Waste-to-Energy:
Proven Technology for Modern Cities
A Low Carbon Technology towards Sustainable Development
## Corporate Profile Overview

<table>
<thead>
<tr>
<th>Company’s Name</th>
<th>HITACHI ZOSEN CORPORATION (Hitz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Founded</td>
<td>1881 by E. H. Hunter (from UK)</td>
</tr>
<tr>
<td>Incorporated</td>
<td>1934</td>
</tr>
<tr>
<td>Headquarters</td>
<td>Osaka and Tokyo</td>
</tr>
<tr>
<td>Employees</td>
<td>9,370 (consolidated)</td>
</tr>
<tr>
<td>Paid-in Capital</td>
<td>45.44 billion yen (≒368 million US$)</td>
</tr>
<tr>
<td>Net Sales</td>
<td>359.3 billion yen (≒2,893 million US$)</td>
</tr>
<tr>
<td>Net Income</td>
<td>5,100 million yen (≒41 million US$)</td>
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</tbody>
</table>

1 JPY = 0.0081 US$ *(as March 31, 2015)*
Overseas Offices

Map of overseas offices
Our Main Products and Business

**Environmental Systems**
- WtE plants
- Water & sludge treatment systems
- Material recycling systems
- Eco-agriculture systems

**Industrial Plants**
- Desalination plants
- Renewable energy systems (wind, solar, biomass power generation)
- Power generation systems

**Infrastructure**
- Shield tunneling machines
- Disaster prevention systems
- Bridges

**Process Equipment**
- Pressure vessels
- Spent nuclear fuel storage cask & canister (container)

**Machinery**
- Marine diesel engines
- Precision machinery etc.
- Press machines

History of our company and WtE Business

1881: Osaka Iron Works (currently Hitachi Zosen Corporation) (JAPAN)

1933: 1st waste incineration plant (Dordrecht, Netherlands)

1943: Name was changed

1960: License Agreement

1965: 1st WtE plant (Osaka, Japan)

1978: AE&E Inova (Von Roll)

2009: 1st WtE plant in CHINA

1997: 1st WtE plant in TAIWAN

1987: 1st WtE plant in KOREA

2012: 1st WtE plant in THAILAND

2016: 1st WtE plant in INDIA

2016: 1st WtE plant in VIETNAM

2018: 1st WtE plant in MALAYSIA

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Waste-to-Energy Technology: Our Technology

Business achievement: Delivery track record (as 12/2015)

Hitz is a global leader company:
- **Global:**
  - Largest share of processing capacity
  - Largest plant’s capacity (3,000 t/d)
- **Japan:**
  - Construction of the first municipal waste to energy plant (1965)
  - Largest energy generation of WtE

GLOBAL: 834 plants

Remarks:
* Thailand: 2 plants by Licensees
** China : 12 plants by Hitachi Zosen Group and 27 plants by Licensees

GLOBAL: 79 plants

Europe: 208 plants

Middle East: 3 plants

South America: 1 plant

Middle America: 79 plants

Africa: 3 plants

Asia: 540 plants

North America: 1 plant

Oceania: 3 plants

ASIA: 540 plants

China: (39 plants**)

Japan: (479 plants)

India: (1 plant)

Vietnam: (7 plants)

Thailand: (2 plants*)

Others: (2 plants)

Korea: (8 plants)

Taiwan: (1 plant)

Malaysia: (1 plant)

Others: (2 plants)
Bio-gas Production Technology

Business achievement: Delivery track record

75 Dry-type: Kompogas®
(as 2014)

5 Wet-type: Water-needless Two-phase Methanation (WTM) system
(as 2015)

North America
1

Europe
70

Asia
4

Asia
5

Dry-type: Kompogas®

Shimoina (JAPAN)

Kitanagoya (JAPAN)

Winterthur (SWITZERLAND)

Backnang (GERMANY)

Doha (QATAR)

Hofu (JAPAN)
EfW Projects in Vietnam

- **Model project**
  Industrial Waste Power Generation System
  (Nam Son – Soc Son)
  \(75 \text{ t/d} \times 1 \text{ line} = 75 \text{ t/d}\)
  Start up: 2016 (expected)

