Waste Management and Recycling in JAPAN

1. Establishment of a Sound Material-Cycle Society

2. Overview of the Waste Management in Japan

3. Implementation of Recycling Laws

Ministry of the Environment
Government of Japan
June 2004
1. Establishment of a Sound Material-Cycle Society
Japan is Undertaking the Transition to a Sound Material-Cycle Society

Concept of “Sound Material-Cycle Society”

Minimize the consumption of natural resources

1st: Reduction
Reduce waste, by-products, etc.

2nd: Reuse
Use things repeatedly.

3rd: Material Recycling
Recycle things which cannot be reused.

4th: Thermal Recycling
Recover heat from things which cannot be recycled materially and which have no alternatives but incineration.

5th: Proper Disposal
Dispose of things which cannot be used by any means.

If the above-mentioned order seems not to contribute to the reduction of the environmental load, exceptions are permitted so that different orders can be adopted.
“Fundamental Law for Establishing a Sound Material-Cycle Society” was enacted in May 2000 in order to enable Japan to transit to a Sound Material-Cycle Society during the 21st century.

A sound material-cycle society, in which the consumption of natural resources is minimized and the environmental load is reduced as much as possible, is established by promoting reduction, reuse, recycling, heat recovery and appropriate disposal.

**Fundamental Law for Establishing a Sound Material-Cycle Society**

**Purposes of the Law**
- Set forth the fundamental policies which facilitate a sound material-cycle society
- Articulate the basic principles underlying such a society
- Clarify the responsibilities of stakeholders
- Establish a Basic Plan

**Basic principles**
- Realize a society in which sustainable development is possible with less environmental impact
- Prioritize the ways of handling products, waste and recyclables
- Ensure the appropriate material cycle in nature

**Responsible Bodies**
- National government
- Citizens
- NGOs and NPOs
- Business organizations
- Local governments

**Fundamental Plan for Establishing a Sound Material-Cycle Society**

**Key Features**
- Reductions in the generation of waste
- Appropriate recycling and waste disposal
- Encouragement of the use of recycled products and materials
- Assessment of products and packaging with regard to the “3Rs”
- Implementation of economic measures such as taxes and levies
- Establishing waste management facilities
- Education
- Facilitating of activities of non-governmental organizations
- Research and development
- International collaboration
Legislative Framework to Establish a Sound Material-Cycle Society in Japan

- Fundamental Environment Law
- Fundamental Environment Plan
- Fundamental Law for Establishing a Sound Material-Cycle Society
  - Ensuring a sound material cycle in society
  - Minimizing the consumption of natural resources
  - Reducing environmental loads

- Waste Management and Public Cleansing Law
  - Appropriate waste management

- Law for the Promotion of Utilization of Recyclable Resources
  - Promotion of reuse and recycling

Regulations affecting particular categories of items

- Container and Packaging Recycling Law
- Home Appliance Recycling Law
- Construction Material Recycling Law
- Food Recycling Law
- End-of-life Vehicle Recycling Law
- Green Purchasing Law
In March 2003, the Government of Japan established “Fundamental Plan for Establishing a Sound Material-Cycle Society.” This Fundamental Plan is established as one of programmes of a 10-year framework in the Johannesburg Plan of Implementation of WSSD in September 2002.

**Fundamental Plan for Establishing a Sound Material-Cycle Society**

**Image of a Sound Material-Cycle Society**

Manufacturing: DfE (Design for Environment), long-life products, lease & rental
Waste management: cyclical use, appropriate disposal system

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**Quantitative Targets: FY2000-2010**

1 **Targets for Indicators Based on Material Flow Accounts**
   a) Resource Productivity
   b) Cyclical Use Rate
   c) Final Disposal Amount

2 **Targets for Indices Related to Efforts**
   - Reducing the quantity of municipal solid waste
     *20% reduction of garbage discharged from households per person per day compared with FY2000*
   - Promoting sound material-cycle related businesses
     *Doubling the size of the related market and the number of related jobs compared with FY 1997*

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**Efforts Required of Entities**

- National Government
  *Fostering partnerships among stakeholders*
- Citizens
  *Changing their lifestyle*
- NPOs and NGOs
  *Promotion of their activities*
- Business Organizations
  *Promoting the “3Rs” based on EPR (Extended Producer Responsibility)*
- Local Governments
  *Enforcing laws and regulations; acting as coordinators*
Material Flow Accounts (MFA) of Japan

The material flow accounts for FY2001 roughly show:

1) Total material input is about 2.1 billion tons.

