Japan’s Resource Circulation Policy for Plastics

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Material Flow of Plastics in Japan

- Plastic waste = 9.4 million tons/year (2% of total waste: 431mt)
- Recycling rate = 24.8%, Recycling & Recovery rate = 81.6%
- CO2 emission (mainly incineration): 18 million tons (60% of waste sector)

[Use & waste generation]

- Plastic Waste (9,400 kilotons)
  - Used Products (8,680 kt, 92%)
  - Production Loss (720 kt, 8%)

[Collection]

- Packaging, Container 4,260 kt
  - Packaging 3,680 kt
  - PET bottle 580 kt
- Home Appliance 280 kt
  - Air conditioner, TV, Refrigerator, Washing machine
- Automobile 330 kt
- Small home appliance 60 kt
- Construction 590 kt
- Other product 3,060 kt
  - Household goods, Clothing, Furniture, Toy, Agri-Fishery tool etc.

[Recycling/treatment]

- Packaging Law (municipal collection) 1,040 kt
  - Packaging 745 kt
  - PET bottle 292 kt
- Home Appliance Law 120 kt
- Automobile Law 220 kt (ASR)
- Small appliance Law 6 kt
- Construction Law
- Other (Outside of recycle law e.g. burnable waste) 6,880 kt

Recycling 2,330 kt (25%)
Energy Recovery 5340 kt (57%)
Unutilized 1,730 kt (18%)

(Year 2013)
Reduction of Plastics

- Reducing plastic bags by partnership - agreement, voluntary actions
- Charge of plastic bags – major for supermarket and CO-OP

[Case study]
- 9 industries (incl. supermarket, laundry services, drug store, DIY store) charge plastic bags
- → 95% of consumers bring “MY Bags” (previously just 10-20%)

[Toyama Prefecture, Mar 2016]

(e.g. 5 cent for a big bag
3 cent for a small bag)

Tripartite Agreement for reduction of plastic bags
- Businesses: Stop free bags
- Government: PR · Coordinating
- Citizens: Enhance actions

Charge of plastic bags

<table>
<thead>
<tr>
<th>Business</th>
<th>Charge</th>
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<tbody>
<tr>
<td>Supermarket</td>
<td>80%</td>
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<tr>
<td>CO-OP</td>
<td>62%</td>
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<tr>
<td>Drug Store</td>
<td>25%</td>
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<tr>
<td>Department Store</td>
<td>20%</td>
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<tr>
<td>Convenience Store</td>
<td>9%</td>
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</tbody>
</table>
- Municipal waste: mainly 10-20 Separation for collection, recycling
- Plastic: Separation into 4 (Packaging, PET bottle, PS tray, Goods)

**Plastic waste**

- Plastic packaging → 745 kilotons/year
- PET bottle → 292 kilotons/year
- PS tray → 6 kilotons/year
- Plastic goods (*collected by small number of municipalities)

**Separation & Collection of Municipal waste (2015)**

- Municipalities
- Number of waste separation

![Graph showing separation and collection of municipal waste](image)
Collection of Plastic waste by business

- Separation into 4 (Bottle, cap, PS tray, Egg pack) with collection box

- PET bottle: 20 kilotons/year
- Egg pack: 10 kilotons/year
- Cap
- PS tray

(Shopping Mall) (Station)
Incentivized Collection of PET bottles

- Bottle collection connected with Electric Money system

Stores

Beverage Manufactures

Collection and Press of used bottles

Logistics

Resource Circulation

Recyclers

Recycled bottles

Mechanical Recycling (Bottle-to-Bottle)

Bottle collection is connected with an Electric Money system, incentivizing the collection of PET bottles. The process involves stores where bottles are collected, logistics for transportation, and recyclers for processing. Recycled bottles are then used in the resource circulation, and the collected bottles are pressed and recycled mechanically.
Recycling of plastic packaging

- Output: 60% as chemical recycling; 40% as material recycling

**Chemical (Feedstock) Recycling**
- Syngas
- Coal alternative with cokes oven
- Economic Value: $300-400/ton

**Material (Mechanical) Recycling**
- Palette
- Recycled resin (e.g.) PP resin (pellet) $300-400/ton

(The Japan Containers and Packaging Recycling Association)
Recycling of PET bottles

