

Regional System Plan Transmission Projects and Asset Condition October 2016 Update



Planning Advisory Committee Meeting

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Highlights

- Major cost estimate changes that occurred between the June 2016 and October 2016 project list:
 - (MA) **Greater Boston Stability** – Projects cancelled analyses supporting the PPA’s demonstrated that these projects are no longer necessary.
 - Project 1644** - Upgrade the Medway 115 kV station to BPS standards (\$6.9M)
 - Project 1636** - Upgrade the West Methuen 115 kV station to BPS standards (\$8.9M)
 - Project 1641** - Upgrade the Edgar 115 kV station to BPS standards (\$9.6M)
 - Project 1642** - Upgrade the Dover 115 kV station to BPS standards (\$4.8M)
 - (MA) Other Projects
 - Project 1207 – Blair Pond (MA)** – Build a new 115kV Substation – cost increase \$39.1M – Increased cost is related the need for a deeper trench for pipe installation, cable installation and the redesign engineering work required for trenchless crossings. Also part of the increased cost is the extended timeframe for demolition and GIS and P&C cost increases and redesign engineering work
 - Project 1517 – Electric Ave (MA)** – Build a new 115kV Substation– cost increase \$7.0M – competitive bid pricing GIS and pipe type cable equipment and installation cost increased
 - Project 1639 – 345 kV line 372 (MA)** – Reconductor the 345 kV underground cable s (372) between Mystic and Kingston substations– cost increase \$4.2M - There was an obstruction in the pipe between Avery and Charles St in Downtown Boston. Additional labor, supervision, extra vacuum shifts, pipe repair, reel structural support, additional digging and civil work for pipe repair pits at the Boston Common and nearby locations. The extensive work in downtown Boston required more traffic control and police details



Highlights

- 8 upgrades on the project list have been placed in-service since the June 2016 update:
 - (CT) SWCT- Install a 115 kV circuit breaker (63 kA interrupting capability) in series with the existing 29T breaker at Plumtree Substation
 - (RI) Brayton Point Non-Price Retirement –Reconductor V-148N line between Washington and Woonsocket Substations
 - (MA) Reconductor the 345 kV underground cables (372) between Mystic and Kingston Substations
 - (MA) Replace existing S145/T146 UG cables with higher capacity cables between Salem Harbor and Railyard
 - (MA) Greater Boston – 2 projects
 - Central – Install K St. tie breaker #33 on the East bus
 - Western Suburbs – Upgrade 115 kV line 533-508 Lexington –Hartwell Ave by removing line clearance limitation and upgrading station equipment
 - (NH) LSP New Peaslee Substation with a five 115 kV breaker ring bus configuration. New 115 kV lines to supply a new Unutil substation and the existing Kingston Substation
 - (NH) Central New Hampshire Solution – Saco Valley Substation – Add two 25 MVAR synchronous condensers



October 2016 Changes

No New Projects and Corresponding Need

Project ID #	Transmission System Upgrades	Cost (in millions \$)	Improvement/Need
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October 2016 Changes, *cont.*

8 Projects Placed In-Service and Corresponding Needs

Project ID #	Transmission System Upgrades	Cost (in millions \$)	Improvement/Need
1562	Install a 115 kV circuit breaker (63 kA interrupting capability) in series with the existing 29T breaker at Plumtree Substation (Connecticut) SWCT	2.8	Address reliability concerns in SWCT area
1623	Reconductor V-148N Line between Washington and Woonsocket Substations (Rhode Island) Brayton Point Non-Price Retirement	5.7	Resolve thermal violations observed with the Brayton Point retirement
1639	Reconductor the 345 kV underground cable (372) between Mystic and Kingston substations. (Massachusetts)	22.7	Resolve asset condition issues
782	Replace existing S145/T146 UG cables with higher capacity cables between Salem Harbor and Railyard (Massachusetts)	62.4	Resolve asset condition issues
1353	Install K St. tie breaker #33 on the East bus (Massachusetts) Greater Boston – Central	1.8	Increase load serving capability and area reliability in the downtown Boston area



