Resource Recirculation Policy of Korea

In

Moving towards a Resource efficient Economy

Oct. 7\textsuperscript{th} 2015

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Content

- Current Status of Waste Management
- Changes in Waste Management Policy
- Prospective Waste Management
Current Status of Waste Management
Current Status of Waste Management

<Domestic Waste Management>

Filth Cleaning Law
(1961)
→ First Amend.
(1973)
→ Second Amend.
(1979)
→ Third Amend.
(1982)
→ Abolition
(1986)

<Industrial Waste Management>

Environmental Pollution Prevention Law
→ Abolition
→ Environmental Preservation Law
→ Environmental Preservation Law

Domestic / Industrial Waste Integration

Waste Management Law
(1986. 12)
Integration of domestic waste and industrial waste
*Domestic, Manure, and General/ Hazardous industrial waste

Act on Treatment of Livestock Manure & Wastewater and Sewage (1991.3)

Present
← Amendment (1999.12)
(Infected Waste Management)
← Amendment (1995.08)
Strengthen Responsibility of Waste Producers
• General Waste, Industrial Waste: General & Hazardous Waste
• Volume Based Tipping System
• Separate Collection of Recyclables
← Amendment (1992.12)
← Amendment (1991.03)

Act On Promotion of Waste Treatment Facility Implementation and of Support for Surrounding Area (1995.01)

Source: Waste resources management, University of Seoul
## Current Status of Waste Management

### Current status of waste generation and management

### Waste generation and treatment method with main processing flows for each waste stream in 2013

<table>
<thead>
<tr>
<th>Waste Streams</th>
<th>Amount</th>
<th>Treatment</th>
<th>Processing flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic Waste</td>
<td>48,728 tons/day</td>
<td>Landfill(17.2%)  Incineration(23.7%) Recycling(59.1%)</td>
<td>Domestic waste → Separating → Loading of waste → Magnetic separation and Crushing → Compression → Packaging → Landfill/ Incineration/ Recycling [SRF]</td>
</tr>
<tr>
<td>Industrial Waste</td>
<td>149,815 tons/day</td>
<td>Landfill(16.7%)  Incineration(6.0%) Recycling(73.0%) Ocean treatment(4.3%)</td>
<td>Produced → Purchase and use → Large size waste → Separating/Trading → General waste → Recycling/ Landfill/ Incineration [Tracking System Applied]</td>
</tr>
<tr>
<td>Construction / Demolition Waste</td>
<td>183,538 tons/day</td>
<td>Landfill(1.4%)  Incineration(0.5%) Recycling(98.1%)</td>
<td>Construction/Demolition waste generated → Coarse Pretreatment/Recycling → Landfill(nonflammable)/ Incineration(combustible) [Tracking System Applied]</td>
</tr>
<tr>
<td>Hazardous (Designated) Waste</td>
<td>10,000 tons/day</td>
<td>Landfill(18.7%)  Incineration(18.2%) Recycling(57.1%) Etc (6.1%)</td>
<td>Waste oil → Liquid(Recycling/Incineration), Solid(Incineration) Organic solvent → Liquid(Recycling), Solid + Liquid(Incineration) Paint → Liquid(Recycling), Solid + Liquid(Incineration) Pesticide → Solid + Liquid(Incineration) Sludge → Landfill, Toxic waste → Landfill, Asbestos → Landfill</td>
</tr>
<tr>
<td>End of Life Vehicles (ELVs)</td>
<td>846,251 cars/year</td>
<td>Recycling(about 80%)  Landfill(about 20%)</td>
<td>Manufacturer → ELV(End of Life Vehicle) → Dismantling → Crushing → Recycling/Treatment of waste gas/Landfill [Monitored by EcoAS]</td>
</tr>
<tr>
<td>Electric-Electronic Products (WEEE)</td>
<td>9,455,000 products/year</td>
<td>Recycling/Reuse/ Landfill/Incineration (Treatment rates between products are varying)</td>
<td>Waste → Recycling Centers → Sorting → Plastics → Incineration → Electric wire → Recycling of metal → Landfill → Remaider → Grinding → Landfill → PCB → Recycling of metal and incineration [Monitored by EcoAS]</td>
</tr>
</tbody>
</table>

