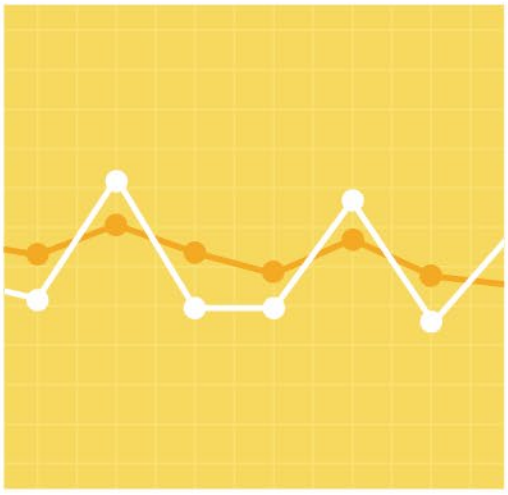
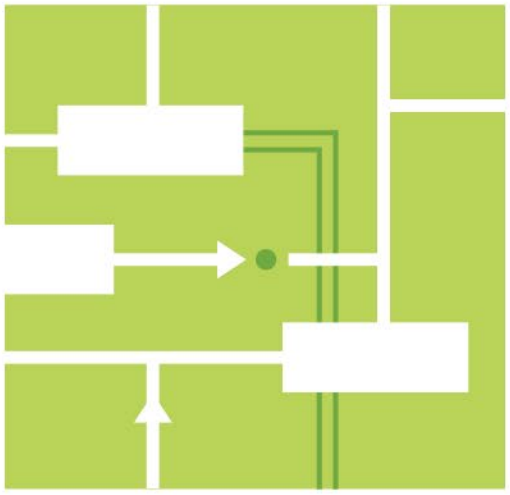
Boston 2028 RFP – Review of Phase One Proposals

Appendix A – Redacted Executive Summaries from Phase One Proposals

JULY 17, 2020





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Section 1
Redacted Executive Summaries of Phase One Proposals

The following subsections provide the responses to Question 2 in the Boston 2028 RFP for each Phase One Proposal. Question 2 requested an executive summary of the proposal, which stated:

> *"Provide a narrative description of the Phase One Proposal highlighting the key project-related attributes including, at a minimum, installed cost, life-cycle cost,[1] a summary of the proposed schedule,[2] design, the timing to procure real estate, and an explanation of how the proposed project addresses the identified needs. Any cost containment provisions should also be described in this summary. This public version will be posted on the public section of the ISO's website when the list of proposals that meet the stated need is posted. It should not contain CEII or confidential information on of the project.*
>
> *It is important that these executive summaries discuss key attributes of the Phase One Proposal as opposed to merely providing general descriptions of the QTPS Respondent's organization and/or accomplishments."*

While Question 2 specifically stated that the response to Question 2 should not contain any CEII or confidential information about the project,[3] some of the responses identified certain portions as confidential. In the subsequent subsections, all information that was marked as confidential by the QTPS Respondent has been redacted. With the exception of the redaction of confidential information, the content of the responses to Question 2 were copied directly from RFP360[4] and has not been changed by the ISO.[5]

The following subsections also identify the QTPS Respondent and the project names. The following table provides a translation from the unique IDs assigned by the ISO for each Phase One Proposal to the QTPS Respondent and the project name for each Phase One Proposal.

Table 1-1:
Translation Table for Phase One Proposals

Proposal ID	QTPS Respondent	Project Name
BOS-001	NSTAR Electric Company	NSTAR Boston Flexible Control Project (BFCP)
BOS-003	New England Power Company	The Mystic Link - National Grid

[1] In the "Life-Cycle Cost Estimate Workbook" the life-cycle cost is found in cell C26 on sheet "RevReq_Full_Summary" and is referred to as "Net Present Value Revenue Requirement."

[2] The proposed schedule includes key high-level milestones for development, siting, procurement of real estate rights, permitting, construction and completion of the Phase One Proposal.

[3] Page 6 of the RTU and METU_Part 2_RFP Instructions document - https://www.iso-ne.com/static-assets/documents/2019/12/boston_2028_rfp_documents.zip

[4] RFP360 is a web based application the ISO uses to communicate with the QTPS Respondents and to collect RFP responses from the QTPS Respondents.

[5] Some formatting changes, e.g. font, font size, and line spacing, were made so each Phase One Proposal is consistently displayed in the appendix.

Proposal ID	QTPS Respondent	Project Name
BOS-005	Anbaric Development Partners, LLC	Anbaric Mystic Reliability AC Wind Link
BOS-007	NSTAR Electric Company	NSTAR Boston Area Smart Control (BASC)
BOS-009	Anbaric Development Partners, LLC	Anbaric Mystic Reliability DC Wind Link
BOS-011	Avangrid Networks, Inc.	Wakefield to Golden Hills Reliability Project
BOS-013	New Hampshire Transmission, LLC	New Hampshire Transmission, LLC-Proposal 13
BOS-015	New England Energy Connection, LLC	New England Energy Connection, LLC (Proposal 1)
BOS-017	NSTAR Electric Company	NSTAR Boston Area Optimized Solution (BAOS)
BOS-019	Transource New England, LLC	Transource New England, LLC (Proposal 1)
BOS-021	NSTAR Electric Company	NSTAR Boston Clean Energy Connect (BCEC)
BOS-023	New Hampshire Transmission, LLC	New Hampshire Transmission, LLC-Proposal 4
BOS-025	New England Energy Connection, LLC	NEEC Proposal 2
BOS-027	New England Energy Connection, LLC	NEEC Proposal 3
BOS-029	Transource New England, LLC	Proposal 2
BOS-031	New England Energy Connection, LLC	NEEC Proposal 4
BOS-033	New England Power Company	Boston Grid Expansion - National Grid
BOS-035	New Hampshire Transmission, LLC	New Hampshire Transmission, LLC-Proposal 3
BOS-037	New England Energy Connection, LLC	NEEC Proposal 5
BOS-039	New England Power Company	Boston Network Reliability Project - National Grid
BOS-041	New Hampshire Transmission, LLC	New Hampshire Transmission, LLC-Proposal 15
BOS-043	New Hampshire Transmission, LLC	New Hampshire Transmission, LLC-Proposal 9
BOS-045	New England Power Company	Golden Hills Power Link - National Grid
BOS-047	New Hampshire Transmission, LLC	New Hampshire Transmission, LLC-Proposal 12
BOS-049	New Hampshire Transmission, LLC	New Hampshire Transmission, LLC-Proposal 7
BOS-051	New Hampshire Transmission, LLC	New Hampshire Transmission, LLC-Proposal 2
BOS-053	SP Transmission, Inc.	SP Transmission, LLC
BOS-055	New Hampshire Transmission, LLC	New Hampshire Transmission, LLC-Proposal 5
BOS-057	New Hampshire Transmission, LLC	New Hampshire Transmission, LLC-Proposal 10
BOS-059	Avangrid Networks, Inc.	Wakefield to Mystic Reliability Link
BOS-061	New Hampshire Transmission, LLC	New Hampshire Transmission, LLC-Proposal 11
BOS-063	New Hampshire Transmission, LLC	New Hampshire Transmission, LLC-Proposal 6
BOS-065	Transource New England, LLC	Proposal 3
BOS-067	New Hampshire Transmission, LLC	New Hampshire Transmission, LLC-Proposal 1
BOS-069	New Hampshire Transmission, LLC	New Hampshire Transmission, LLC-Proposal 14
BOS-071	New Hampshire Transmission, LLC	New Hampshire Transmission, LLC-Proposal 8

1.1 BOS-001: NSTAR Electric Company - NSTAR Boston Flexible Control Project (BFCP)

Introduction and Proposal Overview

In anticipation of the planned retirement of Mystic Generating Station Units 8 and 9, ISO New England Inc. (ISO-NE) identified areas of required improvements to maintain transmission system reliability and restoration capabilities in the Boston area. Subsequently, ISO-NE issued a solicitation for competitive transmission solutions to address these reliability and restoration concerns. In response to ISO-NE's solicitation, NSTAR Electric Company dba Eversource Energy (Eversource) is pleased to submit this proposal to effectively address all system reliability and restoration needs well in advance of the scheduled retirement date for the Mystic units (i.e., by June 1, 2024).

Eversource submitted several proposals in response to ISO-NE's solicitation, including this specific Boston Flexible Control Project solution (hereinafter referred to as the BFCP or the Proposal). All Eversource proposals:

- Meet all ISO-NE criteria and requirements.
- Cost-effectively maximize the use of existing transmission facilities in the Boston area.
- Provide schedule certainty and can be placed in service before the planned Mystic retirements;
- Locate the upgrades to facilities entirely within properties owned by Eversource and the New England Power Company dba National Grid (National Grid) and already used for utility purposes.
- Capitalize on the strong financial capabilities and unparalleled expertise of two companies in developing and constructing transmission projects in Massachusetts.

The BFCP includes additional advantages that further strengthen the transmission system and provides long-term system benefits, including:

- Supporting future electric demand growth in the Boston area; and
- Enabling New England's clean energy transition.

Eversource is confident that the BFCP components can be developed on schedule – well in advance of Mystic's retirement. By utilizing upgrades to existing substations, Eversource and National Grid will leverage site plan approvals, if required, through local zoning processes that can be executed more quickly and at a reduced cost than with a petition filing to the Massachusetts Department of Public Utilities (DPU) requesting zoning relief.

As the Qualified Transmission Project Sponsor (QTPS) for the BFCP, Eversource has assembled a dedicated Proposal team and partnered with National Grid, also a QTPS. Through this partnership, National Grid will construct several upgrades to support the BFCP. The BFCP will also use several of National Grid's existing and planned transmission facilities to establish a new transmission supply into the Boston area. National Grid has submitted several proposals to ISO-NE, and Eversource has agreed to construct certain system upgrades if a National Grid proposal is selected by ISO-NE.

How it Works – the BFCP

Upgrades to address the 345 kV overloads

For the BFCP, Eversource will construct a 115 kV Phase Angle Regulator (PAR) at Dewar Street Substation. The PAR will be identical in size and capacity to the four existing 115 kV PARs installed in the Boston grid at Waltham and Baker Street substations. At North Cambridge Substation, Eversource will install two 9.5 ohm series reactors (one each on the two Woburn to North Cambridge 345 kV cables). Installation of the PAR at Dewar Street will allow Eversource to close the two 115 kV cables that *already exist* between Dewar Street Substation and North Quincy Substation (in Quincy, MA) but are currently operated in a normally open configuration. Closing these two circuits in conjunction with the installation of the 115 kV PAR at Dewar Street will allow additional power supply into Boston from the south and, when operated in tandem with the series reactors on the 345 kV paths supplying power into Boston from the north will eliminate all overloads on all 345 kV paths identified in the ISO-NE Boston 2028 Needs Assessment. The Dewar Street to North Quincy cables were constructed in the 1990s with tie switches at Dewar Street to be closed to supply power to the City of Quincy as a backup under specific maintenance conditions during light load periods. The tie switches cannot be closed at high load conditions without a PAR. By using this existing underutilized cable infrastructure in conjunction with a new 115 kV PAR, Eversource can cost effectively address all transmission constraints.

The series reactors in the BFCP are also sized to provide added protection against more extreme contingency conditions (i.e., N-3) that could occur on transmission lines north and south of Boston. The PAR and the series reactors cost-effectively address the 345 kV overloads identified by ISO-NE, particularly because these facilities will not require review by the Massachusetts DPU or Energy Facilities Siting Board (EFSB) that would otherwise be required to construct new overhead, underground, or underwater transmission facilities.

Dynamic Reactive Device

In response to ISO-NE's identified need for a "dynamic reactive device," National Grid will install a 267 MVA (+/-150MVAR) Synchronous Condenser at Tewksbury Substation (in Tewksbury, MA). Eversource and National Grid determined that several potential devices could meet the ISO-NE requirements for a dynamic reactive device. These include both the proposed synchronous condenser or a different but similar device known as a STATCOM. For the BFCP, Eversource and National Grid selected a synchronous condenser. In addition to meeting the minimum operating condition specified by ISO-NE, under the weakest system conditions, the synchronous condenser will triple the MVA strength at the Tewksbury 345 kV Substation, enabling a strong system restoration. It also improves system inertia and frequency response, particularly during periods when the system is relying on high levels of inverter-based clean energy generation.

Upgrades to address the 115 kV overload

Finally, to address an overload on National Grid's 115 kV K-163 Line north of Boston for the opening of a section of the Seabrook to Ward Hill 345 kV line, National Grid would implement a Direct Transfer Trip (DTT) scheme to open the 345 kV line and the 345/115 kV transformer at West Amesbury Substation. By ensuring that the 345 kV line and the 345/115 kV transformer is

disconnected, this solution eliminates the identified overload on the K-163 Line for less than $800K -- a fraction of the cost of other alternatives, such as reconductoring the line.

National Grid upgrades to support this proposal will be performed under the Joint Development Agreement (JDA) which will be executed by National Grid and Eversource.

Additional Clean Energy Benefits

Eversource anticipates that the construction of this Proposal and the establishment of a new transmission path into Boston from the south will enable the deliverability of about 1,000 MW of new offshore wind into the Boston area. Further, as described above, the synchronous condenser at Tewksbury will provide critical inertial support to the New England transmission system. Additionally, when testing import capability into Boston using a Generation to Load transfer analysis under N-1 contingent conditions, the BFCFP demonstrates particular robustness - with the use of PAR adjustments, the BFCP will increase transmission transfer capability into Boston by about 370 megawatts (MW).

BFCP Schedule and Cost

Eversource will place the BFCP in-service as early as June 2023 or as late as October 2023, depending on the timing of ISO-NE's award-well before the planned June 1, 2024 Mystic retirement. The BFCP schedule is based on a detailed constructability analysis and reflects schedule risk mitigation measures.

Installed Cost and Life-Cycle Cost

The installed cost of Proposal BFCP is $81.2 million. The life cycle cost is $123.0 million.

Cost Containment

Eversource and National Grid will commit to a cost containment arrangement such that return on equity (ROE) will be reduced if actual costs exceed the proposed cost estimate. Specific details can be found in the response to RFP Question 8.1. Eversource and National Grid are confident that the BFCP can be constructed within the proposed schedule and cost estimate for the following reasons.

Land, Permitting, and Construction Requirements

Eversource and National Grid have all necessary property and land rights in place to construct, maintain, and operate the BFCP. Eversource and National Grid have substantial institutional knowledge regarding each existing asset involved in the BFCP, including environmental conditions, as well as regarding permits. The Companies also have constructive relationships with key regulatory and community stakeholders. Eversource and National Grid have used this knowledge in the BFCP design, eliminating constructability and permitting risks due to unknown site conditions. In addition, Eversource has a full understanding of the permits and other regulatory approvals that will be required for the BFCP, and the realistic time frames for obtaining them. Eversource has analyzed the siting and permitting requirements for all components of this Proposal and determined that the requirements are straightforward, and the permits and approvals required are those that are routinely obtained for transmission line and substation projects in Massachusetts.

Eversource Team Qualifications

Eversource operates the largest energy delivery system in New England with more than 3.1 million electricity customers across Connecticut, Massachusetts, and New Hampshire, and more than 3,900 circuit miles of electric transmission lines and 70 substations. For the BFCP, Eversource has assembled a multi-disciplinary approximately 35-person team comprised of personnel with extensive experience in design, siting, permitting, stakeholder engagement, constructing, operating and maintaining major transmission infrastructure projects in the Boston area. The team, which includes Eversource personnel experienced in substation, transmission, protection and controls, and field engineering, is supplemented by specialized independent engineering firms and contractors, with whom Eversource has blanket contractual agreements, to support siting and environmental permitting.

Management Capabilities and Financial Resources

Eversource is a Fortune 500 company with an equity market capitalization of approximately $28 billion and has the full financial resources and depth of experience to design, construct, operate, and maintain the BFCP components. As evidenced by its well-established history in New England, Eversource is well equipped to execute a wide variety of transmission and substation projects, ranging from new, multi-state 345 kV transmission lines and new substations, to transmission line reconductor/rebuild projects and substation upgrades. The Proposal team is well versed in both pre-construction activities (e.g., engineering, procurement, system planning, environmental, outage planning, permitting, outreach) and construction, and apply these skills to expedite all aspects of the work.

Conclusion

Eversource's BFCP represents a comprehensive and cost-effective solution to the Boston area transmission reliability issues that can be constructed prior to the Mystic retirements. By proposing upgrades located only at existing Eversource and National Grid facilities, Eversource can commit, with a high degree of confidence, to developing the Proposal components on schedule. The estimated Proposal costs reflect agreements with trusted contractors, consultants, and fixed supplier pricing for major equipment, as well as the use of established mechanisms for addressing critical path tasks and ensuring that the Proposal can be constructed consistent with Eversource's and National Grid's cost estimates.

1.2 BOS-003: New England Power Company – The Mystic Link - National Grid

INTRODUCTION

The New England Power Company dba National Grid (National Grid), as a Qualified Transmission Project Sponsor (QTPS), submits **The Mystic Link** (referred to hereafter as TML or the Proposal) in response to the *Request for Proposal: Reliability Transmission Upgrade: Boston 2028 RFP*, issued by the Independent System Operator-New England (ISO-NE). The Proposal consists entirely of components that will be contained within existing National Grid or NSTAR Electric Company dba Eversource Energy (Eversource) properties in northeastern Massachusetts. TML addresses all the identified needs in the Boston study area, providing a cost-effective and efficient solution that will be delivered in accordance with ISO-NE's schedule requirements for maintaining the reliability of the New England electric grid after the planned retirement of the Mystic Generating Station Units 8 and 9. For the Proposal, National Grid has already deployed a multi-disciplinary team of personnel experienced in successfully designing, developing, and completing similar projects in Massachusetts. National Grid has partnered with Eversource, also a QTPS, on this Proposal, thereby assuring coordination throughout the planning, design, scheduling, construction, and operation of the Proposal elements.

PROPOSAL ELEMENTS AND BOSTON STUDY AREA NEEDS RESOLUTION

TML creates a new connection for power flow into the Greater Boston area, which not only neatly resolves the needs listed in the RFP, but in addition, provides a new independent transmission path into the area. This new overhead line extension addresses all the thermal overloads that are outlined in the RFP, and by eliminating the contingency of both 349 X&Y cables tripping simultaneously, the solution also reduces local 115 kV line loadings post contingency for several transmission outage conditions and will benefit transmission operations immensely. The Mystic Link offers an opportunity to extend the high voltage network into Boston in a way that offers additional capacity, redundancy, and resiliency to the high voltage system.

Second 345 kV Path, Mystic Substation to Golden Hills Substation 349X Overhead Line Extension

Create a second independent 345 kV path from Eversource's Mystic Substation through National Grid's Golden Hills Substation to National Grid's Wakefield Junction Substation by:

- Separating the existing 349X and 349Y underground cables into two independent circuits at both Mystic Substation and Golden Hills Substation.

- Connecting the existing 349Y Line cable at Golden Hills Substation to the existing overhead 345 kV transmission line to Wakefield Junction Substation (hereafter referred to as the 349 Line); and

- Extending the 349X circuit by constructing a new 2.5-mile 345 kV overhead line segment (referred to herein as the 349X Overhead Line Extension) within National Grid's existing ROW from Golden Hills Substation to Wakefield Junction Substation, and connecting this 349X

Overhead Line Extension to the 349X Line cable at Golden Hills Substation. The existing Q-169 and F-158N 115 kV lines will be reconfigured for a distance of 1.4 miles each to create space within the existing ROW to accommodate the 349X Overhead Line Extension.

The details of the 345 kV Line, 115 kV Line, and existing substation work elements required to create this second independent 345 kV path from Mystic Substation through Golden Hills Substation to Wakefield Junction Substation are described in Sections 4.7, 4.9 and 4.14 of this Proposal, respectively.

Install DTT Scheme for K-163 Line Overload

Install a Direct Transfer Trip ("DTT") scheme to open the 394 Line at West Amesbury after a no-fault contingency at Ward Hill Substation. The DTT scheme will eliminate the 394 no-fault breaker open contingency at Ward Hill Substation and hence will eliminate the overload on the K-163 Line. The work required to implement the DTT scheme for the K-163 Line overload is described in Section 4.14 of this Proposal.

Install STATCOM at Tewksbury 22A Substation

Install a new 345 kV, ±167 MVAr Static Synchronous Compensator (STATCOM), capable of injecting at least ±150 MVAr at all operating conditions specified in the RFP, at Tewksbury 22A Substation, as described in Section 4.18 of this Proposal .

Resolution of Boston Study Area Needs

TML resolves the ISO-NE identified needs as follows:

- **Need 1:** N-1 STE thermal overload on 115 kV K-163 line between West Amesbury and King Street substations. ***Resolution:*** Install a DTT Scheme to eliminate the K-163 Line overload for the no-fault contingency at Ward Hill Substation.

- **Need 2:** N-1-1 LTE thermal overloads on 345 kV 346 and 365 cables between Woburn and North Cambridge stations and 345 kV 358 cable between North Cambridge and Mystic stations. ***Resolution:*** The 349 Line X&Y cable separation and 349X Overhead Line Extension will provide two independent 345 kV circuits between Wakefield Junction and Mystic substations, thus eliminating the existing contingency of both 349 X&Y cables at the same time. The worst-case loading on the 346 cable or 365 cable will be reduced to 92% for the worst-case contingency pair. The worst-case loading on the 358 cable will be reduced to 87% for the worst-case contingency pair.

- **Need 3:** A dynamic reactive device required to maintain the ability to restore the Boston area transmission system. ***Resolution:*** Add a STATCOM at Tewksbury 22A 345 kV Substation on existing property owned by National Grid at the substation site.

LAND, PERMITTING, AND CONSTRUCTION REQUIREMENTS

National Grid and Eversource have all necessary property and land rights in place to construct, maintain, and operate this Proposal. The modifications to the substations will be within the companies' fee-owned property. Similarly, the proposed transmission line work will be performed within National Grid's existing ROWs, where all rights for such transmission lines are in place.

The Proposal team has extensive experience in successfully navigating federal, state, and local permitting processes and thus has a full understanding of the permits that will be required for TML, and the realistic time frames for obtaining them. The team has analyzed the permitting requirements for all components of TML and determined that the requirements are straightforward, and the permits required are those which are routinely obtained by National Grid for transmission line and substation projects throughout Massachusetts. The proposed 2.5-mile 349X Overhead Line Extension, which will be contained entirely on National Grid's existing ROW, will require Section 72 approval from the Massachusetts Department of Public Utilities, but not a more extensive review by the state Energy Facilities Siting Board (EFSB) as is required for some transmission line projects. The permitting requirements are more fully discussed in Section 7.2 of this Proposal.

Similarly, the National Grid team has optimized the Proposal elements by performing construction sequence planning, outage planning, detailed access and work area planning, and by designing the components to be consistent with permitting criteria. The constructability of the Proposal has been confirmed by soliciting the input of and performing field reviews with numerous potential construction service providers.

PROPOSAL SCHEDULE

TML will be placed into service well before the Mystic Generation Station retirements. National Grid has adopted a pro-active approach to assure that this schedule is achieved. For each of the Proposal elements, National Grid already has progressed preliminary engineering and design, compiled baseline environmental data, and validated potential schedule constraints and limitations related to engineering, permitting, real estate, procurement, community relations, construction, outage coordination, testing, and commissioning. The schedule fully incorporates the results of these detailed analyses and reflects schedule risk mitigation measures. Key elements of the schedule include:

- Engineering Complete: July 1, 2021
- Permitting Complete: June 30, 2022
- Construction Start: February 11, 2022
- Construction Complete: November 30, 2023
- **TML In-service Date (all elements): December 31, 2023**
- TML Completion: February 16, 2024

The schedule assumes ISO-NE RFP award on August 11, 2021. All Proposal elements are on National Grid and Eversource properties with no real estate procurement required. Engineering

will be completed, permit applications submitted, and procurement activities initiated in advance of ISO-NE RFP award. The dates listed above refer to the overall TML schedule; refer to Section 7.5 of this Proposal for schedule details, by TML component.

INSTALLED COST AND LIFE-CYCLE COST

The installed cost estimate for this Proposal is $93,673,560, and the life-cycle cost estimate is $142,258,069.

COST CONTAINMENT

National Grid is offering a cost containment mechanism whereby return on equity (ROE) will be reduced if actual costs exceed a specified level for this Proposal. The specific details of the proposed cost containment mechanism are described in Section 8.1 of this Proposal.

PROPOSAL TEAM QUALIFICATIONS

The specific team for this Proposal has been assembled from the extensive experienced in-house staff of National Grid and Eversource, augmented by industry leaders Siemens, Burns & McDonnell, BSC Group, and The Public Archaeology Laboratory, Inc. This 40-plus person team brings to the Proposal comprehensive experience in designing, siting, permitting, constructing, operating, and maintaining a wide variety of transmission projects in New England. The Team Qualifications are more fully described in Section 3.1 of this Proposal.

MANAGEMENT EXPERTISE AND FINANCIAL RESOURCES

National Grid has a proven record of successfully financing, building, operating, and maintaining transmission facilities throughout New England. For this Proposal, National Grid will bring to bear its financial resources and its well-established Project Management processes and procedures, which have recently been applied to successfully complete similar transmission line and substation projects on-time, within budget, and in compliance with regulatory approvals. Most National Grid project managers are certified Project Management Professionals, and many hold other professional licenses and certifications, including Professional Engineer licenses and Certified Utility Safety Professional credentials. As part of a larger project delivery organization, National Grid's project managers can draw support from hundreds of experienced professionals across various functions, including project controls, resource planning, construction planning, construction, contract management, and stakeholder management. This integrated approach to project delivery produces projects with successful schedule, cost, scope, and quality outcomes. National Grid has a strong and proven track record for successful delivery of large and complex electric transmission projects in New England, including the New England East-West Solutions (NEEWS) project, the Salem Cable Rebuild project, and the Merrimack Valley Reliability Project (MVRP). Notably, National Grid and Eversource worked collaboratively to deliver the NEEWS Interstate Reliability Project, a new 75-mile 345 kV transmission line traversing Massachusetts, Rhode Island and Connecticut that went into service in 2015 on schedule and within budget, and the MVRP, a new 345 kV transmission line between New Hampshire and Massachusetts that went into service in 2017 on schedule and within budget. As a result of these experiences, the National Grid team is acutely aware of the factors, such as permitting timelines, that can most affect a

project's cost and schedule and – based on that experience – the team has the full knowledge to manage TML pro-actively to avoid such issues.

1.3 BOS-005: Anbaric Development Partners, LLC – Anbaric Mystic Reliability AC Wind Link

1. The Mystic Reliability AC Wind Link is a 900MW HVAC subsea transmission project between Plymouth, MA and Everett, MA that:

- Addresses all of the needs identified in the Final Boston 2028 Needs Assessment Update ("Needs Assessment").
- Is highly feasible and constructible with extensive terrestrial and marine routing assessments completed (including a sea-floor survey in January 2020 of the route).
- Utilizes a terrestrial route via multi-lane state roads on the north end and an interconnect near the decommissioned Pilgrim Nuclear Plant on the south end, thereby avoiding residential areas and minimizing risk of delay and opposition.
- Is being presented to numerous community and government agencies with positive feedback and ongoing dialogue.
- Provides capability that addresses not only the Needs Assessment but also the additional system needs identified in the May 2019 version should the New England Clean Energy Connect ("NECEC") project – now the subject of a Maine voter referendum in November 2020 – be delayed or cancelled.
- Is highly expandable, incorporating in its design a spare set of duct banks for a later cable to connect 1200MW of additional renewable power from federal offshore wind areas to the Mystic Substation in Everett. **The cost of this spare set of duct banks is being carried by Anbaric and is not being added to the cost of this project.** Further, the project includes a ring bus yard at the Plymouth end and a 4-breaker, six position switchyard in Everett that allows expansion to a breaker-and-a-half if needed.
- Provides a new 345kV HVAC electric path between the SEMA and NEMA zones. This new path allows large amounts of offshore wind energy to be injected into SEMA to serve the high-demand Boston load area. This avoids the need for an additional 345 kV circuit to be added at a later time to move more renewable energy from SEMA to NEMA, as identified in the August 8, 2019 ISO-NE Economic Study presentation to the Planning Advisory Committee at slide 6.
- The 900MW project provides an additional 1,100MW of energy import capability into Boston that provides a margin for additional generation retirement such as the Kendall units.
- Provides line flow controllability via phase angle regulating transformers ("PARs") that will allow system operators to flow power from north-to-south if needed to address certain system conditions should Canal 1 and/or 2 retire.
- Provides for an independently switched, two-cable design that is highly resilient.
- Does not create material adverse impacts on the system.
- Anbaric has worked with EN Engineering and Power Engineers to ensure that the project addresses all identified needs in the most feasible and cost-effective way, and in a way that provides the system operators with an advantageous design.

2. Costs and cost containment provisions

- Anbaric will use a capped ROE of 7.9%, saving ratepayers over $60 million compared to customary ROEs for similar-sized projects
- The base cost of the project is $418,402,486, excluding AFUDC, and the installed cost including AFUDC is $448,816,519, as defined in the Installed Cost Workbook.
- The base cost of the project is capped at $562,453,921, as described in Section 8.
- The project's life cycle cost is $514,281,593.
- The project is highly developed and designed to be in service by June 1, 2024. This is critical not only to deal with the system reliability exposure from the retirement of Mystic 8 and 9 that triggered this RFP, but also to ensure that the region does not incur costs of $200 to $300 million *annually* to secure generation through a gap RFP to maintain the Mystic Generating Station and its fuel supply.

3. Schedule

- Anbaric initiated development of the Mystic Reliability AC Wind Link project in 2019 to meet the June 1, 2024 timeline for the project.
- With this advanced preparation, equipment can be immediately ordered once the project is awarded.
- Outreach to state and municipal authorities and community groups is already well underway, and any advanced permitting work will be prepared during the Phase 2 window, and those permits that require a project award will be filed immediately after award.
- Anbaric anticipates that major post-award permitting work will occur from Q3 2021 to Q3 2023, equipment procurement will be conducted from Q3 2021 to Q4 2023, construction will occur in different areas of the route beginning Q2 2023, ending Q2 2024, and commission and energization will occur from Q1 2024 to Q2 2024. The schedule is set out in Section 7.5, along with greater details regarding the feasibility of meeting those schedule dates in Section 7.2.

Advanced Route Feasibility Work and Key Partnerships to Meet the Required In-Service Date

- In 2019, Anbaric worked with the environmental permitting firm ESS on extensive routing options, including the marine route. A preliminary sea survey of the entire route was conducted in January 2020. This proved out the desktop route, and where difficult soil conditions were identified, the survey vessel was able to locate a better route. A more detailed sea survey will be conducted in Phase 2. Anbaric has already begun working with local fishing groups to ensure that concerns related to the sea cable installation process and location can be addressed.
- On the northern end, Anbaric and ESS evaluated several approaches to the Mystic Substation, including through Boston Harbor and other landing locations. The current route, which comes ashore under Revere Beach and then follows primarily the multi-lane State Route 16, was selected based on a foot-by-foot review with Power Engineers and Bond

Brothers Construction ("Bond") of the feasibility of in-ground installation of the 345 kV cables.

