

**Bran-fired steam boiler****Biowanze  
Wanze, Belgium**

**In November 2006 Babcock & Wilcox Vølund A/S was awarded the contract for the supply of a bran and natural gas fired boiler for a new bioethanol factory under construction in Wanze, Belgium.**

The boiler is fired primarily with bran, which is a residue from the milling of wheat grain used for the production of ethanol. The steam from the boiler is expanded through a steam turbine to provide low pressure steam for the heating processes in the ethanol factory. The power is sold to the grid as green electricity. Usually, bran is used for cow feed, but the increasing amount of bran available and the favourable electricity prices have made the use of bran for

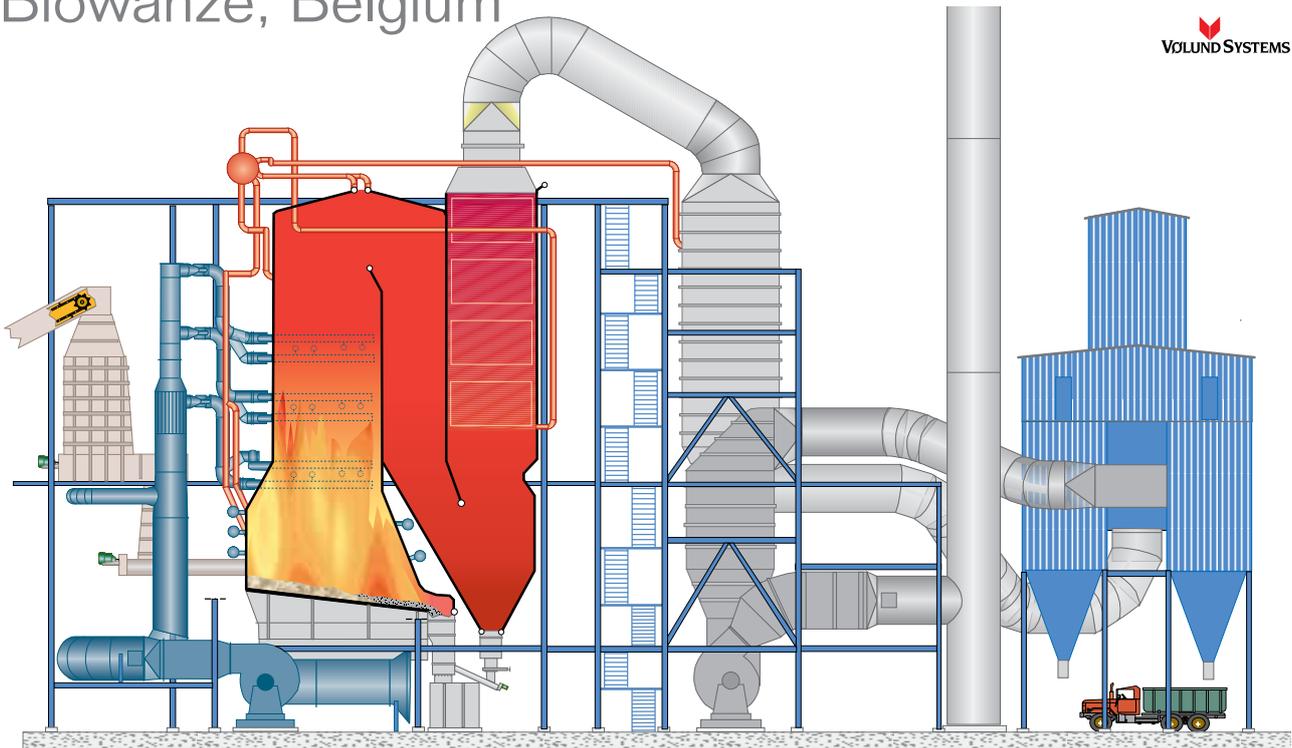
generating power more profitable. The bran boiler is unable to supply all the required steam on bran only, and it was decided to use natural gas for the remaining energy input.

The n-gas is utilised in an external superheater and the flue gas is led to the bran boiler. The external n-gas superheater allows a compact design and high conversion of n-gas to electricity.



# Bran-fired steam boiler

## Biowanze, Belgium



The European initiative to increase the share of the energy consumption within the transport sector based on renewables to 5,75% has led to an increasing demand for bioethanol to be mixed into the gasoline. The new bioethanol factory in Wanze will produce 758 m<sup>3</sup> of ethanol per day.

The bran is delivered to the boiler dosing silo and fed into the boiler with feeding screws. The combustion takes place on a water-cooled vibrating grate due to the ability of this grate to handle high LCV biomass fuels, the low cost of maintenance and operation and the superb performance on biomass.

In order to avoid clogging the boiler is designed with two empty boiler passes to ensure sufficient cooling of the fuel gas before entering the convection part. The bran fuel is expected to generate fouling and slag on the walls in the empty boiler passes, which have therefore been equipped with water sooth blowers.

The flue gas from the external superheater is mixed into the bran boiler in front of the convection section.

The boiler and economiser are of the vertical type. The bottom ash is removed with a submerged chain conveyor and carried to an open ash pit.

Plant design data		
Process parameters	Values	Units
Nominal capacity	20	t/h bran
Heating values	13.5-17	MJ/kg
Steam flow	100	t/h
Bran boiler temperature	430	°C
Final temperature	520	°C
Pressure	93	bara
Feed water temperature	105	°C

Flue gas guarantees: Out of boiler	Values	Units
CO	145	mg/Nm <sup>3</sup> *)
NO <sub>x</sub>	278	mg/Nm <sup>3</sup> *)
Dust	18	mg/Nm <sup>3</sup> *)
NH <sub>3</sub>	30	mg/Nm <sup>3</sup> *)
HCl	25	mg/Nm <sup>3</sup> *)
SO <sub>2</sub>	179	mg/Nm <sup>3</sup> *)
TOC	50	mg/Nm <sup>3</sup> *)

\*) The emission values refer to 6% dry O<sub>2</sub>

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