October 2016 Changes, *cont.*

8 Projects Placed In-Service and Corresponding Needs

Project ID #	Transmission System Upgrades	Cost (in millions \$)	Improvement/Need
1339	Upgrade 115 kV line 533-508 Lexington-Hartwell Ave by removing line clearance limitation and upgrading station equipment (Massachusetts) Greater Boston - Western Suburbs	0.1	Increase the load serving capability of Western Suburbs of Boston
1183	New 115 kV Peaslee Substation with a five 115 kV breaker ring bus configuration. New 115 kV lines to supply a new Unutil substation and the existing Kingston substation (New Hampshire) LSP New Peaslee Substation and 115/34.5 kV transformer	26.9	LSP project to serve the local area load
1278	Saco Valley Substation - Add two 25 MVAR synchronous condensers (New Hampshire) Central New Hampshire Solution	22.5	Resolve voltage needs in the Central New Hampshire area



October 2016 Changes, *cont.*

Cost Estimate Comparisons of Reliability Projects

June 2016 vs. October 2016 Update ⁽¹⁾

	As of June 2016 Plan Update (in millions \$)	As of Oct 2016 Plan Update (in millions \$)	Change in Plan Estimate (in millions \$)
MAJOR PROJECTS			
Maine Power Reliability Program (MPRP)	1459	1459	0
Greater Hartford & Central Connecticut (GHCC)	351	346	-5
New England East - West Solution (NEEWS)	1581	1581	0
NEEWS (Greater Springfield Reliability Project) \$676.0			
NEEWS (Rhode Island Reliability Project) \$362.3			
NEEWS (Interstate Reliability Project) \$482.3			
NEEWS \$59.6			
Pittsfield/Greenfield Project	214	212	-2
Greater Boston - North, South, Central, Western Suburbs	860	843	-17
New Hampshire Solution - Southern, Central, Seacoast, Northern	327	327	0
Vermont Solution - Southeastern, Connecticut River	111	111	0
Southwest Connecticut (SWCT)	450	450	0
SUBTOTAL ⁽²⁾	5353	5329	-24
OTHER PROJECTS	6703	6761	58
NEW PROJECTS			0
PROJECTS WHOSE COST ESTIMATES WERE PREVIOUSLY REPORTED AS TO BE DETERMINED (TBD)		0	0
TOTAL ⁽²⁾	12056	12090	34
Minus 'concept'	0	0	
Minus 'in-service'	-7879	-8024	
Aggregate estimate of active projects in the Plan ⁽²⁾	4177	4066	

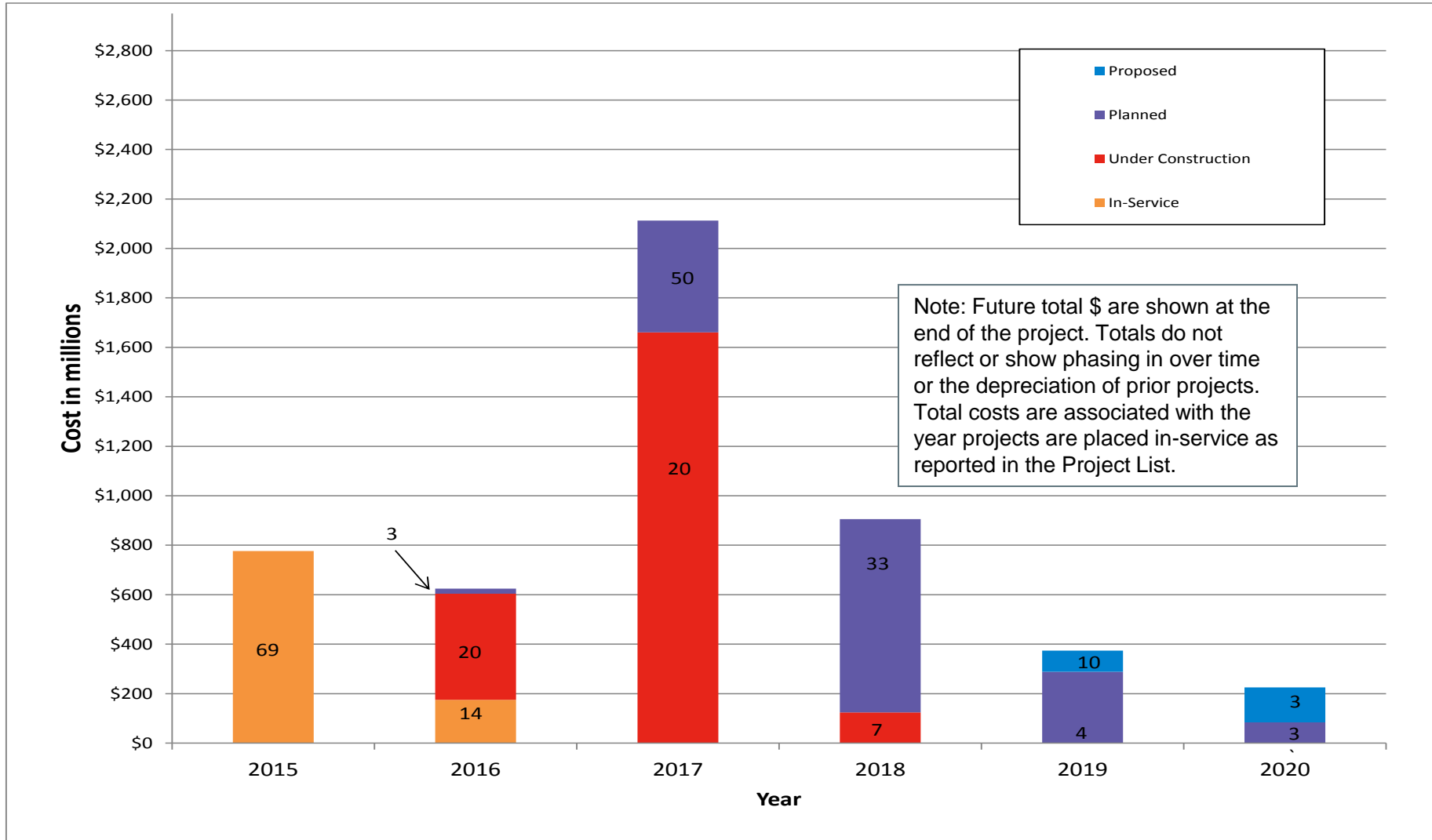
⁽¹⁾ Transmission Owners provided all estimated costs, which may not meet the guidelines described in Planning Procedure 4, Attachment D

