

1. Comprehensive Sustainable Energy Committee Regular Meeting Agenda

Documents:

[COMPREHENSIVE SUSTAINABLE ENERGY COMMITTEE AGENDA 01-12-16.PDF](#)

2. Comprehensive Sustainable Energy Committee Item 1

Documents:

[GYH GRAPH.PDF](#)

3. Comprehensive Sustainable Energy Committee Item 2

Documents:

[GGD PRELIMINARY REPORT.PDF](#)

4. Comprehensive Sustainable Energy Committee Item 3

Documents:

[WWTP LIGHTING QUOTE.PDF](#)

5. Comprehensive Sustainable Energy Committee Item 4

Documents:

[RD TOUR CPP OVERVIEW.PDF](#)

6. Comprehensive Sustainable Energy Committee Item 5

Documents:

[CSEC YEAR END REPORT 2015.PDF](#)

7. Comprehensive Sustainable Energy Committee Item 6

Documents:

[NET 0 LEARN CAMBRIDGE EMAIL.PDF](#)

8. Comprehensive Sustainable Energy Committee Item 7

Documents:

[NET ZERO FOLLOW UP .PDF](#)

9. Comprehensive Sustainable Energy Committee Item 8

Documents:

[REVENUE DECOUPLE AND TIME OF USE RATE WITH CRITICAL PEAK PRICING.PDF](#)

10. Comprehensive Sustainable Energy Committee Item 9

Documents:

[LEARNING FROM FORT COLLINS CO.PDF](#)



## MEETING AGENDA

### Town of Concord Comprehensive Sustainable Energy Committee

**Date:** Tuesday, January 12, 2016  
**Time:** 7:30PM  
**Location:** Harvey Wheeler Community Center  
1276 Main Street

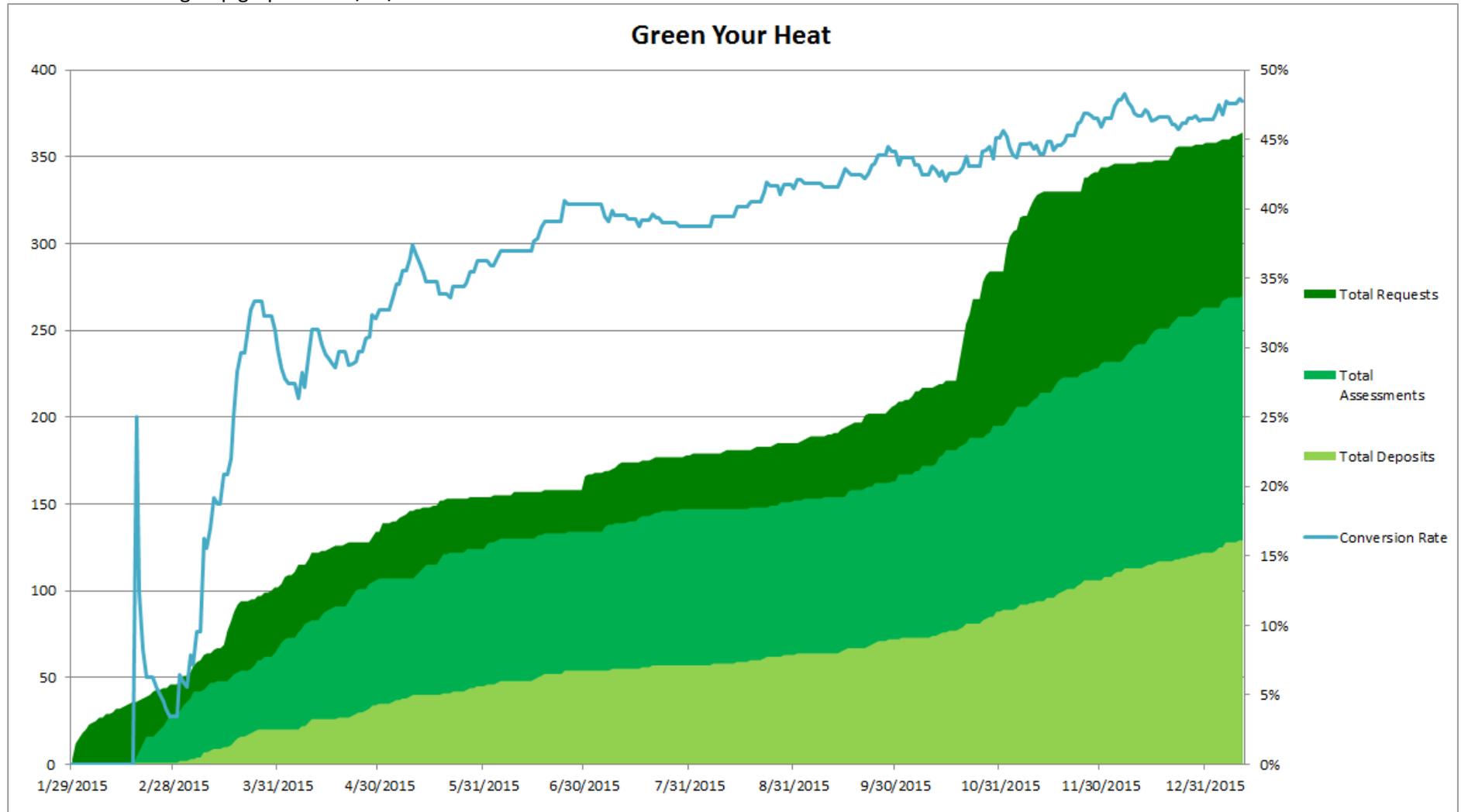
1. Welcome visitors [3 min]
2. 12/1/15 and 12/8/15 CSEC meeting minutes review [10 min]
3. Next meetings [2 min]
4. 2015 CSEC annual report submission (Alan) [5 min]
5. Report on 1/4/16 Select Board mtg re Energy Task Force (Alan) [10 min]
6. Report on meeting with Bouzha Cookman (Alan) [5 min]
7. Proposal for Sawyer Trust funding of WWTP light upgrade (Jan) [10 min]
8. Green Your Heat status/discussion/plans (Pamela/All) [20 min]
9. Short report on Green Communities status (Jan) [10 min]
10. Heat Pump Challenge update/status (Gordon/Jill/Brad/Alan) [15 min]
11. Net-metering proposal on Town Warrant (Brian Foulds) [20 min]
12. Public comment [10 min]
13. Strategic planning discussion (All) [35 min]

Adjournment target: 10pm

#### 2016 Comprehensive Sustainable Energy Committee (CSEC):

Alan Whitney (Chair)	Resident
Annie Moore	Resident
Bradley Hubbard-Nelson	Resident
Gilda Gussin	Resident
Gordon Brockway	Resident
Jill Appel	Resident
Mark Myles	Resident
Sue Felshin	Resident
William Lehr	Resident
Alice Kaufman	BOS Liaison

Green Your Heat sign-up graph as of 1/12/16:



As of 1/19/2016:

Total # of weatherization reviews scheduled:	368
Total # of weatherization reviews completed:	300
# of deposits paid:	141
# of completed projects:	74
Thermal image requests:	204
Current conversion rate:	47%
Average rebate:	\$905
Remaining grants:	15

If we reach 140 oil homes + 11 electric homes  
 expected savings is >500,000 lbs CO2/year  
 also extra 30 natural gas homes (MassSAVE): 65,000 lbs CO2/yr  
 combined = greenhouse gas savings of removing 54 cars from the road

Cost savings to residents: \$50,000 to \$90,000 / yr depending on fuel prices

WWTP is a B2 customer.  
 WWTP is 9th biggest energy user of the 28 largest energy using govt bldgs.



GARCIA • GALUSKA • DESOUSA  
 Consulting Engineers Inc.

370 Faunce Corner Road, Dartmouth, MA 02747-1217

Concord Wastewater Treatment Plant  
 Summary of Payback Analysis

Lighting & Controls		
Capital Investment		\$19,295 \$
Annual Energy Savings		\$2,538 \$/Yr.
Payback		7.6 Yrs.

Heating Pumps/VFDs		
Capital Investment		\$8,000 \$
Annual Energy Savings		\$1,440 \$/Yr.
Payback		5.6 Yrs.

