

National Grid Local System Plan 2016



PAC Presentation – October 19, 2016
Melissa Scott, presenter

Purpose of Local System Plan

The Local System Plan (LSP) is a report that:

- Describes projected improvements to non-PTF that are needed to maintain system reliability
- Reflects:
 - LSP Needs Assessments
 - Corresponding transmission system planning and expansion studies
- Identifies:
 - Local Planning Process (See Appendix)
 - Criteria, Data, and Assumptions (See Appendix)

LSP Communication

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LSP Communication Continued

- The ISO-NE RSP project list links to each individual TO's LSP project list
- National Grid's project list is located at:
 - http://www.nationalgridus.com/oasis/filings_studies.asp
 - "LSP Project List 2016"

LSP Project List

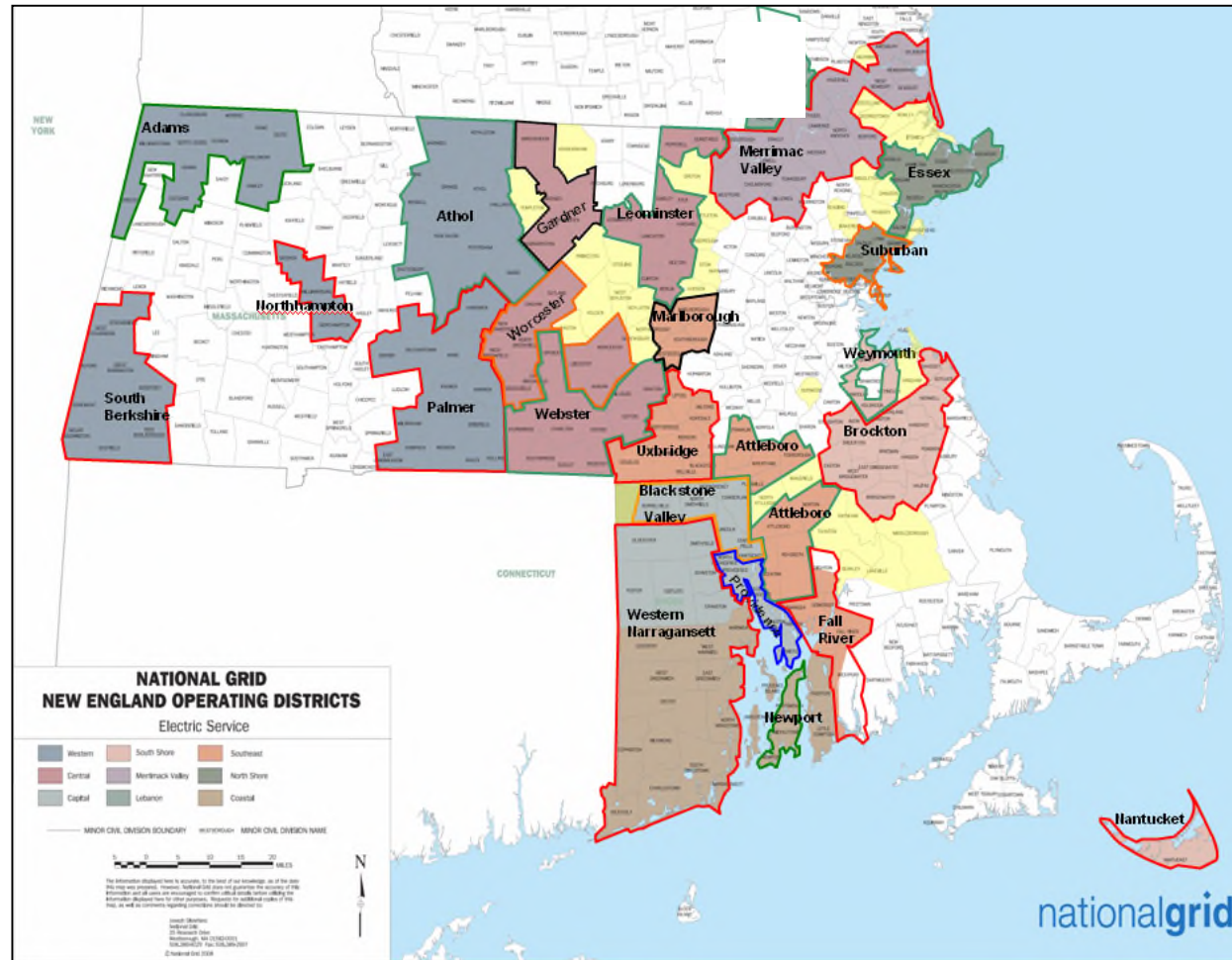
- The LSP Project List is a cumulative listing of proposed regulated transmission solutions that may meet LSP needs
- Lower voltage facilities contained in the LSP Project List pertain to facilities supplying our wholesale municipal customers
- The LSP Project List contains the status of each project:

Project Status Descriptions <i>(may vary slightly from RSP definitions)</i>	
Concept	Project is under consideration as possible solution to a need, but little or no analysis is available
Proposed	National Grid has internally determined that the project is an appropriate solution to a need, but has not yet obtained Proposed Plan Approval (PPA) from ISO-NE (1.3.9 ISO-NE approval)
Planned	PPA has been approved (if required) and has internal approval.
Under Construction	Project is under construction.
In Service	Project is complete

