

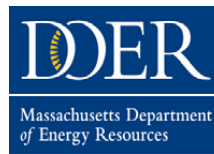
# Massachusetts Renewable Thermal Opportunities and Impacts

CESA Webinar- May 30, 2012

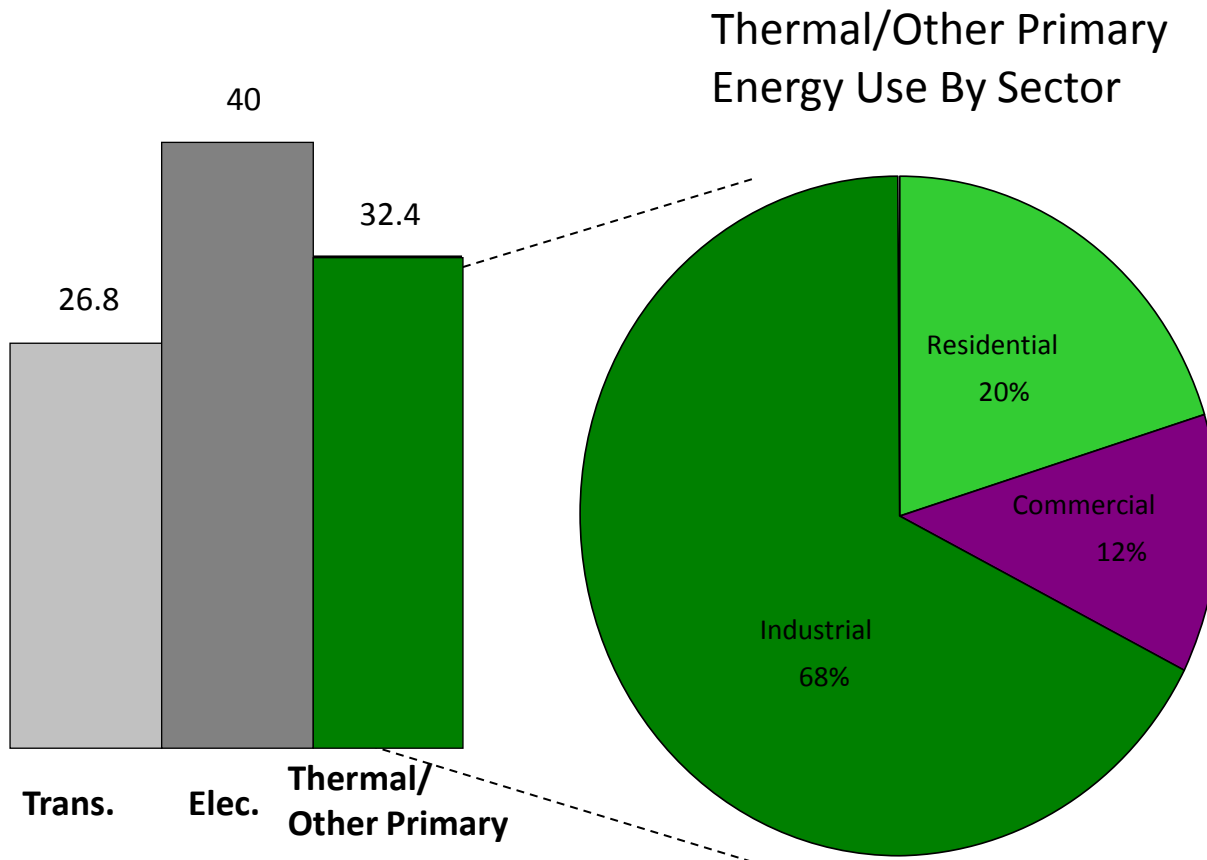
Christie Howe, Massachusetts Clean Energy Center

