



Fitchburg Gas and Electric Light Company

GMAC Planning Process Presentation

May 9, 2023



Planning Efforts

- System Planning
 - 115kV and 69kV portions of the system
- Distribution Planning
 - Distribution Substation Equipment
 - Distribution Circuits from Substation to High-Side of Distribution Transformers
- Area Network
 - Fitchburg Downtown Secondary Network
- Reliability Study
- Project Evaluation Process

System Planning

Performed Annually

- Load Levels
 - 10-Year Overall System Peak Load and Minimum Daytime Load Forecasts
 - 10-Year Distribution Peak Load and DER Forecasts
 - 10-Year Peak Load Grown an Additional 10% for Master Planning
- System Model Development
 - Technical Data Verified/Updated for All Components
 - Thermal Rating, Impedances, Acceptable Voltage Limits
 - Peak Hour and Minimum Daytime Load Snapshot Modeling
 - Future Year Models Created Utilizing Snapshot Models and System and Distribution Load Forecasts
- Analysis
 - Loading Evaluation of 115kV System Supply to the High-Side Bus of Distribution Substations
 - Voltage Limit Check of 115kV System Supply to the Low-Side Bus of Distribution Substations
 - Loading and Voltage Evaluation Performed Under the Following Scenarios
 - Defined N-1 Contingencies
 - Forecasted Peak Load Levels
 - Forecasts Minimum Daytime Load Levels
 - Power Factor Compliance Evaluation at Transmission Interchange

Distribution Planning

Performed Annually

- **Load Levels**
 - 5-Year Distribution Peak Load and DER Forecasts
 - 10-Year Forecasts Used for Master Planning
- **Circuit Model Development**
 - 1/3 of Circuits Get Exported from GIS Annually into Circuit Analysis Software
 - Customer Metering Data Utilized for Load Allocation
 - All Circuit Models Updated with Peak Load Forecasts
 - Minimum Daytime Load Models Developed for all Circuits with at least
 - 500kW of aggregate DER or
 - 15% of circuits historical peak load in aggregate DER
- **Analysis**
 - Loading Evaluation for High-Side Distribution Substation Bus to High-Side of Distribution Transformers
 - Voltage Limit Check from the Low-Side Bus of Distribution Substations to the High-Side of Distribution Transformers
 - Evaluation of Mainline Circuit Tie Capability
 - VVO Analysis
 - Protection Review
 - Distribution Master Planning Evaluation

Area Network Planning

Performed As Needed

- Load Levels
 - 5-Year Distribution Peak Load Forecasts
 - 10-Year Forecasts Used for Master Planning
- Scope
 - Downtown Fitchburg Secondary Network
 - 13.8 kV Supply Circuits
 - Network Transformers
 - Secondary Network “Grid”
- Analysis
 - Loading and Voltage Violation Review
 - N-1 and N-1-1 Scenarios

Reliability Study

Performed Annually

- Review of Past Performance
 - Worst Outages
 - Worst Performing Circuits
 - Multiple Device Operations
 - Customers with Most Number of Outages
 - Common Outage Causes
 - Equipment Failure Trends
 - Forestry Review
- Project Development
 - Forestry Recommendations
 - Capital Improvement Project Development

Project Evaluation Process

Utilized for All Loading and Voltage Driven Capital Improvement Projects

- No Alternatives Required for “Traditional” Projects Estimated to Cost \$100k (Labor and Material, no Overheads) or Less
- “Traditional” Projects Costing Between \$100k and \$500k require the following:
 - Multiple Traditional Options
 - Cost, Reliability and System Master Plan Compliance Review
- Traditional Projects Costing Project costing more than more than \$500k with a start date less than three years in the future require the following
 - Multiple Traditional Options
 - Cost, Reliability and System Master Plan Compliance Review
- Traditional Projects Costing Project costing more than more than \$500k with a start date three to five years in the future require the following:
 - Multiple Traditional Options
 - RFP Process of “Non-Traditional” Alternatives
 - Detailed Cost/Benefit Analysis of “Traditional” and “Non-Traditional” Options
- For Any Project Regardless of Timing or Cost Managers and/or VP of Engineering can Require “Non-Traditional” Alternatives to be Reviewed