A vertical strip of wood chips runs down the left side of the slide.

Biomass Community Energy Systems

HEATING AND COOLING:

RENEWABLE ENERGY OPTIONS FOR MUNICIPALITIES


Presented to the

2007 Smart Growth/Smart Energy Conference

DCU Center

Worcester, Massachusetts | December 7, 2007

**Christopher Recchia, Executive Director
Biomass Energy Resource Center**



Biomass Energy Resource Center (BERC)

BERC is a national nonprofit organization working to promote responsible use of biomass for energy.

BERC's mission is to achieve a healthier environment, strengthen local economies, and increase energy security across the United States by developing sustainable biomass systems at the community level.





What is Biomass?

Biomass is any biological material that can be burned for fuel.

Common sources of biomass include:

- **Forestry & industry residues**
- **Cordwood**
- **Orchard trimmings/prunings**
- **Grasses/straw**
- **Animal manure**
- **Food processing wastes**
- **Pelletized forest and ag materials**



Biomass Feedstocks



Forest Residues

- Timber harvesting
- Forest thinning
- Wood processing



Agricultural Residues

- Farms (corn stover)
- Agricultural processing (sugarcane bagasse)



Energy Crops

- Hybrid poplar
- Switch grass
- Willow

Other Biomass Feedstocks (urban waste, animal manure, waste vegetable oils, etc.)





Advantages of Biomass

- Stored form of solar energy
- Sustainable renewable fuel source
- Predictable and manageable resource
- Can be stored and transported and used where and when required
- Can be used in conjunction with existing infrastructure, uses, and technologies



