USDA FOREST SERVICE

Forest Service Technical Assistance for Woody Biomass Utilization

Veterans Affairs Medical Center

Chillicothe, OH

WERC

WOOD EDUCATION AND RESOURCE CENTER

Wood Education and Resource Center

The WERC Mission

Foster interaction and information exchange with the forest products industry to enhance opportunities for sustained forest products production in the eastern hardwood region of the United States.

Today's Presentation

- Technical Support for Woody Biomass Utilization
- Veterans Affairs Medical Center (VAMC) – Chillicothe, OH

Why utilize biomass for thermal applications?

- **Environmental and Social**
  - Renewable energy
  - Energy security - replace fossil fuel (foreign)
  - Markets for low-use wood = local jobs
  - Energy efficiency (thermal and thermally-led CHP 70 – 90% thermal efficiency)
  - Carbon neutral (sale on voluntary market)
- **Economic**
  - Energy dollars stay local
  - Energy savings to owners

Technical Assistance Team Focus

- **Expand the efficient use of woody biomass**
  - Thermal (heating/cooling) applications
  - CHP energy projects
  - District systems
- **Use proven systems to increase efficiency**
  - Advance Wood Combustion systems
  - Thermal Storage
- **Encourage system monitoring**

WERC Technical Assistance Team

- FS WERC staff and consultants
- Over 100 years of experience working with wood energy.
- State Forester's staff and local champions provide local support

Wood Energy Technical Assistance Process

- State Forester and local champions identify project sites
- Local champions help facility owners collect energy system data
- WERC schedules site visits
- Team provides a pre-feasibility analysis

WERC Technical Assistance Process

- Owner decides to move forward
- Team provides more detailed engineering and financial analysis
- Team provides technical support in financing and RFP development
- Owner selects final designer and/or builder
- Team provides owner support

VAMC – Chillicothe, OH

Chillicothe VAMC

- The Chillicothe VA Medical Center provides mental health, medical, and a wide range of nursing home care services for veterans in southern OH
- 47 miles south of Columbus, OH
- The facility has a total of 297 beds
- 1 million ft^2 of conditioned space
- Site of the first Veterans Bureau hospital in the US – 1923

Chillicothe Project Timeline

- **2008 – VAMC began a project to replace aging NG boilers**
  - EO 13423– calls for increase in the use of renewable energy in federal facilities
  - EO 13514 - make reduction of greenhouse gas emissions (GHG) a priority for Federal agencies

Chillicothe Project Timeline

- October 2008 - VA Washington Office commissions renewable energy study for the site
- October 2008 – Ohio DNR begins to identify woody biomass utilization opportunities in SE Ohio
- Nov 2008 – ODNR focuses study on VAMC – Chillicothe

Chillicothe Project Timeline

- October 2009 – VAMC NG project underway
- November 2009 – VA WO contractor wood energy draft report completed
- November 2009 – OH DNR contractor wood energy draft report completed
- Both reports propose wood energy projects, but proposed projects were very different,
- November 2009 - ODNR asks for support from the WERC Technical Assistance Team

WERC Technical Assistance

- WERC reviews both reports and finds that neither report describes a viable project for the VMAC
- WERC provides an in-depth analysis of a viable biomass project
- WERC Team members defend the proposed project at the 50% design meeting for the new NG boiler plant

WERC Proposal for the VAMC

- **600 hp (20.1 mmBtu/hr) biomass boiler**
  - produce 425 psig saturated steam
  - maximum biomass input rate 26.8 mmBtu/hr (75% efficient)
- **350 kW single stage backpressure steam turbine and generator**
  - 45% efficient
  - 65 psig output pressure
- **Estimated cost $6-10 million**

WERC Estimated Savings

- Biomass will replace 89% of natural gas fuel usage
- 1,600,000 kWh of electricity generated annually

Scenario	Natural Gas Cost $10.50/mcf	Biomass Cost $35/ton	Electric Value $.064/kwh	Total Cost
Existing Natural Gas System	$1,508,850	$0	$0	$1,508,850
Biomass CHP System	$172,505	$503,981	$64,458	$612,029
	Estimated Annual Cost Savings			**$896,821**

WERC Facility Site Visits

- **Visits to 4 Sites**
  - Hospital
  - Paper Mill
  - College
  - Commercial Campus - 1 million ft^2
- **Participants**
  - VAMC staff
  - Wolpert, Inc.
  - Bristol D/B Services
  - COE
  - WERC Team

