

# Biomass Combined Heat & Power (CHP)

Woody Biomass Heat Workshop  
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Bill Carlson  
Wellons, Inc  
Carlson Small Power Consultants  
CSPC@shasta.com

## Focus on Larger Scale Systems

- Greater than 10,000 lb/hr steam
- Greater than 1MW electric
- Uses fuels “as is” without drying or densification
- Steam generation primary, enhanced by electric component

## Potential Applications in Pacific Northwest

- Any forest products facility
  - Drying need (lumber, veneer, paper)
  - On site biomass fuel
- College/University/Hospital Complex
  - Seasonal heating/cooling load
  - Maximum power generation in summer

## Potential Applications in Pacific Northwest (Cont.)

- District Heating System
  - Collection of Offices/commercial buildings
  - Steam or hot water
- Other Industrial Applications
  - Food processing
  - Large consumer of fossil fuels

(All PNW population centers adjacent to forest)

## Fuels for These Applications

- Acceptable
  - Urban wood waste
  - Mill residuals
  - Forestry residuals
  - Ag byproducts (pits, shells)
- Questionable
  - Straws
  - Hulls
  - Grass, leaves

# What Do They Look Like?

Rough & Ready Lumber, Cave Junction, OR



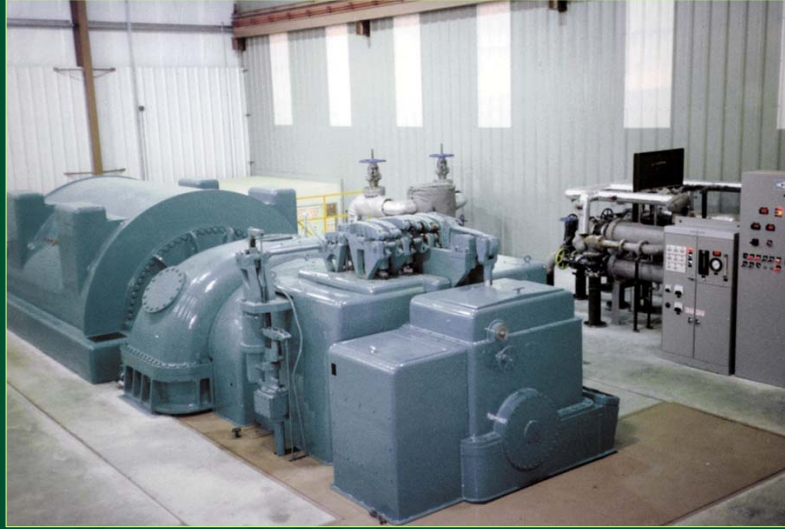
# What Do They Look Like?

Freres Lumber, Lyons, OR

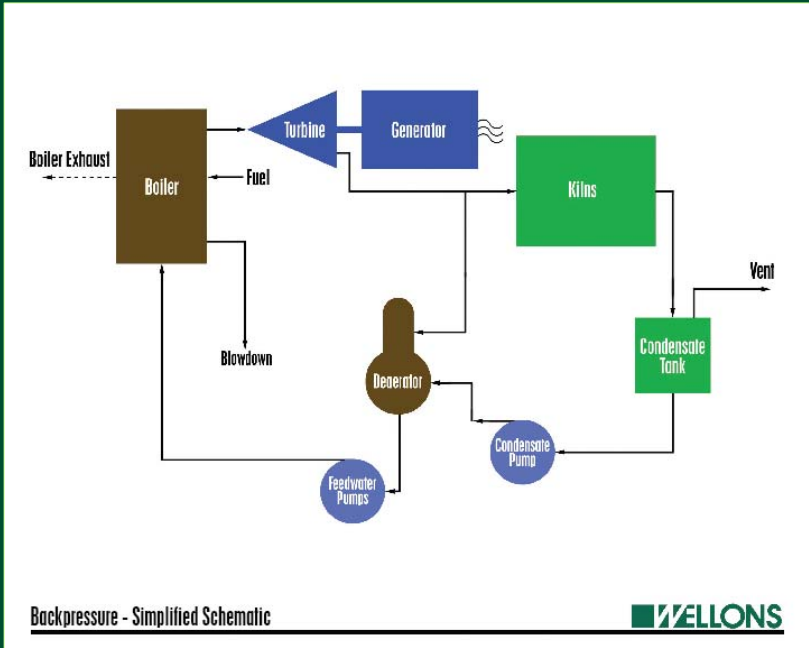


# What Do They Look Like?

## Typical Turbine Generator



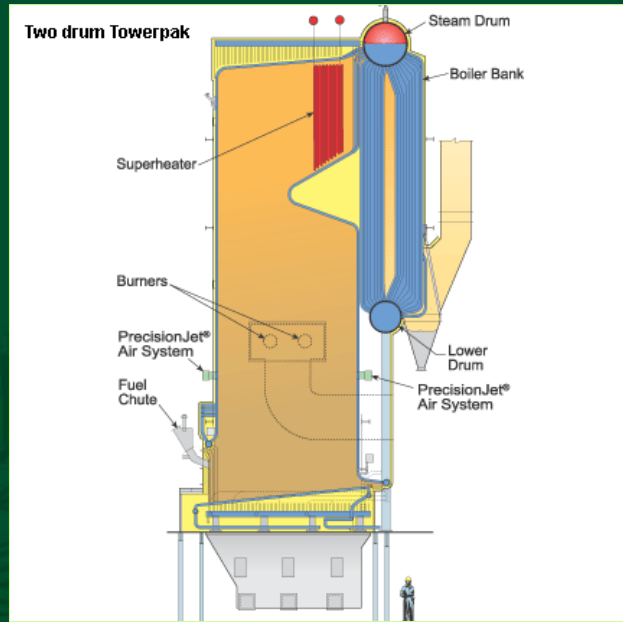
# How Do They Work?





