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VIA ELECTRONIC MAIL

January 6, 2023

TO: Energy & Technology Committee
Environment Committee

FROM: Melanie A. Bachman, Executive Director MAB

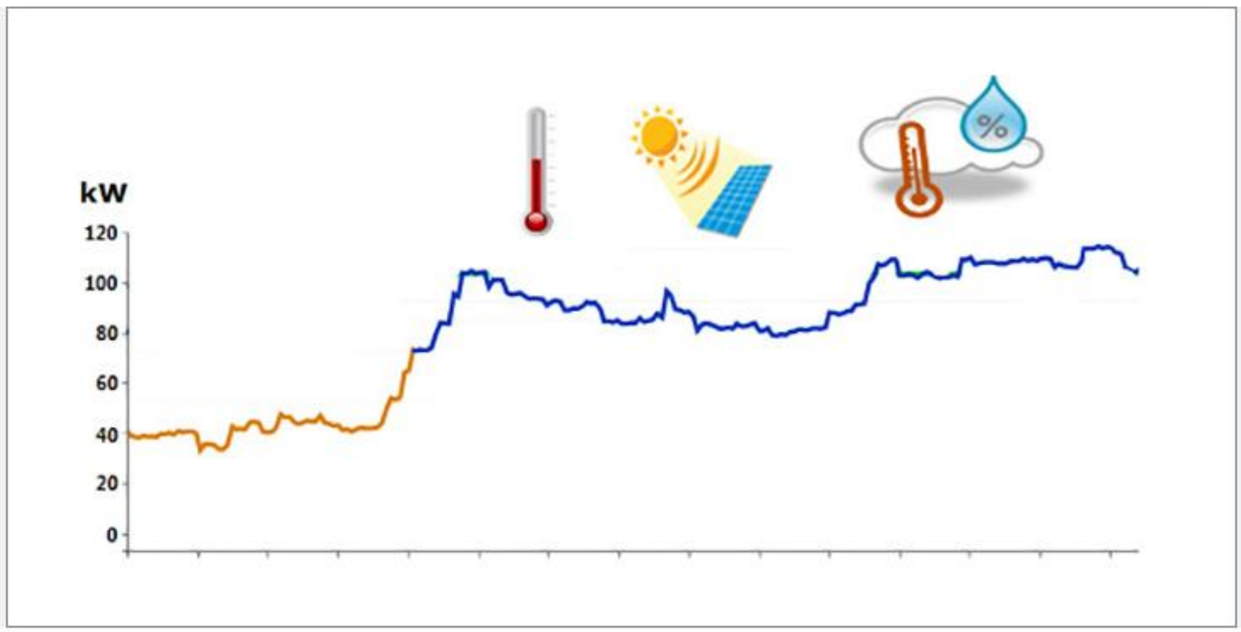
RE: **FORECAST-2022** - Connecticut Siting Council 2022 Review of the Ten-Year Forecast of Connecticut Electric Loads and Resources.

The Connecticut Siting Council (Council) hereby announces the issuance of the *2022 Connecticut Siting Council Review of the Ten-Year Forecast of Connecticut Electric Loads and Resources*. Pursuant to Connecticut General Statutes §16-50r, this report assesses the status of electric loads and resources in the state over a ten-year forecast period.

This report is available on our website at portal.ct.gov/csc under the "Publications" link.

MAB/MP/laf

FORECAST-2022 - Connecticut Siting Council 2022 Review of the Ten-Year Forecast of Connecticut Electric Loads and Resources.



Report

January 5, 2023

TABLE OF CONTENTS

INTRODUCTION

Since 1972, the Connecticut General Assembly has mandated the Connecticut Siting Council (Council) to review the forecasts of our state's electricity needs and resources. Specifically, since 2001, the requirement is to review a ten-year forecast of loads and resources (FLR). Under Connecticut General Statutes (CGS) §16-50r(a), each entity engaged in electric transmission services, electric distribution services or generating electric power with a capacity of one megawatt or greater shall file annually with the Council a forecast of loads and resources (or an update of the previous year's forecast report) on or before March 1.

Such reports shall include, as applicable: (1) A tabulation of estimated peak loads, resources and margins for each year; (2) data on energy use and peak loads for the five preceding calendar years; (3) a list of existing generating facilities in service; (4) a list of scheduled generating facilities for which property has been acquired, for which certificates have been issued and for which certificate applications have been filed; (5) a list of planned generating units at plant locations for which property has been acquired, or at plant locations not yet acquired, that will be needed to provide estimated additional electrical requirements, and the location of such facilities; (6) a list of planned transmission lines on which proposed route reviews are being undertaken or for which certificate applications have already been filed; (7) a description of the steps taken to upgrade existing facilities and to eliminate overhead transmission and distribution lines in accordance with the regulations and standards described in section 16-50t; and (8) for each private power producer having a facility generating more than one megawatt and from whom the person furnishing the report has purchased electricity during the preceding calendar year, a statement including the name, location, size and type of generating facility, the fuel consumed by the facility and the by-product of the consumption.

Upon reviewing such forecast reports, the Council may issue its own report assessing the overall status of loads and resources in the state. If the Council issues such a report, it shall be made available to the public and shall be furnished to each member of the joint standing committee of the General Assembly having cognizance of matters relating to energy and technology, any other member of the General Assembly making a written request to the council for the report and such other state and municipal bodies as the council may designate.

The Council is in receipt of March 2022 utility forecast reports from electric generators and transmission/distribution companies. On September 15, 2022, the Council approved the 2022 FLR schedule. Pursuant to CGS §16-50r(a), after providing notice, the Council held a public comment session at 6:30 p.m. on October 19, 2022 for the convenience of the public.[1]

Given the importance not only for our State, but for our region, the electric network must be highly reliable. Daily operations of the grid, including both power flows and transactions within the wholesale market for electricity, are managed by the Independent System Operator for New England. ISO New England Inc. (ISO-NE) is a private, not-for-profit corporation, governed by an independent board of directors and overseen by the Federal Energy Regulatory Commission (FERC). Reliability standards set or approved by FERC are carried out through ISO-NE by its member companies. This centralized regional authority for management helps to ensure that the system functions reliably and efficiently. ISO-NE also directs annual forward planning for both electric transmission and generation needs in our region. Members choose to participate in this regional planning process in one of the following sectors: generators, suppliers, alternative

[1] Council Public Comment Session Notice, dated September 16, 2022.

resources (including renewable resources), transmission owners, publicly-owned utilities, and end users. Nonetheless, since each state regulates the power facilities in-state only, and affects future electric reliability by establishing energy policies for in-state businesses and citizens, each state must carefully review forecasts of anticipated electric supply and demand within its own borders.

The Department of Energy and Environmental Protection (DEEP) is mandated to create an Integrated Resource Plan (IRP) and a Comprehensive Energy Strategy (CES).

In contrast to the IRP, which establishes policy, and the CES, which addresses strategy, the Council's report is limited strictly to forecasting electric loads and resources.

ELECTRIC DEMAND

Load and Load Forecasting

Load forecasting by the Connecticut utilities is broken down by each electric distribution company's[2] service area. This includes the two largest distribution companies, The Connecticut Light and Power Company d/b/a Eversource Energy (Eversource) and The United Illuminating Company (UI), as well as municipal electric distribution companies, the Connecticut Municipal Electric Energy Cooperative (CMEEC) and Wallingford Electric Division (WED).[3] UI serves 17 municipalities in the greater New Haven area near the coast from Fairfield to North Branford and north to Hamden. CMEEC collectively serves the majority of the municipal utilities in Connecticut, namely, the City of Norwalk's Third Taxing District Electrical Department; Groton Utilities; Jewett City Department of Public Utilities; Norwich Public Utilities; and South Norwalk Electric & Water. Bozrah Power & Light Company (Bozrah) and the Mohegan Tribal Utility Authority (MTUA) are also full-requirement wholesale customers of CMEEC.[4] Wallingford Electric Division (WED) serves the Town of Wallingford (and a portion of North Branford) as a municipal utility. The largest distribution company by size and service area is Eversource, which serves all of the remaining municipalities in Connecticut. Collectively, at any given time, the sum of Eversource, UI, CMEEC[5], and WED loads is approximately equal to the Connecticut load. The Council is mandated by statute to review these utility forecasts for the Connecticut load.

