

Hitachi Zosen  
INOVA

Dubai / United Arab Emirates  
Energy from Waste Plant



5 x 47 t/h, 193 MW

## Dubai Waste Management Center: Maximum Efficiency in the Desert

The world's largest Energy from Waste (EfW) plant is currently under construction in Dubai. Once completed in 2024, it will process 1,890,000 tons of municipal waste a year to produce energy for around 120,000 households.

Dubai waste management center is being built in the Warsan area and will turn an average of 5,500 tons of waste into renewable energy every day. It will be able to use up to 45% of the local municipal waste volume, in turn significantly minimising the volume of municipal waste in landfills. The 193 MW of electricity generated from this waste will be fed into the city's grid as base load power, supplying some 120,000 households. Besides its sheer size, it will be this EfW plant's overall efficiency that makes it so unique. With a net energy efficiency of more than 30%, Dubai's future waste incineration plant will rank among the very best in the world.

A consortium comprising Hitachi Zosen Inova (HZI), Dubai Holding, Dubal Holding, Tech Group, ITOCHU Corporation and BESIX Group (Belgium's largest construction company) has been tasked with realising this extraordinary project. HZI and BESIX are acting as general contractors on behalf of Dubai Municipality for the construction of the turnkey plant and will be joint owners and operators of the project company for the next 30 years. This groundbreaking public-private partnership is one of the biggest investments in renewable energy in the United Arab Emirates.

### | EfW Fuelling Dubai's Sustainability Strategy

The Dubai Strategic Plan 2021, which forms part of the National Agenda 2021, is intended to reposition the country in terms of sustainability and environmental protection. The aim is to bring about a massive reduction in the amount of municipal waste ending up in landfill and to build infrastructure for producing renewable energy as efficiently as possible. The plan includes developing and implementing a regulated waste management system. The new EfW plant will play a key role in putting Dubai's sustainability strategy into practice.

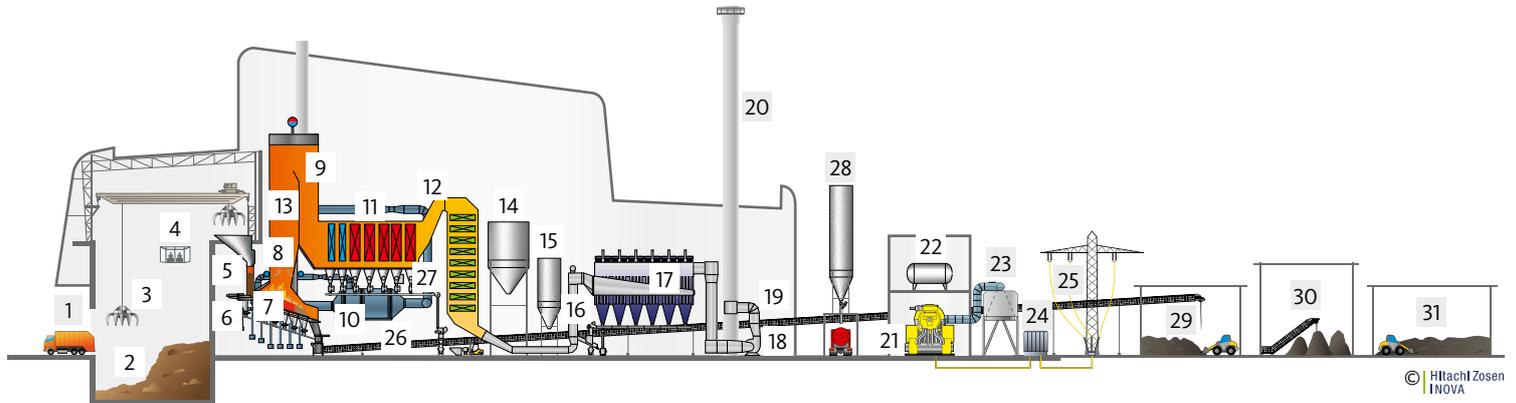
### | Proven Technology for Unrivalled Performance

At the heart of the plant will be HZI's tried-and-tested, air-cooled reciprocating grate (R series) – albeit a version on an unprecedented scale. Measuring 12 x 15 metres, it will be the largest ever built by HZI, and each of its five lines will have a nominal waste throughput of 47 t/h. The heat generated through combustion will be used to create superheated steam in a four-pass boiler. This steam will drive a turbine producing electricity, which will be fed into the local grid. The bottom ash resulting from combustion will be processed to recycle the metals it contains, and the mineral component will be usable as a construction material, for example in road building.

