

ADVANCED

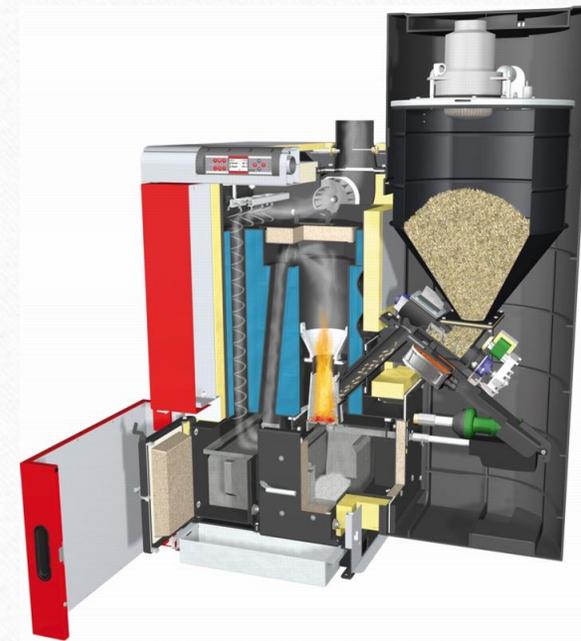
Wood Heat for Municipalities

Emma Hanson - VT Dept of Forests, Parks & Recreation

Andrew Perchlik – Clean Energy Development Fund

What is advanced wood heat?

- Highly efficient wood burning appliances with low emissions
- Automated control with regular thermostats
- New residential wood stoves all the way to wood chip boilers for large commercial and institutional buildings.





It's about the forest

- Vermont is 76% forested
- Currently harvesting less than half the net growth
- Markets for low grade wood have collapsed
- Vermont is losing 1,500 acres a year to suburban and rural development

Support our Local Economy

- 78 cents of every fossil fuel heating dollar leaves Vermont
- Most wood fuel in Vermont is grown within 50 miles of where it is used
- Wood energy generates roughly \$60 million in economic activity annually in Vermont
- An estimated 350 jobs in Vermont are directly attributed to wood energy



Goals

- State Clean Energy Plan – 90% Renewable Energy by 2050
- Obtaining 35% of Vermont's thermal energy needs from wood heat by 2030, through increased adoption of automated wood heating systems



If we reach our goal...

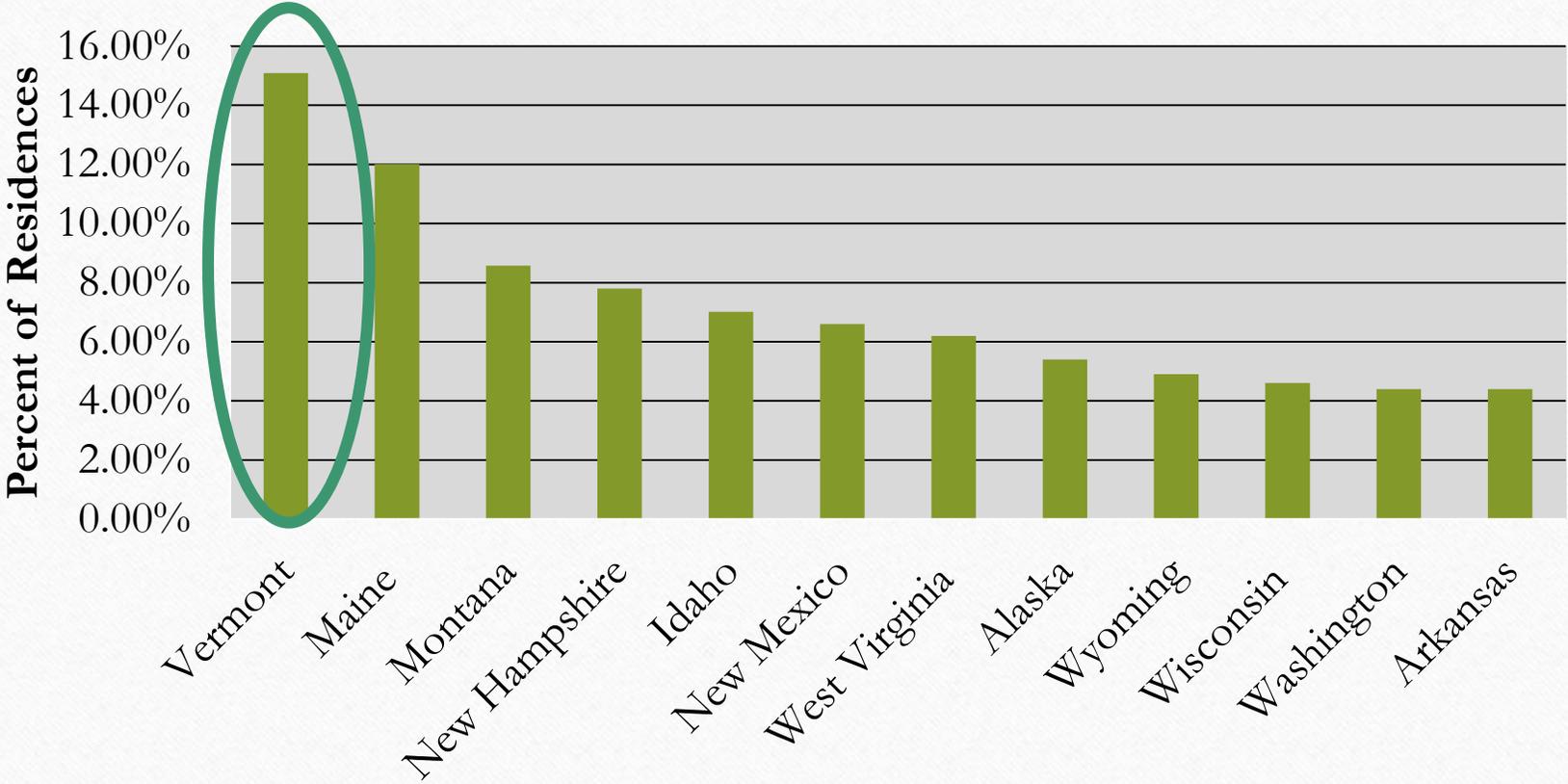
- Displace 40 millions gallons of fossil fuel annually
- Vermonters save \$120,000,000.00/year



