

Massachusetts Renewable Thermal Webinar

August 15, 2012

Welcome! We will begin shortly...

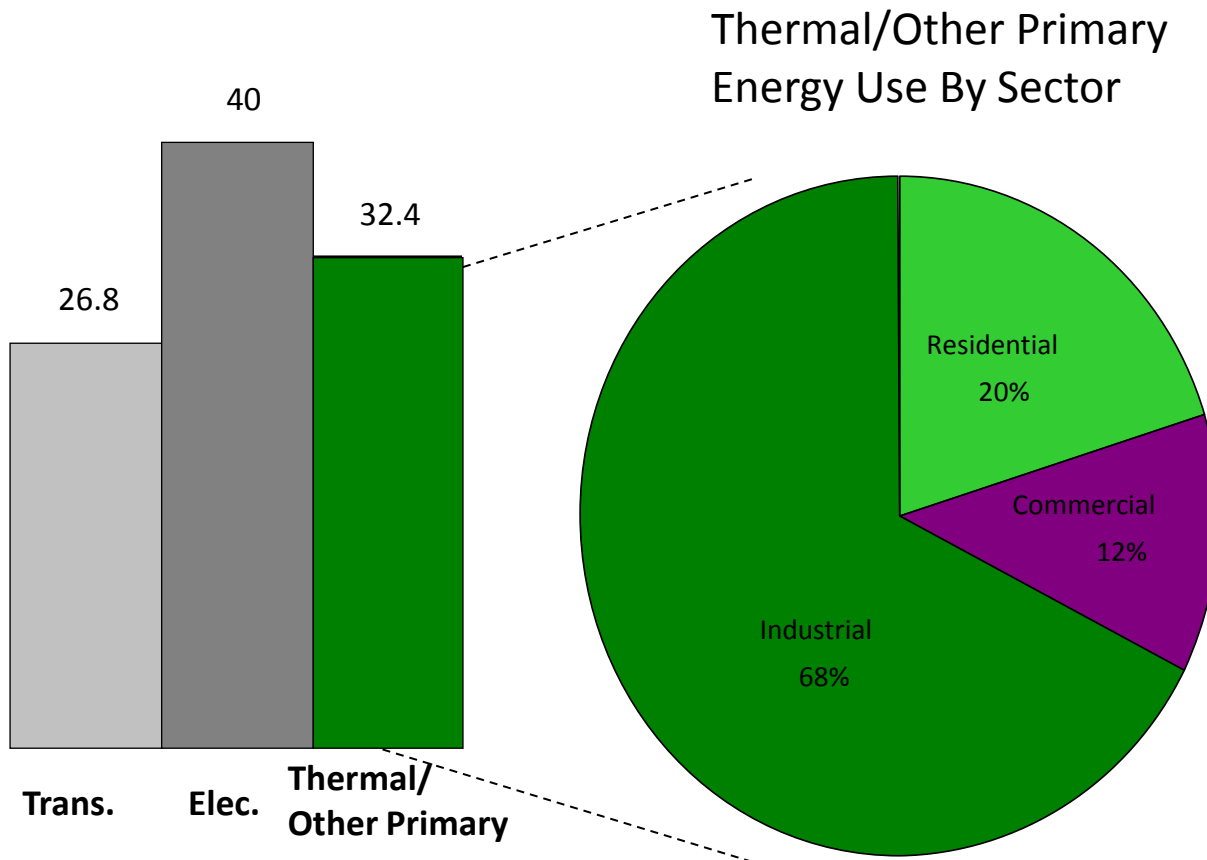
Agenda

- History and policy development overview
 - Dwayne Breger – Massachusetts Department of Energy Resources
- Renewable Heating and Cooling Opportunities & Impacts Report
 - Neil Veilleux – Meister Consultants Group
- MassCEC/DOER Renewable Thermal Pilot Programs
 - Christie Howe - MassCEC

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US Primary Energy Consumption

