Renewable Fuel Heating Plant at U.S. Department of Energy National Renewable Energy Lab

Phil Voss

National Renewable Energy Lab

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National Renewable Energy Laboratory

The National Renewable Energy Laboratory (NREL) is the nation's primary laboratory for renewable energy and energy efficiency research and development.

NREL's Mission: NREL develops renewable energy and energy efficiency technologies and practices, advances related science and engineering, and transfers knowledge and innovations to address the nation's energy and environmental goals.

Renewable Fuel Heating Plant

9 MMBtu/hr wood-waste combustion boiler providing thermal energy for NREL South Table Mountain facilities

Project Economics:

- ESCO Investment: $ 3,307,200
- Annual Savings: $ 406,072
- Simple Pay-back: 8.3 years
- Delivery Order Term: 25 years

RFHP ESPC Process

Goal – operational by 2008-09 heating season

- Initial Proposal – July 31, 2006
- Notice of Intent to Award – Oct. 17, 2006
- Final Proposal – June 6, 2007
- Delivery Order Award – July 5, 2007
- Final Designs under Review
- Construction begins – August 2007
- Commissioning – April 2008

Project Overview

- Completely Automated System
  - Includes combustion system, hot water system, fuel storage and handling system, ash removal
  - Existing NG furnaces provide 100% backup
- Performance guarantee through ESPC
  - Continuous metering of RFHP output
  - Payments based on guaranteed cost savings

History

- Initial assessment presented to NREL Executive Management and DOE Golden
  - No funding, resulted in pursuing ESPC
- Contracting vehicle: Biomass or Alternate Methane Fuels (BAMF) Super ESPC IDIQ contract
  - DOE Technology Specific Super ESPC
- Fair consideration of 4 interested ESCOs – AMERESCO Federal Solutions selected

Business Case

Business case based on economics of reducing natural gas use/costs

- Displace natural gas use with renewable source (local forest thinnings/wood chips)
- Reduce natural gas use by 75%
  - Potentially greater if planned new building connected
- Dual fuel capability
- Hedge against rising natural gas costs