Neil Veilleux, Meister Consultants Group

Bram Claeys, Massachusetts Department of Energy Resources



# US Primary Energy Consumption

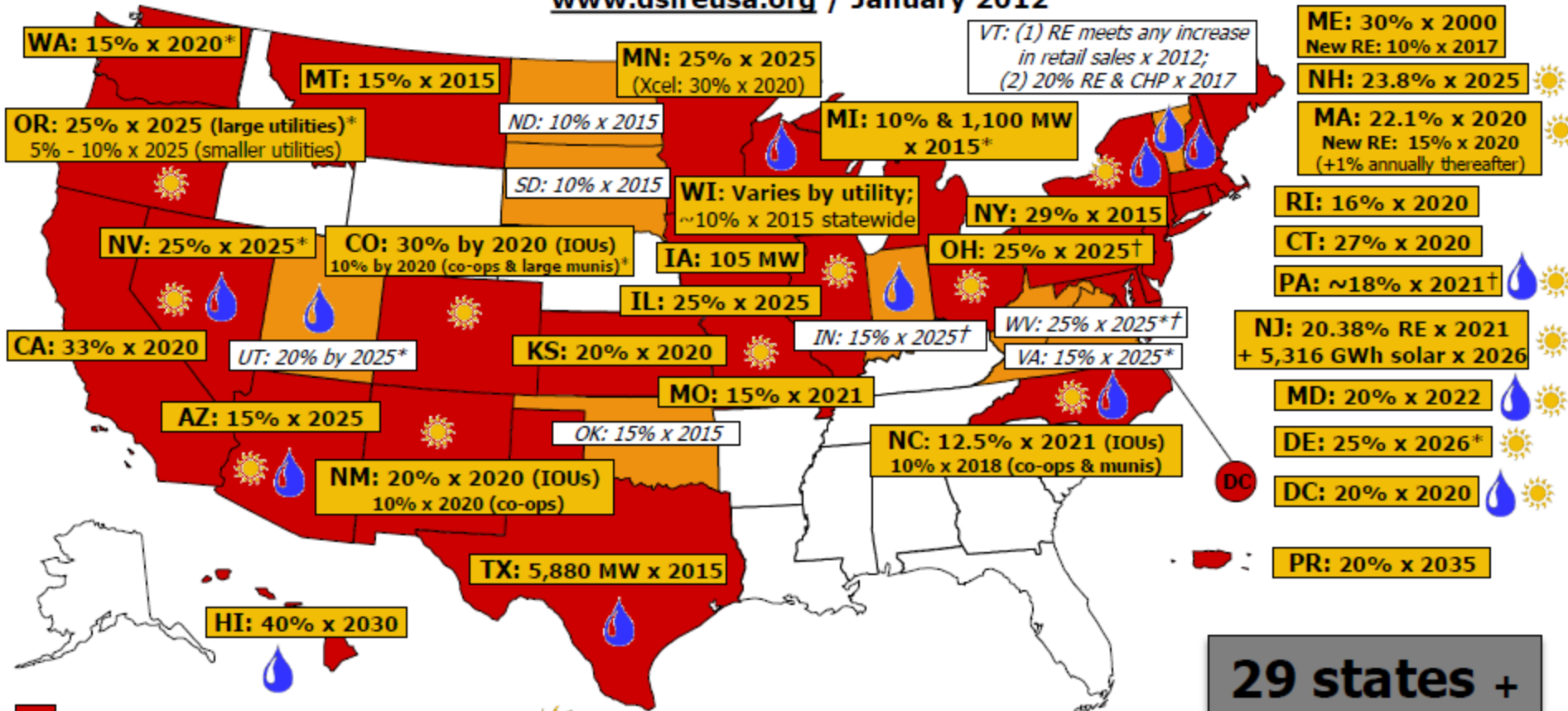


Source: New England Wood Pellet, LLC, based on US EIA data

# STATE RENEWABLE ELECTRICITY POLICIES

## RPS Policies

[www.dsireusa.org](http://www.dsireusa.org) / January 2012



- Renewable portfolio standard
- Renewable portfolio goal
- Solar water heating eligible

- Minimum solar or customer-sited requirement
- Extra credit for solar or customer-sited renewables
- Includes non-renewable alternative resources

**29 states + DC and PR have an RPS**  
(8 states have goals)

# STATE RENEWABLE TRANSPORTATION POLICIES

- Financial Incentives (FI)
- Vehicle Acq / Fuel Use Reg. (VA&EU)

**EPA** United States Environmental Protection Agency

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## Renewable Fuel Standard (RFS)

[Renewable Fuel Standard \(RFS\) Home](#) [Regulations & Standards](#) [Compliance Help](#) [Notices](#) [Moderated Transaction System](#)

EPA is responsible for developing and implementing regulations to ensure that transportation fuel sold in the United States contains a minimum volume of renewable fuel. The Renewable Fuel Standard (RFS) program regulations were developed in collaboration with refiners, renewable fuel producers, and many other stakeholders.

The RFS program was created under the Energy Policy Act (EPA) of 2005, and established the first renewable fuel volume mandate in the United States. As required under EPA, the original RFS program (RFS1) required 7.5 billion gallons of renewable- fuel to be blended into gasoline by 2012.

Under the Energy Independence and Security Act (EISA) of 2007, the RFS program was expanded in several key ways:



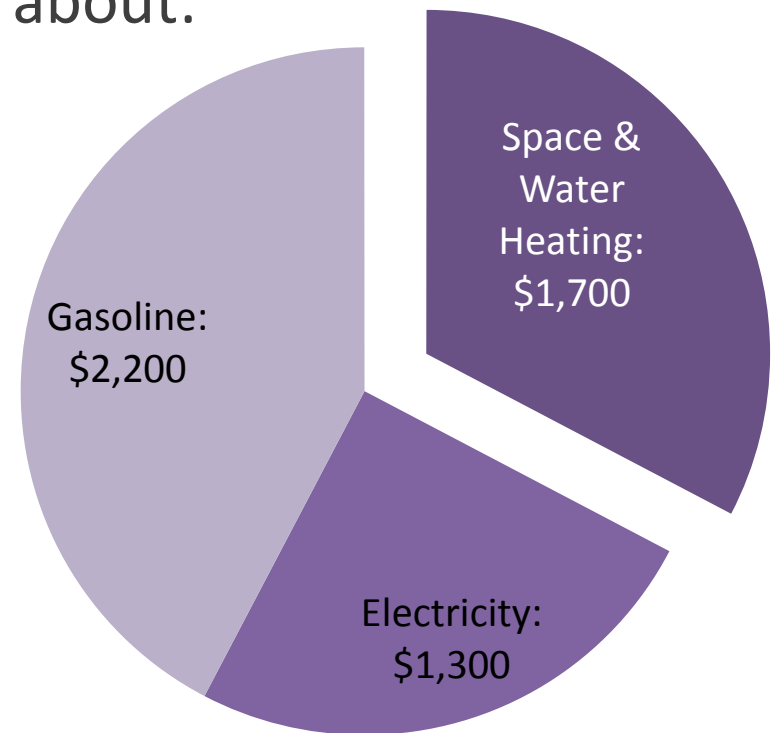
# Integrated policy support for renewable thermal technologies?