Output: 100% as material recycling (Sheet, Fiber, Bottle etc)

- Sheet: 44%
- Fiber: 34%
- Bottle: 21%
- Modeled item: 1%

(PET bottle with 100% recycled resin)

(Recycled PET tray for food)

(FY 2017)

(The Japan Containers and Packaging Recycling Association)
Collection & Recycling of Plastic Products with Packaging

Model Projects in 7 cities (approx. 82600 people in total) in FY2017 [Cities of Yokohama, Kawasaki, Osaka, Nagoya, Toyama, Hiroshima, Kitakyushu]

- PP – 37.1%
- Multi – 19.4%
- PE – 9.5%
- PS – 3.3%
- ABS – 2.8%
- PVC – 2.7% etc

Perspective | Result | Summary
--- | --- | ---
Quantity | ↑ | +36% : 48.1t/month (packaging only) → 65.6t/month
Quality | ↓ / ↑ | No problem with all recycling & recovery; same/better quality of recycled resins (compared to packaging only)
Efficiency | ↑ | Reduced the cost of overlapping sorting processes (between municipality and recycler)
Civilians’ acceptance (by enquête: n=1416) | ↑ | 74% regard as easier separation than packaging only; 81% say this separation system should be adopted

Combination of Mechanical, Chemical (feedstock) recycling & Thermal Recovery
New Financial scheme corresponding to China’s National Sword.

Promotion of domestic resource circulation

Before

From January 2018

Export of Plastics
1.5 million tons/year

PET bottle
0.3 million

Crush/Press

Simple Sorting

Mixed Collection

Export of Household Plastic Waste to China

Domestic Circulation

Materialization

Washing

Sophisticated Sorting

Separated Collection

Mainly exported to China

Export of Plastics
1.5 million tons/year

PET bottle
0.3 million

Financial support for upgrading domestic recycling (Subsidy ½ for new facilities)

No limit subjects (waste emitters, sorters, recyclers, compounders, molders OK)

Budget: $4 million in FY2017 → $15 million in FY2018

Example

Example
Public Procurement

- Strong incentives for 3Rs of plastics
  - Actions for reduction
  - Use reusable goods & recycled materials

Law Concerning the Promotion of Procurement of Eco-Friendly Goods and Services

- **Mandatory** for the national government
- Obligatory to **make effort** for local governments

1. Reduction
   - [Retail businesses] charge of plastic bags / reduction of packaging waste

2. Reuse
   - [Cafeteria] use reusable tableware (e.g. reusable cup)

3. Recycling
   - [Stationery] >40% as recycled plastic; >20% as post-consumer plastic
   - [Office Furniture] >10% as recycled plastic or >25% as bio-plastic
   - [Computers] >40% as recycled plastic
   - [Uniforms, Interior Fixtures] >25% as recycled/bio plastic etc
Further challenges for resource circulation

Huge potentials on 1) reduction 2) quantity 3) efficiency 4) market

1. Reduction
- Reduction of environmentally harmful plastics
  - Minimize – use of plastic bags/packaging

2. Quantity
- Collection & recycling of unutilized plastics
  - (*1.73 million tons)
  - Collect - plastic goods & other recyclable plastics
  - Optimize - combination of recycling & recovery

3. Efficiency
- Efficient 3Rs system
  - Integrate – citizens’ separation & industrial sorting
  - Exceed - vertically segmented recycling laws
    (*packaging, automobile, home appliance, small home appliance)

4. Market
- Activation of Recycled/Bio plastic market
  - Incentives - goods made of recycled/bio plastics
    (e.g. Discount on recycling fee for recycled/bio resin-used car)
Resource Circulation Strategy for Plastics

- Under proposal: in the draft of New Plan for a Sound Material-Cycle Society
- To be covered: Reduction, Reuse and Recycling of plastics;

Basic Principle

1. Corresponding to various challenges including Resource & Waste restriction, Marine Litter, Climate Change
2. Establishing a Sustainable Society & handing over Rich Environment to the Next Generation
3. Reducing the dependence on non-renewable resources & shifting to renewable resources
4. Collecting used resources thoroughly & re-utilizing (reusing and recycling) them many times with consideration on economic and technological feasibility

