



2018 NEEP Summit
EE By The Sea: Oceans of Opportunity
October 1-3 / Middletown, RI

Session 3B: Pathways to Residential Building Decarbonization

Welcome to our Panelists

- Keith Dennis, Senior Director, Strategic Initiatives, National Rural Electric Cooperative Association
- Eugenia Gibbons, Clean Energy Programs Director, Green Energy Consumers Alliance
- Kerry O'Neill, Vice-President, Residential Programs, Connecticut Green Bank
- Richard Faesy, Principal, Energy Futures Group

Pathways to Deep Decarbonization



Electrification of buildings and industry in the United States
Drivers, barriers, prospects, and policy approaches

Electrification Futures Study: End-Use Electric Technology Cost and Performance Projections through 2050

Energy Analysis and Policy
Lawrence Berkeley National Laboratory

AMERICA'S CLEAN ENERGY FRONTIER: THE PATHWAY TO A SAFER CLIMATE FUTURE

Northeast 80x50 Pathway
nationalgrid

EnergyVision
A Pathway to a Modern, Sustainable, Low Carbon Economic and Environmental Future

New Efficiency: New York
A milestone energy efficiency target and comprehensive strategy — New York State's ambitious approach

2025 STATEWIDE ENERGY EFFICIENCY TARGET
185 TBtu end-use savings in buildings and industrial facilities below the 2025 energy use forecast

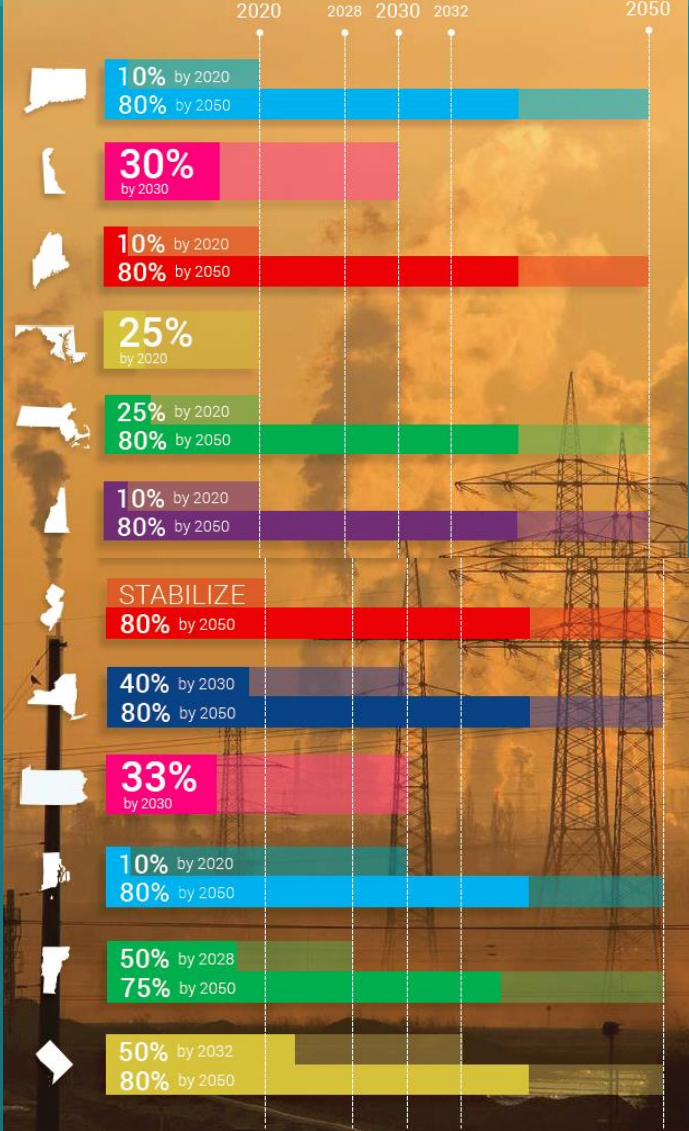
THE ECONOMICS OF ELECTRIFYING BUILDINGS
HOW ELECTRIC SPACE AND WATER HEATING SUPPORTS DECARBONIZATION OF RESIDENTIAL BUILDINGS

