

Legal System of Waste Management and Recycling in Japan

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Outline

1. History of waste management
2. Legislation
 - Legal framework
 - Promotion of 3Rs
3. Waste treatment
4. Specific recycling laws
 - Packaging waste
 - E-waste
 - End-of-life vehicles
5. Major difference between Japan and China

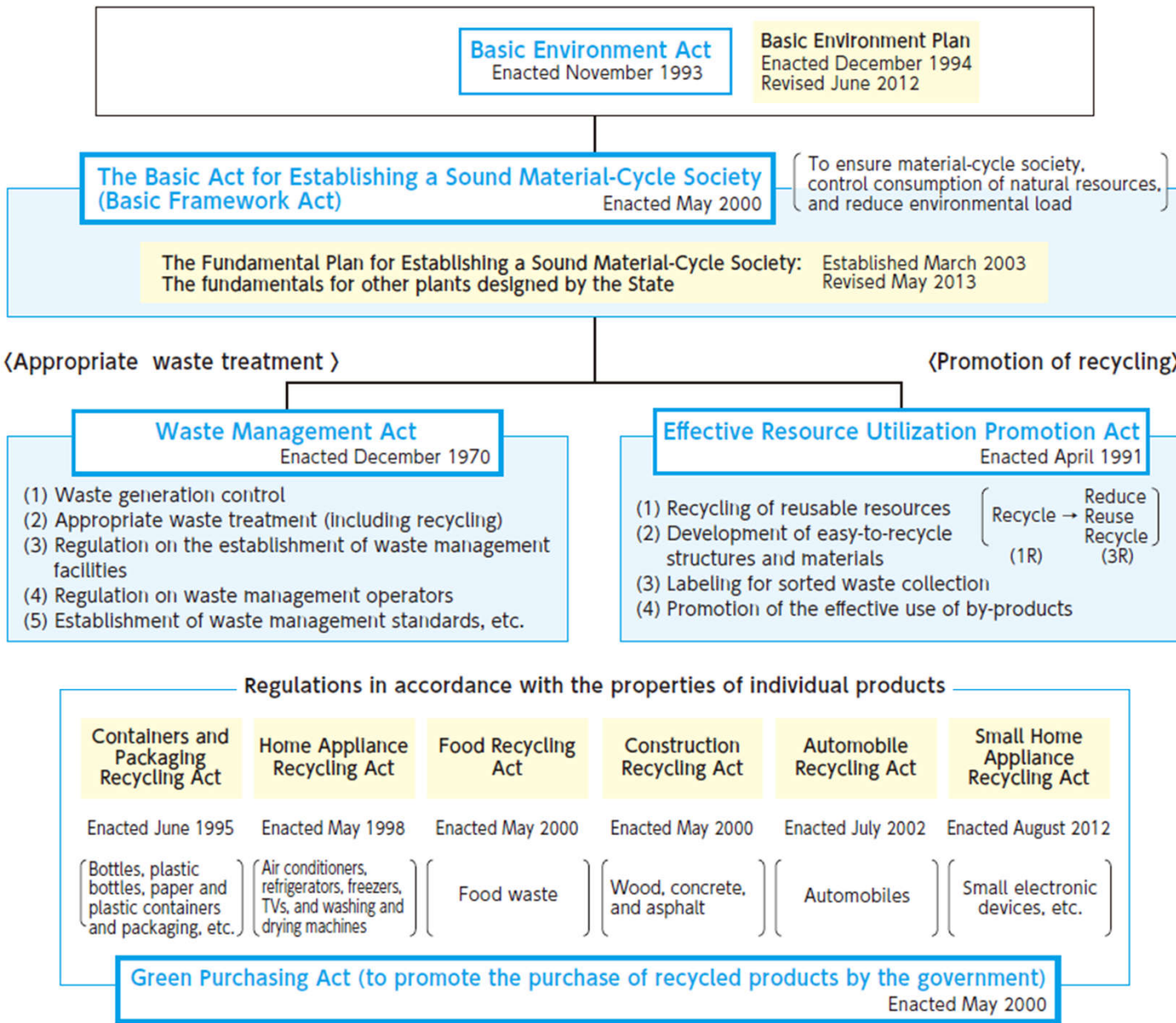
History (until Showa Period)

- Edo era: Material-cycle systems
- Era of public health improvement (Late 19th to early 20th centuries): unsanitary conditions of waste, The Waste Cleaning Act (1900), collection and disposal of waste by municipalities, waste incineration
- Post war period (1945 to 1950s): Increase of waste
⇒ **Public Cleansing Act in 1954**
- Rapid economic growth period (1960s to 1970s):
 - Rapid increase and diversity of urban waste
(**The Tokyo war against waste**)
 - Pollution, proper landfill of hazardous waste
⇒ **Waste Management Act in 1970**

History (modern age)

- Rapid economic growth period to the bubble economy period (1980s to early 1990s):
Mass consumption mass disposal ⇒ Serious shortage of landfills, large-scale illegal dumping (e.g. Teshima island in Kagawa Pref.), Problems of PCB, Dioxin, Asbestos etc.
- Era of establishment of a sound material-cycle society (1990s to 2000s) ⇒ Promotion of 3Rs
 - Containers and Packaging Recycling Act (1995)
 - Basic Act for Establishing a Sound Material-Cycle Society (2000)

Legal system for a "Sound Material-Cycle Society"





Enacted December 1994
Enforcement: August 1998

Enacted December 1994
Revised June 2012

Enacted May 2000

**Basic Act for Establishing a Sound Material-Cycle Society:
The Fundamental Plans for Establishing a Sound Material-Cycle Society**

[Establishment of a general scheme]

Enacted Dec. 1970

Waste Management Act

Enacted April 2001

Law for Promotion of Effective Utilization of Resources

[Individual Products]

Enacted June 1995

Containers and Packaging Recycling Law

Enacted May 1998

Home Appliance Recycling Law

Enacted May 2000

Food Recycling Act

Enacted May 2000

Construction Recycling Act

Enacted July 2002

End-of-Life Vehicles Recycling Act

Enacted Aug 2012

Small Home Appliance Recycling Act

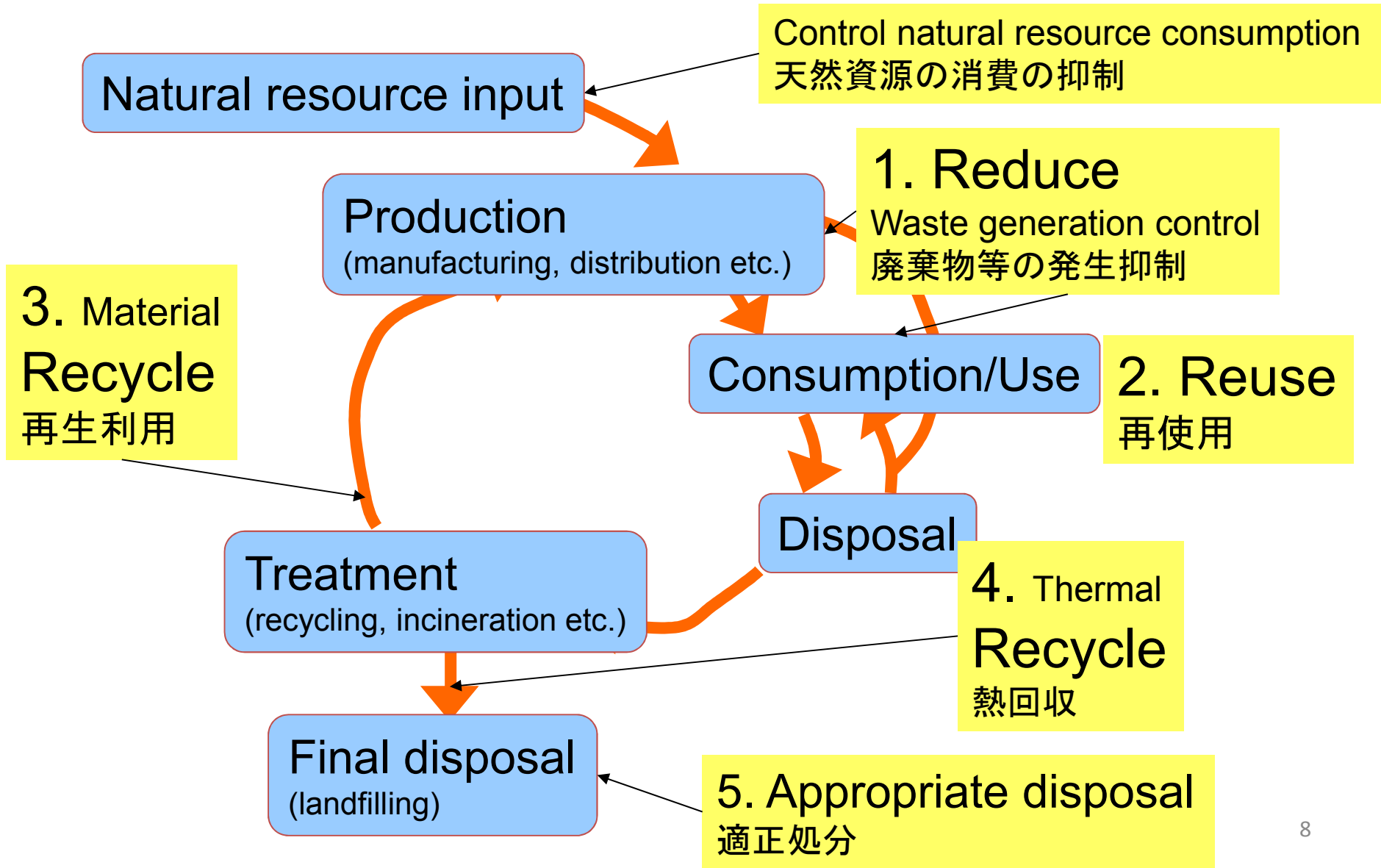
Green Purchasing Act
(Promotion of Procurement of Recycled products by the national government on its own initiative)

April 2001

Basic Act for Establishing a Sound Material-Cycle Society (enacted 2000)

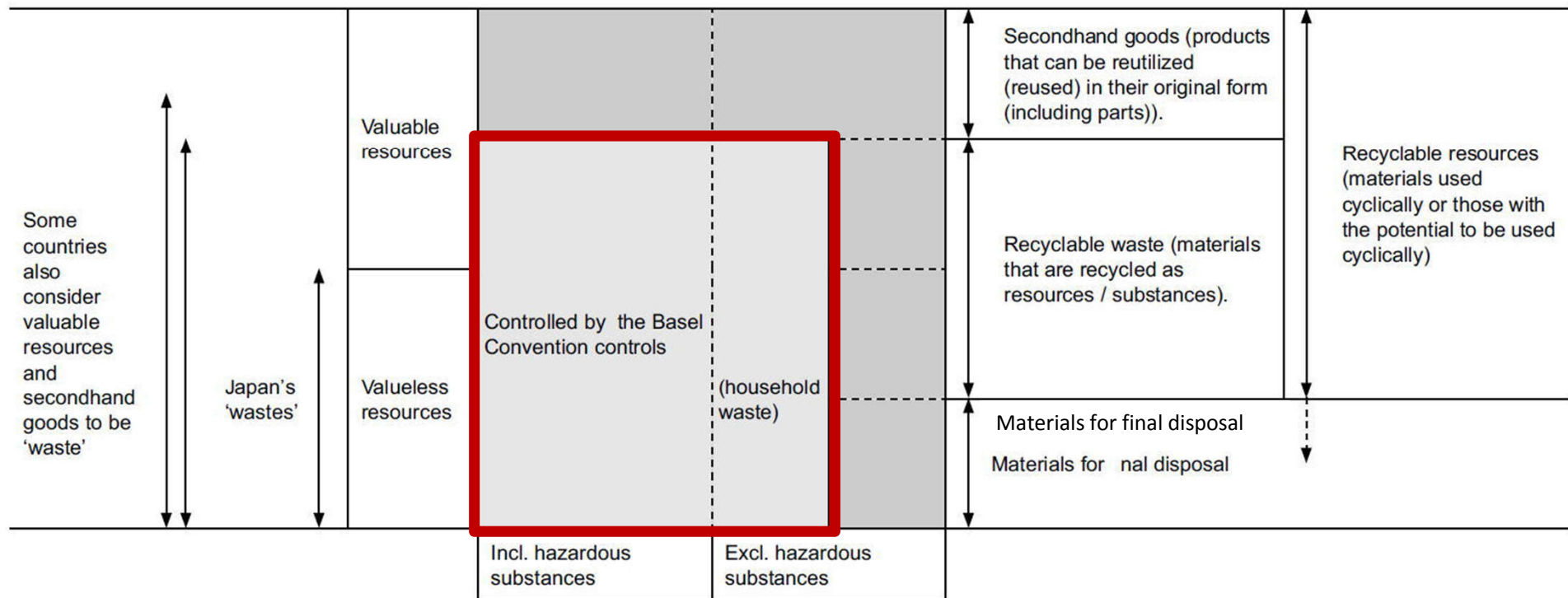
- To move away from the economic system based on mass production, mass consumption and mass disposal; and to promote the establishment of a sound material-cycle society designed to ensure the implementation of 3R and the appropriate management of waste
- The law defines “a Sound Material-Cycle Society” and “Recyclable material” and specifies the order of priority in the management of recyclable resources as well as the roles of different entities (national and local governments, business operators, and consumers)

Vision of a Sound Material-Cycle Society



Definition of Recyclable Resources, Secondhand Goods, Recyclable Waste and Waste

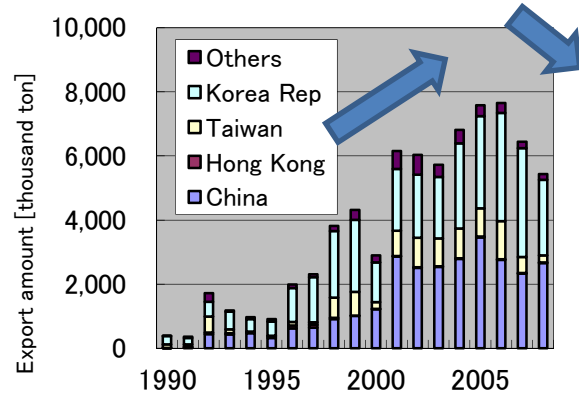
Figure 1-1: Definitions of Recyclable Resources, Secondhand Goods, Recyclable Waste and Waste



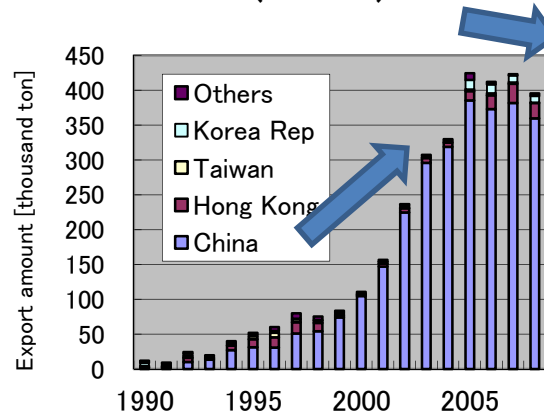
Source: Kojima (2005) Chapter 1 Current Trade Flows in Recyclable Resources within Asia & Related Issues, *International Trade of Recyclable Resources in Asia*, http://d-arch.ide.go.jp/idedp/SPT/SPT002900_005.pdf

Internationalization of Recycling リサイクルの国際化

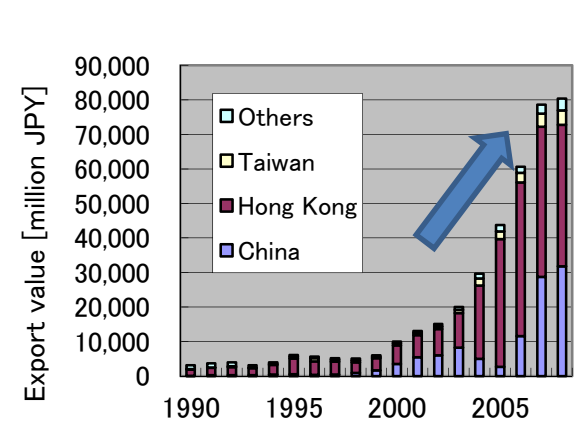
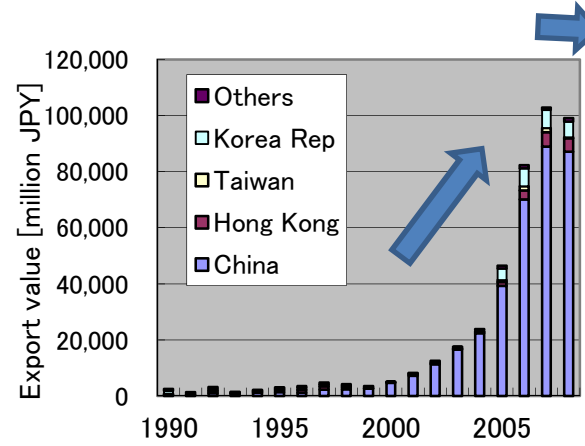
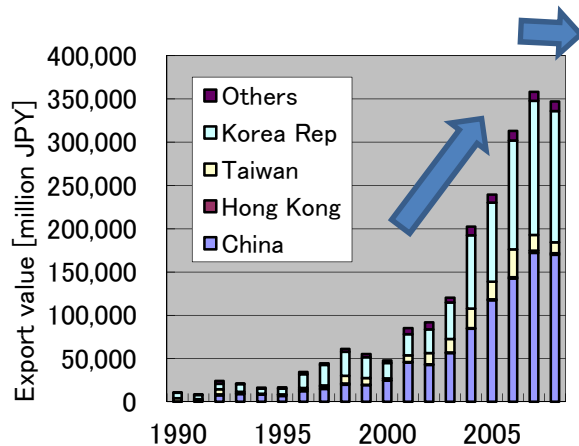
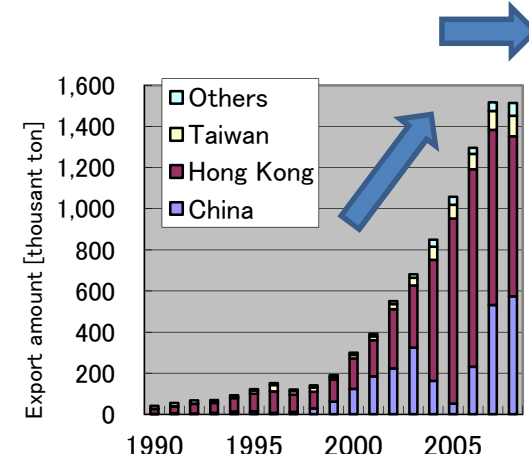
Scrap iron
(HS code:7204)



Scrap copper
(7404)

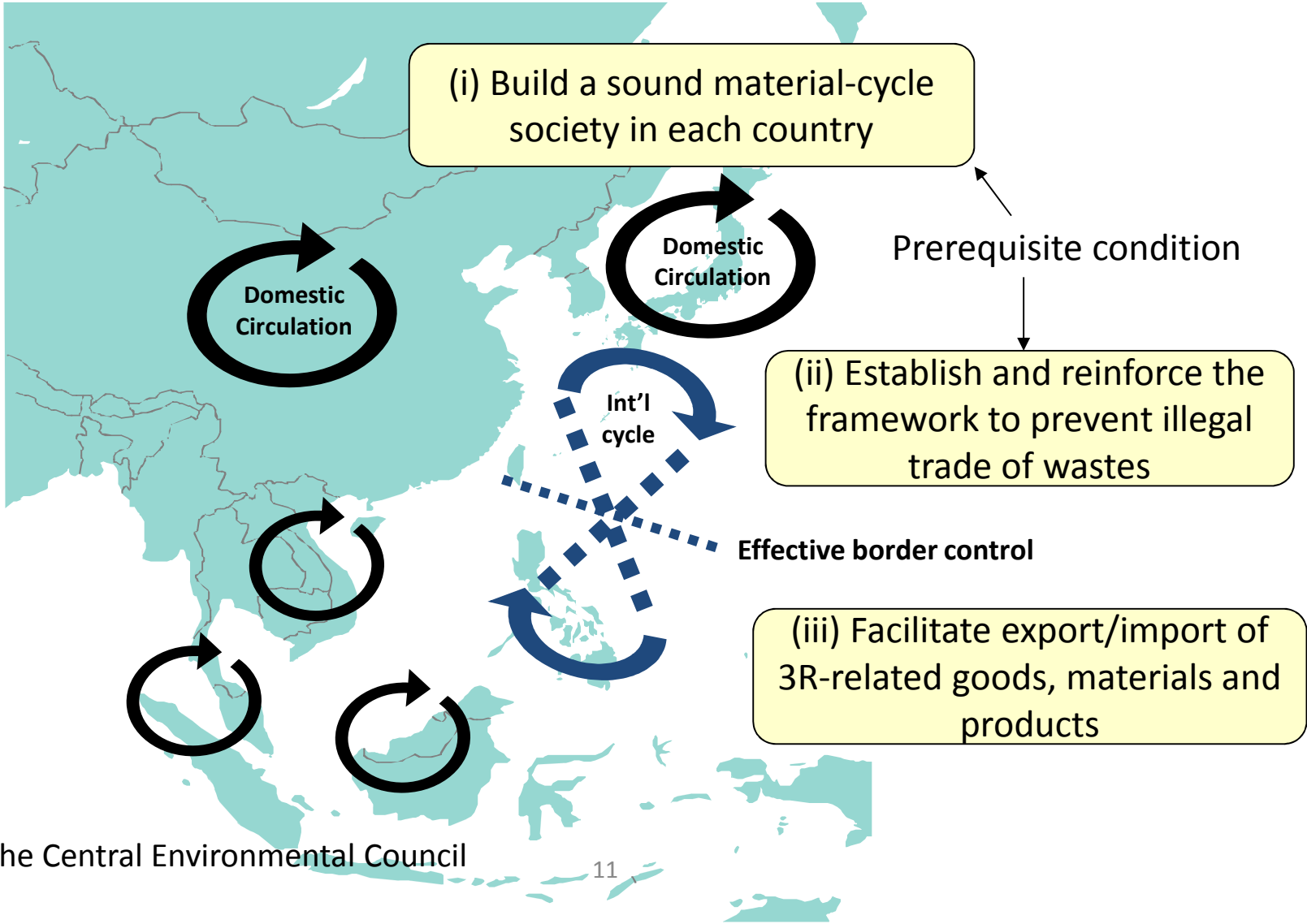


Waste plastics
(3915)



