



February 23, 2018

Mr. Robert Stein, Chairman
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051


Dear Mr. Stein:

The Connecticut Municipal Electric Energy Cooperative (CMEEC) herewith submits an original and fifteen (15) copies to the Connecticut Siting Council of our Forecast of Electric Loads and Resources for 2018-2027 Report as required by Section 16-50R of the Connecticut General Statutes.

Should you require any additional information, please contact me.

Very truly yours,

CONNECTICUT MUNICIPAL ELECTRIC
ENERGY COOPERATIVE




Drew Rankin
Chief Executive Officer

CJC/

Enclosures

Cc: Service List



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FORECAST OF ELECTRIC LOADS AND RESOURCES 2018-2027

March 1, 2018

Connecticut Municipal Electric Energy Cooperative
30 Stott Avenue
Norwich, Connecticut 06360

Introduction and Background

The Connecticut Municipal Electric Energy Cooperative ("CMEEC") is a not-for-profit joint-action power supply agency empowered to finance, plan, acquire, construct, operate, repair, extend, or improve electric generation and transmission facilities and sell power at wholesale and other markets to serve the needs of the Connecticut municipal electric utilities ("MEUs") and other electric utility systems and customers.

The CMEEC Member utilities (collectively, the "Members") are (1) Norwalk's Third Taxing District Electrical Department ("East Norwalk"), (2) Groton Utilities ("Groton"), (3) Jewett City Department of Public Utilities ("Jewett City"), (4) Norwich Public Utilities ("Norwich"), (5) South Norwalk Electric & Water ("South Norwalk"), and (6) Borah Power & Light Company ("Borah"). The Mohegan Tribal Utility Authority ("MTUA") is also a full-requirements wholesale customer of CMEEC. The loads of the CMEEC Members, and the MTUA are represented on an integrated, single-system basis for purposes of ISO-New England ("ISO-NE") operations.

The joint power supply established by CMEEC is intended to meet the diversified power supply needs of all CMEEC's Members and customers. CMEEC's mission is to meet these requirements reliably and at the lowest possible cost over the long-term. Today, CMEEC's portfolio consists of CMEEC and member-owned generation, unit entitlement contracts, long-term contracts, intermediate and short-term system contracts, financial instruments, and ISO New England (ISO-NE) market purchases.

The enclosed forecast for 2018-2027 shows negative load growth for CMEEC's Members/customers in Connecticut. CMEEC's projections for the 2018-2027 period reflect an average compound growth rate of -0.45% for total system energy requirements and -0.47% for annual summer coincident peak demand. There have also been some negative impacts on the Groton Utilities load due to the installation of rooftop solar at the U.S. Submarine Navy housing complex.

Future growth is further modulated by reductions in usage rates resulting from the conservation programs planned and implemented by the municipal electric distribution utilities (MEUs). These programs remain very active and are popular with all sectors of MEU end users. The long-term forecasts of electric demand and the energy of the CMEEC Member and customer utilities are the primary tools used to ascertain future CMEEC power needs. These forecasts utilize regression techniques using 13 years of historical data to weather normalize the load history and model the peak loads. Member and customer normalized data are used to produce dynamic models; these models are adjusted to account for projected mid-term weather trends, and take into consideration residential customer attrition where applicable. When the primary individual forecasts are combined, the result is a CMEEC system-wide energy, peak demand and capacity requirements forecast, which is filed with the Council herein and used to make power supply decisions.

The new Fitch Substation in East Norwalk is expected to meet the needs of that community for several decades and the similar SNEW South Norwalk 115 kV to 13.8 kV SONO substation

which opened in 2014 likewise sets the stage for meeting future load growth with improved reliability over the previous 27.6 kV supply system. Corresponding with this major supply route change SNEW has upgraded its distribution system to 13.8 kV, reducing losses and improving distribution level reliability. With respect to grid related issues, CMEEC participates in NEPOOL studies which include delivery capability review for MEU points of receipt. A current such study is the Southeastern Connecticut Area Study, which looks out to 2022.