Beneficial Electrification
Ensuring Electrification in the Public Interest

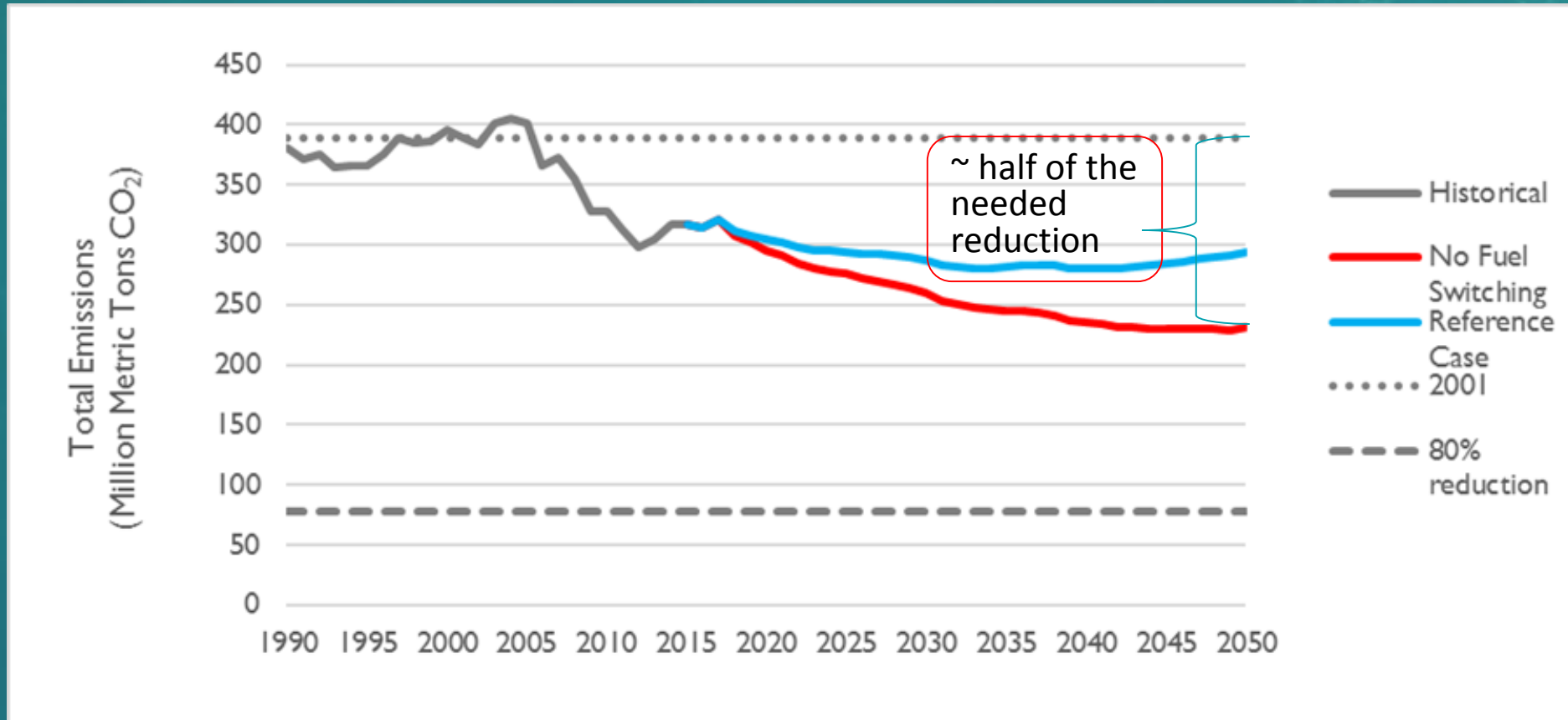
Accelerating Investment in Electric Vehicle Charging Infrastructure
Estimated Needs in Selected Utility Service Territories in Seven States

Action Plan to Accelerate Strategic Electrification in the Northeast

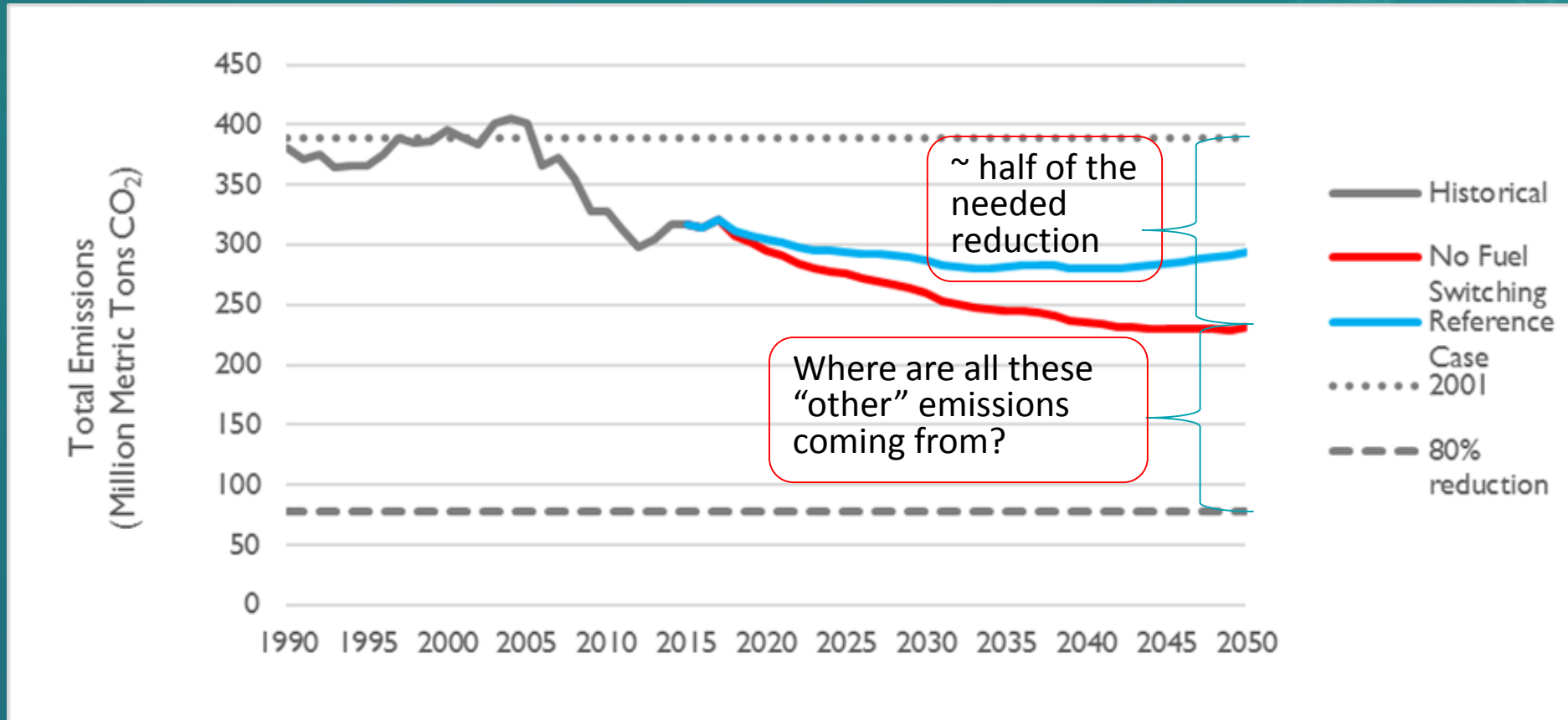
Region's Aggressive Carbon Reduction Targets