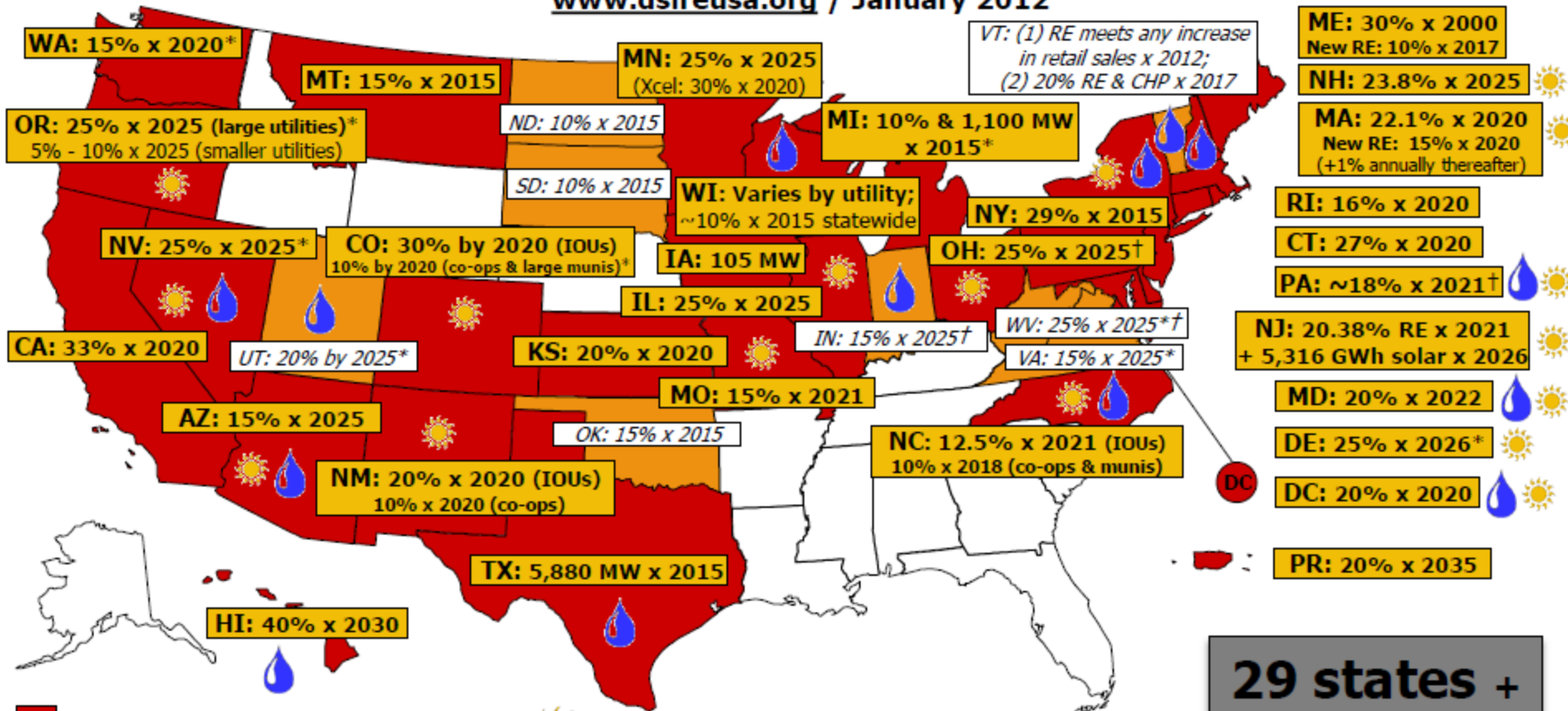


Source: New England Wood Pellet, LLC, based on US EIA data

STATE RENEWABLE ELECTRICITY POLICIES

RPS Policies

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)

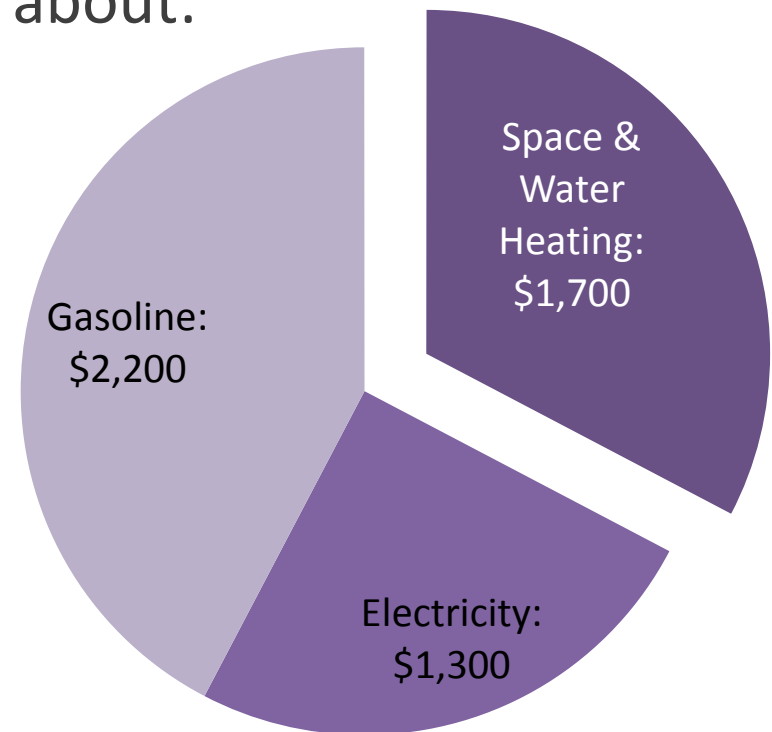
Integrated policy support for renewable thermal technologies?