<del>Air Handling Units - Energy Recovery</del>		
<del>Capital Investment</del>		<del>\$342,600 \$</del>
<del>Annual Energy Savings</del>		<del>\$4,573 \$/Yr.</del>
<del>Payback</del>		<del>74.9 Yrs.</del>

Water Heater - Gas Fired		
Capital Investment		\$5,000 \$
Annual Energy Savings		\$787 \$/Yr.
Payback		6.4 Yrs.

Boiler - Gas Fired		
Capital Investment		\$65,000 \$
Annual Energy Savings		\$9,631 \$/Yr.
Payback		6.7 Yrs.

WWTP in FY14 = 2,514 MMBtu consumption  
 kWh savings = 31,430 x .00342 MMBtu/kWh  
 = 107 MMBtu

Oil savings = 5,075 gal x .139 MMBtu/gal  
 = 817 MMBtu

Total savings = 924 MMBtu

New gas use = 6,448 Therms x .1 MMBtu/therm  
 = 644.8 MMBtu

Net change in MMBtu = 279.2 MMBtu  
 ⇒ 11% ↓ in annual energy consumption  
 for WWTP

Investment = \$97,295

Savings = \$14,396

Payback = 6.8 years

Payback = 8.2 years

w/ gas line

@ \$20,000

May be longer

when boiler room

modifications

are included.

Investment  
 net g.CMLP = \$91,195  
 rebate  
 Payback after = 6.33 years  
 rebate  
 Payback w/ = 7.7 years  
 gas line  
 (not incl. boiler room modifications)

①



**Office Area Lighting & Controls**

Baseline - Existing Fluorescent Lighting	
Lighting & Controls	
Lighting Capital Investment	\$0
Energy Demand	6.8 kW
Energy Use @ 2,600 hrs/yr @ 50 hours/week	17,680 kWh
Energy Cost @ 0.16/kWh	\$2,829.00

Proposed - LED Lighting and Controls	
Lighting & Controls	
Lighting Capital Investment **	\$15,890
Controls Capital Cost	\$3,405
Energy Demand	0.7 kW
Energy Use @ 2,600 hrs/yr	1,820 kWh
Energy Cost @ 0.16/kWh	\$291.00

Baseline vs. Proposed Comparison	
Construction Cost Increase	\$19,295 \$
Annual Energy Savings	\$2,538 \$/Yr.
Payback***	7.6 Yrs.

$\Delta \text{usage} = 15,860 \text{ kWh} \times 0.003412 \text{ MMBtu/kWh} = 54 \text{ MMBtu}$   
 $54 \text{ MMBtu} = 2\% \text{ of annual building energy use}$

$\Delta \text{demand} = 6.1 \text{ kW} \times \$1,000/\text{kW rebate from EMLP} = \$6,100$   
 Net investment = \$13,195  
 Payback = 5.2 years

90% reduction in lighting energy needed.  
 90% reduction in lighting energy costs



Heat Pumps VFD Conversion

Baseline - Pumps

Pumps		
Capital Investment		\$0
Energy Demand		5 kW
Energy Use @ 3,600 hrs/yr		18,000 kWh
Energy Cost @ 0.16/kWh		\$2,880.00

Proposed - Heat Pump VFDs

VFD		
VFD and Valve Capital Investment **		\$8,000
Energy Demand		2.5 kW
Energy Use @ 3,600 hrs/yr		9,000 kWh
Energy Cost @ 0.16/kWh		\$1,440.00

Baseline vs. Proposed Comparison

Construction Cost Increase		\$8,000	\$
Annual Energy Savings		\$1,440	\$/Yr.
Payback***		5.6	Yrs.

$\Delta \text{usage} = 9,000 \text{ kWh} \times 0.003412 \text{ MMBtu/kWh} = 31 \text{ MMBtu}$

31 MMBtu = 1.2% of annual bldg energy consumption

50% reduction in electricity needed for pumps  
50% reduction in electricity costs for pumps



**Air Handling Units**

Baseline - Existing Standard-Efficiency Air Handling Units

Air Handling Unit		
Capital Investment		\$0 \$
Gas Rate (1 Gallon = 100,000 BTUH)		\$1.39 \$/Therm
Approximate Annual Gas Consumption		8,225 Therms
Annual Oil Cost = (Gallons x \$/Gallon)		\$11,433 \$/Yr.

Air Handling Units with Energy Recovery

Air Handling Unit with Energy Recovery		
Capital Investment**		\$342,600 \$
Gas Rate (1 Therm = 100,000 BTUH)		\$1.39 \$/Therm
Approximate Annual Gas Consumption		4,935 Therms
Annual Gas Cost = (Therms x \$/Therm)		\$6,860 \$/Yr.

Baseline vs. Option 1 Comparison

Option 1 Construction Cost Increase		\$342,600 \$
Option 1 Annual Energy Savings		\$4,573 \$/Yr.
Option 1 Payback***		74.9 Yrs.

\*\* Cost of New Air Handling Units only. Does not include installation of gas service to building or necessary modifications.

\*\*\* Payback is calculated by dividing the initial construction cost increase by the annual energy savings.

*Not worth pursuing. Payback too long.*



**Electric Water Heater**

**Baseline - Water Heater**

Water Heater		
Capital Investment *		\$5,000
Energy Demand		18 kW
Energy Use @ 365 hrs/yr		6,570 kWh
Energy Cost @ 0.16/kWh		\$1,052.00

**Proposed - Water Heater**

Water Heater		
Capital Investment **		\$10,000
Energy Use @ 365 hrs/yr		190 Therms
Energy Cost @ \$1.39/therm		\$265.00

**Baseline vs. Proposed Comparison**

Construction Cost Increase		\$5,000	\$
Annual Energy Savings		\$787	\$/Yr.
Payback***		6.4	Yrs.

\* Cost of Standard Efficiency Water Heater.  
 \*\* Cost of Energy Efficient Water Heater.

\*\*\* Payback is calculated by dividing the initial construction cost increase by the annual energy savings.

$\downarrow \Delta \text{ electricity usage} = 6,570 \text{ kWh} \times 0.003412 = 22 \text{ mmBtu}$   
 $\uparrow \Delta \text{ natural gas usage} = 190 \text{ Therms} \times 0.1 \text{ mmBtu/Therm} = -19 \text{ mmBtu}$   
 $\text{total } \Delta \downarrow = 3 \text{ mmBtu}$   
 $3 \text{ mmBtu} = 0.1\% \text{ of annual building energy consumption}$

14% reduction in energy needed for water heating  
 75% reduction in energy costs for water heating



**Heating Energy Consumption & Cost**

**Baseline - Existing Standard-Efficiency Oil-Fired Boilers**

Heating - Oil-Fired		
Boiler Capital Investment		\$0 \$
Efficiency		80% Percent
Oil Rate (1 Gallon = 138,690 BTUH)		\$3.12 \$/Gallon
Approximate Annual Oil Consumption*		5,875 Gallons
Annual Oil Cost = (Gallons x \$/Gallon)		\$18,330 \$/Yr.

**Option 1 - High-Efficiency Gas-Fired Condensing Boilers**

Heating - Gas-Fired		
Boiler Capital Investment**		\$65,000 \$
Efficiency		98% Percent
Gas Rate (1 Therm = 100,000 BTUH)		\$1.39 \$/Therm
Approximate Annual Gas Consumption*		6,258 Therms
Annual Gas Cost = (Therms x \$/Therm)		\$8,699 \$/Yr.

**Baseline vs. Option 1 Comparison**

Option 1 Construction Cost Increase		\$65,000 \$
Option 1 Annual Energy Savings		\$9,631 \$/Yr.
Option 1 Payback***		6.7 Yrs.

\* Based on actual past utility bills.

\*\* Cost of (2) New 1,000 MBH High-Efficiency Gas-Fired Condensing Boilers only. Does not include installation of gas service to building or necessary boiler room modifications (i.e. combustion air, piping, etc).

\*\*\* Payback is calculated by dividing the initial construction cost increase by the annual energy savings.

$$5875 \text{ gallons} \times 0.139 \text{ mmBtu/gal} = 817 \text{ mmBtu savings}$$

$$6,258 \text{ Therms} \times 0.1 \text{ mmBtu/therm} = -625.8 \text{ mmBtu usage}$$


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$$191 \text{ mmBtu net savings}$$

191 mmBtu = 7.6% of annual building energy consumption

23% reduction in energy needed for space heating  
52% reduction in energy costs for space heating

# **Request for Quote**

## **Concord Wastewater Treatment Plant Lighting Design**

### **Background**

The Town of Concord Department of Public Works (CPW) wishes to improve the efficiency of the lighting in its Wastewater Treatment Plant (WWTP).

