Connecticut Siting Council

Review of the Connecticut Electric Utilities' Ten-Year Forecasts of Loads and Resources

2002

Solar collectors at Connecticut National Guard Center, Norwich

792 MW natural gas-fired electric generating facility, Killingly

115-kV electric transmission lines and natural gas transmission pipeline right-of-way, Shelton

1.2 MW of fuel cell capacity at the Connecticut Juvenile Training Center, Middletown

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

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December 17, 2002

Citizens of Connecticut:

It is with great pleasure that I provide you this copy of the Connecticut Siting Council's "Review of the Connecticut Electric Utilities' Ten-Year Forecasts of Loads and Resources 2002." This report compiles and analyzes load growth forecasts of the State's electric utilities and plans to meet the demand for energy through the year 2011.

This analysis, undertaken pursuant to Connecticut General Statutes § 16-50r (a), requires

- "(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 of 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."

These subjects have been fully examined by the Council with full opportunity for public participation. The results of this process have been summarized in this report which we hope you will find to be understandable and useful.

I invite you to read this public report and question the analyses contained herein. With your help I am confident that Connecticut can accurately determine its energy future while protecting the environment and providing opportunities for its citizens. Please feel free to contact the Council's staff or me if you seek additional information.

Very truly yours,

Mortimer A. Gelston

Mortimer A. Gelston
Chairman

CSC
CONNECTICUT SITING COUNCIL

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LOAD FORECAST

Introduction

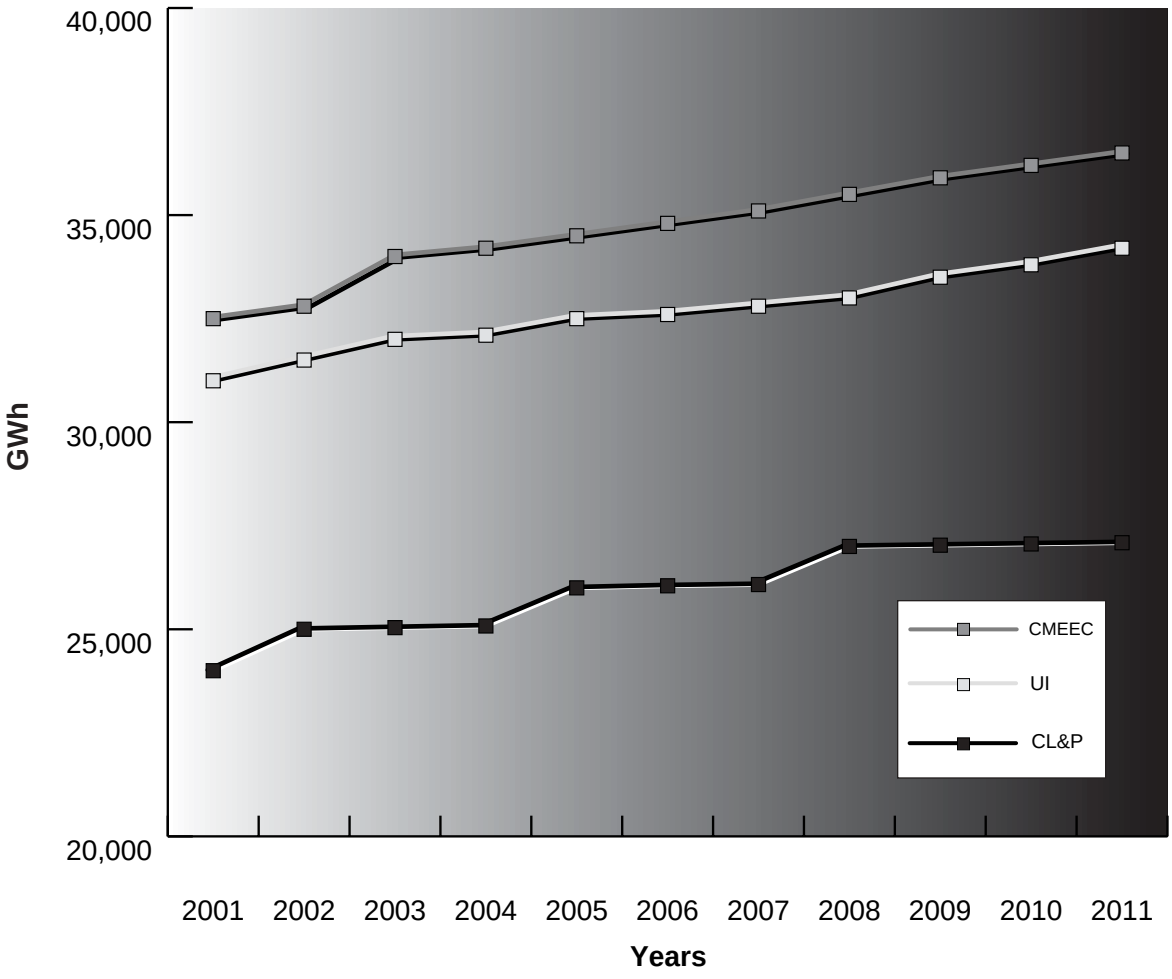
The Connecticut Siting Council (Council) has the legislative charge to annually review forecasts of electric loads and resources in the State of Connecticut. In 2001, the legislature amended Connecticut General Statute Section 16-50r(a) (Public Act No. 01-144) to require a ten-year forecast, rather than a twenty-year forecast, and clarified who shall report and in what context the information must be submitted. (see Appendix D)

Pursuant to such statutory provisions, every person engaged in generating electricity with a capacity of one megawatt or greater, or transmitting and distributing electricity, shall file a report to the Council on March 1 of each year and this report 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.

Load Growth

The state's largest utilities, Connecticut Light and Power Company (CL&P), The United Illuminating Company (UI), and the Connecticut Municipal Electric Energy Cooperative (CMEEC), report they predict incremental load growth throughout the forecast period. As depicted in Figure 1, total energy output requirements for the state are projected to grow from 32,206 gigawatt-hours (GWh) in 2001, at an annual average growth rate of 1.1 percent, to 36,064 GWh in 2011. CL&P projects an annual compound rate of growth of 1.4 percent

Figure 1: Connecticut Electric Utilities' Projected System Requirements



through the forecast period, CMEEC projects a 1.1 percent annual average growth rate, and UI projects a modest 0.1 percent annual average growth rate. Historically, the demand for electricity has been related to economic growth. That positive relationship is expected to continue, however, the ratio is uncertain. The continuing saturation of electric appliances, the availability and adoption of efficient equipment, and efficiency standards are expected to hold growth in national electricity sales to an average of 1.8 percent per year between 2000 and 2020, compared with 3.0 percent annual growth in gross domestic product.

The Office of Policy and Management (OPM) projects a 6 percent increase in population from 2000 to 2010. The per capita consumption of electricity is projected to increase from 9,444 kilowatt-hour (kWh) in 2000 to 10,575 kWh in 2010. Connecticut's per capita electric consumption continues to increase due to the development of larger homes, an active economy, and a high-quality lifestyle that results in increased use of electro-technologies such as electric appliances, computers, and especially air conditioning.

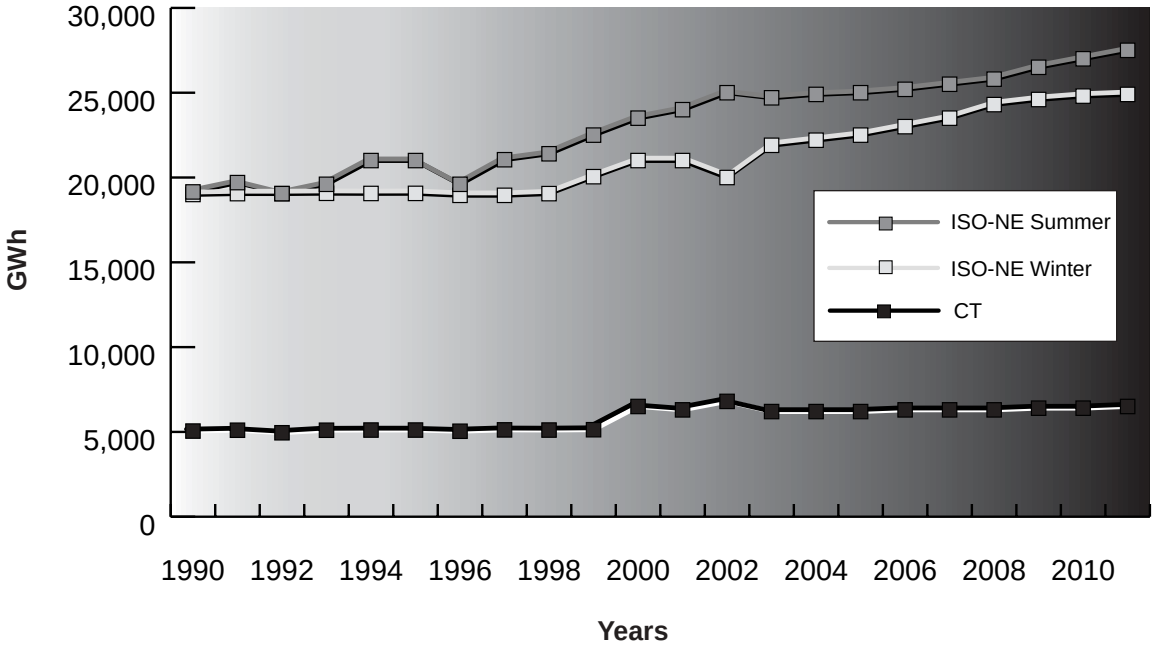
Peak Loads

In 2001, the statewide non-coincident summer peak load was 6,795 MW, — a substantial increase over the previous record high in 1999 at 6,345 MW. However, annual summer peak loads are not expected to increase over the forecast period, as indicated on Figure 2.

The state's utilities project the total peak load growth will decrease by 27 MW or less than one percent from the 6,795 MW 2001 peak load to 6,768 MW by the year 2011; however, ISO-New England expects regional peak load to grow at an annual rate of 1.5 percent from 2001 to 2011, also shown on Figure 2. Also, if peak loads grow at a rate of greater than 2 percent, as they did in the late 1990s, and OPM's projections for the State's population and per capita electric consumption are accurate, peak loads will be substantially higher than those projected by Connecticut utilities.

