
Biomass Heating – An Overview

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CERTS: Local Energy / Local Opportunities

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Presentation Outline

Focus: plant-derived biomass feedstocks

- Why Biomass Heating
- Community Biomass Heating Systems
- Key Factors to Success
- Choosing a Fuel Source
- Choosing a Conversion System (Thermal Conversion)
- Future of Biomass Heating

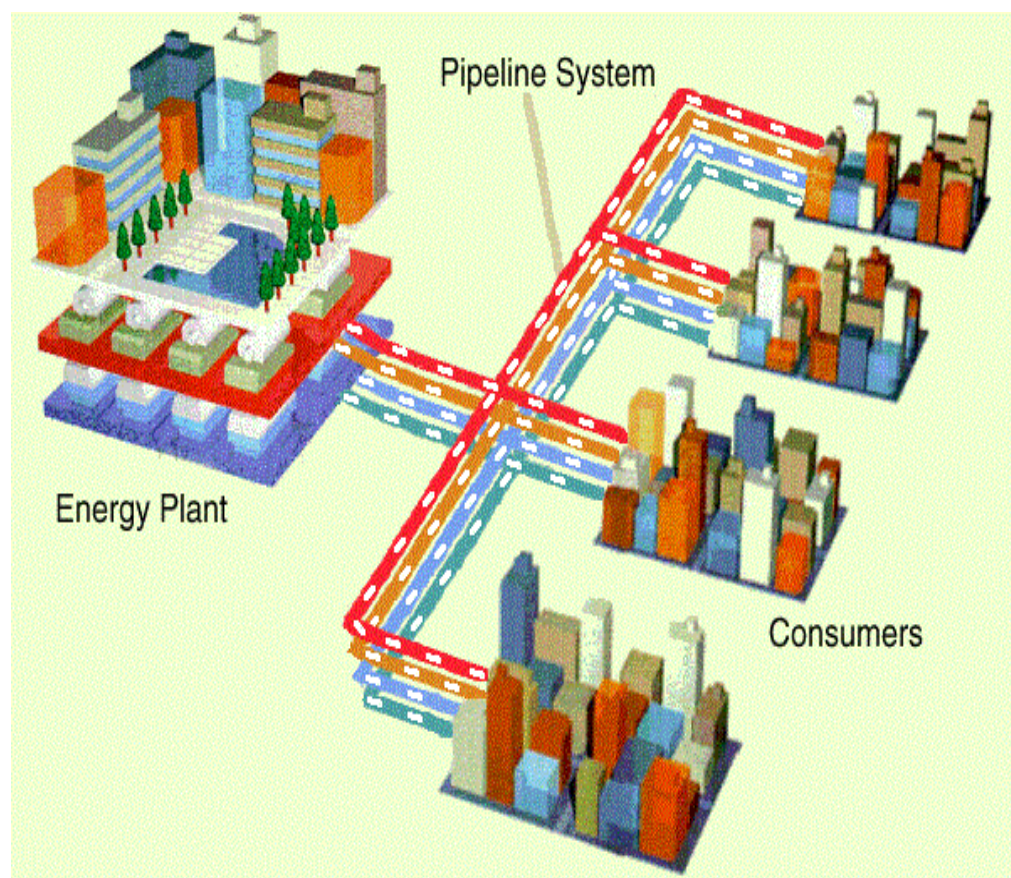


Why Biomass Heating

- Natural Gas & Fuel Oil Prices Rising
- “Avoided” Electricity Price Low
 - Biomass Electricity generation costs = \$0.06 - \$0.12 per kilowatt hour (kWh)
 - Difficult to get PPA outside of Mandate
- Efficiency Benefits.
 - Electricity Only: 20% efficiency.
 - Heat Only: 80-85% efficiency.
- Capital Cost Reduction
 - No need for turbine, high pressure boiler