⁽²⁾ May not sum exactly due to rounding

⁽³⁾ The cost estimates for projects in the "Major Projects" category are moved to the "Other Projects" category once they are fully completed.

October 2016 Changes, *cont.*

Investment of New England Transmission Reliability Projects by Status through 2020

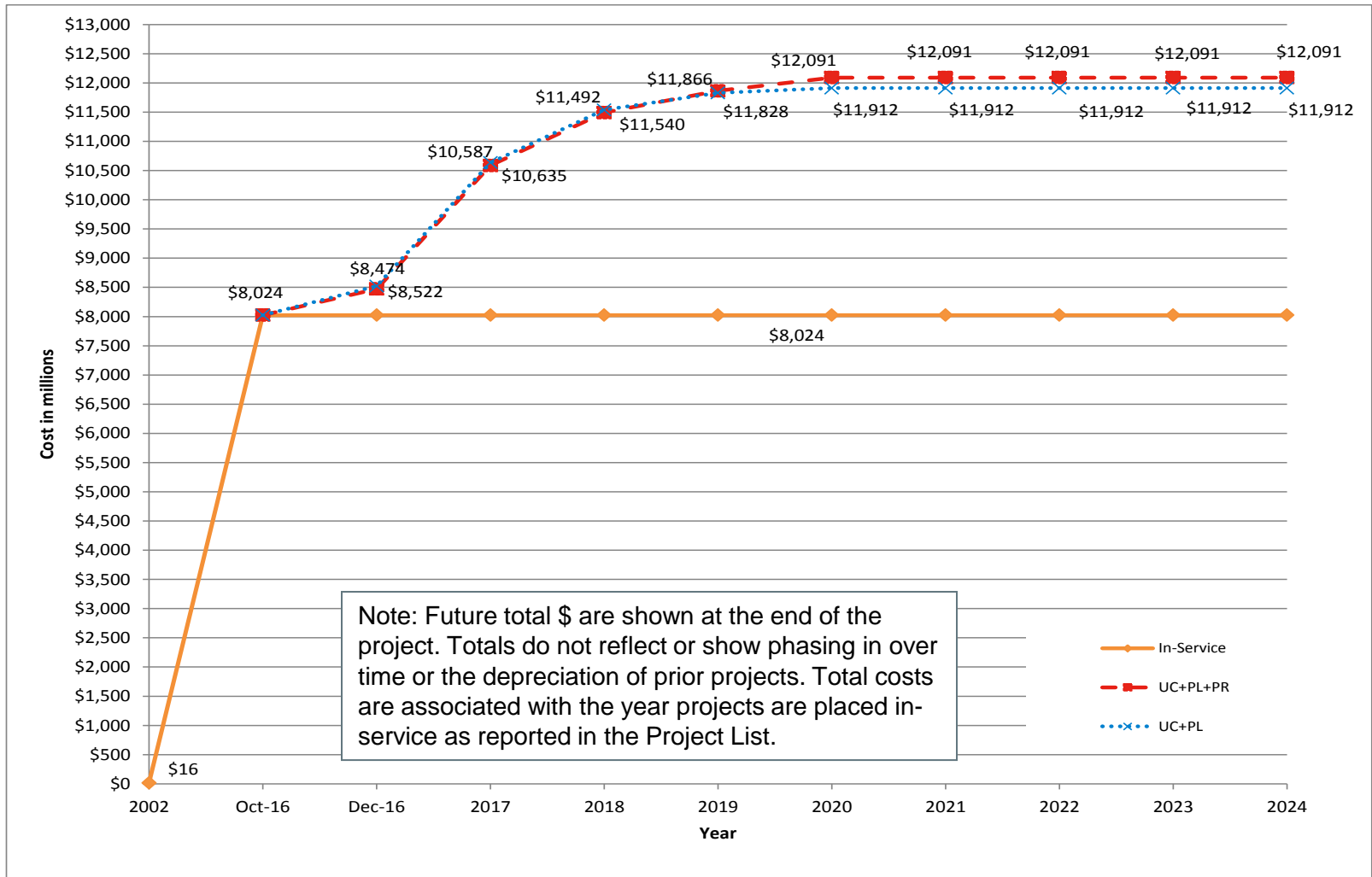


Note: Numbers shown represent project quantities



October 2016 Changes, *cont.*

Cumulative Investment of New England Transmission Reliability Projects through 2024



Note: UC – Under Construction, PL – Planned, PR – Proposed

October 2016 Changes, *cont.*

Reliability Project Counts and Aggregated Cost Estimates by Project Stage with Applied Accuracy Ranges ⁽¹⁾

Project Stage (Status)	Component / Project / Plan Count ⁽²⁾	Estimate Range		Estimated Costs (\$millions)	Range	
		Minimum	Maximum		Minimum	Maximum
Proposed	7	-25%	25% ⁽³⁾	226	170	283
Planned	99	-25%	25%	1625	1219	2031
Under Construction	47	-10%	10%	2215	1994	2437
Total Plan (excluding Concept)	153			⁽⁵⁾ 4066	3382	4750
Concept	0			⁽⁴⁾ 0		
In-Service	8	-10%	10%	145	131	160
Cancelled	5			31		

(1) All costs provided by Transmission Owners. The costs in the table reflect all projected in-service dates

(2) Efforts need to be made to describe projects on a more consistent basis

(3) All estimates may not yet be at this level of accuracy; many estimates may be -25%/+50%

