INDIA-JAPAN PARTNERSHIP FOR ACHIEVING SUSTAINABLE DEVELOPMENT GOALS

Our contribution to environmental improvement in India

2019.03.15
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1. Business profile
Company Profile Overview

Hitachi Zosen Corporation
- Date of Founding: April 1, 1881
  by E. H. Hunter from UK
- Capital: 45,442 ¥ million (≒413 million USD)
- Net Sales: 376,437 ¥ million (≒3,422 million USD, fy2017)
- Employees: 10,377 (fy2017)
- Business Segments: Environmental Systems & Industrial Plants, Machinery, Infrastructure

fy2017 Net sales composition
- Environmental Systems and Industrial Plants: 62%
- Machinery: 27%
- Infrastructure: 7%
- Others: 4%
Our activity in India

ISGEC Hitachi Zosen Ltd. (Dahej)
Joint Venture with ISGEC Heavy Engineering Ltd for manufacturing & Sales of Process Equipment

Osmoflo Engineering Service Pvt. Ltd (Pune)
Plant design service of Desalination plants

Bangalore Metro UG-2 Project
φ6.44m Slurry-type Tunnel Boring machine x 2units

Hitachi Zosen India Pvt. Ltd. (Gurgaon)
Head Office of Hitachi Zosen Corp. Indian Business

Jabalpur WtE Project
Client: Essel Infraprojects Ltd.
Ultimate Client: Jabalpur MC
Capacity: 600t/d x 1line
Power output: 11.5MW
Start-up: May 2016

Hitachi Zosen India Pvt. Ltd. Hyderabad Branch
Centre of Energy from Waste Facilities supply business in Indian and Sub Continent Market

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Our references - WtE -

(as of Mar 31, 2018)

911

Europe 213
Asia 612
North America 79
Africa 3
Oceania 3
South America 1

Market Shares in 2008 - 2016

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Our contribution to SDGs
2. Current state of municipal solid waste disposal in India
Current state of municipal solid waste disposal in India

- Municipal solid waste
  - The ratio of food waste is high and the water content is high.
  - There is a high proportion of incombustible materials such as stone and sand.

<table>
<thead>
<tr>
<th>Contents</th>
<th>Unit</th>
<th>India</th>
<th>Japan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generation amount</td>
<td>tons/day</td>
<td>≅ 115,000</td>
<td>≅ 118,000</td>
</tr>
<tr>
<td>Collection rate</td>
<td>%</td>
<td>69</td>
<td>100</td>
</tr>
<tr>
<td>Per capita generation of waste</td>
<td>g per capita/day</td>
<td>200-600</td>
<td>925</td>
</tr>
</tbody>
</table>

- Separate collection
  - Separate collection is carried out, but it is simple.
  - Usable paper and glass bottles that can be sold are sold by each household and collector.
Intermediate treatment (as of fy2014)
- The ratio of intermediate treatment is lower in India than in Japan.

<table>
<thead>
<tr>
<th>Contents</th>
<th>Unit</th>
<th>India</th>
<th>Japan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermediate treatment ratio</td>
<td>%</td>
<td>18</td>
<td>89</td>
</tr>
</tbody>
</table>

- Most of the technologies adopted in India are composting and methane fermentation.
- More than 80% in Japan is WtE technology.

<table>
<thead>
<tr>
<th>Technology</th>
<th>No. of facility</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>India</td>
</tr>
<tr>
<td>Composting</td>
<td>279</td>
</tr>
<tr>
<td>Methane fermentation</td>
<td>172</td>
</tr>
<tr>
<td>RDF manufacture</td>
<td>29</td>
</tr>
<tr>
<td>Waste to Energy plant</td>
<td>8¹)</td>
</tr>
</tbody>
</table>

Note 1: 4 facilities during operation
Necessity of hygienic waste disposal

Environmental issues by inappropriate disposal

☐ Current situation
  - Directly landfill or illegally disposed
  - Shortage of landfill site

☐ Environmental Impacts
  - Generation of GHG (CH₄ etc.)
  - Shortage of disposal site
  - Disease caused by ground collapse
  - Fire by spontaneous fire
  - Pollution of environment (Offensive odor, Leachate)
  - Pest Infectious disease
  - Landfill Site
Necessity of hygienic waste disposal

To reduce the environmental impacts

- Sanitary waste treatment
  - Prevention of disease and pest
  - Prevention of environmental pollution

- Heat utilization & power generation from waste
  - Reduction of greenhouse gas emission

It is most important to adopt the proven technology that has a stable driving experience over many years.
Advantages of WtE

Waste-to-Energy
- Proven and reliable technology with energy recovery system
- Sanitary method in whole process including flue gas treatment
- Reduce 70-85% weight & 90-95% volume of waste to extend landfill lifetime
- 1-ton waste can generate 400-800 kWh electricity

Waste (Municipal, Industrial) → WtE plant → Electricity / Steam
Ash: 5-10% of original volume → Final Disposal Site
3. Our contribution to environmental improvement in India
Grate system is most economical and popular technology in the world.

Analysis of 692 units, commissioned between 2006 – 2015

Source: ecoprog
Our references - Jabalpur, India -

Consortium of Hitachi Zosen India Private Limited and ISGEC Heavy Engineering Ltd. conduct EPC work for the project.

- 1st Waste to Energy plant engineered by Japanese company to suit local waste handling.
- HZIND’s Scope of Work is main equipment supply, basic & detail design and SV services.
- This facility completed two years of stable operation.

**Client**  Essel Infraprojects Ltd.

**Start-up**  2016

**Technology**

- Furnace  Grate furnace (air-cooled)
- Energy recovery  boiler
- Flue gas treatment  Gas cooler, bag filter

**Technical Data**

- **Fuel**  MSW
- **Waste capacity** 600t/d (600t/d x 1)
- **Generator capacity** 11.5MW
Our contribution to CO₂ reduction

The waste sector in India has emitted **57.73 million tons of CO₂ eq.** in 2007.

The incineration of waste and generating electricity can contribute to the suppression of GHG emissions from landfill and thermal power plants.

![Graph showing GHG emissions by sector in 2007](image)

### Contribution to CO₂ reduction in Jabalpur WtE plant

<table>
<thead>
<tr>
<th>Activity</th>
<th>GHG Reduction</th>
<th>Ratio for Waste Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incineration</td>
<td>104,214 tons CO₂ eq./year</td>
<td>0.2%</td>
</tr>
<tr>
<td>Generating electricity</td>
<td>34,155 tons CO₂ eq./year</td>
<td>0.1%</td>
</tr>
</tbody>
</table>

Source: Clean Air Management Profile, 2010 Edition
Our contribution to stable operation

Tools for realizing stable operation

- Management of waste bunker - visualization –
- CCS using AI technology
- Predictive maintenance
- Remote monitoring system

Substitution of power plant

Suppression of harmful gas emission

Waste bunker visualization
4. Conclusion
Conclusion

- It is important to reduce the environmental impacts of “Open dumping”.

- It need to adopt the technology to produce the energy, while processing waste.

- Our company has already contributed to environmental conservation in India.
Technology for People, the Earth, and the Future

Hitachi Zosen creates links between mother nature and our future