Regional System Plan

Transmission Projects and Asset Condition

June 2022 Update

Planning Advisory Committee Meeting

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Highlights of the RSP Project List Update

- **Major cost estimate changes greater than $5M that occurred between the March and June 2022 Project List**
  - (MA) Greater Boston – cost increase of $14.4M for the Sudbury – Hudson 115 kV line due to material costs increase and siting/permitting delays
- **One new project**
  - (MA) K Street 345 kV 103S Breaker - Operate as Normally Open
    - The cost of this project is $0
- **Three upgrades have been placed in-service since the March 2022 update**
  - (MA) Total of two projects
    - SEMA/RI – one project
    - Boston Area Optimized Solution (BAOS) – one project
  - (RI) Total of one project
    - SEMA/RI – one project
- **No cancelled projects since the March 2022 update**

June 2022 RSP Project List Update

- **One New Project**

Project ID #	Transmission System Upgrades	Cost (in millions $)	Improvement/Need
1898	K Street 345 kV 103S Breaker - Operate as Normally Open (Massachusetts)	0.0	Reduce the loadings on the Stoughton-K Street 345 kV cables under contingency conditions

June 2022 RSP Project List Update, cont.

- **Three Projects Placed In-Service and Corresponding Needs**

Project ID #	Transmission System Upgrades	Cost (in millions $)	Improvement/Need
1718	Robinson Ave 115 kV circuit breaker addition and reterminate Q10 line (Massachusetts) SEMA/RI	2.0	Increase load serving capability in the SEMA/RI area
1724	Kent County T3 345/115 kV transformer replacement (Rhode Island) SEMA/RI	5.9	Resolve thermal overloads
1875	Install a direct transfer trip (DTT) scheme between Ward Hill and West Amesbury Substations for Line 394 (Massachusetts) BAOS	0.9	Resolve thermal overloads

June 2022 RSP Project List Update, cont.

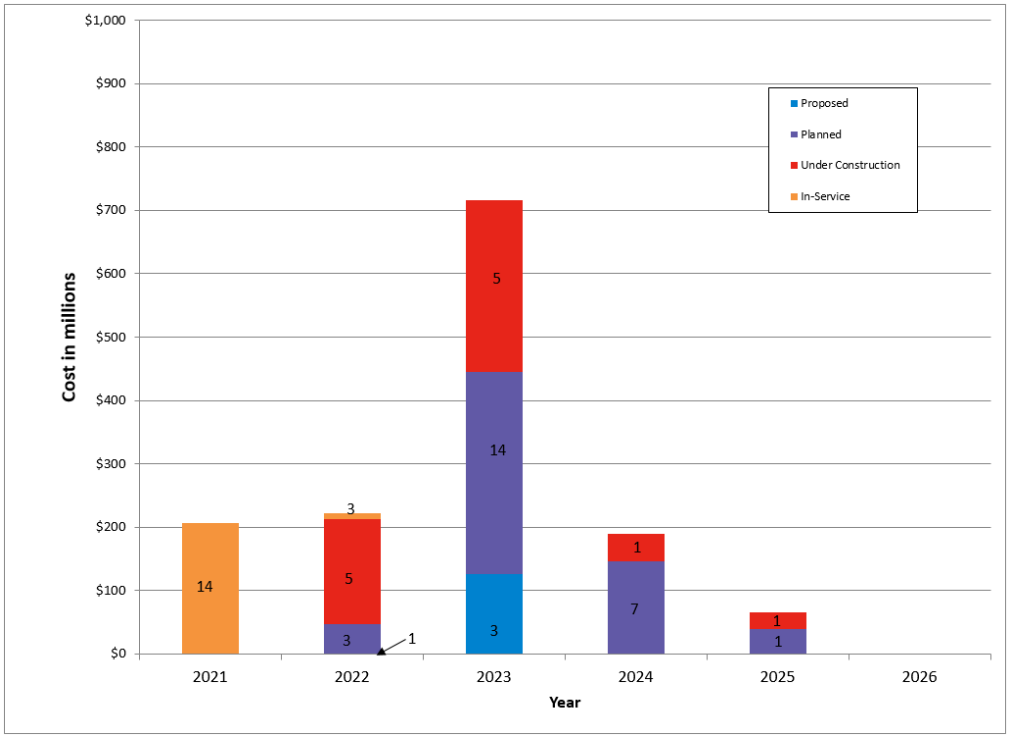
- **Cost Estimate Comparisons of Reliability Projects March vs. June 2022 Update***

