

# Hitachi Zosen INOVA

Sant Adrià de Besòs / Spain  
Energy from Waste Plant



Grate/Boiler Retrofit 3 x 15 t/h, 43.6 MW

## Retrofitting a forty-year-old Hitachi Zosen Inova grate for today's waste and state-of-the-art performance

One of the earlier grate-fired waste treatment plants among Hitachi Zosen Inova's 500 or so references worldwide was delivered to the city of Sant Adrià de Besòs in 1975. Having reliably processed waste over a period of close to 40 years, between 2012 and 2014 the three old grate firings were completely retrofitted to the current state of the art. The energy from waste plant, which treats up to 360,000 tonnes of municipal solid waste per year, is a central pillar of Barcelona's waste management system.

### | Integrated waste management in the city of Barcelona

The energy from waste plant of Sant Adrià de Besòs is located in a former industrial zone north of Barcelona. During the last decade the area has developed into a modern city neighborhood, including a marina and beach adjacent to the plant. The energy-from-waste plant is integrated with one of Barcelona's ecoparques (mechanical-biological treatment plants), from which it receives treatment residues. These residues are mixed with non-treated municipal solid waste in the bunker, and thermally treated to produce electricity, heat and cold for supply to local grids.

### | State-of-the-art technology for safe waste processing for the long term

After close to forty years of reliable waste processing in HZI's robust but outdated grate system, the new water-cooled grate combustors now feature state-of-the-art technology, resulting in better combustion control, increased steam production and stability, fewer ash riddlings under the grate, lower water content in the bottom ash, and reduced wear to the grate bars.

### | Challenges for grate and boiler design

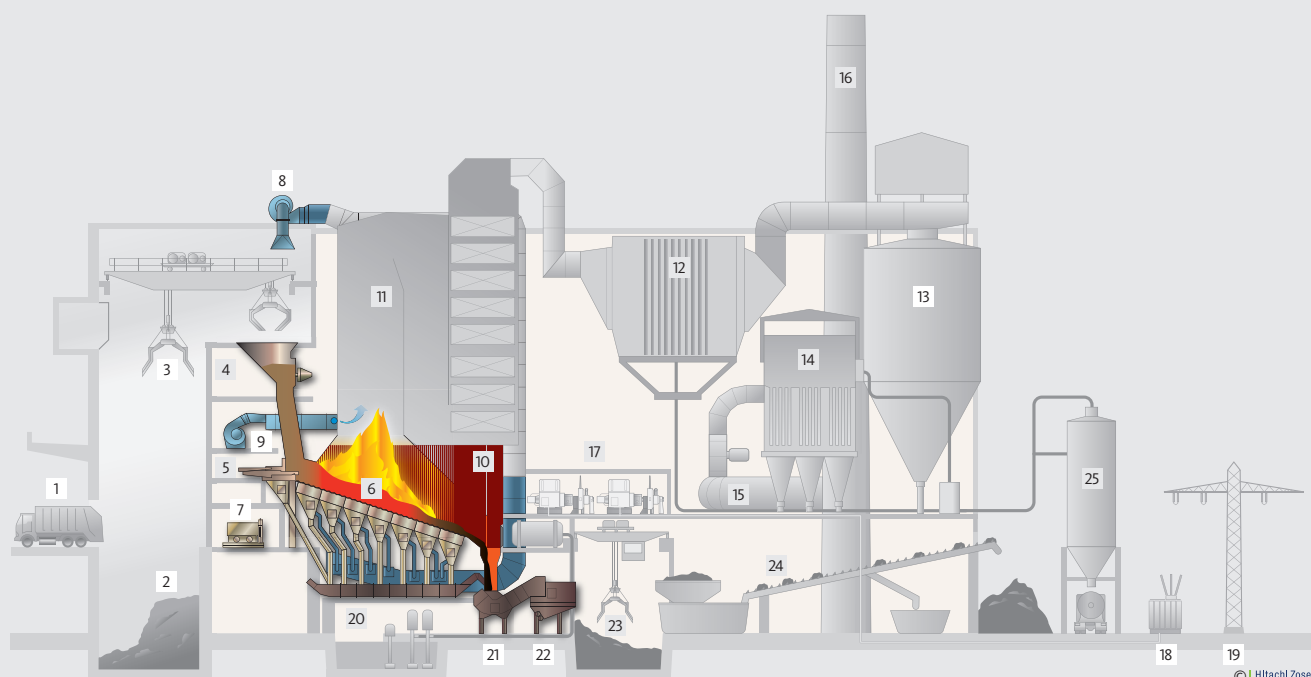
A major challenge for the plant owner and operators is changing waste qualities over the lifetime of the plant. When this plant was conceived in the 1970s, the heating values of collected wastes were lower, in the order of 6–7 MJ/kg. Owing to economic growth and changes in the habits of the population and waste handling processes, the heating values of the mixed waste received by the plant can now be up to 9 to 10 MJ/kg. The client, TERSA, also wanted the retrofit of the grate to increase the thermal capacity of each line by 14% to enable it to cope with the changes in waste properties at constant waste throughputs. Making the necessary design adjustments to the new grate and existing boiler to fulfil the client's expectations, and adapting to the constraints of the existing arrangement, were a challenge for HZI's engineers. They mastered these challenges to the full satisfaction of the client.

