Wood Energy in the Northeast: Project Development Process

Dan Wilson, PE
Wilson Engineering Services, PC

Overview

- Projects covered, thermal & thermally-led CHP
- General steps
- Details for each step
- Thoughts on the overall process
Biomass thermal & thermally-led CHP

**Thermal**
- Designed to use biomass for replacing fossil fuel use in heating applications
- Where cost effective, generate electricity as a bonus

**Thermally-led CHP**
- Working Fluid
- Turbine or Engine (ORC, Steam)
- Electricity
- Heat

Typical process flow

- Storage
- Combustion Unit/Boiler
- Turbine/generator
- Steam to hot water heat exchanger
- 6,000 gallons thermal storage
- HX and Distribution Pumps to three facilities
- 210°F H₂O
- 200°F H₂O
- 175# steam
- 10# steam
- chips
What do these projects entail?

- Housing for fuel storage and combustion system
- Fuel handling equipment
- Combustion unit/boiler or heater
- Emission control
- Interconnect to heat load
- Backup fossil fuel boilers
- Electric generation / interconnect

General Steps

- Biomass thermal/CHP in the $1-$10 M range
Concept Evaluation

- Goal is to identify:
  - General economics
  - Obvious fatal-flaws
  - Options to study in detail

- Varying levels of effort depending on complexity
  - Back of napkin
  - Preliminary feasibility study

Feasibility Study

- Project investigations
  - Owner goals
  - Modeling of thermal/electrical demands
  - Site investigations (geotechnical, surveys, etc.)

- Option evaluation (based on investigations)
  - Equipment, construction methods, costs, schedule, permitting, funding opportunities, economics

- Allows owner to make investment decisions and seek financing
Financing Options

- Direct financing
  - Capital budget
  - Municipal bond
  - Loan
  - Federal / State government loans and grants

- Debt guaranteed by savings
  - Performance contracting
  - Leasing

Project Implementation

- Design, permitting, construction, commissioning/ closeout

- Typical Options
  - Design – Bid – Build
  - Design – Build
  - Performance contracting
  - Hybrids
Design-Bid-Build

- Hire architect or engineering firm to perform design, permitting, and develop bid documents
- Competitively bid construction and commissioning
- Minimum of two contracts for owner

Design-Build

- Hire a single firm to design, permit, construct, and commission the project
- Single point of responsibility
- Key is to clearly define project in contract
Performance contracting

- Hire a performance contractor
  - Provides design-build service
  - Guarantees energy savings

- Often performance contractors have contracts with owners starting in the feasibility study phase or earlier

Timeline

- Biomass thermal/CHP in the $1-$10 M range

- Concept Evaluation: 0-2 months
- Feasibility Study: 1-6 months
- Identify Financing: 1-12 months
- Project Implementation: 12-36 months
A concept evaluation can save you wasted time and expense

A detailed feasibility study or pre-feasibility study is very helpful if you plan to apply for grants

Selection of the project implementation path is based on the owner’s in-house capabilities and staff availability

In order of least owner effort
- Performance contracting
- Design-Build
- Design-Bid-Build
Thoughts on the process

- For any contract, developing a detailed scope of work is critical to obtaining the desired outcome

- Owner’s most effective time spent is upfront in clearly defining the project / scope of work