Although the purpose of forecasting is to identify the risk associated with the supply and demand of electricity, this year's projections are of concern due to unpredictable weather that can dramatically change demand, a dynamic economy, and consumer trends that are difficult to predict with certainty. There is further concern that the separation of generation from distribution companies could, if not carefully monitored, isolate the functions of supply and demand, create deeper load pockets and locked-in generation, and further constrain the existing transmission system.

Figure 2: Actual and Predicted Peak Load for Connecticut and ISO-New England



Conservation and Load Management

In 2001, customers of CL&P and UI contributed nearly $86 million into the Conservation and Load Management (C&LM) Fund established by the legislature pursuant to Public Act 98-28 which created an assessment of three mills per kWh on electricity sold to each end use customer of a publicly-traded electric distribution company. The lifetime savings of energy efficiency funded through this assessment is expected to save customers over $473 million. More than 400,000 customers, spanning all customer classes, participated in 2001. At this time, potential savings from all current and previous C&LM sources are currently forecasted to reduce summer peak in 2006 by approximately 700MW. The most successful DSM programs in 2001, measured in terms of participation and expected energy savings versus budgeted expenditures, were retail lighting; advanced design for new residential, commercial, and industrial construction;

energy efficient residential washing machine sales; and custom on-site energy audits for commercial and industrial customers. The least successful programs were residential audits, heat pump water heater sales, and express services targeted to small load commercial and industrial customers for upgrading lighting, motors, and heating/cooling units.

Within the C&LM fund, a research development and demonstration (RD&D) program was established to identify and manage projects that would advance the development of reliable and efficient use of electricity. RD&D projects seek to deliver sustainable energy savings benefits to Connecticut businesses and residents. RD&D seeks to complement C&LM's portfolio of energy-efficient measures for all customers by uncovering new products and services that save energy, benefit the state's environment and economy, and enhance the reliability and quality of the region's power system.

The RD&D Program solicits innovative technologies or technical services in the categories of Energy Efficiency and Distributed Resources for consideration. Energy efficiency technologies are defined as technologies that offer large electric energy savings whether from one improvement or from a series of smaller ones. Innovative technology topics sought for consideration include lighting; energy management/load control; computer/electronics; refrigeration; water heating; electro-technologies; and space conditioning/ HVAC. Distributed resources technologies are defined as the combined or individual use of distributed generation, energy storage, load management on the customer side of the meter with complimentary energy efficiency benefit, and to address specific customer reliability and power quality needs. Distributed generation refers to the application of small power generation systems at or close to the point of electricity end use. Innovative technology topics sought for consideration include photovoltaics; fuel cell technology; distributed resources and fuel cell cost analysis.

RESOURCE FORECAST

Supply Resources

The State's supply resources are anticipated to be adequate to meet demand during the forecast period, provided all active generators committed to the ISO-New England remain available for continuing use (see Table 1). However, some subregions such as southwest Connecticut are threatened with supply deficiencies and voltage instability problems due to insufficient transmission and inadequate resources within the region.

In the event the Millstone nuclear units or other large base load units are not available, the state's electric generators and transmission/distribution companies would institute the following plan to avoid capacity deficiencies during peak demand periods:

- operate all available generating units to their reasonable limits;
- purchase power from available resources, in and out of Connecticut;
- arrange to temporarily shift load on high load days to substations and transmission facilities outside Connecticut;
- explore additional interruption of service with industrial and commercial customers; and
- maximize use of customer-owned, emergency generators.

This plan has proved to be adequate in the past; however, it is increasingly important for resources to be strategically locat-

Table 1: Resources status quo vs. retirement

CT Balance of Supply and Demand of Electricity

Reported in Megawatts (MW)

	status quo generation scenario			less retirement of units scenario		
	2002	2004	2011	2002	2004	2011
Installed capacity[1]	6192	7234	8834	6192	7234	8834
Capacity additions						
Killingly	792			792		
Milford[2]		544			544	
Wallingford	250			250		
Meriden[2]		544			544	
Oxford[2]		512			512	
Transmission Import Capability[3]	2200	2200	2200	2200	2200	2200
Load shift/Op-4 Action	562	562	562	562	562	562
Units 40 years if age or greater retired						-1739
Resources to meet Peak Demand	**9996**	**11596**	**11596**	**9996**	**11596**	**9857**
Peak Demand[4] - summer	**6296**	**6388**	**6768**	**6296**	**6388**	**6768**
CT reserves	3700	5208	4828	3700	5208	3089
Reserve/Resources* 100%	37%	45%	42%	37%	45%	31%

1 - Summer rating as reported in CSC Review of the Connecticut Electric Utilities 2002 Twenty-Year Forcasts of Loads and Resources-Appendix A
2 - The proposed schedule for commercial operation of these facilities are either postponed or uncertain.
3 - Average of daily transfer limits during daily peak demand for summers 1997-1999, noting Millstone Units #2 and #3 did not operate in 1997 and Millstone Unit #2 did not operate in 1998.
4 - Projected peak demand as reported by CL&P, UI, and CMEEC forecast filings to the CSC on March 1, 2002.

ed on the grid to ensure electric supply can technically and economically serve pockets of high demand. Furthermore, some of the facilities called upon to generate at their maximum capacity may not be able to do so because of age, constraints on the transmission system, or air emission limitations.

This year Connecticut and the region benefited from the addition of the the Wallingford and Killingly facilities, available for commercial operation during the first half 2002, with a total power output of 1,042 MW. With all planned supply resources in place, Connecticut will have a sufficient margin to meet summer peak demand. However, this scenario is speculative and subject to a number of variables, conditions, and expectations that are subject to change.

Public Act 02-64 instituted sulfur dioxide emission limits on older oil-fired electric generation by year-end of 2004. While this may suggest a scenario that may reduce or eliminate the potential of over 2,700 MW of generation located in Milford, New Haven, Norwalk, Bridgeport, Montville, and Middletown, the act also allows the Connecticut Department of Environmental Protection to waive such emissions limits when low sulfur fuel is not available and/or the restriction threatens the reliability of the electricity supply as administered by ISO-New England.

Conversely, this loss may be alleviated by 2,642 MW of new gas-fired generation expected to be all online by 2004. Furthermore, the loss of generation in Bridgeport and Norwalk will exacerbate transmission capabilities in southwest Connecticut and could overload grid connections between New York and New England. Indeed, ISO-New England predicts a substantial loss of reliability to southwest Connecticut if these units are prematurely retired before replacement by new additional generation, new transmission capability, or both. Ultimately, the state will be reliant on generation from the New England Power Pool (NEPOOL), the success of CL&M programs, and the continued operation of committed resources particularly during periods of energy supply failure and high peak demand.

Existing Generation Facilities

As depicted in Figure 4, approximately 1,183 MW or 16 percent of the state's electric generation capacity is oil-fired and will be 40 years old or older by 2011. Until recently there has been little investment in new facilities since the mid-1970s, a period of high fuel costs and uncertain supply. Because the industry rates the service life of these units to be 40 years it may soon place some of these units may soon be placed into retirement.

There are eight cogeneration facilities totaling approximately 319 MW of capacity with units ranging in size from 0.01 MW to 181 MW. Cogeneration facilities use oil, natural gas, landfill methane, wood, or coal to simultaneously produce diversified electricity and thermal energy. Waste fuels, including refuse, waste tires, and methane from landfills are currently used to power generators in the state.

These waste-fueled facilities are diversified, privately operated, and contribute 191 MW, representing approximately three percent of the state's capacity for electric generation.

Reliability has become a key issue to facility operation due to the age of many Connecticut generating plants. Consequently, facility operators, the ISO, and state regulators must continue to assess, test, and confirm individual facility availability. Such continuous measures include confirmation of unit ratings, repairs, and operational schedules.

As depicted in Figure 5, the state's fuel mix for electric generation will largely change from oil-fired units to natural gas-fired units during the next ten years. This fuel mix scenario is consistent with the Department of Energy's projected fuel consumption for electric generation as depicted in Figure 6. However, without

Figure 4: Distribution of Connecticut's Electric Generators by Fuel and Age.

