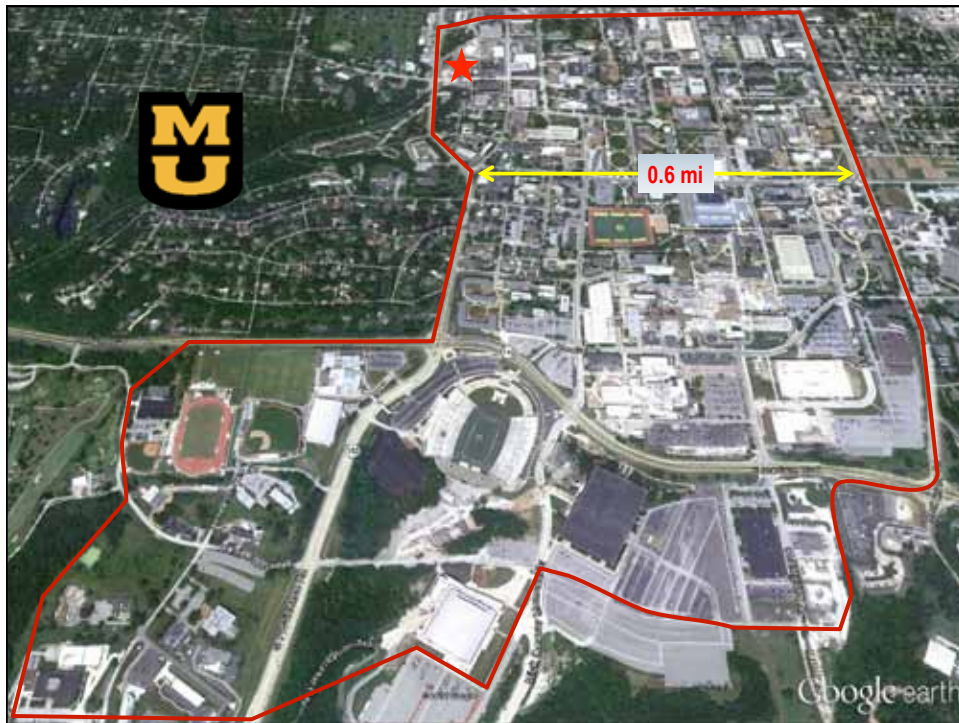


# HEATING THE MIDWEST (OR AT LEAST THE UNIVERSITY OF MISSOURI)

Hank Stelzer  
Department of Forestry  
MU School of Natural Resources



## MU CHP PLANT

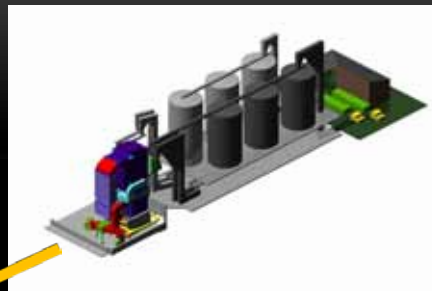
66 MW Generation - 950,000 lb/hr Steam

- 5 Boilers (4 Coal/TDF/Biomass, 1 Gas/Oil)
- 4 Steam Turbine Electric Generators
- 2 Gas Turbine Electric Generators (Gas/Oil)
- 2 Heat Recovery Steam Generators (Gas)



## NEW BIOMASS BOILER

- Will supply 25% base load
- BFB design



PROJECT COST: \$75.8 MM

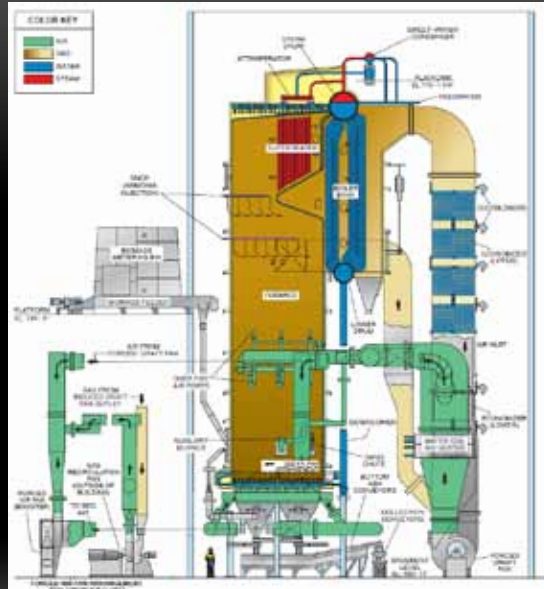


TARGET COMPLETION: OCTOBER 2012



### BFB Specifications

Steam capacity: 150,000 lb/hr  
 Outlet pressure: 950 psi  
 Outlet temp: 850 F  
 Feedwater temp: 300 F