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

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: carve-out for all thermal technologies in RPS as of 1/1/2013
 - 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)

European approach

- 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



Renewable Thermal Development in MA

- 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
 - DOER/CEC commissioned renewable heating and cooling market analysis (published April 2012)
- Energy Bill (S2395, July 2012)
 - Study useful thermal in the Alternative Portfolio Standard

Renewable Thermal Development in MA

- Incentive programs
 - Commonwealth Solar Hot Water Programs (\$10m)
 - ARRA funds: biomass thermal pilots and business transformation (Sandri)
 - Alternative Compliance Payment funds from RPS programs
 - Renewable thermal and cogeneration at public housing (\$2m)
 - Renewable thermal pilots (\$6m)
 - Thermal Business Investment Financing (\$3m)
 - DOE State Energy Projects
 - Renewable thermal retrofits in public housing and schools (\$715k)

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RH&C Opportunities & Impacts Study

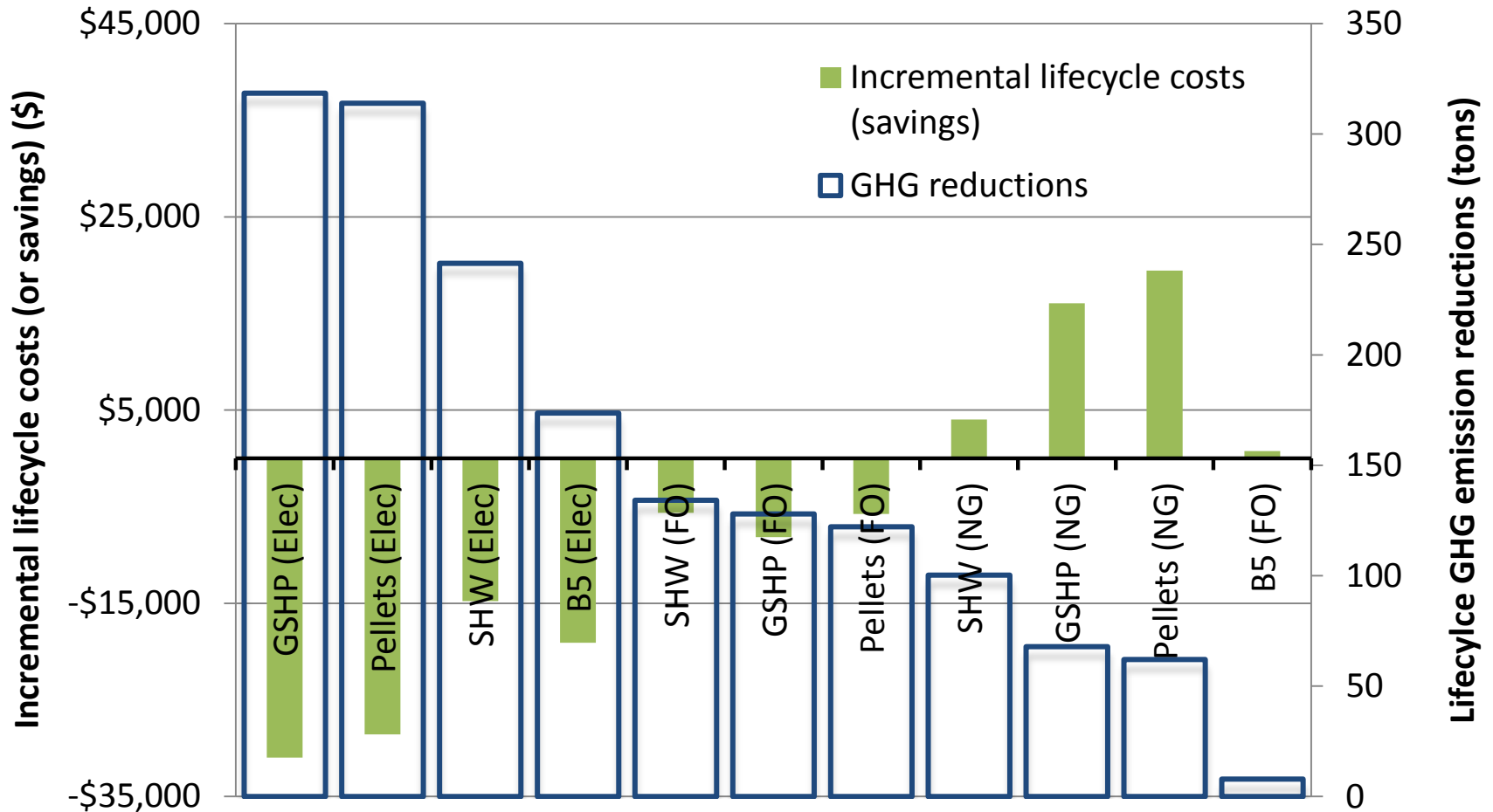
- Commissioned by Mass Department of Energy Resources (DOER) and Mass Clean Energy Center (MassCEC)
- Project Team
 - Meister Consultants Group
 - Regional and national renewable thermal professional and business associations (BTEC, NEGPA, MOC, SEBANE)
- Current market status and supply chain
- Market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