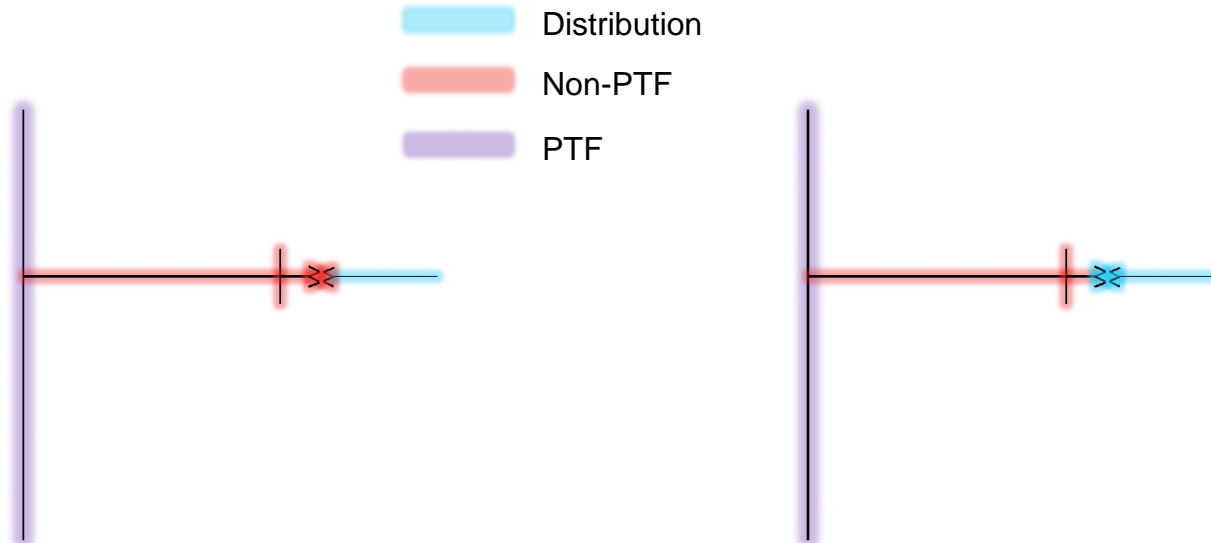


2016 LSP Projects

National Grid New England Service Territory

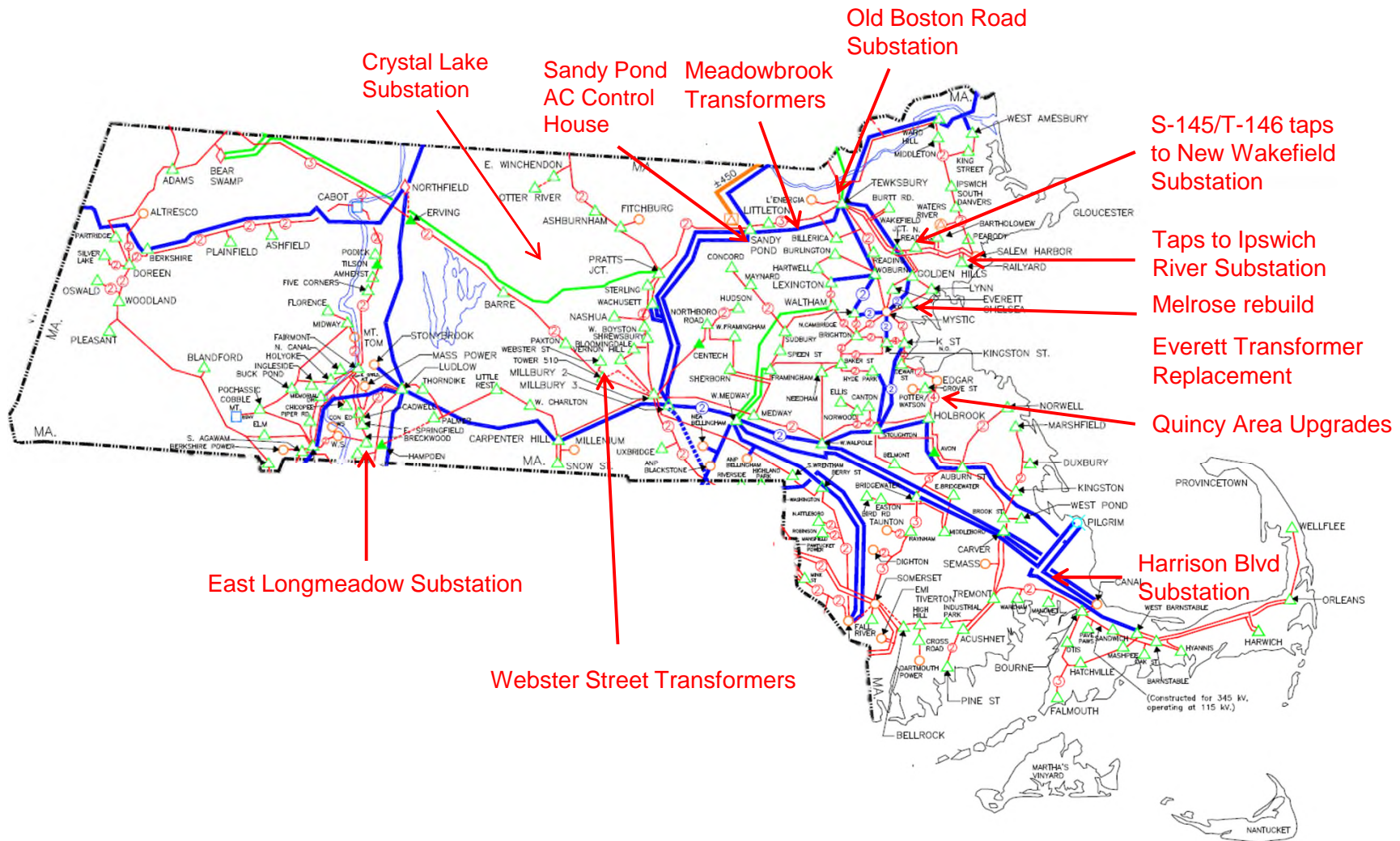


Classification of National Grid Step-Down Transformers



- In Massachusetts
 - In general, for NEP assets, Distribution starts at low-side of step-down transformer
 - For former EUA assets, Distribution starts at high-side of step-down transformer
- In Rhode Island,
 - Narragansett Electric assets, Distribution starts at high side of transformer

Massachusetts Local Projects



LSP – Massachusetts

(Fonts in Red are new or updates)



National Grid - New England Local System Plan Project List - 2016									
Primary Driver	Asset Owner by Company	2016 Update - In Service Date	Major Project	Project	Status Update for 2016	Total non-PTF Project Spend for 2016 report	PPA Approval	Needs Assessment	Solutions
Massachusetts									
Load Growth	New England Power	Jun-20	Attleboro Area Capacity Upgrades	Replace Chartley Pond T1	Concept	TBD	No	Addresses the existing summer emergency loading problem of T1 transformer.	Replace T1
Load Growth	New England Power	Jun-20		Replace Mink St T1 & T2	Concept	TBD	No	Addresses the existing summer normal loading problems of T2 transformer& summer emergency loading problems of T1 transformer at Mink Street substation.	Replace T1 and T2
Load Growth	New England Power	Jun-21		Reynolds Ave. Substation	Concept	TBD	No	Loading concerns of feeders out of Mink St and Read St.	new substation tapped off of C-181, D-182 with 2 transformers.
Load Growth	New England Power	Oct-21		E. Beverly - Replace 115/34kV Transformers	Concept	TBD	10/21/14	The overloading of the East Beverly transformers under normal and emergency conditions is the main driver for this project.	The scope of this project is to install two new 115/34kV 33/44/55MVA transformers to replace the existing T10 and T20 units. The alternative considered was to install a backup unit in parallel at the E Beverly site. This would be more expensive and less operationally convenient. In addition, it will trigger expansion of the substation fence and possible permitting and resulting delays possibly.
Load Growth	New England Power	Dec-21		E. Webster 412 - upgrade transformer T1	Concept	TBD	08/08/14	The town of Webster, MA has experienced increased demand, and in addition to normal area load growth, spot loads have accelerated the need for an increase to area capacity.	Alternative 1(preferred). Upgrade the E. Webster 69/13.2kV transformer 30 MVA T1 to a 24/32/40MVA 69/13.2kV transformer. Alternative 2: a new substation in the area Alternative 3: expanding the existing Snow St and West Charlton substations by adding another feeder position at each. Alternatives 2 and 3 are not preferred due to higher costs and the locations of new facilities are not near the area load center in the town of Webster.
Asset Replacement	New England Power	May-19		Hathaway #106 23 kV Yard Removal	Concept	TBD	No	The project is an asset condition driven project (transmission and distribution assets). Looking to remove 23/13.8kV yard due to aging and inefficient use of station equipment. Poor physical condition of 23kV control house is a safety concern for workers.	Alternative #1: Upgrade the 23/13.8kV yard with 13.8kV Metal Clad switchgear and replace 63TR with 115/13.8kV transformer. Alternative #2: Relocate 106W81 & 106W82 and retire 23/13.8kV yard and remove the 63TR.

