

2009 Forecast of Loads and Resources

Connecticut Siting Council
October 8, 2009

INTRODUCTION

The Connecticut General Assembly has mandated the Connecticut Siting Council (Council) to review annually the state's electricity needs and resources, looking ahead ten years. Most of Connecticut's electric system data, which is used in common by all the state and regional planners, is supplied by Connecticut generators and by our state's two largest transmission and distribution companies, The Connecticut Light and Power Company (CL&P) and The United Illuminating Company (UI). The Connecticut Municipal Electric Energy Cooperative (CMEEC), comprised of the municipal electric distribution companies, also provides its forecast report to the Council.

This report is intended to serve as an abbreviated addendum of metrics and data to the Council's 2008 Forecast Report.

ELECTRIC DEMAND

Peak Load Forecasting

This past year the country has been experiencing its worst economic decline in decades, fueled by a near collapse in the financial markets. Accordingly, citizens and businesses are cutting costs resulting in lower overall electric usage. However, peak demand is known to occur during the hottest days of the year, mainly attributed to air conditioning. Peak electric usage is driven not only by price but also lifestyle choices. Consequently, peak demand is expected to grow and is the value that must be used to weigh against resources in arriving at a forecast for long-term reliability.

The predicted statewide normal weather (50/50) peak load is 6,805 MW for 2009. It is expected to grow at an annual compound growth rate (ACGR) of 1.18 percent, reaching 7,562 MW by year 2018. This growth is mostly attributable to CL&P, since it has the largest service area in the state.

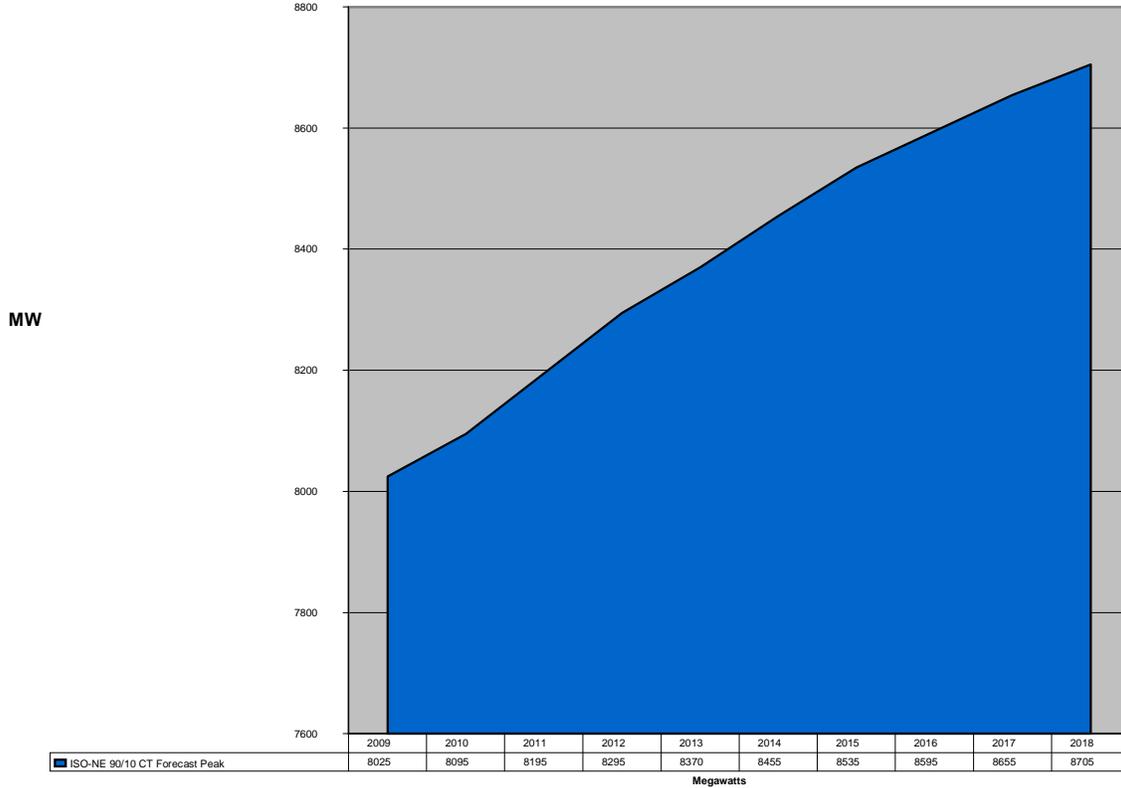
In its 50/50 forecast for Connecticut, the regional grid operator, ISO-New England Inc. (ISO-NE), predicts a peak load of 7,500 MW during 2009. This peak load is expected to grow at an ACGR of 0.87 percent and reach 8,105 MW by year 2018. Note that the ISO-NE 50/50 forecast exceeds the sum of the utilities' forecasts each year by an average of 619 MW. This is because conservation and load management (C&LM), load response (LR), and distributed generation (DG) load reductions are not included in the ISO-NE forecast.