2) Amount of cyclical use (reuse + recycling) is 212 million tons.

3) Amount of final disposal (landfill) is 53 million tons.

a) Resource Productivity

\[
\frac{\text{GDP}}{\text{DMI}^*}
\]

*DMI: Direct Material Input (Input of natural resources and the like)

b) Cyclical Use Rate

\[
\frac{\text{Amount of cyclical use (reuse + recycling)}}{\text{DMI + Amount of cyclical use}}
\]

c) Final Disposal Amount

Final disposal amount of waste
Japan enjoyed a prosperous life in the 20th century, made possible by the system of mass production, mass consumption, and mass disposal.

<table>
<thead>
<tr>
<th>GDP (trillion yen)</th>
<th>Number of passenger cars possessed (cars per 100 households)</th>
<th>Number of televisions possessed (TVs per 100 households)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY 1970: 75.3</td>
<td>FY 1999: 497.3</td>
<td>FY 1999: 224.0</td>
</tr>
</tbody>
</table>

On account of such a lifestyle, huge amounts of waste have been generated.

The remaining capacity of waste disposal sites is insufficient.

Years for which we can dispose of industrial waste at the present rate
(calculated based on the volume remaining at landfill sites)

- FY 1996: 3.1 years
- FY 1997: 3.1 years
- FY 1998: 3.3 years
- FY 1999: 3.7 years
- FY 2000: 3.9 years
- FY 2001: 4.3 years

(Data by Ministry of the Environment)
2. Overview of the Waste Management in Japan
## Overview of Waste Management and Public Cleansing Law

### Waste
filthy and unnecessary matter, which are in solid or liquid state (excluding radioactive waste)

<table>
<thead>
<tr>
<th>Classification</th>
<th>Municipal solid waste</th>
<th>Industrial waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste</td>
<td>waste other than industrial waste e.g. Household waste</td>
<td>Ashes, sludge, waste oil, waste plastics and others wastes generated as a result of business activity</td>
</tr>
</tbody>
</table>

### Municipalities
*Responsibility for Treatment*
- shall specified a "municipal solid waste management plan" in their respective administrative areas
- shall collect, transport and dispose municipal solid waste according to the plan before they interfere with the conservation of the living environment

### MSW Treatment Bodies
- shall receive permission each district
- shall observe treatment standard
- be banned to re-commission
- be banned to name-lending

### MSW Facility-Setting Bodies
- shall receive permission for establishment and handover

### Discharging Agencies
*Responsibility for Treatment*
- shall treat ISW themselves
- shall observe storage standard until carriage
- shall observe treatment standard
- be responsible concerning commission
- shall observe commission standard

### ISW Treatment Bodies
- shall receive permission each district
- shall observe treatment standard
- be banned to re-commission in principle
- be banned to name-lending

### ISW Facility-Setting Bodies
- shall receive permission for establishment and handover

A: permission, B: collection of reports, C: commission for improvement, D: commission for measure
Municipal Waste Discharge per Capita per Day

Change in Waste Discharge in Japan

- **Industrial Waste**: 400 million tons per year in FY 2001
- **Municipal Waste**: 52 million tons per year in FY 2001

**Municipal Waste Discharge per Capita per Day**

- 1,124 g per capita per day discharged in FY 2001
Change in Final Disposal Amount

Change in Treatment and Disposal of Industrial Waste
3. Implementation of Recycling Laws
Container and Packaging Recycling Law

