



56 Prospect Street
Hartford, CT 06103

David J. Burnham
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May 18, 2022

Ms. Emily Laine
Chair, NEPOOL Reliability Committee
ISO New England, Inc.
One Sullivan Road
Holyoke, MA 01040-2841

Dear Ms. Laine,

In accordance with Schedule 12C of the ISO New England ("ISO-NE") Transmission, Markets & Services Tariff ("ISO-NE Tariff"), Eversource Energy Service Company ("Eversource") hereby submits the attached Transmission Cost Allocation ("TCA") application(s) reporting cost support information associated with the construction, retirement, or modification to facilities rated 69 kV and above that qualify as regional Pool Transmission Facilities ("PTF") for the following Eversource project:

ES-22-TCA-15 Eastern Connecticut (ECT) 2029 Transmission Project

Eversource is requesting that ISO-NE submit this TCA to the NEPOOL Reliability Committee for review, in accordance with ISO-NE Planning Procedure No. 4 ("PP-4").

If you have any questions, I can be reached via the information listed above.

Sincerely,

David J. Burnham

David J. Burnham

cc: M. Drzewianowski

Attachment B
TCA Application Form

1. Applicant: Application #: ES-22-TCA-15 Date: May-22

Contact Name: David J. Burnham

Company Name: Eversource Energy Service Company

Address 1: 56 Prospect Street

Address 2: _____

City, State, Zip: Hartford, CT 06103

Contact Phone #: 860-728-4506

Email Address: david.burnham@eversource.com

RSP Project ID # or Asset Condition ID #: 1850, 1851, 1852, 1853, 1854, 1855, 1856, 1857, 1858, 1859, 1860, 1861, 1862, 1863

Is Project related to CIP-14
Yes ☐ No ☒

2. Project Description: In Service Date: Dec-23

a. **High Level Project Details:**

Project Name (If no formal name, then Substation Upgrade, Line Upgrade, etc. are acceptable):

Eastern Connecticut (ECT) 2029 Transmission Project

Project Location (State only):

State:

CT

County:

New London, Windham

b. Summary of PTF-related work for Project:

Numerous upgrades and rebuilds in the Eastern Connecticut area as listed in the attached project cost estimate and schedule sheet.

Final project cost details will be known following closeout of all project work orders.

c. Summary of Non-PTF-related work for Project:

Relocate portions of distribution duct bank at Gales Ferry 11B substation to eliminate conflicts with the rebuild of the 100 and 400 lines from 69-kV to 115-kV. Relocate portions of distribution duct bank at Shunock 32P substation to accommodate synchronous condenser project.

3. Was a transmission Proposed Plan Application required for this work?

Yes

☒

No

☐

PPA Number: Rev.1, ES-21-T39

4. Has a transmission Proposed Plan Application been approved?

Yes

☒

No

☐

N/A ☐

Approval Date: 6/17/2021, 10/27/2021

If yes, attach a copy and reference Proposed Plan Application # and approval date.

(Please check only one)

Need For Project:

5. Need Based On (Check all Categories that apply):

- a. Reliability ☒
- b. Economic ☐
- c. Service to new load ☐
- d. New generator interconnection ☐
- Generator Proposed Plan Application Number _____
- Generator Proposed Plan Application Date _____
- (Attach copy of cover letter & Generator Proposed Plan Application)
- e. Public Policy Transmission Upgrade (PPTU) ☐
- f. Market Efficiency Transmission Upgrade (METU) ☐
- g. Asset Condition ☒
- h. Other (specify in line 6) ☐

6. Provide a narrative description of the need for this Project.

(Include available documentation relative to the need for this Project.)

The ISO-NE Eastern Connecticut Transmission (ECT) 2029 Solution Study referenced the need to upgrade the Eastern Connecticut transmission system. Numerous N-1 and N-1-1 thermal and voltage violations were identified in the Eastern Connecticut area.

