April 15th 2019

Wood Heating Success Stories from the Northeastern US

Alaska-Yukon Wood Energy Conference

Adam Sherman

BERC
Biomass Energy
Resource Center

About VEIC

- Mission-driven nonprofit
- 30+ years reducing economic & environmental costs of energy
- 300 staff in Vermont, Ohio, & Washington DC
- Design and deliver:
  - ❑ Energy efficiency
  - ❑ Renewable energy
  - ❑ Transportation efficiency
- We “think and do”
  - ❑ 30 Consultants
  - ❑ 60 Engineers and TA experts
  - ❑ 10 Data analytics and EM&V experts
  - ❑ 8 Financing strategy experts

- Clients
  - ❑ Utilities
  - ❑ Government
  - ❑ Regulators / Consumer Advocates
  - ❑ Environmental Organizations
  - ❑ Foundations

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Major Initiatives

Biomass Energy Resource Center (BERC)

Advancing the use of Local Wood Heat and CHP in North America

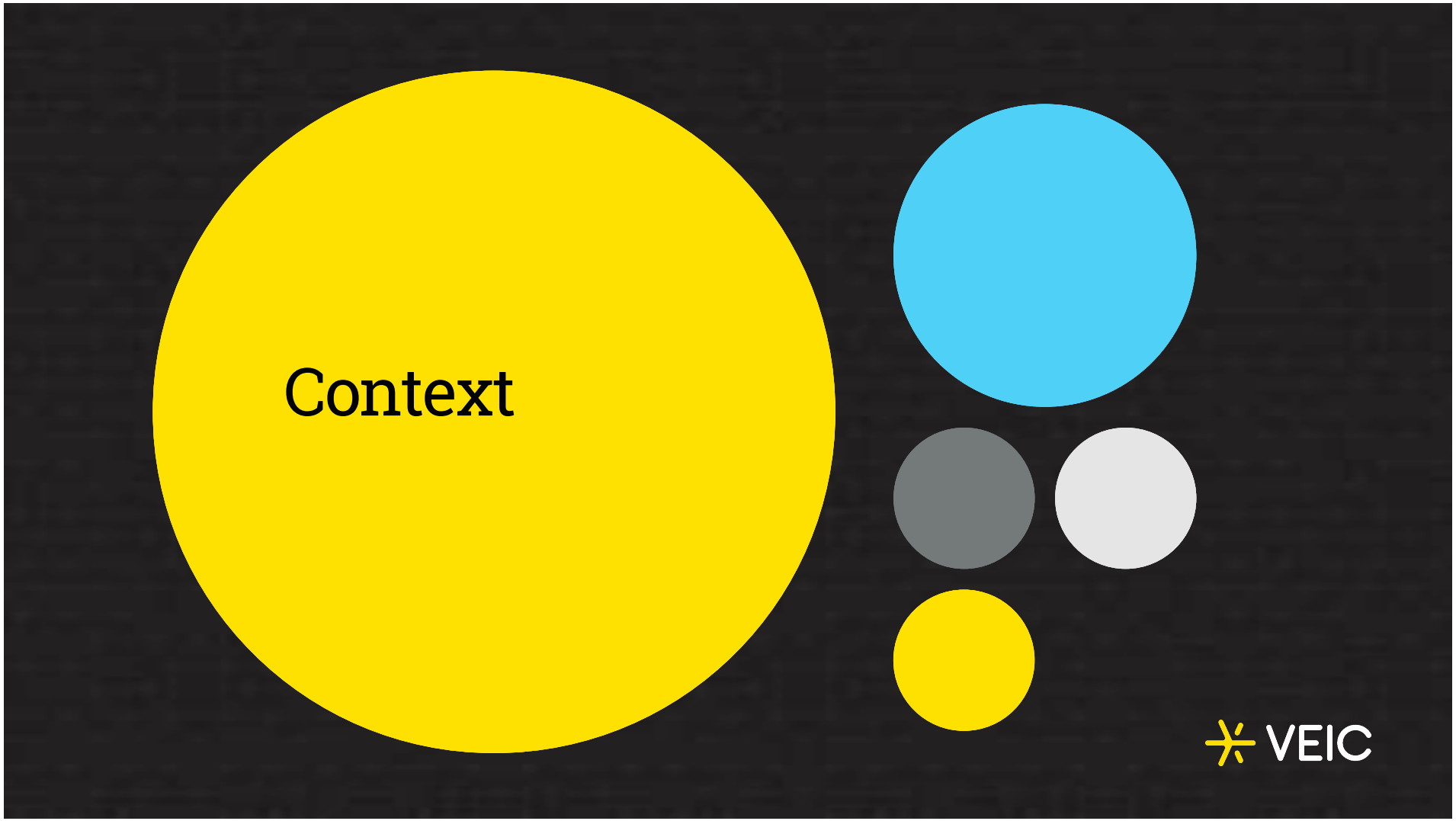
Technical Consulting
- Project feasibility studies
- Fuel supply assessments and procurement
- Third-party expert review
- Develop and review of standards
- Market assessments

Program Design & Implementation
- Wood heat market expansion potential assessments
- Program design and implementation support
- Training and advisory support services

Advocacy
- Showcasing “best practices” and case studies of successful projects
- Tracking market growth and impacts

Presentation Outline

- Stage setting
- Success stories
  - Technology
  - Quality vendors and installations
  - Wood fuel quality
  - Investments in fuel supply chain
  - Outreach and market awareness
  - Program successes
  - State level policies and incentives
- Parting thoughts