### | Effective energy use to cover local energy needs

The thermal energy released by the combustion process is recovered in a boiler producing superheated steam. Following the retrofit, the plant is able to produce up to 31 MW of electrical energy with two steam turbines. About 90% of the electricity produced can be exported to the local grid. Besides this, steam extracted from a turbine is delivered to an adjacent plant, where the heat is transferred either as district heat or used to produce district cold with absorption pumps.

### | Integrated thermal and material recycling

Despite the preprocessing of waste in the ecoparques, the bottom ash still contains more than 5% ferrous metals, which are recovered on site by a magnetic separation process.



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Waste receiving and storage	Combustion and boiler	Flue gas treatment	Energy recovery	Residue handling
1 Tipping hall	4 Feed hopper	12 Electrostatic precipitator	17 Turbine	20 Wet conveyor
2 Waste pit	5 Ram feeder	13 Scrubber	18 Trafo	21 Bottom ash extractor
3 Waste crane	6 Hitachi Zosen Inova grate	14 Bag filter	19 Power export	22 Vibrating conveyor
	7 Hydraulic station	15 Induced draft fan		23 Bottom ash bunker
	8 Primary air fan	16 Stack		24 Bottom ash conveyor
	9 Secondary air fan			25 Residue silo
	10 Membrane walls			
	11 Boiler (existing)			

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<b>General project data</b>	Owner and operator	TERSA
	Start of operation	2013–14
	Total investment	EUR 22 million
	Scope of Hitachi Zosen Inova AG	Engineering and delivery of grate combustion system and boiler membrane walls
	General contractor	Ros Roca S.A.
<b>Technical data</b>	Annual capacity	360,000 t
	Number of trains	3
	Throughput per train	15 t/h (max)
	Calorific value of waste	7.5 MJ/kg (min) – 13.4 MJ/kg (max)
	Thermal capacity per train	43.6 MW
	Waste type	Residual municipal and commercial solid waste Residues from adjacent mechanical sorting and biological treatment plant
<b>Combustion system</b>	Grate type	Hitachi Zosen Inova grate AR-14036
	Grate size	Length: 14.4 m, width: 3.6 m
	Grate cooling	Water-cooled (AquaRoll)
<b>Boiler</b>	Type	Three-pass boiler, vertical
	Steam quantity per train	49.8 t/h
	Steam pressure	40 bar (a)
	Steam temperature	400 °C
<b>Flue gas treatment</b>	Concept	SNCR DeNOx, semi-dry
	Flue gas volume per train	93,300 m <sup>3</sup> /h (i.N.)
<b>Energy recovery</b>	Type	Extraction-condensation turbine
	Electric power	Max. 31.75 MW
	Steam export	Max. 20 t/h
<b>Residues</b>	Bottom ash	89,000 t/a approx.