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Vincent P. Pace
Assistant General Counsel, Berlin, CT

March 1, 2023

Ms. Melanie Bachman
Executive Director
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

Re: CL&P dba Eversource Energy Forecast of Loads & Resources for the Period 2023-2032

Dear Ms. Bachman:

The Connecticut Light and Power Company dba Eversource Energy (the "Company") submits herewith an original and 15 copies of the Company's 2023 Forecast of Loads and Resources, as required by Connecticut General Statute 16-50r.

Please do not hesitate to contact me if you have any questions regarding this filing.

Sincerely,

Vincent P. Pace

Vincent P. Pace
Assistant General Counsel
On behalf of CL&P d/b/a Eversource Energy

Enclosure

2023 Forecast of Loads and Resources

for the Period 2023-2032

March 1, 2023

List of Acronyms

“ACEEE”	American Council for an Energy Efficiency Economy
“C&LM”	Conservation and Load Management
“CAGR”	Compound Annual Growth Rate
“CEAB”	Connecticut Energy Advisory Board
“CSC”	Connecticut Siting Council
“CMEEC”	Connecticut Municipal Electric Energy Cooperative, Inc.
“DEEP”	Department of Energy and Environmental Protection
“EE”	Energy Efficiency
“EEB”	Energy Efficiency Board
“EDC”	Electric Distribution Company
“EV”	Electric Vehicles
“FCA”	ISO-NE Forward Capacity Auction
“FCM”	ISO-NE Forward Capacity Market
“FERC”	Federal Energy Regulatory Commission
“FLR”	Forecast of Loads and Resources
“IRP”	Integrated Resource Plan
“ISD”	In-Service Date
“ISO-NE”	Independent System Operator – New England
“kV”	Kilovolt or 1,000 Volts
“kW”	Kilowatt or 1,000 Watts
“kW-Month”	Kilowatt month
“LREC”	Low Emission Renewable Energy Credits
“MW”	Megawatt or 1,000,000 Watts
“NERC”	North American Electric Reliability Corporation
“NPCC”	Northeast Power Coordinating Council
“NTA”	Non-Transmission Alternative
“PA 11-80”	Public Act 11-80, An Act Concerning the Establishment of the Department of Energy and Environmental Protection
“PAC”	Planning Advisory Committee
“PV”	Photovoltaic
“PURA”	Public Utilities Regulatory Authority
“RFP”	Request for Proposal
“RGGI”	Regional Greenhouse Gas Initiative

List of Acronyms, Continued

“ROFR”	Right of First Refusal
“RSP”	ISO-NE’s Regional System Plan
“TO”	Transmission Owner
“ZREC”	Zero Emission Renewable Energy Credit

Table of Contents

Chapter 1: INTRODUCTION

1.1 Overview of Eversource's 2023 Forecast of Loads and Resources Report

The Connecticut Light & Power Company doing business as Eversource Energy ("Eversource" or the "Company") is a company engaged in electric distribution and transmission services in Connecticut, as defined in Conn. Gen. Stat. §16-1. As such, Eversource has prepared this Ten- Year FLR pursuant to Conn. Gen. Stat. §16-50r. Eversource has provided an annual FLR to the CSC for over forty years. This 2023 FLR includes the following information[1]:

1. A tabulation of the peak loads, resources, and margins for each of the next ten years, using CL&P's 50/50 financial forecasting methodology.
2. Data on energy use and peak loads for the five preceding calendar years, including data on the energy savings provided by Eversource's energy efficiency programs during that period.
3. A list of planned transmission lines on which proposed route reviews are being undertaken or for which certificate applications have already been filed.

1.2 Energy and Peak Demand Forecasts

There is uncertainty in any forecast, and weather can especially have a large impact on the realization of any forecast. Eversource's electric energy usage is expected to slightly increase with a weather-normalized CAGR of 0.1% per year, while peak demand is expected to increase by a weather-normalized CAGR of 0.4% per year over the 10-year forecast period from 2023 through 2032.

While Eversource is providing this forecast, which was developed for financial forecasting purposes, Eversource uses ISO-NE's load forecast for transmission planning purposes. Further discussion of Eversource's forecast is provided in Chapter 2.

1.3 Evolving Load and Resource Influences

As part of the state's restructuring of the electric industry, which began in 1998, Eversource sold its generation assets while remaining a Connecticut electric distribution and transmission company. Since that time, the state has enacted a number of policies and programs which affect the developing wholesale electric market in the region.

1.4 State-Mandated Integrated Resource Planning

In 2007, the Connecticut legislature passed PA 07-242, *An Act Concerning Electricity and Energy Efficiency,* directing the annual development of an IRP for Connecticut. In 2011, the Connecticut legislature passed PA 11-80, *An Act Concerning the Establishment of the Department of Energy and Environmental Protection and Planning for Connecticut's Energy Future.* PA 11-80 calls for DEEP to create an IRP by January 1, 2012, and

[1] Pursuant to discussions with CSC staff, Eversource has removed the previously provided Table 2-3: Existing Customer Owned Facilities 1 MW and Above Providing Generation to the Eversource System from this filing.

biennially thereafter, in consultation with the CEAB[2] and the EDCs.

On October 7, 2021, DEEP issued its 2020 IRP for Connecticut presenting a comprehensive plan for improving Connecticut's electric energy future and identifying pathways to achieve a 100% zero carbon electric supply by 2040.

1.5 Energy Efficiency Programs

For over 20 years, Eversource has worked strategically with other Connecticut electric and natural gas utilities to deliver, develop, and implement nationally recognized energy efficiency programs for Connecticut's businesses, residential customers, and government entities to help them control their energy usage, save money and reduce overall electric consumption in the state. These successful programs are currently funded by six-mill systems benefit charge on customer bills, a Conservation Adjustment Mechanism ("CAM") less gross receipts tax assessed on customer electric bills, and contributions from natural gas customers through a natural gas CAM. In addition, energy efficiency revenues are received from Regional Greenhouse Gas Initiative ("RGGI") auctions and revenue from the ISO-NE Forward Capacity Market ("FCM").

Further discussion of Eversource's energy efficiency program forecast can be found in Chapter 3.

1.6 Transmission Planning

Eversource plans, builds and operates transmission infrastructure with a goal of safely and reliably delivering power to its customers under a wide variety of supply and demand conditions. A discussion of Eversource's transmission forecast can be found in Chapter 4. The key topics include:

- Eversource's transmission facilities are part of the New England regional grid and must be designed, operated, and maintained to ensure compliance with mandatory NERC, the NPCC, ISO-NE and Eversource reliability standards and criteria.
- Eversource is proposing new 115-kV transmission projects to strengthen the Connecticut transmission system.
- The New England transmission system is an important enabler of competitive markets and the region's efforts to meet environmental objectives and mandates.
- Eversource's Transmission Line Department is continuing to improve the reliability of the transmission system. Inspections have found degradation of many overhead wood transmission structures and older steel lattice structures. Replacing these structures over the next several years resolves multiple structural/hardware issues and supports safe and reliable operation.

[2] The CEAB was dissolved as of June 6, 2014. *See* General Statutes § 16a-3, repealed by Public Act 14-94, § 82.

