

## SHORT HISTORY OF THE PLANT

WEISS attended the prequalification for Hjørring installation in December 2011. After very short time the offer was delivered (April 2012) and contract was signed by WEISS in September 2012. Preliminary building data was sent to building constructor during the detail engineering process in November 2012.

The building foundation was established in the winter of 2013 and the final boiler parts were craned to foundation in May 2013. Closing of the building and detail installation of mechanical parts and cabling was finished in 2013. During the spring 2014 the boiler plant was already in operation.

## ABOUT HJØRRING DISTRICT HEATING A.m.b.a

Hjørring District Heating A.m.b.a. supplies electricity, heating and cooling to commercial industries and private homes in northern Jutland, Denmark. Hjørring District Heating aims for top reliability and low heating prices, and is amongst the 8% most inexpensive district heating suppliers nationwide.

### Operations:

- 28 MW multi-biofuel district heating plant
- Natural gas and wood-pellet-fired power and heating plant, supplying 59 MW electricity and 52 MW heat annually
- 1.5 MW district cooling plant
- 289 km pipeline network
- In assessment phase: Geothermic heating plant
- Co-owner with 66% stake in Energisparesekskabet Vendsyssel A/S, which performs energy saving tasks for district heating companies in three local towns and a local electricity company.

### Key figures 2013-2014:

- Turnover 146 M DKK
- Total energy production 287,000 MWh
- Heat supply to 10,000 private homes
- Power supply to 50,000 private homes



### WEISS OFFERS:

- well proven technologies & components
- durability without unexpected shutdowns and unforeseen expenses
- very low maintenance requirements & fully automatically operated