- Anbaric is continuing to work with Bond on the routing analysis and civil engineering of the project. Bond has extensive experience installing in-ground transmission and substation construction for many of the incumbent utilities in the region and elsewhere. This exclusive working arrangement assisted Anbaric in evaluating a schedule on which an in-service date of June 1, 2024 can be met.
- Anbaric is also working with with Massachusetts-based GE to supply the non-cable AC electric components. Anbaric has worked with GE and the other vendors on design and pricing issues to ensure that equipment will be available when needed and at competitive costs.

4. Design and Route Overview

- Anbaric has designed Mystic Reliability AC Wind Link to meet all elements of the Needs Assessment at minimum cost and with high feasibility.
- The project consists of two independently switched tri-core 345kV AC cables from a tap of the 342-3 and 355 345kV lines near Pilgrim into a new 345kV switchyard then up to the Mystic substation in Everett, MA, creating a new, direct 345kV path between the SEMA and NEMA zones.
- The project is designed to carry 900MW of energy directly into Boston. As shown in section 4.2, the two 345kV cables leave a new Anbaric 345kV switchyard located near the retired Pilgrim nuclear generating station. The cables enter the Atlantic Ocean and stay towards the outer area of the three-mile state boundary waters, thereby avoiding the need for federal Bureau of Ocean Energy Management ("BOEM") approval.
- The two cables land under Revere Beach, using horizontal directional drilling to come ashore underground. The buried cable route continues under State Route 16, a road through a commercial area with multiple lanes on each side, enabling installation without the need to shut down traffic. Passing underground 4.9 miles through Revere and Chelsea into Everett, the Project then connects to a 345kV switch yard on property that has already been secured by Anbaric. From here, underground connecting AC cables link the switchyard 1.35 miles to 345kV positions at the Mystic substation.
- **These ducts and vaults through the streets will include an additional open position that will be installed at Anbaric's cost and will not be added to the RNS rate as part of this project.** This will allow for a later cable pull for circuits in a subsequent project, including the offshore wind energy now procured for installation in SEMA, to be directly connected to Mystic without needing additional siting or significant in-road infrastructure. This reduces the cost to consumers for later connections from SEMA, or directly from the south coast wind lease areas, into Boston.
- Each independently switched cable will be capable of transmitting 450MW under normal conditions and power flow will be regulated by phase angle regulators. Cable charging will be compensated by four 180MVAr shunt reactors for each cable, with two switched shunt reactors at each cable terminal.

- The project will have a +/- 150MVAr STATCOM connected to Anbaric's Mystic switching station to address the system restoration need and help system operators regulate voltage in day-to-day operations.
- The project will install a series reactor at the West Amesbury substation.
- The project does not impact the BPS classification of existing substations.

5. The timing to procure real estate and feasible rights-of-way

- The project will require switchyards in Plymouth and Everett, MA, as well as rights-of-way to get to the ocean from the Plymouth switchyard, from Plymouth to Revere in a subsea route from Plymouth to Revere, a right-of-way from Revere Beach through Revere and Chelsea to Anbaric's switchyard in Everett, and from Anbaric's Everett Switchyard to the Mystic Substation.
- For the switchyards, Anbaric has secured site control in Everett, and is in advanced negotiations with a landowner in Plymouth. Final Plymouth site control will be secured in Q2 2020.
- Anbaric is fully aware that portions of the Greater Boston Reliability Project ("GBRP") – approved in 2015 – are years late, and therefore Anbaric avoided proposing a project that would seek installation in similar areas, since these are now seeing projected 2021 in-service dates. *Anbaric is proposing a highly feasible project design that does not rely on going through areas already enmeshed in GBRP siting challenges.*

6. The Mystic Reliability AC Wind Link addresses the identified needs

- The project meets all the specifics of the Needs Assessment with a highly feasible schedule and the minimum achievable cost based on the extensive analysis of alternatives by Anbaric and its engineering consultants.
- At a high level, as described in more detail in Section 7.1 and demonstrated in modeling information provided in Section 5, the project lowers all unacceptable contingency impacts identified in the Needs Assessment to acceptable levels. It reduces thermal loading below 90 percent of LTE rating for the three 345kV cables identified in the Needs Assessment for the most critical N-1-1 contingency pairs and for the 115kV line identified in the Needs Assessment for the most critical N-1 contingency. The project also provides additional margin against high voltage during minimum load conditions. The project reduces voltage at all 21 of the buses identified as driving time-sensitive needs in the Needs Assessment. The project also maintains all circuit breakers within their interrupting capability.
- Anbaric understands that schedule feasibility – getting it built on time – is absolutely critical given that stop-gap energy contract payments could add up to $200 to $300 million *per year* to Boston area consumers' cost if the chosen solution is delayed. Anbaric's participation in previous on-schedule buried cable projects with both sub-sea and underground components provides useful experience and a road map on how to construct the Mystic Reliability AC Wind Link on schedule. The project avoids areas where delay is most likely and utilizes routing where transmission can be installed with a minimal amount of

disruption and without impacting residential areas, while also avoiding environmental impediments that could create permitting delays.

1.4 BOS-007: NSTAR Electric Company - NSTAR Boston Area Smart Control (BASC)

Introduction and Proposal Overview

In anticipation of the planned retirement of Mystic Generating Station Units 8 and 9, ISO New England Inc. (ISO-NE) identified areas of required improvements to maintain transmission system reliability and restoration capabilities in the Boston area. Subsequently, ISO-NE issued a solicitation for competitive transmission solutions to address these reliability and restoration concerns. In response to ISO-NE's solicitation, NSTAR Electric Company dba Eversource Energy (Eversource) is pleased to submit this proposal to effectively address all system reliability and restoration needs well in advance of the scheduled retirement date for the Mystic units (i.e., by June 1, 2024).

Eversource submitted several proposals in response to ISO-NE's solicitation, including this specific Boston Area Smart Control solution (referred to herein as the BASC or the Proposal). All Eversource's proposals:

- Meet all ISO-NE criteria and requirements;
- Cost-effectively maximize the use of existing transmission facilities in the Boston area;
- Provide schedule certainty and can be placed in service before the planned Mystic retirements;
- Locate the upgrades to facilities entirely within properties owned by Eversource and the New England Power Company dba National Grid (National Grid) and already used for utility purposes; and
- Capitalize on the strong financial capabilities and unparalleled expertise of two companies in developing and constructing transmission projects in Massachusetts.

Eversource's proposal includes additional advantages that further strengthen the transmission system and provides long-term system benefits, including:

- Supporting future electric demand growth in the Boston area; and
- Enabling New England's clean energy transition.

Eversource is confident that the Proposal components can be developed on schedule – well in advance of Mystic's retirement. By utilizing upgrades to existing substations, Eversource and National Grid will leverage site plan approvals, if required, through local zoning processes that can be executed more quickly and at a reduced cost than with a petition filing to the Massachusetts Department of Public Utilities (DPU) requesting zoning relief.

As the Qualified Transmission Project Sponsor (QTPS) for the BASC, Eversource has assembled a dedicated Proposal team and partnered with National Grid, also a QTPS. Through this partnership, National Grid will construct several upgrades to support Eversource's Proposal. The BASC will also use several of National Grid's existing and planned transmission facilities to establish a new transmission supply into the Boston area. National Grid has submitted several proposals to ISO-NE, and Eversource has agreed to construct certain system upgrades if a National Grid proposal is selected by ISO-NE.

How it Works – the BASC

Upgrades to address the 345 kV overloads

Under this Proposal, Eversource will construct a 115 kV Phase Angle Regulator (PAR) at Dewar Street Substation. The PAR will be identical in size and capacity to the four existing 115 kV PARs installed in the Boston grid at Waltham and Baker Street substations. At North Cambridge Substation, Eversource will install two 6.5 ohm series reactors (one each on the two Woburn to North Cambridge 345 kV cables). Installation of the PAR at Dewar Street Substation will allow Eversource to close the two 115 kV cables that already exist between Dewar Street Substation and North Quincy Substation (in Quincy, MA) but are currently operated in a normally open configuration. Closing these two circuits in conjunction with the installation of the 115 kV PAR at Dewar Street allows additional power supply into Boston from the south and, when operated in tandem with the series reactors on the 345 kV paths supplying power into Boston from the north eliminates all overloads on all 345 kV paths identified in the ISO-NE Boston 2028 Needs Assessment. The Dewar Street to North Quincy cables were constructed in the 1990s with tie switches at Dewar Street to be closed to supply power to the city of Quincy as a backup under specific maintenance conditions during light load periods. The tie switches cannot be closed at high load conditions without a PAR. By utilizing this existing underutilized cable infrastructure in conjunction with a new 115 kV PAR, Eversource can cost effectively address all transmission constraints.

The PAR and the series reactors cost effectively address the 345 kV overloads identified by ISO-NE needs without needing to file petitions with the Massachusetts DPU or Energy Facilities Siting Board (EFSB) that would otherwise be required to construct new overhead, underground, or underwater transmission facilities.

Dynamic Reactive Device

In response to ISO-NE's identified need for a "dynamic reactive device," National Grid will install a +/-150MVAR STATCOM at Tewksbury Substation (in Tewksbury, MA). Eversource and National Grid determined that several potential devices could meet the ISO-NE requirements for a dynamic reactive device. These include both the proposed synchronous condenser, or a different but similar device known as a STATCOM. For this Proposal, Eversource and National Grid selected a STATCOM. Multiple 345 kV transmission lines connected at Tewksbury 345 kV Substation allows the STATCOM to regulate voltages within ISO-NE specified acceptable range for multiple 345 kV line energization paths in the event of system restoration. Eversource and National Grid studies demonstrate that the proposed STATCOM can successfully provide voltage control under weak system short circuit strength of 300 MVA.

Upgrades to address the 115 kV overload

Finally, to address an overload on National Grid's 115 kV K-163 Line north of Boston for the opening of a section of the Seabrook to Ward Hill 345 kV line, National Grid would implement a Direct Transfer Trip (DTT) scheme to open the 345 kV line and the 345/115 kV transformer at West Amesbury Substation. By ensuring that the 345 kV line and the 345/115 kV transformer is

disconnected, this solution eliminates the identified overload on the K-163 Line for less than $800K -- a fraction of the cost of other alternatives, such as reconductoring the line.

National Grid upgrades to support this proposal will be performed under the Joint Development Agreement (JDA) which will be executed by National Grid and Eversource.

Additional Clean Energy and Load Serving Benefits

Eversource anticipates that the construction of this Proposal and the establishment of a new transmission path into Boston from the south will enable the deliverability of about 1,000 MW of new offshore wind into the Boston area. Additionally, when testing import capability into Boston using a Generation to Load transfer analysis under N-1 contingent conditions, BASC, with the use of PAR adjustments, can increase transmission transfer capability into Boston by about 320 MWs, demonstrative of proposal BASC's robustness.

BASC Schedule and Cost

Eversource will place the BASC in-service as early as June 2023 or as late as October 2023, depending on the timing of ISO-NE's award of this RFP, and well before the planned June 1, 2024 Mystic Generating Station retirement. The BASC schedule is based on a detailed constructability analysis and reflects schedule risk mitigation measures.

Installed Cost and Life-Cycle Cost

The installed cost of the BASC is $57.5 million. The life cycle cost is $86.7 million.

Cost Containment

Eversource and National Grid will commit to a cost containment arrangement such that return on equity (ROE) will be reduced if actual costs exceed the proposed cost estimate. Specific details can be found in the response to RFP Question 8.1.

Eversource and National Grid are confident that the BASC can be constructed within the proposed schedule and cost estimate for the following reasons.

Land, Permitting, and Construction Requirements

Eversource and National Grid have all necessary property and land rights in place to construct, maintain, and operate the BASC. Substantial institutional knowledge is available within Eversource and National Grid on each existing asset, including environmental conditions, on-site permits and constructive relationships with key regulatory and community stakeholders. Eversource and National Grid have used this knowledge in the BASC design, eliminating constructability and permitting risks due to unknown site conditions. In addition, Eversource has a full understanding of the permits and other regulatory approvals that will be required for the BASC, and the realistic time frames for obtaining them. Eversource has analyzed the siting and permitting requirements for all components of this Proposal and determined that the requirements are straightforward, and the permits and approvals required are those that are routinely obtained for transmission line and substation projects in Massachusetts.

Eversource Team Qualifications

Eversource operates the largest energy delivery system in New England with more than 3.1 million electricity customers across Connecticut, Massachusetts, and New Hampshire, and more than 3,900 circuit miles of electric transmission lines and 70 substations. For this Proposal, Eversource has assembled a multi-disciplinary approximately 35-person team comprised of personnel with extensive experience in design, siting, permitting, stakeholder engagement, constructing, operating and maintaining major transmission infrastructure projects in the Boston area. The team, which includes Eversource personnel experienced in substation, transmission, protection and controls, and field engineering, is supplemented by specialized independent engineering firms and contractors, with whom Eversource has blanket contractual agreements, to support siting and environmental permitting.

Management Capabilities and Financial Resources

Eversource is a Fortune 500 company with an equity market capitalization of approximately $28 billion and has the full financial resources and depth of experience to design, construct, operate, and maintain the BASC components. As evidenced by its well-established history in New England, Eversource is well equipped to execute a wide variety of transmission and substation projects, ranging from new, multi-state 345 kV transmission lines and new substations, to transmission line reconductor/rebuild projects and substation upgrades. The Proposal team is well versed in both pre-construction activities (e.g., engineering, procurement, system planning, environmental, outage planning, permitting, outreach) and construction, and apply these skills to expedite all aspects of the work.

Conclusion

Eversource's BASC proposal represents a comprehensive and cost-effective solution to the Boston area transmission reliability issues that can be constructed prior to the Mystic retirements. By proposing upgrades located only at existing Eversource and National Grid facilities, Eversource can commit, with a high degree of confidence, to developing the Proposal components on schedule. The estimated Proposal costs reflect agreements with trusted contractors, consultants, and fixed supplier pricing for major equipment, as well as the use of established mechanisms for addressing critical path tasks and ensuring that the proposal can be constructed consistent with Eversource's and National Grid's cost estimates.

1.5 BOS-009: Anbaric Development Partners, LLC – Anbaric Mystic Reliability DC Wind Link

1. **The Mystic Reliability DC Wind Link is a 1200MW HVDC subsea cable transmission project between Plymouth, MA and Everett, MA that:**

- Addresses all of the needs identified in ISO's Final Greater Boston Needs Assessment Update ("Needs Assessment").
- Is highly feasible and constructible with extensive terrestrial and marine routing assessments completed (including a sea-floor survey of the route in January 2020).
- Utilizes a terrestrial route via multi-lane state roads on the north end and an interconnect near the decommissioning Pilgrim Nuclear Plant, thereby avoiding residential areas and minimizing risk of delay and opposition.
- Is being presented to numerous community and government agencies with positive feedback and ongoing dialogue.
- Provides capability that addresses the additional system needs identified in the May 2019 version of the Needs Assessment in the event that the New England Clean Energy Connect ("NECEC") project – now the subject of a Maine voter referendum in November 2020 – is either delayed or cancelled.
- Is highly expandable, incorporating in its design a spare set of duct banks for a later cable pull to connect 1200MW additional energy from federal offshore wind energy areas to the Mystic Substation in Everett. **The cost of this spare set of duct banks is being carried by Anbaric and is not being added to the cost of this project.**
- Provides a new 1200MW HVDC electric path between the SEMA and NEMA zones. This new path allows for large amounts of offshore wind energy being injected into SEMA to move unconstrained to serve the high-demand Boston load area. This avoids the need for an additional 345kV circuit to be added at a later time to move more renewable energy from SEMA to NEMA, as identified in the August 8, 2019 ISO-NE Economic Study presentation to the Planning Advisory Committee at slide 6.
- The 1200MW project provides significant energy import capability into Boston that may permit retirement of additional generation such as the Kendall units.
- Provides line flow controllability via the HVDC converter stations that will allow system operators to flow power from north-to-south if needed to address certain system conditions should Canal 1 and/or 2 retire.
- Provides +/- 400MVAr at both Everett and Plymouth. This substantial additional of reactive power at both ends will not only address the needs identified by the ISO, but will provide replacement reactive capability for retiring generation on both ends to help system operators control voltage. This is an important benefit to both the Boston area, which has an ever-declining amount of metro-area generation, and in the south where Canal 1 and 2 may retire, and where significant amounts of offshore wind has now been contracted to be added to the power system.
- Anbaric has been working with EN Engineering and Power Engineers since early drafts of the Needs Assessment were released to ensure that Anbaric addresses all identified needs in the most cost-effective way that optimizes transmission reliability and availability. As a

result, the project meets not only the identified needs without creating material adverse impacts, but provides additional energy margin and resiliency. These significant benefits are not add-ons, but inherent in the design.

2. Costs and cost containment provisions

- Anbaric will agree to a capped ROE of 7.9%, saving ratepayers over $100 million compared to customary ROEs for similar-sized projects and fulfilling ISO's obligation to encourage competition.
- The base cost of the project is $682,547,422, excluding AFUDC, and the installed cost including AFUDC is $744,840,962 as defined in the Installed Cost Workbook.
- The base cost of the project is capped at $812,934,923 as described in Section 8.
- The project's life cycle cost is $ 815,050,491.
- The project is highly developed and designed to be in service by June 1, 2024. This is critical not only given the system reliability exposure with the retirement of Mystic 8 and 9, triggering this RFP, but also to ensure that the region does not incur costs of $200 to $300 million *annually* to secure generation and associated fuel through a gap RFP to maintain the Mystic generating station and its fuel supply at the adjacent LNG terminal.

3. Schedule

- Anbaric initiated development of the Mystic Reliability DC Wind Link project in 2018 in order to meet the June 1, 2024 timeline for the project.
- With this advanced preparation, equipment can be immediately ordered once the project is awarded.
- Outreach to state and municipal authorities and community groups is already well underway, and any advanced permitting work will be prepared during the Phase 2 window and those permits that require a project award will be filed shortly after award.
- Anbaric anticipates that major Permitting work will occur from Q3 2021 to Q3 2023, Equipment Procurement will be conducted from Q3 2021 to Q1 2024, Construction will occur in different areas of the route beginning Q2 2023, ending Q2 2024, and Commission and Energization will occur from Q1 2024 to Q2 2024. The schedule is set out in Section 7.5, along with greater details regarding the feasibility of meeting those schedule dates in Section 7.2.

Advanced Route Feasibility Work and Key Partnerships to Meet the Required In-Service Date

- In 2018, Anbaric worked with the environmental permitting firm ESS on extensive routing options, including the marine route. A preliminary sea survey of the entire route was conducted in January 2020. This proved out the desktop route and where difficult soil conditions were identified, the survey vessel was able to locate a better route. A more detailed sea survey will be conducted in Phase 2. Anbaric has already begun working with

local fishing groups to ensure that any concerns related to the sea cable installation process and location are addressed.

- On the northern end, Anbaric and ESS evaluated several approaches to the Mystic Substation, including through Boston Harbor, which presents a large set of environmental challenges, and other landing locations. In the end, the current route, which comes ashore under Revere Beach and then follows primarily the multi-lane State Route 16, was selected based on a foot-by-foot review with Power Engineers and Bond Brothers Construction ("Bond") of the feasibility of in-ground installation of the HVDC cable .
- Anbaric is continuing to work with Bond on the routing analysis and civil engineering of the project. Bond has extensive experience installing in-ground transmission and substation construction for many of the incumbent utilities in the region and elsewhere. This exclusive working arrangement assisted Anbaric in evaluating a schedule on which an in-service date of June 1, 2024 can be met.

4. Design and Route Overview

- Anbaric has designed the Mystic Reliability DC Wind Link to meet all elements of the Needs Assessment at minimum achievable cost and with high feasibility.
- The project consists of a bundled 320kV HVDC circuit between Plymouth and Everett, MA.
- Starting from a tap of the 342-3 and 355 345kV lines near Pilgrim into a new 345kV switchyard, the submarine HVDC cable leaves a voltage source converter station, and is buried in a single ocean trench in the Atlantic Ocean.
- The cable bundle stays towards the outer area of the three-mile state boundary waters, thereby avoiding the need for federal Bureau of Ocean Energy Management ("BOEM") approval.
- The HVDC line lands under Revere Beach, using horizontal directional drilling to come ashore underground. The buried cable route continues under state Route 16, a road through a commercial area with multiple lanes on each side. These characteristics enable installation without the need to shut down traffic. Passing underground 4.9 miles through Revere and Chelsea and into Everett, the Project then connects to a converter station. From here, underground connecting AC cables link the switchyard to 345kV positions at the Mystic substation.
- **These ducts and vaults through the streets will include an additional open position that will be installed at Anbaric's cost and will not be added to the RNS rate as part of this project.** This will allow for a later cable pull for circuits allowing a subsequent project, including the offshore wind energy now procured for installation in SEMA, to be directly connected to Mystic without needed additional siting or significant in-road infrastructure, reducing the cost to consumers of later connections from SEMA or directly from the south coast wind lease areas into Boston.
- The project will provide +/- 400MVAr of reactive power at each end to address the system restoration need and help system operators regulate voltage in day-to-day operations.
- The project will have a series reactor at the West Amesbury substation.
- The project does not impact the BPS classification of existing substations.

5. The timing to procure real estate and feasible rights-of-way

- The project will require switch yards in Plymouth and Everett, MA, as well as rights-of-way to get to the ocean from the Plymouth converter station, from Plymouth to Revere in a subsea route from Plymouth to Revere, a right-of-way from Revere beach through Revere and Chelsea to Anbaric's converter station in Everett, and from Anbaric's Everett Converter Station to the Mystic Substation.
- For the converter stations, Anbaric has secured site control in Everett and will finalize Plymouth property rights in Q2 2020.
- Portions of the Greater Boston Reliability Project ("GBRP") – approved in 2015 – are years late, and therefore Anbaric avoided proposing a project that would seek installation in similar areas, since these are now are seeing 2021 and later in-service dates. *Anbaric is proposing a highly feasible project design that does not rely on going through areas already enmeshed in GBRP siting challenges.*

6. The Mystic Reliability DC Wind Link addresses the identified needs

- The Anbaric project meets all the specifics of the Needs Assessment with a highly feasible schedule and at the minimum achievable cost based on the extensive analysis of alternatives by Anbaric and its engineering consultants.
- As detailed in Section 7.1 and demonstrated in the modeling information provided in Section 5, the Mystic Reliability DC Wind Link lowers all unacceptable contingency impacts identified in the Needs Assessment to acceptable levels. The project provides additional margin against high voltage during minimum load conditions. The project reduces voltage at all 21 of the buses identified as driving time-sensitive needs in the Needs Assessment, with voltage reductions up to 0.8 to 1.4 percent at 15 of these buses and up to 0.5 percent at the remaining 6 buses. The project lowers all unacceptable contingency impacts identified in the Needs Assessment to acceptable levels. Specifically, it reduces thermal loading below 90 percent of LTE rating for the three 345kV cables identified in the Needs Assessment for the most critical N-1-1 contingency pairs and the 115kV line identified in the Needs Assessment for the most critical N-1 contingency. Further, the project maintains all circuit breaks within their interrupting capability.
- Anbaric understands that schedule feasibility – getting it built on time – is absolutely critical given that stop-gap energy contract payments could add up to $200 to $300 million *per year* to Boston area consumers' cost if the chosen solution is delayed. Anbaric's participation in previous on-schedule buried cable projects with both sub-sea and underground components provides useful experience and a road map on how to construct the project on schedule. The project avoids areas where delay is most likely and utilizes routing where transmission can be installed with a minimal amount of disruption and without impacting residential areas, while also avoiding environmental impediments that could create permitting delays.

1.6 BOS-011: Avangrid Networks, Inc. - Wakefield to Golden Hills Reliability Project

Avangrid Networks is pleased to submit this proposed solution in response to ISO-NE's 2028 Boston Request for Proposal (RFP). An integrated project team with expertise from transmission planning, engineering, real estate, environmental planning and siting, permitting, operations, maintenance, construction, commissioning, and cost modeling has spent several months evaluating nine general project configurations to deliver the best value to ISO-NE in addressing the needs of the 2028 Boston Needs Assessment Update. The solution identified in this proposal addresses all of the N-1, N-1-1, and system restoration reliability needs identified in the 2028 Boston Needs Assessment Update in a carefully considered approach. This solution makes **innovative** use of existing transmission assets to **minimize new construction** to drastically **lower the solution's cost** while ensuring proper system performance to deliver exceptional value to ratepayers in the region. The proposed upgrades, route, permitting approach, and schedule are designed and organized in a manner that **ensures meeting the required June 1, 2024** in-service date, and provide the **flexibility and expandability** features discussed throughout this Phase One Proposal.

Solution Overview

Avangrid Networks proposes the **Wakefield to Golden Hills Reliability Project (WGRP)** as an innovative solution to the *Phase One Proposal Identified Needs to be Resolved* in Part 1, Section 2 of the RFP documents.

The company is confident that the WGRP as proposed fully satisfies the requirements and evaluation criteria stated in the RFP; is the **most efficient use** of new and existing assets to address the **reliability needs** caused by the retirement of Mystic; and is the **most competitive and feasible** project from both a life-cycle cost and schedule perspective in meeting ISO-NE's identified needs.

The WGRP is a **3.8-mile underground** 345kV line between Wakefield Junction substation in Wakefield, Massachusetts and Golden Hills Substation in Saugus, Massachusetts, with a **+/- 150 MVAR Static Synchronous Compensator (STATCOM)** adjacent to the Wakefield Junction substation, where it connects at 115kV. The WGRP also includes a direct transfer trip scheme in the vicinity of West Amesbury. The solution has an installed cost of $161.1 million, with **$105.6 million** for the Avangrid Networks scope and $55.5 million dedicated to upgrades (all costs in 2023 dollars as defined by ISO-NE). The net present value revenue requirement (NPVRR), or **life-cycle cost** of the WGRP, is $153.4 million. This NPVRR does not include upgrade costs, as defined by ISO-NE.

The WGRP **mitigates impacts** to private landowners and streamlines site control negotiations by following public roadways for all of the new build project footprint. Additionally, **all required upgrades**, based on Avangrid Networks' detailed analysis, are **cost-effective, can be constructed within the existing footprint** of the Wakefield Junction, Golden Hills, and Mystic substations, and can be sequenced in a manner that **minimizes the required outages**. The only private land required for the project is fee ownership for the location of the STATCOM, for which negotiations are well advanced.

The WGRP is an extremely cost-effective solution to the identified reliability needs that also **preserves the ability to add capacity** to the Greater Boston transmission system at a later date if deemed necessary. This can be accomplished by completing an additional path to the Mystic substation in the future parallel to the existing 349X and Y path.

Finally, the WGRP accomplishes all of this with changes to substation Bulk Power System classifications.

Addressing Identified Needs

The Avangrid Networks transmission planning team has confirmed that the WGRP meets all the identified needs. Table 2-1 describes how each need is addressed, and how the solution is implemented.

Identified Needs		Proposed Solutions	
Type	**Description**	**Description**	**Summary of Results**
N-1	115kV Section K163 Thermal Overload	Install Direct Transfer Trip Scheme on 345kV Section 394 to automatically open West Amesbury when the Ward Hill terminal is opened.	345kV/115kV connection is removed and flow on Section K163 reverses and supplies local load, eliminating violation.
N-1-1	345kV Line Thermal Overloads (Sections 346, 358, and 365)	Install new 345kV line from Golden Hills Substation to Wakefield Junction substation parallel to existing Section 349. The existing Section 349 X and Y circuits between Golden Hills and Mystic Substations will be split and operated as two separate circuits.	Path between Wakefield Junction and Mystic is maintained post Section 349 contingency due to creation of a new parallel line, preventing noted overloads from occurring.
System Restoration	Dynamic Reactive Device with 300 MVAR dynamic reactive range	Install +/- 150 MVAR STATCOM adjacent to Wakefield Junction substation.	The STATCOM installed at this location meets the requirements of the RFP.

Table 2-1: Addressing Identified Needs

Optimized Technical Design

At every step of the design process the Avangrid Networks engineering team has sought to identify ways to maintain or improve system performance while also containing and reducing costs.

For example, the engineering team chose to use 3,000 kcmil XLPE aluminum cable based on a performance analysis showing that the aluminum cable performed comparably to copper but with significant cost savings. Similarly, a market consultation identified a STATCOM as the best value and performance for the Dynamic Reactive Device (DRD) component of the design due its faster response time, ability to supply additional MVAR at lower voltages, superior harmonic performance, and smaller footprint, all with a similar cost to a Static VAR Compensator (SVC) and other alternatives. For the STATCOM location, Avangrid Networks has planned for future station

expandability. Additionally, our transmission planning and engineering groups identified efficient incumbent upgrades to solve the identified needs with minimal impact to the area and the transmission system. As examples, the direct transfer trip scheme is an extremely cost-effective alternative to rebuilding several miles of area 115kV lines, and reconfiguring the 349 X and Y cables creates a continuous path from Wakefield Junction to Mystic with 3.8 miles of new cable versus 10 miles.

The specific approach of reconfiguring the existing Section 349's topology by creating two separate circuits is not new to Avangrid Networks. The company's subsidiary United Illuminating (UI) recently completed a similar project at its 115kV Grand Avenue Switching Substation in New Haven, CT, where the terminations of a double circuit High Pressure Fluid Filled (HPFF) underground cable were relocated from an existing Air Insulated Substation (AIS) to a new Gas Insulated Switchgear (GIS) switching station. The HPFF lines feeding into the existing substation were intercepted and connected to the new terminations thru newly built HPFF extensions. This is an important precedent that supports the feasibility of the WGRP and results in an optimized and cost-effective project that fully addresses the needs of the 2028 Boston Needs Assessment Update.

Route Selection and Permitting Design

The WGRP was designed to facilitate successful permitting and minimize environmental and social impacts on the surrounding communities. An underground solution was selected due to the congested nature of the Greater Boston area and public resistance to overhead transmission projects in recent years. By leveraging the Massachusetts law granting non-exclusive right to public roadways for utility siting, the route minimizes the need to disrupt private property or engage in lengthy, time-consuming negotiations for site control. With the WGRP design, site control is mainly contingent on Energy Facilities Siting Board (EFSB) approval and municipal agreements.

The route has also been reviewed for impacts to environmental resources and seeks to avoid or mitigate such impacts wherever possible. The route follows to the east of the Golden Hills Area of Critical Environmental Concern and to the west of the Breakheart Reservation.

Schedule

Avangrid Networks is confident the WGRP will be in operation well ahead of the June 1, 2024 retirement of Mystic generating units 8 and 9. The project schedule has been structured with the goal of achieving the most optimal in-service date while allowing for activity durations and sequences that are consistent with the company's experience in similar projects. The schedule also considers the location-specific factors of the Boston area, such as its urban nature and winter construction moratoriums. As much as possible, Avangrid Networks has structured activities to minimize outages and impacts on the existing system.