CPW seeks a lighting professional to prepare a lighting design and specifications that CPW can use to solicit comparable quotes for installation of more efficient lighting.

The vendor that prepares the lighting design and specifications is permitted to respond to the Request for Bids on installation of the lighting. The lighting specifications must not include specific lighting brands or products that would give the lighting designer an advantage over any other potential respondent to the RFB.

At CPW's request, the Concord Municipal Light Plant's Energy Conservation Coordinator will provide oversight services for the lighting design project, with input from CPW.

### **Scope of Work**

The scope of work for the lighting design is as follows:

1. Inventory the existing lighting.
2. Gather information from WWTP staff on operating hours and on the functions for which various spaces are used.
3. Prepare a draft lighting design that provides sufficient light levels for tasks for which spaces are used, while maximizing efficiency.
  - a. The lighting design should include an estimate of the installation cost, including materials and labor.
  - b. The lighting design should include an estimate of the electricity demand and annual consumption reduction, in kW, kWh and \$ saved, that will result when the lighting design is implemented.
    - i. When calculating kilowatt hours (kWh) saved per year, it is essential that the operating hours for the lighting in various parts of the building be as precise as possible. CPW will use this electricity savings figure to negotiate with Woodard & Curren, the WWTP operator, on a reimbursement to the Town of utility cost savings due to the lighting upgrade.
    - ii. When estimating monetary savings, use the electricity cost figures in the table below.

4. Confer with CPW and WWTP staff on the lighting design to ensure that it meets their needs and expectations, and incorporate any feedback received from the staff.
5. Prepare installation and equipment specifications that CPW can use to solicit quotes for completion of a lighting upgrade.

**Notes on Design Scope**

1. The design should include occupancy sensors to maximize efficiency where appropriate.
2. The payback period for individual measures must be 8 years or less excluding recycling and permit fees, and before utility incentives are factored in. Measures with a longer payback should either be excluded from the lighting design or less expensive equipment should be specified.
3. The design should incorporate NEMA premium ballasts to the extent practical.
4. The installation specification should require that all old lamps, ballasts and fixture components that are removed be recycled or properly disposed of per applicable regulations.
5. The specification should require that prevailing wage be paid to all installation staff.
6. The specification should require that the installer prepare the application for Concord Light’s rebate on the CPW’s behalf.

**Electricity Cost**

This electricity price incorporates both demand and energy costs.

Space	Cost per kWh
Wastewater Treatment Plant	\$0.15

<sup>1</sup>The rate calculation uses a 56% weighted average coincidence factor to simulate the degree to which demand reduction due to the lighting upgrade will coincide with the building’s monthly peak demand.

**Concord Wastewater Treatment Plant Lighting Design  
Quote Submission Form**

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**Vendor Information**

Vendor Name:	Garcia, Galuska & DeSousa, Inc.
Vendor Address:	370 Faunce Corner Road Dartmouth, MA 02747

**Vendor Contact Information**

Contact Name:	Carlos G. DeSousa, P.E.	Title:	President
Contact Telephone:	508-998-5700	Email:	<a href="mailto:carlos_desousa@g-g-d.com">carlos_desousa@g-g-d.com</a>

**Price Proposal**

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Inclusive quote to complete the scope of work:

In numbers: \$3,500.00 In words: Three Thousand, Five Hundred dollars.

**Statement of Authenticity**

I, Carlos G. DeSousa, P.E. certify that the above price proposal is a legitimate offer and is valid for a period of 30 days after the signing of this statement.

  
Signature of the above authorizing representative

January 5, 2016

Date

## Revenue Decoupled Time of Use Rate with Critical Peak Pricing

Over the last five to ten years CMLP has faced challenges to its century old centralized electric utility business model (Flat rate collection). New technology and the creation of ISO NE have changed what it costs to sell electricity. What are these areas of expense and how can CMLP best structure its rates to manage these new costs?

> **non-Power Supply** - What it costs to run the Light Plant with 2.5% yearly growth. These expenses are relatively fixed and known (staff, trucks, in-town infrastructure, tree trimming and customer billing).

*How is this best collected from customers? A fixed customer fee would ensure full collection without concern over kWh sales targets.*

> **Energy** - The purchase of energy generation through the CMLP power supply portfolio.

*How is this best collected from customers? A flat per kWh fee as it is today. Additionally if energy costs spike seasonally; a seasonal Cost Power Adjustment (CPA) can be added for those months.*

> **Transmission** - CMLP pays this expense based on its highest monthly demand hour. This is the cost to send electricity from the ISO hub to Concord's sub-station.

*How is this best collected from customers? A Time Of Use Rate (TOUR) would help level demand over the day to lower CMLP's monthly demand hour. TOUR on-peak hours should correlate with Concord's monthly peak demand hours annually plus one hour on either end. (on-peak noon to 10pm)*

> **Capacity** - CMLP pays this expense based on New England's highest annual demand hour. This fee is used to grow electrical generation throughout New England to keep up with demand.

*How is this best collected from customers? A Critical Peak Pricing (CPP) method would alert customers and collect for this high expense when it occurs during the summer heat wave.*

**Any future CMLP expenses** should be collected from customers in a method that best correlates to how the expense is incurred.

How does Concord add to its low cost, reliable and green electricity with this rate?

**Net Generation Credit** - If a customer supplies electricity to CMLP, they would receive a credit for the cost of electricity during that hour. This will spark investment in renewable generation and storage through avoided cost, not subsidies.

**Subsidies** like the Residential Rate Assistance Rider, Farm Rider, Adjustment Clauses and Surcharges can be added to this TOUR rate but should not replace it like the current equipment based rates.

**Smart Meters**, a communication infrastructure and automated billing system will need to be fully deployed to implement this rate. This will be a complex planning process and large investment in CMLP so though quick action is needed we must take our time to planning what systems to purchase and how they will all work together to meet Concord Lights needs.

Brian Foulds  
[brian.foulds@gmail.com](mailto:brian.foulds@gmail.com)  
617 460-3571

## **Comprehensive Sustainable Energy Committee (CSEC) 2015 Annual Report**

### **CSEC Charter and Goals**

The Comprehensive Sustainable Energy Committee was established in 2007 to assist the Town in identifying, designing, and implementing programs and projects for fostering energy conservation, energy efficiency, and renewable-energy generation in the Town, as well as to track and report on the financial and environmental impacts of such programs. Programs should address all forms of energy use, including electricity, natural gas, heating oil, and transportation fuels, as well as renewable energy such as solar, encompassing all Town sectors: municipal, town schools, business (including non-profit), and residential.

This report summarizes the 2015 goals and activities of CSEC, highlighting the impacts to energy-use conservation and efficiency, sustainable practices, and dollar savings, as well as CSEC's directions for the future.

### **Green Communities**

Having been designated by the state as a 'Green Community', Concord is working towards the goal of reducing annual municipal energy usage by 20% during the 5-year period FY2012-FY2016 (calculated from a base year of FY2011). To date Concord has received \$476,000 in state funding for major projects, of which \$244,000 was a competitive grant award initiated and written by CSEC. Major projects to date include replacement of aging boilers at both Peabody and Sanborn schools, the HVAC system at Hunt Gymnasium, and the dehumidification system at the Beede Center; other projects have included lighting upgrades and weatherization/insulation at a number of town facilities. Savings to date as a result of these projects amounts to an estimated \$230,000 annually.

Though progress has been encouraging, the Green Community projects to date have netted only about a 6% annual savings based on the Green Communities metric. The major reason for this seemingly small savings rests at least partially on the fact that, since approximately 2008, Concord has been aggressively working to lower its energy consumption, addressing much of the 'low-hanging fruit' before the FY2011 Green Communities base-comparison year. Thankfully, the state is understanding of this fact (which is also the case with a number of other towns in the state) and continues to be supportive of Concord's 'Green Communities' status.

A significant fraction of 'easy stuff' towards town energy-reduction goals has now been done. Making significantly more progress will require renewed and sustained willpower and allocation of resources, whether they be at the local, state or federal level.