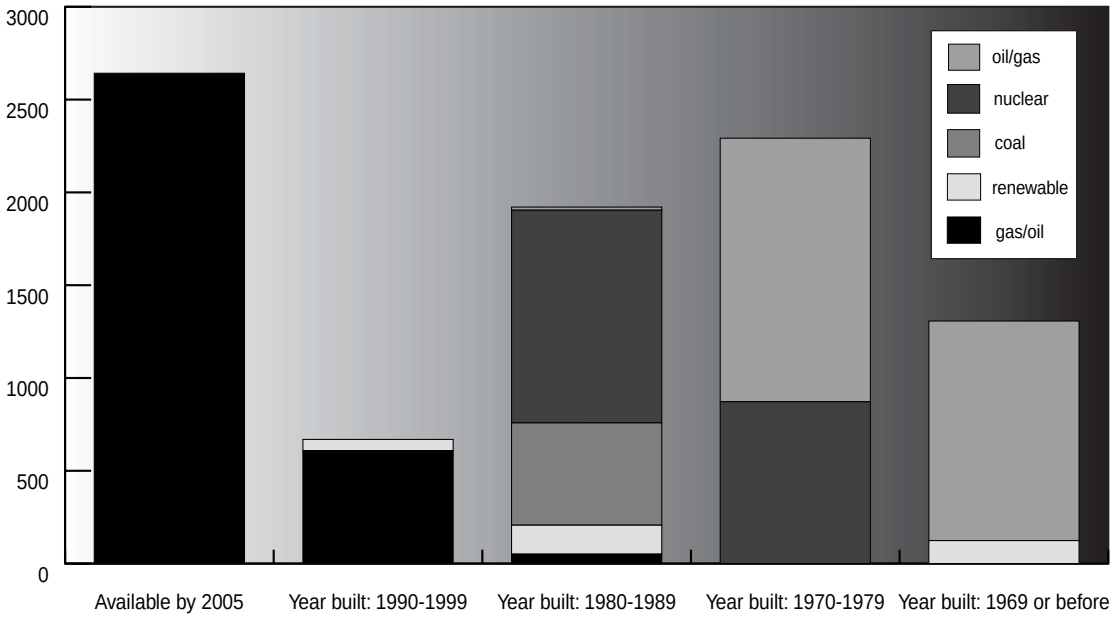


Figure 5: Connecticut Electric Fuel Mix

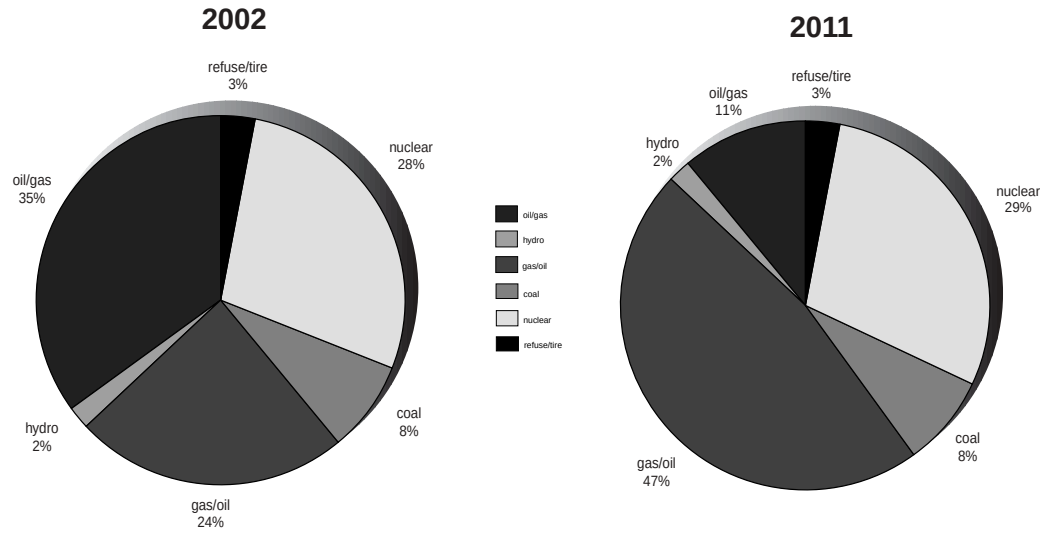
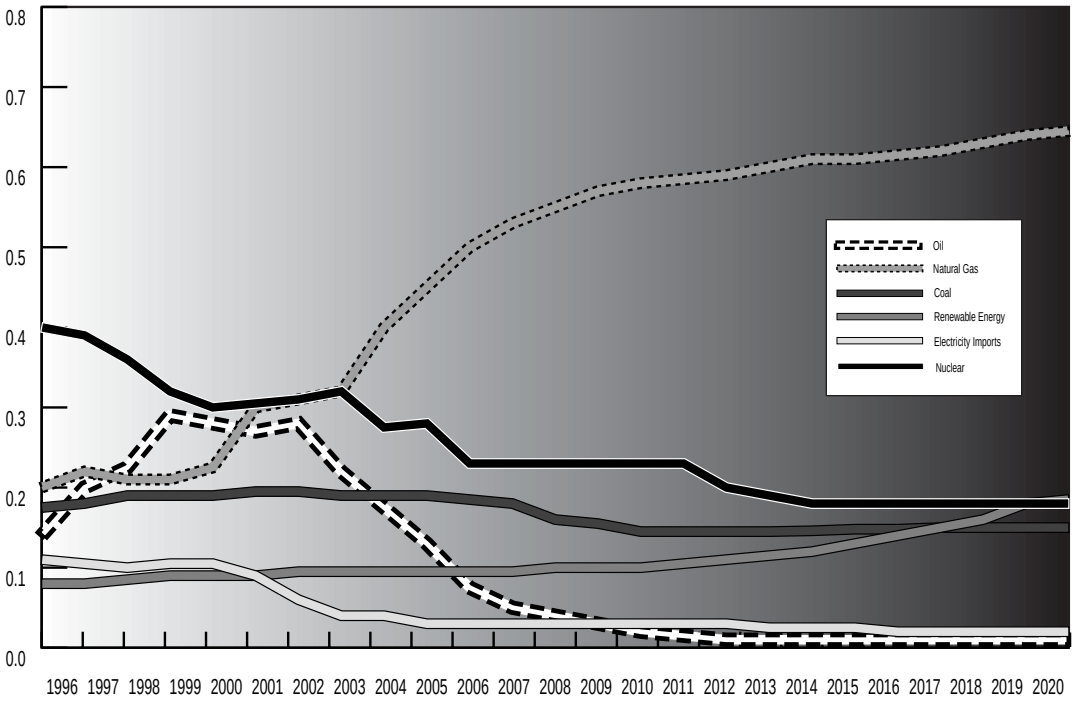


Figure 6: Fuel Consumption for Electric Generation within ISO-New England 1996-2020



increased diversity of supply resources, the state faces an inherent risk of reduced reliability.

Nuclear Power Generation

Connecticut currently has two operational nuclear electric generating units contributing a total of 2,017 MW (summer rating), approximately 28 percent of the state's capacity. Nuclear capacity, which formerly accounted for 45 percent of the state's operating capacity, has been reduced by the retirement of the Connecticut Yankee and Millstone Unit 1 facilities in December 1996, and July 1998, respectively

Although no additional nuclear power capacity is currently planned as a new supply option, nuclear power offers unique benefits and constraints that is being reconsidered in the draft national energy policy. By releasing no production-connected sulfur oxides, nitrogen oxides, or carbon dioxide, nuclear power essentially represents a zero-air-emission generation source. In the event Connecticut were to permanently lose the contribution of its nuclear facilities now operating in Connecticut, the operators would 1) no longer have a surplus of sulfur dioxide allowances granted under the 1990 Clean Air Act Amendments (CAAA), and 2) face the possible loss of future emission allowances under the CAAA. Nonetheless, there remain issues of scheduled and unscheduled outages; nuclear waste storage, transport and disposal; public safety; security; and facility costs.

Coal Power Generation

Connecticut currently has two coal-fired electric generating facilities contributing 551 MW, approximately eight percent of the state's current capacity. Coal reserves in the United States are expected to last over 240 years based on 1998 consumption levels. Despite this apparent benefit of supply and transport via an existing rail infrastructure, coal is not actively being considered as a supply-side fuel option due largely to the relative high expense of facility installation and the concern for control of air emissions, including possible future carbon dioxide regulations. However, with draft national energy policy encouraging development of clean-coal technology, and with the United States possessing approximately 24 percent of world's current estimated total recoverable coal, it may be a fuel that will be more seriously considered as a supply option.

Petroleum Power Generation

Connecticut currently has 29 oil-fired electric generating facilities, some of which can also burn natural gas, contributing a total of 2,600 MW — approximately 35 percent of the state's current capacity. New generation fueled solely by oil has been largely ruled out for future new supply due in part to the volatility of the crude oil market. The United States holds an estimated two- percent of the world's known oil reserves excluding reserves in oil shale; a supply expected to last 70 years based on 1998 consumption levels. Approximately 60 percent of the United States' oil is imported, making it potentially vulnerable to market manipulation by exporting nations. Although the current price of oil is relatively low compared to other fuel types, Connecticut utilities have sought to diversify their fuel mix away from reliance on crude oil. Nevertheless, plans for fuel diversification must always include an assessment of fuel availability, cost, and environmental effects that result if generating facilities are required to use secondary fuels.

Table 2: Cost and Lead Times for New Electric Generation Technologies

Technology	Size (MW)	Leadtime (Yrs.)	Cost* (1999 $/kW)
Conventional Pulverized Coal	400	4	1,092
Gas/Oil Combined Cycle	250	3	445
Gas/Oil Combustion Turbine	160	2	331
Fuel Cells	10	3	2,041
Wind	50	3	983
Biomass	100	4	1,723

* Cost includes contingencies, but excludes interest charges

Natural Gas Generation

Connecticut currently has 11 natural gas-fired electric generating units, some of which can burn oil, contributing a total of 1,705 MW — approximately 24 percent of the state's current capacity. For the foreseeable future, natural gas is expected to be the fuel of choice for electric generation because of sulfur dioxide standards and other limitations set by the CAAA.

Natural gas electric generating facilities are preferred primarily because of the available high efficiency technology, cleaner emissions, and the relatively low capital cost per kWh produced (see Table 2). Current United States reserves are anticipated to last 71 years at 1998 consumption levels. In addition, reserves from Canada have increased supply in New England by more than 50 percent through new pipelines from both western and eastern Canadian provinces. Although impacts on air quality are substantially less than coal or oil-fired facilities, it is less clear if natural gas generation will be able to economically meet future nitrogen oxide and carbon dioxide emission limits and how competition will affect the supply of natural gas to electric generating facilities.

A cogeneration facility in a city setting.

As depicted in Table 3, the natural gas supply for new generation in New England, based on current and proposed natural gas supply capacity, the annual average daily consumption (1999), and the average consumption per MW of generation for new combined cycle natural gas-fired facilities, could provide approximately 11,896 MW of power. This would be consistent with ISO-NE's "Steady-State Analysis of New England's Interstate Pipeline Delivery Capability, 2001-2005" Phase II report identifying development of 10,766 to 12,542 MW of gas-fired electric generation in New England.

Notwithstanding new supplies expected from the Sable Island Basin and new pipeline capacity, the use of natural gas for base load facilities, combined with other heating and transportation uses, might result in over-dependence and lack of fuel diversity which may curtail the plans for nearly one-half of the generation being considered for development in New England. Consequently, there is a need to balance future fuel supply and transmis-

Table 3: Natural Gas Capacity and Consumption Rates for New England (million cubic feet per day)

Existing Capacity Year 2000		Existing Consumption Year 1999		Total Capacity 3,604,009
Algonquin	1,494,763	Connecticut	359,296	Total Consumption 1,605,559
Tennessee	1,186,346	Maine	16,586	
Iroquois	206,900	Massachusetts	922,096	
Vermont Gas	49,000	New Hampshire	55,644	Available Capacity 1,998,450
Granite State	37,000	Rhode Island	229,953	
Portland Natural Gas	230,00	Vermont	21,984	
Maritimes & Northeast	400,00			Average Consumption per MW of Generation 168
Total Capacity	3,604,009	Existing Consumption	1,605,559	**Potential MW Generation in NE 11,896**

sion capacity with proposed generation. Consistent with recommendations by ISO-New England's Steady–State Analysis of New England's Interstate Pipeline Delivery Capability 2001-2005, January 2001 and February 2002, the Council supports a process to:

- certify the character and quality of gas transportation infrastructure;
- improve back-up fuel capability;
- promulgate standards for coordination of scheduling for delivery of natural gas to users;
- conduct a regional natural gas flow simulation to dynamically identify availability and supply constraints; and
- support regulatory streamlining for new pipelines.

