FirstEnergy (FE)
PJM Assumptions Meeting

David Tates – Transmission Planning
November 8, 2018

FirstEnergy Transmission – Annual Planning Analysis

- **FirstEnergy (FE) performs separate analysis from PJM on the FE zonal areas**
- **PJM and FE perform analysis consistent with NERC and ReliabilityFrist (RF) planning requirements**
- **PJM focus is to apply PJM criteria (Manual 14B: Attachment D & G)**
- **FE focus is to apply, based on the system planning model:**
  - **FE Transmission Planning Criteria**
  - **FE Facility Connection Requirements**
  - **FE Energizing the Future (EtF) Project / Program Methodology**
- **Net result is the validation of system analysis by FE and PJM to then propose baseline or supplemental projects in accordance with the PJM process**

FirstEnergy Transmission – Building the System Model

- **The base FE model is updated annually and use a 50/50 load forecast**
- **The updated FE system model is inserted into the latest available model from NERC/RF Multiregional Modeling Working Group (MMWG)**
- **A 90/10 load forecast sensitivity case as well as other sensitivity cases (ex: light load and maintenance condition analysis) are used to assess constraints and robustness of solutions**
- **FE provides the base model used in developing it's local plan to PJM consistent with any applicable confidentiality restrictions, PJM's CEII process and copyright limitations**

FirstEnergy Transmission – Updating System Loads

The loads in the system models are established using three sources:

1. **FE distribution substations and retail customer transmission connected substations use the FE Internal Load Forecast Data Management System (LFDMS) to forecast loads**

2. **Wholesale customer substations (ex: Rural Electric Cooperatives and Municipals) are also forecasted in LFDMS utilizing information provided by the wholesale customers**

3. **FE aggregated system forecasted loads are provided by the FE Retail Tariff Analysis & Forecasting group**

FirstEnergy Transmission – Planning Criteria

- **Intended to meet or exceed all applicable minimum requirements of the North American Electric Reliability Council (NERC), ReliabilityFirst Corp (RFC) and PJM**

- **Applicable to FirstEnergy owned Bulk Transmission and non-Bulk Transmission facilities**

  - **Bulk Transmission facilities are 100 kV and above**
  - **Non-Bulk Transmission facilities are networked systems less than 100 kV**

- **Address loadability criteria, voltage level criteria, voltage and transient stability requirements, load curtailment criteria, voltage regulation requirements, reactive power requirements and short circuit requirements**

Supporting Document Location: www.pjm.com/planning/planning-criteria

FE Transmission – Supplemental Project Planning Assumptions

The Supplemental Project process categorizes system needs into five categories:

- Equipment Material Condition, Performance and Risk
- Operational Flexibility and Efficiency
- Infrastructure Resilience
- Customer Service
- Other

For FirstEnergy, Transmission system needs that follow the Supplemental Project process are based on:

- ***FirstEnergy Energizing the Future (EtF) Project/Program Methodology*** **document**

And Customer Service connections that follow the Supplemental Project process are based on:

- ***FirstEnergy Requirements for Transmission Connected Facilities document***
- ***FirstEnergy Transmission Planning Criteria***

FE Supplemental Project Planning Assumptions
Global Factors

FirstEnergy Energizing the Future (EtF) Project/Program Methodology

FE Global Factors

– Criticality, Impact on Reliability, Customer Outages
– Failure Risk, Age and Condition, Obsolescence, Operational or Design Limitations.
– System Reliability and Performance
– Substation and Line Equipment Limits
– Reliability of Non-Bulk Electric System (Non-BES) Facilities
– Load at Risk and Customers Impacted

FE Supplemental Project Planning Assumptions
Condition Projects

1.1 Substation Condition Rebuild / Replacement

Evaluation of Component and Operational / Maintenance History
– Circuit Breakers, Power Transformers, Protection Systems, Capacitor Banks…
– Line Arresters, Switches, Risers and Connections, Metering, Facilities…

1.2 Line Condition Rebuild / Replacement

Evaluation of Component and Operational / Maintenance History
– Steel and Wood Pole, Line Hardware, Switches Conductor…
– Evaluated with historical or recently completed field condition assessments.
  - Results in projects to rebuild the Transmission line or the replacement of components.

FE Supplemental Project Planning Assumptions
System Performance

2.0 System Performance

Evaluation of the transmission system to improve the overall reliability and system performance for customers.

2.1 Equipment / Technology / Design Upgrades
2.2 System Conversion Methodology
2.3 Network Radial Lines
2.4 Reconductor / Rebuild Transmission Line
2.5 Add / Replace Transformers
2.6 Add / Expand Bus Configuration
2.7 Build New Transmission Line
2.8 Generation Switching Stations
2.9 Upgrade Relay Schemes
2.10 Automatic Sectionalizing Schemes
2.11 Add SCADA Control
2.12 Improve Fault Recorder Communications

NOTE: Certain Condition and Operational Flexibility needs may also be classified as contributing to an System Performance need.

FE Supplemental Project Planning Assumptions
Operational Flexibility

3.0 Operational Flexibility

Strengthen and improve the reliability and performance of the Transmission system for future capacity and operational flexibility.

3.1 Permanent Reactive Device

3.2 Replace Breakers

3.3 Operational Metering

NOTE: Certain Condition and Performance needs may also be classified as contributing to an Operational Flexibility need.