The count of the number of transmission elements with N-1-1 Peak Load Thermal Violations in each subarea was as follows:

Element ID	Overloading Element	Dispatch	LTE Rating (MVA)	Initial Element OOS	Worst Contingency	Worst Case Thermal Loading (%LTE Rating) 2029
Card 5X	Card 345/115 kV Autotransformer	1A	512	LN_3348	BT_MONTV_1T (Loss of Montville to Haddam Neck Line, Montville to Millstone Line, two Montville 345/115 kV Autotransformers)	104.6
1090-NU	Montville to Fort Hill Farms Line	1A/4B	202	TF_CARD_5X	BF_CARD_16T (Loss of the Montville to Tunnel to Card Line, Card to Willimantic Line, two distribution transformers at Card, and one distribution transformer at Willimantic)	110.8
1090-CMEEC	Montville to Fort Hill Farms Line	1A/4B	207	TF_CARD_5X	BF_CARD_16T	108.2
1080-1	Card to Wawecus Junction Line	2B	202	TF_CARD_5X	DC_1000_1090 (Loss of the Montville to Bean Hill Line, Loss of the Montville to Fort Hill Farms Line, two distribution transformers at Dudley and one distribution transformer at Bean Hill and Fort Hill Farms)	109.0

Montville 16X	Montville 115/69 kV Autotransformer	2B	100	LN_3348	DC_1000_1080 (Loss of the Montville to Bean Hill Line, Montville to Tunnel to Card Line, one distribution transformer at Bean Hill and Card, and two distribution transformers at Dudley)	232.7
L190-4	Tower Hill to West Lington Line	1A/3A/4B	251	LN_1280	BF_KNTC_185T (Loss of the G-185S and G-185N Lines, two distribution transformers at Drumrock, one distribution transformer at Davisville, Old Baptist, and West Kingston)	100.6
L190-5	Tower Hill to Davisville Tap Line	1A/3A/4B	251	LN_1280	BF_KNTC_8520 (Loss of the G-185S Line, two distribution transformers and one capacitor at Kent County, one distribution transformer at Davisville, Old Baptist, and West Kingston)	115.0

N-1-1 2029 Peak Load Voltage Violations:

Bus Name	Base kV	Dispatch	Initial Element OOS	Worst Contingency	Worst Case Post- Contingency Pre- switching Voltage (p.u.) 2029	Worst Case Post- Contingency Post-switching Voltage (p.u.) 2029
Killingly	115	2B	TF_KILLNG_2X	LN_1080	No violation	0.885
Tunnel	115	2B	TF_KILLNG_2X	LN_1080	No Violation	0.911
Bean Hill	115	2B	LN_1000	LN_3348	No Violation	0.938
Card	115	4B	LN_1080 TF_CARD_5X	TF_CARD_5X LN_1080	0.850 _13	_13 0.876
Montville	115	1A and 4B	TF_CARD_5X	BT_MONTV_1T	0.604	0.905
Stockhouse	115	4B	LN_1090 TF_CARD_5X	TF_CARD_5X LN_1090	0.870 _13	_13 0.878
Fort Hill Farms	115	4B	LN_1090 TF_CARD_5X	TF_CARD_5X LN_1090	0.866 _13	_13 0.875
Shunock	115	2B	LN_G185S	BO_SHUNOK_2T	No violation	0.930

Link to ISO-NE Solutions Study report below (CEII):

https://smd.iso-ne.com/operations-services/ceii/pac/2020/06/final_ceii_ect_2029_ss.pdf

Cost of Project:

7. Total Project Cost (\$M) equals PTF + Non-PTF + all other Project Costs:

\$225.093

8. Total Proposed PTF Costs

a. Total Proposed PTF Cost of this Project (\$M):

\$195.944

b. Requested Pool-Supported PTF Costs associated with this Project (\$M):

\$195.944c. Breakdown of Requested Pool-Supported PTF Cost associated with this Project (\$M):
(Consistent with Table 1 and Appendix D of this Procedure)

Material

\$38.418

Labor

\$102.171

ROW

\$0.203

Engineering/Permitting/Indirects

\$27.640

Escalation

\$1.671

AFUDC (or equivalent)

\$7.493

Contingency

\$18.348

d. Generator Supported PTF Costs* (\$M):

\$0.000

If the costs in 8.b. plus 8.d. do not equal the total proposed PTF cost (8.a) explain and indicate who is responsible for the remaining costs.

