Waste Disposal Facilities in Kitakyushu City

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Waste Disposal Facilities in Kitakyushu City

- Hiagari Plant (Since April 1991)
- Kogasaki Plant (Since July 1998)
- Shinmoji Plant (Since March 2007)
- Hibikinadanishi District Waste Treatment Plant (since Oct. 1998)
- Kogasaki Excrement Dumping Station (since March 1981)
- Hiagari Bulky Refuse Recycling Center (since June 1992)
- Hiagari Bottle Can Refuse Recycling Center (since July 1993)
- Plastic Recycling Center (since April 2007)
- Honjo Bottle Can Refuse Recycling Center (since April 1997)
- Public facilities and offices in Kitakyushu City
- New regional electric power Kitakyushu Power
Facilities in Hiagari Plant

- Bulky Refuse Recycling Center
- Bottle and Can Recycling Center
- Administration Building
- Weighing Building
- Hiagari Plant
- Entrance and Exit
Overview of Hiagari Plant

Site area: 33,933 m²
Total floor area: 14,792 m²
6 stories above ground and 2 below
Construction work start: September 1987
Completion: March 1991
Total construction cost: Approx. 12.5 billion yen
Incineration capacity: 600 t (200 t x 3 furnaces)
Power generation capacity: 6,000 kW
Annual power generation: 34,928 MWh (FY2014)
(for about 9,700 households)
Sectional View of Hiagari Plant

- Platform
- Crane
- Incinerator
- Boiler
- Exhaust gas treatment equipment
- Chimney
- Ash pit
- Ash crane
- Food waste
Structure of Bag Filter

(During back washing) (During operation)

Back wash air

Clean air

Nozzle for back washing

Chemicals used
- Slaked lime
- Special reaction assistant
- Activated carbon

Hazardous materials
- Hydrogen chloride
- Sulfur oxide
- Soot and dust
- Dioxins

Chemicals
- Silica
- Ca(OH)$_2$
- CaCl$_2$
- CaSO$_4$
- Active Carbon

Toxic Substances
- Hcl
- SO$_2$
- Dioxin (fume)
- Dust
Cooling Absorption Dehumidification Tower

Exhaust gas

Demister

Cooling tower for dehumidification

Demister

Caustic soda

Exhaust gas

To wastewater disposal facility
### Treatment Standards for Exhaust Gas and the Amount of Emissions

Treatment Standards for Exhaust Gas (Air Pollution Control Act and Act on Special Measures against Dioxins) and the Amount of Emissions (Dry gas, O₂ 12% conversion rate)

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard values</th>
<th>Submitted value</th>
<th>Hiagari Plant (Normal time)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount of soot and dust</td>
<td>0.08 g/Nm³ or lower</td>
<td>0.04 g/Nm³ or lower</td>
<td>0.001 g/Nm³ or lower</td>
</tr>
<tr>
<td>Sulfur oxide</td>
<td>18.3 Nm³/h or lower</td>
<td>3.2 Nm³/h or lower</td>
<td>0 Nm³/h</td>
</tr>
<tr>
<td>Hydrogen chloride</td>
<td>700 mg/ Nm³ or lower</td>
<td>196 mg/ Nm³ or lower</td>
<td>0 mg/ Nm³</td>
</tr>
<tr>
<td>Nitrogen oxide</td>
<td>250 ppm or lower</td>
<td>200 ppm or lower</td>
<td>99 to 131 ppm</td>
</tr>
<tr>
<td>Carbon monoxide (1 hour)</td>
<td>100 ppm or lower (1 hour average)</td>
<td>100 ppm or lower (1 hour average)</td>
<td>13 to 25 ppm</td>
</tr>
<tr>
<td>Dioxins</td>
<td>1 ng-TEQ/ Nm³ or lower</td>
<td>1 ng-TEQ/ Nm³ or lower</td>
<td>0.0073 to 0.07 ng-TEQ/ Nm³</td>
</tr>
</tbody>
</table>
Steam Turbine Power Generator

Power generation
6,000 kW

- Steam turbine
- Speed reducer
- Power generator
Changes in the Amount of Waste in Kitakyushu City

* Other: Mainly the waste produced in road / town cleaning activities.
Amount of Waste Brought into Waste Incineration Plants of Kitakyushu City

Waste is also brought into the plants from the cities around Kitakyushu (Nogata City, Onga Town, Nakama City, Yukuhashi City, Miyako Town).
How to Put out Household Waste

- Food waste
- Paper scraps
- Wood shavings
- Glass
- Pottery
- Etc.

Net to prevent garbage being strewn by animals
Protection from dogs and crows

Garbage collection points
33,000 points
Collection of Household Waste

Collection frequency

Twice a week

Small-sized garbage truck
Separation of Household Waste

- Bottles and cans
- Plastic bottles (Containers for tea, juice, etc.)
- Plastic containers and packaging (Cups, bottles, tubes, food trays)

Resource collection station

Every Wednesday
## Prices of Garbage Bags

<table>
<thead>
<tr>
<th>Size</th>
<th>Household waste</th>
<th>Bottles and cans</th>
<th>Plastic bottles</th>
<th>Plastic containers and packaging</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Large</strong> (45 L)</td>
<td>50 yen</td>
<td>20 yen</td>
<td>20 yen</td>
<td></td>
</tr>
<tr>
<td><strong>Medium</strong> (30 L)</td>
<td>33 yen</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Small</strong> (25, 20 liters)</td>
<td>22 yen</td>
<td>12 yen (25 L)</td>
<td>12 yen (25 L)</td>
<td>12 yen (25 L)</td>
</tr>
<tr>
<td><strong>Very small</strong> (10 L)</td>
<td>11 yen</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Proper separation may reduce the cost for garbage bag.*

