,000 MW, 324-mile, 525-kV DC Tie project connecting ERCOT to MISO South in Eastern Mississippi with an expected energization in 2029.
- This was formerly the 2,000 MW Southern Cross Transmission Project. ERCOT has materially completed its work on the directives assigned to ERCOT by the PUC in Project No. 46304. These include Directive 6 (determination regarding any needed transmission upgrades) and Directive 8 (determination regarding Primary Frequency Response and Voltage Support).

- Pattern Energy has requested that ERCOT conduct a transmission interconnection study of the revised Southern Spirit Transmission project to evaluate system constraints under the latest project parameters.
  - Project previously studied at maximum capacity of 2,000 MW; project capacity is now 3,000 MW
  - Project previously studied using line-commutated converter (LCC) technology; Southern Spirit now plans to use voltage-source converter (VSC) technology
  - Studies expected to be completed by end of Q1 2025

Advanced Grid Support (AGS) Inverter-based Energy Storage (ESR) Adoption Effort



- Increasing challenges in reliably operating the ERCOT System with rising IBR integration and fewer online conventional units underscores the importance of proactive measures for grid stability
- Approximately 92% of new interconnection requests are IBRs, with nearly 42% specifically for inverter-based ESRs (i.e., batteries).

Source: ERCOT GIS Report posted on 10/1/2024 for September 2024

- With minimal impact to the hardware, AGS-ESR can enhance grid stability, reduce generation curtailment due to stability constraints, and lessen the severity of grid disturbance.
- The ERCOT AGS-ESR Test Requirement report has been posted on the IBRWG website.
- The Planning and Operating Guides revision requests (NOGRR272 and PGRR121) are currently under the stakeholder review process.

ERCOT AGS-ESR test requirement report

Recent PUC Rule Changes and Initiatives

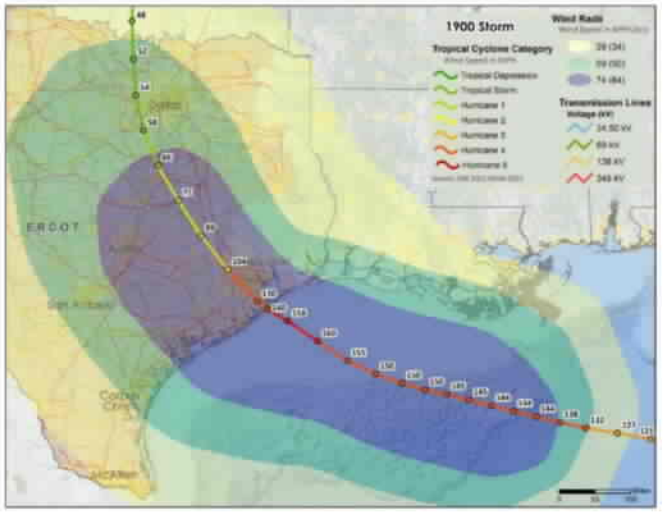
- **Reliability Standard:** The PUC adopted a Reliability Standard for the ERCOT Region in August 2024. The Standard comprises three probabilistic reliability measures and associated compliance criteria. For a system simulation, the metrics assess characteristics of loss-of-load (LOL) events—when there are insufficient resources to meet load and maintain required minimum operating reserves. The metrics and criteria include the following:
  - The expected average frequency of LOL events must not exceed 0.1 events per year
  - The maximum magnitude of LOL events must be less than the maximum number of megawatts of load shed that can be safely rotated during a LOL event (with a 1% exceedance tolerance)
  - The maximum duration of LOL events must be less than 12 hours (with a 1% exceedance tolerance)

  The ERCOT Region is considered deficient if any one of the criteria is not met, thereby triggering development of proposed market design changes to address the deficiency.
- **Capacity, Demand and Reserve (CDR) Report:** The PUC approved NPRR1219 to extensively modify ERCOT's CDR reports. The main modifications include (1) reporting of both peak load hour and peak net load hour capacity reserve margins, (2) incorporating capacity contributions from battery energy storage resources, (3) revising the capacity contribution methodology for IBRs to account for their reliability impacts on the system, and (4) expanding the eligibility criteria for planned resources to include posting of financial security for interconnection construction.