Chapter 2: FORECAST OF LOADS AND RESOURCES

Chapter Highlights

- Electric energy usage is expected to increase slightly over the 10-year forecast period by 0.1% per year, while peak demand is expected to increase by 0.4% per year during this time.
- While Eversource uses its own Reference Plan Forecast for financial forecasting, it uses ISO-NE's load forecast for transmission planning purposes.

2.1 Electric Energy and Peak Demand Forecast

The energy and peak demand forecasts contained in this chapter are based on the Company's budget forecast, which was prepared in the Fall/Winter of 2022, and are based on Eversource's total franchise area. The base case or 50/50[3] case is also referred to as the Reference Plan Forecast. Eversource's Reference Plan *Energy* Forecast is based on the results of econometric models, adjusted for Eversource's forecasted energy efficiency programs, projected reductions resulting from solar installations, expected additions due to electric vehicles (EVs) and the electrification of heating systems.

The Reference Plan *Peak Demand* Forecast is also based on an econometric model, adjusted for energy efficiency, solar, expected large customer additions and EVs. The Reference Plan Forecast is used for Eversource's financial planning and distribution system planning but is not used for transmission system planning. As ISO-NE is responsible for regional transmission planning and reliability, it independently develops its own forecast which the Company utilizes to plan and construct its transmission system. Section 2.1.3 discusses ISO-NE's forecast in general terms and how it conceptually compares to Eversource's forecast.

The Reference Plan *Energy* Forecast projects slight growth in the weather-normalized CAGR for total electrical energy output requirements of 0.1% for Eversource from 2022- 2032. Without the Company's energy efficiency programs, solar installations, or electric vehicles or heating electrification, the forecasted energy growth rate is projected to increase slightly with a weather-normalized CAGR of 0.2 percent.

The weather-normalized CAGR for summer peak demand in the Reference Plan *Peak Demand* Forecast is forecasted to increase by 0.4 percent over the ten-year forecast period. Similarly, if Eversource's energy efficiency, solar installations, EVs and our large customer additions were excluded, the increase in the CAGR for forecasted peak demand would be 0.3 percent.

Table 2-1 provides historic output and summer peaks, actual and normalized for weather, for the 2018-2022 period and forecast output and peaks for the 2023-2032 periods. The sum of the budgeted class sales for each year, increased for losses, is the annual forecast of system electrical energy requirements or output. This is the amount of energy that must be supplied by generating plants to serve the loads on the distribution system. The Reference Plan Forecast is a *50/50* forecast that assumes normal weather throughout the year, with normal peak-producing weather episodes in each season. The forecasted 24-hour mean daily temperature

[3] A "50/50 forecast" is a forecast that is developed such that the probability that actual demand is higher or lower than the forecasted amount is 50 percent.

for the summer peak day is 83° F and is based on the average peak day temperatures from 2013-2022. The Reference Plan Forecast's summer peak day is assumed to occur in July, since this is the most common month of occurrence historically. It should be noted, however, that the summer peak has occurred in June, August, and September in some years.

2.1.1 Uncertainty in the Reference Plan Forecast

There is uncertainty in any long-run forecast because assumptions that are used in the forecast are selected at a point in time. The point of time chosen is generally insignificant unless the forecast drivers are at a turning point. Outlined below are eight areas of uncertainty that are inherent to this forecast:

- The Economy - The Reference Plan Forecast is based on an economic forecast that was developed in November 2022. Business cycles represent normal economic fluctuations which are typically not reflected in long-run trend forecasts because recovery eventually follows recession, although it is difficult to pinpoint when. So, while the level of energy or peak demand that is forecasted for any given year of the forecast may be attained a little earlier or later than projected, the underlying trend is still likely to occur at some point and needs to be planned for.

- Solar Installations - This forecast includes explicit reductions to electrical energy output requirements due to solar installations stemming from the Renewable Energy Solutions programs.

- Energy Efficiency – This forecast includes explicit reductions to electrical energy output and peak demand due to company sponsored energy efficiency based on the most recent 3-year plan.

- Electric Vehicles - This forecast includes explicit additions to electrical energy output requirements and peak demand due to EVs. The EV forecast starts with historical actuals and builds a projection based on national and local market information such as new EV model release plans, state rebate programs and state planned infrastructure investments.

- Large Customers – The peak demand forecast includes explicit adjustments for large customer additions with expected demands greater than 0.25 MW’s.

- Heating Electrification - This forecast includes explicit additions to electrical energy output requirements in the winter months due increasing installations of cold-climate heat pumps. It does not include additions to the peak forecast since the peak occurs in July and there are no heating loads at that time.

- Weather - The Reference Plan Peak Demand Forecast assumes normal weather based on a ten-year average (2013 - 2022). The historical peak day 24- hour mean temperatures range from 79° F to 86° F, with deviations from the average peak day temperatures being random, recurring and unpredictable occurrences. For example, the lowest peak day mean temperature occurred in 2017, while the highest occurred in 2019. This variability of peak-producing weather means that over the forecast period, there will be years when the actual peaks will be significantly above or below the forecasted peaks.

Despite the inherent risks outlined above, the Company believes its current forecast to be the most reasonable, given the information available today.

2.1.2 Forecast Scenarios

Table 2-1 contains scenarios demonstrating the variability of peak load around the 50/50 peak forecast due to weather. The table shows that weather has a significant impact on the peak load forecast with variability of approximately 7 percent, or 370 MWs, above and below Eversource's 50/50 forecast, which is based on normal weather. To illustrate, the 2032 summer peak forecast reflecting average peak-producing weather is 5,067 MWs.

However, either extremely mild or extremely hot weather could result in a range of potential peak loads from 4,782 MWs to 5,520 MWs. This 738 MWs of variation, which is a band of approximately plus or minus 7 percent around the average, demonstrates the potential impact of weather alone on forecasted summer peak demand.

The Extreme Hot Weather scenario roughly corresponds conceptually to ISO-NE's 90/10 forecast, described in Section 2.1.3.