*(Price per piece: incl. tax)*
Garbage Disposal Expenses

FY2013: 13.2 billion yen

- Incineration: 6.6 billion yen (50%)
- Collection & transportation: 5.8 billion yen (44%)
- Sorting: 600 million yen (4%)
- Crush: 200 million yen (1%)
- Landfill: 100 million yen (1%)
- Crush: 200 million yen (1%)

7,200 yen/year per citizen
600 yen/month
Waste Composition Analysis

Note) The graph shows the average values of the components of the waste brought into the three incineration plants: Shinmoji, Hiagari, and Kogasaki, in FY2014.
Waste Composition Analysis (Hai Phong City)

Hai Phong City Green Growth Plan Formulation Support Project in collaboration with Kitakyushu City (Investigation in FY2014)

Household waste
- Kitchen garbage: 78%
- Miscellaneous waste: 9%
- Paper: 4%
- Glass: 1%
- Metal: 0%
- Trees: 1%
- Plastics: 5%
- Fiber: 2%

Market waste
- Kitchen garbage: 91%
- Miscellaneous waste: 3%
- Paper: 2%
- Glass: 3%
- Metal: 0%
- Trees: 1%
- Plastics: 2%
- Fiber: 0%
### Analysis of Three Components and Calorific Value (Hiagari Plant vs. Hai Phong City)

<table>
<thead>
<tr>
<th>Item</th>
<th>Hiagari Plant</th>
<th>Hai Phong City</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Household waste</td>
</tr>
<tr>
<td><strong>Three components</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water (%)</td>
<td>26.1</td>
<td>65.4</td>
</tr>
<tr>
<td>Ash (%)</td>
<td>14.9</td>
<td>13.1</td>
</tr>
<tr>
<td>Flammability (%)</td>
<td>59.0</td>
<td>21.5</td>
</tr>
<tr>
<td><strong>Lower calorific value (kcal/kg)</strong></td>
<td>2,510</td>
<td>698</td>
</tr>
</tbody>
</table>

Lower calorific value required for waste electricity generation: 1,500 kcal/kg
Low calorific value that is the natural limit of waste: 800 kcal/kg
Separation of Waste

Carried-in waste
- 2003- 100 yen/10 kg

(1) Household waste
- (Twice/week) 130 units
- 2006- 50 yen (45 L)

(2) Bulky refuse
- (Once/month) 16 units
- 1994- Charged

(3) Bottles and cans
- (Once/week) 138 units
- 1993-

(4) Plastic bottles
- (Once/week)
- 1997-

(5) Plastic containers
- (Once/week) 30 units
- 2006-

(6) Trays
- 4 units
- 2000-

(7) Food & drink cartons
- 2000-

(8) Fluorescent tubes
- 2 units
- 2002-

(9) Small metal waste
- 2 units
- 2006-

Separation at the Bottle and Can Recycling Center weekly
- Hiagari (50 t/5 h)

Separation at the Plastic Recycling Center weekly
- Collection box
  - Super market, Citizens’ Center, etc. (about 280 points in the City)

Separation at the Bulky Refuse Recycling Center weekly
- Inside of Hiagari Plant (Revolution, 150 t/5 h; Shearing, 50 t/5 h)

Incineration plant
- Shinmoji (240 t x 3)
- Moji, Kokura Minami Ward
- Hiagari (200 t x 3)
- Kokurakita Ward, Tobata Ward
- Kogasaki (270 t x 3)
- Yawatahigashi Ward, Yawatanishi Ward, Wakamatsu Ward

Recycling plant
- Slag & Metal
  - Asphalt aggregate
  - Concrete secondary products
  - Electric power
    - Use in Plant
    - Sell to power companies
  - Steam
    - Sell to bathing facilities

Wood shavings, etc.

Ash

Final disposal site (landfill)

Recycling plant
- Iron waste
  - Steel cans
  - Aluminum cans

Recycling plant
- Bottles

Recycling plant
- Plastic bottles

Recycling plant
- Trays
  - (white)
  - (colored)

Recycling plant
- Food & drink cartons

Recycling plant
- Fluorescent tubes

Recycling plant
- Iron products, etc.

Recycling plant
- Plastic containers and packaging

Recycling plant
- Collection box
  - Super market, Citizens’ Center, etc. (about 280 points in the City)

Recycling plant
- Collection box
  - Electric stores, etc. (about 280 points in the City)

Recycling plant
- Collection box
  - Home Center, Citizens’ Center, etc. (about 110 points)

Recycling plant
- Use in Plant
  - Sell to power companies

Recycling plant
- Sell to bathing facilities

Recycling plant
- Aluminum cans, steel cans
  - Oxygen absorbers
  - Building materials

Recycling plant
- Plastic bottle recycled products
  - Rulers, ball-point pens

Recycling plant
- Plastic materials
  - Chemical raw materials
  - Petrochemical

Recycling plant
- Tray
  - Building materials

Recycling plant
- Recycled fluorescent tubes
- Building materials, etc.

Recycling plant
- Recycled paper
  - Recycled toilet paper
Create Sustainable Sound Material-Cycle Society by Making Good Use of Limited Resources for Our Future Generations!

Environmental Campaign Mascot Character

Teitan & Black Teitan