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2017

DUQUESNE LIGHT COMPANY TRANSMISSION PLANNING CRITERIA

Duquesne Light Company Transmission Planning Criteria
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Compiled from:
Duquesne Light Company's Comprehensive Transmission Reliability Plan, July 2005
Duquesne Light Company's Strategic Transmission Plan, December 2005
Duquesne Light Company's FERC Form 715 Annual Transmission Planning and Evaluation Report, March 2007

SECTION 1: GENERAL OVERVIEW

The reliability guidelines used to plan the transmission system of Duquesne Light Company (DLC) are the criteria by which the ability of the transmission system to serve the future load is determined. In addition to load growth, any significant changes to the generation capacity on DLC's or neighboring utility systems must also be included in any evaluation.

Duquesne Light Company (DLC) defines its bulk electric transmission system as facilities with voltages of 69 kV and above this includes transformers with low side voltages of 69 kV and 138 kV and lines with voltages of 69 kV, 138 kV, and 345 kV. The transmission system consists of over 670 circuit-miles of overhead and underground transmission lines.

The DLC service territory is governed by the reliability standards established by the North American Electric Reliability Corporation (NERC), ReliabilityFirst Corporation (RF), and PJM Interconnections, LLC (PJM) organizations. DLC became a member of the PJM Interconnection on January 1, 2005.

The exact planning requirements of these regulated institutions can be found on their websites and external publications. DLC will adhere to any requirements directed by these agencies in order to meet their established reliability planning criteria.

In addition to these external organizations, DLC also has its own internal planning criteria which will meet or exceed the planning standards above. The following assessments and criteria will be used for all DLC transmission facilities.

SECTION 2: TRANSMISSION PLANNING YEARLY ASSESSMENTS

DLC performs seasonal engineering assessments in order to test for the adequacy of its transmission system for known, short-term conditions. DLC prepares an individual company assessment of the DLC zone bulk electric system for the up-coming peak summer and peak winter load period. This assessment includes the effect of known, planned, and forced outages on overall system performance.

DLC also performs an annual 5-year and 10-year transmission (future) assessment of its local facilities to ensure ongoing adequate delivery service to retail customers in DLC's service territory in accordance with DLC's local reliability standards and distribution service restoration policies.

The future year assessment ensures that the appropriate equipment loading is determined by using historical and projected circuit loads. In order to allow adequate construction time for new projects or system upgrades, load forecasting is essential in anticipating future overloads on existing facilities. This way, relief projects are scheduled prior to the actual occurrence of such overloads. This also helps to minimize loss of

life of equipment as a result of any anticipated overloads. As part of the continuing data collection, records of current and historical loads on individual circuits are maintained.

As part of DLC's assessment, a load flow program (e.g., the Siemens PSS/E Load Flow program) is used to perform both a thermal/voltage analysis and a transient stability analysis of the transmission system. A short-circuit program (e.g., the Electrocon CAPE program) is used to perform the short-circuit analyses. DLC reviews the system using a base case scenario with all facilities in service to simulate normal operating conditions. DLC engineers seek operator input to identify operational issues or outage coordination scenarios that may not appear in the planning studies. DLC engineers perform the short-circuit analysis to determine whether circuit breakers have interrupting capability for faults that they will be expected to interrupt as well.

Lastly, the use of transmission to replace antiquated system designs where substations rely solely on sub-transmission support is considered. Opportunities to reduce inventory, maintenance, and problems created by load growth in areas of marginal capacity are analyzed when applicable.

These criteria form the basis for the planning of DLC transmission facilities. These practices are not associated with NERC Reliability Standards; however, they demonstrate that transmission planning takes additional factors into account in order to ensure the reliability of the transmission system.

Solutions to identify transmission system problems and concerns are determined only after applying the various planning criteria, evaluating all practical alternatives, and selecting the most cost effective solutions.

Opportunities to simplify and/or standardize the transmission system are explored as well as opportunities to evaluate the intelligence and protection of the electric grid. DLC evaluates all solutions through its Capital Planning process. The resulting plan is treated as a dynamic document and subsequently reviewed, revised, expanded, and amended as additional issues and/or changes in existing issues arise.

SECTION 3: TRANSMISSION CRITERIA

In planning the transmission system, DLC believes more stringent reliability guidelines are appropriate to address the needs of a major city. The City of Pittsburgh and its major load centers supporting its urban population and its critical services and infrastructure utilized by the surrounding tri-state area, including a concentration of hospitals and universities, require reliability standards for transmission service more stringent than NERC criteria alone provides.

The DLC transmission system relies on underground cables to supply the City of Pittsburgh. Some of these cables may share a common trench or a common oil return pipe. Outages of these common facilities are simulated and transmission solutions are developed so that no loss of load results. Underground cable outages could be long in duration and therefore, the remainder of the system should continue to operate

reliably and within its normal rating limits following such events. As a result, DLC will advocate transmission solutions so that no loss of load occurs following an N-2 contingency supporting the City of Pittsburgh.

Additionally, DLC endeavors to diversify sources of supply, wherever possible, so that no one substation is the sole source of supply to DLC's load centers. DLC also takes into consideration existing major facilities that are obsolete and/or known to require high and expensive maintenance, options are evaluated to reduce or eliminate those costs.

DLC's transmission system is also required to be reviewed and modified in order to reliably support and supply its distribution load. Transmission projects can arise from efforts to accommodate load growth, back-up capacity needs of the underlying electrical system, or to expand the intelligence of the electric grid.

Where feasible and cost effective, and in order to ensure reliable service to transmission substations, the Transmission Planning department has also developed guidelines which stipulate that once a bulk power substation exceeds or is projected to exceed 100 MVA (approximately 22,000 customers), the station will require three (3) transmission sources. This practice ensures continuous reliable service during routine maintenance scenarios as well as single contingency events.

Document Control

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