Where are we now?

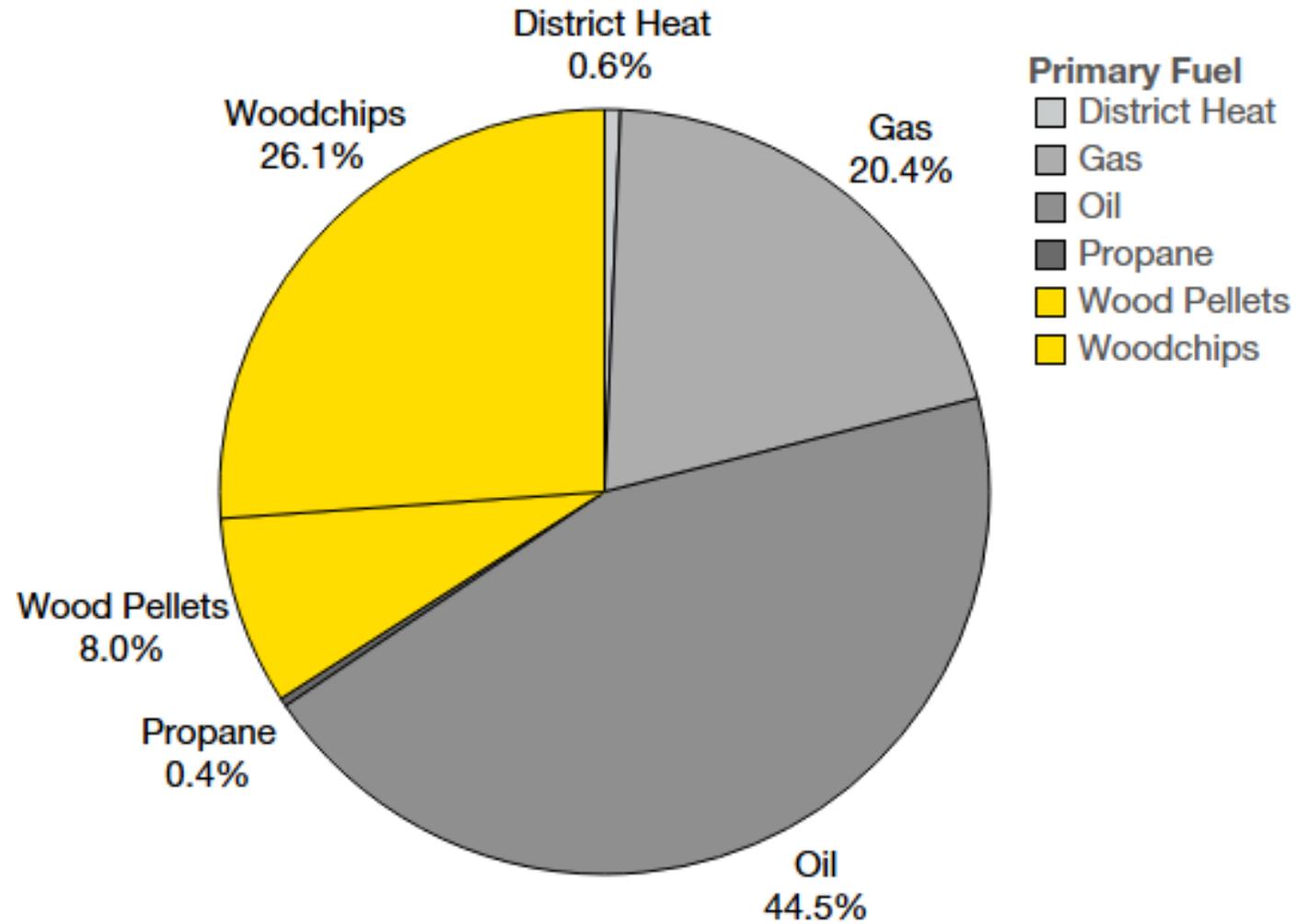
- 21% of thermal energy needs comes from wood
- 38% of Vermonters heat in full or in part with wood

