

Community-Scale Heating with Wood in Maine



Wood Heat Maine - Education, outreach and technical assistance in support of commercial and community-scale modern wood heating in Maine.

Maine Statewide Wood Energy Assistance Team

Background

The Maine Statewide Wood Energy Assistance Team (ME SWEAT) is a program of the Maine Forest Service and a public/private partnership that provides professional guidance to support growth in commercial and institutional heating with wood. ME SWEAT brings together individuals, organizations, businesses, industry associations, and government agencies interested in the sustainable use of our renewable forests to help bring energy independence and economic prosperity to Maine.

This project is coordinated by the Maine Forest Service and funded through a grant from the USDA Forest Service. The Maine Forest Service complies with federal nondiscrimination policy and is an equal opportunity provider



Outline

- I. How Maine Heats**
- II. Benefits**
- III. Supply of Wood for Energy: the Forest Resource**
- IV. Technology Options for Wood Heat**
- V. Examples of Community Scale Wood Heating in Maine**
- VI. How to Get Started/ How Can Wood Heat Maine can Help You**

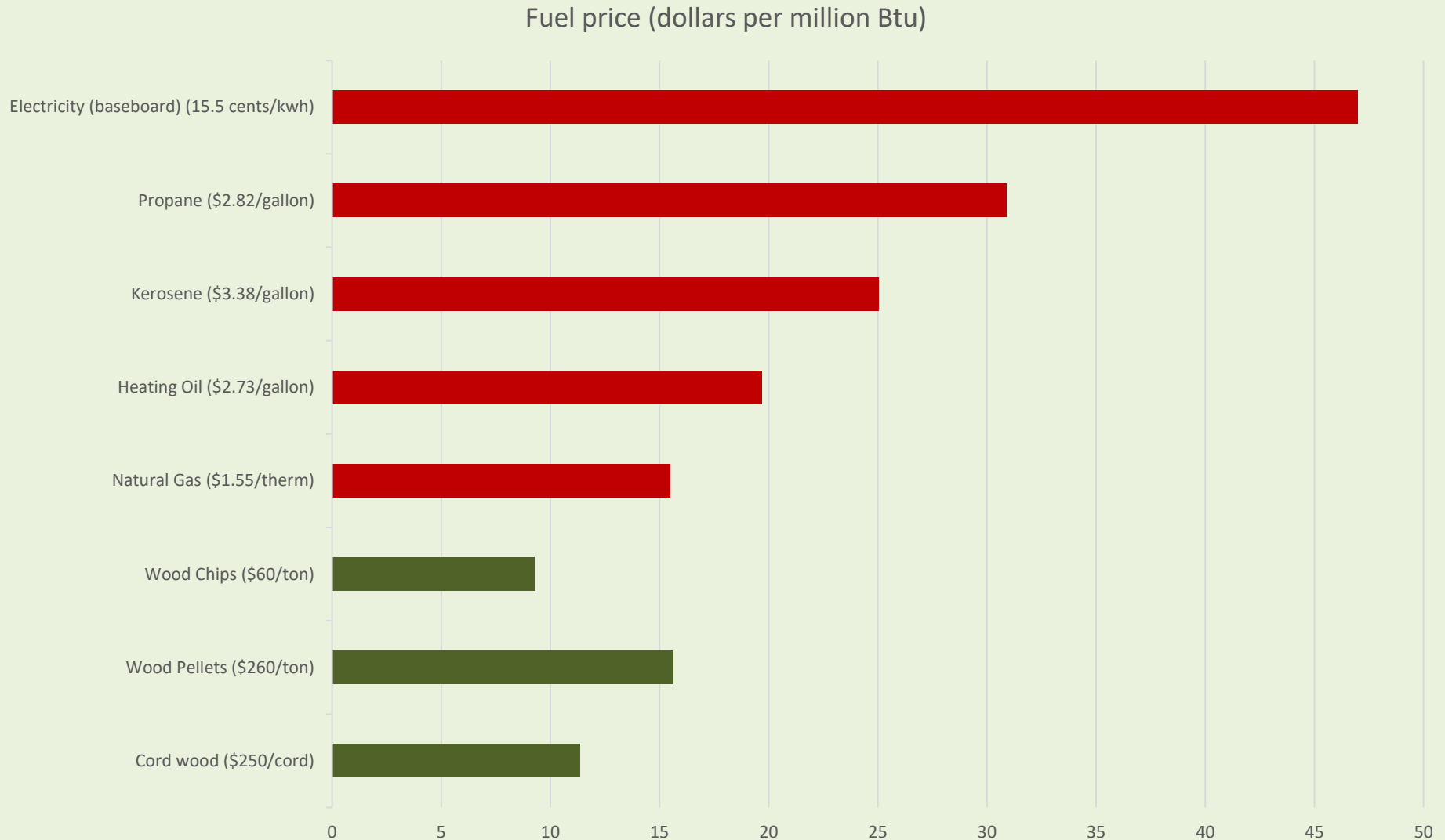


How Maine Heats

- Maine is one of the most dependent states in the U.S. on petroleum energy, and #1 state in dependence on #2 oil
- Over 85% of heating is supplied by imported fossil heating fuels: heating oil, natural gas, propane
- More than 60% of the state's population has no access to pipeline natural gas
- Maine exports over **\$1 Billion** annually to import fossil heating fuels

80 cents of every fuel oil dollar spent leaves the region!!!