Concrete Measures

1. Reduction in the use of plastics contributing to lower environmental impacts, such as the reduction of single-use packaging and products
2. Collection and Recycling of used plastic resources like un-utilized plastics in the radical, effective and efficient manners
3. Improvement in the Practicality of Bio-plastics and; Replacement fossil-fuel based plastics with Bio-Plastics
Thank you so much for your attention
ありがとうございました

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Mottainai (もったいない)
• Japanese cultural word: a sense of worthiness and regret wastefulness
• Exclamation when something useful is wasted - “Don’t waste anything worthy”
• Kenyan environmentalist Wangari Maathai used Mottainai as a slogan for the four Rs: reduce, reuse, recycle and repair.
  “We should all use limited resources effectively and share them fairly if we are to avert wars arising from disputes over natural resources.”
The generation of municipal waste continues to decrease after recording a peak of 548.3 million tons in 2010. The amount of final disposal tends to decrease along with progress in recycling and reduction of waste generation.
The total generation of industrial waste has remained 390 million tons in 2010, almost unchanged since 1990. The final disposal tends to decrease with progress in recycling and a declining tendency of industrial waste in recent years.
## History of regulations related to waste management and recycling

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<th>Period</th>
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<th>Enactment of laws</th>
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| Post war - 1950s | - Waste treatment as a measure for environment and health protection  
- Conservation of healthy and comfortable living environment | - Public Cleansing Act (1954)                                                                                                                     |
| 1960s - 1970s | - Amount of industrial waste increases along with the high economic growth and the problem of pollution comes to the fore.  
- Waste treatment as a measures for environment conservation | - Act on urgent measures for improvement of living environment (1963)  
- Amendment of the Waste Disposal and Public Cleansing Act (1976) |
| 1980s | - Improvement of waste treatment plants is promoted  
- Environment conservation along with the waste treatment | - Act on Bay Area Marine and Environment Consolidation Centers (1981)  
- Law for Combine Household Wastewater Treatment Facility (1983) |
| 1990s | - Waste disposal control and promotion of recycling  
- Establish various recycling systems  
- Countermeasures for hazardous substances (incl. dioxin)  
- Introduction of systems for proper waste treatment, to accommodate a large variety of kinds and characteristics of waste | - Amendment of the Waste Disposal and Public Cleansing Act (1991)  
- Basic Environmental Act (1993)  
- Act for Promotion of Sorted Collection and Recycling of Containers and Packaging (1995)  
- Act on Special Measures against Dioxins (1999) |
| 2000 - | - 3R Promotion for building of a sound material-cycle society  
- Reinforcement of measures of industrial waste treatment  
- Law for the Promotion of the construction material recycling and Utilization of Recyclable Food Resources (2000)  
- Act Concerning Special Measures Against PCB Waste (2001)  
- Small Electrical and Electronic Equipment Recycling Act (2013) |
Legal system for building a sound material-cycle society

- **Basic Environmental Act**: Put completely into effect in August 1994
- **Act on the Promotion of Effective Utilization of Resources**: Revised completely and published in April 2001

**Basic Act for Establishing a Sound Material-Cycle Society** (Basic framework law) *Full enforcement: January 2001*
- Maintain proper material cycle of the society
- Reduce the consumption of natural resources
- Reduce environmental load

**Fundamental plan for Establishing a Sound Material-Cycle Society** *(=Fundamentals of other national plans)* *Published in March 2003, Completely revised in May 2013*

- Proper disposal of waste
- Promotion of material recycling

**Waste Disposal and Public Cleansing Act** *(Partially amended in May 2010)*
- Control waste generation
- Proper treatment of waste (incl. recycling)
- Regulation on establishment of waste treatment plants
- Control for waste treatment service companies
- Setting of criteria for waste disposal, etc.

