U.S. DEPARTMENT OF ENERGY | OFFICE OF ENVIRONMENTAL MANAGEMENT

# Biomass Cogeneration Facility


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DOE-Savannah River


AMERESCO
Green • Clean • Sustainable

**Strategic & Legacy Management Committee**
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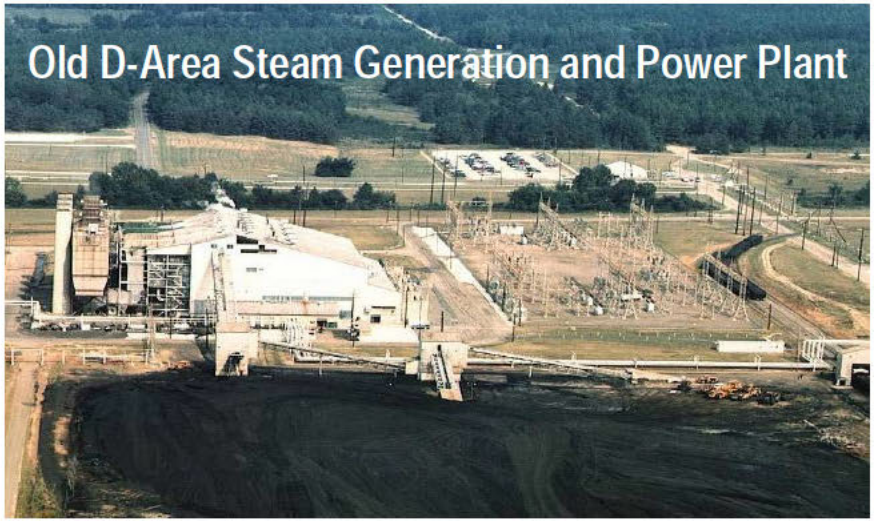
*Clean ● Green ● Sustainable ● Steam*

# 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
  - $SO_2$ 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


1

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## 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