RH&C Study – Massachusetts Scenarios

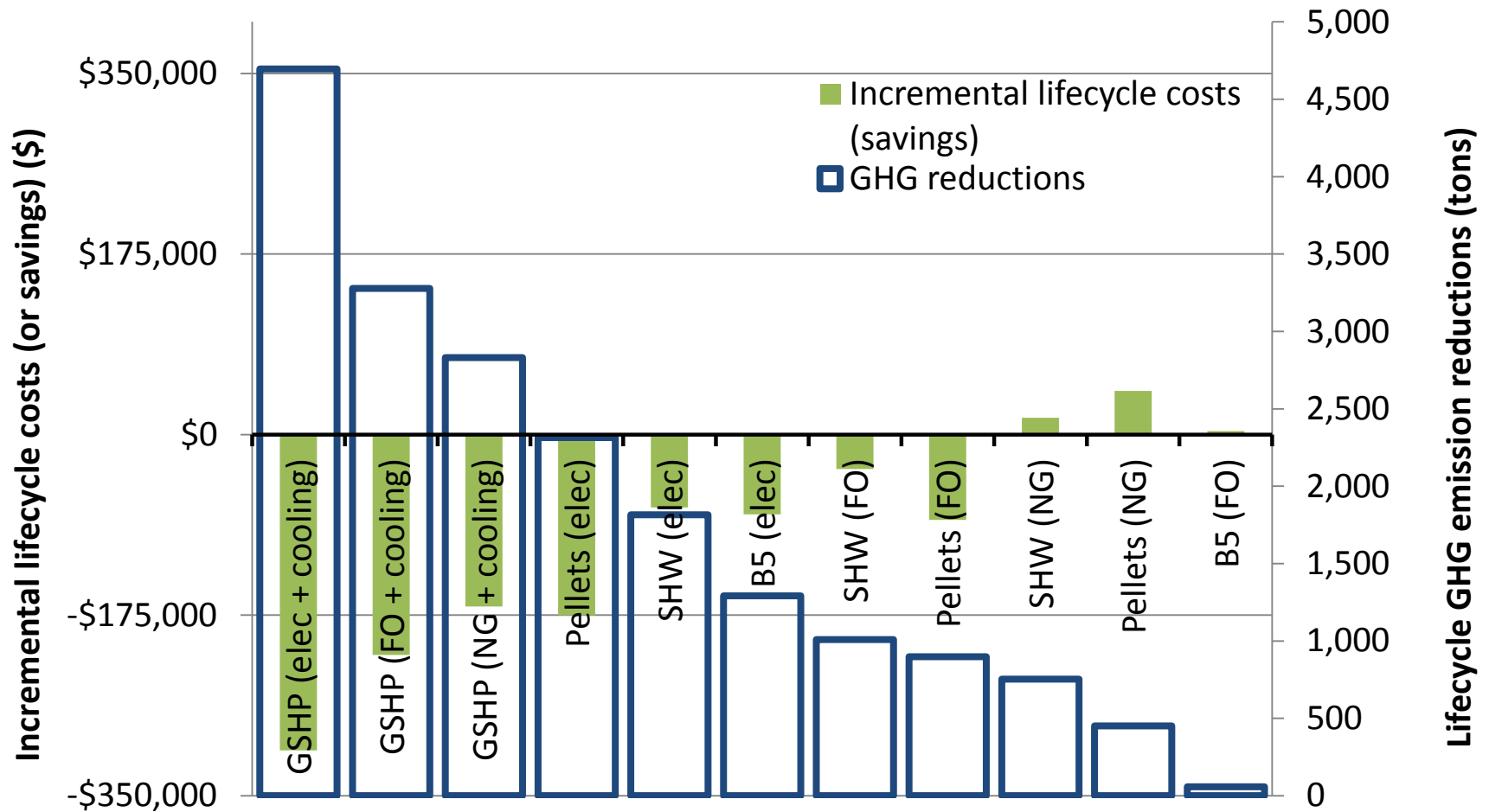
| Abbreviation | RH&C Technology | Fossil Fuel Heating Replaced | Cooling Load Included? |
|-----------------------|-------------------------|------------------------------|------------------------|
| GSHP (elec + cooling) | Ground-source heat pump | Electricity | Yes (commercial only) |
| GSHP (FO + 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 |
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RH&C Study – Residential Results