Export of recyclable resources from Japan

Vision for International Sound Material Cycle Society in Asia

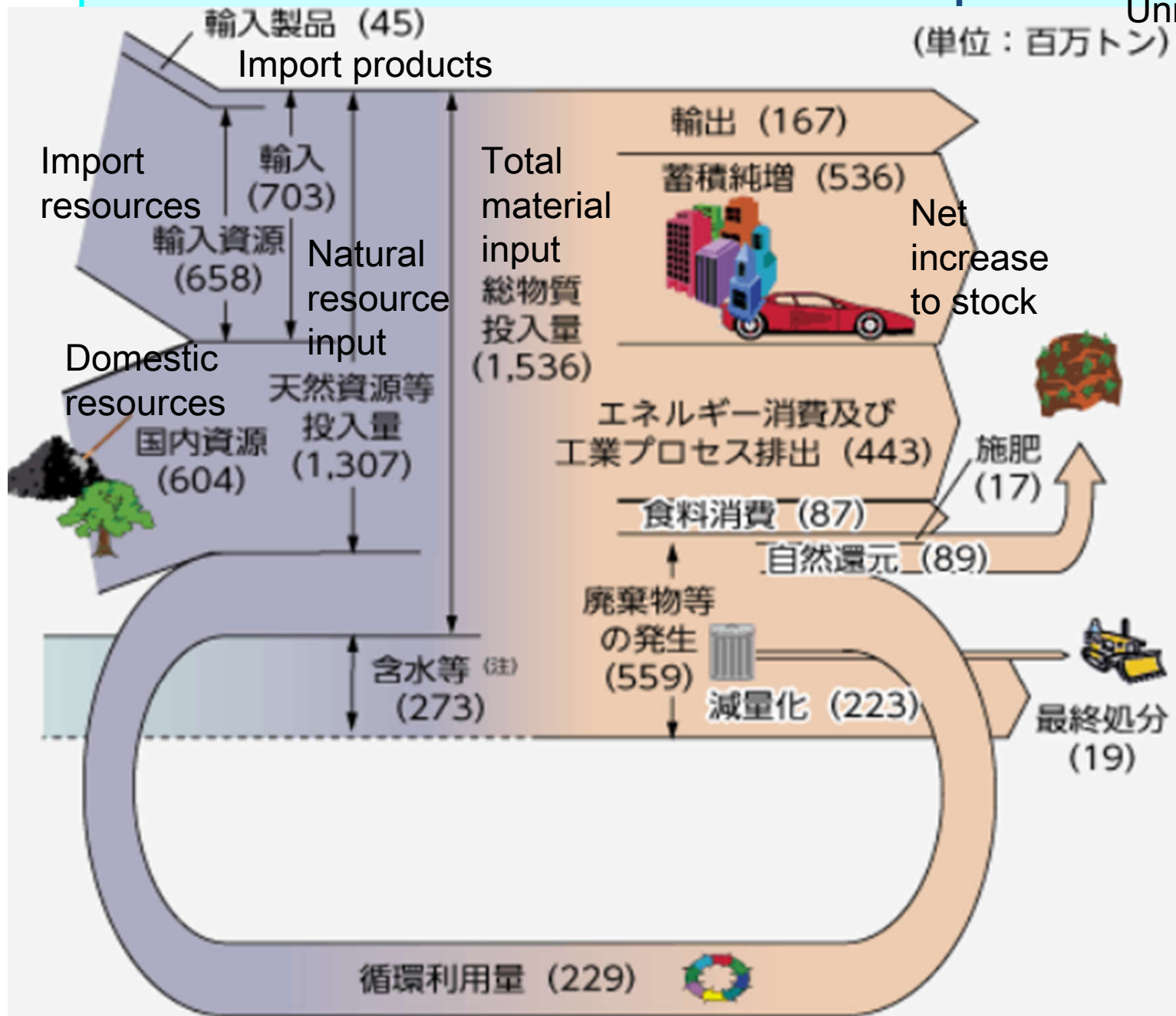


Source: the Central Environmental Council

Material flow in Japan

FY2009

Unit: million tons

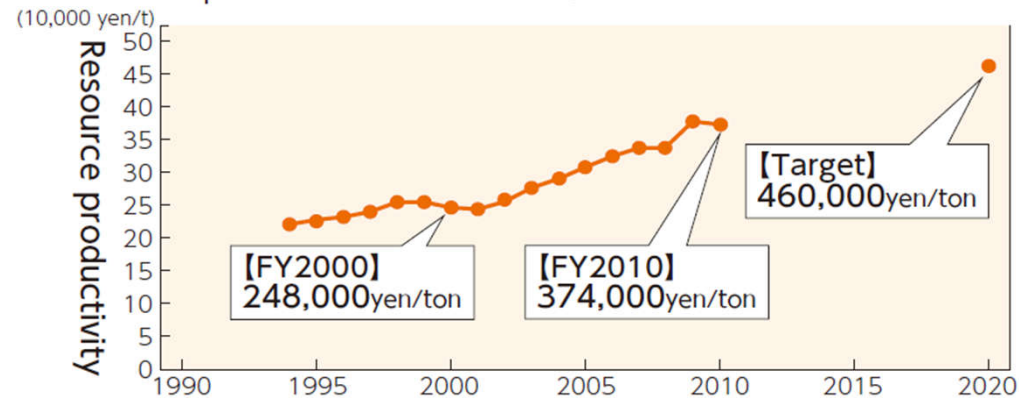


The Fundamental Plan for Establishing a Sound Material-Cycle Society

- Fundamental plan for establishing a Sound Material-Cycle Society is developed by the national government based on the Basic Recycling Act
- First plan in 2003, Second plan in 2008, and third plan in 2013, now preparing for the fourth plan
- Important points of the third fundamental plan
 - Strengthen 2R (Reduce, Reuse) that efforts has been delayed compared to Recycling
 - Recovery of valuable metals
 - Enhance safety and security
 - Promote international cooperation of 3R

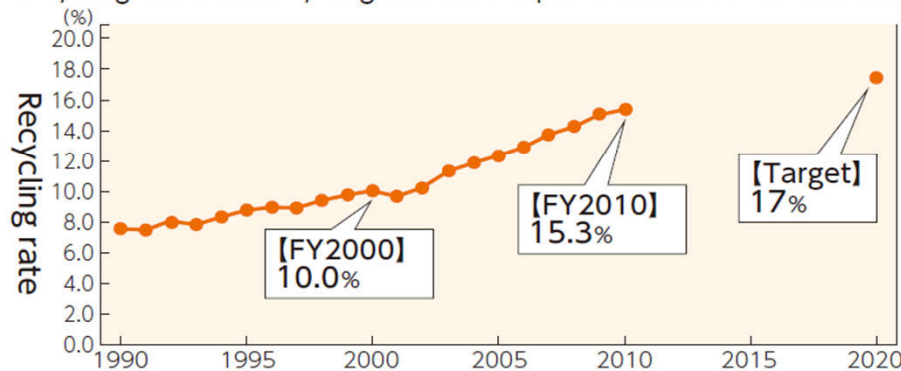
Target of the Third Fundamental Recycling Plan

■ Inlet: Resource productivity GPD / input of natural resources, etc.

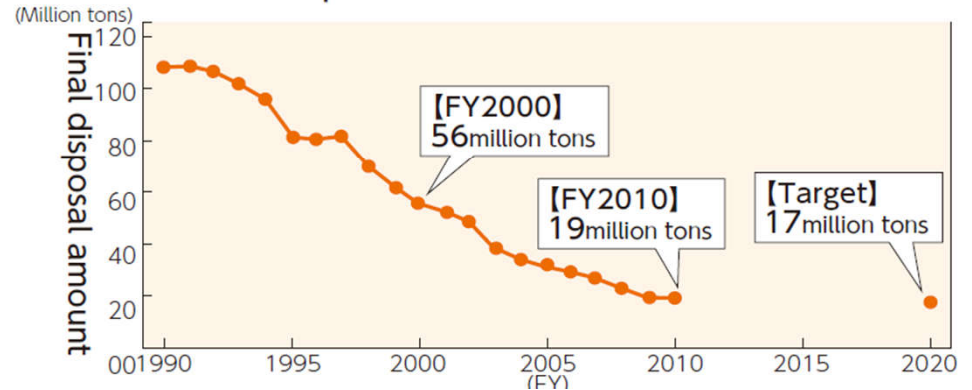


■ Cycle: Recycling rate

Recycling amount / (recycling amount + input of natural resources, etc.)

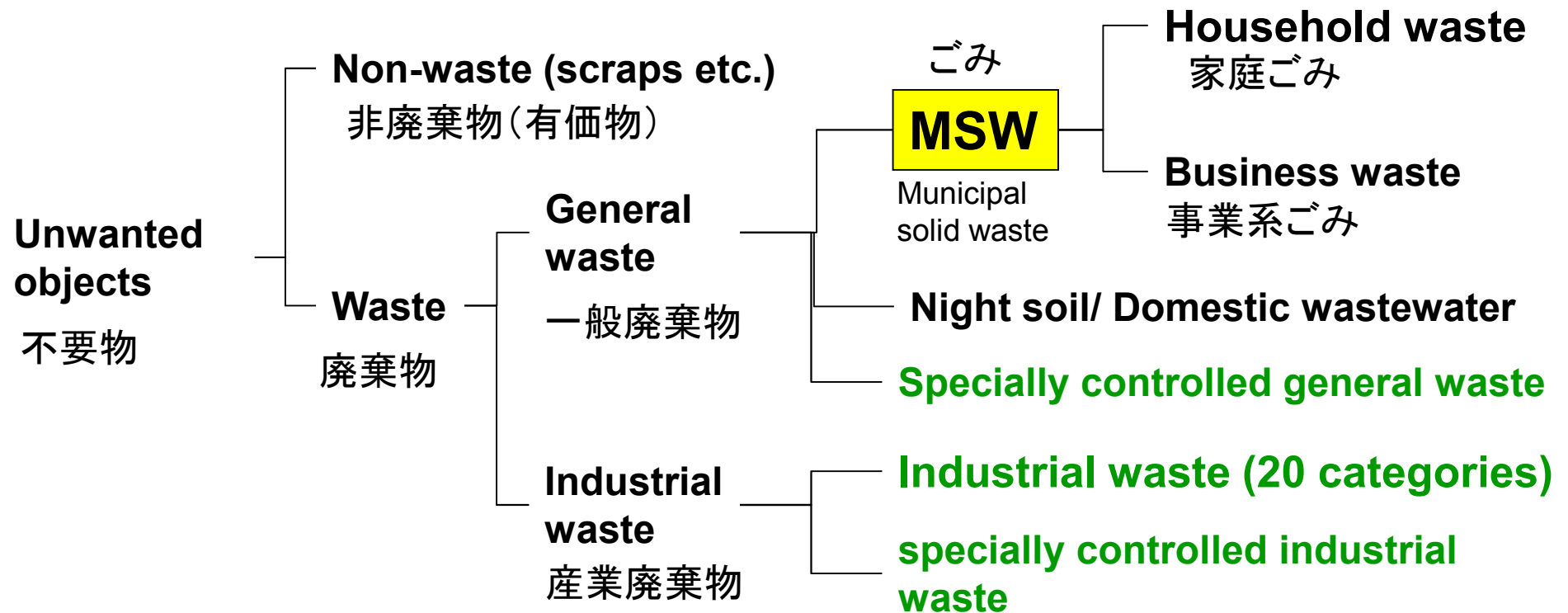


■ Outlet: Final disposal amount



Source: MOE, Overview of the Third Fundamental Plan for Establishing a Sound Material-Cycle Society

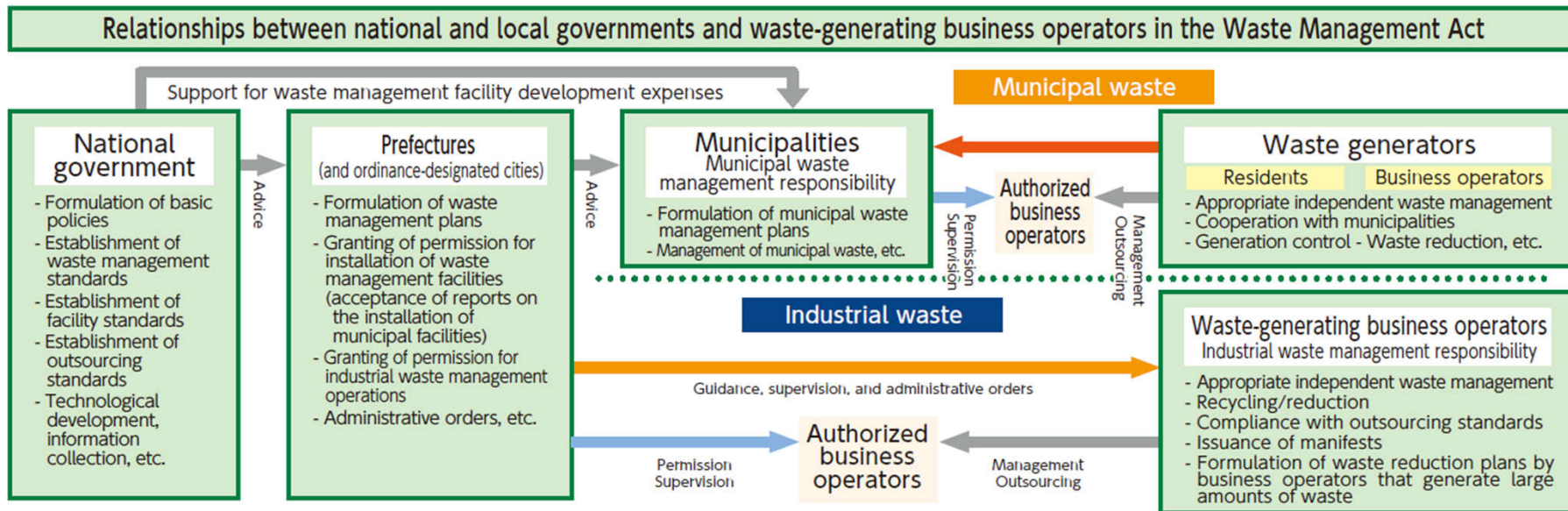
Waste category in Japan



Green letters : designated specifically

Roles and responsibilities of different entities

- Waste Management Act defines the responsibilities of national and local governments, business operators generating waste and consumers



Roles and responsibilities of different entities

National Gov.

- Enacting laws and regulations
- Providing technical and financial support for municipalities and prefectures.

Prefecture

- Authorize and supervise industrial waste processing operators business operations

Municipalities

- Responsible for managing general waste

Waste generators/ Consumers

- Reducing and sorting waste to be disposed of
- Waste-generating business operators

Responsibility of General waste treatment

- General waste from Business ▪ ▪ ▪ Business operators
- General waste from household ▪ ▪ ▪ Municipalities (市町村)

(Responsibilities of Citizens)

Article 2-3

The citizens shall cooperate with the central government and local governments in their activities for waste reduction by restricting their waste discharge, using recycled Articles or otherwise contributing toward the recycling and re-use of waste, sorting waste prior to discharge, managing of waste by themselves as far as possible and so on.

Why separation rules are so different among municipalities?

Waste management act

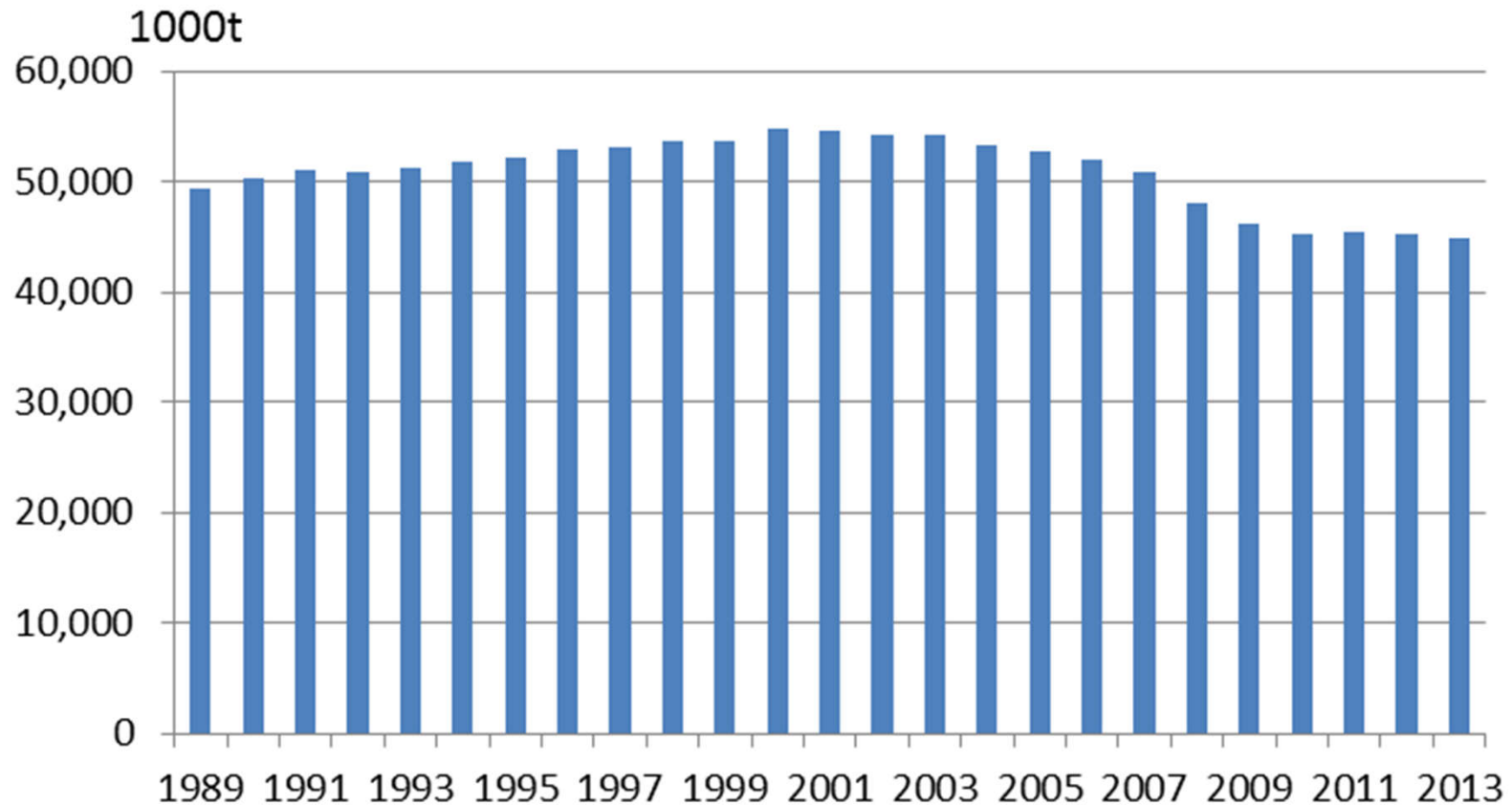
Article 6

The municipalities shall specify forth a definite plan for management of municipal solid waste in their respective administrative areas (hereinafter referred to as a "municipal solid waste management plan").

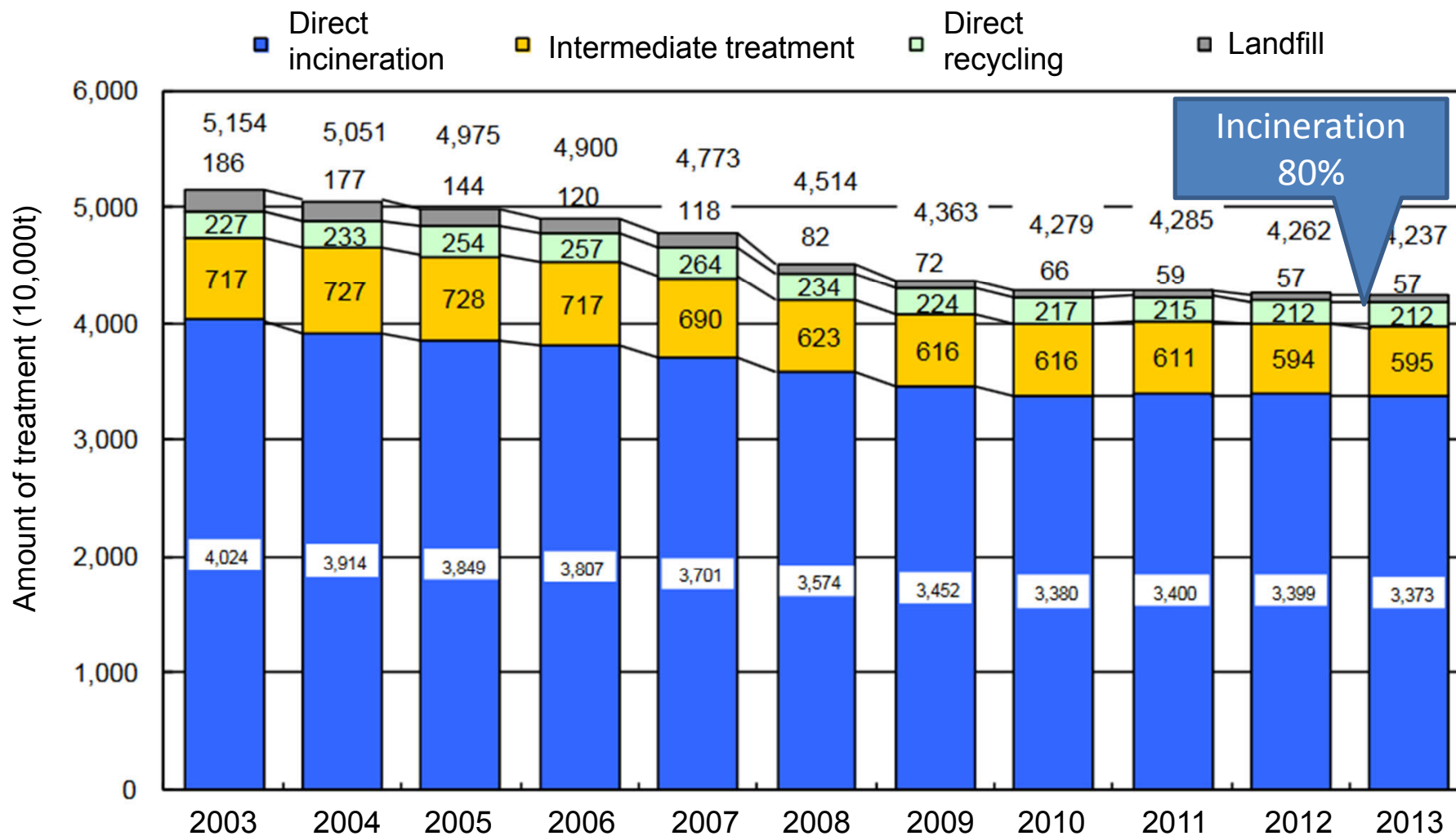
- 2 The municipal solid waste management plan shall include the following matters in regard to the management of municipal solid waste in their administrative areas according to the Ordinance of the Ministry of the Environment.
 - 1) Estimate of the volume of municipal solid waste to be generated and that to be managed.
 - 2) Matters related to measures for suppressing discharge of municipal solid waste.
 - 3) Kinds of municipal solid waste to be presorted for collectors and descriptions of those kinds.
 - 4) Fundamentals of proper municipal solid waste management and also the fundamentals relating to the authorities/persons carrying out such management.
 - 5) Matters pertaining to the improvement or expansion of municipal solid waste disposal facilities.
 - 6) Other matters necessary for the management of municipal solid waste.
- 3 The municipalities shall specify forth a municipal solid waste management plan in line with the basic plan in Paragraph 4 of Article 2 of the Municipalities Law (Law No. 67 of 1947).
- 4 Each municipality shall endeavor to make its municipal solid waste management plan consistent with similar plans of other municipalities with which the particular municipality is in close interrelations and that significantly affect the municipal solid waste management in its administrative area.
- 5 The municipalities shall set forth a municipal solid waste management plan, and make an announcement when changing them without delay.