As discussed further in Section 7.5, the **proposed in-service date** is **December 14, 2023**, earlier than required by ISO-NE. This alone results in an expected completion date approximately **5 ½ months ahead of Mystic's retirement**. This makes the schedule itself a key component of the general mitigation plan for the project. Additionally, Avangrid Networks is confident that the incumbent upgrades associated with the WGRP can be initiated after a project award in mid-to late 2021 and be completed by the proposed in-service date.

Due to the optimized design of the WGRP and its ability to address the ISO-NE reliability needs with a minimal scope, Avangrid Networks has determined that the critical path of the project is the implementation of the incumbent upgrades. This provides the WGRP with buffers in critical activities, including the permitting and construction efforts, which provide greater certainty in achieving the proposed in-service date.

With the proposed in-service date, the WGRP critical path shows the following activities.

Critical Path Element	Duration	Comments and Mitigation Plan
ISO-NE RFP	555 Days	Potential acceleration of ISO-NE RFP process (award earlier than maximum timeframe – assumed).
TO Upgrades	825 Days	Refine schedule by incumbent TOs upon assessment of the proposed network upgrades
Sub-Critical Path Element	**Duration**	**Comments and Mitigation Plan**
Engineering and Environmental Surveys supporting Massachusetts Energy Facilities Siting Board (MA EFSB) filing	330 Days	Compress schedule by using multiple crews to cover entire 3.8 mile cable route simultaneously rather than sequentially. Increase the number of engineering resources associated with the design effort.
MA EFSB Permitting Process and subsequent finalization of relevant state permits	455 Days	Mitigating activities include community outreach, conducting a detailed routing analysis of the cable to find the least disruptive route. The feedback from community outreach will be reflected in the routing analysis. Mitigating activities for state permits contingent on EFSB approval include agency outreach and accelerated filing to facilitate expeditious review process.
Buffer	150 Days	Additional Buffer between Permitting End and Construction Start
Construction of Wakefield STATCOM	395 Days	Secure real estate for STATCOM site well in advance to allow preparation by the STATCOM vendor to conduct work. Explore splitting out civil work from STATCOM contract to accelerate work.

Table 2-2: WGRP Critical and Sub-Critical Paths

As much as possible, key activities and predecessors have been identified and initiated early in the schedule, even before project award if necessary, in order to keep activities out of the critical path. By accelerating key early tasks such as survey work and detailed engineering, Avangrid Networks accelerates the entire project schedule and maximizes its ability to meet ISO-NE's required June 1, 2024 in-service date, even in the face of unexpected delays.

Further schedule details are provided in Sections 3.3 and 7.5.

Key milestones of the WGRP included in the schedule are as follows:

Milestone	Completion Date
Demonstrate adequate financing	September 2021
Demonstrate Required Electrical Ratings	December 2021
Acquisition of all necessary federal, state, county, and local site permits	June 2022
Substantial Site Work Completed	May 2023
Delivery of Major Electrical Equipment	June 2023
Proposed Project In-service date	December 2023
Required Project In-service date	June 2024

Table 2-3: WGRP Key Milestones

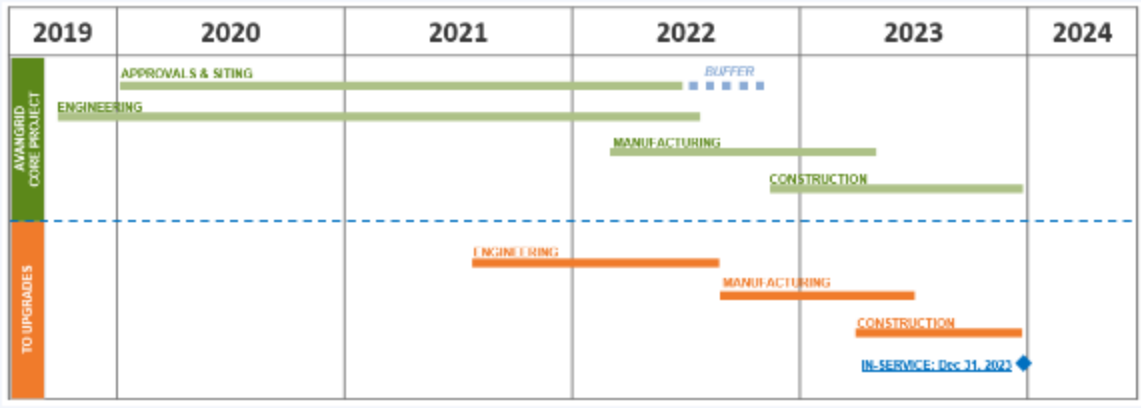

Figure 2-1: WGRP Executive Schedule

This schedule and project in-service date assume ISO-NE uses the full 175 days for evaluation in both Phase One and Two and that the TO upgrades will be in operation by December 14, 2023. If the evaluation schedule or the TO upgrades are accelerated, there are opportunities to further improve the WGRP schedule and in-service date, including the earlier start of the Avangrid Networks' construction.

Cost Containment

Avangrid Networks is confident in its ability to construct the WGRP on time and on budget. As a reflection of this, the WGRP installed cost and lifecycle cost estimates include well-considered cost containment and cost cap provisions. Currently Avangrid Networks is selecting a set of cost caps and cost containment provisions which are further outlined in Section 8.1.

Corporate Capabilities

Supporting the delivery of the project described above will be a world class organization with a track record of success in the region and across the globe. Avangrid Networks combines the resources of eight electric and natural gas utilities with a rate base of $9.1 billion, serving 3.25 million customers across New England and New York. The company has a longstanding footprint in New England in particular. Avangrid Networks companies Central Maine Power (CMP) and the United Illuminating Company (UIL), based in Maine and Connecticut respectively, were both founded in 1899 and have been serving customers in the region ever since. Together they operate over 3,000 miles of transmission lines, 238 substations, and serve almost 1 million customers.

Avangrid Networks is a part of AVANGRID, Inc., a leading, sustainable energy company with $32 billion in assets and operations in 24 U.S. states. As an example of the advantages provided by this corporate scale, Avangrid Networks has secured exclusive supplier agreements for the 2028 Boston RFP for cable supply and installation and other key contracts, as described in Section 3.1.

Conclusion

Avangrid Networks believes that the WGRP, delivers **superior value and performance** to ISO-NE **ratepayers** and the New England transmission system. The WGRP solution will be delivered by a company that is **well practiced in delivering complex projects** on time and on budget. Avangrid Networks' experience, combined with the technical solution, the competitive installed and lifecycle cost, well-planned schedule, risk mitigation measures, and significant cost containment mechanisms outlined in this proposal make the WGRP a winning choice for both ISO-NE and the region's ratepayers.

1.7 BOS-013: New Hampshire Transmission, LLC – Proposal 13

New Hampshire Transmission, LLC (NHT), a subsidiary of NextEra Energy Transmission, LLC (NEET), proposes to construct, own, and operate a new 345 kilovott (kV) underground (UG) line from the Wakefield Junction 345kV Substation to the Mystic 345kV Substation, via the new Hidden Valley 345kV Air Insulated Station (AIS). Hidden Valley contains a Phase Angle Regulator (PAR) to provide increased operational control of the system, and to provide system expandability. Further, a new station, Roger 345kV AIS Station, containing a 175 MVAr STATCOM to provide dynamic reactive power support is proposed. The entire project is referred to herein as the Wakefield-Mystic AC Solution or the Project. The Project includes 12-miles of 345kV UG line extending from the Hidden Valley Substation to the Mystic 345kV Substation. The proposed 12-miles of UG route will be located in state and local road right-of-ways (ROWs), and the Massachusetts Bay Transportation Authority's (MBTA) ROW. The new Hidden Valley Substation is proposed to be located 0.1-miles east of the existing Wakefield Junction 345kV Substation and will house the new PAR. The Hidden Valley Substation will be connected to the existing Wakefield 345kV Substation via a new 0.3-mile 345kV overhead (OH) line and the addition of a new 345kV circuit breaker in the Wakefield 345kV Substation 339 Line breaker bay. The new Roger Substation is proposed to be located 0.6 miles west of the Tewksbury 345kV Substation.

The Project also includes upgrading the existing West Amesbury – King Street 115kV line (K163 Line) to address the identified 115kV overload on this circuit. Upgrades to the K163 Line, modifications to the existing Wakefield Junction and Mystic 345kV Substations to accommodate the new 345kV OH/UG line, and modifications to the Tewksbury 345kV Substation to accommodate the interconnection of the STATCOM, in aggregate, are considered incumbent upgrades. The Project satisfies all of the reliability needs identified in the Boston 2028 Needs Assessment (Assessment), including dynamic reactive support for system restoration.

The Project is a valid alternative solution to NHT's preferred SeaLink Project. It mitigates all of the identified needs in the Boston 2028 Needs Assessment and offers the dynamic reactive power requirements to satisfy the ISO-NE System Restoration Plan requirements. The Project will have minimal impact on the community and environment due to its utilization of UG line design, and location of the PAR and STATCOM being near existing substations.

Installed and Life-Cycle Cost Estimates

The Project's installed cost estimate in nominal dollars is $265.2 million, and the estimated life-cycle cost in 2023 is $260.0 million. NHT understands ISO-NE will obtain costs associated with the Incumbent Upgrades directly from the incumbent owner of those facilities which will serve to validate NHT's estimate, or will serve to replace this portion of NHT's total estimated installed cost. NHT used the latest cost estimate data from leading AC vendors and extensive internal transmission experience, including lessons learned from other NextEra subsidiaries. This process allowed NHT to develop an accurate cost estimate for the Project while significantly reducing uncertainty around that estimate.

Cost Containment

NHT proposes cost containment in the form of multiple firm cost caps, including for installed cost, annual revenue requirements, O&M, maximum equity thickness, and maximum return on equity. In addition, NHT proposes an economic penalty for missing the need date of June 1, 2024, which ultimately helps to mitigate costs for ISO-NE customers.

{Redacted Heading}

{Redacted Table}

Technical Design

In response to identified Boston area needs, NHT proposes the Project, creating a parallel AC path to the existing Wakefield Junction – Mystic 345kV line (LN 349, LN349X, and LN349Y), incorporation of a new PAR and STATCOM, and an upgrade of the existing 115kV K163 Line. The new and upgraded facilities comprising the Project mitigates all identified Boston 2028 reliability needs including all 345kV and 115kV overloads, and provides the required reactive power needs to support the ISO-NE's System Restoration Plan. The proposed project scope of the Wakefiled jct.-Hidden Valley-Mystic AC Solution includes the following:

- two new 345kV lines totaling approximately 13.0 miles
- reconductoring of a 115kV line for approximately 7.3 miles
- one new 345kV single breaker AIS station with breaker and half expansion capability
- one new 345kV single breaker STATCOM station
- addition of three new 345kV breakers to existing bays
- one new +/- 175MVAr STATCOM
- one new Phase Angle Regulator

Routing of Line

NHT reviewed the existing right-of-way (ROW) between Wakefield Junction and the Mystic Substation. Ultimately, NHT determined its strategy was to build an UG line following mostly existing state and city streets and the Massachusetts Bay Transportation Authority's (MBTA) bike trail.

{Redacted Heading}

{Redacted Paragraph(s)}

Community and Environmental Impact

The Project minimizes impact on communities and the environment during construction and creates a valuable resource for the communities during operation. The MBTA ROW 345kV segment will be

underneath a bike path which results in significantly less impact on host communities. Post-construction, the Project will have no visual impact on local residents.

The Project's route enhances six (6) miles of highly desirable bikeway on an existing MBTA easement. This infrastructure investment goes well beyond the basic needs of utility service to enhance the economic vitality and quality of life in the local communities that host the project.

1.8 BOS-015: New England Energy Connection, LLC – New England Energy Connection, LLC (Proposal 1)

New England Energy Connection, LLC ("NEEC"), a subsidiary of LS Power Associates, L.P. ("LS Power"), is pleased to provide this proposal to the ISO New England Inc. ("ISO-NE") in response to the Request for Proposal, Reliability Transmission Upgrade, Boston 2028 RFP dated December 20, 2019 ("Boston 2028 RFP").

This NEEC Proposal Number 1 ("Proposal 1") resolves all needs identified to be resolved in the final Boston 2028 Needs Assessment Update and Boston 2028 Needs Assessment Addendum. Proposal 1 contains three primary elements:

1. A series reactor on the West Amesbury to King Street 115 kV transmission line at West Amesbury, which reduces the loading on the West Amesbury to King Street 115 kV transmission line and resolves the N-1 STE thermal overload.
2. A new 345 kV underground cable between Wakefield Junction and Mystic, which increases the capability of the Northern 345 kV Cable system and adds another circuit on the path between Wakefield Junction and Mystic, resolving all identified N-1-1 thermal overloads.
3. A new nominal +/-150 MVAR STATCOM connected at the Tewksbury 345 kV station, meeting the dynamic reactive device requirements identified in the Boston 2028 Needs Assessment Addendum.

Proposal 1 provides a significant increase in the physical capacity to deliver power into central Boston from the north by adding a new 345 kV cable rated at 615 MVA (normal). As the Boston area population continues to grow, and utility density from all utilities continues to increase, it will be increasingly difficult to site and construct linear facilities such as new transmission cables. The incremental capacity provided by the proposed new 345 kV cable resolves the N-1-1 violations identified in the Boston 2028 Needs Assessment and will be available to meet future system needs, including delivering future renewable resources into the Boston load center, and needs that arise from future area generation retirement. The series reactor at West Amesbury is a straightforward solution to the N-1 thermal overload at a low cost. The proposed STATCOM provides reactive power to one of the locations identified in the Boston 2028 Needs Assessment Addendum in the most cost effective way. A subsidiary of LS Power was recently selected for two 500 kV STATCOM projects by the California Independent System Operator, one +/-848 MVAR and one +/-529 MVAR.

Siting and permitting of the proposal is feasible within the required timeframe. All of the elements of the project are either within existing substations, on property under control of NEEC, or will be within existing municipal rights-of-way. The series reactor will be located within available space at the West Amesbury station. The STATCOM will be located on property under control of NEEC. The new underground cable will be located within existing municipal rights-of-way. All real estate will be acquired prior to the commencement of construction. The primary permitting approval will be from the Massachusetts Energy Facility Siting Board, which has a statutory requirement to act within one year on a siting application. The risk of routing within municipal rights-of-way is

mitigated by having several feasible alternatives. In addition, NEEC has conducted initial outreach to impacted municipalities and no feasibility issues were identified. Permitting feasibility of the proposed STATCOM is high as the property secured for the STATCOM is currently zoned heavy industrial and is adjacent to the existing Tewksbury station.

Assuming ISO-NE selection by June 1, 2021, NEEC estimates filing of the Energy Facility Siting Board application by August 1, 2021, approval by the Energy Facility Siting Board by August 1, 2022, beginning of construction by September 1, 2022, and in-service date prior to May 31, 2024.

Proposal 1 has an estimated installed cost of $218 million and an estimated life-cycle cost of $218 million (per Section 4.6, the life-cycle cost estimate does not include elements where NEEC is not the PTO). NEEC is committed to delivering Proposal 1 within the estimated cost and supports this commitment with four elements of cost containment. NEEC proposes a binding cap on installed costs, a binding cap on its return on equity, a binding cap on the equity percentage as part of its capital structure, and a binding cap on its annual revenue requirement for the first 10 full calendar years of operations of the project.

1.9 BOS-017: NSTAR Electric Company - NSTAR Boston Area Optimized Solution (BAOS)

Introduction and Proposal Overview

In anticipation of the planned retirement of Mystic Generating Station Units 8 and 9, ISO New England Inc. (ISO-NE) identified areas of required improvements to maintain transmission system reliability and restoration capabilities in the Boston area. Subsequently, ISO-NE issued a solicitation for competitive transmission solutions to address these reliability and restoration concerns. In response to ISO-NE's solicitation, NSTAR Electric Company dba Eversource Energy (Eversource) is pleased to submit this Proposal to effectively address all system reliability and restoration needs well in advance of the scheduled retirement date for the Mystic units (i.e., by June 1, 2024).

Eversource submitted several proposals in response to ISO-NE's solicitation, including this Boston Area Optimized Solution (hereafter referred to as the BAOS or the Proposal). For the BAOS, Eversource is the Qualified Transmission Project Sponsor (QTPS) but has partnered with the New England Power Company dba National Grid (National Grid), also a QTPS. Both Eversource and National Grid are identified by ISO-NE as Backstop Transmission Solution providers. Accordingly, in response to ISO-NE's RFP, Eversource, as the lead QTPS, submits this Proposal (BAOS) as the Backstop Solution. The BAOS, as well as all the proposals submitted by Eversource, have the following attributes:

- Cost-effectively maximize the use of existing transmission facilities in the Boston area.
- Provide schedule certainty and can be placed in service before the planned Mystic retirements;
- Locate the upgrades to facilities entirely within properties owned by Eversource and National Grid and already used for utility purposes.
- Capitalize on the strong financial capabilities and unparalleled expertise of two companies in developing and constructing transmission projects in Massachusetts.

To address critical overloads on the 345 kV paths supplying power into Boston from the North, the BAOS includes the installation of 11.9 ohm series reactors on the 346 and 365 lines at North Cambridge Substation. Installation of these series reactors is the most cost-effective solution to address ISO-NE's identified Boston 2028 thermal needs. In addition, BAOS includes a STATCOM, that will be located inside National Grid's Tewksbury 345 kV Substation, that meets ISO-NE's requirements for a dynamic reactive device for system restoration under weak system strength conditions.

The BAOS was identified as the Backstop Transmission Solution because it represents not only the least cost solution, but also the solution with the greatest degree of schedule certainty, due to minimal permitting and siting requirements. Specifically, both the series reactors and the STATCOM included in the BAOS will be sited within the companies' substations and therefore will not require petition filings with the Massachusetts Department of Public Utilities (DPU) or Energy Facilities Siting Board (EFSB). The BAOS also does not rely on the implementation of any other Local System Plans, which could require separate regulatory approvals.

Eversource is confident that that the Proposal components will be constructed and placed in service by October 2023 and well in advance of Mystic's retirement date of June 1, 2024. By upgrading

existing substations, Eversource and National Grid will leverage site plan approvals, if required, through local zoning processes that can be executed significantly earlier and at a reduced cost than with a petition filing to the Massachusetts DPU requesting zoning relief.

How it Works –the BAOS

Upgrades to address the 345 kV overloads

As part of the BAOS, Eversource will install two 11.9 ohm series reactors (one each on the two Woburn to North Cambridge 345 kV cables). Installation of these series reactors on the 345 kV paths supplying power into Boston from the north will help re-direct flows on the 345 kV network, eliminating all overloads on all 345 kV paths identified in the ISO-NE Boston 2028 Needs Assessment.

Dynamic Reactive Device

In response to ISO-NE's identified need for a "dynamic reactive device," National Grid will install a ±167 MVAR STATCOM, capable of injecting at least ±150 MVAR at all operating conditions specified in the RFP, at Tewksbury Substation (in Tewksbury, MA). Eversource and National Grid determined that several potential devices could meet the ISO-NE requirements for a dynamic reactive device. These include both the proposed synchronous condenser or a different but similar device known as a STATCOM. For this Proposal, Eversource and National Grid selected a STATCOM. Multiple 345 kV transmission lines connected at Tewksbury 345 kV Substation will allow the STATCOM to regulate voltages within ISO-NE specified acceptable range for multiple 345 kV line energization paths in the event of system restoration. Eversource and National Grid studies demonstrate that the proposed STATCOM can successfully provide voltage control under weak system short circuit strength of 300 MVA.

Upgrades to address the 115 kV overload

Finally, to address an overload on National Grid's 115 kV K-163 Line north of Boston for the opening of a section of the Seabrook to Ward Hill 345 kV line, National Grid would implement a Direct Transfer Trip (DTT) scheme to open the 345 kV line and the 345/115 kV transformer at West Amesbury Substation. By ensuring that the 345 kV line and the 345/115 kV transformer is disconnected, this solution eliminates the identified overload on the K-163 Line for less than $800K -- a fraction of the cost of other alternatives, such as reconductoring the line.

The National Grid upgrades to support this proposal will be performed under the Joint Development Agreement (JDA) which will be executed by National Grid and Eversource.

BAOS Schedule and Cost

Eversource will place this solution in-service by October 2023 and well before the planned June 1, 2024 Mystic Generating Station retirement. The BAOS schedule is based on a detailed constructability analysis and reflects schedule risk mitigation measures.

Installed Cost and Life-Cycle Cost

The installed cost of Proposal BAOS is $48.6 million. The life cycle cost is $74.2 million.

Cost Containment

Eversource and National Grid will commit to a cost containment arrangement such that return on equity (ROE) will be reduced if actual costs exceed the proposed cost estimate. Specific details can be found in the response to RFP Question 8.1.

Eversource and National Grid are confident that the BAOS can be constructed within the proposed schedule and cost estimate for the following reasons.

Land, Permitting, and Construction Requirements

Eversource and National Grid have all necessary property and land rights in place to construct, maintain, and operate the BAOS. Substantial institutional knowledge is available within Eversource and National Grid on each existing asset, including environmental conditions, on-site permits and constructive relationships with key regulatory and community stakeholders. Eversource and National Grid have used this knowledge in the BAOS design, eliminating constructability and permitting risks due to unknown site conditions. In addition, Eversource has a full understanding of the permits and other regulatory approvals that will be required for the Proposal, and the realistic time frames for obtaining them. Eversource has analyzed the siting and permitting requirements for all components of this Proposal and determined that the requirements are straightforward, and the permits and approvals required are those that are routinely obtained for transmission line and substation projects in Massachusetts.

Eversource Team Qualifications

Eversource operates the largest energy delivery system in New England with more than 3.1 million electricity customers across Connecticut, Massachusetts, and New Hampshire, and more than 3,900 circuit miles of electric transmission lines and 70 substations. For the BAOS, Eversource has assembled a multi-disciplinary approximately 35-person team comprised of personnel with extensive experience in design, siting, permitting, stakeholder engagement, constructing, operating and maintaining major transmission infrastructure projects in the Boston area. The team, which includes Eversource personnel experienced in substation, transmission, protection and controls, and field engineering, is supplemented by specialized independent engineering firms and contractors, with whom Eversource has blanket contractual agreements, to support siting and environmental permitting. In addition, National Grid has assembled a dedicated team to implement its components of this Proposal.

Management Capabilities and Financial Resources

Eversource is a Fortune 500 company with an equity market capitalization of approximately $28 billion and has the full financial resources and depth of experience to design, construct, operate, and maintain the BAOS components. As evidenced by its well-established history in New England, Eversource is well equipped to execute a wide variety of transmission and substation projects, ranging from new, multi-state 345 kV transmission lines and new substations, to transmission line reconductor/rebuild projects and substation upgrades. The Proposal team is well versed in both pre-construction activities (e.g., engineering, procurement, system planning, environmental, outage planning, permitting, outreach) and construction, and apply these skills to expedite all aspects of the work.

Conclusion

Eversource's BAOS offers the most cost-effective and comprehensive solution to the Boston area transmission reliability issues. The BAOS will maximize the use of existing Eversource and National Grid transmission assets by adding new facilities that all can be constructed prior to the Mystic Generation Station retirements. By proposing upgrades located only at existing Eversource and National Grid facilities, Eversource can commit, with a high degree of confidence, to developing the Proposal components on schedule. The estimated Proposal costs reflect agreements with trusted contractors, consultants, and fixed supplier pricing for major equipment, as well as the use of established mechanisms for addressing critical path tasks and ensuring that the BAOS can be constructed consistent with Eversource's and National Grid's cost estimates.

1.10 BOS-019: Transource New England, LLC – Transource New England, LLC (Proposal 1)

Delivering a solution that ISO-NE can be confident is effective, cost competitive, and reliable, Transource New England, LLC ("TNE") offers this Proposal 1 for ISO-NE evaluation. TNE's Proposal 1 comprehensively solves the needs identified in the Boston 2028 Needs Assessment and Needs Assessment Addendum.

The proposal combines multiple project elements to deliver a highly effective and reliable solution. The following elements are proposed to solve the ISO's identified needs:

1. The addition of a new 345kV circuit between the Tewksbury and Wakefield Junction stations, recommended to be built with American Electric Power's (AEP) BOLD® technology to minimize the need for any ROW expansion. The addition of the new 345kV circuit will require consolidation of the existing Tewksbury-Wakefield corridor to accommodate the new line. The current configuration in this ROW is a single-circuit 345kV and two single-circuit 115kV lines. These lines are proposed to rebuilt and replaced with two (2) double-circuit 345/115kV lines.
2. The construction of a new 345 kV GIS station referred herein as the "Sunset Station", located directly adjacent to and interconnected to the existing Wakefield Junction Station. The new Sunset Station will include a new +/-200 MVar STATCOM and a 345kV series reactor. Sunset Station also serves as the termination point for several 345 kV lines that currently terminate at the Wakefield Junction station.
3. The addition of a new underground 345 kV line between the existing Golden Hills Station and the new Sunset station, effectively creating a new 345kV pathway from Sunset to Wakefield Junction to Mystic station.
4. Required station modifications at four existing stations.
5. The reconductoring of the 115 kV line between "West Amesbury" and "King St" stations.

As noted above, one of the proposal highlights is the recommended use of AEP's Breakthrough Overhead Line Design (BOLD) transmission technology to consolidate and rebuild an existing transmission corridor. The proposed rebuild offers the incumbent TO the opportunity to not only solve the reliability violations in this RFP, but also to replace aged infrastructure with new, efficient technology. BOLD offers an innovative transmission tower design that uses lower structure heights, smoothly curved crossarms for an improved viewshed, and more efficient use of existing ROWs. Please see sections 4.11 and 7.2 for more detailed information on the siting and performance advantages that BOLD provides.

These proposal elements result in a design that comprehensively solves the identified needs. For instance, the new 345 kV lines and station adjustments in items #1, 2, 3, and 4 above provide redundancy that help solves contingency violations and system restoration needs. Item #5 cost-effectively solves the W. Amesbury – King Street 115kV thermal overload violations to meet reliability criteria.

The benefits provided by the above elements have a total estimated installed cost of $402 million, including both TNE and incumbent Transmission Owner (TO) work. The project elements that

would be owned by TNE have a lifecycle cost of $282.3 million. TNE has designed the proposal to be as cost effective as possible and offers a cost cap mechanism to ensure cost control. TNE proposes a cost cap on its capital costs, currently estimated at $263.3 million. The capital cost cap excludes capital costs that are anticipated to be owned by one or more incumbent utilities, currently estimated at $138.7 million. This capital cost cap is on the initial project capital costs only, is quoted in year 2023 dollars per ISO-NE's stated annual inflation rate of 1.5%, and will be included in the Selected Qualified Transmission Project Sponsor Agreement (SQTPSA), if selected. The final project cost cap, along with specific terms and conditions outlining any exceptions, exclusions and relief events, will be updated in Phase 2 of the competitive project proceeding incorporating further in-depth project diligence and any changes or clarifications communicated by the incumbent utilities or ISO-NE.

TNE has also provided an informed and reasonable project schedule to construct the above elements. This schedule assumes that ISO-NE selects the SQTPS on June 1, 2021, necessary permitting is completed in January 2023, construction begins in April 2023, and TNE project elements are placed in-service in December 2024 and incumbent TO project elements are placed in-service in December 2025.

In addition, the proposal maximizes use of existing ROW to lessen the impact on project area communities. The recommended consolidation of the Tewksbury – Wakefield Junction corridor is not expected to require any ROW expansion when utilizing the BOLD design. TNE's proposed location for the Sunset Station uses undeveloped and permittable land that is directly proximate to the Wakefield Junction station. TNE's proposed new 345 kV underground line, located within public roadways, is the most direct road route between the interconnecting stations.

TNE is confident that its proposal offers an innovative and compelling solution in which ISO-NE can be confident is both reliable and cost competitive, and comprehensively fulfills the requirements of the Boston 2028 Needs Assessment and Addendum.

1.11 BOS-021: NSTAR Electric Company - NSTAR Boston Clean Energy Connect (BCEC)

Introduction and Proposal Overview

In anticipation of the planned retirement of Mystic Generating Station Units 8 and 9, ISO New England Inc. (ISO-NE) identified areas of required improvements to maintain transmission system reliability and restoration capabilities in the Boston area. Subsequently, ISO-NE issued a solicitation for competitive transmission solutions to address these reliability and restoration concerns. In response to ISO-NE's solicitation, NSTAR Electric Company dba Eversource Energy (Eversource) is pleased to submit this proposal to address all system reliability effectively, and restoration needs well in advance of the scheduled retirement date (i.e., by June 1, 2024) for the Mystic units.

Eversource submitted several proposals in response to ISO-NE's solicitation, including this specific solution, the Boston Clean Energy Connect (hereinafter referred to as the BCEC or Proposal). All Eversource proposals:

- Meet all ISO-NE criteria and requirements;
- Cost-effectively maximize the use of existing transmission facilities in the Boston area;
- Provide schedule certainty and can be placed in service before the planned Mystic retirements;
- Locate the upgrades to facilities entirely within properties owned by Eversource and National Grid and already used for utility purposes; and
- Capitalize on the strong financial capabilities and unparalleled expertise of two companies in developing and constructing transmission projects in Massachusetts.

Eversource's Proposal includes additional advantages that further strengthen the transmission system and provides long-term system benefits, including:

- Supporting future electric demand growth in the Boston area, and
- Enabling New England's clean energy transition.

Eversource is confident that that the proposal components can be developed on schedule – before Mystic's scheduled retirement. By utilizing upgrades to existing substations and transmission facilities, Eversource and National Grid will leverage site plan approvals, if required, through local zoning processes that can be executed more quickly and at a reduced cost. Also, a strategically combined Chapter 40A and Section 72 petition filing to the Massachusetts Department of Public Utilities (DPU) specific to the 115 kV to 345 kV conversion between K-Street and Kingston stations component of this proposal, utilizing previously successful filing materials, will reduce review time.

As the Qualified Transmission Project Sponsor (QTPS) for the BCEC, Eversource has assembled a dedicated Proposal team and partnered with the QTPS New England Power Company dba National Grid (National Grid). The BCEC will also use several of National Grid's existing and planned transmission facilities to establish a new transmission supply into the Boston area.

How it Works –The BCEC

<u>Upgrades to address the 345 kV overloads</u>

Under this proposal, Eversource will construct a 345 kV Phase Angle Regulator (PAR) at K-Street and a 115 kV PAR at Dewar Street substations. The 115 kV PAR will be identical in size and capacity to the four existing 115 kV PARs installed in the Boston grid at Waltham and Baker Street substations. Additionally, under this proposal, BCEC utilizes an existing 115 kV duct bank between K-Street and Kingston stations to replace a 115 kV cable with a new 345 kV cable.

