Module 3: ERCOT Outage Coordination
Module Objectives

• Describe roles and responsibilities for ERCOT and Market Participants

• Describe ERCOT Protocol Requirements for scheduling Resource and Transmission Facility Outages

• Locate MIS Outage Summaries and Reports
Outage Coordination
Outage:
The condition of a Transmission Facility or a portion of a Facility, Generation Resource or Load Resource that is:

- part of the ERCOT Transmission Grid
- defined in the Network Operations Model
- removed from its normal service
- excludes the operations of Transmission Facilities associated with the start-up and shutdown of Generation Resources
Transmission Definitions

Transmission Facilities:
• Transmission Lines, Substations and associated Facilities operated at or above 60 kV.

Transmission Elements - Part of a physical Transmission Facility that are:
• An Electrical Bus, Transmission Line, Transformer, Generator, Load, Breaker, Switch, Capacitor, Reactor, Phase Shifter, etc.
• Part of the ERCOT Transmission Grid
• Defined in the ERCOT Network Operations Model.
Resource
The term is used to refer to both a Generation Resource and a Load Resource.

*Generation Resource*
A generator capable of providing energy or Ancillary Service to the ERCOT System and is registered with ERCOT as a Generation Resource.

*Load Resource*
A Load capable of providing Ancillary Service to the ERCOT System and/or energy in the form of Demand response and registered with ERCOT as a Load Resource.
Outage Coordination Definition

• The management of Transmission Facilities Outages and Resource Outages in the ERCOT System.

• Facility owners are solely and directly responsible for the performance of all maintenance, repair, and construction work, whether on energized or de-energized facilities, including all activities related to providing a safe working environment.
Outage Coordination

What do Outages Affect?

- **Outages**
  - **Congestion Revenue Rights**
    - PCRR Nominations
    - CRR Awards
  - **Day-Ahead**
    - Energy Awards
    - Security Analysis
    - Reliability Unit Commitment
    - Outage Evaluation
  - **Adjustment Period**
    - Security Analysis
    - AS Deployment
    - Reliability Unit Commitment
    - Outage Evaluation
  - **Real-Time**
    - RT Security Analysis
    - SCED
    - Forced Outage Detection

Real-Time applications use the Actual Telemetered State – not the Outage Scheduler
ERCOT’s Role

ERCOT shall coordinate and use reasonable efforts, consistent with Good Utility Practice, to accept, approve or reject all Outage schedules for maintenance, repair, and construction of both Transmission Facilities and Resources within the ERCOT System. ERCOT may reject an Outage schedule under certain circumstances, as set forth in the Protocols.
ERCOT’s responsibilities with respect to Outage Coordination are to:

- Approve, Accept or Reject all outage requests
- Review and coordinate the rolling 12-month plan
- Post approved, accepted, rejected, canceled and withdrawn outages plus Outage Notes
- Implement response to immediate outages
- Establish and implement communication procedures
- Establish and implement record-keeping procedures
Each QSE and TSP shall use reasonable efforts, consistent with Good Utility Practice, to continually update its Outage Schedules.

Unless there is an Emergency Condition, QSEs and TSPs must obtain approval from ERCOT to purposely open or close a breaker or switch unless that device:

- Is shown in a Planned Outage in the Outage Scheduler
- Will return to its previous state within 60 minutes
- Is a generator output circuit breaker
The ERCOT Outage Scheduler is a web-based database and scheduling application which allows Market Participants to create, submit, view and edit outage requests for:

- Transmission Facilities
- Resources (both Generation & Load)

The Outage Scheduler allows ERCOT to study the impact of multiple outage requests spanning varying time periods while meeting the outage coordination response times and goals described in the Protocols.
Outage Scheduler Location

• Outage Scheduler User Interface (OSUI) is accessed via the Market Information System (MIS)
• Digital Certificate required for access
• For multiple Digital Certificates, must select one
• System Browsers must be IE11 and Windows 7+ Compatible
Submitting Outages via External Web Services

• External Web Services (EWS) allow TSPs and QSEs to exchange outage data with ERCOT in XML format
• File upload with return feature in Requestor User Interface
• All Outage Coordination and Scheduling rules for Transmission Facilities and Resources apply
Outage Types
Outage Types

There are two outage categories: Transmission and Resource

Transmission
1. Planned
2. Maintenance
3. Forced
4. Opportunity
5. Simple

Resource
1. Planned
2. Maintenance
3. Forced
4. Opportunity
Resource & Transmission Grouped Outage Example

TSP Operated

- B1
- B2
- B3
- B4
- B5
- B6

Transmission Facilities

QSE Operated

- CD02
- MT02
- XT02
- CD03
- MT03
- XT01
- CT03
- CT02
- ST01

Transmission Facilities

Resource
Planned Outages

Rolling 12-month Outage Plan for QSEs & TSPs

Each TSP and QSE must provide ERCOT a rolling 12 month outage plan with continuous updates.