Table 2-1: Eversource 2023 Reference Plan Forecast

	Net Electrical Energy Output Requirements		Net Electrical Peak Loads								
		Annual		Annual	Load		Annual	Load		Annual	
Year	Output	Change	Peak	Change	Factor	Peak	Change	Factor	Peak	Change	Load Factor
	GWh (1)	(%)	MW	(%)	(2)	MW	(%)	(2)	MW	(%)	(2)
HISTORY											
2018	22236		5045		0.503						
2019	21274	-4.3%	4763	-5.6%	0.510						
2020	20635	-3.0%	4802	0.8%	0.489						
2021	20876	1.2%	4949	3.1%	0.481						
2022	20974	0.5%	4787	-3.3%	0.500						
Compound Rates of Growth (2018-2022)											
	-1.5%		-1.3%								
HISTORY NORMALIZED FOR WEATHER											
2018	21657		4989		0.496						
2019	21047	-2.8%	4462	-10.6%	0.538						
2020	20585	-2.2%	5090	14.1%	0.460						
2021	20927	1.7%	4773	-6.2%	0.501						
2022	20644	-1.4%	4855	1.7%	0.485						
Compound Rates of Growth (2018-2022)											
	-1.2%		-0.7%								
FORECAST			Reference Plan (50/50 Case)			Extreme Hot Scenario			Extreme Cool Scenario		
2023	20734	0.4%	4836	-0.4%	0.489	5282	8.8%	0.448	4560	-6.1%	0.519
2024	20796	0.3%	4836	0.0%	0.490	5283	0.0%	0.448	4560	0.0%	0.519
2025	20727	-0.3%	4855	0.4%	0.487	5303	0.4%	0.446	4578	0.4%	0.517
2026	20689	-0.2%	4869	0.3%	0.485	5317	0.3%	0.444	4591	0.3%	0.514
2027	20639	-0.2%	4880	0.2%	0.483	5329	0.2%	0.442	4600	0.2%	0.512
2028	20660	0.1%	4899	0.4%	0.480	5349	0.4%	0.440	4618	0.4%	0.509
2029	20586	-0.4%	4924	0.5%	0.477	5375	0.5%	0.437	4642	0.5%	0.506
2030	20600	0.1%	4959	0.7%	0.474	5411	0.7%	0.435	4676	0.7%	0.503
2031	20646	0.2%	5006	0.9%	0.471	5458	0.9%	0.432	4722	1.0%	0.499
2032	20795	0.7%	5067	1.2%	0.467	5520	1.1%	0.429	4782	1.3%	0.495
Compound Rates of Growth (2022-2032)											
	-0.1%		0.6%			1.4%			0.0%		
Normalized Compound Rates of Growth (2022-2032)											
	0.1%		0.4%			1.3%			-0.2%		

1. Sales plus losses.
2. Load Factor = Output (MWh) / (8760 Hours X Season Peak (MW)).

Forecasted Reference Plan Peaks are based on normal peak day weather (83º mean daily temperature). Forecasted Extreme Hot Scenario Peaks are based on the weather that occurred on the 2019 peak day (86º mean daily temperature). Forecasted Extreme Cool Scenario Peaks are based on the weather that occurred on the 2017 peak day (79º mean daily temperature).

2.1.3 Long-Term Demand Assessment

In addition to the outlined 10-year forecast, the Company is introducing capabilities to develop a long-term electric demand assessment to reflect the overall impacts from electrification objectives across mobility and heating, as well as the aggressive deployment of distributed energy resources on the distribution system in response to both state and federal level objectives and incentives.

It is the Company's objective to consider future scenarios of electrification (e.g., 50 percent of light duty vehicles as battery electric) in the design of capital projects with the intention to ensure that every investment made by the Company supports electrification goals for the foreseeable future.

For this purpose, the company is working together with a wide variety of vendors to build detailed electric demand assessment models, specifically:

- **Electric Vehicles**: EVs, due to their mobility, introduce a high degree of uncertainty into electric demand modeling. The Company EV demand analysis has two main components:
    - **Adoption Rate Model**: The projections outlined in the 2050 Massachusetts Decarbonization Roadmap – All Options Pathway is the basis for the overall adoption rate in the Commonwealth. The projected proportions of EV stock for light duty, medium, and heavy-duty fleet vehicles are applied at the zip code level and aggregated by substation
    - **Charging Demand Model**: The Company has acquired vehicle travel data with onboard GPS (medium/heavy duty) and mobility (cellular) tracking data. The data is used to estimate the charging requirements of EVs based on existing vehicle travel patterns. When combined with the adoption rate, this gives a 24-hour profile of load demand (at 15 min intervals) for an unmanaged charging scenario
- **Electric Heating:** Through the introduction of electric heat pumps over the next decades, a significant amount of electric load will be added to the system. The trend is expected to convert a large portion of the system to winter peaking
    - **Adoption Rate Model**: Customer level adoption rate model using socio-economic data to provide adoption propensity levels by customer type and aggregated by feeder and substation
    - **Weather Normalized Heating Model**: Using standard heat pump efficiency assumption as well as a BTU/sq-ft(T)
- **Distributed Solar Generation:**
    - **Behind the Meter**
        - **Geospatial Deployment Model**: Uses Company historical solar deployment data, customer class information and census level socio-economic data to provide solar penetration by customer type and aggregated by substation
    - **Front of the Meter**
        - **Adoption Rate Model**: Based on statewide parcel analytics, the adoption rate models build economic models that enable adoption propensity results by region/bulk station in terms of available parcels and cost of developing solutions, as well as zoning / land use restrictions
        - **Saturation Model**: Looks at potentially developable parcels by region / bulk station by performing data analytics on parcel data bases at a state level.

2.1.4 ISO-NE Demand Forecasts

The CSC's 2008 Review of the Ten-Year Forecast of Loads and Resources provides a concise description of the ISO-NE's "90/10" forecast used by Eversource for transmission planning purposes. A relevant excerpt is provided below.

> Called the "90/10" forecast, it is separate from the normal weather (50/50) forecasts offered by the Connecticut utilities. However, it is the one used by both ISO-NE and by the Connecticut utilities for utility infrastructure planning, including transmission and generation.

The 90/10 forecast is a plausible worst-case hot weather scenario. It means there is only a 10 percent chance that the projected peak load would be exceeded in a given year, while the odds are 90 percent that it would not be exceeded in a given year. Put another way, the forecast would be exceeded, on average, only once every ten years. While this projection is extremely conservative, it is reasonable for facility planning because of the potentially severe disruptive consequences of inadequate facilities: brownouts, blackouts, damage to equipment, and other failures. State utility planners must be conservative in estimating risk because they cannot afford the alternative.

Just as bank planners should ensure the health of the financial system by maintaining sufficient collateral to meet worst-case liquidity risks, system planners must ensure the reliability of the electric system by maintaining adequate facilities to meet peak loads in worst-case weather conditions. While over-forecasting can have economic penalties due to perceived excessive and/or unnecessary expenditures on infrastructure, the consequences of under-forecasting can be much more serious. Accordingly, the Council will base its analysis in this review on the ISO-NE 90/10 forecast.

As Eversource has reported in the past, there is one other major difference between the Eversource and ISO-NE forecasts, aside from the difference between the 50/50 forecast methodology used by Eversource and the 90/10 forecast methodology used by ISO-NE. The Eversource peak demand forecasts include explicit reductions for the Company's EE programs, solar resources and explicit large customer additions, while the ISO-NE demand forecasts do not include these adjustments; instead, ISO-NE considers EE and large scale solar to be supply resources in their capacity forecast. ISO-NE has developed a new PV forecast such that small scale solar is calculated and explicitly reduces the ISO-NE demand forecast. ISO- NE publishes the PV forecast annually as part of their load forecast documentation.

Table 2-2 shows Eversource's Reference Plan Forecast with savings from Eversource's EE programs, solar and large customer additions added back in to make it easier to compare Eversource's forecast with ISO-NE's forecast.