	As of Mar 2022 Plan Update (in millions $)	As of Jun 2022 Plan Update (in millions $)	Change in Plan Estimate (in millions $)
MAJOR PROJECTS ****			
Southeast Massachusetts/Rhode Island Reliability (SEMA/RI)	368	368	0
Greater Boston - North, South, Central, and Western Suburbs	1035	1050	14
Eastern CT 2029	221	221	0
Boston Area Optimized Solution (BAOS)	49	49	0
New Hampshire (NH) 2029	135	135	0
Upper Maine (UME) 2029	159	159	0
SUBTOTAL**	1966	1981	14
OTHER PROJECTS	11045	11060	16 ***
NEW PROJECTS	0	0	0
TOTAL**	**13010**	**13041**	**31**
Minus 'in-service'	-11722	-11747	-25
**Aggregate estimate of active projects in the Plan ** **	**1288**	**1294**	**6**

* Transmission Owners provided all estimated costs, which may not meet the guidelines described in Planning Procedure 4, Attachment D.
** May not sum exactly due to rounding.
*** The cost estimates for 'in-service projects' were updated in the June 2022 update to reflect historical data cleanups.
**** The cost estimates for projects in the "Major Projects" category are moved to the "Other Projects" category once they are fully completed.

June 2022 RSP Project List Update, cont.

- **Investment of New England Transmission Reliability Projects by Status through 2026**

