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NIPPON STEEL ENGINEERING CO., LTD.

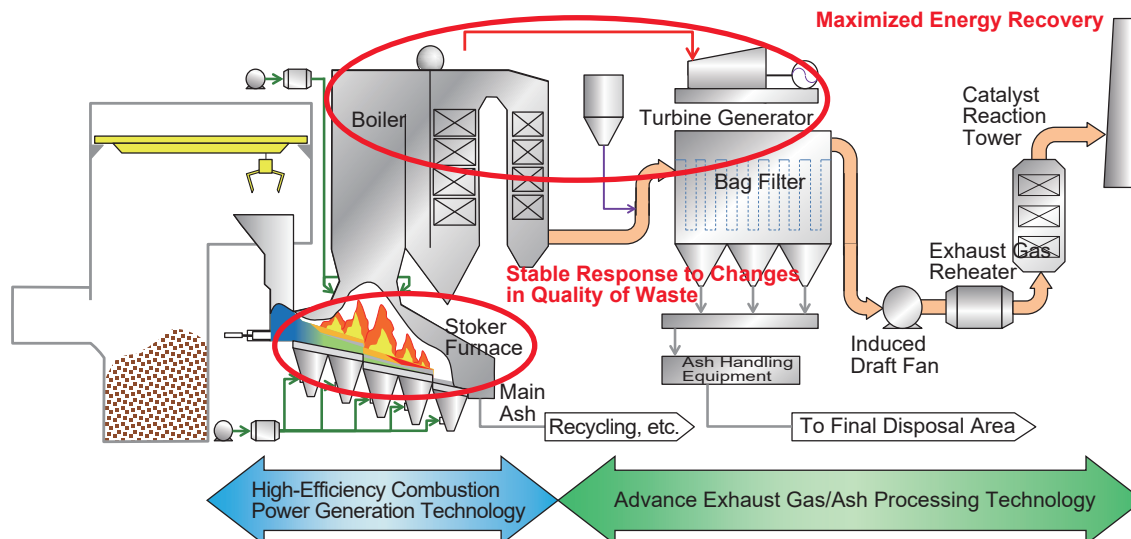
## Waste to Energy Facility (Stoker Furnace)

### Features

NSE's stoker furnace utilizes the heat created during the waste incineration process to generate electricity with a boiler and steam turbine. It has the two main features.

**1. Maximizing Energy Recovery** ... Highly efficient plants

**2. Stable Operation When Quality of Waste Changes** ... Water-cooled fire grate and combustion controlled according to changes in quality of waste allows use of high-calorie waste



### Basic Concept or Summary

#### I. Energy Efficient

##### 1) Energy Recovery

We have a track record in the highest level of high-temperature high-pressure boilers in the world (90 bar, 500 °C [Naples]), and devote our resources to creating an advanced steam cycle (regeneration cycle, reheating cycle) and the reduction of heat loss with exhaust gas (low-temperature economizer, gas-gas heat exchanger) in order to achieve maximum recovery of energy (track record of a maximum of 30% or higher).

#### II. Stability

##### 1) Replacement Frequency Reduced and Stable Operation Achieved by Using Different Fire Grate According to Quality (Grade) of Waste

A water-cooled fire grate is adopted for high-calorie waste, extending the life compared to an air-cooled fire grate. In addition, simplification of the connection between the frame and fire grate reduces problems such as waste getting stuck and enhances the ease of fire grate replacement work. These and other features enable stable operation.

##### 2) Simple and Highly Reliable Control Accommodate Fluctuation in Quality of Waste

The primary air flow is adjusted to maintain a constant volume of steam (constant steam volume control), and the volume of waste supplied and fire grate feed rate are adjusted (combustion zone control) in order to maintain a balance between the combustion volume in the furnace and the amount of waste supplied. In addition, the secondary air volume is adjusted (oxygen concentration control) in order to maintain a constant oxygen concentration at the boiler outlet.

#### III. Purity

##### 1) Low Dioxins Emissions

The shape of the secondary combustion chamber and secondary combustion air blowing method are optimized by utilizing numerical analysis, efficiently agitating and mixing unreacted oxygen and unburned gas / dust in order to minimize the generation of dioxin.

##### 2) Low Cost HCl and NOX Emissions

A diverse menu of processes allows us to propose a process that meets the needs of the customer.

High-performance dry process technology and catalyst free NOx reduction technology enables the amount of equipment and volume of reagent used to be reduced, satisfying HCl and NOX regulatory values at a low cost (initial / running).

#### IV. Reliability

##### 1) More than 50 years operation & maintenance

##### 2) Approximately 500 units delivered

**Domestic** Orders received: 2 sets  
6 water-cooled fire grate licenses provided

**Overseas** Approximately 500 units (Number of contracts listed below)

Area/Country	Number	Area/Country	Number
<b>Europe</b>	164	<b>Southern Europe</b>	17
Germany	103	Italy	15
France	22	Other	2
Switzerland	22	<b>Asia</b>	18
Holland	14	Korea	10
Other	3	China	5
<b>Northern Europe</b>	23	Other	3
United Kingdom	10	<b>North America</b>	10
Sweden	7	United States	10
Other	6		
<b>Eastern Europe</b>	17		
Russia	9		
Other	8		



Photograph of Facility (Naples, Italy)(Source: Steinmüller Babcock Environment GmbH)

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