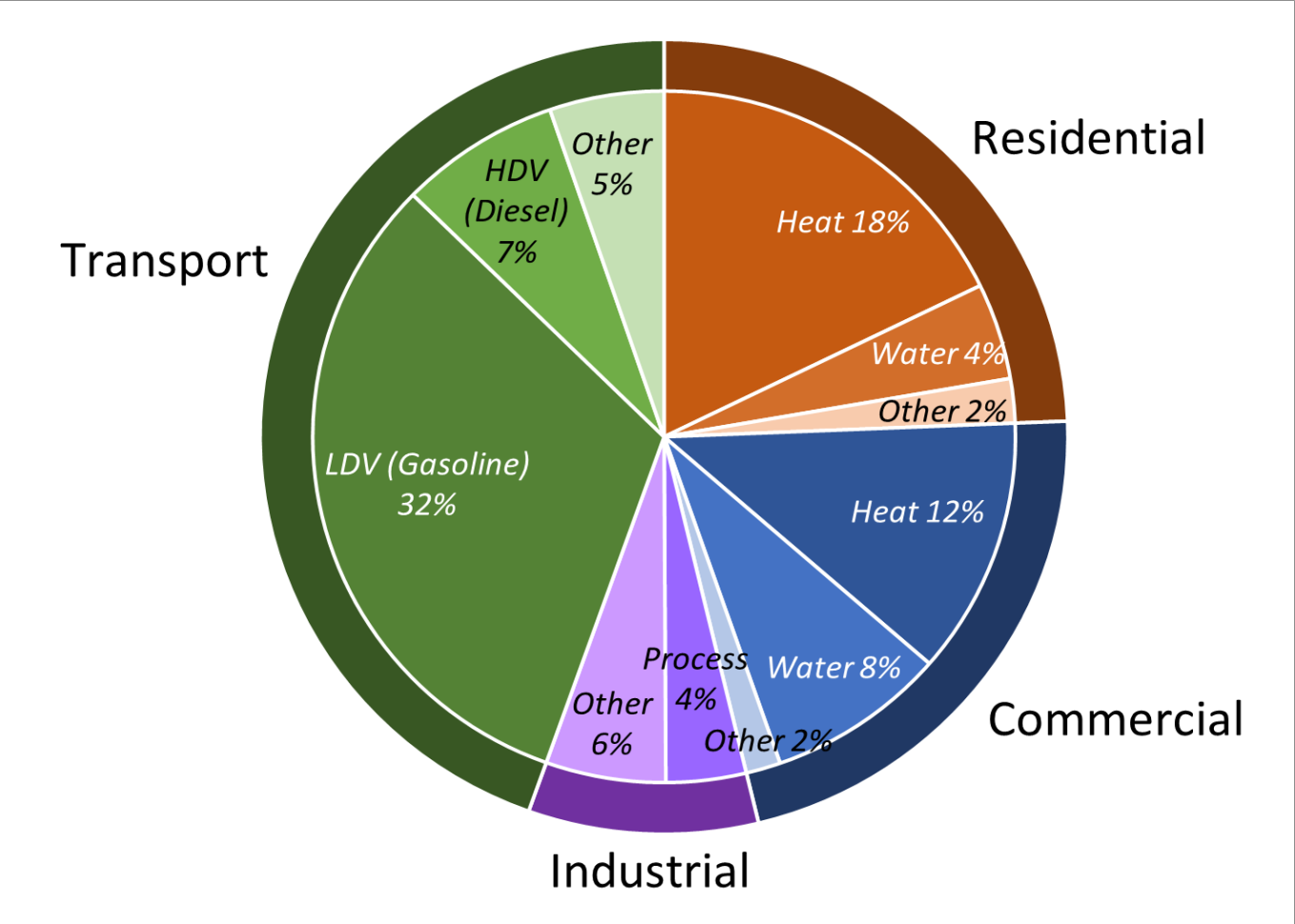
Aren't we on the path to 80% CO2 reductions?