Amounts of MSW generated

- 448.7 million ton (958g/person) in 2013
- Continuously reduced from the peak of 2000
- 65% is household waste

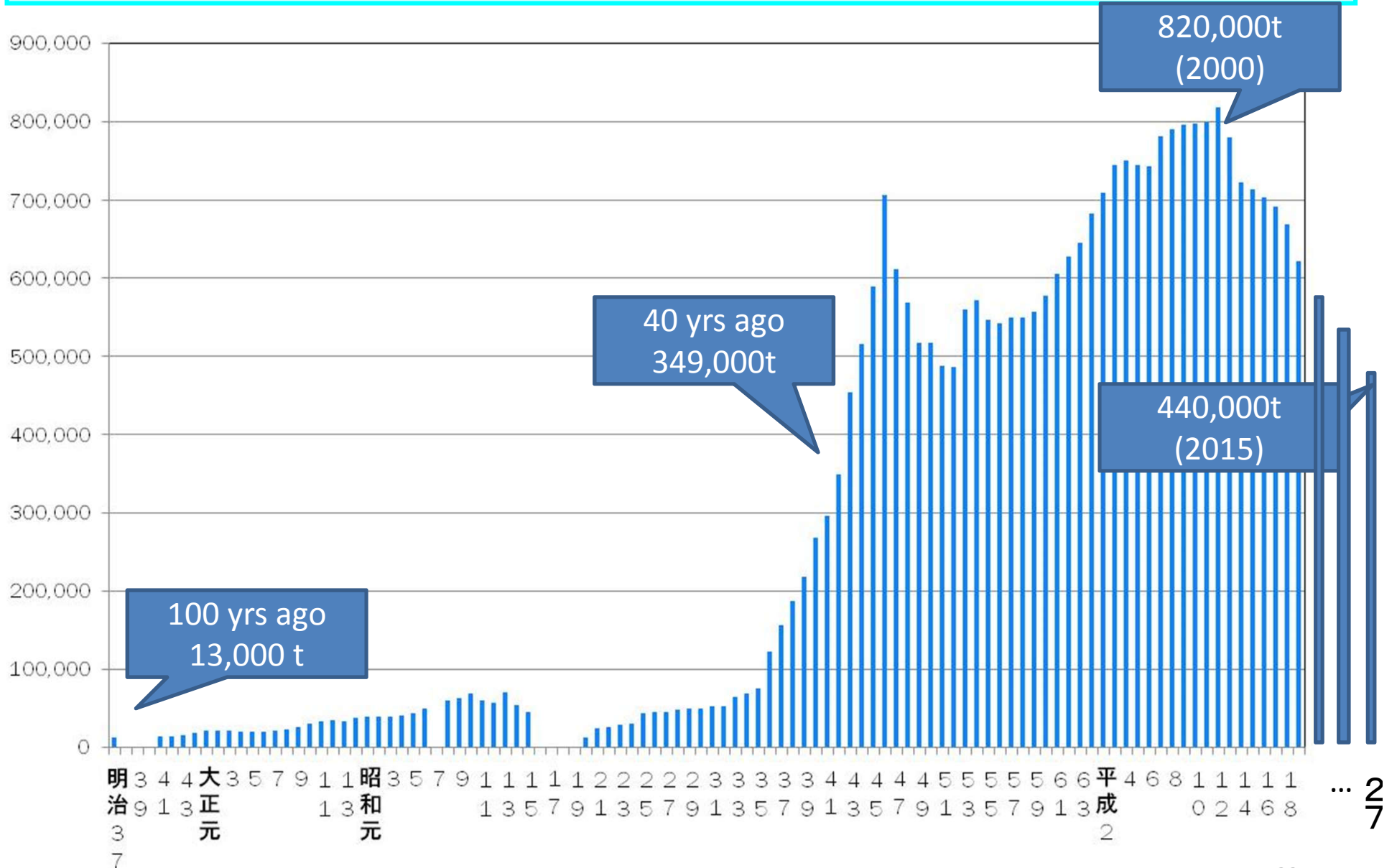


Amount of MSW treatment



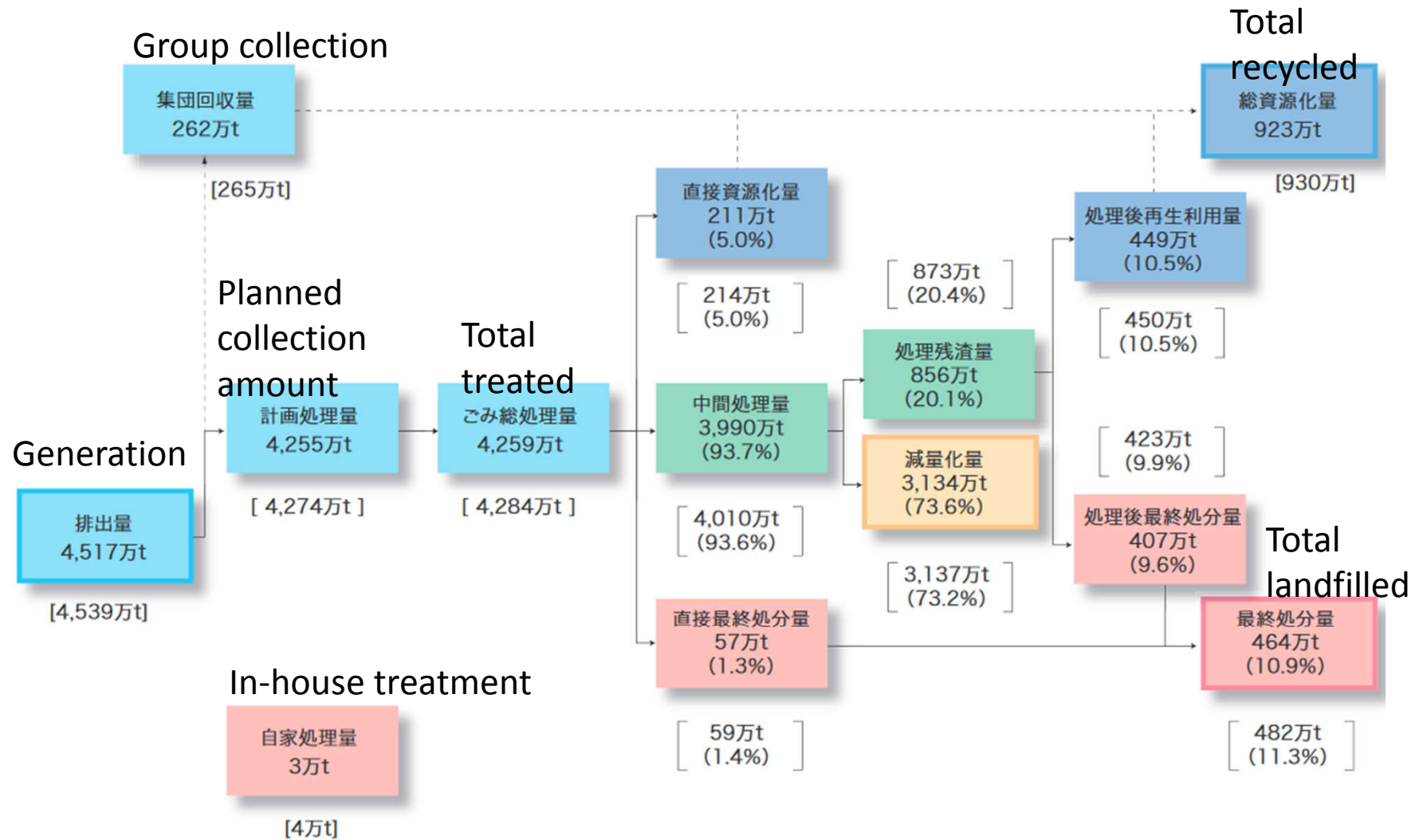
Source: Ministry of the Environment

Household waste of Kyoto city over 100 years



Source: Kyoto city government

図-1-4 全国のごみ処理のフロー（平成24年度実績）
Waste treatment flow (FY2012)



注1：計量誤差等により、「計画処理量」と「ごみ総処理量」（＝中間処理量＋直接最終処分量＋直接資源化量）は一致しない。
[] 内は、平成23年度の数値を示す。

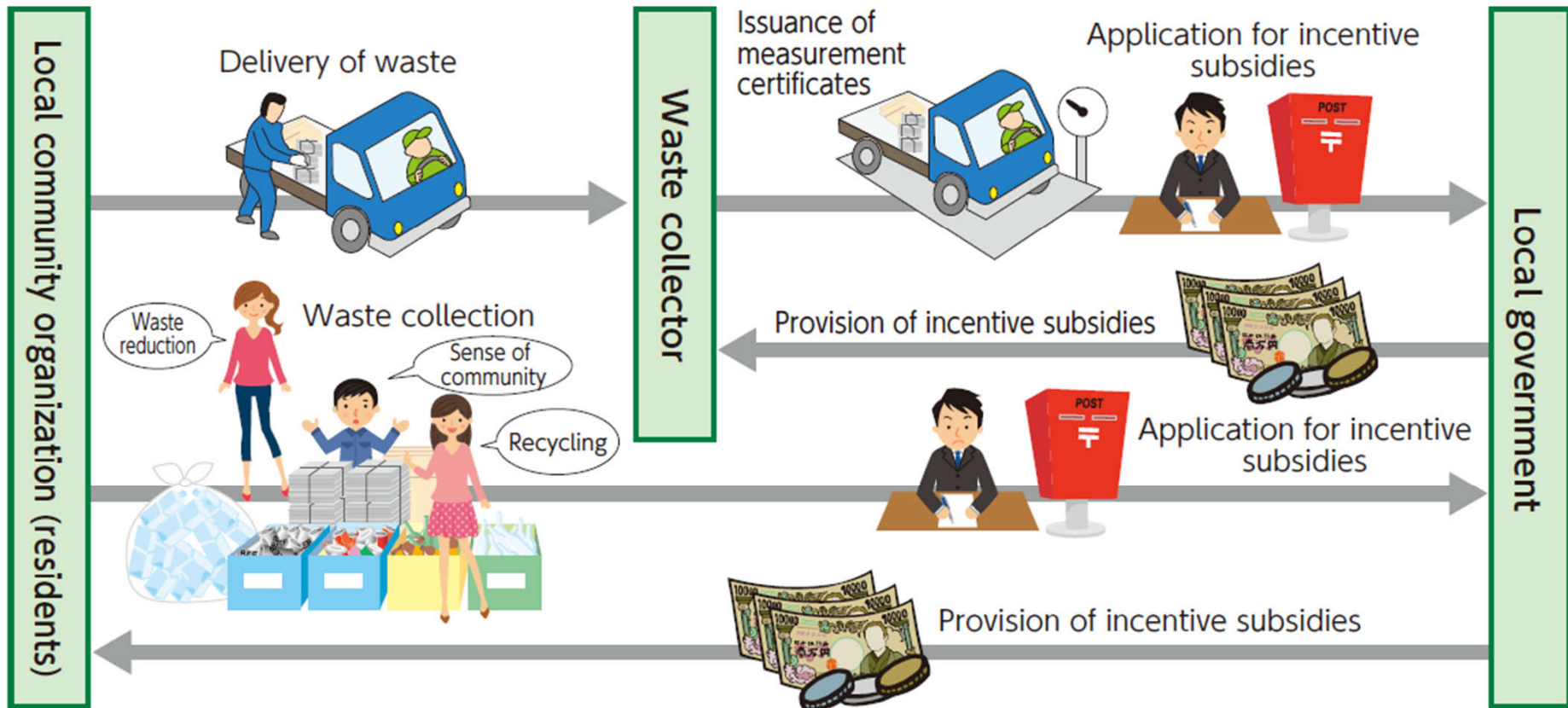
Community group collection

■ Group collection

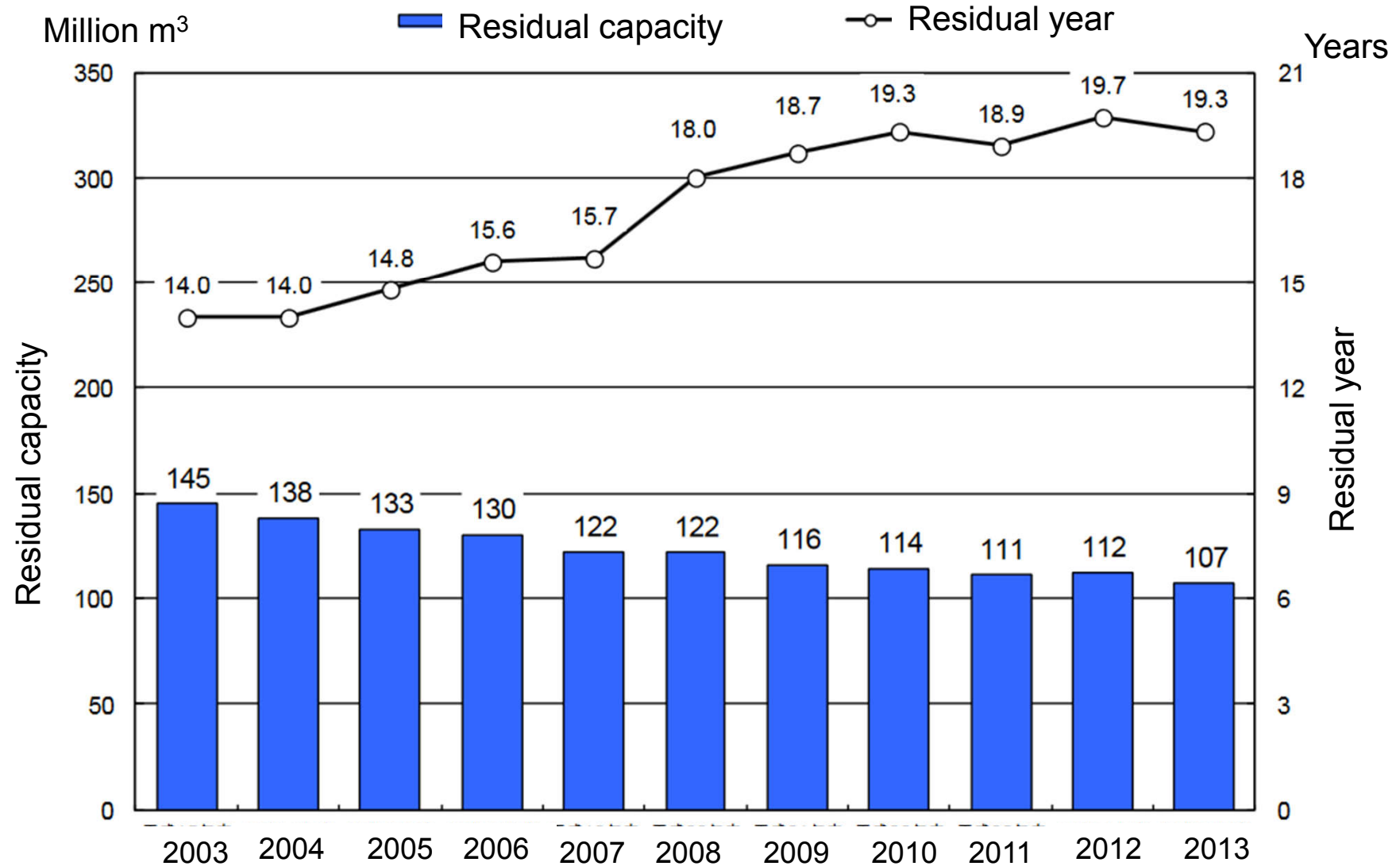
Group collection of waste is a system in which independent resident groups in local communities, including neighborhood associations, district organizations, and volunteer groups, collect recyclable waste discharged from homes, such as empty bottles, empty cans, used paper, and cardboard, in a specific place at a specific time, and deliver the collected waste to resource recycling operators in order to recycle waste as resources.

Group collection reduces waste collection costs not only for local governments, but also for waste collectors by enabling them to efficiently collect specific amounts of waste. Group collection provides advantages to residents as well, such as enabling them to sort recyclable waste at home on specific days and creating new opportunities for communication with other residents. To increase the amount of recyclable waste collected and to reduce waste, many local governments have created incentive systems, including providing subsidies to local community organizations that practice group collection.

Community group collection



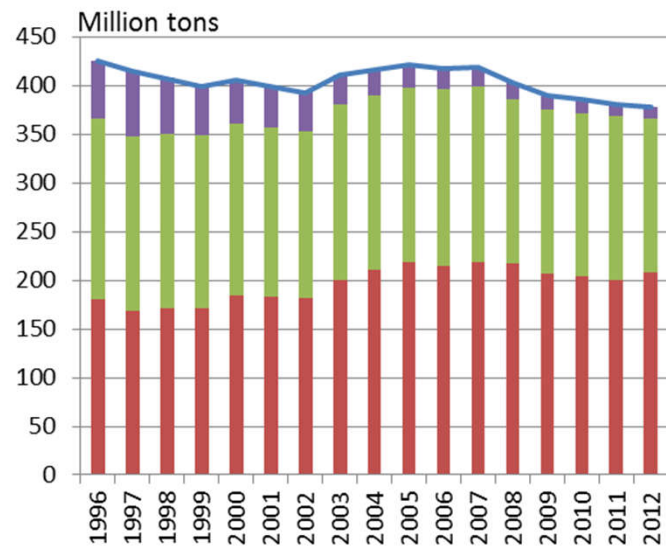
Landfills of MSW



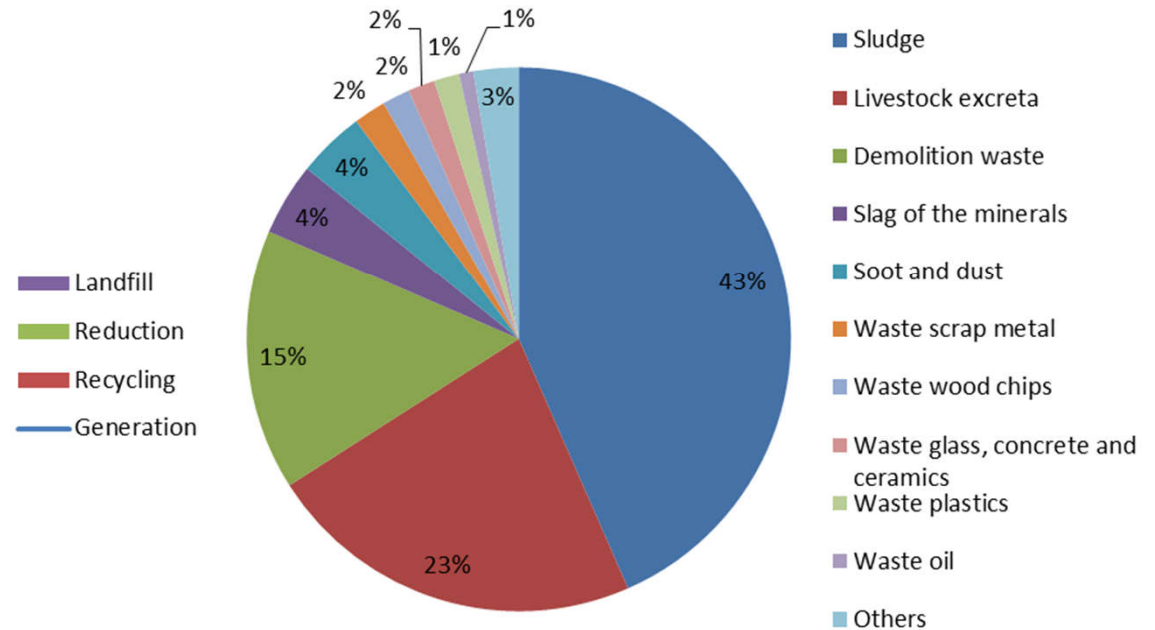
Source: Ministry of the Environment

Industrial waste

- Generation 400 million tons
- **50% of the generation is recycled.**



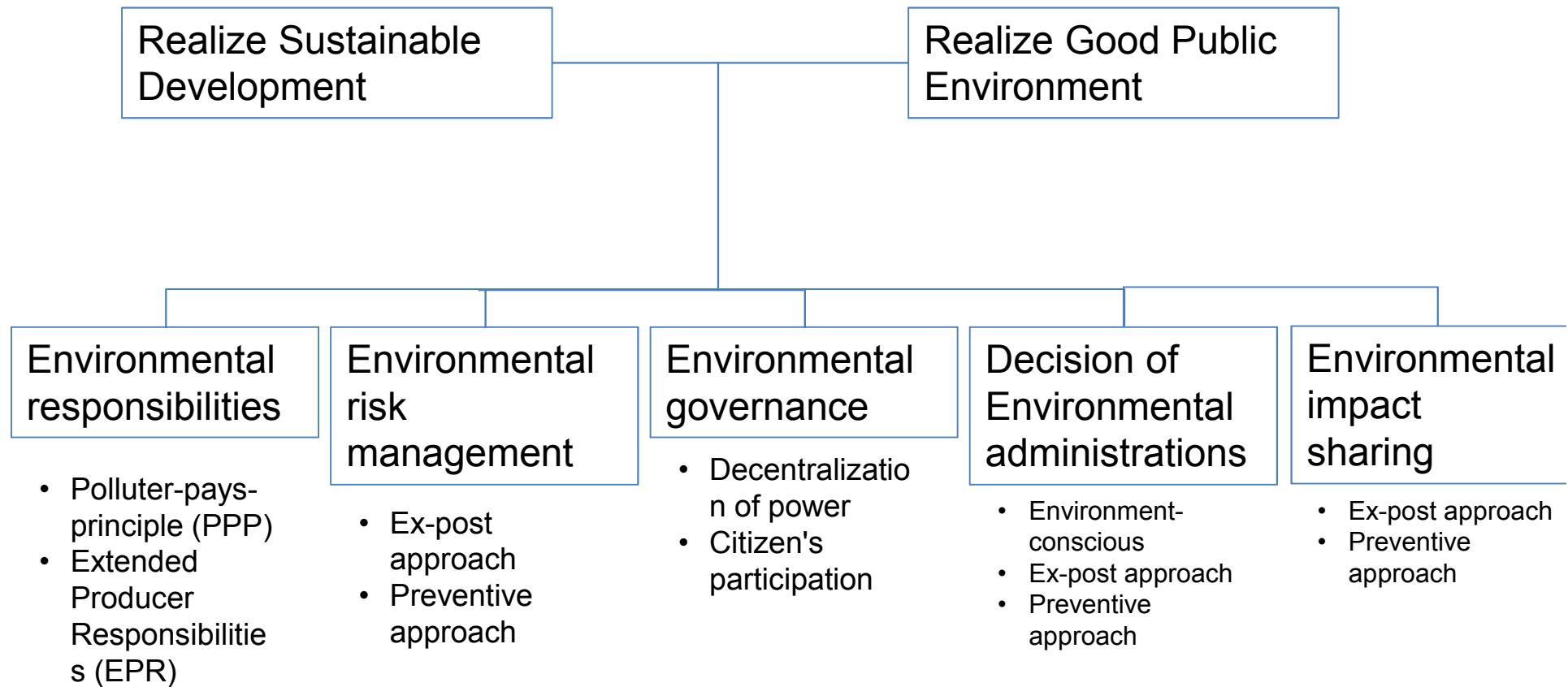
Industrial Waste Generation by Type (2012)



Industrial waste are classified into 20 types

3R Related Laws & Extended Producer Responsibilities

Ultimate Goals and Basic Concept of Environmental Laws



Definition of EPR (Extended Producer Responsibility)

- EPR is a policy approach under which producers are given a significant responsibility – financial and/or physical – for the treatment or disposal of post-consumer products (OECD (2001) Extended Producer Responsibility: A Guidance Manual for Governments).
- Physical responsibility: Take-back, recycle and disposal of the end-of-life products
- Financial responsibility: pay for the costs of treatment and disposal of the products

Background and context of EPR

Economic activities “over-use” the environment which generate the damages

→ It is important to internalize the environmental externalities. Extending the responsibility for the treatment of products at post consumer stage to the producers to influence product design.

Policy instruments of EPR

1. Take-back requirements
2. Economic instruments
 - a) Deposit-refund schemes
 - b) Advance disposal fees
 - c) Material taxes
 - d) Upstream combination tax/subsidy
3. Performance standards

EPR in the legislation of Japan (1)

Basic Act on Establishing a Sound Material-Cycle Society,
Article 11(Responsibility of Business Operators)

- Prevent or reduce the incidence of raw materials, products, containers, etc. becoming wastes
- Increase the durability of the products, containers etc. and strengthen systems for conducting repairs to these goods.
- Considerate the design and selection of raw materials for products, containers, etc.
- Collect or undertake the proper cyclical use of, these products, containers, etc. which have become circulative resources

EPR in the legislation of Japan (2)

Waste Management Act: For proper disposal of waste

- Paragraph 2 Article 3 Develop products and provide information on appropriate management to ensure appropriate management of the products/containers without difficulty.
- Article 6-3 (Specified appropriate disposal difficult products)
The Minister of the Environment can specify certain MSW which are difficult to be treated and managed properly. The mayors of the municipalities can demand the cooperation of the businesses who manufacture or handle the products/containers
- Article 19-2 The minister of the Environment can demand the other ministers who have regulative power over manufactures etc, place a mark indicating the material and the method of processing it on a product.

EPR in the legislation of Japan (3)

Act on the Promotion of Effective Utilization of Resources (Enacted in 1991), specifies rules about measures to promote 3R in product manufacture and design, implement voluntary collection and recycling

Industries, products and by-products designated by government ordinance

- Industries specified for resource conservation

Targeted industries : Five industries, including paper manufacturing and steel manufacturing industries

Objective : Reduction in the generation of by-products and promotion of recycling

- Industries specified for reuse

Targeted industries : Five industries, including paper manufacturing and glass container manufacturing industries

Objective : Recycling of waste as raw material and reuse of parts

- Specified by-products

Targeted by-products : Coal ash in the electric industry and soil, concrete blocks, wood, etc. in the construction industry

Objective : Reuse of waste as raw material by relevant business operators

- Products specified for resource conservation

Targeted products : 19 products, including automobiles, home appliances, and PCs

Objective : Streamlining of the use of raw materials by manufacturers, promotion of long-term use, etc.