The principal term for describing electric load is "demand," which can be thought of as the rate at which electrical energy is consumed. Demand is the total amount of electricity required at any given instant by electric customers and can be used interchangeably with the term "load". Load is created by the aggregate load (demand) of customers' equipment (residential, commercial, and industrial). The most familiar unit of demand or load is a "Watt." On a household scale, a kilowatt (kW) is used, a unit of 1,000 Watts. However, since utility companies serve loads on a much larger scale, forecasts typically use the unit of a megawatt (MW), or one million watts. Very large utility-level loads can sometimes be expressed in gigawatts (GW). One GW is equal to one billion watts or 1,000 MW.

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[2] Electric distribution company or distribution company means any person providing electric transmission or distribution services within the state. (C.G.S. §16-1(23)(2021))
[3] WED was formerly part of CMEEC. WED separated from CMEEC in 2014.
[4] However, for the purposes of load forecasting, Bozrah and MTUA may be treated as part of CMEEC's "service area."
[5] A very small amount of CMEEC load (and thus Connecticut load) is the result of providing service to Fisher's Island, New York via a connection to a substation in Groton, Connecticut.

Loads increase when the number of electrical devices being used at the same time increases. Demand also depends on the size of the electrical loads or how much work is being performed by those devices. Generally, the higher the electrical loads, the more the stress on the electrical infrastructure. Higher loads result in more generators having to run and run at higher output levels. Transmission lines must carry more current to transformers located at the various substations. The transformers in turn must carry more electrical load, and supply it to the distribution feeders, which must carry more current to pole or ground-mounted transformers to supply the end users. In order to maintain reliability and predict when infrastructure must be added, upgraded, and replaced to serve customers adequately, utilities must have a meaningful and reasonably accurate estimate or projection of future loads. The process of calculating future loads is called "load forecasting."

In a ten-year forecast, peak loads are predicted for the calendar year that the forecast report is issued and for nine additional years into the future. Thus, a 2022 ten-year forecast does not predict peak loads through 2032, but rather 2031. The 2022 utility reports are considered in the Council's forecast report, as they are the most up-to-date available at this time.

Peak Load Forecasting

Load forecasting focuses primarily on peak load, that is, the highest hourly load experienced during the year. Peak load is more important than typical or average load because the peak represents a clearly-defined worst-case stress on the electric system. Connecticut experiences its peak load during a hot, humid summer day. This is because air conditioning generally creates one of the largest components of demand for power.

While winter months in Connecticut do have periods of significant loads, winter peaks are generally lower than summer peaks because much of the energy for heating is supplied directly by fossil fuels consumed on the customer's premises, not by electricity.[6] While natural gas, propane, or oil heating systems do typically require electricity for blowers/fans, control systems, pumps, etc., this electrical load is generally smaller than the load from air conditioning, which runs entirely on electricity.[7] Conversely, areas such as the Canadian province of Québec, where electric heating is common in winter and there is less demand for air conditioning in summer, can experience peak loads in the winter.

While a detailed discussion of peak loads would include additional factors such as customer usage, demographics, conservation efforts, economic conditions, and others, the most important factor is weather—specifically the temperature and humidity. Higher temperatures result in more frequent use of air conditioning, and the units work harder, consuming more electricity. Also, higher humidity can exacerbate the situation, as it can make the temperature feel hotter than it actually is (raising what is sometimes called the "heat index") and further encourage air conditioning use.

The duration of a "heat wave" is another factor. While some customers may tolerate an unusually warm day or two with little or no air conditioning use, extended periods of hot weather can lead to those customers (who initially may be reluctant to run air conditioning) to turn on their air

[6] According to the U.S. Department of Energy, roughly 78 percent of Connecticut homes are heated using fossil fuels such as natural gas, fuel oil, or other petroleum products. See https://www.eia.gov/state/?sid=CT.
[7] There are some natural gas-powered air conditioning systems, but they are much less common than electric air conditioning.

conditioning units. Thus, daily peak loads can sometimes rise during a heat wave even if the daily high temperatures remain more or less uniform.

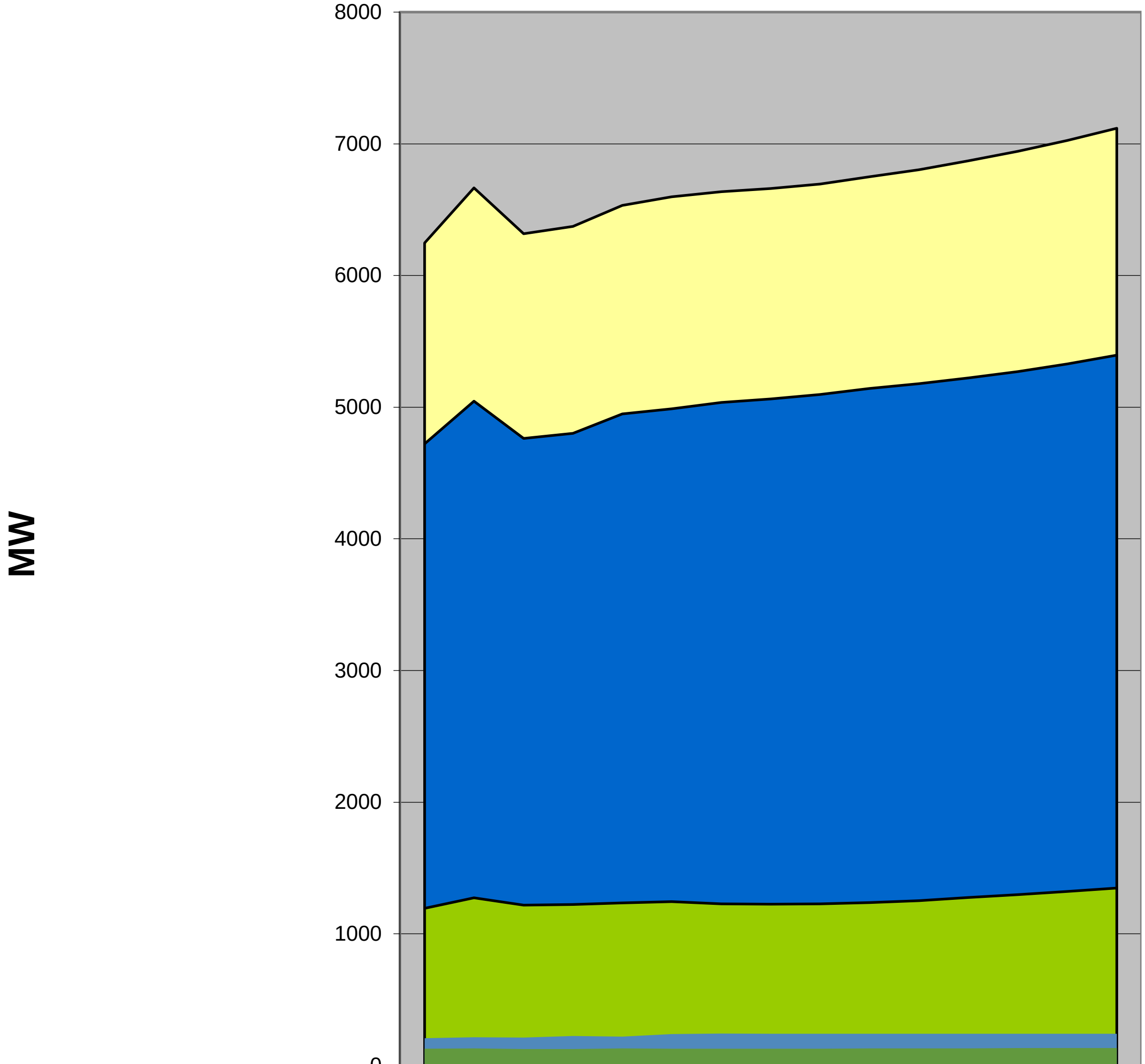
Normal Weather (50/50) Peak Load Forecast

In order to account for weather effects as accurately as possible for financial planning purposes, the Connecticut distribution companies provide a forecast based on "normal weather," or assumed temperatures consistent with approximately the past 30 years of meteorological data. This is also referred to as the "50/50" forecast, which means that, in a given year, the probability of the projected peak load being exceeded is 50 percent, while the probability that the actual peak load would be less than predicted is also 50 percent. Another way of considering this 50/50 forecast would be to say that it would be exceeded, on average, once every two years.[8]

In its normal weather (50/50) forecast, Eversource predicted a peak load of 4,988 MW for its service area during 2022. This load is expected to grow during the forecast period at a compound annual growth rate (CAGR) of 0.88 percent, reaching 5,395 MW in 2031. UI predicted, in its normal weather (50/50) forecast, a peak load of 1,244 MW for its service area during 2022. This load is expected to grow during the forecast period at a CAGR of 0.90 percent, reaching 1,348 MW in 2031. CMEEC predicted, in its normal weather (50/50) forecast, a peak load of 239 MW for its service area during 2022. This load is expected to grow during the forecast period at a CAGR of approximately 0.14 percent, reaching 242 MW in 2031. Finally, WED predicted, in its normal weather (50/50) forecast, a peak load of 127 MW for its service area during 2022. This load is expected to grow during the forecast period at a CAGR of 0.51 percent, reaching 133 MW in 2031. All the state utilities' 50/50 summer peak loads are depicted in Figure 1a.

