Emera Maine’s Local System Plan – Bangor Hydro District
Needs Assessment/Potential Solutions
Local Planning Advisory Committee Meeting

Emera Maine Representative:
Jeffrey Fenn, P.E., SGC Engineering LLC
Purpose of Local System Plan (LSP)

- Per Appendix 1 of Attachment K of the ISO-New England OATT – The LSP is an annual report that:
  - Describes non-PTF transmission system reliability needs
  - Reflects
    - Local system planning studies
    - Proposed solutions
  - Identifies
    - Local planning process
    - Criteria, Data and Assumptions
  - Gives opportunity for input
    - Local needs and solutions
    - Public Policy needs
LSP Communication

- LSP is communicated via Transmission Owners Planning Advisory Committee (TOPAC) meeting following an ISO-New England PAC meeting.

- The material is posted prior to the TOPAC meeting (via the ISO-New England PAC posting system).

- Transmission Customers and Stakeholders have 30 days after TOPAC presentation to provide written comments for consideration by Emera Maine.
LSP Communication (continued)

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- EM LSP is located at:
Local System Planning Process

The process is “Needs Assessment” followed by Solutions Proposals

- Local system needs can result from:
  - Load growth
  - Sub-area reliability assessments
  - Point of delivery request from customers
  - Generation interconnection requests (in accordance with appropriate generator interconnection procedures)
  - Public Policy Requirements
  - Asset Condition

- Local System Plan consists of:
  - Summary of needs assessment results
  - Listing of criteria, data and study assumptions
  - Identification of proposed alternatives
  - Solution study results and selection of preferred alternative
Criteria, Data, and Assumptions

- Loads are based on the New England specific area as provided in the ISO-New England MOD case, Emera Maine specific forecasts and local customer needs are used to refine this.

- Studies use relevant assumptions regarding transmission, generation and demand resources found in the latest ISO-New England Regional System Plan.

- Criteria follows ISO-New England as well as TPL criteria or local planning criteria as appropriate – Local criteria listed at the end of this presentation.
LSP Project List

- The LSP project list is a cumulative listing of proposed transmission solutions intended to meet local needs.
- Similar to the ISO-New England PTF RSP, the LSP contains the status of each project:
  - **Concept** – Project is under consideration as a solution to a partial needs assessment.
  - **Proposed** – Needs assessment completed and project proposed as a solution, but not formally budgeted.
  - **Planned** – Formally budgeted and, if necessary, PPA/i.3.9 approved by ISO-New England.
  - **Under Construction** – Significant engineering and internal approvals in process and project is being implemented.
  - **In-Service** – Project used and useful.
# LSP – Concept

<table>
<thead>
<tr>
<th>Need</th>
<th>Needs Assessment</th>
<th>Service Area</th>
<th>Name</th>
<th>Status</th>
<th>Potential Solutions</th>
<th>In-Service Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliability</td>
<td>Condition</td>
<td>Bangor</td>
<td>Line 84</td>
<td>Concept</td>
<td>46kV L84 Rebuild</td>
<td>2020</td>
</tr>
<tr>
<td>Reliability</td>
<td>Condition</td>
<td>Bangor</td>
<td>Line 8 Partial Rebuild</td>
<td>Concept</td>
<td>Partial 46kV Line Rebuild</td>
<td>2019</td>
</tr>
</tbody>
</table>
## LSP – Proposed