The Boston 345 kV system connects Tewksbury (North), Sandy Pond (North East), West Medway (South East), and Stoughton (South) substations. These substations serve as the critical supply points into the Greater Boston region. While Tewksbury connects into Mystic Substation (which then connects into Kingston Street) and Stoughton connects into K-Street in the heart of Boston, Mystic and K-Street substations remain unconnected. Because of this electrical gap on the 345 kV system into Boston, generation supplying power into Boston from the North and South have been supplied from distinctly different locations. The connection of the southern and northern electrical systems is complex; thus, a 345 kV PAR is needed to regulate these power flows within this extensively networked 345 kV system. The BCEC does just that – and by connecting the south and north systems with the help of a 345 kV connection between K-Street and Kingston substations and a new 775 MVA PAR, BCEC drives about 60% reduction in loading on the projected overloaded 345 kV transmission lines.

Installation of the 115 kV PAR at Dewar Street Substation will allow Eversource to close the two 115 kV cables that already exist between Dewar Street Substation and North Quincy Substation (in Quincy, MA), but are currently operated in a normally open configuration. Closing these two circuits in conjunction with the installation of the 115 kV PAR at Dewar Street allows additional power supply into Boston from the south and, when operated in tandem with the 345 kV PAR at K-Street, eliminates all overloads and significantly reduces loadings on all 345 kV paths identified in the ISO-NE Boston 2028 Needs Assessment. The 115 kV PAR also addresses potential adverse impacts on the 115 kV system from conversion of one of the 115 kV circuits between K-Street to Kingston to 345 kV.

While the same technical system benefits could be achieved by adding a new 345 kV cable between K-Street and Mystic (either an underwater or underground cable with construction of new duct banks in downtown Boston), efficacy of these plans are limited to a simulation world. Given our extensive expertise with siting projects in Boston, we rejected any electrical solution that would require a MA EFSB filing.

Dynamic Reactive Device

In response to ISO-NE's identified need for a "dynamic reactive device," Eversource and National Grid selected a STATCOM at Tewksbury 345 kV Substation. Multiple 345 kV transmission lines connected at Tewksbury 345 kV Substation will allow the STATCOM to regulate voltages within ISO-NE specified acceptable range for multiple 345 kV line energization paths in the event of system restoration. Eversource and National Grid studies demonstrate that the proposed STATCOM can successfully provide voltage control under weak system short circuit strength of 300 MVA.

Upgrades to address the 115 kV overload

Finally, to address an overload on National Grid's 115 kV K-163 Line north of Boston for the opening of a section of the Seabrook to Ward Hill 345 kV line, National Grid would implement a Direct Transfer Trip (DTT) scheme to open the 345 kV line and the 345/115 kV transformer at West Amesbury Substation. By ensuring that the 345 kV line and the 345/115 kV transformer is disconnected, this solution eliminates the identified overload on the K-163 Line for less than $800K -- a fraction of the cost of other alternatives, such as reconductoring the line.

National Grid upgrades to support this proposal will be performed under the Joint Development Agreement (JDA) which will be executed by National Grid and Eversource.

Additional Clean Energy and Load Serving Benefits

Eversource anticipates that the construction of the BCEC and the establishment of a new 345 kV transmission path into Boston from the south will enable the deliverability of about 1,100 MW of new offshore wind into the Boston area. Additionally, when testing import capability into Boston using a Generation to Load transfer analysis under N-1 contingent conditions, BCEC with the use of 345 kV and 115 kV PAR adjustments can increase transmission transfer capability into Boston by about 1,600 MWs, demonstrative of proposal BCEC's significant robustness.

BCEC Schedule and Cost

Eversource will place this solution in-service by April 2024, or earlier, depending on the timing of ISO-NE's award, but before the planned June 2024 Mystic Generating Station retirement. The BCEC schedule is based on a detailed analyses, and reflects schedule risk mitigation measures.

Installed Cost and Life-Cycle Cost

The installed cost of Proposal BCEC is $119.0 million. The life cycle cost is $171.8 million.

Cost Containment

Eversource and National Grid will commit to a cost containment arrangement such that return on equity (ROE) will be reduced if actual costs exceed the proposed cost estimate. Specific details can be found in the response to RFP Question 8.1.

Eversource and National Grid are confident that the BCEC can be constructed within the proposed schedule and cost estimate for the following reasons.

Land, Permitting, and Construction Requirements

Eversource and National Grid have all necessary property and land rights in place to construct, maintain, and operate the BCEC. Eversource and National Grid have used this knowledge in the BCEC design, eliminating constructability and permitting risks due to unknown site conditions. Besides, Eversource has a full understanding of the permits and other regulatory approvals that will be required for the BCEC, and the realistic time frames for obtaining them. Eversource has analyzed the siting and permitting requirements for all components of this Proposal and determined that the requirements are straightforward, and the permits and approvals required are those that are routinely obtained for transmission line and substation projects in Massachusetts.

Eversource Team Qualifications

Eversource operates the largest energy delivery system in New England with more than 3.1 million electricity customers across Connecticut, Massachusetts, and New Hampshire, and more than 3,900 circuit miles of electric transmission lines and 70 substations. For the BCEC, Eversource has assembled a multi-disciplinary approximately 35-person team comprised of personnel with extensive experience in design, siting, permitting, stakeholder engagement, constructing, operating, and maintaining major transmission infrastructure projects in the Boston area. The team, which includes Eversource personnel experienced in substation, transmission, protection and controls, and field engineering, is supplemented by specialized independent engineering firms and contractors, which whom Eversource has blanket contractual agreements, to support siting and environmental permitting.

Management Capabilities and Financial Resources

Eversource is a Fortune 500 company with an equity market capitalization of approximately $28 billion and has the full financial resources and depth of experience to design, site, permit, construct, operate, and maintain the Proposal BCEC components. As evidenced by its long-established history in New England, the proposal team at Eversource is well equipped to execute a wide variety of transmission and substation projects, ranging from new, multi-state 345 kV transmission lines and new substations, to transmission line reconductor/rebuild projects and substation upgrades.

Conclusion

The BCEC represents the most robust and cost-effective solution to the Boston area transmission reliability issues that can be constructed before the Mystic retirements. By proposing upgrades located only at existing Eversource and National Grid facilities, Eversource can commit, with a high degree of confidence, to developing the Proposal components on schedule. The estimated Proposal costs reflect agreements with trusted contractors, consultants, and fixed supplier pricing for major equipment, as well as the use of established mechanisms for addressing critical path tasks and ensuring that the proposal can be constructed consistent with Eversource's and National Grid's cost estimates.

1.12 BOS-023: New Hampshire Transmission, LLC – New Hampshire Transmission, LLC-Proposal 4

New Hampshire Transmission, LLC (NHT), a subsidiary of NextEra Energy Transmission, LLC (NEET), proposes to construct, own, and operate the SeaLink Project (SeaLink or the Project), a 68 mile, 720 megawatt (MW) undersea/underground transmission cable system. SeaLink will utilize High Voltage Direct Current (HVDC) technology to efficiently transmit power in either direction across the key Boston Import and North-South New England interfaces and directly connect two major substations by way of a new corridor. The SeaLink Project's core elements set forth in this proposal are two Voltage Source Converter (VSC) Stations and a submarine HVDC cable electrically connecting the 345 kilovolt (kV) transmission systems at NHT's Seabrook Switchyard in Seabrook, NH with the 345kV Mystic Substation in Everett, MA. The Project is very similar to the version of SeaLink that NHT previously proposed between 2012-2015. The undersea route remains the same heavily-studied, proven route, while the terrestrial segments at the northern and southern end of the proposed project were improved. NHT's proposal also includes upgrading the existing West Amesbury – King Street 115kV line (K163 Line) to provide enhanced thermal margin to resolve the identified 115kV overload. The K-163 upgrade is considered an incumbent upgrade.

SeaLink is in an advanced stage of development and ready to proceed rapidly to mitigate the reliability needs identified in the Boston 2028 Needs Assessment (the Assessment). Due to the Project's advanced development stage, SeaLink provides significantly reduced siting and permitting risk as well as schedule certainty, in addition to superior electrical performance at a competitive life-cycle cost. SeaLink's HVDC cable will be entirely buried and most of the converter station equipment will be inside of buildings and/or behind vegetation to obstruct public view. SeaLink also utilizes a new transmission corridor and does not have the impact on adjacent existing lines that competing AC solutions may cause. In addition, the Project mitigates a variety of risks from weather, generator retirements, permitting delays, and cost overruns.

SeaLink creates a new, hardened corridor to move power that will be much less susceptible to weather extremes compared to overhead AC lines. Weather events in New England are expected to increase in severity and frequency in the coming decades. SeaLink's hardened underground infrastructure is less susceptible to hurricanes, nor'easters, and ice storms compared to overhead lines. That resiliency increases reliability and reduces costs. These advantages will only increase over time as stronger and more frequent storms inflict more damage and impose more ratepayer-borne repair costs on overhead lines.

Recent ISO-NE reliability planning has also focused on physical separation of transmission elements so that failure of one element from severe weather or other causes does not adversely affect other elements or overall system reliability. SeaLink offers an advantage compared to new projects in existing right-of-ways (ROWs) by creating a new, underground, geographically distinct transmission corridor. Competing AC solutions may propose using crowded, existing transmission corridors that already include redundant critical lines susceptible to a single failure. Putting more critical assets in the same space can reduce overall system security and could increase the likelihood that future, costly reliability projects will need to be undertaken to separate the lines.

SeaLink's diversification of the transmission system in a new corridor using climate-change resilient underground or undersea elements is an inherent and unique benefit of the Project that should be considered by ISO-NE when comparing the costs and reliability attributes of competing projects.

Installed and Life-Cycle Cost Estimates

SeaLink's total installed cost estimate in nominal dollars is $656.4 million, and the estimated life-cycle cost in 2023 is $634.9 million. The proposal contains detailed power flow work NHT included in its RFP solicitation documents to leading HVDC vendors to assist them with their cost estimates, which in turn allowed NHT to provide a more accurate cost estimate for SeaLink. Moreover, buried HVDC lines require fewer ongoing operation and maintenance expenses than an equivalent AC system, and SeaLink traverses 15 miles of federal waters which reduces property taxes.

Cost Containment

NHT proposes cost containment in the form of multiple firm cost caps, including for installed cost, annual revenue requirements, O&M, maximum equity thickness, and maximum return on equity. In addition, NHT proposes an economic penalty for missing the need date of June 1, 2024, which ultimately helps to mitigate costs for ISO-NE customers.

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Technical Design

In response to the identified Boston area needs, NHT is proposing to construct the Project, a VSC-based HVDC solution that will deliver 720MW into the Mystic 345kV substation. In addition, NHT is proposing the incumbent upgrade of the existing 115kV K163 Line. The Project is comprised of the following:

- Expand the existing Seabrook 345kV yard to accommodate one new 345kV cable;
- Construct two +/-320kV VSC-HVDC converter stations, one adjacent to Seabrook 345kV substation, and another at a greenfield site located at 20 Bennett Hwy in Revere, MA, with the ability to deliver 720MW to the Mystic substation;
- Construct approximately 3000' of 345kV AC cable between Seabrook 345kV substation and proposed Seabrook converter station;
- Construct approximately 5.5 miles of 320kV underground DC cable between the Seabrook DC converter and underground (UG)-underwater (UW) transition point in Salisbury, MA;
- Construct approximately 50 miles of 320kV underwater DC cable;
- Construct approximately 5 miles of 320kV underground DC cable between UW-UG transition point (Lynn, MA landing site) and proposed converter station in Revere, MA;
- Construct approximately 6 miles of underground 345kV AC cable between proposed Revere, MA converter station to the existing Mystic 345kV station;
- Replace existing Mystic Unit Seven connection with proposed 345kV cable between Bennett converter and Mystic station; and

- Reconductor 7.3 miles of existing 115kV overhead line between West Amesbury and King Street (K163 line) stations to achieve minimum Long-Term Emergency rating of 405MVA.

Real Estate

SeaLink's real estate land control is in a mature stage. NHT and its affiliates have secured the privately-owned real estate rights required for SeaLink to ensure cost and schedule certainty. The land required for both of SeaLink's converter stations (Seabrook, NH & Revere, MA) is subject to land control option agreements with NHT affiliates.

SeaLink's terrestrial portion of the line in the Greater Boston area will primarily utilize rights-of-way (ROW) owned by the Massachusetts Bay Transportation Authority (MBTA) from Lynn to Everett, for which NHT has a long term ROW agreement in place. Eleven percent of the remaining required ROW are owned by public entities such as MassDOT, and, therefore, will be obtained through a permit process in 2021.

Reliability Needs

NHT tested SeaLink with extensive power flow modeling using ISO-NE study models and assumptions and confirmed that SeaLink solves the reliability criteria violations ISO-NE identified in the Assessment. In addition, SeaLink exceeds the identified dynamic reactive requirements for system restoration identified by ISO-NE in the Boston 2028 Needs Assessment Addendum.

SeaLink includes dynamic reactive support for system restoration, while providing additional operational advantages. The thermal overloads identified on Woburn to N. Cambridge 345kV, N. Cambridge to Mystic 345kV, and West Amesbury to King Street 115kV are reduced to approximately 74%LTE, 75%LTE and 70%LTE, respectively, without post secondary PAR optimization. The inherent capabilities of VSC-HVDC technology enables SeaLink to provide up to +/-360MVAr of dynamic reactive power at Mystic 345kV station to address the dynamic reactive capability requirements for ISO-NE's System Restoration Plan.

HVDC technology is well proven, and has been deployed successfully in numerous locations. An important example is the Trans Bay Cable, which also employs VSC-HVDC technology and is owned and operated by an NHT affiliate. The NHT team will bring the engineering and operational expertise gained from its Trans Bay Cable experience to the Project.

SeaLink also delivers operational benefits which AC solutions cannot. For example, HVDC technology allows for quick ramping of power and independent control of active and reactive power, which in turn enhances grid stability. VSC links, such as proposed by the project, can also be utilized during black start events to supply power and act to stabilize the grid as generation and load are added to the system. Additionally, the complete system is less vulnerable than overhead AC to extreme weather events.

Community and Environmental Impact

By its design, the underwater cable used by SeaLink minimizes the impact on communities and the environment during construction, while providing a valuable transmission resource for the Commonwealth and ISO-NE region during operation. SeaLink consulted closely with applicable state

and federal agencies in selecting its undersea route. The results of our completed marine studies confirmed the entire line can be safely buried beneath the ocean floor, thereby minimizing interference with fishing and shipping. The only above-ground structures will be two converter stations designed to blend into the unique characteristics of the surrounding communities near each end of the route. Otherwise, there will be no overhead lines that would negatively introduce additional visual impact and recurring vegetation management.

SeaLink's preferred onshore underground route via a new transmission corridor will create or enhance 11-miles of highly desirable, new bicycle paths in New Hampshire and Massachusetts. NHT is proposing to make these added bicycle path improvements without seeking regional cost recovery for its investment. The chosen route expands upon a network of recreation trails in the north shore communities created from former rail lines. This infrastructure investment goes well beyond the basic needs of utility service to enhance the economic vitality and quality of life in the local communities that host the project.

1.13 BOS-025: New England Energy Connection, LLC – NEEC Proposal 2

New England Energy Connection, LLC ("NEEC"), a subsidiary of LS Power Associates, L.P. ("LS Power"), is pleased to provide this proposal to the ISO New England Inc. ("ISO-NE") in response to the Request for Proposal, Reliability Transmission Upgrade, Boston 2028 RFP dated December 20, 2019 ("Boston 2028 RFP").

This NEEC Proposal Number 2 ("Proposal 2") resolves all needs identified to be resolved in the final Boston 2028 Needs Assessment Update and Boston 2028 Needs Assessment Addendum. Proposal 2 contains three primary elements:

1. A series reactor on the West Amesbury to King Street 115 kV transmission line at West Amesbury, which reduces the loading on the West Amesbury to King Street 115 kV transmission line and resolves the N-1 STE thermal overload.
2. Creating a second 345 kV circuit between Wakefield Junction and Mystic by a) splitting the existing 349XY cables to operate independently, b) constructing a new underground 345 kV line ID#349X-1 between Wakefield Junction and Golden Hills (within the existing utility right-of-way), and c) directly connecting line 349Y to the existing Wakefield Junction to Golden Hills line 349 and directly connecting line 349X to a the Wakefield Junction to Golden Hills line ID#349X-1. The result is two parallel circuits between Wakefield Junction and Mystic, which resolves all identified N-1-1 thermal overloads.
3. A new nominal +/-150 MVAR STATCOM connected at the Tewksbury 345 kV station, meeting the dynamic reactive device requirements identified in the Boston 2028 Needs Assessment Addendum.

Proposal 2 addresses all identified needs in a straightforward, least cost manner. The second circuit between Wakefield Junction and Mystic resolves the N-1-1 overloads with only 2.4 miles of new 345 kV transmission in an existing right-of-way. The series reactor at West Amesbury is a straightforward solution to the N-1 thermal overload at a low cost. The proposed STATCOM provides reactive power to one of the locations identified in the Boston 2028 Needs Assessment Addendum in the most cost effective way. A subsidiary of LS Power was recently selected for two 500 kV STATCOM projects by the California Independent System Operator, one +/-848 MVAR and one +/-529 MVAR.

Siting and permitting of the proposal is feasible within the required timeframe. All of the elements of the project are either within existing utility right-of-way or on property under control of NEEC. The series reactor will be located within available space at the West Amesbury station. The STATCOM will be located on property under control of NEEC. The new transmission line will be located within existing utility right-of-way. All real estate will be acquired prior to the commencement of construction. Permitting/schedule risk is mitigated by the fact that the new line does not meet the definition of a "Facility" that requires approval of the Energy Facility Siting Board, and will be located underground, avoiding new visual impacts. The new transmission line

will not require any major outages of existing lines, and will not create any new common tower contingencies. Permitting of the proposed STATCOM is facilitated by the fact that the property secured for the STATCOM is currently zoned heavy industrial and is adjacent to the existing Tewksbury station.

Assuming ISO-NE selection by June 1, 2021, NEEC estimates obtaining all necessary permits and approvals for construction by May 1, 2022, beginning STATCOM construction by August 1, 2022, beginning transmission line construction by September 2022, with in-service date prior to May 31, 2024. Given the limited nature of the scope of Proposal 2, construction could start as late as March 2023 to meet the required in-service date, providing significant schedule cushion for potential delays.

Proposal 2 has an estimated installed cost of $80 million and an estimated life-cycle cost of $82 million. NEEC is committed to delivering Proposal 2 within the estimated cost and supports this commitment with four elements of cost containment. NEEC proposes a binding cap on installed costs, a binding cap on its return on equity, a binding cap on the equity percentage as part of its capital structure, and a binding cap on its annual revenue requirement for the first 10 full calendar years of operations of the project.

1.14 BOS-027: New England Energy Connection, LLC – NEEC Proposal 3

New England Energy Connection, LLC ("NEEC"), a subsidiary of LS Power Associates, L.P. ("LS Power"), is pleased to provide this proposal to the ISO New England Inc. ("ISO-NE") in response to the Request for Proposal, Reliability Transmission Upgrade, Boston 2028 RFP dated December 20, 2019 ("Boston 2028 RFP").

This NEEC Proposal 3 ("Proposal 3") resolves all needs identified to be resolved in the final Boston 2028 Needs Assessment Update and Boston 2028 Needs Assessment Addendum. Proposal 3 contains three primary elements:

1. A series reactor on the West Amesbury to King Street 115 kV transmission line at West Amesbury, which reduces the loading on the West Amesbury to King Street 115 kV transmission line and resolves the N-1 STE thermal overload.
2. New Phase Angle Regulators ("PARs") on the 345 kV transmission path south of Tewksbury: controlling flow on the Tewksbury-Woburn 345 kV line and the Tewksbury-Wakefield Junction 345 kV line. These PARs will provide for the ability to control the flow onto the Northern 345 kV Cable System, resolving all identified N-1-1 thermal overloads.
3. A new nominal +/-150 MVAR STATCOM connected at the Tewksbury 345 kV station, meeting the dynamic reactive device requirements identified in the Boston 2028 Needs Assessment Addendum.

Proposal 3 provides strong performance and adds controllability and flexibility to system operations in a low-risk manner. The control of the power flow on the lines south of Tewksbury provided by the PARs provides signficiant operational flexibility, and the ability to manage changing system flows likely to occur in the future. The series reactor at West Amesbury is a straightforward solution to the N-1 thermal overload at a low cost. The proposed STATCOM provides reactive power to one of the locations identified in the Boston 2028 Needs Assessment Addendum in the most cost effective way. A subsidiary of LS Power was recently selected for two 500 kV STATCOM projects by the California Independent System Operator, one +/-848 MVAR and one +/-529 MVAR.

Proposal 3 addresses all identified needs without the need for the permitting, routing, and siting of any new linear facilities. All of the real estate required for the PARs and STATCOM is under control of NEEC. This provides a much higher level of feasibility compared to a proposal which requires permitting, routing, and siting of linear facilities. Siting and permitting of the proposal is feasible within the required timeframe. The series reactor will be located within available space at the West Amesbury station. Permitting/schedule risk is mitigated by the fact that the property secured for the STATCOM and PARs is currently zoned heavy industrial and is adjacent to the existing Tewksbury station.

Assuming ISO-NE selection by June 1, 2021, NEEC estimates filing of the local permit applications by October 1, 2021, approval of local permits by June 1, 2022, beginning of construction by August 1, 2022, and in-service date well in advance of May 31, 2024. Given the limited nature of the scope

of Proposal 3, construction could start as late as March 1, 2023 to meet the required in-service date, providing significant schedule cushion for potential delays.

Proposal 3 has an estimated installed cost of $121 million and an estimated life-cycle cost of $135 million. NEEC is committed to delivering Proposal 3 within the estimated cost and supports this commitment with four elements of cost containment. NEEC proposes a binding cap on installed costs, a binding cap on its return on equity, a binding cap on the equity percentage as part of its capital structure, and a binding cap on its annual revenue requirement for the first 10 full calendar years of operations of the project.

1.15 BOS-029: Transource New England, LLC – Proposal 2

Delivering a solution that ISO-NE can be confident is effective, cost competitive, and reliable, Transource New England, LLC ("TNE") offers this Proposal 2 for ISO-NE evaluation. TNE's proposal comprehensively solves the needs identified in the Boston 2028 Needs Assessment and Needs Assessment Addendum.

The proposal combines multiple project elements to deliver a highly effective and reliable solution with minimal impact to the Boston area. The following elements are proposed to solve the ISO's identified needs:

1. The construction of a new 345 kV GIS station referred herein as the "Sunset Station", located directly adjacent to and interconnected to the existing Wakefield Junction Station. The new Sunset Station will include a new +/-200 MVar STATCOM and a 345kV series reactor. Sunset Station also serves as the termination point for several 345 kV lines that currently terminate at the Wakefield Junction station.
2. The addition of a new 345 kV series reactor on the Tewksbury - Woburn 345kV line, located at an expansion of the existing Tewksbury 345kV station.
3. The addition of a new underground 345 kV line between the existing Golden Hills Station and the new Sunset station, effectively creating a new 345kV pathway from Sunset to Wakefield Junction to Mystic station.
4. Required station modifications at four existing stations.
5. The reconductoring of the 115 kV line between "West Amesbury" and "King St" stations.

These proposal elements result in a design that comprehensively solves the identified needs. For instance, the new 345 kV line and station adjustments in items #1, 2, 3, and 4 above provide redundancy that help solve contingency violations and system restoration needs. Item #5 cost-effectively solves the W. Amesbury – King Street 115kV thermal overload violations to meet reliability criteria.

The benefits provided by the above elements have a total estimated installed cost of $267.1 million, including both TNE and incumbent Transmission Owner (TO) work. The project elements that would be owned by TNE have a lifecycle cost of $249.4 million. TNE has designed the proposal to be as cost effective as possible and offers a cost cap mechanism to ensure cost control. TNE proposes a cost cap on its capital costs, currently estimated at $233.3 million. The capital cost cap excludes capital costs that are anticipated to be owned by one or more incumbent utilities, currently estimated at $33.9 million. This capital cost cap is on the initial project capital costs only, is quoted in year 2023 dollars per ISO-NE's stated annual inflation rate of 1.5%, and will be included in the Selected Qualified Transmission Project Sponsor Agreement (SQTPSA), if selected. The final project cost cap, along with specific terms and conditions outlining any exceptions, exclusions and relief events, will be updated in Phase 2 of the competitive project proceeding incorporating further in-depth project diligence and any changes or clarifications communicated by the incumbent utilities or ISO-NE.

TNE has also provided an informed and reasonable project schedule to construct the above elements. This schedule assumes that ISO-NE selects the SQTPS on June 1, 2021, necessary permitting is completed in January 2023, construction begins in April 2023, and all project elements are placed in-service in December 2024.

In addition, the proposal maximizes use of existing ROW to lessen the impact on project area communities. TNE's proposed location for the Sunset Station uses undeveloped and permittable land that is directly proximate to the Wakefield Junction station. An expansion of the Tewksbury 345kV station is feasible to accomodate the new 345kV series reactor on the Tewksbury - Woburn 345kV line. Additionally, TNE's proposed new 345 kV underground line, located within public roadways, is the most direct road route between the interconnecting stations.

TNE is confident that its proposal offers an innovative and compelling solution in which ISO-NE can be confident is both reliable and cost competitive, and comprehensively fulfills the requirements of the Boston 2028 Needs Assessment and Addendum.

1.16 BOS-031: New England Energy Connection, LLC – NEEC Proposal 4

New England Energy Connection, LLC ("NEEC"), a subsidiary of LS Power Associates, L.P. ("LS Power"), is pleased to provide this proposal to the ISO New England Inc. ("ISO-NE") in response to the Request for Proposal, Reliability Transmission Upgrade, Boston 2028 RFP dated December 20, 2019 ("Boston 2028 RFP").

This NEEC Proposal Number 4 ("Proposal 4") resolves all needs identified to be resolved in the final Boston 2028 Needs Assessment Update and Boston 2028 Needs Assessment Addendum. Proposal 4 contains three primary elements:

1. A series reactor on the West Amesbury to King Street 115 kV transmission line at West Amesbury, which reduces the loading on the West Amesbury to King Street 115 kV transmission line and resolves the N-1 STE thermal overload.
2. New Phase Angle Regulators ("PARs") on the 345 kV transmission lines south of Woburn, the Woburn- North Cambridge 345 kV lines These PARs will provide for the ability to control the flow onto facilities which are subject to the N-1-1 thermal overloads, resolving these issues.
3. A new nominal +/-150 MVAR STATCOM connected at the Tewksbury 345 kV station, connected at 345 kV, meeting the dynamic reactive device requirements identified in the Boston 2028 Needs Assessment Addendum.

Proposal 4 provides strong performance and adds controllability and flexibility to system operations in a low-cost manner. Since the proposed PARs directly control flow on the Woburn-North Cambridge cables, it is an effective technical solution. The series reactor at West Amesbury is a straightforward solution to the N-1 thermal overload at a low cost. The proposed STATCOM provides reactive power to one of the locations identified in the Boston 2028 Needs Assessment Addendum in the most cost effective way. A subsidiary of LS Power was recently selected for two 500 kV STATCOM projects by the California Independent System Operator, one +/-848 MVAR and one +/-529 MVAR.

Proposal 4 addresses all identified needs without the need for the permitting, routing, and siting of any new linear facilities. This provides a higher level of feasibility compared to a proposal which requires permitting, routing, and siting of linear facilities. Siting and permitting of the proposal is feasible within the required timeframe. The series reactor will be located within available space at the West Amesbury station. The proposed STATCOM will be located at property secured by NEEC currently zoned heavy industrial and is adjacent to the existing Tewksbury station. The specific location of the PARs has not been secured, but there are several potential sites along the Woburn to North Cambridge 345 kV lines that would be suitable.

Assuming ISO-NE selection by June 1, 2021, NEEC estimates filing of the local permit applications for the STATCOM by October 1, 2021, applying for local permit applications for the PARs by May 1, 2022, approval of local permits by December 1, 2022 beginning of construction by January 1, 2022, and in-service date prior to May 31, 2024. Given the limited nature of the scope of Proposal 4, construction could start as late as March 1, 2023 to meet the required in-service date, providing schedule cushion for potential delays.

Proposal 4 has an estimated installed cost of $98 million and an estimated life-cycle cost of $99 million. NEEC is committed to delivering Proposal 4 within the estimated cost and supports this commitment with four elements of cost containment. NEEC proposes a binding cap on installed costs, a binding cap on its return on equity, a binding cap on the equity percentage as part of its capital structure, and a binding cap on its annual revenue requirement for the first 10 full calendar years of operations of the project.

1.17 BOS-033: New England Power Company – Boston Grid Expansion - National Grid

INTRODUCTION

The New England Power Company dba National Grid (National Grid), as a Qualified Transmission Project Sponsor (QTPS), submits the **Boston Grid Expansion** (referred to hereafter as BGE or the Proposal) in response to the Request for Proposal: Reliability Transmission Upgrade: Boston 2028 RFP, issued by the Independent System Operator-New England (ISO-NE). The Proposal consists entirely of components that will be contained within existing National Grid or NSTAR Electric Company dba Eversource Energy (Eversource) properties in northeastern Massachusetts. BGE addresses all the identified needs in the Boston study area, providing a cost-effective and efficient solution that will be delivered following ISO-NE's schedule requirements for maintaining the reliability of the New England electric grid after the planned retirement of the Mystic Generating Station. For the Proposal, National Grid has already deployed a multi-disciplinary team of personnel experienced in successfully designing, developing, and completing similar projects in Massachusetts. National Grid has partnered with Eversource, also a QTPS, on this Proposal, thereby assuring coordination throughout the planning, design, scheduling, construction, and operation of the Proposal elements.

PROPOSAL ELEMENTS AND BOSTON STUDY AREA NEEDS RESOLUTION

BGE creates a new connection for power flow into the Greater Boston area, which not only neatly resolves the needs listed in the RFP, but also provides a new independent transmission path into the area. This new overhead line extension addresses all the thermal overloads that are outlined in the RFP, and by eliminating the contingency of both 349 X&Y cables tripping simultaneously, the solution also reduces local 115 kV line loadings post contingency for several transmission outage conditions and will benefit Transmission Operations immensely. BGE offers an opportunity to extend the high voltage network into Boston in a way that offers additional capacity, redundancy, and resiliency to the high voltage system.

Second 345 kV Path, Mystic Substation to Golden Hills Substation 349X Overhead Line Extension

Create a second independent 345 kV path from Eversource's Mystic Substation through National Grid's Golden Hills Substation to National Grid's Wakefield Junction Substation by:

- Separating the existing 349X and 349Y underground cables into two independent circuits at both Mystic Substation and Golden Hills Substation.
- Connecting the existing 349Y Line cable at Golden Hills Substation to the existing overhead 345 kV transmission line to Wakefield Junction Substation (hereafter referred to as the 349 Line); and
- Extending the 349X circuit by constructing a new 2.5-mile 345 kV overhead line segment (referred to herein as the 349X Overhead Line Extension) within existing ROW from GoldenHills Substation to Wakefield Junction Substation and connecting this 349X Overhead Line Extension to the 349X Line cable at Golden Hills Substation. The existing Q-169 and F-

158N 115 kV lines will be reconfigured for a distance of 1.4 miles each to create space within the existing ROW to accommodate the 349X Overhead Line Extension.

