Are you stoked?

Wood Heat & the Forest

Emma Hanson

Wood Energy Coordinator

Vermont Department of Forests, Parks & Recreation

What's a Wood Energy Coordinator?

- Marketing
- Coordination
- Education

What is advanced wood heat?

- Highly efficient wood burning appliances
- New wood stoves all the way to wood chip boilers
- *Automated* wood heat is programmable with a thermostat

AUTOMATED
WOOD
HEAT™

feelgoodheat.org

It's about the forest.

- Vermont is 76% forested, 80% of which is privately owned

- Currently harvesting less than half the net growth

- Markets for low grade wood are evolving

- Vermont is losing 2,123 acres of forest each year

"Keeping forests as forests is the single most important action a family forest owner can take to maintain forest carbon sequestration and storage, reducing the impact of climate change."

From: Forest Carbon, An essential natural solution for climate change

By: Paul Catanzaro, Umass Amherst and Anthony D'Amato, UVM

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

- Energy dollars support loggers, truckers & landowners in VT

- Wood energy generates roughly $60 million in economic activity annually in Vermont

- An estimated 350 jobs in Vermont are directly attributed to wood energy
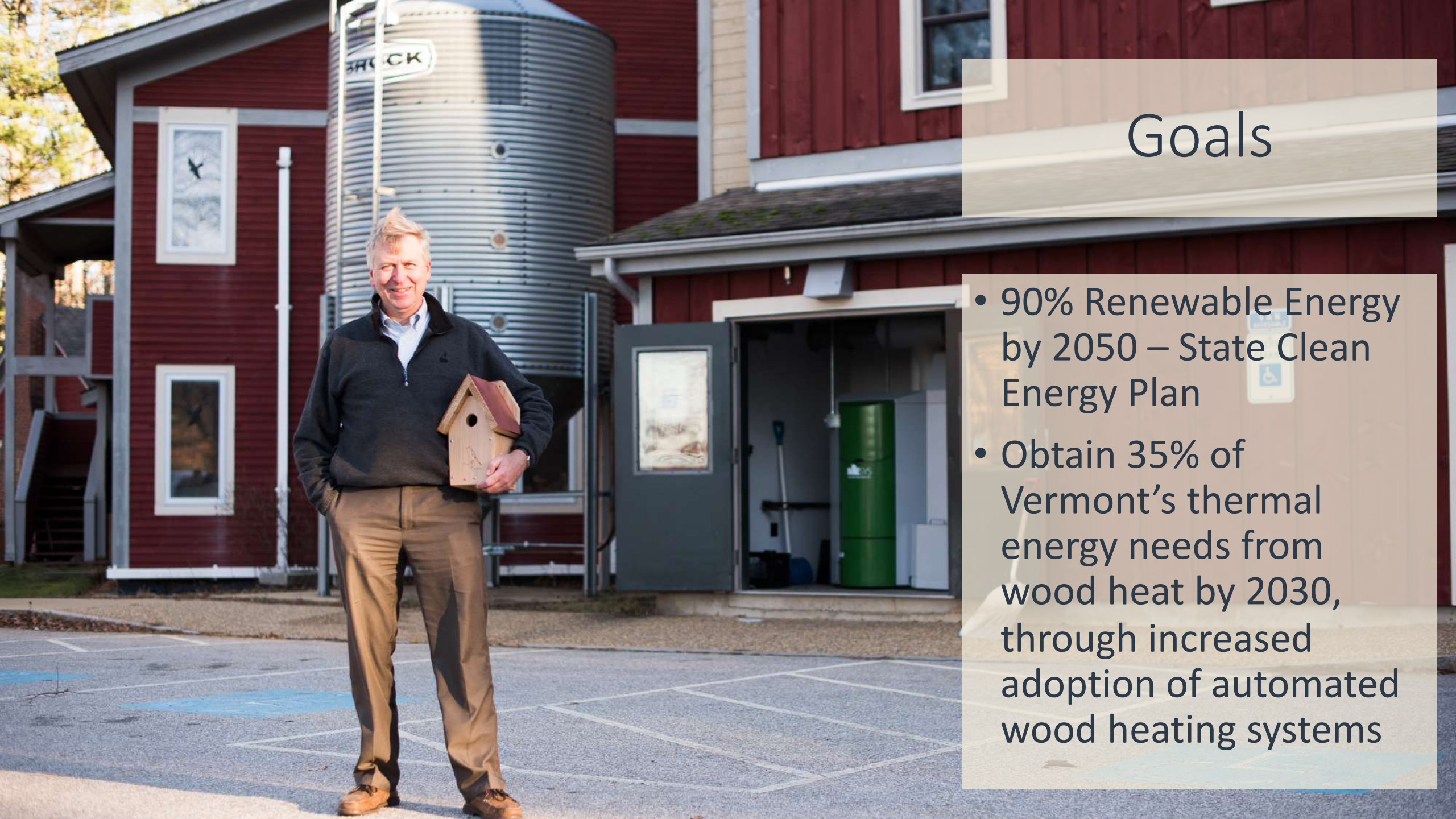
Goals