The more important forecast to be discussed in this review is the one produced by ISO-NE. This is called the "90/10" forecast. It is separate from the normal weather (50/50) forecasts offered by the Connecticut utilities. However, it is the one used by both ISO-NE and by the Connecticut utilities for utility infrastructure planning, including transmission and generation.

A 90/10 forecast is a plausible worst-case hot weather scenario. The forecast would be exceeded, on average, once every ten years. While this projection is extremely conservative, it is reasonable for facility planning because of the potentially severe disruptive consequences of inadequate facilities: brownouts, blackouts, damage to equipment, and other failures. Accordingly, the Council will base its analysis in this review on the ISO-NE 90/10 forecast.

ISO-NE’s 90/10 forecast has a projected (worst-case) peak load of 8,025 MW in 2009. This load is expected to grow at an ACGR of 0.91 percent and reach 8,705 by 2018. See Figure 1.

Figure 1: Extreme Weather and 90/10 Forecasts in MW



Forecasting Electric Energy Consumption

Taken together, the Connecticut utilities’ data result in a statewide electric energy consumption of approximately 31,980 GWh in 2009. This number is expected to decline at a (weighted) ACGR of 0.21 percent and reach 31,394 GWh by 2017.

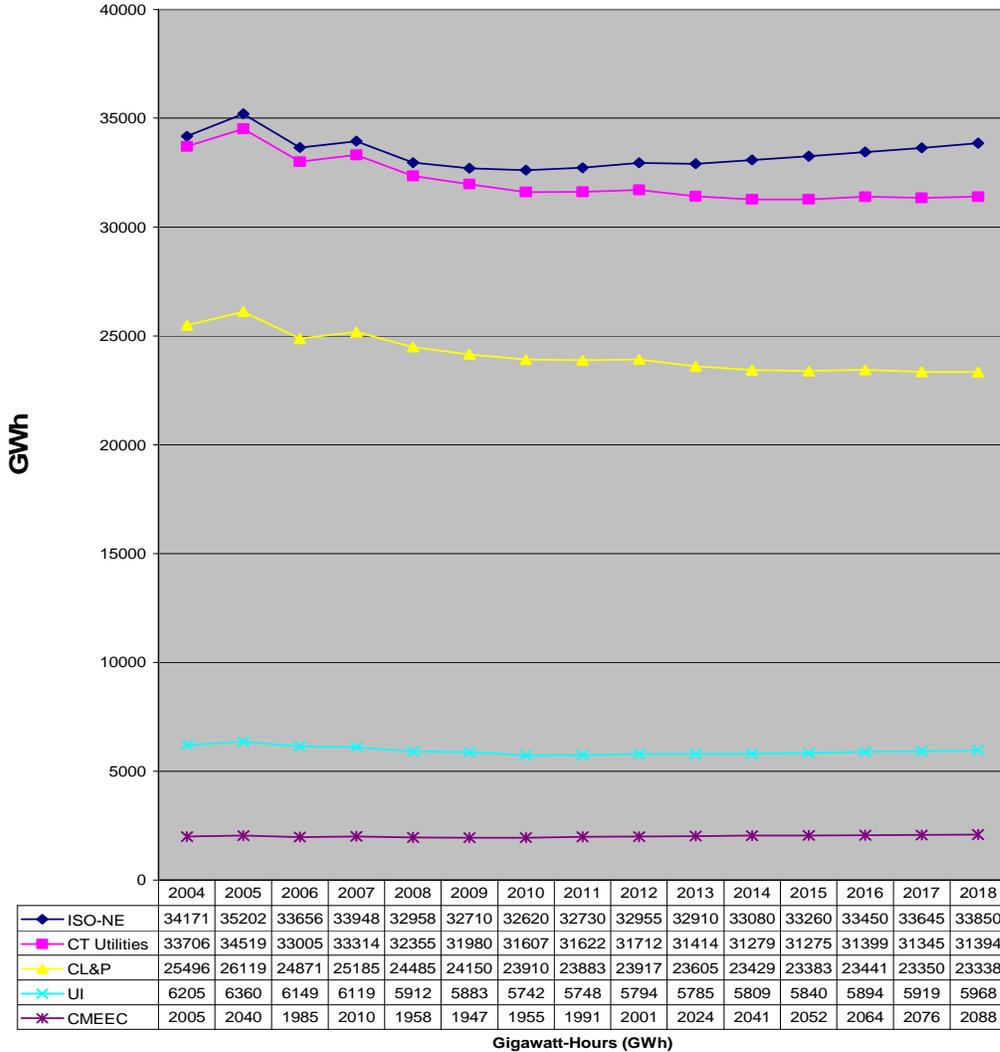