Roles played by those concerned and flow of recycle

Area covered by the Law

Consumer
Cooperate separate discharge

Municipalities
Separate collection

Businesses
(recycling)
Designated Organization

In addition to Glass bottle, PET bottle, other containers and Packaging of Plastic and paper follows this flow

In addition to Steel can, Aluminum can, paper Packaging and corrugated carton follows this flow

‘Separated Glass Bottle’
Separated according to its color and removed stains)

Become valuable by separate collection

Become valuable

Wash and Crush into pieces

Cullet

Sold

Sold

Recycled

Recycled

3-1
Containers and packaging wastes collected separately are recycled as raw materials in the following way.

**Metal**
- Aluminum
- Steel
  - Non-colored
  - Brown
  - Other colors

**Glass**
- There is no obligation to recycle since these are considered to be usable materials when collected by municipalities.
- Cleaning/cullet
  - Glass bottle materials/construction materials

**Paper**
- Paper cartons
- Cardboard
  - Other materials

**Plastics**
- PET bottles
  - Shredded flakes/pellets/monomers
  - Pellets/blast furnace materials/oil/gas
- Other forms
  - Plastic materials/blast furnace materials/chemical materials/fuel

**Steel materials**

**Aluminum materials**

**Paper materials**

**Raw materials**
### Time course of the amount of containers and packaging for sorted collection and recycling

<table>
<thead>
<tr>
<th>Item (unit: ton)</th>
<th>Sorted collection of containers and packaging</th>
<th>Recycling amount</th>
<th>Item (unit: ton)</th>
<th>Sorted collection of containers and packaging</th>
<th>Recycling amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY1998 322,284</td>
<td>303,240</td>
<td>FY1998 471,638</td>
<td>461,347</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FY1999 326,110</td>
<td>307,237</td>
<td>FY1999 471,127</td>
<td>456,892</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FY2000 352,386</td>
<td>334,549</td>
<td>FY2000 484,752</td>
<td>476,177</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FY2001 355,157</td>
<td>339,443</td>
<td>FY2001 461,357</td>
<td>450,229</td>
<td></td>
<td></td>
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<tr>
<td>FY2002 348,698</td>
<td>337,888</td>
<td>FY2002 419,667</td>
<td>415,364</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FY1998 274,374</td>
<td>256,227</td>
<td>FY2001 448,855</td>
<td>438,998</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FY1999 290,127</td>
<td>272,559</td>
<td>FY1999 112,527</td>
<td>107,455</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FY2000 312,539</td>
<td>294,959</td>
<td>FY2000 121,214</td>
<td>117,315</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FY2001 311,993</td>
<td>298,785</td>
<td>FY2001 128,541</td>
<td>124,690</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FY2002 304,172</td>
<td>293,240</td>
<td>FY2002 141,408</td>
<td>137,753</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other-coloured glass bottle</td>
<td>FY1997 107,533</td>
<td>95,190</td>
<td>FY2002 145,789</td>
<td>141,101</td>
<td></td>
</tr>
<tr>
<td>FY1998 136,953</td>
<td>123,227</td>
<td>FY2000 150,139</td>
<td>147,546</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FY1999 149,332</td>
<td>134,084</td>
<td>FY2000 135,910</td>
<td>132,386</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FY2000 164,551</td>
<td>150,139</td>
<td>FY2001 141,408</td>
<td>137,753</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FY2001 162,481</td>
<td>152,965</td>
<td>FY2002 145,789</td>
<td>141,101</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FY2002 163,903</td>
<td>156,856</td>
<td>FY2002 145,789</td>
<td>141,101</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paper packaging and container*</td>
<td>FY1997 34,537</td>
<td>26,310</td>
<td>FY2000 380,290</td>
<td>372,576</td>
<td></td>
</tr>
<tr>
<td>FY2000 47,620</td>
<td>45,192</td>
<td>FY2001 448,855</td>
<td>438,998</td>
<td></td>
<td></td>
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<tr>
<td>FY2001 57,977</td>
<td>54,145</td>
<td>FY2002 502,903</td>
<td>498,702</td>
<td></td>
<td></td>
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<tr>
<td>FY2002 21,361</td>
<td>19,330</td>
<td>FY1998 6,644</td>
<td>6,419</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PET bottle</td>
<td>FY1998 75,811</td>
<td>70,783</td>
<td>FY1999 8,939</td>
<td>8,670</td>
<td></td>
</tr>
<tr>
<td>FY1999 75,811</td>
<td>70,783</td>
<td>FY1999 9,574</td>
<td>9,416</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FY2000 124,873</td>
<td>117,877</td>
<td>FY2000 12,565</td>
<td>12,071</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FY2001 161,651</td>
<td>155,837</td>
<td>FY2001 13,136</td>
<td>12,435</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FY2002 188,194</td>
<td>183,427</td>
<td>FY2002 15,696</td>
<td>15,358</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastic packaging and container*</td>
<td>FY2000 100,810</td>
<td>77,568</td>
<td>Total (of available data from FY1997; excluding * items)</td>
<td>FY1997 1,249,418</td>
<td>1,175,189</td>
</tr>
<tr>
<td>FY2001 197,273</td>
<td>180,306</td>
<td>FY1998 1,383,022</td>
<td>1,315,218</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FY2002 282,561</td>
<td>268,640</td>
<td>FY1999 1,450,622</td>
<td>1,375,661</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FY2000 1,587,576</td>
<td>1,518,158</td>
<td>FY2000 1,607,183</td>
<td>1,547,447</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FY2001 1,586,119</td>
<td>1,546,234</td>
<td>FY2001 1,586,119</td>
<td>1,546,234</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FY2002 2,103,213</td>
<td>1,994,612</td>
<td>FY2002 2,103,213</td>
<td>1,994,612</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FY2001 2,303,034</td>
<td>2,211,026</td>
<td>FY2001 2,303,034</td>
<td>2,211,026</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Person discharging payment of fees for collection and recycling
recycling fee Air-conditioner \3,500, Television \2,700,
Refrigerator \4,600, Washing machine \2,400