### **Green Your Heat Project**

Natural-gas customers in Concord are eligible for the state's MassSAVE program, which provide free energy audits, followed-up by generous rebates (75% of homeowner's cost up to first \$2,000 spent) to residents who weatherize their homes. CSEC sought to create a similar program for residents who heat with oil, propane, electricity, or wood and are therefore not covered by MassSAVE. To do so, CSEC wrote and received a state grant for \$145,000,

augmented by \$75,000 in Town funds, to create the Green Your Heat (GYH) program. This program provides weatherization (insulation, air-sealing, and programmable thermostats) rebates to homeowners, covering 50% of the homeowners' costs up to the first \$1,000 spent.

In the first 10 months of the program, over 400 residents contacted the program, resulting in more than 60 weatherization installations, primarily in oil-heated homes. Unexpectedly, but welcome, over the same period MassSAVE recorded markedly increased participation in Concord despite no change in advertising, perhaps due to the immediate referral by GYH of gas users to MassSAVE!

To date, 71 GYH projects have been completed, resulting in estimated savings of over 9,000 gallons of heating oil and over 7,000 kWh of electricity per year. This is equivalent to over 100 tons of avoided CO<sub>2</sub> emissions (or ~240,000 miles driven in a typical passenger car!). CSEC is proud of this successful program and plans to build on it by providing other grant-based programs to help Concord residents improve their carbon footprints.

### **Sawyer Trust Fund**

In 2009, \$1.7M was gifted to the Town to establish the Sawyer Trust Fund to be used to fund energy-efficiency projects in Concord municipal facilities. Since that time, CSEC has worked with town officials to fund more than \$1.5M in energy-efficiency projects, including the 48kW solar-panel array on Willard School, an improved dehumidification system for the Beede Center, and conversion of lighting in buildings and streetlights to LEDs. As a result of Sawyer Trust Fund investments, Concord now realizes an annual savings of ~\$130,000, plus an annual income of ~\$15,000 from renewable-energy credits ('SRECs') for energy generated by the Willard School solar-panel array.

### **Community Impact**

The impact of projects funded by the Sawyer Trust Fund, along with more than \$600,000 from state grants awarded to Concord through CSEC-initiated proposals to support Green Your Heat and Green Communities programs, as well as contributions to the Concord Solar Challenge that installed 1.3MW of solar-generation capability on Concord homes, can be summarized as follows:

- \$2,300,000 in one-time revenue to Concord
- ~\$360,000 annual savings to the Town
- ~\$580,000 annual savings to Concord residents
- ~3,000,000 lbs of CO<sub>2</sub> emissions avoided annually (equivalent to CO<sub>2</sub> absorption capacity of ~15,000 mature trees)

### **Looking to the Future**

#### Partnership with Tufts University Mechanical Engineering Department

As part of an effort to better understand the role that air-sourced heat-pumps might play in creating a greener Concord, CSEC developed a successful partnership with Tufts University Mechanical Engineering Department to help develop better modeling of real-world use of heat pumps for greener residential heating compared to both fossil fuels and direct-electric heating. As part of the project, the Tufts students involved in the project came to Concord to

give a well-received public presentation on the results of their work. There is interest both within CSEC and at Tufts in continuing this win-win relationship that both benefits Concord green energy usage goals and helps students further their education; further discussions with Tufts faculty are continuing to identify potential additional fruitful areas for collaboration.

#### Future CSEC goals and initiatives

As part of its strategic vision, CSEC is exploring additional avenues through which the goals of the CSEC charge can be achieved. A couple of areas that appear promising are:

Town vehicle purchasing and usage: Both the annual cost and CO<sub>2</sub> footprint associated with town vehicles has been steadily rising over the past several years for reasons that are not well understood; ongoing discussions with the Town Manager are centered around possible updating of both vehicle purchasing guidelines and vehicle usage policies.

Collaboration with other area towns in setting goals and developing programs to meet sustainability goals: The Hanscom Area Towns Committee (HATS) is an alliance of the towns of Concord, Lincoln, Lexington and Bedford dedicated to addressing matters of common concern. Through HATS, there is considerable interest in developing collaborative/coordinated programs to address areas of common concern, among which sustainable energy practice is rising to a position at or near the top of the list.

From: Bouzha Cookman <bouzha@gmail.com>  
Date: January 27, 2016 at 5:20:27 PM EST  
Subject: Getting to Net Zero: Learning from Cambridge - Feb 2nd, 7:30 at First Parish Church, Concord  
Cc: Jan Aceti <jaceti@concordma.gov>  
To: Gordon Brockway <gordon.brockway@yahoo.com>, Alan Whitney <awhitney@haystack.mit.edu>, Annie Moore <anniemore@gmail.com>, Sue Felshin <sfelshin@alum.mit.edu>, William Lehr <wlehr@MIT.EDU>, Bradley Hubbard-Nelson <bradhn@mindspring.com>, Gilda Gussin <gilda.gussin@comcast.net>

Dear CSEC Members,

On behalf of the Concord Community Organizing Team (COT) of Mothers Out Front (MOF), as well as me personally, we hope you can attend the upcoming Climate Solutions event, *Getting to Net Zero: Learning from Cambridge*, which is being promoted around town by MOF and other interested groups. The event will take place next Tuesday, February 2nd, at First Parish Church in Concord with a reception beginning at 7pm and the presentation starting at 7:30pm. (The official flyer is attached.)

The two speakers are Henrietta Davis, a former Mayor of Cambridge, and Quinton Zondervan, the President of Green Cambridge. Both have key insights to share regarding the development of Cambridge's Net Zero Action Plan and the efforts that led to the City Council's vote to adopt it in June of 2015. There are of course key differences between Cambridge and our town, but Cambridge gives us a local example of how bold collective action towards greater sustainability is both possible, and happening already.

We really hope you can attend the event and the discussion as we together discover the best approach for our town. Meanwhile, thank you for your ongoing leadership and consideration of Concord's energy future.

All the best,

Bouzha Cookman and the MOF COT

(cell) 978-618-1468

**Subject:**Net Zero Follow Up...

**Date:**Sat, 9 Jan 2016 18:54:26 -0500

**From:**Cookman Bouzha <[bouzha@gmail.com](mailto:bouzha@gmail.com)>

**To:**Alan Whitney <[awhitney@haystack.mit.edu](mailto:awhitney@haystack.mit.edu)>

Hi Alan,

Good to see you at the Select Board meeting Monday night. Had a few preliminary thoughts re possible next steps and interested in your and your colleagues in CSEC's thoughts on whether these are ideas worth following up on:

1. Asking if one or two CSEC members would be official "liaisons" with MOF as we think through net zero and reach out to other town constituents?
2. Work with the Select Board, if possible, to create a strategic subcommittee to outline what components a Net Zero Concord Plan might consider. For example, after talking with CSEC members over the past week or so and some other interested parties a number of potential areas for discreet work were identified that would fit under the 25-year net zero umbrella.

Each area could be run by a subcommittee that would most likely have sub groupings under them. Here are some suggested "buckets"

1. Light Plant Business Model -- Rate structure, smart metering, etc. Pilot programs, etc.
2. All Buildings -- Building codes, retrofit, etc.
3. Transportation
4. Wastewater treatment plant (s) alternatives
5. Inter-regional opportunities
6. Payback analysis
7. Creating the best town governance structure to carry forward after plan was in place
8. ??? other ideas???

3. Start identifying what information/research would be needed as a baseline before moving forward on a plan for any of the above -- think you were getting to this last week?

Please let me know what you think.