To ensure that a plant of this size, which must also handle an extremely diverse mix of waste types, can be operated reliably, HZI will employ its enhanced combustion control system CCS+. This will adjust combustion in line with the composition of the waste fed in and optimise burnout, ensuring that the reduction of nitrogen oxides meets the highest quality standards even in the combustion phase. In combination with XeroSorp dry sorption flue gas treatment, this will mean that emissions not only comply with the legal limits, but in fact fall below them.

### | Maximum Efficiency Despite Difficult Conditions

The location in the Dubai desert brings with it a number of challenges. In designing the plant, the fact that ambient temperatures only allow limited air-cooling of the steam had to be taken into account, so provision was made for a larger air-cooled condenser (ACC). Another potential issue is desert sand clogging up the surface of the ACC and preventing air from flowing through. To prevent this from happening, the ACC has to be cleaned much more often and thoroughly than it



#### Waste Delivery and Storage

- 1 Tipping area
- 2 Waste bunker
- 3 Waste crane
- 4 Control room

#### Combustion and Boiler

- 5 Feed hopper
- 6 Ram feeder
- 7 HZI Grate
- 8 Secondary air
- 9 Four-pass boiler
- 10 Primary air
- 11 Superheater
- 12 Economiser

#### Flue Gas Treatment

- 13 SNCR DyNOR®
- 14 Lime slaker
- 15 Additive silo (lime)
- 16 XeroSorp (dry sorption)
- 17 Fabric filter
- 18 Induced draught fan
- 19 Silencer
- 20 Stack

#### Energy Recovery

- 21 Steam turbine
- 22 Feed water tank
- 23 Air cooled condenser
- 24 Transformer
- 25 Electrical power distribution

#### Residue Handling and Treatment

- 26 Bottom ash extractor
- 27 Boiler ash discharge
- 28 Residue silos
- 29 Bottom ash pre-storage area
- 30 Bottom ash treatment plant
- 31 Maturation area

does in other plants. Despite this unusual environment for an EfW plant, the Dubai project will achieve energy efficiency of 30%, among the best figures worldwide.

To avoid having to use the city's scarce water reserves, the plant will be built right next to the Al Aweer Sewage Treatment Plant. Water will be treated in two stages in the sewage plant before being fed to the EfW facility, where it will be entirely used by various processes so it does not have to be returned to the treatment plant.

#### Boosting Public Acceptance

This will be Dubai's very first EfW plant, so informing its population is very important. This has been done right from the start through public events and multimedia presentations. A visitor centre will also be built on the site to provide detailed information on the topic and allow people to tour part of the plant. This will reduce fear of contact and concerns while also highlighting the plants many benefits.

#### General Project Data

Owner and operator	Consortium (Dubai Holding, Dubal Holding, ITOCHU, BESIX and HZI)
Commissioning	2024
Services provided by Hitachi Zosen Inova	Together with BESIX, general contractor for the construction of the turnkey plant and sub-sequently joint owner and operator
Plant design	Hitachi Zosen Inova

#### Technical Data

Annual capacity (nominal)	1,890,00 t/a
Number of lines	5
Maximum throughput per line	47 t/h
Heat value of waste	7 MJ/kg (min.), 14 MJ/kg (max.)
Thermal output per line	124 MW <sub>th</sub>
Waste type	Mixed household and commercial waste

#### Combustion

Grate type	HZI's air-cooled reciprocating grate
Grate design	5 rows with 6 zones per row
Grate size	Width: 15 m; length: 12 m
Grate cooling	Air-cooled

#### Boiler

Type	Four-pass boiler
Live steam mass flow rate per line	160 t/h
Live steam pressure	77 bar
Live steam temperature	432°C

#### Flue Gas Treatment

Concept	Dry sorption reactor, fabric filter, SNCR DyNOR®
Flue gas volume per line	220,000 m³/h (STP)

#### Energy Recovery

Type	Extraction condensing turbine
Electrical output	193 MW <sub>el</sub>