Table 2-2: Adjustments to Output and Summer Peak Forecasts

Net Electrical Energy Output Requirements (GWH)

Year	Unadjusted Output	Solar	Company Energy Efficiency	Large Customer Additions	Heating Electrification	Electric Vehicles	Adjusted Output	Annual Change (%)
HISTORY NORMALIZED FOR WEATHER								
2022							20,644	
FORECAST								
2023	20,767	(33)	-	-	2	27	20,734	0.4%
2024	20,873	(77)	-	-	3	53	20,796	0.3%
2025	20,851	(124)	-	-	8	87	20,727	-0.3%
2026	20,826	(137)	-	-	15	131	20,689	-0.2%
2027	20,789	(150)	-	-	23	179	20,639	-0.2%
2028	20,822	(162)	-	-	31	234	20,660	0.1%
2029	20,761	(175)	-	-	41	308	20,586	-0.4%
2030	20,788	(188)	-	-	51	400	20,600	0.1%
2031	20,847	(200)	-	-	63	514	20,646	0.2%
2032	21,008	(213)	-	-	69	665	20,795	0.7%
Normalized Compound Rates of Growth (2022-2032)								
	0.2%						0.1%	

50/50 Reference Plan (MW)

Year	Unadjusted Peak	Solar	Company Energy Efficiency	Large Customer Additions	Heating Electrification	Electric Vehicles	Adjusted Peak	Annual Change (%)
HISTORY NORMALIZED FOR WEATHER								
2022							4,855	
FORECAST								
2023	4,854	(19)	(13)	8	-	7	4,836	-0.4%
2024	4,864	(27)	(36)	21	-	14	4,836	0.0%
2025	4,883	(32)	(57)	39	-	22	4,855	0.4%
2026	4,899	(34)	(76)	47	-	34	4,869	0.3%
2027	4,914	(36)	(94)	47	-	49	4,880	0.2%
2028	4,931	(39)	(109)	47	-	69	4,899	0.4%
2029	4,947	(41)	(123)	47	-	94	4,924	0.5%
2030	4,964	(43)	(135)	47	-	127	4,959	0.7%
2031	4,981	(45)	(147)	47	-	170	5,006	0.9%
2032	5,000	(47)	(157)	47	-	225	5,067	1.2%
Normalized Compound Rates of Growth (2022-2032)								
	0.3%						0.4%	

Extreme Hot Weather Scenario (MW)

Year	Unadjusted Peak	Solar	Company Energy Efficiency	Large Customer Additions	Heating Electrification	Electric Vehicles	Adjusted Peak	Annual Change (%)
HISTORY NORMALIZED FOR WEATHER								
2022							4,855	
FORECAST								
2023	5,307	(19)	(13)	8	-	7	5,282	8.8%
2024	5,325	(27)	(36)	21	-	14	5,283	0.0%
2025	5,353	(32)	(57)	39	-	22	5,303	0.4%
2026	5,381	(34)	(76)	47	-	34	5,317	0.3%
2027	5,412	(36)	(94)	47	-	49	5,329	0.2%
2028	5,450	(39)	(109)	47	-	69	5,349	0.4%
2029	5,492	(41)	(123)	47	-	94	5,375	0.5%
2030	5,542	(43)	(135)	47	-	127	5,411	0.7%
2031	5,604	(45)	(147)	47	-	170	5,458	0.9%
2032	5,678	(47)	(157)	47	-	225	5,520	1.1%
Normalized Compound Rates of Growth (2022-2032)								
	1.6%						1.3%	

Chapter 3: ENERGY EFFICIENCY

Chapter Highlights

- Energy savings resulting from Connecticut Energy Efficiency Fund ("Fund") programs are the most cost-effective and reliable resource for Connecticut's energy policymakers and stakeholders. The conservation and load management ("C&LM") programs help Connecticut residents, businesses, and local/state governments reduce their energy bills and help mitigate peak energy prices.
- Fund programs are nationally recognized and are perennially ranked in the top 10 states for energy efficiency and demand management. Connecticut's Electric Companies (Eversource and United Illuminating) and Natural Gas Companies (Eversource, Connecticut Natural Gas, and Southern Connecticut Gas), collectively "the Companies", develop and implement Fund C&LM programs.
- Connecticut's energy efficiency and demand management strategies are designed to help the state in its efforts to reduce greenhouse gas emissions resulting from energy usage in buildings, and to provide economic benefits.

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3.1 Connecticut's Energy Efficiency Programs

For over 20 years, the Companies have delivered nationally recognized programs that drive energy savings, reduce greenhouse gas emissions and other air pollutants[4], employ a highly skilled and local clean energy workforce, and strengthen the state's economy by increasing energy affordability and improving business productivity.

The Companies Residential, Commercial and Industrial ("C&I"), and Education, Workforce and Community Outreach Portfolios are nationally recognized by the Environmental Protection Agency ("EPA"), US Department of Energy, and the American Council for an Energy Efficiency Economy ("ACEEE") for their innovative conservation and load management ("C&LM") programs and initiatives. Since 2000, the ACEEE has ranked Connecticut as one of the top 10 states for energy efficiency. In the ACEEE's 2022 State Energy Efficiency Scorecard (most recent publication), Connecticut ranked ninth in the nation. This ranking reflects the success and expertise of Connecticut's Companies in developing and administering innovative energy efficiency programs.

Energy efficiency is a cost-effective resource available to policymakers to address rising energy costs, reliability challenges, and increasing greenhouse gas emissions. Connecticut's energy efficiency and demand management programs reduce the amount of energy used by residential and C&I customers. This decreases energy demand from power plants, reduces the amount of greenhouse gas emissions emitted due to power generation, and helps to lower customers' energy bills across all sectors. Energy efficiency and demand management programs also provide economic development benefits for Connecticut and help mitigate winter peak energy prices resulting from natural gas pipeline constraint during winter high-use periods.

Eversource, with guidance from the Energy Efficiency Board ("EEB"), maintains its energy efficiency

[4] The primary greenhouse gas reduced by energy efficiency and demand management programs is carbon dioxide ("CO_2"). Other air pollutants that are reduced due to the implementation of the Plan's programs include nitrous oxides ("NOx") and sulfur oxides ("SOx").

and demand management programs' success through a flexible and integrated approach that reaches out to customers in their homes, at their jobs, in schools, and in the community. Through seminars, workshops, museum partnerships, trade ally and professional affiliations, retail partnerships, educator trainings, and marketing, Eversource is helping to shape a more efficiency- minded consumer who not only participates in innovative programs, but who also makes wise energy choices every day.

3.2 Legislative History

In 1998, the Connecticut General Assembly passed *Public Act 98-28—An Act Concerning Electric Restructuring*, establishing the Fund and the EEB to advise Connecticut's Electric Companies in developing their annual C&LM plans.

In 2005, *Public Act 05-01—An Act Concerning Electricity and Energy Efficiency* was passed by the Connecticut General Assembly. This legislation created a funding mechanism for the Natural Gas Companies to develop and implement cost-effective programs that reduce natural gas consumption for residential and C&I customers. Additionally, under Public Act 05-01, the EEB's role was expanded to provide guidance for the Companies in their development of energy efficiency programs for electric and natural gas customers.

In 2007, new legislation called for the Companies to pursue "all cost-effective energy efficiency" with the passage of *Public Act 07-242—An Act Concerning Electricity and Energy Efficiency*. This legislation envisioned energy efficiency as the focal point for statewide energy policy. In 2011, the Connecticut General Assembly passed *Public Act 11-80—An Act Concerning the Establishment of the Department of Energy & Environmental Protection and Planning for Connecticut's Energy Future*. This landmark legislation created DEEP and laid the groundwork for pursuing all cost-effective energy efficiency. Additionally, Public Act 11-80 established ambitious energy-saving targets for the state, including reducing state buildings' energy consumption by 10 percent by 2013 and an additional 10 percent by 2018, and weatherizing 80 percent of Connecticut's residential homes by 2030.