LSP – Massachusetts Continued

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Massachusetts									
Asset Replacement	New England Power	Oct-17		I-35 T-Line Decommission	Concept	TBD	No	Shrewsbury 306 substation, which the I-35 services from Millbury 2, is currently de-energized and set for decommissioning. The drive for decommissioning Shrewsbury 306 comes from the lack of need for the substation. The major customer fed from Shrewsbury 306 has their electric needs satisfied by Bloomingdale 27 substation and their own back-up generation.	Solution is Retire Transmission Line assets of I-35, erect monuments in right of way to indicate National Grid land ownership Alternative 1 – Do nothing is not recommended on the account of public safety Alternative 2 – Keep I-35 transmission line assets in-service for future potential connection; Not recommended due to insufficient need/justification for keeping transmission line assets and the total life costs of maintaining the assets while they are not being used.
Asset Replacement	New England Power	Nov-21		N-192 Cable Replacement	Concept	TBD	No	The N-192 is a 3.6 mile underground cable with a 0.5 mile submarine section installed in 1971. The N-192 has reached its end of life based on a condition assessment performed which highlights increased oil leaks and outage durations.	A project has been initiated to replace the underground cable system. A new route will likely be needed due to existing access issues as the N-192 currently runs along a very active railroad. A river crossing will still be required.
Asset Replacement	New England Power	Mar-18		Nantucket Diesel Generation Replacement Project (i.e. Bunker Road Project phase 1)	Concept	TBD	No	Replace/Upgrade generation units at Bunker Rd Substation unit due to asset condition and future supply contingency issues.	Solution is Install one 10 MW generator at Bunker Road and remove the existing 2 – 3 MW generators Alternative 1- Do nothing is not acceptable as condition of the generation units are in significant stage of decay. Alternative 2 - Refurbish existing generation units – doesn't solve contingency issues.
Asset Replacement	New England Power	Mar-18		The Bunker Road Projects (Phase 2)	Concept	TBD	No	Replace/Upgrade generation units at Bunker Rd Substation unit due to asset condition and future supply contingency issues.	Solution is a) install battery storage at Bunker Road or b) install a second 10 MW generator Alternative 1- Do nothing is not acceptable as condition of the generation units are in significant stage of decay. Alternative 2 - Refurbish existing generation units – doesn't solve contingency issues.
Load Growth	New England Power	Jun-22		North Marlboro 2nd 115/13.8kV Transformer	Concept	TBD	No	Due to load growth need in area a second distribution transformer is needed.	Install 2nd 40MVA 115/13.8kV transformer T2 at N Marlboro #318 Substation
Load Growth	New England Power	Aug-20		Phillips Lane 2nd Transformer Addition	Concept	TBD	No	Due to load growth need in area a second distribution transformer is needed.	The proposed solution is the installation of a second 1-28/37.3/46.7MVA 115/13.8 kV transformer.
Point of Delivery Request from Customer	New England Power	Dec-20		Proposed Hendersonville Substation in Everett, MA	Concept	TBD	No	Accommodate the load growth in the Hendersonville area of Everett, MA (due to proposed Wynn Everett Casino).	Solution: A new 115/13.8 kV substation is proposed at a new site (TBD) in the Hendersonville area of Everett, and it will tap both the O-167 and P-168 lines radially. The new substation will have two 115/13.8 kV 33/44/55 MVA transformers. Alternative: Rebuild Everett with GIS

LSP – Massachusetts Continued

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Massachusetts									
Asset Replacement	New England Power	May-19		Revere Substation Install 55MVA 115/23 kV Transformer	Concept	TBD	No	The 115/23 kV transformers need replacement due to asset conditions.	Upgrade of the Revere 7 T3 and T4 115-23 kV transformers to 55MVA.
Asset Replacement	New England Power	Jun-21		Salem Harbor - 115kV - 23kV rebuild	Concept	TBD	No	Asset Condition replacement based on testing and trouble history	Replacement of transformers and rebuild 23 kV yard.
Area Reliability Assessment	New England Power	Oct-20		Sandy Pond substation remove distribution load from tertiary windings of transformer and install 115-23 kV substation.	Concept	TBD	No	Reliability concern (bulk power transformer failure because of a 23 kV circuit fault) of serving 23 kV off of 345/115/13 kV transformer tertiary	Alternative 1 (preferred): Install a 115/23 kV 33/44/55 MVA transformer at Sandy Pond and a 115 kV breaker in a spare 115 kV position
Asset Replacement	New England Power	Dec-18		Everett 37 115-23kV Transformer Replacement	Proposed	\$4,196,000	No	Three 115-23.5-4.16 kV transformers need replacement due to contingency overload and unserved load. Transformers also need replacement due to asset condition.	The transformers are three winding units two are 115-23.5-4.16kV; 25/33.3 MVA & one is a 50/66.6 MVA design. All three transformers will be replaced with two larger three phase two winding units. The two new transformers will be 115-23kV; 40/60/75 MVA units. The 4.16kV yard at Everett 37 is being retired in the near future so there is no longer a need for tertiary windings on these transformers.
Load Growth	New England Power	May-17		Mid Weymouth Substation Add T1 40 MVA	Proposed	\$2,589,000	07/17/14	Address distribution load growth in the area resulting in overloads. Replace failed T2 transformer.	Add a second 115-13.8 kV 24/32/40 MVA transformer (T1) - In-service. Alternative is to install a second transformer at East Holbrook. This is a more costly alternative due to higher substation costs. Replace the failed T2 transformer with a 115-13.8 kV 24/32/40 MVA transformer.
Load Growth	New England Power	Sep-19		North Grafton 69/13.8 kV Substation	Proposed	\$6,280,000	08/08/14	The North Grafton substation, which is tapped off the 69 kV X-24W line, serves the town of North Grafton, Millbury and Westborough. Due to expected load growth in this area, including significant customer development, there is a need for more capacity in this area.	Preferred alternative is to build a new North Grafton Substation tapped off the X-24W line with one 69/13.8 kV, 40 MVA transformer and remove the existing 69/4.16 kV transformer at N. Grafton. Load from substations in surrounding towns will be transferred to the new substation in North Grafton to help alleviate some overloaded feeders. Alternative - Rebuild Millbury substation with more feeders. This alternative is more costly and provides less capacity.

LSP – Massachusetts Continued

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Massachusetts									
Load Growth	Massachusetts Electric Company	Jun-20		North Oxford add a 2nd Transformer (associated with RSP # 1624)	Proposed	\$1,600,000	07/23/15	Address load growth in the area resulting in overloads	Alternative 1 (preferred). Add a 2nd 24/32/40 MVA, 115-13.2kV transformer at N. Oxford #406 substation, tapped off the V-174 line with an in-line breaker. Alternative 2: a new substation in the area Alternative 3: expanding the existing Snow St and West Charlton substations by adding another feeder position at each. Alternatives 2 and 3 are not preferred due to higher costs and the locations of new facilities are not near the area load center in the town of Oxford.
Load Growth	New England Power	Mar-19		Read St Sub Replace T4 with 40 MVA	Proposed	\$3,300,000	08/28/13	Accommodate load growth in area. Per MECo distribution planning.	Replace Read St T4 transformer with 40 MVA, 115/13.2 kV transformer
Asset Replacement	New England Power	Mar-18		Z1-Y2 Refurbishment (Condition Improvement and Structural Analysis - Fall River, Somerset, Swansea, MA)	Proposed	\$23,645,000	NR	Refurbish circuits due to existing asset condition including excessive top insulator socket wear, shieldwire condition, and copper conductor condition. Also, structural analysis of the Taunton River crossing structures (4 207' lattice tower crossing structures) determined corrosion loss and other structural concerns.	Alt. 1 (preferred) Solution is to replace all four river crossing steel lattice towers with four steel structures on H-pile and rock anchor type foundations. Main line: Reconductor with 477 ACSR/ACCR conductor & OPGW & 3/8" EHS shieldwire. Additionally, the peninsula retaining walls will be refurbished. Alt 2 - Replace Existing River Crossing Towers with Double Circuit Structures (reliability issues)
Load Growth	New England Power	Aug-20		Old Boston Road Substation (formerly Wamesit Substation)	Planned	\$5,830,000	11/08/12	Identified capacity issues on the distribution systems in Lowell and Tewksbury, MA, known as Merrimack Supply Area. Major supply transformers are located in Tewksbury #22, Perry St., Billerica and Sandy Pond. The tertiary windings of the Tewksbury T2 and T4 230-115-14kV transformers are expected to be overloaded in 2017 on contingency.	Plan 1 (preferred): New substation with two 115/13.2 33/44/55 MVA transformers on Tewksbury #22 property, a 115 kV tap line on both the K-137E and J-162 and install a load break on K-137. Plan 2: Tap the A-153 line instead of the K-137 line. The A-153 tap would have to pass under the K-137 line. This alternative would be more expensive.
Point of Delivery Request from Customer	New England Power	Jan-18		Taps to serve Ipswich River Substation in Peabody, MA	Planned	(reimbursed by PMLP)	04/16/15	Load growth and Flood mitigation of existing Ipswich River Peabody substation.	Peabody Muni will remove existing single transformer Ipswich River 115-23 kV substation currently tapped from B-154N line and install a new two transformer (36/48/60 MVA) Ipswich River 115-23 kV substation which will tap both the B-154N and the C-155N lines. National Grid will build and own approximately 500 feet of each tap to new substation.