All the best,

Bouzha

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Bouzha Cookman  
94 Hubbard Street/Concord, MA

# Revenue Decoupled and Time of Use Rate with Critical Peak Pricing

*Speaker: Brian Foulds*

Wednesday, December 9, 2015

Concord Light

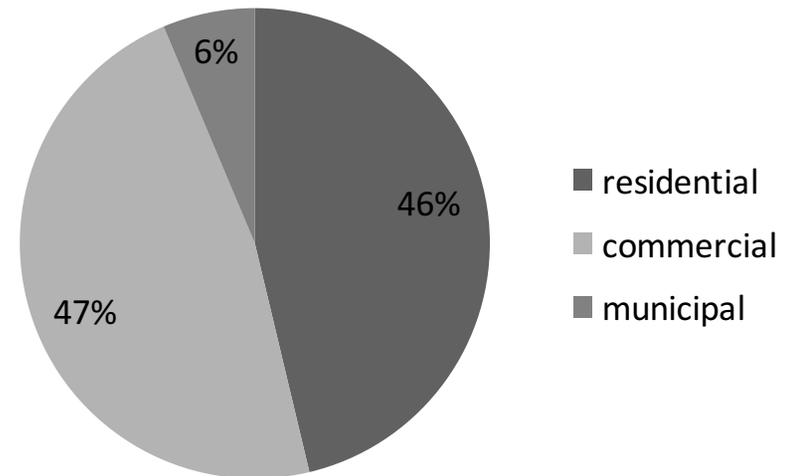
# Town Manager's Proposed Enterprise Budget FY16

## Electricity Rate Revenue

The total revenue expected to be raised through electricity rates in 2015 is projected to be **\$26,861,704**, with \$12.4 million to be received from residential customers, \$12.7 million from commercial customers, and \$1.7 million from municipal customers.

Of a total of 169.9 MWh of electricity expected to be provided in 2015, it is forecasted that residential sales will be approximately 76.2 MWh, commercial 82.2 MWh, municipal 11.0 MWh, and street lighting 0.5 MWh. Usage varies with the weather, economic conditions, and other factors.

## Total Revenue Expected



# Town Manager's Proposed Enterprise Budget FY16

The total revenue expected \$26,861,704

The total power supply expense \$18,028,272

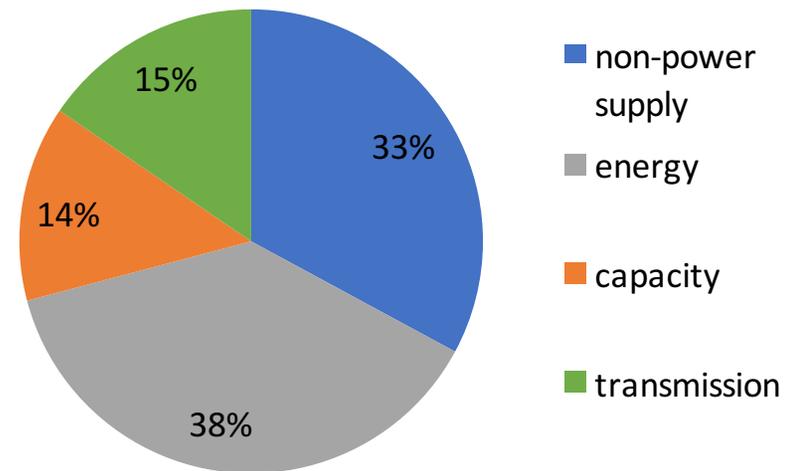
The total non-power supply \$8,833,432

The total energy purchases \$10,206,938

The total capacity purchases \$3,662,369

The total transmission cost \$4,158,965  
(power supply – energy and capacity)

**Total Revenue Expected**



# Non-Power Supply

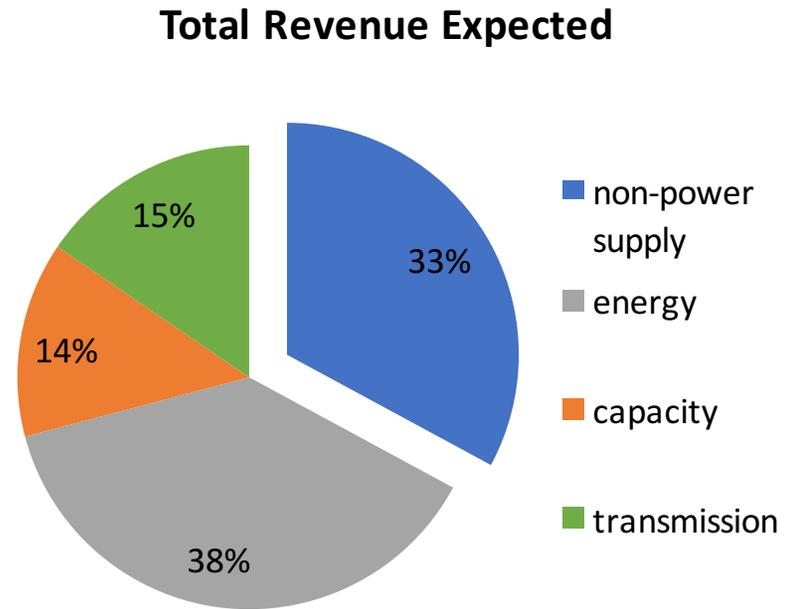
- Revenue collected that does not pay the power supply expense

The total revenue expected \$26,861,704

The total power supply expense \$18,028,272

The total non-power supply \$8,833,432

- A mostly fixed cost that is budgeted each year

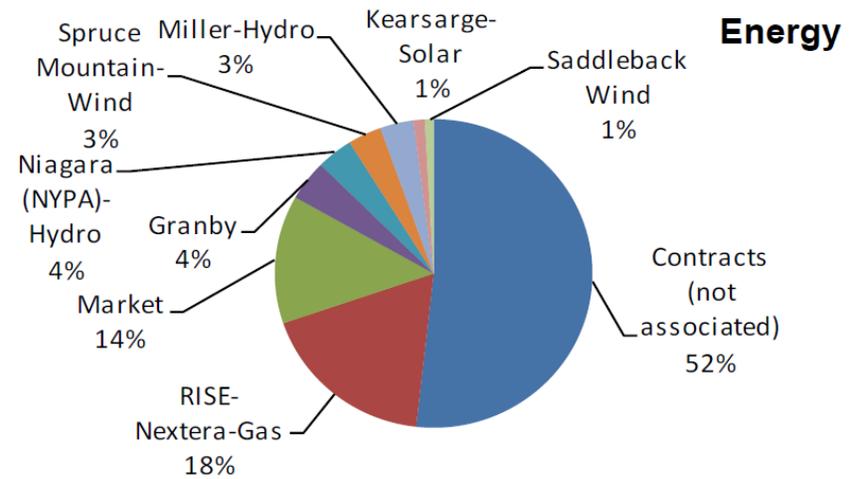


# Energy

- Contacts for generation of electricity

The total energy purchases \$10,206,938

- Total contacts cost divided by expected kWh sale = \$ per kWh

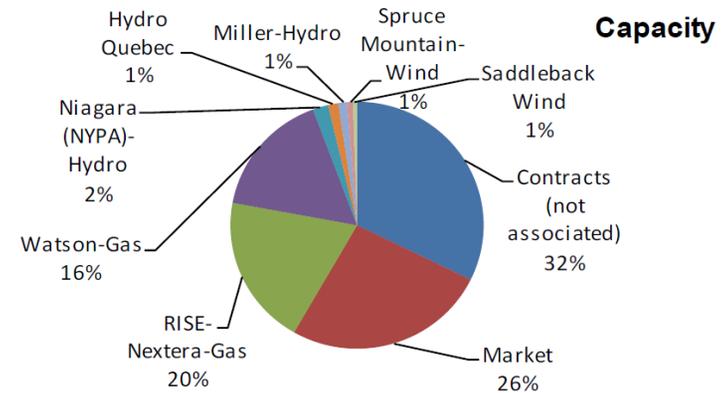


# Capacity

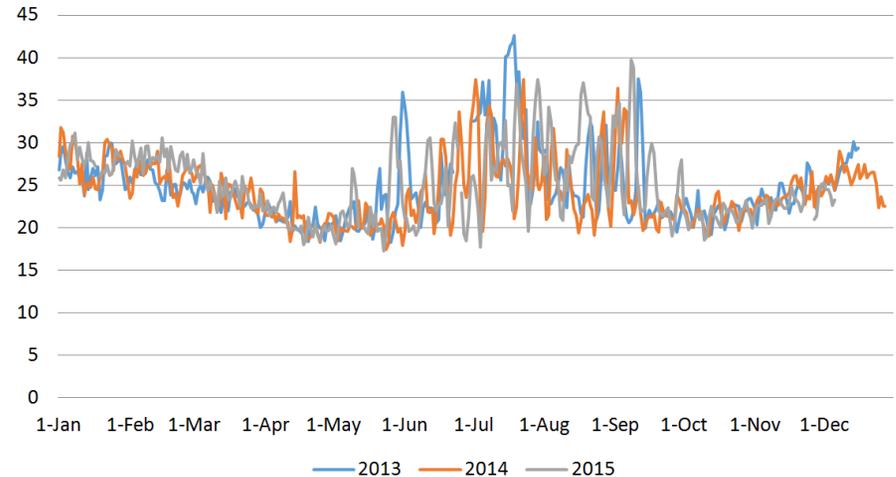
- Forward Capacity Market, designed to ensure the region continuously develops the resources needed to meet demand and maintain reliability

