

EPI Energy Products of Idaho

Presents

*Retrofitting Coal Boilers
With Fluidized Bed Technology*

... or ...

Recycling Power Plants For Fun and Profit!

Why Retrofit A Boiler?

Green Power Generation!

- ❑ Full or Partial Conversion to Biomass
- ❑ Renewable Energy from Existing Equipment
- ❑ Meet State RPS Requirements
- ❑ Reduce CO Emissions
- ❑ Use of CO₂ Neutral Fuels
- ❑ Improve Public Image
- ❑ *Recycle an Obsolete Power Plant*

First Things First ...

Selecting the Boiler for Retrofit

What Makes A Boiler Or Power Plant A Good Candidate For A Retrofit Project?

- Boilers over 30 years old
- Boilers currently out of service
- Boilers currently, or about to be, out of environmental compliance

Retrofit Options

- ❑ **Full Replacement Boiler System**
- ❑ **Bottom Retrofit**
 - ❑ **Thermal Oxidizer Bottom**
 - ❑ **Advanced Staged Gasifier Bottom**
- ❑ **External Gasifier Add-On**

Second The Biomass Fuel

Alfalfa Seed Straw • Almond Brush • Almond Shells • Almond Wood • Apple Wood • Apricot Wood • Barley Straw • Bean Straw • Cherry Pits • Chicken Litter • Citrus Trees • Coffee Grounds • Corn Cobs • Corn Stalks • Cotton Gin Wastes • Cotton Seed Hulls • Cotton Stalks • Cow Manure • Cubed Garlic • Fig Culls • Fig Wood • Garlic & Onion Skins • Grape Canes • Grape Pomace • Grape Scaffolds • Manure & Wheat Straw • Nectarine Wood • Oat Straw • Olive Pits • Orange Peel & Pulp • Paunch Manure • Peach Pits • Peach Wood • Pear Wood • Peat • Pecan Shells • Pistachio Shells • Pistachio Wood • Plum Wood • Prune Pits • Prune Wood • Race Track Shavings • Race Track straw • Rice Hulls • Rice Straw • Safflower Stalks • Sunflower Hulls • Tobacco Sludges • Tomato Pomace • Walnut Shells • Walnut Wood • Wheat Straw • Bark • Board Plant Waste • Hardwoods • Planer Shavings • Railroad Ties • Sander Dust • Saw Dust • Slash • Softwoods • Urban Wood Waste • Woodex Pellets • Zinc Borate • OSB Waste • RDF • Paper Sludge • Municipal Sludge • Peat • Demolition Waste • Grease • Scum • Coated Stock