On the surface, this decline in energy consumption may seem counterintuitive and even inconsistent, given the 1.18 percent ACGR of peak electric load growth in the state. Actually, it is not. It is the result of changing customer behavior in response to concerns about the economy and electric rates, and also due to various efficiency efforts encouraged by the utilities and the state. Peak load occurs only during relatively short periods: even though energy consumption will increase during those times, net energy consumption will still decline overall.

ISO-NE’s projections for energy consumption differ from the sum of the utilities’ projections because of the different forecasting models used. Furthermore, the ISO-NE forecast differs from the sum of the utilities’ forecasts because ISO-NE excludes the impact of C&LM and DG effects. DR is not expected to affect energy consumption significantly since demand response only operates for a limited number of peak hours per year.

Specifically, ISO-NE predicts electric energy consumption in Connecticut to be 32,710 GWh in 2008. This number is expected to grow at an ACGR of 0.38 percent and reach 33,850 GWh.

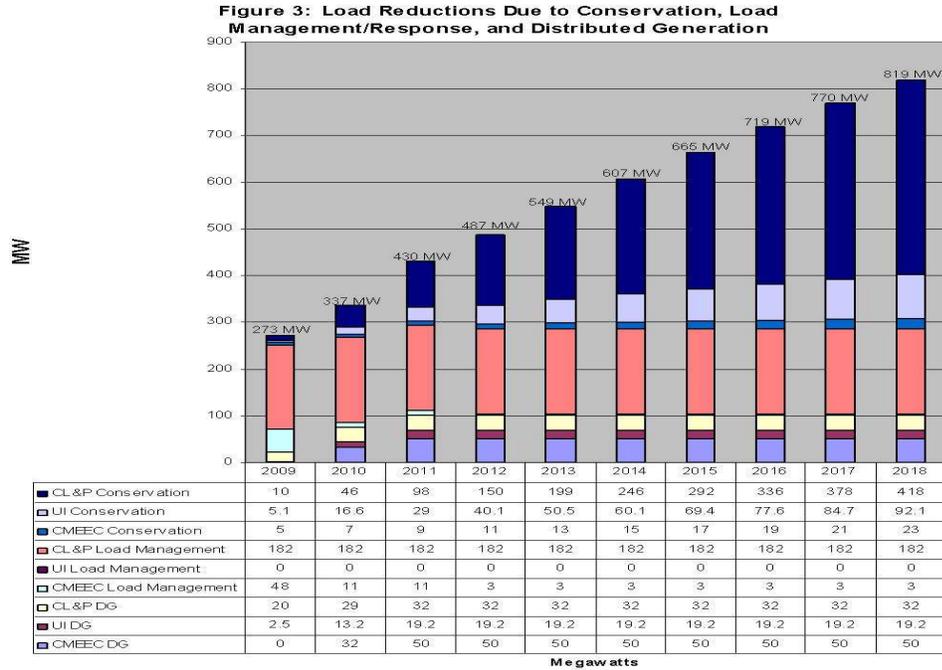
While the ISO-NE projections are higher than the utilities numbers, this discrepancy can be largely explained by the exclusion of efficiency measures and a different forecasting model than the utilities. Figure 2 depicts all the separate energy requirement forecasts for Connecticut.