[8] With a 50 percent probability of being exceeded in a given year, it would be a near certainty (or about 99.9 percent chance) that such forecast peak load would be exceeded at least once in ten years.

Figure 1a: Utility Adjusted Historical & 50/50 Peak Load Forecast in MW



Years	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
CT Utilities Historical & 50/50 Forecast Peak w/C&LM & DG	6248	6664	6318	6373	6532	6598	6635	6660	6694	6751	6803	6870	6944	7026	7118
Eversource Historical & 50/50 Forecast Peak	4721	5045	4763	4802	4949	4988	5035	5063	5096	5141	5178	5221	5271	5328	5395
UI Historical & 50/50 Forecast Peak	1193	1274	1217	1222	1234	1244	1229	1226	1228	1238	1252	1276	1299	1323	1348
CMEEC Historical & 50/50 Forecast Peak	207	215	212	224	219	239	243	242	241	242	242	242	242	242	242
WED Historical & 50/50 Forecast Peak	127	130	126	125	130	127	128	129	129	130	131	131	132	133	133

The sum of the utilities' forecasts resulted in a projected statewide peak load of 6,598 MW during 2022. This load is expected to grow at a CAGR of 0.85 percent and reach 7,118 MW by year 2031.

This is close to Eversource's CAGR because Eversource has the largest service area in Connecticut, and its customers are the dominant source of load in the State.

The sum of individual utilities' forecasts can only approximate the total Connecticut peak load. Because temperatures and customer usage patterns vary across the State, the individual utilities do not necessarily experience their peaks on the same hour and/or same day. Indeed, adding the four utilities' forecasts may slightly overstate the peak load in the State (i.e. be a conservative analysis), but the error is generally considered small.

Extreme Weather (90/10) Peak Forecast

In order to account for weather effects as accurately as possible for infrastructure planning purposes, the Connecticut distribution companies provide a forecast based on "extreme weather," or "90/10" forecast,[9] which means that 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 quite 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.

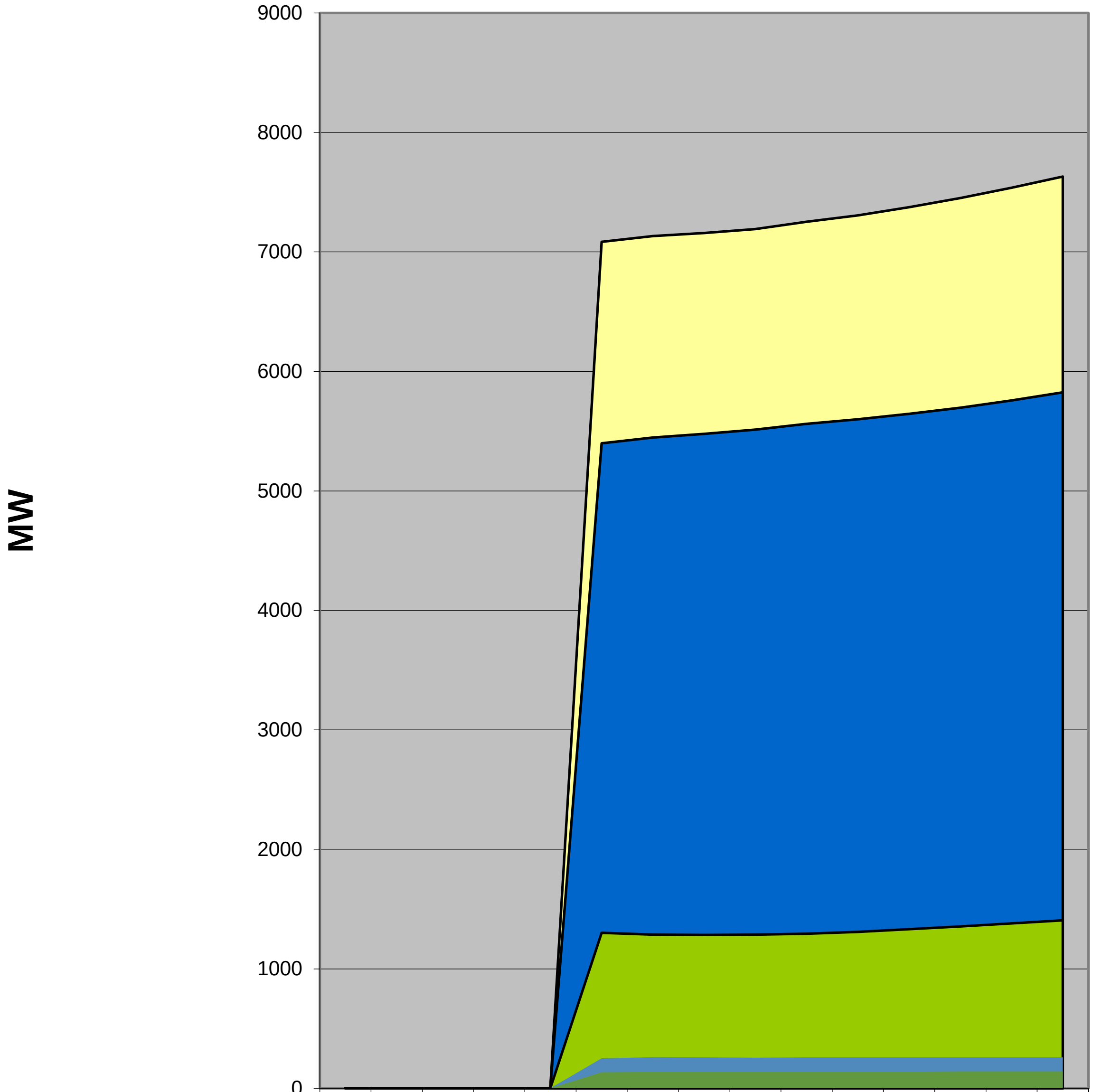
Utility planners must be conservative in estimating risk because they cannot afford the alternative. Just as bank planners should ensure the health of the financial system by maintaining sufficient collateral to meet worst-case liquidity risks, so load forecasters must ensure the reliability of the electric system by maintaining adequate facilities to meet peak loads in worst-case weather conditions or unanticipated equipment failures. While over-forecasting can have economic penalties due to excessive and/or unnecessary expenditures on infrastructure, the consequences of under-forecasting can be much more serious.

The sum of the utilities' extreme weather forecasts[10] is 7,086 MW for 2022. This would grow at a CAGR of 0.83 percent to reach 7,631 MW in 2031. See Figure 1b for the extreme weather forecast.

[9] Used by both ISO-NE and by the Connecticut utilities for utility infrastructure planning, including both transmission and generation.

[10] An extreme weather forecast is not available for WED. The extreme weather data is estimated from the 50/50 forecast data provided by multiplying by the same ratio (per year) as the sum of the other utilities' 90/10 to 50/50 peak loads. The effects of any errors on the statewide extreme weather forecast total would be very small.

Figure 1b: Utility Extreme Load Forecast in MW



	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
CT Utilities' Extreme Weather						7086	7132	7158	7193	7253	7307	7376	7451	7537	7631
Eversource Extreme Weather						5399	5448	5478	5513	5561	5599	5645	5696	5756	5825
UI Extreme Weather						1301	1287	1283	1285	1295	1310	1333	1356	1381	1406
CMEEC Extreme Weather						252	260	259	257	258	258	258	258	258	258
WED Extreme Weather						134	137	138	138	139	140	140	141	142	142

ELECTRIC SUPPLY

Electric supply is conservatively calculated using the generator's forecast reports and the ISO-NE Seasonal Claimed Capability Report (SCC Report). The SCC Report includes all generation as seen and/or dispatched by ISO-NE. While other smaller DG at the distribution level can serve to reduce loads, those under 1 MW would not be required to file a report with the Council, and such loads could be included in the distribution utilities' net load predictions or conservatively excluded.