The details of the 345 kV Line, 115 kV Line, and Existing Substation work elements required to create this second independent 345 kV path from Mystic Substation through Golden Hills Substation to Wakefield Junction Substation are described in Sections 4.7, 4.9 and 4.14 of this Proposal, respectively.

Reconductor K-163 115 kV Line

Reconductor the existing 115 kV K-163 Line between the West Amesbury Substation and the King Street Substation, a distance of approximately 7.2 miles. The existing conductors on the line will be replaced to increase the rating of the transmission line. No structure replacements will be required, and all work will be within the existing ROW. The 115 kV Line work required for the K-163 Line Reconductoring is described in Section 4.9 of this Proposal.

Install STATCOM at Tewksbury 22A Substation

Install a new 345 kV, ±167 MVAr Static Synchronous Compensator (STATCOM), capable of injecting at least ± 150MVAr at all operating conditions specified in the RFP, at Tewksbury 22A Substation, as described in Section 4.18 of this Proposal. The controls for the STATCOM will hold the voltage of the Tewksbury 345 kV bus at 1.028 p.u.

Resolution of Boston Study Area Needs

- **Need 1**: N-1 STE thermal overload on 115 kV K-163 line between West Amesbury and King Street substations. ***Resolution:***Reconductor K-163 Line. This will increase the STE rating on the line by 23% and eliminate the overload for the no-fault contingency at Ward Hill Substation.
- **Need 2**: N-1-1 LTE thermal overloads on 345 kV 346 and 365 cables between Woburn and North Cambridge substations and 345 kV 358 cable between North Cambridge and Mystic substations. ***Resolution:*** The 349 Line X&Y cable separation and 349X Overhead Line Extension will provide two independent 345 kV circuits between Wakefield Junction and Mystic substations, thus eliminating the existing contingency of both 349 X&Y cables at the same time. The worst-case loading on the 346 cable or 365 cable is reduced to 92% for the worst-case contingency pair. The worst-case loading on the 358 cable will be reduced to 87% for the worst-case contingency pair.
- **Need 3**: A dynamic reactive device required to maintain the ability to restore the Boston area transmission system. ***Resolution:*** Add a STATCOM at Tewksbury 22A 345 kV Substation on existing property owned by National Grid at the substation site.

LAND, PERMITTING, AND CONSTRUCTION REQUIREMENTS

National Grid and Eversource have all necessary property and land rights in place to construct, maintain, and operate the BGE. The modifications to the substations will be within the companies' fee-owned property. Similarly, the proposed transmission line work will be performed within National Grid's existing ROWs, where all rights for such transmission lines are in place.

The project team has extensive experience in successfully navigating federal, state, and local permitting processes and thus has a full understanding of the permits that will be required for this Proposal, and the realistic time frames for obtaining them. The Proposal team has analyzed the permitting requirements for all components of the BGE and determined that the requirements are straightforward, and the permits required are those which are routinely obtained by National Grid for transmission line and substation projects throughout Massachusetts. The proposed 2.5-mile 349X Overhead Line Extension, which will be contained entirely on National Grid's existing ROW, will require Section 72 approval from the Massachusetts Department of Public Utilities, but not a more extensive review by the state Energy Facilities Siting Board (EFSB). The permitting requirements are more fully discussed in Section 7.2 of this Proposal.

Similarly, the National Grid team has optimized the Proposal by performing construction sequence planning, outage planning, detailed access and work area planning, and by aligning project designs to be consistent with permitting criteria. The constructability of the Proposal has been confirmed by soliciting the input of and performing field reviews with numerous potential construction service providers.

PROPOSAL SCHEDULE

The BGE will be placed into service well before the Mystic Generation Station retirements. National Grid has adopted a pro-active approach to assure that this schedule is achieved. For each of the Proposal elements, National Grid already has progressed preliminary engineering and design, compiled baseline environmental data, and validated potential schedule constraints and limitations related to engineering, permitting, real estate, procurement, community relations, construction, outage coordination, testing, and commissioning. The schedule fully incorporates the results of these detailed analyses and reflects schedule risk mitigation measures. Key elements of the schedule include:

- Engineering Complete: July 1, 2021
- Permitting Complete: June 30, 2022
- Construction Start: February 11, 2022
- Construction Complete: November 30, 2023
- **BGE In-service Date (all elements): December 31, 2023**
- BGE Completion: February 16, 2024

The schedule assumes ISO-NE RFP award on August 11, 2021. All Proposal elements are on National Grid and Eversource properties with no real estate procurement required. Engineering will be completed, permit applications submitted, and procurement activities initiated in advance of ISO-NE RFP award. The dates listed above refer to the overall BGE schedule; refer to Section 7.5 of this Proposal for schedule details, by BGE component.

INSTALLED COST AND LIFE-CYCLE COST

The installed cost estimate for this Proposal is $102,845,738, and the life-cycle cost estimate is $154,977,746.

COST CONTAINMENT

National Grid is offering a cost containment mechanism whereby return on equity (ROE) will be reduced if actual costs exceed a specified level for this Proposal. The specific details of the proposed cost containment mechanism are described in Section 8.1 of this Proposal.

PROPOSAL TEAM QUALIFICATIONS

The specific team for this Proposal has been assembled from the extensive experienced in-house staff of National Grid and Eversource, augmented by industry leaders Siemens, Burns & McDonnell, BSC Group, and The Public Archaeology Laboratory, Inc. This 40-plus person team brings to this Proposal comprehensive experience in designing, siting, permitting, constructing, operating, and maintaining a wide variety of transmission projects in New England. The Team Qualifications are more fully described in Section 3.1 of this Proposal.

MANAGEMENT EXPERTISE AND FINANCIAL RESOURCES

National Grid has a proven record of successfully financing, building, operating, and maintaining transmission facilities throughout New England. For this Proposal, National Grid will bring to bear its financial resources and its well-established Project Management processes and procedures, which have recently been applied to successfully complete similar transmission line and substation projects on-time, within budget, and in compliance with regulatory approvals. Most National Grid project managers are certified Project Management Professionals, and many hold other professional licenses and certifications, including Professional Engineer licenses and Certified Utility Safety Professional credentials. As part of a larger project delivery organization, National Grid's project managers can draw support from hundreds of experienced professionals across various functions, including project controls, resource planning, construction planning, construction, contract management, and stakeholder management. This integrated approach to project delivery produces projects with successful schedule, cost, scope, and quality outcomes. National Grid has a strong and proven track record for successful delivery of large and complex electric transmission projects in New England, including the New England East-West Solutions (NEEWS) project, the Salem Cable Rebuild project, and the Merrimack Valley Reliability Project (MVRP). Notably, National Grid and Eversource worked collaboratively to deliver the NEEWS Interstate Reliability Project, a new 75-mile 345 kV transmission line traversing Massachusetts, Rhode Island and Connecticut that went into service in 2015 on schedule and within budget, and the MVRP, a new 345 kV transmission line between New Hampshire and Massachusetts that went into service in 2017 on schedule and within budget. As a result of these experiences, the National Grid team is acutely aware of the factors, such as permitting timelines, that can most affect a project's cost and schedule and – based on that experience – the team has the full knowledge to manage the Proposal pro-actively to avoid such issues.

1.18 BOS-035: New Hampshire Transmission, LLC – New Hampshire Transmission, LLC-Proposal 3

New Hampshire Transmission, LLC (NHT), a subsidiary of NextEra Energy Transmission, LLC (NEET), proposes to construct, own, and operate the SeaLink Project (SeaLink or the Project), a 68 mile, 720 megawatt (MW) undersea/underground transmission cable system. SeaLink will utilize High Voltage Direct Current (HVDC) technology to efficiently transmit power in either direction across the key Boston Import and North-South New England interfaces and directly connect two major substations by way of a new corridor. The SeaLink Project's core elements set forth in this proposal are two Voltage Source Converter (VSC) Stations and a submarine HVDC cable electrically connecting the 345 kilovolt (kV) transmission systems at NHT's Seabrook Switchyard in Seabrook, NH with the 345kV Mystic Substation in Everett, MA. The Project is very similar to the version of SeaLink that NHT previously proposed between 2012-2015. The undersea route remains the same heavily-studied, proven route, while the terrestrial segments at the northern and southern end of the proposed project were improved.

SeaLink is in an advanced stage of development and ready to proceed rapidly to mitigate the reliability needs identified in the Boston 2028 Needs Assessment (the Assessment). Due to the Project's advanced development stage, SeaLink provides significantly reduced siting and permitting risk as well as schedule certainty, in addition to superior electrical performance at a competitive life-cycle cost. SeaLink's HVDC cable will be entirely buried and most of the converter station equipment will be inside of buildings and/or behind vegetation to obstruct public view. SeaLink also utilizes a new transmission corridor and does not have the impact on adjacent existing lines that competing AC solutions may cause. In addition, the Project mitigates a variety of risks from weather, generator retirements, permitting delays, and cost overruns.

SeaLink creates a new, hardened corridor to move power that will be much less susceptible to weather extremes compared to overhead AC lines. Weather events in New England are expected to increase in severity and frequency in the coming decades. SeaLink's hardened underground infrastructure is less susceptible to hurricanes, nor'easters, and ice storms compared to overhead lines. That resiliency increases reliability and reduces costs. These advantages will only increase over time as stronger and more frequent storms inflict more damage and impose more ratepayer-borne repair costs on overhead lines.

Recent ISO-NE reliability planning has also focused on physical separation of transmission elements so that failure of one element from severe weather or other causes does not adversely affect other elements or overall system reliability. SeaLink offers an advantage compared to new projects in existing right-of-ways (ROWs) by creating a new, underground, geographically distinct transmission corridor. Competing AC solutions may propose using crowded, existing transmission corridors that already include redundant critical lines susceptible to a single failure. Putting more critical assets in the same space can reduce overall system security and could increase the likelihood that future, costly reliability projects will need to be undertaken to separate the lines.

SeaLink's diversification of the transmission system in a new corridor using climate-change resilient underground or undersea elements is an inherent and unique benefit of the Project that should be considered by ISO-NE when comparing the costs and reliability attributes of competing projects.

Installed and Life-Cycle Cost Estimates

SeaLink's total installed cost estimate in nominal dollars is $648.6 million, and the estimated life-cycle cost in 2023 is $634.9 million. The proposal contains detailed power flow work NHT included in its RFP solicitation documents to leading HVDC vendors to assist them with their cost estimates, which in turn allowed NHT to provide a more accurate cost estimate for SeaLink. Moreover, buried HVDC lines require fewer ongoing operation and maintenance expenses than an equivalent AC system, and SeaLink traverses 15 miles of federal waters which reduces property taxes.

Cost Containment

NHT proposes cost containment in the form of multiple firm cost caps, including for installed cost, annual revenue requirements, O&M, maximum equity thickness, and maximum return on equity. In addition, NHT proposes an economic penalty for missing the need date of June 1, 2024, which ultimately helps to mitigate costs for ISO-NE customers.

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Technical Design

In response to the identified Boston area needs, NHT is proposing to construct the Project, a VSC-based HVDC solution that will deliver 720MW into the Mystic 345kV substation. The Project is comprised of the following:

- Expand the existing Seabrook 345kV yard to accommodate one new 345kV cable;
- Construct two +/-320kV VSC-HVDC converter stations, one adjacent to Seabrook 345kV substation, and another at a greenfield site located at 20 Bennett Hwy in Revere, MA, with the ability to deliver 720MW to the Mystic substation;
- Construct approximately 3000' of 345kV AC line between Seabrook 345kV substation and proposed Seabrook converter station;
- Construct approximately 5.5 miles of 320kV underground DC cable between the Seabrook DC converter and underground (UG)-underwater (UW) transition point in Salisbury, MA;
- Construct approximately 50 miles of 320kV underwater DC cable;
- Construct approximately 5 miles of 320kV underground DC cable between UW-UG transition point (Lynn, MA landing site) and proposed converter station in Revere, MA;
- Construct approximately 6 miles of underground 345kV AC cable between proposed Revere, MA converter station to the existing Mystic 345kV station; and
- Replace existing Mystic Unit Seven connection with proposed 345kV cable between Bennett converter and Mystic station.

Real Estate

SeaLink's real estate land control is in a mature stage. NHT and its affiliates have secured the privately-owned real estate rights required for SeaLink to ensure cost and schedule certainty. The

land required for both of SeaLink's converter stations (Seabrook, NH & Revere, MA) is subject to land control option agreements with NHT affiliates.

SeaLink's terrestrial portion of the line in the Greater Boston area will primarily utilize ROW owned by the Massachusetts Bay Transportation Authority (MBTA) from Lynn to Everett, for which NHT has a long term ROW agreement in place. Eleven percent of the remaining required ROW are owned by public entities such as MassDOT, and, therefore, will be obtained through a permit process in 2021.

Reliability Needs

NHT tested SeaLink with extensive power flow modeling using ISO-NE study models and assumptions and confirmed that SeaLink solves the reliability criteria violations ISO-NE identified in the Assessment. In addition, SeaLink exceeds the identified dynamic reactive requirements for system restoration identified by ISO-NE in the Boston 2028 Needs Assessment Addendum.

SeaLink includes dynamic reactive support for system restoration, while providing additional operational advantages. The thermal overloads identified on Woburn to N. Cambridge 345kV, N. Cambridge to Mystic 345kV, and West Amesbury to King Street 115kV are reduced to approximately 74%, LTE, 75% LTE, and 81% STE, respectively, respectively, without post secondary PAR optimization. The inherent capabilities of VSC-HVDC technology enables SeaLink to provide up to +/- 360MVAr of dynamic reactive power at Mystic 345kV station to address the dynamic reactive capability requirements for ISO-NE's System Restoration Plan.

HVDC technology is well proven, and has been deployed successfully in numerous locations. An important example is the Trans Bay Cable, which also employs VSC-HVDC technology and is owned and operated by an NHT affiliate. The NHT team will bring the engineering and operational expertise gained from its Trans Bay Cable experience to the Project.

SeaLink also delivers operational benefits which AC solutions cannot. For example, HVDC technology allows for quick ramping of power and independent control of active and reactive power, which in turn enhances grid stability. VSC links, such as proposed by the project, can also be utilized during black start events to supply power and act to stabilize the grid as generation and load are added to the system. Additionally, the complete system is less vulnerable than overhead AC to extreme weather events.

Community and Environmental Impact

By its design, the underwater cable used by SeaLink minimizes the impact on communities and the environment during construction, while providing a valuable transmission resource for the Commonwealth and ISO-NE region during operation. SeaLink consulted closely with applicable state and federal agencies in selecting its undersea route. The results of our completed marine studies confirmed the entire line can be safely buried beneath the ocean floor, thereby minimizing interference with fishing and shipping. The only above-ground structures will be two converter stations designed to blend into the unique characteristics of the surrounding communities near each end of the route. Otherwise, there will be no overhead lines that would negatively introduce additional visual impact and recurring vegetation management.

SeaLink's preferred onshore underground route via a new transmission corridor will create or enhance 11-miles of highly desirable, new bicycle paths in New Hampshire and Massachusetts. NHT is proposing to make these added bicycle path improvements without seeking regional cost recovery for its investment. The chosen route expands upon a network of recreation trails in the north shore communities created from former rail lines. This infrastructure investment goes well beyond the basic needs of utility service to enhance the economic vitality and quality of life in the local communities that host the project.

1.19 BOS-037: New England Energy Connection, LLC – NEEC Proposal 5

New England Energy Connection, LLC ("NEEC"), a subsidiary of LS Power Associates, L.P. ("LS Power"), is pleased to provide this proposal to the ISO New England Inc. ("ISO-NE") in response to the Request for Proposal, Reliability Transmission Upgrade, Boston 2028 RFP dated December 20, 2019 ("Boston 2028 RFP").

Proposal 5 resolves all needs identified to be resolved in the final Boston 2028 Needs Assessment Update and Boston 2028 Needs Assessment Addendum. Proposal 5 contains three primary elements:

1. A series reactor on the West Amesbury to King Street 115 kV transmission line at West Amesbury, which reduces the loading on the West Amesbury to King Street 115 kV transmission line and resolves the N-1 STE thermal overload.
2. Creating a second 345 kV circuit between Wakefield Junction and Mystic by a) splitting the existing 349XY cables to operate independently, b) constructing a new underground 345 kV line ID#349X-1 between Wakefield Junction and Golden Hills (within the existing utility right-of-way), and c) directly connecting line 349Y to the existing Wakefield Junction to Golden Hills line 349 and directly connecting line 349X to a the Wakefield Junction to Golden Hills line ID#349X-1. The result is two parallel circuits between Wakefield Junction and Mystic, which resolves all identified N-1-1 thermal overloads.
3. Two new nominal +/- 75 MVAR synchronous condensers connected at the Tewksbury 345 kV station, meeting the dynamic reactive device requirements identified in the Boston 2028 Needs Assessment Addendum.

Proposal 5 addresses all identified needs in a straightforward, low cost manner. The second circuit between Wakefield Junction and Mystic resolves the N-1-1 overloads with only 2.4 miles of new 345 kV transmission in an existing right-of-way. The series reactor at West Amesbury is a straightforward solution to the N-1 thermal overload at a low cost. The proposed synchronous condensers provides reactive power to one of the locations identified in the Boston 2028 Needs Assessment Addendum with signficiant additional technical benefits beyond the minimum stated reactive requirement. When inductive capability is most valuable to the system, at high voltage (1.05 p.u.), the synchronous condensers will be able to absorb 183 MVAR. At low voltage (0.90 p.u.), the synchronous condensers will be able to provide 154 MVAR. The proposed synchronous condensers provide significant other system benefits including increased system inertia and short circuit strength. A long-term need for additional system inertia has been forecast, and installing a synchronous condenser in the near term provides long-term cost savings relative to installing a STATCOM today, and also a synchronous condenser in the future. The short circuit contribution of the synchronous condenser is very valuable to the system, particularly during higher transients possible during system restoration.

Siting and permitting of the proposal is feasible within the required timeframe. All of the elements of the project are either within existing utility right-of-way or on property under control of NEEC. The series reactor will be located within available space at the West Amesbury station. The synchronous condenser will be located on property under control of NEEC. The new transmission

line will be located within existing utility right-of-way. All real estate will be acquired prior to the commencement of construction. Permitting/schedule risk is mitigated by the fact that the new transmission line does not meet the definition of a "Facility" that requires approval of the Energy Facility Siting Board, and will be located underground, avoiding new visual impacts. The new transmission line will not require any major outages of existing lines, and will not create any new common tower contingencies. Permitting of the proposed synchronous condenser is facilitated by the fact that the property secured for the synchronous condenser is currently zoned heavy industrial and is adjacent to the existing Tewksbury station.

Assuming ISO-NE selection by June 1, 2021, NEEC estimates obtaining all necessary permits and approvals for construction by May 1, 2022, beginning synchronous condenser construction by August 1, 2022, beginning transmission line construction by September 2022, with in-service date prior to May 31, 2024. Given the limited nature of the scope of Proposal 5, construction could start as late as December 1, 2022 to meet the required in-service date, providing significant schedule cushion for potential delays.

Proposal 5 has an estimated installed cost of $100 million and an estimated life-cycle cost of $103 million. NEEC is committed to delivering Proposal 5 within the estimated cost and supports this commitment with four elements of cost containment. NEEC proposes a binding cap on installed costs, a binding cap on its return on equity, a binding cap on the equity percentage as part of its capital structure, and a binding cap on its annual revenue requirement for the first 10 full calendar years of operations of the project.

1.20 BOS-039: New England Power Company – Boston Network Reliability Project - National Grid

INTRODUCTION

The New England Power Company dba National Grid (National Grid), as a Qualified Transmission Project Sponsor (QTPS), submits the **Boston Network Reliability Project** (referred to herein as the Proposal or BNRP) in response to the Request for Proposal: Reliability Transmission Upgrade: Boston 2028 RFP, issued by the Independent System Operator-New England (ISO-NE). The Proposal consists entirely of components that will be within existing National Grid or Eversource properties in northeastern Massachusetts. BNRP addresses all the identified needs in the Boston study area, providing a cost-effective and efficient solution that will be delivered following ISO-NE's schedule requirements for maintaining the reliability of the New England electric grid after the planned retirement of the Mystic Generating Station. For the Proposal, National Grid has already deployed a multi-disciplinary team of personnel experienced in successfully designing, permitting, developing, and constructing similar projects in Massachusetts. National Grid has partnered with Eversource, also a QTPS, on this Proposal, thereby assuring coordination throughout the planning, design, scheduling, construction, and operation of the Proposal elements.

PROPOSAL ELEMENTS AND BOSTON STUDY AREA NEEDS RESOLUTION

BNRP creates a new connection for power flow into the Greater Boston area, which not only neatly resolves the needs listed in the RFP, but besides provides a new independent transmission path into the area. This new overhead line extension addresses all the thermal overloads that are outlined in the RFP, and by eliminating the contingency of both 349 X&Y cables tripping simultaneously, the solution also reduces local 115 kV line loadings post contingency for several transmission outage conditions and will benefit Transmission Operations immensely. BNRP offers an opportunity to extend the high voltage network into Boston in a way that offers additional capacity, redundancy and resiliency to the high voltage system.

Second 345 kV Path, Mystic Substation to Golden Hills Substation 349X Overhead Line Extension

Create a second independent 345 kV path from Eversource's Mystic Substation through National Grid's Golden Hills Substation to National Grid's Wakefield Junction Substation by:

- Separating the existing 349X and 349Y underground cables into two independent circuits at both Mystic Substation and Golden Hills Substation;
- Connecting the existing 349Y Line cable at Golden Hills Substation to the existing overhead 345 kV transmission line to Wakefield Junction Substation (hereafter referred to in its entirety as the 349 Line); and
- Extending the 349X circuit by constructing a new 2.5-mile 345 kV overhead line segment (referred to herein as the 349X Overhead Line Extension) within existing ROW from Golden Hills Substation to Wakefield Junction Substation and connecting this 349X Overhead Line Extension to the 349X Line cable at Golden Hills Substation (hereafter referred to in its entirety as 349X). The existing Q-169 and F-158N 115 kV lines will be reconfigured for a distance of 1.4

miles each to create space within the existing ROW to accommodate the 349X Overhead Line Extension.

The details of the 345 kV Line, 115 kV Line, and existing substation work elements required to create this second independent 345 kV path from Mystic Substation through Golden Hills Substation to Wakefield Junction Substation are described in Sections 4.7, 4.9 and 4.14 of this Proposal, respectively.

Reconductor K-163 115 kV Line

Reconductor the existing 115 kV K-163 Line between the West Amesbury Substation and the King Street Substation, a distance of approximately 7.2 miles. The existing conductors on the line will be replaced to increase the rating of the transmission line. No structure replacements will be required, and all work will be within the existing ROW. The 115 kV Line work required for the K-163 Line Reconductoring is described in Section 4.9 of this Proposal.

Install Synchronous Condenser at Tewksbury 22A Substation

Add a 267 MVA, +/-190 MVAr synchronous condenser at the Tewksbury 22A 345 kV Substation, capable of injecting at least ±150 MVAr at all operating conditions specified in the RFP, as described in Section 4.18 of this Proposal.

Resolution of Boston Study Area Needs

- Need 1: N-1 STE thermal overload on 115 kV K-163 line between West Amesbury and King Street substations. ***Resolution:*** Reconductor K-163 Line. This will increase the STE rating on the line by 23% and eliminate the overload for the no-fault contingency at Ward Hill Substation.
- Need 2: N-1-1 LTE thermal overloads on 345 kV 346 and 365 cables between Woburn and North Cambridge stations and 345 kV 358 cable between North Cambridge and Mystic substations. ***Resolution:*** The 349 Line X&Y cable separation and 349X Overhead Line Extension will provide two independent 345 kV circuits between Wakefield Junction and Mystic substations, thus eliminating the existing contingency of both 349 X&Y cables at the same time. The worst-case loading on the 346 cable or 365 cable will be reduced to 92% for the worst-case contingency pair. The worst-case loading on the 358 cable will be reduced to 87% for the worst-case contingency pair.
- Need 3: A dynamic reactive device required to maintain the ability to restore the Boston area transmission system. ***Resolution:*** Add a synchronous condenser at Tewksbury 22A 345 kV Substation on existing property owned by National Grid at the substation site.

LAND, PERMITTING, AND CONSTRUCTION REQUIREMENTS

National Grid and Eversource have all necessary property and land rights in place to construct, maintain, and operate this Proposal. The modifications to the substations will be within the companies' fee-owned property. Similarly, the proposed transmission line work will be performed within National Grid's existing ROWs, where all rights for such transmission lines are in place.

The project team has extensive experience in successfully navigating federal, state, and local permitting processes and thus has a full understanding of the permits that will be required for the BRNP, and the realistic time frames for obtaining them. The project team has analyzed the permitting requirements for all BNRP components and determined that the requirements are straightforward, and the permits required are those which are routinely obtained by National Grid for transmission line and substation projects throughout Massachusetts. The proposed 2.5-mile 349X Overhead Line Extension, which will be contained entirely on National Grid's existing ROW, will require Section 72 approval from the Massachusetts Department of Public Utilities, but not a more extensive review by the state Energy Facilities Siting Board (EFSB) as is required for some transmission line projects. The permitting requirements are more fully discussed in Section 7.2 of this Proposal.

Similarly, the National Grid team has optimized the Proposal elements by performing construction sequence planning, outage planning, detailed access and work area planning, and by designing the components to be consistent with permitting criteria. The constructability of the Proposal has been confirmed by soliciting the input of and conducting field reviews with numerous potential construction service providers.

PROPOSAL SCHEDULE

The BNRP will be placed into service well before the Mystic Generation Station retirements. National Grid has adopted a pro-active approach to assure that this schedule is achieved. For each of the Proposal elements, National Grid already has progressed preliminary engineering and design, compiled baseline environmental data, and validated potential schedule constraints and limitations related to engineering, permitting, real estate, procurement, community relations, construction, outage coordination, testing, and commissioning. The Proposal schedule fully incorporates the results of these detailed analyses and reflects schedule risk mitigation measures. Key elements of the schedule include:

- Engineering Complete: July 1, 2021
- Permitting Complete: June 30,2022
- Construction Start: March 4, 2022
- Construction Complete: November 30, 2023
- **BNRP In-service Date (all elements): December 31, 2023**
- BNRP Completion: February 16, 2024

The schedule assumes ISO-NE RFP award on August 11, 2021. All Proposal elements are on National Grid and Eversource properties, with no real estate procurement required. Engineering will be completed, permit applications submitted, and procurement activities initiated in advance of ISO-NE RFP award. The dates listed above refer to the overall BNRP schedule; refer to Section 7.5 of this Proposal for schedule details, by BNRP component.

INSTALLED COST AND LIFE-CYCLE COST

The installed cost estimate for this Proposal is $120,781,937, and the life-cycle cost estimate is $183,453,989.

COST CONTAINMENT

National Grid is offering a cost containment mechanism whereby return on equity (ROE) will be reduced if actual costs exceed a specified level for this Proposal. The specific details of the proposed cost containment mechanism are described in Section 8.1 of this Proposal.

PROPOSAL TEAM QUALIFICATIONS

The specific team for this Proposal has been assembled from the extensive experienced in-house staff of National Grid and Eversource, augmented by industry leaders Siemens, Burns & McDonnell, BSC Group, and The Public Archaeology Laboratory, Inc. This 40-plus person team brings to the Proposal comprehensive experience in designing, siting, permitting, constructing, operating, and maintaining a wide variety of transmission projects in New England. The Team Qualifications are more fully described in Section 3.1 of this Proposal.

MANAGEMENT CAPABILITIES AND FINANCIAL RESOURCES

National Grid has a proven record of successfully financing, building, operating, and maintaining transmission facilities throughout New England. For this Proposal, National Grid will bring to bear its financial resources and its well-established Project Management processes and procedures, which have recently been applied to successfully complete similar transmission line and substation projects on-time, within budget, and in compliance with regulatory approvals. Most National Grid project managers are certified Project Management Professionals, and many hold other professional licenses and certifications, including Professional Engineer licenses and Certified Utility Safety Professional credentials. As part of a larger project delivery organization, National Grid's project managers can draw support from hundreds of experienced professionals across various functions, including project controls, resource planning, construction planning, construction, contract management, and stakeholder management. This integrated approach to project delivery produces projects with successful schedule, cost, scope, and quality outcomes. National Grid has a strong and proven track record for successful delivery of large and complex electric transmission projects in New England, including the New England East-West Solutions (NEEWS) project, the Salem Cable Rebuild project, and the Merrimack Valley Reliability Project (MVRP). Notably, National Grid and Eversource worked collaboratively to deliver the NEEWS Interstate Reliability Project, a new 75-mile 345 kV transmission line traversing Massachusetts, Rhode Island and Connecticut that went into service in 2015 on schedule and within budget, and the MVRP, a new 345 kV transmission line between New Hampshire and Massachusetts that went into service in 2017 on schedule and within budget. As a result of these experiences, the National Grid team is acutely aware of the factors, such as permitting timelines, that can most affect a project's cost and schedule and – based on that experience – the team has the full knowledge to manage the project pro-actively to avoid such issues.

1.21 BOS-041: New Hampshire Transmission, LLC – Proposal 15

New Hampshire Transmission, LLC (NHT), a subsidiary of NextEra Energy Transmission, LLC (NEET), proposes to construct, own, and operate a portion of a new 345 kilovott (kV) underground (UG) line from the Wakefield Junction 345kV Substation to the Mystic 345kV Substation. The entire project is referred to herein as the Wakefield-Mystic AC Solution or the Project. The Project includes 12-miles of 345kV UG line extending from the Hidden Valley Substation to the Mystic 345kV Substation. The proposed 12-miles of UG route will be located in state and local road right-of-ways (ROWs), and the Massachusetts Bay Transportation Authority's (MBTA) ROW.

The Project will include a new 175MVAr STATCOM located within the Tewksbury Substation. The Project also includes upgrading the existing West Amesbury – King Street 115kV line (K163 Line) to address the identified 115kV overload on this circuit. Upgrades to the K163 Line, the new STATCOM, and modifications to the existing Wakefield Junction and Mystic 345kV Substations to accommodate the new 345kV OH/UG line extending from the Wakefield Junction Substation, in aggregate, are considered incumbent upgrades. The Project satisfies all of the reliability needs identified in the Boston 2028 Needs Assessment (Assessment), including dynamic reactive support for system restoration.

The Project is a viable alternative solution to NHT's preferred SeaLink Project. It mitigates all of the identified needs in the Boston 2028 Needs Assessment and offers the dynamic reactive power requirements to satisfy the ISO-NE System Restoration Plan requirements. The Project will have minimal impact on the community and environment due to its UG line design, and location of the STATCOM being adjacent to an existing substation.