Figure 2: State and Utility Energy Requirements in GWh



CONSERVATION AND LOAD MANAGEMENT (C&LM)

CL&P's distributed generation is projected to reach 20 MW in 2009 and grow to 32 MW by 2018. UI expects that 2.5 MW of distributed generation will be added in 2009 and 19.2 MW will be added by 2018. CMEEC's distributed generation is expected to grow from 0 MW in 2009 to 50 MW in 2018. Thus, the total statewide DG output is expected to grow from 22.5 MW in 2009 to 101 MW in 2018. This results in an ACGR of 18.2 percent. Accordingly, Figure 3 depicts total load reductions by utility and type of reduction, i.e. conservation, load management/load response, and distributed generation.



The Council believes that energy efficiency and programs like Connecticut Energy Efficiency Fund (CEEF) are an extremely important part of Connecticut’s electric energy strategy. Increased efficiency allows the state’s electric needs to be met, in part, without incurring the incremental pollution that would be caused by dispatching generation to serve the additional load. Reductions in peak load due to increased efficiency can also impact the schedule of necessary changes to existing utility infrastructure, such as transmission lines and substation equipment (transformers, distribution feeders, etc.) and hence tend to hold down utility costs. Electric energy efficiency also reduces federal congestion costs and the costs of new generation.

ELECTRIC SUPPLY

The Balance Table (Table 1) indicates a shortage of electric generation supply early in the forecast period (2009 through 2010). However, the assumptions are quite conservative with respect to assumed unavailable generation (576 MW) since the reserve requirement taking into account the loss of the largest resource (Millstone 3: 1,233 MW), an average import capacity (2,000 MW), and neglects load management (approx. 185 MW). Overall, given that the magnitude of the deficit is less than 600 MW (i.e. approx. 7 percent of the peak load), and assuming most generation is available for dispatch, it is likely that supplies will meet demand, taking into account the most conservative forecast (ISO-NE’s 90/10 estimate).

According to the 2009 Integrated Resources Plan, approximately 1,267 MW of oil-fired generation could retire beginning in 2013, per more strict environmental standards. This results

in a shortage in the Balance Table beginning in 2013. The Council notes this projection is hypothetical and subject to change. It is difficult to predict with certainty, which, if any, generation would retire and which, if any, would be replaced with newer, more efficient units.

Demand/Supply Balance

Table 1 contains a tabulation of generation capacity vs. peak loads. The ISO-NE 90/10 forecast is applied in this table because it is the forecast used for utility transmission facility planning purposes. The largest reserve requirement is 1,233 MW, which is approximately the size of Connecticut's largest generator, Millstone 3. In the event that Millstone 3 or any significantly sized smaller unit or combination of smaller units trip off-line, reserves must be available to rapidly compensate for that loss of capacity.

Assumed unavailable generation is an estimate of the typical amount of generation off-line for maintenance purposes. Existing generation supply resources are based on the total existing generation in Connecticut listed in Appendix A. Appendix A contains data from the July 2009 Seasonal Claimed Capability report from ISO-NE. Approved generation projects (not yet constructed and/or complete) are also included in Table 1. In-service dates for these facilities are estimates and may be subject to change.