Context
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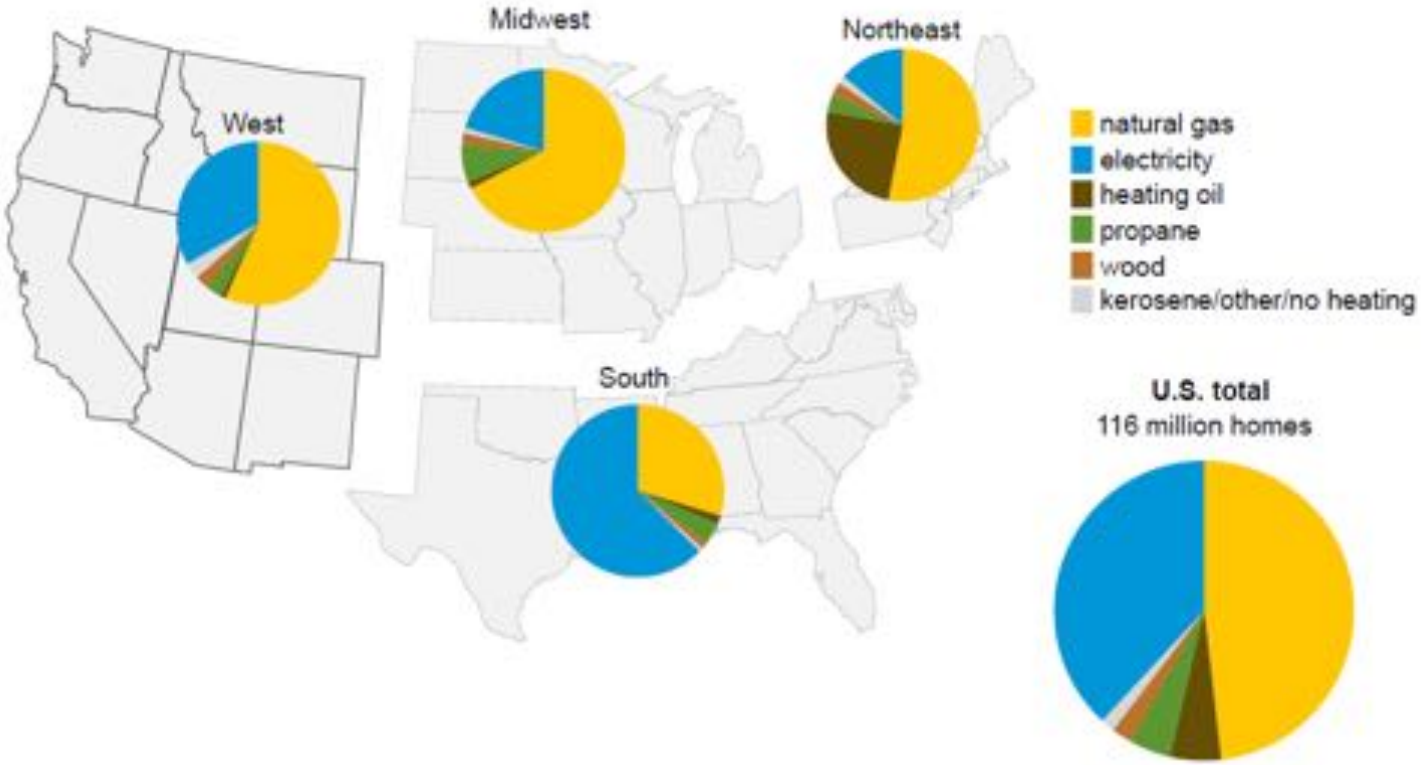
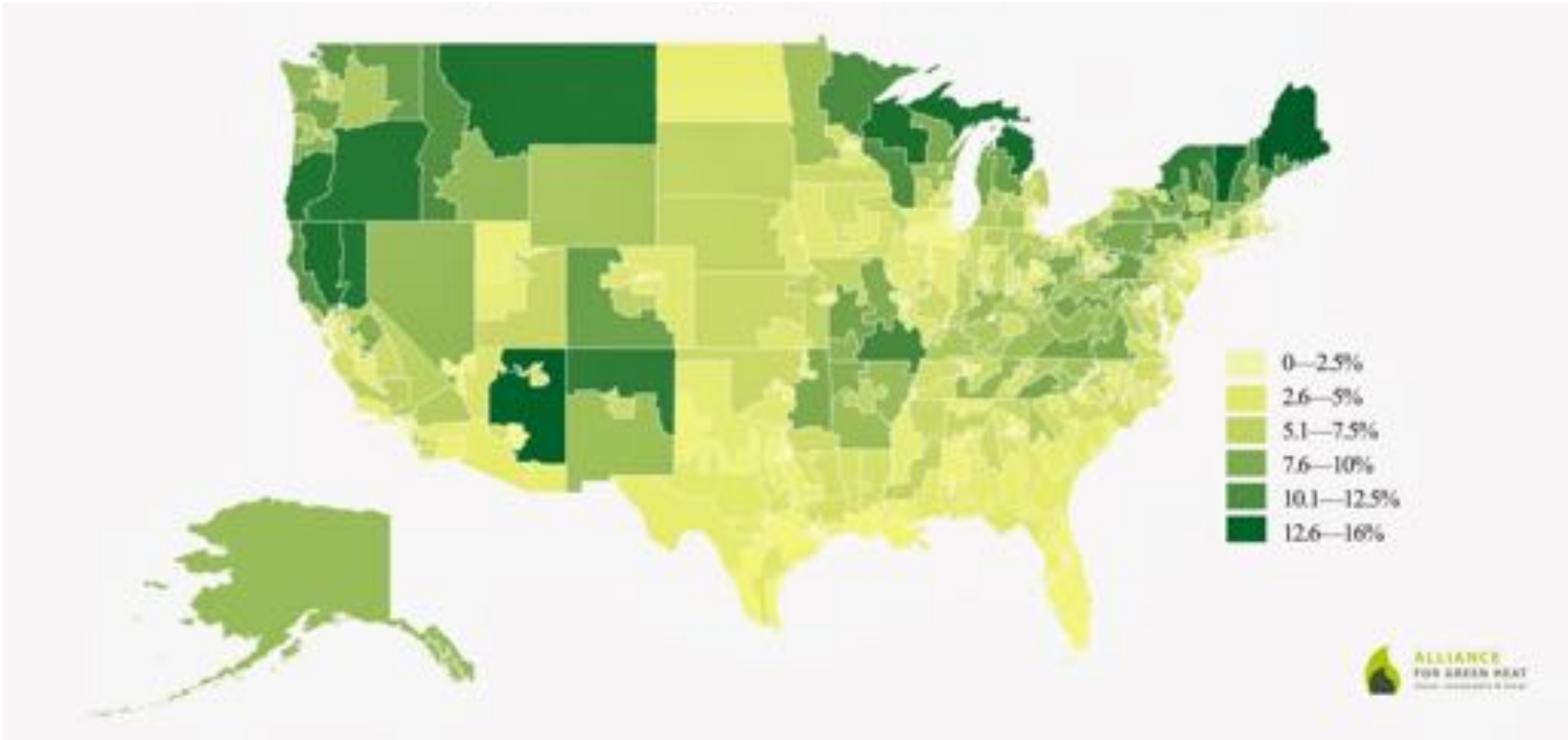
Residential Space Heating Sources in the US



Source: U.S. **Census Bureau**, *2012 American Community Survey*

Residential Wood Heating in US



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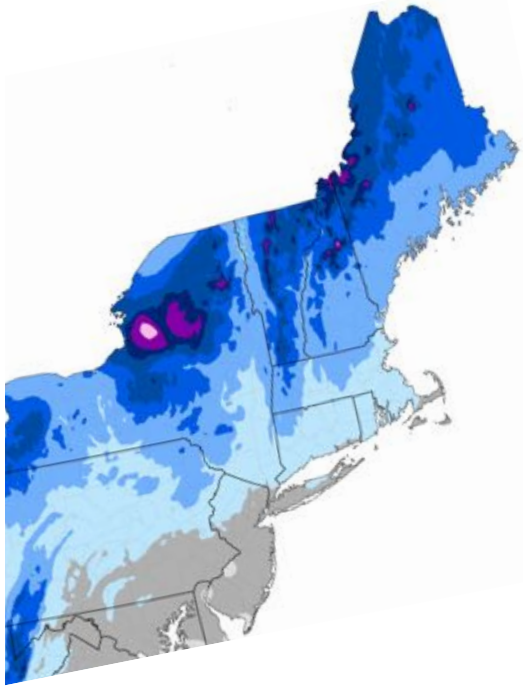
Market Conditions in Northeastern US