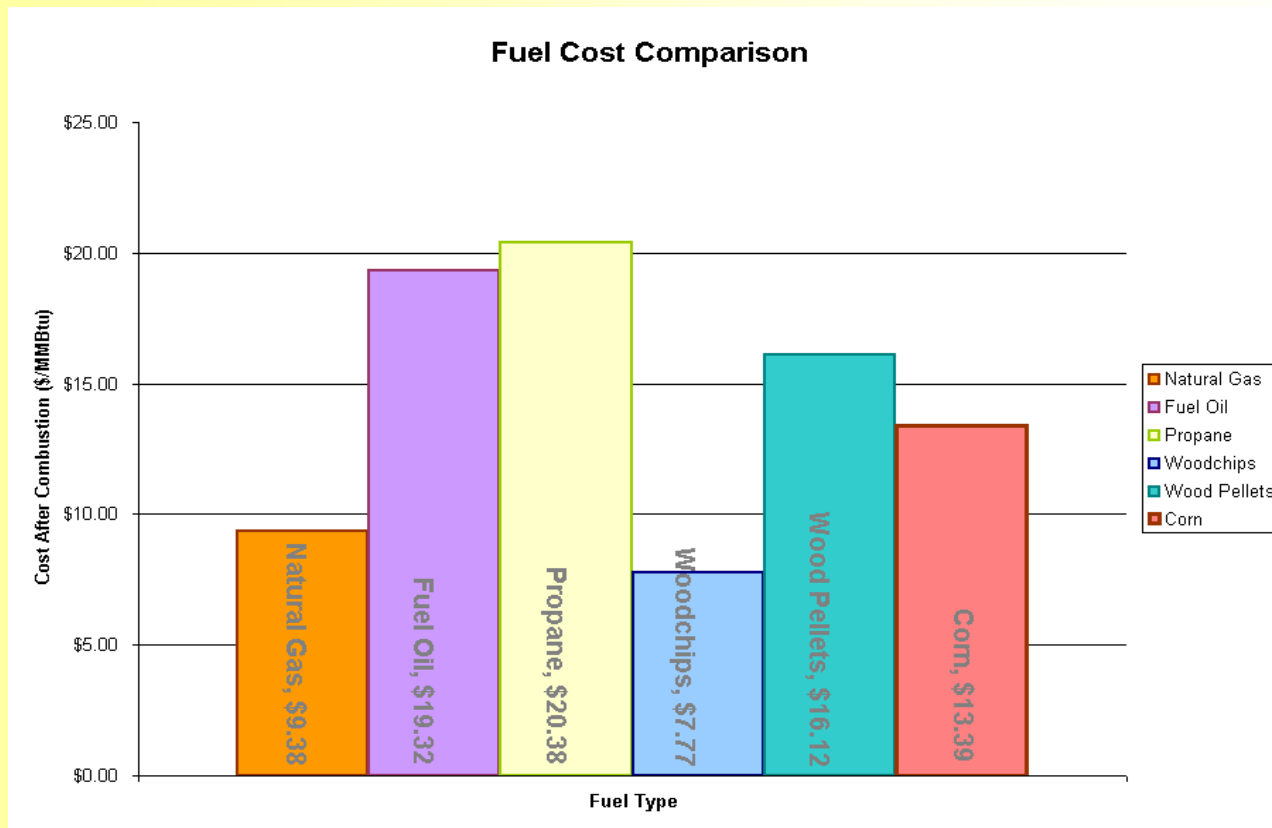


Advantages of Biomass

- Managed properly - Carbon neutral or better
- Greenhouse gas benefits and positive impact in moderating global climate change
- Local and regional community economic development
- Modern systems burn cleanly
- Low-cost fuel with more stable prices and fuel flexibility



