



Available Technologies

2014 Western Idaho Biomass Energy Workshop

July 29th 2014



Background

✓ PES was formed in 1993 as a Biomass Technical Services and O&M contract operator.



✓ PES offers services to Industrial Energy Users and the IPP Industry in all aspects of thermal fuel based energy and electrical power production. PES has provided services from Turnkey Plant installations through Operation and Maintenance for 20 years



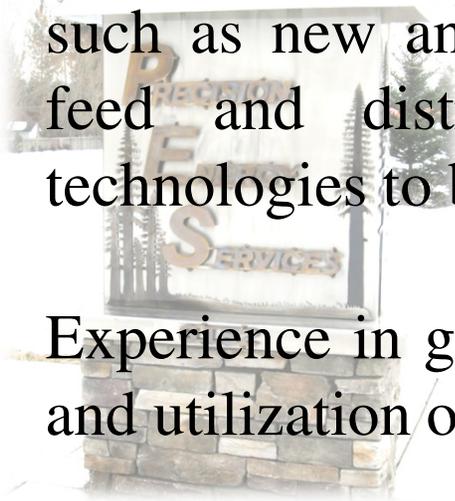
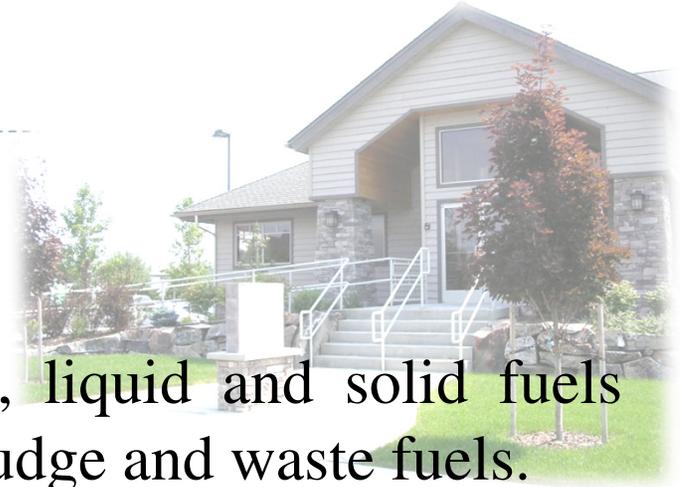
Background

Combustion/Gasification

Expertise in the combustion of gaseous, liquid and solid fuels including difficult to burn fuels such as sludge and waste fuels.

Experience in improving combustion with advanced techniques such as new and modified over-fire air systems, improved fuel feed and distribution and modifying existing combustion technologies to be compatible with new fuels.

Experience in gasification technologies including the combustion and utilization of low-Btu gas from various source fuels.



Background

Boiler Systems

PES provides new, modifications and re-design services for:
Units burning wood, biomass, sludge, coal, fossil fuels and natural gas.

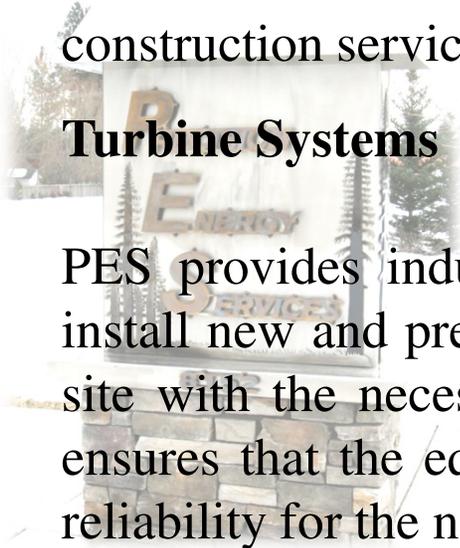
Co-Generation units up to 50MWe

Projects anywhere in the nation

PES is a licensed General Contractor that offers engineering, procurement and construction services.

Turbine Systems

PES provides industrial and utility plants with the resources to re-build or install new and pre-owned turbine/generators. These services are generally on-site with the necessary components being shipped to specialized shops. This ensures that the equipment will be carefully and precisely rebuilt to maintain reliability for the necessary run-time without unforeseen problems.