- **JCM Model Project**
  Anaerobic Digestion of Organic Waste for Biogas Utilization at Market

- **JCM Project Planning Study**
  Introduction of Energy-from-Waste Project in Ho Chi Minh City

**Locations:**
- Ho Chi Minh
- Hanoi
- Truong Sa Islands (Vietnam)
- Hoang Sa Islands (Vietnam)
Support and collaboration activities

Hitz had support and collaboration activities to Ho Chi Minh city

Co-organizing training courses in both Japan and Ho Chi Minh city for member of DONRE and related departments

Sponsoring waste-bins and hand-carts for 3R pilot programs in District 1 and Binh Thanh District

Co-organizing workshops on environmental protection issues in Ho Chi Minh city

Providing technical assistance for 3R pilot programs (surveys and evaluations of implementation efficiency)
### Project General Information

<table>
<thead>
<tr>
<th>Name of project</th>
<th>“Energy-from-Waste Project in Ho Chi Minh City”</th>
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<tbody>
<tr>
<td>Technology</td>
<td>Stoker type furnace, Boiler, and turbine &amp; generator</td>
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</tbody>
</table>
| Finance         | - Hitachi Zosen Corporation and its partners  
                 - JCM support from Ministry of Environment of Japan |
| Waste sources   | Municipal Solid waste |
| Waste treatment capacity | 600 tons/day (1st phase) |
| Estimated amount of power sold | 9 MW  
                          64.8 GWh/year (=0.37% of electricity consumption of HCMC in 2013: 17,680 GWh) |
| Expected GHG Emission Reduction | 42,000 tons/year  
                          (=0.75% of National greenhouse gases emission by solid waste sector in 2000: 5.597Mt) |
Introduction of Energy-from-waste project

Business scheme of this project

Japan

Japanese Government

Financial support

Hitz

Partner Companies

Viet Nam

Vietnamese Government

Agreement

Solid Waste (600 t/d)

EPC: Engineering, Procurement and Construction

O&M: Operations & Maintenance

SPC: Special Purpose Company

(Project implementing body)

EPC cost

Bank

Loan

Incomes (Waste treatment fee)

Incomes (Electricity sales)

Ho Chi Minh City

Japanese Government

Financial support

Partner Companies

Hitz

Investment

SPC: Special Purpose Company

(Project implementing body)

EPC: Engineering, Procurement and Construction

O&M: Operations & Maintenance

Electricity

Income (Electricity sales)

Construction / O&M

Hitachi Zosen

SPC

Incomes

(Electricity sales)

(Electricity sales)

(Electricity sales)

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Overview image of WtE plant

(1) Waste receiving & charging system

(2) Furnace & Boiler system

(3) Waste heat utilization system

(4) Flue gas clean system

(5) Ash handling system
General process flow of Waste-to-Energy plant

- **Crane operation room**
- **Waste pit**
- **Crusher**
- **Weighing bridge**
- **Platform**
- **Waste feeding hopper**
- **Air pre-heater**
- **Super heater**
- **Economizer**
- **Furnace**
- **Boiler**
- **Turbine & generator**
- **Fabric filter**
- **Flue gas cooler**
- **Fly ash solidification**
- **Silencer**
- **SCR**
- **ID fan**
- **Stack**
- **Flow of waste**
- **Flow of ash**
- **Flow of flue gas**
- **Flow of steam**
- **Flow of air**
- **Chemical**

**Chemical**

- **AC**
- **Lime**

**Utilization (plant or demander)**

- **Flow of waste**
- **Flow of ash**
- **Flow of flue gas**
- **Flow of steam**
- **Flow of air**
- **Chemical**
Our Typical Reference Plants

(1) Tokyo (Chuo), JAPAN

- Hitachi Zosen contractor for Turn-key basis excluding building work
- Generation of electrical power and heat supply to the Spa beside the plant
- Harmonize with local view as a landmark

**Client:** Clean Association of Tokyo 23  
**Start-up:** 2001

**Technology**
- Furnace: Grate furnace (air-cooled)
- Energy recovery: Boiler
- Flue gas treatment: dry type + wet type + SCR
  (Bag filter, gas scrubber, SCR)