The retirement of older generating units is difficult to predict because it is the result of many factors such as market conditions, environmental regulations and the generating companies' business plans. It is important to note that prior to a unit retiring its owner must file with ISO-NE for approval; if a unit is qualified as a reliability-must-run unit it is unlikely the request would be granted, at least for the near-term. As a hypothetical, per the utilities' 2009 Integrated Resources Plan, retirements were included in the Balance Table.

Conservation and distributed generation are also included in the Balance Table. Although these are not included in the ISO-NE forecast, they would likely be in effect during a peak load situation as depicted on Table 1.

Table 2: MW Balance

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
90/10 Load	8025	8095	8195	8295	8370	8455	8535	8595	8655	8705
Reserve (Equiv. Millstone 3)	1233	1233	1233	1233	1233	1233	1233	1233	1233	1233
Load + Reserve	9258	9328	9428	9528	9603	9688	9768	9828	9888	9938
Existing Generation	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100
Est.Unavail. Generation	576	576	576	576	576	576	576	576	576	576
Available Generation	6524	6524	6524	6524	6524	6524	6524	6524	6524	6524
Normal Import ¹	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Energy Efficiency ² per Fig. 3	20	70	136	201	263	321	378	433	484	533
Total Avail. Resources	8544	8594	8660	8725	8787	8845	8902	8957	9008	9057
Surplus/Deficiency³	-714	-734	-768	-803	-816	-843	-866	-871	-880	-881
Approved Generation Projects										
Ameresco	5	5	5	5	5	5	5	5	5	5
Project 150 ⁴		0	9	54	54	54	54	54	54	54
Cos Cob	40	40	40	40	40	40	40	40	40	40
Middletown			620	620	620	620	620	620	620	620
Waterbury	96	96	96	96	96	96	96	96	96	96
Ansonia			58	58	58	58	58	58	58	58
NRG Devon #15-18			200	200	200	200	200	200	200	200
NRG Middletown #12-15				200	200	200	200	200	200	200
Surplus/Deficiency	-573	-593	260	470	457	430	407	402	393	392
Possible Generation Retirements Per 2009 IRP ⁵					-1267	-1267	-1267	-1267	-1267	-1267
Surplus/Deficiency	-573	-593	260	470	-810	-837	-860	-865	-874	-875
Future Projects Under Council Review										
NEEWS ^{6,7,8}	0	0	0	0	0	300	700	1100	1100	1100
Clearview Renewable Energy, LLC (Proj. 150)				30	30	30	30	30	30	30
Future Projects Not Yet Filed⁹										
South Norwalk Renewable Generation (Proj. 150)			32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5
Stamford Hospital Fuel Cell CHP (Proj. 150)		5	5	5	5	5	5	5	5	5
Clearview East Canaan Energy, LLC (Proj. 150)			3	3	3	3	3	3	3	3
Waterbury Hospital Fuel Cell CHP (Proj. 150)		2	2	2	2	2	2	2	2	2
PSEG Power New Haven			130	130	130	130	130	130	130	130
Total Net Surplus/Deficiency	-573	-586	432.5	673	-608	-335	42.5	437.5	428.5	427.5

¹This is an average value. The actual import capacity can range between 1,500 MW to 2,500 MW.

²This takes into account only passive (non-dispatched) demand reductions such as energy efficiency, to be conservative.

³This is based on a one-in-ten years event and assumes conservative import capacity, no load response, and no newly-approved generation.

⁴Only the Council-approved projects associated with Project 150 are listed in this row.

⁵Such retirements are hypothetical based on certain conditions, and are difficult to predict with certainty at this time, especially since they require ISO-NE approval.

⁶NEEWS is a group of transmission projects, three of which are in Connecticut. The Council is currently considering the first of these, along with a non-transmission alternative.

⁷The other NEEWS applications are expected to be received in the near future.