Hydroelectric Power Generation

Connecticut hydroelectric generation consists of 30 facilities contributing 149 MW, approximately two percent of the state's current capacity. Hydro-power, long considered to be an environmentally acceptable source of power, has recently come under increased scrutiny by both recreational and environmental advocacy groups whose concerns include the effects of dams on river flow, water quality, fish populations, and wildlife habitats. The Falls Village, Bulls Bridge, Shepaug, Stevenson, and Rocky River hydro-units, totaling 115 MW of capacity, are undergoing relicensing review with the Federal Energy Regulatory Commission. Consequently, while hydropower may be considered a clean and renewable energy source, renewal of existing licenses or development of any additional large units in Connecticut would likely be limited by these constraints, relative cost, and lack of sites.

Privately Owned Generation

There are approximately 127 MW of electricity generated by 73 privately owned entities in Connecticut. This portion of generation is not credited to the state's capability to meet demand; or in other words, ISO-NE does not control dispatch of these entities. However, these units serve to reduce load on the grid particularly during peak demand. These generation units range between 1 kW to 25 MW in size and are fueled primarily by natural gas with several others using oil, hydro, methane, solar and wind. The installation of additional privately-owned generation is expected, but only at competitive rates or by an entity that views self-generation as a benefit.

Import Resources

Since 1986, Connecticut utilities have held contracts for 479 MWs from a total of 1,500 MWs of import capability from the Hydro-Quebec Phase I and Phase II projects. These contracts and others in New England expired on August 31, 2001, making the 1,500 MWs available for sale to wholesale and retail electric suppliers. Although the Hydro-Quebec interconnection tie is not counted toward Connecticut generation capability, it is expected to assist in meeting New England's energy needs on a competitive basis.

Distributed Generation

Commercial technologies such as reciprocating engines and small combustion turbines are used in a variety of applications for energy, cogeneration, and emergency power. Emerging technologies that appear close to being economically viable for use to generate electricity are micro-turbines, fuel cells, wind turbines, and photovoltaics (see Table 4).

There are three main types of fuel cells being developed for commercial electric generation: phosphoric acid, molten carbonate, and solid oxide. The current prices per kWh of these units limit their appeal for base load applications. However, fuel cells can be considered viable supply resources in distributed and cogeneration applications.

Wind turbines would need to be placed in windy areas such as on hilltops or the shores of Long Island Sound. Consequently, the siting of these facilities could potentially compromise the preservation of scenic resources in Connecticut.

Solar power generation facilities can take advantage of the large area of industrial and commercial rooftops and south-facing facades to achieve significant output based on current technology; however, their price has currently confined them to certain high value niche markets.

Distributed generation applications can be designed to meet a wide variety of service requirements and fulfill the needs of many customers. Such applications provided by distributed generation are combined heat and power, standby power, peak-shaving, grid support, and stand alone generation. Distributed generation has faced obstacles that include lack of technology maturation, cost associated with an economy of scale, and regulatory barriers. Regulatory barriers include interconnection requirements, permitting and siting, and compliance with building and electrical codes. Market forces, technological advances, and industry restructuring will continue to remove obstacles for the strategic development of distributed generation and integration of supply resources within load pockets. In addition, distributed generation has the advantage over large centralized systems of being secure at customer's sites and less reliant on transmission infrastructure.

Table 4: Distributed Generation Technologies

Technology	Size	Efficiency*	Turnkey Cost* ($/kW)
Combustion Turbine	1 MW - 30 MW	21-40%	650-900
Reciprocating Engine	30 kW - 10 MW	30-43%	500-900
Microturbine	30 kW - 400 kW	25-30%	600-1,100
Fuel Cell	50 kW - 1 MW	35-54%	1,900-3,500
Photovoltaics	1 kW +	10-20%	5,000-10,000
Wind	1 kW - 20 kW	12-38%	1,000-2,500

* Does not include combined Heat and Power

Electric Restructuring

Pursuant to Public Act 98-28, Connecticut electric consumers are provided an opportunity to choose their electric generation supplier. This law is also intended to open electric generation to competition from other generation suppliers to decrease the price of electricity, foster technological innovation, and improve environmental quality through new facilities with lower emission profiles.

The Department of Public Utility Control has initiated the process to unbundle generation from other components of the electric utilities; establish non-bypassable service charges to fund energy conservation programs and fund investments in renewable technologies; and establish a systems benefit charge to fund education programs, public policy programs, and provide assistance to utility workers and municipalities that are impacted by restructuring. While many of the market-based provisions of this Act have already been executed including the divestiture of nuclear and non-nuclear generation and customer choice of electric generation suppliers, continued oversight of electric supply markets will continue to ensure efficient management.

Most customers are still being served through the standard offer service of CL&P and UI. Relatively few have chosen an alternate electric generation supplier. Market conditions, customer awareness, and availability of viable alternatives are factors which may affect consumer decisions to choose an electric generation supplier other than the standard offer. The standard offer rate is in place as a transition to competition and will expire December 31, 2003. The market will be tested after the expiration of this rate, and the cost of service could change dramatically depending on the availability of competitive supply and demand for energy.

Facility Siting

As a consequence of restructuring legislation, the Council's jurisdiction and statutory decision criteria have been modified to provide uniform treatment between utilities and private power producers so that a full range of environmental and economic effects can be appropriately considered for new generation facilities. Such new generation facilities are expected to be developed in Connecticut at a rapid pace over the next few years.

To date the Council has approved the following natural gas-fired electric generating facilities:

- 520-MW Bridgeport Energy LLC project in Bridgeport became operational in May 1999,
- 544-MW PDC-El Paso LLC project in Milford is expected to begin operation,
- 544-MW NRG Northeast Generating LLC project in Meriden started construction and completion is undetermined,
- 792-MW Lake Road Generating Company, L.P. project in Killingly became operational June 2002,
- 512-MW Towantic Energy LLC project in Oxford, is in litigation and progress is uncertain, and
- 250 MW Wallingford, PPL project in Wallingford became operational March 2002.

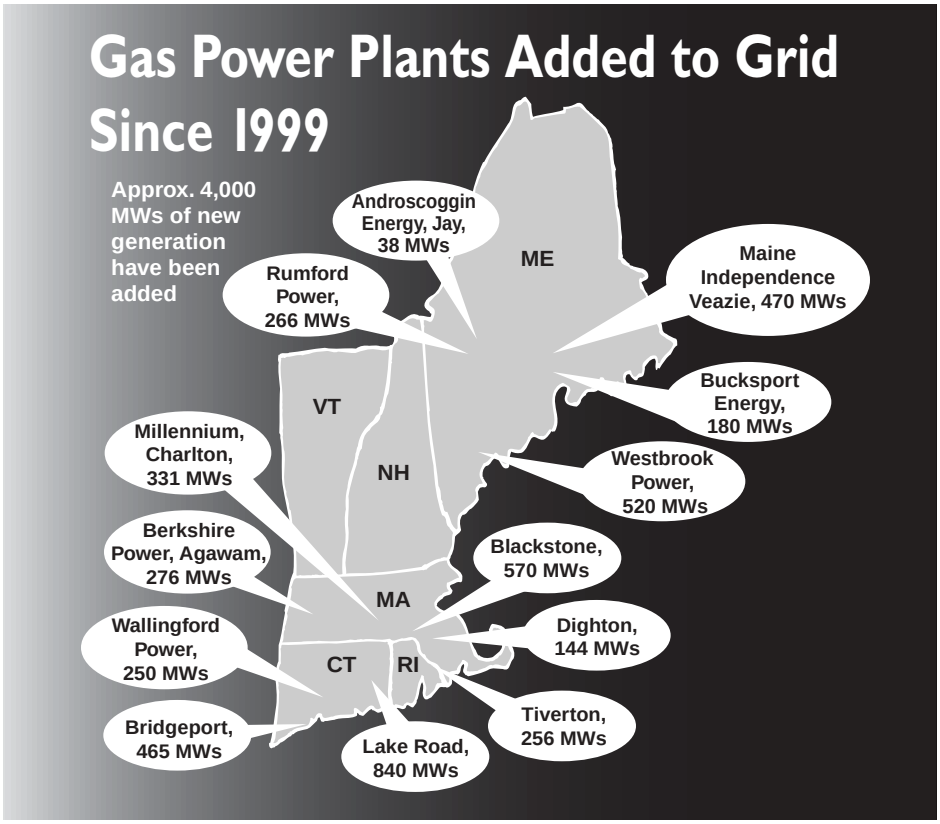
3,162 MW total of approved generation

The Bridgeport Energy project has been operational since 1999. Other approved projects in Killingly and Wallingford became operational during the first half of 2002, and a facility in Milford should become operational soon. The facility in Meriden, formerly known as PDC-El Paso, has been acquired by NRG and its construction schedule is unclear. The Towantic Energy facility in Oxford is not expected to be operational before 2004.

The Council is reviewing a 550 MW gas-fueled electric generating facility to be located in Middletown. Other projects listed on the ISO-NE interconnection study status for possible development include South Norwalk (100 MW), New Britain (500 MW), Bridgeport Harbor (520 MW), New Haven Harbor (520 MW), and Middletown Station (500 MW). While plans for 2,710 MW of capacity from these facilities are speculative and subject to change, it is likely that at least some of these plants will be developed.

