EKPC Local Planning Assumptions

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EKPC Project Identification Process

- EKPC develops three different categories of projects:
  - **Baseline projects** are projects that address planning criteria violations which originate from internal analysis and/or PJM RTEP analysis.
  - **Network upgrade projects** are developed in conjunction with PJM to provide facilities for connection of new generation facilities and/or upgrades in output of existing generation facilities.
  - **Supplemental projects** are not covered by baseline analysis and address the following drivers:
    - Equipment Material Condition, Performance and Risk
    - Operational Flexibility and Efficiency
    - Customer Service
    - Infrastructure Resilience
    - Other

EKPC Baseline Planning Criteria

- EKPC plans its system to meet:
  - NERC TPL Reliability Standards
  - SERC regional criteria
  - PJM planning criteria
  - EKPC transmission planning criteria
- EKPC planning criteria for both BES and non-BES facilities is similar to Table 1 of the existing NERC TPL Standards in most respects
  - Primary difference -- EKPC considers the loss of a line, transformer, or generator in conjunction with the loss of a generator to be a single-contingency (P1) event subject to the performance requirements for P1 events.
  - EKPC planning criteria are posted at http://www.pjm.com/planning/planning-criteria/to-planning-criteria.aspx

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EKPC Baseline Planning Methodology & Assumptions

- EKPC will share its baseline assessment results with PJM
- EKPC generally uses a 10-year baseline planning horizon, but will expand the planning horizon to 15 or 20 years, as appropriate and necessary for specific areas of its system.

EKPC Baseline Planning Methodology & Assumptions (cont.)

- EKPC jointly develops internal base cases with LGE/KU for EKPC baseline project planning studies
  - EKPC and LGE/KU have 54 free-flowing interconnections
  - EKPC has 57 distribution delivery points connected to the LGE/KU system (600+ MW at peak)
  - LGE/KU has 17 distribution delivery points connected to the EKPC system (100+ MW at peak)
  - System topology is based on the most recent MMWG modeling efforts extended to include both the EKPC and LGE/KU respective area topology updates since the creation of the MMWG models.
    - All EKPC known future baseline and supplemental projects are modeled as in service in the appropriate year.
- EKPC considers external contingencies from neighboring systems (AEP, DEOK, LGE/KU, and TVA) in addition to all internal EKPC contingencies in its baseline project planning

EKPC Baseline Planning Methodology & Assumptions (cont.)

- EKPC uses the following load forecast assumptions/methodology:
  - EKPC uses substation load forecasts developed internally
    - Developed using a top-down approach
      - Start with overall EKPC system forecast developed by EKPC Load Forecasting department
      - The overall EKPC system forecast is segmented by the EKPC Load Forecasting department among the 16 EKPC distribution cooperatives based on a variety of factors, including historical load, anticipated growth in service area residential, commercial, and industrial builds, etc.
      - EKPC Transmission Planning then allocates each distribution cooperative forecast among the delivery points for that distribution cooperative using similar factors.
  - EKPC baseline planning models use two sets of forecast probabilities
    - 50/50 probability for summer and winter (equal probability of actual load being above or below the forecast)
    - 90/10 probability for summer and winter (10% probability of actual load reaching the forecast)

EKPC Baseline Planning Methodology & Assumptions (cont.)

- EKPC uses the following assumptions:
  - Base case generation assumptions – EKPC generators are dispatched as needed to meet EKPC load based on economic merit order.
  - EKPC uses the generation dispatch scenarios below during annual planning analysis. These generation dispatch scenarios, when coupled with a contingency, are assumed to create the worst case power flow condition.

Generation Outage	Replacement Generation Imported From
Big Sandy	South
Brown 3	North
Brown 3	South
Cooper 1&2	North
Cooper 1&2	South
Ghent 1	South
JK Smith 9 & 10	North
JK Smith 9 & 10	South
Mill Creek 4	South
Spurlock 2	South
Trimble 2	South

Supplemental Projects

- Supplemental Projects – EKPC supplemental projects are identified based on the following drivers:
  - Equipment Material Condition, Performance and Risk
  - Operational Flexibility and Efficiency
  - Customer Service
  - Infrastructure Resilience
  - Other

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Supplemental Projects – Equipment Material Condition, Performance and Risk

- Equipment Material Condition, Performance and Risk projects are identified to address degraded equipment performance, material condition, obsolescence, equipment failure, safety and environmental impact.
- Project drivers include:
  - Safety
  - Transmission infrastructure replacements based on condition, obsolescence, or equipment that has reached its end of life
  - Environmental drivers
  - Other
- Inputs considered include:
  - Outage history, maintenance history, condition assessment reports, number of customers/amount of load/type of load at risk, etc.

Supplemental Projects – Operational Flexibility and Efficiency

- Operational Flexibility and Efficiency projects are identified to optimize system configuration, equipment duty cycles, and restoration capabilities and to minimize outages.
  - Project drivers include:
    - Enhancing system functionality, flexibility, or operability
    - Recurring real time equipment overloads
    - PCLLRW frequency
    - Number of outages and annual outage duration
    - Load exposure
  - Inputs considered include:
    - Number of customers/amount of load/type of load at risk, number of PCLLRWs, restrictions in ability to take maintenance outages, operational loading/voltage concerns, etc.

Supplemental Projects – Customer Service

- Customer service projects are identified to address customer outage exposure, equipment loading, load growth or to interconnect new customer load.
  - Project drivers include:
    - Member System Needs
      - Identified based on Member System requirements for service to end-use customers
    - SAIDI, CAIDI, number of outages and annual outage durations
    - New customer connections
  - Inputs considered include:
    - Customer input, ability to serve from existing system, outage history, etc.

Supplemental Projects – Infrastructure Resilience

- Infrastructure Resilience projects improve the system's ability to anticipate, absorb, adapt to, and/or rapidly recover from a potentially disruptive event, including severe weather, geo-magnetic disturbances or physical and cyber security challenges.
- Project drivers include:
  - Network existing radial facilities
  - Building new 69kV for future higher voltage conversion and eliminate 69kV in dense load pockets
  - Adding redundant facilities
  - Infrastructure hardening (additional physical/cyber security, replacement of equipment, etc.)
  - Other
- Inputs considered include:
  - Load exposure, long-term plan compatibility, outage history, type/amount of load at risk, environmental considerations, etc.

Supplemental Projects – Other

- These projects would address concerns not discussed in the other definitions.
- Project drivers include:
  - Industry recommendations
  - Technological pilot projects
  - Other

EKPC Project Approval Process

- EKPC has a Capital Management Committee (CMC)
  - Members include all levels of leadership at the Manager level and above in the Power Delivery business unit.
  - Process starts with a problem to be addressed.
    - SME Team develops solution projects (alternatives) to address the identified problem.
    - All solution projects and the recommended solution are presented to the CMC.
    - CMC reviews solutions and approves projects.
  - All projects are approved by the CMC, COO, CEO and the EKPC Board.

EKPC/PJM Coordination and RTEP

- EKPC will share its assessment results with PJM
- EKPC will work with PJM to develop appropriate upgrades/mitigation plans for identified planning criteria violations
- EKPC will coordinate with PJM to present identified needs, potential solutions, and recommended projects at the PJM sub-regional RTEP meetings and TEAC meetings as necessary to consider stakeholder needs and potential solutions.

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