Natural Gas
Pipeline Service

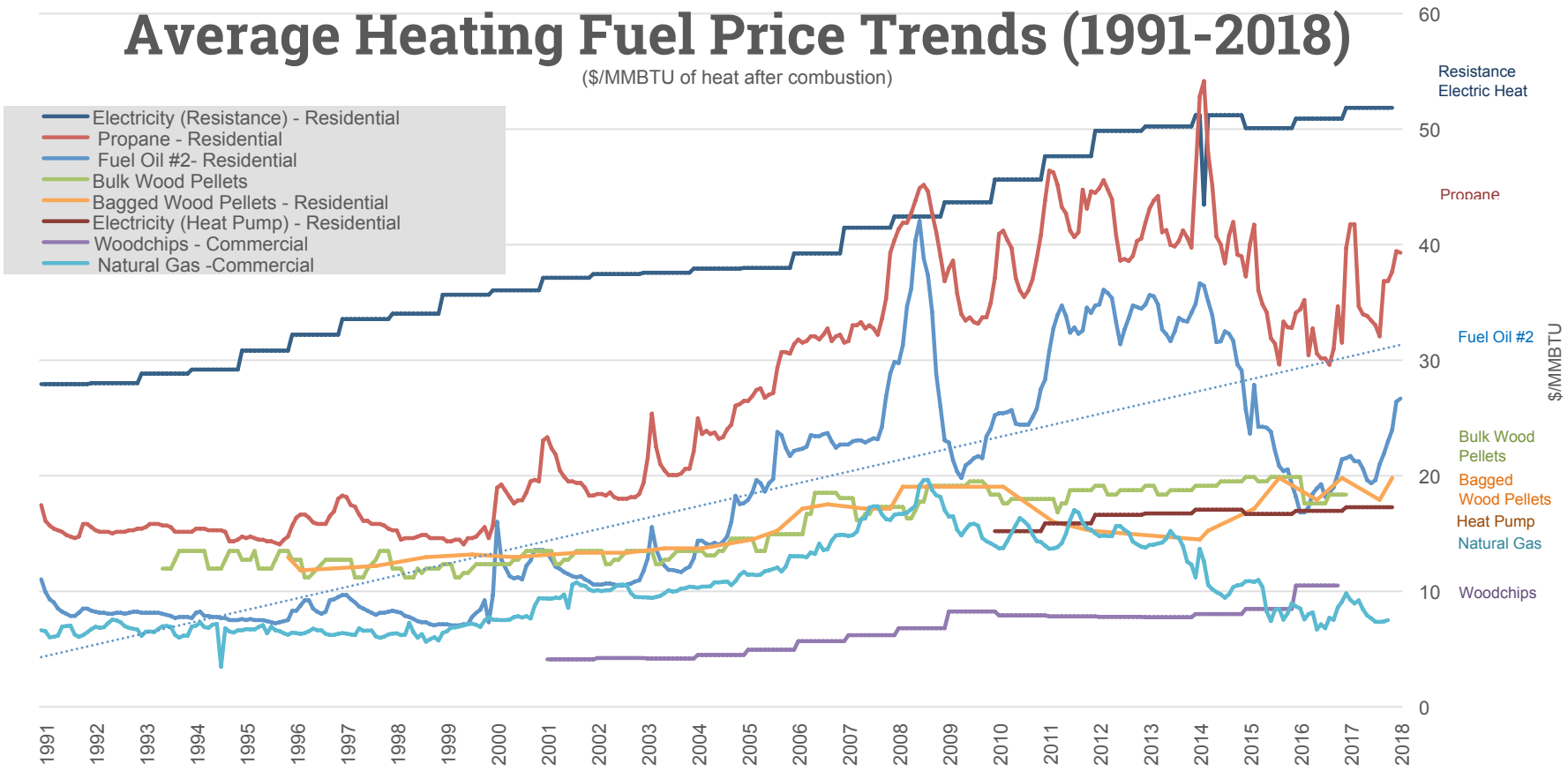


Heating
Degree Days

Forestland
Area

Average Heating Fuel Price Trends (1991-2018)

($/MMBTU of heat after combustion)



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Success Stories: Technology

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“Biomass Heating”

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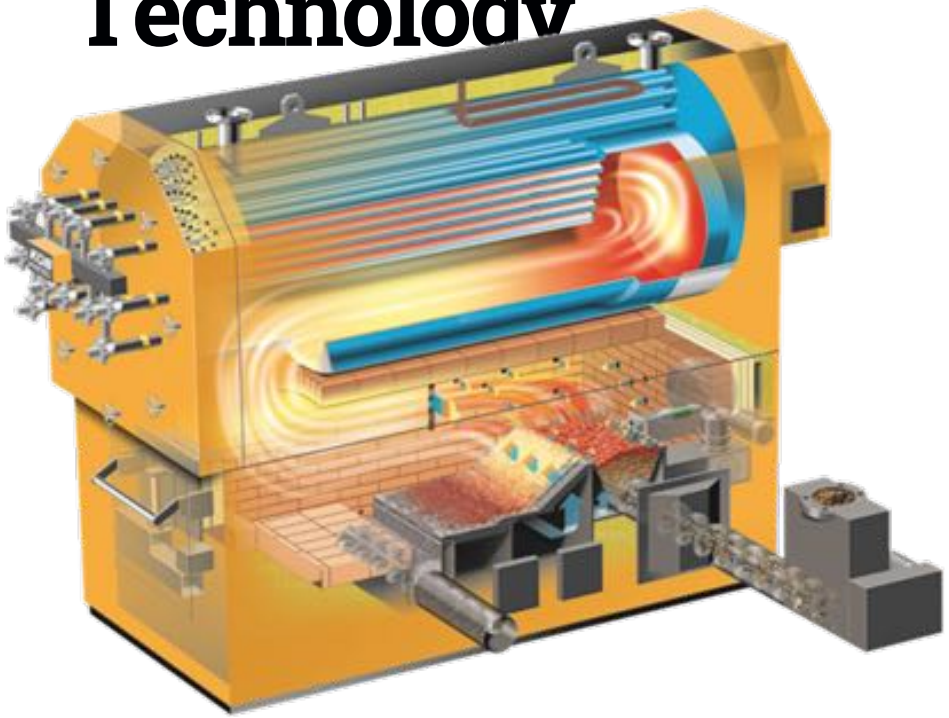
"Advanced Wood Heating" Technology



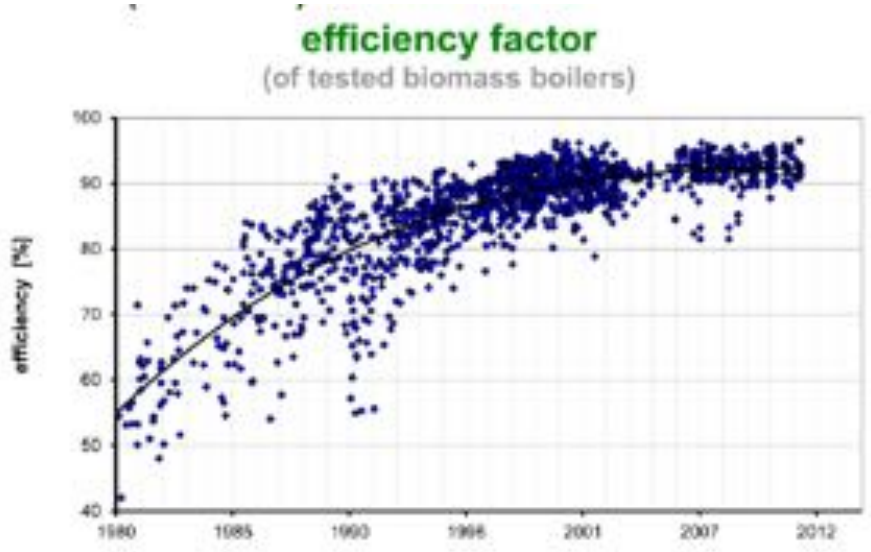
Large-scale Boilers with Horizontal Heat Exchange