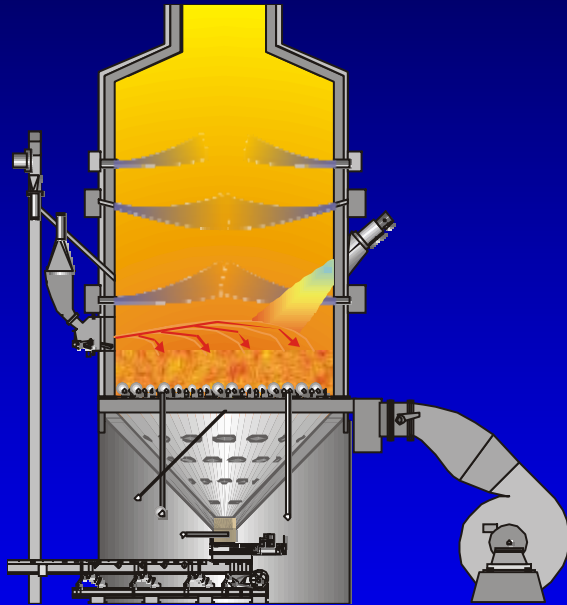
Third ... Retrofit Technology Choices

Select the Right Technology for a Successful Project

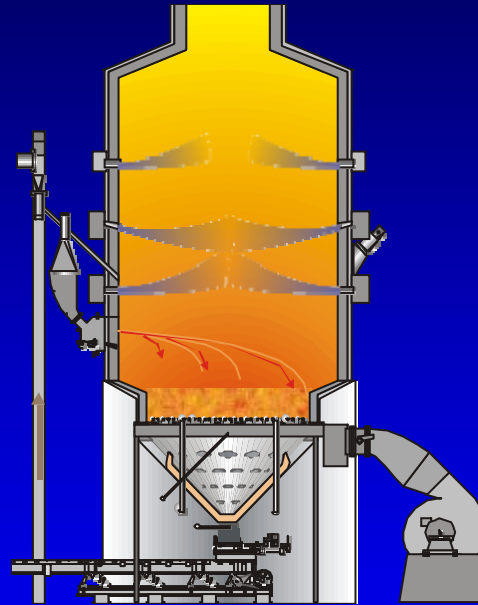
- Thermal Oxidization?
- Advanced Staged Gasification?
- Gasification?

Three Options from a Single **EPI** Technology Platform

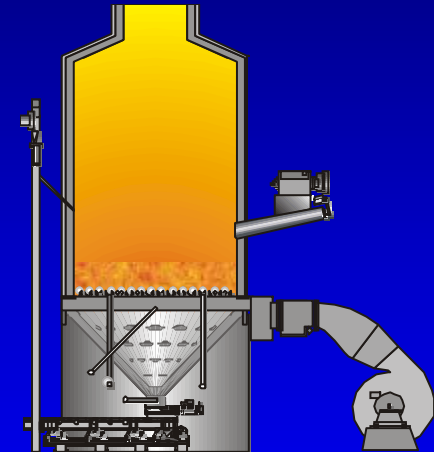
Technology Similarities



Thermal Oxidizer



Staged Gasifier



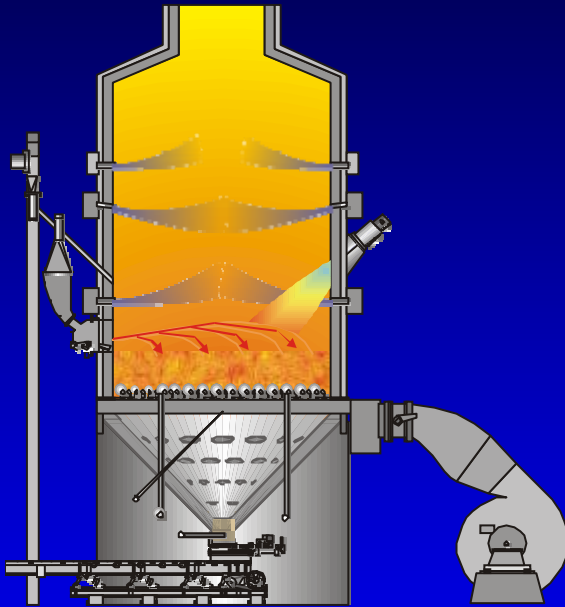
Gasifier

† Fluidization Technology
† Construction

† Bed Cleaning & Reinjection
† Fuel Metering

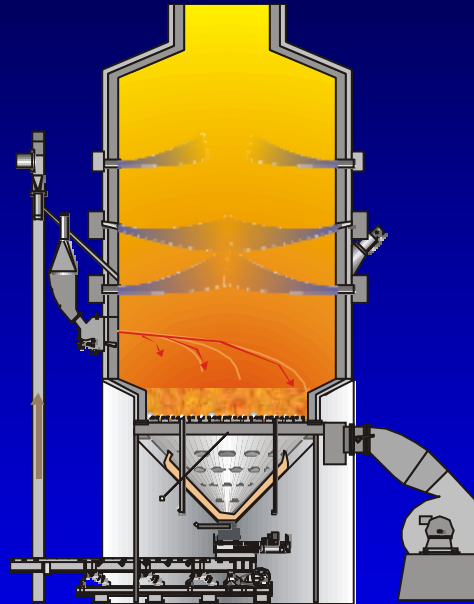
† Control System

Technology Differences

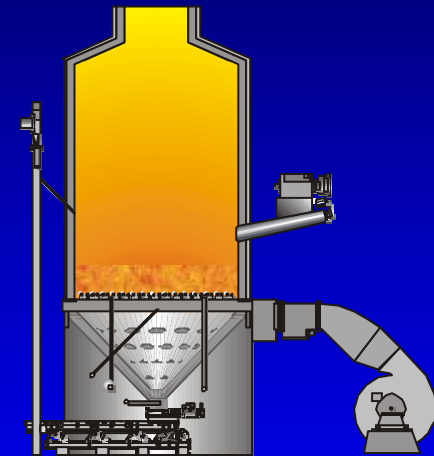


Thermal Oxidizer

- ✦ Complete thermal oxidization
- ✦ Low bed energy density
- ✦ Limestone Injection & SNCR
- ✦ Overfire air
- ✦ Extremely wide fuel variations



