Biomass and Fuel Flexible CHP/District Energy Systems
District Energy System Applications

– Colleges & Universities

– States & Municipalities

– Healthcare

– Federal Government
Middlebury College
Middlebury, VT

• Steam Production: 23,500 per hour @ 240 psig
• 50% reduction in #6 fuel oil annually (1,000,000 gallons plus)
• CO2 reduction: 12,500 plus metric tons per year.
• 40% reduction in carbon footprint
• Annual wood chip consumption: 20,000 tons per year
• Electricity produced: 15-20% of the campuses need (3-5 million kilowatt-hours of electric per year)
• Particulate emissions: 0.017 lbs/MMBTU, average

Images Courtesy of Chiptec
Colby College
Waterville, ME

- (2) 400 hp high pressure boilers
- Combined steam production: 26,000 lbs per hour @ 300psig
- Consumes 22,000 tons of locally sourced woodchips annually
- Fuel sourced within a 50 mile radius from Sustainable forest operations
- 90% reduction in #6 fuel oil annually (1 million gallons)
- Entire plant LEED Gold Certified
- CO emissions: less than 0.1 lbs/MMBTU, average Particulate emissions: 0.01 lbs/MMBTU, average
University of British Columbia

- Key component to commitment to reduce GHG’s by 100%
- Syngas fuels a 2MW generator, eliminates new electrical transmission line
- Created a Living Laboratory
State of Vermont District Heating

• New biomass fueled facility for serving the current and anticipated State heating requirements as well as the initial phase of the City’s municipal thermal utility.
• Reduce reliance on oil
• Two (2) new 600 BHP wood fueled boiler systems and (1) new #2 oil emergency backup boiler

Images Courtesy of AFS Energy Systems
Enwave Seattle

- Utilized waste wood, avoiding landfill
- Serves approximately 200 buildings downtown
- Reduces CO2 output by 55,000 tons/year
- Cuts carbon footprint by 50-60%
- Supports LEED for customers
800 horsepower biomass boiler making steam at 400psi
Gundersen Lutheran Medical Center, Inc.
La Crosse, WI
Steam Turbine Generator

Electricity to Clinic (400kW)
2,200,000 kW-hrs.

Steam to Facility

400 psi

100 psi
CHP Tri Generation System

Veterans Affairs Battle Creek, MI

• EO 13514: Reduce GHGs by 28% by 2020
• VA Goal: 7.5% of energy from renewable sources by 2020
• 2 MWe and 4.4 MWth for heat & power
• GHG Reduction: 14,000 tonnes/yr
• Produces 10,400,000 kWh- 84% of yearly electricity load

Images Courtesy of Nexterra
VA Medical Center
Chillicothe, OH

- 600HP wood fired boiler, 450 psig
- Supplies steam to a 350kW steam turbine generator
- Capable of burning a multitude of wood residues
- Fully automatic ash extraction system

ImagesCourtesy of Wellons FEI Corp
VA Medical Center

Chillicothe, OH

- 8 Rake moving floor storage bin with fuel handling
- Stepped grate combustion system with automatic ash extraction
- Electrostatic Precipitator Emissions Control
- Test results on particulate emissions less than half of what is normally produced by a natural gas burner
Marine Corps Logistics Base

Albany, GA

- First “Net Zero” Marine Corps Installation
- Uses woody biomass such as tree trimmings, scrap wood, crop residues, and methane gas from landfills for power generation
- 2.1 MW Combined Heat and Power landfill generator
- 8.5 MW steam turbine to generate 44 MWh per year