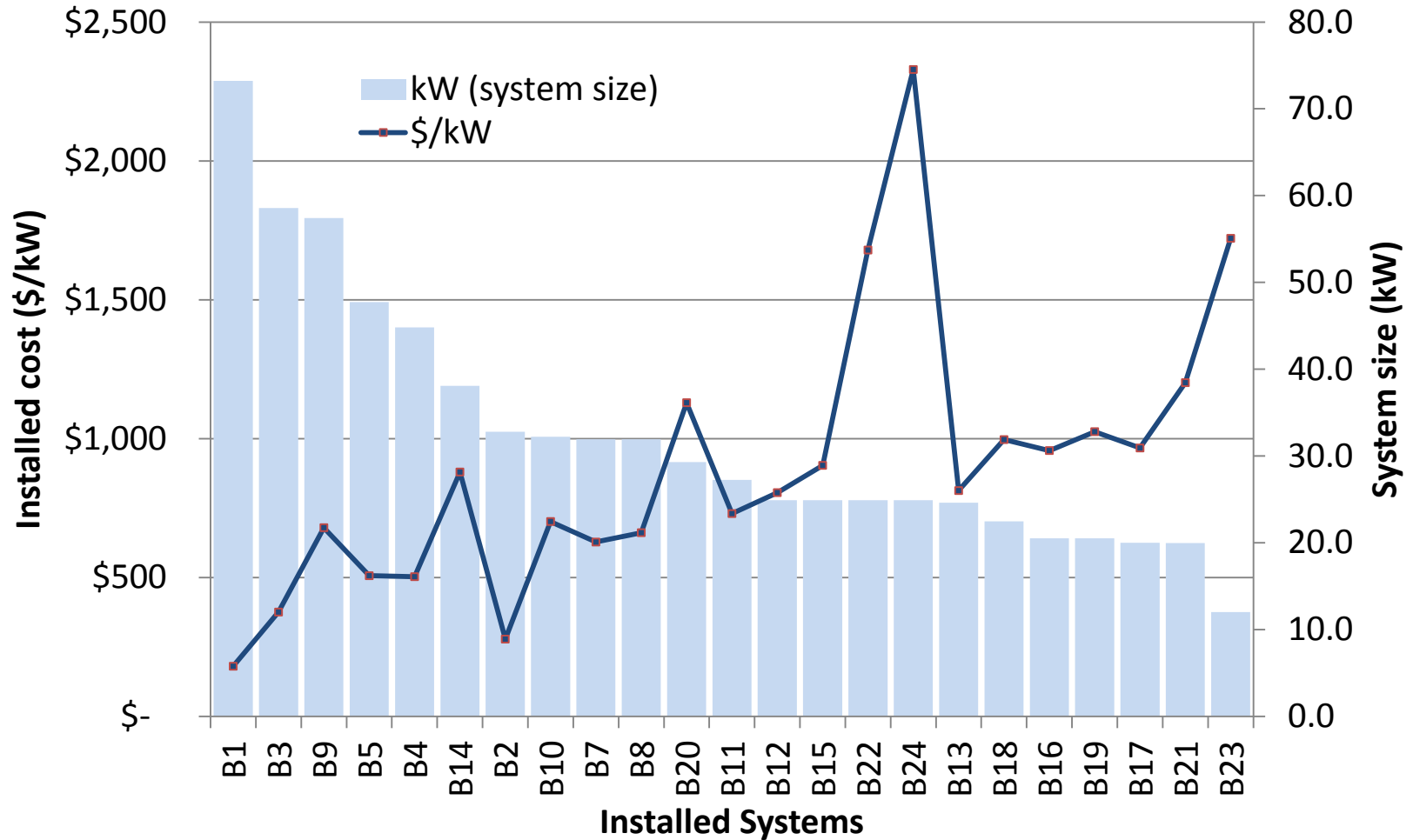
GHG reductions & lifecycle costs (or savings) for **residential** renewable thermal systems in MA