# Renewable Thermal Benefits

- Economic Growth
- Job Creation
- Reduction of Greenhouse Gas (GHG) emissions
- Improved Energy Security

In 2008, an average MA household spent about:



Source: Massachusetts Clean Energy & Climate Plan for 2020

# Renewable Thermal Development in MA

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- Global Warming Solutions Act
  - Commits MA to GHG reductions of 25% below 1990 levels by 2020 and 80% below 1990 levels by 2050
- Massachusetts Clean Energy and Climate Plan for 2020
  - Renewable thermal technologies to displace 2 million tons of GHG emissions, or ~2% of total 1990 emissions
- Massachusetts Clean Energy Center Incentive Programs
  - Commonwealth Solar Hot Water Programs
- Massachusetts Stretch Code
  - Performance-based appendix to MA Building Code with more advanced energy efficiency standards

# RH&C Opportunities & Impacts Study

- Commissioned by Mass Department of Energy Resources (DOER) and Mass Clean Energy Center (MassCEC)
- Project Team
  - Meister Consultants Group
  - Regional and national renewable thermal professional and business associations (BTEC, NEGPA, MOC, SEBANE)
- Current market status and supply chain
- Market barriers and potential
- Lifecycle cost assessment and simple payback
- GHG emissions and job creation potential

