APPENDIX 1

INTERCONNECTION REQUEST

FOR ELECTIVE TRANSMISSION UPGRADE

The undersigned Interconnection Customer submits this request to interconnect its Elective Transmission Upgrade ("ETU") to the Administered Transmission System under Schedule 25 – Elective Transmission Upgrade Interconnection Procedures ("ETU IP") of Section II to the ISO New England Inc. Transmission, Markets and Services Tariff (the "Tariff"). Capitalized terms have the meanings specified in the Tariff.

PROJECT INFORMATION

Proposed Project Name: _____

1. Description of the ETU objective (*select one of a, b, c, d, or e):*

1. ____Addition of a specific technology:

1. Type of new facility *(check all applicable)*:

____DC ____AC ____controllable ____non-controllable ____Other (Explain):

2. Address(es) or Location(s) of the ETU (including Town/City, County & State or a map detailing such information):

3. Location(s) of the proposed Point(s) of Interconnection and associated terminals:

4. Transmission transfer capability, including:

1. Energy transfer capability and direction(s) of flow

2. Capacity transfer capability and direction(s) of flow

3. Other:

5. Indicate whether the study should consider:

1. Both directions of flow

2. One direction of flow only

3. Explain:

2. ____ Modification to existing PTF, MTF or OTF that is part of or interconnected to the Administered Transmission System. Explain.

3. ____Specific performance objective associated with specific Generating Facility(ies)/resources:

1. Identify Generating Facility(ies)/resources, including Queue Positions:

ii) Identify the specific performance goals/objectives of the ETU (e.g., energy integration):

4. ____Increase in transfer capability between points, including:

1. Transfer points (from/to)

2. Energy transfer capability increase and direction(s) of flow

3. Capacity transfer capability increase and direction(s) of flow

4. Other

5. ____Other specific and clearly described discrete objective:

6. Projected Dates:

1. Commercial Operation: _____

2. Trial Operation: _____

3. In-Service: _____

4. This request is for (*check either Internal ETU or External ETU options*):

1) ____An <u>Internal ETU</u> (*check one of i <u>or</u> ii*):

1. ____The interconnection of proposed new (*check one*):

1. ____PTF;

2. ____OTF or MTF.

2. ____A modification to, an increase in the transmission capability of, or other specific proposed objective associated with *(check one*):

1. ____existing internal PTF;

2. ____existing internal MTF or OTF that is interconnected to the Administered Transmission System.

2) ____An <u>External ETU</u> *(check i or ii or iii and specify the other Control Area interconnecting to*_____)

1. ____The interconnection of proposed new *(check one):*

1. ____PTF;

2. ____ OTF or MTF.

2. ____A modification to, an increase in the transmission capability of, or other specific proposed objective associated with (*check one):*

1. ____existing external PTF

2. ____existing external MTF or OTF.

3. _____A change from NI Interconnection Service to CNI Interconnection Service for a controllable MTF or OTF (no physical change to facilities).

1. For External controllable OTF or MTF in the importing direction, applicant requests (*check one*):

1. ____NI Interconnection Service (i.e., energy only): _____ MW

2. ____CNI Interconnection Service (i.e., capacity and energy): _____ MW

1. If CNI Interconnection Service, does the Interconnection Customer request Long Lead Facility treatment? ____Yes or ____No

If yes, provide to ISO-NE, together with this Interconnection Request, the Long Lead Facility deposit and other required information as specified in Section 3.2.3 of the ETU IP, including a justification for Long Lead Facility treatment.

3. Evidence of Site Control *(check one)*:

a. ____If for CNI Interconnection Service, Site Control is included with this Interconnection Request form, as required.

b. ____If for NI Interconnection Service *(check one):*

1. ___Site Control is provided with this Interconnection Request form.

2. ___In lieu of evidence of Site Control, a $10,000 deposit is provided with this Interconnection Request form (refundable within the cure period as described in Section 3.3.3 of the ETU IP).

3. ___Site Control is not provided because the proposed modification is either: a) to existing MTF, OTF or PTF and by checking this option, the Interconnection Customer certifies that the proposed modification does not require additional real property, or b) to PTF and the Interconnection Customer does not own such PTF.