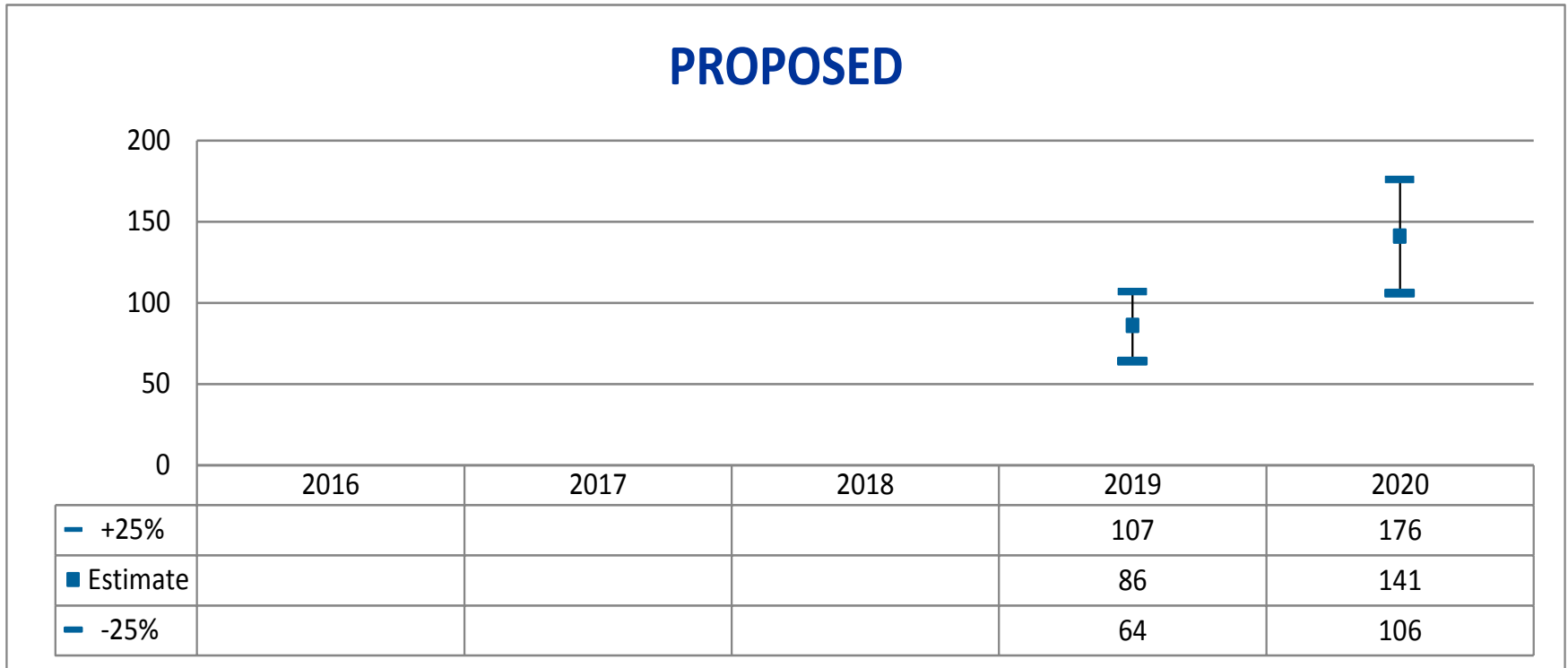
(4) Not included here are the costs of reliability projects for which no estimates have been provided.

Estimates for these projects are noted as TBD in the Project Listing