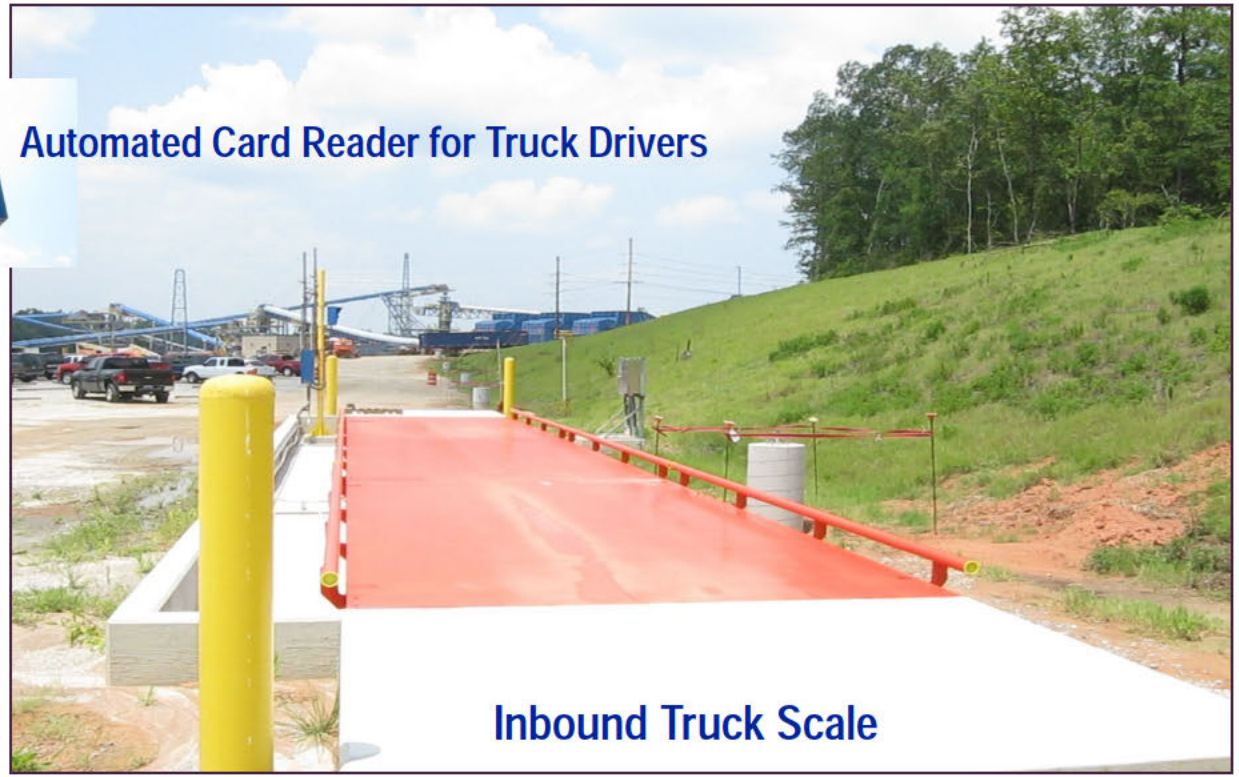
June 2011 – December 2011

# Operations

January 2012

# Processing of Biomass at BCF

Automated Card Reader for Truck Drivers



Inbound Truck Scale

# Processing of Biomass at BCF (cont.)

## 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 – Re-claimer

# Types of Biomass being used at SRS

## Woody

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

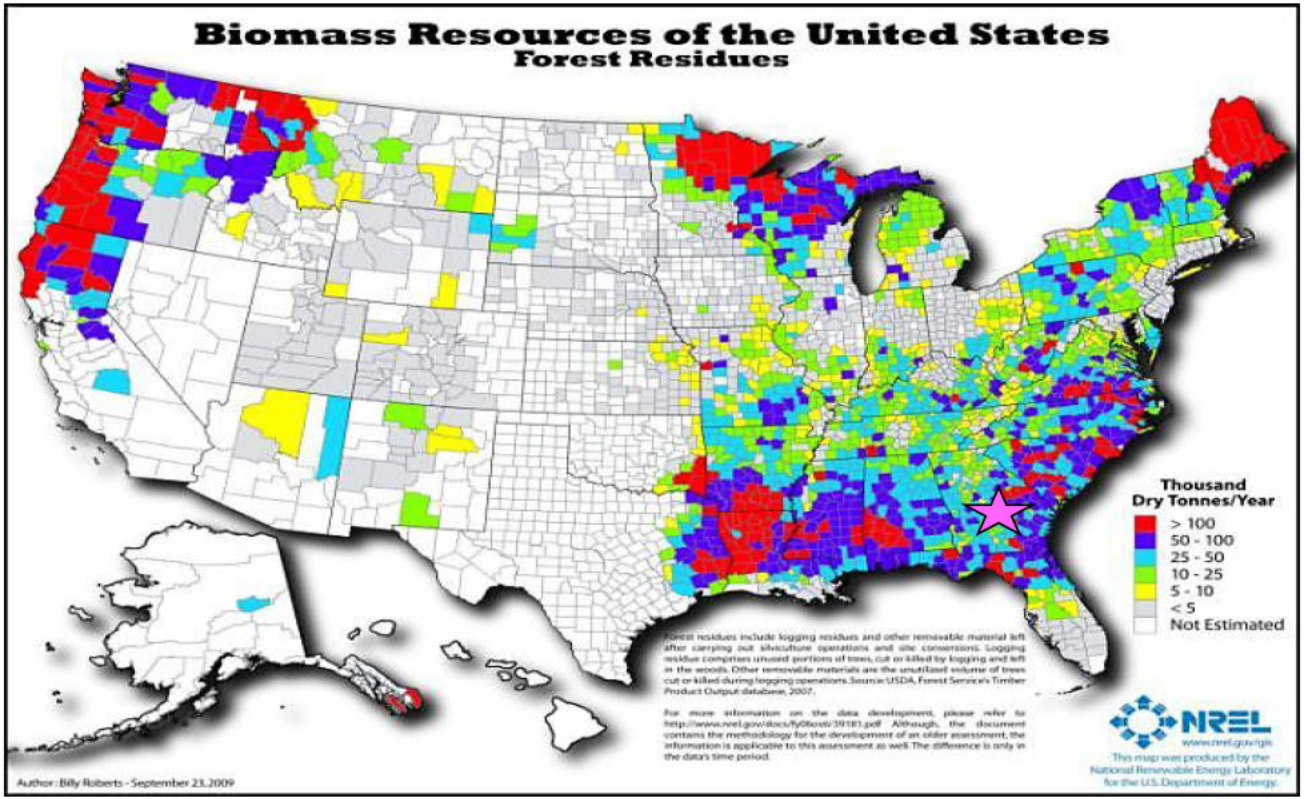
## Non-Woody

- Agricultural Sources
- Animal/Livestock Wastes
- Solid Wastes

# Woody Biomass Supply Chain Characteristics

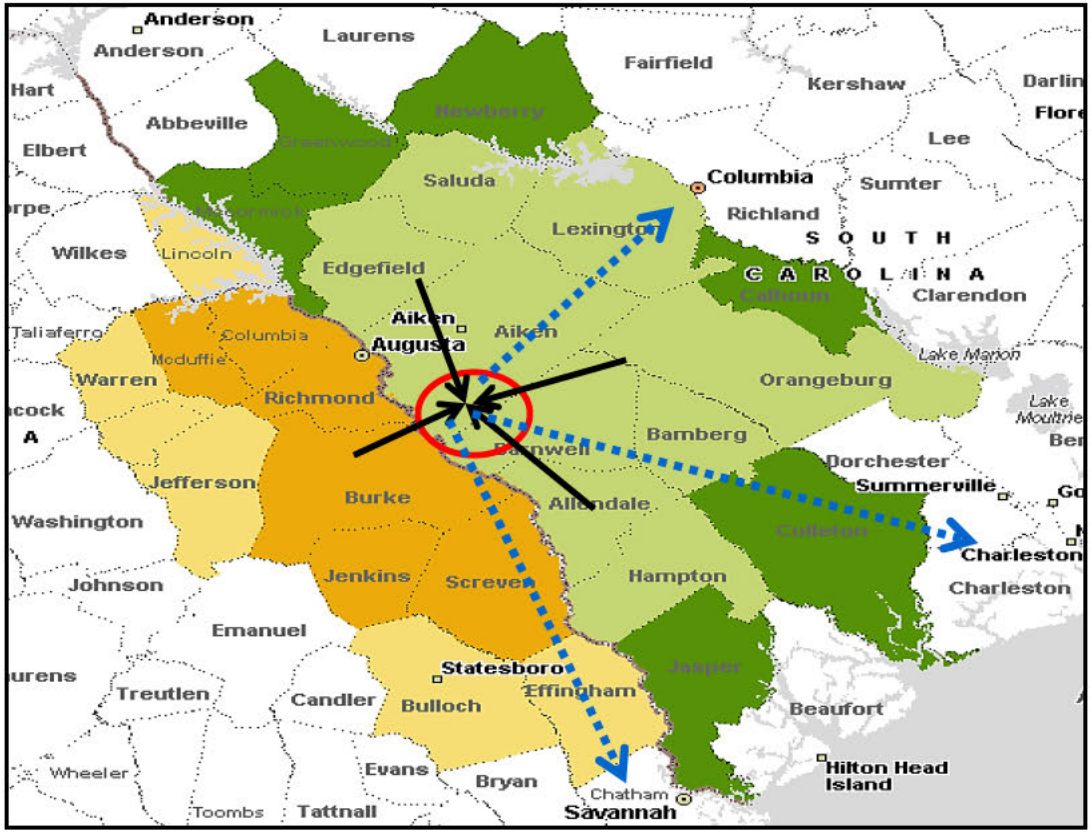
- Many "suppliers" and many "consumers"
  - Thousands of timberland owners in SC
  - Hundreds of wood consuming facilities in SC
  - U.S. Forest timber sales
- Highly fragmented
  - Landowners
  - Consultant
  - Supplier (Wood Dealer)
  - Producer (Logger)
  - Hauler (Trucker)
  - Primary / Secondary 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



# 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 Plants at DOE Savannah River Site

AMERESCO

## 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 needs at Savannah River Site

## 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

# Questions

Thank you for your time!

Questions?

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