While peak loads occur during the summer, the electric system is further challenged by the fact that generation capability is at its lowest during the summer.[11] This is largely due to lower thermodynamic efficiencies of many plants when the outside temperatures are higher. Accordingly, generators report two different power outputs to ISO-NE. They are referred to as Summer and Winter Seasonal Claimed Capabilities, respectively. (See Appendix A.) For instance, Connecticut's December 2022 ISO-NE generation output is 9,279 MW in the summer and 9,954 MW during the winter.

Electric Transmission

Electric transmission is used to efficiently move bulk power long distances. To provide balanced power, alternating current (AC) transmission uses three electrical phases that work together as one to serve loads. The potential difference between any two of the phases is called the "line to line voltage" or simply "line voltage." All else being equal, a transmission line with a higher line voltage is a higher capacity line. Higher voltages also reduce losses because, generally, less current would be required to serve a given load, and losses are a function of the current. Under CGS §16-50i, the Council has jurisdiction over an electrical transmission line facility with a design capacity (or line voltage) of at least 69,000 Volts or 69 kilovolts (kV). The Council also has jurisdiction over substation and switching station facilities of 69-kV and up.

Electric transmission is needed for electric reliability in order to serve substation facilities, which in turn, serve local distribution loads (and end users). Electric transmission can also allow electricity that may be produced by lower cost generators to reach more distant load centers. Finally, to the extent the electric transmission crosses the border into another state (i.e. via an interstate tie line), transmission can promote import or export capacity. Import capacity is a resource to Connecticut (like generation) and is discussed in the next section.

Most recent transmission-related projects that have been reviewed and approved by the Council were related to line upgrades (e.g. conductor and structure upgrades) to meet various current National Electrical Safety Code, North American Electric Reliability Corporation, Northeast Power Coordinating Council, and/or ISO-NE standards. Appendix B contains a list of Planned/Proposed Transmission Projects[12] submitted by the utilities in accordance with CGS §16-50r(a). In such appendix, "Concept" means that the utility has a conceptual but not necessarily final design for such project. "Proposed" means that the utility is seeking Council review and approval of such project. "Planned' means the project has already received approval, and construction is either underway or will be commencing in the near future.

[11] Some combustion turbine power plants can partially compensate for this effect by using evaporative coolers or other cooling system to chill the incoming air during summer months. But all else being equal, power outputs are still generally higher during the winter months for traditional generation.
[12] The status of the projects are reported as of March 2022.

Connecticut's utilities also continue to upgrade, replace and install substation facilities to continue to reliably serve local distribution loads and to ensure the reliability of the transmission system as transmission lines connect to and/or pass through substations as well. Such projects are identified in Appendix C.

Import Capacity

The ability to import electricity plays a significant role in Connecticut's electric supply. It is essential for maximizing reliability and for allowing economic interchange of electricity. In October 2021, the 2020 Connecticut Integrated Resource Plan, Appendix A1, estimated a Connecticut import capacity of 3,400 MW for 2020 through 2024+. While any future transmission tie upgrades could potentially affect this number, the Council has conservatively utilized a flat 3,400 MW for the remainder of the forecast period (i.e. through 2031) in Table 2.

Demand/Supply Balance

Table 2 contains a tabulation of generation capacity versus peak loads. The 90/10 forecast is applied in this table. Note that peak load here is combined with a reserve requirement. This is an emergency requirement in case a large generating unit trips off-line; thus, reserves must be available to compensate rapidly for that loss of capacity. The largest reserve requirement is 1,244 MW, which is approximately the current summer output of the State's largest generating unit, Millstone 3.

"Installed capacity derate" takes into account a possible number of power plants off-line for maintenance purposes. Existing generation listed in Table 2 is based on the 9,279 MW of total existing generation in Connecticut listed in Appendix A.[13] Appendix A data is from ISO-NE's December 2022 Seasonal Claimed Capability report.

In general, the retirement of older generating units is difficult to predict because it is the result of many factors such as market conditions, environmental regulations and the generating companies' business plans. According to ISO-NE's 2022 Regional Electricity Outlook, approximately 5,000 MW of existing fossil-fueled generation in New England is at risk for retirement in coming years. Three of such generating facilities are located in Connecticut: Middletown Nos. 2-4 (~725 MW); Montville Nos. 5-6 (~484 MW); and New Haven Harbor (~448 MW). All three are listed below in Table 2 (to be conservative) and are based on the most up to date December 2022 summer seasonal claimed capability ratings.

Even taking into account the most conservative prediction, the utilities' extreme weather 90/10 forecast, at-risk power plant retirements, the worst-case generating output (the summer output), neglecting the load reducing effects of small DG, the Council anticipates that electric resource supply for Connecticut will be adequate to meet demand during the forecast period. (See Table 2.)

[13] In this report, to be conservative, the summer (not winter) power outputs of existing generation will be considered. To also find the winter power outputs, see Appendix A.

Table 2: Connecticut Resources vs. Peak Load - Balance Table

Year	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
90/10 Load	7086	7132	7158	7193	7253	7307	7376	7451	7537	7631
Reserve (Equiv. Millstone 3)	1244	1244	1244	1244	1244	1244	1244	1244	1244	1244
Load + Reserve	8330	8376	8402	8437	8497	8551	8620	8695	8781	8875
Existing Generation[14]	9279	9279	9279	9279	9279	9279	9279	9279	9279	9279
Normal Import	3400	3400	3400	3400	3400	3400	3400	3400	3400	3400
Total Avail. Resources	12679	12679	12679	12679	12679	12679	12679	12679	12679	12679
Surplus/Deficiency	**4349**	**4303**	**4277**	**4242**	**4182**	**4128**	**4059**	**3984**	**3898**	**3804**
At Risk Retirements per 2022 ISO-NE Regional Electricity Outlook[15]										
Middletown Nos. 2-4			**-725**	**-725**	**-725**	**-725**	**-725**	**-725**	**-725**	**-725**
Montville Nos. 5-6			**-484**	**-484**	**-484**	**-484**	**-484**	**-484**	**-484**	**-484**
New Haven Harbor			**-448**	**-448**	**-448**	**-448**	**-448**	**-448**	**-448**	**-448**
Surplus/Deficiency[16]	**4349**	**4303**	**2620**	**2585**	**2525**	**2471**	**2402**	**2327**	**2241**	**2147**

RESOURCE PLANNING

State of Connecticut

Connecticut Siting Council

The Council's purpose is to balance the need for adequate and reliable public utility services at the lowest reasonable cost to consumers while protecting the environment and ecology of Connecticut.

In addition to evaluating applications for new facilities and petitions for modifications to existing facilities, the Council reviews the life cycle costs of electric transmission lines and issues a report every five years. The Council also updates, as necessary, its Best Management Practices for Electric and Magnetic Fields for Electric Transmission Lines.[17]

By virtue of its siting authority, the Council accumulates data and maintains records on the physical characteristics, construction costs, adequacy and reliability of power facilities in Connecticut. This

[14] This report does not take into account fuel availability during the winter season.

[15] At risk generation retirement dates are not yet known and are only estimated early in the forecast period to be conservative.

[16] This represents an ideal situation. Maximum import capacity and maximum available generation may not necessarily occur at the same time.

[17] https://portal.ct.gov/CSC/3_Petitions/Petition-Nos-0001-1219/PE754_

material forms the basis for the annual forecast report and the life-cycle report. By extension, it also forms a basis for energy resource planning done by various other state agencies, and for policy decisions. The Council may make recommendations to those other agencies, depending on patterns observed in its data, records, and reports; however, the Council itself is not an energy resource planning agency, nor is it authorized to set policy.

Integrated Resource Plan (IRP)

CGS 16a-3a requires that DEEP prepare an Integrated Resources Plan (IRP) every two years. Such IRP provides an in-depth assessment of the state's future electric needs and a plan to meet those future needs. Such report considers both the demand side resources (e.g. energy efficiency) as well as supply side resources such as generation and transmission and makes recommendations on how best to meet future electric needs in the state while taking into account Connecticut's decarbonization goals.