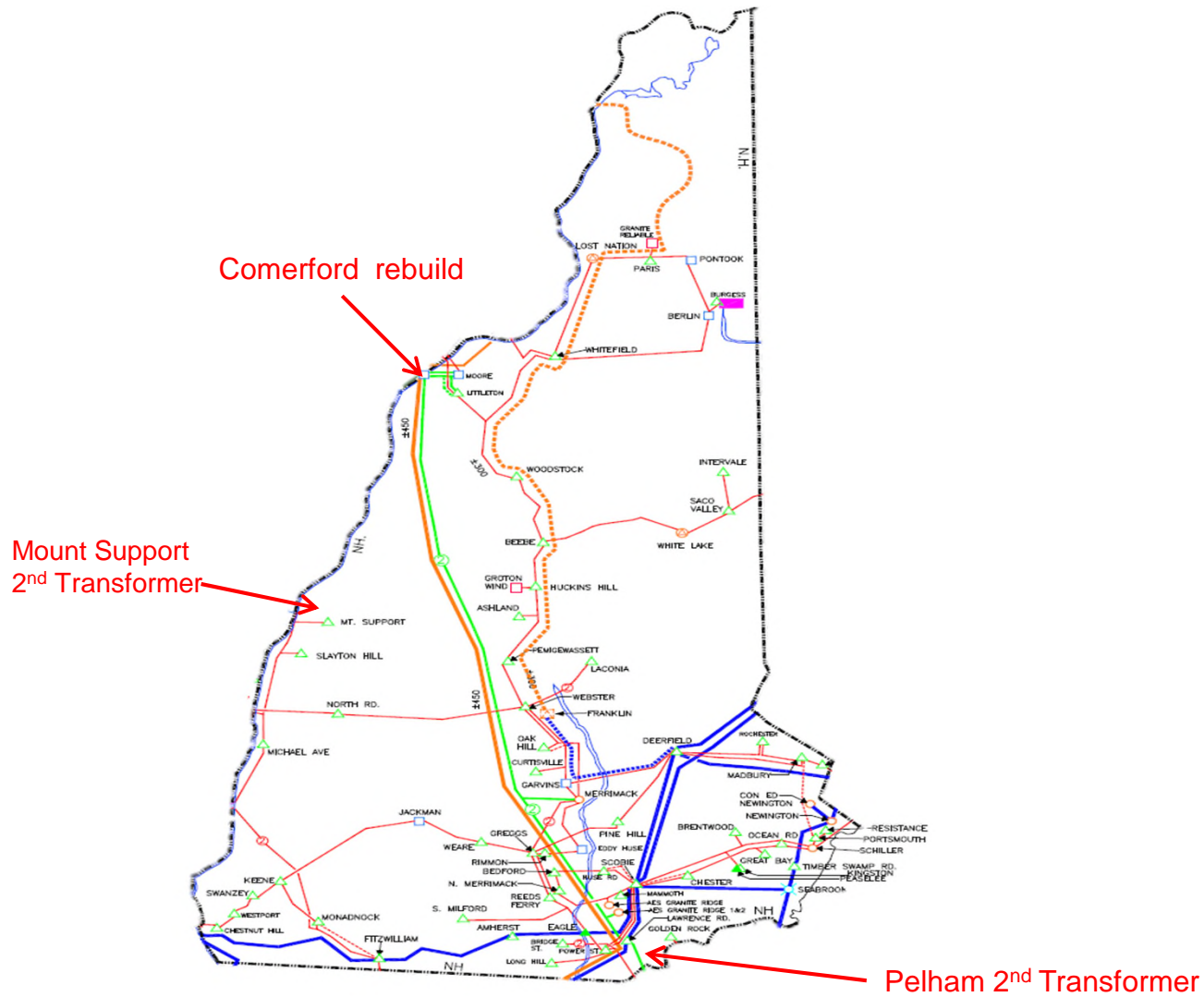
LSP – Massachusetts Continued

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Massachusetts									
Point of Delivery Request from Customer	New England Power	Sep-16		115/24kV Transformer Treasure Valley	Under Construction	(reimbursed by the customer)	08/23/16	Solterra has requested service to a 14.682 MW solar installation at Saint Joseph's Abbey off Alta Crest Rd in Spencer, MA.	Solution is: Expansion of the Treasure Valley #55 substation to provide a 23 kV express circuit to the customer's site including a new 23 kV feeder position and 115/23.9 kV transformer. Alternative 1: Consideration was given to serving this project at 34.5 kV rather than 23 kV. Not selected based on cost and implementation time.
Asset Replacement	New England Power	Oct-16		Crystal Lake Substation Gardner, MA (Associated with Asset Condition ID #2)	Under Construction	\$3,869,305	05/05/16	Reliability and environmental issues: Exposure to environmental and drinking water contamination at Park St. Distribution retired 4 kV system and upgraded to 13.8 kV. Conversion of 4 kV to 13.8 kV is leading to 69-13.8kV transformer loading issues.	Relocating new station away from the City drinking water supply approximately 3000' along existing ROW and removing PTF Transmission line structures that will no longer be needed. New structures for new lines to new location. Replace 69 kV PTF breakers, disconnect switches and air break switches. Replace 2 transformers with 69/13.8 kV 40 MVA LTC transformers. Alternative: Retire 4 kV and rebuild 13kV yard at existing Park Street Station. This alternative was eliminated due to close proximity to drinking water.
Load Growth	New England Power	May-17		Everett 37 115-13.8 kV Transformer Replacement	Under Construction	\$7,984,000	03/01/11	Two 115-13.8 kV transformers need replacement due to contingency overloading. Loss of 1 transformer overloads the other past the summer emergency rating and could lead to extended outage.	Phase I - Upgrade the 115/13.8 kV transformers from 40MVA to 55MVA - complete. Phase II Replace five air breaks on the high side of transformers with circuit switchers. Install new 115 kV Control House.
Asset Replacement	New England Power	Apr-17		Melrose #2 rebuild 115/23kV Sub	Under Construction	\$7,701,000	NR	The 23 kV equipment is in poor condition, with insulators, potential transformers, control cables, and circuit breakers that have exhibited a history of failures, intermittent false tripping, and leaks.	Solution is: This project proposes replacement of the existing outdoor 23kV open air substation equipment with a new breaker-and-a-half Metal Clad Switchgear Power Center (MCSPC) and installation of two metal clad capacitor banks at Melrose #2 substation located at 204 Howard Street, Melrose MA. Two existing 55MVA, 115 - 23 kV transformers would serve the new MCSPC. Alternative 1: Doing nothing is not a viable alternative, as National Grid must in some manner address replacement of deteriorating assets at Melrose #2 substation Alternative 2: In-kind replacement of the Melrose #2 substation 23 kV open air equipment would be more costly than the recommended option. The in-kind rebuild would still leave an antiquated Melrose #2 substation 23 kV switching arrangement.
Load Growth	New England Power	Mar-17		Meadowbrook Substation - two new 115-13 kV transformers	Under Construction	\$10,650,000	11/01/10	New transformers driven by load growth and distribution reliability issues for the Lowell area. Need to relieve 13.8 and 23kV supply circuits and transformers at Meadowbrook Sub, Blossom St Sub, Worthen St Sub, and Concord Sub	Install (2) 115-13.2kV: 33/44/55 MVA Transformers (T3 and T4), (2) 115kV Circuit Switchers and associated equipment along with associated distribution work.