Households with Primary Wood Heat by State



Source: 2010 US Census Data

Vermont Public School Sector





Wood Fuel Types

Wood Pellets

- Made of compressed sawdust
- Burn very clean
- Less work and less storage than cordwood
- Appropriate for residential and small commercial buildings
- Can be fully automated
- Sold in bag and in bulk



Pellet Boilers vs Stoves

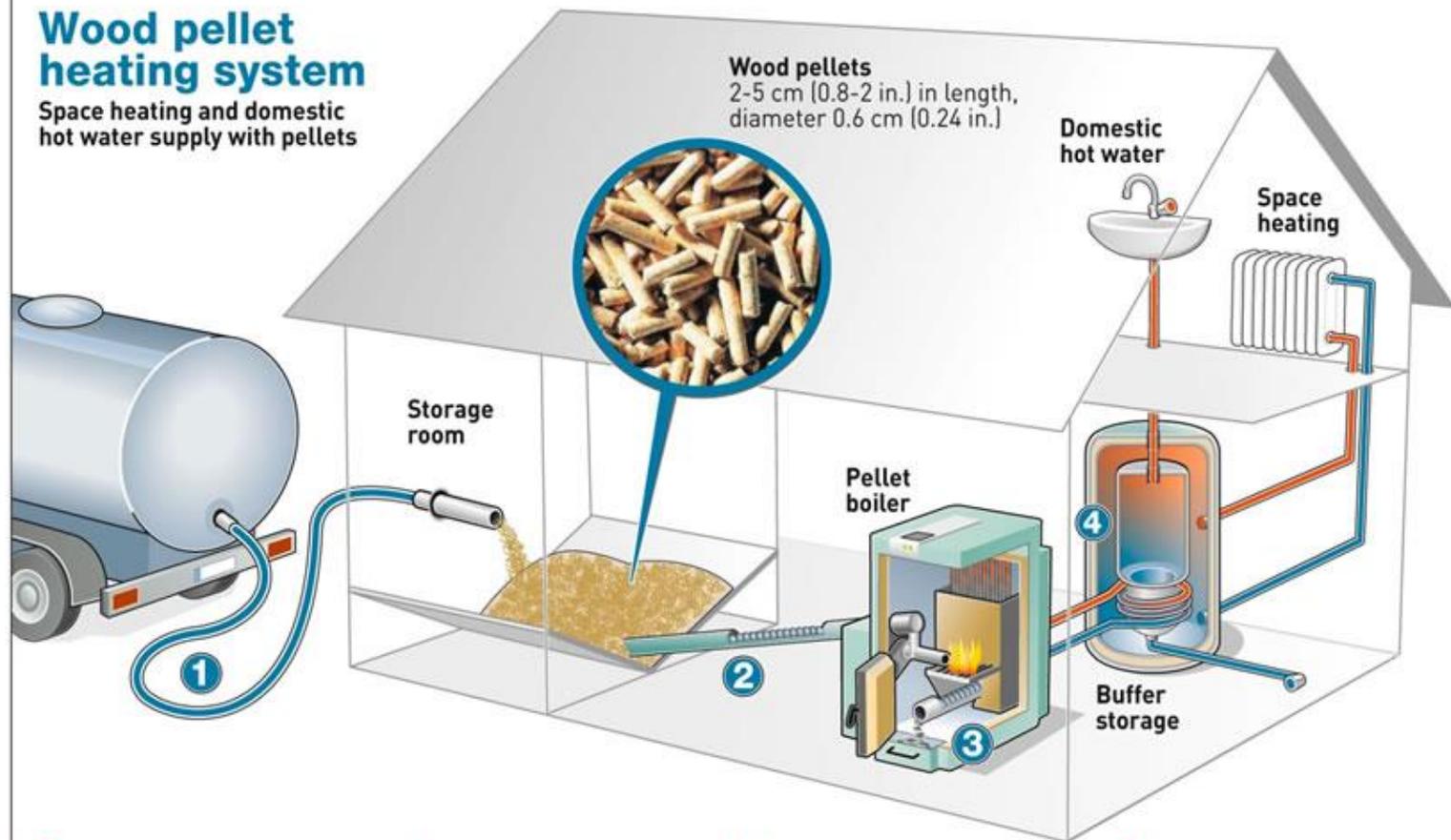


Pellet Boilers & Furnaces

- Fully automated whole home/business heating
- Same experience as heating with oil or propane