4. This Interconnection Customer requests *(check one):*

4) ___An Interconnection Feasibility Study to be completed as a separate and distinct study, or

5) ___An Interconnection System Impact Study with the Feasibility Study to be performed as the first step of the study.

6) If seeking CNI Interconnection Service, does the Interconnection Customer request a preliminary non-binding, analysis to identify potential upgrades that may be necessary to qualify resources for participation in a Forward Capacity Auction? ____Yes or ____No

Note: The above selection of a or b is not required as part of the initial Interconnection Request; however, the Interconnection Customer shall select either option and may revise this selection up to within five (5) Business Days following the Scoping Meeting.

5. The ETU technical data specified within the applicable attachment to this form *(check one):*

1) ____Is included with the submittal of this Interconnection Request.

2) **____Will be provided on or before the execution and return of the Feasibility Study Agreement (Attachment B) or the System Impact Study Agreement (Attachment A), as applicable.**

CUSTOMER INFORMATION

	Interconnection Customer	**Customer Representative**
Company Name:		
Address: (PO Box)		
(Street)		
(City, State, ZIP)		
Phone:		
FAX:		
Email:		

ISO Customer ID# (if available):_____

This Interconnection Request is submitted by:

Authorized Signature:_____ **Date:** _____

Name (type or print):_____

Title:_____

Company:_____

In order for an Interconnection Request to be considered a valid request, it must:

(a) Be accompanied by a deposit of $50,000.00 that is provided electronically and which may be refundable in accordance with Section 3.3.1 of the ETU IP;

(b) For CNI Interconnection Service, include documentation demonstrating Site Control. If for NI Interconnection Service, demonstrate Site Control or post an additional deposit of $10,000. If the Interconnection Customer with an Interconnection Request for NI Interconnection Service demonstrates Site Control within the cure period specified in Section 3.3.3 of the ETU IP, the additional deposit of $10,000 shall be refundable (An Interconnection Customer does not need to demonstrate Site Control for an Interconnection Request for a modification to its existing PTF, MTF or OTF facility where the Interconnection Customer has certified that it has Site Control and that the proposed modification does not require additional real property);

(c) Include a detailed map, such as a map of the quality produced by the U.S. Geological Survey, which clearly indicates the site of the new facility and pertinent surrounding structures;

(d) Include a one-line diagram of the facilities (2 copies);

(e) Include all information required on the Interconnection Request form and any attachments thereto; and

(f) Include the deposit and all information required for Long Lead Facility treatment, if such treatment is requested in accordance with Section 3.2.3 of the ETU IP.

In addition, within sixty (60) days of submitting an Interconnection Request to the System Operator, the Interconnection Customer with a request for an External ETU, shall provide evidence that it has submitted a valid request with the other Control Area to which it seeks to interconnect.

All Interconnection Requests must be sent to the System Operator via the Interconnection Request Tracking Tool or IRTT, a web-based application for submitting, tracking and viewing Interconnection Requests available on the ISO New England website.

ISO New England Inc. Use

Date Elective Transmission Upgrade Request Received: _____

Received By:_____

☐ **Deficient** **Date Cured:** _____

Date Deemed Valid Application: _____

Deemed Valid By: _____

The technical data required below must be submitted no later than the date of execution of the System Impact Study Agreement pursuant to Section 7.2 of the ETU IP. Submit additional data sheets as necessary.

ELECTIVE TRANSMISSION UPGRADES:

GEOGRAPHIC MAP
Geographic map which clearly illustrates the location of the proposed Elective Transmission Upgrade facilities and which includes the location of the proposed Point(s) of Interconnection and a specific transmission line or transmission cable route if applicable.
ONE LINE DIAGRAM
Detailed one-line diagram of the proposed Elective Transmission Upgrades facilities showing the connectivity between all new proposed equipment (i.e., circuit breakers, instrument transformers, surge arresters, transformers, shunt-connected capacitor banks, shunt-connected reactors, dynamic reactive power supply systems, transmission lines, etc.) and the proposed bus configuration at the Point(s) of Interconnection. Equipment grounding configuration should be depicted on the one-line (i.e., for transformers show winding and grounding arrangement)
PROPOSED POINT(S) OF INTERCONNECTION ***(include additional points as necessary)***
Point of Interconnection A:
Voltage Level: _____kV
Point of Interconnection B:

Voltage Level: _____Kv
Point of Interconnection C:
Voltage Level: _____kV
AC TRANSMISSION LINE DATA ***(include data for segments between the POI and converter station(s) as necessary)***
Transmission line length: _____Miles
AC transmission tower design illustrating tower type, conductor type, number of conductors per bundle, spacing of conductors within bundle, phase spacing between conductors or conductor bundles, and conductor or conductor bundle clearances.
Voltage level: _____kV
Transmission line MVA base: _____ MVA
Positive sequence impedances on transmission line MVA base: R: _____ p.u. X:_____ p.u. B:_____ p.u.
Zero sequence impedances on transmission line MVA base): R: _____ p.u. X:_____ p.u. B:_____ p.u.
Line Rating: Normal/LTE/STE Rating _____ MVA / _____ MVA /_____ MVA

TRANSFORMER DATA ***(include data for converter station power transformer(s) as necessary)***
Transformer Rating: OA/FA/FOA Rating _____ MVA / _____ MVA /_____ MVA
Voltage Ratio: High-side/Low-side/Tertiary _____kV /_____kV /_____kV
Winding Connections (Delta, Wye, or Wye-Grounded): High-side Winding / Low-side Winding / Tertiary Winding _____ / _____ / _____
Fixed or Variable Taps:
Tap Range:
Two-Winding Transformer Impedances: Positive Sequence Impedance on transformer OA MVA base: _____% _____ X/R Zero Sequence Impedance on transformer OA MVA base: _____% _____ X/R
Three-Winding Transformer Impedances:
Positive Sequence Impedance on transformer OA MVA base $Z1_{H-L}$ (on self-cooled MVA rating) _____%, X/R _____ $Z1_{H-T}$ (on self-cooled MVA rating) _____%, X/R _____ $Z1_{L-T}$ (on self-cooled MVA rating) _____%, X/R _____

Zero Sequence Impedance on transformer OA MVA base $Z0_{H-L}$ (on self-cooled MVA rating) _____%, X/R _____ $Z0_{H-T}$ (on self-cooled MVA rating) _____%, X/R _____ $Z0_{L-T}$ (on self-cooled MVA rating) _____%, X/R _____
FIXED OR SWITCHED SHUNT CAPACITOR BANK DATA
Capacitor Bank Rating: _____ MVAr
Positive sequence susceptance on capacitor bank rating base: B:_____ p.u.
Zero sequence susceptance on capacitor bank rating base: B:_____ p.u.
FIXED OR SWITCHED SHUNT REACTOR DATA
Nameplate Reactor Rating: _____ MVAr
Positive sequence susceptance on reactor rating base: B:_____ p.u.
Zero sequence susceptance on reactor rating base: B:_____ p.u.
DYNAMIC SHUNT REACTIVE SUPPLY SYSTEM
Device Type (i.e., SVC, STATCOM, etc.):
Reactive power supply reference point:
Maximum leading reactive power supply capability: _____ MVAr

Maximum lagging reactive power supply capability: _____ MVAr
DC TRANSMISSION SYSTEMS (LINE-COMMUTATED CONVERTER TECHNOLOGY)
Nameplate power transmission capacity: _____ MW _____ MVA
Minimum power transmission capacity: _____MW
Maximum power transmission ramp rate: _____MW/min
Point-to-point or back-to-back transmission:
Monopolar or bipolar transmission configuration:
Unidirectional or bidirectional power transmission: (identify rectifier station for detail to be submitted below):
Rated DC voltage: _____ kV
Rated DC current: _____ A
Power controlling converter station and real power reference location:
Converter station losses (including auxiliary power demand) at nameplate power: Rectifier: _____ kW Inverter: _____ kW
Transmission line or cable losses at nameplate power: _____kW
Nominal rectifier firing angle (alpha): _____ deg