The development of new facilities in the last three years has added approximately 4,000 MW of capacity to the New England electric grid. As seen in Figure 7, facilities have been developed in Maine, Massachusetts, Rhode Island, and Connecticut. Most plants were constructed near intersections of electric and natural gas transmission infrastructure, many on green field sites and away from load centers. However, policy makers envisioned a more streamlined development by the repowering of existing facilities that already have electric and/or gas infrastructure in place and are located near load centers. Consequently, the siting of future generation and transmission facilities is best considered together, and on a regional basis, to enable efficient electric dispatch and fuel supply.

Figure 7: New electric generation in New England.



Source: New England Gas Association

TRANSMISSION SYSTEM

Connecticut's high voltage electric transmission system consists of approximately 1,300 circuit miles of 115-kV, 398 circuit miles of 345-kV, 5.8 circuit miles of 138-kV and 104 circuit miles of 69-kV lines. While much of the state's electric transmission infrastructure is already developed, the electric utilities maintain the system and expand it where needed to serve load centers and new generation. As shown in Appendix C, many of the transmission line projects being planned consist of the rebuilding or reconductoring of existing lines to increase each line's capacity to meet load growth and/or generation dispatch conditions. In addition, CL&P proposes two new 345-kV transmission projects that would enhance system reliability, decrease congestion, and increase import capabilities. These projects are between Bethel and Norwalk and Middletown and Norwalk. CL&P proposes that these projects would benefit the state with connection to other regional systems and provide access to a greater supply of bulk power. The Bethel-Norwalk line is presently under review by the Council in Docket No. 217.

The Council also approved a Northeast Utilities application (Docket No. 224) to replace an existing 138-kV submarine lines between Norwalk and Northport, New York, and a Cross Sound Cable application (Docket No. 221) a merchant direct current submarine line between New Haven and Brookhaven, New York. The utilities continue to monitor electricity usage for transmission and substation upgrading to improve system reliability, promote efficiency, and reduce energy losses.

While the generation and transmission infrastructure were under high demand during the hot and dry summer of 1999, most outages were attributed to failure of distribution feeders leaving high voltage

substations, and distribution transformers near end use customers. The state's utilities state that the failures were due to aged equipment and have replaced such equipment. Accordingly, Department of Public Utility Control Docket No. 99-08-01, DPUC Investigation into Electric Capacity and Distribution noted that the southwestern corner of the state appeared to require some transmission and distribution reinforcements. The distribution companies have pursued numerous modifications to the existing 115 kV transmission system serving that area as load continued to grow. These modifications have included routine breaker upratings, line rebuilds and installations of capacitor banks. The DPUC investigated possible shortages of electricity in southwest Connecticut during summer periods of peak demand for 2002 and beyond (Docket No. 02-04-12). The following is an excerpt from that decision:

"However, during 1999 it was not readily apparent that system reliability in SWCT was in jeopardy. Since that time, several significant events that threatened system reliability have occurred, including the following:

• On June 11, 2000, a significant challenge to system reliability in SWCT occurred. On Sunday, typically a low load day, the system experienced a double circuit fault, and voltage in the area dipped to approximately 30% of nominal. Voltage remained low for approximately eight seconds, which is an extremely long time in AC electrical circuitry. As a consequence, CL&P's Cedar Heights substation was de-energized, which serves approximately 50,000 customers in Stamford.

• On August 9, 2001, a heat wave resulted in extraordinarily high electric demand in SWCT. All generating units in the area were available, and no unexpected failures occurred. However, the system was stretched to its limits and an unexpected outage of a generation unit or transmission line would likely have resulted in difficulties maintaining electric service in the area.

• On August 31, 2001, with relatively light demand in the region (approximately 80% of peak), Bridgeport Energy Station tripped off-line. This resulted in power transfers into SWCT increasing to the point where there was insufficient capacity to cover the loss of an additional generator. In addition to the SWCT capacity situation, two 115-kV lines that supply the Norwalk-Stamford area failed. ISO-NE declared an emergency and supported the system in part over the Long Island – Norwalk Harbor cable."

"The above incidents demonstrate that although the SWCT region has not yet experienced widespread blackouts, the area has come precipitously close to such blackouts on at least these three occasions.

"It should also be noted that unplanned transmission line outages and generating unit outages are regular occurrences in the electric system. However, transmission constraints and load growth in the area exacerbate the effects of outages in the system. This is the case since the system is often being operated near its limits. Therefore, as outages occur, the effects of the outages on the system become more severe. The outages noted above are not unusual and similar events have occurred in the past. However, the consequences are becoming more severe, and ISO-NE and the utilities have had to take more drastic measures to avoid widespread blackouts. Since unplanned outages are unavoidable, it should be expected that the consequences of such events on the system would become more severe as time goes on, unless measures are taken that either decrease load or increase transmission capabilities."

As depicted in Appendix B, load centers, identified by population density, are located primarily in and around urban areas and in the southwestern portion of Connecticut. Generally, it is prudent to locate generation assets near the load centers because of efficiency in transmission. The locations for new transmission lines and bulk supply substations will be determined based on load centers and new generation in conjunction with ISO-New England.

ISO-New England systematically assesses load requirements, establishes reserve margins across the power pool, and dispatches energy as necessary. In addition, ISO-New England assesses each new electric generation facility requesting connection to the electric grid for transmission system reliability. Also, ISO-New England continues to monitor transmission interfaces that deliver power to Connecticut. The state is currently only able to import 2,300 MW relevant to in-state resources without compromising grid voltage and system operating stability.

The regional importance of these interconnections is important. While Connecticut undertakes this review as a measure of responsibility and to reduce potential regional disparity, the electric transmission system must be considered a regional facility capable of inter- and intra-region export and import of power. Consequently, Connecticut must continually examine its position in a regional context to import and export capacity. Such examination will likely favor the construction of regional facilities that strengthen the system grid for overall increased reliability. Some regional interconnections may not be popular to local land use authorities or local residents, however, state siting should maintain a regional perspective for maximum integration and efficient dispatch to reduce the cost of uplift to load pockets. Regional interconnections are being considered with possible federal preemption through the Federal

Table 5: Planned Bulk Substations in Connecticut

Planned Substation	Date of Completion
Installation of new Trumbull Junction, Trumbull (UI)	2004
Installation of new substation in north or western Fairfield (UI)	2006 or later
Installation of new Beseck Junction 345 kV Switching Station	2006
Installation of new East Devon S/S 345 kV	2006
Installation of new 345 kV S/S at Pequonnock S/S, Bridgeport	2006

Energy Regulatory Commission and oversight by a Regional Transmission Organization (RTO). However, until these entities exist or obtain jurisdiction to coordinate regional facilities, Connecticut and other states will need to consider regional interests.

As shown in Table 5, as many as five new bulk power substations or switching stations to reduce high-voltage transmission to lower voltage may be needed in high load areas within the state over the next four years.

Because the development of both new transmission and substation facilities might be considered undesirable by local communities, utilities must carefully assess supply locations, load center demands, and the need for new or upgraded facilities far in advance of actual construction. While the importance of regional interconnections must be understood, on-site generation and targeted conservation and load management programs must be continually evaluated as part of new transmission system planning alternatives.

Transmission lines and electric substations have received increased scrutiny by groups concerned about the possible effects of electric and magnetic fields (EMF). In 1999, an international panel of experts issued a final report titled Research on Power-Frequency Fields Completed Under the Energy Policy Act of 1992, National Academy Press, 1999, Washington, D.C. U.S.A. The report stated that the results of their investigation "do not support the contention that the use of electricity poses a major unrecognized public-health danger." Nonetheless, EMF remains a concern to many communities, and siting decisions should consider possible links between exposure and health.

RESOURCE PLANNING

The Council fully endorses and participates in the assessment of resources, modeling, and planning initiatives to maintain electric reliability. These processes include programs for conservation and load management, resource supply, and transmission planning. The complexity and necessary integration of these programs has substantially increased as increased demand has stressed existing resources. In addition, consumer costs, congestion management, targeted demand-side programs, regional transfers, and the difficulty in facility siting has presented issues that have made decision-making difficult and not without consequences.

For example, modeling undertaken pursuant to the ISO-New England Regional Transmission Expansion Plan (RTEP01) has identified:

- gross noncompliance with the "loss of load expectation criteria" with the retirement of 14 "high environmental impact" generation facilities, potentially subject to new air emission regulations;
- insufficient transmission that will begin to "lock-in" generation capacity in southeast Massachusetts and Rhode Island;
- transmission line congestion in New England is predicted to cost between $200 and $600 million per year to run "out of economic merit" (uplift) generation facilities to meet demand;
- inadequate transmission in southwest Connecticut to maintain voltage and energy supply during unplanned outage of certain transmission and/or generation facilities; and
- regional transmission constraints to transfer energy from New York, Canada, and other regions.

As shown in Appendix B, the Council

continues to assess existing electric transmission, fuel supply, generation, and demand-side resources as well as planning options to maintain and improve reliability. Many design studies have been initiated to correct some of these problems with transmission enhancement. However, multiple scenarios of demand-side planning, new natural gas pipeline siting, new generation siting, and dispatch of existing generation facilities must be considered before final decisions are made by state regulators and the ISO. In Connecticut, enhancement plans for northwest Connecticut, the Norwalk-Stamford area, and southwest Connecticut are expected to be completed by year end 2002. These and other subregional plans are expected to complement other enhancements throughout the New England electric power system consistent with reliability criteria established by NEPOOL, the Northeast Power Coordinating Council, and the North American Electric Reliability Council. The assessment of these enhancement plans and recommended strategies will be difficult and time consuming, but will allow the public participation and community involvement necessary for the efficient deployment of facilities.

In view of recent electric and gas transmission industry activity in proposing and constructing infrastructure in the State, the legislature passed An Act Concerning the Protection of Long Island Sound relating to electric power line, gas pipeline, and telecommunications crossings (Public Act No. 02-95). Consistent with Governor Rowland's Executive Order No. 26, a task force was created to assess economic considerations and environmental preferences and the appropriateness of installing the transmission lines underground or overhead; feasibility of meeting all or part of the region's electric power needs through distributive generation; and electric reliability, operational and safety concerns of the region's transmission system, and the technical and economic feasibility of addressing those concerns with available electric transmission system equipment. The Institute of Sustainable Energy at Eastern Connecticut State University has been selected to lead the task force in preparing the assessment and providing a report of its findings to the legislature.