2024 Grid Reliability and Resiliency Assessment (GRRA)

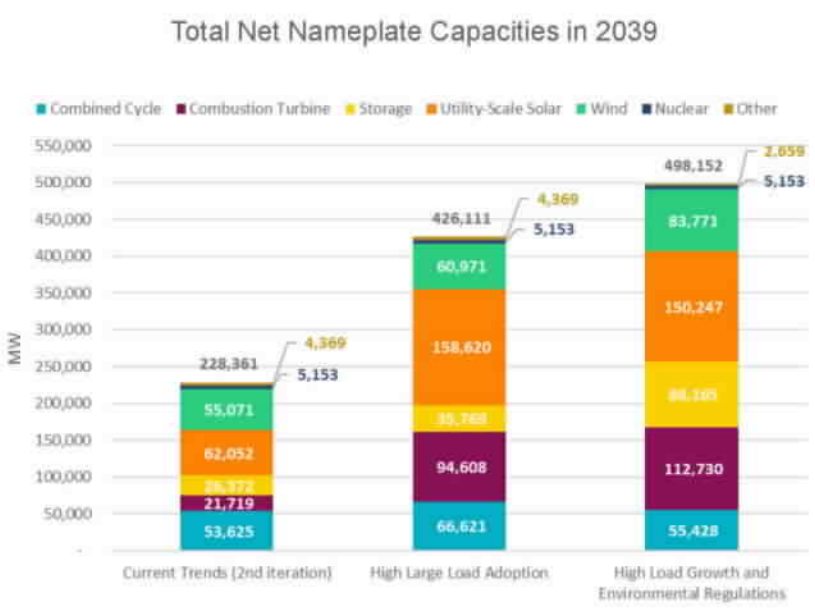
- The 2024 GRRA was performed to meet the requirements established in 16 TAC § 25.101(b)(3)(E).
- The 2024 GRRA identified projects that are necessary to prevent cascading, instability, or uncontrolled islanding and/or to reduce the impact of outages on customers under the following two extreme weather scenarios:
  - An extreme winter peak scenario that considered a weather condition similar to the 2021 Winter Storm Uri event but with the impacts of the weatherization rules effective since then factored in.
  - A hurricane scenario representing a worst-case scenario Category 5 hurricane with Houston area landfall using information provided in the Argonne National Laboratory's 2024 Hurricane Study for ERCOT.

- Key takeaways:
  - Additional transmission enhancements were found to be beneficial to increase the resiliency of the ERCOT Transmission Grid under both scenarios.
  - Substation hardening was found to have a critical role in increasing system resiliency under the hurricane scenario.
  - Though distribution hardening was out of the scope of this assessment, a more resilient distribution system was deemed as crucial to increase the overall system resiliency under the hurricane scenario.



2024 Long-Term System Assessment (LTSA)

- ERCOT's 2024 LTSA analyzed potential system needs through 2039.
- ERCOT analyzed different future scenarios in its long-term planning process to account for the inherent uncertainty of planning the transmission system beyond six years.



Across all scenarios, significant growth in wind, solar, natural gas, and battery energy storage was projected to replace retired coal capacity and meet rising demand.

		Congestion Rent	
Index	Constraint	2034	2039
1	West Texas Export Interface	$556M	$821M
2	Farmland - Wett Long Draw 345-kV Line	$134M	$233M
3	Meadow - PH Robinson 345-kV Line	$162M	$155M
4	Bell County East Switch - Sandow Switch 345-kV Line	$121M	$153M
5	South Texas Project - Jones Creek 345-kV Line	$55M	$143M
6	Panhandle Interface	$142M	$140M
7	Refuge - Jones Creek 345-kV Line	$49M	$112M
8	North - Houston Interface	$60M	$108M
9	Kendall - Welfare 138-kV Line	$15M	$81M
10	MacKenzie Substation - Northeast Substation 115-kV Line	$55M	$79M

Transmission challenges were identified for both the export from the renewable resource-rich regions and the import into the demand centers.