Conservation and Load Management

The MEU's, for which CMEEC reports, continued delivery of cost effective Conservation and Load Management ("C&LM") programs to customers in 2017. CMEEC, on behalf of the MEUs, for which is reports, worked with the members of the Energy Efficiency Board ("EEB") pursuant to Conn. Gen. Stat. Section 7-233y, in implementing additional and ongoing programs to reduce customer electricity usage and peak demand. The C&LM Plan measures the overall impact of electricity conservation programs on customer energy usage and peak demand.

In 2017, the MEUs, for which CMEEC reports (and including prior years, as noted below), provided a fully implemented portfolio of energy-efficiency initiatives, including:

- Performing comprehensive energy audits and weatherization of 430 homes;
- Distributing over 21,000 LED and compact fluorescent lamps, bringing the total to over 1,350,000 since program inception in 2006;
- Participation in the Cool Choice HVAC Rebate program by more than 100 residential and commercial customers;
- Providing energy-efficiency assessments and incentives for over 100 commercial and industrial customer projects (e.g. custom equipment replacement, lighting retrofits); and
- Serving more than 2,900 customers in total.

MEU CL&M efforts during 2017 resulted in a 0.844 MW in coincident summer peak demand reduction and more than 6,563 MWh in annual energy savings, at a cost of about \$0.04 per lifetime kWh. MEU commercial and industrial customers received over \$1.9 million in incentives for installing energy-efficiency measures in their facilities. Residential customers received over \$760,000 in incentives. These efforts will continue through 2018 and beyond.

The following material and tables are in the specific itemized requirements of Sec.16-50r of the General Statutes and provided on behalf of CMEEC and its Members and customers. Items (1) through (8) listed below correspond to the numbers included in that section.

- (1) Provide a tabulation of estimated peak loads, resources and margins for each year (of the forecast period):

Table I shows forecasted energy and demand for the period as well as data on summer and winter peak demands. Table II reflects the forecasted annual peak demands for the 2018-2027 periods for both the 50/50 forecast as well as the 90/10 extreme condition forecast.

CMEEC is a participant in ISO NE and meets its net power needs through the ISO-NE market system. CMEEC also maintains power and related resources delivered to the Markets. Market resources over the forecast period include NYPA and Hydro Quebec ICAP credits (20 - 30 MW), Conservation & Load Response ICAP Credits (5 MW), A.L. Pierce (75 – 95 MW), Norwich Jet (15 - 18 MW). CMEEC maintains distributed generator resources (50 - 65 MW) to help attain local reliability goals.

- (2) Provide data on energy use and peak loads for the five preceding calendar years:

Historical aggregated energy use and peak loads for the six-member CMEEC system and the Mohegan Tribal Utility Authority (MTUA), are provided in Table III.

- (3) Provide a list of existing generating facilities in service:

Generating facilities owned by CMEEC and CMEEC Members are listed in Table IV. The mix of existing generating facilities and system power agreements that serve the CMEEC system are listed in Table V. Anticipated retirement dates of CMEEC and Member generating facilities are listed in Table VI.

- (4) Provide 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:

CMEEC executed a lease in 2014 with the United States Navy for use of an approximately 1 acre federally owned site located at the Naval Submarine Base in Groton. CMEEC is currently developing a 7.4 MW fuel cell generating facility to be located at the Naval Submarine Base. All necessary applications have yet to be filed but are expected to be filed during calendar year 2018.

- (5) Provide 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 electric requirements:

There are no planned CMEEC owned generating units responsive to this question.

CMEEC has entered into five Power Purchase Agreements (“PPAs”) with an independent developer for the development, design, construction and operation of solar photo-voltaic (“PV”) array electric generating facilities at five separate locations in the service areas of CMEEC’s Members and customers and interconnecting with the Members’ electric distribution systems. These facilities follow the business model of a community solar garden and range in size from approximately 2.5 to 6 MWs in capacity depending on location. The commercial operation date of these projects is anticipated to occur over the next 1-2 years, following completion of permitting, development and construction activities. Under the PPAs, the developer is responsible for the development, construction and operation of the projects. CMEEC, under the PPAs, is the purchaser of the electric products produced by the projects.

