Biomass Cogeneration Facility

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Strategic & Legacy Management Committee
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About the Plant
- Project Drivers
- Project Benefits
- Plant Description
- Contract Overview
- Project Team

Clean ● Green ● Sustainable ● Steam

Construction and Start-up

Overview of Biomass C cogeneration Facility Operations
- Processing of Biomass
- Type of Biomass/Supply Chain
- Summary of First 2 Years of Operation

Other Biomass Plants at SRS
D-Area Powerhouse was over 55 years old and well past its economic life. Condition and reliability were rapidly deteriorating.

Steam demand will remain for current and future critical missions, but will be reduced over time.

Several Federal mandates require Federal Agencies to conserve energy.
Project Benefits

Environmental

- Overall annual air emissions rates will decrease:
  - Particulate Matter by > 400 tons a year
  - NOx by >2,500 tons a year, and
  - SO₂ by more than 3,500 tons a year

- Greenhouse Gas (GHG) emissions reduced by 100,000 tons a year significantly decreasing the carbon footprint of the SRS

- Use of renewable energy

- The amount of river water currently drawn from the Savannah River will decrease by over 1.4B gallons per year
Contract Overview

- Project executed as a Delivery Order under the DOE Biomass and Alternate Methane Fuel (BAMF) Super Energy Savings Performance Contract (ESPC)

- Contract signed on May 15, 2009, between Ameresco Federal Solutions (Ameresco) and the DOE-SR
  - Ameresco is responsible for the project and for operations throughout the performance period of the contract

- Turnkey (finance, design, construct, operate and maintain)

- Implementation Cost: $149,172,566

- Contract Term: 19 Years
Integrated Project Team

- Integrated Project Team formed in September 2009
- Included CO, FPM, representatives of FRs, Safety, Permits, Savannah River Nuclear Solutions (SRNS), technical representatives as required
- Met weekly for the two year construction of the project
- Responsible for:
  - Working required Utility Interfaces
  - Resolving Contract Issues
  - Maintaining Integrated Schedule
Site Prep and Construction

September 2009 – June 2011
Commissioning and Start-up

Steps of Commissioning & Startup

- Ameresco System Commissioning of 30 systems
- Ameresco Equipment Performance Testing
- DOE–SR Team Readiness Assessment

June 2011 – December 2011
Processing of Biomass at BCF

Automated Card Reader for Truck Drivers

Inbound Truck Scale
Above Ground Truck Dumps & Hoppers at BCF

- Three off loading pads
- Each hopper hold two truck loads
- Dump Time 6-8 minutes
- One truck load every 15 min
Processing of Biomass at BCF (cont.)

Disc Scalping Screen & Hogg Tower

Transfer Station

Radial Stacker – Reclaimer
Types of Biomass being used at SRS

**Woody**
- Whole-tree chips ✓
- Roundwood ✓
- Mill Residues ✓
- Forest/Logging Residues ✓
- Primary/Sawmill Chips ✓
- Urban/Municipal Wood Waste

**Non-Woody**
- Agricultural Sources
- Animal/Livestock Wastes
- Solid Wastes
Woody Biomass Supply Chain Characteristics

- Many “suppliers” and many “consumers”
  - Thousands of timberland owners in SC
  - Hundreds of wood consuming facilities in SC
  - U.S. Forest timber sales
- Highly fragmented
  - Landowners
  - Consultant
  - Supplier (Wood Dealer)
  - Producer (Logger)
  - Hauler (Trucker)
  - Primary / Secondary Biomass Consuming Facilities
    (Chipmills, Papermills, Sawmills, OSB Mills, Pellet Mills, Cogeneration Plants)
- Transportation dependent
  - Miles to delivery point
  - Diesel fuel costs
- Weather dependent
  - Seasonal
  - Geographical (localized / regional)
Biomass Availability Around SRS

Biomass Resources of the United States
Forest Residues

Thousand Dry Tonnes/Year
- > 100
- 50 - 100
- 25 - 50
- 10 - 25
- 5 - 10
- < 5
- Not Estimated

Forest residues include logging residues and other renewable material left over from agriculture operations and site conversions. Logging residues consist of branches, trunks, and other parts of trees cut or killed by logging and left at the sites. Other renewable materials are the wood waste from sawmills, shippers, and grinders. See NREL, Forest Service, Timber Product I/O Database, 2007.

For more information on the data development, please refer to http://www.nrel.gov/docs/fy09osti/48917.pdf. Although the document contains the methodology for the development of an inventory, the information is applicable to this assessment as well. The difference is only in the data's time period.

Author: Billy Roberts • September 29, 2009
Wood Fiber Flow

- Majority of BCF woody biomass fuel supply originates from within the light green counties in South Carolina
- Practical limit for fuel wood is about 50 miles
- Majority of saw and pulp wood from SRS flow out to larger high production mills
Summary of First Two Years of Operation

Biomass Cogeneration Facility commercial operations began on January 10, 2012

- After the first two years of operation:
  - No recordable safety issues equating to 180,000 person hours without incident
  - Delivered an average of 200,000 pounds per hour of steam
  - Generated 3.1 billion pounds of steam for site for export to SRS facilities and for “green” power generation
  - Facility consumed more than 20,000 tons of tires and 500,000 tons of clean biomass, consisting of local forest residue and wood chips
  - Entire first year with no steam interruption, one steam interruption second year

- Project has provided 100% process steam and up to 30% of the SRS power and from renewable fuel
- Project is a great example of private industry and the federal government forming a partnership and working together for success.
Biomass Cogeneration Facility

- The BCF includes (2) 120,000 PPH boilers and one 20 megawatt turbine.
- The steam and power produced from the facility is exported to the SRS distribution system.
- BCF replaced a 1950’s vintage coal-fired powerhouse in dire need of repairs and upgrades.

A-Area Biomass Plant
- One 30,000 PPH biomass boiler

K & L Area Biomass Heating Plants
- Two identical biomass boilers were installed, one at K Area and one at L-Area.
- Boilers 10,500 PPH capacity each.
Biomass Cogeneration Facility

- Requires approximately 325,000 tons/year of woody biomass to meet site’s steam need
- Average approximately 30 – 40 truck loads/day
- Permitted to burn up to 30% by heat of tire derived fuel (e.g. chipped tires)

K Area and L Area Heating Plants

- Requires approximately 4,000 tons/year of cleaner burning biomass
- Equates to 6 truck loads per week for both K and L Plants during the typical heating season (November to April)
- Ameresco is responsible for fuel procurement at BCF and K&L Plants

A-Area Biomass Plant

- Requires approximately 17,000 tons/year of cleaner burning biomass
- Average of 10-14 truck loads/week of wood during the summer months and 18 to 20 truck loads/week of wood during the winter months
- SRNS is responsible for fuel procurement at A-Area Biomass Plant
Thank you for your time!

Questions?

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