

## BIOMASS COMBUSTION ENERGY SYSTEMS



Whether your energy needs are; hot water, gas, steam or thermal oil to produce heat or electricity, Saxlund has the proven combustion unit and in-house experience to offer you an integrated system to meet your process energy needs.

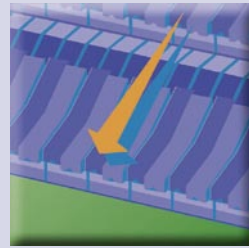
Since 1960, Saxlund's experience in biomass combustion has permitted it to develop a highly efficient, low maintenance and through-life cost competitive solution for plants between 5-50MW thermal, (1-10MW electric).

The company's combustion systems are comfortably capable of handling a wide range of biomass fuels with moisture contents up to 60% including:

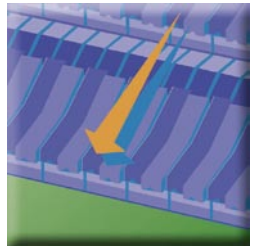
- bark
- wood chips
- sawdust
- forest residue
- peat
- recycled wood etc

Plants for the conversion of biomass fuels into energy need to be designed with the best available technical, environmental as well as the economic demands of tomorrow. With the combustion chamber being at the heart of any energy system, Saxlund has, with its many years of experience and with sophisticated research input developed the most efficient and environmentally friendly combustion system available.





Specialist in  
 bulk material handling with particular expertise in  
 fuel feed and combustion control



**Patented fuel feed system ("stoker")**

The combustion system is greatly influenced by the quality and consistency of its feed system. For this reason Saxlund has designed a specific type of fuel feeding unit. This "stoker" unit provides fuel distributed evenly and with equal depth across the complete width of the step grate, minimising 'burn through' and the possibility of uncontrolled air supply through the grate. The "stoker" unit also compensates for the differing burn rate across the grate by biasing feed to the middle.

The specific design of the "stoker" system is dependent upon several factors:

- Fuel type
- Fuel moisture content and range
- Particle size
- Grate width
- Furnace output

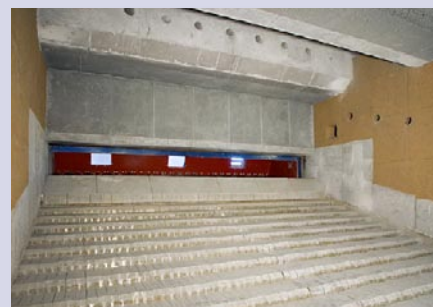
To optimise the various design parameters, the following configurations can be incorporated:

- Modular "stoker" assembly
- Single or double fire protection dampers
- Surge capacity in the fuel chute
- Water cooled feeder
- Water cooled frame

**The Reciprocating Grate**

Again based on Saxlund's longevity in the industry the company has developed the optimum reciprocating grate design, benefiting from the following major advantages:

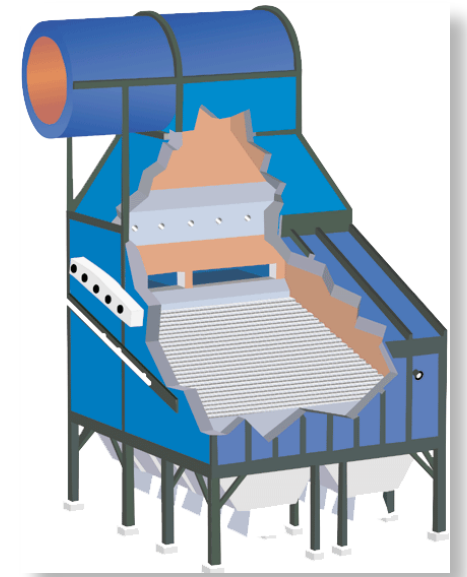
- Patented grate bars may be rotated for doubled service life.
- The grate bars are machined to tight tolerances and bolted together to give uniform airflow over the entire grate providing efficient combustion without hot spots.
- Stable combustion can be achieved even at very low outputs.
- Grate side cooling prevents slag formation meaning less maintenance.
- The grate design is modular and can be easily retrofitted.
- Actuators are placed at the front of the grate meaning there is no width limitation.
- Combined with the Saxlund patented fuel feed system the heat release is maximised since the whole grate is only used for combustion, not feeding fuel.



**Optimum Performance Combustion Chamber**

Ever tightening environmental emission consent levels make the control of fuel feed to the grate and combustion on it ever more important. Saxlund's longevity in the industry has permitted the company developed combustion geometry to accurately feed and control the burn on the grate. The technology behind this new geometry is based on the fundamental requirement to achieve complete burn out by the correct introduction of combustion air. When necessary, flue gas re-circulation can also be installed.