9. Total Proposed Non-PTF Cost of this Project (\$M):

\$3.018

10. Proposed PTF Costs (\$M) introduced as a result of local, state or other regulatory/legislative requirements, including costs identified pursuant to Section 1.6.3 of this PP-4.

\$0.000

a. Description of Proposed PTF Cost introduced as a result of local, state or other regulatory/legislative requirements as defined in question 8 above.

11. All other Project Costs not captured in PTF Costs (8) or Non-PTF Costs (9) (\$M) associated with this Project:

\$26.131

12. Total PTF Cost based on: (check one)

Actual Costs ☐**OR**Estimated Costs* ☒13. Valuation Year(s) of dollar amounts submitted above: 2022

14. If applicable, explain how the cost of common facilities were allocated between PTF and Non-PTF.

15. Does this Project result in a change of existing Non-PTF facilities to PTF?

Yes

☐

No

☒

16. Describe the major transmission alternatives, and their costs consistent with the breakdown provided in item 7 of this Application, that were considered. Provided an explanation why the preferred alternative was selected.

(Include available documentation relative to the major transmission alternatives analysis and selection.)

Alternative:

Solution Alternative 1 -

Add a second 345/115-kV autotransformer at the Card substation; add a second 345/115-kV autotransformer at the Killingly substation; and add a 50 MVAR synchronous condenser at the Shunock substation.

- This does not address multiple asset condition concerns

Preferred:

Solution Alternative 2 -

Add a second 345/115-kV autotransformer at the Card substation; convert lines 400 and 100 (Tunnel to Buddington to Montville) substation from 69-kV to 115-kV; add a 50 MVAR synchronous condenser at the Shunock substation; add a 25.2 MVAR capacitor at the Killingly substation; and add a series breaker with the Montville 1T 345-kV breaker.

- This preferred solution will resolve the time-sensitive thermal overloads and voltage violations as well as address asset condition concerns.

Link to ISO-NE Solutions Study report below (CEII):

https://smd.iso-ne.com/operations-services/ceii/pac/2020/06/final_ceii_ect_2029_ss.pdf

17. Has state and local siting been completed? If yes, explain the siting process and any provisions that were made during siting, provide docket or siting reference numbers. If no, then explain when siting is expected to be completed and any provisions that have been agreed to.

Line	Title	Docket	Status	Special Provisions
1	RSP1850 - Install 2nd 345/115-kV Autotransformer (4X) and one 345-kV breaker at Card	Petition No. 1448	Approved 6/3/21	None
2	RSP1851 - Upgrade Card 115-kV to BPS standards	Petition No. 1448	Approved 6/3/21	None
3	RSP1852 - Install one 115-kV circuit breaker in series with Card 14T	Petition No. 1448	Approved 6/3/21	None
4	RSP1853 - Convert Gales Ferry substation from 69-kV to 115-kV	Petition No. 1484	Approved 05/12/2022	None
5a	RSP1854 - Rebuild the 100 Line from Montville to Gales Ferry to allow operation at 115-kV	Petition No. 1468	Approved 01/27/22	None
5b	RSP1854 - Rebuild the 100 Line from Montville to Gales Ferry to allow operation at 115-kV	Petition No. 1475	Approved 2/24/22	None
6	RSP1855 - Reterminate the 100 Line at Montville station and associated work. Energize 100 Line at 115-kV	Petition No. 1468	Approved 01/27/22	None
7	RSP1856 - Rebuild 400-1 Line section to allow operation at 115-kV (Tunnel to Ledyard Jct.)	Petition No. 1486	Approved 05/12/2022	None
8	RSP1857 - Add one 115-kV circuit breaker and re-terminate the 400-1 line section into Tunnel substation. Energize 400 Line at 115-kV	Petition No. 1486	Approved 05/12/2022	None
9	RSP1858 - Rebuild 400-2 Line section to allow operation at 115-kV (Ledyard Jct. - Border Bus with CMEEC)	Petition No. 1486	Approved 05/12/2022	None
10	RSP1859 - Rebuild 400-3 Line section to allow operation at 115-kV (Gales Ferry - Ledyard Jct.)	Petition No. 1475	Approved 2/24/22	None
11	RSP1860 - Install a 25.2 MVAR, 115-kV capacitor breaker at Killingly and one capacitor breaker	Petition No. 1453	Approved 7/29/21	None
12	RSP1861 - Install one 345-kV series breaker with Montville 1T (345-kV)	Exempt Modification EM-EVER-086-210611	Acknowledged 4/13/21	None
13	RSP1862 - Install a 50 MVAR synchronous condenser with two 115-kV breakers at Shunock	Petition No. 1459	Approved 10/07/21	None
14	RSP1863 - Install a 1% series reactor with by-pass switch at Mystic, CT on the 1465 Line	Petition No. 1455	Approved 7/29/21	None