- (6) Provide a list of planned transmission lines on which proposed route reviews are being undertaken or for which certificate applications have already been filed.

There are no planned transmission lines.

- (7) Provide 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.

Several projects are recently completed, underway or in various stages of completion in the CMEEC Member service territories, which are summarized below.

South Norwalk (SNEW) has completed (except for non-functional items such as a final report to the Siting Council) and placed into service a new 115 kV to 13.8kV distribution substation connected to a new Ever source Energy PTF station. The new SNEW station replaced two unreliable 27.6 kV sub-transmission feeders owned by the former Connecticut Light & Power (CL&P). The new distribution substation, feeder breakers and switch gear replaces a 70-year-old 27.6 kV to 13.8 kV and a 27.6 kV to 4.16 kV substation, including all existing station switchgear. The old station is out of service and is in the process of being decommissioned. The new station necessitated the conversion of SNEW's existing 4.16 kV overhead distribution system to 13.8 kV. The purpose of the new station is to increase reliability and efficiency. SNEW has re-sized all distribution transformers. SNEW is currently replacing existing distribution system primary switches, resizing transformers, balancing loads on the distribution system and adding additional distribution system protection equipment to further improve system reliability. The new station provides additional capacity for future system load expansion.

East Norwalk (TTD) put in service a new PTF level substation in December 2013 (Fitch 47R) which is the subject of CSC DN 426. The project has been completed in accordance with the CT Siting Council and the City of Norwalk Planning and Zoning Commission. This project addresses reliability and replaces aging portions of the distribution system which posed unacceptable risks to TTD. In addition, it allows for TTD to satisfy additional load growth within their system and eliminates two underground supply cables owned by Eversource which were originally installed in 1946. These cables have been repaired continuously because of system faults. TTD's completed SCADA system monitors TTD's transmission system and allows for control of distribution substations. This system will allow for future expansion and will ensure compliance with NERC/NE-ISO regulations.

Norwich Department of Public Utilities (NPU) continues to upgrade its 4.8kV distribution system to 13.8kV to increase efficiency by reducing system losses, improve reliability through better voltage conditions, newer equipment and reduce operating costs.

All NPU substations, generating stations and several distribution switches are monitored and controlled 24/7 via a Supervisory Control and Data Acquisition (SCADA) system in NPU's control room. All stations have been moved to NPU's fiber optic network for more reliable communication and monitoring. In 2017, NPU performed several upgrades to the Electric SCADA system, increasing reliability and strengthening cyber security measures.

The Greeneville Dam and Occum Dam fish passages operated successfully during 2017. NPU continued to work closely with DEEP on fish passages, eel passages, pit tagging program and shad trucking to promote the migration of shad to new spawning grounds. Occum Dam continues to pass American Shad and NPU in conjunction with DEEP will continually monitor its performance. NPU's Greeneville and Occum Dams are certified by the Low Impact Hydro Institute (LIHI) and continue to accrue renewable energy certificates (RECs). In 2017, NPU performed an overhaul of the #2 Hydro Generator at our 2nd St. facility significantly increasing the efficiency and production of the unit.

Over the last several years, NPU has successfully installed a total of 18,050 operational AMI meters as part of its meter upgrade project. NPU is planning to complete the remaining 3,159 electric meters in 2018. In 2017, NPU integrated the AMI system with its upgraded Outage Management System providing Control Room Operators with real time information on customer outages and further improving NPU's outage response and storm management.

Jewett City Department of Public Utilities (JCDPU) is continuing the upgrading of its distribution network in an intended development of long-range system expansion and as part of this effort, any business or residential expansion would involve underground cable installation. All JCDPU customers are now served through smart meters. Jewett City recently completed the overhaul of their backup substation and this work will go towards increasing the reliability within their service territory. Jewett City DPU is beginning the task of correcting a Load Power Factor deficiency and this work will extend out in time for the next (2) years (expected to be complete by end of 2019).

Groton Utilities installed 3,325 feet of underground primary and secondary cables that provides electric power to a housing complex on Military Highway in Groton CT. In addition, numerous underground services to residential customers have been installed throughout the year in the prior two years. Groton Utilities preferred construction standard is to place all power distribution facilities underground.