**Act on the Promotion of Effective Utilization of Resources** *(Partially amended in May 2001)*
- Recycling of recyclable resources
- Design and review the structure and materials for facilitating the recycling
- Indicate how to separate waste
- Promote the effective use of secondary products

*Reduce Recycle → Reuse Recycle (1R) (3R)*

**Regulations depend upon characteristics of articles and materials**

- **Act on Promoting Green Purchasing** *(Promoted by the government taking initiative for purchasing of recycled products)* *Fully enforced in April 2001*

### Acts
- **Act for Promotion of Sorted Collection and Recycling of Containers and Packaging**
  - Fully enforced in April 2000
  - Partially amended in June 2006
  - Bottles, PET bottles, paper/plastic containers

- **Home Appliance Recycling Act**
  - Fully enforced in April 2001
  - Partially amended in June 2007
  - Air conditioner, refrigerator, freezer, TV sets, Washing machine, clothes dryer

- **Food Recycling Law**
  - Fully enforced in May 2001
  - Partially amended in June 2007
  - Food residue

- **Construction Waste Recycling Law**
  - Fully enforced in May 2002
  - Partially amended in June 2007
  - Wooden/concrete/asphalt materials

- **End-of-Life Vehicle Recycling Law**
  - Fully enforced in January 2005
  - Automobile

- **Small Electrical and Electronic Equipment Recycling Act**
  - Enforced in April 2013
  - Small electrical and electronic equipment

### Enforced Dates
- **Fundamental plan for Establishing a Sound Material-Cycle Society**: Put completely into effect in August 1994
- **Basic Act for Establishing a Sound Material-Cycle Society**: Full enforcement: January 2001
- **Basic Environmental Act**: Published in March 2003, Completely revised in May 2013
- **Act on the Promotion of Effective Utilization of Resources**: Revised completely and published in April 2001
- **Waste Disposal and Public Cleansing Act**: Partially amended in May 2010
The recycling rate of municipal waste is 20.8% (FY2010). The recycling rate of municipal waste has been rising steadily, and exceeded 20% in both FY2007 and FY2008.

The recycling rate of industrial waste is 53.0% (FY2009). The recycling rate of industrial waste, which has been rising gradually, exceeded 50% since FY2004.
The following policies were created so that each consumer, municipalities, businesses will have their own roles in:
- ① Sorting through waste
- ② Collection of classified waste
- ③ Recycle of containers and packaging waste

Specified business entities (manufactures of packages and Containers, business entities using packages and containers) - (Obligation for recycling)

Consumers (Sorted discharge)

Sorted collection of containers and packaging waste

Supply of Products

Local Municipalities (*City, town, villages) (Sorted collection)

Contract to take over the goods

Tender

Payment of recycling costs

Delivery of Products complying with sorted collection criteria

Fulfillment of obligations (Payment of recycling fee)

Recycling business - Execute the recycling/re-commercializing

(e.g. Manufacturer of flakes, pellets etc.)

Sort of recycled products

Businesses using recycled products

(e.g. manufacturer of sheets, fibers, etc.)

Flow of containers and packages

Flow of the costs for Re-commercialization

Sorted collection of containers and packaging waste

Appendix
The following policies were created so that each of consumer, municipalities, businesses will have their own roles in:

① Sorting through the waste ② Collection of classified waste ③ Recycling of containers and packages

**Duty**
- Consumer: Sorting through the waste
- Municipalities: Collection of classified waste
- Businesses: Recycling

**Target object**
- Container and packaging: a product’s containers and packages, (which will be no longer needed if once separated from the said product - or, if the said product is consumed.)
- Container and packaging: specified containers + specified packages
- Container and packaging waste

**Exceptions**
- Target object is limited to the general waste
- Permission not needed for specifically certified companies under the law.
  → Permission not needed for the Designated corporation, Companies certified by the minister (and their contractors) under the Waste Disposal & Public Cleaning Law.
Mechanism of Home Appliances Recycling Law

Target equipment: AC, TV (CRT, LCD, plasma TV sets*), refrigerators, freezers, washing machines, dryers

(Promulgation June 1998, full enforcement Apr, 2001)

(*) Portable TV, Car TV as well as bathroom TV are excluded

Disposers

1) Appropriate disposal
2) Payment of costs for collection and recycling.

Retailers

Obligation to take-back
1) Taking back home appliances that retailers themselves have sold
2) Taking back home appliances at the request of consumers who buy new ones to replace old ones

Obligation to Deliver

Designated Take-back Site

Manufacturers/Importers

Obligation to Take-back
Take back home appliances that they themselves manufactured or imported.