Comparing Heating Costs of Different Fuel Types



Wood Fuel Diversity



Wood Pellets, Wood Chips



Wood or Grass Briquettes



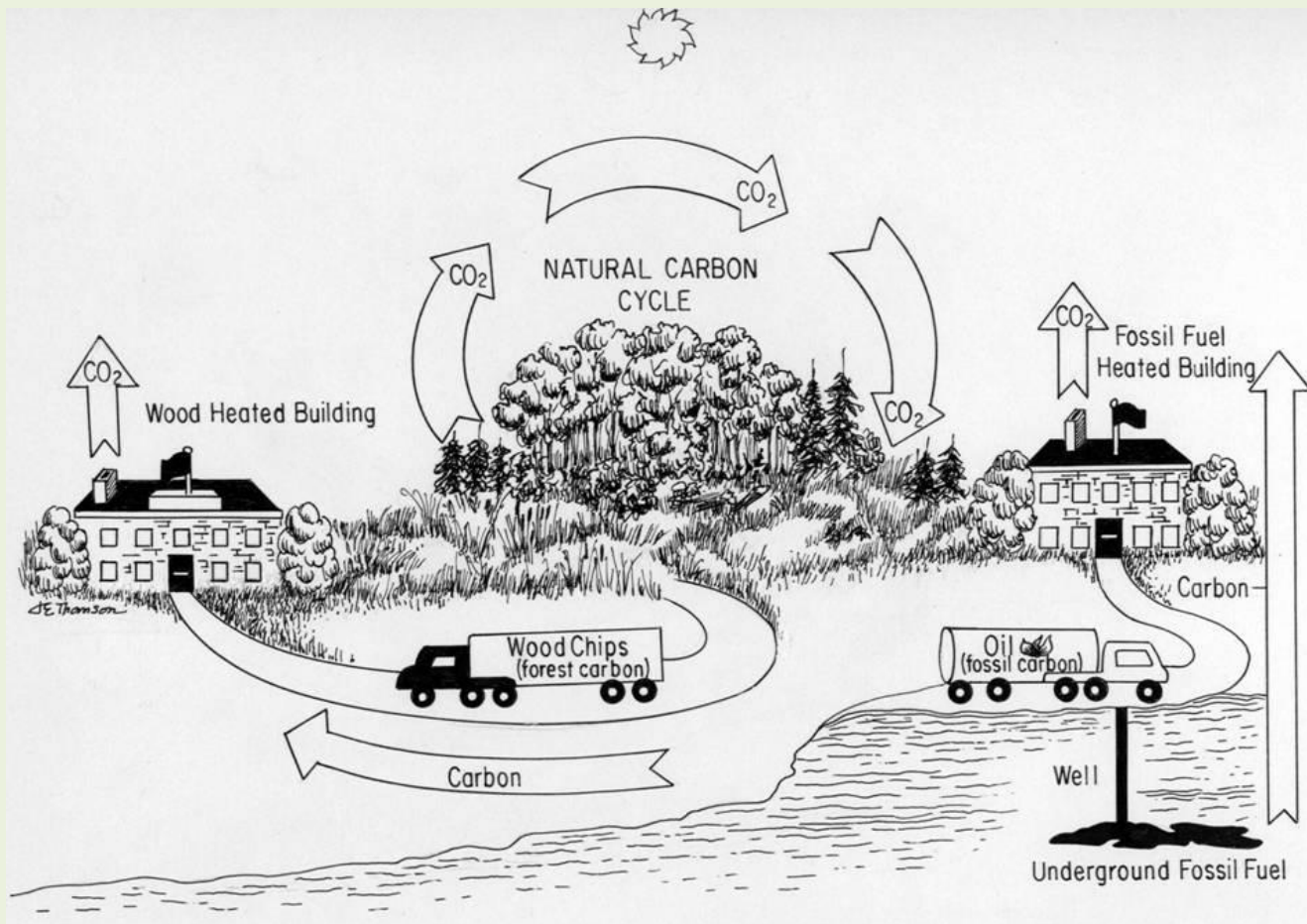
Cord wood

Benefits of Heating with Wood

- ✓ **Save \$\$\$** on heating cost
- ✓ Keep fuel dollar in **local economy**
 - ✓ we export over **\$1 BILLION** annually for fossil heating fuels
- ✓ Reduce dependence on imported oil/propane
- ✓ Reduce greenhouse gas emissions, wood is low carbon fuel in comparison to fossil fuels
- ✓ Support strong markets for low-grade wood
 - keeps forests undeveloped
- ✓ Create **jobs** in Maine
- ✓ Reduce certain air pollutants (e.g. SO₂, Hg)
- ✓ **RENEWABLE, SUSTAINABLE**