In October 2021, DEEP issued its most recent IRP (2020 IRP) that incudes pathways to achieve a 100 percent zero carbon electric supply by 2040.[18]

Comprehensive Energy Strategy (CES)

CGS §16a-3d requires that DEEP prepare a CES every four years. The CES examines future energy needs in the state and identifies opportunities to reduce costs for ratepayers, ensure reliable energy availability, and mitigate public health and environmental impacts of Connecticut's energy use, such as greenhouse gas (GHG) emissions and emissions of criteria air pollutants. The CES provides recommendations for legislative and administrative actions that will aid in the achievement of interrelated environmental, economic, security, and reliability goals.

DEEP issued its 2018 CES on February 8, 2018.[19] Throughout 2022, DEEP held a number of technical sessions in support of its upcoming CES.[20]

Regional Resource Planning

ISO New England Inc. (ISO-NE) Regional System Plan

ISO-NE is a not-for-profit corporation responsible for the reliable and economical operation of New England's electric power system. It also administers the region's wholesale electricity markets and manages the comprehensive planning of the regional power system. The planning process includes the preparation of an annual Regional System Plan (RSP) for the New England region, which includes the following:

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18 Integrated Resource Planning (ct.gov)
19 https://portal.ct.gov/DEEP/Energy/Comprehensive-Energy-Plan/Previous-Comprehensive-Energy-Strategies
20 https://portal.ct.gov/DEEP/Energy/Comprehensive-Energy-Plan/Comprehensive-Energy-Strategy

- Forecasts[21] of annual energy use and peak loads (i.e. the demand for electricity) for a 10-year planning horizon and the need for resources (i.e., capacity);
- Information about the amounts, locations, and characteristics of market responses (e.g., generation or demand resources or elective transmission upgrades) that can meet the defined system needs – systemwide and in specific areas; and
- Descriptions of transmission projects for the region that could meet the identified needs, as summarized in an RSP Project List, which includes information on project status and cost estimates and is updated several times each year.

On November 2, 2021, ISO-NE issued its *2021 Regional System Plan* (2021 RSP).[22] The executive summary offers this perspective: "…[T]he ISO continues to work with stakeholders to improve the transmission system and wholesale electricity markets. Despite the fact that future supply-side resources are likely to be less controllable than traditional resources, and that loads will be more challenging to forecast, the ISO is well positioned to anticipate and prepare for the future… For all RSP analyses, the ISO used a number of assumptions, discussed with the Planning Advisory Committee (PAC). These assumptions are subject to uncertainty as the system evolves over the planning period and the markets are reformed to accommodate state laws, mandate and policies. Changes in these assumptions could affect the results and conclusions of RSP analyses, and ultimately the development of transmission, generation and demand resources. While each RSP is a snapshot in time, the planning process is proactive and continuous. As needed and appropriate, the ISO updates the results of planning activities by accounting for the status of ongoing projects, studies, and new initiatives."

CONCLUSION

This Council has considered Connecticut's electric energy future and finds that even taking into account the most conservative prediction, the 90/10 forecast, at-risk power plant retirements, the worst-case generating output (the summer output), and neglecting the load reducing effects of small DG, the resources (i.e. generation plus import) for Connecticut during 2022-2031 are expected to be adequate to meet demand.

[21] ISO-NE performs regional forecasting in its Capacity, Energy, Loads, and Transmission (CELT) Report, and this report is generally consistent with the 2022 CELT Report.

[22] https://www.iso-ne.com/system-planning/system-plans-studies/rsp/

Glossary

50/50 forecast: A projection of peak electric load assuming normal weather conditions. The 50/50 projected peak load has a 50 percent chance of being exceeded in a given year.

90/10 forecast: A projection of peak electric load assuming extreme (hot) weather conditions. The 90/10 forecast has a 10 percent chance of being exceeded in a given year. This forecast is used for transmission facility planning.

AC (Alternating Current): An electric current that reverses (alternates) its direction of flow periodically. In the United States, this occurs 60 times per second (60 cycles or 60 Hz).

Ampere (amp): A unit measure for the flow (current) of electricity. As load increases, so does the amperage at any given voltage.

Baseload generator: A generator that operates roughly 70%+ of the time and operates at nearly constant output.

Blackout: A total disruption of the power system, usually involving a substantial or total loss of load and generation over a large geographical area.

Black start capability: The capability of a power plant to start generating electricity by itself without any outside source of power, for instance, during a general blackout.

British thermal unit (BTU): The amount of energy required to heat or cool one pound of water by one degree Fahrenheit.

C&LM (Conservation and load management): Any measures to reduce electric usage and provide savings. See Conservation. See Demand response.

Cable: A fully insulated conductor, usually installed underground.

CAGR (Compound annual growth rate): The percentage by which a quantity (such as load or energy) increases per year over the forecast period, on average, while taking into account compounding effects. It is analogous to a computed compound interest rate on a bank account based on a beginning balance and final balance several years later (assuming no deposits other than interest and no withdrawals). Since it is nine years from the first year of the forecast period to the last, for the purposes of this report, CAGR = (100%*((Final Value/Initial Value)^(1/9)) – 1).

CELT (Capacity, Energy, Load and Transmission Report): An annual ISO-NE report including data and projections for New England's electric system over the next ten years.

CHP (Combined heat and power): Term used interchangeably with cogeneration. See Cogen.

Circuit: A system of conductors (three conductors or three bundles of conductors) through which electrical energy flows between substations. Circuits can be supported above ground by transmission structures or placed underground.

Circuit breaker: A device designed to open and close a circuit manually and also to open the circuit automatically on a predetermined overload of current.

CMEEC (Connecticut Municipal Electric Energy Cooperative): Collective municipal transmission/distribution companies that serve customers of the City of Norwalk's Third Taxing District Electrical Department; Groton Utilities; Jewett City Department of Public Utilities; Norwich Public Utilities; South Norwalk Electric & Water; Bozrah Power & Light Company (Bozrah) and the Mohegan Tribal Utility Authority (MTUA).

Combined-cycle: A power plant that uses its waste heat from a gas turbine to generate even more electricity for a higher overall efficiency.

Conductor: A metallic wire, bus bar, rod, tube or cable, usually made of copper or aluminum, that serves as a path for electric flow.

Cogen (Cogeneration plant): A power plant that produces electricity and uses its waste heat for a useful purpose. For example, cogeneration plants heat buildings, provide domestic hot water, or provide heat or steam for industrial processes.

Conservation: The act of using less electricity. Conservation can be achieved by cutting out certain activities that use electricity, or by adopting energy efficiencies.

Customer-side distributed resource: "The generation of electricity from a unit with a rating of not more than sixty-five megawatts on the premises of a retail end user within the transmission and distribution system including, but not limited to, fuel cells, photovoltaic systems or small wind turbines, or a reduction in demand for electricity on the premises of a retail end user in the distribution system through methods of conservation and load management, including, but not limited to, peak reduction systems and demand response systems." (Conn. Gen. Stat. § 16-1(a)(34))

DC (Direct Current): An electric current that flows continuously in one direction as contrasted to an alternating current (AC).

Dual-fuel: The ability of a generator to operate on two different fuels, typically oil and natural gas. Economics, the availability of fuels and environmental (e.g. air emission) restrictions are factors that generating companies consider when deciding which fuel to burn.

Demand: The total amount of electricity required at any given instant by an electric customers. "Demand" can be used interchangeably with the term "load". See Load.

Demand response: The ability to reduce load during peak hours, by turning down/off air conditioning units, industrial equipment, etc. Demand response resources on a scale large enough to affect transmission are typically aggregated through a third party, using automated controls.

Distribution: The part of the electric delivery system that operates at less than 69,000 volts. Generally, the distribution system connects a substation to an end user.

Distributed generation: Generating units (usually on the customer's premises) that connect to the electric distribution system, not to the transmission system. These units are generally smaller than their counterparts.

Energy (electric): The total work done by electricity. Energy is the product of the average load and time. The unit is kilowatt hours (kWh).

Energy efficiency (in the case of an electric generator or of any dynamic process): The actual amount of energy required to accomplish a task, as opposed to a theoretical 100 percent efficiency.

Eversource (The Connecticut Light and Power Company d/b/a Eversource Energy): A transmission/distribution company that serves customers in 149 Connecticut municipalities.

Feeder: Conductors forming a circuit that are part of the distribution system. See Distribution. See Circuit.