Source: Environment statistics yearbook, Korean Ministry of Environment
Current Status of Waste Management

- Waste Generation and Treatment in Overall (‘82~’13)

> 90% Landfill

> 80% Recycle

Source: Environment statistics yearbook, Korean Ministry of Environment
Current Status of Waste Management

- Domestic waste ('82~'13)
  - Total domestic waste generation in 2013 is 48,728 tons/day

Source: Environment statistics yearbook, Korean Ministry of Environment
Current Status of Waste Management

- **Industrial waste (‘82~’13)**
- Total industrial waste generation in 2013 is 149,815 tons/day

Change in Waste Classification (‘91-92)

Source: Environment statistics yearbook, Korean Ministry of Environment
Current Status of Waste Management

- Construction/Demolition waste (‘96~’13)
  - Total construction/demolition waste generation in 2013 is 183,538 tons/day
Current Status of Waste Management

- **Hazardous waste (‘91~’13)**
  - Total hazardous waste generation in 2013 is 12,400 tons/day
Current Status of Waste Management

- Treatment of Domestic Waste (‘82~’13)

  > 96% Landfill (‘82)

  16% Landfill
  25% Incineration
  59% Recycle (‘13)

Source: Environment statistics yearbook, Korean Ministry of Environment
Current Status of Waste Management

- Treatment of Industrial Waste (‘82~’13)

- > 80% Landfill (‘82)
- 16% Landfill
- 6% Incineration
- 76% Recycle (‘13)

Source: Environment statistics yearbook, Korean Ministry of Environment
Current Status of Waste Management

- Treatment of Construction/Demolition Waste (‘96~’13)

98% Recycle (‘13)

Source: Environment statistics yearbook, Korean Ministry of Environment
Current Status of Waste Management

- Treatment of Hazardous Waste (‘91~’13)

19% Landfill
17% Incineration
59% Recycle (‘13)
Changes in Waste Management Policy
Changes in Waste Management Policy

- Comprehensive Plan in Waste Management

Integrated Waste Management Since 1993

- Minimizing and Recycling of Waste
- Resolution of Conflicts in Locals
- Change in Environmental Policy toward Globalization
- Established System of Burden Sharing
- Effective Waste Management

Source: Waste management, past and present. Daegu Gyeonbuk Development Institute
Changes in Waste Management Policy

- **1st Comprehensive plan in waste management (1993-2001)**
  - **Objective**
    
    Establishment of Sustainable Resource Circulation Economy and Zero Waste Society

- **For effective management, 4 main policies implemented**

  1. Minimization of waste → Volume-based tipping system
     - Reduction on packaging waste and food waste
  2. Waste to resource → Deposit-refund and allotment system
     - Creating and supporting foundation of recycling industry
     - Introduction of extended producer responsibility
  3. Stable management of waste → Making foundation of incineration and landfill facility
     - Setting up landfill leachate criteria
     - Setting up dioxin emission criteria in incineration
  4. Establishment of Base → Promulgation of waste management law
     - Statistical data acquisition of waste

Source: Waste management, past and present, Daegu Gyeonbuk Development Institute
Changes in Waste Management Policy

- **Volume Based Tipping System (1995.1~)**

  - Effect (Reduction on waste generation & Benefit on economy)

    - **1994**
      - 1.33 kg/day/person
    - **2004**
      - 1.03 kg/day/person

    Reduction in Generation

    Cost saving in transportation and landfilling
    : about 6 billion $

- **Summary**

  Households purchase plastic bags. Price of a bag by volume will be determined by local governments depending on the cost of waste handling.
  (partially supported by central government.)