Nominal inverter extinction angle (gamma): _____ deg

Converter station total reactive power supply (including filtering system) at nameplate active power: Rectifier: _____ MVAr Inverter: _____MVAr
Number of switched filter or reactive power supply devices: Rectifier: _____ Inverter:_____
Size of largest switched filter or reactive power supply device: Rectifier:_____ MVAr Inverter: _____ MVAr
DC transmission tower design illustrating tower type, conductor type, number of conductors, spacing between pole conductors or conductor bundles, and conductor or conductor bundle clearances.
DC cable design illustrating cable type, cable spacing, and underground or submarine installation design.
Pole conductor resistance at maximum operating temperature: _____ ohms
DMNR conductor resistance at maximum operating temperature : _____ ohms
DC TRANSMISSION SYSTEMS (VOLTAGE SOURCE CONVERTER TECHNOLOGY)
Nameplate power transmission capacity: _____ MW _____ MVA
Point-to-point or back-to-back transmission:

Transmission configuration (i.e., mono-pole, bi-pole or other):
Unidirectional or bidirectional power transmission: (identify rectifier station for detail to be submitted below):
Maximum power transmission ramp rate: _____ MW/min
Rated DC voltage: _____ kV
Rated DC current: _____ A
Real power controlling converter and reference location:
Converter station losses (including auxiliary power demand) at nameplate power: _____ kW
Transmission line or cable losses at nameplate power: _____kW
Passive filter size: Rectifier: Fixed: ____MVAr Switched at de-block: _____MVAr Inverter: Fixed: ____MVAr Switched at de-block: _____MVAr
Maximum converter station leading reactive power supply (including filtering system) at the network side of the power transformer and at nameplate active power: Rectifier:_____ MVAr Inverter: _____MVAr

Maximum converter station lagging reactive power supply (including filtering system) at the network side of the power transformer and at nameplate active power: Rectifier:_____ MVAr Inverter: _____MVar
Provide reactive capability curve.
DC transmission tower design illustrating tower type, conductor type, number of conductors, spacing between pole conductors or conductor bundles, and conductor or conductor bundle clearances.
DC cable design illustrating cable type, cable spacing, and underground or submarine installation design.
Pole conductor resistance at maximum operating temperature: _____ ohms
POWER SYSTEM SIMULATION MODELS
Completed, fully-functioning, public (*i.e.*, non-proprietary or non-confidential) Siemens PTI's ("PSS/E") power flow models or other compatible formats, such as IEEE and General Electric Company Power Systems Load Flows ("PSLF") data sheet, must be supplied with this Attachment A. If additional public data sheets are more appropriate to the proposed device, then they shall be provided and discussed at the Scoping Meeting. For all Interconnection Studies commencing after January 1, 2017, all power flow models must be standard library models in PSS/E or applicable applications. After January 1, 2017, user-models will not be accepted. If a PSCAD model is deemed required at the Scoping Meeting, then the PSCAD model must be provided to the System Operator within ninety (90) Calendar Days of the executed Interconnection System Impact Study Agreement. A benchmarking analysis, consistent with the requirements in the ISO New England Planning Procedures, confirming acceptable performance of the PSS/E model in comparison to the PSCAD model, shall be provided at the time PSCAD model is submitted.

OTHER TRANSMISSION FACILITY DATA
System Operator and Interconnecting Transmission Owner reserve the right to request additional technical information from Interconnection Customer as may reasonably become necessary consistent with Good Utility Practice during the course of the Interconnection Facilities Study.

Applicant Signature

I hereby certify that, to the best of my knowledge, all the information provided in this Attachment A to the Interconnection Request is true and accurate.

For Interconnection Customer:_____ Date:_____

Attachment A-1
To Attachment A of Appendix 1
Cluster System Impact Study

Application Form

CLUSTER SYSTEM IMPACT STUDY APPLICATION FORM

The undersigned Interconnection Customer submits this form to request the inclusion of the Interconnection Request for its Elective Transmission Upgrade in a Cluster Interconnection System Impact Study pursuant to Section 4.2.3.2.2 of this ETU IP.

To be included in a Cluster Interconnection System Impact Study, the following must be submitted together with this form to the System Operator by the Cluster Entry Deadline:

1. Project Information:
   1.3 Project Name:_____
   1.4 Queue Position:_____
   1.5 Is the Interconnection Request contractually associated with an Interconnection Request for a Generating Facility? Yes ____ No ____
   If yes, identify Queue Position of the associated Interconnection Request and provide evidence of the contractual commitment. Queue Position No.: _____

2. Initial Cluster Participation Deposit as specified in Section 4.2.3.2.2

Applicant Signature

I hereby certify that, to the best of my knowledge, all the information provided in this form is true and accurate.