Obligation to collect
Target appliances formerly sold by the retailer
Target appliances received in part-exchange

Retailer
Obligation to transfer

Designated collecting site

380 Designated collecting sites
39 Recycling Plants

Recycling

Obligation to collect
1 Bankruptcy of manufacturer, etc.
2 Consignment by medium and small businesses
Target appliances formerly manufactured or imported by the manufacturer or importer

Manufacturer
Importer

Designated corporation

Obligation of recycling

Recycling Standards: Air-conditioner 60%, Television 55%,
Refrigerator 50%, Washing machine 50%

Securing Reliable Transportation by Manifest System

Monitoring of implementation

Discharge

Collection and Transportation

Obligation to collect

Obligation to transfer

Municipality

Flow of Home Appliances Recycling
More than 10 million home appliances (4 items) were collected and recycled in FY 2002.

<table>
<thead>
<tr>
<th>Unit</th>
<th>Numbers collected (thousand)</th>
<th>Numbers recycled (thousand)</th>
<th>Amounts treated (ton)</th>
<th>Amounts recycled (ton)</th>
<th>Recycling rate (% of recycled/treated)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY2001</td>
<td>1,334</td>
<td>1,301</td>
<td>57,634</td>
<td>45,019</td>
<td>78%</td>
</tr>
<tr>
<td>FY2002</td>
<td>1,636</td>
<td>1,624</td>
<td>72,009</td>
<td>56,739</td>
<td>78%</td>
</tr>
<tr>
<td>FY2001</td>
<td>3,083</td>
<td>2,981</td>
<td>127,596</td>
<td>76,359</td>
<td>78%</td>
</tr>
<tr>
<td>FY2002</td>
<td>3,520</td>
<td>3,515</td>
<td>148,662</td>
<td>91,006</td>
<td>78%</td>
</tr>
<tr>
<td>FY2001</td>
<td>8,538</td>
<td>8,307</td>
<td>319,249</td>
<td>210,975</td>
<td>61%</td>
</tr>
<tr>
<td>FY2002</td>
<td>10,147</td>
<td>10,104</td>
<td>386,858</td>
<td>262,822</td>
<td>60%</td>
</tr>
</tbody>
</table>