In 2013, the Connecticut General Assembly passed *Public Act 13-228—An Act Concerning Implementation of Connecticut's Comprehensive Strategy and Various Revisions to the Energy Statutes*. Public Act 13-228 modified how the Companies developed their C&LM plans with a requirement for them to develop a three-year combined plan, beginning on November 1, 2015. The 2022-2024 Plan, filed November 1, 2021, is the third three-year plan developed after the passage of Public Act 13-228.

During the 2016-2018 term, significant funding for the Fund's programs was diverted to the state's General Fund through the Connecticut General Assembly's passage of June Special Session's *Public Act 17-2—An Act Concerning the State Budget for the Biennium Ending June 30, 2019, Making Appropriations Therefor, Authorizing and Adjusting Bonds of the State and Implementing Provisions of the Budget* (SS Public Act 17-2) on October 31, 2017. The Act diverted $63.5 million per year for Fiscal Years 2018 and 2019 from the Fund and diverted an additional $10 million per year in proceeds from the Regional Greenhouse Gas Initiative's ("RGGI") carbon trade auctions. These diversions negatively impacted the Companies' Portfolios for 2017, 2018, and 2019.

In 2018, the Connecticut General Assembly passed *Public Act 18-50*—An Act Concerning Connecticut's *Energy Future*.[5] Due to the passage of this legislation, the Companies saw partial restoration of funds for Program Year 2019, and full funding for Program Years 2020 and 2021. To deter future funding diversion efforts, Public Act 18-50 changed the structure of how energy efficiency programs are funded in the state. In addition, the Act introduced a new energy savings goal policy for the state, requiring the Companies to reduce energy consumption by 1.6 million MMBtus (one million British Thermal Units), or the equivalent megawatts of electricity, "annually each year for calendar years commencing on and after January 1, 2020, through calendar year 2025." [6]

[5] Public Act 18-50, *An Act Concerning Connecticut's Energy Future*, approved May 24, 2018. Also known as Senate Bill 9 ("SB 9"). Available online at: https://www.cga.ct.gov/2018/act/pa/pdf/2018PA-00050-R00SB-00009-PA.pdf.

[6] Public Act 18-50, § 8. "It shall be the policy of the state to reduce energy consumption by not less than 1.6 million MMBtu, orthe

Public Act 18-50 also revised the state's general statutes, specifically § 16-245, adding "demand management" to the Companies' legislatively directed program mandates[7] and requiring the Companies to be fuel blind in the delivery of energy efficiency programs.[8] Another piece of legislation passed in 2018 was *Public Act 18-82: An Act Concerning Climate Change Planning and Resiliency*. This legislation requires the state to achieve greenhouse gas emissions reductions of at least 45 percent below 2001 greenhouse gas emissions levels by January 1, 2030.

3.3 Conservation & Load Management Plans

The 2022-2024 Plan is a $707 million investment in making Connecticut more energy efficient. The Plan's three priorities are equity, decarbonization, and energy affordability. For the 2022-2024 term, program design, outreach efforts, and budgets have all been crafted with these three priorities in mind and this consideration is reflected across the Portfolios.

2022-2024 Plan Priorities

Equity is defined as the process of establishing more equal access to and participation in energy efficiency and demand management programs, particularly among those groups who have historically participated at lower rates. For the 2022-2024 term, the Companies' first priority is to ensure that the Portfolios are equitable in their distribution of programs and benefits across the state, including communities and neighborhoods, market segments, and customer types. The Companies' equity efforts have been shaped and will continue to be developed by DEEP's Equity in Energy Efficiency ("E3") proceeding.

Decarbonization is the second key priority. Energy efficiency and demand management programs are key tools in protecting the environment and reducing greenhouse gas and other air pollutant emissions. The Companies will help to reduce greenhouse gas emissions from the building sector by promoting high-efficiency, low-carbon space and water heating technologies, such as heat pumps and heat pump water heaters. Additional decarbonization strategies will include a renewed push for Zero Net Energy, Zero Net Energy Ready, and Passive House certifications for commercial and residential new construction projects. The Companies will introduce packaged energy efficiency program offerings for all-electric new construction projects through the C&I Portfolio. During the 2022-2024 term, the Companies will also begin to align the C&I new construction program, Energy Conscious Blueprint, with the US Department of Energy's ("DOE") Grid Interactive Efficient Building initiative. The Companies will offer increased technical and financial support for low-carbon technologies in retrofit applications and will significantly increase their efforts to weatherize residential and C&I buildings.

The Companies' third priority is energy affordability—promoting economic development through lower energy bills, enhanced energy security, and increased reliability. For the 2022-2024 term, the Companies will continue to prioritize energy affordability for residential and C&I customers across the state, including low-income customers who have high energy burdens. The Companies will conduct education and outreach through the Community Partnership Initiative which is designed to reach communities, customers, and market segments where participation in energy efficiency has been limited due to multiple factors. The combination of energy savings goals by segment and continuing to

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equivalent megawatts of electricity, as defined in subdivision (4) of section 22a-197 of the general statutes, annually each year for calendar years commencing on and after January 1, 2020, up to and including calendar year 2025." While PA 18-50 refers to "megawatts," the technical conversion of MMBtus (as an energy unit) to an electric unit would be megawatt hours.

[7] Public Act 18-50, § 9(d)(1). "…of implementing "cost effective energy conservation programs, demand management and market transformation initiatives." This directive started in 2020.

[8] Public Act 18-50, § 9(d)(1). "…provided a customer of an electric distribution company may not be denied such services based on the fuel such customer uses to heat such customer's home."

reach customers who contribute to install energy-efficient measures will both increase customers' energy savings and reduce their energy burdens, therefore making energy more affordable to all customer segments.

Funding

For the 2022-2024 term, the primary funding sources for Connecticut's energy efficiency programs will be: (1) a six-mill Conservation Adjustment Mechanism ("CAM") on customer electric bills[9] and (2) contributions from natural gas customers (on firm rates) through the natural gas CAM. Additional funding sources for the 2022-2024 term will include the Regional Greenhouse Gas Initiative ("RGGI"), a Northeast carbon trade system and the Independent System Operator-New England's ("ISO-NE") Forward Capacity Market ("FCM").

Ten-Year C&LM Forecast

Table 3-1 below presents the potential cumulative annualized energy savings and summer and winter peak-load reductions forecasted for energy efficiency programs implemented in Eversource's (f/k/a CL&P) service territory for the 2022-2024 Plan. The forecast is based on anticipated savings from the 2022-2024 Plan. Forecasted savings beyond 2024 assume similar programs and savings as anticipated in 2024. However, savings in years 2025 and beyond reflect anticipated changes in energy efficiency budgets and production costs due to market transformation, stringent building codes, and federal standards.

Forecast Sensitivity

Connecticut's energy efficiency and demand management programs utilize a complementary mix of lost opportunity, retrofit, and market transformation implementation strategies to achieve energy savings. The energy savings and peak-load reductions projected in this forecast are sensitive to changes in several factors including changes in the electricity marketplace and consumer attitudes. In particular, the impact of federal policy on lighting standards is unclear at this point and may impact future savings.