- Products specified for reuse

Targeted products : 50 products, including automobiles, home appliances, and PCs

Objective : Promotion of easy-to-recycle product designs by manufacturers

- Products specified for labeling

Targeted products : Seven products, including steel cans, aluminum cans, plastic bottles, and small reusable batteries

Objective : Identification labeling for sorted collection

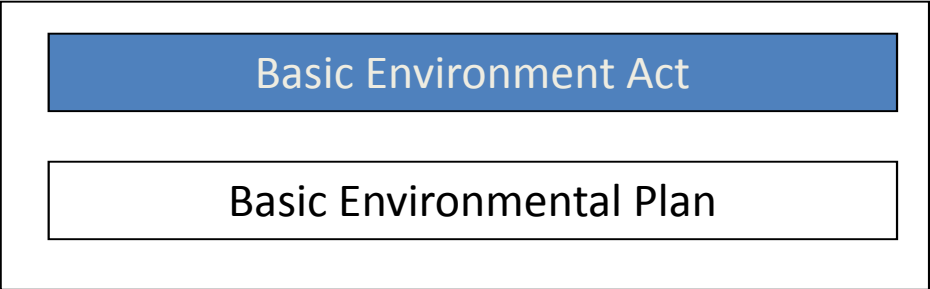
- Products specified for recycling

Targeted products : PCs and small reusable batteries

Objective : Collection and recycling by business operators

Implementation EPR

Law	Implementation
Containers & Packaging Recycling Act	Targets: Containers and packages Specified business operators are obliged to recycle containers and packaging
Home Appliance Recycling Act	Targets: Specified four large home appliances which are difficult to be treated by the municipalities Retailers to accept end-of-life home appliances Manufacturers to recycle waste home appliances
End-of-Life Vehicle Recycling Act	Targets: end-of-life vehicles Automobile manufacturers to accept and recycle three automobile items (shredder residues, CFCs, and air bags)



Enacted December 1994
Enforcement: August 1998

Enacted December 1994
Revised June 2012

Enacted May 2000

**Basic Act for Establishing a Sound Material-Cycle Society:
The Fundamental Plans for Establishing a Sound Material-Cycle Society**

[Establishment of a general scheme]

Enacted Dec. 1970

Waste Management Act

Enacted April 2001

**Law for Promotion of Effective
Utilization of Resources**

[Individual Products]

Enacted June 1995

**Containers and
Packaging
Recycling Law**

Enacted May 1998

**Home
Appliance
Recycling Law**

Enacted
May 2000

**Food
Recycling
Act**

Enacted May 2000

**Construction
Recycling Act**

Enacted July 2002

**End-of-Life
Vehicles
Recycling
Act**

Enacted
Aug 2012

**Small Home
Appliance
Recycling
Act**

Green Purchasing Act April 2001
(Promotion of Procurement of Recycled products by the national government on its own initiative)

Containers and Packaging Recycling (enacted in 1995)

Purpose: Reduce and adequate recycling of container and packaging, adopt the concept EPR and specify the roles of stakeholders

Outline of the act:

- Promote recycling of waste containers & packaging
- Reduce the amount of MSW, Utilize recyclable resources
- Proper treatment of waste

Presiding ministry: Ministry of Economy, Trade and Industry (METI), Ministry of the Environment (MOE)

Containers & Packaging

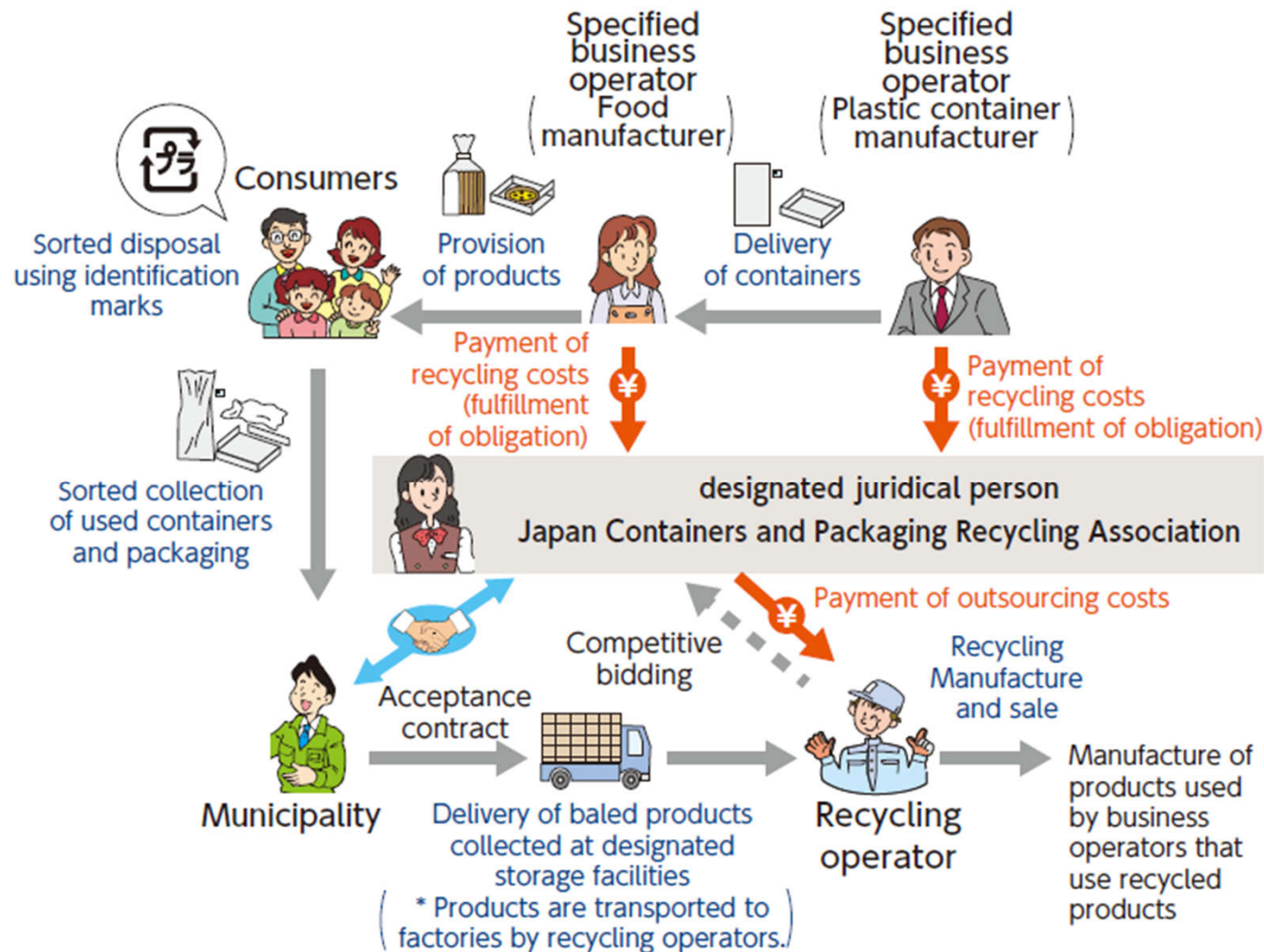


Containers & Packaging which used for transportation, protection of the products, promotion of sales etc.

Something which become useless when product was consumed or separated from the products



Flows of recycling costs and containers and packaging



Lightweight of containers & packaging

<本品>



容器樹脂量：56%削減
CO₂排出量：55%削減
(1回使用量あたり)

<つめかえ>



容器樹脂量：39%削減
CO₂排出量：39%削減
(1回使用量あたり)

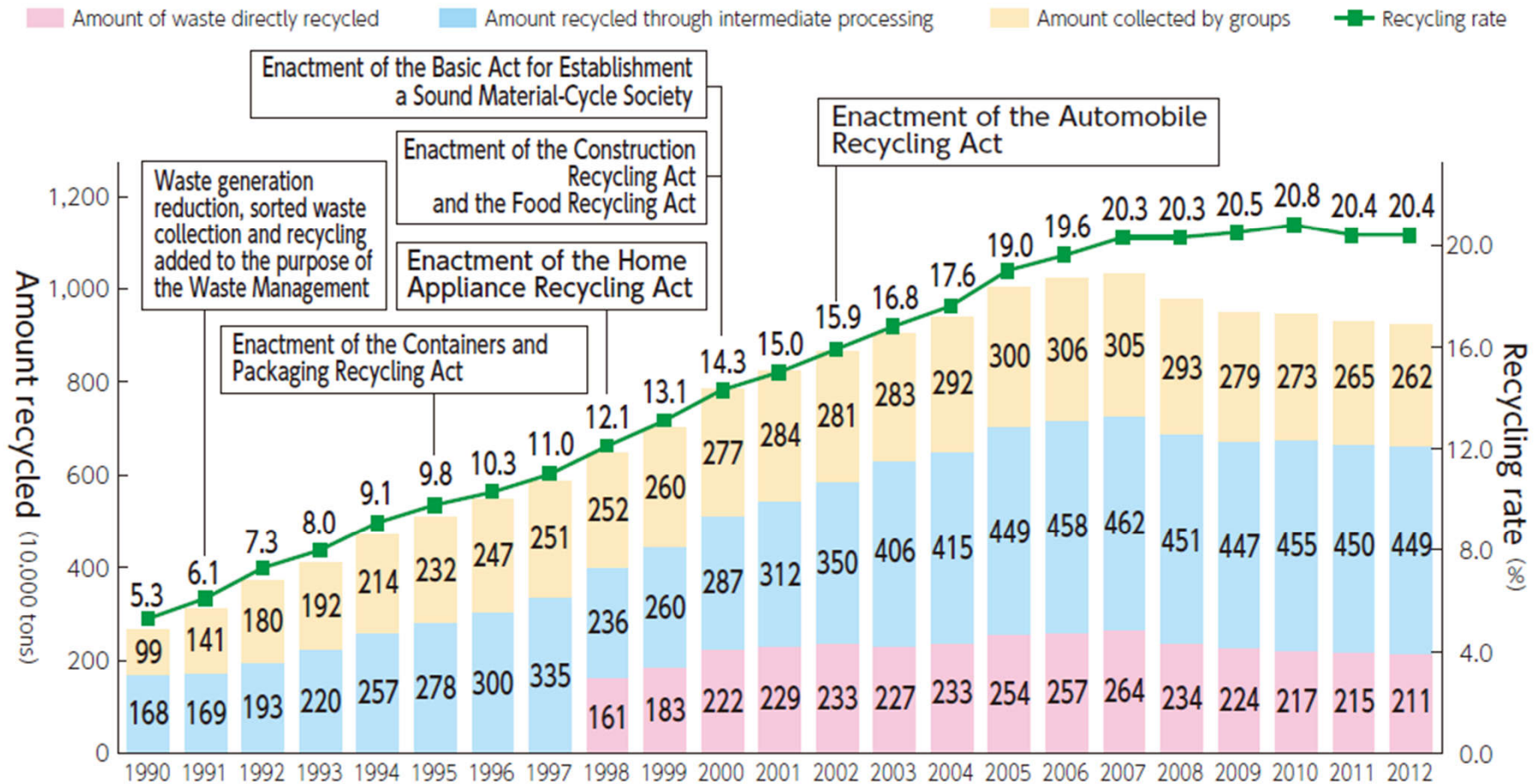
食パン袋の軽量化

食パン1斤袋の高さの適正化を図り、製品1個あたりの容器包装重量を約4%削減し、年間約126トン削減しました。



Changes in the amount of MSW recycled and recycling rate

Changes in the amount of waste recycled and the recycling rate



Source: Compiled from MOE, Waste Management in Japan (annual editions)

Cost of PET bottle recycling (FY2005)

	JPY/kg
Transportation cost	
(Weight base)	14~268
(Volume base)	60~300
Intermediate treatment (separation, storage) cost	20~40
Payment of recycling outsourcing cost	31.2

Source: Japan Containers And Packaging Recycling Association (Feb. 2005)

PET bottle Import & Export regulation

寺園(2008)

1000tons

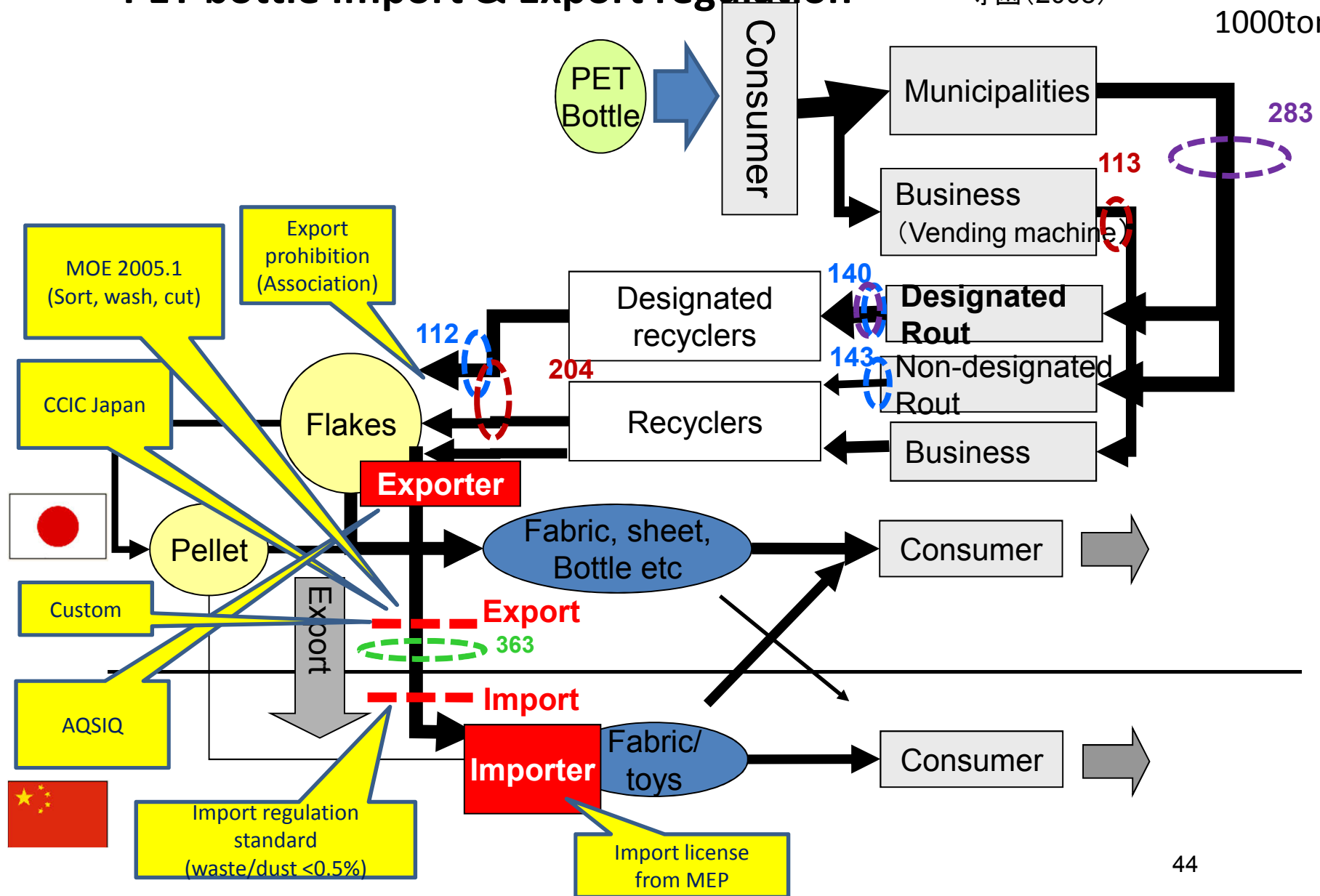
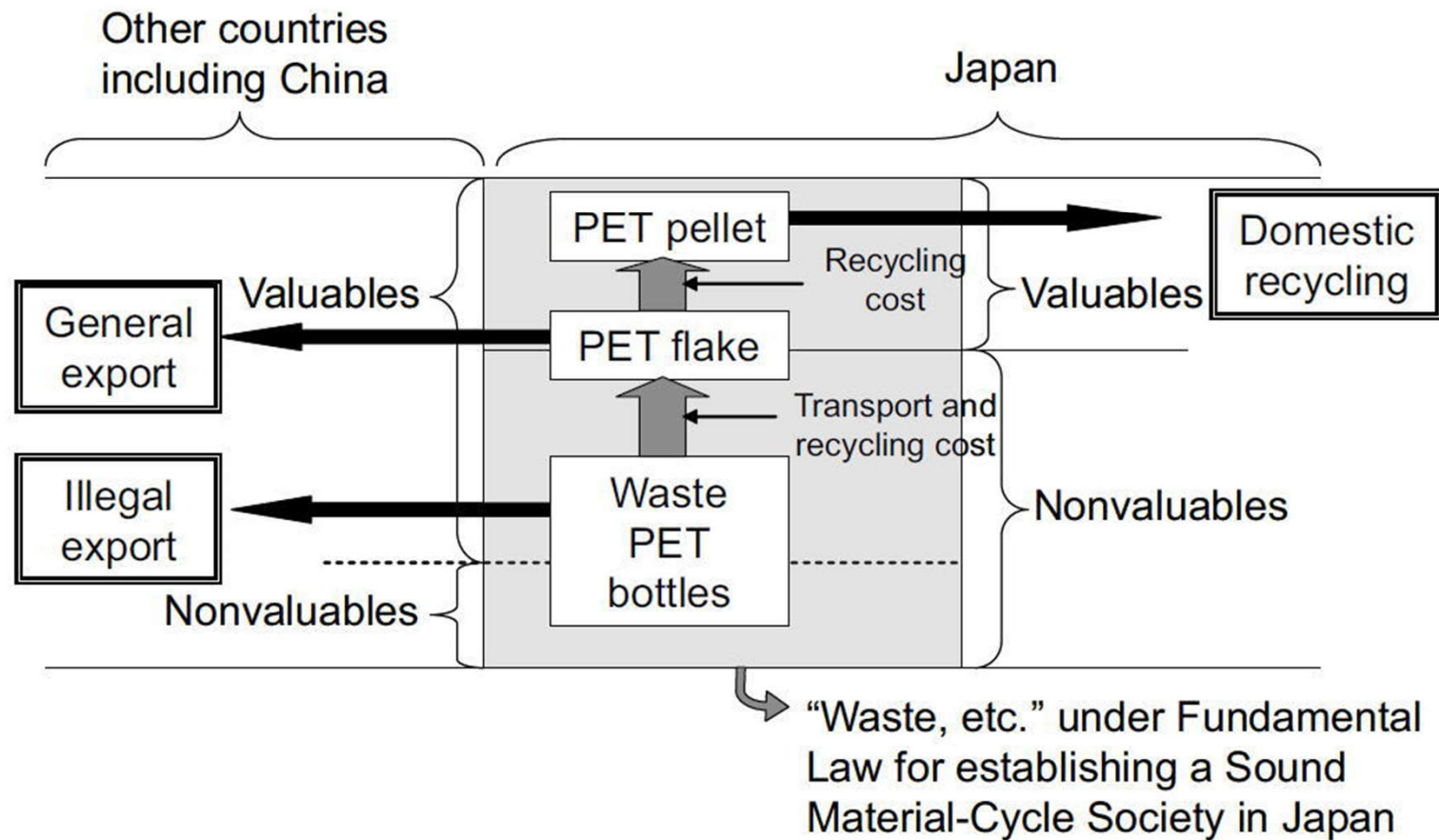


Figure 2-4: Relationship between Domestic Recycling and Exports for used PET




Source: Modified from Fig. 7 of Terazono (2004b)

Source: Terazono (2005) Chapter 2 Japanese Recycling Laws and International Trade in Recyclable Resources, *International Trade of Recyclable Resources in Asia*, http://d-arch.ide.go.jp/idedp/SPT/SPT002900_005.pdf

Summary of Containers and Packaging Recycling

- Extended manufacturers' responsibilities to the disposal of the containers and packaging.
- Refill products have been developed and reduced the use of resources.
- Returnable glass bottles were decreased, the use of PET bottles have increased. (Recycling has become an excuse.)
- Regarding municipalities' transportation cost issue, in Amendment in 2006, the financial system from business operators to municipalities was established and the burden has been reduced.)
- Export issue is unresolved.

E-waste recycling schemes in Japan

	Home Electronic appliances	PC (household) -voluntary scheme 	Small home appliances
Enforcement	April, 2001	Oct, 2003	April, 2013
Regulated items	Air conditioners, TVs, Refrigerators/freezers, Washing machine/ clothes driers	Desktop, Laptop, CRT display, LCD display	96 items (including mobile phone, PCs)
Who collect?	Retailers	Parcel service	Local government, Retailers
Collection cost	Consumers (Fees on disposal)	Consumers (Advanced recycling fee)	Local government
Who recycle?	Producers	Producers	Certified operators
Recycling cost	Consumers	Consumers (Advanced recycling fee)	-

Home Appliances Recycling Act (enacted in 1998)

Background: Local gov. had difficulties recycling and disposing of large home appliances

Date put into force: April 2001

Purpose: Clarifying the role-sharing between consumers, retailers and manufacturers in managing home appliances

Outline of the act: The act provides for a collection and recycling system in which

-home appliance retailers take charge of collecting

-manufacturers take charge of recycling collected home appliances

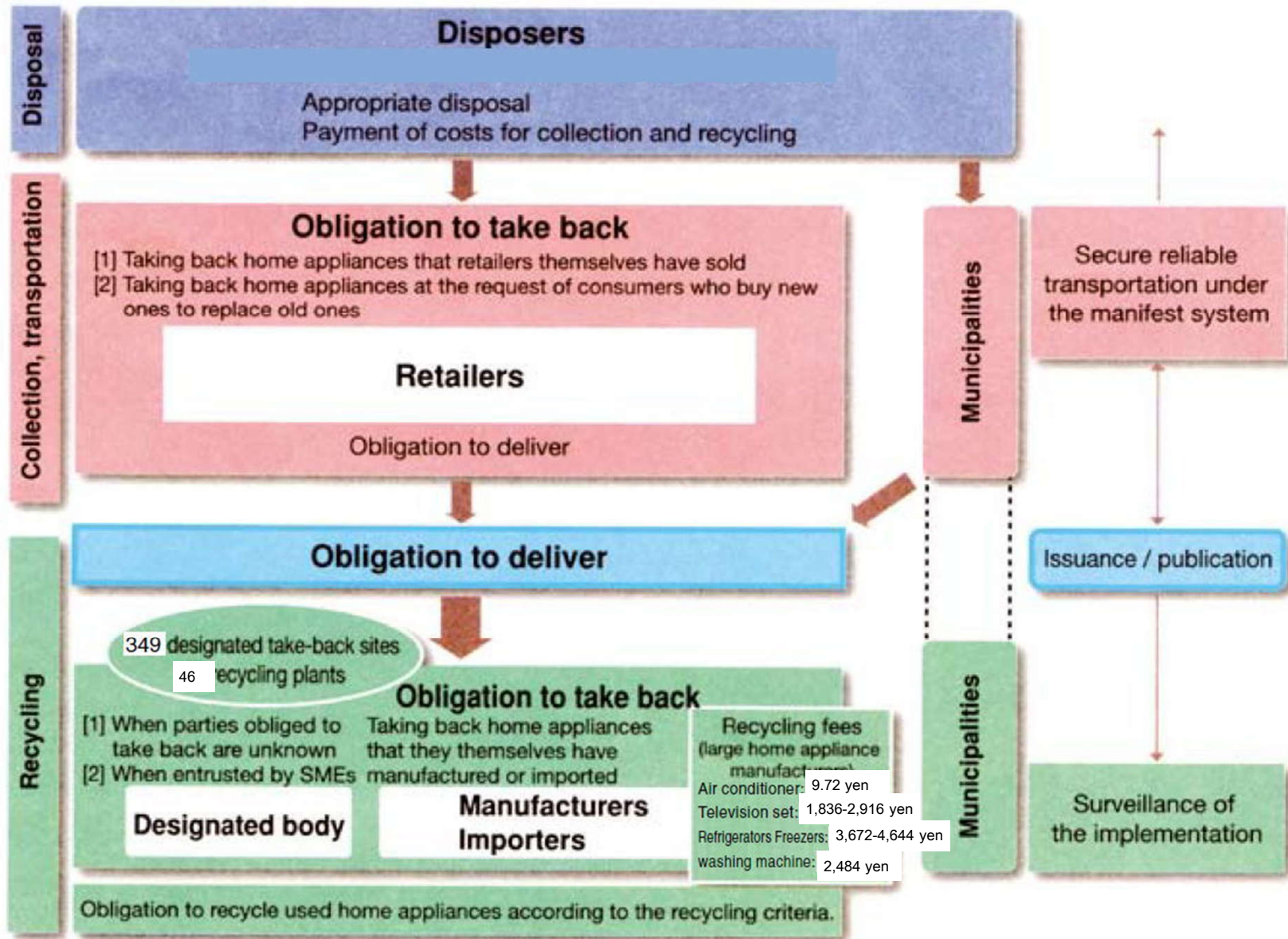
Presiding ministry: METI, MOE

Relationship between Wastes Disposal and Public Cleansing Act

In order to ensure smooth implementation of HARA, there are following preferential measures on Waste Management Act is applied regarding obtaining license of waste recycling business.

