

**SOME HELPFUL WEBSITES FOR MORE INFO:**

- North Country Resource Conservation & Development—www.nhrcd.net
- Northeast District Energy Corporation—www.energy.rochester.edu/ndec/
- Biomass Energy Resource Center—www.biomasscenter.org
- Fuels for Schools—www.fuelsforschools.org
- New England Wood Pellets—www.pelletheat.com
- Crotched Mountain Woodchip Plant—  
www.crotchedmountain.org/crotchedmountain/html/woodchipplant.htm
- International District Energy Association—www.districtenergy.org
- Greenfield District Heating—www.greenfelddistrictheating.org
- Union of Concerned Scientists—www.ucsusa.org/clean\_energy
- Danish Board of District Heating—www.dbdh.dk/

**PROJECT PARTNERS (at time of printing):**

- |                                                                |                                                       |
|----------------------------------------------------------------|-------------------------------------------------------|
| North Country RC&D                                             | NORESKO                                               |
| US Forest Service, State & Private Forestry, Northeastern Area | Fall Mountain School District Clean Power Development |
| US Forest Service, White Mountain National Forest              | Town of Colebrook                                     |
| NH Department of Education                                     | Town of Lancaster                                     |
| UNH Cooperative Extension                                      | City of Berlin                                        |
| NH Office of Energy & Planning                                 | Coos Economic Development Corp.                       |
| The Jordan Institute                                           | Business Enterprise Development Corporation           |
| NH Division of Forests & Lands                                 | Ramboll A/S                                           |
| New England Wood Pellet                                        | Danish Board of District Heating                      |
| Plymouth State University                                      | Northeast District Energy Corp.                       |
| NH Timberland Owners Assn.                                     | Woodstone Wood Pellet                                 |
| NH Dept. of Environmental Services                             | North Country Council                                 |
| Biomass Energy Resource Center                                 | Thayer Corporation                                    |
| Crotched Mtn. Rehabilitation Center                            | A&B Logging                                           |
| Merrimack Valley School District                               | The Mount Washington Resort                           |
| Audubon Society of NH                                          | Northeast Mill Services                               |
| Hanover High School                                            | Propell Energy                                        |
| Town of Lyme, NH                                               | Pure Point Energy                                     |
| Grafton County Commissioners                                   | White Mtn. Community College                          |
| Strafford County Commissioners                                 | The Balsams Resort                                    |

The work upon which this publication was based was funded in whole or in part through a grant awarded by the Northeastern Area State and Private Forestry, U.S. Forest Service. All programs and assistance of the RC&D Council are available without regard to race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact the USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write USDA Director, Office of Civil Rights, Room 326W, Whitten Building, 14<sup>th</sup> and Independence Avenue SW, Washington, DC 20250-9410, or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.

**RC&D—Bringing People, Ideas and Resources Together to Make Things Happen!**

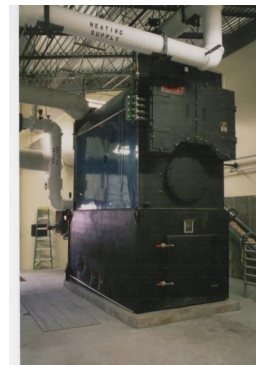
**NORTH COUNTRY RC&D**

719 North Main Street, Rm 220  
Laconia, NH 03246

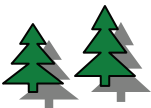
Nonprofit Org.  
U.S. Postage  
**PAID**  
Meredith, NH  
Permit No. 20

**WOOD BIOMASS FOR HEAT AND POWER**

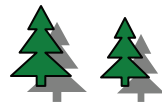
An Energy Saving and  
Community Economic  
Development Opportunity for  
New Hampshire



- + Lower energy costs
- + Increase energy independence
- + Enhance local economies
- + Improve NH forest lands



## What is Biomass?



Biomass is any biological material that can be used as a fuel to produce heat, electricity, or both heat and power. Wood biomass includes wood chips, wood pellets and other low-grade wood wastes. Other common biomass fuels are agricultural crop residues and farm animal wastes.

**Paying \$40/ton for wood chips is the same as paying:**

- \$0.72/gallon for heating oil;
- \$0.51/gallon for propane;
- \$5.50/1000 cu. ft. for natural gas; and
- \$0.02/kWh for electricity.