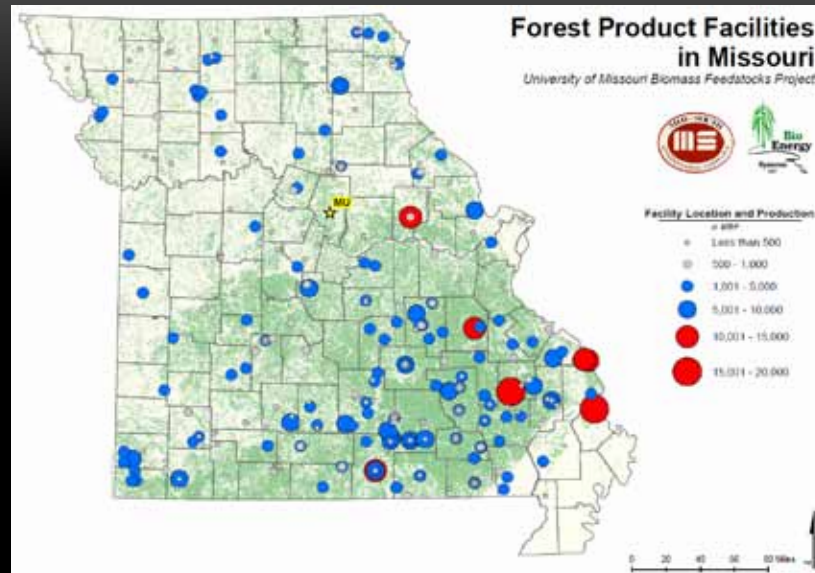


### MU CHP BIOMASS FUEL SOURCES

- Woody... 100 – 80% of total supply
  - Non-Forest Derived Residue (non-FDR)... 90 – 80% of woody supply
  - Forest Derived Residue (FDR)... 10 – 20% of woody supply
  - Wood waste
  - Future fuels (dedicated energy crops)
- Agricultural... 0 – 20% of total supply
  - Corn cobs/stover
  - Future fuels (dedicated energy crops)

## MU CHP WOODY BIOMASS FUEL SOURCES

- **Non-Forest Derived Residues (non-FDR)**
  - Primary forest products: slabs, edgings, cut-offs, sawdust, log cores
  - Secondary forest products: cabinet shops, cooperages, flooring, pallet plants
  - Wood waste: non-treated, clean-sawn lumber; pallets; r-o-w & park maintenance; urban tree damage





## MU CHP WOODY BIOMASS FUEL SOURCES

- **Forest Derived Residues (FDR)**

- Harvest residues: Tops, branches, crooks, and other portions of trees resulting from commercial timber harvesting usually left in the forest.
- Unacceptable growing stock: Trees that are considered structurally weak or having low vigor and lacking the potential to eventually yield a 12-foot saw log or survive for at least 10 years
- Forest-grown trees that are damaged



<http://projects.cares.missouri.edu/MoBAT/>



## ECONOMICS OF WOODY BIOMASS SUPPLY



## IMPORTANT POINT

**Forest derived residues that are processed offsite and NOT meeting the criteria for non-forest derived residues are still considered to be forest derived residues**

In other words... no 'green-washing'

## MU CHP OTHER BIOMASS FUEL SOURCES

- Opportunity Fuels

- Short-term abundance of clean woody biomass from ice/wind storms or other natural disasters



## MU CHP OTHER BIOMASS FUEL SOURCES

- Future Fuels

- Dedicated energy crops, such as plantation-grown willow or hybrid poplar





## MU CHP OTHER BIOMASS FUEL SOURCES



## FDR SUSTAINABILITY STANDARDS

- **UNACCEPTABLE** FDR Biomass Fuels
  - Land conversion from forestland to either agricultural row crops or pasture
  - Land conversion from forestland to commercial development UNLESS seller can document through a zoning/building permit that such conversion was going to happen anyway



## FDR SUSTAINABILITY STANDARDS

- All land from which FDR is sourced, public or private, will be managed according to a **written forest management plan** prepared by a professional forester as recognized by the Society of American Foresters (SAF)



## FDR SUSTAINABILITY STANDARDS

- All FDR will be harvested in accordance with the **Missouri Woody Biomass Harvesting Best Management Practices Manual**, as may be amended during the contract period



## FDR SUSTAINABILITY STANDARDS

- Each FDR harvesting team shall include at least one logger that, as a minimum, has completed the Missouri Forest Products Association's **Professional Timber Harvester Program** or its equivalent from a neighboring state



## FDR SUSTAINABILITY STANDARDS

- No FDR will be obtained from any clearing operations unless either so prescribed in the written forest management plan for acceptable silvicultural reasons or deemed prudent as a result of a pest outbreak or natural disaster, and approved by a professional forester as recognized by the SAF



## FDR THIRD-PARTY AUDITS

- Prior to commencing harvest operations, the supplier must provide notice to MU
  - Description of harvest site; legal land description and/or GPS coordinates
  - Ownership name and contact information
  - Anticipated date(s) of harvest
  - Estimate of forest biomass to be removed
- Prior to completion of harvest operations, the supplier must provide notice to MU
  - Signed statement by an SAF-recognized professional forester that all sustainability standards specified in this section were met

## FDR THIRD-PARTY AUDITS

- MU will hire an independent SAF Certified Forester to conduct periodic audits of randomly selected harvest sites.
- Supplier shall facilitate the inspections.
- Certified Forester will provide written report to both supplier and MU



## CONSEQUENCES

Failure to comply may serve as grounds for contract termination

*"Do what you can, with what you have, where you are."*

Theodore Roosevelt