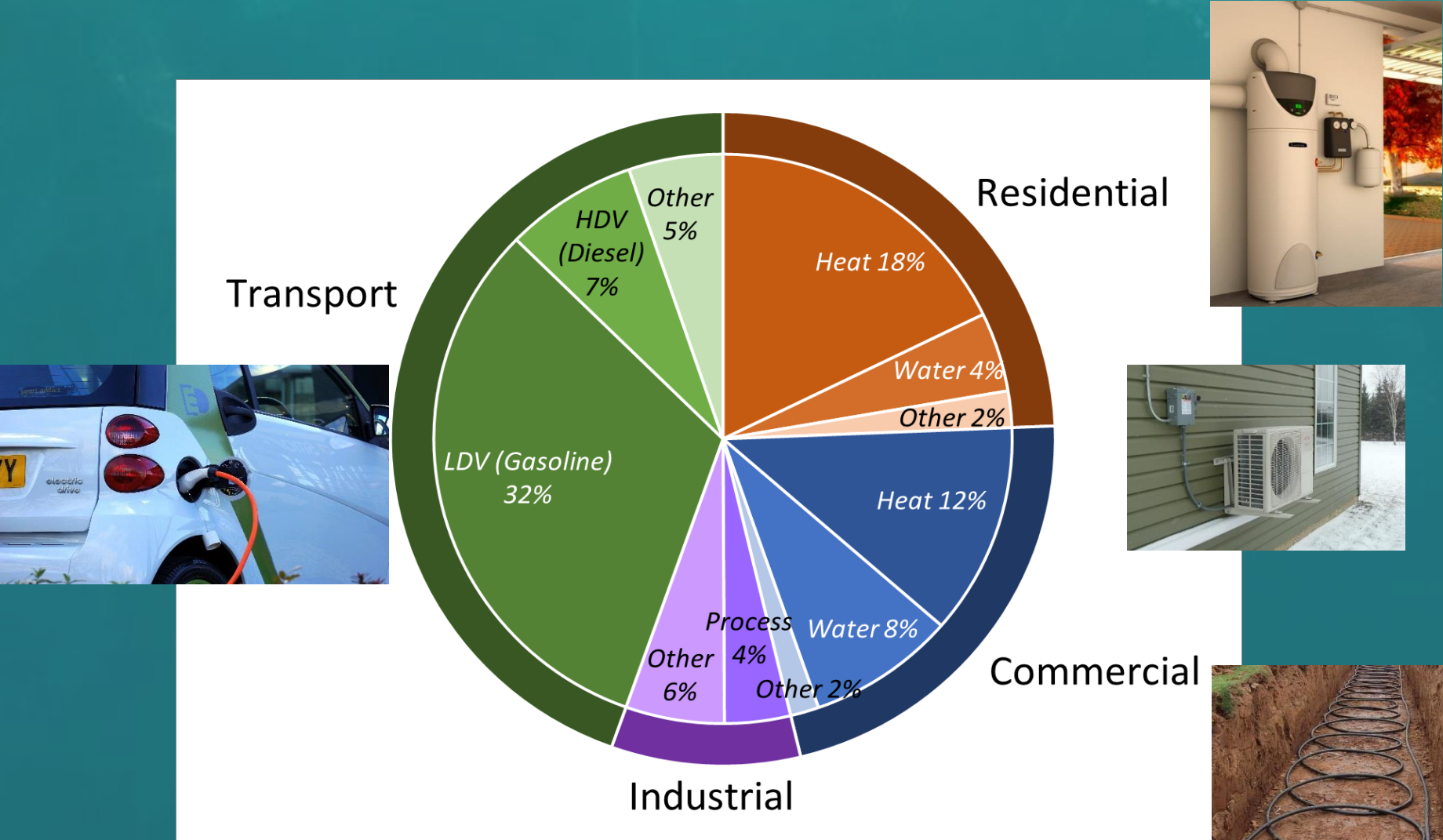
Aren't we on the path to 80% CO2 reductions?



Direct Use of Fossil Fuels (NE/NY)



Advanced Electrification Technologies



Requires massive market transformations

- Assumed Market shares in 2035 according to NEEP's "Plausibly Optimistic" scenario reflects;
 - **Residential Heat Pumps-**
 - 89% for delivered fuel systems
 - 68% sales share of today's natural gas systems sales
 - **Cars and Light trucks-**
 - 70% of Sales

Time to ACT!



Action Plan to Accelerate Strategic
Electrification in the Northeast

Building Decarbonization → 3 Key Elements

NEEP's analysis points to three critical elements to a strategic electrification pathway that benefits consumers, businesses and the environment. These are:



Advanced Electric Technologies

Space/Water heating, EVs



Deep Energy Efficiency

Thermal improvements



Grid Integration

Flexible use of low-carbon electricity

The Action Plan



Establish Goals, Policies, and Programs for Strategic Electrification with Deep Efficiency



Build Public-Private Relationships to Accelerate Strategic Electrification Activities



Protect Consumers



Support Market Development for Key Electrification Pathways



Encourage Local Leadership



Prioritize Low-Income Consumers as a Near-Term Focus



Advance Strategic Electrification with Thermal Efficiency in Homes and Buildings



Provide Public and Consumer Outreach and Education



Address Grid Preparedness to Effectively Manage New, Dynamic Loads

Beneficial Electrification

Keith Dennis
Senior Director, Strategic Initiatives
National Rural Electric Cooperative Association
(NRECA)



Introduction: What is “Beneficial Electrification?”

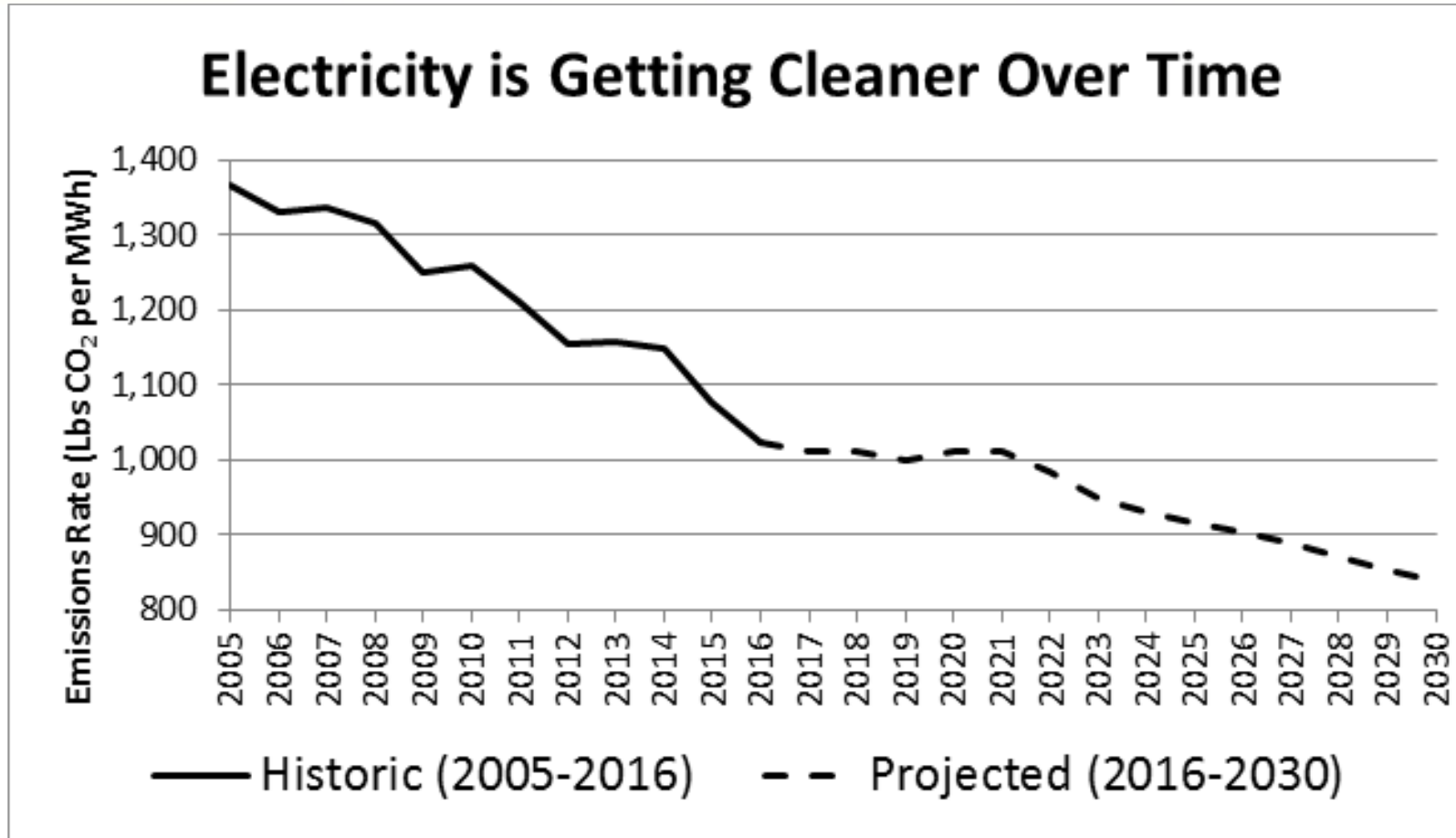
Beneficial Electrification League:

