Integrated Solid Waste Management in Yokohama

Resources & Wastes Recycling Bureau, City of Yokohama
## City of Yokohama Profile

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>Population</strong></td>
<td>3,693,200 (as of Sep.1, 2011)</td>
</tr>
<tr>
<td><strong>Households</strong></td>
<td>1,594,320 (as of Sep.1, 2011)</td>
</tr>
</tbody>
</table>
| **Frequency of garbage collection** | Household waste (Combustible waste), Dry-cell batteries, Noncombustible waste, Spray cans: Twice a week  
                           | Cans, Bottles, PET bottles, Small metal items, Plastic containers and packaging: Once a week  
                           | Used paper, Used cloth: Twice a month  
                           | Bulky waste: Application required |
| **Collection points**       | About 66,000 sites           |
Flow of garbage and recyclables treatment

- Separation
- Collection
- Garbage
- Recyclables
- Collection Point
- Collection
- Incineration
- Incineration Plant
- Ash
- Landfill
- Landfill Site
- Recycle
- Reuse or Recycle

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Facilities layout

- Collection offices 18 in the city (1 in each ward)
- Transport offices 3 in the city
- Incineration plants 4 in the city (2 plants: closed 1 plants: suspended)
- Landfill sites 1 in the city (1 site: closed)
Transition of Garbage Treatment

~1940’s
1930
Population 620 k
Total weight of waste 80 k-t

~1950’s~1960’s
1955
Population 1.14 mil
Total weight of waste 90 k-t

~1970’s~1990’s
1986
Population 3.05 mil
Total weight of waste 1.19 M-t

2000’s~
2008
Population 3.66 mil
Total weight of waste 0.95 M-t

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Transition of System of Incineration

1929, Takigashira plant
- Batch furnace (fixed grate)
- Simple exhaust gas treatment equipment for only fly ash

1973, Asahi plant
- Continuous mechanized furnace
- Exhaust gas treatment equipment

2001, Kanazawa plant
- Continuous mechanized furnace
- Sophisticated exhaust gas treatment equipment
- Bottom ash melting facilities
- High-efficiency power generation system

Resources & Wastes Recycling Bureau, City of Yokohama
Incineration Plants and Landfill Sites

- Incineration Plants

<table>
<thead>
<tr>
<th></th>
<th>Tsurumi</th>
<th>Asahi</th>
<th>Kanazawa</th>
<th>Tsuzuki</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>1,200 t/day</td>
<td>540 t/day</td>
<td>1,200 t/day</td>
<td>1,200 t/day</td>
</tr>
<tr>
<td>capacity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Landfill Sites

Shinmeidai Disposal Site (~Mar. 2011)
Minami-Honmoku Final Disposal Site

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Effective Use of Thermal Energy

A steam turbine generator is installed to supply electric power not only to the incineration plant itself, but also to adjacent facilities. Furthermore, electric power is sold to the electric company. The revenue generated through the sale of power is about 2.3 billion yen.
“Yokohama G30”

Yokohama municipal solid waste management master plan (FY2002-FY2010)
Background for the Creation of the Yokohama G30 Plan (1)

Ever-Increasing Garbage

Amount of Garbage in Yokohama City, Changes in the Population

Resources & Wastes Recycling Bureau, City of Yokohama
Continuation of society will be difficult if no action is taken to solve various environmental problems...

In order to hand over the rich natural environment to our children

Jan. 2003

“Yokohama G30 Plan” was created
Basic Principles of the Yokohama G30 Plan

Citizens, companies and the administration work together in promoting the 3Rs for waste, with the aim of realizing a “sound material-cycle society” where the consumption of resources and energy is reduced as well as reducing the environmental impact.

Roles of Citizens, Companies the Administration

<table>
<thead>
<tr>
<th>Citizens</th>
<th>Changing to an environmentally friendly lifestyle, rigorous sorting of garbage, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Companies</td>
<td>Design and production of products which reduce the emission of waste, collection and recycling of used products, etc.</td>
</tr>
<tr>
<td>Administration</td>
<td>Creation of systems for 3Rs, raising the awareness of people, provision and exchange of information, etc.</td>
</tr>
</tbody>
</table>
Efforts to Reduce Household Waste
- Increase in Items for Sorted Collection -

<Past: 5 types, 7 items>

- Household waste (Combustible waste)
- Bulky waste
- Cans, Bottles, PET bottles
- Small metal items
- Used dry-cell batteries

<Present: 10 types, 15 items>

- Household waste (Combustible waste)
- Bulky waste
- Cans, Bottles, PET bottles
- Small metal items
- Used dry-cell batteries
- Plastic containers and packaging
- Noncombustible waste
- Spray cans
- Used paper
  - Newspaper
  - Magazines, other paper
  - Paper cartons
- Used cloth
- Cardboard

indicates the new items to be sorted for collection

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Publicity and explanation to the residents

- **Separation briefing**: About 11,000 times (FY2004 & 2005)
- **Educational campaign in front of train stations**: About 600 times (FY2004 & 2005)
- **Early morning educational instruction at collection point**: About 3,300 times (FY2004 & 2005)
- **Garbage left behind due to non-separation**: About 10,900 times (FY2009)
The inspection of collected waste at incineration plants became stricter from Dec. 2003. A self-propelled waste inspection device was introduced at all plants. If the collected garbage contains a large volume of inappropriate waste and recyclable waste such as used paper, the garbage collection company is instructed to take it back.