Fuel cell: Fuel cells are devices that produce electricity and heat by combining hydrogen and oxygen in an electrochemical reaction. Fuel cells can operate on a variety of fuels, including natural gas, propane, landfill gas, and hydrogen. Unlike traditional generating technologies, fuel cells do not use a combustion process that converts fuel into heat and mechanical energy. Rather, a fuel cell converts chemical energy into heat and electrical energy. This process results in quiet operation, low emissions, and high efficiencies.

Generator: A device that produces electricity. See Baseload generator, Intermediate generator, and Peaking generator.

Grid: A system of interconnected power lines and generators that is managed so that the generators are dispatched as needed to meet the overall requirements of the customers connected to the grid at various points. “Grid” has the same meaning as “bulk power system.”

Grid-side distributed resource: “The generation of electricity from a unit with a rating of not more than sixty-five megawatts that is connected to the transmission or distribution system, which units may include, but are not limited to, units used primarily to generate electricity to meet peak demand.” (Conn. Gen. Stat. § 16-1(a)(37))

ISO-NE: (ISO New England): An entity charged by the federal government to oversee the bulk power system and the electric energy market in the New England region.

Intermediate generator: A generator that operates approximately 10 to 70 percent of the time, and it ramps up and down depending on system load conditions.

kV (kilovolt): One thousand volts (i.e. 345 kV = 345,000 volts). See Volt.

Line: A series of overhead transmission structures that support one or more circuits; or, in the case of underground construction, a single electric circuit.

Load: Amount of power delivered, as required, at any point or points in the system. Load is created by the aggregate load (demand) of customers’ equipment (residential, commercial, and industrial).

Load management: Steps taken to reduce demand for electricity at peak load times or to shift some of the demand to off-peak times. The reduction may be made with reference to peak hours, peak days or peak seasons. Electric peaks are mainly caused by high air-conditioning use, so air-conditioners are the prime targets for load management efforts. Utilities or businesses that provide load management services pay customers to reduce load through a variety of manual or remotely-controlled methods.

Loss or losses: Electric energy that is lost as heat and cannot be used to serve end users. There are losses in both the transmission and the distribution system. Higher voltages help reduce losses.

Megawatt (MW): One million Watts. A measure of the rate at which useful work is done by electricity.

Microgrid: A group of interconnected loads and distributed energy resources within clearly defined electrical boundaries that acts as a single controllable entity with respect to the grid and that connects and disconnects from such grid to enable it to operate in both grid-connected or island mode. (Conn. Gen. Stat. §16-243y)

Normal weather: Temperatures and humidity consistent with past meteorological data.

Peak load: The highest electric load experienced during a given time period. See Load.

Peaking unit: A generator that can start under short notice (e.g. 10 to 30 minutes).

REC (Renewable Energy Credit): A certificate representing proof that one megawatt-hour of electricity has been generated from an eligible renewable energy resource. In Connecticut, a REC is an electronic certificate created by the New England Power Pool Generation Information System. RECs can be sold or traded.

Smart meter: An electrical meter that records consumption of electric energy in intervals of an hour or less and communicates that information at least daily back to the utility for monitoring and billing purposes.

Substation: Electric facilities that use equipment to switch, control and change voltages for the transmission and distribution of electrical energy.

Switching station: Equipment used to connect together two or more circuits via switches. It is similar to a substation, but no change in voltage occurs. Also referred to as a switchyard.

Terminal structure: A structure typically within a substation that physically ends a section of transmission line.

Transformer: A device used to change voltage levels to facilitate the efficient transfer of electrical energy from the generating plant to the ultimate customer.
Transmission line: Any electric line operating at 69,000 or more volts.

Transmission tie-line or tie: A transmission line that connects two separate transmission systems. In the context of this report, a tie is a transmission line that crosses state boundaries and connects the transmission systems of two states.

UI (The United Illuminating Company): A transmission/distribution company that serves customers in Ansonia, Bridgeport, Derby, East Haven, Eason, Fairfield, Hamden, Milford, New Haven, North Branford, North Haven, Orange, Shelton, Stratford, Trumbull, West Haven, and Woodbridge.

Voltage or volts: A measure of electrical pressure.

WED (Wallingford Electric Division): A municipal electric distribution company that serves the Town of Wallingford and a portion of North Branford.

Wire: See Conductor.

Appendix A Existing Generation

Facility	Generation Type	Primary Fuel	Secondary Fuel	Summer SCC	Winter SCC
WHEELABRATOR BRIDGEPORT, L.P.	Steam Turbine	Refuse		58.488	58.488
BRANFORD 10	Combustion Turbine	Oil		15.840	20.950
BRISTOL REFUSE	Steam Turbine	Refuse		11.316	12.966
BULLS BRIDGE	Hydro	Water		0.000	6.297
COS COB 10	Combustion Turbine	Oil		18.932	23.000
COS COB 11	Combustion Turbine	Oil		18.724	23.000
COS COB 12	Combustion Turbine	Oil		19.082	23.000
DERBY DAM	Hydro	Water		0.262	6.383
DEVON 10	Combustion Turbine	Oil		14.407	18.865
DEVON 11	Combustion Turbine	Oil	Natural Gas	29.299	38.819
DEVON 12	Combustion Turbine	Oil	Natural Gas	29.227	37.982
DEVON 13	Combustion Turbine	Oil	Natural Gas	29.967	38.967
DEVON 14	Combustion Turbine	Oil	Natural Gas	29.078	37.315
FALLS VILLAGE	Hydro	Water		0.000	6.647
FRANKLIN DRIVE 10	Combustion Turbine	Oil		15.417	20.527
LISBON RESOURCE RECOVERY	Steam Turbine	Refuse		12.289	12.231
MIDDLETOWN 10	Combustion Turbine	Oil		15.290	20.015
MIDDLETOWN 2	Steam Turbine	Oil	Natural Gas	112.534	120.000
MIDDLETOWN 3	Steam Turbine	Oil	Natural Gas	227.860	236.957
MIDDLETOWN 4	Steam Turbine	Oil		384.997	402.000
MILLSTONE POINT 2	Steam Turbine	Nuclear		863.882	869.796
MILLSTONE POINT 3	Steam Turbine	Nuclear		1244.180	1234.339
MONTVILLE 10 AND 11	Internal Combustion	Oil		5.296	5.354
MONTVILLE 5	Steam Turbine	Oil	Natural Gas	81.000	81.590
MONTVILLE 6	Steam Turbine	Oil		402.969	384.151
NEW HAVEN HARBOR	Steam Turbine	Oil	Natural Gas	447.894	453.264
NORWICH JET	Combustion Turbine	Oil		15.255	18.404
SECREC-PRESTON	Steam Turbine	Refuse		15.486	15.558
SHEPAUG	Hydro	Water		41.081	41.064
SO. MEADOW 11	Combustion Turbine	Oil		0.000	46.711
SO. MEADOW 12	Combustion Turbine	Oil		0.000	47.815

SO. MEADOW 13	Combustion Turbine	Oil		0.000	46.036
SO. MEADOW 14	Combustion Turbine	Oil		0.000	46.346
SO. MEADOW 5	Steam Turbine	Refuse		0.000	15.152
SO. MEADOW 6	Steam Turbine	Refuse		0.000	13.982
STEVENSON	Hydro	Water		0.000	28.826
TORRINGTON TERMINAL 10	Combustion Turbine	Oil		15.638	20.748
TUNNEL 10	Combustion Turbine	Oil		16.085	17.704
ROCKY RIVER	Pumped Storage	Water		27.973	27.906
GOODWIN DAM	Hydro	Water		3.000	3.000
WYRE WYND Hydro	Hydro	Water		0.075	1.789
TOUTANT	Hydro	Water		0.000	0.405
PUTNAM	Hydro	Water		0.022	0.596
MECHANICSVILLE	Hydro	Water		0.000	0.193
CEC 004 DAYVILLE POND U5	Hydro	Water		0.000	0.070
QUINEBAUG	Hydro	Water		0.037	1.350
TUNNEL	Hydro	Water		0.000	1.656
SCOTLAND	Hydro	Water		0.000	0.820
TAFTVILLE CT	Hydro	Water		0.000	0.870
NEW MILFORD	Internal Combustion	Landfill Gas		0.599	0.672
BRIDGEPORT ENERGY	Combined Cycle	Natural Gas		538.294	555.472
LAKE ROAD 1	Combined Cycle	Natural Gas		264.449	295.442
LAKE ROAD 2	Combined Cycle	Natural Gas		272.882	288.800
LAKE ROAD 3	Combined Cycle	Natural Gas		278.315	297.801
WALLINGFORD UNIT 1	Combustion Turbine	Natural Gas		46.500	50.000
WALLINGFORD UNIT 2	Combustion Turbine	Natural Gas		44.683	49.559
WALLINGFORD UNIT 3	Combustion Turbine	Natural Gas		46.150	50.000
WALLINGFORD UNIT 4	Combustion Turbine	Natural Gas		45.681	49.709
WALLINGFORD UNIT 5	Combustion Turbine	Natural Gas		45.295	50.000
MILFORD POWER 1	Combined Cycle	Natural Gas		262.438	290.785
MILFORD POWER 2	Combined Cycle	Natural Gas		261.790	290.029
WATERSIDE POWER	Combustion Turbine	Oil		67.159	68.682
DEVON 15	Combustion Turbine	Oil	Natural Gas	46.889	49.200
MIDDLETOWN 12	Combustion Turbine	Oil	Natural Gas	46.900	49.111
WATERBURY GENERATION FACILITY	Combustion Turbine	Natural Gas	Oil	89.703	98.749