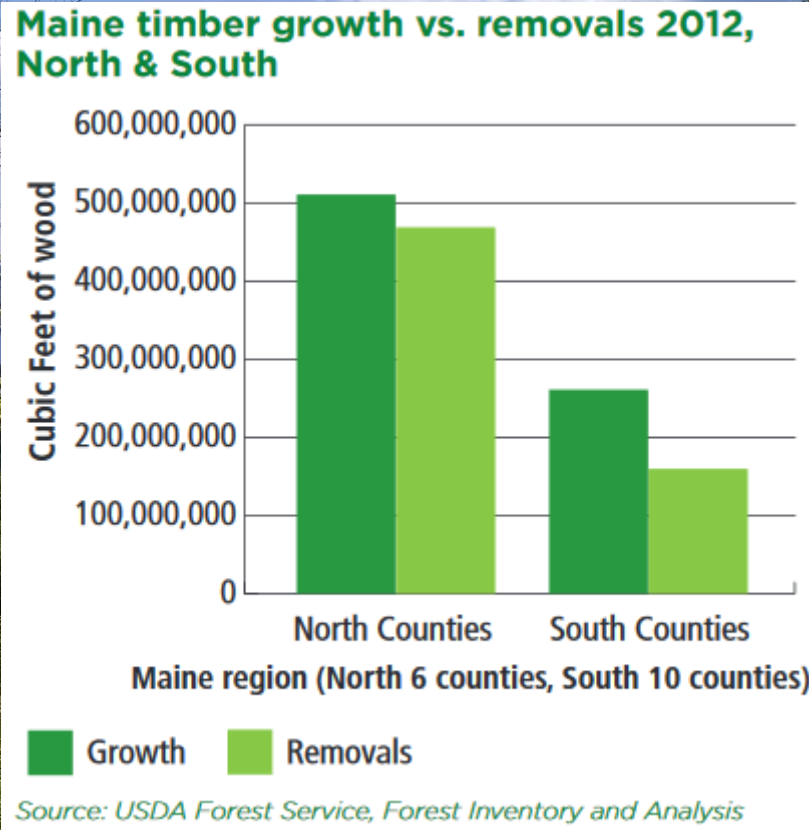


The Carbon Cycle: Biomass vs. Fossil Fuels



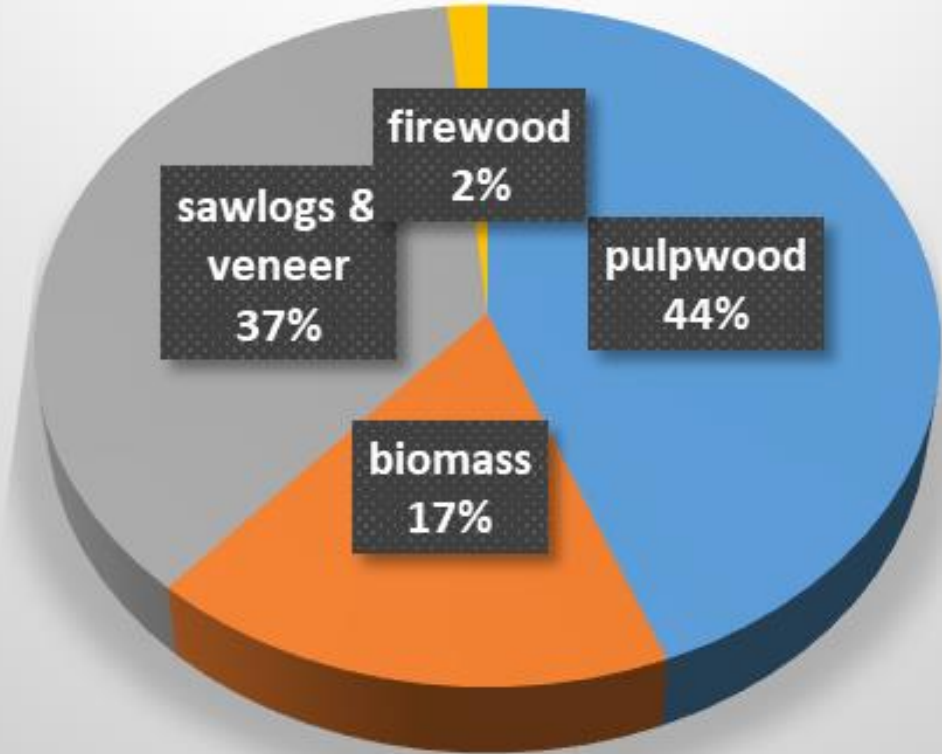
Supply of Wood for Energy: the Forest Resource