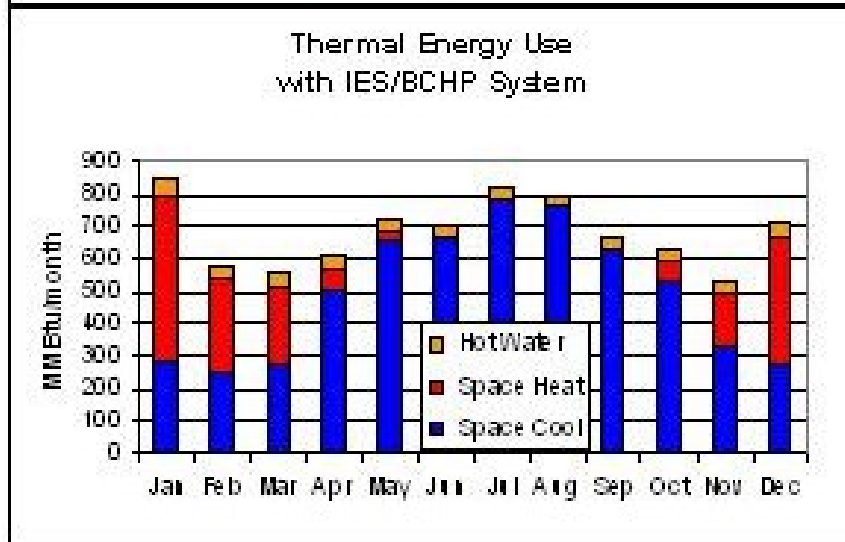
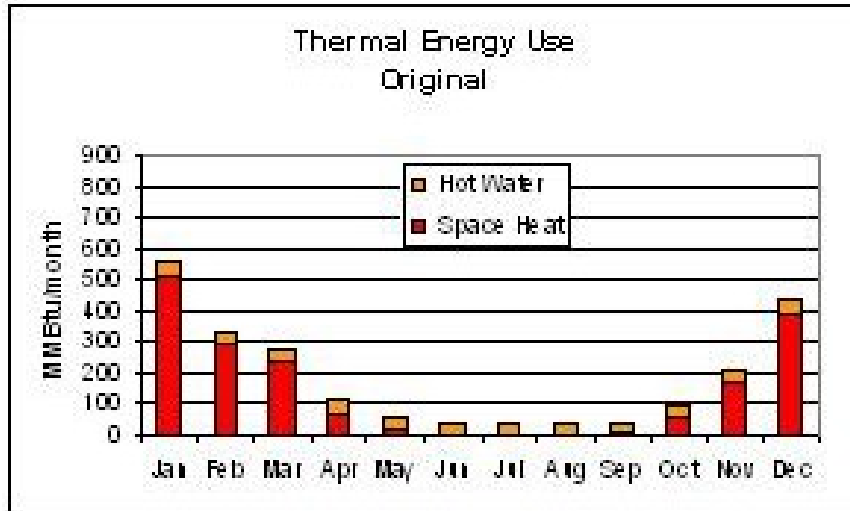
A Community Energy System



Connects a centralized source of heat generation to a set of residential, commercial, and/or industrial thermal energy users.



Key Factors for Success



(1) Availability of low-cost biomass fuel supply.

(2) Adequate thermal loads
(Should be consistent throughout the year)





Choosing a Fuel Source

- Urban Wood Waste (Cities)
- Mill & Forest Residues (up North)
- Agricultural Residues (Mid/South)
- Energy Crops (Across the State - working to make more cost effective)



Fuel Handling Critical Issues

- Drying - Most fuels have a 10-60% moisture content
- Transporting - Distance from Facility/Transport Type
- Pre-Processing – Fuel size and blending
- Storing - Times of harvest v. boiler needs & redundancy
- Long-term Contracts



Choosing a Conversion System

- Fuel Flexibility
 - Hedge against Weather and Market Dynamics
- Fuel Handling/Processing Needs
- Capital Costs
 - Depends on scale of project, but boiler and distribution system pipes are majority of costs
- Scalability
 - Economies of scale v. Fuel Need Pressure
 - Permitting (EIA at 25 MW)



Combustion

Conventional Stoker Boiler

- Fuel Flexibility: limited. Can take wood but only about 10% agricultural biomass (alkali/silica).

Fluidized Bed Boiler

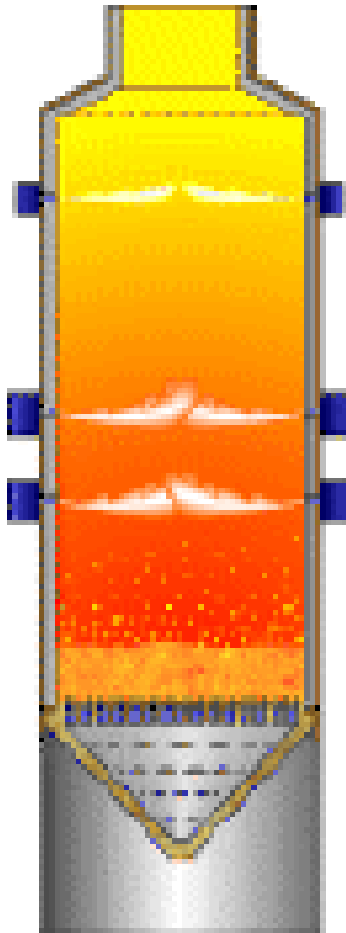
- More Flexible. Can take about 30% agricultural biomass.
- Can Take moisture content of up to 50-60%
- Fuel Size Needs: 2-4 inches



St. Paul District Energy



Gasification



- Gasifies the biomass in oxygen-starved environment.
- Fuel Flexibility: very good.
- Fuel Handling: dry fuels of uniform size (sawdust)
- Moisture Content needs: 15 percent to 20 percent.
- Very efficient and low emissions
- EXAMPLE: Little Falls Ethanol Plant



Future of Biomass Heating

Fuel Source: Energy Crops

- Perennial natives prairie grasses and woody biomass.
 - Promoting Legislation on:
 - » Standards
 - » Payments to Crop Producers
 - » Incentives to heat and power facilities that utilize perennial natives.

Technologies: Gasification (Europe), Small Modular Systems, Biorefinery Byproduct



Thank You!

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