The number and amount of home appliances for collection and recycling.
Outline of the Law Related to the Recycling of End-of-Life Vehicles

Car manufacturers/importers
(Carried out by themselves or entrusted to other companies)

Designated

Claiming costs
Payment

Capital management companies

Recycling fee

Car owners*1 (New car)

Used car

Motor vehicle inspection and registration system in compliance with Road Vehicle Act

Car owners

Delivery/acceptance obligation

Collecting companies
(Car dealers, auto repair shops)

Registered

Collecting companies
(Fluorocarbons, and etc.)

Registered

Dismantling companies

Licensed

Shredding companies

Licensed

ELV (End-of-Life Vehicles)

Payment

ELV

Delivery/acceptance obligation for fluorocarbons, etc.

Payment for collection

Delivery/acceptance obligation for airbags

Payment for collection

Delivery/acceptance obligation for shredding residues

ELV scraps

Metal, etc.

Reusable parts, etc.

Used parts market
Market for recycled metal, and others

*2 Third parties will be involved only in case of absence of a party responsible for recycling.

*3 Electric Control (Manifest) system was introduced, and information management available by third parties.

Source: The Industrial Structure Council
The outline of the flow and the recycling rate of the End-of-Life Vehicles in Japan

Car manufacturers
Importers

Car dealers etc.

New cars (about 5,610 thousand cars)
Imported cars (about 270 thousand cars)

Car owners

End-of-Life Vehicles (about 5 million cars)

Car dealers etc.

Used car stores (about 50,000)
Auto repair shops (about 80,000)

Car dealers (about 18,000)

Reuse parts
20 30%
(engine, body parts, electric parts)

Recycle parts
15%
(engine, catalyst, nonferrous metal, tire)

Body shells 55 65%
(the state of only the outer frame which removed engine, tire, etc.)

Dismantling companies (about 5,000)

Shredding companies (about 140)

Recycle (as parts)
20 30%

Recycle (as materials)
50 55%

Automobile Shredding Residue (ASR)
20 25%

Recycle 75 80%

Export (about 1 million cars)

Landfill
Incineration

The flow of a manifest
An orderer of construction work (demolition and construction work with a scale larger than designated) submits the notification to the prefectural government.

Note: The violation of notification is penalized.

Demolition work costs, etc. must be prescribed in a contract agreement.

• An order for change is issued, if a plan does not conform with certain standards.

A report on the completion of recycling is issued by a prime contractor to an orderer.

Governor of the prefectures

Note: The violation of order is penalized.

Implements the sorting of wastes generated from demolition work (Demolition work, etc. must be performed while waste is sorted based on the standards.)

Registration of demolition work companies

Note: The violation of registration is penalized.

Wood chips
Concrete
Asphalt
Other wastes

Implements the recycling of waste. (Consignment to a waste disposal company is also possible.)

Disposal (Recycling, incineration, landfill, etc.)

Advice, recommendation, and order.

Advice, recommendation, and order.

Basic policy of the Government

Guidelines of prefectural governments

Demolition work costs, etc. must be prescribed in a contract agreement.

Advice, recommendation, and order.

Governor of the prefectures

Note: The violation of order is penalized.

Wood chips → Timber boards, etc. (Reduction by incineration if recycling is impossible)
Concrete → Roadbed materials, aggregate, etc.
Asphalt → Recovered asphalt, roadbed materials, etc.