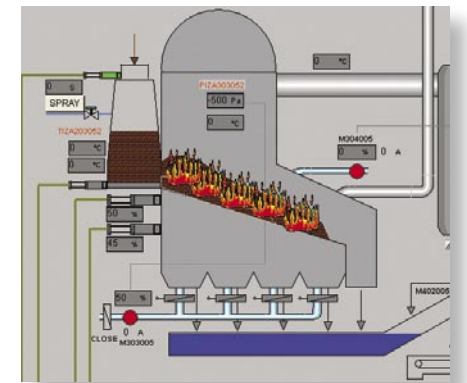
For WID Compliance, the Saxlund combustion unit permits another chamber to be added so that volatile gases liberated during the combustion process are successfully retained in the combustion unit at above 850°C for the two second residence time to ensure complete combustion.



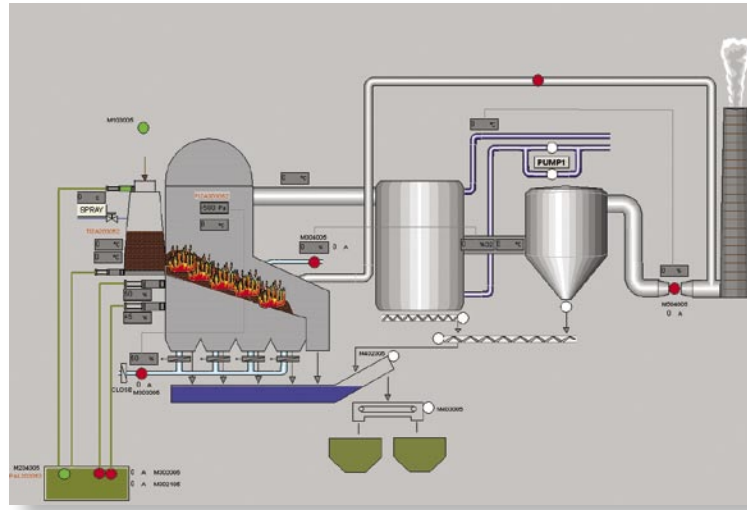
**Unique Combustion Control System**

Saxlund's unique control system controls fuel feed, grate reciprocation speed, and airflow to achieve optimum performance of the system with widely varying loads. Due to the accuracy of control of the combustion inputs, the Saxlund combustion system can be adjusted quickly to compensate for varying energy load demands. The system is designed for multiple users, such as with a thermal oil heating system and direct fired dryer in combination.

Ease of operation is enhanced by utilising the latest Man Machine Interface (MMI) technology, showing all operating parameters in real time. The automatic energy plant will measure up to all demands on periodic checking.







## Complimentary Systems

A number of complimentary systems are required to complete any combustion energy system, dependent on the requirements of the feed process. All of these systems can be integrated by our in-house engineers:

### Boiler systems

#### Thermal oil boiler system

Thermal oil is usually used as a heat transfer medium in the board industry and for producing electricity through an Organic Ranking Cycle (ORC).

The ORC module working medium is evaporated and expanded in an asynchronous turbine running at low speed generating electricity. The organic medium is then cooled in a regenerator and condensed in a heat condenser, thereby producing hot water at 80-90°C for use within the heating system.

#### Hot water boilers

Sawmills in the timber industry tend to use hot water as heat transfer medium for the kilns, in common with district heating plants.

#### Steam

High pressure steam can be used to produce electricity through a steam turbine. The steam can also be used for other industries such as paper

#### Hot gases

Hot gases can be used directly from Saxlund combustion chamber through a drum drier for drying wood or other materials.

#### Multiple users

Saxlund's sophisticated control system makes it possible to combine several of the above mentioned systems from only one combustion chamber.

### Flue gas cleaning

Saxlund can also integrate the best flue gas cleaning systems appropriate for the plant's operating requirements. These can be:

#### Electro Static Precipitators ESP

Electro Static Precipitators are often used when the temperature of flue gases is  $> 200^{\circ}\text{C}$  since the ESP has low life cycle costs because the system has no wear parts.

#### Flue gas condenser and WESP

Flue gas condensation is suitable for plants where the fuel source has a high moisture content.

The flue gas condenser recycles the heat in the flue gases to achieve a return temperature below the dew point. A flue gas condenser requires a Wet Electro Static Precipitator WESP.

#### Bag filters

Often used for Waste Incineration Directive WID compliant plants where an additive is required such as active coal, bicarbonates etc.