Source: Korean Ministry of Environment
Changes in Waste Management Policy

- 2nd Comprehensive plan in waste management (2002-2011)

- Objective

  **Maturation of Sustainable Resource Circulation Economy and Zero Waste Society**

- For settling sustainable resource circulation economy and zero waste society, 6 main policies implemented

  1. Management of waste risk
     - Management of hazardous waste
     - Tighten management of human body risk

  2. Waste to resource (Value Management)
     - Enhancing “waste to resource policy” by waste value improvement

  3. Reduction of waste (Curb on Waste Generated)
     - Promotion of preventive waste management

  4. Management of environmental factor
     - State of the art tech in treatment facility and management system for zero waste

  5. Management of economic factor
     - Recycling industry encouragement and hailing to international trend

  6. Management of social factor
     - Promotion of private sector participation

Source: Waste management, past and present, Daegu Gyeonbuk Development Institute
Changes in Waste Management Policy

- **EPR (Extended Producer Responsibility) System (2003.1~)**

  Allocation of Mandatory Total Recycling Amount (Ministry of Environment)

  **Enforcement Agency**
  (Korea Resource Recovery and Reutilization Corporation >>> KEC)

  - Reports on total operation
  - Target amount
  - Performance management
  - Reports on mandatory recycling

  **Selected Items**
  - Share of expenses
  - Acting mandatory recycling
  - Performance management

  **Producer**
  - Product
  - Demand of Taking over
  - Contract on consignment

  **Distribution Dealer**
  - Product
  - Collection, Selection

  **Consumer**
  - Waste
  - Contract on consignment

  **Selected Items**
  - Fund support
  - Purchase
  - Transfer
  - Waste recycling

  **Recycling Operator**
  - Fund support
  - Contract on consignment

  **Secondary Market**
  - Waste

Source: Korean Ministry of Environment
Changes in Waste Management Policy

- Resource Circulation of Electric • Electronic Products and Automobiles (2008)
  - WEEE

  - EPR System

    - Production
    - Consumption
    - Recycling/Reuse

  - Natural Resource Exploitation
  - Environmental Damage
  - Input of resources

  - Restriction on the use of hazardous substances
  - Improvement of material structure
  - Achievement of recycling maximization

  - Reinforcement of facility standard
  - Method and standard of recycling
  - Achievement of recycling goal

- End-of-Life Vehicles

  - Manufacturer
  - ELV
  - Dismantling company
  - Shredder company
  - Final recycling dealer
  - Waste gas disposal dealer
  - Shredder residue recycling dealer

  - Achievement of 95% recycling goal in 2015

  - Funded by Manufacturers

Source: Korean Ministry of Environment
Comprehensive plan in “Waste to Energy” (2008-2020)

Objective

- Waste heat from incineration: 1,280,000 Gcal/year
- Landfill gas: 308,160 m³/day

Waste(2012)
3,800,000 ton/year
(31%)

2007
220,000 ton/year
(1.8 %)

2020
12,180,000 ton/year
(100 %)

Combustible 1,850,000 ton/year

Organic 1,950,000 ton/year

Source: Korean Ministry of Environment
Changes in Waste Management Policy

- Comprehensive plan on waste to energy (2008 - )

Background: Target of renewable energy portion in Korea

- To meet the share of national renewable energy (6.08 and 11% in 2020 and 2030, respectively), still around 70% of renewable energy would be supplied from waste and biomass.
- Waste to Energy has taken major fraction of renewable Energy in Korea.

Source: Korean Ministry of Environment
Changes in Waste Management Policy

- Comprehensive plan on waste to energy (2008-2020)

<table>
<thead>
<tr>
<th>Year</th>
<th>‘07</th>
<th>‘13</th>
<th>‘20</th>
</tr>
</thead>
<tbody>
<tr>
<td>WtE rate for Recyclables</td>
<td>1.9% (220 thousands ton)</td>
<td>33% (3.8 million tons)</td>
<td>100% (12 million tons)</td>
</tr>
</tbody>
</table>

**Combustible >> SRF/Bio-SRF**

<table>
<thead>
<tr>
<th>Year</th>
<th>‘13</th>
<th>‘20</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.8 million tons</td>
<td>3.8 million tons</td>
<td></td>
</tr>
</tbody>
</table>

**Organic >> Biogas**

<table>
<thead>
<tr>
<th>Year</th>
<th>‘13</th>
<th>‘20</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0 million tons</td>
<td>7.9 million tons</td>
<td></td>
</tr>
</tbody>
</table>