Staged Gasifier



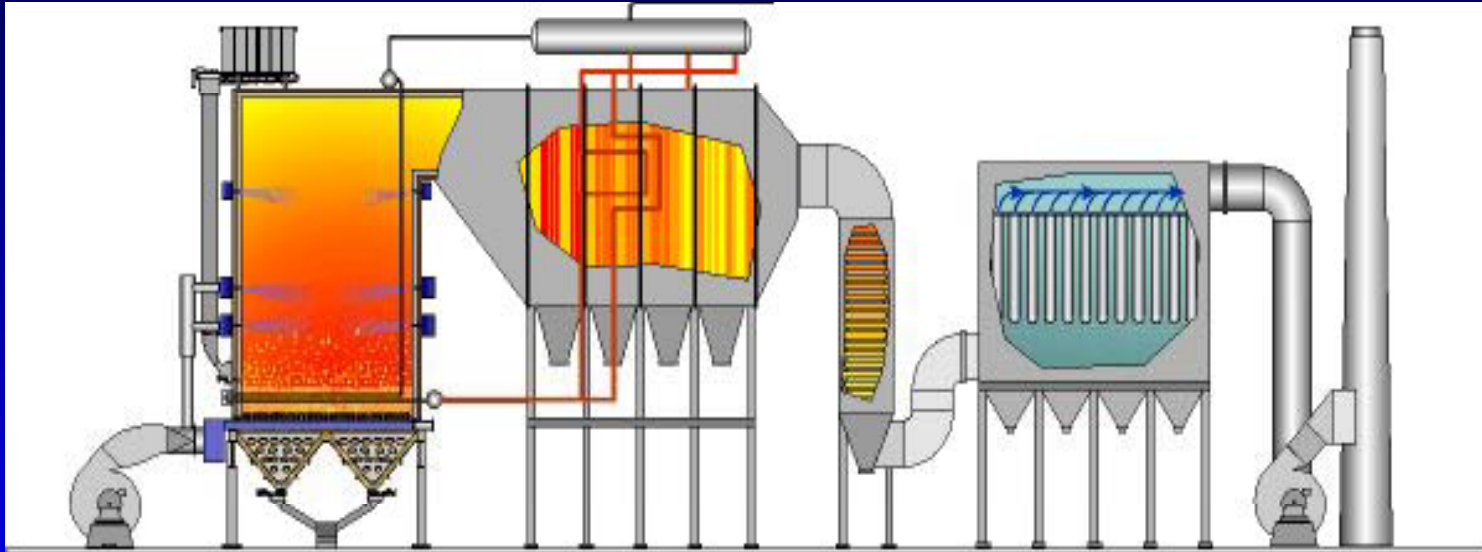
Gasifier

- ✦ Incomplete oxidization
- ✦ High bed energy density
- ✦ No limestone or SNCR used
- ✦ No overfire air
- ✦ Limitations on fuel

Thermal Oxidation

Gasification

Fluidized Bed Boiler System



Applications

- Replacement for Fuel Oil or Natural Gas Boilers
- Replace Outdated/out of Compliance Coal Boilers
- Reuse of Existing Balance of Plant Systems: Generation, Transmission, Controls, Etc.

