Wood Heat for Municipalities

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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

Primary Fuel
- District Heat: 0.6%
- Gas: 20.4%
- Oil: 44.5%
- Wood Pellets: 8.0%
- Propane: 0.4%

Woodchips: 26.1%
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 Stoves
• Looks and functions much like a wood stove
• Much easier to load and run
• Removes user error
• Can be direct vented through a wall
• Requires electricity

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.

www.unendlich-viel-energie.de
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

<table>
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<th>Lbs of PM per MMBtu</th>
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<tr>
<td>PROPANE BOILERS</td>
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<tr>
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<td>MODERN PELLET BOILERS</td>
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<td>MODERN PELLET STOVE</td>
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<tr>
<td>MODERN CERTIFIED WOOD STOVE</td>
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<tr>
<td>OLD NON-CERTIFIED WOOD STOVE OR OWB</td>
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Source: EPA Burnwise program
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%
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

($/MMBtu of heat after combustion)
Municipal Examples
Mansfield Union High School

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

Net savings over 10 years
$987,455
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 aprox $34,000
- Eight year savings to date (from pellet system to date is aprox. $22,400. w/insulating & Air Sealing is aprox. = $28,700

![Image of Fayston Town Offices](image-url)
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?

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