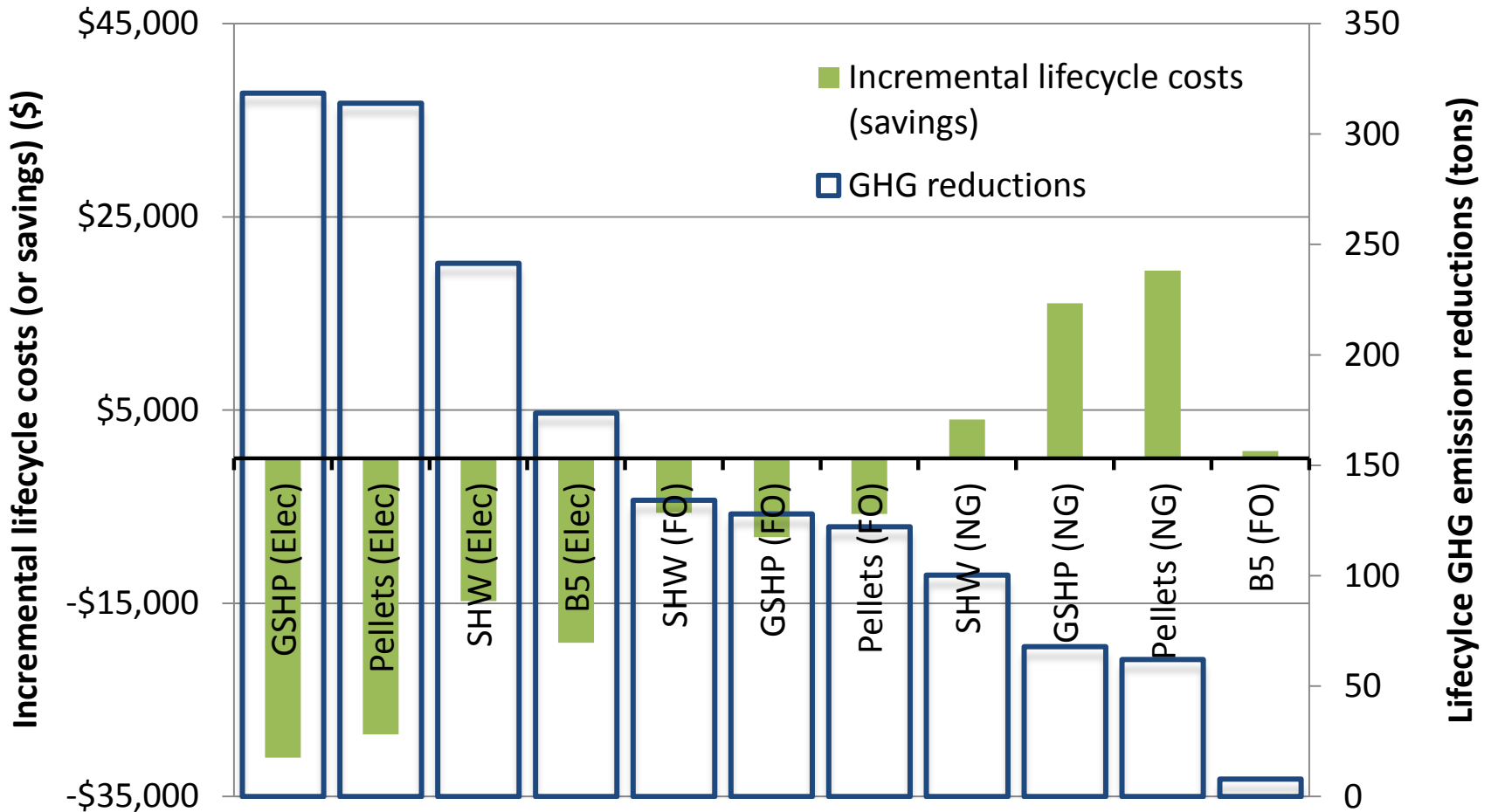




# RH&C Study – Massachusetts Scenarios

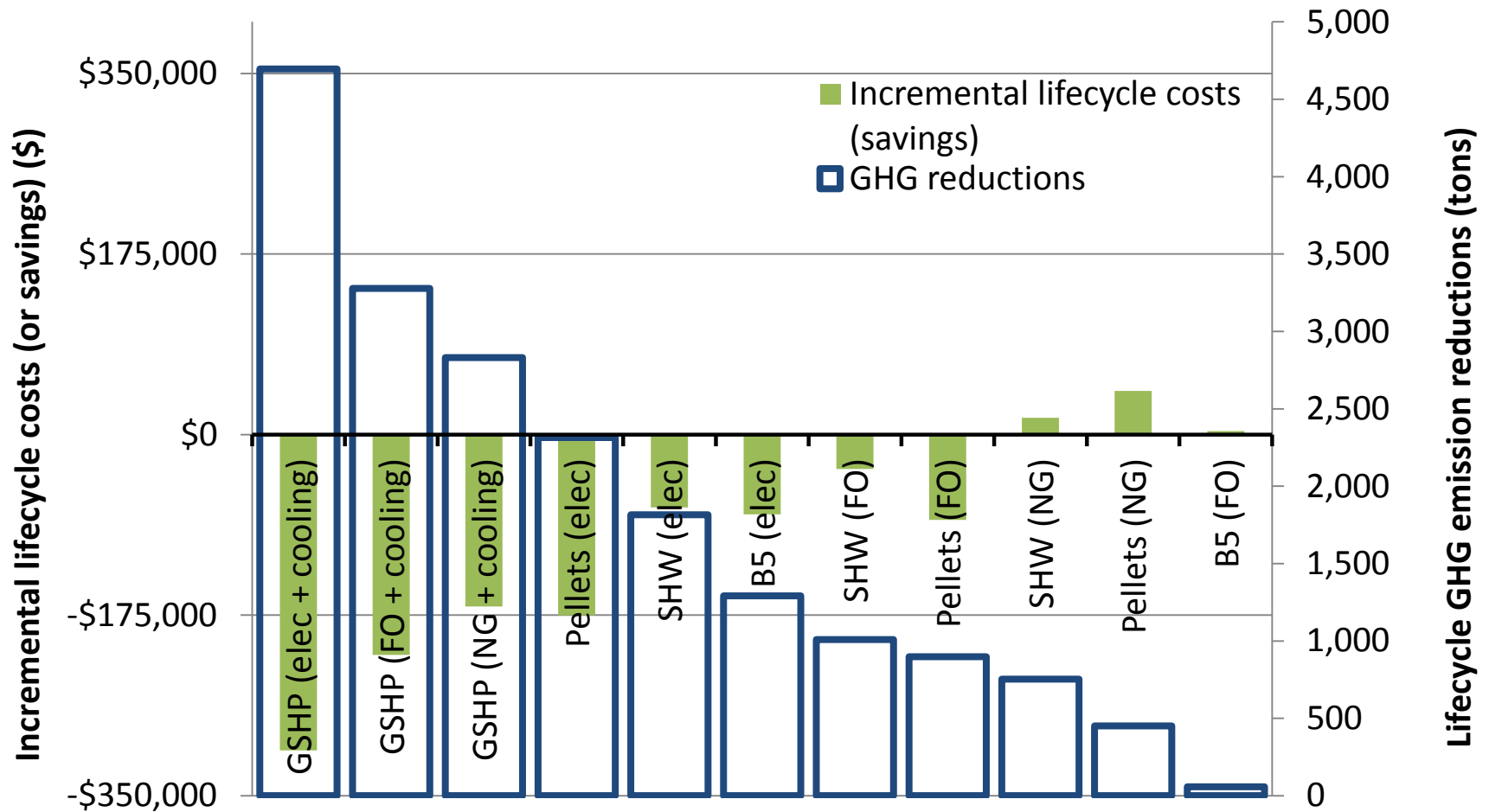
| Abbreviation          | RH&C Technology         | Fossil Fuel Heating Replaced | Cooling Load Included? |
|-----------------------|-------------------------|------------------------------|------------------------|
| GSHP (elec + cooling) | Ground-source heat pump | Electricity                  | Yes (commercial only)  |
| GSHP (FO + cooling)   | Ground-source heat pump | Fuel Oil                     | Yes (commercial only)  |
| GSHP (NG + cooling)   | Ground-source heat pump | Natural Gas                  | Yes (commercial only)  |
| Pellets (elec)        | Biomass Heating Pellets | Electricity                  | No                     |
| SHW (elec)            | Solar Hot Water         | Electricity                  | No                     |
| B5 (elec)             | Biodiesel (5% blend)    | Electricity                  | No                     |
| SHW (FO)              | Solar Hot Water         | Fuel Oil                     | No                     |
| Pellets (FO)          | Biomass Heating Pellets | Fuel Oil                     | No                     |
| SHW (NG)              | Solar Hot Water         | Natural Gas                  | No                     |
| Pellets (NG)          | Biomass Heating Pellets | Natural Gas                  | No                     |
| B5 (FO)               | Biodiesel (5% blend)    | Fuel Oil                     | No                     |