<table>
<thead>
<tr>
<th>Need</th>
<th>Needs Assessment</th>
<th>Service Area</th>
<th>Project Name</th>
<th>Status</th>
<th>Solution</th>
<th>Project In-Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliability</td>
<td>Condition and MDOT Road Job</td>
<td>Washington County</td>
<td>Line 20</td>
<td>Proposed</td>
<td>Partial 34.5kV Targeted Rebuild</td>
<td>12/2018</td>
</tr>
<tr>
<td>Need</td>
<td>Needs Assessment</td>
<td>Service Area</td>
<td>Project Name</td>
<td>Status</td>
<td>Solution</td>
<td>Project In-Service</td>
</tr>
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</tr>
<tr>
<td>Reliability</td>
<td>Condition including conductor failure</td>
<td>Bangor</td>
<td>L89 Rebuild (46kV)</td>
<td>Planned</td>
<td>Rebuild</td>
<td>04/2018</td>
</tr>
<tr>
<td>Reliability</td>
<td>Condition</td>
<td>Northern</td>
<td>Chester 46kV T2L Breaker</td>
<td>Planned</td>
<td>Replace</td>
<td>12/2018</td>
</tr>
<tr>
<td>Reliability</td>
<td>Loading</td>
<td>Eastern</td>
<td>Relocate Chester T1 to replace Boggy T1</td>
<td>Planned</td>
<td>115/46kV Transformer Replace</td>
<td>12/2018</td>
</tr>
<tr>
<td>Reliability</td>
<td>Condition</td>
<td>System Wide</td>
<td>Numerous 34.5kV &amp; 46kV subtransmission targeted rebuilds</td>
<td>Planned</td>
<td>Targeted Rebuild</td>
<td>12/2018</td>
</tr>
</tbody>
</table>
# LSP – Under Construction

<table>
<thead>
<tr>
<th>Need</th>
<th>Project In-Service</th>
<th>Service Area</th>
<th>Project Name</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliability</td>
<td>10/2017</td>
<td>Bangor</td>
<td>L75 (46kV) Phase 2 rebuild with distribution underbuild</td>
<td>Under Construction</td>
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<tr>
<td>Reliability</td>
<td>12/2017</td>
<td>Eastern</td>
<td>MDI Reliability</td>
<td>Under Construction</td>
</tr>
<tr>
<td>Reliability</td>
<td>05/2018</td>
<td>Washington County</td>
<td>Cutler – New Load</td>
<td>Under Construction</td>
</tr>
<tr>
<td>Reliability</td>
<td>12/2017</td>
<td>Bangor</td>
<td>Line 80 Partial 46kV Targeted Rebuild</td>
<td>Under Construction</td>
</tr>
<tr>
<td>Reliability</td>
<td>12/2017</td>
<td>Bangor/Eastern</td>
<td>Line 1 Partial 46kV Targeted Rebuild</td>
<td>Under Construction</td>
</tr>
<tr>
<td>Reliability</td>
<td>12/2017</td>
<td>Washington County</td>
<td>Line 25 Partial 34.5kV Targeted Reconductor and Tap to Line 16</td>
<td>Under Construction</td>
</tr>
</tbody>
</table>
# LSP – In-Service

<table>
<thead>
<tr>
<th>Need</th>
<th>Project In-Service</th>
<th>Service Area</th>
<th>Project Name</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliability</td>
<td>4/2017</td>
<td>Bangor</td>
<td>Saxl Park Substation</td>
<td>In-Service</td>
</tr>
<tr>
<td>Reliability</td>
<td>7/2017</td>
<td>Bangor</td>
<td>Line 50 Corinth Village Support</td>
<td>In-Service</td>
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</tbody>
</table>
Maine and Emera Maine – Bangor Hydro District - Major Transmission System
Emera Maine Bangor Hydro District Detailed System
Descriptions - Concept

- **Line 84 Rebuild** – Condition of existing 46kV facilities - 2020
- **Line 8 Partial Rebuild** – This is required due to 46kV thermal ratings. - 2019
Descriptions - Concept
Project Descriptions – Proposed

- **Line 20 Targeted Rebuild** – 34.5kV line from Scotts Hill to Dennysville substations. Structure condition based. Partial rebuild based on condition of segments. MDOT road job driving part of need/schedule.
Project Descriptions - Proposed
Project Descriptions – Planned

- **Line 89 Rebuild** – 46kV Medway to East Millinocket. Many of the structures have deteriorated to the point they need to be replaced. The conductor has thermal and voltage concerns. Last portion of the line rebuild that was started in the 1990’s.