- 90% Renewable Energy by 2050 – State Clean Energy Plan

- Obtain 35% of Vermont's thermal energy needs from wood heat by 2030, through increased adoption of automated wood heating systems

Why 35%?

- Based on the 2010 Vermont Wood Fuel Supply Study

- A conservative estimate of net available low-grade wood (NALG) that could be used for fuel without compromising forest health

- Was just updated in 2019 and it's calculated that there's 5% more NALG now than reported in 2010

If we reach our goal…

- Displace 40 millions gallons of fossil of fuel annually

- Vermonters save $120,000,000.00/year
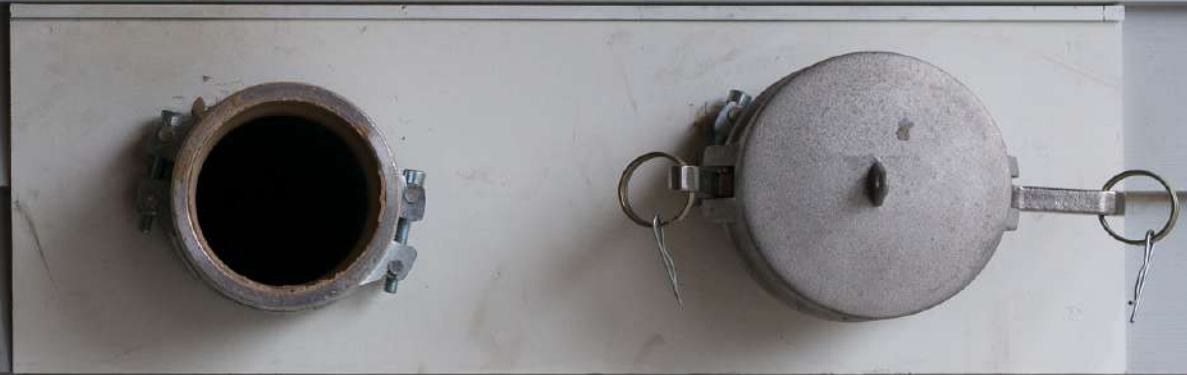
Where are we now?

- 21% of thermal energy needs comes from wood

- 43% of Vermonters heat in full or in part with wood

- 400ish residential pellet boilers currently installed

Cord W...

Wood...

- Prim... y source... hea...

- New... UCH m... effic...

- Hav... once a...