### AVAILABLE BOILER CAPACITIES:

**Steam Boiler**  
1,5 t/h up to 25 t/h pressure.  
Typical 16 Bar

**Hot Water Boiler**  
1 MW up to 30 MW.  
Typical 6 Bar

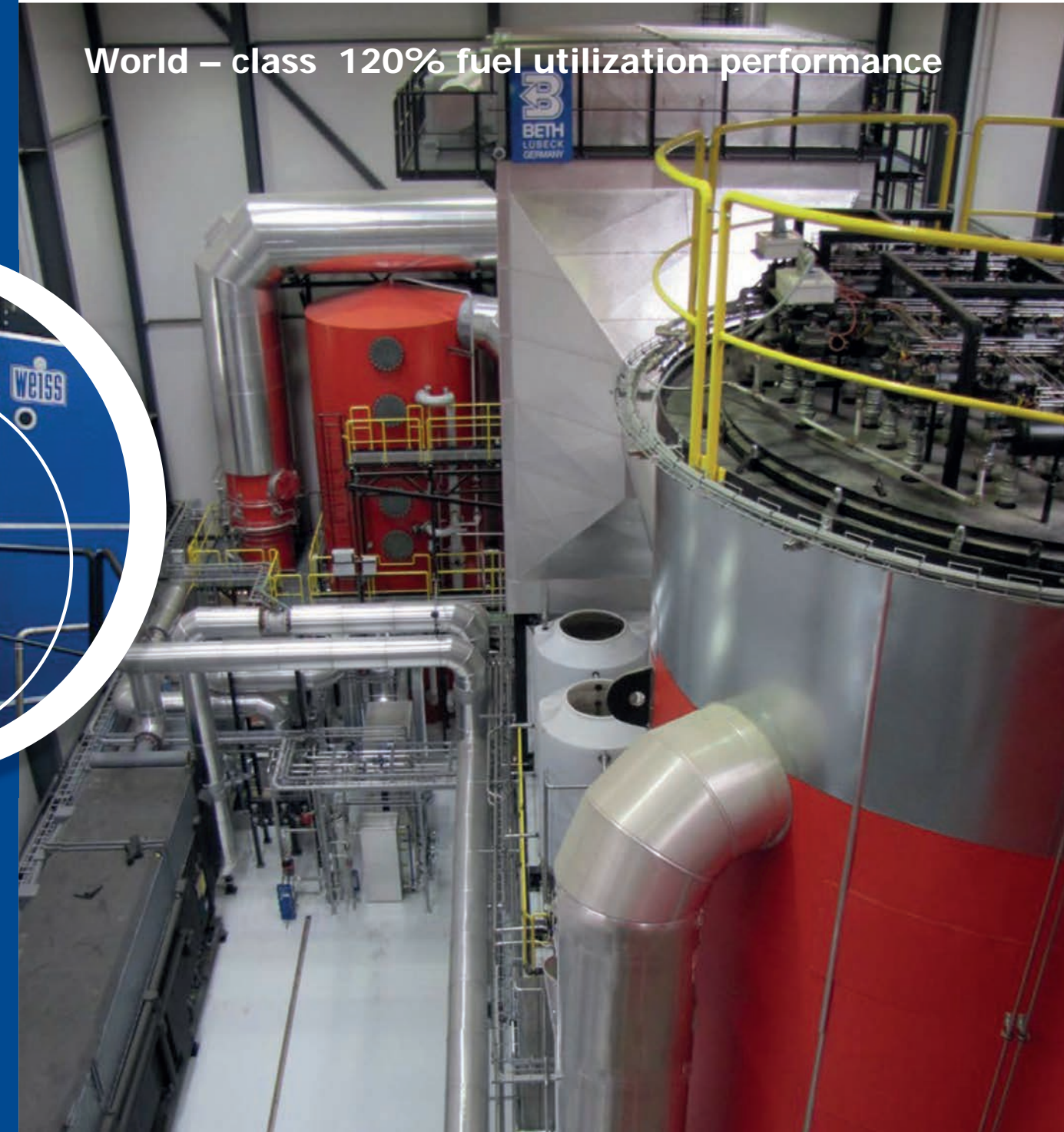
Name: **Hjørring multi biomass boiler**

Input: **Wood chips (main fuel)**

Output: **Hot water**



**World – class 120% fuel utilization performance**



• Commencement year	<b>2014</b>	• Operating hours yearly	<b>4500 h</b>
• Fuel	<b>Wood chips</b>	• Operating temperature	<b>170°C</b>
• Fuel moisture content	<b>35-55 %</b>	• Operation pressure	<b>14 bar</b>
• System size	<b>28 MW</b>	• Efficiency	<b>120 %</b>
• Fuel consumption	<b>9 t/h</b>	• Flue gas temperature	<b>9°C</b>

## PLANT CONCEPT

**Solution:** WEISS developed a 20 MW bio-fuel boiler, which could provide 170°C hot water at 14 bars. This hot water is used for source heat to heatpump cooling flue gas to 9°C. This way boiler plant gains extra 3MW heat.

Furthermore, the plant is equipped with a heat recovery condenser unit that provides 5 MW.

**The Plant Concept:** WEISS designed a boiler plant divided in several sections. This resulted in its short installation time. The boiler house was based on prefabricated standard materials.

**WEISS boiler design:** WEISS chose boiler design that enabled transport in 4 whole pieces – so as to avoid onsite welding.

**Wood chips:** The control and combustion systems are designed to use standard wood chips with moisture content of 45 %. By switching the boiler into the “wet” mode, wood chips up to 55% can be used as well. This allows the client to be more flexible when purchasing wood chips.

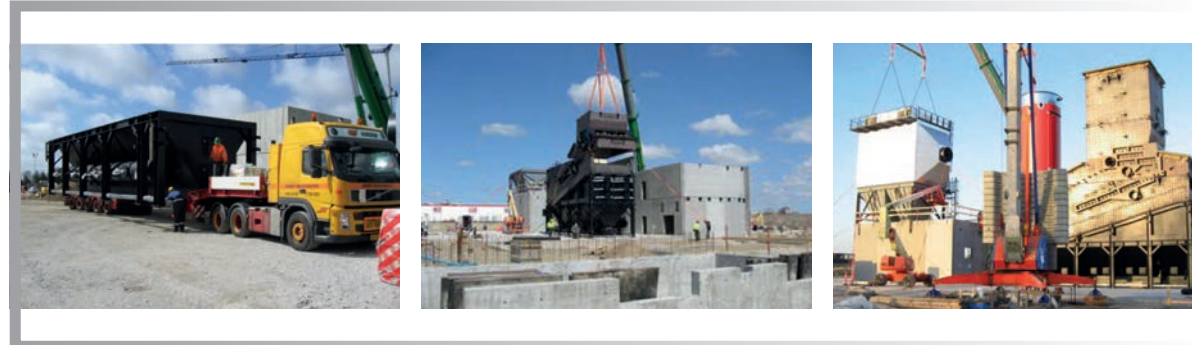
## BENEFITS

- Flexible fuel utilization (boiler is able to burn different fuels like: straw, tree roots, willow, oat)
- Vertical boiler for optimal efficiency
- Instead of traditional multi cyclone - electrical filters used (remove particles from flue gas)
- Synchronous reluctance (SynRM) motors and IE4 induction (IM) motors
- No inline pumps – only axial piston pumps
- High efficiency fans in ventilation plant
- Transformer located closer to plant to minimize cable losses
- ABB 800 XA control system, set up for PROFIBUS, crane, heating, pumps, and emergency generator
- Plant can be controlled by using tablets, a new solution for district heating, already well-known in other fields