[9] Similar to a millage rate tax structure on property, the CAM charge is a 0.6 cent per kilowatt-hour charge to support energy efficiency programs.

Table 3-1

CL&P C&LM Programs Annual Energy Savings

And

Peak Load Reduction by Customer Class

Connecticut Light and Power

2023-2032

GWh Sales Saved

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	16	25	38	49	60	69	77	85	91	97
Commercial	77	154	223	285	340	391	436	477	513	546
Industrial	23	46	67	85	102	117	131	143	154	164
Total	**116**	**225**	**327**	**419**	**502**	**577**	**644**	**704**	**758**	**807**

MW Reductions (Passive Resource Summer Impacts)

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	3	6	8	11	13	15	17	19	20	22
Commercial (non-Load Response)	14	29	43	55	66	75	84	92	99	106
Industrial (non-Load Response)	4	9	13	16	20	23	25	28	30	32
Total	**22**	**44**	**64**	**82**	**99**	**113**	**127**	**139**	**149**	**159**

MW Reductions (Passive Resource Winter Impacts)

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential	4	6	9	12	15	18	20	22	24	25
Commercial (non-Load Response))	12	23	34	43	52	59	66	73	78	83
Industrial (non-Load Response)	3	7	10	13	16	18	20	22	23	25
Total	**19**	**36**	**53**	**69**	**82**	**95**	**106**	**116**	**125**	**134**

Notes:

1) Table 3-1 includes only passive resources. It does not include 279.3MW of Active Demand Response (“ADR”) resources that is planned during the 2022-2024 term.
2) Total savings assumes that all measures will continue to provide savings for their measure lives throughout the forecast period.

Chapter 4: TRANSMISSION PLANNING AND SYSTEM NEEDS

4.1 Transmission is planned and built for the long term

Transmission systems enable varying amounts and sources of generation to serve load over the long term. The addition of significant amounts of remote renewable generating capacity or the retirement of local generation may increase the need to import or export power to or from Connecticut, and the transmission system may need to be expanded. Transmission system additions are proposed and built to accommodate the future by considering many possible scenarios.

4.2 Transmission Planning and National Reliability Standards

Eversource's transmission facilities are part of the New England regional grid and must be designed, operated, and maintained to ensure compliance with mandatory NERC, NPCC, ISO-NE, and Eversource reliability standards and criteria.

On December 20, 2012, the FERC issued a final ruling (FERC Order 773) approving revisions to NERC's "Bulk Electric System" definition. Key revisions to the approved definition removed language allowing for broad discretion across the reliability regions in North America and establish a "bright-line" threshold that includes all facilities operated at or above 100 kilovolts. The revised definition requires that more facilities be compliant with the NERC Transmission Planning Reliability Standards than under the previous definition. Periodic transmission planning assessments and studies have been expanded to adhere to this revised definition in order to comply with the NERC reliability standards.

On March 19, 2015, FERC approved Order 1000 that requires a transition in the way New England plans the transmission system. In May 2015, ISO New England implemented changes to the regional and interregional transmission planning process to comply with the directives in FERC Order No. 1000 which establishes new electric transmission planning and cost allocation requirements for public utility transmission providers. This introduced competition into the development of regulated transmission solutions. It removed arrangements that protect the ROFR for incumbent transmission providers.

On March 27, 2020, NPCC approved revisions to the Criteria A-10 "Classification of Bulk Power System Elements" that requires a more targeted approach to how bulk power system elements 69-kV and above are identified and classified as critical elements and thus included on the NPCC Bulk Power System list. Key revisions that were approved eliminated the automatic inclusion of system elements on the Bulk Power List and introduced a test that will allow NPCC members to exclude elements that are impactful to Bulk Power Transfer and inter-area reliability. All future regional and local studies conducted by ISO-NE and New England Transmission Owners will include the revised Criteria A-10.

On February 2, 2020, FERC approved Reliability Standard TPL-001-5 (Transmission System Planning Performance Requirements) submitted by the North American Electric Reliability Corporation ("NERC"), the Commission-certified Electric Reliability Organization, with an effective date of April 12, 2020. Reliability Standard TPL-001-5 revised the prior version of the TPL-001 standard in three key respects:

- Reliability issues concerning single points of failure in Protection Systems, as identified in:
  - Federal Energy Regulatory Commission (FERC) Order No. 754, issued on September 15, 2011; and
  - the report dated September 2015 by two subcommittees under the NERC Planning Committee, the System Protection and Control Subcommittee and System Analysis and Modeling Subcommittee titled *Assessment of Protection System Single Points of Failure Based on the Section 1600 Data Request*.
- Directives from FERC Order No. 786 (October 17, 2013) approving Reliability Standard TPL-001-4, relating to:
  - modeling known outages with a duration of less than six months; and
  - adding stability analysis for the outage of major Transmission Equipment with a lead time of one year or more; and,
- References to the Reliability Standards MOD-010 and MOD-012 which have been superseded by the MOD-032 Reliability Standard.

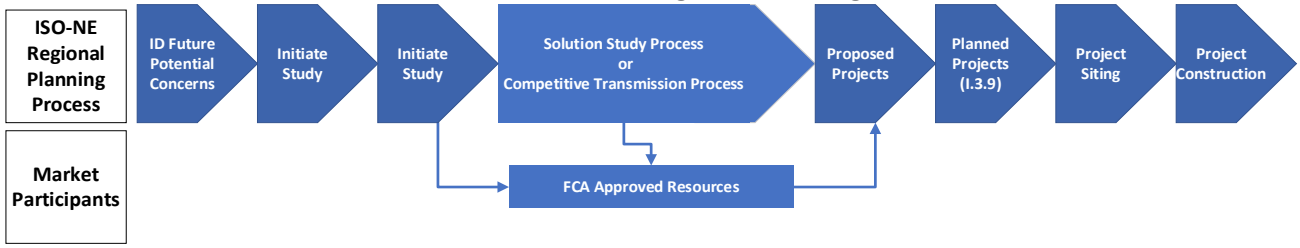
4.3 Transmission Planning Process

Within the ISO-NE regional planning process established for compliance with NERC and NPCC planning standards, ISO-NE performs reliability assessment studies of the New England transmission system. Individual sub-area studies ("Needs Assessments") are performed to identify system needs over a ten-year horizon. When a system reliability problem is identified from a needs assessment, ISO-NE first determines whether the system reliability problem is expected to develop within three years or beyond three years. Where the reliability problem is expected within three years, ISO-NE and the Transmission Owners ("TOs") develop one or more transmission system options to resolve the transmission reliability needs and ensure that NERC and NPCC reliability standards are met. If the system reliability problem is not expected to materialize until more than three years from the completion of the Needs Assessment, ISO-NE uses its competitive transmission development process to solicit regulated transmission solutions from any qualified developer, including Eversource.

The transmission system solution options are then further evaluated to determine their feasibility of construction, potential for environmental impacts, estimated costs, longevity, operational differences, etc. When analysis of the options is complete, ISO-NE recommends a proposed transmission project to the Planning Advisory Committee.

The transmission studies and any needed transmission system upgrades are documented in a series of reports prepared by ISO-NE as depicted in the sequence shown in Figure 1 below:

Transmission Planning Process Figure 1



4.4 Connecticut's Transmission System and Serving Load

Eversource plans, builds, and operates transmission infrastructure with goals of safely and reliably delivering power to its customers under a wide variety of supply and demand conditions.

