Boden, Northern Sweden

VØLUND™ WASTE-TO-ENERGY TECHNOLOGY

PROJECT CASE HISTORY

The modularized boiler is being lifted into place.

Three lines by the arctic circle

In 1995, the first Vølund™ waste-to-energy line was commissioned at Boden in northern Sweden. A second Volund grate line was built was built in 2008. In December 2016, municipal-owned Boden Energi AB awarded Babcock & Wilcox Renewable (B&W) the contract for a third Vølund line (Boiler 18), this time with a DynaGrate® combustion grate. The two previous lines are still operational.

Building a plant in subarctic conditions where winter temperatures can plummet below –30°C presented additional challenges for the team. Despite the harsh arctic climate, Boden's newest line was completed ahead of schedule in April 2019, meeting all guaranteed values.

B&W supplied the entire boiler island, including the key DynaGrate combustion grate and DynaFeeder™ waste fuel feeder components. Boiler 18 generates 8.5 MW_e electricity and 30 MW_t district heat. Each year, the three B&W Renewable lines at Boden deliver a combined total of 55 GWh of electricity and 350 GWh of district heating.

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DynaGrate® technology

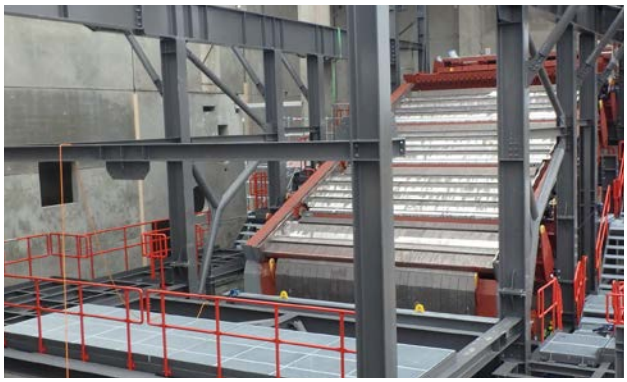
The DynaGrate systems for the plant were produced at B&W Renewable's manufacturing facility in Esbjerg, Denmark. The grate was shipped to northern Sweden in four sections and assembled onsite.

The Boden DynaGrate combustion grate has a total capacity of 17.3 tons per hour. It has one combustion lane, each divided into four sections. The inclusion of our computational fluid dynamics (CFD)-designed VoluMix™ overfire air system helps to reduce carbon monoxide (CO) and total organic carbon (TOC) to a minimum in the gas phase.

Unlike other types of grates, there is no physical contact between moving grate components. This unique design limits wear and minimizes the mechanical forces internally in the grate. The mechanism of the DynaGrate system is designed to increase plant availability and lower operation and maintenance costs.

With this grate, plant operation is not interrupted by melting metals, thereby increasing operational uptime. The mechanical wave movement of the DynaGrate combustion grate breaks-up the waste layer on the grate resulting in thorough agitation. This allows for superior combustion conditions and very low TOC values in the bottom ash.

B&W has supplied three units for Boden. The most recent line is shown in the foreground.



The 416 t/day DynaGrate combustion grate during construction.

The DynaGrate combustion grate is designed to reduce maintenance costs compared to classic forward- and backward reciprocating grates, and to increase availability due to low exchange rates of grate elements. For instance, the driving mechanism is situated on the side of the grate as opposed to under the grate, a design utilized by competitors. Locating the grate on the side prevents it from being exposed to an aggressive environment and offers easy access for maintenance.

Process Data: Boden Boiler 18

Process Parameters	Values
Waste capacity (MCR)	416 t/day
Lower heating value (MCR)	8 MJ/kg
Steam temperature	402 °C
Steam pressure	44 bar(a)
Gross electric output	8.5 MW_e
Distric heating	30 MW_t
Boiler outlet flue gas temperature	150 to 170 °C
Feed water temperature	124 °C
Total organic carbon (TOC)	< 3%
Fuel range, lower heating value	7 – 15 MJ/kg

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