Groton Utilities and Bozrah have deployed about 15,000 electric meters onto its AMI System.

Bozrah Light and Power installed seven (7) underground services throughout the year in the prior two years. Bozrah's preferred construction method is to place all power distribution facilities underground.

- (8) For each private power producer having a facility generating more than one (1) megawatt, and from whom CMEEC has purchased electricity during the preceding

calendar year, provide 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:

Generally, the customers in CMEEC Members service areas who have generating capacity greater than 1 MW retain the power for ongoing internal utilization and/or load management. Table VII summarizes major on-site generation capability at customer locations within the municipal service territories. CMEEC does not have formal arrangements in place to purchase power from those facilities at this time. Many of these customers, however, are asked to generate power and/or shed load during high load or emergency conditions as defined in NEPOOL's Operating Procedure #4.

TABLE I
CONNECTICUT MUNICIPAL ELECTRIC ENERGY COOPERATIVE
10-YEAR FORECAST OF MEMBER AND CUSTOMER ENERGY REQUIREMENTS AND CMEEC PEAK DEMAND
2018-2027

YEAR	Groton MWh	Norwich MWh	Jewett City MWh	East Norwalk MWh	South Norwalk MWh	Bozrah MWh	Air Gas MWh	Mohegan Tribal Utility Authority MWh	CyrusOne MWh	Systems Energy Requirements Met by CMEEC Mwh [1]	CMEEC Summer Coincident Peak Demand MW [2]	CMEEC Winter Coincident Peak Demand MW [2]	Load Factor %
2017	400,209	306,693	23,522	60,288	91,188	46,672	165,959	132,544	2,402	1,229,457	222.32	182.90	63.1
2018	435,468	316,857	23,617	61,132	91,255	44,317	164,684	131,297	1,988	1,270,614	210.16	203.26	69.0
2019	430,032	310,634	23,571	60,674	90,088	44,317	164,684	131,297	1,975	1,257,275	207.83	200.63	69.1
2020	426,076	305,552	23,598	60,400	89,209	44,439	165,138	131,650	1,964	1,248,005	205.59	198.10	69.1
2021	419,868	299,000	23,481	59,777	87,829	44,317	164,684	131,297	1,953	1,232,206	203.43	195.67	69.1
2022	415,119	293,565	23,436	59,337	86,736	44,317	164,684	131,297	1,942	1,220,433	201.37	193.35	69.2
2023	415,119	293,565	23,436	59,337	86,736	44,317	164,684	131,297	1,942	1,220,433	201.37	193.35	69.2
2024	415,119	293,565	23,436	59,337	86,736	44,317	164,684	131,297	1,942	1,220,433	201.37	193.35	69.0
2025	415,119	293,565	23,436	59,337	86,736	44,317	164,684	131,297	1,942	1,220,433	201.37	193.35	69.2
2026	415,119	293,565	23,436	59,337	86,736	44,317	164,684	131,297	1,942	1,220,433	201.37	193.35	69.2
2027	415,119	293,565	23,436	59,337	86,736	44,317	164,684	131,297	1,942	1,220,433	201.37	193.35	69.2
AACGR % Increase 2017 -2027	0.37	-0.44	-0.04	-0.16	-0.50	-0.52	-0.08	-0.09	-2.11	-0.07	-0.98	0.56	

[1] Totals are the sum of kilowatthours rounded to the nearest megawatthour (MWh).

[2] The forecasted CMEEC coincident peak demands were computed by summing the Groton, Norwich, Jewett City, East Norwalk, South Norwalk, Bozrah, Air Gas, the Mohegan Tribal Utility Authority and CyrusOne noncoincident peak demands and multiplying by an average historical coincidence factor.