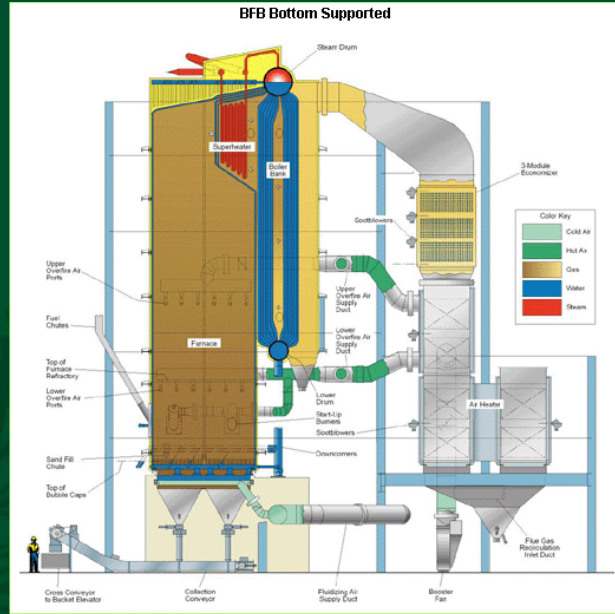
# What Are the Technologies?

Stoker  
fueled grate  
boiler



# What Are the Technologies?

## Fluidized Bed Boiler



# What Are the Technologies?

Biomass  
Gasification





## Why Add Power Generation to Simple Boiler System?

- Maximize use of invested capital by adding insatiable electric market
- Dramatic improvement in efficiency of electric production (20→50/60%)
- Many incentives only available for electric production or CHP
- Lower cost for heating/cooling application

## Should I Supply My Own Electric Load?

Typical answer today is NO!

- Standby/shutdown charges typically 25-33% of current bill
- Some incentives do not apply unless electric component sold to market
- You are typically a poor customer (on peak only)
- You can buy mix of old/new generation, but sell at price of new generation

## What Do Utilities Think of Biomass Power?

- It is renewable power that meets their Portfolio Standard (RPS) Requirements
- It is a firm, base load resource as opposed to intermittent wind/solar
- It is available in small, disbursed increments
- It is typically end of line, providing valuable voltage control/reliability
- It does not require transmission upgrades
- It offers local economic development, assistance with forest restoration, potential carbon offsets

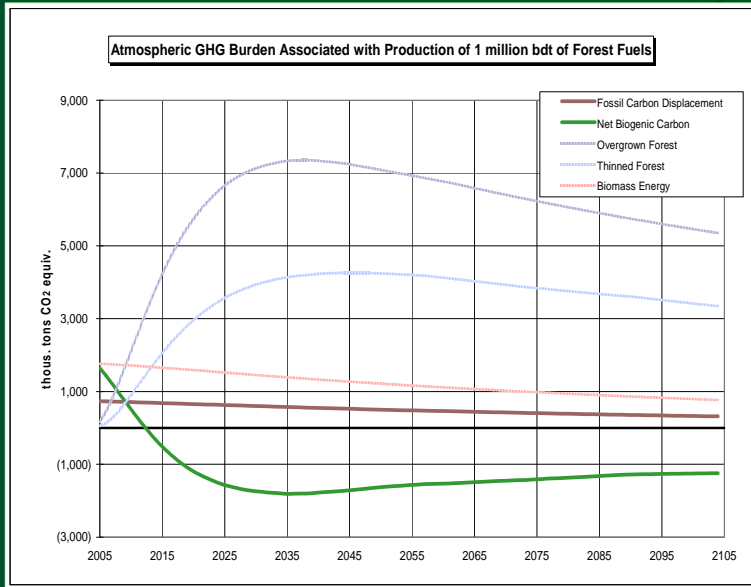
## An Example—Doing This In Oregon

- Newest western Renewable Portfolio Standard
  - Plus transmission access to California market
- Good PUC approach to renewable electricity
  - Avoided cost based on new gas fired unit
  - “Green Tags” can be sold separately
  - Standard offering for projects up to 10MW
- Business Energy Tax Credit (BETC)
  - 50% credit on first \$20 million
- Forest Fuel Tax Credit
  - \$10/green ton

## An Example—Doing This In Oregon (Cont.)

- State Loan Program
- Energy Trust of Oregon programs
- Member of Western Climate Initiative
- Complementary federal programs
  - Production Tax Credit
  - USDA grant/loan programs
  - Potential CHP tax credits/RPS credits

# Biomass & Carbon



## Who Should Consider Biomass CHP?

- Any substantial user of fossil fuels for heating/cooling
- Any forest products firm
- Any large institution
  - Hospital, prison, university
- Any grouping of offices/commercial buildings