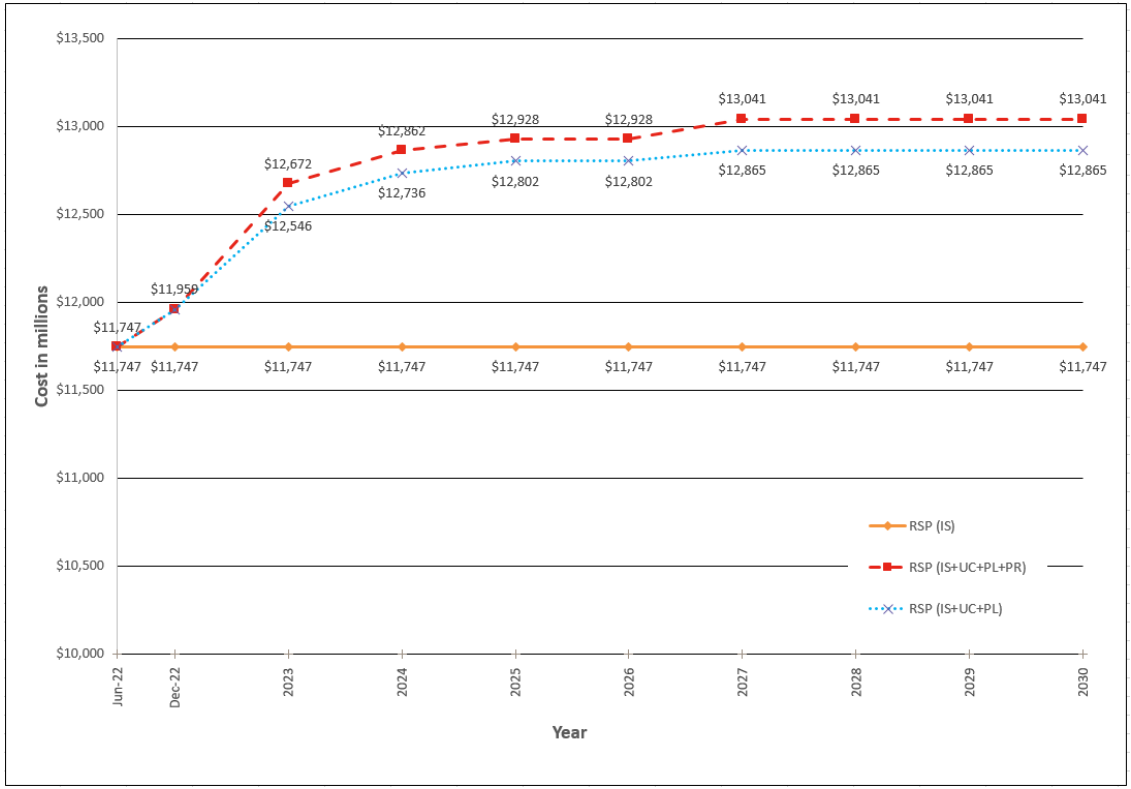


* Numbers shown represent project quantities.

** 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.

June 2022 RSP Project List Update, cont.

- **Cumulative Investment of New England Transmission Reliability Projects through 2030**



* IS – In Service, UC – Under Construction, PL – Planned, PR – Proposed

** 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.

June 2022 RSP Project List Update, cont.

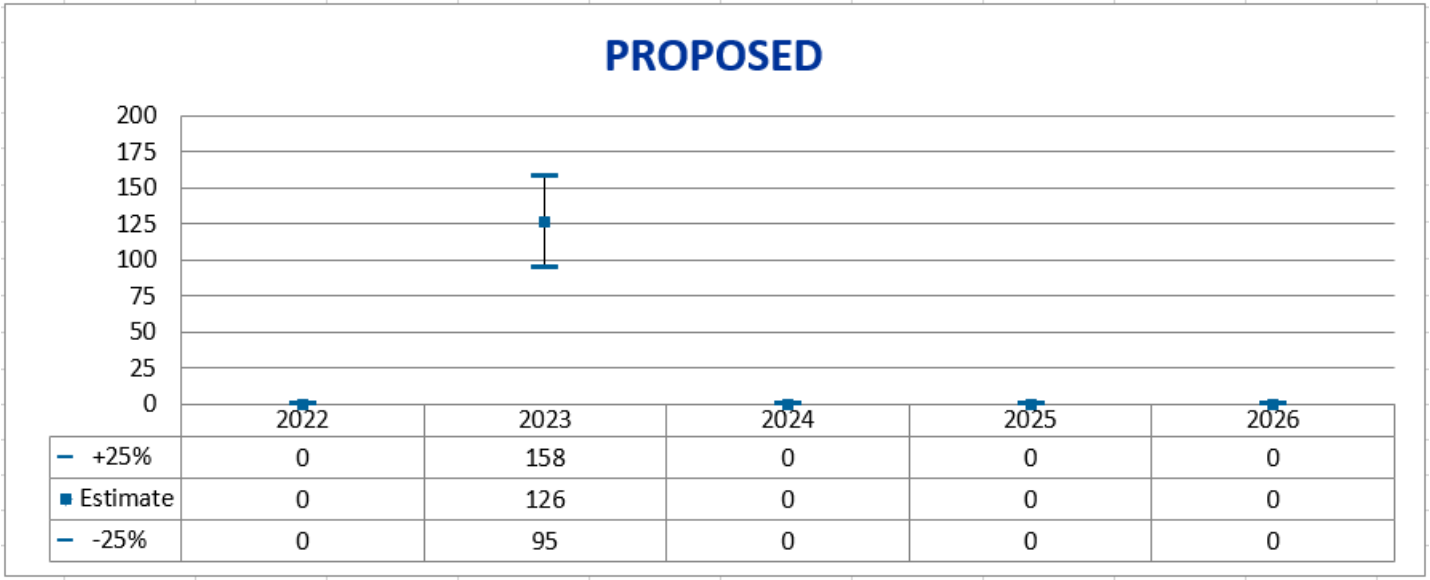
- **Reliability Project Counts and Aggregated Cost Estimates by Project Stage with Applied Accuracy Ranges***