TABLE II

March 2018

CONNECTICUT MUNICIPAL ELECTRIC ENERGY COOPERATIVE (CMEEC)

SUMMARY OF CMEEC PEAK FORECASTS (1)

<u>Year</u>	<u>50/50 Peak Forecast</u>	<u>90/10 Peak Forecast</u>
2018	210.16	225.25
2019	207.83	222.75
2020	205.59	220.35
2021	203.43	218.04
2022	201.37	215.83
2023	201.37	215.84
2024	201.37	215.84
2025	201.37	215.85
2026	201.37	215.85
2027	201.37	215.85

(1) CMEEC developed its extreme weather forecast peak values by using the CMEEC summer peak forecast and applying an extreme weather scenario to arrive at the 90/10 forecast.

TABLE III

March 2018

CONNECTICUT MUNICIPAL ELECTRIC ENERGY COOPERATIVE (CMEEC)

HISTORICAL ENERGY USE AND PEAK LOAD
2013-2017

<u>Year</u>	<u>CMEEC Coincident Peak Load (MW) [1]</u>	<u>CMEEC Energy (MWh) [1]</u>
2013	237.89	1,363,749
2014	230.68	1,342,000
2015	219.85	1,329,940
2016	230.77	1,284,532
2017	222.32	1,229,277

[1] Reflects CMEEC Member loads inclusive of Bozrah and the Mohegan Tribal Utility Authority (MTUA) for 2013-2017. These values also include AirGas an interruptible customer located in Bozrah, CT.

TABLE IV

CONNECTICUT MUNICIPAL ELECTRIC ENERGY COOPERATIVE (CMEEC)

**EXISTING GENERATION FACILITIES OWNED BY
CMEEC AND ITS MEMBERS**

As of March 1, 2018

<u>Generating Facility</u>	<u>Winter Rating (MW)</u>	<u>Summer Rating (MW)</u>
Norwich Combustion Turbine (Oil-Fired) [1]	18.800	15.255
Pierce Generating Unit (Oil/Gas-Fired) [2]	97.000	77.500
Norwich Waste Water Treatment (Oil-Fired)	2.00	2.00
Norden 1 (Oil-Fired)	2.00	2.00
Norden 2 (Oil-Fired)	2.00	2.00
Norden 3 (Oil-Fired)	2.00	2.00
Norwich Second Street (Hydro)	[3]	[3]
Norwich Tenth Street (Hydro)	[3]	[3]
Norwich Occum (Hydro)	[3]	[3]

[1] Represents CMEEC current joint-ownership share. The full capability of the Norwich combustion turbine unit is under contract to CMEEC.

[2] Represents CMEEC current sole ownership share. The full capability of the Pierce generating unit is under contract to CMEEC.

[3] Winter and summer ratings are based on average river flow conditions. The nameplate rating for the Second Street hydro station is 0.95 MW. The nameplate rating for the Tenth Street hydro station is 1.00 MW. The nameplate rating for the Occum hydro station is 0.80 MW. These hydro units remain a resource of the Norwich Department of Public Utilities. The generations of these hydro units are used by Norwich to directly offset Norwich load.

TABLE V

As of March 1, 2018

MIX OF EXISTING GENERATION - CMEEC RESOURCES

<u>Unit Designation</u>	<u>In-Service Date</u>	<u>Net Winter Capacity (In MW) [1]</u>	<u>CMEEC Share (MW)</u>	<u>Net Summer Capacity (In MW) [2]</u>	<u>CMEEC Share (MW)</u>	<u>CMEEC Percent of Unit (%)</u>
<u>Long-Term System & Asset Contracts [3]</u>						
Base System Purchase		80.60	80.60	64.70	64.70	
On-Peak System Purchase		14.60	14.60	14.85	14.85	
Total System Contracts		95.20	95.20	79.55	79.55	
<u>Municipal Generation</u>						
Norwich Combustion Turbine	1972	18.80	18.80	15.25	15.25	100.00
Norwich Waste Water Treatment	2008	2.00	2.00	2.00	2.00	100.00
Pierce Generation Unit	2007	97.00	97.00	77.50	77.50	100.00
Norden 1	2009	2.00	2.00	2.00	2.00	100.00
Norden 2	2009	2.00	2.00	2.00	2.00	100.00
Norden 3	2009	2.00	2.00	2.00	2.00	100.00
Total Municipal Generation		123.80	123.80	100.75	100.75	
TOTAL CMEEC CAPACITY RESOURCES			219.00		180.30	
<u>Other Resources</u>						
PA Hydro (Firm & Peaking) [4]			13.20		13.20	NA
Short-Term Purchases [5]			Varies		Varies	NA
CMEEC's Microgen Units [6]			50.00		50.00	

[1] Represents NEPOOL Winter Maximum Claimed Capability.