New Components

- Fuel Yard
- Full Fluidized Bed Boiler System
- ✓ Thermal Oxidizer
or
- ✓ Staged Gasifier
- Ash System

Reuse/Recycle

- Plant Infrastructure
- Turbine - Generator
- Condenser
- Cooling Tower
- Water Treatment
- Control System
- Switch Gear

Fluidized Bed Gasifier Bottom Retrofit

Applications

- PC Boilers
- Grate Boilers
- Full Conversion

New Components

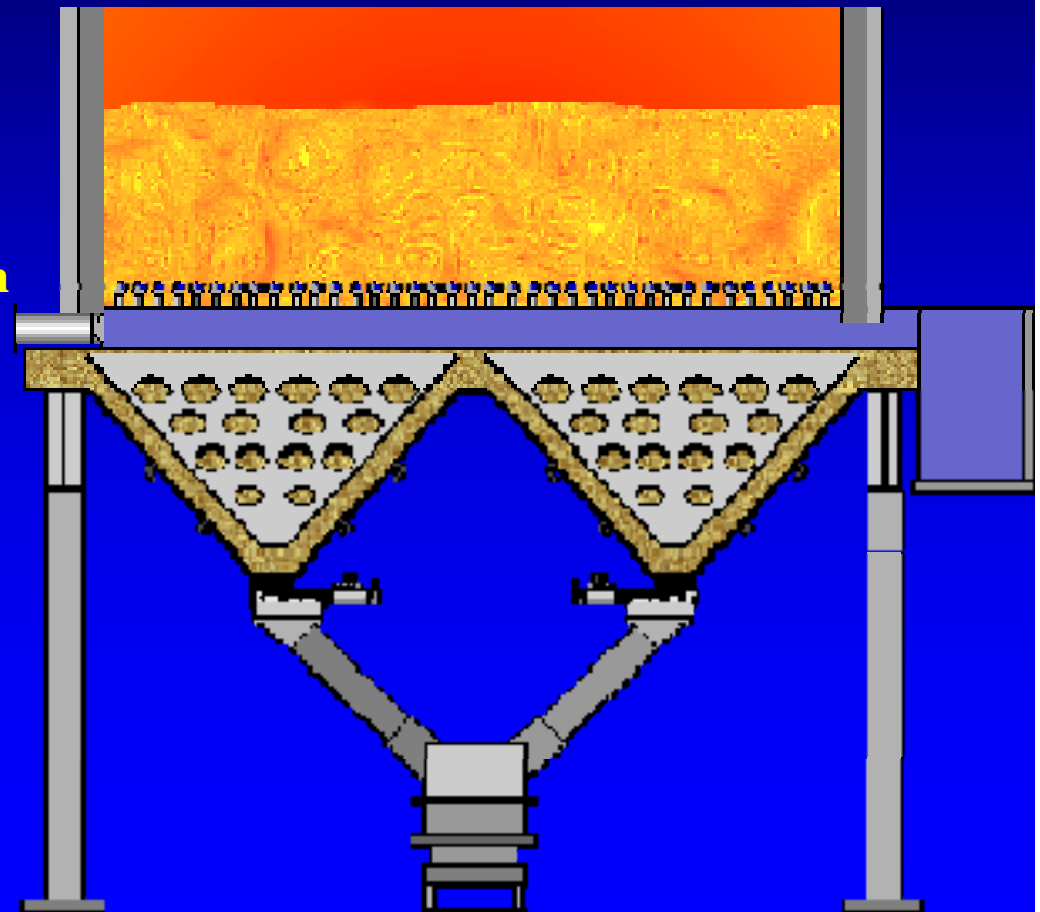
- Fuel Yard
- EPI Fluidized Bed Gasifier Bottom
- Bed Recycle System

Options

- Overfire Air Modifications
- SNCR
- Limestone Injection

Reuse/Recycle

- All Other Existing Plant Infrastructure & Generating Systems!