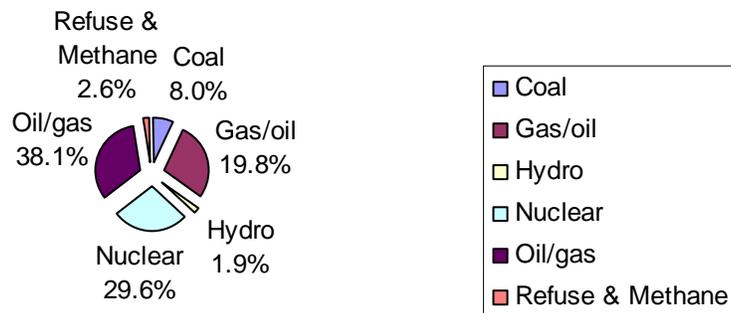
⁸NEEWS' effect on import capacity will ultimately depend on which, if any, of the projects are approved.

⁹It is not known when these projects will be filed with the Council or whether they would be approved.

Fuel Mix

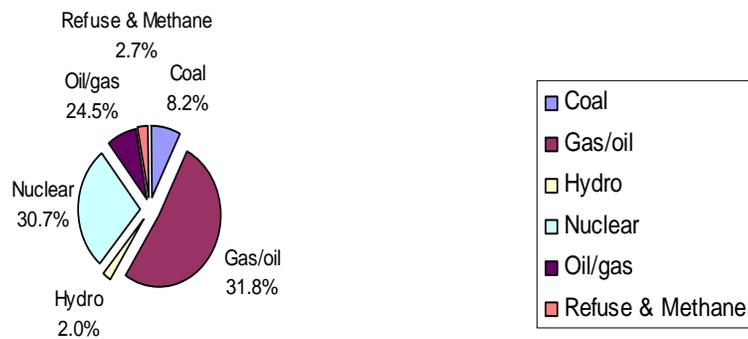
Based on existing generation and future (approved) generation projected in Table 1, the estimated fuel mix in MW based on peak power demand is provided below for 2009 and also 2018, the end of the forecast period. In this proceeding, NRG recommended that the Council assume for planning purposes that the Norwalk Harbor, Middletown, and Montville generating stations are retired. See Figure 4a and 4b below.

Figure 4a: 2009 Fuel Mix



*Lake Road plant (~700 MW) is not included in the fuel mix charts because it is electrically more a part of Rhode Island than Connecticut.

Figure 4b: 2018 Fuel Mix



Import Capacity

The 2,500 MW import capability only represents about 30 percent of the state's peak demand. Looking ahead, CL&P is developing a transmission upgrade plan that would increase the state's import capacity to approximately 45 percent of peak demand. This plan, if approved, may significantly increase the reliability of Connecticut's supply system and allow for greater import of economical supply. It is called the New England East – West Solution (NEEWS). NEEWS, a group of four related transmission projects, three of which affect Connecticut, has attracted some competing non-transmission alternatives. The first of NEEWS projects, along with an alternative, are currently under Council review. (See Appendix B Transmission facilities.)