Project Stage (Status)	Component / Project / Plan Count	Estimate Range Minimum	Estimate Range Maximum	Estimated Costs ($millions)	Range Minimum ($millions)	Range Maximum
Proposed	7	-25%	25%**	175	131	219
Planned	26	-25%	25%	615	461	768
Under Construction	12	-10%	10%	504	454	555
Total Plan	**45**			*** **1294**	**1046**	**1542**
In-Service	3	-10%	10%	9	8	10
Cancelled	0	-25%	25%	0	0	0

* All costs are provided by Transmission Owners. The costs in the table reflect all projected in-service dates.
** All estimates may not yet be at this level of accuracy; many estimates may be -25%/+50%.
*** May not add up due to rounding.

June 2022 RSP Project List Update, cont.

- **Project Cost Estimate Tolerances by Status and Year in Millions $ for the next five years**

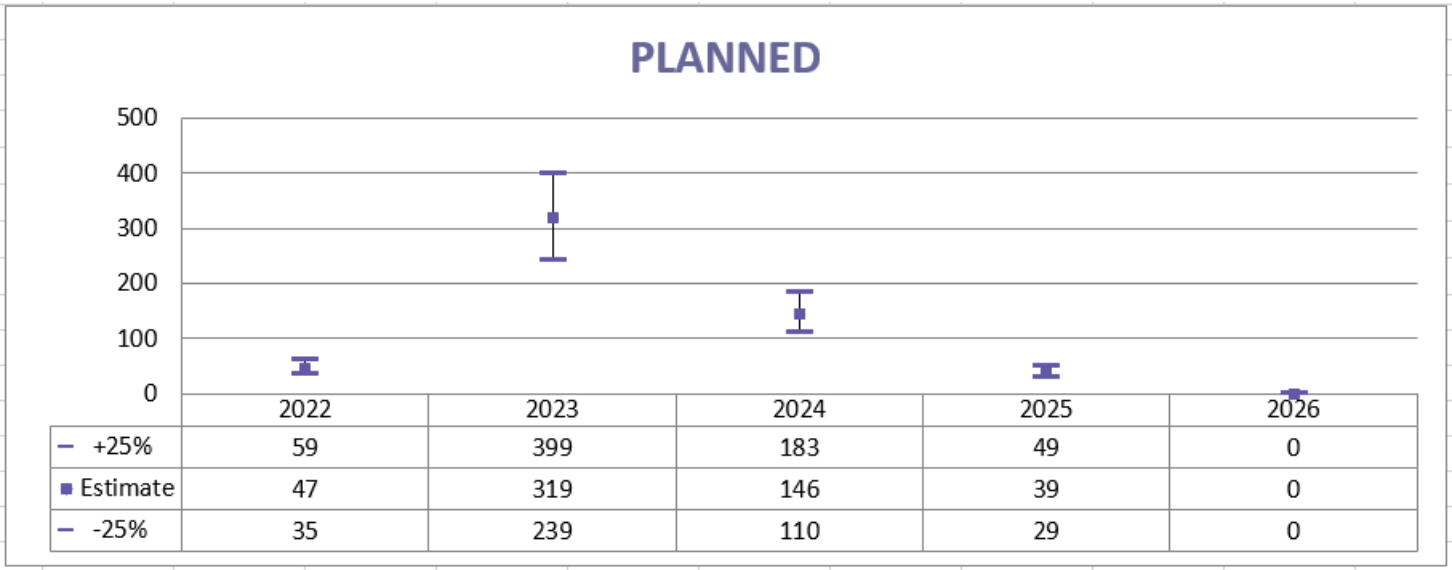


	2022	2023	2024	2025	2026
+25%	0	158	0	0	0
Estimate	0	126	0	0	0
-25%	0	95	0	0	0

* 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.

June 2022 RSP Project List Update, cont.