Eversource is required to meet reliability standards mandated by the FERC and implemented by NERC. Penalties for non-compliance can be up to $1.2 million per event per day, based on the severity of the violation.

4.5 Assessment of Transmission Needs in Connecticut's Sub-areas

Eversource divides its Connecticut service territory into several areas for the purpose of assessing the reliability of its transmission system. ISO-NE has previously identified reliability projects within those areas that are needed to maintain system reliability.

- The ISO-NE Southwest Connecticut ("SWCT") area is the largest load area within Connecticut which comprises fifty-four towns, including all Avangrid's service territory, Wallingford Electric and some of the CMEEC service territory. This area includes the towns essentially west of Interstate 91 and south of Interstate 84, and accounts for approximately half of the state's peak electric load demand. In July of 2014, the Southwest Connecticut 2022 Preferred Solution was presented to ISO-NE PAC. Eversource received ISO-NE approval for the SWCT preferred Solution in April of 2015. Eversource has since successfully constructed and placed the SWCT 2022 Solution in service at the end of 2020.

- The Eastern Connecticut ("ECT") Area extends in a westerly direction for about twenty miles from the Rhode Island border and north from Long Island Sound to the Massachusetts border. The area is served by both Eversource and CMEEC. In May of 2018, ISO-NE completed a 2027 Needs Assessment that analyzed the performance of the sub-area. In March of 2019, ISO-NE announced a re-assessment of the Eastern Connecticut Needs due to the reduction of load resulting from the 2018 and 2019 CELT Report load forecasts. The Eastern Connecticut 2029 Needs Assessment results were presented to ISO- NE PAC in September of 2019. ISO-NE subsequently presented the ECT 2029 Preliminary Preferred Solution at the May 20, 2020 Planning Advisory Committee ("PAC") meeting. A draft ECT 2029 Solutions Study was then posted on June 3, 2020 and the final version on June 19, 2020 on ISO-NE's external website. This report established the preferred solution to address the identified time-sensitive needs for the ECT area. Eversource's components of the ECT 2029 Solutions are expected to be in service by the end of 2023.

- Eversource's Transmission Line Department is continuing to improve the reliability of the transmission system. Inspections have found degradation of many overhead wood transmission structures and older steel lattice structures. Replacing these structures over the next several years resolves multiple structural/hardware issues and supports continued safe and reliable operation.

A list of all transmission projects and their components is listed by transmission line and substation in Tables 4-1 and 4-2 below. Transmission line reinforcements and asset condition projects are identified by entries under the "from" and "to" station headings in Table 4-1. Station reinforcements are identified by single line entries under the "from" station heading in Table 4-2. The term "station" is interchangeable with both substation and switching station. The tables also include the project's targeted in-service date.

Table 4-1: Eversource Proposed Transmission Line Projects in Connecticut

From Station	City or Town	To Station	City or Town	Voltage kV	ISD	Miles	Project Description	Status
Montville	Montville	Bean Hill	Norwich	115	2023	N/A	Line structure replacements	Proposed
Montville	Montville	Tunnel Card Lisbon	Preston Lebanon Norwich	115	2023	N/A	Line structure replacements	Under Construction
Montville	Montville	Mystic Buddington	Stonington Groton	115	2023	N/A	Line structure replacements	Under Construction
Bristol	Bristol	Forestville	Bristol	115	2023	N/A	Copper and shield wire replacement	Under Construction
Card	Lebanon	Willimantic	Windham	115	2023	N/A	Line structure and shield wire replacements	Under Construction
Tunnel	Preston	SCRRA	Preston	115	2023	N/A	Replace copper conductor and shield wire	Under Construction
Haddam Neck	Haddam	Beseck	Wallingford	345	2023	N/A	Line structure and shield wire replacements	Under Construction
Haddam	Haddam	Bokum	Old Saybrook	115	2023	N/A	Line structure replacements	Proposed
Farmington	Farmington	East New Britain	New Britain	115	2023	N/A	Line structure and shield wire replacements	Under Construction
Beseck	Wallingford	Southington	Southington	345	2023	N/A	Line structure replacements	Under Construction
Montville	Montville	Gales Ferry	Ledyard	69	2023	2.4	Line rebuild to allow operation at 115-kV	Under Construction
Tunnel	Preston	Ledyard Jct.	Ledyard	69	2023	8.6	Line rebuild to allow operation at 115-kV	Under Construction
Ledyard Jct.	Ledyard	Gales Ferry	Ledyard	69	2023	1.6	Line rebuild to allow operation at 115-kV	Under Construction
Plumtree	Bethel	Bethel Peaceable Wilton Norwalk	Bethel Redding Wilton Norwalk	345	2023	N/A	Laminated structure replacements	Under Construction
Barbour Hill	South Windsor	Enfield Windsor Locks	Enfield Windsor Locks	115	2023	N/A	Replace copper conductor and shield wire	Under Construction
Card	Lebanon	Millstone	Waterford	345	2023	N/A	Line structure and insulator replacements	Under Construction

From Station	City or Town	To Station	City or Town	Voltage kV	ISD	Miles	Project Description	Status
Scovill Rock	Middletown	East Shore	New Haven	345	2023	N/A	Line structure and insulator replacements	Under Construction
Southington	Southington	Scovill Rock	Middletown	345	2023	N/A	Line structure and insulator replacements	Under Construction
Manchester	Manchester	Kleen	Middletown	345	2023	N/A	Line structure and insulator replacements	Under Construction
Beseck	Wallingford	Southington	Southington	345	2023	N/A	Line structure and insulator replacements	Under Construction
Southington	Southington	Black Rock	New Britain	115	2024	N/A	Replace structures and copper conductor	Concept
Haddam	Haddam	East Haddam Junction	Haddam	345	2024	N/A	Line structure and shield wire replacements, and river crossing	Proposed
Haddam	Haddam	Pratt & Whitney	Haddam	115	2024	N/A	Line structure and shield wire replacements, and river crossing	Under Construction
Southington	Southington	Scovill Rock	Middletown	345	2024	N/A	Line structure replacements	Proposed
Southinton	Southington	Schwab	Wallingford	115	2024	18.9	Partial line rebuilds	Proposed
Southington	Southington	Wallingford Junction	Wallingford	115	2024	N/A	Line structure replacements	Proposed
Frost Bridge	Watertown	Noera	Waterbury	115	2024	N/A	Copper and shield wire replacement	Proposed
Southington	Southington	Hanover	Meriden	115	2024	N/A	Copper retirement	Proposed
Plumtree	Bethel	Stony Hill Shepaug	Brookfield Southbury	115	2024	N/A	Copper and shield wire replacement	Proposed
Old Town	Bridgeport	Hawthorne Weston Norwalk JCT Norwalk	Fairfield Weston Norwalk Norwalk	115	2025	26.8	Partial line rebuilds	Proposed
Card	Lebanon	Lake Road	Killingly	345	2025	N/A	Sectionalize tap for QP724	Planned
Darien	Darien	Fitch St. (CMEEC)	Norwalk	115	2025	N/A	Line relocation	Proposed