Wood Pellets

- Made of 100% compressed sawdust

- Burn very clean

- Less work and less storage than cordwood

- Appropriate for residential and small commercial buildings

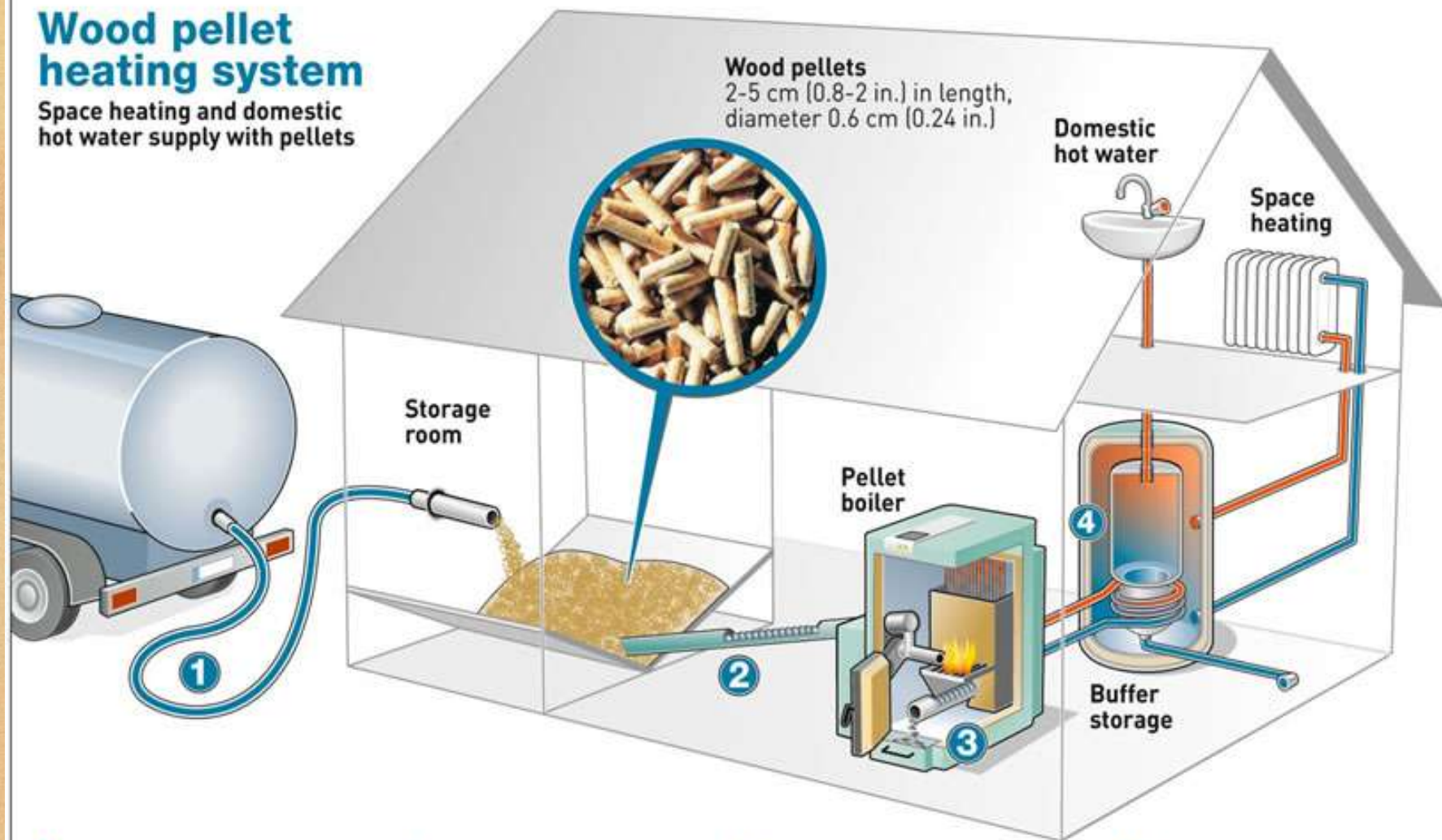- Can be fully automated

- Sold in bag and in bulk

Wood Pellets

Wood pellet heating system

Space heating and domestic hot water supply with pellets

Wood pellets
2-5 cm (0.8-2 in.) in length, diameter 0.6 cm (0.24 in.)