CONCLUSION

These forecasts have modeled Connecticut's electric energy future for the next 10 years and show improved supply to meet demand. Nonetheless, these forecasts are models that are based on assumptions that are subject to change over time.

The change in the state's fuel mix for electric generation, over-reliance on natural gas as a fuel, transmission constraints, and the separation of electric generation from transmission and distribution raise new concerns for the reliability of Connecticut's electric capacity. This analysis and these models should not be used as a tool to simply predict the future, but to increase learning curves, reduce risk, and to identify effective strategies to obtain desirable goals.

Issues that warrant attention include:

- targeted subregion strategies in load pockets to address transmission constraints, load growth, and generation resources;
- emergency contingency planning to manage electric supply and demand;
- regional siting to improve system efficiency and reduce uplift costs;
- long-term system reliability;
- facility management for reliable operation;
- scheduled maintenance for predictable operations;
- responding to a changing economy that has proven difficult to predict;
- long-term management of volatile fuel supplies;
- efficient load management and conservation investments; and
- maintaining regional transmission systems to accommodate high demand during adverse weather conditions.

Refinement of policy may also be warranted in the following areas as Connecticut's role is better defined by market conditions:

- fuel - encouragement of fuel diversity with sustainable alternative fuel facilities;
- fuel storage - incentives for back-up fuel storage;
- interconnection - encouragement of distributed energy at load centers;
- planning - continued forecast modeling for electric supply, demand, and transmission;
- regulation - streamlined siting for regional generation, electric transmission, and gas pipelines;
- education - continued education on all elements of electric restructuring, supply options, and market-based decisions; and
- conservation - refined policies to provide economic alternatives to reduce energy consumption.

In addition, market mechanisms need to be assessed and applied to planning strategies to determine if there are sufficient incentives to ensure an adequate supply of generation and demand-side resources to provide reliable service.

Appendix A
Existing Electric Generation Facilities
as of July 1, 2002

Facility *Entities that generate electricity for sale.*	**Owner**	**Town**	**Fuel**	**Summer Rating (MW)**	**Winter Rating (MW)**
Bridgeport Harbor #3	Wisvest-CT, LLC	Bridgeport	Coal	370.39	400.00
AES Thames	AES Thames, Inc.	Montville	Coal/Oil	181.00	182.15
Hartford Hospital	Energy Network	Hartford	Gas	2.85	2.85
G. Fox	Downtown Cogeneration Assoc.	Hartford	Gas	3.00	3.00
Bridgeport Energy	Bridgeport Energy LLC	Bridgeport	Gas	447.88	527.12
Wallingford	Global PPL	Wallingford	Gas	250.00	250.00
Lake Road Generating Proj.	Pacific Gas & Electric Energy Grp.	Killingly	Gas/Oil	792.00	810.00
Devon #14	NRG	Milford	Gas/Oil	30.80	41.37
Devon #11	NRG	Milford	Gas/Oil	30.85	40.37
Devon #12	NRG	Milford	Gas/Oil	30.86	40.07
Devon #13	NRG	Milford	Gas/Oil	31.00	40.00
C. H. Dexter	Alstom	Windsor Locks	Gas/Oil	38.00	39.00
Aetna Capitol District	Capitol District Energy Ctr.	Hartford	Gas/Oil	47.96	54.04
Rocky Glen	Rocky Glen Hydro LP	Newtown	Hydro	0.04	0.04
Dayville Pond	Summit Hydro Power	Killingly	Hydro	0.05	0.05
Bantam #1	NGC	Litchfield	Hydro	0.07	0.32
Mechanicsville	Saywatt Hydro Associates	Thompson	Hydro	0.10	0.10
Glen Falls	Summit Hydro Power	Plainfield	Hydro	0.10	0.10
Toutant	Toutant Hydro Power, Inc.	Putnam	Hydro	0.16	0.16
Gilman Hydro	Gilman	Bozrah	Hydro	0.18	0.18
Kinneytown A	Kinneytown Hydro Co.	Ansonia	Hydro	0.25	0.25
Putnam	Putnam Hydropower, Inc.	Putnam	Hydro	0.27	0.27
McCallum Enterprises	McCallum Enterprises	Derby	Hydro	0.28	0.28
Robertville #1- #2	NGC	Colebrook	Hydro	0.32	0.62
Willimantic 2	Willimantic Power Corp.	Willimantic	Hydro	0.39	0.39
Willimantic 1	Willimantic Power Corp.	Willimantic	Hydro	0.42	0.42
Kinneytown B	Kinneytown Hydro Co.	Seymour	Hydro	0.65	0.65
Norwich 2nd St./Greenville Dam	CMEEC	Norwich	Hydro	0.95	0.95
Norwich 10th St.	CMEEC	Norwich	Hydro	0.98	1.17
Quinebaug	Quinebaug Associates LLC	Killingly	Hydro	0.98	2.81
Colebrook	MDC	Colebrook	Hydro	1.37	1.37

Appendix A
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as of July 1,2002

Facility *Entities that generate electricity for sale.*	**Owner**	**Town**	**Fuel**	**Summer Rating (MW)**	**Winter Rating (MW)**
Tunnel #1- #2	NGC	Preston	Hydro	1.53	2.10
Wyre Wynd	Summit Hydro Power	Griswold	Hydro	1.61	1.61
Scotland #1	NGC	Windham	Hydro	1.69	2.20
Taftville #1- #5	NGC	Norwich	Hydro	2.03	2.03
Goodwin Dam	MDC	Hartland	Hydro	2.06	2.06
Derby Dam	McCallum Enterprises	Shelton	Hydro	7.05	7.05
Rainbow Dam	Farmington River Power Co.	Windsor	Hydro	8.20	8.20
Bulls Bridge#1- #6	NGC	New Milford	Hydro	8.40	8.40
Falls Village #1- #3	NGC	Canaan	Hydro	9.76	11.00
Stevenson #1- #4	NGC	Monroe	Hydro	28.31	28.90
Shepaug #1	NGC	Southbury	Hydro	41.71	43.40
Rocky River	NGC	New Milford	Hydro- pump storage	29.35	30.40
Shelton Landfill	CRRA	Shelton	Methane	0.00	0.62
Hartford Landfill	CRRA	Hartford	Methane	2.85	2.85
New Milford Landfill	Waste Management Co.	New Milford	Methane/Oil	3.01	3.01
Millstone 2	Dominion Nuclear CT, Inc.	Waterford	Nuclear	871.79	872.28
Millstone 3	Dominion Nuclear CT, Inc.	Waterford	Nuclear	1145.62	1159.25
Montville #11	NRG	Montville	Oil	2.60	2.70
Montville #10	NRG	Montville	Oil	2.70	2.80
Norwalk Harbor 10	NRG	Norwalk	Oil	11.53	16.73
Bridgeport Harbor #4	Wisvest-CT, LLC	Bridgeport	Oil	12.38	16.88
Torrington Terminal #10	NRG	Torrington	Oil	14.79	19.19
Branford #10	NRG	Branford	Oil	14.90	18.80
Tunnel #10	NGC	Preston	Oil	15.11	19.98
Norwich	CMEEC	Norwich	Oil	15.25	18.80
Cos Cob #10	NRG	Greenwich	Oil	15.52	20.97
Cos Cob #11	NRG	Greenwich	Oil	15.52	20.87
Cos Cob #12	NRG	Greenwich	Oil	16.12	22.57
Franklin Drive #10	NRG	Torrington	Oil	16.42	17.47
Middletown #10	NRG	Middletown	Oil	17.20	19.20
Devon #10	NRG	Milford	Oil	17.20	19.20

Appendix A
Existing Electric Generation Facilities
as of July 1, 2002

Facility *Entities that generate electricity for sale.*	Owner	Town	Fuel	Summer Rating (MW)	Winter Rating (MW)
South Meadow #12	CL&P	Hartford	Oil	33.87	43.87
South Meadow #11	CL&P	Hartford	Oil	36.02	47.16
South Meadow #13	CL&P	Hartford	Oil	37.07	46.67
South Meadow #14	CL&P	Hartford	Oil	37.93	47.93
Bridgeport Harbor #2	Wisvest-CT, LLC	Bridgeport	Oil	50.98	166.15
Norwalk Harbor #1	NRG	Norwalk	Oil	162.00	164.00
Norwalk Harbor #2	NRG	Norwalk	Oil	168.00	172.00
Middletown #4	NRG	Middletown	Oil	400.00	402.00
Montville #6	NRG	Montville	Oil	410.00	409.91
Montville #5	NRG	Montville	Oil/Gas	81.00	81.59
Devon #8	NRG	Milford	Oil/Gas	106.84	109.00
Devon #7	NRG	Milford	Oil/Gas	107.00	109.00
Middletown #2	NRG	Middletown	Oil/Gas	117.00	120.00
Middletown #3	NRG	Middletown	Oil/Gas	236.00	245.00
New Haven Harbor #1	Wisvest-CT, LLC	New Haven	Oil/Gas	449.56	466.00
Lisbon RRF	Riley Energy Systems	Lisbon	Refuse	13.04	13.04
Mid-CT RRF	CRRA	Hartford	Refuse	57.10	59.67
Bridgeport RRF	CRRA	Bridgeport	Refuse	59.50	59.65
Wallingford RRF	CRRA	Wallingford	Refuse/Oil	6.35	6.90
Preston RRF	SCRRRA	Preston	Refuse/Oil	9.88	13.85
Bristol RRF	Ogden Martin Systems-CT	Bristol	Refuse/Oil	12.74	12.74
Exeter	Oxford Energy, Inc.	Sterling	Tires/Oil	26.00	26.00
Pinchbeck	William Pinchbeck, Inc.	Guilford	Wood	0.01	0.01
	Seasonal Claimed Capability available for dispatch by ISO-NE.			7,234.25	7,683.76