For Interconnection Customer:_____Date:_____

The technical data required below must be submitted no later than the date of execution of the Feasibility Study Agreement pursuant to Section 6.1 of the ETU IP. Submit additional data sheets as necessary.

ELECTIVE TRANSMISSION UPGRADES:

GEOGRAPHIC MAP
Geographic map which clearly illustrates the location of the proposed Elective Transmission Upgrade facilities and which includes the location of the proposed Point(s) of Interconnection and a conceptual transmission line or transmission cable route if applicable.
ONE LINE DIAGRAM
Conceptual one-line diagram of the proposed Elective Transmission Upgrades facilities showing the connectivity between all new proposed equipment (i.e., circuit breakers, transformers, shunt-connected capacitor banks, shunt-connected reactors, dynamic reactive power supply systems, transmission lines, etc.) and the proposed bus configuration at the Point(s) of Interconnection.
PROPOSED POINT(S) OF INTERCONNECTION ***(include additional points as necessary)***
Point of Interconnection A:
Voltage Level: _____kV
Point of Interconnection B:
Voltage Level: _____kV

Point of Interconnection C:
Voltage Level: _____kV
AC TRANSMISSION LINE DATA ***(include data for segments between the POI and converter station(s) as necessary)***
Estimated transmission line length: _____Miles
Conceptual AC transmission tower design illustrating tower type, conductor type, number of conductors per bundle, spacing of conductors within bundle, phase spacing between conductors or conductor bundle spacing, and conductor or conductor bundle clearances.
Voltage level: _____kV
Transmission line MVA base: _____ MVA
Estimated positive sequence impedances on transmission line MVA base: R: _____ p.u. X:_____ p.u. B:_____ p.u.
Estimated zero sequence impedances on transmission line MVA base): R: _____ p.u. X:_____ p.u. B:_____ p.u.
Line Rating: Normal/LTE/STE Rating _____ MVA / _____ MVA /_____ MVA

TRANSFORMER DATA ***(include data for converter station power transformer(s) as necessary)***
Estimated Transformer Rating: OA/FA/FOA Rating _____ MVA / _____ MVA /_____ MVA
Voltage Ratio: High-side/Low-side/Tertiary _____kV /_____kV /_____kV
Winding Connections (Delta, Wye, or Wye-Grounded): High-side Winding / Low-side Winding / Tertiary Winding _____ / _____ / _____
Fixed or Variable Taps:
Estimated Tap Range:
Estimated Two-Winding Transformer Impedances: Positive Sequence Impedance on transformer OA MVA base: _____% _____ X/R Zero Sequence Impedance on transformer OA MVA base: _____% _____ X/R
Estimated Three-Winding Transformer Impedances:
Positive Sequence Impedance on transformer OA MVA base $Z1_{H-L}$ (on self-cooled MVA rating) _____%, X/R _____ $Z1_{H-T}$ (on self-cooled MVA rating) _____%, X/R _____ $Z1_{L-T}$ (on self-cooled MVA rating) _____%, X/R _____

Zero Sequence Impedance on transformer OA MVA base $Z0_{H-L}$ (on self-cooled MVA rating) _____%, X/R _____ $Z0_{H-T}$ (on self-cooled MVA rating) _____%, X/R _____ $Z0_{L-T}$ (on self-cooled MVA rating) _____%, X/R _____
FIXED OR SWITCHED SHUNT CAPACITOR BANK DATA
Capacitor Bank Rating: _____ MVAr
Estimated positive sequence susceptance on capacitor bank rating base: B:_____ p.u.
Estimated zero sequence susceptance on capacitor bank rating base: B:_____ p.u.
FIXED OR SWITCHED SHUNT REACTOR DATA
Nameplate Reactor Rating: _____ MVAr
Estimated positive sequence susceptance on reactor rating base: B:_____ p.u.
Estimated zero sequence susceptance on reactor rating base: B:_____ p.u.
DYNAMIC SHUNT REACTIVE SUPPLY SYSTEM
Device Type (i.e., SVC, STATCOM, etc.):
Reactive power supply reference point:
Maximum leading reactive power supply capability: _____ MVAr

