SRRTEP Meeting – 2020 Assumptions for Exelon Utilities

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December 16, 2019 - Mid-Atlantic

December 18, 2019 - West

Exelon

Agenda

- Base Case Power Flow Model
- PJM Baseline Analysis
- FERC 715 Analysis
- Supplemental Project Drivers
- Asset Management and Multi Drivers
- Retirement of Existing Facilities

Base Case Power Flow Model

- Use PJM developed RTEP power flow models for all assessments if available
  - Updated with latest information including updated project status and distribution load profiles, etc.
- Use most recent ERAG MMWG series power flow models if PJM RTEP cases not available
- Loads will be modeled consistently with the 2020 PJM Load Forecast Report

Baseline Analysis

- All Exelon Utilities study their respective transmission systems to identify the need for baseline reliability upgrades:
  - NERC planning criteria
  - PJM criteria (Manual 14B)
  - Exelon Utilities' FERC Form 715 planning criteria
- Exelon Utilities works with PJM to analyze and validate results
- Potential violations are included in a PJM open window per schedule 6 of the PJM Operating Agreement
- Proposed solutions are presented to TEAC or Sub-Regional RTEP and, once confirmed, become baseline projects
- All applicable cases, analysis files and available results can be made accessible through PJM's CEII process.

FERC Form 715 Planning Criteria

- There have been no Exelon Utility Planning Criteria changes from the April 2019 FERC Form 715 annual submittal
- The specific details of the Planning Criteria established for the Exelon Utilities can be found through the following link.

  Exelon Utilities Planning Criteria

- Exelon Utilities' Transmission Planning Criteria compliments PJM planning criteria detailed in attachments D and G of Manual 14B
- Exelon Utilities specific planning criteria include: contingency analysis on lower voltage transmission facilities, additional 90/10 load analysis studies, additional voltage recovery and stability studies, and the system impacts due to the variability of wind generation.

Supplemental Project Drivers

#	Driver	Definition
1	Equipment Material Condition, Performance and Risk	Degraded equipment performance, material condition, obsolescence, equipment failure, employee and public safety and environmental impact.
2	Operational Flexibility and Efficiency	Optimizing system configuration, equipment duty cycles and restoration capability, minimize outages.
3	Infrastructure Resilience	Improve system ability to anticipate, absorb, adapt to, and/or rapidly recover from a potentially disruptive event, including severe weather, geo-magnetic disturbances, physical and cyber security challenges, critical infrastructure reduction.
4	Customer Service	Service to new and existing customers. Interconnect new customer load. Address customer transmission & distribution load growth, outage exposure, and equipment loading.
5	Other	Meet objectives not included in other definitions including: industry recommendations, potential generation retirements, technological pilot projects, and governmental / utility commission regulations.

Supplemental Project Drivers

Equipment Material Condition, Performance and Risk

- Equipment Material Condition, Performance and Risk:
  Degraded equipment performance, material condition, obsolescence, equipment failure, employee and public safety and environmental impact

  Identify and make the needed investments to ensure the safe and reliable operation of the transmission system. These decisions can be based on equipment performance, obsolescence and expected service life concerns, condition of equipment, reliability impact, increased maintenance costs, and engineering recommendations.

- Project drivers can include:
  - Employee and public safety
  - Transmission infrastructure replacements (EOL/condition/obsolescence) that are consistent with efficient asset management decisions
  - Programmatic replacement of breakers, relays, wood poles, cables, etc.
  - Environmental drivers
  - Supply Strategy guidance resulting in standard conductor sizes and other standard equipment
  - Building new 69kV for future higher voltage conversion and eliminating 69kV in areas with dense load pockets, stranded load, or where there have been reliability performance issues
  - Facility Relocation

Supplemental Project Drivers

Operational Flexibility and Efficiency

- **Operational Flexibility and Efficiency:**
  Optimizing system configuration, equipment duty cycles and restoration capability, minimize outages

  Planning teams coordinate with Operations to identify needed improvements on the transmission system that will provide for improved operating flexibility. These projects can reduce the impact and limit exposure to our customers for planned or forced events and can facilitate improved restoration times. These projects can opportunistically bring the system up to current standards and design principals.

