

## Straw-fired combined heat and power plant

# Avedøreværket

# Avedøre, Denmark



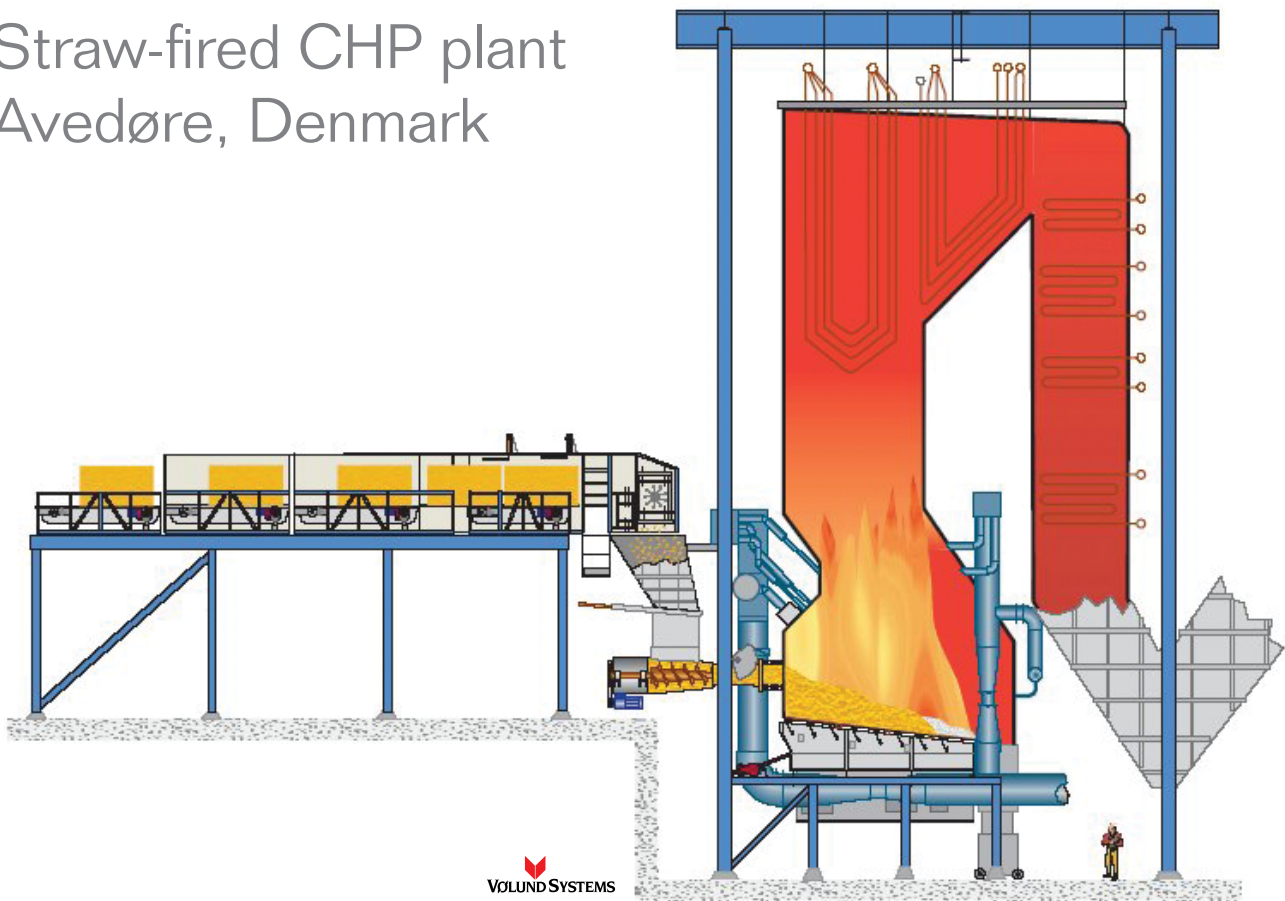
**Avedøreværket generates electricity for the Sealand electricity grid and heat for one of the largest metropolitan district heating systems in Northern Europe. The plant was commissioned in 1990.**

The new Combined Heat and Power (CHP) block, Avedøre 2, represents a completely new technology and is the world's largest plant of its kind. It is also the world's most advanced straw-fired CHP plant.

In 1998 Babcock & Wilcox Vølund A/S (BWV) was awarded the contract for the construction of the steam turbine. In 1999 a contract was awarded to BWV for the ultra supercritical straw-fired boiler plant, featuring a new advanced straw-feeding system.



# Straw-fired CHP plant Avedøre, Denmark



The Avedøre 2 plant, which can fire gas, oil and biomass, began operation at the end of 2001.

The biomass plant will contribute up to 35 MW electricity and 50 MJ/s heat. The plant will account for about 10 percent of the annual fuel consumption, or approximately 150,000 tonnes of straw per year.

The boiler is designed for 100 percent straw firing, and is the world's largest and most effective straw fired boiler with ultra supercritical steam parameters. The boiler generates steam for the main steam turbine of the CHP block.

The advanced combustion system consists of two straw feeder systems which include:

- Conveyor system from straw storage to boiler house
- Fire damper for prevention of backfire
- Control system for straw supply
- Newly developed straw shredder which reduces the straw density from 100 kg/m<sup>3</sup> to 30 kg/m<sup>3</sup>
- Double screw feeders built into the water-cooling feeding ducts mounted on the boiler front
- Water-cooled vibrating grate

The straw is fed into the furnace by screw feeders onto a water-cooled gasification grate where up to 80 percent of the energy content is released by pyrolysis and gasification. The remaining straw/carbon will burn out on the water-cooled vibrating grate.

A bag filter system removes more than 99 percent of the particulates from the flue gas leaving the boiler. Slag and ash is carried to containers by a submerged slag conveyor system.

Plant Data	Process Values	Unit
Steam flow	144	t/h
Steam pressure	310	bar
Steam temperature	583	°C
Energy input	105	MW
Fuel input	26.5	t/h
Feedwater temperature	230	°C
Flue gas temperature after air heater	115	°C
Thermal efficiency	93.2	%
Electrical efficiency, total	49,5	%
<b>Total plant output</b>		
Maximum electric output	535	MW
Maximum thermal output	620	MJ/s

Local Flue Gas Limits (based on 6% O <sub>2</sub> in dry flue gas)	Process Values	Unit
CO, max.	625	mg/ Nm <sup>3</sup>
NO <sub>x</sub> (calculated as NO <sub>2</sub> ), max.	240	mg/ Nm <sup>3</sup>

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