Wood pellet heating system

Space heating and domestic hot water supply with pellets



1 Once or twice a year the pellets are delivered by a silo tanker. A loaded storage room of 4.5 m² is enough to keep a single-family house warm for one year.

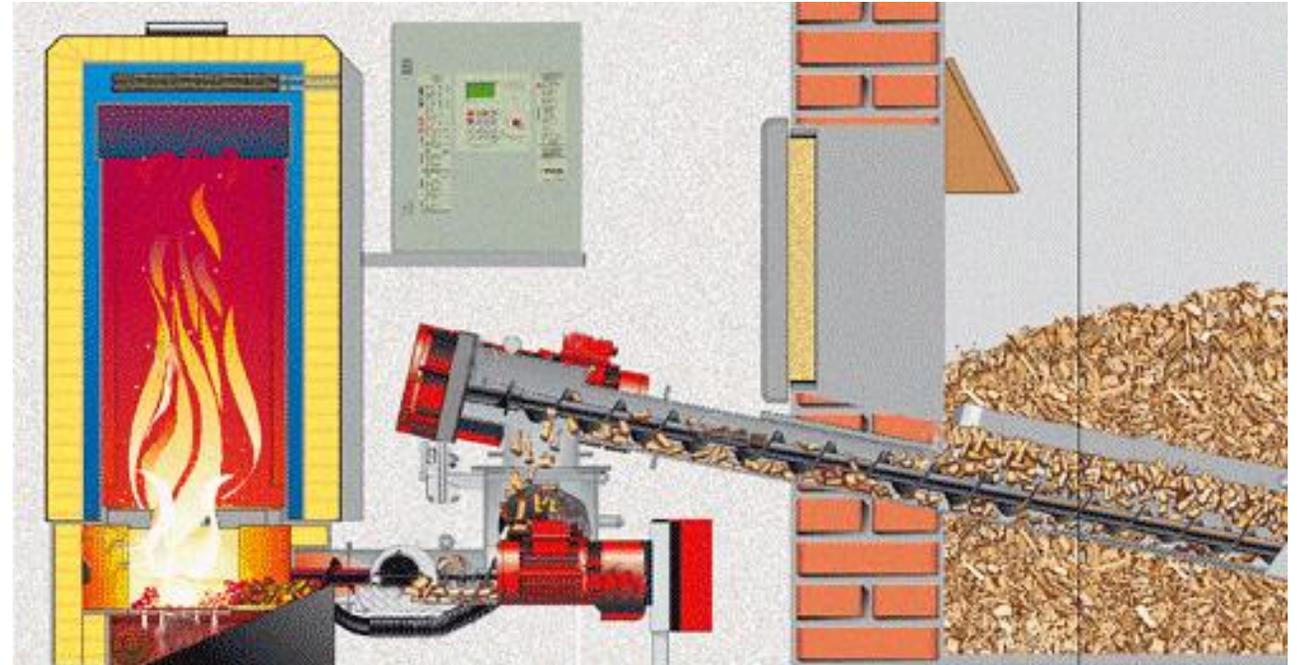
2 The pellets are carried from the storage room to the boiler by a fully automatic pellet feed.

3 After the burning process all that's left is ash – with a weight of only 0.5 per cent of the original pellet. The ash can be disposed of with the domestic waste.