- **Chester 46kV T2L Breaker** – Chester 115/46kV substation breaker replacement due to age and condition.

- **Relocate Chester T1 to Boggy T1** – Relocate 115/46kV Chester T1 to Boggy Brook to increase capacity for the older overloaded Boggy T1.
Numerous 34.5kV and 46kV subtransmission targeted rebuilds – Numerous subtransmission lines have structure condition issues and need to be partially rebuilt. Condition is based on regular testing of the structures, and the full line(s) do not have to be rebuilt. (Not on map)
Project Descriptions – Under Construction

- **Line 75 Phase 2 Rebuild** – Rebuild part of 46kV L75 along with its distribution underbuild. This is required due to condition as well as L75 conductor rating.

- **MDI Reliability** – A second 34.5kV transmission line is required to improve reliability and serve load growth, including rebuild/replacement of existing Bar Harbor substation

- **Cutler** – 34.5kV line extension associated with new area load
Project Descriptions – Under Construction

- **Line 80 Targeted Rebuild** – 46kV line from Milford to Sanford substations. Structure condition based need for partial targeted rebuild.

- **Line 1 Targeted Rebuild** – 46kV line from Graham to Ellsworth substations. Structure condition based. Partial rebuild based on condition of segments.

- **Line 25 Targeted Rebuild and Tap** – 34.5kV line from new L16 tap to Jonesport substation. Structure condition based and Reliability need. Partial rebuild based on condition of segments.
Project Descriptions – Under Construction
Local System Planning Criteria

Criteria follows ISO-New England as well as TPL criteria or local planning criteria as appropriate

- The transmission system for purposes of this study is defined as those system facilities that are operated at 34.5kV and above and are not considered to be under ISO-NE planning (in general non-PTF).
- The standard of service to be provided dictates the need for changes to the existing system. It is necessary to consider the capability of transmission system elements, possible equipment failures, and the impact of failures on the ability to serve area loads.
- Transmission equipment is designed to operate within certain capabilities. The power that may be transferred over transmission lines depends upon the current carrying capacity of the wire and/or the required clearances of lines above ground. Transformers are limited by their heat dissipation capability. Circuit breakers or switches are designed to sustain a certain continuous amount of current. Also, the operation of customer electrical equipment requires that voltage be maintained within a certain acceptable range. Transmission system facilities are capable of regulating voltage within a limited range by varying reactive power and changing transformer tap settings.
Local System Planning Criteria

- Since all equipment is subject to breakdown, it is necessary to consider the consequence of such failures. One possible outcome could be the overload of other equipment that remains in service. For example, if one of two parallel lines trips, the remaining line may become overloaded. Overload beyond emergency ratings must be avoided due to possible permanent damage to the equipment or for public safety. Another consequence of equipment failure is the loss of power supply to customer load. This could occur with the loss of a radial transmission line or as the result of the cascaded outage of a looped transmission system. The loss of supply is critical to loads such as industrial processing, home heating, and hospitals, and must be considered in the design of the transmission system.
Local System Planning Criteria

CAPACITY CRITERION

- No facility is to be loaded in excess of its normal rating for any expected dispatch of system generation at any load level. For any single contingency, no facility is to be loaded in excess of its normal rating for the following load cycle or in excess of its emergency rating immediately following the contingency. Uneconomic generation dispatch may be utilized to maintain power flows within ratings following a contingency.

VOLTAGE CRITERION

- Transmission system voltages are to be maintained between 95% and 105% of operating base voltage under normal system conditions and for any single contingency. Further, voltages on the regulated side of load serving buses are to be maintained between 100% and 105% of operating base voltage under normal system conditions.
Local System Planning Criteria

LOSS OF LOAD CRITERION

- No loss of load in excess of 25 MW is to occur for any single contingency. Loss of load less than 25 MW should be resupplied within 24 hours, except under very adverse conditions.

MAINTENANCE CRITERION

- Transmission system planned maintenance is to be possible without exceeding normal voltage and capacity limits and without loss of load.
Questions?

End