Timely updates important.
Results used as input to network models that affect planning and operations functions, as well as CRR Auctions

ERCOT will coordinate in-depth reviews of the 12-month plan with all TSPs at least twice each year.
### ERCOT Action for Transmission Outage Requests

<table>
<thead>
<tr>
<th>Outage Request lead time</th>
<th>ERCOT Action</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>More than 90 days</td>
<td>Approve or Reject by 75 days prior to the Outage</td>
<td></td>
</tr>
<tr>
<td>46 to 90 days</td>
<td>Approve or Reject by 30 days prior to the Outage</td>
<td></td>
</tr>
<tr>
<td>9 to 45 days</td>
<td>Approve or Reject by 4 days prior to the Outage</td>
<td></td>
</tr>
<tr>
<td>4 to 8 days</td>
<td>Approve or Reject by 1800 hours, 3 days prior to the Outage</td>
<td></td>
</tr>
<tr>
<td>3 days</td>
<td>Approve or Reject by 1800 hours, 2 days prior to the Outage</td>
<td></td>
</tr>
</tbody>
</table>
## ERCOT Action for Resource Outage Requests

<table>
<thead>
<tr>
<th>Outage Request lead time</th>
<th>ERCOT Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than 45 days</td>
<td>Accept, but may discuss alternatives to minimize reliability and cost impacts. Notify the QSE of conflicts with previously scheduled Outages.</td>
</tr>
<tr>
<td>9 to 45 days</td>
<td>Approve or Reject within 5 business days after submission. Planned Outages are Accepted after 5 business days.</td>
</tr>
<tr>
<td>4 to 8 days</td>
<td>Approve or Reject by 1800 hours, 3 days prior to the Outage</td>
</tr>
<tr>
<td>3 days</td>
<td>Approve or Reject by 1800 hours, 2 days prior to the Outage</td>
</tr>
</tbody>
</table>
ERCOL Action has different requirements for Black Start and Reliability Must Run Resources

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<th>Outage Request lead time</th>
<th>ERCOT Action</th>
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</thead>
<tbody>
<tr>
<td>More than 45 days</td>
<td>Approve or Reject by 30 days prior to the Outage</td>
</tr>
<tr>
<td>No less than 30 days</td>
<td>Approve or Reject by 15 days prior to the Outage</td>
</tr>
</tbody>
</table>
Maintenance Outages
Resource & Transmission Maintenance Outages

• Initiated manually to remove equipment from service to perform work on components
• Required to prevent a potential forced Outage
• Could be postponed briefly, but not until next planned Outage
• Approved by ERCOT as soon as possible

<table>
<thead>
<tr>
<th>Outage Levels</th>
<th>Equipment must be removed from service…</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Within 24 hours</td>
</tr>
<tr>
<td>2</td>
<td>Within 7 days</td>
</tr>
<tr>
<td>3</td>
<td>Within 30 days.</td>
</tr>
</tbody>
</table>
Unavoidable Extensions

- Apply to Planned, Maintenance & Simple Outages
- New Planned End may be submitted:
  - up to two hours after Planned End
  - multiple times within the two hour window
- New Forced Outage required after Planned End plus two hours

Scheduled Return Time

Work exceeds scheduled return time

Unavoidable Extension
Forced Outages
QSE & TSP Forced Outages

Transmission Forced Outage - Initiated by protective relay (or manually, in response to an observation by personnel that the condition of equipment could lead to potential event) that poses a threat to people, equipment, or public safety.

Resource Forced Outage - requires immediate removal, either through controlled or uncontrolled actions, of all or a portion of the capacity of the Resource from service through automated or manual means.