4 If the pellet boiler is interconnected with a buffer storage, emissions can be reduced and efficiency increased.

Wood Chips

- Appropriate for large square footage buildings and district heating systems
- Very affordable fuel
- These systems require more maintenance

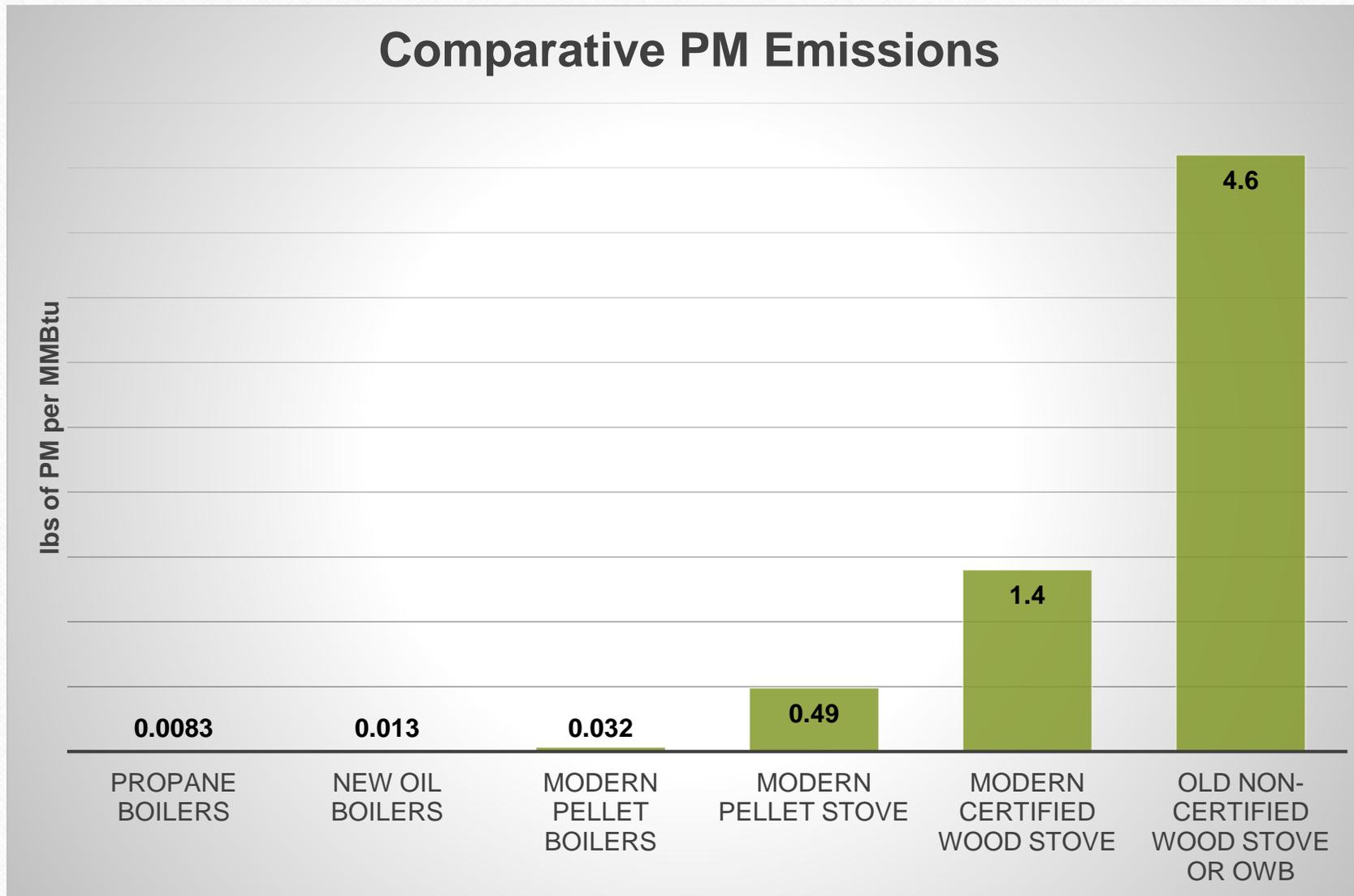


Emissions



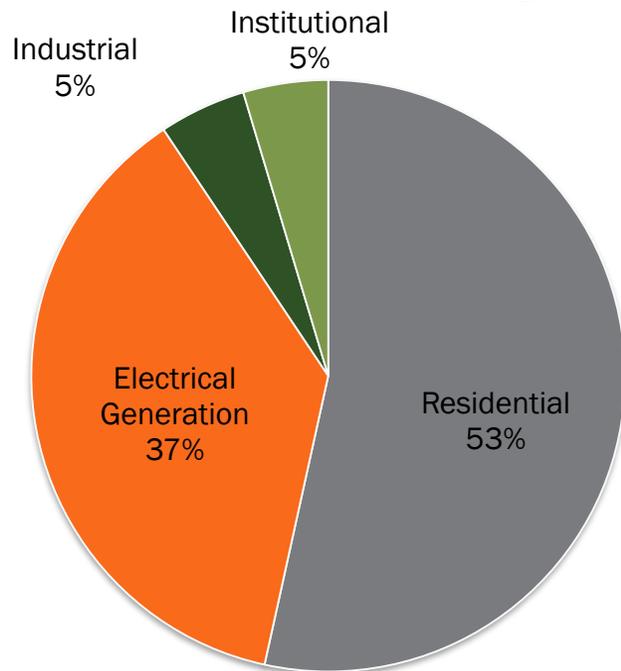
- Wood burning produces emissions of fine particulate matter which is a health concern