PIERCE STATION	Combustion Turbine	Natural Gas	Oil	74.085	93.146
COS COB 13	Combustion Turbine	Oil		19.053	22.852
COS COB 14	Combustion Turbine	Oil		19.209	22.602
KLEEN ENERGY	Combined Cycle	Natural Gas	Oil	620.000	620.000
NORDEN 1	Internal Combustion	Oil		1.789	0.000
NORDEN 2	Internal Combustion	Oil		1.931	0.000
NORDEN 3	Internal Combustion	Oil		1.923	0.000
NORWICH WWTP	Internal Combustion	Oil		1.966	2.000
KIMB ROCKY RIVER PH2	Combined Cycle	Natural Gas		13.276	15.922
NEW HAVEN HARBOR UNIT 2	Combustion Turbine	Oil	Natural Gas	42.667	47.657
PLAINFIELD RENEWABLE ENERGY	Steam Turbine	WDS		0.000	37.620
UDR GLASTONBURY	Fuel Cell	Natural Gas		2.467	2.577
BRIDGEPORT FUEL CELL	Fuel Cell	Natural Gas		12.912	14.126
DEVON 16	Combustion Turbine	Oil	Natural Gas	46.900	49.200
DEVON 17	Combustion Turbine	Oil	Natural Gas	46.900	49.200
DEVON 18	Combustion Turbine	Oil	Natural Gas	46.900	49.200
MIDDLETOWN 13	Combustion Turbine	Oil	Natural Gas	46.900	49.200
MIDDLETOWN 14	Combustion Turbine	Oil	Natural Gas	46.900	49.200
MIDDLETOWN 15	Combustion Turbine	Oil	Natural Gas	46.900	48.420
PSEG BRIDGEPORT HARBOR CCGT EX	Combined Cycle	Natural Gas		494.064	514.816
UI RCP BGPT FC	Fuel Cell	Natural Gas		2.443	2.528
UI RCP NH FC	Fuel Cell	Natural Gas		2.451	2.229
UI RCP WOODBRIDGE FC	Fuel Cell	Natural Gas		2.052	2.200
NEW HAVEN HARBOR UNIT 3	Combustion Turbine	Oil	Natural Gas	42.667	47.657
NEW HAVEN HARBOR UNIT 4	Combustion Turbine	Oil	Natural Gas	42.667	47.657
DEXTER 1	Combined Cycle	Natural Gas	Oil	39.835	40.409
DEXTER 2	Combined Cycle	Natural Gas		4.665	5.091
ENERGY STREAM Hydro	Hydro	Water		0.000	0.079
UI RCP BGPT PV	Solar PV	Sun		0.228	0.000
CPV TOWANTIC 1A	Combined Cycle	Natural Gas	Oil	384.963	438.250
CPV TOWANTIC 1B	Combined Cycle	Natural Gas	Oil	384.963	438.250
90 WOODS HILL RD. POMFRET CT	Solar PV	Sun		10.564	0.000
WALLINGFORD UNIT 6	Combustion Turbine	Natural Gas		46.362	49.780
WALLINGFORD UNIT 7	Combustion Turbine	Natural Gas		46.215	50.000

FUSION SOLAR CENTER	Solar PV	Sun		13.904	0.004
DWW SOLAR	Solar PV	Sun		19.679	0.000
NUTMEG SOLAR	Solar PV	Sun		13.169	0.001
RAINBOW 1 Hydro	Hydro	Water		4.100	4.100
RAINBOW 2 Hydro	Hydro	Water		4.100	4.100
BLOOM ENERGY FUEL CELL	Fuel Cell	Natural Gas		9.303	9.486
CF NORTH HAVEN LLC	Solar PV	Sun		2.382	0.000
WALLINGFORD SOLAR I	Solar PV	Sun		2.660	0.000
WALLINGFORD SOLAR II	Solar PV	Sun		2.731	0.000
WALLINGFORD SOLAR III	Solar PV	Sun		2.307	0.000
QUINEBAUG SOLAR	Solar PV	Sun		27.561	0.685

Total

Summer SCC 9279.322

Winter SCC 9954.159

Appendix B
Planned/Proposed Transmission Lines in Connecticut

Planned/Proposed Transmission Projects in Connecticut	Voltage (kV)	Estimated In-Service Date	Length (miles)	Utility	Status
Tunnel S/S, Preston - SCRRA, Preston (Replace copper conductor and shield wire)	115	2022	N/A	Eversource	Proposed
Ledyard Jct., Ledyard - Gales Ferry, Ledyard (Line rebuild to allow operation at 115-kV)	69	2022	1.6	Eversource	Proposed
Salisbury S/S, Sharon - CHGE, New York Border (Line rebuild and asset condition)	69	2022	N/A	Eversource	Proposed
Plumtree S/S, Bethel - Bethel S/S, Bethel; Peaceable S/S, Redding S/S; Wilton S/S, Wilton; Norwalk S/S, Norwalk (Line structure replacements)	345	2022	N/A	Eversource	Proposed
Long Mountain S/S, New Milford - Carmel Hill S/S, Woodbury; Frost Bridge S/S, Watertown (Line structure replacements)	345	2022	N/A	Eversource	Proposed
Montville S/S, Montville - Gales Ferry S/S, Ledyard (Line rebuild to allow operation at 115-kV)	69	2022	2.4	Eversource	Planned
Tunnel S/S, Preston - Ledyard Jct., Ledyard (Line rebuild to allow operation at 115-kV)	69	2022	8.6	Eversource	Planned
Millstone S/S, Waterford - Manchester S/S, Manchester (Line structure replacements)	345	2022	N/A	Eversource	Under Construction
Montville S/S, Montville - Haddam Neck S/S, Haddam (Line structure replacements)	345	2022	N/A	Eversource	Under Construction
Millstone S/S, Waterford - Card S/S, Lebanon (Line structure replacements)	345	2022	N/A	Eversource	Under Construction
Beseck S/S, Wallingford - Southington S/S, Southington (Line structure replacements)	345	2022	N/A	Eversource	Under Construction
Northeast Simsbury S/S, Simsbury - Canton S/S, Canton (Line structure replacements)	115	2022	N/A	Eversource	Under Construction
Rocky River S/S, New Milford - West Brookfield S/S, Brookfield (Line structure replacements)	115	2022	N/A	Eversource	Under Construction
Campville S/S, Harwinton - Canton S/S, Canton; Franklin Drive S/S, Torrington (Line structure replacements)	115	2022	N/A	Eversource	Under Construction
Barbour Hill S/S, South Windsor - Rockville S/S, Vernon (Replace copper conductor and shield wire)	115	2022	N/A	Eversource	Under Construction
Ledyard Jct., Ledyard - Buddington S/S (CMEEC), Groton (Line rebuild to allow operation at 115-kV)	69	2022	1.8	Eversource	Under Construction
Barbour Hill S/S, South Windsor - Enfield S/S, Enfield; Windsor Locks S/S, Windsor Locks (Replace copper conductor and shield wire)	115	2022	N/A	Eversource	Under Construction
Millstone S/S, Waterford - Manchester S/S, Manchester (Line structure and insulator replacements)	345	2022	N/A	Eversource	Under Construction
Card S/S, Lebanon - Millstone S/S, Waterford (Line structure and insulator replacements)	345	2022	N/A	Eversource	Under Construction
Scovill Rock S/S, Middletown - East Shore S/S, New Haven (Line structure and insulator replacements)	345	2022	N/A	Eversource	Under Construction
Southington S/S, Southington - Scovill Rock S/S, Middletown (Line structure and insulator replacements)	345	2022	N/A	Eversource	Under Construction
Manchester S/S, Manchester - Kleen S/S, Middletown (Line structure and insulator replacements)	345	2022	N/A	Eversource	Under Construction
Beseck S/S, Wallingford - Southington S/S, Southington (Line structure and insulator replacements)	345	2022	N/A	Eversource	Under Construction
Card S/S, Lebanon - Lake Road S/S, Killingly (Line structure replacements)	345	2022	N/A	Eversource	Under Construction
Montville S/S, Montville - Buddington S/S (CMEEC), Groton (Line structure replacements)	115	2022	N/A	Eversource	Under Construction
Northwest Hartford S/S, Hartford - North Bloomfield S/S, Bloomfield; Rood Avenue S/S, Windsor (Line structure replacements)	115	2022	N/A	Eversource	Under Construction
Southington S/S, Southington - Todd S/S, Wolcott (Line structure replacements)	115	2022	N/A	Eversource	Under Construction
Mystic S/S, Stonington - Shunock S/S, North Stonington (Line structure replacements)	115	2022	N/A	Eversource	Under Construction
Frost Bridge S/S, Watertown - Southington S/S, Southington (Line structure replacements)	345	2022	N/A	Eversource	Under Construction
Frost Bridge S/S, Watertown - Noera S/S, Waterbury (Copper and shield wire replacement)	115	2023	N/A	Eversource	Proposed
Darien S/S, Darien - Fitch St. S/S (CMEEC), Norwalk (Line relocation)	115	2023	N/A	Eversource	Proposed
Sherwood S/S, Westport - South Norwalk S/S (CMEEC), Norwalk (Line relocation)	115	2023	N/A	Eversource	Proposed
Montville S/S, Montville - Bean Hill S/S, Norwich (Line structure replacements)	115	2023	N/A	Eversource	Proposed
Montville S/S, Montville - Tunnel S/S, Preston; Card S/S, Lebanon; Lisbon S/S, Norwich (Line structure replacements)	115	2023	N/A	Eversource	Proposed
Montville S/S, Montville - Mystic S/S, Stonington; Buddington S/S (CMEEC), Groton (Line structure replacements)	115	2023	N/A	Eversource	Proposed