and are only Concept Projects.

(5) May not add up due to rounding.

October 2016 Changes, *cont.*

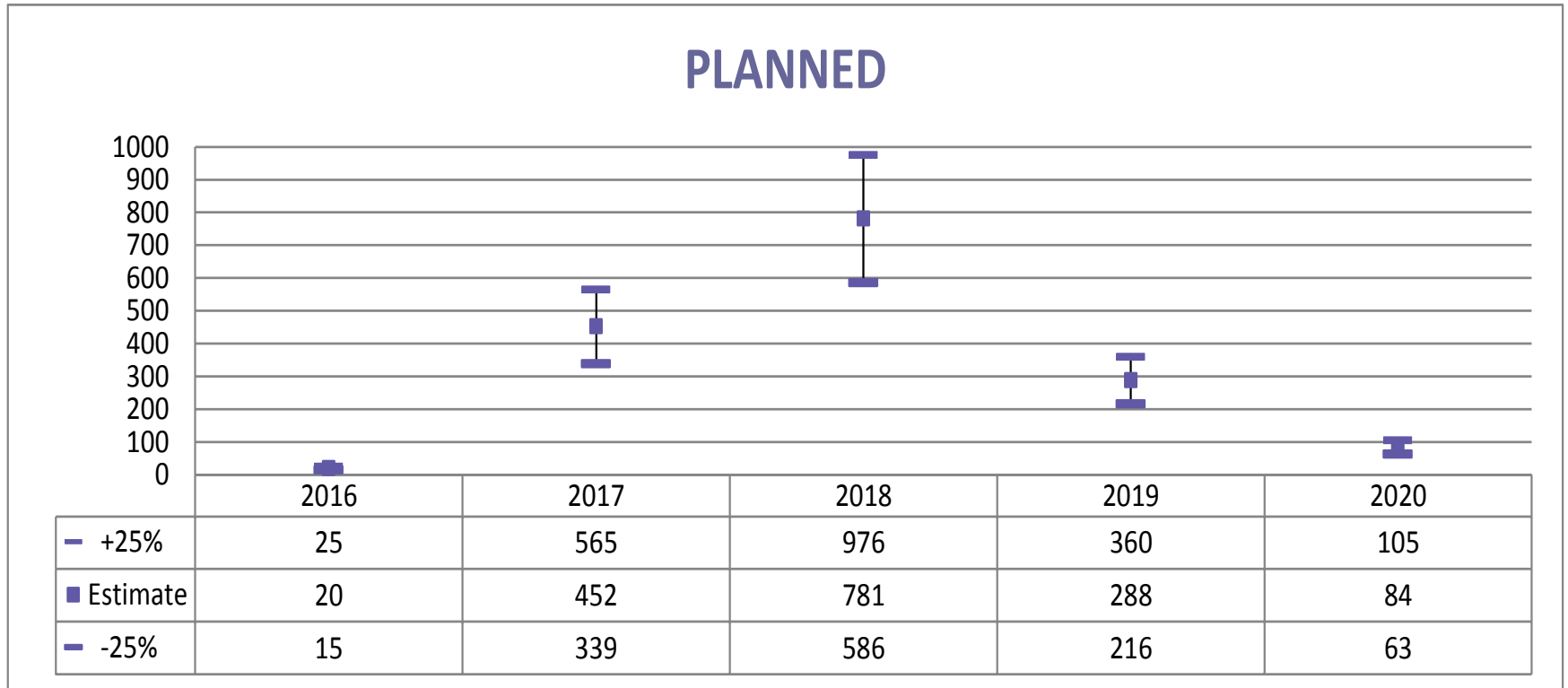
Project Cost Estimate Tolerances by Status and Year in Millions \$