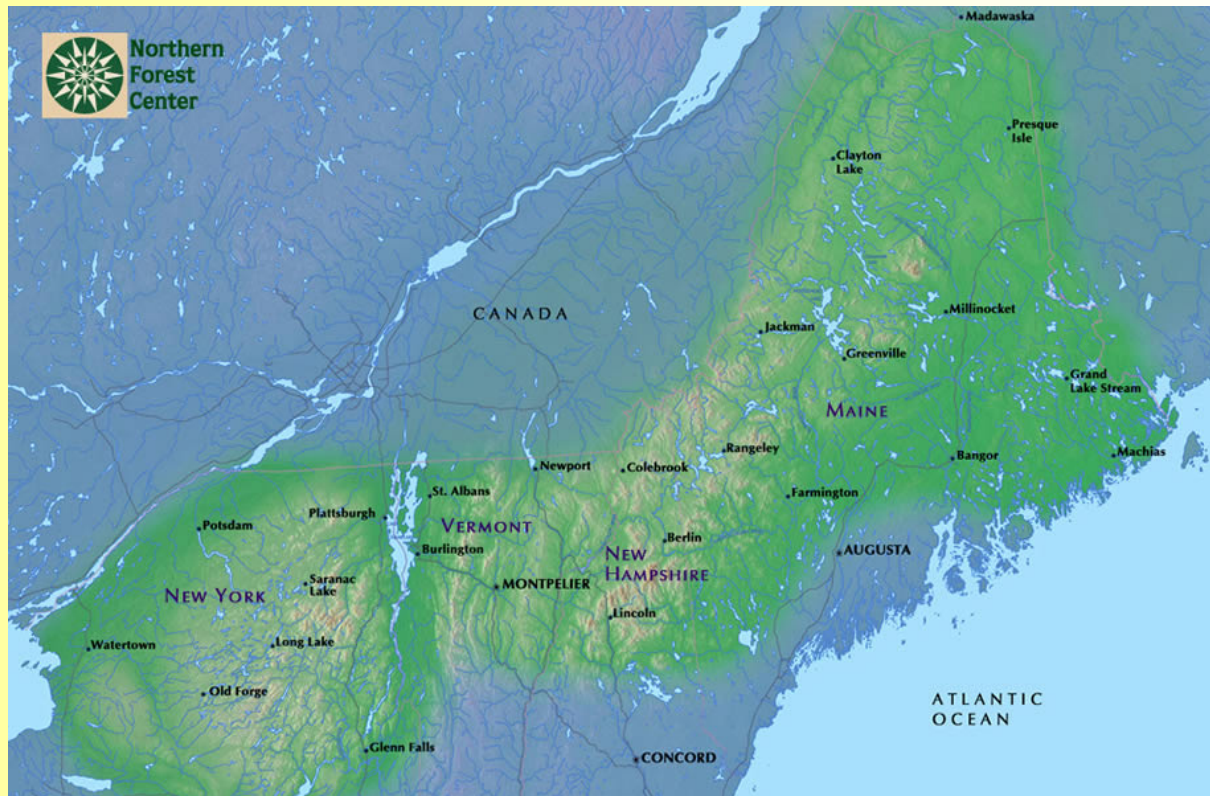
Biomass: A Cost-Effective Fuel



Heating with biomass is less expensive than heating with fossil fuels.



Why Woody Biomass is a Good Energy Choice for the Northeast



A vertical strip of wood chips runs down the left side of the slide.

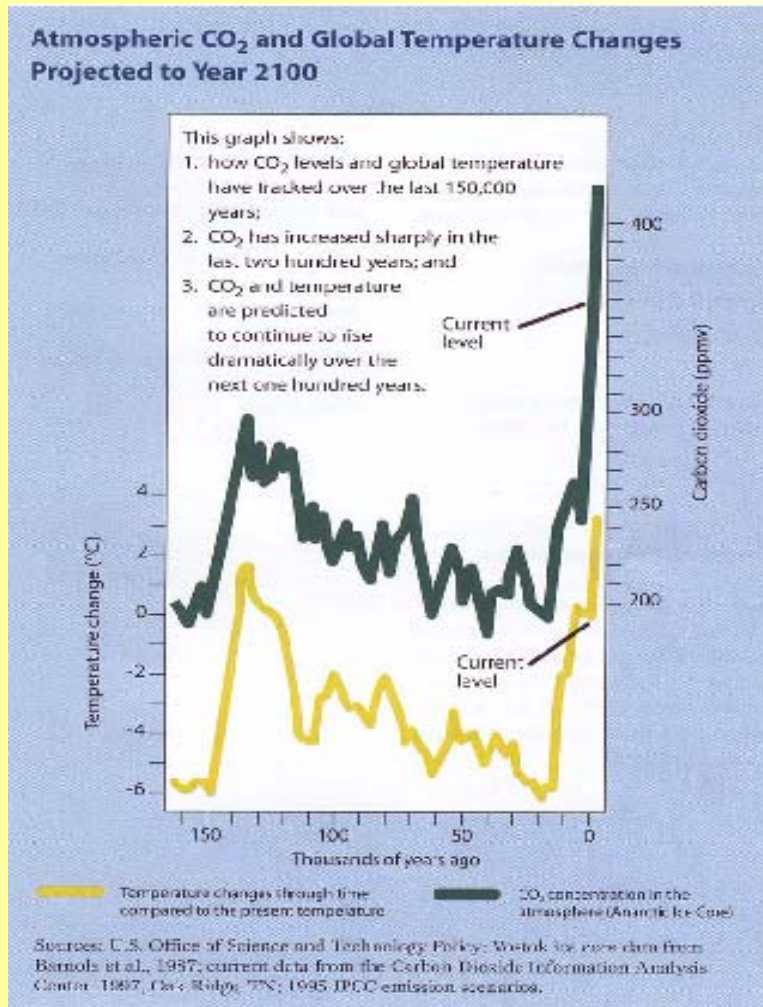
Where do communities fit into the discussion about climate change, energy, and sustainable forestry?