TECHNOLOGIES

Wellons Cell

Fluid Bed

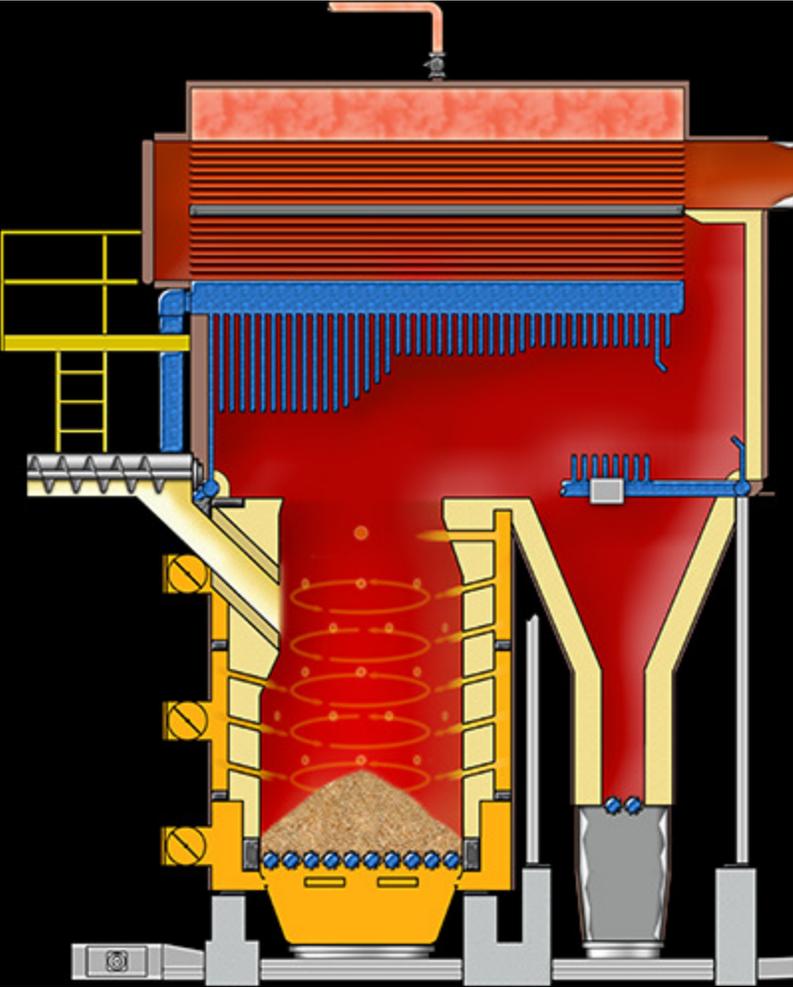
Reciprocating Grate

Fix Grate Pellets

Fix Grate Chips



Wellons Cell



Relevant Experience

Plant Relocation

- ▶ Hampton Lumber Plant re-installation
 - ▶ Pablo, Montana to Warrenton, Oregon



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Plant Relocation

- ▶ Hampton Lumber Plant re-installation
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PES **PRECISION**
ENERGY
SERVICES INC.



