Identifying and Implementing Biomass Heating Solutions

Successful Strategies and Qualifiers for Biomass Boiler System Installations

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Agenda

Identifying and Implementing Biomass Heating Solutions

> Ideal Client Profile

> Successful Attributes of a Biomass Project

> Qualifying an Opportunity – My Perspective

> Lessons Learned from Past Projects

> Implementation Strategies

> Summary

Ideal Client Profile

Ideal Client Profile

- *Public or Private*
- *Heating load of facilities does not matter, the client's passion does*
- *Strong commitment to .....renewable energy, sustainability, timber industry, etc.*
- *Genuine interest in biomass heating*
- *Ability to grasp "bigger picture" concepts and ideas and support them*
- *Willingness to become a demonstration project*
- *Understanding of the total cost of ownership of a systems, versus a first cost ownership approach*
- *Has a willing maintenance team to operate the boiler*

Successful Attributes of a Biomass Project

Successful Project Attributes

- *Start with the fuel (availability, quality, cost) and design around that*
- *Understand the client's motivation for using a biomass boiler system, and make it effective for their needs*
- *Educate, Educate and Educate some more.....the client and community need to know as much as possible about the biomass boiler system*
- *Economic Drivers – Current fuel cost, biomass fuel cost, incentives, and operating costs impact the project success*
- *A passionate client can create a successful project*
- *Understand all the impacts to the project and cover off on them.*

Qualifying an Opportunity – My Perspective

Qualifying an Opportunity – My Perspective

- *Figure out the client drivers and passion*
- *What is the current fuel?*
- *Is the current boiler at the end of its useful life?*
- *What type of biomass fuel would work best for the client?*
- *What are the client's maintenance staff capabilities?*
- *Is there space in the existing boiler room, or are you constructing a new building?*
- *If not, where are you going to put the boiler?*
- *What is the right heat load calculation for the building? Faceplate data does not mean heat load*
- *All the stakeholders need an "eyes wide open" understanding of the system ownership*

Qualifying an Opportunity – My Perspective

- *Is there access for fuel delivery?*
- *Is there a back up boiler?*
- *How do you tie into the existing system?*
- *What needs to be replaced on the current system? Steam traps, unit ventilators, piping, etc. all impact whether the project is successful or not*
- *Is this in a nonattainment area? Oregon has two Particulate Matter (PM-2.5) Nonattainment Areas, Klamath Falls and Oakridge*

And finally

- *How is the client going to pay for the design and installation of the biomass boiler system*

Lessons Learned from Past Projects

Lessons Learned

- *No matter what you plan for, Murphy's Law will happen*
- *Fuel is the most important aspect of the project*
- *Never assume, confirm, document and continually confirm*
- *Get buy in on operating the system from all levels of the clients' organization, especially the maintenance staff*
- *Count on your first years' energy savings being less than what you predict it to be, like 30% to 50% of predicted energy cost savings*
- *Well thought out design is crucial to the success of the project, sweat the small details*
- *Commissioning of the system is a necessity, not a nice-ity*

Lessons Learned

- *Be prepared for anything to happen, be willing to adapt where you can*
- *Did I mention fuel is the most important aspect of the project?*
- *Know what it costs to burn fossil fuel versus wood, be able to explain that burning wood saves money*
- *Owners of the system, ask the hard questions about everything regarding the project*
- *Designers and Constructers of the project, if the client doesn't ask, still communicate everything with them, and once again, over communicate and document everything for them*
- *By the way, did I mention fuel is the most important aspect of the project? If not, it is.*

Implementation Strategies

Implementation Strategies

- *Design in integral to all biomass projects (civil, mechanical, electrical)*
- *Both Public and Private clients can use:*
  - *Design/Bid/Build*
  - *Design/Build*
  - *Energy Savings Performance Contracting*
  - *“We can do it ourselves” approach*

Design/Bid/Build

- *The traditional method that most client's use for construction, especially public sector clients*
- *Three very district phases of work*
- *Need tight integration and collaboration to make the project come out successfully*
- *The owner assumes a lot of the project risk, and owns the project outcome*
- *Can be a successful installation mechanism, as long as the separate and district phases of work can be controlled by an intelligent owner's representative*
- *Mostly results in low bid, conform to specification sections of work, once again risky to the owner*
- *Owner assumes all operational risks post installation*

Design/Build

- *Integrates the design of the biomass boiler system with the building of the project*
- *Reduces three distinct phases of work, to one*
- *Since the design team and build team are one team, the outcome is more comprehensive*
- *The project risks associated with Design/Bid/Build are shifted to the Design/Build team*
- *The project is outcome based, which focuses on total cost of ownership, not just first cost*
- *Owner assumes all operational risks post installation*