RH&C Study – Commercial Results



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

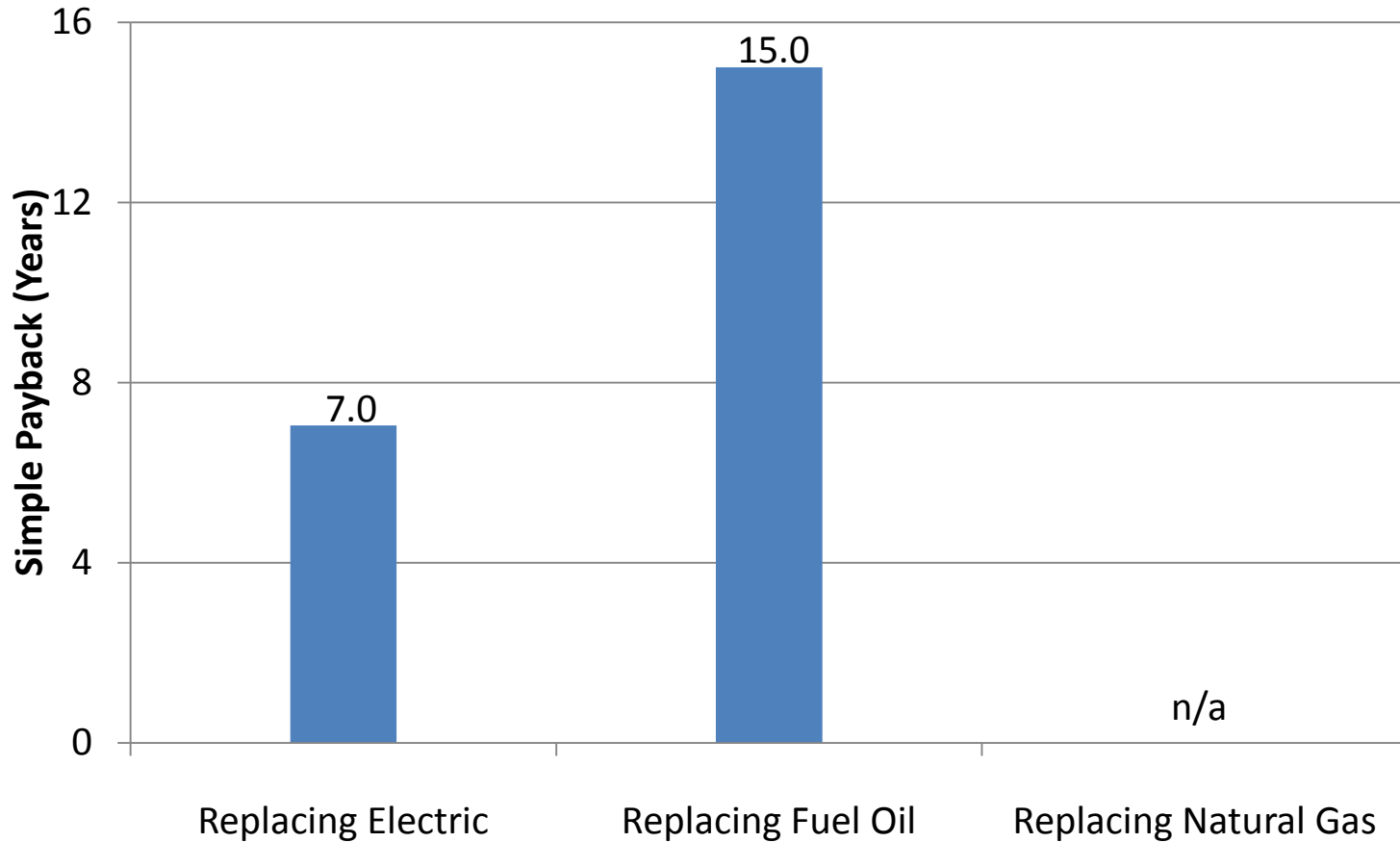
Example: Residential Biomass Thermal System Costs