NERC & DOE Studies of Interregional Transfer Capability

NERC Interregional Transfer Capability Study (ITCS)

- Fiscal Responsibility Act of 2023: NERC must conduct study of "total transfer capability" to recommend "prudent additions . . . that would demonstrably strengthen reliability within and among . . . neighboring transmission planning regions."
- Based on the identified resource deficiencies under several instances including the most severe of which was observed during Winter Storm Uri event, study recommends 14,100 MW of transfer capability as "prudent additions" to connect ERCOT with other planning regions:
  - 5,700 MW to the "Front Range" area of the Western Interconnection
  - 4,300 MW to MISO South
  - 4,100 MW to SPP South
- ITCS report notes that alternative approaches other than transmission can also mitigate these future energy risks, such as local generation, or demand-side solutions.
- ERCOT's advisory group member submitted comments noting that study does not account for ~8,500 MW of generation under Texas Energy Fund that is expected to be available to help mitigate energy deficiencies.
- NERC filed the ITCS final document with the Federal Energy Regulatory Commission (FERC) on November 19, 2024.
  - Public comments allowed once FERC publishes study in the Federal Register.
  - FERC must provide report to Congress within 12 months after end of public comment period.
  - FERC may provide recommendations for statutory changes.

DOE National Transmission Planning Study (NTPS)

- Extends on 2023 National Transmission Needs Study to provide more robust recommendations of interregional transfer capability based on analysis of overall reliability and economic impacts and facility costs.
- On October 3, 2024, the Department of Energy (DOE) released its National Transmission Planning Study.
- Primary purpose of study was to identify regional and interregional transmission additions needed under a wide array of different future scenarios of emissions restrictions and demand growth.
- Some of the key study conclusions:
  - Increasing regional and interregional transmission buildout to 2.4–3.5 times 2020 capacity by 2050 decreases system costs by $270–490 billion (NPV) due to increased generation-sharing and use of low-marginal-cost wind and solar power, assuming medium growth and emissions reduction policies.
  - Greater reliance on wind and solar power reduces CO2 emissions by 10.2-11.2 billion metric tons (43% to 48%).
  - Under high demand growth assumption (2.7%), estimated net savings from accelerated transmission range from $710–970 billion (NPV).
  - 2035 nodal multi-terminal (MT) HVDC analysis identifies a need for up to 28 GW of additional transfer capability between ERCOT and other regions (MISO-South, SPP, and Western Interconnection).

ERCOT Interregional Transfer Study Proposal

- ERCOT is currently seeking via a request for proposal (RFP) a contractor to perform a study of the costs and benefits of increasing synchronous and/or asynchronous connections between ERCOT and other regions.
- Summary of the study objectives and scope:
  - full assessment of costs and benefits of increasing connections to other regions from the perspective of Texas consumers.
  - advantages/disadvantages of synchronous vs. asynchronous connections.
  - alternatives to synchronous and asynchronous connections, such as switchable generation and demand response.
- Key milestones:
  - November 2024: issuance of RFP
  - January 2025: proposals due
  - March 2025: draft outline of final report due
  - August 2025: report completion

Contacts and Links

Contacts and Information

For general communications and queries, please submit an information request to: https://www.ercot.com/about/contact/inforequest

Media

Media@ercot.com

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Links

ERCOT website: https://www.ercot.com/

Market Participants can access additional planning information on the Market Information System (MIS), which can be accessed through the "MIS LOG IN" link located at the top of the ERCOT website. A digital certificate is required to access to this area. Information available on the MIS includes a variety of data, procedures, reports, and maps for both operations and planning purposes, including the following planning-related information:

- Generation project interconnection information
- RPG information
- Steady-state base cases

Attachment J

Report on ERCOT's Compliance with Cybersecurity and Information Security Laws

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