- 1. Retailers** No need to obtain license from a municipality mayor (household waste) or license from prefectural governor (industrial waste)
- 2. Manufacturers** With obtaining recognition from the competent minister, no need to obtain license from a municipality mayor or prefectural governor
- 3. Designated body** By receiving approval from the competent minister, no need to obtain license from a municipality mayor or prefectural governor

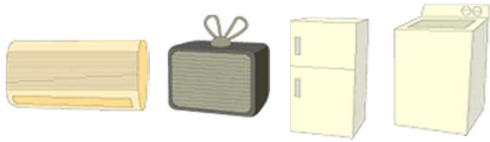
Waste flows and stakeholder rolls under HARA



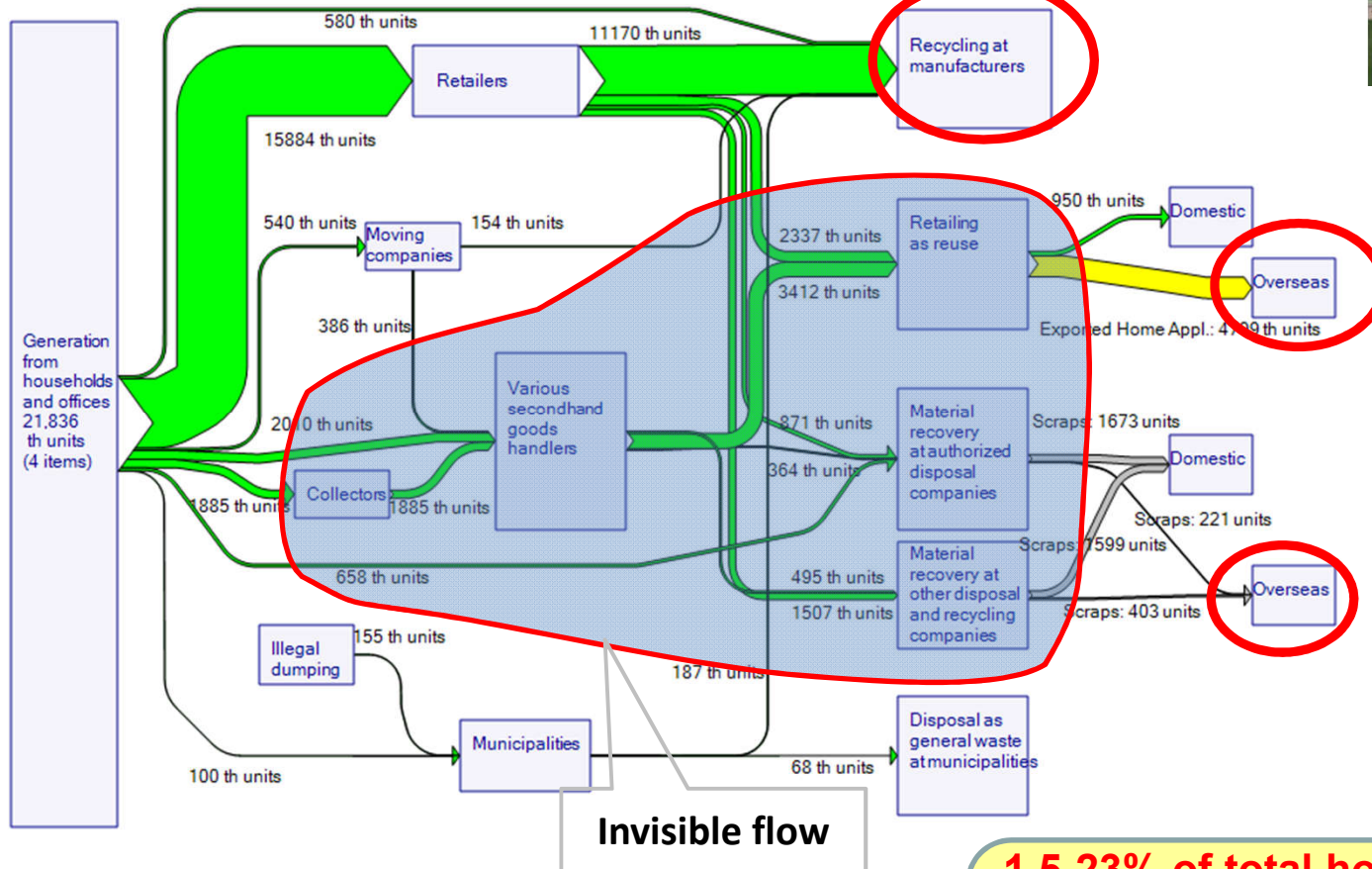
Reasons to choose 'Pay at the time of disposal'

1. Difficult to collect recycling fee for historical waste
2. Difficult to estimate recycling cost at the time of purchase (Because of long product lifetime)
3. Secure recycling fee for orphan products (Products made by manufacturers that no longer exist today)
4. Promotion of long product lifetime, waste reduction

Material flow of Large-sized Home Appliances



50% is recovered at manufacturers under the Home Appliance Recycling Law in Japan



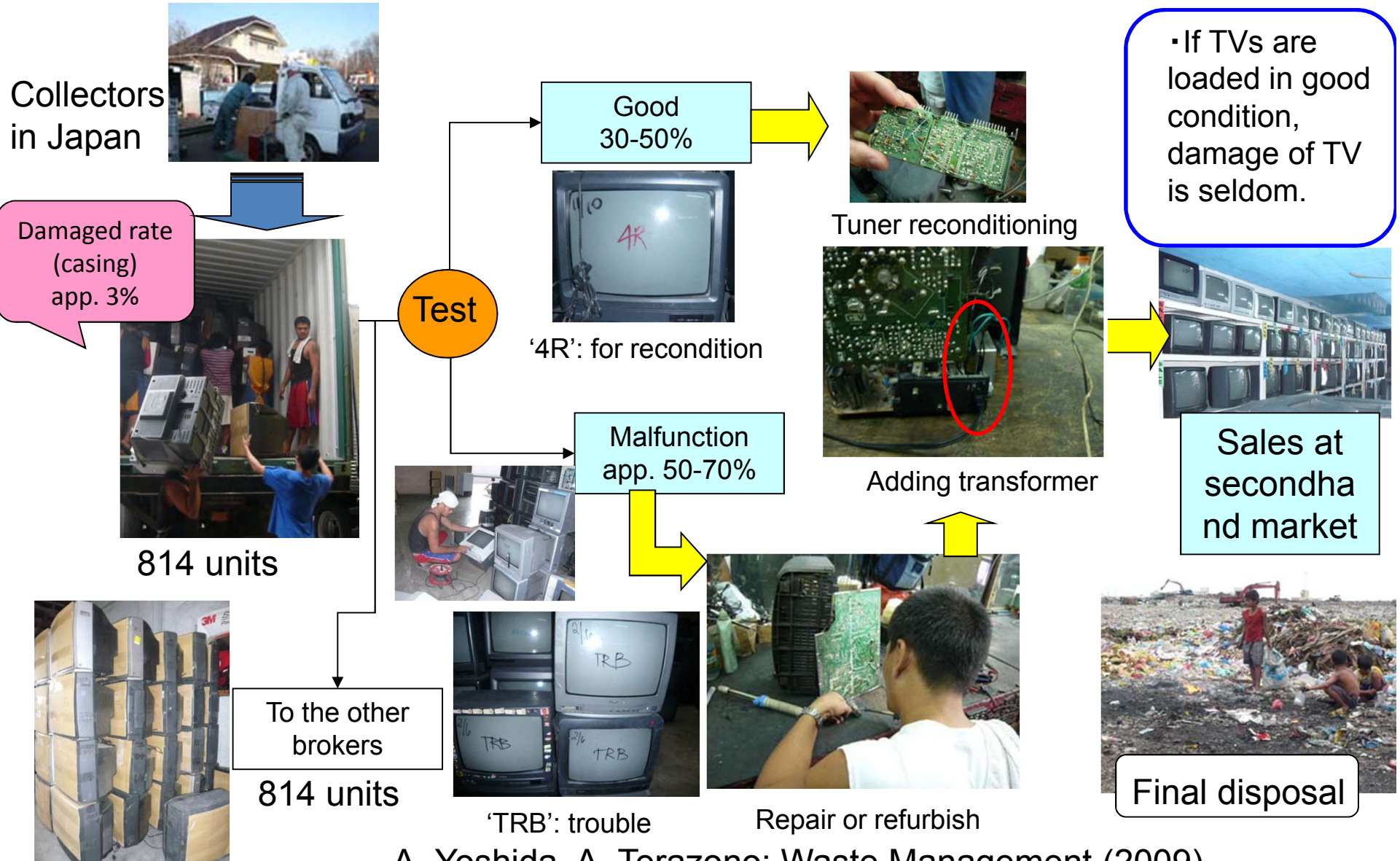
Other flow is called "invisible flow". 4.8 million units are estimated to be exported for reuse in 2007. (over 2.0 million are TV sets.)



Domestic material flow of end-of life home appliances of Japan in FY2007 (estimated by Terazono)

1.5-23% of total home appliances can be contained in the mixed metal scrap from our sample studies.

Reuse of Secondhand CRT TVs (from Japan to the Philippines)



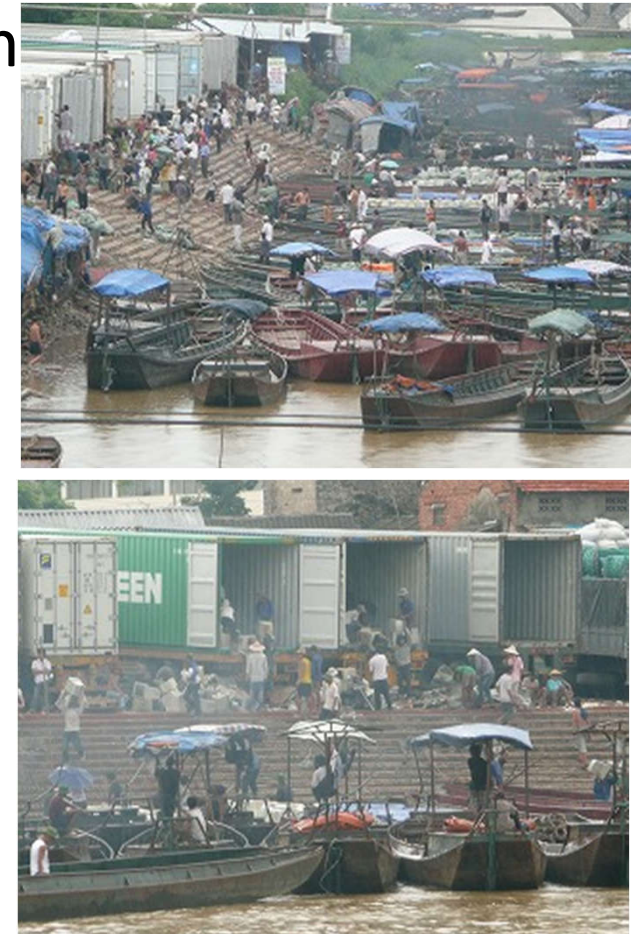
Import and re-export from Vietnam

Observed material flow of secondhand EEE and E-waste around Vietnam



→ Printed circuit board

→ Secondhand PCs
 → Secondhand home appliances (e.g. TV sets)



Exporting secondhand PC monitors at Mong-cai (Vietnam) to China (Sep 2007)

Above flows are estimated based on the interviews by our colleague, Dr. Shinkuma



Import control of secondhand and waste EEE in Asia

	Secondhand EEE	Waste EEE (E-waste)
Cambodia	Possible (only PCs are prohibited)	Some items are prohibited as hazardous waste.
China	Prohibited (3C certification is needed for home and large electric machines. TV is prohibited.)	Prohibited except for waste motors, cables and others with restricted permission.
Hong Kong	Possible (permission needed) “Advice” requires 1) demand in Hong Kong, 2) functioning, 3) proper packaging, and 4) 5 or less years after manufacturing .	Possible (permission needed) Prohibited from OECD, EC and Liechtenstein.
Indonesia	Most secondhand EEE imports are prohibited . Except PCs and LCD monitor which is functioning and with proper packaging , and < =5 years	Prohibited if regarded as hazardous waste.
Japan	Possible	Possible (permission needed)
Korea	Possible (safety certification needed.)	Possible
Malaysia	Possible (application needed.) It requires functioning, no physical damage, proper packaging, and < = 3 years .	Possible (permission needed) Prohibited from OECD.
Philippines	Possible (application and consent needed)	Possible (permission needed)
Singapore	Possible (permission needed)	Possible (permission needed)
Taiwan	Possible	Prohibited
Thailand	Possible, but it requires 1) EEE < = 3 years , Copy machine < = 5 years , 2) industrial standard, and 3) guarantee.	Possible (permission needed)
Vietnam	Prohibited except for re-export case (only laptop PC possible.)	Prohibited

Export criteria of secondhand CRT TV (September, 2009)

- Criteria
 - 15 or less years after manufacturing
 - Good appearance
 - Functioning with electricity
 - Proper packaging
 - Confirmation of retailers in importing country
- Next criteria for other secondhand EEES are under discussion.

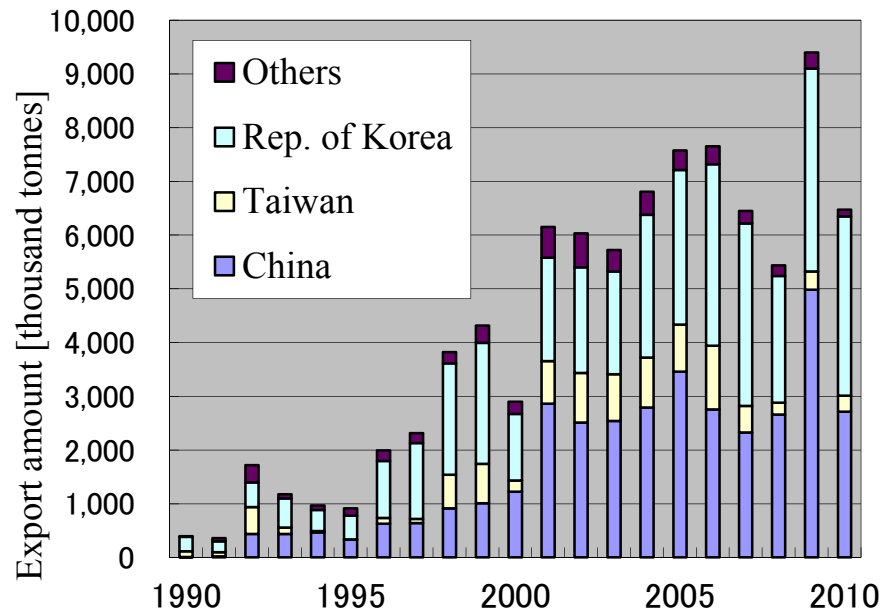
Informal collectors issue

- In many cities, 'free-of-charge' collectors or 'disused article' collectors collect used home appliances.
- Some of used appliances can be sold as secondhand, but most of them are traded as scrap.
- Mixed metal which exported to China contains various electric appliances. Sometime it causes fire due to heat accumulation of waste batteries etc.

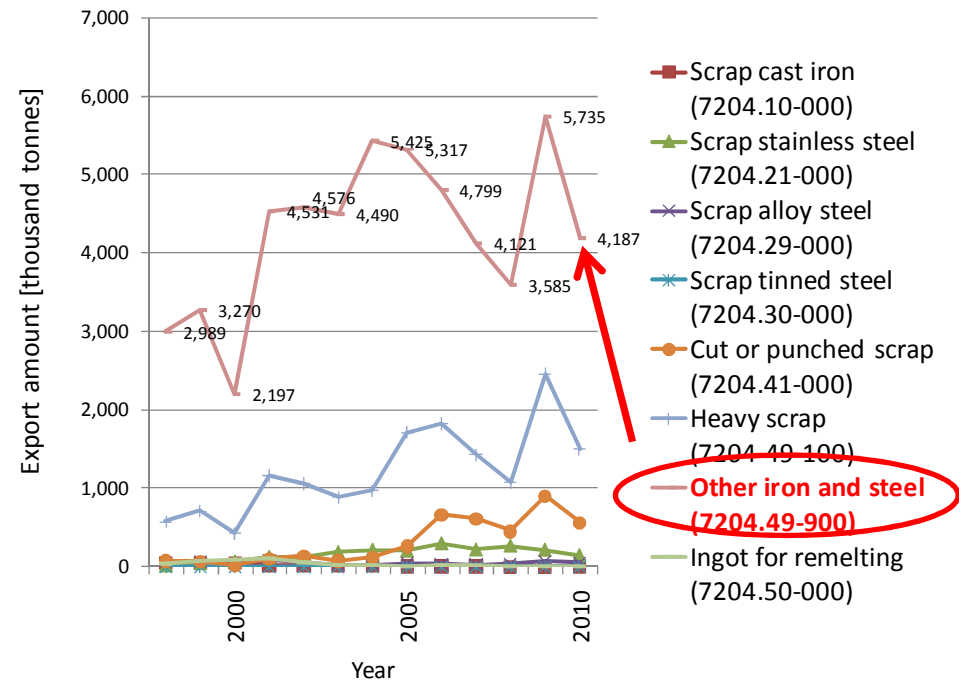




Export of mixed metal scrap from Japan



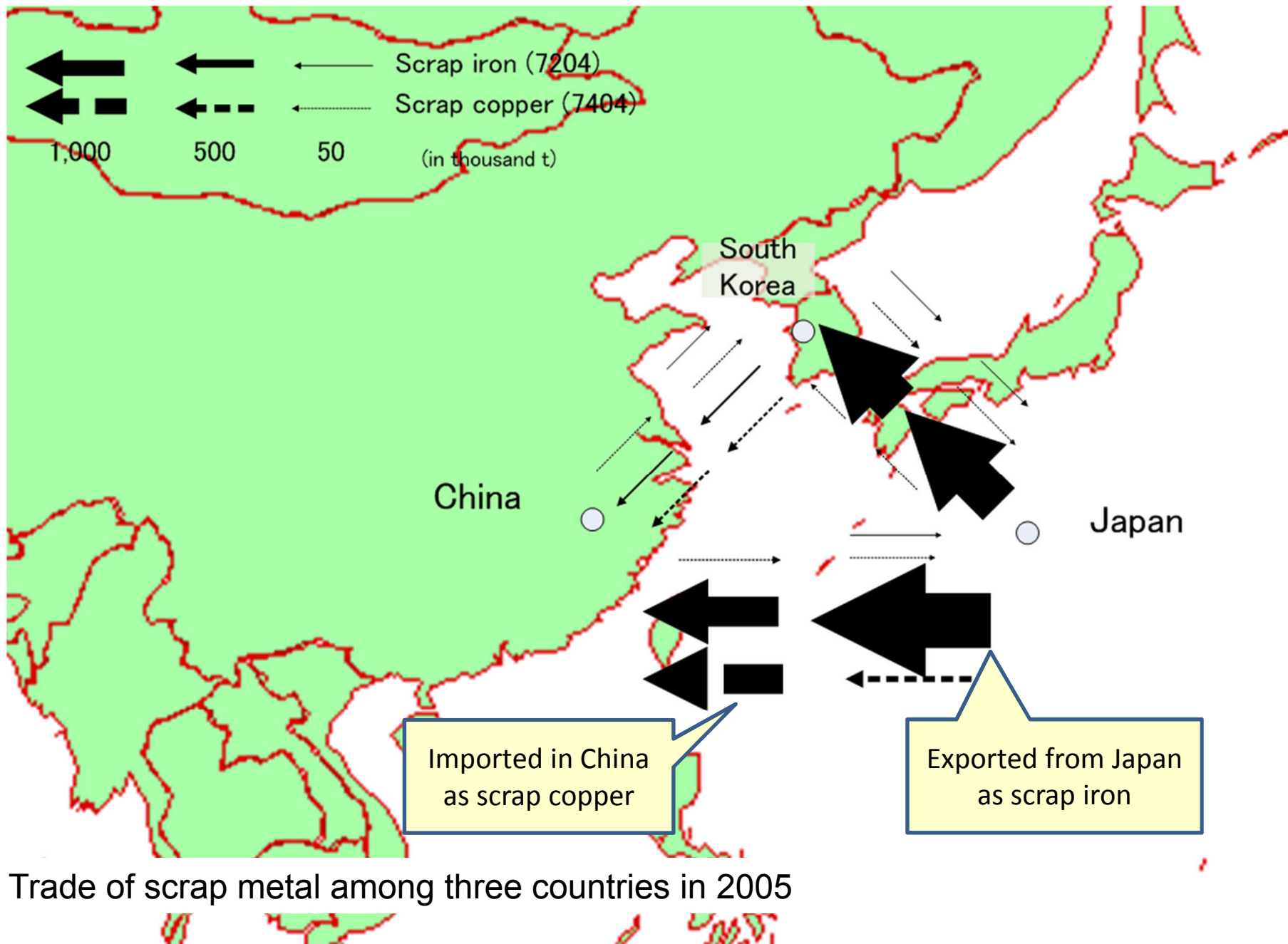
(by destination)



(by category)

Fig. Export of **scrap iron and steel (HS:7204)** from Japan

- So-called “**mixed metal scrap**” or “zappin”(雑品 in Japanese, miscellaneous commodities in English) is mostly included in “**Other scrap iron and steel**” (HS: **7204-49.900**) that is exported with 4.2 million tons in 2010. **1.3 to 2.0 million tons** is considered as mixed metal scrap.



Trade of scrap metal among three countries in 2005

Mixed metal scrap: Simplified flow



Household,
Office, Industry

Charge-free
collectors, delivery
traders, retailers



Recycler

Importer
in China

Exporter
in Japan

Scrap dealer



Various regulation
and inspection



Custom inspection

Prior-consultation by MOE/METI
considering Basel law and
Waste Management Law

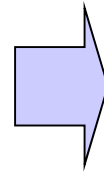
Inspection before shipment



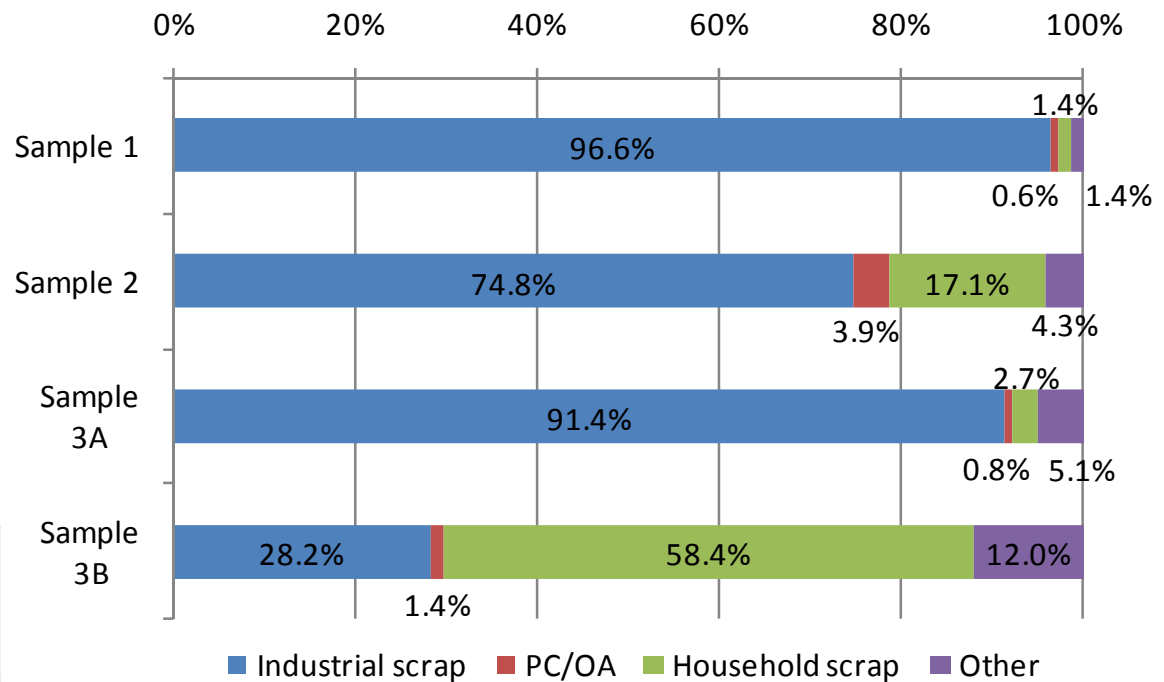
Manual separation
and recycling
(material recovery)

Sample examination for items/materials: Overall results

We sampled **10 tons** of scrap metal three times to examine **contained items** and **hazardous materials** in the scrap metal.