The total capacity purchases \$3,662,369

- Concord Light's demand on the grid during the ISO annual peak demand sets Concord Light's capacity requirement



Concord Daily Peak Demand



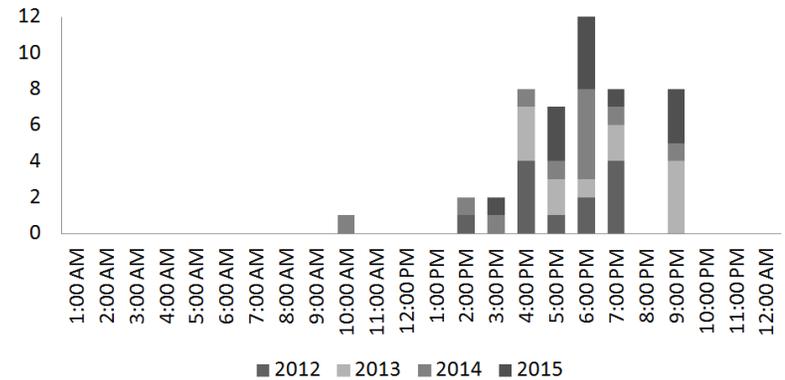
# Transmission

- The cost to send electricity from the generators to Concord sub-station

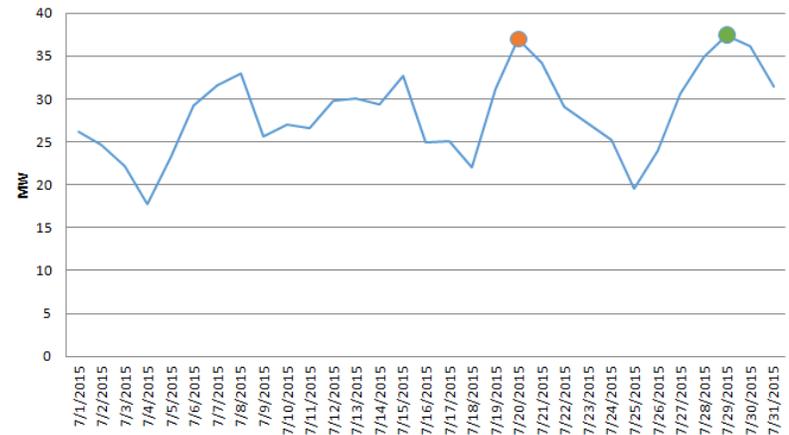
The total transmission cost \$4,158,965  
(power supply – energy and capacity)

- Collected as a demand charge each month at a rate of about \$7.76 per kW

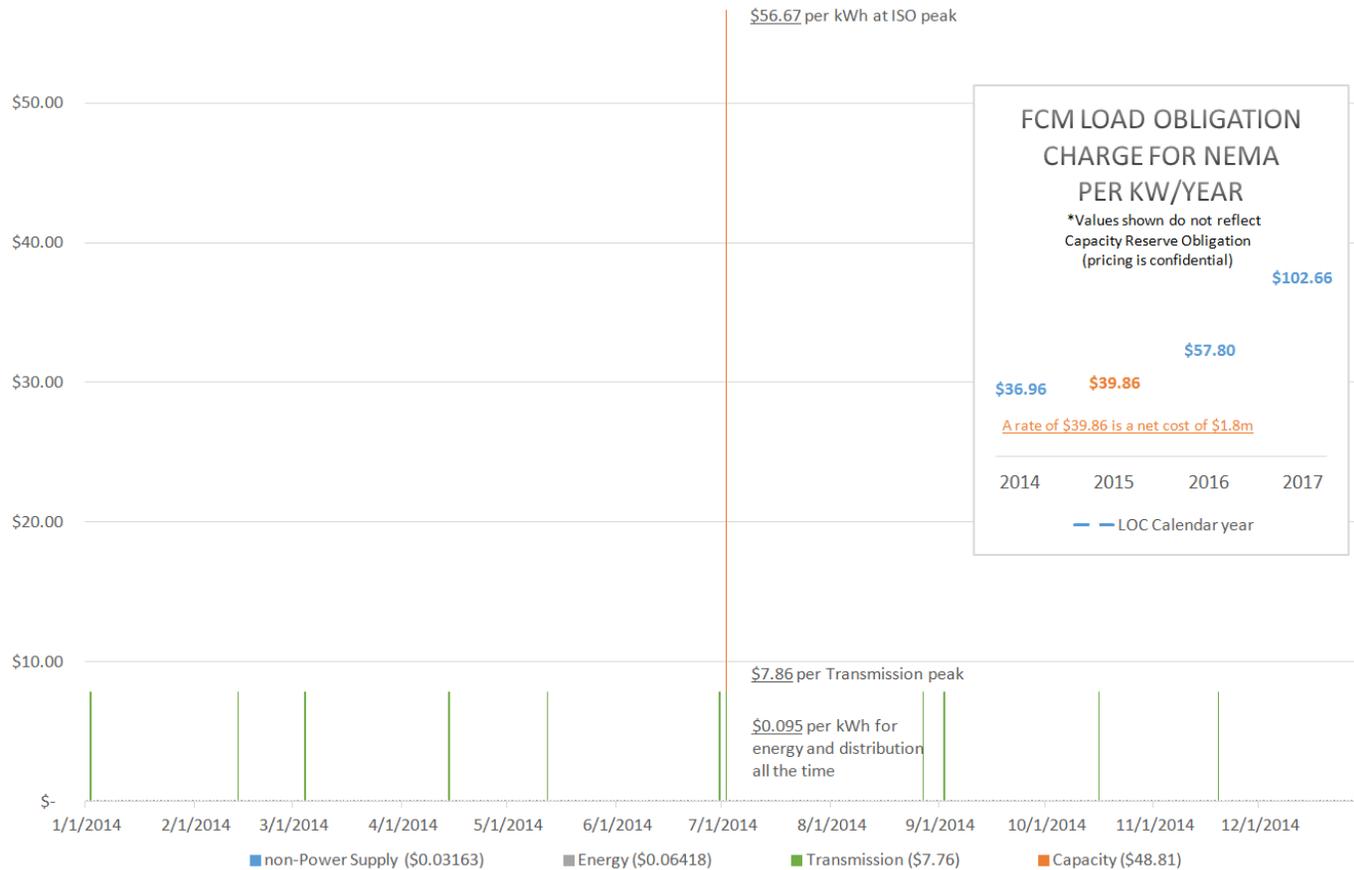
Monthly Peak Time of Day



Daily Peaks July 2015



# Concord Light's expenses over time (per kWh)



# How is this collected?

***CMLP has different service rates for residential and business customers. Click on the service rates below to learn more.***

[Printer-Friendly Version](#)

Residential Service Rates	Commercial Service Rates
<a href="#">Residential</a>	<a href="#">Small General (G1)</a>
<a href="#">Residential Farm Rider</a>	<a href="#">Small General ETS Off Peak</a>
<a href="#">Residential Controlled Water Heating Rider</a>	<a href="#">Small General Net Metering*</a>
<a href="#">Residential Time of Use</a>	<a href="#">Medium General (G2)</a>
<a href="#">Residential ETS Off Peak</a>	<a href="#">Medium General Net Metering*</a>
<a href="#">Residential Electric Vehicle Off Peak</a>	<a href="#">Large General (G3)</a>
<a href="#">Residential Electric Vehicle Time of Use</a>	<a href="#">Large General Net Metering*</a>
<a href="#">Residential Rate Assistance Rider</a>	<a href="#">Power Cost Adjustment Clause</a>
<a href="#">Residential Net Metering w/Banking*</a>	<a href="#">Underground Utilities Charge</a>
<a href="#">Residential Electric Resistance Heat and Heat Pump</a>	<a href="#">Renewable Energy &amp; Conservation Charge</a>
<a href="#">Power Cost Adjustment Clause</a>	<a href="#">Private Area Lighting</a>
<a href="#">NYPA Cost Adjustment Clause</a>	
<a href="#">Underground Utilities Charge</a>	
<a href="#">Renewable Energy &amp; Conservation Charge</a>	
<a href="#">Private Area Lighting</a>	
<a href="#">Adopt-a-Light</a>	