**Technical Data**
- **Fuel:** MSW
- **Waste capacity:** 600t/d (300t/dx2)
- **Generator capacity:** 15MW
Our Typical Reference Plants

(2) Osaka (Maishima), JAPAN

- Site on artificially built island in the bay of Osaka
- Hitachi Zosen contractor for Turn-key basis excluding building work
- Architecture and interior design by famous Austrian artist Friedensreich Hundertwasser

Client: Osaka city, Japan
Start-up: 2001

Technology
Furnace: Grate furnace (air-cooled)
Energy recovery: Boiler
Flue gas treatment: dry type + wet type + SCR (Bag filter, gas scrubber, SCR)

Technical Data
Fuel: MSW
Waste capacity: 900t/d (450t/dx2)
Generator capacity: 32MW
Our Typical Reference Plants

(3) Taipei (Peitou), TAIWAN

- Hitachi Zosen constructor for Turn-key of Mechanical and Electric System
- 8,000Hrs Continues Operation achieved in 2000
- The stack is utilized as a sightseeing tower

Client: Taipei City, Taiwan
Start-up: 1999

Technology
Furnace: Grate furnace (air-cooled)
Energy recovery: Boiler
Flue gas treatment: semi-dry type

Technical Data
Fuel: MSW
Waste capacity: 1,800t/d (450t/dx4)
Generator capacity: 48MW

Restaurant & Observatory

Hitachi Zosen constructor for Turn-key of Mechanical and Electric System
8,000Hrs Continues Operation achieved in 2000
The stack is utilized as a sightseeing tower

Client: Taipei City, Taiwan
Start-up: 1999

Technology
Furnace: Grate furnace (air-cooled)
Energy recovery: Boiler
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Technical Data
Fuel: MSW
Waste capacity: 1,800t/d (450t/dx4)
Generator capacity: 48MW

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Our Typical Reference Plants

(4) Shanghai (Laogang), CHINA

- Largest WtE plants in China
- Hitachi Zosen contractor for equipment supply (incinerator) for main parts, basic & detail design and service

Client: Shanghai Laogang Solid Waste Utilization Co., Ltd.
Start-up: 2014

Technology
Furnace: Grate furnace (air-cooled)
Energy recovery: Boiler
Flue gas treatment: dry type + wet type (Bag filter, gas scrubber)

Technical Data
Fuel: MSW
Waste capacity: 3,000t/d (750t/d x 4)
Generator capacity: 60MW
(5) Riverside (London), UNITED KINGDOM

- Largest WtE facility in the UK
- Hitachi Zosen Inova as full turnkey contractor including jetty and road works
- 80% of waste delivery via barges from Thames River
- Highly efficient plant at higher steam conditions
- Plant operation during first 4 years carried out by Hitachi Zosen Inova

**Client:** Riverside Resource Recovery Ltd.
**Start-up:** 2011

**Technology**
- Furnace: Grate furnace (air-cooled)
- Energy recovery: Boiler, turbine
- Flue gas treatment: SNCR, semi-dry type

**Technical Data**
- Fuel: MSW
- Capacity: 2,289t/d (763t/d x3)
- Generator capacity: 65MW
(6) Issy-les-Moulineaux (Paris), FRANCE

- Waste treatment plant for 1.1 million inhabitants in 22 municipalities & 3 districts of Paris
- Located on the outskirts of Paris
- Large part of the plant embedded in the ground
- After loading waste, no waste truck has to drive more than 15km to reach the plant
- Hitachi Zosen Inova supplier of process components for combustion, steam production and flue gas cleaning

**Client:** SYCTOM Paris  
**Start-up:** 2007

**Technology**  
Furnace: Grate furnace (water-cooled)  
Energy recovery: pass boiler, turbine  
Flue gas treatment: Dry type with bicarbonate

**Technical Data**  
Fuel: MSW  
Waste capacity: 460,000 t/a (2 x 30 t/h)  
Generator capacity: 52MW
Thank you very much for kind attention!

http://www.hitachizosen.co.jp/