# RH&C Study – Residential Results



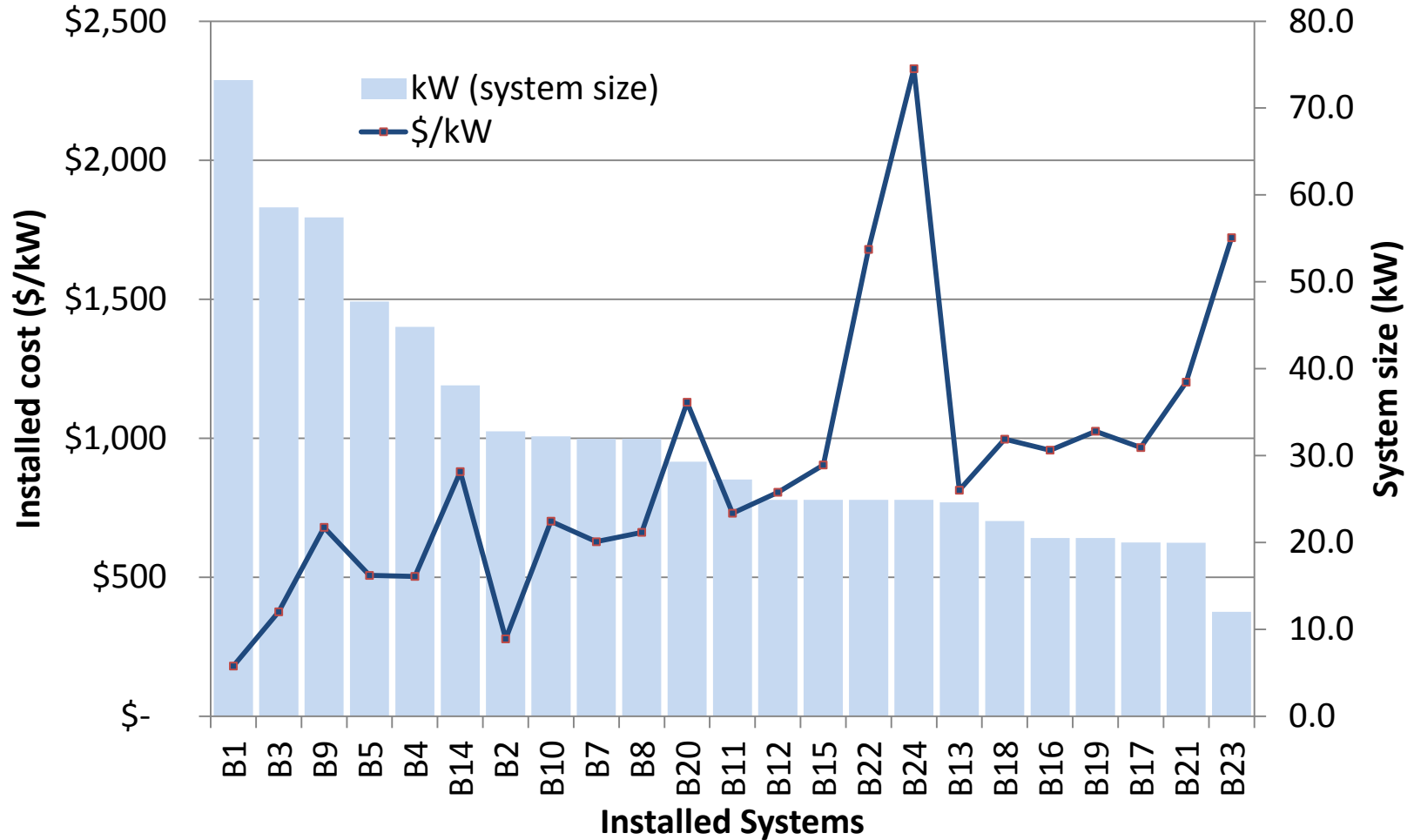
GHG reductions & lifecycle costs (or savings) for **residential** renewable thermal systems in MA

# RH&C Study – Commercial Results



GHG reductions & lifecycle costs (or savings) for **commercial** renewable thermal systems in MA