Domestic hot water

Space heating

Storage room

Pellet boiler

Buffer storage

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.
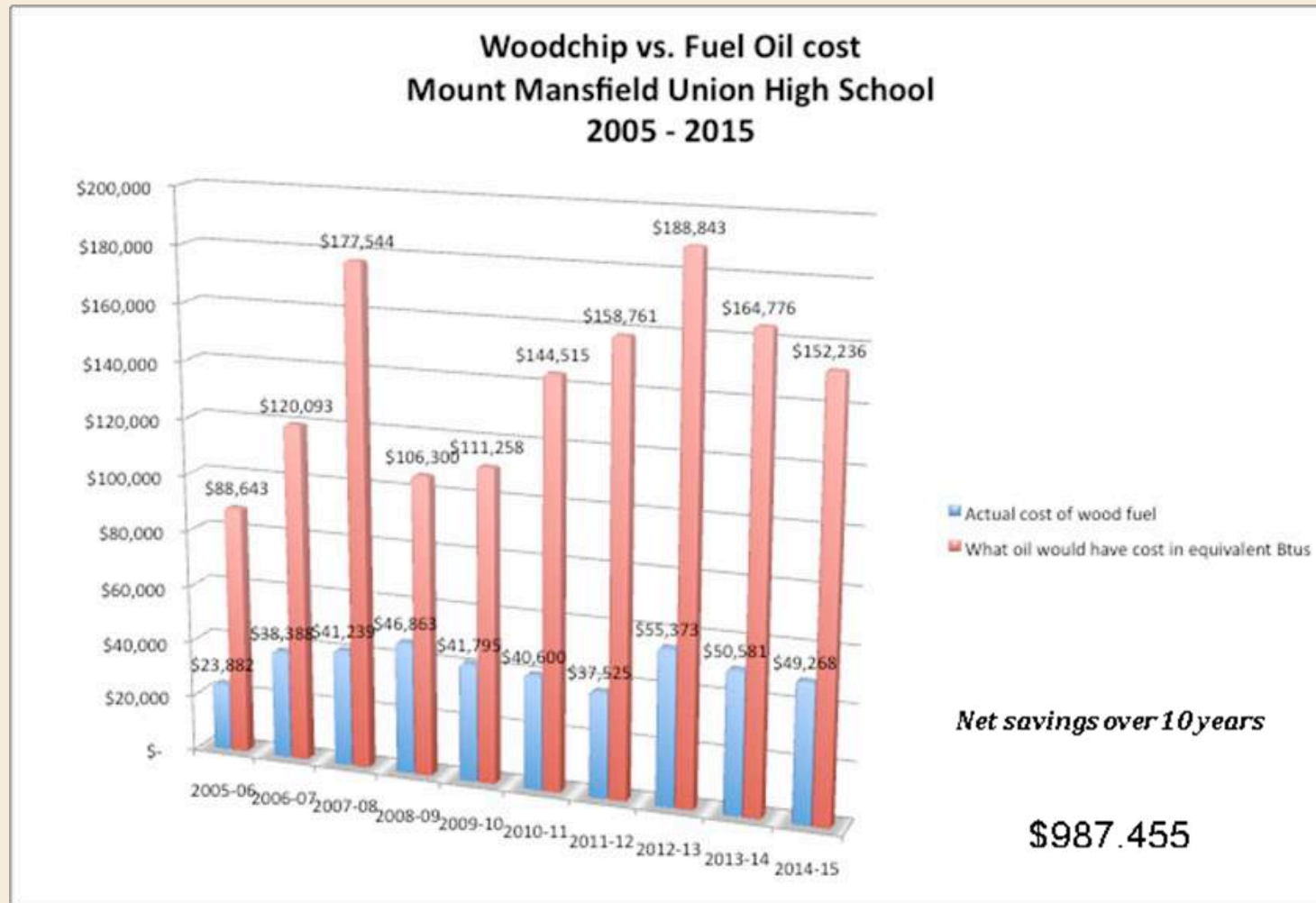
www.unendlich-viel-energie.de