- **Project Cost Estimate Tolerances by Status and Year in Millions $ for the next five years**

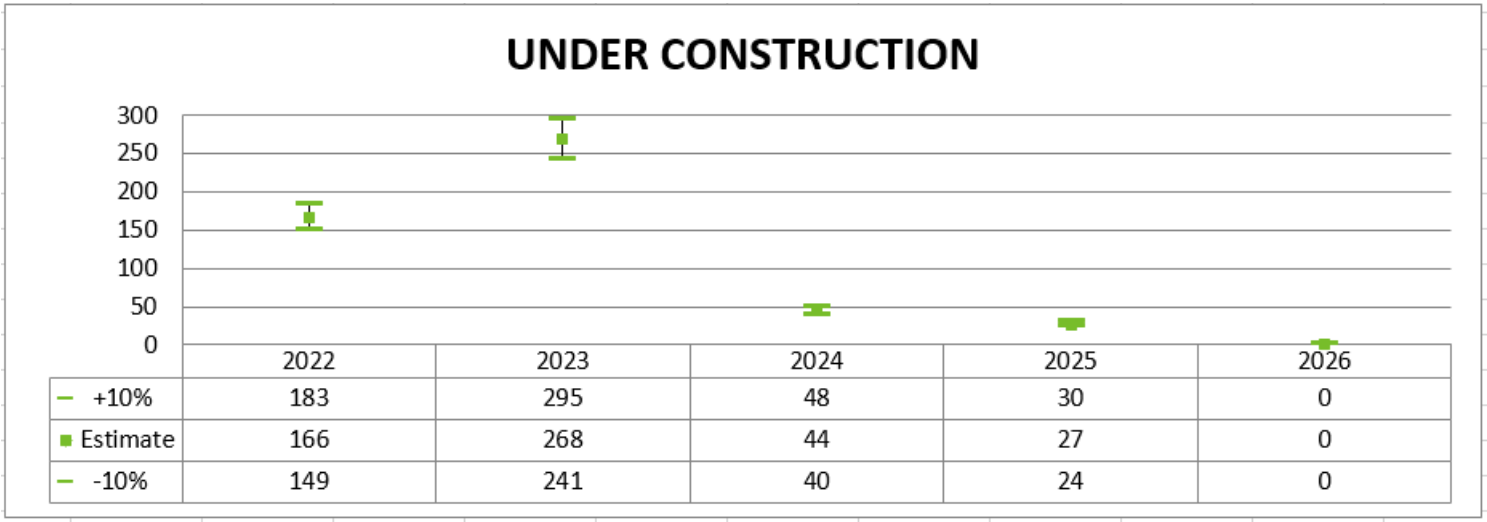


	2022	2023	2024	2025	2026
+25%	59	399	183	49	0
Estimate	47	319	146	39	0
-25%	35	239	110	29	0

* 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.

June 2022 RSP Project List Update, cont.

- **Project Cost Estimate Tolerances by Status and Year in Millions $ for the next five years**



	2022	2023	2024	2025	2026
+10%	183	295	48	30	0
Estimate	166	268	44	27	0
-10%	149	241	40	24	0

* 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
Southeast MA/RI Reliability (SEMA/RI)	Approved 5/2017, 4/2018	Submitted	Project completion 2017-2025
Greater Boston – North, South, Central and Western Suburbs	Approved 4/2015, 5/2015, 6/2016	Submitted	Project completion 2013-2023
Eastern CT 2029	Approved 6/2021	Not Submitted	Project completion 2021-2024
Boston Area Optimized Solution (BAOS)	Approved 5/2021	Submitted	Project completion 2023
New Hampshire (NH) 2029 Solution	Approved 1/2022 (New Hampshire Transmission) Not Submitted (Eversource)	Not Submitted	Project completion 2023
Upper Maine (UME) 2029 Solution	Approved 2/2022 (Versant Power) Partially approved 5/2022 and remainder not submitted (Avangrid)	Not Submitted	Project completion 2023-2027