Appendix A
Existing Electric Generation Facilities
as of July 1, 2002

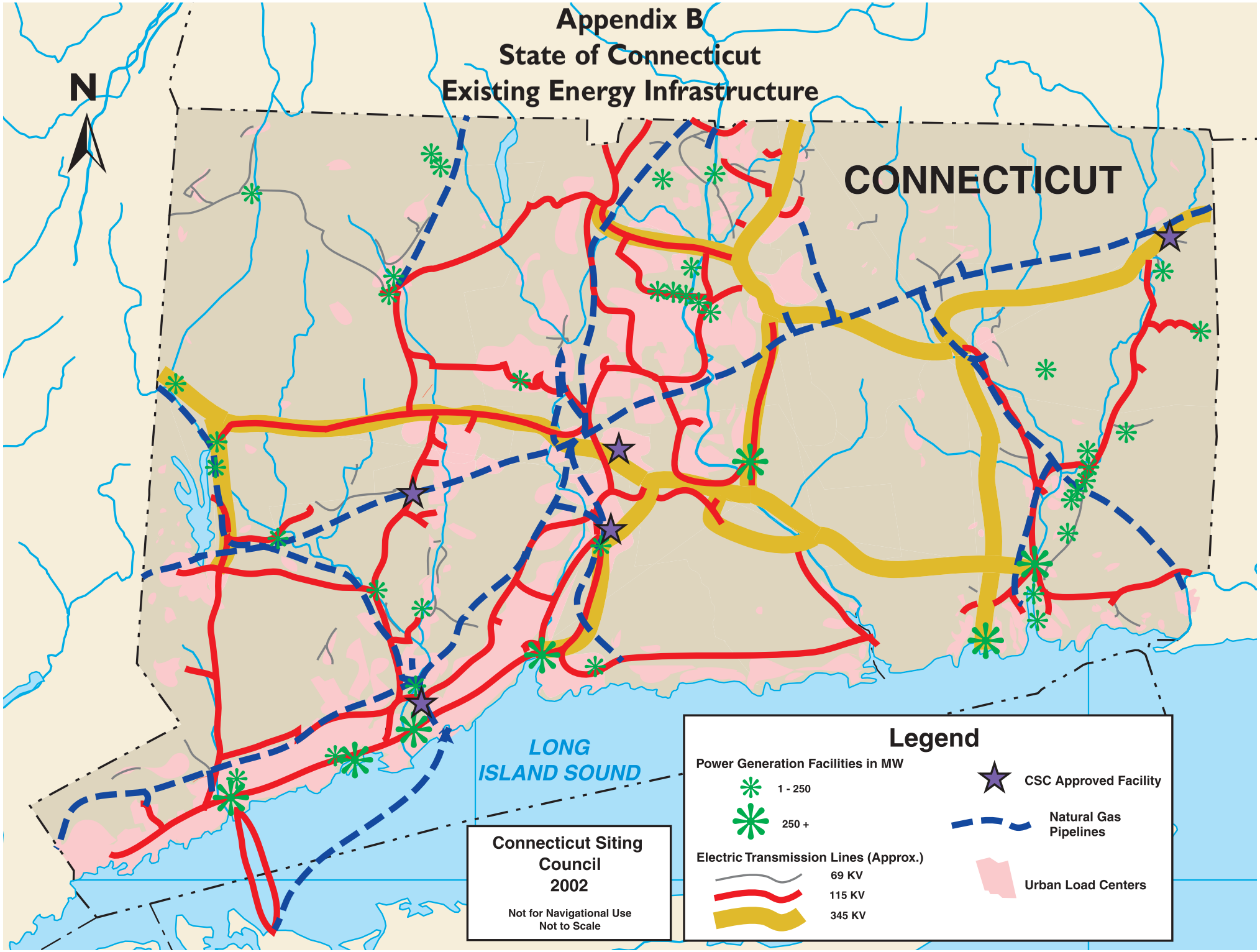
Facility	Owner	Town	Fuel	Summer Rating (MW)	Winter Rating (MW)
Entities that are capable of self generating electricity that is not dispatched by ISO-NE.					
Yale Univ diesels	Yale University	New Haven	Diesel	4.50	4.50
Agnes Morely Apts	Agnes Morely Apts	Greenwich	Gas	0.03	0.03
Atrium Plaza	Atrium Plaza	New Haven	Gas	0.06	0.06
Bridgeport J City Ctr	Bridgeport J City Ctr	Bridgeport	Gas	0.06	0.06
Bridgeport YMCA	Bridgeport YMCA	Bridgeport	Gas	0.06	0.06
Candid Associates 1&2	Candid Associates	North Haven	Gas	0.12	0.12
Candid Associates 3	Candid Associates	North Haven	Gas	0.18	0.18
Component Technologies	Component Technologies	Newington	Gas	0.30	0.30
Davenport Residence	Davenport Residence	Hamden	Gas	0.06	0.06
Dunbar Residence	Davenport Residence	Hamden	Gas	0.06	0.06
Fairfield YMCA	Fairfield YMCA	Fairfield	Gas	0.03	0.03
First Baptist Housing	First Baptist Housing	Bridgeport	Gas	0.08	0.08
Greenwich YMCA	Greenwich YMCA	Greenwich	Gas	0.06	0.06
Hamilton Standard	UTC	Windsor Locks	Gas	0.20	0.20
Hartford Holiday Inn	Hartford Holiday Inn	Hartford	Gas	0.06	0.06
Hartford YMCA	Hartford YMCA	Hartford	Gas	0.12	0.12
Hartford YWCA	Hartford YWCA	Hartford	Gas	0.06	0.06
Immanuel House	Immanuel House	Hartford	Gas	0.06	0.06
Inter Church	Inter Church	Bridgeport	Gas	0.24	0.24
Laurelwood	Laurelwood	Bridgeport	Gas	0.06	0.06
Loctite	Loctite	Rocky Hill	Gas	1.18	1.18
Longobardi	Longobardi, Ann	North Haven	Gas	0.06	0.06
Maefair Health Care	Maefair Health Care	Trumbull	Gas	0.04	0.04
New Haven JCC	New Haven JCC	Woodbridge	Gas	0.06	0.06
Norconn	Norconn	Meriden	Gas	0.20	0.20
Norwalk Hospital	Norwalk Hospital	Norwalk	Gas	2.36	2.36
Nova Metal Finishing	Nova Metal Finishing	Waterbury	Gas	0.04	0.04
Pitney Bowes	Pitney Bowes	Stamford	Gas	0.75	0.75
Pratt & Whitney	UTC	E. Hartford	Gas	23.80	23.80
Pratt & Whitney	UTC	Middletown	Gas	1.00	1.00

Appendix A
Existing Electric Generation Facilities
as of July 1, 2002

Facility	Owner	Town	Fuel	Summer Rating (MW)	Winter Rating (MW)
Entities that are capable of self generating electricity that is not dispatched by ISO-NE.					
Sheraton	Sheraton	Waterbury	Gas	0.15	0.15
CT Job Corp	CT Job Corp	Hamden	Gas	0.15	0.15
Apple Hill	Apple Hill	Hamden	Gas	0.15	0.15
Southern CT Gas Co.	Southern CT Gas Co.	Milford	Gas	0.27	0.27
Sprague Paper Board	Carol Starr	Sprague	Gas	9.00	9.00
Sycamore Place	Sycamore Place	Bridgeport	Gas	0.04	0.037
Town of Winchester	Town of Winchester	Torrington	Gas	0.06	0.06
Vernon Manor	Vernon Manor	Vernon	Gas	0.06	0.06
Washington Heights	Washington Heights	Bridgeport	Gas	0.06	0.06
Westport YMCA	Westport YMCA	Westport	Gas	0.06	0.06
Simkins	Simkins	New Haven	Gas/Oil	2.50	2.50
Yale Univ Unit 1	Yale University	New Haven	Gas/Oil	6.20	6.20
Yale Univ Unit 2	Yale University	New Haven	Gas/Oil	6.20	6.20
Yale Univ Unit 3	Yale University	New Haven	Gas/Oil	6.20	6.20
Bynes Falls	Coventry Hydro	Coventry	Hydro	0.10	0.10
Congdom Dam	Warren Hobbs	Montville	Hydro	0.06	0.06
Lyme Hydro	Lyme Hydro	Lyme	Hydro	0.02	0.02
Mainstream Inc.	Mainstream Inc.	Essex	Hydro	0.01	0.01
Norwich Occum	CMEEC	Norwich	Hydro	0.53	0.53
Putnam #2	Putnam Hydropower, Inc.	Putnam	Hydro	0.25	0.25
Rawson Mfg. Co.	Rawson Mfg. Co.	Thompson	Hydro	0.02	0.02
S CT Reg. Water Auth.	S CT Reg. Water Auth.	North Branford	Hydro	0.30	0.30
McCann Mfg. Co.	McCann Mfg. Co.	Sterling	Hydro	0.06	0.06
Town of Manchester	Town of Manchester	Manchester	Methane	0.13	0.13
Connecticut Valley Hospital	State of Connecticut	Middletown	Oil	2.05	2.05
East Hartford High	East Hartford High	East Hartford	Oil	0.28	0.28
Fairfield Hills Hospital	Fairfield Hills Hospital	Newtown	Oil	3.95	3.95
Fishers Island Elec. Co.	Fishers Island Elec. Co.	Groton	Oil	1.10	1.10
Gottier	Gottier, Nelson	Tolland	Oil	0.01	0.01
Norwich State Hospital	Norwich State Hospital	Norwich	Oil	2.00	2.00

Appendix A
Existing Electric Generation Facilities
as of July 1, 2002

Facility	Owner	Town	Fuel	Summer Rating (MW)	Winter Rating (MW)
Entities that are capable of self generating electricity that is not dispatched by ISO-NE.					
Pfizer	Pfizer	Groton	Oil	25.00	25.00
Travelers	Travelers	Hartford	Oil	2.00	2.00
Groton Sub Base	U.S. Navy	Groton	Oil/Gas	18.50	18.50
Southbury Training School	State of Connecticut	Southbury	Oil/Gas	1.50	1.50
Notre Dame Convalescent	Notre Dame Convalescent	Norwalk	Propane	0.03	0.03
Fairfield University	Fairfield University	Fairfield	Solar	0.01	0.01
Anne Scott	Anne Scott	Sharon	Solar	0.05	0.05
Gregory Sholz	Gregory Sholz	Simsbury	Solar	0.05	0.05
John Roundtree	John Roundtree	Norwalk	Solar	0.02	0.02
Smurfit-Stone Container Co.	Smurfit-Stone Container Co.	Montville	Waste Heat	2.00	2.00
Gianninoto Wind Turbine	F. Gianninoto	Redding	Wind	0.02	0.02
Highfield Farm	Sparkmen	Coventry	Wind	0.02	0.02
Dorizzi Wind Turbine	John Dorizzi	Canaan	Wind	0.01	0.01
		Generation retained by facility.		127.06	127.05
	Total MWs of generation in Connecticut.			7,361.31	7,810.81