LSP – Massachusetts *Continued*

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Massachusetts									
Area Reliability Assessment	New England Power	May-17		Replace transformer and switches at E. Longmeadow substation (Associated with RSP #946)	Under Construction	\$4,182,000	01/09/14	Five distribution feeders and two supply transformers are projected to exceed their limits.	Recommended: Install one 69/13.2 kV, 24/32/40 MVA transformer to replace 6 MVA transformer, two 69 kV circuit switchers, two disconnect switches, two bus tie breaker disconnect switches, and a capacitor bank; Option 1: all distribution upgrades.
Asset Replacement	New England Power	Jun-18		Sandy Pond AC Control House Rebuild and Asset Replacement (Associated with RSP ID #1489)	Under Construction	\$7,210,000	NR	Existing control house has overcrowded control and relay panels that no longer meet modern safety and reliability requirements. Many existing relays are over 30 years old and no longer supported by manufacturers. In addition, several primary assets need replacing.	Construction of a new control house containing all primary and secondary systems. Specific key primary 345 kV, 115 kV, and 23 kV assets will be replaced (CCVT's, disconnects)

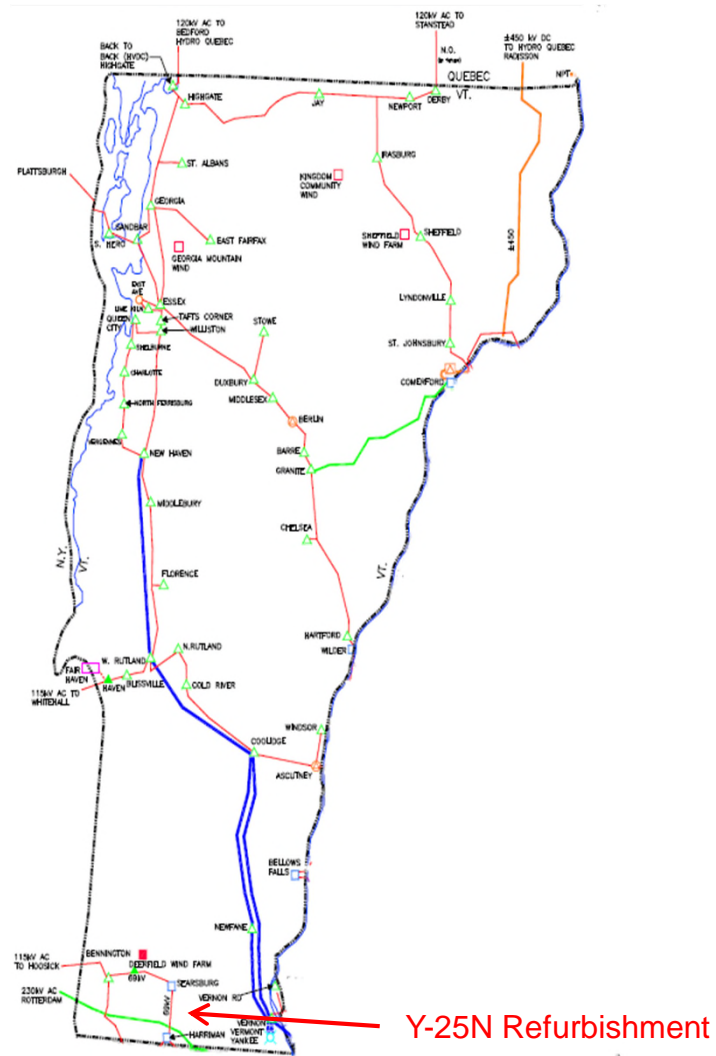
New Hampshire Local Projects



LSP – New Hampshire

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New Hampshire									
Asset Replacement	New England Power	Dec-22		Moore 20 Asset Separation	Concept	TBD	No	Asset Separation from TransCanada	
Load Growth	New England Power	Jun-18		Golden Rock - add second 115/13 kV transformer and in-line breaker	Concept	TBD	No	Liberty Utility conducted a study in the Salem, New Hampshire area to address load growth and the retirement of a modular 23 - 13.2 kV substation. Liberty Utility concluded that more capacity was needed to accommodate the issues in the study area.	Installation of a 33/44/55 MVA 115 – 13.2 kV transformer at the National Grid owned Golden Rock substation. Loop the G-133W line in and out of the Golden Rock substation and install a 115 kV in-line breaker.
Asset Replacement	New England Power	Dec-17		3308 Asset Condition Refurbishment (Sub-T)	Planned	\$4,440,000	NR	34.5kV OHL Asset Condition Project - West Kingston	Refurbishment
Asset Replacement	New England Power	Nov-17		3314 Asset Condition Refurbishment (Sub-T)	Planned	\$2,285,392	NR	34.5kV OHL Asset Condition Project - Gilman Tap	Refurbishment
Asset Replacement	New England Power	May-17		3318 Asset Condition Refurbishment (Sub-T)	Planned	\$518,000	NR	34.5kV OHL Asset Condition Project out of Comerford/Lebanon	Refurbishment
Asset Replacement	New England Power	Oct-19		Comerford 34.5 kV Rebuild	Planned	\$5,255,000	No	Asset condition and operational issues. High failure rates, obsolescence and deterioration of 34.5 kV equipment. Reliability, environmental (PCB oil), and safety issues (minimum approach distance and clearances) not up to present day standards	Replace three of the existing six oil circuit breaker with 1200 Amp breakers, disconnect switches, copper bus, insulators, and control house.
Load Growth	New England Power	Oct-17		Pelham 14 - add second 115/13 kV transformer (associated with RSP #1625)	Planned	\$6,600,000	07/01/14	Due to load growth and thermal overloads, study to add another transformer at Pelham 14 in Pelham, NH on the Y151. Right now there is a single tap to a 20MVA with a projected 2011 loading of 23.0MVA (100% of summer normal).	At Pelham Substation, Pelham, NH, install an in-line 115 kV circuit breaker. Loop the 115 kV Y-151 line through the substation via a section of new 115 kV overhead line. Replace the existing 115/13.2 kV, 12/16/20 MVA transformer with a 115/13.2 kV, 24/32/40 MVA transformer. Install a second 115/13.2 kV, 24/32/40 MVA transformer.
Asset Replacement	New England Power	Dec-16		3315+Tap Asset Condition Refurbishment (Sub-T)	Under Construction	\$13,032,000	NR	34.5kV OHL Asset Condition Project out of Comerford/Lebanon. This circuit has a history of poor reliability due to its condition and remote location	Preferred alt - rebuild line in the nearby C-203/D-204 right of way with 477 ACSR. Alt 1 - Do Nothing/ Defer (does not address reliability and safety concerns), Alt 2 - Damage Failure (expect higher cost over time), Alt 3 - Life Extension (does not address remoteness), Alt 4 - Targeted Refurbishment (still remote), Alt 5 - Full Refurb (still remote)
Load Growth	New England Power	Nov-16		Mount Support substation - install 2nd transformer (Associated with RSP #1503)	Under Construction	\$1,920,000	04/01/13	Distribution driven need for load growth and overload of existing transformer and distribution feeders	Install 2nd transformer 55 MVA 115-13.8 kV and new control house. Loop the 115 kV W-149N line into the substation and install 115 kV inline breaker.