EPI Gasifier Add-On System

Applications

- PC Boilers
- Cyclone Boilers
- Full Conversion
- Partial Conversion

New Components

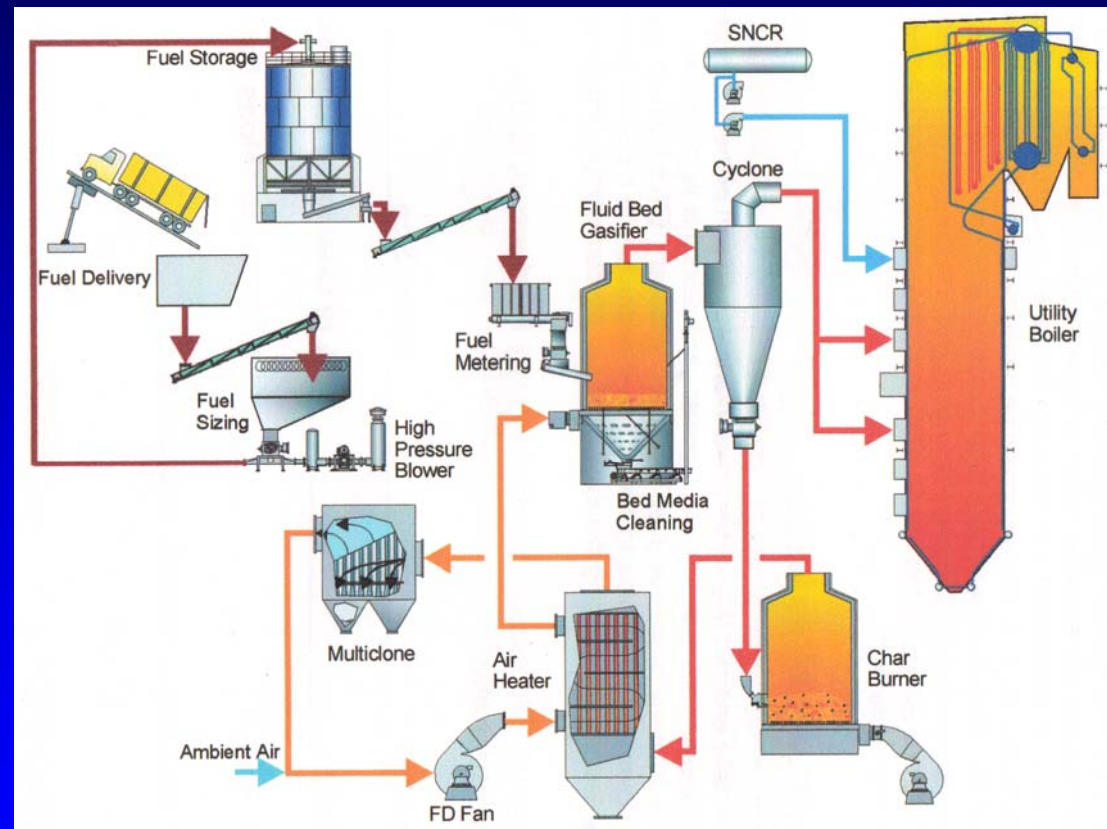
- Fuel Yard
- EPI Gasifier

Options

- Hot Cyclone
- Char Conversion System
- Gas Reburn System

Reuse/Recycle

- All Existing Plant Infrastructure & Generating Systems!



Finally ... Fuel Diversity

(not to belabor the point)

Alfalfa Seed Straw • Almond Brush • Almond Shells • Almond Wood • Apple Wood • Apricot Wood • Barley Straw • Bean Straw • Cherry Pits • Chicken Litter • Citrus Trees • Coffee Grounds • Corn Cobs • Corn Stalks • Cotton Gin Wastes • Cotton Seed Hulls • Cotton Stalks • Cow Manure • Cubed Garlic • Fig Culls • Fig Wood • Garlic & Onion Skins • Grape Canes • Grape Pomace • Grape Scaffolds • Manure & Wheat Straw • Nectarine Wood • Oat Straw • Olive Pits • Orange Peel & Pulp • Paunch Manure • Peach Pits • Peach Wood • Pear Wood • Peat • Pecan Shells • Pistachio Shells • Pistachio Wood • Plum Wood • Prune Pits • Prune Wood • Race Track Shavings • Race Track straw • Rice Hulls • Rice Straw • Safflower Stalks • Sunflower Hulls • Tobacco Sludges • Tomato Pomace • Walnut Shells • Walnut Wood • Wheat Straw • Bark • Board Plant Waste • Hardwoods • Planer Shavings • Railroad Ties • Sander Dust • Saw Dust • Slash • Softwoods • Urban Wood Waste • Woodex Pellets • Zinc Borate • OSB Waste • RDF • Paper Sludge • Municipal Sludge • Peat • Demolition Waste • Grease • Scum • Coated Stock

EPI

Energy Products of Idaho

The Alternative Energy Company

Thank You

Contact Information

Energy Products of Idaho (EPI)
4006 Industrial Avenue
Coeur d'Alene, ID 83815

Phone: (208) 765-1611
Fax: (208) 765-0503
e-mail epi2@energyproducts.com