

# Biomax Gasification Project: Bioenergy from Wood



**Les Groom & Tom Elder\***

Utilization of Southern Forest Resources

USDA Forest Service

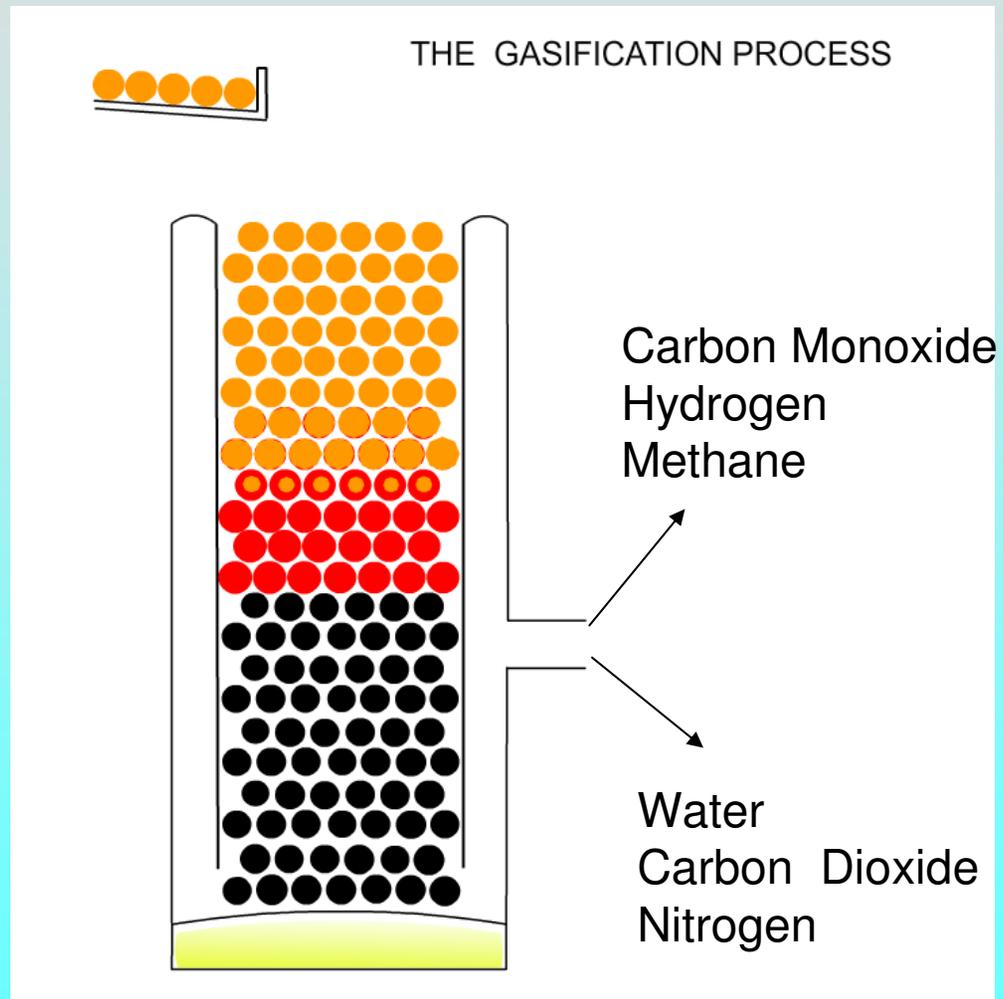
Southern Research Station



\*respectively Project Leader & Research Chemist

# Gasification 101

- Combustion of carbonaceous materials
  - High Temp
  - Anaerobic
- Produces “Synthesis gas”
  - CO, H<sub>2</sub>, CH<sub>4</sub>
  - H<sub>2</sub>O, CO<sub>2</sub>, N<sub>2</sub>



# Gasification – Demo/Research

- Wood chips in →  
Electricity out ←
- The Forest Service has acquired a BioMax25
- This will be used for:
  - Electricity (for Winn Ranger District)
  - Demo
  - Research



# Cooperative Projects

- **National Forest System – *Functional Energy***
  - Unit will be installed at the Winn Ranger District (primary power source)
  - Fully portable, so may be transported as needed for emergency power
- **Southern Research Station – *Feedstock Effect***
  - Operating conditions will be optimized for feedstocks available in the vicinity of the Kisatchie National Forest, LA
    - Hurricane debris
    - Logging debris
    - Fuel load reduction work
  - Unit is instrumented to provide information on gas yield and composition as a function of time
- **Forest Health Protection – *Demonstration Projects***
  - Local tree farmers
  - Development of Southern Pine beetle control protocols



# Gasification: “BioMax25”



# Overview of FS Gasification Project

- Feedstock (to date) has been Southern Pine wood chips
- Chips are loaded into two drying bins that hold ~700 pounds of dry chips each



# Overview of FS Gasification Project

- The chips are sorted to size
- An auger transports the chips into the gasifier



# Overview of FS Gasification Project

- The gasifier has several heated zones with temperatures in the range of 800-900 °C
- At these temperatures, and in an oxygen-starved environment, the wood is converted into synthesis gas



