

Hitachi Zosen
INOVA

Giubiasco / Switzerland
Waste to Energy Plant



2 x 33.5 MW

ICTR Giubiasco – Waste to Energy Facility Meets the Highest Environmental Standards with Hitachi Zosen Inova Technology

Low environmental impact, while maintaining a high energy and metals recovery rate – were the client's requirements for the Waste to Energy (WtE) Plant on the southern side of the Swiss Alps. Hitachi Zosen Inova (HZI) delivered all the equipment for flue gas and residue treatment.

| Minimal Emissions During Processing and Delivery

The site is ideally located in the middle of Canton Ticino, close to industrial and urban areas and with direct links to the main North-South motorway. The plant's building envelope was designed to reduce noise emissions from the plant to a minimum.

| Modern Combustion and Energy Recovery with Flexibility for the Future

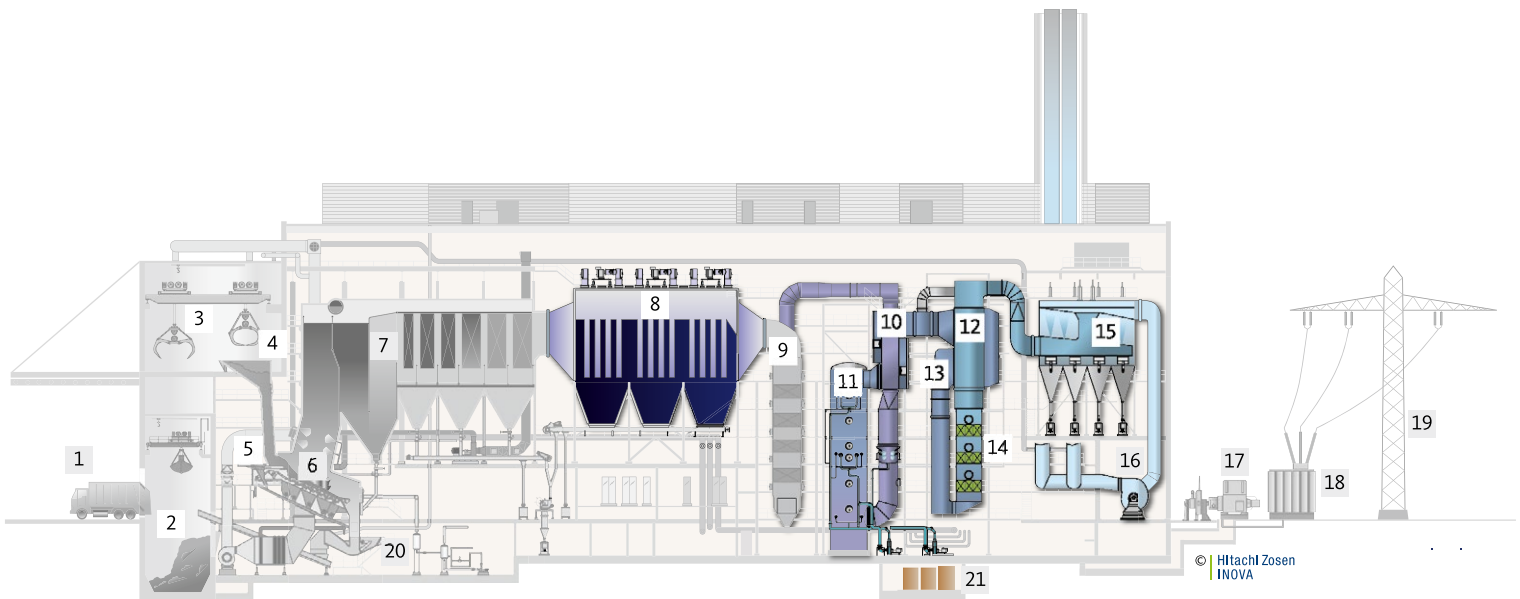
Two lines, with grate combustion and boiler, process the waste and feed steam into an extraction condensation turbine. The plant can either convert all energy to electricity or provide energy to a district heating system which supplies local residential and business customers. This district heat system may be further extended in the future to reach even more homes and business.