“The application of electricity to end-uses that would otherwise consume fossil fuels (e.g., natural gas, propane, oil, gasoline) where doing so satisfies at least one of the three following conditions, without adversely affecting the other two:

- 1) Benefit the environment and reduce greenhouse gas emissions;
- 2) Save consumers money over time;
- 3) Foster a more robust and resilient grid.”



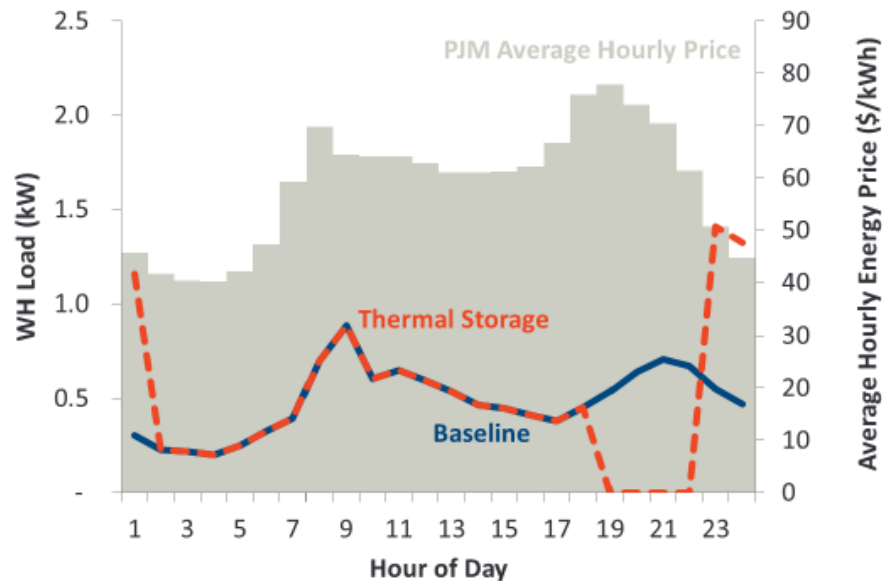
Opportunity for “EBE” to Improve “Emissions Efficiency”



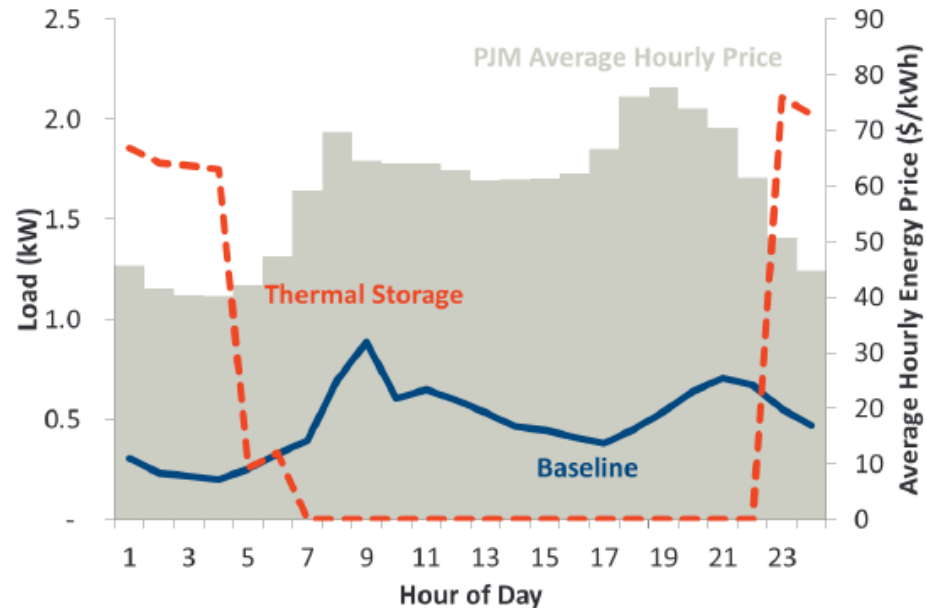
While the energy efficiency of devices will not change once installed, the emissions efficiency (or “emiciency”) will improve over time