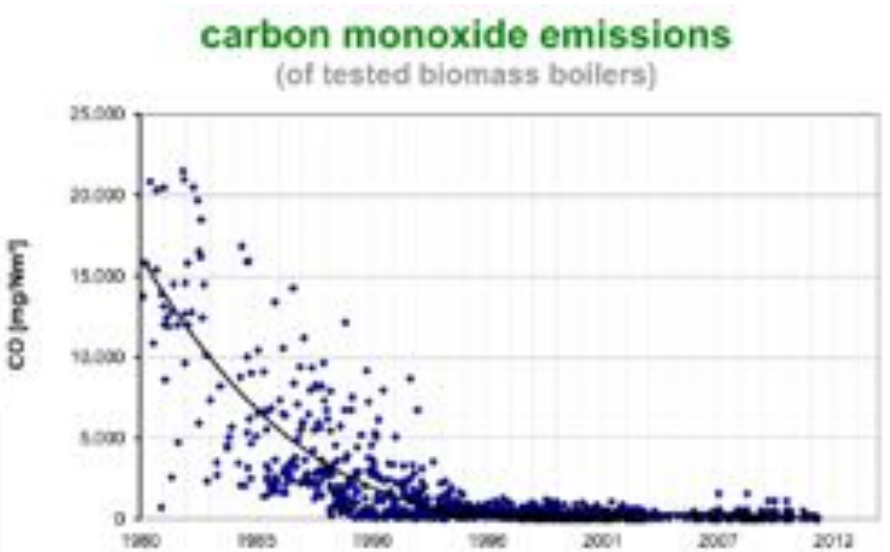
Image courtesy of Viessmann

Small-scale Boilers with Vertical heat Exchange

Image courtesy of Windhager

Advancements in Modern Combustion





Source: BioEnergy 2020+

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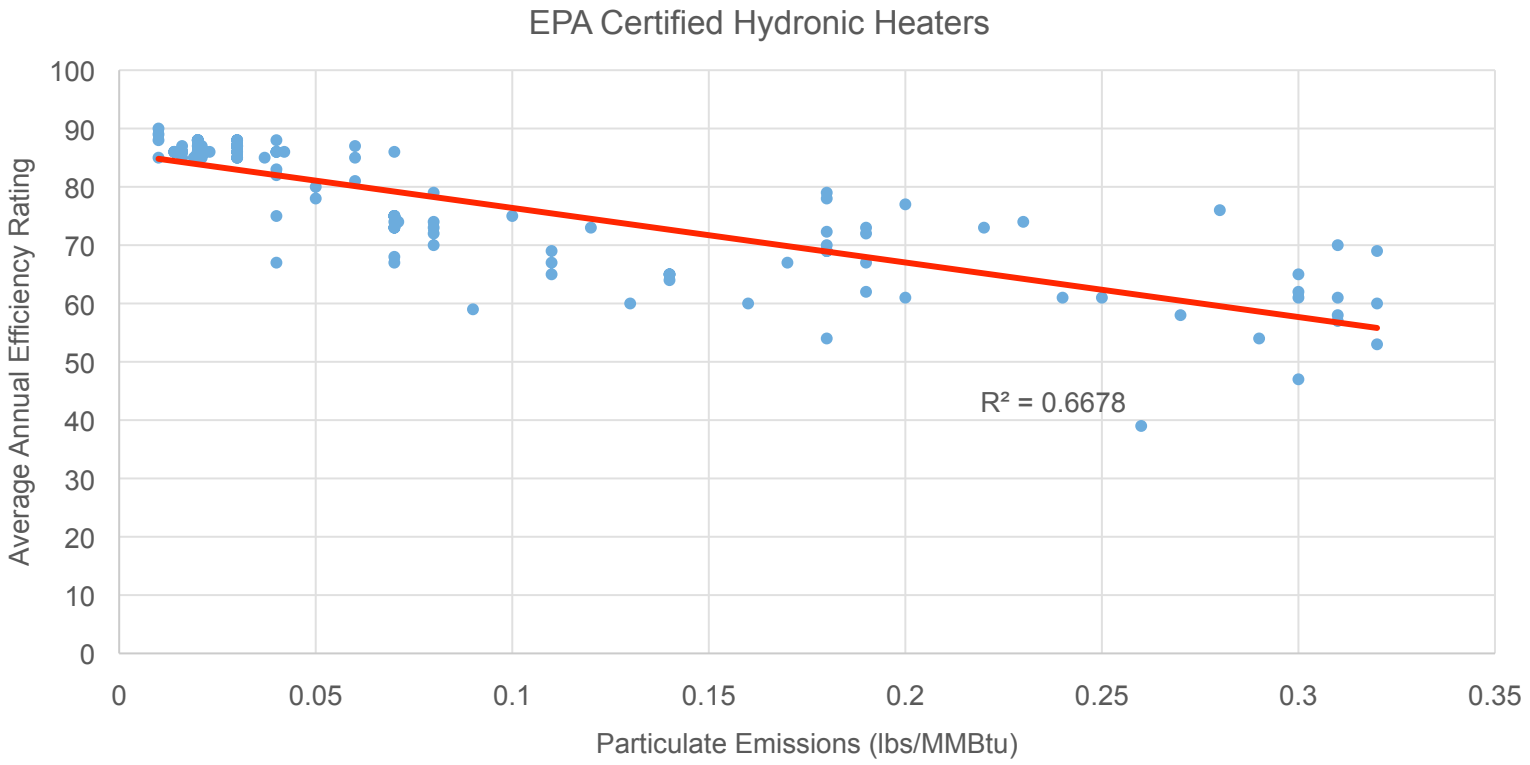
Emissions and Efficiency Relationship



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Other Technology Innovations - CHP