- Older wood stoves and boilers are a significant source of particulate emissions
- Air Pollution Control devices are available and effective for larger units

Comparative PM Emissions

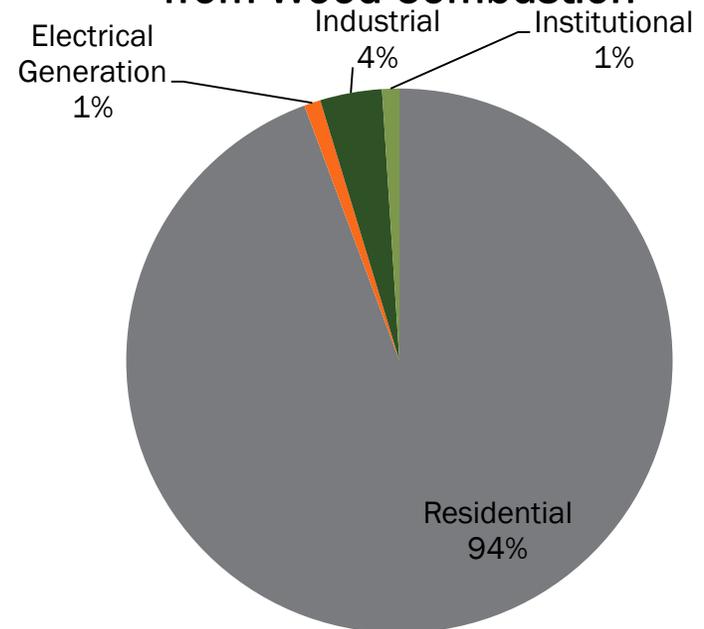


Emissions by Source

2015 Wood Fuel Usage



2015 Estimated PM Emissions from Wood Combustion



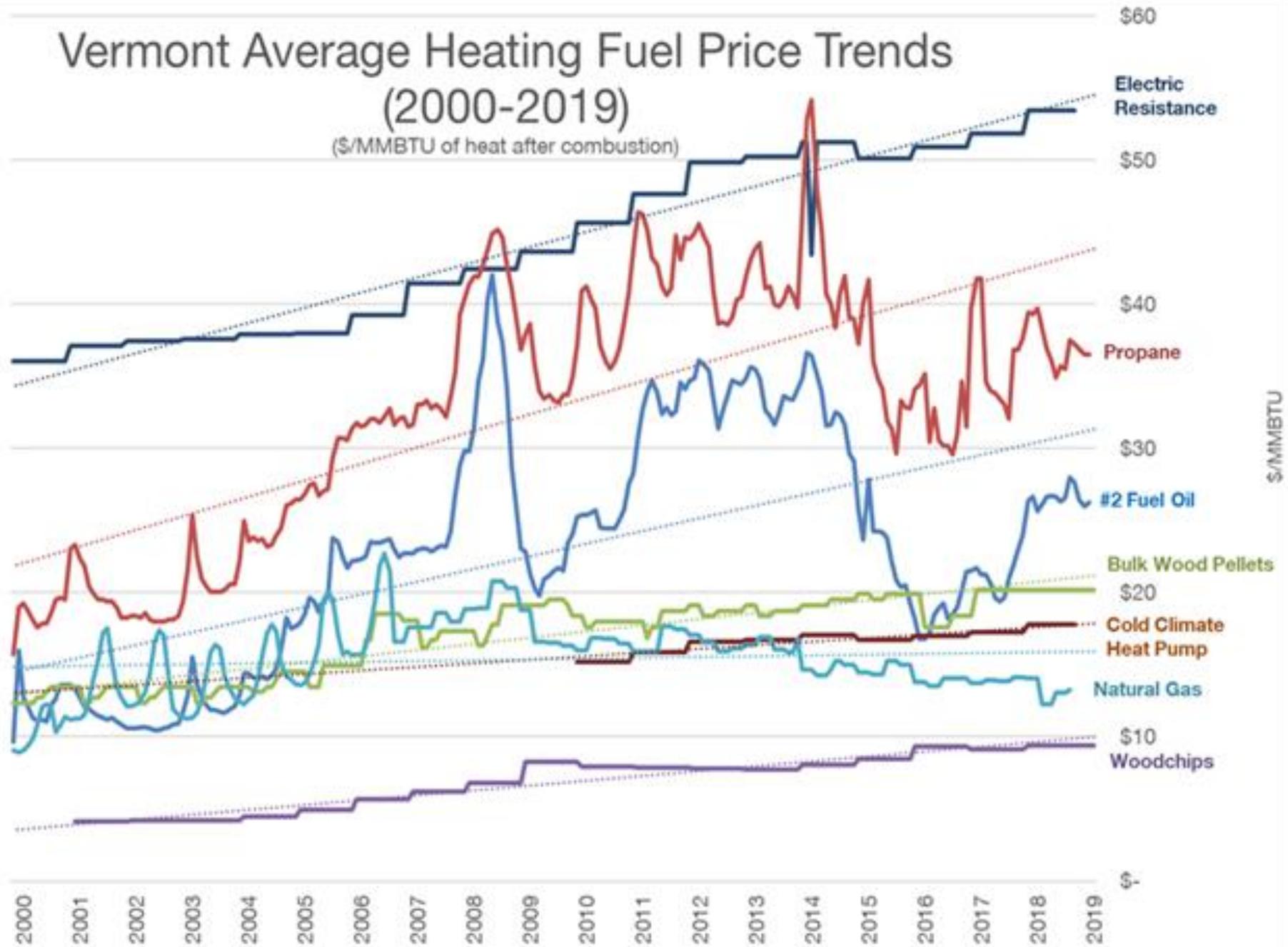
Will We Save Money?