Appendix B
Planned/Proposed Transmission Lines in Connecticut

Southington S/S, Southington - Hanover S/S, Meriden (Copper retirement)	115	2023	N/A	Eversource	Proposed
Montville S/S, Montville - QP788, Montville (Generator tie line for QP788)	69	2023	N/A	Eversource	Proposed
Bristol S/S, Bristol - Forestville S/S, Bristol (Copper and shield wire replacement)	115	2023	N/A	Eversource	Under Construction
Card S/S, Lebanon - Willimantic S/S, Windham (Line structure replacements)	115	2023	N/A	Eversource	Under Construction
Southington S/S, Southington - Black Rock S/S, New Britain (Replace structures and copper conductor)	115	2024	N/A	Eversource	Concept
Card S/S, Lebanon - Lake Road S/S, Killingly (Sectionalize tap for QP724)	345	2024	N/A	Eversource	Planned
Derby Jct., Shelton - Ansonia S/S, Ansonia (Derby Junction to Ansonia 115-kV Transmission Line Rebuild Project)	115	2024	4.1	UI	Planned
Stevenson S/S, Monroe - Pootatuck S/S, Shelton (Copper and shield wire replacement)	115	2026	N/A	Eversource	Proposed
Devon S/S, Milford - South Naugatuck S/S, Naugatuck (Copper and shield wire replacement)	115	2026	N/A	Eversource	Proposed
Plumtree S/S, Bethel - Stony Hill S/S, Brookfield; Shepaug S/S, Southbury (Copper and shield wire replacement)	115	2026	N/A	Eversource	Proposed
Milvon S/S, Milford - West River S/S, New Haven (Milvon to West River Railroad Transmission Line 115-kV Rebuild Project)	115	2028	9.5	UI	Planned
Fairfield - Congress S/S, Bridgeport (portion of Railroad Lines Upgrade Project)	115	2028	TBD	UI	TBD
Ledyard/Groton Town Line - Buddington Substation, Groton (1410/400/1280 Line Structure Replacement Project)	115	TBD	1.7	Groton Utilities (CMEEC)	Planned

Appendix C
Planned/Proposed Substations

Appendix C: Planned Substation and Switching Station Projects	Voltage (kV)	Est. In-Service Date	Utility	Status	Project
Sasco Creek S/S, Westport	115	2022	Eversource	Proposed	Replace two transformers
Manchester S/S, Manchester	115 and 345	2022	Eversource	Under Construction	Manchester Control House Expansion
Rood Avenue S/S, Windsor	115/23	2022	Eversource	Under Construction	Add a distribution transformer
Southington S/S, Southington	115	2022	Eversource	Under Construction	Replace relays
Mystic S/S, Stonington	115	2022	Eversource	Under Construction	Install a series reactor
Montville S/S, Montville	69	2023	Eversource	Concept	Install one autotransformer
Ridgefield S/S, Ridgefield	115	2023	Eversource	Concept	Replace two transformers
Sandy Hook S/S, Newtown	115/23	2023	Eversource	Proposed	Add a distribution transformer
Montville S/S, Montville	69	2023	Eversource	Proposed	Install breaker and MOD for QP788
Canterbury S/S, Canterbury	115	2023	Eversource	Proposed	Install breaker for QP787
Carmel Hill S/S, Woodbury	115/23	2023	Eversource	Planned	Add a distribution transformer
Card S/S, Lebanon	345/115	2023	Eversource	Planned	Install second autotransformer
Card S/S, Lebanon	115	2023	Eversource	Planned	Upgrade substation to BPS standards
Card S/S, Lebanon	115	2023	Eversource	Planned	Install one breaker
Gales Ferry S/S, Gales Ferry	69	2023	Eversource	Planned	Convert from 69-kV to 115-kV
Buddington S/S, Groton	115	2023	CMEEC	Planned	Add 115-kV bus and circuit breaker; relocate 400 Line transformer; and re-
Congress S/S, Bridgeport	115	2023	UI	Planned	Install perimeter floodwall system
Singer S/S, Bridgeport	345	2023	UI	Planned	Install perimeter floodwall system
Mansfield S/S, Mansfield	115/23	2023	Eversource	Under Construction	Add a distribution transformer
Glenbrook S/S, Stamford	115	2023	Eversource	Under Construction	Relay upgrades
Plumtree S/S, Bethel	345/115	2023	Eversource	Under Construction	Relay upgrades
Norwalk S/S, Norwalk	345/115	2023	Eversource	Under Construction	Relay upgrades
Falls Village S/S, Canaan	69/13.2	2024	Eversource	Concept	Replace transformer
Southington S/S, Southington	115/13.8	2024	Eversource	Concept	Replace transformer
Salisbury S/S, Salisbury	69/13.2	2024	Eversource	Concept	Replace transformer
Skungamaug S/S, Coventry	69/13.8	2024	Eversource	Concept	Replace transformer
Hopewell S/S, Glastonbury	115/23	2024	Eversource	Concept	Replace two transformers
Grand Avenue/Mill River S/S, New Haven	115	2024	UI	Proposed	Install perimeter floodwall system
Cotton Bridge S/S, Killingly	345	2024	Eversource	Planned	Construct substation for QP724
Bunker Hill S/S, Waterbury	115	2024	Eversource	Planned	Reconfigure substation to a 6-breaker ring bus
Shunock S/S, North Stonington	115	2024	Eversource	Under Construction	Install a synchronous condenser and two breakers
Pequonnock S/S, Bridgeport	115/13.8	2024	UI	Under Construction	Install replacement substation
Franklin Drive S/S, Torrington	115/13.2	2025	Eversource	Concept	Replace both distribution transformers
Beacon Falls S/S, Beacon Falls	115/13.8	2025	Eversource	Concept	Replace two transformers
Mansfield S/S, Mansfield	115	2025	Eversource	Concept	New substation
Bokum S/S, Old Saybrook	115/27.6	2025	Eversource	Proposed	Replace transformers
Old Town S/S, Bridgeport	115/13.8	2025	UI	Planned	Install replacement substation
Burrville S/S, Torrington	115	2027	Eversource	Concept	New substation