Maine is 89% Forested



Products from the Forest

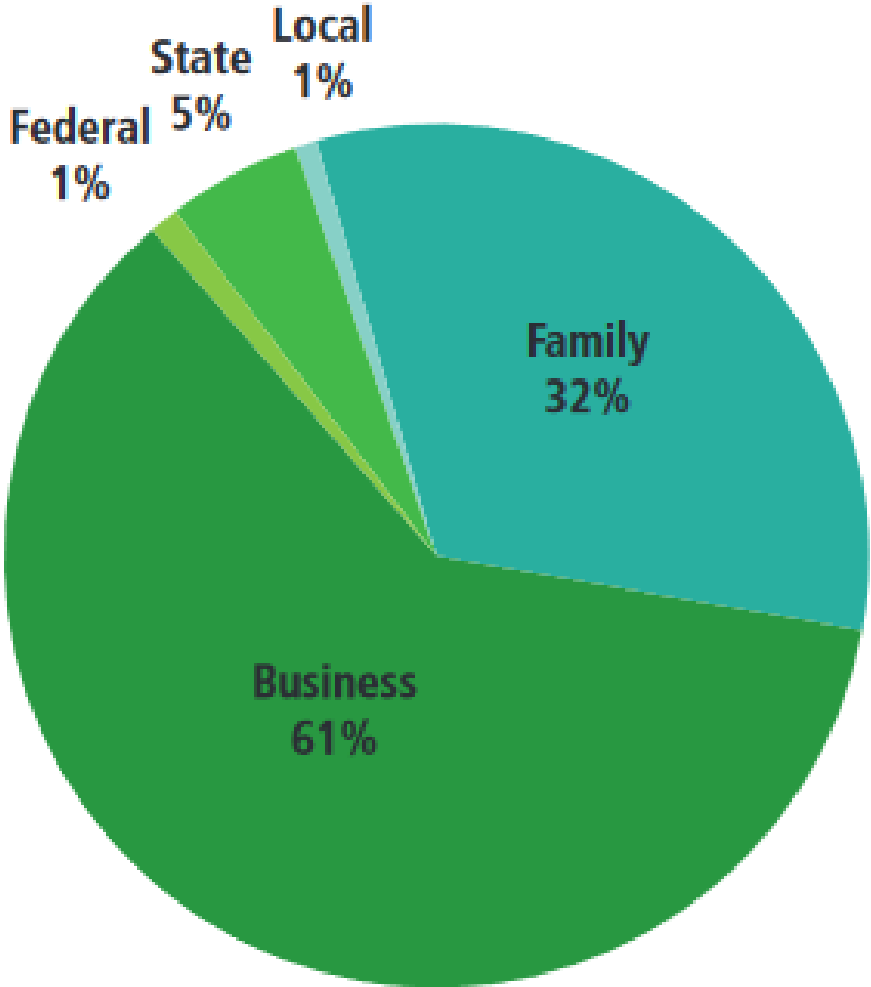
Maine timber harvests 2016



Source: Maine Forest Service, 2016 data

ME Forest Ownership

Maine Timberland Ownership



Source: USDA Forest Service, Forest Inventory and Analysis & private data

Wood Fuel Supply

- **Roundwood** - firewood
- **Pellets** – densified from sawdust, chips, grindings or shavings
- **Chips** - whole tree chips (mostly for electric generation, co-firing)
 - bole chips
 - pulp quality chips from sawmill or chipping plant
 - chips from other sources of clean wood – e.g. pallets



Community-Scale

Community-scaled projects draw from the following supplies and create new local markets for:



- Sawmill residues
- Bole chips from culled and poor quality trees
- Land clearing activities; chipping contractors
- Pellet manufacturers

Characteristics of Advanced Wood Heating Systems



- **Controlled combustion engineering**
- **Fully automated fuel storage and conveying**
- **Fully automated ash handling**
- **Computer controls and monitoring**
- **Emission controls to meet stringent standards**
- **Hot water or steam at range of pressures**
- **Can be combined with thermal storage and other renewable technologies (e.g. solar hot water)**



Delivery and Transport



Wood Chip

Generally by live-floor trailers that dump into large fuel storage bin, usually under cover



Wood Pellet Fuel

Bulk delivery to inside or outside storage (silo style)



Chips Vs. Pellets

Parameter	Chips	Pellets
Heat Cost (\$/MMBtu)	Lower	Higher (about 2X chips)
Capital Cost/MMBtu	Higher	Lower
Fuel supply	Diversity of suppliers	Fewer suppliers
Applicability	Generally >3MMBTU	Generally <3MMBTU
Fuel Standards to Ensure Consistency of Fuel	Yes	Yes
Energy Density (MMBtu/ton)	Lower	Higher (about 2X chips)
Maintenance Cost	Generally higher than pellet system	Generally lower than chip system
Output efficiency	Generally <75%	80-90+%
Particulate Emissions	Higher than pellets w/out emission controls	Lower than chips

Wood Chip Heating Systems in Maine (partial list)