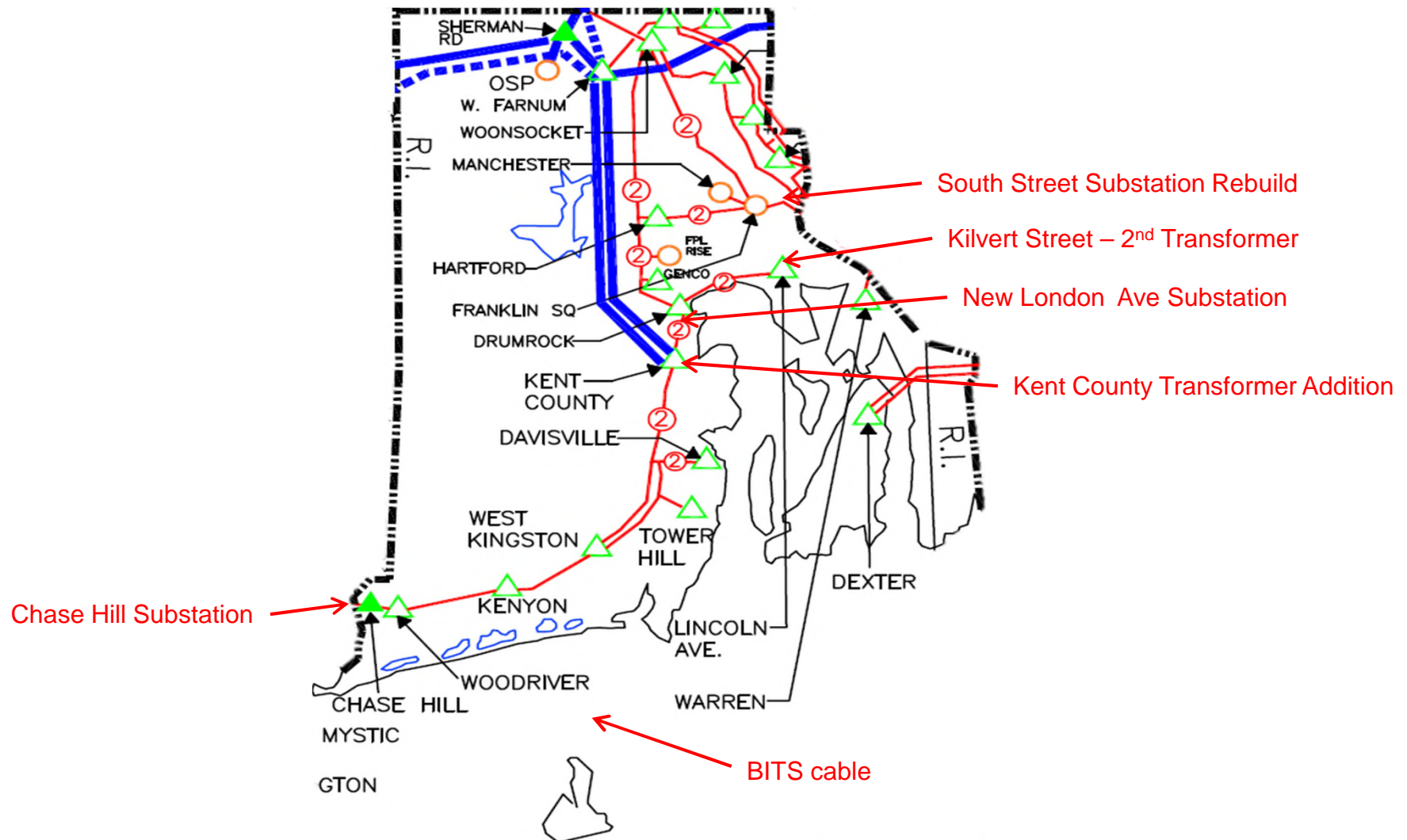
Vermont Local Projects



LSP – Vermont

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Vermont									
Asset Replacement	New England Power	Dec-22		Wilder Asset Separation	Concept	TBD	No	Asset separation from TransCanada at Wilder Substation, VT.	
Asset Replacement	New England Power	Oct-17		Y-25N Bennington - Harriman + Taps	Planned	\$250,000	NR	Asset Condition and Replacement of Cracked cement inside insulators and additional work to extend life of line	Preferred Alternative - Targeted Refurbishment, Alt 1 - Do Nothing (potential reliability and safety issues), Alt 2 - Replace PP Knox Insulators only, Alt 3 - Full Line Refurbishment

Rhode Island Local Projects



LSP – Rhode Island

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Rhode Island									
Asset Replacement	Narragansett Electric Company	Jul-21	Greater Rhode Island Transmission Reinforcements	Admiral St-Franklin Square (Q143 and R144) 115 kV UG	Concept	TBD	04/25/08	Reliability due to the condition assessment study results, recent outages, the joint failure history, and line importance factor.	Replace cable and increase capacity. Replace with new 1,000 kcmil copper solid dielectric cables within the existing duct and manhole system.
Asset Replacement	Narragansett Electric Company	May-21		Manchester St - Breaker Upgrades	Concept	TBD	No	Project to upgrade/ replace 8 - 115 kV breakers due to Asset Condition replacement based on testing and trouble history	Replacement of asset
Area Reliability Assessment	Narragansett Electric Company	Dec-19	Aquidneck Island Reliability Project	Newport Area Transmission Reinforcements (Associated with RSP #1669 & 1670)	Proposed	\$4,580,000	In Progress	Overloading of 115-69 kV transformer at Dexter, overloading of 69-13.8 kV transformer at Jepson, overloading of 69 kV lines and address voltage problem in Newport.	Alternative 1 (preferred): Conversion of Jepson to 115 kV and replacement of transformers (one 115-69kV transformer). Remove 115-69 kV transformers at Dexter and maintain supply to existing 115 - 13.8 kV transformer. Alternative 2: Reinforcing 69kV (PTF) and addressing asset conditions
Area Reliability Assessment	Narragansett Electric Company	Apr-21		Southeast Substation	Proposed	\$1,600,000	10/21/14	Pawtucket No. 1 station consists of a four story brick building built 1907 and outdoor switchgear. The indoor building houses distribution switchgear and other electrical equipment. The indoor substation has safety risks due to design and equipment condition. Its outmoded design no longer meets currently accepted safety practices. 73 and 74 transformers overload for loss of one onto the other.	Build a new 115/13.8kV metal clad station on York Ave in the City of Pawtucket with two 55 MVA 115-13.8kV transformers. Supply station from existing 115kV lines crossing site, X-3 and T-7. -Alternative - develop a new 115/13.8kV metal clad substation at Pawtucket No. 1 with two 55 MVA 115-13.8kV transformers. Infrastructure from Pawtucket is all underground requiring a new manhole and ductline systems. This alternative would be more expensive.
Asset Replacement	Narragansett Electric Company	Dec-18		South Street Substation Rebuild and T1, T2, T3 line rebuilds	Planned	\$33,000,000 (\$6.9M to be reimbursed by developer)	02/23/16	Significant asset condition concerns at the South Street Sub for the transformers, breakers, switches, feeder reactors, and battery system. Building layout is such that it precludes the implementation of modern installation standards to replace original equipment. Developer proposed a project in the area of the existing substation. Developer also requested undergrounding 115 kV lines from Franklin Square to South Street sub.	The project includes a new substation on the existing South Street substation site in the City of Providence, R.I. The new substation includes three 115-11 kV, 33/44/55 MVA LTC transformers and an indoor substation building with indoor metal clad switchgear. Additionally, the project includes moving the three 115 kV transmission lines from overhead to underground for 0.3 miles long from Franklin Square to the new South Street substation. The existing South Street 115/11kV station and existing overhead transmission lines will be removed.
Point of Delivery Request from Customer	Narragansett Electric Company and New England Power	Mar-17		BITS - cable between New Shoreham and mainland Rhode Island	Under Construction	\$131,830,000 (paid by Block Island Power and Narragansett Electric)	NR	Interconnection for new customer for dual purpose of delivering the wind farm's power to the mainland and providing transmission service Block Island Power Company (BIPCO)	20 mi of 34.5 kV submarine cable; two new 34.5 kV substations. One on Block Island and one on the mainland approx. 1 mi of combined OH and UG infrastructure on Block Island; approx. 4 mi of UG infrastructure on mainland in Town of Narragansett and Wakefield. A fiber optic running from the mainland to Block Island required for the protection system.