- Lots of rates
- Complex rates
- Rates are continually debated and changed
- Rationale for past rates is not well documented
- Consultants are paid to review rates
- Conservation at a profit only

# How is this collected?



# What am I suggestion be done?

- Revenue Decoupling (RD)
  - Separating utility fixed cost recovery from sales volume
- Time of Use Rate with Critical Peak Pricing (TOUR CPP)
  - Charging for when electricity is used

# Revenue Decoupling

Separating utility fixed cost recovery from sales volume

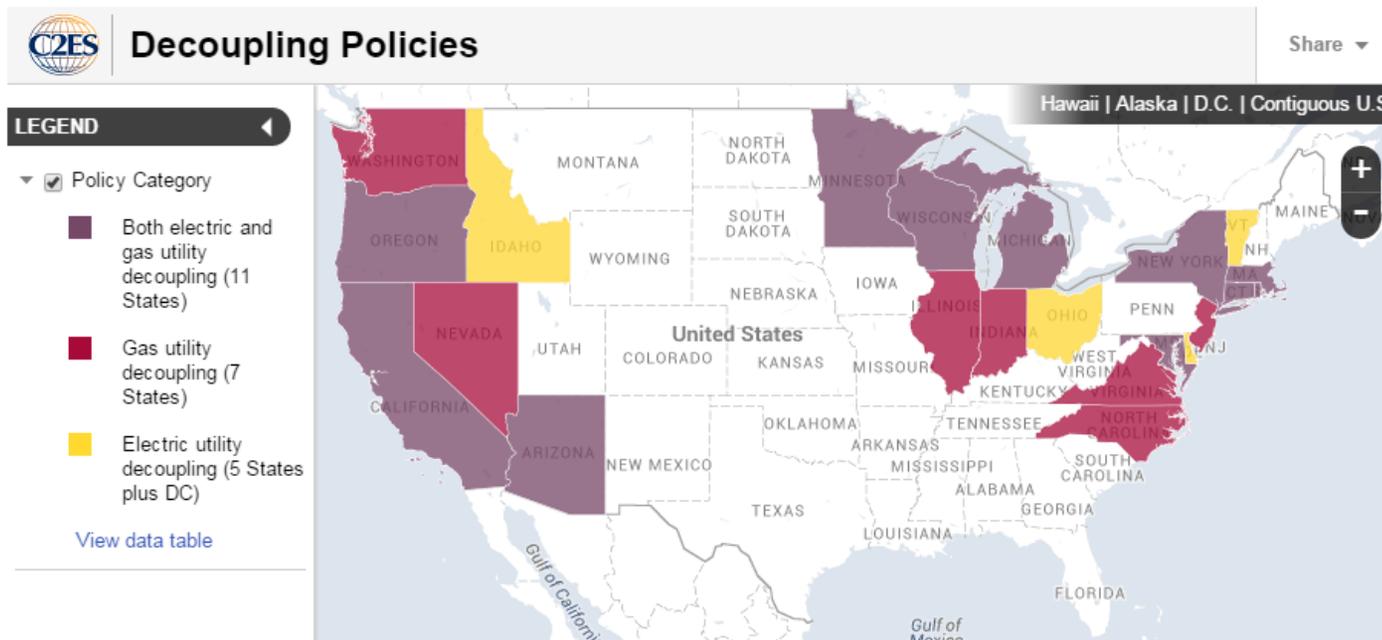
# Conflicting Goals and Mission Statements

Light Board	Town Committee	Customers
Low cost electricity	Conservation	Energy efficiency
Reliable electricity	Carbon reduction	Net metering (generation)
Green electricity	Green communities	Green building
Treat all rate classes fairly	Energy efficiency	Reliable electricity (storage)
Secure funding	Green building	Electric vehicles (transportation)

Concord's many conservation goals and Concord Light's need to fund non-power supply expenses are in direct conflict because Concord Light collects mainly through a per kWh fee. A new collection method is needed.

# Revenue Decoupling (RD)

- The Massachusetts Department of Public Utilities (DPU) adopted revenue decoupled regulation as a statewide regulatory policy in 2008 and individual utilities filed revenue regulation tariffs in response. ([Map](#))



# Revenue Decoupling (RD) – Questions to ask

- What expenses in the non-power supply (\$8,833,432) are directly correlated to sales volume?
  - If an expense varies with the amount of kWh sold collect with a per kWh charge (distribution fee)
  - If not, collect with a monthly fixed charge (meter fee)
- The more non-power supply expenses collected with a monthly fixed charge the less weather and conservation will affect net operating income

# Revenue Decoupling (RD) – Questions to ask

- Fixed cost recovery – equal shares or based on usage?
- How best is money collected in a fixed manner?
  - Equal shares (all residents pay \$25 a month)
  - Last years usage determines next years fixed fee (pay based on past not current usage)
  - Mix of both?
- How will net annual generators pay a fair share of fixed cost recovery?

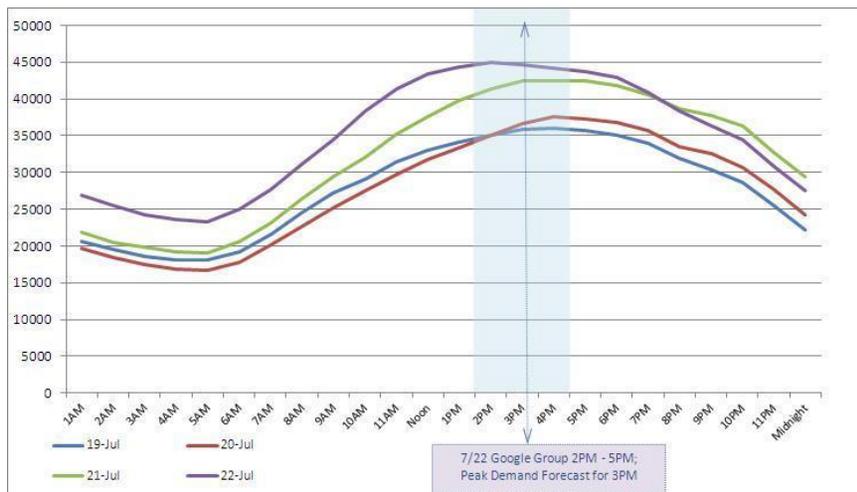
# Time of Use Rate with Critical Peak Pricing (TOUR CPP)

Charging for when electricity is used

# Critical Peak Pricing (CPP) – Google List

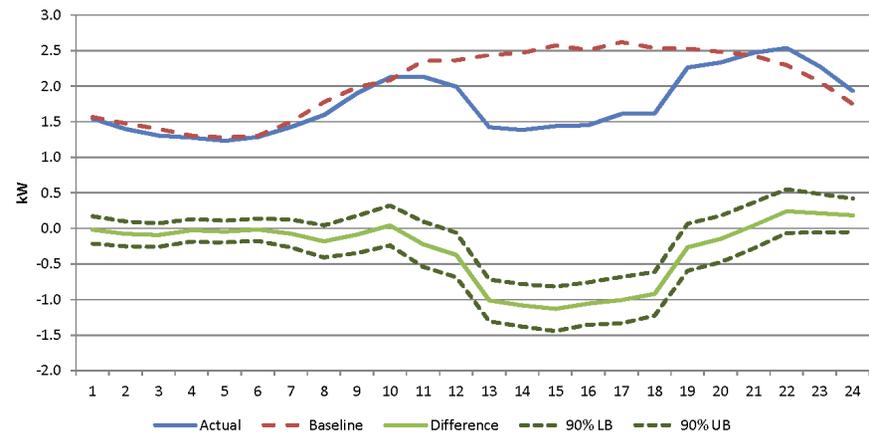
Concord 7/22/11 (purple)