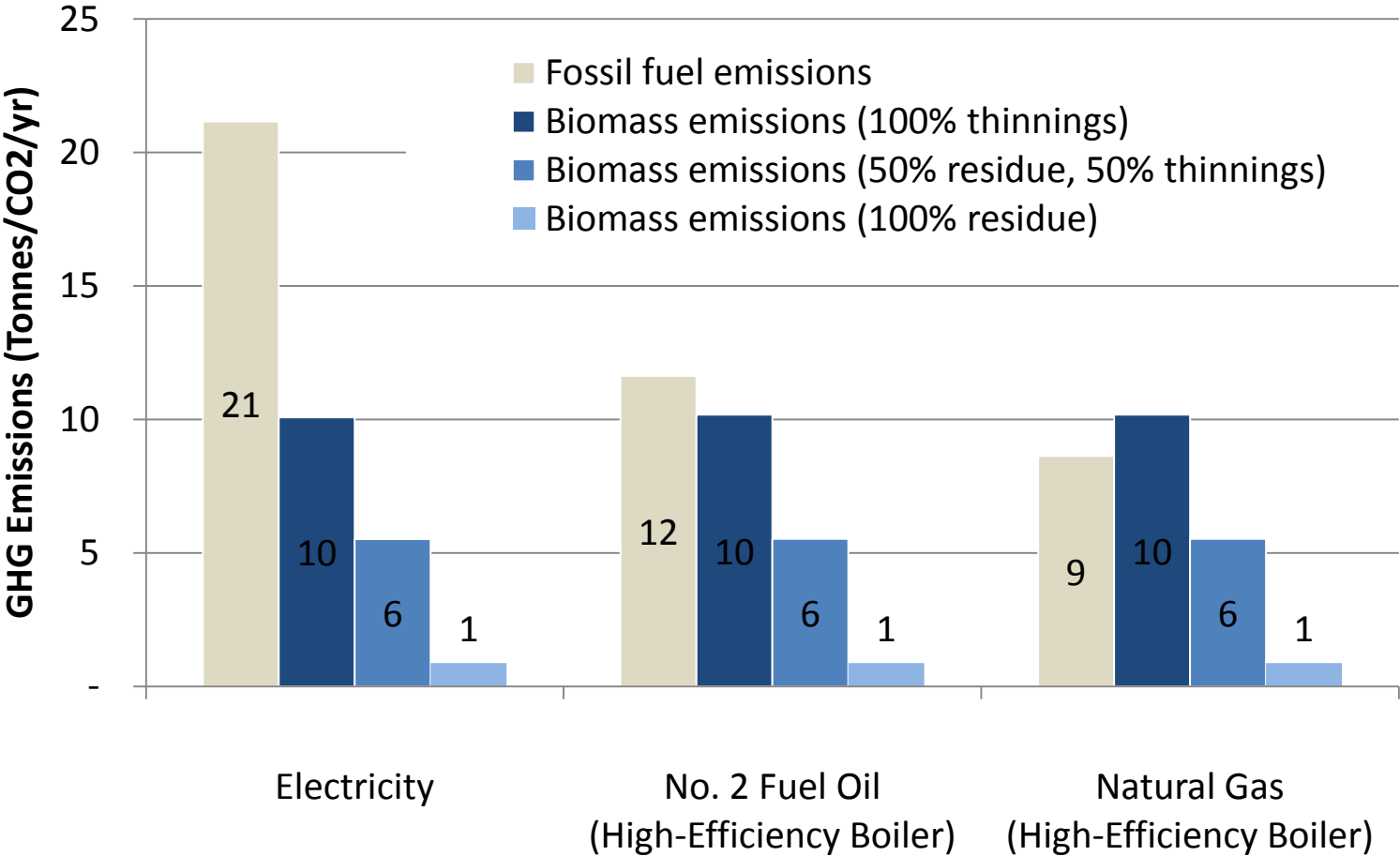
Example: Residential Biomass Thermal Payback

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)



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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
 - Developing renewable thermal pilots with MassCEC

MassCEC/DOER

Renewable Energy Thermal Pilot Programs

- Solar Hot Water
- Biomass Heating Systems (with MassDEP)
 - Residential Whole House Automated Pellet Boilers
 - Woodstove and Outdoor Hydronic Heaters Replacements
 - Commercial Scale Pellet Boiler Systems
 - Focus on Public Schools, Public Buildings, Greenhouses
- Thermal Air- and Ground- Source Heat Pumps
 - Residential and Commercial Scale
- District Energy Project Support
 - Preferred projects utilize Biomass or Heat Pump technologies
- Suite of programs approved by MassCEC Board, June 2012
- Funded by Renewable Energy Trust Fund & FY2010 Alternative Compliance Payments

Program Goals and Benefits

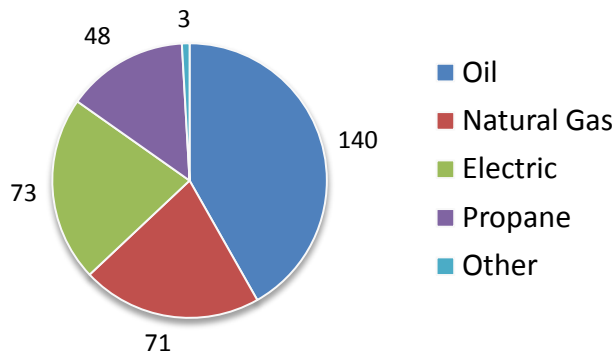
- Increase public awareness of renewable thermal technologies
- Reduce the up-front costs for renewable thermal technologies
- Address concerns about installation quality and performance by creating a well-qualified installer base through inspections and training
- Develop the renewable thermal market supply chain
- Collect baseline data for over 500 renewable thermal systems
 - Consumer demand, installer base, installation costs, actual performance
- Establish goals for larger renewable thermal programs or policy decisions based on assessment of pilot performance

Solar Hot Water Pilot Programs

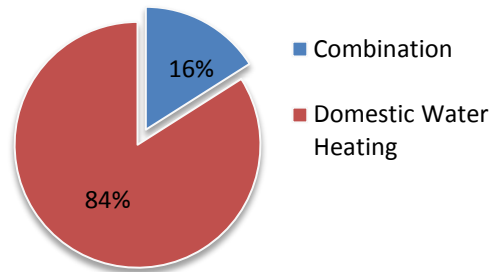
- Commonwealth Solar Hot Water Pilot Program
 - Awarded 320 residential & commercial-scale solar hot water systems \$534,697 in construction rebates
 - Totaling almost 2 MW in thermal capacity
 - Awarded 38 commercial-scale solar hot water feasibility studies
 - 55 participating solar thermal installation companies
 - Monitoring performance of 46 projects
- Low Income Solar Thermal
 - Fully funded 16 large-scale systems (16,784 sq ft in collectors)
 - >\$1.6 million in total project costs