<table>
<thead>
<tr>
<th>Notification Requirements</th>
<th>ERCOT Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbally communicate outage immediately.</td>
<td>Accepted automatically when submitted.</td>
</tr>
<tr>
<td>Submit into Outage Scheduler as soon as practicable.</td>
<td></td>
</tr>
<tr>
<td>If applicable, QSEs must also update COP.</td>
<td></td>
</tr>
</tbody>
</table>
Forced Extensions

• Apply to Forced Outages only
• New Planned End may be submitted:
  • up to two hours after Planned End
  • multiple times within the two hour window
• New Forced Outage required after Planned End plus two hours
ERCOT can review & withdraw approval of submitted outages to ensure the reliability of the ERCOT System except for:
- Forced Outages
- Forced Extensions
- Unavoidable Extensions

ERCOT can Cancel Forced Outages entered in error

<table>
<thead>
<tr>
<th>Before Approval of Outage</th>
<th>After Approval of Outage</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERCOT can Reject Outage</td>
<td>ERCOT can Withdraw Outage</td>
</tr>
<tr>
<td>TSP or QSE can Cancel Outage</td>
<td>TSP or QSE can Cancel Outage</td>
</tr>
</tbody>
</table>
Opportunity Outages
Opportunity Outage

**TSP Opportunity Outage**

- May be approved by ERCOT when a specified Resource will be outaged and
- TSP has an outage “Received at ERCOT” for Transmission Elements associated with the specified Resource

**Resource Opportunity Outage**

- May be accepted by ERCOT when a specific Resource experiences a Forced Outage and
- Resource had been previously Approved or Accepted for a planned outage during the next eight days
QSE Opportunity Outage Sequence of Events

• QSE has a previously Accepted or Approved Planned Outage on a Resource with a Start date of eight (8) calendar days or less.

• QSE enters a Forced Outage on the Resource.

• QSE may access the original Planned Outage request and select:
  - “Yes” to take a Resource Opportunity Outage.
    • The Resource will stay off-line.
    • Opportunity Outage covers the time period between the start of Forced Outage and the start of the Planned Outage.
  - “No” to not take the Opportunity Outage.
    • QSE must submit a Forced Outage request
    • Resource comes back on-line
    • Original Planned Outage does not change.
To perform maintenance on TSP-owned switches, GT01 needs to be off-line.
Transmission Opportunity Outage – Sequence of Events

- TSP and QSE/Resource attempt to schedule maintenance during a Resource Planned Outage.

- If no Resource outage is planned or scheduled, TSP may submit an Opportunity Outage request.

- If QSE submits a Planned, Forced or Maintenance outage request on the designated Resource:
  - Outage Scheduler issues Warning Message to ERCOT & TSP
  - TSP must:
    - Confirm that work can be completed during the Resource outage.
    - Enter Planned Start and End dates into the Opportunity Outage request.
  - ERCOT will evaluate the request and if no security violations occur, issue approval.
Simple Outages
<table>
<thead>
<tr>
<th><strong>Request for Approval</strong></th>
<th><strong>Approval / Acceptance Rejection</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Submitted at least 1 day in advance</td>
<td>• Within 8 business hours after receipt at ERCOT</td>
</tr>
<tr>
<td>• Outage must have a restoration time of 1 hour or less</td>
<td></td>
</tr>
<tr>
<td>• Duration of the outage must be 12 hours or less</td>
<td></td>
</tr>
<tr>
<td>• Must not cause a topology change in the LMP calculation</td>
<td></td>
</tr>
<tr>
<td>• Must not cause LMPs to change with or without the element.</td>
<td></td>
</tr>
</tbody>
</table>
High Impact Outages
Transmission Element (Previously Discussed)
A physical Transmission Facility that is either an Electrical Bus, line, transformer, generator, Load, breaker, switch, capacitor, reactor, phase shifter, or other similar device that is part of the ERCOT Transmission Grid and defined in the ERCOT Network Operations Model.

High Impact Transmission Element (HITE)
A Transmission Element that may, in certain conditions, result in high congestion risk when taken out-of-service

High Impact Outage (HIO)
A Planned Outage or Rescheduled Outage that interrupts flow on a High Impact Transmission Element (HITE).
Rescheduled High Impact Outage

• Approved Planned Transmission Outage with:
  • At least one High Impact Transmission Element (HITE)
  • Submitted more than 90-days prior to the Outage
  • Subject to withdrawal of approval by ERCOT

• Only ERCOT shall be able to convert a Planned High Impact Outage into a Rescheduled Outage after discussion with the Requestor.