Using Electric End-Uses Smartly is Energy Efficiency

50-gallon Tank



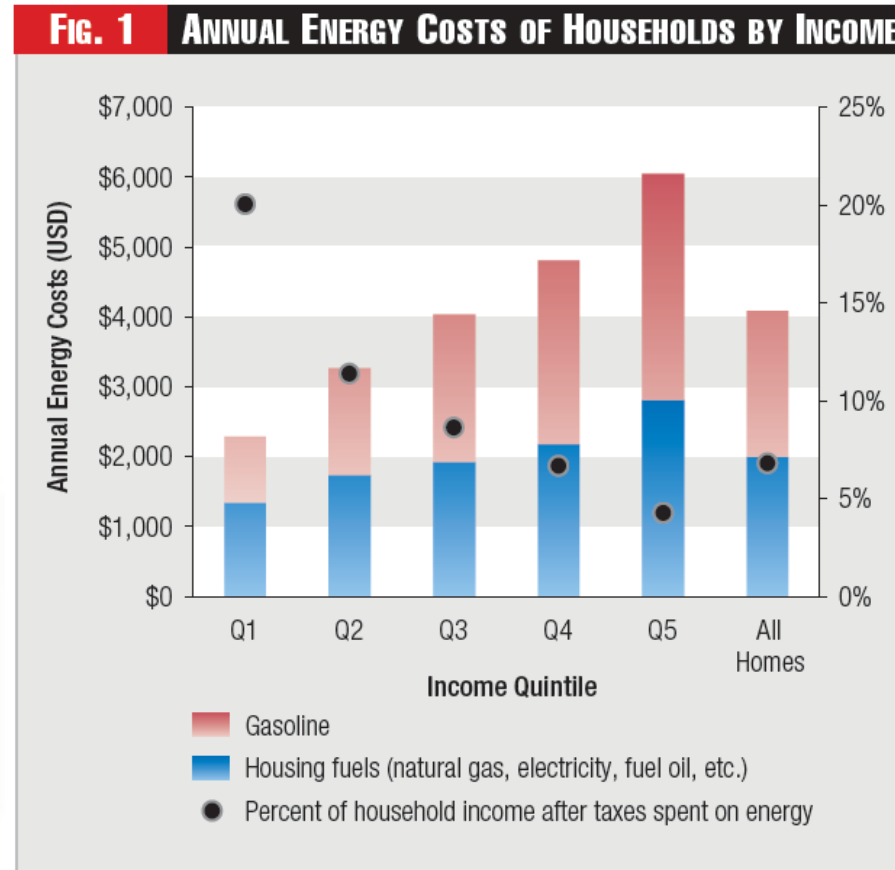
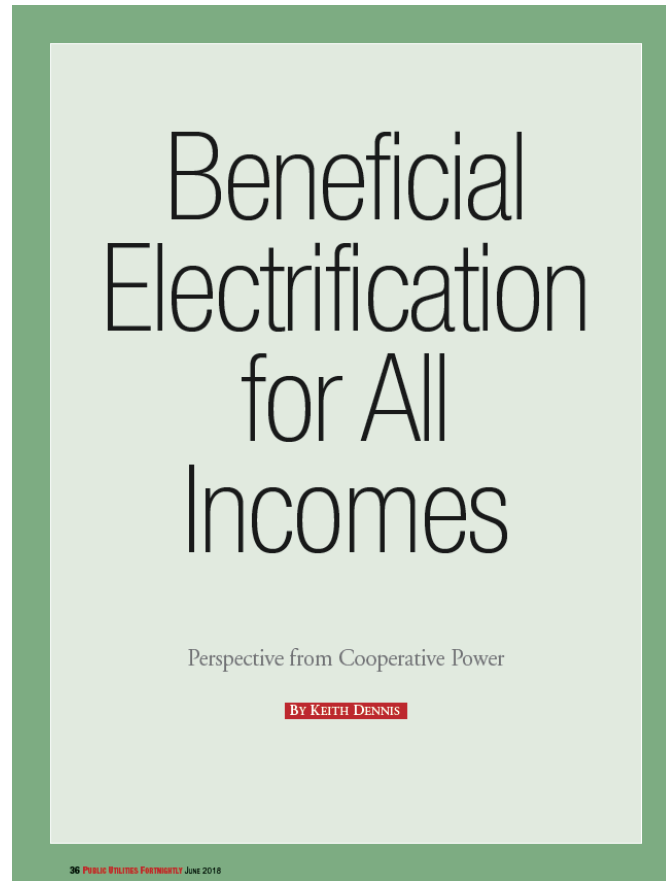
80-gallon Tank



- Electric water heaters can be used as thermal storage to save consumers money, manage the grid, and lower emissions through using energy wisely.
- Energy “efficiency” should include options like smart water heating that changes time of when energy is used. Unlike kWh saved, CO₂ emissions saved are all equal.
- Dual fuel options similarly are beneficial to grid, consumers, and environment
- Source energy and kWh are increasingly outdated metrics for “energy efficiency”

New Opportunities for All Incomes

- June 2018 Public Utility Fortnightly Article



Utilities are a key part of solution with ~ \$8 Billion on EE spending annually

Welcome the “Beneficial Electrification League”!!!



- A new non-profit dedicated to promoting the benefits of beneficial electrification.
- www.beneficialelectrification.com
- Supporters include: Natural Resources Defense Council (NRDC), National Rural Cooperative Association (NRECA), Environment and Energy Institute (EESI), WECC, Great River Energy, Oglethorpe Power, Jackson EMC, and more.