Source: Korean Ministry of Environment
Changes in Waste Management Policy

- Maximization of Resource Circulation (4R policy)

Reduce
- Regulation on exaggerated packaging
- Waste allocation system
- Reduction of food waste
- Volume-based tipping system
- Reduction system of industrial waste

Reuse
- Management of recycling center
- Deposit system of empty bottles
- Remanufacturing and reusing component

Recycle
- EPR System
- Food waste to resource
- Promotion of recycling industry
- Promotion through incentive system
- Effcient collection system (separate collection of recyclable waste)

Energy Recovery
- Expansion of “waste to energy” facility
- Low carbon green village construction/operation
- Development of waste to energy technology
- Professional education on WtE

Stable & Safe Treatment
- Treatment of agricultural waste
- Efficient management of exportation and importation of waste
- Treatment of abandoned waste
- Improvement on infectious waste treatment

Source: Korean Environmental Industry & Technology Institute
Prospective of Waste Management
Background

- Resource circulation not work well!
  * About 56% of incinerating or landfilled waste can be recycled

- Most of recycling is down-cycle
  * About 60% of recycling is simple shattering and pulverizing

- No more landfill sites
  * Landfill sites for industrial and C/D waste will be full up in 4 years
    → if waste crisis begins, disposal cost shoot up

Enhanced policy to reduce use of natural resource and energy by
Minimizing the incineration and landfilling,
and Maximizing the recycling
**Outline**

- MOE will legislate ‘Act on Promotion of the conversion to resource circulation society’

  *(Special feature) This act will overwhelm all other waste related acts*

- The act has not only basic act features (recycling principle etc.), but has specific policy and discipline to guarantee effectiveness

  *(Goals) To achieve zero landfilling of recyclable waste by 2020*

- MOE will decrease landfilling below 3% among waste treatment streams
- **Progress**

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012.1~2013.3</td>
<td>Legislation forum (12times) * joining Experts, Stakeholders</td>
</tr>
<tr>
<td>2013.2.6</td>
<td>Selected national agenda</td>
</tr>
<tr>
<td>2013 6~</td>
<td>Collecting opinions of Interested parties (37times) * academia, experts and other stakeholders</td>
</tr>
<tr>
<td>2014.10</td>
<td>The Bill on promotion of the conversion to resource circulation society (submitted to national assembly)</td>
</tr>
<tr>
<td>2016</td>
<td>The Act on promotion of conversion to resource circulation society (government Legislation decree)</td>
</tr>
<tr>
<td>2017</td>
<td>The Act Entry into force of the Act</td>
</tr>
</tbody>
</table>
Features

Conversion to resource recycling economic system, support recycling business

(1) Minimize waste of recyclables

- Introduce ‘landfill and incineration charges’ which promote recycle and prevent incineration and landfilling
  * Netherland, Sweden, Swiss imposed landfill charges and achieved zero-waste

(2) Reinforce policies to support recycling businesses and create market for recyclables/ products from recyclables

- Certificate for circulation resources[products] to guarantee quality, mandatory use of circulation resources, Operation of circulation resource exchange depot
  * Recognize end of waste, alleviate stringent regulation on recycling facilities
(3) Framework to support circulation

- Establishes definition of resource circulation society, formulate basic plan for resource circulation, supports conversion to resource circulation culture and economy

< resource recirculation system >
- **Expectations**

  **(Economic) Make recycling market and jobs**

  - Expending recyclable resource volumes 10M tons/yr, making recyclables market [1 billion $/yr] and recycling related jobs [11 thousands/yr]

  **(Environmental) extend life of landfill sites, reduce use of natural resources**

  - Use of circulation resource increase led to decreasing dependence on overseas import of natural resources
  - Landfill charge decreases waste, and enterprise benefit from extending life of land fill sites

  **(Social) Common benefit and mutual prosperity between local government and neighbor of landfill sites**

  - Landfill charge for improvement of environmental near landfill sites and support the community nearby
Thank you

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