## Why Use Biomass for Energy?

Biomass is a renewable fuel that can be sustainably produced. It makes sense to use biomass in place of conventional, nonrenewable fossil fuels (oil, gas, and coal) for several good reasons:

- ✦ **Biomass fuel is a local product.** Biomass is grown and harvested on local forests and farms. Dollars spent on biomass fuel stay in the local economy, creating jobs and supporting forestry and agriculture.
- ✦ **Biomass is easy to use and has high energy content.** Wood pellets or wood chips are a clean-burning, high energy renewable fuel that is convenient to use and requires less storage space than other biomass fuels.
- ✦ **Biomass fuel prices are generally lower and more stable.** Biomass fuels have increased by only about 1%/year over the past 20 years and have historically been lower-priced than fossil fuels.
- ✦ **Biomass energy is good for the environment.** Using carbon-neutral biomass in place of fossil fuels helps reduce atmospheric buildup of greenhouse gases, which contribute to climate change. Biomass energy systems help keep forests healthy by providing a market for low-grade “cull” wood, whose removal improves the well-being of the forest and the value of commercial trees.

**Paying \$200/ton for pellets is the same as paying:**

- \$1.67/gallon for heating oil;
- \$1.18/gallon for propane;
- \$12.50/1000 cu. ft. for natural gas; or
- \$0.04/kWh for electricity.

## Using Biomass to Heat and Power Single Buildings or Clusters of Buildings

Wood biomass in the form of chips and pellets can be used effectively to provide heat and hot water for stand-alone or building clusters. Many options exist today for the types of boilers, fuel storage and fuel feeding systems. Adding thermal storage to a system provides additional advantages. The State of Vermont has been helping schools convert inefficient fossil fuel heating and hot water systems to wood biomass for close to 30 years. Contact the VT Department of Forest & Parks or the VT School Superintendents Association for a listing of schools currently using biomass—their experience is impressive! On average, annual fuel savings are around \$42,000/school/year. Vermont schools have reduced their fossil fuels consumption by 80% (equivalent to 70,000 gallons of oil). In New Hampshire we have just begun this conversion. The following schools and organizations are some examples of systems in NH:

—**Merrimack Valley High & Middle School, Penacook, NH**—Produces 6.74 MMBtu/hour using approximately 636 tons of wood chips annually. The system heats 230,000 sq. ft.

—**Crotched Mountain Rehabilitation Center in Greenfield, NH**—A 12 MMBtu/hr biomass hot water heating system which heats 24,400sq. ft. of its campus. The system uses 3000 green tons of wood chips annually.

—**Hanover High School, Hanover, NH**—A 5.0 MMBtu/hr heat only system using approximately 223 tons of wood chips per year.

—**Society for the Protection of NH Forests, Conservation Center, Concord, NH**—a wood chip gasification system.

—**Audubon Society of NH, Concord, NH**—a single boiler wood pellet heat system with an automatic feed system.



## Using Biomass for District Heat and Power

Wood biomass systems can also heat and provide hot water to portions of or entire communities. In the spring of 2008 a study was conducted in the village of Groveton, NH and part of the Town of Northumberland, NH to determine rough feasibility estimates for creating and providing a system for the whole community that could heat homes, municipal buildings and commercial buildings. Such a system would be comparable to creating a water or sewer district. In systems of this size it usually makes economic sense to include electrical power co-generation as part of the system.

Visit [www.nhrcd.net](http://www.nhrcd.net) to view the Executive Summary of the Groveton Feasibility Report. Call (603) 527-2093 to request a complete copy of the study. Since the completion of the Groveton Study, several NH communities have expressed interest in “district heating” systems. Currently the towns of Colebrook, Lancaster, Berlin and Barnstead are investigating the potential for “district heating”, along with several other communities and private entities.

In 2008 several feasibility studies were conducted to convert single buildings on campuses to biomass heat. Visit [www.nhrcd.net](http://www.nhrcd.net) to look at the following studies:

—**Fall Mountain School District**—Feasibility studies for the Charlestown Middle School and Walpole Elementary School.

—**Grafton County Complex**—Feasibility study for the Grafton County Court, Nursing Home and jail.

—**Strafford County Complex**—Feasibility study for a biomass system serving the nursing home and jail.

—**Dept. of Resource & Economic Development Warehouse at Bear Brook State Park**

—**Plymouth State University**—Feasibility study to convert an existing oil fueled co-generation plant to wood biomass.

—**Penacook Elementary School**

—**Loudon Elementary School**

—**Boscawen Elementary School**

## Biomass District Energy System