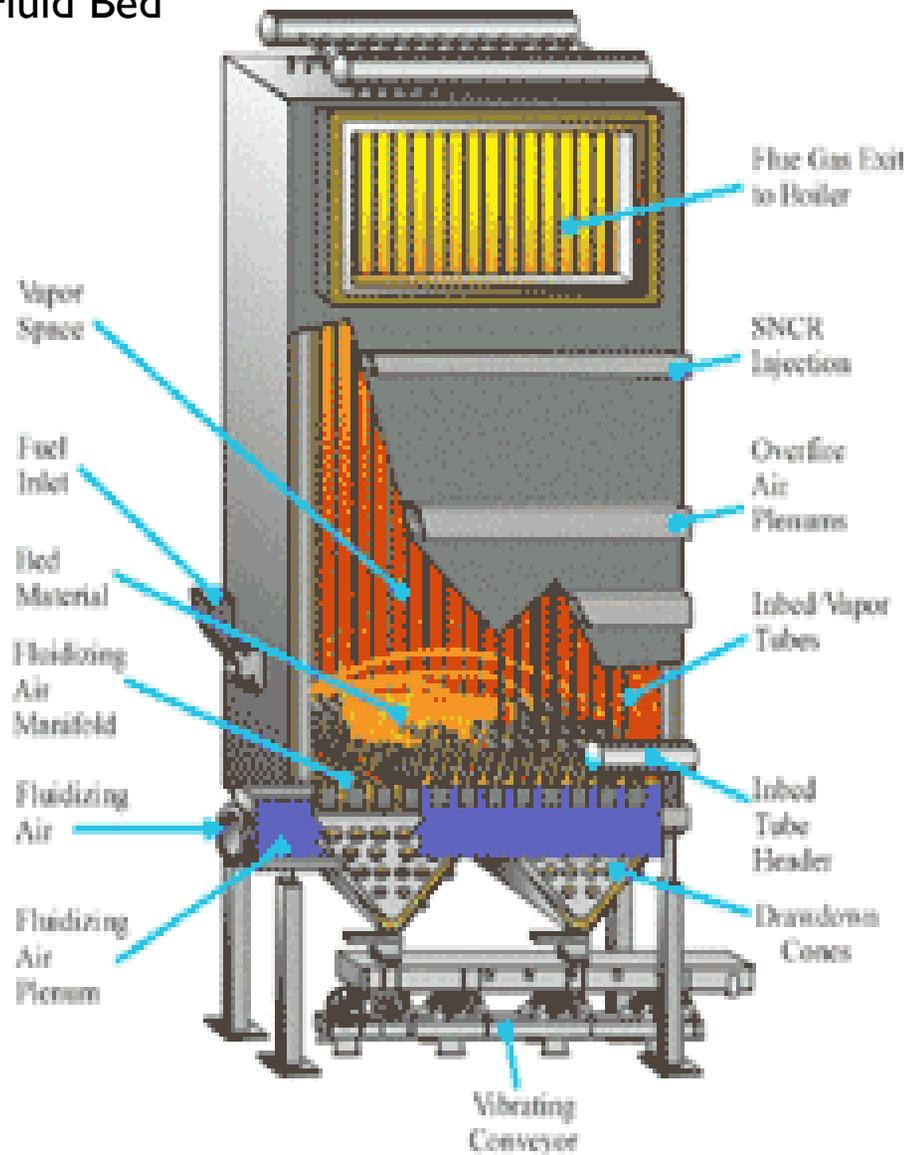
Relevant Experience

Plant Relocation

- ▶ **Hampton Lumber Plant re-installation**
 - ▶ Pablo, Montana to Warrenton, Oregon