<table>
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<th>Rate of collection trucks inspected</th>
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<td>FY2009 85% (164,095 trucks)</td>
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<tr>
<td>FY2010 89% (176,847 trucks)</td>
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</table>

Inspection of incoming waste  Waste inspection device
Promoting Environment Study

- **G30 Delivery lecture**: Visit elementary and Junior High schools
  - Explain about the situation with the amount of garbage and processing system
  - Demonstration of collection work

- **Incineration plant facility tour**: About 38,000 participants (FY2009)
“Fureai” Collection: with the help of volunteers from the local area, we offer assistance to the elderly and persons with disabilities by carrying trash from their homes to the collection locations.

Narrow road collection: Utilize pickup trucks to collect refuse from areas where the regular garbage collectors cannot enter.
# Movements and Targets of Amount of Waste

**Target in the G30 Plan**

1,130,000 tons

(▲30%)

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### Movements of Amount of Waste

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>2001</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2010 (goal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste q.t.</td>
<td>1,589</td>
<td>549</td>
<td>41%</td>
<td>490</td>
<td>43%</td>
</tr>
<tr>
<td>Household waste</td>
<td>935</td>
<td>618</td>
<td>34%</td>
<td>591</td>
<td>36%</td>
</tr>
<tr>
<td>Industrial waste</td>
<td>654</td>
<td>351</td>
<td>51%</td>
<td>318</td>
<td>54%</td>
</tr>
<tr>
<td>Population</td>
<td>3,463</td>
<td>3,691</td>
<td>5%</td>
<td>3,673</td>
<td>6%</td>
</tr>
<tr>
<td></td>
<td>3,707</td>
<td>7%</td>
<td></td>
<td>3,707</td>
<td>7%</td>
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</table>

- **G30 Plan**
  - Target: 1,130,000 tons (▲30%)

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*Resources & Wastes Recycling Bureau, City of Yokohama*
“Effects of G30”

(1) Incineration plants - closed and suspended -

- Two incineration plants were closed down and one was suspended due to a significant reduction in the amount of garbage.

[Incineration plant]
Sakae (1,500t/day) : Oct. 2005 closed
Konan (900t/day) : Nov. 2006 closed
Hodogaya (1,200t/day) : Apr. 2010 suspended
“Effects of G30”
(2) Reduction of Environmental Impact

- CO₂ emissions when treating garbage were reduced by significantly reducing the amount of garbage.

- CO₂ emissions in FY 2009 were reduced by 900,000 tons when compared to FY 2001.
  (originally calculated by City of Yokohama with LCA method.)

This is equivalent to the CO₂ absorbed by 64 million Japanese cedars in one year.
“Combustible waste” still contains recyclable paper or plastic containers that can be separated out.
Beyond the G30 Plan

“Yokohama 3R Dream (slim)"

Yokohama municipal solid waste management master plan (FY2010-FY2025)
G30 to Yokohama 3R Dream Plan

◆ G30 Plan (Jan. 2003)
We have promoted reduction of the amount of garbage by the separation and recycling of garbage

◆ Yokohama 3R Dream Plan (Jan. 2011)
While continuing the separation and recycling of garbage, we plan
1. to reduce garbage (waste generation control)
2. to deal with global warming and to reduce GHG emissions
3. to pursue safe, secure, and stable garbage processing
What is “3R Dream”? 

“3R Dream” ⇒ “3R Dream Plan” aims to reduce garbage and its impact on the environment by “3R”, and ensure the environment’s richness to future generation. And so we will establish a society comprising of citizens and companies where children have “Dreams” for future.

“3R” ⇒ Practice the 3Rs

Reduce : Reduce garbage itself
Reuse : Use any goods as long as we can
Recycling : Separate and use articles as recyclables
Basic principle of 3R Dream Plan

We will endeavor to effectively use limited resources and energy as well as to promote 3R based on further cooperation among the citizen, companies, and administration by conducting proper disposal management, and establish a sustainable and Eco-Model City by combining reduction in the impact on the environment and healthy fiscal management.
Targets of 3R Dream Plan

Scheduled Period: FY2010 to FY2025

- Further challenge for 3R
  We will reduce total generation of garbage (total amount of garbage and recyclables) by more than 3% by FY2013 (as compared to the generation for FY 2009) and by more than 10% by FY2025 (as compared to the generation for FY 2009)

- Tackle global warming starting from reduction garbage
  We will reduce GHG emissions from garbage processing by more than 10% by FY2013 (as compared to the emissions for FY 2009) and by more than 50% by FY2025 (as compared to the emissions for FY 2009)

- Pursuing safe, secure, and stable garbage processing
Match of Reduce ~Yokohama R Square~

Promoting “Reduce” efforts

In order to promote the “Reduce” effort, which is the measure most kind to the environment, we introduced “Yokohama R(reduce) square” in Oct. 2010.

Committee made up of residents, businesses and the municipal government to support the actualization of new efforts by providing information, publicity and the introduction of partners.

Reduce Yokohama R Committee

Yokohama R Square

Send information

Support・Matching

Create locations for exchange

【Schematic image】

Resources & Wastes Recycling Bureau, City of Yokohama
Striving for the further reduction and recycling of waste.