Pellet boiler + Sterling engine

Down-draft gasifier coupled with IC engine

Organic Rankine Cycle (ORC) system

Success Stories:
High-Quality Installations

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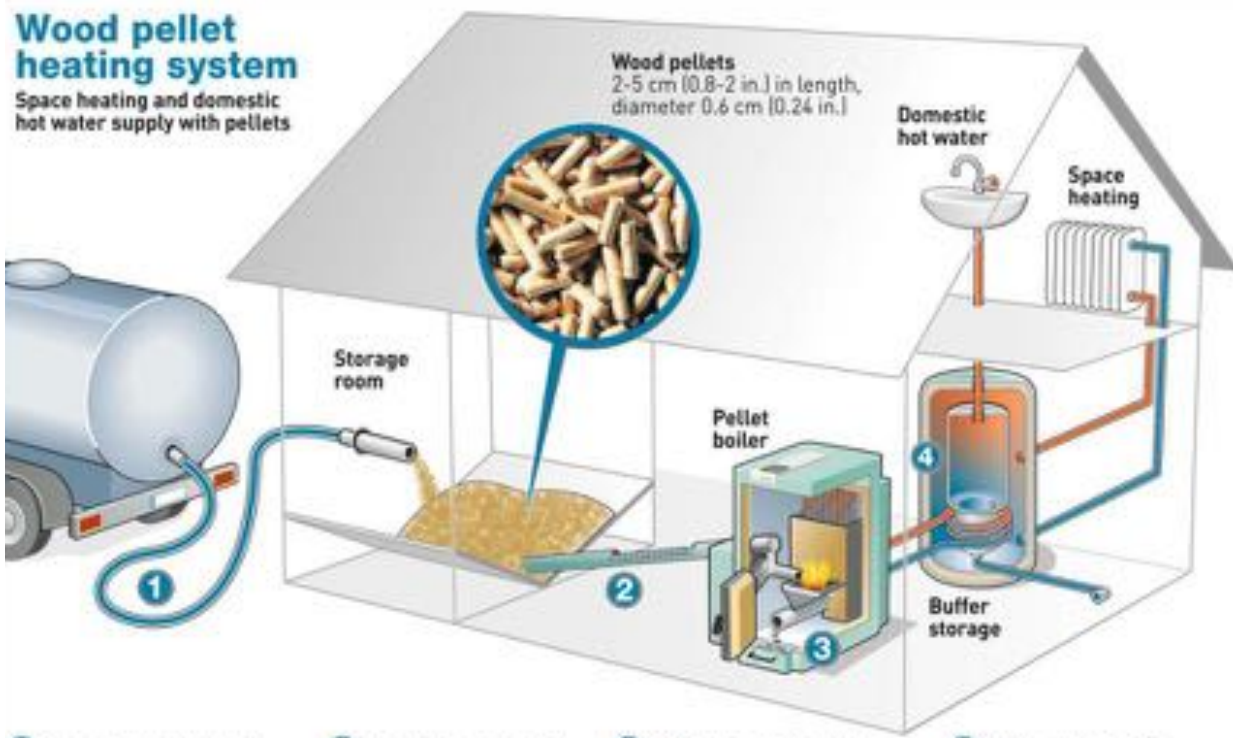
Whole-Building Heating with Hydronic Systems



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Typical Residential Pellet System

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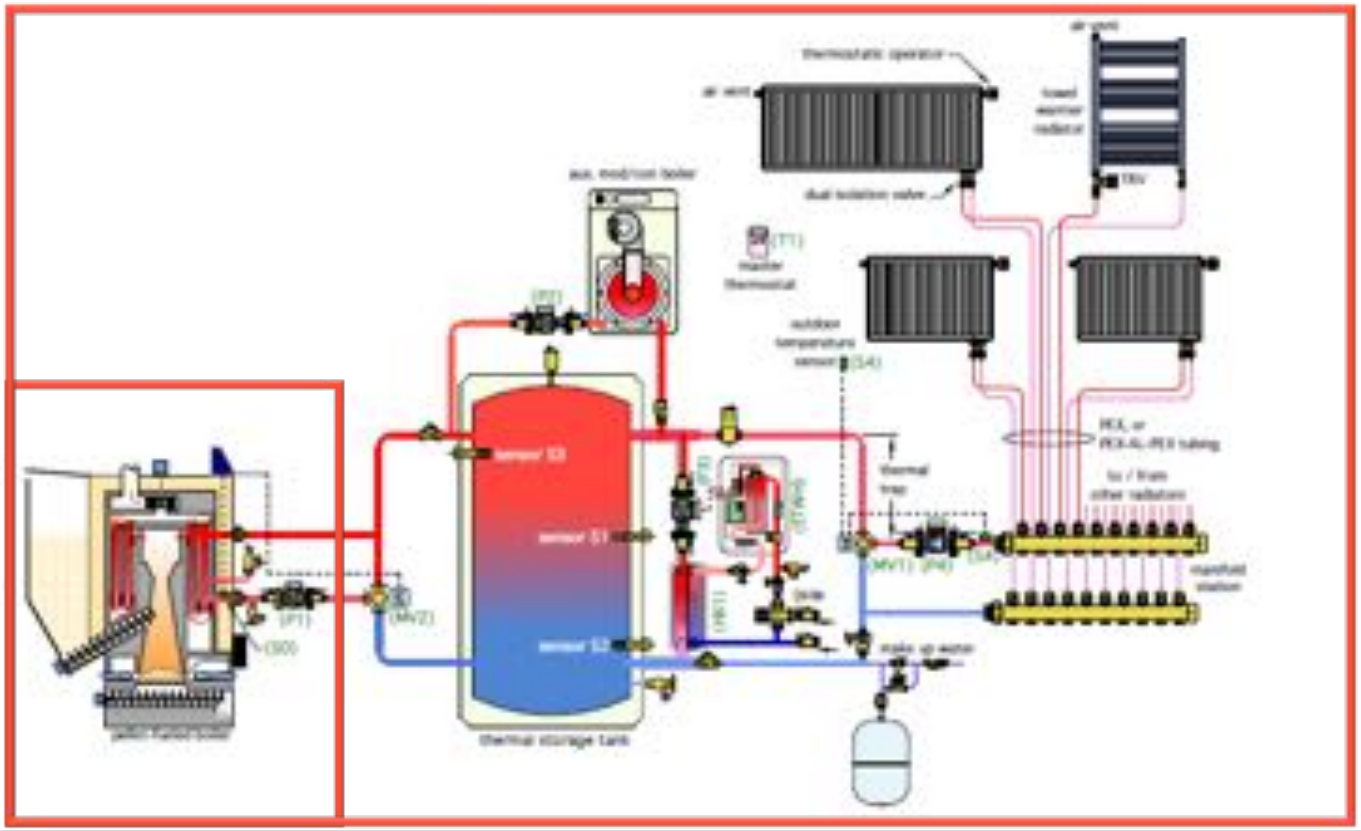
Integration with Heat Distribution System



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Success Stories:
Wood Fuel Quality

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Wood Heating Fuels

Chunkwood

- Requires hand firing
- Sold based on volume (4'x8'x4')
- Wide range of energy value based on moisture (10 – 55%)

Woodchips

- Automated fuel feed
- Sold by the green ton
- Variable energy value based on moisture (15-50%)
- Quality specifications

(www.woodchipstandard.org)

Wood Pellets

- Automated fuel feed
- Sold by the ton
- Very consistent energy value (6-8% moisture)
- Quality specifications

(www.pelletheat.org/pfi-standards)

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Integration of Fuel Quality into System Performance

Know-how to produce given grades of fuel

Fuel that consistently meets the specs.