- Wood fuel prices are lower and less volatile than fossil fuel
- Higher up front costs, lifetime savings
- ROI ranges from 3 to 20 years
 - Price of oil
 - Available incentives



Vermont Average Heating Fuel Price Trends (2000-2019)

(\$/MMBTU of heat after combustion)

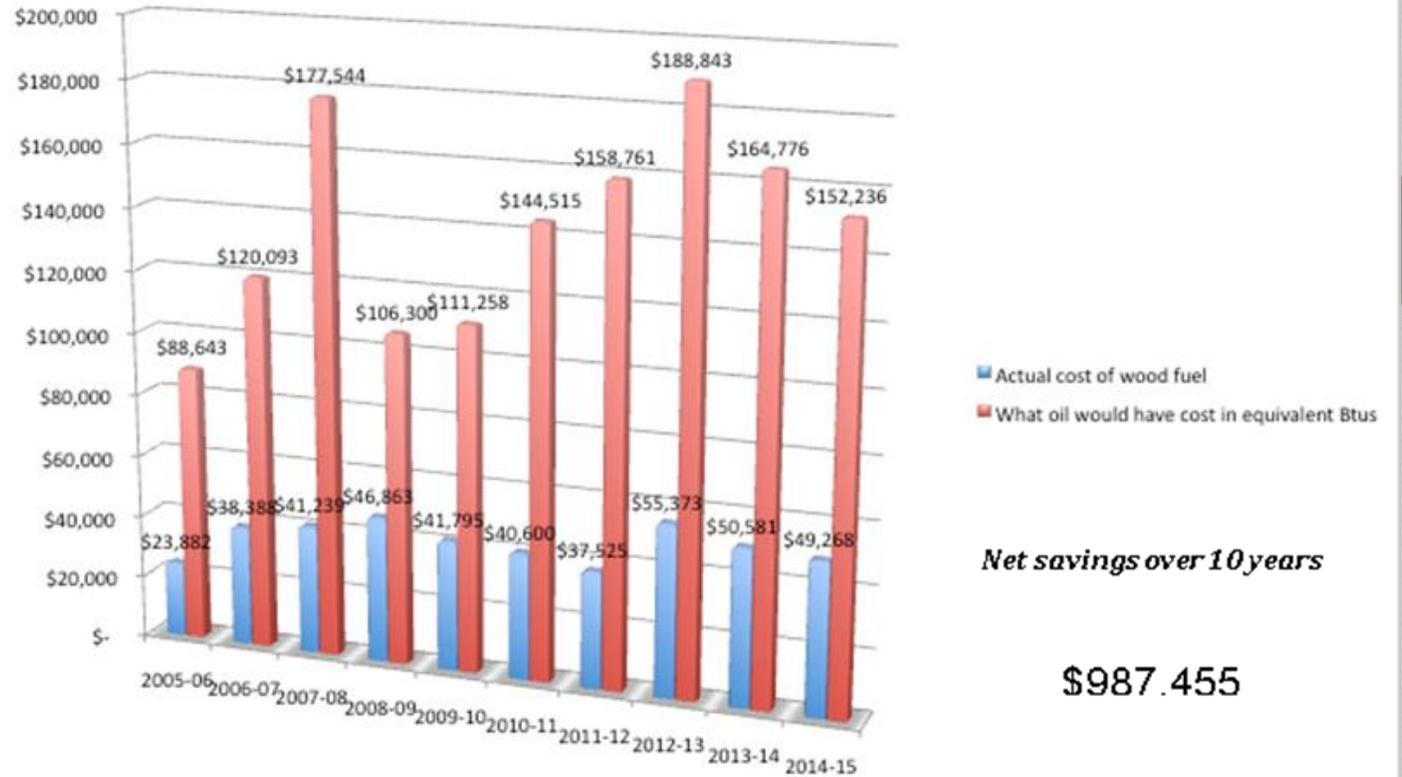


Municipal Examples

Mansfield Union High School



Woodchip vs. Fuel Oil cost
Mount Mansfield Union High School
2005 - 2015



Fayston Town Offices

- Went on line in Fall of 2009
- Overall Project Avg. Annual Savings w/ Energy Efficiency = \$3,590
- AWH System is estimated to be 78% of that = \$2,800
- Uses 8+/- Tons of pellets annually
- Pellet system offsetting an average of 1,600 to 2,000 gallons of #2 heating oil annually
- Pellet System cost w/o boiler room addition was approx \$34,000
- Eight year savings to date (from pellet system to date is aprox. \$22,400. w/insulating & Air Sealing is aprox. = **\$28,700**)



Marshfield, Old Schoolhouse Common Building

~6,600 sq. ft.

- Project installed in Fall of 2011
- Displacing 2,500 gallons of heating oil/yr.
 - Another 2,200 gal/yr. due to weatherization
- 6 ton indoor pellet bin
- Removed one oil boiler and an oil tank. Kept one old oil boiler as back-up
- Total cost ~\$35,000. Internal loan.
- Uses ~20 tons of pellets/yr.



Next Steps

Consult a technical expert

- Consider a feasibility study
- Talk to an experienced installer

How to pay for it

- Incentives
- Financing

Technical Experts

- Stoves: Go to your local stove shop
- Pellet Boilers: Talk to an installer
 - List at www.EfficiencyVermont.com
- Large Scale: Talk to a consultant about a feasibility study
 - Biomass Energy Resource Center