Note: Future total \$ are shown at the end of the project. Totals do not reflect or show phasing in over time or the depreciation of prior projects. Total costs are associated with the year projects are placed in-service as reported in the Project List.

October 2016 Changes, *cont.*

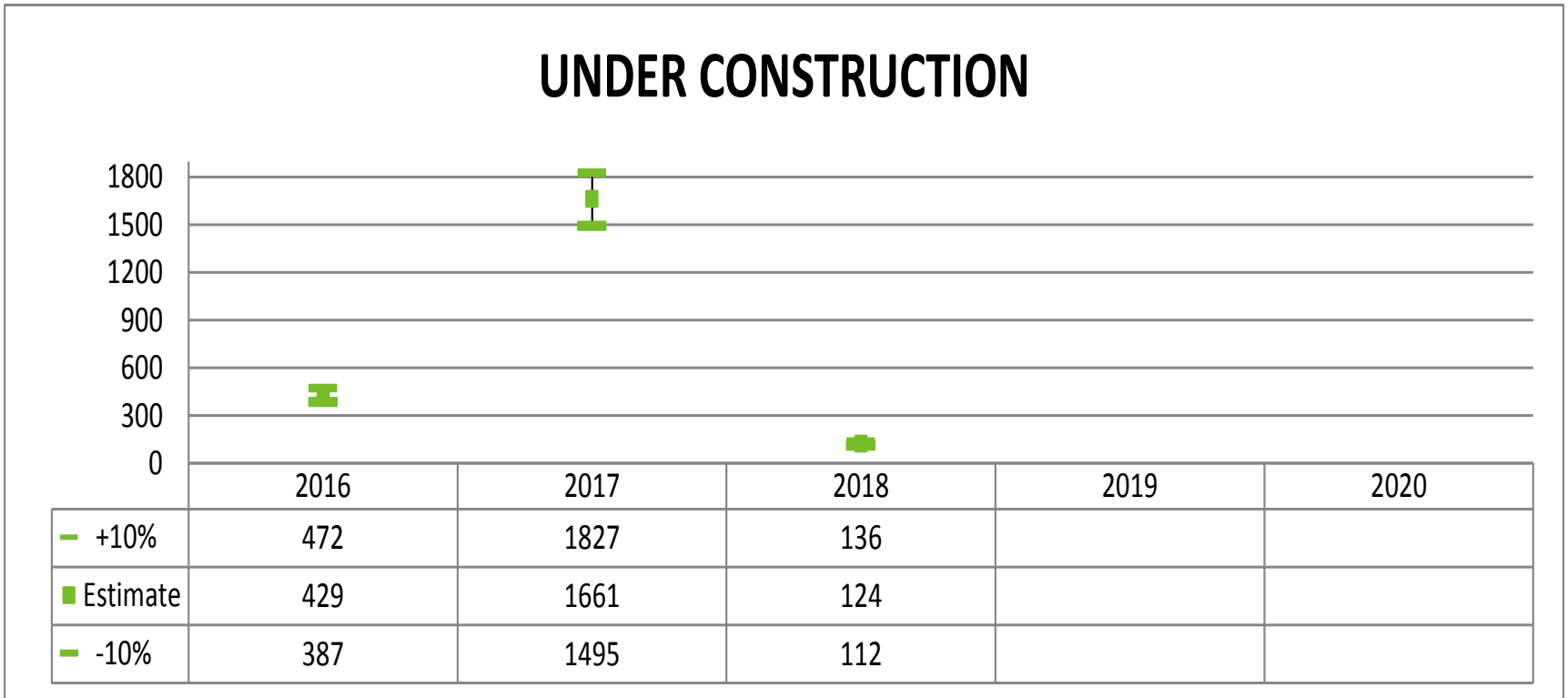
Project Cost Estimate Tolerances by Status and Year in Millions \$