Energy Savings Performance Contracting

- *Integrates the design of the biomass boiler system with the building of the project, with the on-going operations being covered through energy savings and operational performance guarantees*
- *Reduces three distinct phases of work, to one*
- *The Energy Services Company works with the client to determine how the project will be installed, mostly done through a design/build or CM/GC role*
- *The project risks associated with Design/Bid/Build are shifted to the Energy Services Company*
- *The project is outcome based, which focuses on total cost of ownership, not just first cost*
- *Owner assumes operational risks post installation, but the ESCO has the energy and equipment performance risks*

“We Can Do It Ourselves” Approach

- *Client is driven by overall costs being low, but have a strong desire to install a biomass boiler*
- *Mostly done with “in-house” staff, which relies on their technical expertise to create a successful project*
- *Sometimes this approach works, most times it doesn’t*
- *All project risks and performance risks reside with the owner*
- *Biomass boiler installations are not the area to take on the “bravado of a barn raising” project approach*

Summary

Summary

- *Fuel is the beginning and most important attribute*
- *Maintenance costs are more for biomass boiler systems*
- *Strong commitment is needed from key stakeholders from the project team and client team*
- *Design of these systems is different than other boiler systems*
- *Great systems that have a unique appeal to them*


Enterprise School District

Project Overview

- *Rural district with 389 students*
- *Buildings range in age with the oldest built in 1917*
- *Aging infrastructure and strong need to replace equipment*
- *Limited budgets, last bond was for $2 million to complete some projects*
- *3 buildings totaling +100,000 ft2*
- *Strong community support for the district, but limited bonding capacity*
- *Wanted to upgrade facilities*

Project Overview

- *Rising Energy Costs (Fuel Oil especially)*
- *Using approximately 50,000 gallons of oil each year*
- *In 2006, Oil was at $1.90/gallon*
- *In 2010, Oil was at $2.50/gallon*
- *In 2011, Oil is at $3.00/gallon*
- *Boilers are 40+years old*
- *Other systems need to be upgraded*
- *And finally, No Funds for upgrades*

Project Costs

- *Total Turnkey Project Costs included engineering, construction administration, and construction costs for the boiler, building and interconnection to existing system*
  - *Project Cost - $1,519,586*
  - *Energy Savings - $76,141*
  - *Simple Payback – 20 years*
  - *Incetnives - $448,000*
  - *Net Cost - $1,071,586*
  - *Net Simple Payback – 14 years*

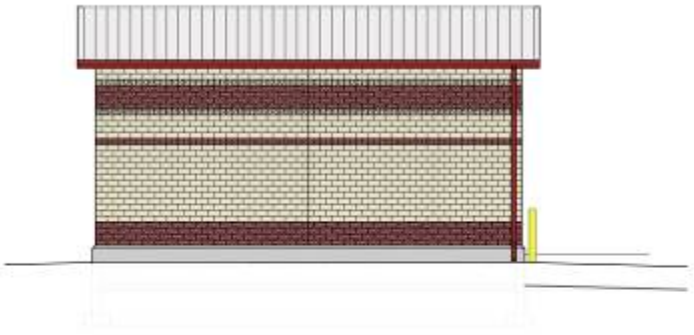
Financing the Project

- *Qualified Zone Academy Bond – Low Interest Loan program for School Districts*
- *Using available incentives to reduce the costs like the Business Energy Tax Credit*
- *Other loan programs available*
- *Guaranteed Energy Savings (90% of Savings):*
- *Estimated to be $76,141 annually at $1.90/gallon*
- *Payback is reduced every time oil rises over $1.90/gallon*

Enterprise School District Pictures

Enterprise School District

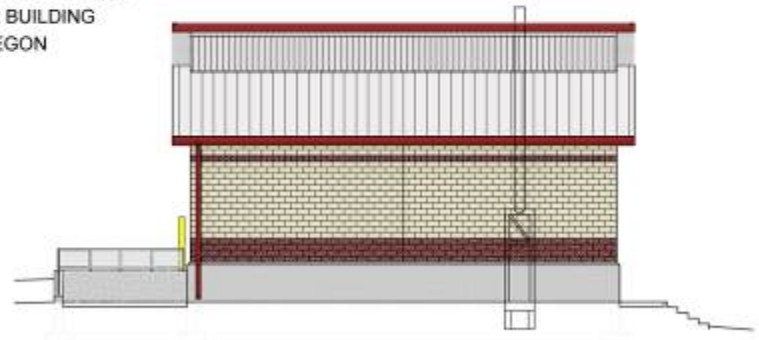
NORTH ELEVATION



EAST ELEVATION

EXTERIOR COLOR RENDERING
ENTERPRISE SCHOOL DISTRIST
NEW BIO-MASS BOILER BUILDING
ENTERPRISE, OREGON

SOUTH ELEVATION



WEST ELEVATION

ENTERPRISE SCHOOL DISTRIST
BOIMASS BOILER BUILDING

Enterprise School District

Building in construction and finished

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Boiler being installed

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Fuel Handling Bin and Material Handling System

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Metering bin and transition conveyor

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The Boiler Installed

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Multi-Cyclone and Air Dryer

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Ribbon Cutting Ceremony September 2008

Enterprise School District

Small Modifications after the installation