State of the art combustion technology engineered to burn specific fuel

Optimal system performance (low emissions, high efficiency, & minimal O&M)

Market and Regulatory Confidence and Trust

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Success Stories:
Fuel Supply Chains

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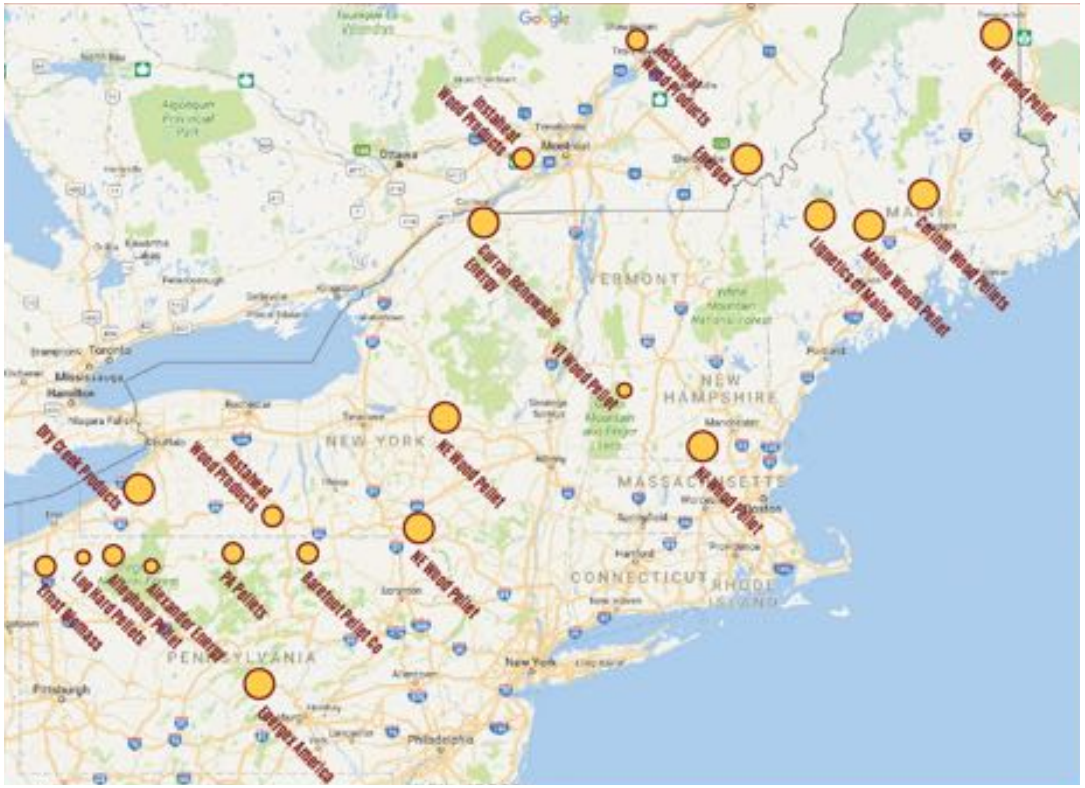
Regional Pellet Mill Capacity



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Specialized Pneumatic Bulk Pellet Delivery

Dried Woodchip Production

Pneumatically Loading Silos with Dry chips

Success Stories: Outreach and Market Awareness

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“Biomass Energy”

Large-scale, low-efficiency power plants burning wood fuel from half-way around the world from poorly managed forests

“Advanced Wood Heat”

High-efficiency, clean-burning systems directly displacing fossil fuels, using local wood fuel from well-managed forests

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Feel Good Heat Campaign

https:/feelgoodheat.org

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Success Stories: Programs

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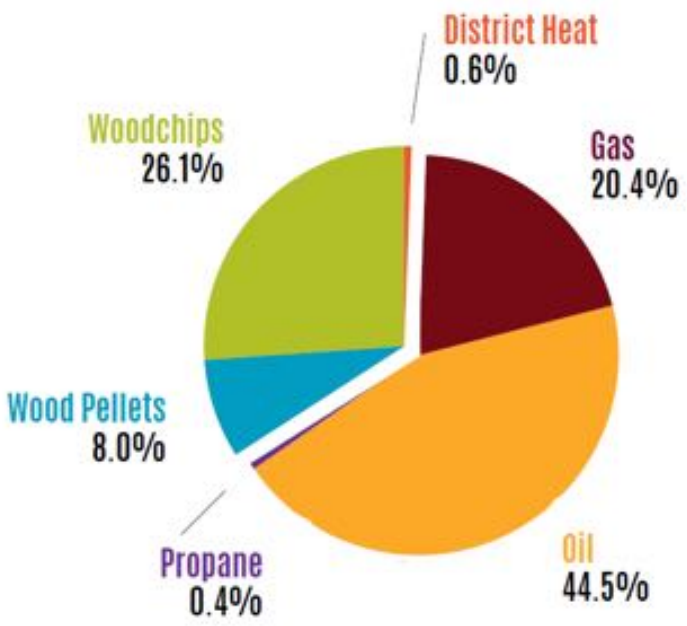
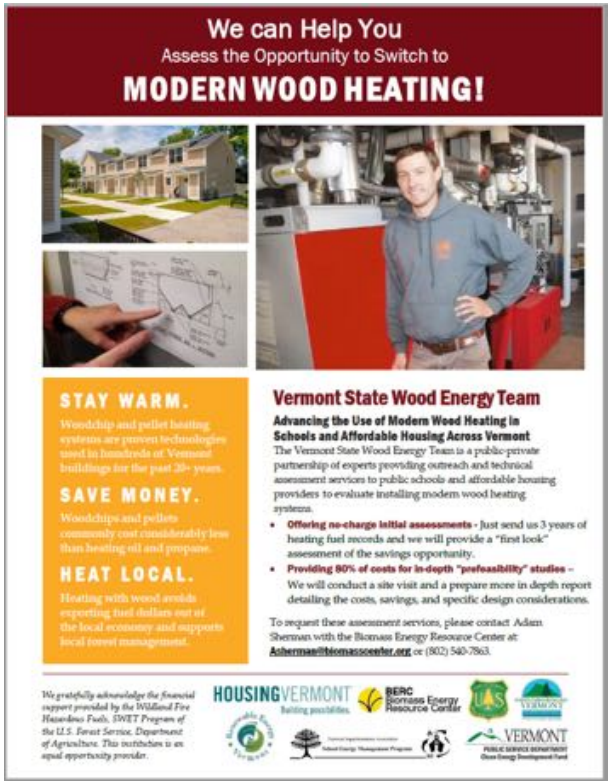
Fuels for Schools



Over 1/3 of public K-12 school space in Vermont is heated with wood!