• Rescheduled High Impact Outages were implemented on 9/13/2017, but only apply to Planned Outages submitted after 9/13/20017
Outage Evaluation
ERCOT Outage Coordinator performs Outage Evaluation

- Applies to Outages in Study Status
- Approves or Rejects outage within required timelines
Outage Evaluation

Data Inputs

Outages
- Received
- Study
- Approved
- Accepted

Network Operations Models
Contingency Definitions
Dynamic Ratings Table
7-day Load Forecast
36-month Load Forecast
Generation in/out service (COP)
Load Distribution Factors
Generator Cost Information
Remedial Action Plans
Automatic Mitigation Plans
Remedial Action Schemes

Outage Evaluation
Outage Scheduler
Outage Evaluation Function

• Runs sequence of power flow and contingency analysis
• Determines if submitted outages pose threat of insecure operating state

Outage Evaluation Process

Requested Outages + Approved Outages → Power Flow Studies, Contingency Analysis → Security Violation?

NO → Outage Scheduler

YES → Modify outage request
Approved and Accepted Outages

• Updated in the Outage Scheduler
• Posted to the MIS Secure area
• Used to update
  • Network Operations Model
  • Planning Model
  • Congestion Revenue Rights (CRR) model
Outage Reports on the Market Information System
### MIS – Accessing Outage Related Reports

**Market Information System**

<table>
<thead>
<tr>
<th>Markets</th>
<th>Grid</th>
<th>Reports</th>
<th>Applications</th>
<th>Groups and Rules</th>
<th>Services</th>
<th>Notices</th>
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</thead>
<tbody>
<tr>
<td>Transmission</td>
<td>Generation</td>
<td>Forecasts</td>
<td>Long-Term Planning</td>
<td>Regional Planning</td>
<td>Resource Integration</td>
<td></td>
</tr>
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</table>

#### Transmission Outages

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Consolidated Transmission Outage Report</td>
</tr>
<tr>
<td>Daily Transmission Outage Comments Report</td>
</tr>
<tr>
<td>High Impact Outages - Submitted 90 Days or Less</td>
</tr>
<tr>
<td>High Impact Transmission Elements (HITEs) List</td>
</tr>
<tr>
<td>Transmission Outage Schedule Statistics</td>
</tr>
</tbody>
</table>

#### Real-Time Operations

<table>
<thead>
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<tbody>
<tr>
<td>Assessment of Chronic Congestion</td>
</tr>
<tr>
<td>Daily Real-Time Congestion Report - Exceeded Constraints Not Activated</td>
</tr>
<tr>
<td>ICCP Link Availability Statistics Report</td>
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<tr>
<td>Monthly Average Dynamic Ratings Report</td>
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### Voltage and Dynamic Ratings

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<tr>
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<tbody>
<tr>
<td>Dynamic Ratings Submission</td>
</tr>
<tr>
<td>Exceptions</td>
</tr>
<tr>
<td>Forecasted Temperature Adjusted Dynamic Ratings</td>
</tr>
<tr>
<td>Monthly Average Dynamic Ratings Report</td>
</tr>
<tr>
<td>Real-Time Dynamic Rating Data</td>
</tr>
<tr>
<td>Transmission Elements Recommended for Dynamic Ratings</td>
</tr>
<tr>
<td>Voltage Profiles</td>
</tr>
</tbody>
</table>

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### Generic Transmission Limits

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</table>
Posted to the MIS Hourly

• Includes Active, Inactive, Future and Completed Outages with the Status of:
  • Accepted
  • Approved
  • Canceled
  • Received at ERCOT
  • Rejected
  • Study
  • Withdrawn

• Outages are removed 120 days after their Planned End Date
Posted to the MIS Daily

- Records the Notes fields associated with the Outage IDs in the Consolidated Transmission Outage Report related to:
  - Requestor Notes
  - RAP, RAS and AMP Notes
  - Supporting Information
  - Reviewer Notes
- Automatically removed with the associated Outage ID
Posted to the MIS in 2 Reports

- High Impact Outages – Submitted 90 Days or Less
  - Posted to the MIS Daily
  - Only when they are Accepted or Approved
  - ERCOT may coordinate with the TDSP to make reasonable efforts to minimize impacts

- High Impact Transmission Elements (HITEs) List
  - Posted to the MIS at least Annually
  - Developed by ERCOT with input from Market Participants
  - Reviewed and Approved by TAC
Posted to the MIS Monthly

• Informational

• Categorizes Outages by:
  • Submitted more than 335 days (11 months)
  • Submitted between 90 and 334 days
  • Submitted between 8 and 89 days
  • Submitted between 3 and 7 days
  • Submitted less than 3 days
  • Outage Type
  • Outages Status
  • Requesting Company
END OF MODULE....You should now be able to:

- Describe roles and responsibilities for outage coordination
- Describe requirements for scheduling the types of Resource and Transmission Facility Outages
- Locate MIS Outage Summaries and Statistic Reports