Volunteer program - A 1% reduction at the peak hour



Marblehead 7/22/11

CPP at \$1.00 per kWh - A 40% reduction at the peak hour

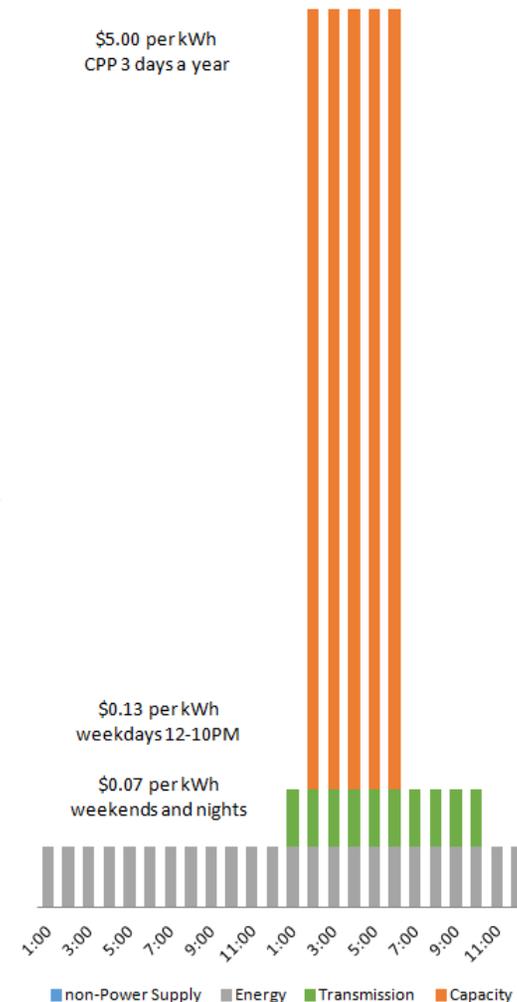


# Critical Peak Pricing (CPP)

- Full deployment of an Advanced Metering Infrastructure
  - Smart Meters
  - Communications
  - In-Home Display (Intelahome or something else)
- A fully automated billing system (is Harris up to the task?)
- Experienced staff to manage and monitor the IT systems
- Consumer education and alert system

# RD-TOUR-CPP

- High fixed monthly fee (\$25)
- Weekend and nights would be off-peak
  - Cost of energy only (~ \$0.07 kWh)
- Weekdays noon to 10 PM would be on-peak
  - Cost of energy and transmission (~ \$0.13 kWh)
- 3 Critical Peak Pricing Days each year
  - Cost of capacity (~ \$5.00 kWh)
  - Total of 15 hours each year (3 days a year)
  - Large community awareness effort
- Net Generation Credit




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## Transforming How Communities Use Energy: Learning from Fort Collins



*Image courtesy of Caleb Kenna*

### eLab

[What is eLab?](#)
[What is eLab Doing?](#)
[Who's Involved?](#)
[eLab Media](#)

The City of Fort Collins has adopted climate action goals that are among the most ambitious climate commitments in the nation. Under new goals adopted in March 2015, the city aims to reduce its community greenhouse gas emissions 80% by 2030 (relative to a 2005 baseline) and 100% (reaching carbon neutrality) by 2050. In adopting these goals, the Fort Collins City Council accelerated by 20 years the previous target of 80% emissions reduction by 2050.

Fort Collins' remarkable achievement in adopting an ambitious goal is the fruition of a multi-year process led by stakeholders including city government, local businesses, Colorado State University, the local municipal utility, and community and environmental advocates. Along the way, Rocky Mountain Institute and eLab have played key roles in facilitations, analytical support, expert convening, and communications. This page provides an overview of our approach and offers links to resources for other communities who are considering forward-looking climate action.

### THE ROLE OF CITIES

With more than 80% of Americans living in urban areas, cities play a pivotal role in addressing climate change. The design of cities—what we consume, how we design our buildings, how we develop our land, how we get around, and how we deal with our waste—significantly determines the amount of energy we use, the greenhouse gas emissions we produce, and the risks of disruption from climate-related weather events. While Fort Collins' direct impact on global greenhouse gas emission is small on a global scale, active leadership is a powerful force for change. Fort Collins and other leading cities have the opportunity to demonstrate to the nation and the world that it is possible to dramatically reduce greenhouse gas emissions, while maintaining and enhancing healthy, prosperous, and resilient places to do business.

Cities and communities are today at the forefront of practical, meaningful climate action. While a national strategy to fight climate change is stalled in the U.S. Congress, many cities and some states are acting now to reduce emissions. In a recent survey of 288 major cities, more than half (53%) had committed to reducing greenhouse gas emissions .

National and international networks of cities, including 100 Resilient Cities, International Council for Local Environmental Initiatives, C40 Cities, and many others are sharing best practices and comparing results. Local planning enables communities to craft policies that are best adapted to local values, constraints, and economic considerations while at the same time guiding and inspiring pragmatic local action and effectively engaging the business community.

## WHAT RMI DID

- **Formulate the Aspiration:** [With support from eLab](#), Fort Collins community leaders and outside experts convened in November 2012 to explore the opportunities and challenges in creating a clean energy future for Fort Collins. In this two-day charrette, participants expressed enthusiasm for accelerating the time frame of Fort Collins' citywide climate action goals. The group posited that not only is acceleration feasible, it could also drive local economic growth, innovation, and electricity system resilience.
- **Size the technical and economic potential:** RMI partnered with Fort Collins Utilities (FCU) in 2012 to answer the question: How far and how fast can Fort Collins go toward a clean, prosperous, and secure energy future? The resulting cost-benefit analysis provided a foundation for City Council to issue a resolution in April 2014 calling for the creation of a Climate Action Plan that would achieve 80% reductions in greenhouse gas emissions by 2030.
- Evaluate best-in-class community participation strategies: RMI consulted a network of 40+ experts to identify and extrapolate lessons learned from best-in-class efficiency and renewable energy adoption programs around the nation and world. RMI's findings inform the strategies and tactics included in the community's revised Climate Action Plan framework.
- **Activate the Utility:** RMI has collaborated with Fort Collins Utilities (FCU) and the Colorado Clean Energy Cluster to outline the elements of a new utility business model. A pilot program is being considered for implementation in 2016 that will enable FCU to offer a range of non-traditional services (including efficiency and on-site renewables) to households with no change to (or cheaper) monthly utility bills. This new model uses innovative on-bill repayment mechanisms to help customers finance and implement energy measures.
- **Create an integrated climate action plan:** RMI partnered with the City and its climate action planning team over a period of ten months to develop a revised Climate Action Plan for City Council consideration. The resulting framework for action was presented to Council in February 2015 and helped make the case for the formal adoption of accelerated climate action goals.

## DOWNLOADABLE RESOURCES:

- **FortZED Charrette Report (2012):** Understand the convening process that developed Fort Collins' aspirations from a vision for a net zero energy district (FortZED) into a vision for a net zero city.
- **Stepping Up: Benefits and cost of accelerating Fort Collins' Energy and Climate Goals. (2014):** Learn about the technical and economic potential for Fort Collins to accelerate its energy and climate action while capturing economic, social, and environmental benefits. This report summarizes RMI's findings in Fort Collins' key energy sectors: building efficiency, transport, and the electricity supply system.
- **Stepping Up: Technical Appendix**  
Understand RMI's assumptions and analytic method, which are grounded in the principles and approach of RMI's national [Reinventing Fire](#) study.
- **Accelerated Emission Reductions Tactics: Findings from expert conversations and research (2014):**  
Consider the various programs your community could implement to enable accelerated emissions reductions. See the short list of tactic and strategies considered for Fort Collins, and review best in class existing programs and design considerations required to take programs to scale. [Additional Info: CAP Tactics Descriptions.](#)
- **Integrated Utility Services Report (2014):** Utilities can play a pivotal role in enabling communities to achieve their carbon emissions reduction goals. Consider a new replicable business model that integrates distributed energy resource offerings (e.g. building efficiency, onsite solar panels) that help communities achieve aggressive energy goals while keeping utilities competitive in a quickly evolving industry.
- **Fort Collins Climate Action Plan: Framework (2015):** Reference Fort Collins' framework for action, organized around twelve strategic areas, to get Fort Collins on the path to accelerated climate goals.

For more information, please contact Coreina Chan ([cchan@rmi.org](mailto:cchan@rmi.org)), Martha Campbell ([mcampbell@rmi.org](mailto:mcampbell@rmi.org)), and Aman Chitkara ([achitkara@rmi.org](mailto:achitkara@rmi.org)).