The economies of communities in rural areas are threatened by:

- Global climate change
- The end of cheap fossil fuels



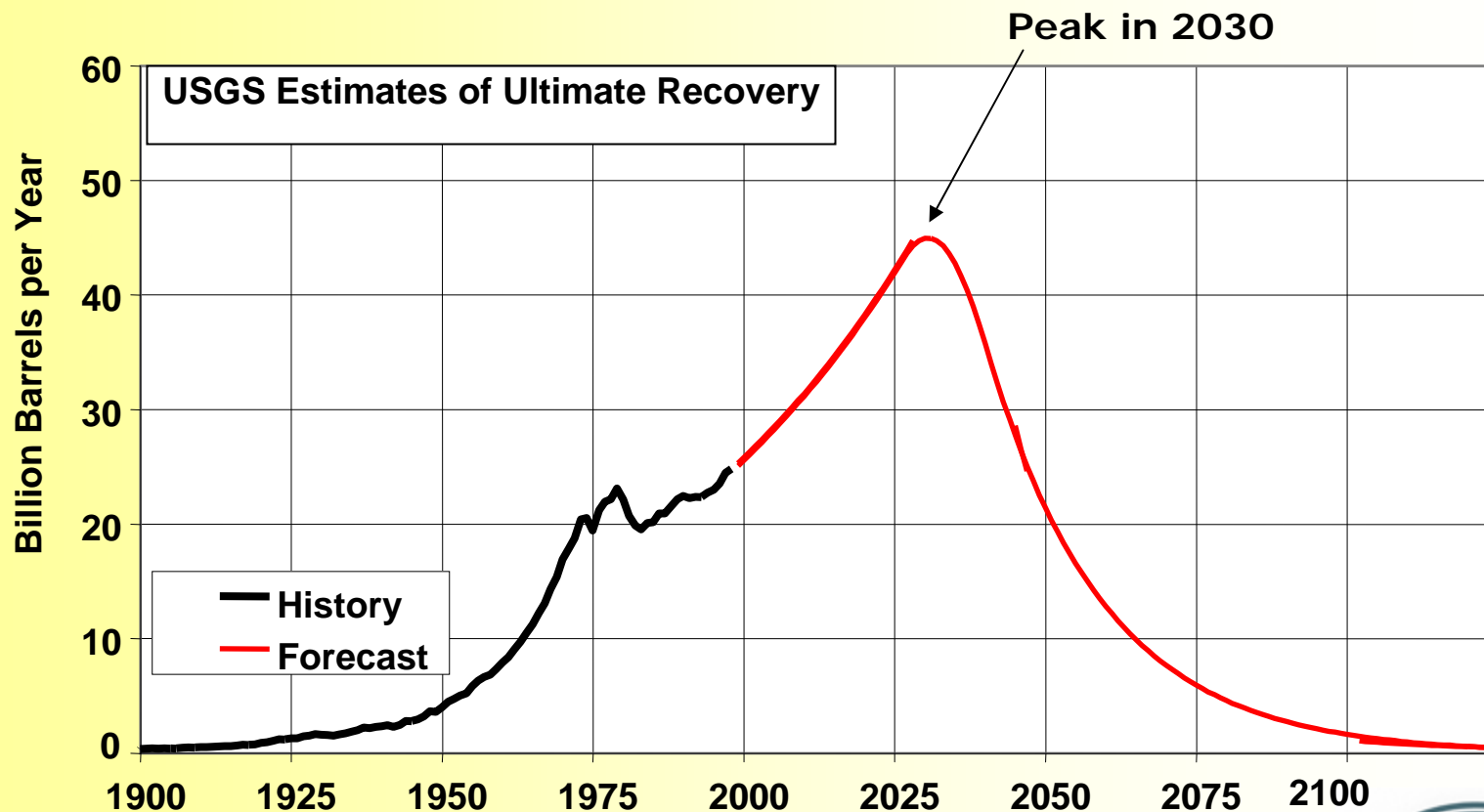
Global Climate Change



Climate change is already observable in Vermont and impacting the state economy.

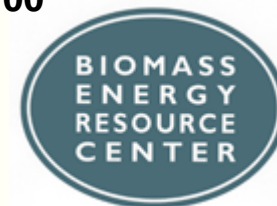


World Oil Production History & Forecast



Note: US volumes were added to the USGS foreign volumes to obtain world totals.

