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., LR/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.
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
<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>
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<tbody>
<tr>
<td>Reliability</td>
<td>Condition</td>
<td>Washington County</td>
<td>Line 21 Part 2</td>
<td>Concept</td>
<td>34.5kV Line 21 partial rebuild</td>
<td>2020</td>
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<td>Condition</td>
<td>Northern</td>
<td>Line 84 Rebuild Part 3</td>
<td>Concept</td>
<td>46kV L84 Rebuild</td>
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## 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>
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<td>Reliability</td>
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<td>Stanford Capacitor Circuit Sw.</td>
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<td>Line 1 Partial Rebuild Part 2</td>
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<td>Lincoln Capacitor Circuit Sw.</td>
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<td>Condition</td>
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<td>Lincoln 8502 Breaker Replacement</td>
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<td>Replace Breaker</td>
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<td>Condition</td>
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<td>L86 Rebuild</td>
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<td>L86 Partial Rebuild</td>
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<td>Bangor</td>
<td>Tibbetts L8 Link</td>
<td>Proposed</td>
<td>Line 8 Protection Upgrade</td>
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<td>Condition</td>
<td>Washington County</td>
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<td>Proposed</td>
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<td>Need</td>
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<td>115/46kV Transformer Replace</td>
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<td>Condition</td>
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<td>Numerous 34.5kV &amp; 46kV Transmission Targeted Rebuilds</td>
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<td>Targeted Rebuild</td>
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<td>T3L WCS Breaker replacement</td>
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<td>Remove transformers T1 and T2, reconfigure, replace T3L Bkr</td>
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<td>Bangor</td>
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Maine and Emera Maine – Bangor Hydro District - Major Transmission System
Emera Maine Bangor Hydro District
Detailed System
Descriptions - Concept

- **Line 21 Rebuild Part 2** – 34.5kV WCS to Cutler. Condition of existing transmission facilities
- **Line 84 Rebuild Part 3** – 46kV Mattawamkeag to Medway. Condition of existing transmission facilities
Project Descriptions – Proposed

- Stanford Capacitor Circuit Sw. – 46kV substation capacitor bank where the controlling circuit switcher has become unreliable
- Line 80 Partial Rebuild Part 2 – 46kV Milford to Stanford. Many of the structures have deteriorated to the point they need to be replaced.
- Line 1 Partial Rebuild Part 2 – 46kV Veazie to Ellsworth. Many of the structures have deteriorated to the point they need to be replaced.
- Lincoln Capacitor Circuit Sw. – 46kV substation capacitor bank where the controlling circuit switcher has become unreliable
Project Descriptions – Proposed

- **Lincoln 8502 Breaker Replacement** – 46kV substation line breaker due to be replaced based on condition.
- **Line 86 Partial Rebuild** – 46kV Chester to Medway. Many of the structures have deteriorated to the point they need to be replaced.
- **Tibbetts Line 8 Link** – 46kV Tibbetts St Substation. Reconfigure substation and related protection to allow line normally connected.
- **Line 21 Partial Rebuild** – 34.5kV WCS to Cutler. Condition of existing transmission facilities.
Project Descriptions - Proposed
Project Descriptions – Planned

- 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 Transmission Targeted Rebuilds – Numerous local transmission 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)
WCS T3L Breaker Replacement – Remove old T1 and T2. Reconfigure facilities associated with the removals. Replace T3L breaker due to condition.

Youngs Corner Sw. Station – Rebuild Youngs Corner Switching Station to meet reliability needs.

Line 84 Rebuild Part 2 – 46kV Chester to Mattawamkeag. Condition of existing transmission facilities
Project Descriptions - Planned
Chester Remove T1 for Boggy
Boggy Brook T1 Change

L60

L57

Boggy Brook
115kV

T1

46kV

L68

L67
WCS T3L Breaker Replacement

(WCS 34.5kV)

6106

T3

T3L

T2

(Partial Diagram)
Youngs Corner Sw. Station

Youngs Corner

Burn’s Corner

L32

34.5kV

L40

NE Hbr

L22

Acadia
Project Descriptions – Under Construction

- **Chester T2L Breaker Replacement** – Install new T2L breaker and remove old T1 for reuse at Boggy Brook.

- **Numerous 34.5kV and 46kV Transmission Targeted Rebuilds** – Numerous local transmission 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)
Chester T2L Breaker

Chester 46kV

T1L

L86
L84

L85
L87

T3

T4L

Main

Transf

Chester 115kV

Emera Maine
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.
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.