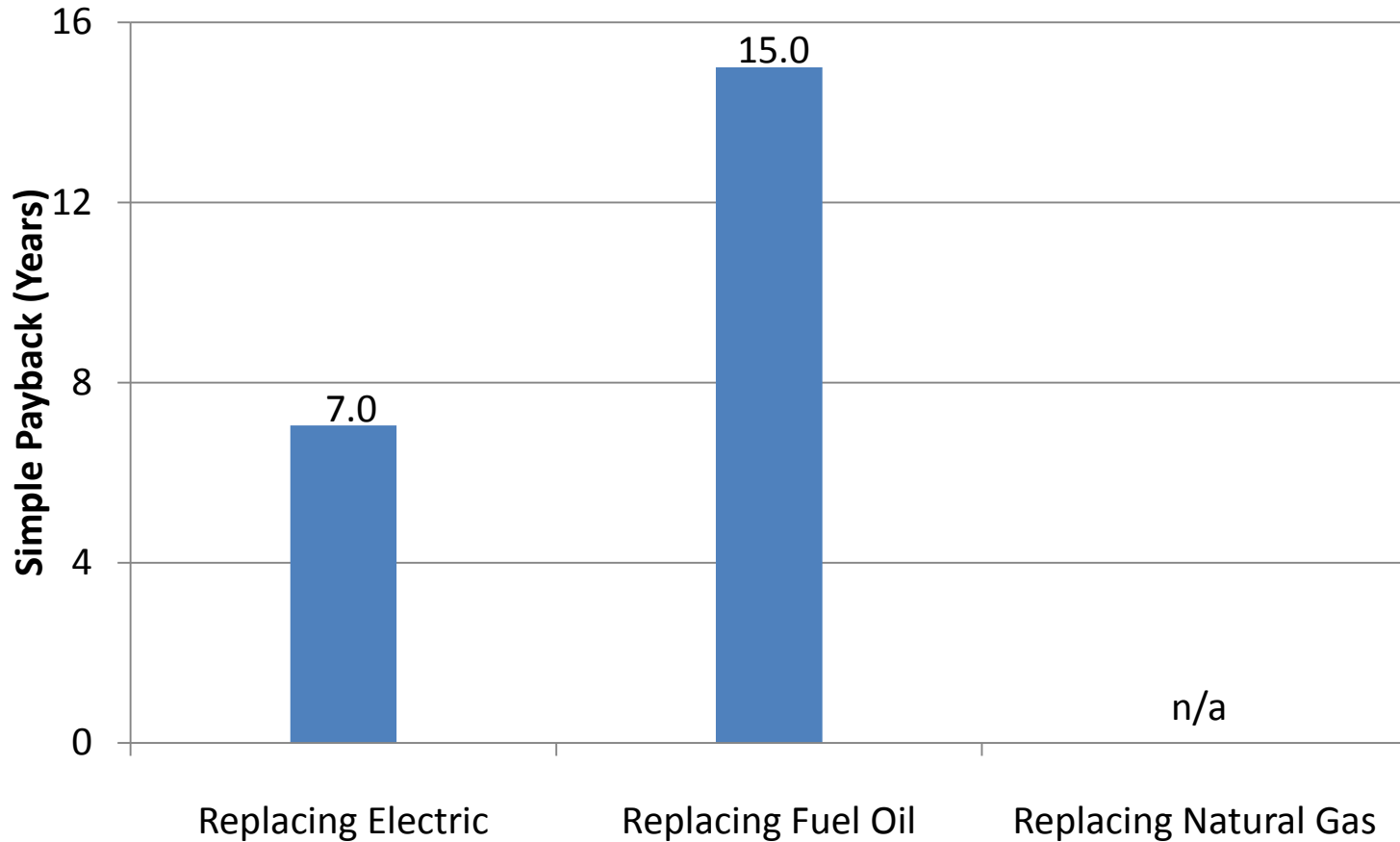
# Example: Residential Biomass Thermal System Costs