Further Contact Information

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Eugenia Gibbons, Green Energy Consumers Alliance



Using Financing & Special Offers to Support CT Residential Decarbonization Goals and Market Transformation

NEEP Summit

October 3, 2018



Smart-E Loan for Homeowners with Network of Local Lenders & Contractors



Quick, Easy, Affordable

- Unsecured personal loan, no application fee, no prepayment penalty
- **Low-interest** with **flexible terms** and fixed monthly payments
 - 2nd loss reserve used to achieve below market rates and longer terms
- **40+** energy improvements can be financed
 - Boilers, Furnaces, Heat Pumps, Central Air, Insulation, Solar, EV Chargers and more!
 - Loan amounts from \$500-\$40,000
- 25% of Loan can be used to address **health & safety**, appliances, “other”
- **Working capital** built in for contractors

Loan Terms

5-yr	7-yr	10-yr	12-20-yr
4.49%	4.99%	5.99%	6.99%

- **Standard:** **640+ FICO**, 40-45% DTI
- **Credit-Challenged:** **580+ FICO**, 50% DTI



smart-e loan

Case Study: Using Special Promotions with CT Market Transformation in Mind



Goal: Use a 7 month 0.99% interest rate buydown to achieve lasting impacts on the Connecticut market and...

- 1. Support state policies** to drive customer awareness of specific technologies/packages
 - Heat pumps, solar +, going deeper
- 2. Create customer “pull” with contractors** to recruit new companies to Smart-E
- 3. Deepen contractor engagement** with Smart-E

Looking for a more efficient way to chill?

LIMITED-TIME LOW RATES **0.99%**

NO MONEY DOWN / LONG-TERM FINANCING

Heat pump technology is the solution for savings and comfort.

High efficiency heat pump technology can reduce energy costs while cooling and heating your home. Heat pumps provide year-round comfort, making your home cooler in the summer and warmer in the winter.

Limited-Time Heat Pump Technology Special Offer

- 0.99% financing
- 5, 7, and 10-year terms available
- Finance 100% of your project
- Use up to 25% of the loan for related home upgrades like EnergyStar® appliances and healthy home improvements.

Visit www.ctgreenbank.com/smartheatpump to learn more and get started.

Qualifying Heat Pump Technology:



- Ductless mini splits
- Air source heat pumps
- Heat pump hot water heaters
- Geothermal/ground source heat pumps

smart-e loan



in partnership with **energize CT**

EASY AS CHILD'S PLAY

EASY TO APPLY

NO MONEY DOWN

LOW INTEREST FINANCING

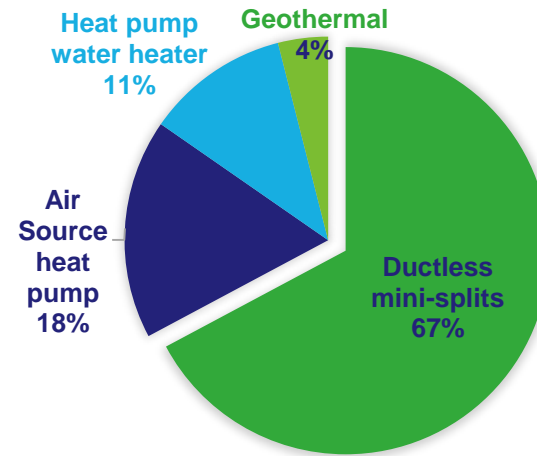
Case Study: Using Special Promotions with CT Market Transformation in Mind



During 2017 Campaign	After Campaign – 2018
<ul style="list-style-type: none">▪ 6x increase in volume – 10x increase in heat pump volume▪ 54 new contractors<ul style="list-style-type: none">▪ Majority of new entrants are HVAC▪ Brought total to 300▪ 85% of contractors used product during campaign<ul style="list-style-type: none">▪ vs. 60% in the year before	<ul style="list-style-type: none">▪ Volume didn't collapse!<ul style="list-style-type: none">▪ 2018 run rate is 3-4x higher than the volume before campaign, including heat pumps▪ Continue training contractors<ul style="list-style-type: none">▪ Over 400 now▪ Majority of new entrants still HVAC▪ Some contractors now funding their own buydowns with lenders

Smart-E Loan Heat Pump Results in Connecticut

SMART-E LOANS with HEAT PUMPS	
2013-2016	174
2017	400
2018	116



smart-e loan



Solar, heat pump helps couple save money and stay comfortable

- **Ductless mini-splits most common**
 - Then air source heat pumps, heat pump water heaters, and geothermal
- **Heat pumps can sell even when oil prices are low**
 - **Cooling** and comfort are the big customer drivers
- **One third of heat pump projects were part of multi-measure jobs**
 - Heat pumps + solar, insulation or other HVAC

More Info:

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energyfuturesgroup.com

Pathways to Residential Building Decarbonization - Home Energy Rating & Labeling to Scale-Up

NEEP SUMMIT 2018

Richard Faesy

October 3, 2018

About Energy Futures Group

Vermont-based clean energy consulting firm established in 2010

Areas of Expertise

- Energy Efficiency & Renewable Energy
- Program Design
- Policy Development
- Expert Witness Testimony
- Building Codes
- Evaluation
- Cost-Effectiveness

Range of Clients

- Government Agencies
- Advocates
- Regulators
- Utilities

Clients in 39 states and provinces plus regional, national and international organizations.