Maximum lagging reactive power supply capability: _____ MVAr
DC TRANSMISSION SYSTEMS (LINE-COMMUTATED CONVERTER TECHNOLOGY)
Nameplate power transmission capacity: _____ MW _____ MVA
Minimum power transmission capacity: _____MW
Maximum power transmission ramp rate: _____MW/min
Point-to-point or back-to-back transmission:
Monopolar or bipolar transmission configuration:
Unidirectional or bidirectional power transmission: (identify rectifier station for detail to be submitted below):
Rated DC voltage: _____ kV
Rated DC current: _____ A
Power controlling converter station and real power reference location:
Estimated converter station losses (including auxiliary power demand) at nameplate power: Rectifier: _____ kW Inverter: _____ kW
Estimated transmission line or cable losses at nameplate power: _____kW
Nominal rectifier firing angle (alpha): _____ deg

Nominal inverter extinction angle (gamma): _____ deg
Estimated converter station total reactive power supply (including filtering system) at nameplate active power: Rectifier: _____ MVAr Inverter: _____ MVAr
Estimated number of switched filter or reactive power supply devices: Rectifier: _____ Inverter: _____
Estimated size of largest switched filter or reactive power supply device: Rectifier: _____ MVAr Inverter: _____ MVAr
Conceptual DC transmission tower design illustrating tower type, conductor type, number of conductors, spacing between pole conductors or conductor bundles, and conductor or conductor bundle clearances.
Conceptual DC cable design illustrating cable type, cable spacing, and underground or submarine installation design.
Estimated pole conductor resistance at maximum operating temperature: _____ ohms
Estimated DMNR conductor resistance at maximum operating temperature : _____ ohms
DC TRANSMISSION SYSTEMS (VOLTAGE SOURCE CONVERTER TECHNOLOGY)
Nameplate power transmission capacity: _____ MW _____ MVA
Point-to-point or back-to-back transmission:

Transmission configuration (i.e., mono-pole, bi-pole or other):
Unidirectional or bidirectional power transmission: (identify rectifier station for detail to be submitted below):
Maximum power transmission ramp rate: _____MW/min
Rated DC voltage: _____ kV
Rated DC current: _____ A
Real power controlling converter and reference location:
Estimated converter station losses (including auxiliary power demand) at nameplate power: _____ kW
Estimated transmission line or cable losses at nameplate power: _____kW
Estimated passive filter size: Rectifier: Fixed: ____MVAr Switched at de-block: _____MVAr Inverter: Fixed: ____MVAr Switched at de-block: _____MVAr
Estimated maximum converter station leading reactive power supply (including filtering system) at the network side of the power transformer and at nameplate active power: Rectifier:_____ MVAr Inverter:_____ MVAr

Estimated maximum converter station lagging reactive power supply (including filtering system) at the network side of the power transformer and at nameplate active power: Rectifier:_____ MVAr Inverter:_____ MVAr
Provide reactive capability curve.
Conceptual DC transmission tower design illustrating tower type, conductor type, number of conductors, spacing between pole conductors or conductor bundles, and conductor or conductor bundle clearances.
Conceptual DC cable design illustrating cable type, cable spacing, and underground or submarine installation design.
Estimated pole conductor resistance at maximum operating temperature: _____ ohms
POWER SYSTEM SIMULATION MODELS
Completed, fully-functioning, public (*i.e.,* non-proprietary or non-confidential) Siemens PTI's PSS/E power flow models or other compatible formats, such as IEEE and General Electric Company Power Systems Load Flows ("PSLF") data sheet, must be supplied with this Attachment A. If additional public data sheets are more appropriate to the proposed device, then they shall be provided and discussed at the Scoping Meeting. For all Interconnection Studies commencing after January 1, 2017, all power flow models must be standard library models in PSS/E or applicable applications. After January 1, 2017, user-models will not be accepted.
OTHER TRANSMISSION FACILITY DATA

System Operator and Interconnecting Transmission Owner reserve the right to request additional technical information from Interconnection Customer as may reasonably become necessary consistent with Good Utility Practice during the course of the Interconnection System Impact Study.

Applicant Signature

I hereby certify that, to the best of my knowledge, all the information provided in this Attachment B to the Interconnection Request is true and accurate.

For Interconnection Customer:_____ Date:_____