Source: US DOE, Energy Information Administration



A vertical strip of wood chips runs down the left side of the slide.

After the World Oil Peak – What Happens to Communities in Rural Areas?

- **Very high, rapidly increasing oil and gas costs**
- **Competitive disadvantage**
- **Economic un-development**
- **Dependence on an unfriendly global economy**



Local Energy –

A new way to look at the relationship between communities and forests



A vertical strip of wood chips is visible on the left side of the slide.

What Are the Characteristics of Local Energy?

- Uses *community-scale* technology
- Replaces fossil fuels with *local* biomass, for heat and power
- Uses *efficient, clean* technology
- Has strict requirement for *sustainable* fuels



What Does Local Energy Look Like?

- Community district energy (using wood fuel)
- School and other institutional wood heating
- Wood-fired campus energy systems
- Small-scale power generation and CHP



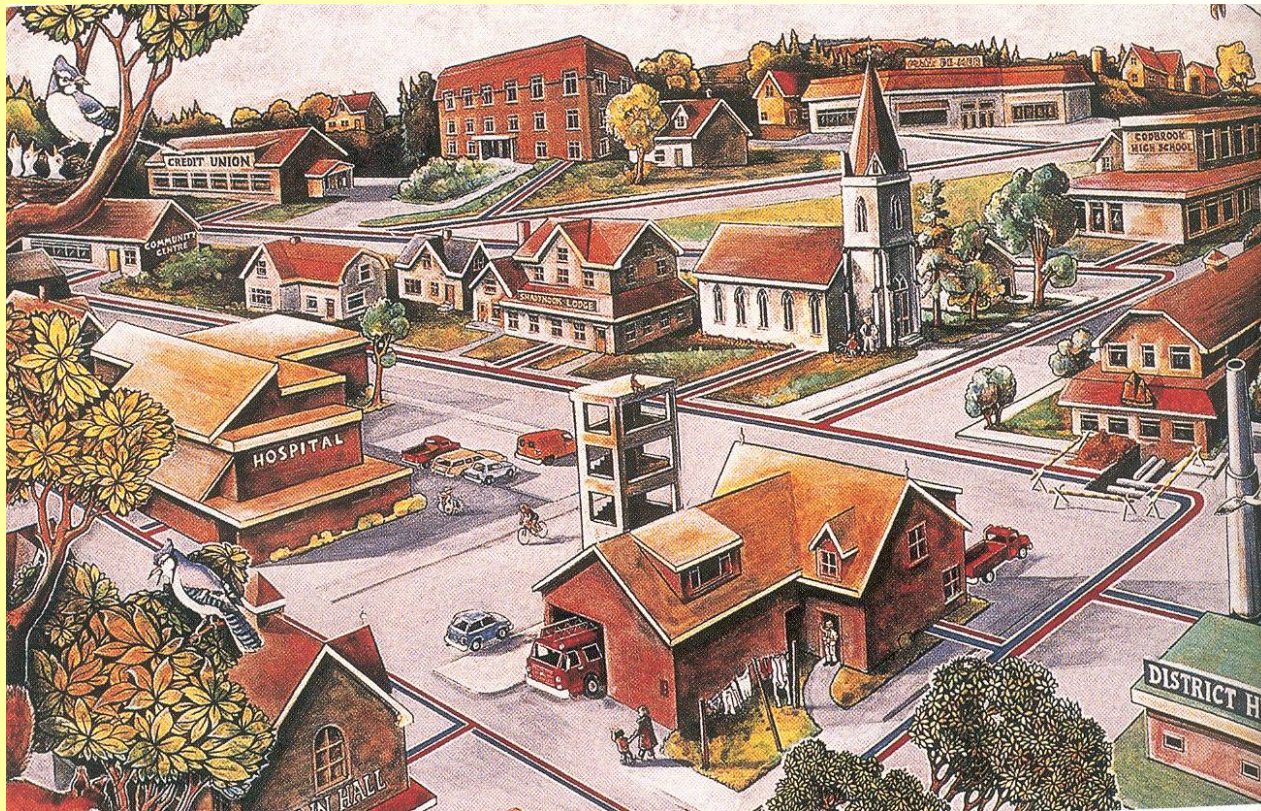


What Are the Benefits of Local Energy?