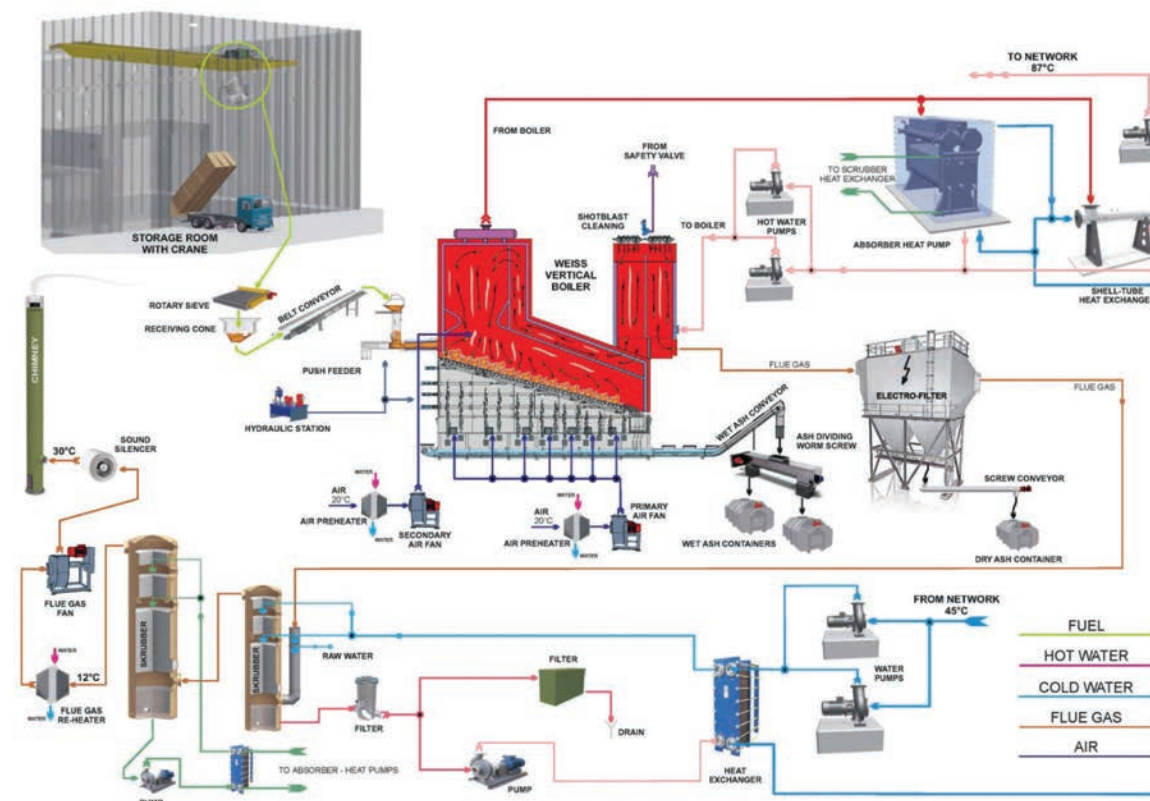
**Flue gas emission levels are extraordinarily low.** Levels of gas and dust emission are a fraction of the current permissible limits, and some already meet the planned compliance levels for the year 2022.

Emission Type	Unit	Measured emission level at full load, April 2014	Maximum permissible emission limit, Denmark 2014	Probable maximum permissible emission limit, Denmark 2022
CO	mg/Nm <sup>3</sup>	17	625	
NOx (NO <sub>2</sub> )	mg/Nm <sup>3</sup>	230	300	220
Dust	mg/Nm <sup>3</sup>	4.4	100	14
O <sub>2,dry</sub>	%	7.37		6

## PROJECT REALIZATION – PICTURE GALLERY



## FLOW CHART



## STORAGE & FUEL FEEDING