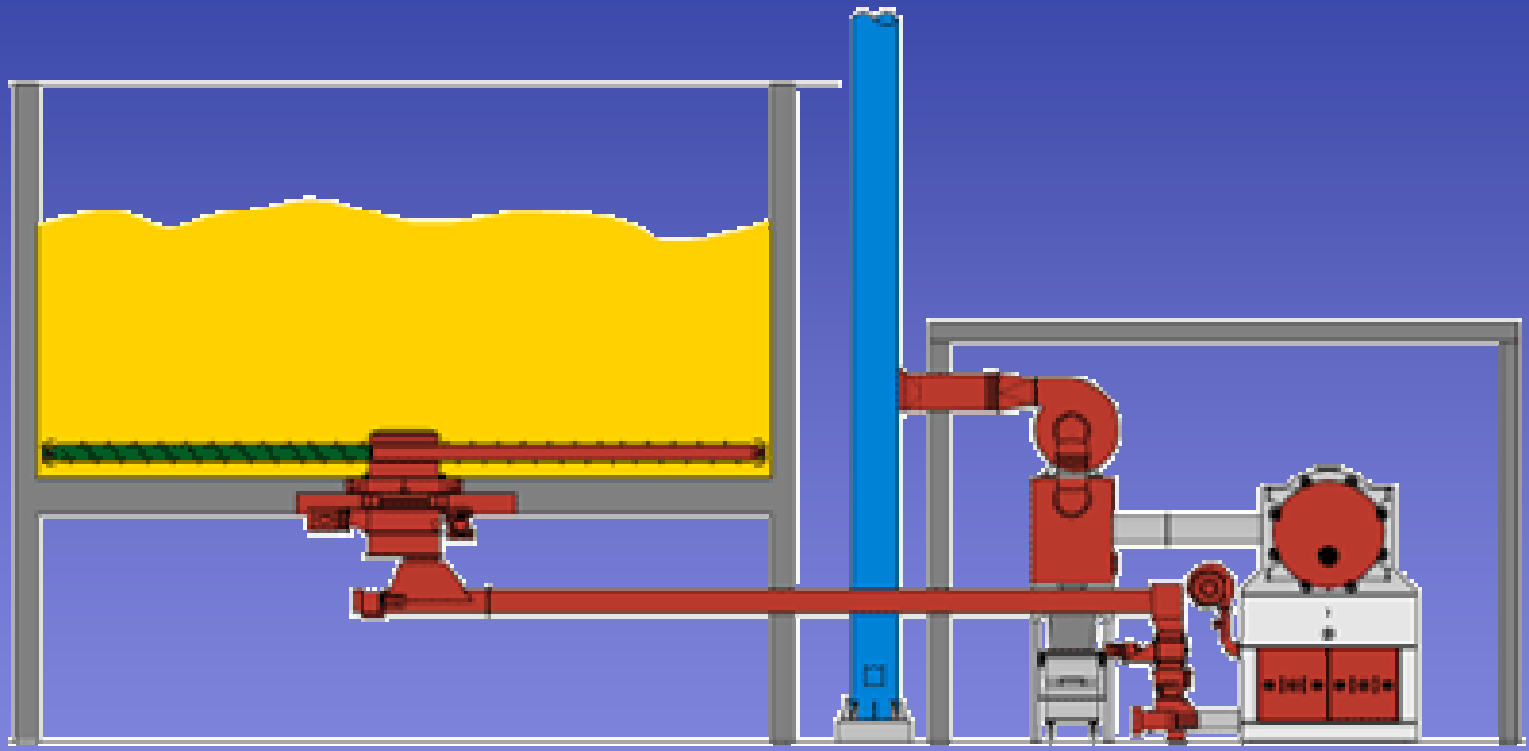
DOE/NREL Requirements

- Fully automated system
  - 3+ days on-site fuel storage
  - Automated fuel delivery system
  - Automated ash removal, and no ash goes to landfill
- Reliable, sustainable supply of fuel
- Fuel quality assurance
- Sustained performance through O&M and Repair & Replacement service
- Showcase project

RFHP Proposed to Heat Major Buildings

- Wood chip fueled RFHP added to FTLB
- New pipes connect to SERF/S&TF
- Later, additional pipes could serve planned RSF and other buildings

Conceptual RFHP Layout



Wood chip boiler with fuel storage

Environmental Assessment

- Performed by DOE/NREL
  - Ameresco gathered and provided info
  - NREL and DOE Environmental experts completed
- Combined EA efforts
  - RFHP, Mesa Top PV Project
- Final considerations
  - CO Air Pollution Control Division issued permit to construct, start-up, and operate
  - FONSI issued July

Fuel Supply

- 4 to 7 day on-site wood fuel storage
- A-1 Organics as primary fuel supplier
  - $29/ton, or $2.42/MMBtu (includes ash removal)
  - Long term contract between A-1 Organics and Ameresco
- QC of fuel supply
  - Ameresco will monitor fuel supply for quality, specification and quantity
  - Periodic inspection by operators as part of O&M
  - Acquisition of fuel supply

Operations & Maintenance

- Plant daily operation & maintenance by NREL personnel/ARE supplier
- Ameresco will provide maintenance for boiler at during three visits each year, including start-up/shut-down procedures

Repair and Replacement:

- Ameresco will repair and replace plant components at the end of their rated life

Measurement & Verification

- Baseline of ~50,000 decatherms based on two years of data
- Option B: Continuous metering of energy output from the biomass plant using predetermined existing plant efficiency and metering of gas consumed in the biomass boiler
- Monthly reporting of total energy input and output of RFHP

Low Risk

- Commercial technology
- Viable method to implement renewable energy
- Abundant local fuel supply
- Reliable heat with 100% backup from existing systems
- Diversified fuel supply hedges against rising natural gas prices
- Long equipment service life
- Performance guarantee – O&M, R&R, and M&V

Renewable Energy Showcase

- NREL “Walking the Talk”
- Supports DOE TEAM Initiative and EO 13423
- Displaces fossil fuel with renewable energy
- Utilizes local wood-waste (including forest thinnings supporting Healthy Forest initiative)
- Significant onsite RE project
- Contributed to Science and Technology Facility LEED Platinum rating

Keys to Success

- Communication
- Getting the right people involved – early in the process
- Teamwork
- Management support

Overall success to be determined by cost savings and reliable performance throughout DO term

Would you like to know more about this session?

- Phil Voss
- National Renewable Energy Lab
- 1617 Cole Boulvard, Golden, CO 80401
- philip_voss@nrel.gov

- Don’t forget to fill out and drop off your session evaluations.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