- Industrial scrap: more than 75% (by weight base); **household scrap may be more than half.**
- Household scrap includes many **air conditioners**. TV was also found.
- Various E-wastes and small batteries were included.



Examples of found items



LCD TV, Monitor



Lead coated boiler



Ni-Cd battery



Printed circuit board



Lead Acid battery



Li battery



Spray can



Li-ion battery



Compressor

Violation of Basel Law (Basel wastes)

Danger of flammability or explosion



Air conditioner (business-use)



CFC12 detected

Air conditioner (home-use)

Violation of CFC Recovery and Destruction Law

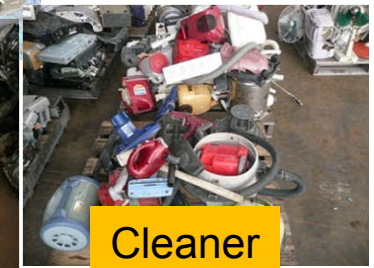
Necessity of enhanced collection under Recycling Law



Video cassette recorder



Rice cooker



Cleaner

Necessity of domestic collection and recycling

Most of them also violate Chinese import regulation

Scrap mixed metal: **fire accident**



Fire during loading of mixed metal scrap
(Osaka Bay, Sep 11, 2009,
photo by Japan Coast Guard)



Piled up and burnt mixed metal scrap
(Osaka Bay, Sep 14, 2009
photo by Terazono)



Fire during loading of mixed metal scrap
(Osaka Bay, Sep 11, 2009,
photo by Kyodo News)

Reasons of fire are not identified
in most cases, though batteries and
machines with oil are sometimes
found.

No incentives for fire prevention
by exporters.....

Personal Computer Recycling

Title of the Act: Ministry ordinance (of the Act for the Promotion of Effective Utilization of Resources)

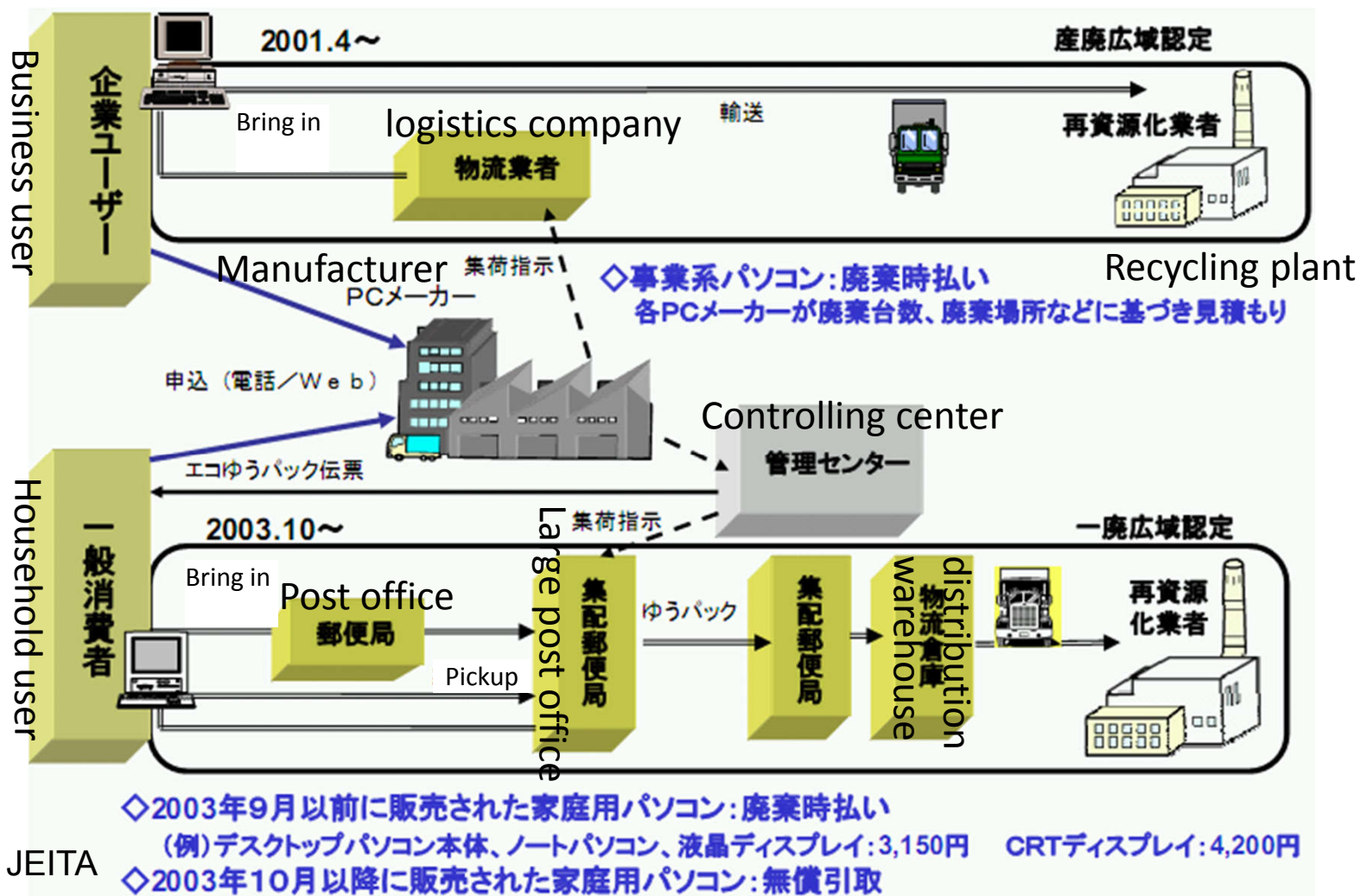
Date put into force:

April 2001 (Business); October 2003 (Household)

Outline of the system: Computer manufacturers and importers are required to **build voluntary collection and recycling scheme** for the PCs.

Presiding ministry: METI, MOE

PC recycling scheme



Source: JEITA

Why different system are applied for PCs?

1. Retailer take-back is difficult to be the main rout (unlike large home appliances)
2. Replacement timing is not always the same time (need some time for data transition)
3. Concerns of illegal dumping

Costs of PC recycling



-For household PCs, Recycling fee is included in product price since October 2003.

-Pay on disposal of historical PCs

● Target items

Desktop PC
(main body)
3,000 + tax
JPY/unit



CRT display,
CRT display
all-in-one PC



4,000 + tax
JPY/unit

Laptop PC
3,000 + tax
JPY/unit



LCD display,
LCD display
all-in-one
PC



3,000 + tax
JPY/unit

-Peripherals (keyboard, mouse, cables and other accessories) can be collected together with waste PCs.

-Orphan PCs, home-built PCs can be recycled by PC 3R promotion center (Producer Responsibility Organization), but it costs additional 1000 JPY from the above prices.

Source: PC3R promotion association website <http://www.pc3r.jp/>

Collection & Recycling Fee

※ Yu-pack Parcel cost



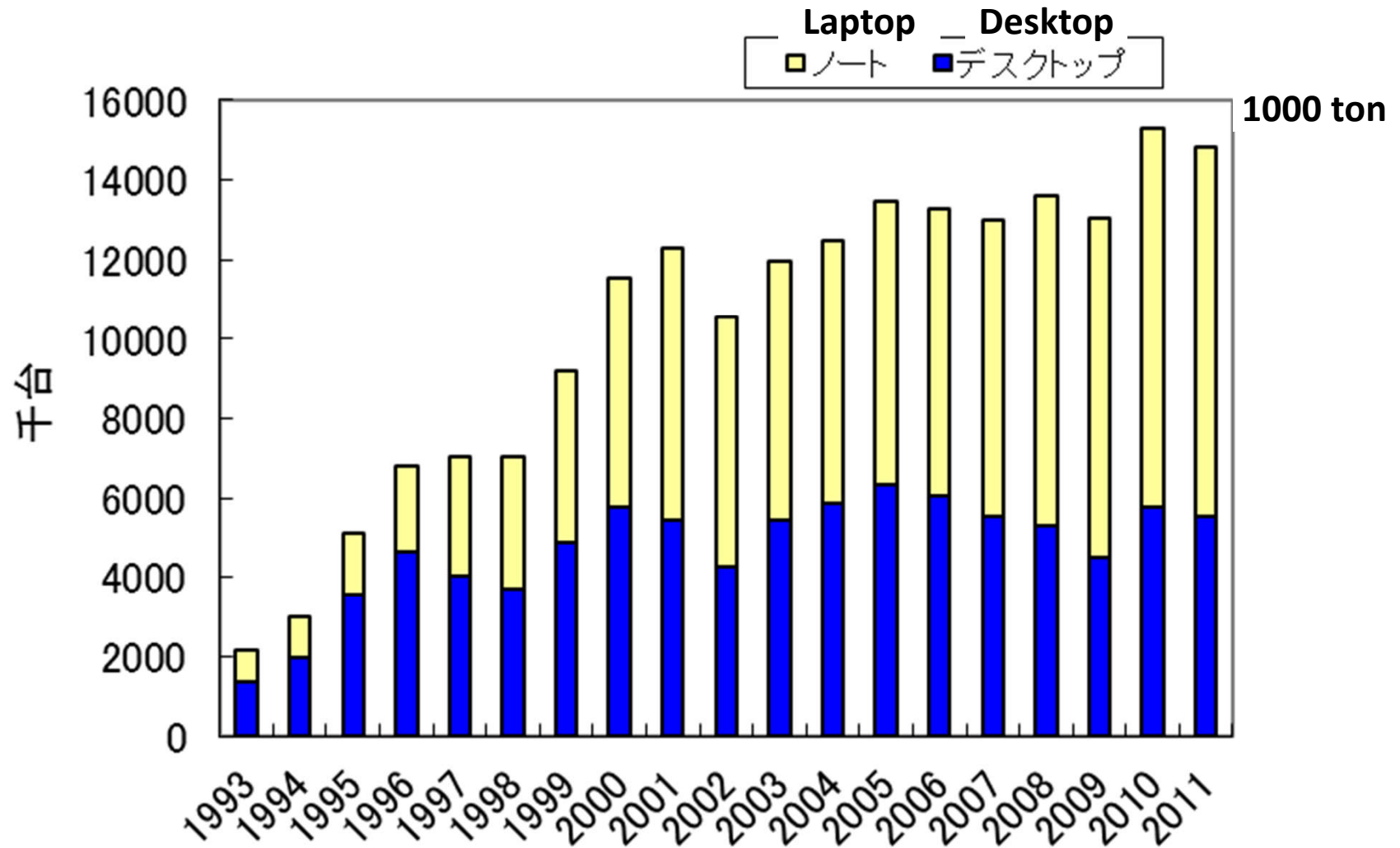
Fee was included in the sales price

	After Oct. 2003	Before Oct. 2003	Orphan PC, home-built PC
Desktop PC (main body)	0	3,240	4,320
Laptop PC	0	3,240	4,320
CRT Display	0	4,320	5,400
LCD Display	0	3,240	4,320

- Peripherals (keyboard, mouse, cables and other accessories) can be collected together with waste PCs.

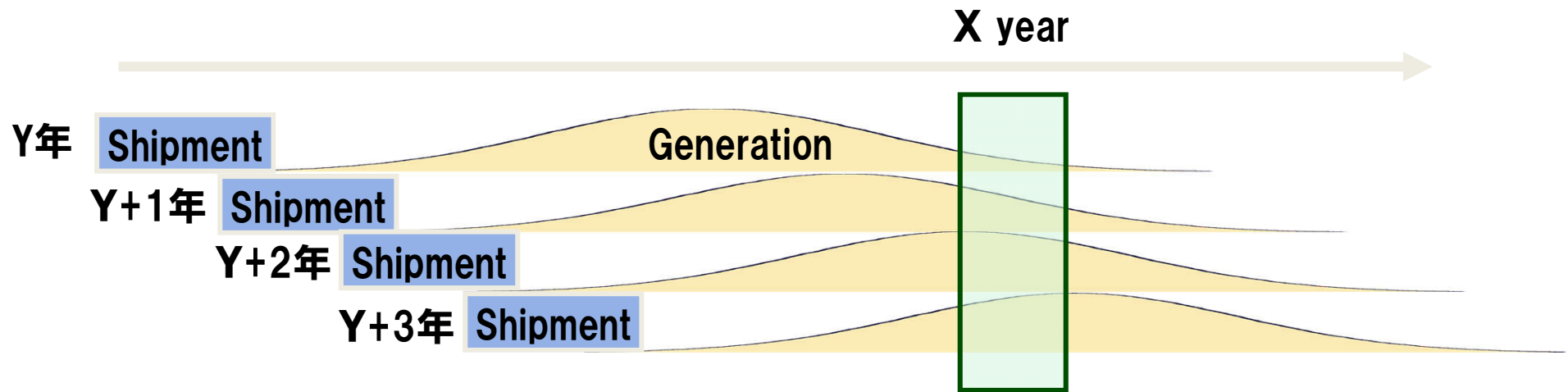
Source: PC3R promotion association website <http://www.pc3r.jp/e/>

Domestic Shipment of PCs



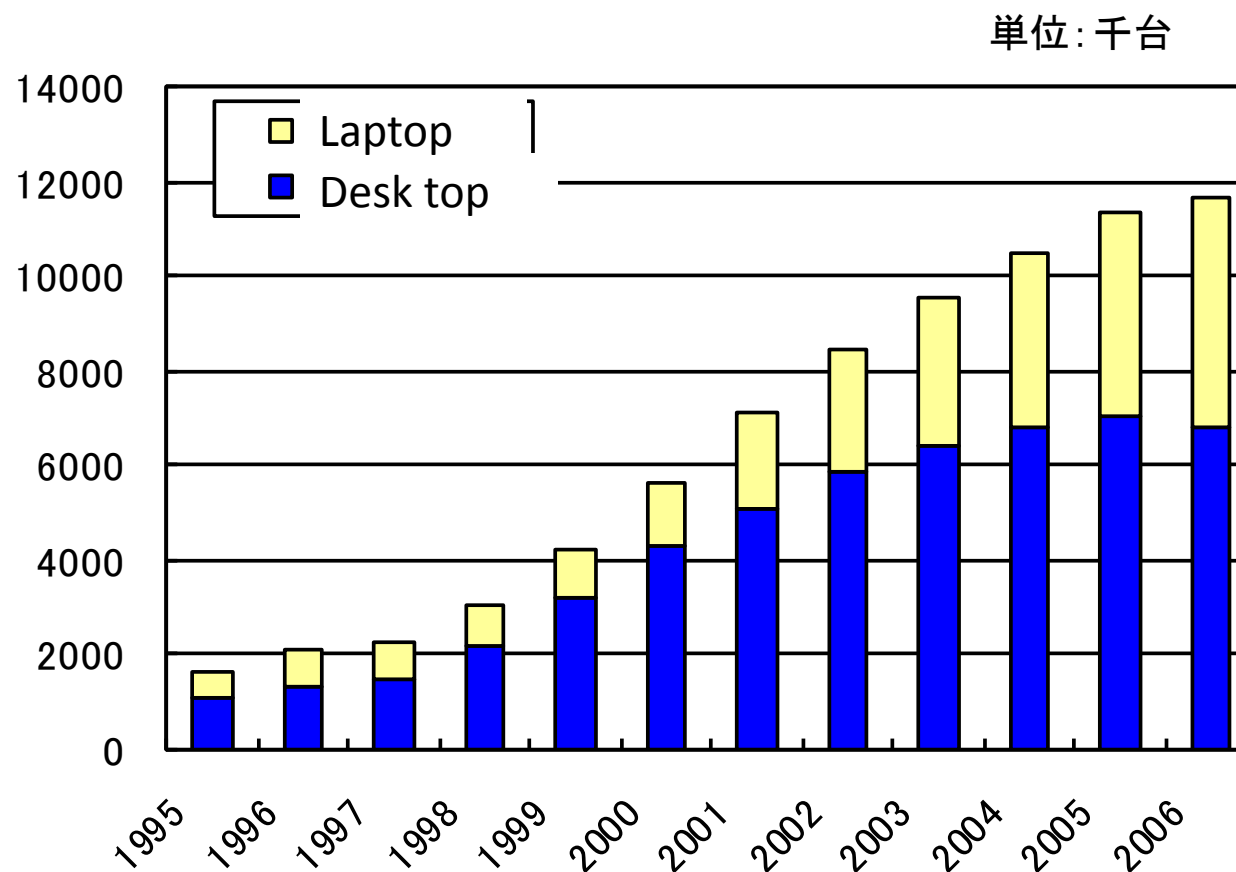
出典:2000年まで一般社団法人 電子情報技術産業協会(JEITA)、
2001年~2011年MM総研

Estimating the generation of used PCs



$$\text{Generation} = \sum (\text{Shipment} * \text{Generation rate})$$

Generation of used PCs in Japan (2004)



出典：JEITA

Average lifetime of PCs in Japan (in 2004)

Reasons for replacing major durable goods in Japanese Households

	Average years in Use (years)	Reasons for replacement (%)			Penetration rate (%)
		Broken	Upgrade	Other	
Color TV	9.8	72.0	17.1	10.9	99.0
PC	4.3	31.1	53.3	15.7	65.7
Mobile phone	2.3	27.6	52.0	20.4	85.1

Source: The Consumer Behavior Survey

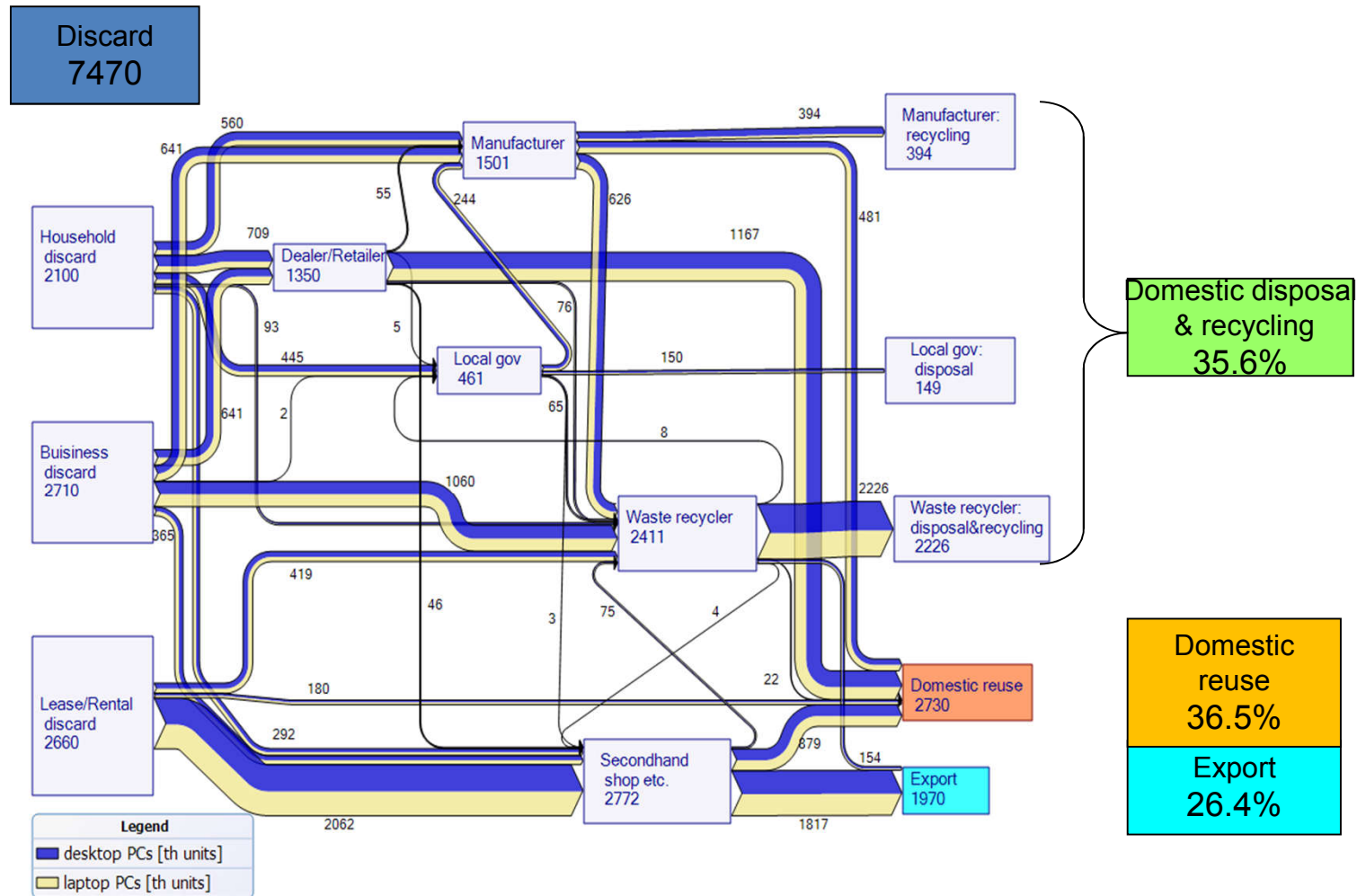
DT: desktop, LT: laptop

	Household Use	Business Use
Average lifetime (years) ^b	DT: 8.4 LT: 9.1	5.8
Average lifetime (years) ^c	DT: 6.6 LT: 7.4	

Source: b.JEITA [2006], c. Oguchi et al.[2006]

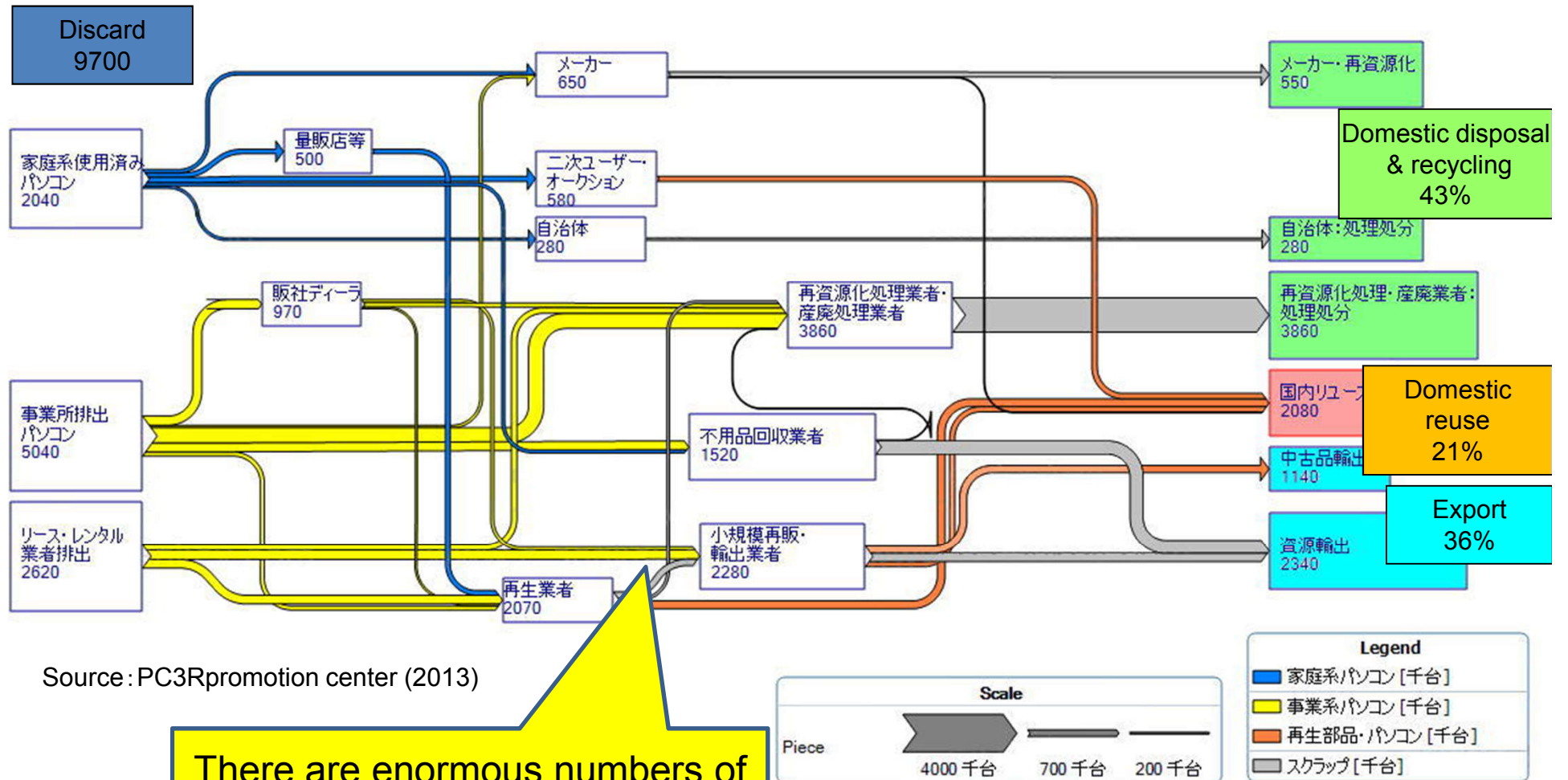
Material Flow of Used PCs in Japan (2004)