* Pool-Supported PTF costs were determined pursuant to Schedule 11 of Section II of the Tariff.

PROJECT COST ESTIMATE & SCHEDULE SHEET

Transmission Owner: The Connecticut Light and Power Company

RSP Project #: 1850, 1851, 1852, 1853, 1854, 1855, 1856, 1857, 1858, 1859, 1860, 1861, 1862, 1863

Project Name: Eastern Connecticut (ECT) 2029 Transmission Project

Date: May-22

1. Project Scope Summary

Numerous upgrades and Rebuilds in the Eastern CT area to include: Installing a 2nd 345/115-kV Autotransformer (4X) and one 345-kV breaker at the Card substation; Upgrading the Card 115-kV substation to BPS standards; Install one 115-kV circuit breaker in series with Card 14T; Convert the Gales Ferry substation from 69-kV to 115-kV; Rebuild the 100-Line from Montville substation to Gales Ferry substation to allow operation at 115-kV; Reterminate the 100 Line at Montville substation and associated work and energize the 100 Line at 115-kV; Rebuild the 400-1 Line section to allow operation at 115-kV (Tunnel to Ledyard Jct.); Add one 115-kV circuit breaker and re-terminate the 400-1 line section into Tunnel substation and energize the 400-Line at 115-kV; Rebuild the 400-2 Line section to allow operation at 115-kV (Ledyard Jct. - Border Bus with CMEEC); Rebuild the 400-3 Line section to allow operation at 115-kV (Gales Ferry - Ledyard Jct.); Install a 25.2 MVAR 115-kV capacitor and capacitor breaker at Killingly; Install one 345-kV series breaker with the Montville 1T (345-kV); Install a 50 MVAR synchronous condenser with two 115-kV breakers at Shunock; Install a 1% series reactor with by-pass switch at Mystic, CT on the 1465 Line.

2. Project Cost Summary

(\$M)

2.1. Project Cost Summary			
Cost Category	PTF	Non-PTF	Total
Material	\$ 38.418	\$ 0.134	\$ 38.552
Labor & Equipment	\$ 102.171	\$ 1.244	\$ 103.415
Right of Way	\$ 0.203	\$ -	\$ 0.203
Engineering/Permitting /Indirects	\$ 27.640	\$ 1.324	\$ 28.964
Escalation	\$ 1.671	\$ -	\$ 1.671
AFUDC	\$ 7.493	\$ 0.052	\$ 7.545
Contingency	\$ 18.348	\$ 0.264	\$ 18.612
Total Project Cost	\$ 195.944	\$ 3.018	\$ 198.962