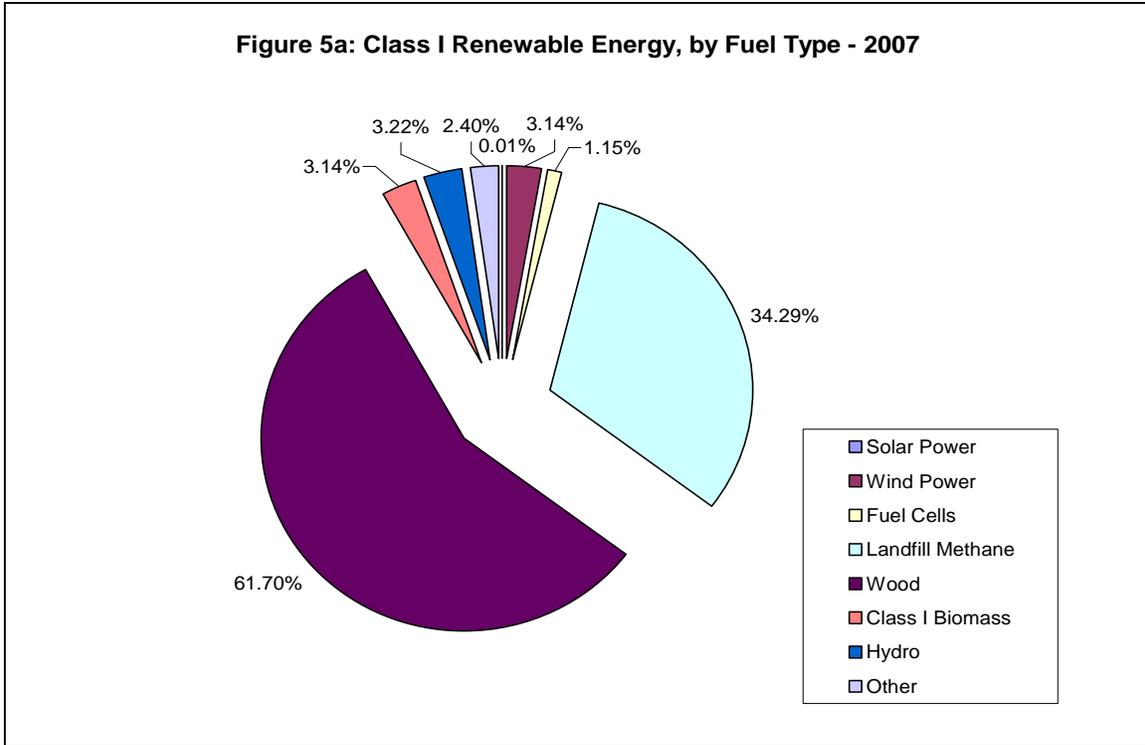
American Clean Energy and Security Act

This year the United States Congress is considering legislation that would address, on a national level, issues Connecticut and other northeast states have already tackled by adopting the Regional Greenhouse Gas Initiative (RGGI) and Renewable Portfolio Standards (RPS). This federal legislation, entitled the American Clean Energy and Security Act (ACES), would amend a number of existing Acts that pertain to the utility industry, including the Public Utility Regulatory Policies Act of 1978, the Clean Air Act, the Energy Policy and Conservation Act, and the Federal Power Act.

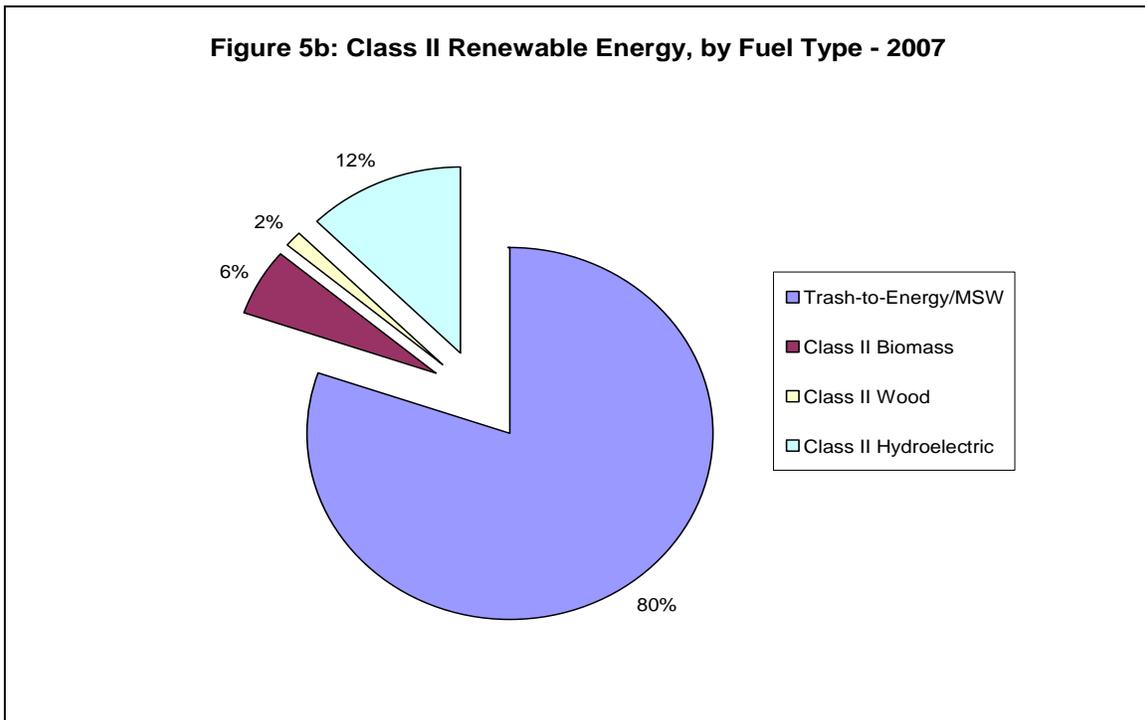
ACES contains a far-ranging set of policy measures aimed at improving energy efficiency and conservation. For the purposes of this report, the bill's most important features are: the adoption of a federal Renewable Portfolio Standard; energy efficiency in the production of electricity; and a cap and trade system intended to reduce the amount of greenhouse gas emissions. In comparison to Connecticut's RPS the ACES legislation is contemplating slightly lower standards. However, compared with the RGGI emissions reduction target, the ACES target is more strict. As the final version of ACES has not been enacted, it is too early to know its exact ramifications for Connecticut's electricity providers and consumers, and, its possible effects are not included in this report.