Obligation to Recycle
Recycling standards: AC: 70%, CRT TV: 55%, LCD/Plasma TV: 50%, refrigerator and freezer: 60%, washing machine and dryer: 65%

Designated body
1) When parties obliged to take back are unknown
2) When Entrusted by SMEs (Small & medium sized companies)

Secure reliable transportation under the manifest System

Issuance/Publication

Surveillance Of the Implementation

Municipalities

Designated body

377 Designated collection sites
49 Recycling plants
(As of June 2012)
Consumers, retailers, manufacturers must conduct each of their roles: ① Bear the costs, ② Collect and transport ③ Recycle the specified home appliances

**Duty**
- **Consumer**: Appropriate disposal, as well as bearing the costs
- **Retailer**: Collection and transportation
- **Manufacturer**: Recycling

**Target Object**
- Specified household appliances of post-consumer use: electrical appliances and other equipment, used by the general consumers in daily lives
- Specified household appliance waste (including general waste and industrial waste)

**Special exceptions**
- If the company is certified by the minister under Home Appliances Recycling Law, permission is not required.
- *It doesn’t change the company’s nature as subject to the law: obligation for waste disposal standards, or penalties are applied.

**Target appliances**: AC, TV (CRT)*, refrigerator, freezer, washing machines (*LCD TV, plasma TV, dryers also included)

Mechanism of Automobile Recycling Law

(July 2002 promulgated, January 2005 full-scale enforced)

Fund management corporation

Recycling fees

- Destruction fee of CFCs
  - Vehicle holders
  - ELVs
  - Transaction companies
  - CFCs destruction facilities
  - CFCs recycling fee
  - CFCs recycling companies
  - No CFCs

- Airbag recycle and recycling fees
  - Airbag recycling facilities
  - Pretreated dismantled vehicles
  - Dismantling companies
  - Dismantling vehicles
  - No CFCs

- Shredder residue recycling fee
  - Certificated Dealers of Whole Dismantled Vehicles
  - Shredder residue recycling facilities
  - Furesu, shear companies
  - Crushing companies
  - Uncertificated Dealers of Wholy Dismantled Vehicles (including exporting)
  - Transaction report
  - Delivery report

Vehicle producer and importer, and specified recycling companies

- Recycling fees
  - CFCs destruction facilities
  - CFCs recycling fee
  - CFCs recycling companies

- Airbag recycle and recycling fees
  - Airbag recycling facilities
  - Pretreated dismantled vehicles
  - Dismantling companies
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Information management center
Create a framework where owners, collection operators, fluorocarbon recovering operators, dismantling and shredder companies, automotive manufacturers must be under each of their roles: ① receive and hand over ② recycle used vehicles

Duty
- Owners: Hand over to collection operators
- Collection operator: transfer from the final owner, transfer to dismantling company (Air conditioner units should be handed over to fluorocarbon recovery operators)
- Fluorocarbon Recovery Operator: receive from collection operators, recover fluorocarbons, deliver to dismantling company
- Dismantling and Shredder companies: Recycle ELV (used vehicles or dismantled vehicles)
- Automotive Manufacturers: Recycling (Parts Specified for Recycling)

Target products
- Used vehicles: As for vehicles, those that have finished its use (Used parts, market dismantling for iron resources)
- Dismantled vehicles: Separate components, materials, and other useful parts that can be found by dismantling a used vehicle and the remaining materials after collection
- Parts Specified for Recycling: shredder residue (Automobile Shredder Residue), airbags (Parts Designated for Recovery), Fluorocarbons

Parts Specified for Recycling: shredder residue (Automobile shredder residue), airbags (Parts designated for recovery), fluorocarbons.

Special exceptions
- Used vehicles are handled as both industrial and general waste
- According to the ELV Recycling Law, dismantling and shredding companies that receive permission does not need permission under the Waste Disposal Law. It is also not necessary to apply for an industrial waste manifesto.
Small Home Appliance Recycling Law

- Legal framework to ensure stable recycling
  - Authorization of business operators by the Minister of the Environment and the Minister of Economy, Trade and Industry
  - Used small electronic devices collected by local governments being delivered to the authorized business operators
  - Exemption for the authorized business operators from obtaining permission based on the Waste Management and Public Cleansing Law

Enforced in April, 2013