Material

Labor & Equipment

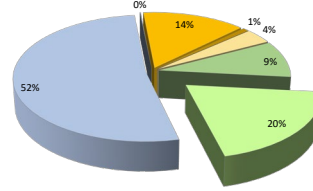
Right of Way

Engineering/Permitting /Indirects

Escalation

AFUDC

Contingency



2.2 Detailed Cost Summary By Project Element

Eastern Connecticut (ECT) 2029 Transmission Project	Material	Labor & Equipment	Right of Way	Engineering/ Permitting/ Indirects	Escalation	AFUDC	Contingency	Total	PTF Amount
RSP 1850, Install 2nd 345/115-kV Autotransformer (4X) and one 345-kV breaker at Card	\$ 4.801	\$ 8.144	\$ -	\$ 1.471	\$ 0.587	\$ 0.864	\$ 1.527	\$ 17.394	\$ 17.394
RSP 1851, Upgrade Card 115-kV to BPS standards	\$ 4.832	\$ 8.195	\$ -	\$ 1.481	\$ 0.590	\$ 0.869	\$ 1.535	\$ 17.502	\$ 17.502
RSP 1852, Install one 115-kV circuit breaker in series with Card 14T	\$ 0.539	\$ 0.914	\$ -	\$ 0.165	\$ 0.066	\$ 0.097	\$ 0.171	\$ 1.952	\$ 1.952
RSP 1853, Convert Gales Ferry substation from 69-kV to 115-kV	\$ 1.810	\$ 11.237	\$ -	\$ 2.698	\$ 0.172	\$ 0.786	\$ 1.843	\$ 18.546	\$ 17.256
RSP 1854, Rebuild the 100 Line from Montville to Gales Ferry to allow operation at 115-kV	\$ 0.888	\$ 3.528	\$ -	\$ 1.789	\$ -	\$ 0.197	\$ 0.593	\$ 6.995	\$ 6.995
RSP 1855, Reterminate the 100 Line at Montville station and associated work. Energize 100 Line at 115-kV	\$ 1.295	\$ 4.753	\$ -	\$ 1.335	\$ 0.026	\$ 0.347	\$ 0.651	\$ 8.407	\$ 8.407
RSP 1856, Rebuild 400-1 Line section to allow operation at 115-kV (Tunnel to Ledyard Jct.)	\$ 7.757	\$ 27.075	\$ 0.203	\$ 2.296	\$ 0.070	\$ 1.277	\$ 4.239	\$ 42.917	\$ 42.917
RSP 1857, Add one 115-kV circuit breaker and re-terminate the 400-1 line section into Tunnel substation. Energize 400 Line at 115-kV	\$ 0.635	\$ 4.562	\$ -	\$ 1.106	\$ 0.160	\$ 0.231	\$ 0.745	\$ 7.439	\$ 7.439
RSP 1858, Rebuild 400-2 Line section to allow operation at 115-kV (Ledyard Jct. - Border Bus with CMEEC)	\$ 1.566	\$ 9.611	\$ -	\$ 3.546	\$ -	\$ 0.410	\$ -	\$ 15.133	\$ 15.133
RSP 1859, Rebuild 400-3 Line section to allow operation at 115-kV (Gales Ferry - Ledyard Jct.)	\$ 0.798	\$ 4.364	\$ -	\$ 1.156	\$ -	\$ 0.237	\$ 0.300	\$ 6.855	\$ 6.855
RSP 1860, Install a 25.2 MVAR, 115-kV capacitor and one capacitor breaker at Killingly	\$ 0.490	\$ 3.137	\$ -	\$ 1.135	\$ -	\$ 0.061	\$ -	\$ 4.823	\$ 4.823
RSP 1861, Install one 345-kV series breaker with the Montville 1T (345-kV)	\$ 0.484	\$ 1.991	\$ -	\$ 1.395	\$ -	\$ 0.103	\$ -	\$ 3.973	\$ 3.973
RSP 1862, Install a 50 MVAR synchronous condenser with two 115-kV breakers at Shunock	\$ 12.228	\$ 13.722	\$ -	\$ 8.002	\$ -	\$ 1.950	\$ 6.344	\$ 42.246	\$ 40.518
RSP 1863, Install a 1% series reactor with by-pass switch at Mystic, CT on the 1465 Line	\$ 0.429	\$ 2.182	\$ -	\$ 1.389	\$ -	\$ 0.116	\$ 0.664	\$ 4.780	\$ 4.780
Total	\$ 38.552	\$ 103.415	\$ 0.203	\$ 28.964	\$ 1.671	\$ 7.545	\$ 18.612	\$ 198.962	\$ 195.944