[2] Represents NEPOOL Summer Maximum Claimed Capability.

[3] System Purchases, Contract Purchases & Unit Entitlement Purchases from several counterparties.

[4] Represents maximum hourly contract deliveries to CMEEC. New York Power Authority (NYPA) hydro purchases began July 1, 1985. Energy contributions from NYPA are considered to be firm contracts and used to reduce electric requirements thereby reducing CMEEC Capability Responsibility in NEPOOL.

[5] The MW amounts shown for Short-Term Purchases vary from month to month from 0 MW to 25 MW through December 2018.

[6] Represents the CMEEC MicroGen Units which are currently commercially operating. Seven (7) 2.50 MW units are located in Groton, two (2) 2.50 MW units are located in Norwich, one (1) 2.50 MW unit is located in Jewett City, two (2) 2.50 MW units are located in Lebanon, CT, four (4) 2.50 MW units are located at the Mohegan Tribal Utility Authority and (4) 2.5 MW units located at Backus Hospital in Norwich. These resources will be used for demand reduction purposes and are not anticipated to be enrolled in the ISO New England markets.

TABLE VI
CONNECTICUT MUNICIPAL ELECTRIC ENERGY COOPERATIVE

March 2018

Anticipated Unit Retirement Dates

Retirement Date

Conventional Hydro

Norwich Tenth Street Hydro	Not Scheduled
Norwich Second Street Hydro	Not Scheduled
Norwich Occum Hydro	Not Scheduled

Peaking

Norwich Combustion Turbine	Not Scheduled
Pierce Generating Unit	Not Scheduled
Norwich Waste Water Treatment	Not Scheduled
Norden 1	Not Scheduled
Norden 2	Not Scheduled
Norden 3	Not Scheduled

Table VII

Connecticut Municipal Electric Energy Cooperative (CMEEC)**COGENERATION & SMALL POWER PRODUCTION FACILITIES
GREATER THAN 1 MW IN TOTAL SIZE [1]****Groton Utilities
March 2018**

<u>Facility Name</u>	<u>Facility Type</u>	<u>Facility Location</u>	<u>No. Of Units</u>	<u>Prime Mover</u>	<u>Type Fuel</u>	<u>Summer & Winter Capacity</u>	<u>Years Installed</u>
Pfizer, Inc.	Cogeneration	Groton CT	4	Steam Turbine	Turbine Fuel	35,500 kW	1950 1993 2001 2009
			2	Fuel Cell	Natural Gas	2,800 kW each	2017
U.S. Naval Sub Base	Cogeneration	Groton CT	1	Steam Turbine	Duel Fuel	5,000 kW	1996
			2	Diesel Engine	#2 oil	750 kW [2]	2015

[1] The customer retains power from each of these facilities.

[2] This diesel generator is used to provide black start capability.

Tesla's Pelican Farm	Solar Farm	Groton CT		Solar Panels	Solar	3,500 kW	2017
Tesla's Trident Farm	Solar Farm	Groton CT		Solar Panels	Solar	1,000 kW	2017

**Bozrah Light and Power
March 2018**

Tesla's Brush Solar Farm	Solar Farm	Bozrah CT		Solar Panels	Solar	2,700 kW	2016
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**Norwich Public Utilities
March 2018**

Tesla's Stott Avenue Solar Farm	Solar Farm	Norwich CT	Solar Panels	Solar	3,500 kW	2017
Tesla's Rogers Road Landfill Solar Farm	Solar Farm	Norwich CT	Solar Panels	Solar	1,500 kW	2017
Tesla's Rogers Road Greenfield Solar Farm	Solar Farm	Norwich CT	Solar Panels	Solar	1,000 kW	2017