Renewable Portfolio Standards Attainment

Data available through the Department of Public Utility Control make it possible to determine how Connecticut's electricity providers met the state's RPS requirements for 2007, the latest year for which data can be obtained. In this year, approximately one million megawatt hours were acquired from Class I renewable energy sources. The largest percentage of these hours, 53%, was generated using wood as a fuel.



In 2007, Connecticut’s electricity providers acquired approximately 1,300,000 megawatt hours from Class II renewable energy fuels. The largest percentage of this total is attributable to trash-to-energy followed by hydroelectric.



The Integrated Resource Plan

On February 18, 2009, the DPUC issued its final decision in Docket No. 08-07-01, *DPUC Review of the Integrated Resource Plan (IRP)*. In that decision, the DPUC noted the electric distribution companies' IRP finding that Connecticut's local resource adequacy needs are satisfied for the foreseeable future. This assumes no retirements of existing generation, and the addition of planned operation to existing plants, as well as planned demand-side management resources, along with transmission upgrades.

CONCLUSION

This Council has considered Connecticut's electric energy future for the next ten years. Deficits in generation appear during the early (2009-2010) and later portions (2013-2018) of the forecast period when taking into account the most conservative weather prediction (ISO-NE's 90/10 estimate) and the possible retirement of several oil-fired generating facilities per the analysis in the 2010 IRP. However, assuming most generation is available for dispatch, and given the significant reserve requirement, it is likely that electric resources will meet demand during the forecast period. Furthermore, the NEEWS projects, if approved, would significantly increase import capacity. One NEEWS project, the Greater Springfield Reliability Project, and competing non-transmission alternatives are currently under Council review. Other NEEWS project applications are expected to be filed with the Council in the near future.

The most significant gain in generating capacity will be associated with the upcoming 620 MW Kleen Energy power plant in Middletown. Furthermore, additional generation fueled by renewable resources as well as increased efficiency in homes and businesses are expected to result from P.A. 07-242 An Act Concerning Electricity and Energy Efficiency.

Generating capacity and demand-side management are necessary to supply Connecticut's electricity needs, but the Council cannot overstate the importance of having adequate transmission to transport electricity from both in-state and out-of-state generators to serve local loads.

Issues that warrant attention in the future include:

- continue to pursue additional interstate transmission resources that will allow greater transfer capability into Connecticut, increasing reliability and helping meet the state's renewable portfolio standards requirements, as well as the growing load in the New England region;
- promote clarity, transparency and a longer forecast period in relation to ISO-NE's operating reserve requirements for Connecticut;
- be proactive regarding the deactivation/retirement of older generating facilities in the context of electric system needs and consider replacement/repowering of such facilities where feasible;
- encourage additional energy efficiency and demand response as recommended in the Integrated Resource Plan;
- increase fuel diversity to avoid excessive reliance on any one fossil fuel for generation; and
- encourage innovations that conserve energy and/or generate electricity through diverse technologies.