After the enforcement of Household PC recycling scheme



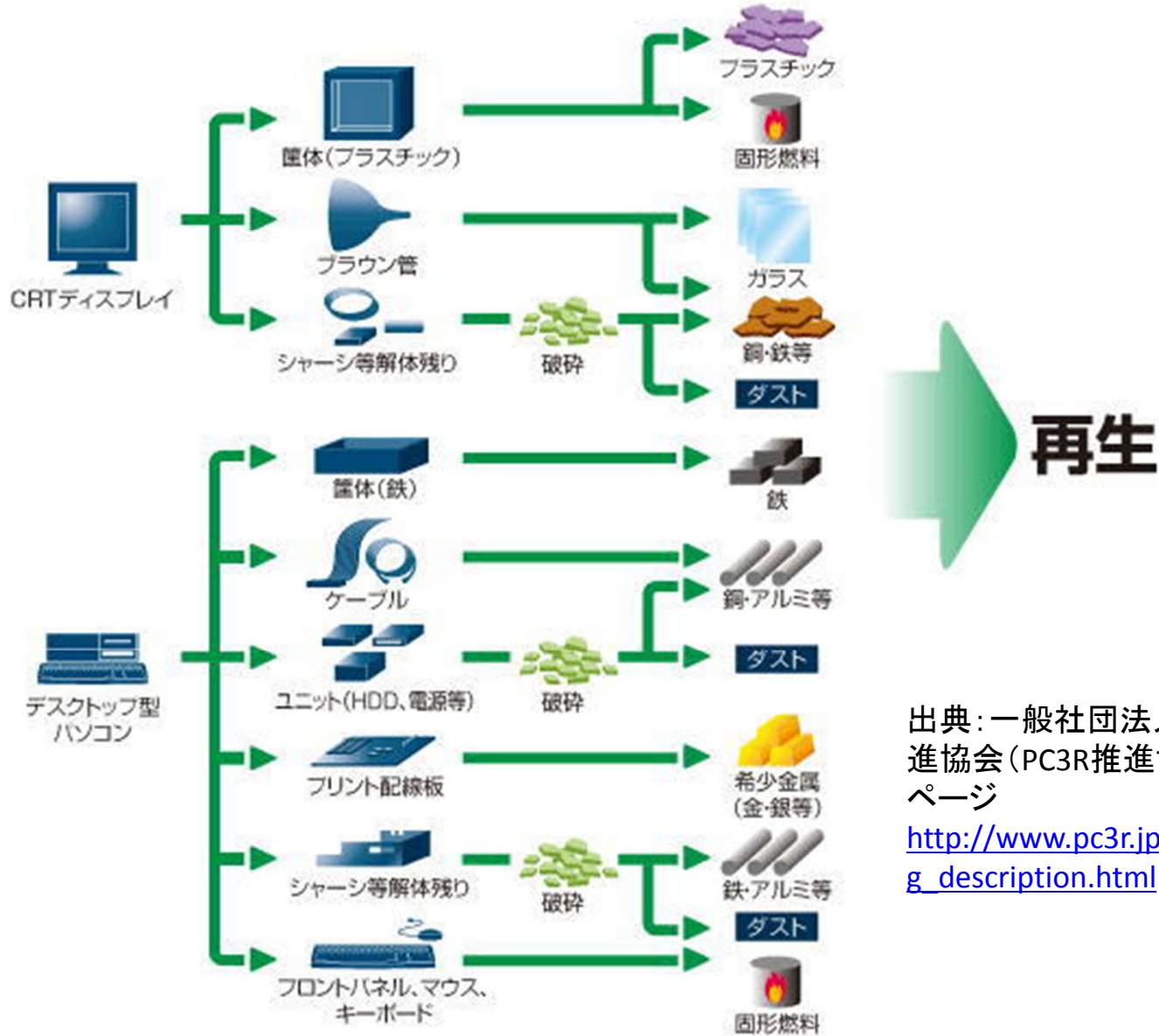
Source: Yoshida et al. (2009)

Material Flow of Used PCs in Japan (2012)



There are enormous numbers of used PC free-take-back companies (PC reuse companies, exporters etc.)

パソコンの再資源化例



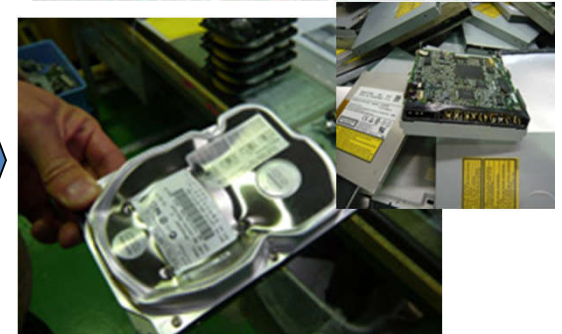
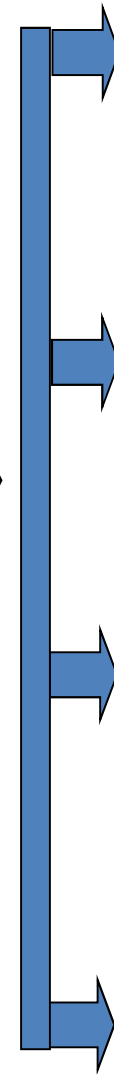
出典：一般社団法人パソコン3R推進協会(PC3R推進協会)ホームページ

http://www.pc3r.jp/home/recycling_description.html

General dismantling flow of used PCs



Dismantling and separation by hand

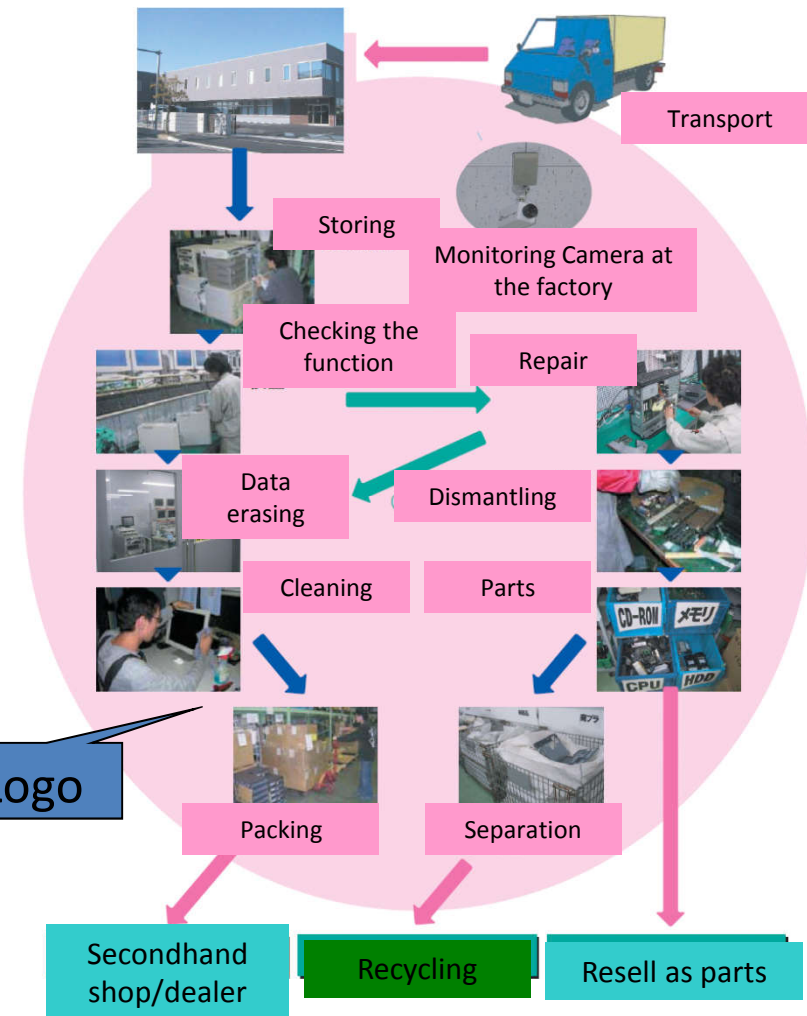


Fujitsu's recovery plant in Sagamihara, Kanagawa

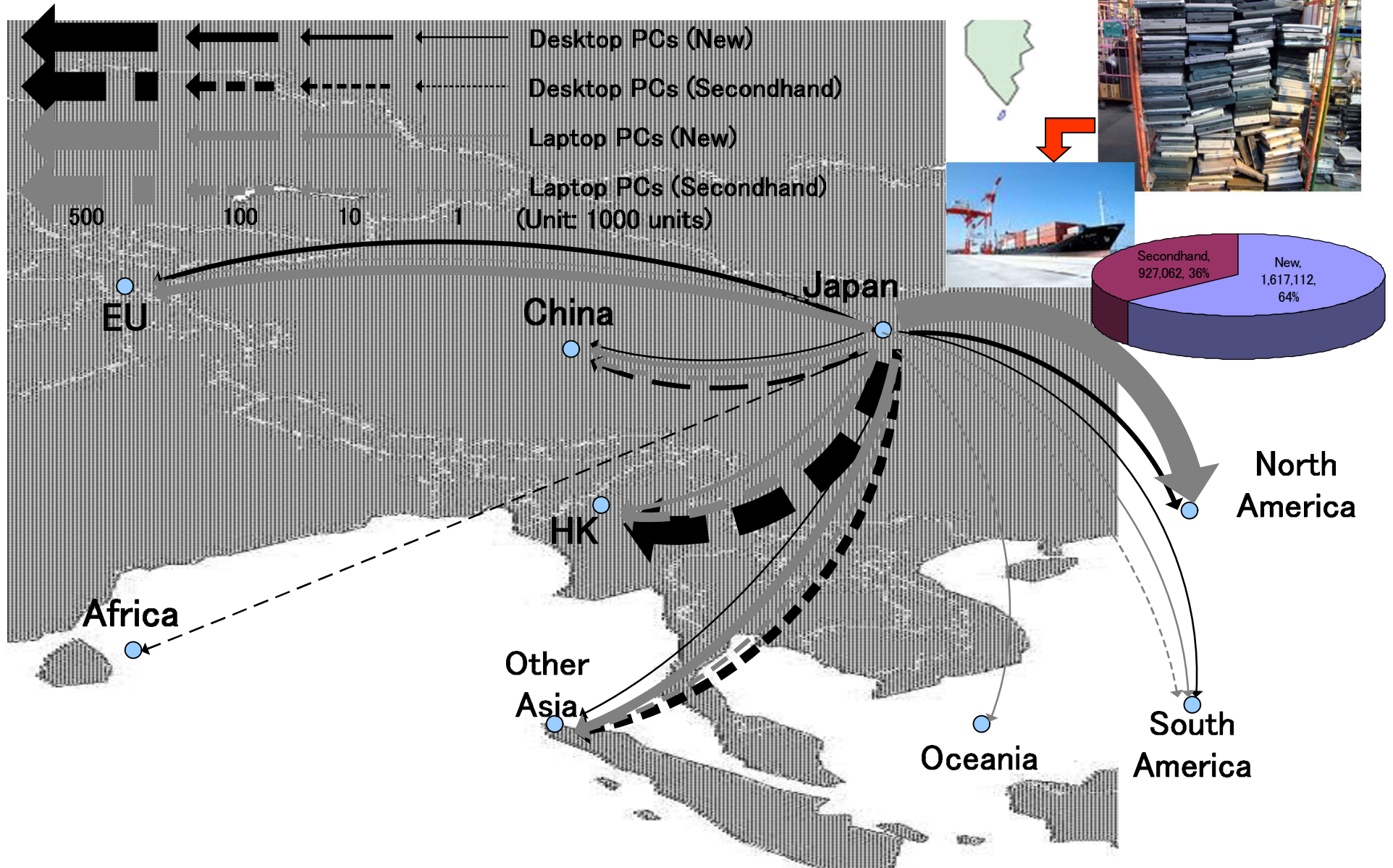
Reuse PC business in Japan



- There are about 20 major PC reuse companies in Japan.
- RITEA: Refurbished (Reused) Information Technology Equipment Association was established in 2006.
- Some of them are Joint Venture of major Lease/Rental, trading companies or rather new waste management companies.
- They **buy** used PC from Business (include schools, government offices), Lease/Rental companies.
- Generator usually has to pay for the recycling, so “Reuse PC” business helps the generator to reduce their cost for disposing waste.



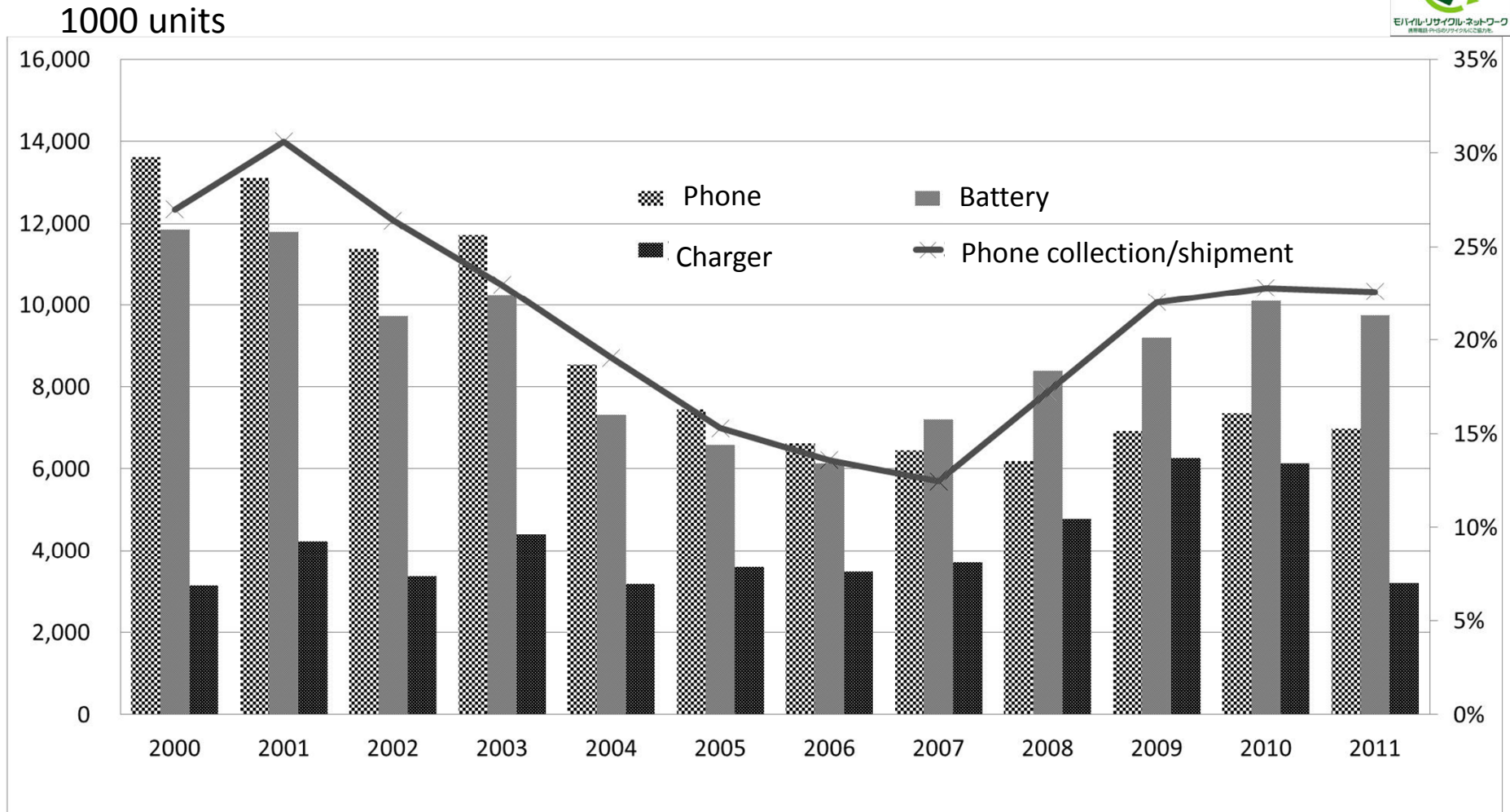
Export destination of PC



(2004 Japan Custom statistics)

Since April 2001

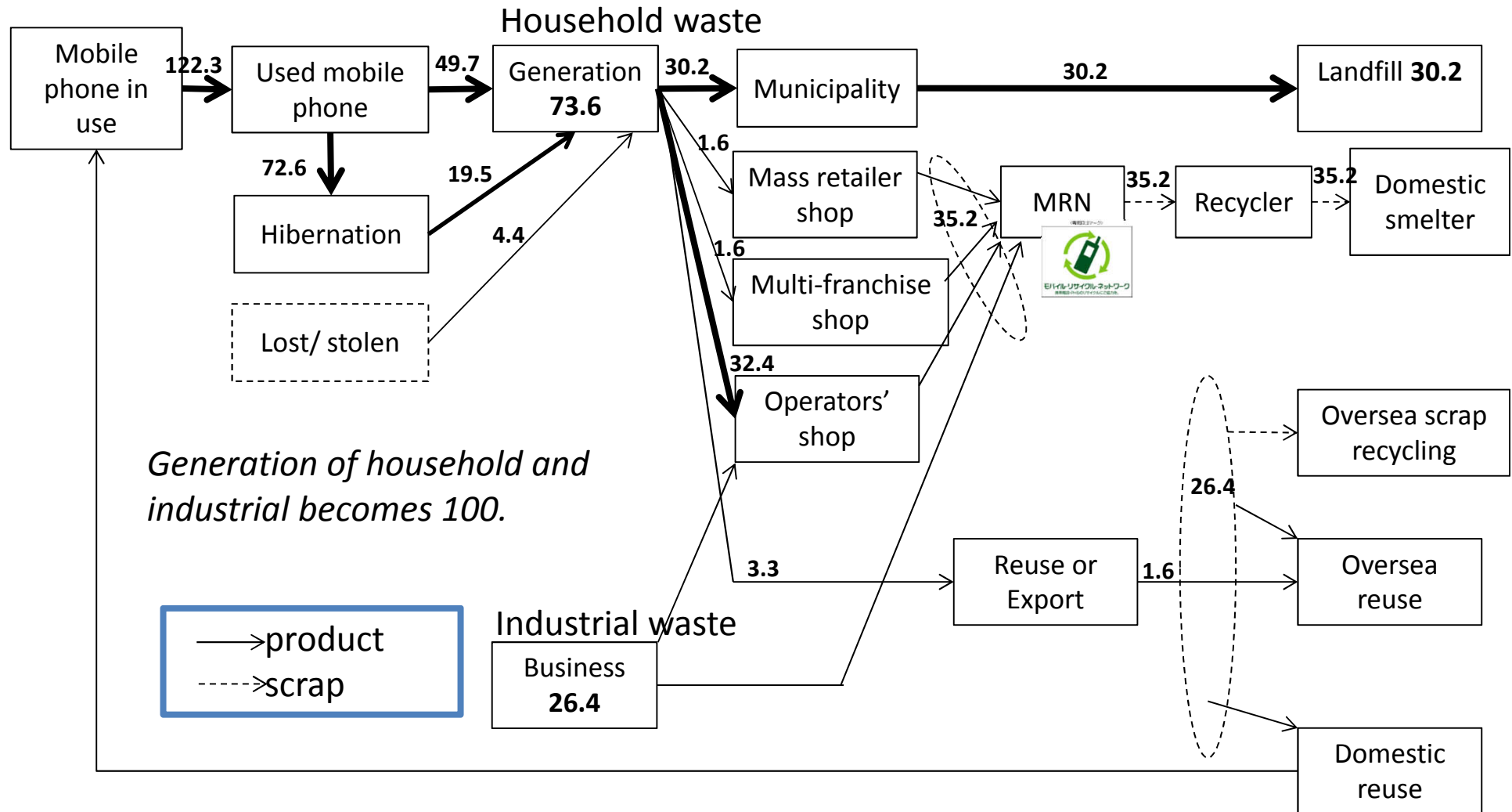
Collection amount under M R N



Source: MRN

<http://www.mobile-recycle.net/result/index.html>

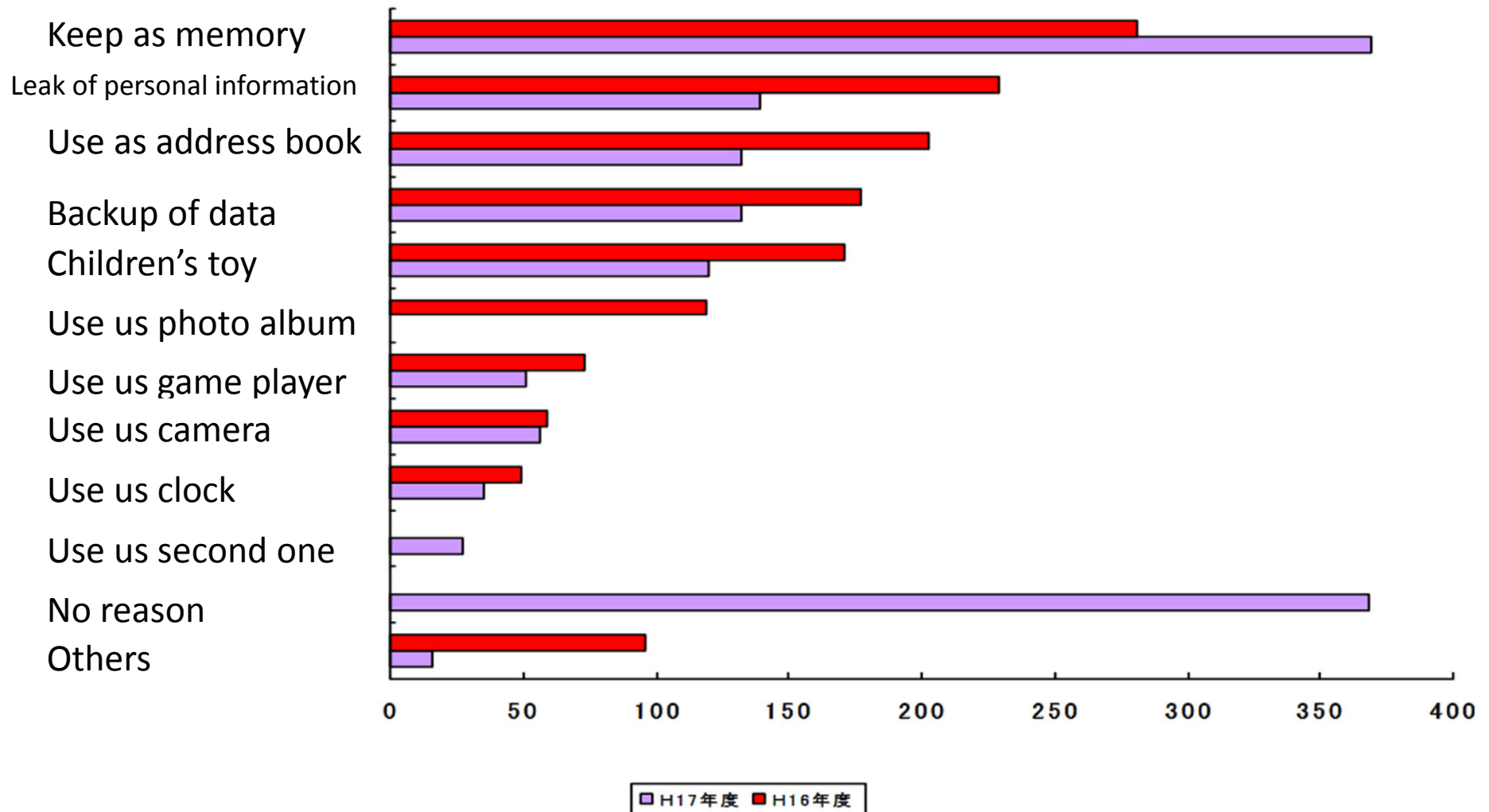
Material flow of used mobile phone



Source: Ministry of the Environment of Japan, Central Environment Council and Industrial Structure Council, <http://www.env.go.jp/council/03haiki/y0324-10/mat03-1.pdf>

Why you don't dispose old cell phone?