Fluid Bed



Relevant Experience Boiler Installation

- ▶ Seattle Steam Boiler Installation

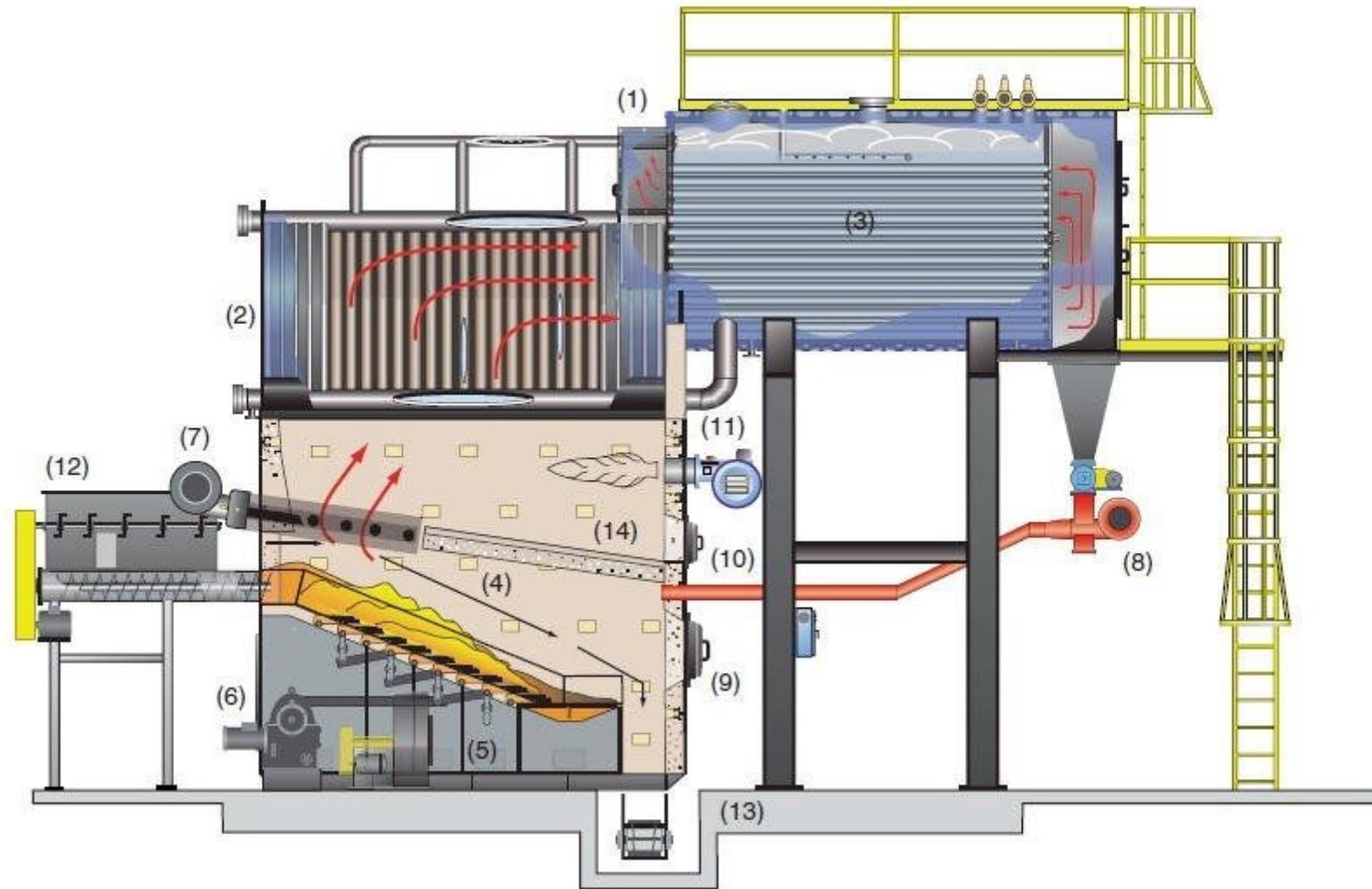


Relevant Experience Boiler Installation

- ▶ **Seattle Steam Boiler Installation**



Reciprocating Grate



Commercial System Alternative

- ▶ Reciprocating Step-Grate



Relevant Experience

CHP Tri Generation System

- ▶ Veterans Administration Medical Center - Vermont



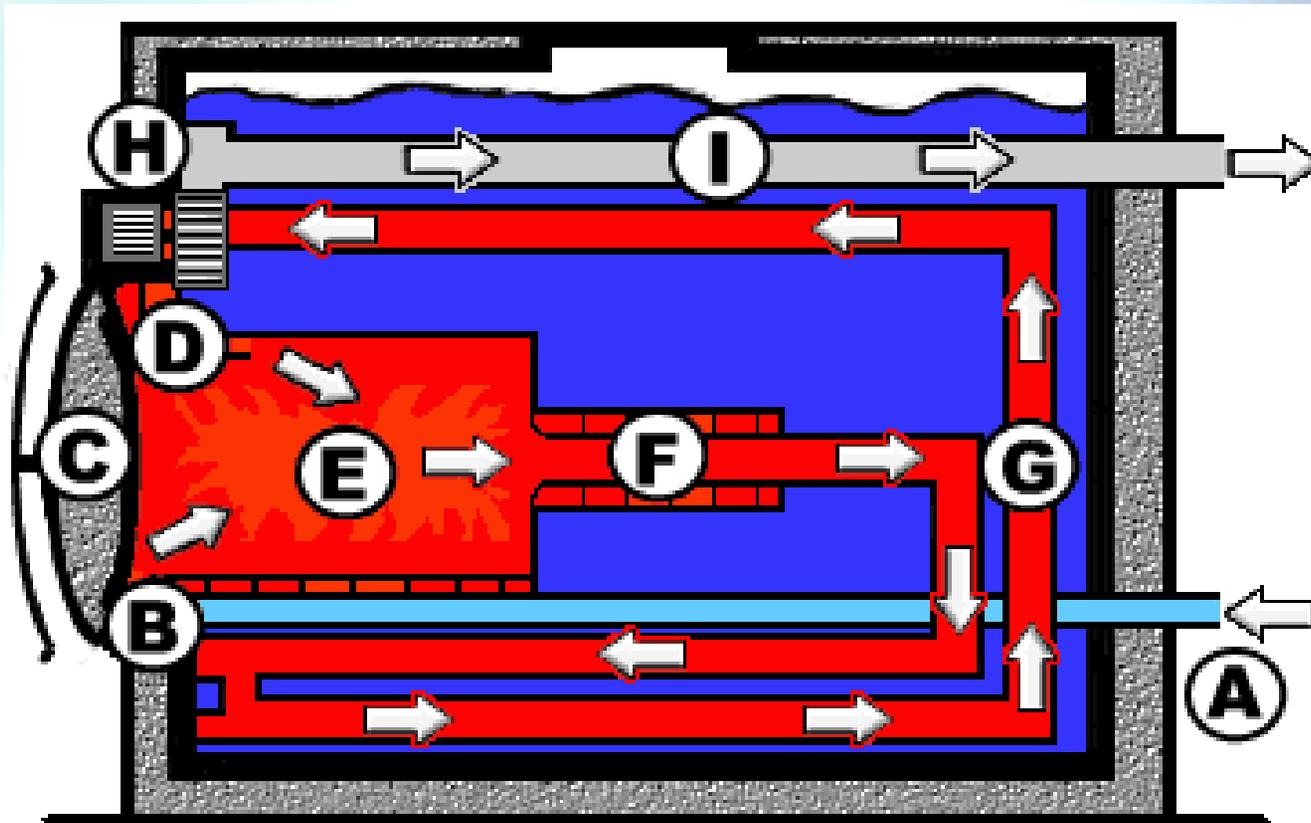
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CHP Tri Generation System

- ▶ Veterans Administration Medical Center - Vermont



GARN Technology Cord Wood



- A – Outdoor combustion air inlet
- B – Primary air nozzle
- C – Insulated, cool-to-touch door
- D – Secondary over-fire air nozzle
- E – Primary combustion chamber
- F – Insulated secondary reaction chamber

Yields 96% combustion efficiency.

Cord-wood Biomass Burners

Capable of Hot Water, Steam or Hot Air
through various manufacturers.

Following is a Hot Water system, using cord-
wood.

Produced by Martin Lunde of Dectra Corp
and used by permission.

Minnesota Residence – installed in 1990



GARN Line of Wood-Fired Hydronic Heaters

- Initial development began in 1976.
- An 1979 DOE grant confirmed prototype efficiency.
- 1981 thru 1986 R & D improved efficiency and lowered emissions.
- In **1986** GARN units were independently tested and certified for safety (UL and CSA) **and efficiency**. Even the 1986 models complied with the January 2007 EPA Standard. **Overall efficiency was 70% (HHV basis)**.



Fix Grate-Pellets



Relevant Experience

Small System Installation

- ▶ Mineral Community Hospital
- ▶ Superior, Montana



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Small System Installation

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Fixed Grate-Chips



Relevant Experience

Small System Installation

- ▶ Glacier High School
- ▶ Kalispell, MT



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Small System Installation

- ▶ Glacier High School
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Commercial System Alternative

- ▶ **Gasification**
 - ▶ Secondary Combustion



Questions



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www.PES-world.com