Note: Future total \$ are shown at the end of the project. Totals do not reflect or show phasing in over time or the depreciation of prior projects. Total costs are associated with the year projects are placed in-service as reported in the Project List.

October 2016 Changes, *cont.*

Project Cost Estimate Tolerances by Status and Year in Millions \$



Note: Future total \$ are shown at the end of the project. Totals do not reflect or show phasing in over time or the depreciation of prior projects. Total costs are associated with the year projects are placed in-service as reported in the Project List.

Status of Major Transmission Projects

	PPA	TCA	Construction
Pittsfield/Greenfield Project	Approved 12/12, 01/16, 05/16	Partial 2/11/16	Project completion 2014-2019
Maine Power Reliability Program (MPRP)	Approved 7/08, 2/09, 11/10	Approved 1/29/10	Project completion 2014-2018
Vermont Solution – Connecticut River Valley	Approved 4/15	Not Submitted	Project completion 2018
Southwest Connecticut (SWCT)	Approved 4/15	Partial 7/16/15, 4/15/16, 5/13/2016	Project completion 2013-2020

Status of Major Transmission Projects, *cont.*

	PPA	TCA	Construction
Central/Western MA Reinforcements	Approved 12/07, 3/11	Group 1 2/29/2012	Project completion 2009-2017
Greater Boston – North, South, Central and Suburbs	Approved 4/15, 5/15,6/16	Not Submitted	Project completion 2013-2019
New Hampshire Solution – Western, Central, Southern and Seacoast	3/13	Seacoast 11/5/15 Southern 1/7/16 Western 12/17/15 Central 11/25/15	Project completion 2013-2020
Greater Hartford & Central Connecticut (GHCC)	4/15	Partial 11/25/15	Project completion 2018

October Asset Condition

4 New Projects

Project ID #	Transmission System Upgrades	Cost (in millions \$)
14	1231/1242 Line Clearance remediation Project (Massachusetts)	13.8
15	Install a new Medway control house which is to be built to BPS standards in a location within the existing station footprint (Massachusetts)	11.8
16	3419 line (portion in Connecticut) asset condition and storm hardening. Asset condition - replace 24 wood poles H-frame with direct embed steel wood pole equivalent or wood located in MA & CT (Connecticut)	Part of Asset Condition #1 (11.0)
17	East Shore 345 kV circuit switcher replacement project. Replace 345 kV circuit switchers with dead tank breakers (Connecticut)	10.9



October Asset Condition

2 Projects Placed In-Service

Project ID #	Transmission System Upgrades	Cost (in millions \$)
14	1231/1242 Line Clearance remediation Project (Massachusetts)	13.8
16	3419 line (portion in Connecticut) asset condition and storm hardening. Asset condition - replace 24 wood poles H-frame with direct embed steel wood pole equivalent or wood located in MA & CT (Connecticut)	Part of Asset Condition #1 (11.0)