State Wood Energy Teams



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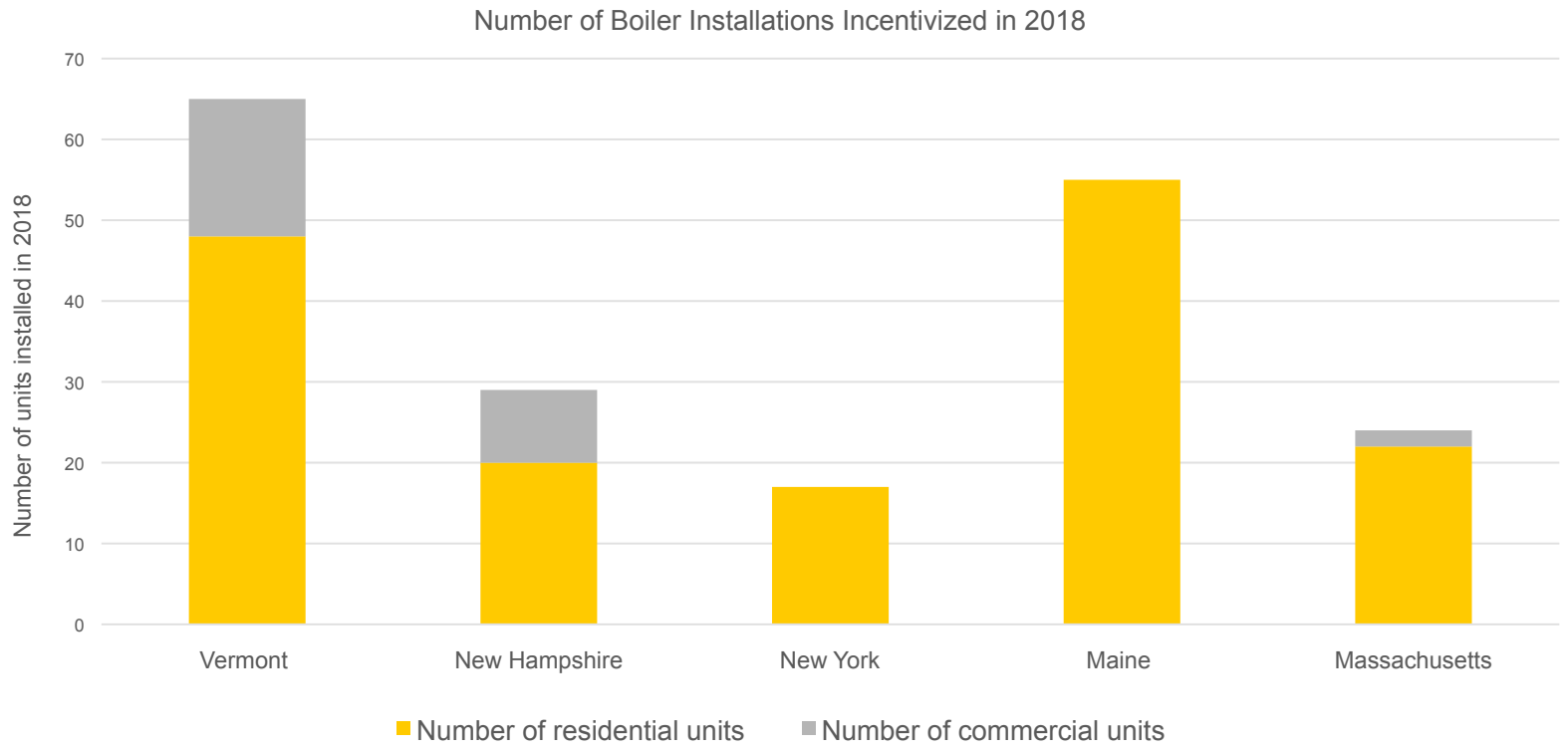
Advanced Wood Heating State Incentives



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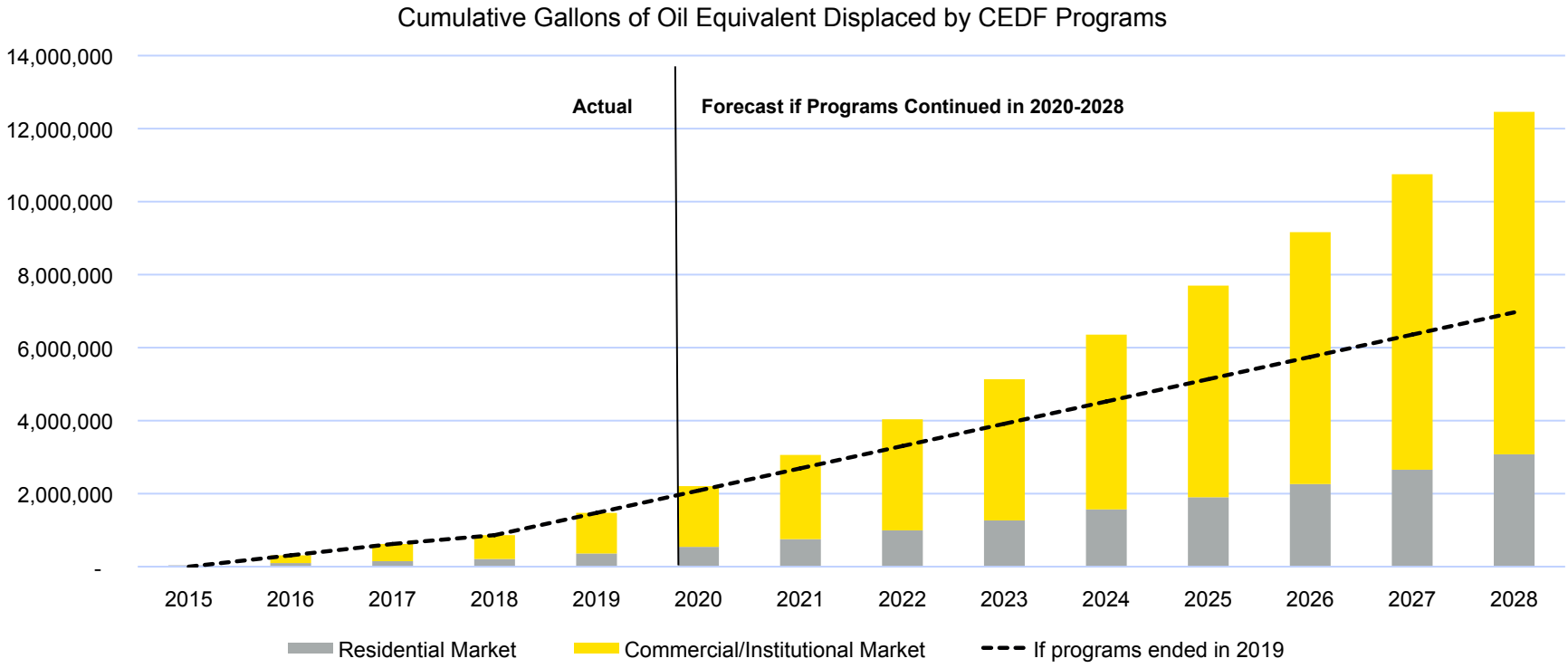
Vermont's Incentive Program



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Success Stories:
State-level Policies & Incentives

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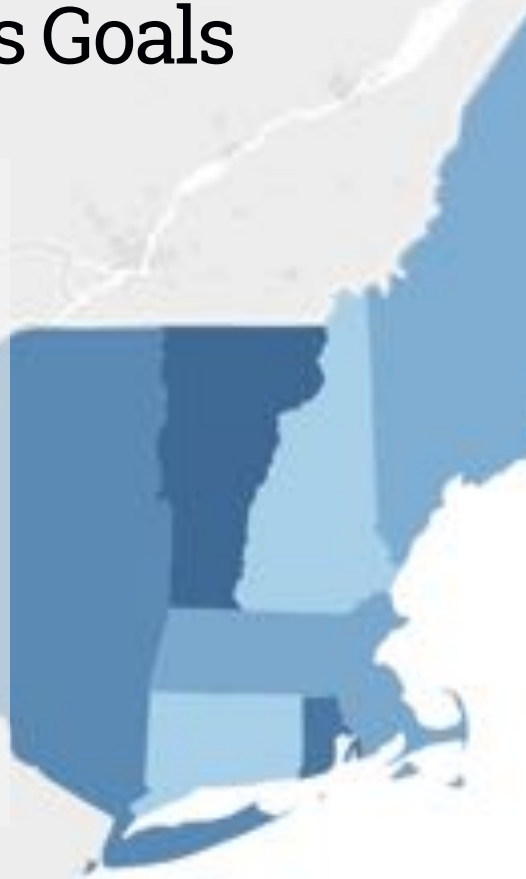
Regional Dependence on Oil for Heating