Vermont Average Heating Fuel Price Trends
(2000-2019)
($/MMBTU of heat after combustion)
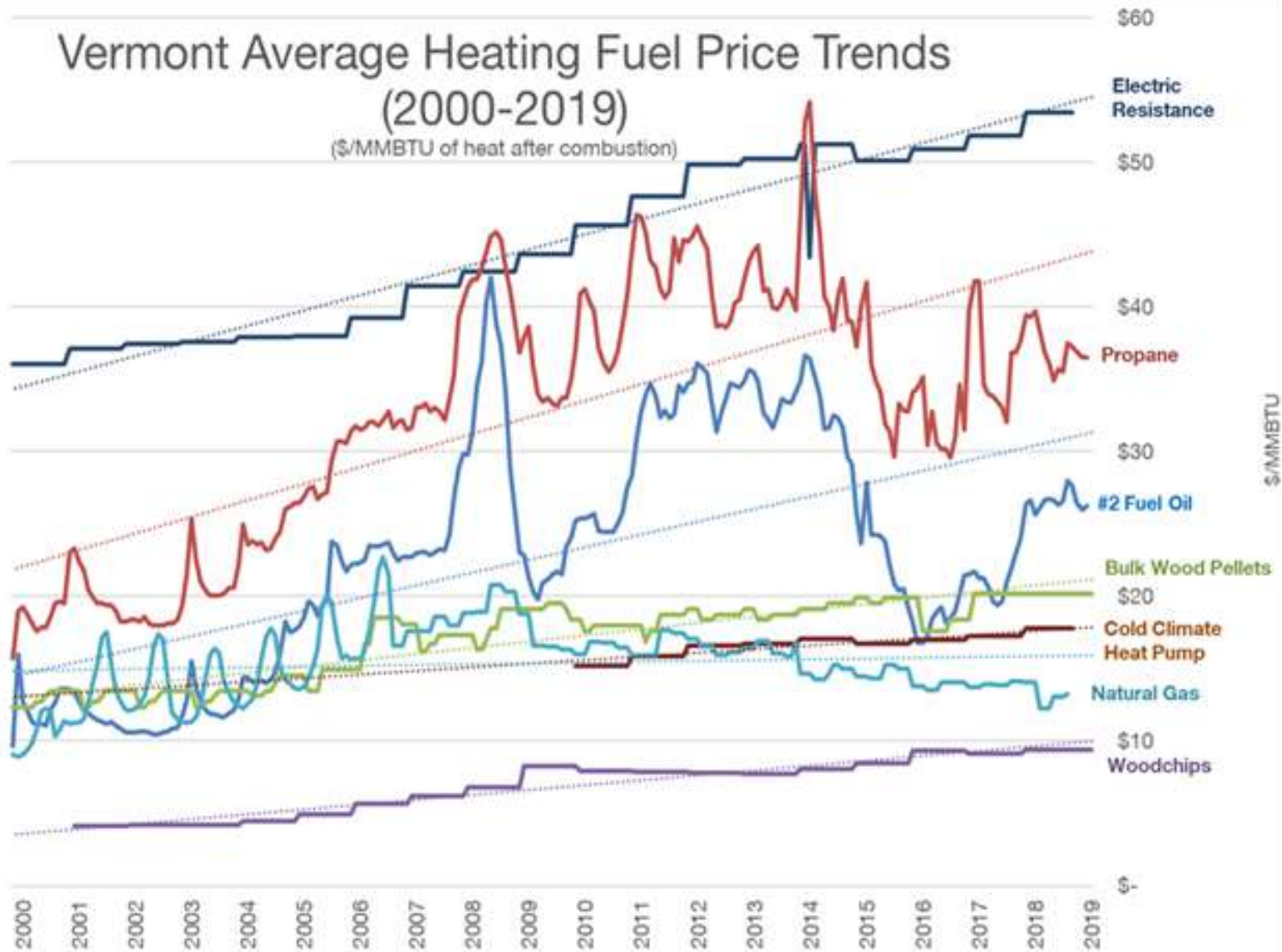
Case Study: Wood Fuel Cost vs. Heating Oil