From Station	City or Town	To Station	City or Town	Voltage kV	ISD	Miles	Project Description	Status
Sherwood	Westport	South Norwalk (CMEEC)	Norwalk	115	2025	N/A	Line relocation	Proposed
Stevenson	Monroe	Pootatuck	Shelton	115	2026	N/A	Copper and shield wire replacement	Proposed
Devon	Milford	South Naugatuck	Naugatuck	115	2026	N/A	Copper and shield wire replacement	Proposed
Glennbrook	Stamford	Cedar Heights	Stamford	115	2026	5.0	XLPE replacement	Concept
Triangle	Danbury	Middle River	Danbury	115	2026	4.0	XLPE replacement	Concept

Table 4-2: Eversource Proposed Substation Projects in Connecticut

Substation	City or Town	Voltage kV	ISD	Project Description	Status
Sasco Creek	Westport	115	2023	Replace two transformers	Proposed
Montville	Montville	69	2023	Install one autotransformer	Under Construction
Ridgefield	Ridgefield	115	2023	Replace two transformers	Planned
Carmel Hill	Woodbury	115/23	2023	Add a distribution Transformer	Planned
Card	Lebanon	115	2023	Install breaker	Under Construction
Gales Ferry	Gales Ferry	69	2023	Convert from 69-kV to 115-kV	Under Construction
Tunnel	Preston	115	2023	Install breaker	Under Construction
Montville	Montville	69	2023	Install two breakers	Under Construction
Sandy Hook	Newtown	115/23	2023	Add a distribution transformer	Planned
Mansfield	Mansfield	115/23	2023	Add a distribution transformer	Under Construction
Glenbrook	Stamford	115	2023	Relay upgrades	Under Construction
Plumtree	Bethel	345/115	2023	Relay upgrades	Under Construction
Norwalk	Norwalk	345/115	2023	Relay upgrades	Under Construction
Shunock	Mystic	115	2023	Install a synchronous condenser and two breakers	Under Construction
East Devon	Milford	345/115	2023	Relay upgrades	Under Construction
Southington	Southington	115/13.8	2024	Replace transformer	Concept
Salisbury	Salisbury	69/13.2	2024	Replace transformer	Concept
Hopewell	Glastonbury	115/23	2024	Replace two transformers	Concept
Bunker Hill	Waterbury	115	2024	Reconfigure substation to a 6-breaker ring bus	Planned
Campville	Harwinton	115	2024	Replace circuit breaker	Concept
Canterbury	Canterbury	115	2025	Install breaker for QP787	Planned
Falls Village	Canaan	69/13.2	2025	Replace transformer	Concept
Cotton Bridge	Killingly	345	2025	Construct substation for QP724	Planned

Substation	City or Town	Voltage kV	ISD	Project Description	Status
Franklin Drive	Torrington	115/13.2	2025	Replace both distribution transformers	Concept
Beacon Falls	Beacon Falls	115/13.8	2025	Replace two transformers	Concept
Mansfield	Mansfield	115	2025	New substation	Concept
Bokum	Old Saybrook	115/27.6	2025	Replace transformers	Planned
Devon Railroad	Milford	115/27.6	2025	Circuit breaker and transformer replacement	Under Construction
North Canaan	North Canaan	69/13.8	2025	Replace distribution transformer	Concept
Millstone	Waterford	345	2026	Circuit breaker replacement	Proposed
Burrville	Torrington	115	2031	New substation	Concept

4.6 Incorporation of Renewables on the Eversource Transmission and Distribution System

There is a significant amount of solar PV and offshore wind development in southern New England that is supported by Eversource's transmission and distribution system in Connecticut.

Solar PV interconnections in Connecticut are increasing at a rapid pace due largely to the LREC/ZREC and other financing programs noted in Section 2.1.1. Two of the most notable transmission interconnected projects are the 120 MW Gravel Pit Solar Project (QP892/940/1030) which is currently in engineering and construction and the 49 MW Quinebaug Solar Project (QP588) which went in service in late 2021. Most PV systems however are interconnecting to the distribution system which is driving the need to modernize the electric distribution system. (PURA Dockets 17-12-03RE01 – 17-12-03RE11).

As of 1/31/2023, there were approximately 1,390 MW of installed DER in Connecticut, of which 815 MW or 59 percent is solar PV. However, of the 365 MW installed in the last three years, 310 MW or 85 percent is solar PV. The trend toward more PV has been consistent over the past decade and is expected to continue. The impact of this growing PV penetration is more pronounced on the distribution system. Several stations, such as Tracy and Frybrook in Eastern Connecticut and Rocky River in Western Connecticut, already have large amounts of online DER with much more in the queue. The technical issues related to high DER penetration at congested stations, especially ones with low load levels, are significant and have the potential to slow DER growth in these areas. Infrastructure upgrades needed to both resolve technical issues and safely, reliably integrate DER at these stations can sometimes be costly. Solutions and incentives that promote proactive infrastructure buildout, optimal DER location, and progressive cost allocation frameworks have the potential to promote renewable growth and integration which is in alignment with the state's comprehensive energy strategy.

Offshore wind interconnections are impacting the Eversource T&D system in Connecticut both as physical interconnections to the grid in Connecticut and as energy contracts with offshore wind projects located in other areas. DEEP, through competitive RFPs, secured offshore wind resources that will provide approximately 19 percent of the state's electricity supply, although none of those projects are interconnecting to the electric system in Connecticut.

Deepwater Wind's Revolution Wind project (QP781) is a 704 MW joint venture offshore wind project by Eversource Energy and Ørsted. This project will be interconnected to a switching station in the state of Rhode Island and will provide approximately 5 percent of the electrical supply in the state of Connecticut.

Vineyard Wind's Park City Wind project (QP624) is an 800 MW offshore wind project that was selected as part of the 2019 RFP. This project will make a landfall in Barnstable County, Massachusetts and is expected to provide approximately 14 percent of the electrical supply of the Connecticut.

Other large offshore wind projects have submitted interconnection requests to ISO-NE. Notably, one project seeks to interconnect 1,200 MW into Eastern Massachusetts and the other project seeks to interconnect 1,200 MW into Southeastern Connecticut. These projects combined could provide approximately 35 percent of the electrical supply in the state of Connecticut, but the

energy from these projects could be purchased by other states in the region in the same way that Connecticut has purchased energy from projects interconnecting to Rhode Island and Massachusetts.

The offshore wind projects in New England are in various levels of regulatory approval, contract negotiations, study, and development. However, the two projects that are selling energy to Connecticut have contracts approved by PURA.

Eversource will continue to monitor and incorporate these projects in the reliability planning of the electrical system in Connecticut. There are activities underway to address the integration of all these clean energy resources. ISO-NE initiated two cluster studies to address the interconnection of significant amounts of offshore wind on Cape Cod, some of which plans to sell energy to Connecticut. The second Cape Cod cluster study was terminated by ISO-NE in January 2023, due to offshore wind project withdrawals. ISO-NE has also performed a pilot study to assess potential modifications to the reliability planning process to address the integration of clean energy resources. Planning assumptions were updated late in 2021 based on the results of the pilot study. CT DEEP's Draft Integrated Resource Plan found that electric transmission is an essential part of integrating enough clean energy to meet state targets, and DEEP has recommended that the region undertake a coordinated, scenario-based approach to planning the future electric grid.