Connecticut Department of Energy and Environmental Protection
GC3 Meeting

April 13, 2016
1:30 — 3:30 p.m.
Agenda

1:30 Welcome & Announcements

1:35 Recap state and local climate actions discussion

1:45 REMI Building Sector Inputs and Assumptions

2:05 CT’s Efficient Buildings: Capturing opportunities for emission reductions, job creation, and increased competitiveness

2:20 Building Sector Policy Discussion

4:30 Public Comments
Recap State and Local Climate Actions Discussion
REMI Building Sector Inputs and Assumptions
Review energy efficiency and building technology scenarios

- Residential & Commercial Renewable Thermal
  - Air Source Heat Pumps ~ 90%
  - Ground Source Heat Pumps ~ 10%

- Expanded electric & gas energy efficiency
  - Based on continuing current EE investments out to 2035
Energy Efficiency Measure Savings
Direct Costs From LEAP Used in REMI Modeling

• Changes in energy expenditures
  – Increased electricity spending
  – Reduced spending on fossil fuels

• Changes in total investment spending on residential & commercial heating and cooling equipment
  – Broken out into labor, capital and materials

• Incremental spending on efficiency measures
  – Broken out into labor, capital, materials and other local industries involved in EE deployment
CT’s Efficient Buildings:

Capturing opportunities for emission reductions, job creation, and increased competitiveness
Key Strategies for Better Buildings

1. Prioritize energy savings as a financing resource and as an energy resource.
2. Improve energy performance of existing buildings; increase productivity of processes.
3. Integrate efficiency, storage, rates, and renewables to reduce peak demand.
4. Ensure interoperability of demand response communications between grid and buildings.
Connecticut’s Current Investment and Progress

- $700M portfolio for customers
- 129k residential homes weatherized
- 9.7 M residential products distributed
- All 169 communities actively engaged
- 28k businesses more efficient
- Energy as a resource: Energy savings equivalent to the output of a 262 MW power plant

Source: 2016-2018 Conservation and Load Management Plan
CT Building Stock: Emissions Reduction Opportunity

- Over 70% of building stock built before 1970
- Old, inefficient, housing stock with insufficient weatherization
- Half of households heat using fuel oil
- Use of inefficient fossil fuels
- Volatile Fuel Costs
- Limited control of energy expenditures

Focus Investment on Thermal Efficiency
Efficiency Improves CT Productivity

Connecticut’s businesses are using less electricity to produce an increasing quantity of goods and services.

29% reduction in electricity consumption per $ of CT Gross State Product

Sources: EIA SEDS data, US Bureau of Economic Analysis, Federal Reserve Economic Data
Efficiency employs 34,000 in CT

Connecticut Energy Employment by Major Technology

Source: (United States Department of Energy, 2017)
ISO-NE: Investment in energy efficiency will decrease overall load growth, but peak demand continues to grow, spreading costs over fewer units.
Managing peak demand means customizing solutions for different customer classes. Why?

Because solutions require understanding varied energy profiles at the ISO level, distribution level, and customer level.

Source: Eversource
Advance Controls and Two-Way Communications

- Empowering individuals and businesses to recognize the opportunity and receive value of demand response, distributed generation, and energy storage

**Benefits:**
- Reduces capacity needs
- Reduces transmission & distribution investments
- Contributes to a more resilient electrical grid
Mainstreaming Energy Efficiency

✓ Externalized costs of other energy sources make efficiency resource appear costly
  • requiring need for optimized mix of actions to correct market imperfections
  • incentives, simple financing, codes, standards

✓ Increase automated controls and automated and standardized monitoring and verification tools

✓ Improve consumer awareness and standardize valuation of savings opportunity through Energy Star, Home Energy Score

✓ Better target segment-specific barriers
  • Improve access to capital in some sectors
  • Compete better against other investment opportunities
  • Ready homes for weatherization
Better Buildings Best Practices
Strategies to reduce GHG emissions

**Primary Target** — There are four primary means to reduce greenhouse gas emissions from the building sector:

- Procure efficiency as a resource
- Increase performance of new and existing buildings
- Reduce peak demand
- Increase efficiency of thermal equipment

**Approach** — There are various approaches to achieve a target, which range from voluntary efforts to mandatory actions:

![Mandatory and Voluntary Approaches](image)

**Regulation** Examples:
Building Codes
Product Efficiency Standards
Efficiency before or with Solar

**Economic Incentive** Examples:
Time of Use Rates
Peak Time Rebates
Insurance Discounts

**Education** Examples:
Home Energy Score
Benchmarked buildings
Train skilled workforce

**Timing** — Immediate vs. long-term impacts

**Effectiveness Factors** — policy design/nuances and consumer responses

**Ease of Implementation** — political feasibility, equity, economic impacts, and co-benefits

Source: adapted from DOT FHWA Transportation and Global Climate Change: A review and analysis of the literature.
Example strategies to reduce GHG emissions

<table>
<thead>
<tr>
<th>Procure energy efficiency as a resource</th>
<th>Increase performance of new and existing buildings</th>
<th>Reduce peak demand (electric efficiency)</th>
<th>Increase thermal efficiency (renewable thermal technologies)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procure efficiency as a resource</td>
<td>Reduce waste</td>
<td>Economic Signals and Incentives</td>
<td>Advance simple financing and upstream incentives</td>
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<tr>
<td>• Replicate recent procurement per PA 15-107 of a 34 MW energy efficiency commitment to displace other generation sources</td>
<td>• Increase application of combined heat and power</td>
<td>• Time of Use Rates</td>
<td>• for insulation, HVAC, and water heating</td>
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<td>• Invest portion of federal energy assistance funds in efficiency to sustainably close affordability gap</td>
<td>• Improve voltage regulation/optimization</td>
<td>• Peak Time Rebates</td>
<td>• to mainstream availability of most efficient equipment</td>
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<td>Catalyze avoided costs as a financing resource</td>
<td>• Integrate water conservation; increase efficiency of treatment</td>
<td>• Home Energy Score</td>
<td>Heat Pump &amp; Solar Water Heaters</td>
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<td>• to repurpose savings to invest in building infrastructure</td>
<td>• Assess applicability of district heating/thermal loops</td>
<td>Increase and standardize two-way communication</td>
<td>• Incentivized for most customers</td>
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<td>Lock in efficiency</td>
<td>Lead by Example</td>
<td>• Deploy advanced meters or comparable data acquisition equipment</td>
<td>• Subsidized for low income customers</td>
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<td>• Provide simple life cycle analyses to account for both operating and installation costs</td>
<td>• Insulate and upgrade HVAC in public buildings</td>
<td>• Promote use of standards to provide a common basis to manage and communicate about electrical energy consumptions and forecasts, such as ANSI/ASHRAE/NEMA Standard 201-2016, Facility Smart Grid Information Model</td>
<td>• Upstream availability to mainstream</td>
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<td>• Train for and reward installation of higher efficiency equipment</td>
<td>• Promote insurance discounts for well insulated buildings</td>
<td>Heat Pumps for heating and cooling/conditioning</td>
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<td>Lead by Example</td>
<td>Be prepared</td>
<td>• Target electric homes with marketing and assessments to replace electric resistance heat in near term</td>
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<td>• Insulate and upgrade HVAC in public buildings</td>
<td>• Integrate pre-weatherization costs into financing and include this work in projects</td>
<td>• Replace fossil fuel heating equipment in longer term</td>
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<td>Maintain consistent utility administered investments</td>
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<td>• to stabilize industry</td>
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Building Sector Policy Discussion
Public Comments