LSP – Rhode Island Continued

National Grid - New England Local System Plan Project List - 2016									
Primary Driver	Asset Owner by Company	2016 Update - In Service Date	Major Project	Project	Status Update for 2016	Total non-PTF Project Spend for 2016 report	PPA Approval	Needs Assessment	Solutions
Rhode Island									
Load Growth	Narragansett Electric Company	Mar-17		Kent County Transformer Addition	Under Construction	\$990,000	12/01/15	Mitigate load at risk for loss of the Kent County substation transformer, T6	Existing single 115/12.47 kV low profile substation with one 24/32/40 MVA transformer - designed for two. Install second 115/13.2 kV 24/32/40 MVA transformer with tie breakers. Alt 1 - expand New London Ave Sub (higher cost). Alt 2 - defer (not recommended)
Load Growth	Narragansett Electric Company	Mar-17		Chase Hill (formally Hopkinton) 115-12.47 kV Substation in Hopkinton, RI (associated with RSP #1253)	Under Construction	\$330,000	06/01/11	Found concerns in SWRI area of projected loading on feeders, transformers, & dist. supply lines in excess of summer normal/ emergency capability.	New 115-12.47 kV Substation in SWRI area with one 115 - 12.47 kV 24/32/40 MVA transformer.
Load Growth	Narragansett Electric Company	Nov-16		New London Ave. (formally W. Warwick) 115 - 12.47 kV Sub	Under Construction	\$7,510,000	06/01/10	Heavy loading issues on 23 kV & 12.47 kV distribution systems and transformers in the area of West Warwick, Coventry, Warwick, and Cranston.	Proposal of a new 115-12.5 kV substation with a 115 - 12.5 kV 24/32/40 MVA transformer for New London Ave, Warwick, RI. Tap off T-172 and site clearing. Alt 1: Expansion of West Cranston and Kent County substations. Alt 2: New 115 - 12.5kV sub in Cranston. Alts were dismissed due to excessive costs.

LSP – Removed From List

National Grid - New England Local System Plan Project List - 2016									
Primary Driver	Asset Owner by Company	Projected In Service Date Month/Year	Major Project	Project	Status Update for 2016	Total non-PTF Project Cost	PPA Approval	Needs Assessment	Solutions
Removed from List									
Asset Replacement	New England Power	Jul-16		4401 Asset Condition Refurbishment (Sub-T)	In Service	\$650,000	NR	46kV OHL Asset Condition Project - Charlestown	Refurbishment
Asset Replacement	New England Power	Jul-16		4402 Asset Condition Refurbishment (Sub-T)	In Service	\$160,000	NR	46kV OHL Asset Condition Project - Charlestown	Refurbishment
Load Growth	New England Power	Feb-16	Quincy Area Upgrade	Field Street	In Service	\$11,808,000	03/01/11	Need for this project is load growth in the area of Quincy. The major problems in the study area are contingency overloads (130%) on the 115-13.8 kV supply transformers. Operating issues exist, such as the inability to switch and sectionalize the 115 kV supply system while it is energized. Also, installation of a high speed protection scheme on the 532/533 lines in order to prevent local generation from losing synchronism.	At Field St., the existing T3 and T4, 115-13.8 kV 40 MVA transformers will be replaced with 55 MVA units. Also 115 kV circuit switchers and breakers will replace disconnect switches to provide live line sectionalizing and enhanced protection on the Edgar 532 and 533 lines that supply Field St. #1 and N. Quincy #11 substations. Also, a 115 kV bus tie composed of a circuit switcher in series with a motor operated disconnect switch as well as a Permissive Overreaching Transfer Trip (POTT) protection scheme will be installed on the 532/533 lines.
Asset Replacement	New England Power	May-15		N. Quincy Sub Improvements	In Service	\$2,434,000	03/01/11	Asset condition issues on 115kV circuit switches at N. Quincy. System is in need of enhanced switching flexibility and reliability in the Quincy area.	Replace two 115kV circuit Switches at N. Quincy (1T115 & 2T115). Replace two line disconnect switches with remote controlled circuit switchers (532N-3 & 533N-3). Installation of a spare transformer.
Load Growth	New England Power	Mar-16		Harrison Blvd (previously Avon) - new 115/13.8 kV substation (associated with RSP #1360)	In Service	\$5,000,000	04/03/09	The Stoughton, Parkview, and Ames St substations in the Brockton Northwest region are approaching 100% Summer Normal loading. Loading of the Parkview and Stoughton substations is limited by 13.8 kV bus work, while Ames substation is limited by transformer.	Proposal of a new 115-13.8 kV substation in Avon, MA. The transformer for the proposed Avon substation is a 115- 13.8 kV 24/32/40 MVA.
Asset Replacement	Massachusetts Electric Company	Sep-15		Hull 1 and 2 lines (23kV)	In Service	\$1,982,622	NR	Address asset condition of structures	This project addresses the asset condition issues by replacing a number of structures and reconductoring of portions of the lines.
Area Reliability Assessment	Narragansett Electric Company	Jun-16		Kilvert St. #87 Substation	In Service	\$1,600,000	08/27/12	Loss of Kilvert St. T2 exceeding reliability criteria	Recommended: 2nd 115/12.47 kV, 33/44/55 MVA Transformer addition tapped off of J-188 with 2nd 12.47 kV capacitor bank and manual 115 kV switch; Option 1: new 115/12.47 kV substation supplied from adjacent 115 kV lines with new land purchase (higher cost); Option 2: new 23/12.47 kV modular substation w/two feeders at former 4.16 kV sub site which needs reinforcement of 23 kV supply system (higher cost).