Current Incentives

Complete list at: https://fpr.vermont.gov/woodenergy/rebates

Automated Pellet Boilers

- $3000 – Clean Energy Development Fund
- $3000 – Efficiency Vermont
- $1000 – Washington Electric Coop Members
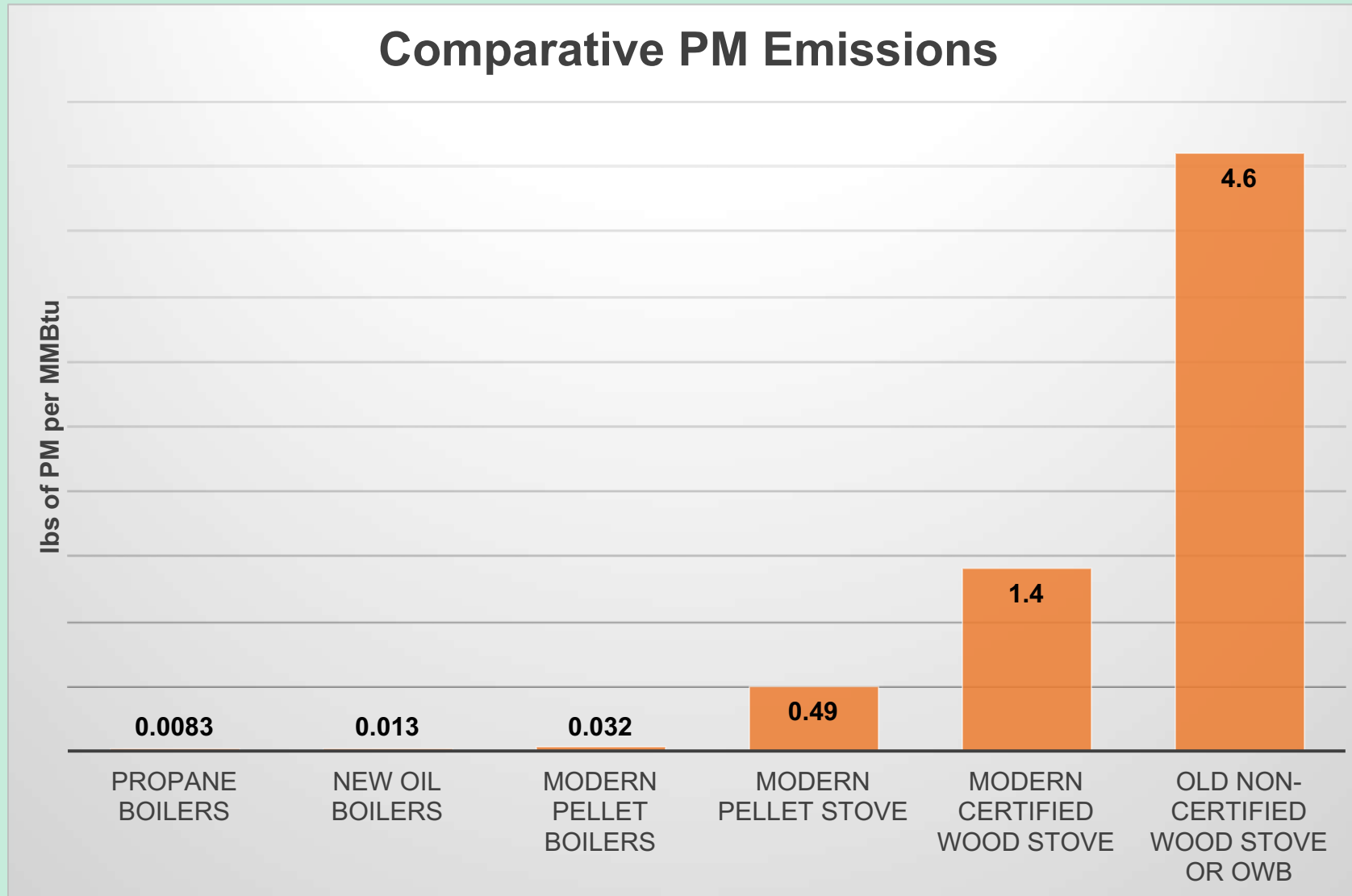- Sales Tax Exempt through June 2021