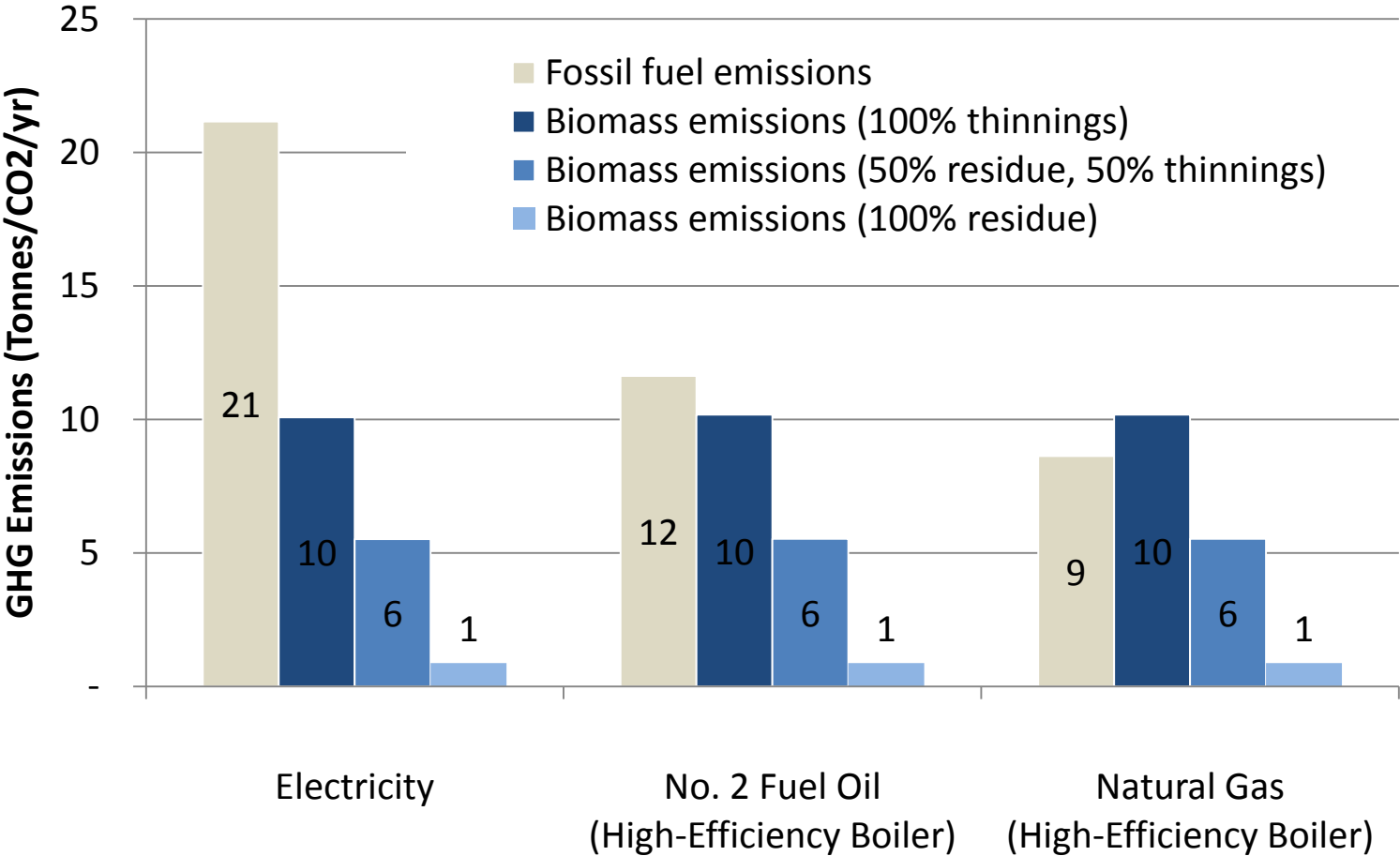
# Example: Residential Biomass Thermal Payback

## Assumptions:

- ~\$21,000 for a 13 kWth system (44,000 BTU/hr)
- Fossil fuel back-up system in place



# Example: Residential Biomass Thermal GHG Emission (Reductions)



# Policy development

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# Emerging US RE Heating Policy