Installed and Life-Cycle Cost Estimates

The Project's installed cost estimate in nominal dollars is $219.1 million, and the estimated life-cycle cost in 2023 is $197.5 million. NHT understands ISO-NE will obtain costs associated with the Incumbent Upgrades directly from the incumbent owner of those facilities which will serve to validate NHT's estimate, or will serve to replace this portion of NHT's total estimated installed cost. NHT used the latest cost estimate data from leading AC vendors and extensive internal transmission experience, including lessons learned from other NextEra subsidiaries. This process allowed NHT to develop an accurate cost estimate for the Project while significantly reducing uncertainty around that estimate.

Cost Containment

NHT proposes cost containment in the form of multiple firm cost caps, including for installed cost, annual revenue requirements, O&M, maximum equity thickness, and maximum return on equity. In addition, NHT proposes an economic penalty for missing the need date of June 1, 2024, which ultimately helps to mitigate costs for ISO-NE customers.

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Technical Design

In response to identified Boston area needs, NHT proposes the Project, creating a parallel AC path to the existing Wakefield Junction – Mystic 345kV line (LN 349, LN349X, and LN349Y), incorporation of a new PAR and STATCOM, and an upgrade of the existing 115kV K163 Line. The new and upgraded facilities comprising the Project mitigates all identified Boston 2028 reliability needs including all 345kV and 115kV overloads, and provides the required reactive power needs to support the ISO-NE's System Restoration Plan. The proposed project scope includes the following:

- one new 345kV line totaling approximately 12.0 miles
- reconductoring of a 115kV line for approximately 7.3 miles
- expansion of an existing 345kV station to accommodate a STATCOM
- addition of two new 345kV breakers to existing bays
- one new +/- 175MVAr STATCOM

Routing of Line

NHT reviewed the existing right-of-way (ROW) between Wakefield Junction and the Mystic Substation. Ultimately, NHT determined its strategy was to build an UG line following mostly existing state and city streets and the Massachusetts Bay Transportation Authority's (MBTA) bike trail.

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Community and Environmental Impact

The Project minimizes impact on communities and the environment during construction and creates a valuable resource for the communities during operation. The MBTA ROW 345kV segment of this Project will be underneath a bike path which results in significantly less impact on host communities. Post-construction, the Project will have no visual impact on local residents.

The Project's route enhances six (6) miles of highly desirable bikeway on an existing MBTA easement. This infrastructure investment goes well beyond the basic needs of utility service to enhance the economic vitality and quality of life in the local communities that host the project.

1.22 BOS-043: New Hampshire Transmission, LLC – Proposal 9

New Hampshire Transmission, LLC (NHT), a subsidiary of NextEra Energy Transmission, LLC (NEET), proposes to construct, own, and operate a portion of a new 345 kilovott (kV) overhead (OH) and underground (UG) line from the Wakefield Junction 345kV Substation to the Mystic 345kV Substation and the new Hidden Valley 345kV Air Insulated Substation (AIS) with a Phase Angle Regulator (PAR). The entire project is referred to herein as the Wakefield Jct-Hidden Valley-Mystic AC Solution or the Project. The Project includes 11-miles of 345kV OH and UG line extending from the Wakefield Junction Substation to the Mystic 345kV Substation. The proposed five (5) miles of incumbent OH will be located in an incumbent right-of-way (ROW) and the remaining six (6) miles of UG route will be owned by NHT and located in the Massachusetts Bay Transportation Authority's (MBTA) ROW. The new Hidden Valley Substation is proposed to be located 0.1-miles east of the existing Wakefield Junction 345kV Substation and will house the new PAR. The Hidden Valley Substation will be connected to the existing Wakefield 345kV Substation via a new 0.3-mile 345kV overhead (OH) line and the addition of two new 345kV circuit breakers in the Wakefield 345kV Substation 339 Line breaker bay.

The Project will also include a new 150MVAr STATCOM located within the Tewksbury Substation, and upgrading the existing West Amesbury – King Street 115kV line (K163 Line) to address the identified 115kV overload on this circuit. Upgrades to the K163 Line, the new STATCOM, the first 5 miles of OH, and modifications to the existing Wakefield Junction and Mystic 345kV Substations to accommodate the new 345kV OH/UG line extending from the Wakefield Junction Substation, in aggregate, are considered incumbent upgrades. The Project satisfies all of the reliability needs identified in the Boston 2028 Needs Assessment (Assessment), including dynamic reactive support for system restoration.

The Project is a viable alternative solution to NHT's preferred SeaLink Project. It mitigates all of the identified needs in the Boston 2028 Needs Assessment and offers the dynamic reactive power requirements to satisfy the ISO-NE System Restoration Plan requirements. The Project will have minimal impact on the community and environment due to its utilization of existing transmission OH ROWs, UG line design, and location of the PAR and STATCOM being adjacent to existing substations.

Installed and Life-Cycle Cost Estimates

The Project's installed cost estimate in nominal dollars is $199.2 million, and the estimated life-cycle cost in 2023 is $127.1 million. NHT understands ISO-NE will obtain costs associated with the Incumbent Upgrades directly from the incumbent owner of those facilities which will serve to validate NHT's estimate, or will serve to replace this portion of NHT's total estimated installed cost. NHT used the latest cost estimate data from leading AC vendors and extensive internal transmission experience, including lessons learned from other NextEra subsidiaries. This process allowed NHT to develop an accurate cost estimate for the Project while significantly reducing uncertainty around that estimate.

Cost Containment

NHT proposes cost containment in the form of multiple firm cost caps, including for installed cost, annual revenue requirements, O&M, maximum equity thickness, and maximum return on equity. In

addition, NHT proposes an economic penalty for missing the need date of June 1, 2024, which ultimately helps to mitigate costs for ISO-NE customers.

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Technical Design

In response to identified Boston area needs, NHT proposes the Project, creating a parallel AC path to the existing Wakefield Junction – Mystic 345kV line (LN 349, LN349X, and LN349Y), incorporation of a new PAR and STATCOM, and an upgrade of the existing 115kV K163 Line. The new and upgraded facilities comprising the proposed Project mitigates all identified Boston 2028 reliability needs including all 345kV and 115kV overloads, and provides the required dynamic reactive power needs to support the ISO-NE's System Restoration Plan. The proposed project scope of the Project includes the following:

- two new 345kV OH lines totaling approximately 11.3 miles
- reconductoring of a 115kV line for approximately 7.3 miles
- reconfiguring two 115 kV lines into a double circuit tower configuration totaling approximately 10.0 miles
- one new 345 kV single breaker AIS station with breaker and half expansion capability
- expansion of an existing 345kV station to accommodate a STATCOM
- addition of two new 345kV breakers to an existing bay
- one new +/- 150MVAr STATCOM
- one new Phase Angle Regulator

Routing of Line

NHT reviewed the existing transmission ROW between Wakefield Junction and the Mystic Substation. The existing transmission line ROW already contains two 115kV overhead lines and one 345kV line, therefore NHT proposes rebuilding the incumbent's two (2) 115kV single circuit lines as a double circuit 115kV in order to accommodate the proposed 345kV OH section in the existing ROW. Ultimately, NHT determined its strategy was to propose a new OH 345kV line in the incumbent ROW and then build an UG line in the MBTA's bike trail.

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Community and Environmental Impact

The Project minimizes impact on communities and the environment during construction and creates a valuable resource for the communities during operation. The MBTA ROW 345kV segment will be

underneath a bike path which results in significantly less impact on host communities. Post-construction, the UG segment of the Project will have no visual impact on local residents.

The Project's route enhances six (6) miles of highly desirable bikeway on an existing MBTA easement. This infrastructure investment goes well beyond the basic needs of utility service to enhance the economic vitality and quality of life in the local communities that host the project.

1.23 BOS-045: New England Power Company – Golden Hills Power Link - National Grid

INTRODUCTION

The New England Power Company dba National Grid (National Grid), as a Qualified Transmission Project Sponsor (QTPS), submits this Proposal, the **Golden Hills Power Link**, (hereinafter referred to as the GHPL or the Proposal) in response to the *Request for Proposal: Reliability Transmission Upgrade: Boston 2028 RFP*, issued by the Independent System Operator-New England (ISO-NE). The Proposal consists entirely of components that will be contained within existing National Grid or NSTAR Electric Company dba Eversource Energy (Eversource) properties in northeastern Massachusetts. GHPL addresses all the identified needs in the Boston study area, providing a cost-effective and efficient solution that will be delivered following ISO-NE's schedule requirements for maintaining the reliability of the New England electric grid after the planned retirement of the Mystic Generating Station. For the Proposal, National Grid has already deployed a multi-disciplinary team of personnel experienced in successfully designing, developing, and completing similar projects in Massachusetts. National Grid has partnered with Eversource, also a QTPS, on this Proposal, thereby assuring coordination throughout the planning, design, scheduling, construction, and operation of the Proposal elements.

PROPOSAL ELEMENTS AND BOSTON STUDY AREA NEEDS RESOLUTION

The Proposal consists of the overhead extension of a 345 kV transmission line, modifications to existing substations and transmission lines, and the installation of a Dynamic Reactive Device all within existing National Grid or Eversource properties or existing rights-of-way (ROWs) in northeastern Massachusetts. When implemented, the GHPL components will solve all the identified transmission reliability needs in the Boston study area. The Proposal elements and the needs that each will resolve are summarized below.

Second 345 kV Path, Mystic Substation to Golden Hills Substation 349X Overhead Line Extension

Create a second independent 345 kV path from Eversource's Mystic Substation through National Grid's Golden Hills Substation to National Grid's Wakefield Junction Substation by:

- Separating the existing 349X and 349Y underground cables into two independent circuits at both Mystic Substation and Golden Hills Substation;
- Connecting the existing 349Y Line cable at Golden Hills Substation to the existing overhead 345 kV transmission line to Wakefield Junction Substation (hereafter referred to as the 349 Line); and
- Extending the 349X circuit by constructing a new 2.5-mile 345 kV overhead line segment (referred to herein as the 349X Overhead Line Extension) within existing ROW from Golden Hills Substation to Wakefield Junction Substation, and connecting this 349X Overhead Line Extension to the 349X Line cable at Golden Hills Substation. The existing Q-169 and F-158N 115 kV lines will be reconfigured for a distance of 1.4 miles each to create space within the existing ROW to accommodate the 349X Overhead Line Extension.

The details of the 345 kV Line, 115 kV Line, and Existing Substation work elements required to create this second independent 345 kV path from Mystic Substation through Golden Hills Substation to Wakefield Junction Substation are described in Sections 4.7, 4.9 and 4.14 of this Proposal, respectively.

The details of the 345 kV Line, 115 kV Line, and Existing Substation work elements required to create this second independent 345 kV path from Mystic Substation through Golden Hills Substation to Wakefield Junction Substation are described in Sections 4.7, 4.9 and 4.14 of this Proposal, respectively.

Install DTT Scheme for K-163 Line Overload

Install a Direct Transfer Trip ("DTT") scheme to open the 394 Line at West Amesbury after a no-fault contingency at Ward Hill Substation. The DTT scheme will eliminate the 394 no-fault breaker open contingency at Ward Hill Substation and hence eliminates the overload on K-163 Line. The work required to implement the DTT scheme for the K-163 Line overload is described in Section 4.14 of this Proposal.

Install Synchronous Condenser at Tewksbury 22A Substation

Add a 267 MVA, +/- 190 MVAr synchronous condenser at the Tewksbury 22A 345 kV Substation, capable of injecting at least ±150 MVAr at all operating conditions specified in the RFP, as described in Section 4.18 of this Proposal.

Resolution of Boston Study Area Needs

- Need 1: N-1 STE thermal overload on 115 kV K-163 line between West Amesbury and King Street substations. ***Resolution:*** Install a DTT Scheme to eliminate the K-163 Line overload for the no-fault contingency at Ward Hill Substation.
- Need 2: N-1-1 LTE thermal overloads on 345 kV 346 and 365 cables between Woburn and North Cambridge substations and 345 kV 358 cable between North Cambridge and Mystic substations. ***Resolution:*** The 349 Line X&Y cable separation and 349X Overhead Line Extension will provide two independent 345 kV circuits between Wakefield Junction and Mystic substations, thus eliminating the existing contingency of both 349 X&Y cables at the same time. The worst-case loading on the 346 cable or 365 cable is reduced to 92% for the worst-case contingency pair. The worst-case loading on the 358 cable will be reduced to 87% for the worst-case contingency pair.
- Need 3: A dynamic reactive device required to maintain the ability to restore the Boston area transmission system. ***Resolution:*** Add a synchronous condenser at Tewksbury 22A 345 kV Substation on existing property owned by National Grid at the substation site.

LAND, PERMITTING, AND CONSTRUCTION REQUIREMENTS

National Grid and Eversource have all necessary property and land rights in place to construct, maintain, and operate the GHPL. The modifications to the substations will be within the companies' fee-owned property. Similarly, the proposed transmission line work will be performed within National Grid's existing ROWs, where all rights for such transmission lines are in place.

The project team has extensive experience in successfully navigating federal, state, and local permitting processes and thus has a full understanding of the permits that will be required for the GHPL, and the realistic time frames for obtaining them. The project team has analyzed the permitting requirements for all components of GHPL and determined that the requirements are straightforward, and the permits required are those which are routinely obtained by National Grid for transmission line and substation projects throughout Massachusetts. The proposed 2.5-mile 349X Overhead Line Extension, which will be contained entirely on National Grid's existing ROW, will require Section 72 approval from the Massachusetts Department of Public Utilities, but not a more extensive review by the state Energy Facilities Siting Board (EFSB). The permitting requirements are more fully discussed in Section 7.2 of this Proposal.

Similarly, the National Grid team has optimized the Proposal by performing construction sequence planning, outage planning, detailed access and work area planning, and by designing the components to be consistent with permitting criteria. The constructability of the Proposal has been confirmed by soliciting the input of and performing field reviews with numerous potential construction service providers.

PROPOSAL SCHEDULE

The GHPL will be placed into service well before the Mystic Generation Station retirement. National Grid has adopted a pro-active approach to assure that this schedule is achieved. For each of the Proposal elements, National Grid already has progressed preliminary engineering and design, compiled baseline environmental data, and validated potential schedule constraints and limitations related to engineering, permitting, real estate, procurement, community relations, construction, outage coordination, testing, and commissioning. The schedule fully incorporates the results of these detailed analyses and reflects schedule risk mitigation measures. Key elements of the schedule include:

- Engineering Complete: July 1, 2021
- Permitting Complete: June 30,2022
- Construction Start: March 4, 2022
- Construction Complete: November 30, 2023
- **GHPL In-service Date (all elements): December 31, 2023**
- GHPL Completion: February 16, 2024

The schedule assumes ISO-NE RFP award on August 11, 2021. All Proposal elements are on National Grid and Eversource properties with no real estate procurement required. Engineering will be completed, permit applications submitted, and procurement activities initiated in advance of ISO-NE RFP award. The dates listed above refer to the overall GHPL schedule; refer to Section 7.5 of this Proposal for schedule details, by GHPL component.

INSTALLED COST AND LIFE-CYCLE COST

The installed cost estimate for this Proposal is $111,609,760, and the life-cycle cost estimate is $170,734,312.

COST CONTAINMENT

National Grid is offering a cost containment mechanism whereby return on equity (ROE) will be reduced if actual costs exceed a specified level for this Proposal. The specific details of the proposed cost containment mechanism are described in Section 8.1 of this Proposal.

PROPOSAL TEAM QUALIFICATIONS

The specific team for this Proposal has been assembled from the extensive experienced in-house staff of National Grid and Eversource, augmented by industry leaders Siemens, Burns & McDonnell, BSC Group, and The Public Archaeology Laboratory, Inc. This 40-plus person team brings to this Proposal comprehensive experience in designing, siting, permitting, constructing, operating, and maintaining a wide variety of transmission projects in New England. The Team Qualifications are more fully described in Section 3.1 of this Proposal.

MANAGEMENT EXPERTISE AND FINANCIAL RESOURCES

National Grid has a proven record of successfully financing, building, operating, and maintaining transmission facilities throughout New England. For this Proposal, National Grid will bring to bear its financial resources and its well-established Project Management processes and procedures, which have recently been applied to successfully complete similar transmission line and substation projects on-time, within budget, and in compliance with regulatory approvals. Most National Grid project managers are certified Project Management Professionals, and many hold other professional licenses and certifications, including Professional Engineer licenses and Certified Utility Safety Professional credentials. As part of a larger project delivery organization, National Grid's project managers can draw support from hundreds of experienced professionals across various functions, including project controls, resource planning, construction planning, construction, contract management, and stakeholder management. This integrated approach to project delivery produces projects with successful schedule, cost, scope, and quality outcomes. National Grid has a strong and proven track record for successful delivery of large and complex electric transmission projects in New England, including the New England East-West Solutions (NEEWS) project, the Salem Cable Rebuild project, and the Merrimack Valley Reliability Project (MVRP). Notably, National Grid and Eversource worked collaboratively to deliver the NEEWS Interstate Reliability Project, a new 75-mile 345 kV transmission line traversing Massachusetts, Rhode Island and Connecticut that went into service in 2015 on schedule and within budget, and the MVRP, a new 345 kV transmission line between New Hampshire and Massachusetts that went into service in 2017 on schedule and within budget. As a result of these experiences, the National Grid team is acutely aware of the factors, such as permitting timelines, that can most affect a project's cost and schedule and – based on that experience – the team has the full knowledge to manage the project pro-actively to avoid such issues.

1.24 BOS-047: New Hampshire Transmission, LLC – Proposal 12

New Hampshire Transmission, LLC (NHT), a subsidiary of NextEra Energy Transmission, LLC (NEET), proposes to construct, own, and operate a portion of a new 345 kilovott (kV) underground (UG) line from the Wakefield Junction 345kV Substation to the Mystic 345kV Substation and the new Hidden Valley 345kV Air Insulated Substation (AIS) with a Phase Angle Regulator (PAR). The entire project is referred to herein as the Wakefield-Mystic AC Solution or the Project. The Project includes 12-miles of 345kV UG line extending from the Hidden Valley Substation to the Mystic 345kV Substation. The proposed 12-miles of UG route will be located in state and local road right-of-ways (ROWs), and the Massachusetts Bay Transportation Authority's (MBTA) ROW. The new Hidden Valley Substation is proposed to be located 0.1-miles east of the existing Wakefield Junction 345kV Substation and will house the new PAR. The Hidden Valley Substation will be connected to the existing Wakefield 345kV Substation via a new 0.3-mile 345kV overhead (OH) line and the addition of a new 345kV circuit breaker in the Wakefield 345kV Substation 339 Line breaker bay.

The Project will include a new 175MVAr STATCOM located within the Tewksbury Substation. The Project also includes upgrading the existing West Amesbury – King Street 115kV line (K163 Line) to address the identified 115kV overload on this circuit. Upgrades to the K163 Line, the new STATCOM, and modifications to the existing Wakefield Junction, Tewksbury, and Mystic 345kV Substations to accommodate the new 345kV line and STATCOM, in aggregate, are considered incumbent upgrades. The Project satisfies all of the reliability needs identified in the Boston 2028 Needs Assessment (Assessment), including dynamic reactive support for system restoration.

The Project is an appropriate alternative solution to NHT's preferred SeaLink Project. It mitigates all of the identified needs in the Boston 2028 Needs Assessment and offers the dynamic reactive power requirements to satisfy the ISO-NE System Restoration Plan requirements. The Project will have minimal impact on the community and environment due to its utilization of UG line design and location of the PAR and STATCOM being adjacent to existing substations.

Installed and Life-Cycle Cost Estimates

The Project's installed cost estimate in nominal dollars is $254.4 million, and the estimated life-cycle cost in 2023 is $229.8 million. NHT understands ISO-NE will obtain costs associated with the Incumbent Upgrades directly from the incumbent owner of those facilities which will serve to validate NHT's estimate, or will serve to replace this portion of NHT's total estimated installed cost. NHT used the latest cost estimate data from leading AC vendors and extensive internal transmission experience, including lessons learned from other NextEra subsidiaries. This process allowed NHT to develop an accurate cost estimate for the Project while significantly reducing uncertainty around that estimate.

Cost Containment

NHT proposes cost containment in the form of multiple firm cost caps, including for installed cost, annual revenue requirements, O&M, maximum equity thickness, and maximum return on equity. In addition, NHT proposes an economic penalty for missing the need date of June 1, 2024, which ultimately helps to mitigate costs for ISO-NE customers.

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Technical Design

In response to identified Boston area needs, NHT proposes the Project, creating a parallel AC path to the existing Wakefield Junction – Mystic 345kV line (LN 349, LN349X, and LN349Y), incorporation of a new PAR and STATCOM, and an upgrade of the existing 115kV K163 Line. The new and upgraded facilities comprising the Project mitigates all identified Boston 2028 reliability needs including all 345kV and 115kV overloads, and provides the required dynamic reactive power needs to support the ISO-NE's System Restoration Plan. The proposed project scope includes the following:

- two new 345kV lines totaling approximately 12.3 miles
- reconductoring of a 115kV line for approximately 7.3 miles
- one new 345kV single breaker AIS station with breaker and half expansion capability
- expansion of an existing 345kV station to accommodate a STATCOM
- addition of three new 345kV breakers to existing bays
- one new +/- 175MVAr STATCOM
- one new Phase Angle Regulator

Routing of Line

NHT reviewed the existing right-of-way (ROW) between Wakefield Junction and the Mystic Substation. Ultimately, NHT determined its strategy was to build an UG line following mostly existing state and city streets and the Massachusetts Bay Transportation Authority's (MBTA) bike trail.

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Community and Environmental Impact

The Project minimizes impact on communities and the environment during construction and creates a valuable resource for the communities during operation. The MBTA ROW 345kV segment will be underneath a bike path which results in significantly less impact on host communities. Post-construction, the Project will have no visual impact on local residents.

The Project's route enhances six (6) miles of highly desirable bikeway on an existing MBTA easement. This infrastructure investment goes well beyond the basic needs of utility service to enhance the economic vitality and quality of life in the local communities that host the project.

1.25 BOS-049: New Hampshire Transmission, LLC – New Hampshire Transmission, LLC-Proposal 7

New Hampshire Transmission, LLC (NHT), a subsidiary of NextEra Energy Transmission, LLC (NEET), proposes to construct, own, and operate a new Hidden Valley 345 kilovolt (kV) Air Insulated Substation (AIS) with a STATCOM. As part of this project, incumbent upgrades of the existing 115kV K163 line between West Amesbury and King Street, 345kV LN345/346 lines between Woburn and North Cambridge, and the LN351 line between North Cambridge and Mystic are included. The entire project is referred to herein as the Woburn-North Cambridge-Mystic AC Solution or the Project. The Project includes a new 345kV air insulated substation (AIS) referred to herein as the Hidden Valley Substation. The Hidden Valley Substation is proposed to be located 0.1-miles east of the existing Wakefield Junction 345kV Substation and will include a new 150MVAr STATCOM.

The Woburn-North Cambridge-Mystic AC Solution also includes upgrading the existing West Amesbury – King Street 115kV line (K163 Line) to address the identified 115kV overload on this circuit. Upgrades to the K163 Line, the Woburn - North Cambridge 344kV (LN345/346) upgrade, and the North Cambridge-Mystic (LN351) upgrade are considered incumbent upgrades. The Woburn-North Cambridge-Mystic AC Solution satisfies all of the reliability needs identified in the Boston 2028 Needs Assessment (Assessment), including dynamic reactive support for system restoration.

The Project is a viable alternative solution to NHT's preferred SeaLink Project. The Project mitigates all of the identified needs in the Boston 2028 Needs Assessment and offers the dynamic reactive power requirements to satisfy the ISO-NE System Restoration Plan requirements. The Woburn-North Cambridge-Mystic AC Solution will have minimal impact on the community and environment due to the STATCOM being adjacent to an existing substation.

Installed and Life-Cycle Cost Estimates

The Projects's installed cost estimate in nominal dollars is $303.0 million, and the estimated life-cycle cost in 2023 is $43.5 million. NHT understands ISO-NE will obtain costs associated with the incumbent upgrades directly from the incumbent owner of those facilities which will serve to validate NHT's estimate, or will serve to replace this portion of NHT's total estimated installed cost. NHT used the latest cost estimate data from leading AC vendors and extensive internal transmission experience, including lessons learned from other NextEra Energy subsidiaries. This process allowed NHT to develop an accurate cost estimate for the Project while significantly reducing uncertainty around that estimate.

Cost Containment

NHT proposes cost containment in the form of multiple firm cost caps, including for installed cost, annual revenue requirements, O&M, maximum equity thickness, and maximum return on equity. In addition, NHT proposes an economic penalty for missing the need date of June 1, 2024, which ultimately helps to mitigate costs for ISO-NE customers.

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Technical Design

In response to identified Boston area needs, NHT proposes to upgrade the existing Woburn-North Cambridge-Mystic 345kV lines, incorporate a new STATCOM, and to upgrade the existing 115kV K163 Line. The upgraded facilities comprising the proposed solution mitigates all identified Boston 2028 reliability needs including all 345kV and 115kV overloads, and provides the required dynamic reactive power needs to support the ISO-NE's System Restoration Plan. The proposed project scope of the Woburn-North Cambridge-Mystic AC Solution includes the following:

- one new 345kV OH line totaling approximately 0.7 miles
- replacement of three 345 kV cables for approximately 15.6 miles
- reconductoring of a 115kV OH line for approximately 7.3 miles
- one new 345kV single breaker STATCOM station
- one new +/- 150MVAr STATCOM

Routing of Line

The Project will utilize rights of way currently in use by the existing 115 kV line (K163) and underground cables (LN 346, LN 365, and LN 358).

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Community and Environmental Impact

Woburn-North Cambridge-Mystic AC Solution minimizes impact on communities and the environment during operation and construction. The Woburn-North Cambridge-Mystic 345kV segment of this AC Solution will use existing transmission ROWs which results in limited impact on host communities.

Post-construction, the Woburn-North Cambridge-Mystic Station 345kV segment of the Project will have minimal visual impact on local residents. The Hidden Valley 345kV Substation and STATCOM will be located in modest buildings and/or air insulated facilities designed to blend into the unique characteristics of the surrounding communities and utilize additional vegetation as needed.

1.26 BOS-051: New Hampshire Transmission, LLC – New Hampshire Transmission, LLC-Proposal 2

New Hampshire Transmission, LLC (NHT), a subsidiary of NextEra Energy Transmission, LLC (NEET), proposes to construct, own, and operate the SeaLink Project (SeaLink or the Project), a 68 mile, 475 megawatt (MW) undersea/underground transmission cable system. SeaLink will utilize High Voltage Direct Current (HVDC) technology to efficiently transmit power in either direction across the key Boston Import and North-South New England interfaces and directly connect two major substations by way of a new corridor. The SeaLink Project's core elements set forth in this proposal are two Voltage Source Converter (VSC) Stations and a submarine HVDC cable electrically connecting the 345 kilovolt (kV) transmission systems at NHT's Seabrook Switchyard in Seabrook, NH with the 345kV Mystic Substation in Everett, MA. The Project is very similar to the version of SeaLink that NHT previously proposed between 2012-2015. The undersea route remains the same heavily-studied, proven route, while the terrestrial segments at the northern and southern end of the proposed project were improved. NHT's proposal also includes upgrading the existing West Amesbury – King Street 115kV line (K163 Line) to provide enhanced thermal margin to resolve the identified 115kV overload. The K-163 upgrade is considered an incumbent upgrade.

SeaLink is in an advanced stage of development and ready to proceed rapidly to mitigate the reliability needs identified in the Boston 2028 Needs Assessment (the Assessment). Due to the Project's advanced development stage, SeaLink provides significantly reduced siting and permitting risk as well as schedule certainty, in addition to superior electrical performance at a competitive life-cycle cost. SeaLink's HVDC cable will be entirely buried and most of the converter station equipment will be inside of buildings and/or behind vegetation to obstruct public view. SeaLink also utilizes a new transmission corridor and does not have the impact on adjacent existing lines that competing AC solutions may cause. In addition, the Project mitigates a variety of risks from weather, generator retirements, permitting delays, and cost overruns.

SeaLink creates a new, hardened corridor to move power that will be much less susceptible to weather extremes compared to overhead AC lines. Weather events in New England are expected to increase in severity and frequency in the coming decades. SeaLink's hardened underground infrastructure is less susceptible to hurricanes, nor'easters, and ice storms compared to overhead lines. That resiliency increases reliability and reduces costs. These advantages will only increase over time as stronger and more frequent storms inflict more damage and impose more ratepayer-borne repair costs on overhead lines.

Recent ISO-NE reliability planning has also focused on physical separation of transmission elements so that failure of one element from severe weather or other causes does not adversely affect other elements or overall system reliability. SeaLink offers an advantage compared to new projects in existing right-of-ways (ROWs) by creating a new, underground, geographically distinct transmission corridor. Competing AC solutions may propose using crowded, existing transmission corridors that already include redundant critical lines susceptible to a single failure. Putting more critical assets in the same space can reduce overall system security and could increase the likelihood that future, costly reliability projects will need to be undertaken to separate the lines.

SeaLink's diversification of the transmission system in a new corridor using climate-change resilient underground or undersea elements is an inherent and unique benefit of the Project that should be considered by ISO-NE when comparing the costs and reliability attributes of competing projects.

Installed and Life-Cycle Cost Estimates

SeaLink's total installed cost estimate in nominal dollars is $542.0 million, and the estimated life-cycle cost in 2023 is $527.2 million. The proposal contains detailed power flow work NHT included in its RFP solicitation documents to leading HVDC vendors to assist them with their cost estimates, which in turn allowed NHT to provide a more accurate cost estimate for SeaLink. Moreover, buried HVDC lines require fewer ongoing operation and maintenance expenses than an equivalent AC system, and SeaLink traverses 15 miles of federal waters which reduces property taxes.

Cost Containment

NHT proposes cost containment in the form of multiple firm cost caps, including for installed cost, annual revenue requirements, O&M, maximum equity thickness, and maximum return on equity. In addition, NHT proposes an economic penalty for missing the need date of June 1, 2024, which ultimately helps to mitigate costs for ISO-NE customers.

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Technical Design

In response to the identified Boston area needs, NHT is proposing to construct the Project, a VSC-based HVDC solution that will deliver 475MW into the existing Mystic 345kV substation. In addition, NHT is proposing the incumbent upgrade of the existing 115kV K163 Line. The Project is comprised of the following:

- Expand the existing Seabrook 345kV yard to accommodate one new 345kV cable;
- Construct two +/-200kV VSC-HVDC converter stations, one adjacent to Seabrook 345kV substation, and another at a greenfield site located at 20 Bennett Hwy in Revere, MA, with the ability to deliver 475MW to the Mystic substation;
- Construct approximately 3000' of 345kV AC cable between Seabrook 345kV substation and proposed Seabrook converter station;
- Construct approximately 5.5 miles of 200kV underground DC cable between the Seabrook DC converter and underground (UG)-underwater (UW) transition point in Salisbury, MA;
- Construct approximately 50 miles of 200kV underwater DC cable;
- Construct approximately 5 miles of 200kV underground DC cable between UW-UG transition point (Lynn, MA landing site) and proposed converter station in Revere, MA;
- Construct approximately 6 miles of underground 345kV AC cable between proposed Revere, MA converter station to the existing Mystic 345kV station;
- Replace existing Mystic Unit Seven connection with proposed 345kV c between Bennett converter and Mystic station; and
- Reconductor approximately 7.3 miles of existing 115kV overhead line between West Amesbury and King Street (K163 line) stations to achieve minimum Long-Term Emergency rating of 405MVA.