- **Project drivers can include:**
  - Internal and/or regulatory design guidelines or PJM minimum design standards
  - Enhancing system functionality, flexibility, or operability
  - Removal of existing SPS/RAS/LPS
  - Networking existing radial facilities
  - Diversifying multiple radial circuits on the same structures from the same sources
  - Limiting the number of taps on a transmission line
  - Increasing system capacity
  - Remedy recurring operational problems
  - Provide Operations more options to deal with non-standard operating conditions
  - Follow internal Transmission & Substation recommended designs

Supplemental Project Drivers

Infrastructure Resilience

- Infrastructure Resilience:
  Improve system ability to anticipate, absorb, adapt to, and/or rapidly recover from a potentially disruptive event, including severe weather, geo-magnetic disturbances, physical and cyber security challenges, critical infrastructure reduction.

  Improving the resilience of the system is an important consideration in the design of the transmission system and these projects are designed to reduce the impact to our customers for disruptive natural or man made events. These projects can also improve the operability of the system and will reduce customer exposure.

- Project drivers can include:
  - Resiliency enhancements
  - Network existing radial facilities
  - Diversify multiple radial circuits on the same structures from the same sources
  - Limit the number of taps on a transmission line
  - Building new 69kV for future higher voltage conversion and eliminating 69kV in areas with dense load pockets, stranded load, or where there have been reliability performance issues

Supplemental Project Drivers
Customer Service

- **Customer Service:**
  Service to new and existing customers. Interconnect new customer load. Address Transmission & Distribution load growth, customer outage exposure, equipment loading.

  Projects that accommodate new, increasing, or future load so that the system can reliably address customer needs. Also includes improvements to facilities that serve our customers.

- **Project drivers can include:**
  - Transmission System configuration changes due to new or expansion of existing distribution substations
  - New transmission customer interconnections or modification to an existing customer
  - Building to support future economic growth
  - Wholesale customers on transmission voltages

- **Link to Exelon Utilities Transmission Facility Interconnection Requirements:**

  Transmission Facility Interconnection Requirements

Supplemental Project Drivers

Other

- **Other:**

  Meet objectives not included in other definitions.

- **Project drivers can include:**
  - Industry recommendations
  - Potential generation retirements
  - Technological pilot projects
  - Governmental / Utility Commission Regulations
  - Others

Asset Management and Multi Drivers

- Asset Management
  - Some Asset Management Drivers that are not subject to FERC 890 may be presented utilizing some parts of the M3 process for purposes of transparency.
  - Link to Exelon Asset Management Strategy Document:
    - Asset Management Document
- Multi Drivers
  - Assessment of system infrastructure future performance focusing on facilities serving major urban areas that include more than one category of specific supplemental project drivers. Such as:
    - Load growth – including future electrification initiatives.
    - Reliability – Large sections of older transmission infrastructure serving heavily populated areas.
    - Resiliency – Risk assessment of the impacts of multiple simultaneous facility outages.
    - Obsolescence – Equipment no longer supported by manufacturers and out of date technologies.

Retirement of Existing Facilities

Statement

The purpose of transmission planning is to ensure that the capacity of the existing transmission system is maintained or expanded as needed to ensure the reliability, efficiency, safety, resilience and security of the transmission system for the benefit of customers. There are no national, regional or local standards or criteria driving the retirement and not replacement of existing facilities. Although in specific situations, facilities may be removed and not replaced as dictated by system and/or customer needs, or the design and construction of new or replacement transmission projects, decisions to not replace individual facilities may have the cumulative effect of negatively impacting the reliability, efficiency, safety, resilience and security of the transmission system. That cumulative negative impact could also drive the need for additional facilities to be constructed to compensate for those removed, including greenfield installations. Accordingly, existing facilities are maintained in service or retired based on Good Utility Practice.