Stoves

- $1000 rebate on new pellet stove or $800 on new wood stove when you turn in old stove – CEDF
- $650 rebate on new wood or pellet stove, no turn in required – Efficiency Vermont
- $250 Bill Credit – Washington Electric Coop Members
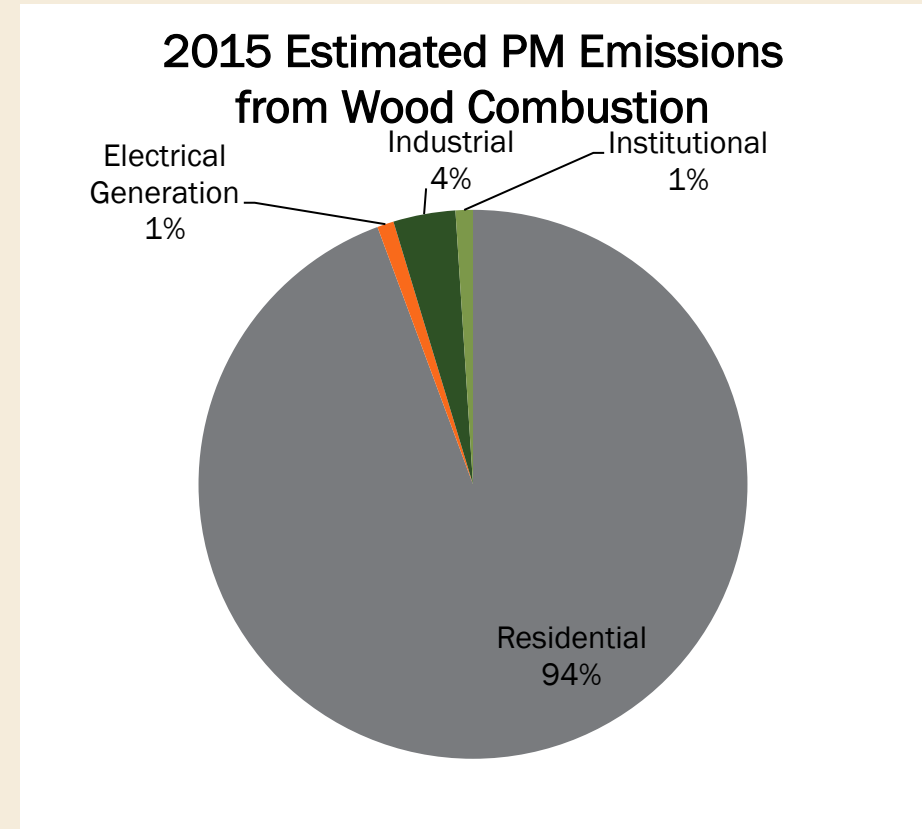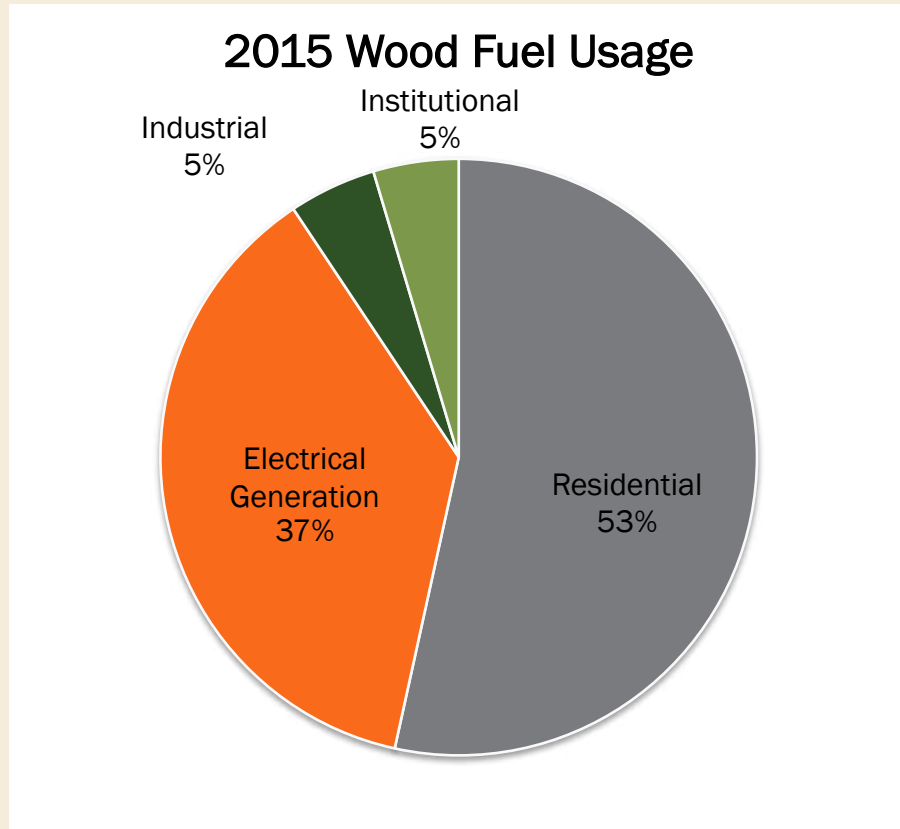- FREE Wood or Pellet Stove for Income Eligible Households