| Efficient Flue Gas Cleaning

Reliable removal of contaminants from emissions was the key requirement of the sponsors of the project. The efficient flue gas treatment (FGT) system that Hitachi Zosen Inova (HZI) installed in the plant continues to achieve, from an air quality point of view, emission values that are much lower those required by Swiss Quality Ordinance (LRV) or European (WID) standards. The plant's flue gas treatment consists of the following sections: electrostatic precipitator (three fields), 3-stage HZI WetScrubber, SCR (selective catalytic reduction) DeNO_x system, and a polishing fabric filter. The different temperature levels are adjusted with two flue gas heat exchangers and one steam flue gas heat exchanger. In addition, the injection of a powdered adsorbent, traces of remaining pollutants and particles are collected in the polishing fabric filter. Spent adsorbent is reduced to ashes by injection into the combustion chamber.

| FGT Residue Treatment and Metal Recovery

All mercury in the HZI's WetScrubber blowdown is removed by a special trap; the residue of that process is delivered to a mercury recycling facility. The acidic blowdown is then collected and used for metal extraction from the FGT residues i.e. fly ash from the electrostatic precipitator and boiler. The treated and inertized ash is landfilled together with the bottom ash.



Waste Receiving and Storage

- 1 Delivery hall
- 2 Waste bunker
- 3 Waste crane

Combustion and Boiler

- 4 Feed hopper
- 5 Ram feeder
- 6 Martin grate
- 7 Boiler

Flue Gas Treatment

- 8 Electrostatic precipitator
- 9 External Economiser
- 10 Flue gas heat exchanger 1
- 11 HZI WetScrubber
- 12 Flue gas heat exchanger 2
- 13 Steam flue gas heat exchanger
- 14 SCR DeNo_x
- 15 Fabric filter
- 16 Induced draught fan

Energy Recovery

- 17 Turbine
- 18 Transformer
- 19 Electricity export

Residue Handling and Treatment

- 20 Bottom ash extractor
- 21 Residue & waste watertreatment

Extracted metals are precipitated and concentrated in a metal hydroxide sludge with up to 30% zinc content. This filtered cake sludge is delivered to a metal recycling facility. The liquid effluent (containing neutral salts of sodium, potassium and calcium) is discharged after passing the final polishing and control steps. No hazardous residue is pro-

duced, and no further residue treatment is required at landfill sites – a significant amount of metals are recycled instead of being landfilled and potentially becoming pollutants.

General Project Data

Owner and operator	ACR, Azienda Cantonale di Rifiuti, Giubiasco TI
Commissioned	2009
Investment HZI scope	CHF 50 million
Scope of Hitachi Zosen Inova	Flue gas treatment, residue and wastewater treatment
Contractor electromechanical equipment	Consortium Martin GmbH (grate/boiler), Kraftanlagen München GmbH (WSC, energy recovery), ATEL (E & C), Hitachi Zosen Inova AG

Technical Data

Annual waste capacity	180,000 t
Number of lines	2
Throughput per line	68,000 m ³ N/h flue gas
Throughput residue treatment	800 kg/h (ESP and boiler ash)
Thermal capacity	2 x 33.5 MW

Combustion System

Grate type	Martin GmbH
------------	-------------

Boiler

Type	Four-pass boiler, horizontal, with external economizer
------	--

Energy Recovery

Concept	Extraction-condensation turbine, nom. 16 MW _{el}
---------	---

Flue Gas Treatment

Concept	Electrostatic precipitator, 3-stage wet scrubber, heat exchangers, SCR DeNO _x , polishing bag filter
Additives (Input)	Water, caustic soda, ammonia water, adsorbent (lignite coke/calcium hydroxide)
Flue gas temperatures	160 °C (inlet)/60 °C (scrubber)/230 °C (SCR)/150 °C (stack)

Residue and Waste Water Treatment

Type	Acidic fly ash washing with metal recovery
Design	All ESP and boiler ash plus all scrubber blowdown pass by residue treatment Continuous operation 3–5 days/week, storage capacity for weekends
Concept	Controlled extraction in stirring vessel cascade, dewatering on vacuum belt filter; metal precipitation; hydroxide sludge dewatering with candle filters; special ion exchanger for heavy metal removal and recovery
Output	Metal concentrate for zinc and mercury recovery; inertized ash (landfilled together with bottom ash); cleaned liquid effluent