Real Estate

SeaLink's real estate land control is in a mature stage. NHT and its affiliates have secured the privately-owned real estate rights required for SeaLink to ensure cost and schedule certainty. The land required for both of SeaLink's converter stations (Seabrook, NH & Revere, MA) is subject to land control option agreements with NHT affiliates.

SeaLink's terrestrial portion of the line in the Greater Boston area will primarily utilize rights-of-way (ROW) owned by the Massachusetts Bay Transportation Authority (MBTA) from Lynn to Everett, for which NHT has a long term ROW agreement in place. Eleven percent of the remaining required ROW are owned by public entities such as MassDOT, and, therefore, will be obtained through a permit process in 2021.

Reliability Needs

NHT tested SeaLink with extensive power flow modeling using ISO-NE study models and assumptions and confirmed that SeaLink solves the reliability criteria violations ISO-NE identified in the Assessment. In addition, SeaLink exceeds the identified dynamic reactive requirements for system restoration identified by ISO-NE in the Boston 2028 Needs Assessment Addendum.

SeaLink includes dynamic reactive support for system restoration, while providing additional operational advantages. The thermal overloads identified on Woburn to N. Cambridge 345kV, N. Cambridge to Mystic 345kV, and West Amesbury to King Street 115kV are reduced to approximately 67% LTE, 92% LTE, and 81% STE, respectively, without post secondary PAR optimization. The inherent capabilities of VSC-HVDC technology enables SeaLink to provide up to +/-237MVAr of dynamic reactive power at Mystic 345kV station to address the dynamic reactive capability requirements for ISO-NE's System Restoration Plan.

HVDC technology is well proven, and has been deployed successfully in numerous locations. An important example is the Trans Bay Cable, which also employs VSC-HVDC technology and is owned and operated by an NHT affiliate. The NHT team will bring the engineering and operational expertise gained from its Trans Bay Cable experience to the Project.

SeaLink also delivers operational benefits which AC solutions cannot. For example, HVDC technology allows for quick ramping of power and independent control of active and reactive power, which in turn enhances grid stability. VSC links, such as proposed by the project, can also be utilized during black start events to supply power and act to stabilize the grid as generation and load are added to the system. Additionally, the complete system is less vulnerable than overhead AC to extreme weather events.

Community and Environmental Impact

By its design, the underwater cable used by SeaLink minimizes the impact on communities and the environment during construction, while providing a valuable transmission resource for the Commonwealth and ISO-NE region during operation. SeaLink consulted closely with applicable state and federal agencies in selecting its undersea route. The results of our completed marine studies confirmed the entire line can be safely buried beneath the ocean floor, thereby minimizing interference with fishing and shipping. The only above-ground structures will be two converter stations designed to blend into the unique characteristics of the surrounding communities near each end of the route. Otherwise, there will be no overhead lines that would negatively introduce additional visual impact and recurring vegetation management.

SeaLink's preferred onshore underground route via a new transmission corridor will create or enhance 11-miles of highly desirable, new bicycle paths in New Hampshire and Massachusetts. NHT is proposing to make these added bicycle path improvements without seeking regional cost recovery for its investment. The chosen route expands upon a network of recreation trails in the north shore communities created from former rail lines. This infrastructure investment goes well beyond the basic needs of utility service to enhance the economic vitality and quality of life in the local communities that host the project.

1.27 BOS-053: SP Transmission, LLC – SP Transmission, LLC

SP Transmission's proposal consists of three key parts:

1. A +/- 165 MVAR STATCOM, including a new single breaker radial-bus station, a step-up transformer (with spare), and a short overhead 345 kV line to the existing Tewksbury substation. Extension of the existing substation to accommodate an additional terminal is to be completed by the owner of the Tewksbury station. This STATCOM meets the System Restoration need that was identified in the October 2019 Boston 2028 Needs Assessment Addendum by providing a dynamic reactive device that can deliver the required "at least 300 MVAR of dynamic reactive range", interconnects directly to one of the five listed stations, and meeting all of the detailed requirements listed in Sections 3.1 and 3.2 of the Addendum.
2. Two 4% p.u. reactors to be installed near Woburn substation on the Woburn – N. Cambridge 345 kV underground cables (on both circuit 1 and 2), including a small switchyard that will contain the reactors and associated switchgear and controls. Loop-in/out of the existing cables are to be completed by the owner of these cables. These 345 kV reactors address the three N-1-1 thermal violations that were identified in the Boston 2028 Needs Assessment Update from October 2019 by increasing the impedance (and decreasing current flow to below the cables' ratings) on the parallel Woburn – North Cambridge – Mystic underground cables that were overloaded under some N-1-1 conditions in the Needs Assessment. These reactors are designed so that they can be by-passed in normal operation in order to minimize system losses and allow for increased operational flexibility – they can be designed to either be switched manually or automatically following the loss of the first element (N-1) in anticipation of the N-1-1 conditions.
3. A 3% p.u. reactor to be installed near W. Amesbury substation on the W. Amesbury – King Street 115 kV transmission line, including a small switchyard that will contain the reactor and associated switchgear and controls. Loop-in/out of the existing transmission line is to be completed by the owner of this line. This 115 kV reactor addresses the N-1 thermal violation on this transmission line that was identified in the Boston 2028 Needs Assessment Update from October 2019 by increasing the impedance (and decreasing current flow to below the line's thermal rating). The reactor is designed with a normally-open switch in parallel so that the reactor can be by-passed in the event that the reactors are out of service for an extended period of time due to maintenance or failure.

The total estimated installed cost of this proposal is $63.4 Million. The life-cycle cost of this proposal is estimated to be $95.1 Million.

Based on ISO-NE's posted RFP timeline, final selection of the Project Sponsor and execution of the SQTPSA will not be completed until mid-2021. During Phase Two proposal development, Purchase Option Agreements for needed real-estate (three small substation parcels) will be negotiated, preliminary permitting discussions and planning will begin, and much of the detailed design and engineering will be completed. Immediately following SQTPSA execution, real-estate acquisition will be completed (2-3 months), permitting will begin in earnest and will take approximately one year, and engineering and procurement will be completed (expected to take about 12-14 months).

Construction and commissioning are expected to take 9-10 months, with some equipment procurement and delivery continuing while construction proceeds. Total duration from SQTPSA execution to commercial operation is expected to be about 20 months, which would beat the required 6/1/2023 in-service date by about three months.

SP Transmission proposes to provide cost containment via a cap on total Installed Cost of SP Transmission's scope of this proposal and financial penalties for delays beyond the ISO required in-service date. SP Transmission is also considering various caps on O&M/A&G costs and/or total ARR for the first several years of operation.

1.28 BOS-055: New Hampshire Transmission, LLC – New Hampshire Transmission, LLC-Proposal 5

New Hampshire Transmission, LLC (NHT), a subsidiary of NextEra Energy Transmission, LLC (NEET), proposes to construct, own, and operate a new 345 kilovolt (kV) underground (UG) line from the Salem 115kV Substation to the Mystic 345kV Substation. As part of this project, NHT also proposes a new South Salem 345kV Air Insulated Substation (AIS) station with a Phase Angle Regulator (PAR) and a new STATCOM located at the proposed Hidden Valley 345kV AIS Substation (Hidden Valley). The entire project is referred to herein as the Salem-Mystic AC Solution or the Project. The Project includes a new 16-mile 345kV UG line extending from a new 345kV AIS referred to herein as the South Salem Substation. A new PAR will be located within the new South Salem Substation. The new Hidden Valley Substation is proposed to be located 0.1-miles east of the existing Wakefield Junction 345kV Substation and will house the new STATCOM. The Hidden Valley Substation will be connected to the existing Wakefield 345kV Substation via a new 0.3-mile 345kV overhead (OH) line and the addition of a new 345kV circuit breaker in the Wakefield 345kV Substation 339 Line breaker bay.

The Project also includes upgrading the existing West Amesbury – King Street 115kV line (K163 Line) to address the identified 115kV overload on this circuit. Upgrades to the K163 Line, modifications within the existing Wakefield Junction 345kV Substation to accommodate the addition of the new 345kV circuit breaker for termination of the new 345kV OH line connecting to the new Hidden Valley and modifications to the existing Mystic 345kV Substation to accommodate termination of the new 345kV UG line extending from the new South Salem Substation, in aggregate, are considered incumbent upgrades. The Salem-Mystic AC Solution satisfies all of the reliability needs identified in the Boston 2028 Needs Assessment (Assessment), including dynamic reactive support for system restoration.

The Project is an appropriate alternative solution to NHT's preferred SeaLink Project. The Project mitigates all of the identified needs in the Boston 2028 Needs Assessment and offers the dynamic reactive power requirements to satisfy the ISO-NE System Restoration Plan requirements. The Salem-Mystic AC Solution will have minimal impact on the community and environment due to its underground line design and location of the PAR and STATCOM being adjacent to existing substations.

Installed and Life-Cycle Cost Estimates

The Project's installed cost estimate in nominal dollars is $264.1 million, and the estimated life-cycle cost estimate in 2023 is $274.7 million. NHT understands ISO-NE will obtain costs associated with the Incumbent Upgrades directly from the incumbent owner of those facilities which will serve to validate NHT's estimate, or will serve to replace this portion of NHT's total estimated installed cost. NHT used the latest cost estimate data from leading AC vendors and extensive internal transmission experience, including lessons learned from other NextEra subsidiaries. This process allowed NHT to develop an accurate cost estimate for Salem-Mystic AC Solution while significantly reducing uncertainty around that estimate.

Cost Containment

NHT proposes cost containment in the form of multiple firm cost caps, including for installed cost, annual revenue requirements, O&M, maximum equity thickness, and maximum return on equity. In addition, NHT proposes an economic penalty for missing the need date of June 1, 2024, which ultimately helps to mitigate costs for ISO-NE customers.

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Technical Design

In response to identified Boston area needs, NHT proposes the Salem-Mystic AC Solution creating a new AC path, incorporation of a new PAR and STATCOM, and an upgrade of the existing 115kV K163 Line. The new and upgraded facilities comprising the Project mitigates all identified Boston 2028 reliability needs including all 345kV and 115kV overloads, and provides the required reactive power needs to support the ISO-NE's System Restoration Plan. The proposed project scope of the Salem-Mystic AC Solution includes the following:

- two new 345kV underground cables totaling approximately 16.3 miles
- one new 115kV OH line totaling approximately 0.02 miles
- reconductoring of a 115kV OH line for approximately 7.3 miles
- one new 345kV breaker and a half AIS station with two bays
- one new 345kV single breaker STATCOM station
- addition of one new 345kV breaker to an existing bay
- one new 345/115kV autotransformer
- one new +/- 260MVAr STATCOM
- one new 345kV Phase Angle Regulator

Routing of Line

NHT reviewed multiple existing transmission right-of-ways (ROWs) to Mystic Substation. Ultimately, NHT determined a viable strategy was to build an UG line starting in Salem following mostly existing city streets and the Massachusetts Bay Transportation Authority's (MBTA) bike trail.

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Community and Environmental Impact

The Project minimizes impact on communities and the environment during construction and creates a valuable resource for the communities during operation. The MBTA ROW 345kV segment will be buried underneath a bike path which results in significantly less impact on host communities.

Post-construction, as an entirely UG cable, the Salem-Mystic Station 345kV segment of the Project will have no visual impact on local residents. The South Salem and Hidden Valley Substations will be located in modest buildings and/or air insulated facilities designed to blend into the unique characteristics of the surrounding communities and utilize additional vegetation as needed. Otherwise, there will be very limited overhead lines that would negatively introduce additional visual impact and recurring vegetation management.

The Project route enhances eight (8) miles of highly desirable bikeway on an existing MBTA easement. This infrastructure investment goes well beyond the basic needs of utility service to enhance the economic vitality and quality of life in the local communities that host the project.

1.29 BOS-057: New Hampshire Transmission, LLC – New Hampshire Transmission, LLC-Proposal 10

New Hampshire Transmission, LLC (NHT), a subsidiary of NextEra Energy Transmission, LLC (NEET), proposes to construct, own, and operate a portion of a new 345 kilovott (kV) parallel path overhead (OH) and underground (UG) line from the Wakefield Junction 345kV Substation to the Mystic 345kV Substation, the new Hidden Valley 345kV Air Insulated Substation (AIS) with a Phase Angle Regulator (PAR), and the new Roger 345kV AIS with a STATCOM. As part of this project, NHT also proposes an incumbent upgrade of the existing 115kV K163 line. The entire project is referred to herein as the Wakefield-Mystic AC Solution or the Project. The Project includes 11-miles of 345kV OH and UG line extending from the Wakefield Junction Substation to the Mystic 345kV Substation. The proposed five (5) miles of incumbent OH will be located in an right-of-way (ROW) and the remaining six (6) miles of UG route will be owned by NHT and located in the Massachusetts Bay Transportation Authority's (MBTA) ROW. The new Hidden Valley Substation is proposed to be located 0.1-miles east of the existing Wakefield Junction 345kV Substation and will house the new PAR. The Hidden Valley Substation will be connected to the existing Wakefield 345kV Substation via a new 0.3-mile 345kV overhead (OH) line and the addition of a new 345kV circuit breaker in the Wakefield 345kV Substation 339 Line breaker bay. The new Roger Substation is proposed to be located 0.6 miles west of the Tewksbury 345kV Substation.

The Project also includes upgrading the existing West Amesbury – King Street 115kV line (K163 Line) to address the identified 115kV overload on this circuit. Upgrades to the K163 Line and the first 5 miles of OH, and modifications to the existing Wakefield Junction and Mystic 345kV Substations to accommodate the new 345kV OH/UG line extending from the Wakefield Junction Substation, in aggregate, are considered incumbent upgrades. The Project satisfies all of the reliability needs identified in the Boston 2028 Needs Assessment (Assessment), including dynamic reactive support for system restoration.

The Project is a viable alternative solution to NHT's preferred SeaLink Project. It mitigates all of the identified needs in the Boston 2028 Needs Assessment and offers the dynamic reactive power requirements to satisfy the ISO-NE System Restoration Plan requirements. The Project will have minimal impact on the community and environment due to its utilization of existing transmission OH ROWs, UG line design, and location of the PAR and STATCOM being near existing substations.

Installed and Life-Cycle Cost Estimates

The Project's installed cost estimate in nominal dollars is $210.0 million, and the estimated life-cycle cost in 2023 is $155.2 million. NHT understands ISO-NE will obtain costs associated with the Incumbent Upgrades directly from the incumbent owner of those facilities which will serve to validate NHT's estimate, or will serve to replace this portion of NHT's total estimated installed cost. NHT used the latest cost estimate data from leading AC vendors and extensive internal transmission experience, including lessons learned from other NextEra subsidiaries. This process allowed NHT to develop an accurate cost estimate for Project while significantly reducing uncertainty around that estimate.

Cost Containment

NHT proposes cost containment in the form of multiple firm cost caps, including for installed cost, annual revenue requirements, O&M, maximum equity thickness, and maximum return on equity. In addition, NHT proposes an economic penalty for missing the need date of June 1, 2024, which ultimately helps to mitigate costs for ISO-NE customers.

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Technical Design

In response to identified Boston area needs, NHT proposes the Project creating a parallel AC path to the existing Wakefield Junction – Mystic 345kV line (LN 349, LN349X, and LN349Y), incorporation of a new PAR and STATCOM, and an upgrade of the existing 115kV K163 Line. The new and upgraded facilities comprising Wakefield Junction-Hidden Valley-Mystic AC Solution mitigates all identified Boston 2028 reliability needs including all 345kV and 115kV overloads, and provides the required dynamic reactive power needs to support the ISO-NE's System Restoration Plan. The proposed project scope of the Project includes the following:

- three new 345kV lines totaling approximately 12.0 miles
- reconductoring of a 115kV line for approximately 7.3 miles
- reconfiguring two 115kV lines into a double circuit tower configuration totaling approximately 10.0 miles
- one new 345kV single breaker AIS station with breaker and half expansion capability
- one new 345kV single breaker STATCOM station
- addition of three new 345kV breakers to existing bays
- one new +/- 150MVAr STATCOM

Routing of Line

NHT reviewed the existing transmission ROW between Wakefield Junction and the Mystic Substation. The existing transmission line ROW has two 115kV overhead lines and one 345kV line, therefore NHT proposes rebuilding the incumbent's two (2) 115kV single circuit lines as a double circuit 115kV in order to accommodate the proposed 345kV OH section in the existing ROW. Ultimately, NHT determined its strategy was to propose and new OH 345kV line in the incumbent ROW and then build an UG line in the MBTA's ROW.

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Community and Environmental Impact

The Project minimizes impact on communities and the environment during construction and creates a valuable resource for the communities during operation. The MBTA ROW 345kV segment will be underneath a bike path or existing city streets which results in significantly less impact on host communities. Post-construction, the UG segment of the Project will have no visual impact on local residents.

The Project's route enhances six (6) miles of highly desirable bikeway on an existing MBTA easement. This infrastructure investment goes well beyond the basic needs of utility service to enhance the economic vitality and quality of life in the local communities that host the project.

1.30 BOS-059: Avangrid Networks, Inc. - Wakefield to Mystic Reliability Project

Avangrid Networks is pleased to submit this proposed solution in response to ISO-NE's 2028 Boston Request for Proposal (RFP). An integrated project team with expertise from transmission planning, engineering, real estate, environmental planning and siting, permitting, operations, maintenance, construction, commissioning, and cost modeling has spent several months evaluating nine general project configurations to deliver the best value to ISO-NE in addressing the needs of the 2028 Boston Needs Assessment Update. The solution identified in this proposal addresses all of the N-1, N-1-1, and system restoration reliability needs identified in the 2028 Boston Needs Assessment Update in a carefully considered approach balancing system performance and cost impacts to deliver the best value for ratepayers in the region. The proposed upgrades, route, permitting approach, and schedule are designed and organized in a manner that ensures meeting the required June 1, 2024 in-service date, and provide the flexibility and expandability features discussed throughout this Phase One Proposal.

Solution Overview

Avangrid Networks proposes the **Wakefield to Mystic Reliability Project (WMRP)** as a solution to the *Phase One Proposal Identified Needs to be Resolved* in Part 1, Section 2 of the RFP documents. The WMRP is a 10.1-mile underground 345kV line between Wakefield Junction substation in Wakefield, Massachusetts and Mystic substation in Everett, Massachusetts, with a +/- 150 MVAR Static Synchronous Compensator (STATCOM) adjacent to the Wakefield Junction substation, where it connects at 115kV. The WMRP also includes a direct transfer trip scheme in the vicinity of West Amesbury. The solution has an installed cost of $254.4 million, with **$222.2 million** for the Avangrid Networks scope and $32.2 million dedicated to upgrades (all costs in 2023 dollars as defined by ISO-NE). The net present value revenue requirement (NPVRR), or **life-cycle cost** of the WGRP, is **$304.7 million**. This NPVRR does not include upgrade costs, as defined by ISO-NE.

The WMRP mitigates impacts to private landowners and streamlines site control negotiations by following public roadways and Massachusetts Bay Transit Authority (MBTA) controlled areas for 100% of the cable route. Additionally, all required upgrades, based on publicly available information, can be constructed within the existing footprint of the Wakefield Junction and Mystic substations, and no upgrades or refurbishments to existing lines are required. The only private land required for the project is fee ownership for the location of the STATCOM, for which negotiations are well advanced.

Addressing Identified Needs

The Avangrid Networks transmission planning team, with support from external planning resources deeply familiar with the Greater Boston transmission system (see Section 7.1), have confirmed that the WMRP meets all the identified needs. Table 2-1 describes how each need is addressed, and how the solution is implemented.

Identified Needs		Proposed Solutions	
Type	Description	Description	Summary of Results
N-1	115kV Section K163 Thermal Overload	Install Direct Transfer Trip Scheme on 345kV Section 394 to automatically open West Amesbury when the Ward Hill terminal is opened	345kV/115kV connection is removed and flow on Section K163 reverses and supplies local load, eliminating violation.
N-1-1	345kV Line Thermal Overloads (Sections 346, 358, and 365)	Install new 345kV line from Mystic substation to Wakefield Junction substation parallel to existing Section 349.	Path between Wakefield Junction and Mystic is maintained post Section 349 contingency due to creation of a new parallel line, preventing noted overloads from occurring.
System Restoration	Dynamic Reactive Device with 300 MVAR dynamic reactive range	Install +/- 150 MVAR STATCOM adjacent to Wakefield Junction substation.	The STATCOM installed at this location meets the requirements of the RFP.

Table 2-1: Addressing Identified Needs

Optimized Technical Design

At every step of the design process the Avangrid Networks engineering team has sought to identify ways to maintain or improve system performance while also containing and reducing costs.

For example, the engineering team chose to use 3000 kcmil XLPE aluminum cable based on a performance analysis showing that the aluminum cable performed comparably to copper but with significant cost savings. Similarly, a market consultation identified a STATCOM as the best value and performance for the Dynamic Reactive Device (DRD) component of the design due its faster response time, ability to supply additional MVAR at lower voltages, superior harmonic performance, and smaller footprint, all with a similar cost to a Static VAR Compensator (SVC) and other alternatives. For the STATCOM location, Avangrid Networks has planned for future station expandability. Additionally, our transmission planning and engineering groups identified the direct transfer trip scheme as an extremely cost-effective alternative to rebuilding several miles of area 115kV lines.

Although Avangrid Networks will not be responsible for the upgrades to existing facilities proposed for the WMRP, careful steps have been taken to ensure that the upgrades are constructible in a cost effective and timely manner. As an example, the WMRP proposes interconnecting the new 345kV line into the existing Generator 7 position at Mystic substation, which will be vacated when Mystic Generating Unit 7 retires on June 1, 2022 in accordance with its ISO-NE approved full retirement de-list bid.

Route Selection and Permitting Design

The WMRP was designed to facilitate successful permitting and minimize environmental and social impacts on the surrounding communities. An underground solution was selected due to the congested nature of the Greater Boston area and public resistance to overhead transmission projects in recent years. By leveraging the Massachusetts law granting non-exclusive right to public roadways for utility siting, the route minimizes the need to disrupt private property or engage in lengthy, time-consuming negotiations for site control. With the WMRP design, site control is mainly contingent on Energy Facilities Siting Board (EFSB) approval and municipal agreements.

Additionally, the route follows the inactive Saugus Branch rail corridor for approximately 20% of the length of the route, which will lessen traffic disruptions to the area. Negotiating with a single entity, the MBTA, for this portion of the route, will facilitate the permitting process. Based on initial discussions with MBTA and historical analysis, Avangrid Networks anticipates reaching an option agreement with MBTA by end of Q4 2020. The route has also been reviewed for impacts to environmental resources and seeks to avoid or mitigate such impacts wherever possible. The route follows to the east of the Golden Hills Area of Critical Environmental Concern and to the west of the Breakheart Reservation.

Schedule

Avangrid Networks is confident the WMRP will be in operation well ahead of the June 1, 2024 retirement of Mystic generating units 8 and 9. The project schedule has been structured with the goal of achieving the most optimal in-service date while allowing for activity durations and sequences that are consistent with the company's experience in similar projects. The schedule also considers the location-specific factors of the Boston area, such as its urban nature and winter construction moratoriums. As much as possible, Avangrid Networks has structured activities to minimize outages and impacts on the existing system.

As discussed further in Section 7.5, the proposed in-service date is **February 9, 2024**, earlier than required by ISO-NE. This alone results in an expected completion date almost **4 months ahead of Mystic's retirement**. This makes the schedule itself a key component of the general mitigation plan for the project. Additionally, Avangrid Networks is confident that the incumbent upgrades associated with the WMRP can be initiated after a project award in mid-to late 2021 and be completed by the proposed in-service date.

With the proposed in-service date, the WMRP critical path shows the following activities. The table below shows additional measures planned by the company to mitigate the timing risk associated with each critical path element:

Critical Path Element	Duration	Comments and Mitigation Plan
Engineering and Environmental Surveys supporting Massachusetts Energy Facilities Siting Board (EFSB) filing	330 Days	Compress schedule by using multiple crews to cover entire 10.1-mile cable route simultaneously rather than sequentially. Increase the number of engineering resources associated with the design effort.
MA EFSB Permitting Process and subsequent finalization of relevant state permits	540 Days	Mitigating activities include community outreach, conducting a detailed routing analysis of the cable (ID# 3000) to find the least disruptive route. The feedback from community outreach will be reflected in the routing analysis. Mitigating activities for state permits contingent on EFSB approval include agency outreach and accelerated filing to facilitate expeditious review process.
Wakefield Junction to Mystic (ID# 3000) Duct Bank Construction, and Cable Installation	545 Days	Overlap as practicable duct bank and cable installation so that cable installation is not contingent on full duct bank installation before starting the work. Deploy crews to multiple simultaneously rather than sequentially.

Table 2-2: WMRP Critical Path

As much as possible, key activities and predecessors have been identified and initiated early in the schedule, even before project award if necessary, in order to keep activities out of the critical path. By accelerating key early tasks such as survey work and detailed engineering, Avangrid Networks accelerates the entire project schedule and maximizes its ability to meet the required June 1, 2024 in-service date, even in the face of unexpected delays.

Key milestones of the WMRP included in the schedule are as follows:

Milestone	**Completion Date**
Demonstrate adequate financing	September 2021
Demonstrate Required Electrical Ratings	December 2021
Acquisition of all necessary federal, state, county, and local site permits	August 2022
Substantial Site Work Completed	April 2023
Delivery of Major Electrical Equipment	June 2023
Proposed Project In-service date	February 2024
Required Project In-service date	June 2024

Table 2-3: WMRP Key Milestones

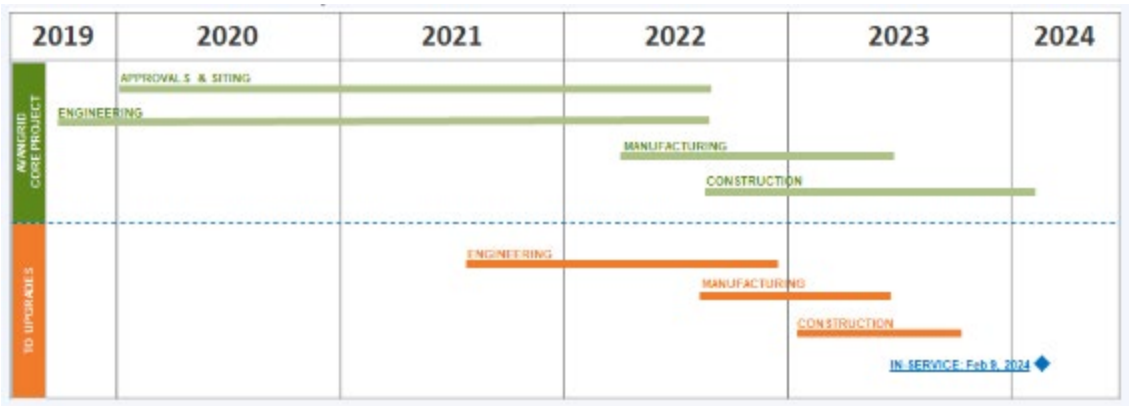

Figure 2-1: WMRP Executive Schedule

This schedule and project in-service date assume ISO-NE uses the full 175 days for evaluation in both Phase One and Two. If the evaluation schedule is accelerated, there are opportunities to accelerate the WMRP schedule and in-service date, including the earlier start of Avangrid Networks' construction.

Cost Containment

Avangrid Networks is confident in its ability to construct the WMRP on time and on budget. As a reflection of this, the WMRP installed cost and lifecycle cost estimates include well-considered cost containment and cost cap provisions. Currently Avangrid Networks is selecting a set of cost caps and cost containment provisions which are further outlined in Section 8.1.

Corporate Capabilities

Supporting the delivery of the project described above will be a world class organization with a track record of success in the region and across the globe. Avangrid Networks combines the resources of eight electric and natural gas utilities with a rate base of $9.1 billion, serving 3.25 million customers across New England and New York. The company has a longstanding footprint in New England in particular. Avangrid Networks companies Central Maine Power (CMP) and the United Illuminating Company (UIL), based in Maine and Connecticut respectively, were both founded in 1899 and have been serving customers in the region ever since.

Avangrid Networks is a part of AVANGRID, Inc., a leading, sustainable energy company with $32 billion in assets and operations in 24 U.S. states. As an example of the advantages provided by this corporate scale, Avangrid Networks has secured exclusive supplier agreements for the 2028 Boston RFP for cable supply and installation and other key contracts, as described in Section 3.1.

Conclusion

Avangrid Networks believes that the WMRP, together with the team and resources behind it, delivers **superior value and performance to ISO-NE ratepayers** and the New England transmission system. The WMRP solution will be delivered by a company that is **well practiced in delivering complex projects** on time and on budget. Avangrid Networks' experience, combined with the technical solution, the competitive installed and lifecycle cost, well-planned schedule, risk

mitigation measures, and significant cost containment mechanisms outlined in this proposal make the WMRP a winning choice for both ISO-NE and the region's ratepayers.

1.31 BOS-061: New Hampshire Transmission, LLC – New Hampshire Transmission, LLC-Proposal 11

New Hampshire Transmission, LLC (NHT), a subsidiary of NextEra Energy Transmission, LLC (NEET), proposes to construct, own, and operate a new 345 kilovott (kV) overhead (OH) and underground (UG) line from the Wakefield Junction 345kV Substation to the Mystic 345kV Substation, and the new Hidden Valley 345kV Air Insulated Substation (AIS) with a Phase Angle Regulator (PAR) and STATCOM. The entire project is referred to herein as the Hidden Valley-Mystic AC Solution or the Project. The Project includes a new 11-mile 345kV OH/UG line extending from a new 345kV 5-breaker air insulated substation (AIS) referred to herein as the Hidden Valley Substation. The proposed five (5) miles of incumbent OH will be located in an incumbent right-of-way (ROW) and the remaining six (6) miles of UG route will be owned by NHT and located in the Massachusetts Bay Transportation Authority's (MBTA) ROW. The Hidden Valley Substation is proposed to be located 0.1-miles east of the existing Wakefield Junction 345kV Substation. The existing Wakefield Junction-Tewksbury 345kV line (339 Line) will be bifurcated and reconnected through the new Hidden Valley Substation. A new PAR will be located within the new Hidden Valley Substation. The Project will also include a new +/-150MVAr STATCOM located within the Hidden Valley Substation. The STATCOM will be connected to the existing Wakefield Junction 345kV Substation via a new 0.1-mile 345kV line and the addition of a new 345kV circuit breaker in the Wakefield 345kV Substation 339 Line breaker bay.