June 2022 Asset Condition List Update

- **Two New Projects**

Project ID #	Transmission System Upgrades	Cost (in millions $)
328	Bridgewater #16 Substation Asset Condition Upgrades (Massachusetts)	26.0
329	115 kV Line Structure and OPGW Replacements - Line 1428 (Massachusetts)	8.0

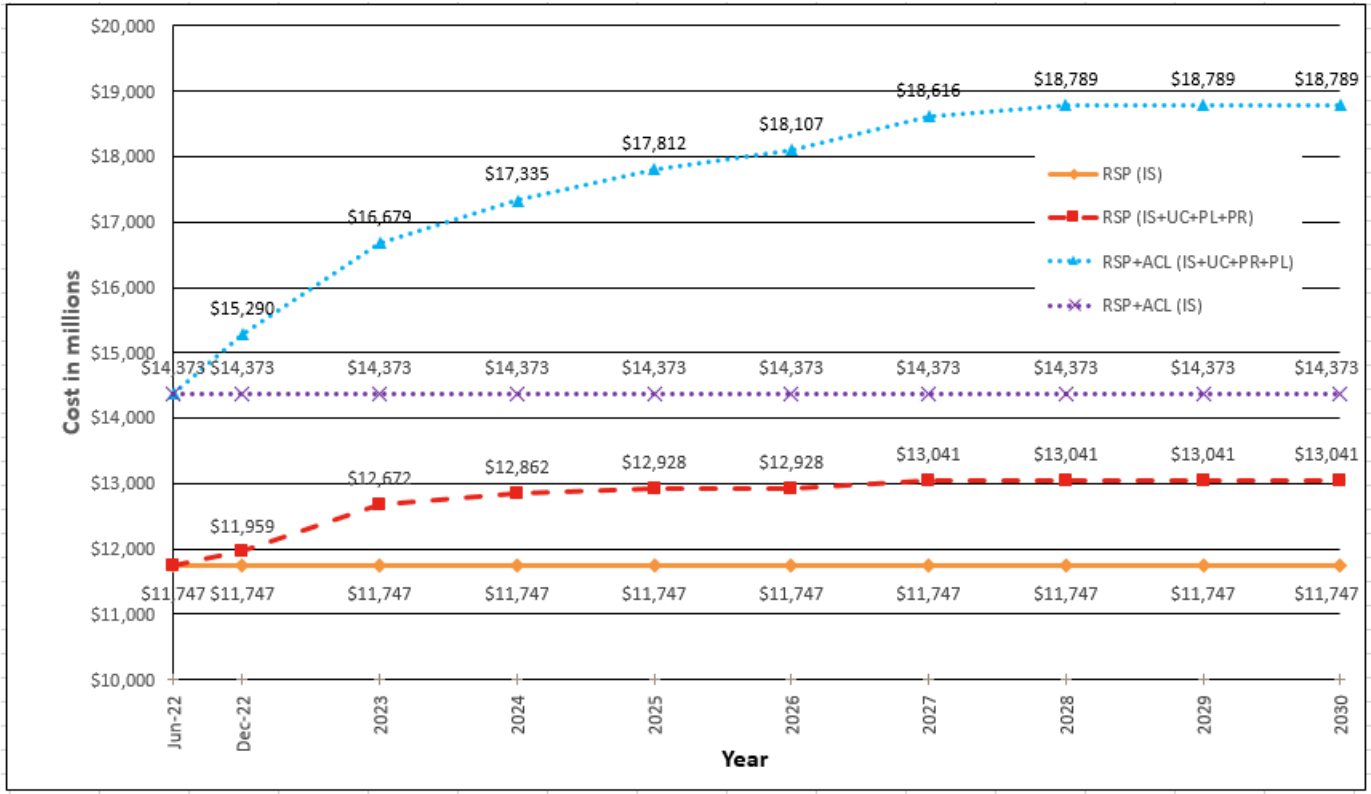
June 2022 Asset Condition List Update, cont.