Note: The violation of registration is penalized.
Law for Promotion of Recycling and Related Activities for the Treatment of Cyclical Food Resources (Food Waste Recycling Law)

I. Purpose of Law

- Establishment of Cycling Society
- Prevention of waste generation
- Treatment for reduction of waste
- Recycling of waste

Recycling and related activities of food resources

II. Basic Policy (the Agriculture Minister, the Environment Minister, etc)

- basic course of promotion of recycling etc.
- target of the amount of recycling (20% of recycling rate in 2006) etc.
- measures to promote recycling etc.
- dissemination of the meaning of recycling etc.

III. Obligation on Parties Concerned

- Food-related businesses (manufacture, distributors, restaurants, etc)
  - Waste prevention
  - Recycling waste
- Consumers
  - Waste prevention using recycled product
- Government/Local authorities
  - Conducting measures to promote recycling products

IV. Instructions and Advice to Businesses

A decision criteria for businesses is set up by the government to promote recycling

- Action in accordance with the judgment criteria
- Instructions and advice of the competent minister
- Parties who generate larger amounts than those specified
- Advises/announcements
- Directives/penalties

V. Measurer to Facilitate Recycling

1) Registration system for recycling businesses
   a) Business that carry out recycling appropriately are registered by the competent minister
   b) Exception to the Waste Management Law, Fertilizer Control Law, and Feed Safety Law

2) Authorization system of the recycling businesses plan
   a) Recycling plans made by food-related businesses are authorized by the competent minister
   b) Exception to the Waste Management Law, Fertilizer Control Law, and Feed Safety Law
Law For Promotion of Effective Utilization of Resources

Basic Policy
The competent minister shall establish and announce the basic policy in order to comprehensively promote the effective use of resource by utilizing recyclable resources and reusable parts.

Responsibility

Business Entity
- Rationalize use of raw materials in order to reduce the generation of used goods and by-products
- Utilization of recyclable resources and reusable parts
- Promotion of the utilization of used goods and by-product as recyclable resources and reusable parts

Consumer
- Usage of the product for a long term period
- Promotion of the utilization of recyclable resources and reusable parts
- Cooperation with the government, local authorities and business entities in implementation of measures

Government, Local Authorities
- Securing of funds
- Promotion of the utilization of recyclable resources and reusable parts when procuring articles
- Promotion of science and technology
- Measures to deepen citizen’s understanding

Example
- *1 Steel, Paper, Chemical and Nonferrous metal industry
- *2 paper, glass container, construction and copy industry
- *3 car, electric appliance, large furniture, oil and gas appliance and personal computer
- *4 personal computer, copy machine, car
- *5 steel can, aluminum can, PET bottle, Ni-Cd battery, paper container package and plastic container package
- *6 personal computer and Ni-Cd battery
- *7 electric and construction industry
The Law for Promotion of Procurement of Recycled Products by the National Organizations and Local Authorities on its own Initiative (referred to as the Green Purchasing Law) has been established to actively procure environmentally friendly goods – such as recycled goods – by them, and to promote the provision of useful data concerning green purchasing.

The law specifies the types of environmental goods [specific procurement articles, communication/printing paper (recycling paper), official cars (low pollution vehicles), copiers (energy saving types)] to be promoted for procurement as a priority, and takes effect from April 2001.

**Promotion of procurement by the government, etc**

- Establishment of the basic policy
- Basic articles for each organization to prepare procurement policies

**National organizations**

(the Diet, law courts, Ministries, designated corporation etc)

- Preparing and announcing a procurement policy each fiscal year
- Promoting procurement based on the procurement policy
- Summarizing, announcing, and reporting procurement results to the Minister of the Environment

**Requests to other ministers from Minister of the Environment**

**Local authorities**

- Preparing a procurement policy for each fiscal year
- Promoting procurement based on the procurement policy (Obligation to implement policy)

Taking care not to increase the total amount of articles procured for environmental procurement

**Businesses / the public**

- Selecting environmentally friendly products as far as possible when purchasing goods

**Information provision**

**Manufacturers**

- Providing appropriate information on environmentally friendly products

**Information provision system, such as environment labels**

- Providing information while adopting international standards and scientific knowledge
- Continued studies into what information provision system is