PM 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 commercial installations

Emissions by Source

2015 Wood Fuel Usage

- Residential 53%
- Electrical Generation 37%
- Industrial 5%
- Institutional 5%

2015 Estimated PM Emissions from Wood Combustion

- Residential 94%
- Electrical Generation 1%
- Industrial 4%
- Institutional 1%

Why burn seasoned wood?

- Save money, time and effort
- Heat is wasted on effort to dry out the wood
- Tars and creosote in the excess smoke will line the chimney and blacken the glass
- Indoor & outdoor air quality

You can feel good about heating with wood!

Takeaways

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

Questions?

Heat Values and Fuel Equivalents of Various Wood Species

	Wood (1 air-dried standard cord)	Available heat (million BTUs)	Fuel Equivalents		
			Fuel oil (L)	Natural gas (m3)	Electricity (kWh)
Hardest	Elm, rock	32.0			
	Hickory, shagbark	30.6	553	493	3,800
	Oak, white	30.6			
	Locust, black	28.5			
	Maple, sugar	29.0			
	Beech	27.8			
	Oak, red	27.3	503	453	3,500
	Birch, yellow	26.2			
	Ash, white	25.0			
	Maple, red	24.0			
	Tamarack	24.0			
	Cherry, black	23.5	432	385	3,000
	Birch, white	23.4			
	Walnut, black	19.5			
	Hemlock	17.9			
	Aspen	17.7	326	289	2,200
	Spruce	16.2			
	Pine, white	17.1			
	Basswood	17.0			
	Cedar, white	16.3	276	246	1,900
Softest	Fir, balsam	15.5			

Sources: Thomas 2006, www.ontariowoodlot.com/pdf_older/by_the_cord.pdf, www.tdc.ca/wood.htm