Biomass Cogeneration Facility

James DeMass
Utilities Program Manager
Infrastructure Services Division
DOE-Savannah River

Savannah River Site Citizens Advisory Board
November 18, 2014
Content

- About the Plant
  - Project Drivers
  - Project Benefits
  - Plant Description
  - Contract Overview
  - Project Team

- Construction and Start-up

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

- Other Biomass Plants at SRS
Project Drivers

- 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
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
January 2012
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 ✓
- Forest/Logging Residues ✓
- Roundwood ✓
- Primary/Sawmill Chips ✓
- Mill Residues ✓
- Urban/Municipal Wood Waste ✓

**Non-Woody**
- Agricultural Sources
- Animal/Livestock Wastes
- Solid Wastes

Residues to be removed for biofuel and taken to BCF
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)
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.
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.
- Ameresco is responsible for operations, maintenance, and fuel procurement at BCF and K&L Plants

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
Thank you for your time!

Questions?

Department of Energy:

James DeMass
jim.demass@srs.gov
803-952-8261