Lockheed-Martin Owego, NY

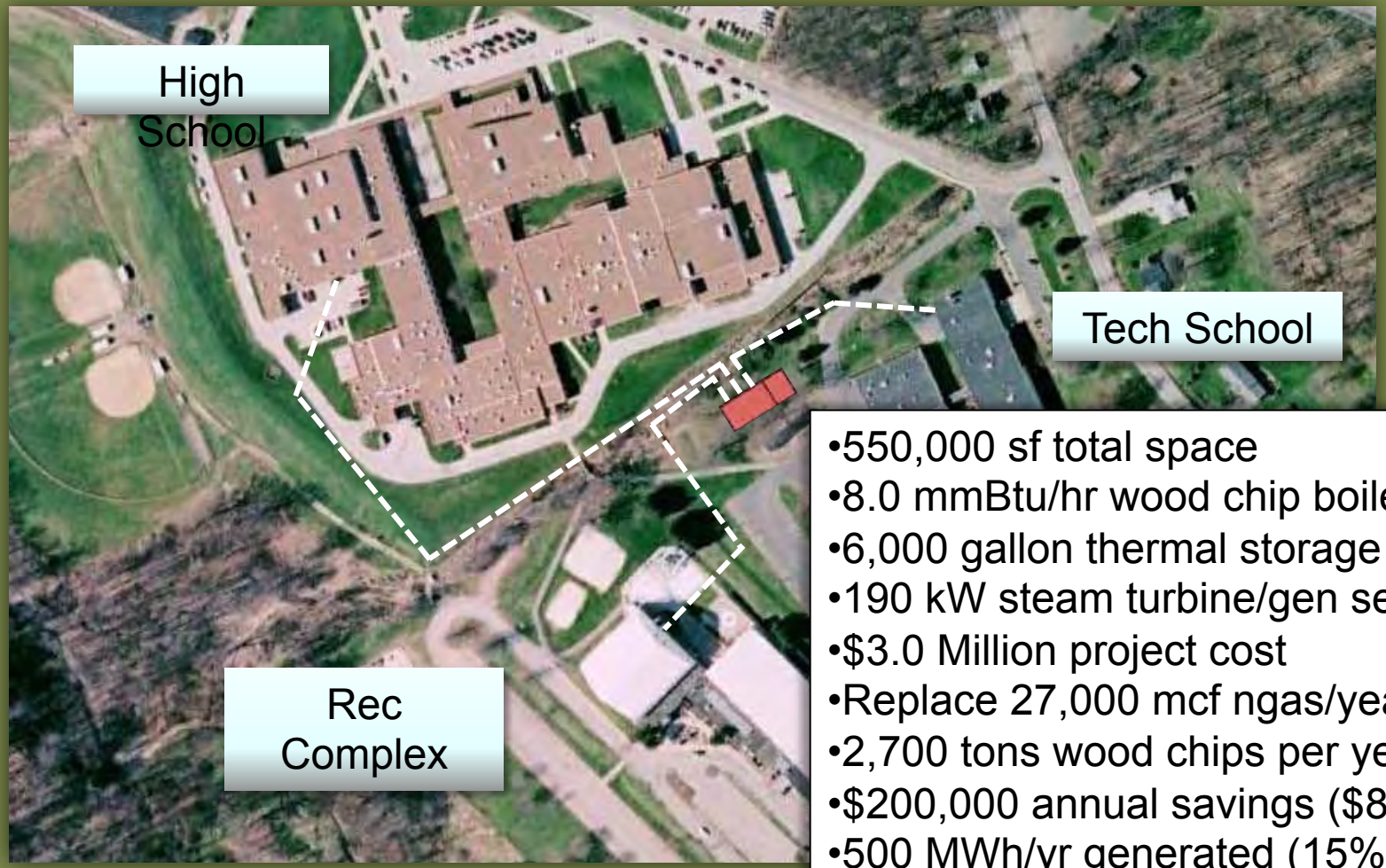
Lockheed-Martin – Owego, NY

- Delivery and Storage: Walking floor trailers; below-grade; wedged rake walking floor unloading system; 3 days of storage
- Fuel Processing: shaker removes oversized chips
- Boiler System: Wellons 600 hp boilers(2);300 psig steam. Steam flow - 12,000 to 40,000 lbs/hr.
- Power Generation System: Back pressure 750 KW
- Absorption Chiller: 2 stage chillers -2300 T
- Ash Handling System: Automated; roll off dumpster.
- Emissions Control System: Multi clone for each boiler and a dry ESP

Lockheed-Martin storage bay

Lockheed-Martin Boiler Room

Crawford Central Biomass CHP District Heating (hot water)



- 550,000 sf total space
- 8.0 mmBtu/hr wood chip boiler
- 6,000 gallon thermal storage tank
- 190 kW steam turbine/gen set
- $3.0 Million project cost
- Replace 27,000 mcf ngas/year (80%)
- 2,700 tons wood chips per year
- $200,000 annual savings ($8/mcf)
- 500 MWh/yr generated (15%)

For more information

http://www.na.fs.fed.us/ea/werc/werc.shtm/

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