	Annual Gallons of Heating Oil	Population	Gallons Oil/ Capita
Connecticut	473,000,000	3,500,000	135
Maine	263,000,000	1,300,000	202
Massachusetts	596,000,000	6,646,000	90
New Hampshire	137,000,000	1,320,000	104
New York	1,308,000,000	19,570,000	67
Pennsylvania	757,000,000	12,763,000	59
Rhode Island	131,000,000	1,050,000	125
Vermont	89,000,000	626,000	142
Total/Average	3,753,000,000	46,775,000	80

Source: Energy Information Administration (EIA) and 2015 US Census Data

Greenhouse Gas Goals



Connecticut
10% GHG reduction by 2020
80% GHG reduction by 2050

Massachusetts
25% GHG reduction by 2020
80% GHG reduction by 2050

Rhode Island
25% zero-energy new cars by 2025
State government:
10% reduction electric use by 2019

New York
40% GHG reduction by 2030
80% GHG reduction by 2050
Coal-free by 2020

Maine
10% GHG reduction by 2020

New Hampshire
20% GHG reduction by 2025
80% GHG reduction by 2050

Vermont
40% GHG reduction by 2030
80-95% GHG reduction by 2050

Source: State websites

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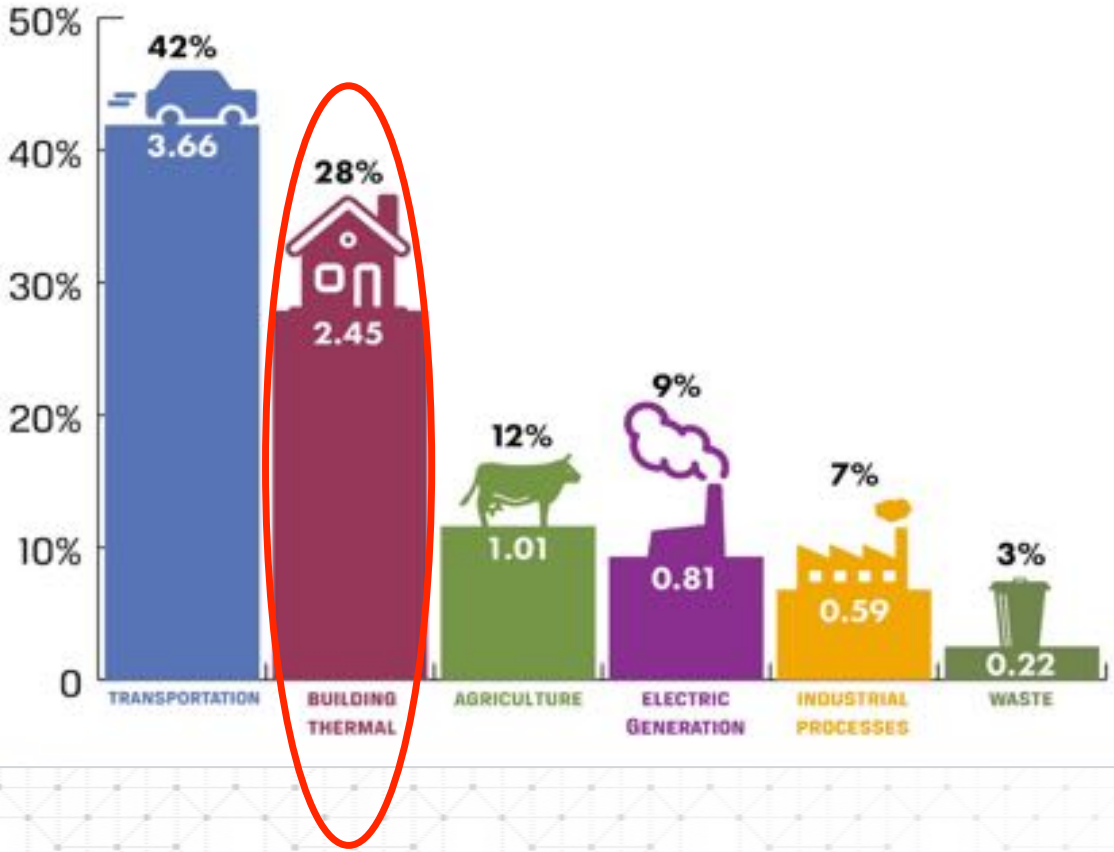
Vermont Greenhouse Gas Contributors



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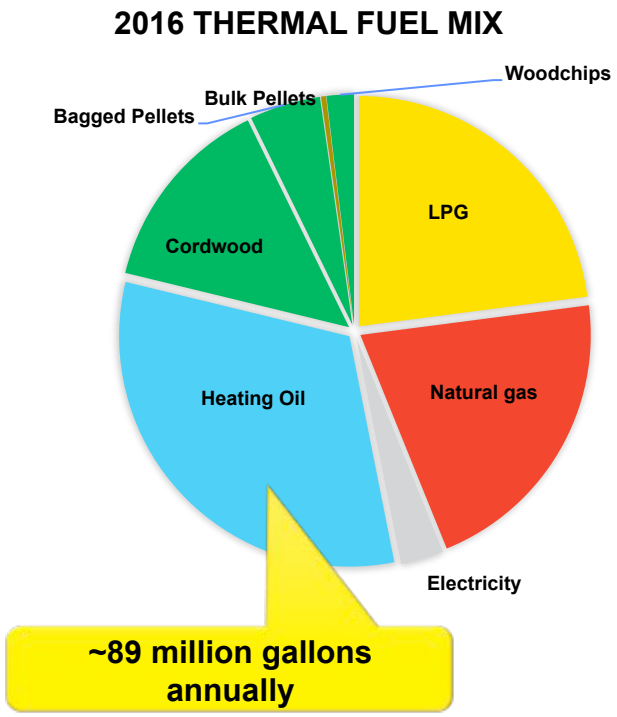
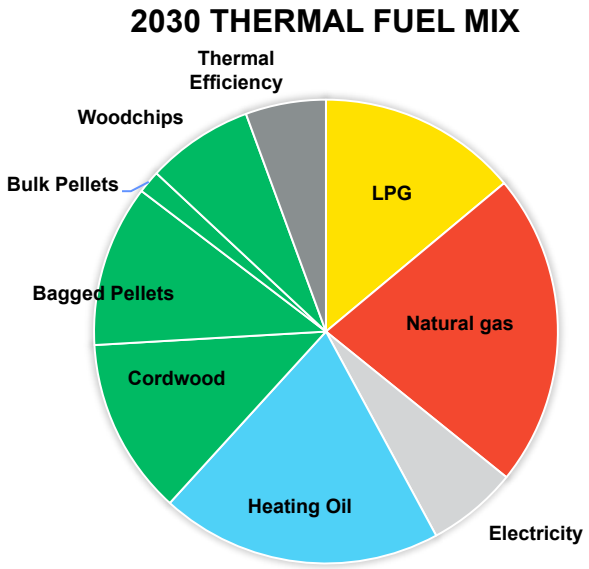
Vermont Energy Goal –
35% of Thermal Energy from Wood Heat by 2030





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Thank you!

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