Hitachi Zosen
INOVA

Erfurt / Germany

Waste to Energy Plant

Turnkey Plant 1 x 9.75 t/h, 26 MW

Waste Treatment at Erfurt: Synergy from Biology and Energy

With the completion of the residual waste treatment plant at Erfurt, TUS Thüringer UmweltService GmbH has broken new ground in Europe. Commissioned in 2006, the plant combines mechanical-biological treatment with directly connected Waste to Energy (WtE) conversion of the high calorific waste fractions.

Integrated in the premises of an existing power plant in the eastern part of the city, the WtE plant treats the municipal solid waste from about 350,000 residents of the German federal state of Thuringia. Hitachi Zosen Inova (HZI) was as general contractor responsible for the underlying design, engineering, implementation, and construction of the Waste to Energy section.

Thanks to the combination of processes, the operators can respond flexible to changing waste compositions of the incoming waste by dividing the material streams into separate fractions for biological or thermal treatment. In tandem with the adjacent power plant, all energy management tasks can thus be reliably fulfilled at any time.

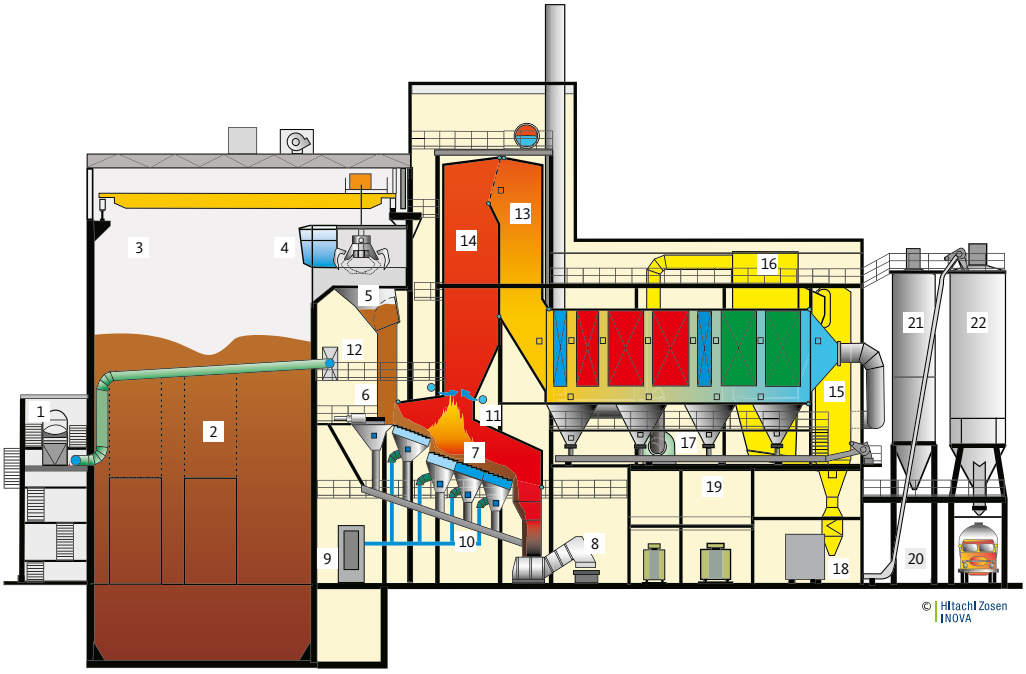
Fuel for the WtE plant is provided by the high calorific fraction of the Mechanical-Biological Treatment plant (MBT) which is separated from the delivered waste after shredding and screening. The remaining amount of waste (about 25%) undergoes biological treatment in intensive rotting and post-trotting stages before being released for disposal.

WtE with Optimal Process Linkage

The concept of the WtE plant is based on the HZI compact plant which consists of a single process train including grate combustion system, boiler and thermal system, energy recovery, and flue gas treatment.

Special Fuel Requires Special Treatment

A conveyor belt carries the fuel from the MBT plant directly to interchangeable chutes from where it is dropped into a specifically for this plant designed bunker pit. The HZI Grate comprisesfour zones – two of them water-cooled – and ensures complete burnout of the high calorific fuels. In the overhead three-pass boiler, thermal energy is extracted and then released as cogenerated electrical power and steam to the adjacent gas and steam power plant.



Waste Delivery and Storage

1 Fuel conveyor from MBT plant
2 Fuel pit
3 Fuel crane
4 Crane control cabin

Combustion and Boiler

5 Feed hopper
6 Ram feeder
7 HZI Grate
8 Bottom ash discharger
9 Pimary air pre-heating
10 Primary air distribution
11 Secondary air injection
12 Rotting gas supply
13 Three-pass boiler

Flue Gas Treatment

14 SNCR injection levels
15 Semi-dry reactor
16 Fabric filter
17 Induced draft fan
18 Stack consumables and residues

Residue Handling

19 Ash conveying system
20 Residue conveying system
21 Lime silo
22 Residue silo

Admixture of Rotting Gas Saves Energy and Increases Ecological Soundness

A special feature, implemented at Erfurt for the first time, is the admixture of the heavily contaminated rotting gas from the mechanical-biological treatment with additional air and its utilization as primary and secondary air. This makes it possible to comply with the legal exhaust emission limits without resorting to energy-intensive regenerative thermal oxidation (RTO). Moreover, the admixture of the rotting gas reduces exhaust emissions to the lower level of the WtE plant.

Advanced Flue Gas Treatment, Safe and Proven

The two-stage flue gas treatment ensures that the legal emission limits are safely met at all times. While nitric oxides are destroyed in the SNCR (selective non-catalytic reduction) process, the subsequent semi-dry flue gas treatment ensures that particles, gaseous pollutants, as well as heavy metals and dioxins are safely separated.

The residues consist of bottom ash for subsquent utilizazion as well as residues flue gas for offsite disposal.

Hitachi Zosen INOVA

Erfurt / Germany Waste to Energy Plant

General Project Data

Owner	TUS Thüringer UmweltService GmbH
Start of operations	2006
Total investment	EUR 43 million
Scope of Hitachi Zosen Inova AG	General contractor for entire plant, including civil works

Technical Data

Annual capacity	90,000 t/a entry MBT
Number of trains	1
Throughput per train	9.75 Mg/h (nom)
Calorific value of waste	7 MJ/kg (min.), 16 MJ/kg (max.)
Thermal capacity	26 MW
Waste type	High-calorific waste fraction from MBT-plant, municipal waste

Waste Receiving

Waste pit capacity	4,620 m^3
Waste pre-treatment	Bulky waste shredding, screening

Combustion System

Grate type	HZI Grate
Grate design	2 rows with 4 zones per row
Grate size	Length 8.5 m, Width 4 m
Grate cooling	First two zones watercooled (Aquaroll®)

Boiler

Type	Three-pass boiler, horizontal
Steam quantity per train	29.4 t/h
Steam pressure	40 bar
Steam temperature	400 °C
Flue gas outlet temperature	175–220 °C (end of operations campaign)

Flue Gas Treatment

Concept	Semi-dry system
Flue gas volume per train	57,600 m^3/h (at standard conditions)

Energy Recovery

Type	Extraction-condensation turbine
Electric power output	4.9 MW
Heat output	23.4 Mg/h 10 bar process steam

Residues

Bottom ash	20,700 t/a

Special Features

	Admixture of the rotting gas from the mechanical-biological treatment with additional air and its utilization as primary and secondary air

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