- Molly Ockett School, Fryeburg
- UMaine Farmington, Farmington
- Falmouth Schools, Falmouth
- Mount Blue High School, Farmington
- Messalonskee Schools, Oakland
- Limestone School, Limestone
- Jefferson Village ES, Jefferson
- Woolwich School, Woolwich
- Chelsea School, Chelsea
- SAD 46 School, Dexter
- Mount View School, Thorndike
- Leavitt High School, Turner
- Fort Fairfield Schools, Ft. Fairfield
- Houlton High School, Houlton
- Madawaska Middle/HS, Madawaska
- No. Maine Medical Ctr., Fort Kent
- Oxford Hills HS, South Paris
- Poland Reg. High School, Poland
- Charleston Correctional Facility, Charleston
- Colby College, Waterville
- Tex Tech, Monmouth
- Caribou High School, Caribou
- Nokomis High School, Newport

Limestone School, Limestone

**5 MMBTU
wood chip
boiler heats
buildings
with hot
water grid**



University of Maine, Farmington



17 MMBTU wood chip boiler boiler heats campus buildings

Mount View School, Thorndike



5MM BTU wood chip boiler heats school with hot water

Wood Pellet Heating Systems in Maine (partial list)

- Millinocket Reg. Hospital, Millinocket
- No. Maine Comm. College, Presque Isle
- Phillips Middle School, Phillips
- Strong Town Hall, Strong
- Thorndike Town Hall, Thorndike
- UMaine Presque Isle, Presque Isle
- Waterville Senior HS, Waterville
- Jackson Laboratories, Bar Harbor
- College of the Atlantic, Bar Harbor
- Piscataquis Comm. E.S., Guilford
- Telstar Middle HS, Bethel
- Crescent Park Elem School, Bethel
- Garrett Schenck School, Anson
- Salt Marsh Project, Yarmouth
- Maine Top Mill, Waldoboro
- Henderson Memorial Baptist Church, Farmington
- Gould Academy, Bethel
- Yates, Max, Farmington
- King, Joyce & Clayton, Farmington
- County Of Oxford, So. Paris
- Blue Hill Public Library, Blue Hill
- Tides Institute & Museum Of Arts, Eastport
- Town Of Thorndike, Thorndike

Carrabec Community School, Carrabec

**200 MBTU
wood pellet
boilers**



Strong Town Hall, Strong, ME



205 MBTU wood pellet boiler, heats town building

Henderson Memorial Baptist Church, Farmington, ME



**200 MBTU
wood pellet
boilers**

Emissions

- State permitting for systems >2MMBTU, may require air dispersion modeling
- Regulated pollutants: SO₂, NO_x, PM, CO, VOCs
- Particulate matter is primary public health focus
- Best technology = complete combustion = minimal emissions
- Pellets generally lower in emissions than chips
- Back end controls can reduce PM to limits comparable to fossil fuel systems but add cost

Getting Started

- Understand what you are trying to achieve
- Learn as much as you can on your own

- lots of free information at

www.woodheatmaine.org

- Talk to others who have already done it
- Talk to prospective vendors
- Hire a qualified energy advisor to assist you
- Consider audit and efficiency measures **BEFORE** you size your system
- Carefully size your system
- Develop financial pro forma
- Consider public relations of your project: fuel supply, emissions, trucks, etc.
 - engage your stakeholders!



Incentives

- USDA REAP grant 25% capital cost up to \$500,000
- Possible new grant program for installations through Efficiency Maine (debated during 2018 legislative session)
- Maine Statewide Wood Energy Assistance Team
 - Applications for technical assistance accepted on a rolling basis

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Levels of Assistance from ME SWEAT

- **Introductory presentation** – introduce your project leaders to basics of commercial/institutional wood heating (presentation like this one)
- **Engineering Assistance/ Pre-Feasibility Studies** – an expert on modern fully-automated wood heating systems – may be hired at no cost to you and will meet with you, analyze your current heating system(s) and make a preliminary determination on whether you should pursue a switch to a wood heating system

Maine Statewide Wood Energy Assistance Team

www.woodheatmaine.org

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