

# ORNL Biomass Steam Plant Progress Report

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# Background

- The Utilities Division is responsible for the operation and maintenance of a safe, reliable and energy efficient steam plant and distribution system for ORNL.
- High pressure steam is produced and distributed throughout the ORNL campus on a 24/7 basis for both process and space conditioning purposes. Winter peak loads are on the order of 145,000 lbs/hr.
- 670 million pounds of steam is produced and distributed annually – equivalent to heating 18,200 households annually.

# History

- 1947: Original steam plant constructed
  - Three, 250 psig, 50,000 lb/hr coal-fired boilers
- 1956: A fourth boiler of same type & capacity added.
- Late 1950s: These four boilers were reconfigured for natural gas & fuel oil and derated to 25,000 lbs/hr in the late 1950s.
- Early 1960s: A fifth natural gas-fired boiler was installed. Boiler #5 has a capacity of 100,000 lbs/hr.
- Late 1990s: A sixth natural gas-fired boiler was installed. Boiler #6 also has a capacity of 100,000 lbs/hr.
- Through the start of biomass construction, total installed capacity was 300,000 lbs/hr.



# Biomass Steam Plant Highlights

## System & Fuel:

- Capacity: 60,000 lbs/hr of 150 psig steam
- Fuel: Locally sourced wood with 3+ day storage capability
- Consumption: ~70,000 green tons per year

## Benefits

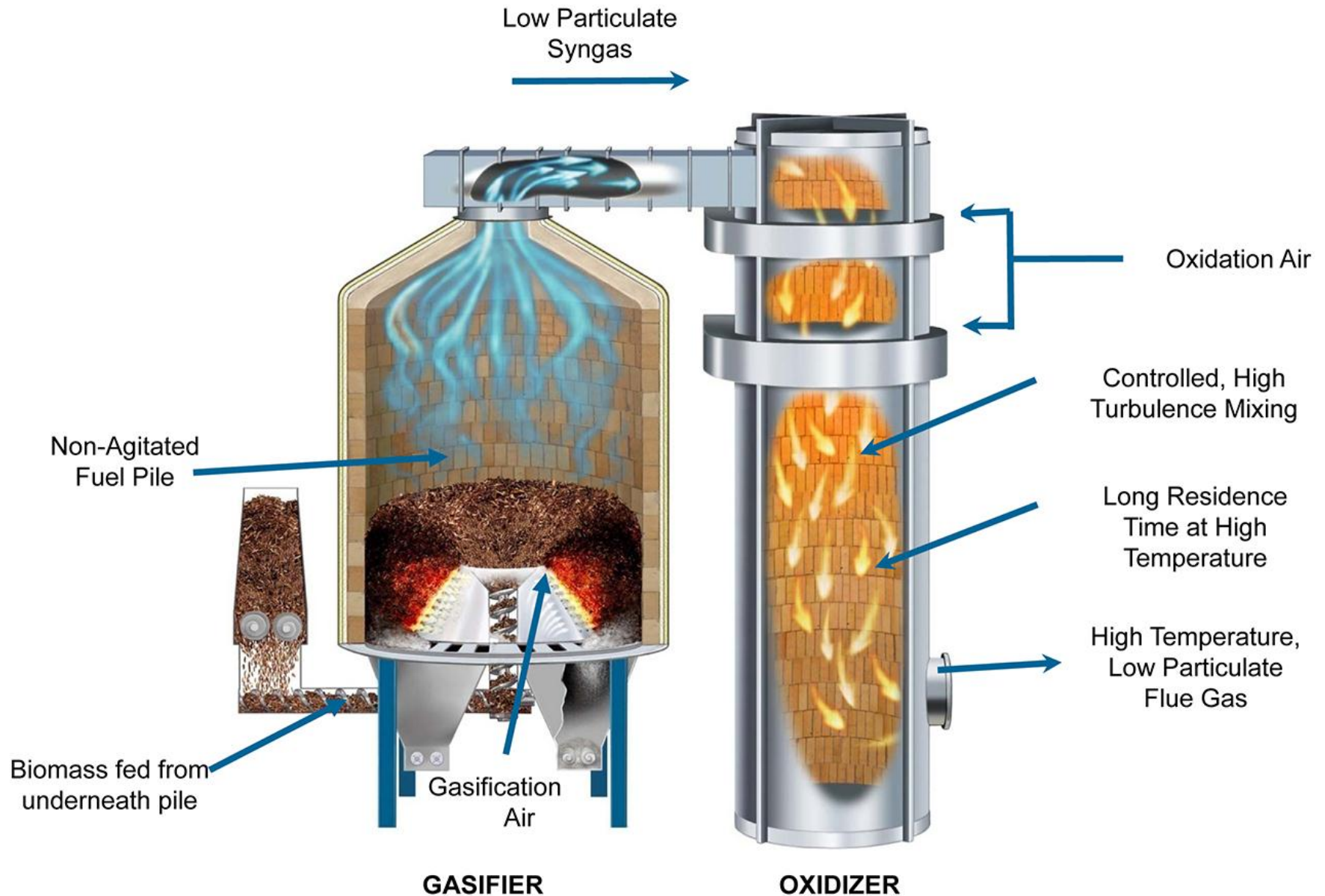
- Annual Cost Savings: ~\$4 million per year (energy & energy related O&M savings)
- Reduces reliance on fossil fuel by 85%
- Greenhouse Gas Reduction: 20,000 tons/yr (estimated)
- Reduced Reliance on Fossil Fuels: Enables ORNL to shut down four fossil fuel fired boilers
- Local Economy: Supports local business by using locally sourced wood fuel
- Adds a valuable research tool for ORNL



# Biomass Gasification Process



# Cutaway of Gasifier





# Fuel Storage



***ORNL will be able to house 3-day supply of fuel in a covered building***



# Gasifiers & Oxidizer





# New North Face of Steam Plant





# New South Face of Steam Plant



# Current Status

- Construction and commissioning completed
- Formal approval from DOE to operate received in July 2012
- System is operating and making steam
- ~22,000 tons of wood fuel have been burned through the system to date



# Questions??