CSHW Pilot Program Summary Results

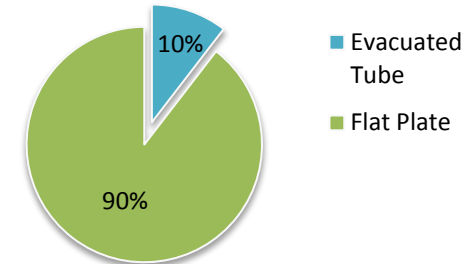
Residential Fuel After SHW Installation



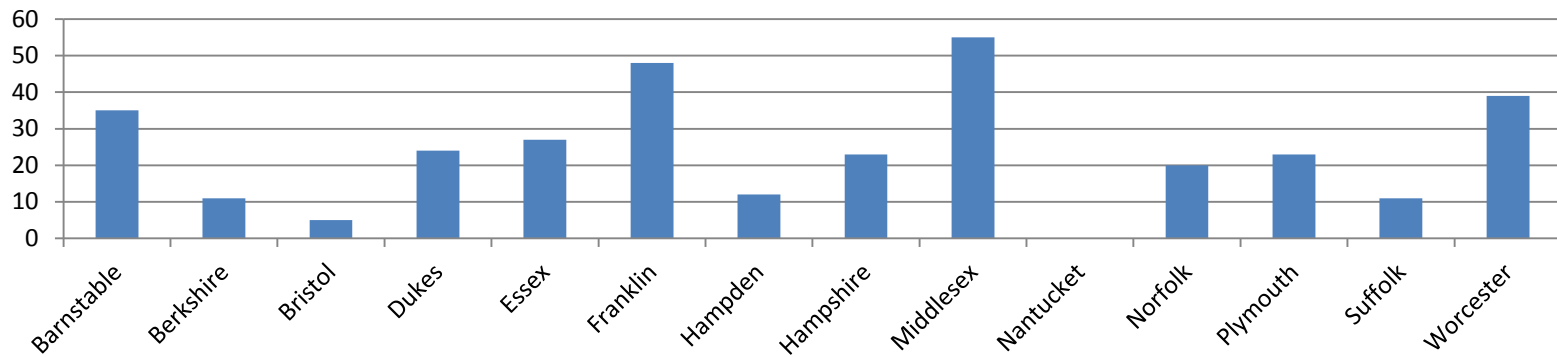
System Use



Collector Type



Awarded Solar Hot Water Projects by County



New Commonwealth Solar Hot Water Program

- \$10 million over next 4.5 years through end of 2016
 - \$1.5 million budget for FY13 (July 2012 – June 2013)
- For any residential, multi-family or commercial building
 - Displace ANY fuel type
- Feasibility Study Grants (commercial-scale only)
 - Help building owners assess the potential benefits of installing a solar thermal system
- Construction Rebates
 - Help system owners with the upfront capital costs of installing the solar thermal system
- www.MassCEC.com/SolarHotWater

Proposed Program Budget: Biomass Whole Building Heating Systems

| Category | Type of Grant | Estimated # of Grants | <u>Estimated</u> Total Budget |
|--|--------------------------|-----------------------|-------------------------------|
| Residential Whole House Pellet Boilers | First-come, First-served | 40-50 | ~\$500k |
| Woodstove Replacement | First-come, First-served | 50 | \$100k |
| Outdoor Boiler Replacement | First-come, First-served | 15 | \$150k |
| Commercial Scale Pellet Boilers | Competitive | 4-8 | ~\$1.5m |
| | | | ~\$2,000,000 |

Proposed Program Budget: Ground- and Air-Source Heat Pumps

| Category | Type of Grant | Estimated # of Grants | <u>Estimated</u> Total Budget |
|---|--------------------------|-----------------------|-------------------------------|
| Residential Ground Source Heat Pumps | First-come, First-served | 30-40 | \$500k |
| Residential Air Source Heat Pumps | First-come, First-served | 55 | \$400k |
| Commercial Scale Ground Source Heat Pumps | Competitive | 2-4 | \$1.1m |
| | | | \$2,000,000 |

Proposed Program Budget: District Energy Projects

| Category | Type of Grant | Estimated # of Grants | <u>Estimated</u> Total Budget |
|---------------------------------|---------------|-----------------------|----------------------------------|
| District Energy Project Support | Competitive | 2 | \$2,000,000 |

Thank you!

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- MCG website: www.mc-group.com

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- MassCEC website: www.masscec.com

Market Analysis: <http://www.mass.gov/eea/docs/doer/renewables/renewable-thermal-study.pdf>