# Overview of FS Gasification Project

- The gas is subsequently cooled and filtered
- The gas composition is monitored



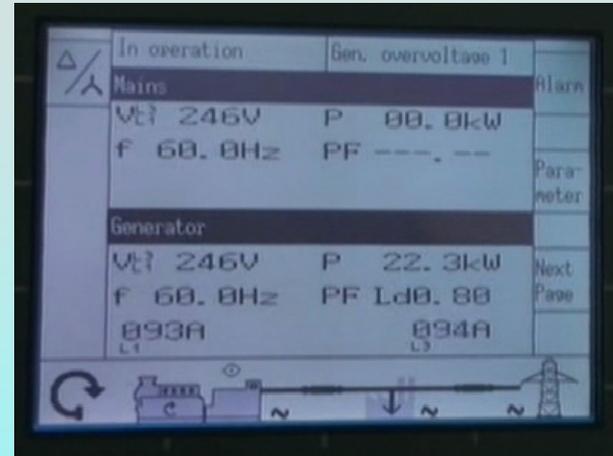
# Overview of FS Gasification Project

- The cleaned and cooled gas goes to a conventional, spark-ignited, internal combustion engine
- This powers a generator capable of producing 25kW of electricity



# Overview of FS Gasification Project

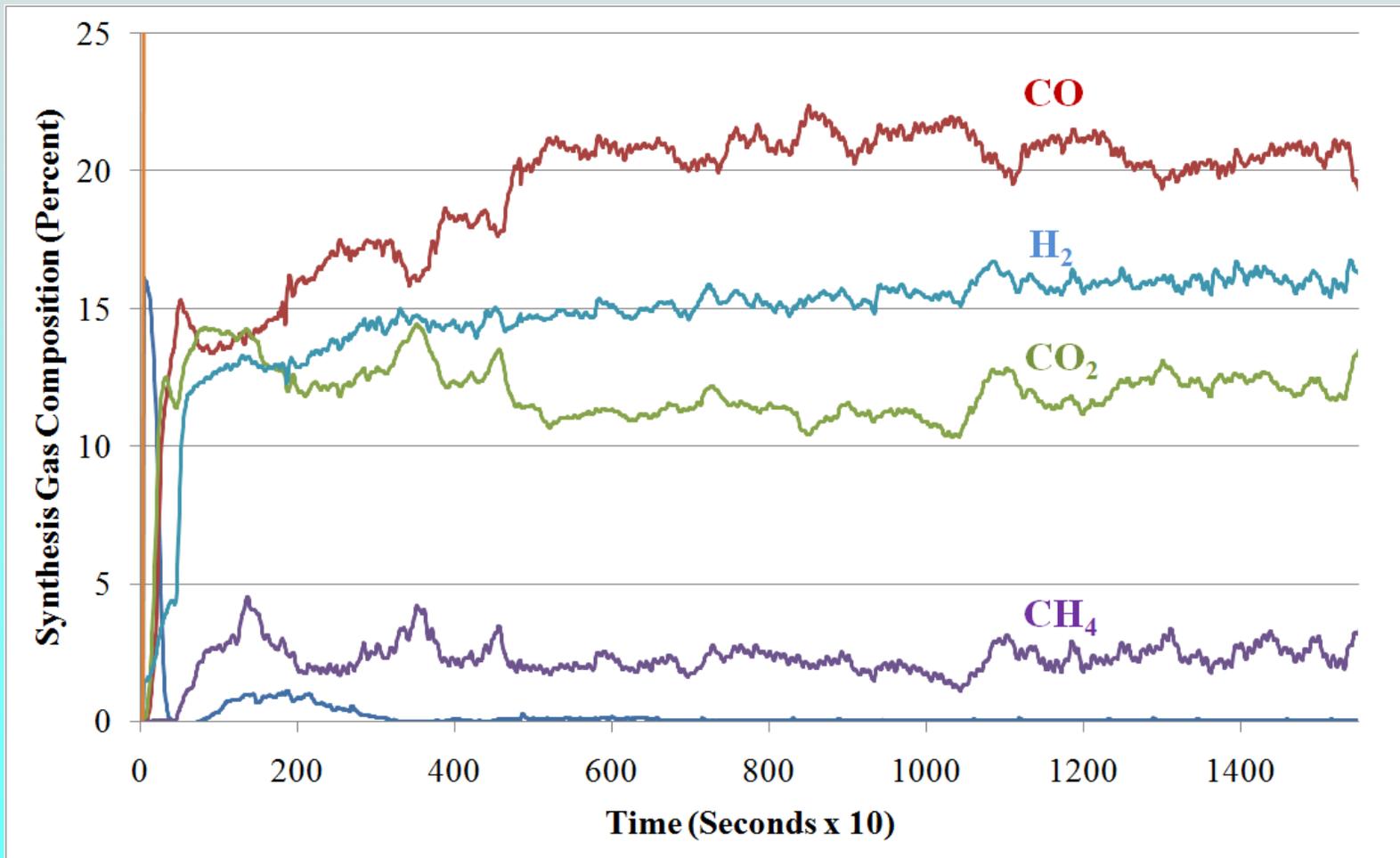
- The electricity generated is enough to power the Winn Ranger District Office building, with the excess returned to the utility grid.



# Overview of FS Gasification Project

- Initial Project
  - Establish baseline information about the gasification of Southern Pine chips
  - Compare these data to results from:
    - Hardwood chips
    - Understory material
    - Beetle-killed trees
- Gas to Liquids

# Gas Analysis (from 01/29/09)



# *“More than Producing Kilowatts...”*



- Developing a Fischer-Tropsch Reactor Module
  - Synthetic Diesel
  - Cellulosic Alcohols
  - Synthetic Gasoline
- Field Demonstration in Winter 2009

# Contact Information

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