Appendix B
State of Connecticut
Existing Energy Infrastructure
N
CONNECTICUT
LONG
ISLAND SOUND
Legend
Power Generation Facilities in MW
1 - 250
250 +
CSC Approved Facility
Natural Gas
Pipelines
Electric Transmission Lines (Approx.)
69 KV
115 KV
345 KV
Urban Load Centers
Connecticut Siting
Council
2002
Not for Navigational Use
Not to Scale

Appendix C
Planned Transmission Lines in Connecticut

Transmission Line	Length (miles)	Voltage (kV)	Planned Date of Completion
Barbour Hill S/S, South Windsor - Rockville S/S, Vernon (upgrade)	4.7	69 to 115	2002
Canton S/S, Canton - Weingart Jct., Harwinton (rebuild)	9	115	2002
Glenbrook S/S, Stamford - Rowayton Jct., Norwalk 1880 line (reconductor)	4.4	115	2002
Glenbrook S/S, Stamford - Rowayton Jct., Norwalk 1890 line (reconductor)	4.4	115	2002
East Shore S/S, New Haven - Brookhaven, N.Y. (new HVDC)	24	150	2002
Norwalk Harbor Station, Norwalk - Northport Station, Northport, N.Y. (replace)	5.8	138	2003
Plumtree S/S, Bethel - Norwalk S/S, Norwalk (new)	20	345	2003
Plumtree S/S, Bethel - Norwalk S/S, Norwalk (reconfigure 1470/1565 lines)	20	115	2003
Norwalk Jct., Norwalk - Norwalk S/S, Norwalk (reconfiure 1637/1720 lines)	5.2	115	2003
Baird S/S, Bridgeport - Congrees Street S/S, Bridgeport (increase conductor clearance)	2.3	115	2003
Pequonnock S/S, Bridgeport - Seaview Tap, Bridgeport (maintain conductor ratings)	1.4	115	2003
Manchester S/S, Manchester - Wapping Jct., South Windsor (rebuild)	5.1	115	2004
Norwalk S/S, Norwalk - Shore Road S/S, Oyster Bay N.Y. (new HVDC)	10.8	300	2004
Bunker Hill S/S, Waterbury - Baldwin Jct., Middlebury (reconductor)	3	115	2004
Glenbrook S/S, Stamford - Glenbrook Jct., Stamford (new)	0.1	115	2004
Tunnel S/S, Preston - Ledyard Jct., Ledyard (rebuild & upgrade)	8.5	69 to 115	2004
Ledyard Jct., Ledyard - Gales Ferry S/S, Ledyard (upgrade)	1.6	69 to 115	2004
Ledyard Jct., Ledyard - Buddington S/S (CMEEC), Groton (upgrade)	2.9	69 to 115	2004
Montville Station, Montville - Gales Ferry S/S, Ledyard (upgrade)	2.4	69 to 115	2004
Frost Bridge S/S, Watertown - Walnut Jct, Thomaston (new)	6.4	115	2006
Southington S/S, Southington - Schwab Jct., Wallingford (unbundle/rebuild)	7.3	115	2006
Schwab Jct., Wallingford - Colony S/S (CMEEC), Wallingford (unbundle)	1.5	115	2006
Colony S/S , Wallingford - N. Wallingford S/S (CMEEC) (unbundle)	2.4	115	2006
East Meriden S/S, Meriden - Haddam S/S, Haddam (unbundle)	6.9	115	2006
Scovill Rock S/S, Middletown - Chestnut Jct., Middletown (new)	2.6	345	2006
Chestnut Jct., Middletown - Beseck Jct., Wallingford (new switchyard)	9	345	2006
Black Pond Jct., Middlfield - Beseck Jct, Wallingford (new switchyard)	5.8	345	2006
Beseck Jct., Wallingford - East Devon S/S, Milford (new)	32.6	345	2006
East Devon S/S, Milford - Trumbull Jct., Trumbull (new)	4.2	345	2006
Trumbull Jct., Trumbull - Norwalk S/S, Norwalk (new)	18.9	345	2006
Trumbull Junction, Trumbull - Pequonnock S/S, Bridgeport	5.3	345	2006
Farmington S/S, Farmington - Newington S/S, Newington (rebuild)	3.6	115	2008
Wapping Jct., South Windsor - Barbour Hill S/S, South Windsor (rebuild)	2.4	115	2008
Manchester S/S, Manchester - Hopewell S/S, Glastonbury (rebuild)	7	115	2008
Card S/S, Lebanon - Lake Road Station, killingly (new)	29	345	2008
Lake Road Station, Killingly - Sherman Road S/S, Rhode Island (National Grid)(new)	7.5	345	2008

APPENDIX D

Public Act No. 01-144

AN ACT CONCERNING ELECTRIC FORECAST OF LOADS AND RESOURCES.

Be it enacted by the Senate and House of Representatives in General Assembly convened:

Subsection (a) of section 16-50r of the general statutes is repealed and the following is substituted in lieu thereof:

(a) Every person engaged in electric transmission services, as defined in section 16-1, electric generation services, as defined in said section, or electric distribution services, as defined in said section generating electric power in the state [, except a private power producer, as defined in section 16-243b] utilizing a generating facility with a capacity greater than one megawatt, shall, annually, on or before March first, file a report on a forecast of loads and resources which may consist of an update of the previous year's report with the council for its review. [containing a twenty-year forecast of loads and resources. The report shall describe the facilities that, in the judgment of such utility, will be required to supply system demands during the forecast period.] The report shall cover the [twenty-year] ten-year forecast period beginning with the year of the report. Upon request, the report shall be made available to the public. The report 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. Confidential, proprietary or trade secret information provided under this section may be submitted under a duly granted protective order. The council may adopt regulations, in accordance with the provisions of chapter 54, that specify the expected filing requirements for persons that transmit electric power in the state, electric distribution companies, and persons that generate electric power in the state utilizing a generating facility with a capacity of greater than one megawatt. Until such regulations are adopted, persons that transmit electric power in the state shall file reports pursuant to this section that include the information requested in subdivisions (6) and (7) of this section; electric distribution companies in the state shall file reports pursuant to this section that include the information requested in subdivisions (1), (2), (7) and (8) of this section; persons that generate electric power in the state utilizing a generating facility with a capacity greater than one megawatt shall file reports pursuant to this section that include the information requested in subdivisions (3), (4), (5) and (8) of this section. The council shall hold a public hearing on such filed forecast reports annually. The council shall conduct a review in an executive session of any confidential, proprietary or trade secret information submitted under a protective order during such a hearing. At least one session of such hearing shall be held afier six-thirty p.m. 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.

Approved July 6, 2001

Connecticut Siting Council Composition
For Energy and Telecommunications Facility Proceedings

Chairperson appointed by the Governor from the general public with the advice and consent of the House or Senate.	Mortimer A. Gelston, Council Chairman and former Council Chairman; former Chairman of Middlesex County Soil and Water Conservation District; State Agriculture Conservation and Stabilization Committee; former Treasurer, Council of Soil and Water; former President, CT Assoc. of Soil Conservation Districts; dairy farmer and businessman.
Commissioner of Environmental Protection.	Commissioner or designee.
Chairperson of the Department of Public Utility Control.	Chairperson or designee.
One designee of the Speaker of the House.	Brian F. O'Neill, President of Maiden America, Inc.; member of the Stamford Board of Representatives; member of the Connecticut Greenways Council; member of the Mianus Greenways Coalition; former Vice-Chairman of Stamford Historic Neighborhood Preservation Program; member of the Fort Stamford Preservation Coalition; former Board member of the Stamford Historical Society.
One designee for the President Pro Tempore.	Daniel P. Lynch, Jr., Chairman of the Board of Cash Can, Inc.; Vice President of Redemption Unlimited; Treasurer of The Connecticut Redemption Association; Consultant to the LHR International Trading, L.L.C; Volunteer Consultant to the Nutmeg State Games; former member of Connecticut Siting Council, 1988 to 1995.
Member appointed by Governor with experience in ecology.	Edward S. Wilensky, former Mayor of Wolcott (1983-1993); past Chairman of Bristol Resource Recovery Authority; past Chairman of Central Naugatuck Valley Council of Governments; past Vice Chairman of Connecticut Conference of Municipalities; former member of Governor's Task Force on Aquifer Management; former member of Board of Director for Tunxis Recycling Operating Committee; former Chairman of Wolcott Planning and Zoning Commission; former member of Board of Directors for Connecticut Interlocal Risk Management Agency (CIRMA).
Member appointed by Governor with experience in ecology.	Colin C. Tait, Esq., Professor of Law, University of Connecticut Law School (subjects: environmental and energy law); past Chairman, Planning and Zoning Commissions, Towns of New Hartford and Colebrook; past member, Colebrook Inland Wetland Agency, Norfolk Planning & Zoning Commission; Appalachian Trail Conference Board of Managers.
Member appointed by Governor with utility background.	Philip T. Ashton, Chairman, President and CEO, Yankee Energy System (retired); former Vice President, Transmission and Distribution, Northeast Utilities; Professional Engineer (Massachusetts and formerly Connecticut); Chairman, Meriden Flood Control Implementation Agency; Director and past Chapter Chairman, American Red Cross-Greater Hartford Chapter; former Chairman, Meriden Planning Commission; former Advisor on Energy to the U.S. Trade Representative; former Chairman, New England Gas Association; former Director, American Gas Association; former Vice President, Power Engineering Society of the IEEE.
Member appointed by Governor from the general public.	Pamela B. Katz, Environmental and Safety Consultant, Professional Engineer, Certified Safety Professional; former Selectman, former Conservation Commission Chairman and present Planning Commissioner - Town of Simsbury; former Board member of Connecticut Resource Recovery Authority; former Board member of Farmington Valley Health District.