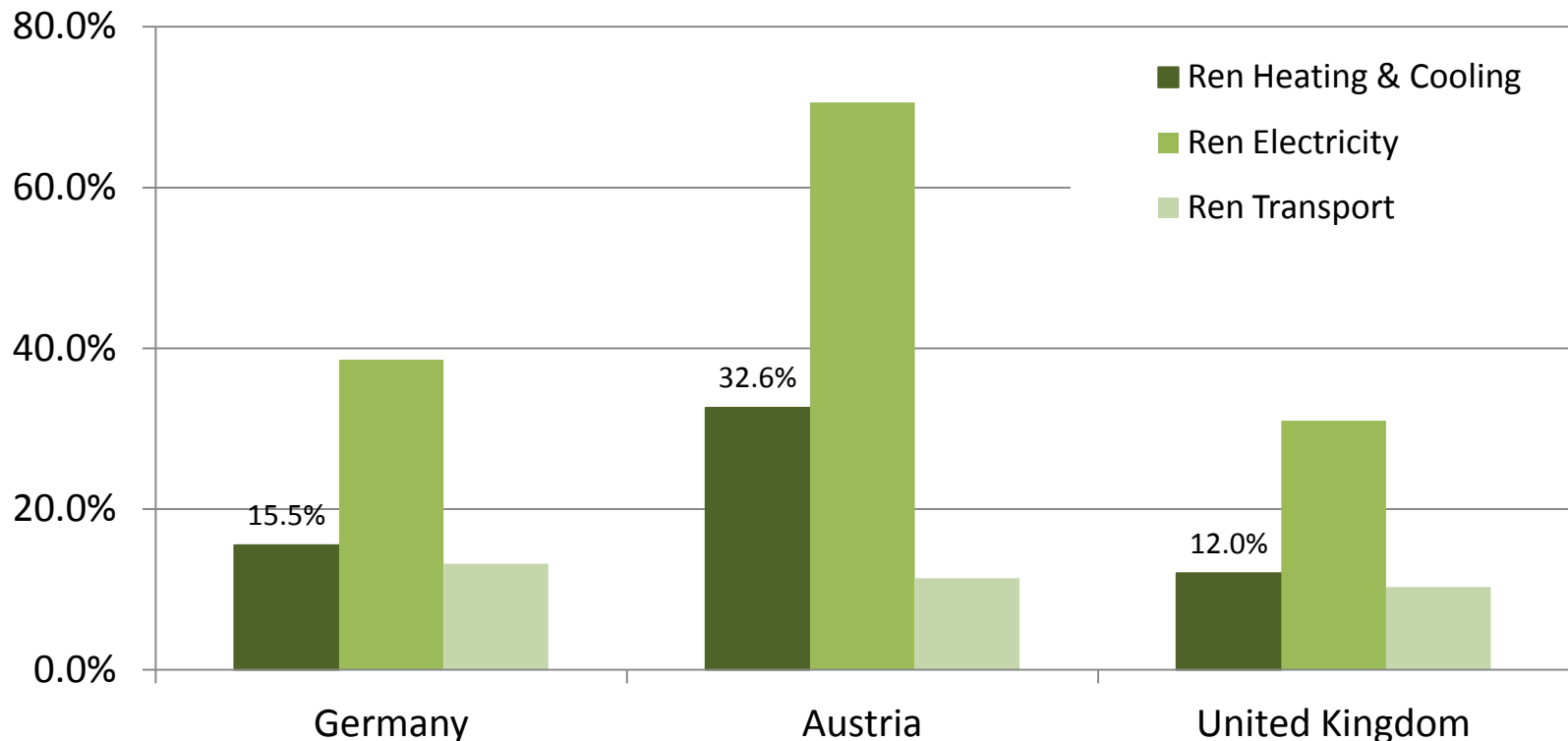


- **Federal**
  - REAP Act: PTC for non-electrical RE
  - SHW included in federal RPS proposal
  - Biomass stoves get 30% federal tax credit
- **States considering or having some or all RE thermal in RPS:**
  - NH, AZ, NV, UT, TX, KS, WI, NC
- **Hawaii** passes solar heating mandate
- **Minnesota** considering legislation to allow utilities to offer rebates for renewable heating (HF 2159)



# Renewable Thermal Targets in EU Countries

## European Union 2020 Targets



Source: *National Renewable Energy Action Plans*

# European approach

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- EU: targets and link to building energy performance
- Germany
  - Integrated framework of targets, grants
  - Bonus for combinations of technologies, efficiency
- United Kingdom
  - Renewable Heating Incentive
    - Metering
- Austria (Upper Austria)
  - Solar Hot Water is strategic objective
  - Grants, building regulations, promotion



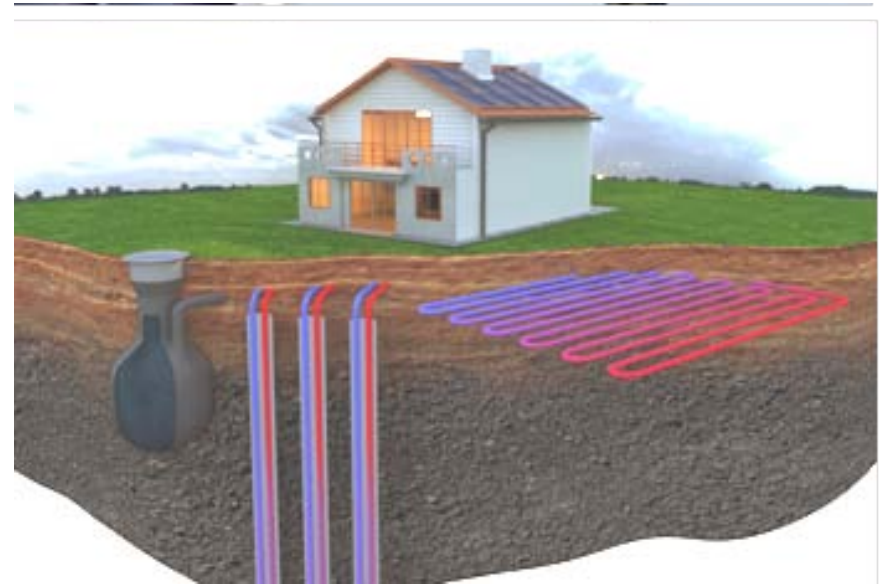
# The need for a comprehensive approach

## 1. Financial Incentives

- Minimum Technical Requirements
- Installer Qualification
- Performance Monitoring

## 2. Expanding Awareness

- Targeted marketing
  - Facility owners/managers in priority sectors
  - Installers, building professionals, fossil fuel distributors
- General public awareness campaign



## 3. Integration into Building code

- Efficiency & renewables

## 4. Training

- Skilled workers/Contractors
- Community Colleges
- Inspectors

# Massachusetts – Next Steps

- Study is important foundation
  - MA businesses and stakeholders can evaluate market opportunities
  - Policymakers can assess policy and programmatic needs and options to efficiently stimulate renewable thermal market
- DOER leading next steps
  - Discuss study's findings with stakeholders and the public
  - Develop renewable thermal pilots with MassCEC

# Thank you!

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- DOER website: [www.mass.gov/doer](http://www.mass.gov/doer)