- Keeps local energy dollars circulating in the community
- Displaces expensive fossil fuels and increases security
- Scaled to link community energy economy with local resources
- Acts as a force for sustainable forestry
- Uses manageable volumes of biomass for each project
- Supports forest-products industry and creates jobs



Community Energy Systems



Wood-fired central heating plant, with buried hot water piping to individual buildings



Community Energy Systems



**Small-Scale
Setting**

Green Acres Family Housing, Barre, VT



Community Energy Systems

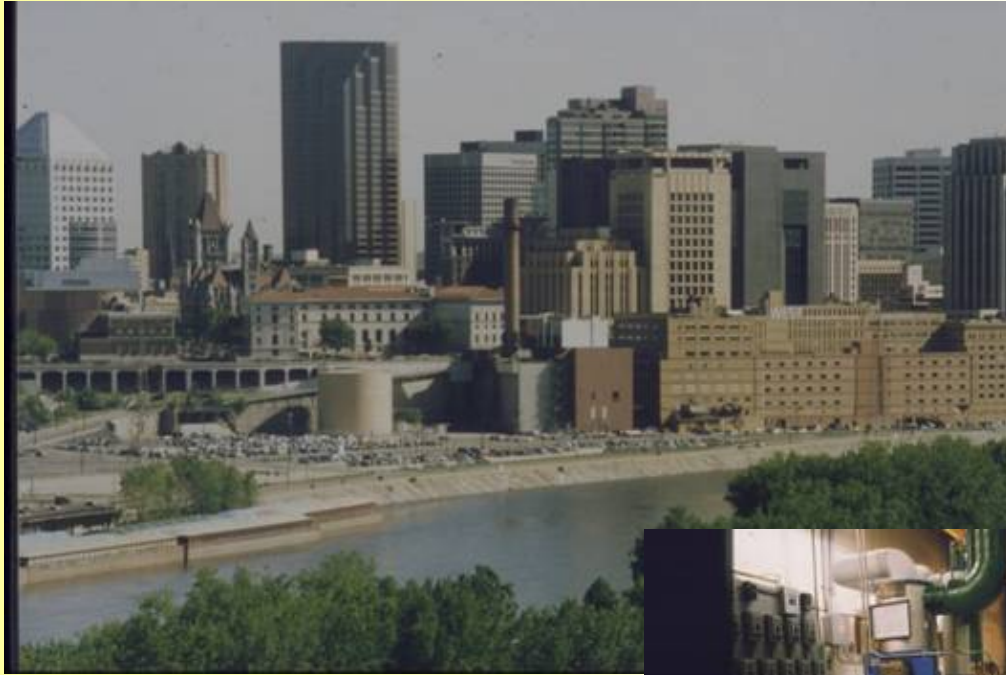


Charlottetown, Prince Edward Island, Canada

**Small
Community
Setting**



Community Energy Systems



St. Paul, Minnesota

Urban
Setting



Community Energy Systems



Ouje-Bougoumou, Quebec



Community Energy Systems



Montpelier, Vermont

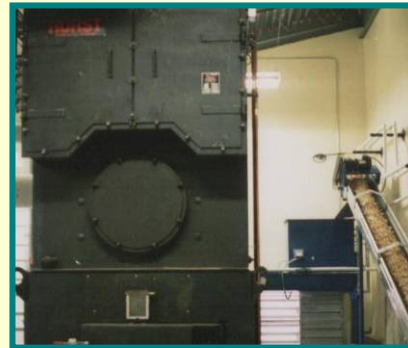
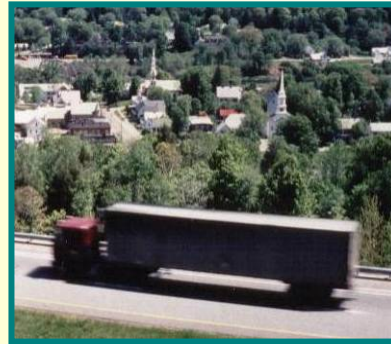


