ERCOT's NMMS -Network Model Management in Action

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# ERCOT NMM

- ► The ERCOT System
- NMMS Overview & Key Functionality
- Stakeholder Model Update Submissions

# **ERCOT Models**





#### Network Operations Model

- Energy MS
- Market MS
- Steady State Analysis
- State Estimator
- Day Ahead
- Outage Coordination
- Voltage Stability

Planning Model

- Future Year Analysis
- Production Cost
- Analysis

  Voltage Stability



#### CRR Model

 Congestion Auction



#### Dynamics Model

• Stability Analysis



# What is NMMS? In Short:

<u>One</u> system manages all model data for up to one year into the future The Network Model Management System (NMMS)



# What Does NMMS Do?



# NMMS - Key Requirements

- Time-based modeling
  - A change that will happen in 5 months can be modeled today.
  - A model that represents all changes 5 months into the future or from the past can be created today.
- Generate all models for all processes
  - Repository for all model information
  - Both full and incremental CIM files
- Accept incremental modeling updates.
  - Submitted by the Market Participants (TSP, QSE, LSE, RE)
  - QSE, LSE and REs must submit data to an ERCOT representative.



# **Time-Based Modeling**



- Incremental Changes All model updates are stored as a packet of database modification commands
- Effective Date Each incremental change is given an energization date
- Future Models Applying dated incremental changes to a base model creates a model representing a future date



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### PTC's Case Builder

- Model Generator in PTC's Case Builder is used to
  - Build a model for a target build date (one day prior to next model load)

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### Exporting a Model

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  - Build a model for a target build date (one day prior to next model load)
  - Export CIM/XML profiles from the model that is built.

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# **Future Model Creation**

#### Creating an Operations Model

The model is created by applying all the incremental changes that occur between the current and future dates to the base model

#### Creating a Planning Model

- An Operational model is created for the future date
- This model is passed through a "topology processor" to change the breaker/switch model into a bus/branch Planning model
- Planning incremental changes are then applied to the model to make it reflect the future date

 Consistent Data - Converting an Operational model guarantees consistency



# ERCOT Network Model Build Process



 All activities are executed in a Test Model Development environment using the latest available Production data snapshot.



#### ERCOT Steady State Planning Model Creation Process



## ERCOT Dynamic Model Creation Process



## **ERCOT Model Re-creation for Validation**



# **Stakeholder Submissions**

#### ERCOT Stakeholders include:

- Transmission/Distribution Service Provider (TSP)
- Qualified Scheduling Entity (QSE)
- Resource Entity (RE or Generators)
- QSEs and REs must submit their data through an ERCOT representative and do not have access to the NMMS directly. The ERCOT network modelers take their data and input it into the NMM system.
- TSPs may submit their data in one of 2 ways:
  - Online through the Portal using a One-Line Editor
  - Submission of CIM/XML incremental instance files per the IEC standards.



# NMMS Stakeholder Submissions



# Summary

- The set of requirements faced by ERCOT is not exactly the same as for other ISO/RTOS.
- ISO/RTO requirements are not the same as TSO requirements.
- However, there is a lot of overlap and the same underlying design principles can be applied.
- ERCOT NMMS did not do everything right, but it is a success!
- It demonstrates that planning, operations and markets can share common modeling source data to their mutual benefit.
- It demonstrates that a group of entities in an interconnection can coordinate modeling, to everyone's benefit



# Thanks!

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