Shenzhen East Waste-to-Energy Power Plant

PROJECT CASE HISTORY

Shenzhen, China

Babcock & Wilcox Vølund A/S (B&W Vølund), a subsidiary of The Babcock & Wilcox Company (B&W), was selected to design a waste-to-energy (WtE) boiler for Shenzhen Energy Environmental Engineering Co. Ltd. in Shenzhen, Guangdong Province, China. The 165 MWe plant is among the world's largest, and is scheduled to be completed in 2019. Once online, it will combust up to 5,600 tons of municipal waste per day, approximately one-third of the waste generated by Shenzhen's 20 million inhabitants every year.

Sustainable energy

With continuous economic growth in China and throughout Asia, there is a growing demand for reliable, sustainable and clean renewable energy.

To help meet this demand, B&W Vølund will supply equipment for a new WtE plant in Shenzhen that includes a DynaGrate® combustion grate system, hydraulics, burners and other boiler components. The Shenzhen plant's circular building is designed by Danish architects Schmidt Hammer Lassen and Gottlieb Paludan. The plant is expected to be an important showcase of the most advanced technology for environmentally friendly energy production in China. Built with sustainability in mind, it will incorporate rooftop solar panels, a visitor education center and an observation platform into its architectural design. The project is developed and implemented in partnership with our licensee Beijing China Science Runyu Environmental Technology Group Co. Ltd.

Plant highlights

- One of the world's largest waste treatment facilities to date
- Combustion of up to 5,600 tons of municipal waste per day
- Handling approximately one-third of the waste generated by Shenzhen's 20 million inhabitants every year
- First plant in China to use B&W Vølund's DynaGrate technology

B&W Vølund's scope of supply

- 6 DynaGrate combustion grates
- Boiler design
- Feeding pusher
- Hydraulic system
- Burners and other boiler components
- Construction and commissioning advisory assistance

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DynaGrate technology

The DynaGrate systems for the plant will be produced at B&W Vølund's manufacturing facility in Esbjerg, Denmark. Once completed, each grate will be shipped to China in 8 sections and assembled onsite.

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 mechanical design of the DynaGrate system is developed to increase plant availability and lower operation and maintenance costs.

With this grate, plant operation is not interrupted by melting metals. The mechanical break-up of the waste layer on the grate results in thorough agitation and thereby superior combustion conditions resulting in some very low total organic carbon (TOC) values in the bottom ash.

Shenzhen East Process Data

Process Parameters	Values
R1 value	0,8
Waste capacity (MCR)	5616 t/day
Heat value, lower (MCR)	8792 KJ/kg
Steam temperature	450 °C
Steam pressure	65 bar(a)
Gross electric output	165 MW
Boiler outlet flue gas temperature	180-200 °C
Feed water temperature	130 °C

Optimized combustion

The DynaGrate modular system is delivered as one or two combustion lanes depending on the size of the plant. For this project, each combustion lane is divided into four sections, with a total capacity of 44 t/h.

The inclusion of our computational fluid dynamics (CFD)-designed VoluMix™ overfire air system helps to reduce CO and TOC to a minimum in the gas phase.

Minimized maintenance cost

The DynaGrate 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, which prevents it from being exposed to an aggressive environment and offers easy access for maintenance. To accommodate increases in heat values from the local waste, the six Shenzhen DynaGrate combustion grates are prepared for water-cooling.

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