The Project also includes upgrading the existing West Amesbury – King Street 115kV line (K163 Line) to address the previously identified 115kV overload on this circuit. Upgrades to the K163 Line, modifications within the existing Wakefield Junction 345kV Substation to accommodate the addition of the new 345kV circuit breaker for termination of the new 345kV OH line connecting to the new STATCOM, bifurcation of the existing 339 Line, and modifications to the existing Mystic 345kV Substation to accommodate termination of the new 345kV UG line extending from the new Hidden Valley Substation, in aggregate, are considered incumbent upgrades. The Project satisfies all of the reliability needs identified in the Boston 2028 Needs Assessment (Assessment), including dynamic reactive support for system restoration.

The Project is an appropriate alternative solution to NHT's preferred SeaLink Project. It mitigates all of the identified needs in the Boston 2028 Needs Assessment and offers the dynamic reactive power requirements to satisfy the ISO-NE System Restoration Plan requirements. The Project will have minimal impact on the community and environment due to its underground line design and location of the PAR and STATCOM being adjacent to existing substations.

Installed and Life-Cycle Cost Estimates

The Project's installed cost estimate in nominal dollars is $222.8 million, and the estimated life-cycle cost in 2023 is $176.9 million. NHT understands ISO-NE will obtain costs associated with the Incumbent Upgrades directly from the incumbent owner of those facilities which will serve to validate NHT's estimate, or will serve to replace this portion of NHT's total estimated installed cost. NHT used the latest cost estimate data from leading AC vendors and extensive internal transmission experience, including lessons learned from other NextEra Energy subsidiaries. This process allowed

NHT to develop an accurate cost estimate for Hidden Valley-Mystic AC Solution while significantly reducing uncertainty around that estimate.

Cost Containment

NHT proposes cost containment in the form of multiple firm cost caps, including for installed cost, annual revenue requirements, O&M, maximum equity thickness, and maximum return on equity. In addition, NHT proposes an economic penalty for missing the need date of June 1, 2024, which ultimately helps to mitigate costs for ISO-NE customers.

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Technical Design

In response to identified Boston area needs, NHT proposes the Project creating a parallel AC path to the existing Wakefield Junction – Mystic 345kV line (LN 349, LN349X, and LN349Y), incorporation of a new PAR and STATCOM, and an upgrade of the existing 115kV K163 Line. The new and upgraded facilities comprising the Project mitigates all identified Boston 2028 reliability needs including all 345kV and 115kV overloads, and provides the required dynamic reactive power needs to support the ISO-NE's System Restoration Plan. The proposed project scope of the Project includes the following:

- four new 345kV lines totaling approximately 13.1 miles
- reconductoring of a 115kV line for approximately 7.3 miles
- reconfiguring two 115kV lines into a double circuit tower configuration totaling approximately 10.0 miles
- one new 345kV breaker and half AIS station with two bays
- addition one new 345kV breaker to an existing bay
- one new +/- 150MVAr STATCOM
- one new Phase Angle Regulator

Routing of Line

NHT reviewed the existing transmission ROW between Wakefield Junction and the Mystic Substation. The existing transmission line ROW already contains two 115kV overhead lines and one 345kV line, therefore NHT proposes rebuilding the incumbent's two (2) 115kV single circuit lines as a double circuit 115kV in order to accommodate the proposed 345kV OH section in the existing ROW. Ultimately, NHT determined its strategy was to propose a new OH 345kV line in the incumbent ROW and then build an UG line in the MBTA's bike trail.

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Community and Environmental Impact

The Project minimizes impact on communities and the environment during construction and creates a valuable resource for the communities during operation. The MBTA ROW 345kV segment will be underneath a bike path which results in significantly less impact on host communities.

Post-construction, the MBTA ROW-Mystic Station 345kV UG segment of the Project will have no visual impact on local residents. The Hidden Valley 345kV Substation, PAR, and STATCOM will be located in modest buildings and/or air insulated facilities designed to blend into the unique characteristics of the surrounding communities and utilize additional vegetation as needed. Otherwise, there will be very limited new overhead lines that would negatively introduce additional visual impact.

The Project's route enhances six (6) miles of highly desirable bikeway on an existing MBTA easement. This infrastructure investment goes well beyond the basic needs of utility service to enhance the economic vitality and quality of life in the local communities that host the project.

1.32 BOS-063: New Hampshire Transmission, LLC – New Hampshire Transmission, LLC-Proposal 6

New Hampshire Transmission, LLC (NHT), a subsidiary of NextEra Energy Transmission, LLC (NEET), proposes to construct, own, and operate a new 345 kilovolt (kV) underground (UG) line from the Salem 115kV Substation to the Mystic 345kV Substation. As part of this project, NHT also proposes a new 345kV Air Insulated Substation (AIS) with a Phase Angle Regulator (PAR), a new incumbent owned STATCOM located at the Tewksbury 345kV Substation. The entire project is referred to herein as the Salem-Mystic AC Solution or the Project. The Project includes a new 16-mile 345kV UG line extending from a new 345kV AIS referred to herein as the South Salem Substation. A new PAR will be located within the new South Salem Substation. A new incumbent STATCOM is proposed to be located at the Tewsbury 345kV Substation.

The Project also includes upgrading the existing West Amesbury – King Street 115kV line (K163 Line) to address the identified 115kV overload on this circuit. Upgrades to the K163 Line and modifications to the existing Mystic 345kV Substation to accommodate termination of the new 345kV UG line extending from the new South Salem Substation, in aggregate, are considered incumbent upgrades. The Salem-Mystic AC Solution satisfies all of the reliability needs identified in the Boston 2028 Needs Assessment (Assessment), including dynamic reactive support for system restoration.

The Project is a viable alternative solution to NHT's preferred SeaLink Project. It mitigates all of the identified needs in the Boston 2028 Needs Assessment and offers the dynamic reactive power requirements to satisfy the ISO-NE System Restoration Plan requirements. The Salem-Mystic AC Solution will have minimal impact on the community and environment due to its underground line design and location of the PAR and STATCOM being adjacent to existing substations.

Installed and Life-Cycle Cost Estimates

The Project's installed cost estimate in nominal dollars is $257.7 million, and the estimated life-cycle cost in 2023 is $237.9 million. NHT understands ISO-NE will obtain costs associated with the incumbent upgrades directly from the incumbent owner of those facilities which will serve to validate NHT's estimate, or will serve to replace this portion of NHT's total estimated installed cost. NHT used the latest cost estimate data from leading AC vendors and extensive internal transmission experience, including lessons learned from other NextEra Energy subsidiaries. This process allowed NHT to develop an accurate cost estimate for Salem-Mystic AC Solution while significantly reducing uncertainty around that estimate.

Cost Containment

NHT proposes cost containment in the form of multiple firm cost caps, including for installed cost, annual revenue requirements, O&M, maximum equity thickness, and maximum return on equity. In addition, NHT proposes an economic penalty for missing the need date of June 1, 2024, which ultimately helps to mitigate costs for ISO-NE customers.

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Technical Design

In response to identified Boston area needs, NHT proposes the Salem-Mystic AC Solution creating a new AC path, incorporation of a new PAR and STATCOM, and an upgrade of the existing 115kV K163 Line. The new and upgraded facilities comprising the Project mitigates all identified Boston 2028 reliability needs including all 345kV and 115kV overloads, and provides the required dynamic reactive power needs to support the ISO-NE's System Restoration Plan. The proposed project scope of the Salem-Mystic AC Solution includes the following:

- one new 345kV underground cable totaling approximately 16.0 miles
- one new 115kV OH line totaling approximately 0.02 miles
- reconductoring of a 115kV OH line for 7.3 miles
- one new 345kV breaker and a half AIS station with two bays
- expansion of an existing 345kV station to accommodate a STATCOM
- addition of one new 345kV breaker to an existing bay
- one new 345/115kV autotransformer
- one new +/- 260MVAr STATCOM
- one new Phase Angle Regulator

Routing of Line

NHT reviewed multiple existing transmission right-of-ways (ROWs) to Mystic Substation. Ultimately, NHT determined a viable strategy was to build an UG line starting in Salem following mostly existing city streets and the Massachusetts Bay Transportation Authority's (MBTA) bike trail.

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Community and Environmental Impact

Salem-Mystic AC Solution minimizes impact on communities and the environment during construction and creates a valuable resource for the communities during operation. The MBTA ROW 345kV segment will be buried underneath which results in significantly less impact on host communities.

Post-construction, as an entirely UG cable, the Salem-Mystic Station 345kV segment of the Project will have no visual impact on local residents. The South Salem, PAR, and STATCOM will be located in

modest buildings and/or air insulated facilities designed to blend into the unique characteristics of the surrounding communities and utilize additional vegetation as needed. Otherwise, there will be very limited overhead lines that would negatively introduce additional visual impact and recurring vegetation management.

The Project route enhances eight (8) miles of highly desirable bikeway on an existing MBTA easement. This infrastructure investment goes well beyond the basic needs of utility service to enhance the economic vitality and quality of life in the local communities that host the project.

1.33 BOS-065: Transource New England, LLC – Proposal 3

Delivering a solution that ISO-NE can be confident is effective, cost competitive, and reliable, Transource New England, LLC ("TNE") offers this Proposal 3 for ISO-NE evaluation. TNE's proposal comprehensively solves the needs identified in the Boston 2028 Needs Assessment and Needs Assessment Addendum.

The proposal combines multiple project elements to deliver a highly effective and reliable solution. The following elements are proposed to solve the ISO's identified needs:

1. The addition of two new 345kV circuits, one between the Tewksbury and Wakefield Junction stations and the other between the Tewksbury and Woburn stations, recommended to be built with American Electric Power's (AEP) BOLD® technology to minimize the need for any ROW expansion. The addition of the new 345kV circuits will require consolidation of the existing Tewksbury-Wakefield and Tewksbury-Woburn corridors to accommodate the new lines. The current configuration in these ROWs is a single-circuit 345kV and two single-circuit 115kV lines. These lines are proposed to rebuilt and replaced with two (2) double-circuit 345/115kV lines.
2. The construction of a new 345 kV GIS station referred herein as the "Sunset Station", located directly adjacent to and interconnected to the existing Wakefield Junction Station. The new Sunset Station will include a new +/-200 MVar STATCOM. Sunset Station also serves as the termination point for several 345 kV lines that currently terminate at the Wakefield Junction station.
3. The addition of a new underground 345 kV line between the existing Golden Hills Station and the new Sunset station, effectively creating a new 345kV pathway from Sunset to Wakefield Junction to Mystic station.
4. Required station modifications at five existing stations.
5. The reconductoring of the 115 kV line between "West Amesbury" and "King St" stations.

As noted above, one of the proposal highlights is the recommended use of AEP's Breakthrough Overhead Line Design (BOLD) transmission technology to consolidate and rebuild the existing transmission corridors. The proposed rebuild offers the incumbent TO the opportunity to not only solve the reliability violations in this RFP, but also to replace aged infrastructure with new, efficient technology. BOLD offers an innovative transmission tower design that uses lower structure heights, smoothly curved crossarms for an improved viewshed, and more efficient use of existing ROWs. Please see sections 4.11 and 7.2 for more detailed information on the siting and performance advantages that BOLD provides.

These proposal elements result in a design that comprehensively solves the identified needs. For instance, the new 345 kV lines and station adjustments in items #1, 2, 3, and 4 above provide redundancy that help solves contingency violations and system restoration needs. Item #5 cost-effectively solves the W. Amesbury – King Street 115kV thermal overload violations to meet reliability criteria.

The benefits provided by the above elements have a total estimated installed cost of $488.8 million, including both TNE and incumbent Transmission Owner (TO) work. The project elements that would be owned by TNE have a lifecycle cost of $250.8 million. TNE has designed the proposal to be as cost effective as possible and offers a cost cap mechanism to ensure cost control. TNE proposes a cost cap on its capital costs, currently estimated at $234.5 million. The capital cost cap excludes capital costs that are anticipated to be owned by one or more incumbent utilities, currently estimated at $254.3 million. This capital cost cap is on the initial project capital costs only, is quoted in year 2023 dollars per ISO-NE's stated annual inflation rate of 1.5%, and will be included in the Selected Qualified Transmission Project Sponsor Agreement (SQTPSA), if selected. The final project cost cap, along with specific terms and conditions outlining any exceptions, exclusions and relief events, will be updated in Phase 2 of the competitive project proceeding incorporating further in-depth project diligence and any changes or clarifications communicated by the incumbent utilities or ISO-NE.

TNE has also provided an informed and reasonable project schedule to construct the above elements. This schedule assumes that ISO-NE selects the SQTPS on June 1, 2021, necessary permitting is completed in January 2023, construction begins in April 2023, and TNE project elements are placed in-service in December 2024 and incumbent TO project elements are placed in-service in December 2026.

In addition, the proposal maximizes use of existing ROWs to lessen the impact on project area communities. The recommended consolidation of the Tewksbury–Wakefield Junction and Tewksbury-Woburn corridors is not expected to require any ROW expansion when utilizing the BOLD design. TNE’s proposed location for the Sunset Station uses undeveloped and permittable land that is directly proximate to the Wakefield Junction station. TNE’s proposed new 345 kV underground line, located within public roadways, is the most direct road route between the interconnecting stations.

TNE is confident that its proposal offers an innovative and compelling solution in which ISO-NE can be confident is both reliable and cost competitive, and comprehensively fulfills the requirements of the Boston 2028 Needs Assessment and Addendum.

1.34 BOS-067: New Hampshire Transmission, LLC – New Hampshire Transmission, LLC-Proposal 1

New Hampshire Transmission, LLC (NHT), a subsidiary of NextEra Energy Transmission, LLC (NEET), proposes to construct, own, and operate the SeaLink Project (SeaLink or the Project), a 68 mile, 475 megawatt (MW) undersea/underground transmission cable system. SeaLink will utilize High Voltage Direct Current (HVDC) technology to efficiently transmit power in either direction across the key Boston Import and North-South New England interfaces and directly connect two major substations by way of a new corridor. The SeaLink Project's core elements set forth in this proposal are two Voltage Source Converter (VSC) Stations and a submarine HVDC cable electrically connecting the 345 kilovolt (kV) transmission systems at NHT's Seabrook Switchyard in Seabrook, NH with the 345kV Mystic Substation in Everett, MA. The Project is very similar to the version of SeaLink that NHT previously proposed between 2012-2015. The undersea route remains the same heavily-studied, proven route, while the terrestrial segments at the northern and southern end of the proposed project were improved.

SeaLink is in an advanced stage of development and ready to proceed rapidly to mitigate the reliability needs identified in the Boston 2028 Needs Assessment (the Assessment). Due to the Project's advanced development stage, SeaLink provides significantly reduced siting and permitting risk as well as schedule certainty, in addition to superior electrical performance at a competitive life-cycle cost. SeaLink's HVDC cable will be entirely buried and most of the converter station equipment will be inside of buildings and/or behind vegetation to obstruct public view. SeaLink also utilizes a new transmission corridor and does not have the impact on adjacent existing lines that competing AC solutions may cause. In addition, the Project mitigates a variety of risks from weather, generator retirements, permitting delays, and cost overruns.

SeaLink creates a new, hardened corridor to move power that will be much less susceptible to weather extremes compared to overhead AC lines. Weather events in New England are expected to increase in severity and frequency in the coming decades. SeaLink's hardened underground infrastructure is less susceptible to hurricanes, nor'easters, and ice storms compared to overhead lines. That resiliency increases reliability and reduces costs. These advantages will only increase over time as stronger and more frequent storms inflict more damage and impose more ratepayer-borne repair costs on overhead lines.

Recent ISO-NE reliability planning has also focused on physical separation of transmission elements so that failure of one element from severe weather or other causes does not adversely affect other elements or overall system reliability. SeaLink offers an advantage compared to new projects in existing right-of-ways (ROWs) by creating a new, underground, geographically distinct transmission corridor. Competing AC solutions may propose using crowded, existing transmission corridors that already include redundant critical lines susceptible to a single failure. Putting more critical assets in the same space can reduce overall system security and could increase the likelihood that future, costly reliability projects will need to be undertaken to separate the lines.

SeaLink's diversification of the transmission system in a new corridor using climate-change resilient underground or undersea elements is an inherent and unique benefit of the Project that should be considered by ISO-NE when comparing the costs and reliability attributes of competing projects.

Installed and Life-Cycle Cost Estimates

SeaLink's total installed cost estimate in nominal dollars is $534.1 million, and the estimated life-cycle cost in 2023 is $527.2 million. The proposal contains detailed power flow work NHT included in its RFP solicitation documents to leading HVDC vendors to assist them with their cost estimates, which in turn allowed NHT to provide a more accurate cost estimate for SeaLink. Moreover, buried HVDC lines require fewer ongoing operation and maintenance expenses than an equivalent AC system, and SeaLink traverses 15 miles of federal waters which reduces property taxes.

Cost Containment

NHT proposes cost containment in the form of multiple firm cost caps, including for installed cost, annual revenue requirements, O&M, maximum equity thickness, and maximum return on equity. In addition, NHT proposes an economic penalty for missing the need date of June 1, 2024, which ultimately helps to mitigate costs for ISO-NE customers.

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Technical Design

In response to the identified Boston area needs, NHT is proposing to construct the Project, a VSC-based HVDC solution that will deliver 475MW into the existing Mystic 345kV substation. The Project is comprised of the following:

- Expand the existing Seabrook 345kV yard to accommodate one new 345kV cable;
- Construct two +/-200kV VSC-HVDC converter stations, one adjacent to Seabrook 345kV substation, and another at a greenfield site located at 20 Bennett Hwy in Revere, MA, with the ability to deliver 475MW to the Mystic substation;
- Construct approximately 3000' of 345kV AC cable between Seabrook 345kV substation and proposed Seabrook converter station;
- Construct approximately 5.5 miles of 200kV underground DC cable between the Seabrook DC converter and underground (UG)-underwater (UW) transition point in Salisbury, MA;
- Construct approximately 50 miles of 200kV underwater DC cable;
- Construct approximately 5 miles of 200kV underground DC cable between UW-UG transition point (Lynn, MA landing site) and proposed converter station in Revere, MA;
- Construct approximately 6 miles of underground 345kV AC cable between proposed Revere, MA converter station to the existing Mystic 345kV station; and
- Replace existing Mystic Unit Seven connection with proposed 345kV cable between Bennett converter and Mystic station.

Real Estate

SeaLink's real estate land control is in a mature stage. NHT and its affiliates have secured the privately-owned real estate rights required for SeaLink to ensure cost and schedule certainty. The land required for both of SeaLink's converter stations (Seabrook, NH & Revere, MA) is subject to land control option agreements with NHT affiliates.

SeaLink's terrestrial portion of the cable in the Greater Boston area will primarily utilize a ROW owned by the Massachusetts Bay Transportation Authority (MBTA) from Lynn to Everett, for which NHT has a long term ROW agreement in place. Eleven percent of the remaining required ROW are owned by public entities such as MassDOT, and, therefore, will be obtained through a permit process in 2021.

Reliability Needs

NHT tested SeaLink with extensive power flow modeling using ISO-NE study models and assumptions and confirmed that SeaLink solves the reliability criteria violations ISO-NE identified in the Assessment. In addition, SeaLink exceeds the identified dynamic reactive requirements for system restoration identified by ISO-NE in the Boston 2028 Needs Assessment Addendum.

SeaLink includes dynamic reactive support for system restoration, while providing additional operational advantages. The thermal overloads identified on Woburn to North Cambridge 345kV, North Cambridge to Mystic 345kV, and West Amesbury to King Street 115kV are reduced to approximately 87% LTE, 92% LTE, and 81% STE, respectively, without post secondary PAR optimization. The inherent capabilities of VSC-HVDC technology enables SeaLink to provide up to +/- 237MVAr of dynamic reactive power at Mystic 345kV station to address the dynamic reactive capability requirements for ISO-NE's System Restoration Plan.

HVDC technology is well proven, and has been deployed successfully in numerous locations. An important example is the Trans Bay Cable, which also employs VSC-HVDC technology and is owned and operated by an NHT affiliate. The NHT team will bring the engineering and operational expertise gained from its Trans Bay Cable experience to the Project.

SeaLink also delivers operational benefits which AC solutions cannot. For example, HVDC technology allows for quick ramping of power and independent control of active and reactive power, which in turn enhances grid stability. VSC links, such as proposed by the project, can also be utilized during black start events to supply power and act to stabilize the grid as generation and load are added to the system. Additionally, the complete system is less vulnerable than overhead AC to extreme weather events.

Community and Environmental Impact

By its design, the underwater cable used by SeaLink minimizes the impact on communities and the environment during construction, while providing a valuable transmission resource for the Commonwealth and ISO-NE region during operation. SeaLink consulted closely with applicable state and federal agencies in selecting its undersea route. The results of our completed marine studies confirmed the entire cable can be safely buried beneath the ocean floor, thereby minimizing interference with fishing and shipping. The only above-ground structures will be two converter stations designed to blend into the unique characteristics of the surrounding communities near each end of the route. Otherwise, there will be no overhead lines that would negatively introduce additional visual impact and recurring vegetation management.

SeaLink's preferred onshore underground route via a new transmission corridor will create or enhance 11-miles of highly desirable, new bicycle paths in New Hampshire and Massachusetts. NHT is proposing to make these added bicycle path improvements without seeking regional cost recovery for its investment. The chosen route expands upon a network of recreation trails in the north shore communities created from former rail lines. This infrastructure investment goes well beyond the basic needs of utility service to enhance the economic vitality and quality of life in the local communities that host the project.

1.35 BOS-069: New Hampshire Transmission, LLC – New Hampshire Transmission, LLC – Proposal 14

New Hampshire Transmission, LLC (NHT), a subsidiary of NextEra Energy Transmission, LLC (NEET), proposes to construct, own, and operate a portion of a new 345 kilovott (kV) overhead (OH) and underground (UG) line from the Wakefield Junction 345kV Substation to the Mystic 345kV Substation. The entire project is referred to herein as the Wakefield-Mystic AC Solution or the Project. The Wakefield-Mystic AC Solution includes 11-miles of 345kV OH and UG line extending from the Wakefield Junction Substation to the Mystic 345kV Substation. The proposed five (5) miles of incumbent OH will be located in an incumbent right-of-way (ROW) and the remaining six (6) miles of UG route will be owned by NHT and located in the Massachusetts Bay Transportation Authority's (MBTA) ROW.

The Project will also include a new 150MVAr STATCOM located within the Tewksbury 345kV Substation. The Wakefield-Mystic AC Solution also includes upgrading the existing West Amesbury – King Street 115kV line (K163 Line) to address the identified 115kV overload on this circuit. Upgrades to the K163 Line, the STATCOM, the first five (5) miles of OH, and modifications to the existing Wakefield Junction and Mystic 345kV Substations to accommodate termination of the new 345kV OH/UG line extending from the Wakefield Junction Substation, in aggregate, are considered incumbent upgrades. The Wakefield-Mystic AC Solution satisfies all of the reliability needs identified in the Boston 2028 Needs Assessment (Assessment), including dynamic reactive support for system restoration.

The Project is a viable alternative solution to NHT's preferred SeaLink Project. It mitigates all of the identified needs in the Boston 2028 Needs Assessment and offers the dynamic reactive power requirements to satisfy the ISO-NE System Restoration Plan requirements. The Wakefield-Mystic AC Solution will have minimal impact on the community and environment due to its utilization of existing transmission ROWs, partial underground line design, and location of the STATCOM being adjacent to an existing substation.

Installed and Life-Cycle Cost Estimates

The Wakefield-Mystic AC Solution's installed cost estimate in nominal dollars is $160.5 million, and the estimate life-cycle cost in 2023 is $89.3 million. NHT understands ISO-NE will obtain costs associated with the Incumbent Upgrades directly from the incumbent owner of those facilities which will serve to validate NHT's estimate, or will serve to replace this portion of NHT's total estimated installed cost. NHT used the latest cost estimate data from leading AC vendors and extensive internal transmission experience, including lessons learned from other NextEra subsidiaries. This process allowed NHT to develop an accurate cost estimate for Wakefield-Mystic AC Solution while significantly reducing uncertainty around that estimate.

Cost Containment

NHT proposes cost containment in the form of multiple firm cost caps, including for installed cost, annual revenue requirements, O&M, maximum equity thickness, and maximum return on equity. In addition, NHT proposes an economic penalty for missing the need date of June 1, 2024, which ultimately helps to mitigate costs for ISO-NE customers.

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Technical Design

In response to identified Boston area needs, NHT proposes the Wakefield-Mystic AC Solution creating a parallel AC path to the existing Wakefield Junction – Mystic 345kV line (LN 349, LN349X, and LN349Y), incorporation of a new PAR and STATCOM, and an upgrade of the existing 115kV K163 Line. The new and upgraded facilities comprising Wakefield-Mystic AC Solution mitigates all identified Boston 2028 reliability needs including all 345kV and 115kV overloads, and provides the required reactive power needs to support the ISO-NE's System Restoration Plan. The proposed project scope of the Wakefield-Mystic AC Solution includes the following:

- one new 345kV line totaling approximately 11.0 miles
- reconductoring of a 115kV line for approximately 7.3 miles
- reconfiguring two 115kV lines into a double circuit tower configuration totaling 10.0 miles
- expansion of an existing 345kV station to accommodate a STATCOM
- addition of two new 345kV breakers to existing bays
- one new +/- 150MVAr STATCOM

Routing of Line

NHT reviewed the existing transmission ROW between Wakefield Junction and the Mystic Substation. The existing transmission line ROW already contains two 115kV overhead lines and one 345kV line, therefore NHT proposes rebuilding the incumbent's two (2) 115kV single circuit lines as a double circuit 115kV in order to accommodate the proposed 345kV OH section in the existing ROW. Ultimately, NHT determined its strategy was to propose a new OH 345kV line in the incumbent ROW and then build an UG line in the MBTA ROW.

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Community and Environmental Impact

The Project minimizes impact on communities and the environment during construction and creates a valuable resource for the communities during operation. The MBTA ROW 345kV segment will be underneath a bike path which results in significantly less impact on host communities. Post-construction, the UG segment of the Project will have no visual impact on local residents.

The Project's route enhances six (6) miles of highly desirable bikeway on an existing MBTA easement. This infrastructure investment goes well beyond the basic needs of utility service to enhance the economic vitality and quality of life in the local communities that host the project.

1.36 BOS-071: New Hampshire Transmission, LLC – New Hampshire Transmission, LLC-Proposal 8

New Hampshire Transmission, LLC (NHT), a subsidiary of NextEra Energy Transmission, LLC (NEET), proposes to construct, own, and operate a portion of a new 345 kilovolt (kV) overhead (OH) and underground (UG) line from the Wakefield Junction 345kV Substation to the Mystic 345kV Substation. As part of this project, NHT also proposes a new Phase Angle Regulator (PAR) at the Wakefield Junction 345kV Substation. The entire project is referred to herein as the Wakefield-Mystic AC Solution or the Project. The Wakefield-Mystic AC Solution includes 11-miles of 345kV OH and UG line extending from the Wakefield Junction Substation to the Mystic 345kV Substation. The proposed five (5) miles of incumbent OH will be located in an incumbent right-of-way (ROW) and the remaining six (6) miles of UG route will be owned by NHT and located in the Massachusetts Bay Transportation Authority's (MBTA) ROW.

The Project will also include a new 150MVAr STATCOM located within the Tewksbury Substation, and upgrading the existing West Amesbury – King Street 115kV line (K163 Line) to address the identified 115kV overload on this circuit. Upgrades to the K163 Line, the PAR, STATCOM, the first 5 miles of OH, and modifications to the existing Wakefield Junction and Mystic 345kV Substations to accommodate termination of the new 345kV OH/UG line extending from the Wakefield Junction Substation, in aggregate, are considered incumbent upgrades. The Wakefield-Mystic AC Solution satisfies all of the reliability needs identified in the Boston 2028 Needs Assessment (Assessment), including dynamic reactive support for system restoration.

The Project is a viable alternative solution to NHT's preferred SeaLink Project. It mitigates all of the identified needs in the Boston 2028 Needs Assessment and offers the dynamic reactive power requirements to satisfy the ISO-NE System Restoration Plan requirements. The Wakefield-Mystic AC Solution will have minimal impact on the community and environment due to its utilization of existing transmission ROWs, partial underground line design, and location of the PAR and STATCOM being adjacent to existing substations.

Installed and Life-Cycle Cost Estimates

The Wakefield-Mystic AC Solution's installed cost estimate in nominal dollars is $182.2 million, and the estimated life-cycle cost in 2023 is $89.3 million. NHT understands ISO-NE will obtain costs associated with the Incumbent Upgrades directly from the incumbent owner of those facilities which will serve to validate NHT's estimate, or will serve to replace this portion of NHT's total estimated installed cost. NHT used the latest cost estimate data from leading AC vendors and extensive internal transmission experience, including lessons learned from other NextEra subsidiaries. This process allowed NHT to develop an accurate cost estimate for Wakefield-Mystic AC Solution while significantly reducing uncertainty around that estimate.

Cost Containment

NHT proposes cost containment in the form of multiple firm cost caps, including for installed cost, annual revenue requirements, O&M, maximum equity thickness, and maximum return on equity. In addition, NHT proposes an economic penalty for missing the need date of June 1, 2024, which ultimately helps to mitigate costs for ISO-NE customers.

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Technical Design

In response to identified Boston area needs, NHT proposes the Wakefield-Mystic AC Solution creating a parallel AC path to the existing Wakefield Junction – Mystic 345kV line (LN 349, LN349X, and LN349Y), incorporation of a new PAR and STATCOM, and an upgrade of the existing 115kV K163 Line. The new and upgraded facilities comprising Wakefield-Mystic AC Solution mitigates all identified Boston 2028 reliability needs including all 345kV and 115kV overloads, and provides the required reactive power needs to support the ISO-NE's System Restoration Plan. The proposed project scope of the Wakefield-Mystic AC Solution includes the following:

- one new 345kV line totaling 11 miles
- reconfiguring two 115kV lines into a double circuit tower configuration totaling 10.0 miles
- reconductoring of a 115kV line for 7.3 miles
- expansion of an existing 345kV station to accommodate a Phase Angle Regulator
- addition of three new 345kV breakers to existing bays
- expansion of an existing 345kV station to accommodate a new STATCOM

Routing of Line

NHT reviewed the existing transmission ROW between Wakefield Junction and the Mystic Substation. The existing transmission line ROW already contains two 115kV overhead lines and one 345kV line, therefore NHT proposes rebuilding the incumbent's two (2) 115kV single circuit lines as a double circuit 115kV in order to accommodate the proposed 345kV OH section in the existing ROW. Ultimately, NHT determined its strategy was to propose a new OH 345kV line in the incumbent ROW and then build an UG line in the MBTA ROW.

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Community and Environmental Impact

The Project minimizes impact on communities and the environment during construction and creates a valuable resource for the communities during operation. The MBTA ROW 345kV segment will be underneath a bike path or existing city streets which results in significantly less impact on host communities. Post-construction, the UG segment of Wakefield-Mystic AC Solution will have no visual impact on local residents.

The Project's route enhances six (6) miles of highly desirable bikeway on an existing MBTA easement. This infrastructure investment goes well beyond the basic needs of utility service to enhance the economic vitality and quality of life in the local communities that host the project.