Appendix



Summary: Project Listing Definitions

- **ISO New England Inc. Transmission, Markets and Services Tariff Section II**
 - **Attachment K, Regional System Planning Process**
 - Definition Of Needs Assessment
 - Definition of Solution Studies
 - **Project Listing Subcategories**
 - **Concept:** shall include a transmission project that is being considered by its proponent as a potential solution to meet a need identified by the ISO in a Needs Assessment or the RSP, but for which there is little or no analysis available to support the transmission project. (Project not well-defined, costs not well-defined, solution implementation not supportable).
 - **Proposed:** The project will include a regulated transmission solution that has been proposed in response to a specific Needs Assessment on the RSP and has been evaluated or further defined and developed in a Solutions Study and communicated to PAC. (Project well-defined, cost estimate quality sufficient for comparison of alternatives).
 - **Planned:** The project will include a Transmission upgrade that has been approved by the ISO, pursuant to Section I.3.9 (presumes Needs Assessment and Solutions Study have been completed). (Still subject to Schedule 12C review for Transmission Cost Allocation)

Project Listing

Project Listing Column
Definitions for:

- Reliability Projects
- Interconnection Projects
- Market Efficiency Upgrades
- Elective Projects
- Merchant Projects
- Projects In-Service
- Cancelled Projects

Project Listing – Column Definitions

Part Number (Part #)

The Part #'s designate the 'need' category of the project. Original categories are not changed when a project is placed 'In-Service' or 'Cancelled'.

Part 1 – These projects are Reliability Upgrades.

1a: Planned or Under Construction

1b: Conceptual or Proposed

Part 2 – These projects are Generator Interconnection Upgrades.

2a: Proposed (I.3.9 approval but without Generator Interconnection Agreement), Planned (I.3.9 approval with Generator Interconnection Agreement), or Under Construction

2b: Conceptual or Proposed

Part 3 – These projects are Market Efficiency Upgrades.

3a: Planned or Under Construction

3b: Conceptual or Proposed

Part 4,5 – These projects may be promoted by any entity electing to support the cost of transmission changes. The entity sponsoring the changes will have their own justification for their actions.

4,5a: Planned or Under Construction

4,5b: Conceptual or Proposed

Project Listing – Column Definitions, *cont.*

Project ID

This number is generated from ISO-NE System Planning Information Tracking System. It may change in the future as the tracking system evolves.

Primary Equipment Owner

The company listed here is the responsible equipment owner / provider designated to design and implement the project.

Other Equipment Owner

For projects that involve multiple Transmission Owners, the company listed here is also a responsible equipment owner / provider designated to design and implement the project.

Projected Month/Year of In-Service

The month/year entered is the date the project is expected to be placed in service.

Major Project

Name given to a project that consists of smaller subprojects.

Project / Project Component

A brief, high-level description of the project is entered here. It will either include major pieces of substation equipment and/or types of line work to be performed.



Project Listing – Column Definitions, *cont.*

Status

In Service: The project has been placed in operation.

Under Construction: The project has received necessary approvals and a significant level of engineering or construction is underway.

Planned: The project will include a Transmission upgrade that has been approved by the ISO.

Proposed: The project will include a regulated transmission solution that has been proposed in response to a specific Needs Assessment on the RSP and has been evaluated or further defined and developed in a Solutions Study and communicated to PAC.

Concept: Shall include a transmission project that is being considered by its proponent as a potential solution to meet a need identified by the ISO in a Needs Assessment or the RSP, but for which there is little or no analysis available to support the transmission project.

Cancelled: Project has been cancelled.

Project Listing – Column Definitions, *cont.*

PPA Approval (Review of Market Participant’s Proposed Plans)

A date in this column signifies when the project received approval pursuant to Section I.3.9 of the ISO-New England Tariff. This approval indicates that the project will have no adverse impact on the stability, reliability, or operating characteristics of the system. A ‘no’ indicates that an approval is required, but has not been received yet. An ‘NR’ indicates that an I.3.9 approval is not required.

TCA Approval (Transmission Cost Allocation)

A date in this column signifies when the project PTF costs were reviewed and approved. This approval indicates that it has been agreed whether, and by how much, the scope of the project and associated costs exceed regional needs. An ‘NR’ indicates that a TCA approval is not applicable either because the project has been cancelled or no/very minimal PTF costs are involved.

Estimated Costs

The pool-supported project cost estimate presented here should be the best estimate available. It is understood that the estimate accuracy may vary dependent on the maturity of the project.

Accuracy tolerances for these estimates are targeted as follows:

Concept Project

Proposed Project that has been reviewed and approved to proceed by ISO-NE (+/-25%),

I.3.9-Approved Project (+/-25%), and

TCA-Approved Project (+/-10%)