Duke Energy Ohio & Kentucky

Local Planning Assumptions, 12-05-2019

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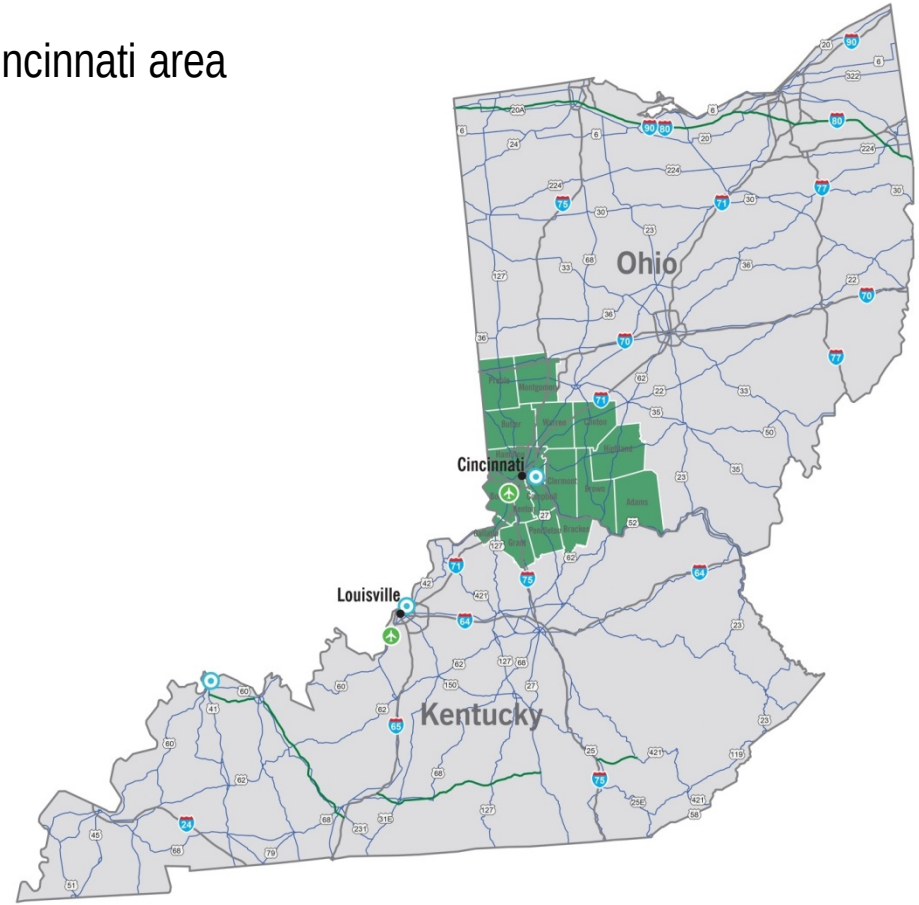
- DEOK serves the greater Cincinnati area including northern Kentucky
- Transmission Facilities
  - 345 kV 364 miles
  - 138 kV 685 miles
  - 69 kV 585 miles



- Load Flow Models
  - DEOK uses RTEP and MMWG models for analysis
  - DEOK works with PJM to develop the RTEP and MMWG models
    - Topology verified
    - Contingencies verified
    - Load profile submitted
    - Seasonal ratings profiles submitted
  - DEOK model updates are submitted through MOD

- Baseline Assessment
  - PJM analyzes the DEOK area using RTEP model
  - DEOK validates the analysis and coordinates with PJM to identify baseline reliability upgrades
    - NERC reliability criteria
    - PJM criteria
    - DEOK transmission planning criteria filed under FERC Form 715

      Available on PJM website

      (https://www.pjm.com/planning/planning-criteria/to-planning-criteria.aspx)

  - Baseline needs and solutions are presented to the Subregional RTEP Committee – Western and Transmission Expansion Advisory Committee

- Supplemental Needs and Solutions
  - Presented at the Subregional RTEP Committee – Western and Transmission Expansion Advisory Committee meetings
  - Drivers:
    - Equipment condition, performance and risk
    - Operational flexibility and efficiency
    - Infrastructure resilience
    - Customer service
    - Other

- Equipment Condition, Performance and Risk
  - Degraded equipment performance, material condition, obsolescence, equipment failure, employee and public safety and environmental impact
    - Criteria includes:
      - Outage frequency and duration
      - At risk load
      - Number of customers and customer type affected
      - Normal loading and loading limits
      - Negative maintenance trends
      - Increasing maintenance costs
      - Availability of spare parts or vendor support
      - Expected service life/age of equipment

- Equipment Condition, Performance and Risk

  - Criteria includes (continued):
    - Related ancillary equipment performance
    - Programmatic replacement of equipment
    - Long lead time or construction time required for replacement
    - Risk of failure based on industry or company data

- Operational Flexibility and Efficiency
  - Optimizing system configuration, equipment duty cycles and restoration capability, minimize outages
    - Criteria includes:
      - Operational options for switching
      - Networking of radial lines
      - Remedy recurring operational problems
      - Provide more options to deal with non-standard operating conditions
      - Enhance system operational functionality

- 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
    - Criteria includes:
      - Improving system's ability to absorb and recover from an interruption
      - Networking radial lines
      - Separate circuits from shared structures or paths
      - Adding infrastructure to limit circuit and/or load loss
      - Diversify sources and source paths to load areas

- Customer Service
  - Service to new and existing customers. Interconnect new customer load. Address distribution load growth, customer outage exposure, equipment loading
    - Criteria includes:

      Serving new customer load

      Serving additional customer load

      Customer requested infrastructure

      New infrastructure to support economic development

      New customer interconnections

      DEOK Facility Connection Requirements available on PJM website (https://www.pjm.com/planning/design-engineering/to-tech-standards/deok.aspx)

- Other
  - Meet objectives not included in other definitions
    - Criteria includes:
      - New technology pilot projects
      - Utility industry recommendations

- Retirement of Existing Facilities
  - 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.

- Asset Management
  - Some asset management criteria may be presented as part of needs and solutions during the M3 process. These considerations are beyond the scope of FERC Order 890 but may be presented to help stakeholders better understand the need or solution, and for purposes of transparency.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