3. Project Milestone Schedule

Description	Start	End	2017				2018				2019				2020				2021				2022				2023				2024			
			Qtr1	Qtr2	Qtr3	Qtr4	Qtr1	Qtr2	Qtr3	Qtr4	Qtr1	Qtr2	Qtr3	Qtr4	Qtr1	Qtr2	Qtr3	Qtr4	Qtr1	Qtr2	Qtr3	Qtr4	Qtr1	Qtr2	Qtr3	Qtr4	Qtr1	Qtr2	Qtr3	Qtr4	Qtr1	Qtr2	Qtr3	Qtr4
			Siting & Permitting																															
Approval and Permits	5/1/2019	9/8/2022																																
			Engineering																															
Engineering and Design	5/1/2019	12/31/2022																																
			Material																															
Material	12/3/2019	3/1/2023																																
			Construction																															
Construction	9/2/2020	12/31/2023																																

Eastern Connecticut (ECT) 2029 Transmission Project
Correlation Table

<u>TCA</u>	<u>RSP:</u>	<u>Study:</u>	<u>PPA Application:</u>		<u>PAC/RC Meeting:</u>	<u>TCA Application (\$Ms):</u>	
<u>Item</u>	Project ID #	Reliability Issues Requiring <u>Action</u>	<u>PPA No.</u>	<u>Preferred Solution Description</u>	<u>Presentation Reference</u>	<u>PTF Estimate</u>	<u>Non-PTF Estimate</u>
1	1850		ES-21-T31	Install 2nd 345/115-kV Autotransformer (4X) and one 345-kV breaker at Card substation	ISO-NE 2029 Solution Study June 2020 RC - PPA approvals received 6/17/2021, 10/27/2021	\$ 17.394	
2	1851		ES-21-T39	Upgrade Card 115-kV to BPS standards		\$ 17.502	
3	1852		ES-21-T32	Install one 115-kV circuit breaker in series with Card 14T		\$ 1.952	
4	1853		ES-21-T33, ES-21-T34	Convert Gales Ferry substation from 69-kV to 115-kV		\$ 17.256	1.290
5	1854		ES-21-T25	Rebuild the 100 Line from Montville substation to Gales Ferry substation to allow operation at 115-kV		\$ 6.995	
6	1855		ES-21-T26	Reterminate the 100 Line at Montville station and associated work. Energize 100 Line at 115-kV		\$ 8.407	
7	1856		ES-21-T27	Rebuild 400-1 Line to allow operation at 115-kV (Tunnel to Ledyard Jct.)		\$ 42.917	
8	1857		ES-21-T28	Add one 115-kV circuit breaker and re-terminate the 400-1 line section into Tunnel substation. Energize 400 Line at 115-kV		\$ 7.439	
9	1858		ES-21-T29	Rebuild 400-2 Line section to allow operation at 115-kV (Ledyard Jct. - Border Bus with CMEEC)		\$ 15.133	
10	1859		ES-21-T30	Rebuild the 400-3 Line section to allow operation at 115-kV (Gales Ferry-Ledyard Jct.)		\$ 6.855	
11	1860		ES-21-T35	Install a 25.2 MVAR, 115-kV capacitor and one capacitor breaker at Killingly		\$ 4.823	
12	1861		ES-21-T36	Install one 345-kV series breaker with the Montville 1T (345-kV)		\$ 3.973	
13	1862		ES-21-T38-Rev.1	Install a 50 MVAR synchronous condenser with two 115-kV breakers at Shunock		\$ 40.518	1.728
14	1863		ES-21-T37	Install 1 1% series reactor with by-pass switch at Mystic, CT on the 1465 Line		\$ 4.780	
SUBTOTAL						\$ 195.944	\$ 3.018