The Decarbonization Challenge

SIZING UP THE CHALLENGE: Efficiency Retrofits + Heating Electrification NY & New England Homes



- 14.6 million homes
- 20% of regional carbon emissions
- 73% built before 1980
- 80%+ need:
 - + Efficiency retrofits and associated improvements
 - + Heat pumps
 - = \$5,000 - \$20,000 per home
- Cost: \$175 billion +



\$14 Billion Annual Regional Spend on Home Heating Fuels

Decarbonization Strategies

NEEP's Regional Action Plan



Establish Goals, Policies, and Programs for Strategic Electrification with Deep Efficiency



Build Public-Private Relationships to Accelerate Strategic Electrification Activities



Protect Consumers



Support Market Development for Key Electrification Pathways



Encourage Local Leadership



Prioritize Low-Income Consumers as a Near-Term Focus



Advance Strategic Electrification with Thermal Efficiency in Homes and Buildings



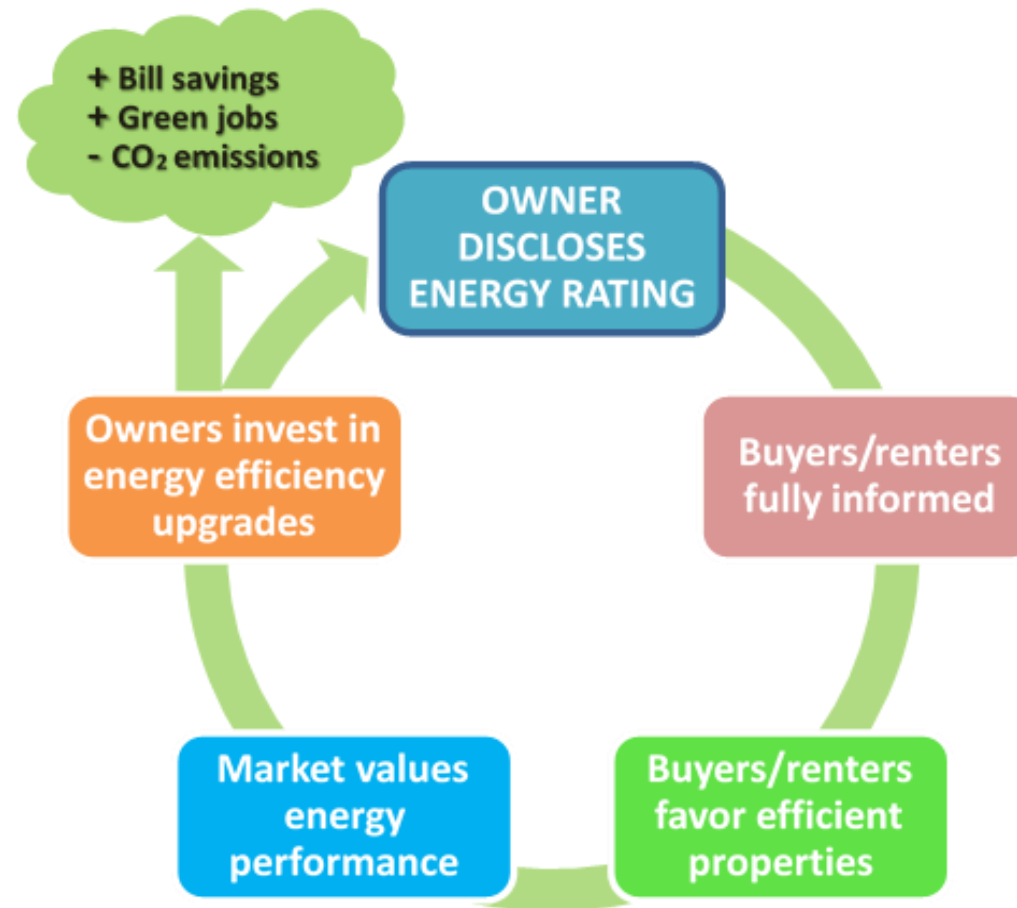
Provide Public and Consumer Outreach and Education



Address Grid Preparedness to Effectively Manage New, Dynamic Loads

Energy Labeling Supports These Efforts

- Key to scaling-up investments in building efficiency, renewables and electrification by making energy visible
- The “Virtuous Cycle of Energy Information Disclosure”



(Dunsky/NEEP 2009)

Labeling & Disclosure Supports Decarbonization

1. Transparency allows for market valuation of energy efficient properties and their features.
 - To overcome market awareness, lender/appraiser/Realtor, policy and regulatory barriers
2. Prepares the market for building energy performance requirements for existing buildings.
 - Voluntary programs are insufficient to meet our climate stabilization goals.
 - Building energy codes for existing buildings will be needed.
 - Portland, Oregon time of listing Home Energy Score requirement
 - District of Columbia pending legislation to establish a minimum energy performance requirement for existing commercial buildings
 - Rating and Disclosure ordinance (2008)
 - Database of benchmarking
 - Helped build market capacity

Tools and Resources

- **EMPRESS**
(<http://empress.naseo.org/energy-labeling>)
- **HELIX** (Home Energy Labeling Information eXchange)
 - Database to move energy information into the MLS
 - NEEP project
- **PEARL Certification**
(<https://pearlcertification.com/>)
- **EPA ENERGY STAR Certification for Existing Homes**

Home Energy Labeling:

A Guide for State and Local Governments

Created by the EMPRESS Team



The EMPRESS (Energy Metrics to Promote Residential Energy Scorecards in States) project is a State Energy Office-led 2017-2018 project supported by funding from the U.S. Department of Energy State Energy Program and private sector partners. The project is focused on enhancing large-scale residential home energy labeling and harmonizing various energy scoring programs to better support the market valuation of energy efficient homes.

Project Partners Include: the Rhode Island Office of Energy Resources, the Massachusetts Department of Energy Resources, the Missouri Division of Energy, the Arizona Energy Office

What's Next?

- Create labels that are relevant and understandable
 - To building owners, tenants, buyers, investors, lenders, appraisers, Realtors, code officials, utilities, policy makers, etc.
- Support a labeling infrastructure
 - Of credentialed professionals (HERS Raters, BPI contractors, engineering firms, etc.)
- Make energy visible
 - Auto-populate MLS, Zillow, Realtor.com, Trulia, etc. with data from utility programs, code compliance, solar installations, etc.
- Support markets and reward building upgrades through transparency and disclosure at time of listing
- Evolve building energy codes to disclose, reward low-users and upgrade high users






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Moderator: Dave Lis, NEEP

Audience small group discussions



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- What were the most compelling strategies or programs you heard from the panel?
- What outstanding questions do you have about the strategies or programs?