Universe of Technology Options for Biomass Heating Systems

Biomass Feedstocks	Storage of Feedstock	Handling of feedstock	Distribution of Heat	End Uses
Woodchips (hardwood/ softwood/bole/w hole tree chips)	Below Grade Bin	Fully- automated	Hot water	Heat
Pellets (Grass/saw dust/ agricultural residues)	Above Grade Bin		Steam	Cooling
Cordwood	Silo (inside or under a roof or outside)	Semi- automated	Hot air	Electricity
Agricultural Crops(Corn)				



Components of Biomass Systems

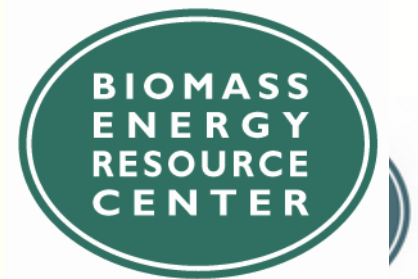


- Fuel Sources
- Fuel Transport and Delivery
- Fuel Storage
- Fuel Handling
- Combustion System

System Construction



Fuel Transport and Delivery



Fuel Transport and Delivery

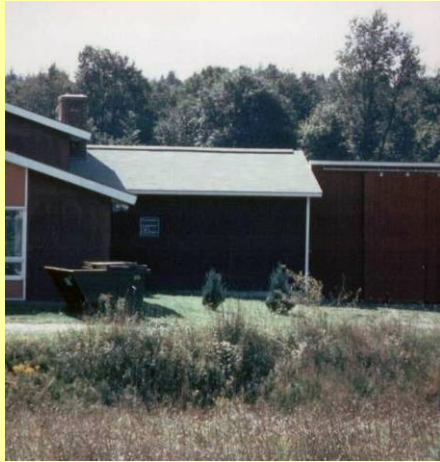


“Walking floor” trailer



Dump truck

Building Space for Wood Systems



Attached



Integrated



Separate



On-Site Fuel Storage



Below-grade bin



Automated Fuel Handling



Low-Cost Semi-Automated Systems



On-slab fuel storage



Fuel moved with small loader



Day bin and small combustor

Wood-Chip Combustion



Wood boiler



Wood and backup boilers



How “Modern” Biomass Energy Systems are Different from Home Wood and Pellet Stoves

- Increased efficiency
- Lower emissions
- Low time requirements
- Reliable operation



Goal:

Increase the use of sustainably-supplied woody biomass in municipal, public, and institutional energy applications that will:

- Reduce operating budgets for municipalities, schools, and other institutions
- Keep energy dollars in local economy
- Create jobs
- Sustain, revitalize, and empower communities
- Strengthen the forest products industry
- Improve forests and benefit forestland owners
- Provide energy security
- Reduce climate change emissions in a meaningful way



A vertical strip of wood chips runs down the left side of the slide. The chips are light brown and appear to be mulch or a byproduct of wood processing.

Conclusion

Local Energy—making the energy connection between rural communities and their forest resources—meets the challenges of climate change, renewable energy, and sustainable forestry at the right scale.



Contact Information

**Christopher Recchia,
Executive Director**

Biomass Energy Resource Center

PO Box 1611, 43 State Street

Montpelier, VT 05601

802-223-7770 X 122

crecchia@biomasscenter.org

www.biomasscenter.org