- **Seven Projects Placed In-Service**

Project ID #	Transmission System Upgrades	Cost (in millions $)
327	Laminated Wood Structure Replacement Program Phase II - M164 115 kV Line (New Hampshire)	6.0
203	115 kV Wood Pole and Shield Wire Replacement - K174 (New Hampshire)	16.2
296	X-176 115 kV Line Asset Condition Refurbishments (Massachusetts)	18.5
313	345 kV Structure and Shield Wire Replacements - 329 Line (Connecticut)	6.2
261	115 kV Wood Pole and Shield Wire Replacement 2020-2023 - Line 1465 (Connecticut)	8.8
164	345 kV Structure Replacement Projects - Line 310 (Connecticut)	19.7
172	345 kV Structure Replacement Projects - Line 383 (Connecticut)	22.1

June 2022 Asset Condition List Update, cont.

- **Cumulative Investment of New England Transmission Reliability Projects and Asset Condition through 2030**



* IS – In Service, UC – Under Construction, PL – Planned, PR – Proposed

** 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.

Questions

APPENDIX

Project Listing

- **Project Listing Column Definitions for**
  - Reliability Projects
  - Interconnection Projects
  - Market Efficiency Upgrades
  - Elective Projects

Project Listing – Column Definitions, cont.

- **Part Number (Part #)**
  - The Part #'s designate the 'need' category of the project*
    - Part 1: these projects are Reliability Upgrades
      - 1a Planned (must be the preferred solution to solve the needs and have I.3.9 approval) or Under Construction
      - 1b Proposed (is supported by a Solutions Study or a Competitive Solution Process)
    - Part 2: these projects are Generator Interconnection Upgrades
      - 2a Planned (I.3.9 approval with Interconnection Agreement including FCM related transmission upgrades to meet the Capacity Capability Interconnection Standard), or Under Construction
      - 2b Proposed (at a minimum, a completed System Impact Study and I.3.9 approval but no Interconnection Agreement)
    - Part 3: these projects are Market Efficiency Upgrades
      - 3a Planned (must be the preferred solution to solve the needs and have I.3.9 approval) or Under Construction
      - 3b Proposed (is supported by a Competitive Solution Process)
    - Part 4: 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
      - 4a Planned (I.3.9 approval with Interconnection Agreement) or Under Construction
      - 4b Proposed (I.3.9 approval but without Interconnection Agreement)

* Original categories are not changed when a project is placed 'In-Service' or 'Cancelled'.

Project Listing – Column Definitions, cont.

- **Project ID**
  - The Project ID is generated by ISO-NE System Planning
- **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 is given to a project that consists of smaller subprojects
- **Project/Project Component**
  - The month/year entered is the date the project is expected to be placed in service
  - A brief, high-level description of the project is entered here
    - Includes 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
    - A regulated transmission solution upgrade that has been approved by the ISO pursuant to Section I.3.9 of the Tariff, or
    - An interconnection related transmission upgrade that has been approved by the ISO pursuant to Section I.3.9 of the Tariff with Interconnection Agreement
  - Proposed
    - A regulated transmission solution that has been selected by the ISO in response to a Needs Assessment and communicated to PAC, or
    - An interconnection related transmission upgrade that has been approved by the ISO pursuant to Section I.3.9 of the Tariff, but without Interconnection Agreement
  - Cancelled
    - Project has been cancelled

* On December 10, 2019, FERC accepted Tariff changes that removed the 'Concept' category.

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 because the project has been cancelled, has no/minimal PTF cost, or is associated with the interconnection of a resource or Elective Transmission Upgrade
- **Estimated Costs**
  - The PTF 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:
    - Proposed Project that has been reviewed and approved to proceed by ISO-NE (+50%/-25%)
    - I.3.9-Approved Project (+/-25%), and
    - TCA-Approved Project (+/-10%)
  - An "NR" indicates that the PTF cost estimate is less than $5M, either for the individual project or for the entire project when the individual project is part of a larger project (typically shown as Major Project), and/or not eligible for regional cost