LSP – Removed From List Continued

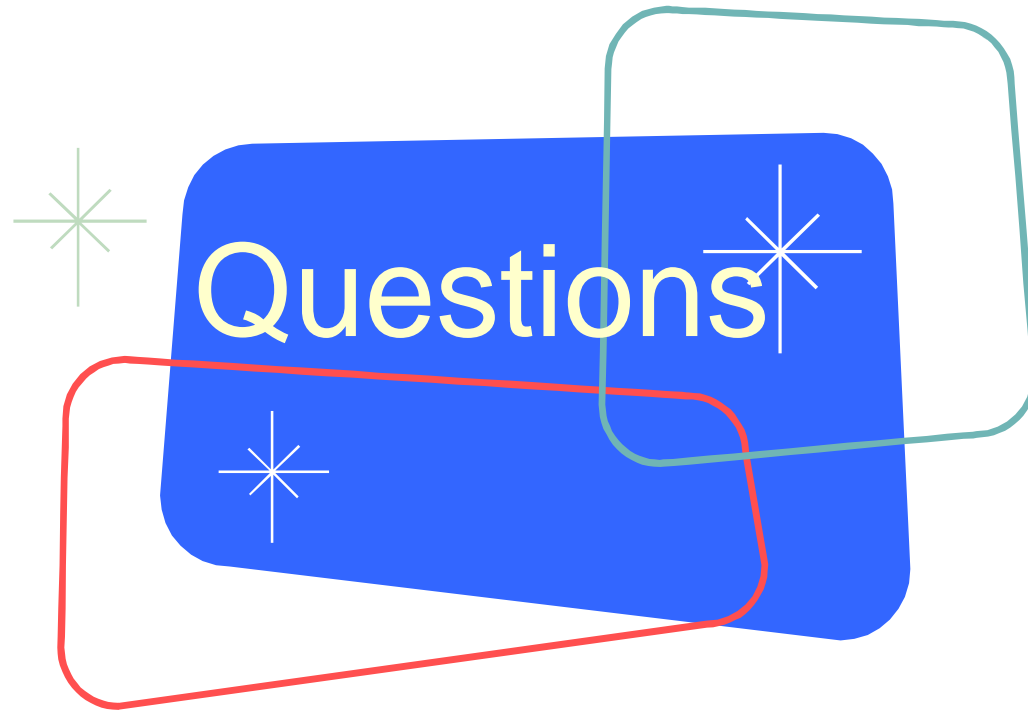
National Grid - New England Local System Plan Project List - 2016									
Primary Driver	Asset Owner by Company	Projected In Service Date Month/Year	Major Project	Project	Status Update for 2016	Total non-PTF Project Cost	PPA Approval	Needs Assessment	Solutions
Removed from List									
Asset Replacement	New England Power	Dec-15		O15S Asset Condition Refurbishment	In Service	\$6,878,000	NR	Based on the FY11 performance scores, the N14 and O15S were ranked among the worst performing lines with respect to vegetation outages during both storm and non storm events.	This project involves the installation spacer cable along sections of O15S that will remain 69 kV and that are located within a narrow right-of-way adjacent to tall trees. The proposed scope also includes refurbishment work, three (3) structure replacements, seven (7) insulator assembly replacements/upgrades, eleven (11) V-brace installations, two (2) cross arm replacements and tightening of guys on one (1) structure, along sections of the O15S in East Longmeadow and the N14 tap towards Shaker Road substation.
Point of Delivery Request from Customer	New England Power	Nov-15		S145 & T146 115 kV Taps to new Wakefield Municipal Substation - Wallace (Associated with RSP #1511)	In Service	\$558,000 (to be reimbursed by WMGLD)	07/25/13	Construct two (2) 115kV taps to support the new Wakefield Municipal substation with 2-60 MVA 115-13.8 kV transformers.	Construct two 115 kV taps to new Wakefield Municipal substation in Wakefield, MA. The new lines tap off the S145 and T146 115 kV Transmission lines.
Asset Replacement	New England Power	Jun-16		Webster St transformers	In Service	\$10,803,000	Submitting PPA	Replace four transformers at Webster Street due to their asset condition.	All four transformers will be replaced 115-13.8kV ; 24/32/55 MVA LTC units, matched set of two. The transformer replacement requires new neutral reactors, bus work, relay work, disconnects, CCTVs, relocation of cap banks and firewalls.
Load Growth	New England Power	Sep-23		Foxboro Area Load Supply (previously Union Loop)	On Hold	TBD	No	Quick load growth of Patriot Place Mall may overload existing supply of 23 kV and 13.8 kV. Serving 23.5 MW initially from 2013.	Develop a 115 - 13.8 kV supply point in the Foxborough / Wrentham/ Plainville area near Gillette Stadium with a 115 - 13.8 kV 24/32/40 MVA LTC transformer. Alternative 1 Recommended: Extend the A24 115 kV line along the ROW from Bird Road sub to the proposed junction in Walpole, MA, Routing alternatives are under evaluation to determine if proposed 115/13.8 kV substation will be constructed adjacent to ROW or in Foxboro; Alternative 2: Construct a new 115 kV line from West Walpole sub; Alternative 3. Extend A24 from Bird Road sub to West Walpole sub with a tap. Alternative 4: Construct new underground 115 kV line tapped off of C-181N/D-182N to Crocker Pond Sub and convert it to 115-13.8 kV.
Asset Replacement	Narragansett Electric Company	Nov-17		S171/T172 Woonsocket-W.Farnum Aseet Condition Refurbishment	PTF project	\$2,140,000	NR	Asset Condition	Refurbishment
Asset Replacement	New England Power	Dec-19		Moore #7 GSU Transformer Asset Condition Project	PTF project	TBD		Asset Condition of Moore T7 115-13.8 kV 50 MVA Transformer	Alternative 1: Replace T7 transformer Alternative 2: Retire T7 transformer
Load Growth	Narragansett Electric Company	Nov-20	Newport Area Study	Newport Area Supply Reinforcements - Jepson Substation	Delete from LSP - Distribution Project	-	No	To address distribution and sub transmission supply line loading, short circuit duty and reactive support on Aquidneck Island.	Build a new substation at Jepson Substation with two 115-23 kV 55 MVA transformers, and two 115-13.8 kV 40 MVA transformers.

LSP – Removed From List Continued

National Grid - New England Local System Plan Project List - 2016									
Primary Driver	Asset Owner by Company	Projected In Service Date Month/Year	Major Project	Project	Status Update for 2016	Total non-PTF Project Cost	PPA Approval	Needs Assessment	Solutions
Removed from List									
Asset Replacement	New England Power	Apr-20		Deerfield 5 Transformer Replacement	Remove from LSP Asset Condition <\$5M	\$3,030,000	NR	Deerfield 5 69-13.8 kV, 18/24/30 MVA GSU Transformer needs replacement due to asset condition. 69 kV PTF OCB's 5910 and 525 need replacement due to asset condition. 69 kV disconnect switches need replacement due to asset condition.	This project will replace the Deerfield 5 Station #1 GSU transformer in kind. Due to asset condition PTF OCB's 5910 and 525, 5T1 high side air break, and associated disconnect switches will also be replaced.
Asset Replacement	New England Power	Sep-19		Northborough Rd - Asset Upgrades	Remove from LSP Asset Condition <\$5M	\$810,000	NR	Repalce OCBs due to Asset Condition replacement based on testing and trouble history. 69 kV switch overloads to Marlboro Taps (W-23W and G-7)	Replacement of oil circuit breakers and switches with 2000A
Asset Replacement	New England Power	Apr-18		Vernon Hill #8 Transformer Replacement	Remove from LSP Asset Condition <\$5M	\$2,785,000	NR	Asset Condition replacement based on testing and trouble history	Replace the #2 transformer.

Questions

- PAC, Transmission Customers, and other Stakeholders have 30 days to provide any written comments for consideration by National Grid.





Appendix

Criteria

- All National Grid facilities that are part of the interconnected National Grid system shall be designed in accordance with the National Grid Transmission Planning Guide (TGP28)
- The National Grid Transmission Planning Guide is posted on our website under:

http://www.nationalgridus.com/transmission/c3-8_standocs.asp

as:

- Transmission Planning Guide

Local System Planning Process

- Local studies can result from:
 - Load Growth
 - Area Reliability Assessments
 - Point of Delivery Request from Customer
 - Asset Replacement

Local System Planning Process

- A Planner –
 - summarizes the results from the needs assessment and provides: *criteria, data and assumptions used in study*
 - builds study cases with proposed alternatives
 - determines the most effective solution
 - summarizes the results of the solutions study

Data and Assumptions

Resources for studies:

- NEPOOL Library cases for load flow and ASPEN short circuit studies
- CELT Report Load forecasts for NE wide loads
- Customer provided forecasted loads for local areas