 - Forward Thinking
 - Wilson Engineering
 - US Forest Service
 - And more!

Current Incentives – Automated Systems

Complete list available at: <http://fpr.vermont.gov/incentives>

Buildings < 5,000 sq. ft.

- \$3,000 – Clean Energy Development Fund
- \$3,000 - Efficiency Vermont
- \$1,000 – Washington Electric Coop Members

Buildings > 5,000 sq. ft.

- Efficiency VT - Custom incentive at \$1.25/sq. ft. up to \$50,000

Current Incentives - Stoves

- Efficiency Vermont - \$650 rebate on a **new** wood or pellet stove
- CEDF Wood Stove Changeout Program
 - \$1,000 rebate on a pellet stove
 - \$800 rebate on an EPA certified wood stove
 - \$100 for a new catalyst
- Washington Electric Coop Members - \$250 rebate for wood or pellet stove
- Vermont Electric Coop Members - \$150 bill credit with pellet stove purchase

Grants & Other Programs

- USDA Rural Development
 - Community Facilities Direct Loan & Grant Program: Grants and loans for biomass energy projects
 - Cities, villages, and towns with populations less than 20,000
- Windham Wood Heat Initiative
 - Up to \$100,000 towards technical and installation costs for an automated wood heat system
- Vermont Community Loan Fund – Farm & Forest Fund

Wait, you never said what these cost!

- Pellet boilers & furnaces - \$18-\$20k installed (*residential*)
- Pellet Stove - \$3-\$4k installed
- Wood Stove - \$2-\$3k installed (assuming you have a chimney)
- Wood Chip Boilers – Lots

Takeaway

- You can feel good about using local wood heat!
 - Keep energy dollars local
 - Support jobs for your neighbors
 - Keep forests as forests
 - (and save some money)





Questions?

- Emma.Hanson@Vermont.gov
- Andrew.Perchlik@Vermont.gov