<なぜ、処分しないのか？>



Small Electrical Electric Equipment Recycling Act (enacted in 2012)

Title of the Act: Act on Promotion of Recycling of Small Waste Electrical and Electronic Equipment (SEEE)

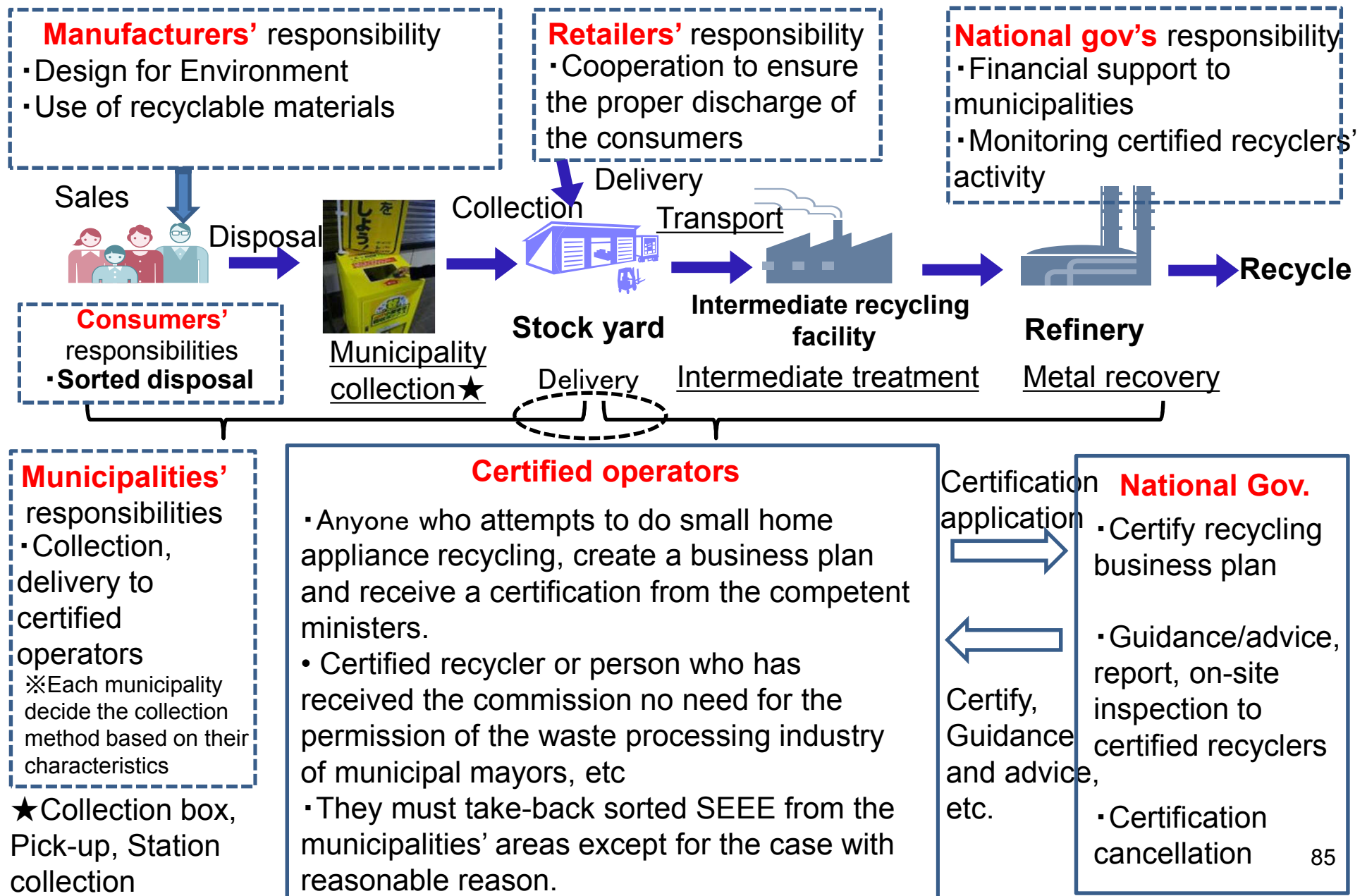
Date put into force: April, 2013

Background: Improve recycling of rare metals in small WEEE

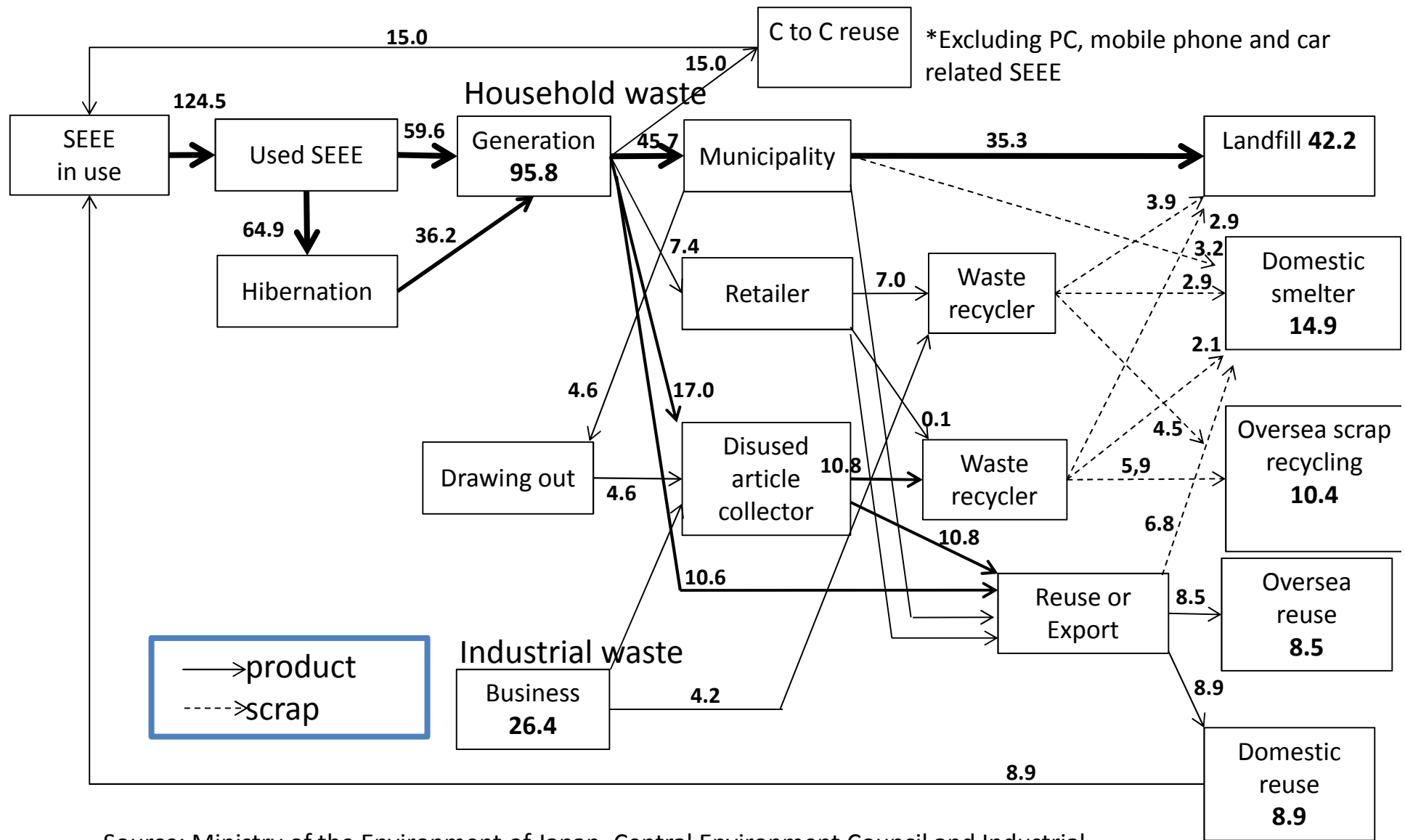
Outline of the system: Municipalities collect and certified recyclers do recycling (not EPR system)

Presiding ministry: MOE, METI

Flow of Small home appliance Recycling



Material flow of Small Home Appliances*



Source: Ministry of the Environment of Japan, Central Environment Council and Industrial Structure Council, <http://www.env.go.jp/council/03haiki/y0324-10/mat03-1.pdf>

Collection methods of small home appliances

ボックス回収



回収ボックスを公共施設等に設置し、定期的に回収する手法

ステーション回収



ステーション(ごみ回収場所)ごとに定期的に行っている資源回収で回収する手法

イベント回収



イベント開催の期間に限定してイベント会場で回収を行う手法

ピックアップ回収



排出されたごみや資源から、小型家電を清掃工場等で抜き取る手法

Small Home Appliances (since July 2010)

不要になった
小型家電を入れてください

Mobile phone Digital camera Video camera Portable music player

AC adapter Calculator Electric organizer Portable game player

IC recorder Car navigation

の **10品目** が対象です



Broken items, any brand manufactures can be collected.
Delete personal data from the mobile phones.
Remove batteries (if possible)

Small Home Appliances

回収品目：回収ボックスの投入口(30センチ×15センチ)に入る長さ30センチ未満の、電気・電池で動作する製品。



回収する製品の一例

Yokohama City

Target item of Small Home Appliance Act

Target condition :

1. Electric equipment/device using at home,
2. Possible to collect & transport efficiently,
3. Valuable as materials

Exclude items : 1. PV panel etc. (need special tools), 2. easy to break Fluorescent lamp/bulb (need special transportation)

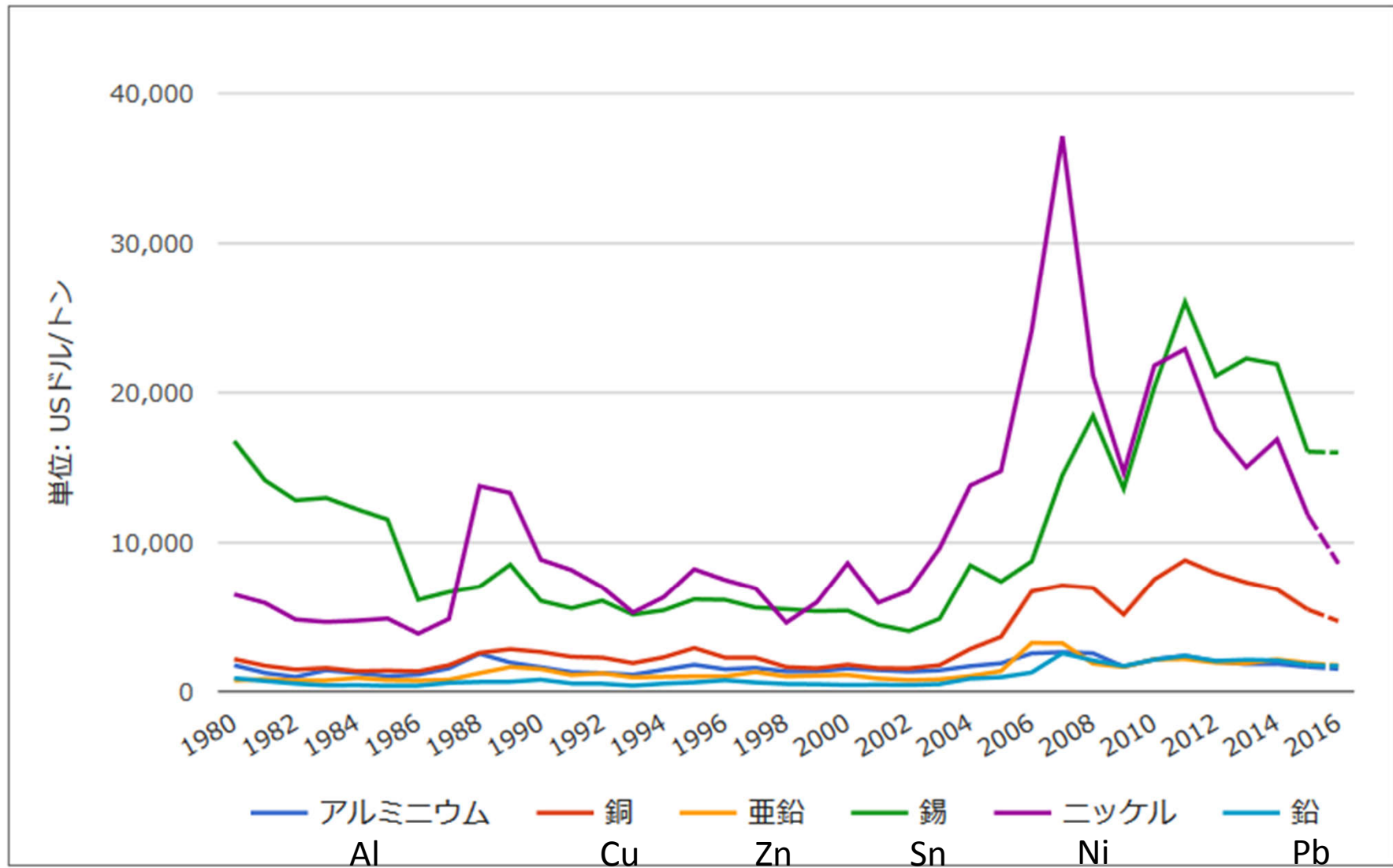
◆ Target items

- | | | |
|---------------------------------|--|---------------------------------|
| 1) Telephone set, Fax machine | 12) Other electric tools | 21) Hair dryer, shaver |
| 2) Mobile phone | 13) Electronic calculator | 22) Household massager |
| 3) Radio, TV image receptor | 14) Bathroom scale | 23) Treadmill |
| 4) Digital camera, Video camera | 15) Household medical matter formation machine | 24) Electric mower |
| 5) Digital audio player | 16) Film camera | 25) Electric lighting equipment |
| 6) Personal computer | 17) Rice cooker, Microwave | 26) Electric clock |
| 7) DVD recorder, CD player | 18) Electric fan, Humidifier | 27) Electric instrument |
| 8) Printer | 19) Electric iron, Vacuum cleaner | 28) Portable game console |
| 9) Display | 20) Electric stove | |
| 10) e-book device | | |
| 11) Electric sewing machine | | |

Basic Policy of Small Home Appliance

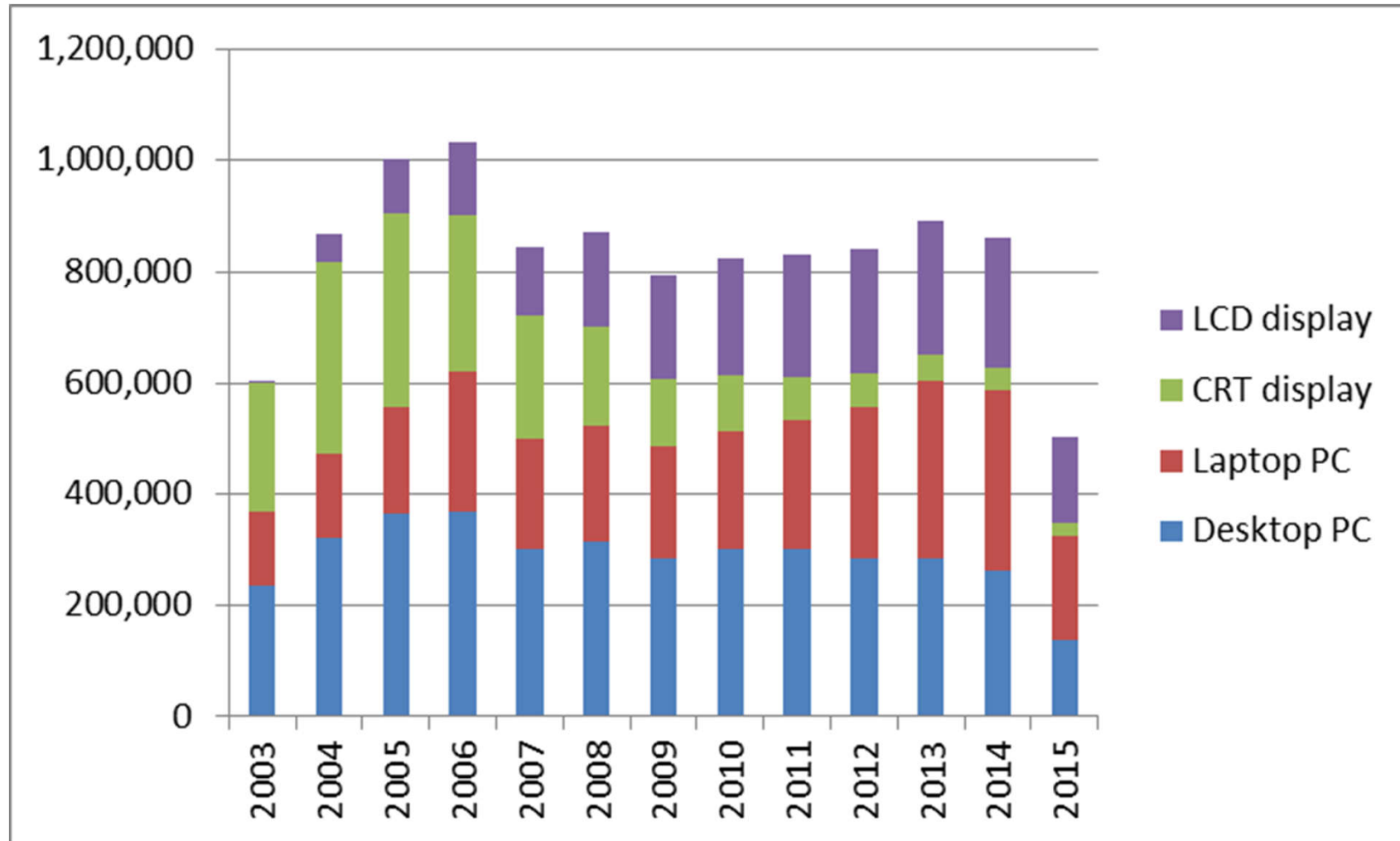
- Promote collection
- Target : 140,000 t/year by 2015
(Per person 1kg/year) ≒ Collection rate 20%
- Promote the knowledge of Small home appliance collection
- Grasp mass quantity and reuse situation
- Protect personal information
 - Collection & Pre-treatment stage
 - Ensure industrial health and safety
 - Prevent the generation of hazardous substance, protect surrounding environment condition

Unit: USD/ton



Price of nonferrous metals

Collection amount by the manufacturers



Source : PC3R promotion association

Features & Problems of Small home appliance Act

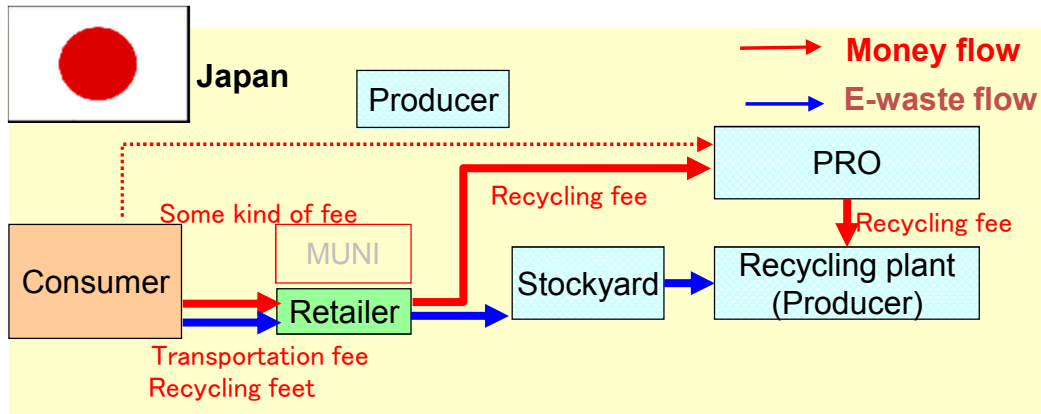
Key features:

- Promotive type of legislation
- No responsibility on manufacturers
- A lot of target items
- Multi-collection routs

Problems :

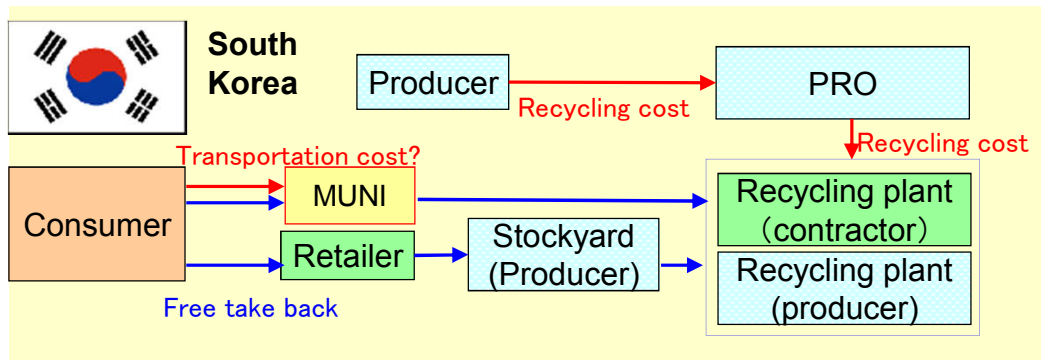
- Not all items are collected throughout the country
- System influenced by market price
- Risk of leakage of personal information
- Lack of consumers' recognition(Box collection+ α)
- No DfE (Design for Environment)

Comparison with Korean and Taiwan systems



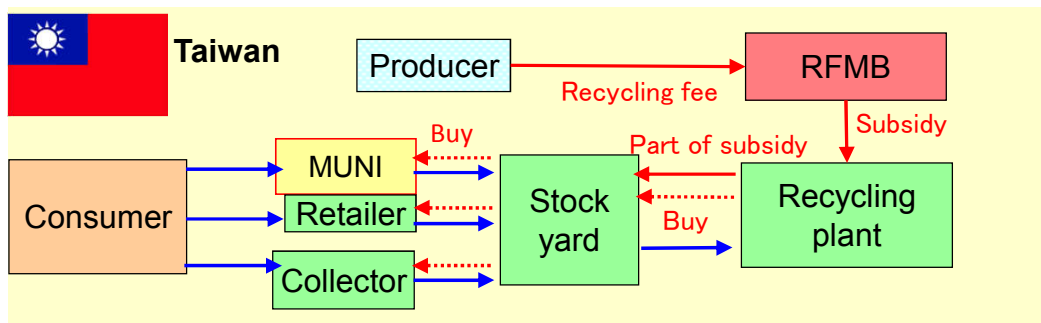
【Japan】

- Physical responsibility
- Retailer take-back
- Weak role of municipalities
- Consumer pays at the time of disposal



【South Korea】

- Physical responsibility
- Retailer free take-back



【Taiwan】

- Monetary responsibility
- Multiple collection root

PRO: Producer Responsibility Organization
RFMB: Recycling Fund Management Board

Comparison of collection & recycling volume (2012)

	Market sales (t)	Collection amount(t)	Collection amount per person (Kg/person)	Collection rate※ (%)	Recycling rate (%)
Japan (Large home appliance)	913,644	468,022	3.7	51	85
South Korea	591,597	138,617	2.8	25	-
Taiwan	237,784	127,909	5.5	54	62
Sweden	220,000	167,000	17.5	76	84
UK	1,426,244	504,563	7.9	35	51
France	1,600,000	470,556	7.4	29	83

※Collection rate: Collection amount/ Market sales amount

Source: European Commission–DG Environment, Ishikawa (2015), SWh RHEE(2015), Taiwan EPA

Conclusion on E-waste Recycling System

- 60% used PCs are reuse and recycled within the country; 30% exported to other countries. But the manufacturers' take-back amount is very little.
- Collection amount of small home appliances is low-growing.
- We need to realize the better system to dispose e-waste easy, economically feasible for the consumers.

End-of-life Vehicle (ELV) Recycling Act (enacted in 2002)

Title of the Act: Act on Recycling of End-of-Life Vehicle

Date put into force: January, 2005

Background: Illegal dumping and improper disposal of ELV

Outline of the system: Automobile manufacturers accept and properly recycle the difficult-to-handle automotive items (shredder residues, CFCs and air bags). Automobile owners pay recycling fees to cover the costs for the disposal of ELV.

Presiding ministry: MOE, METI

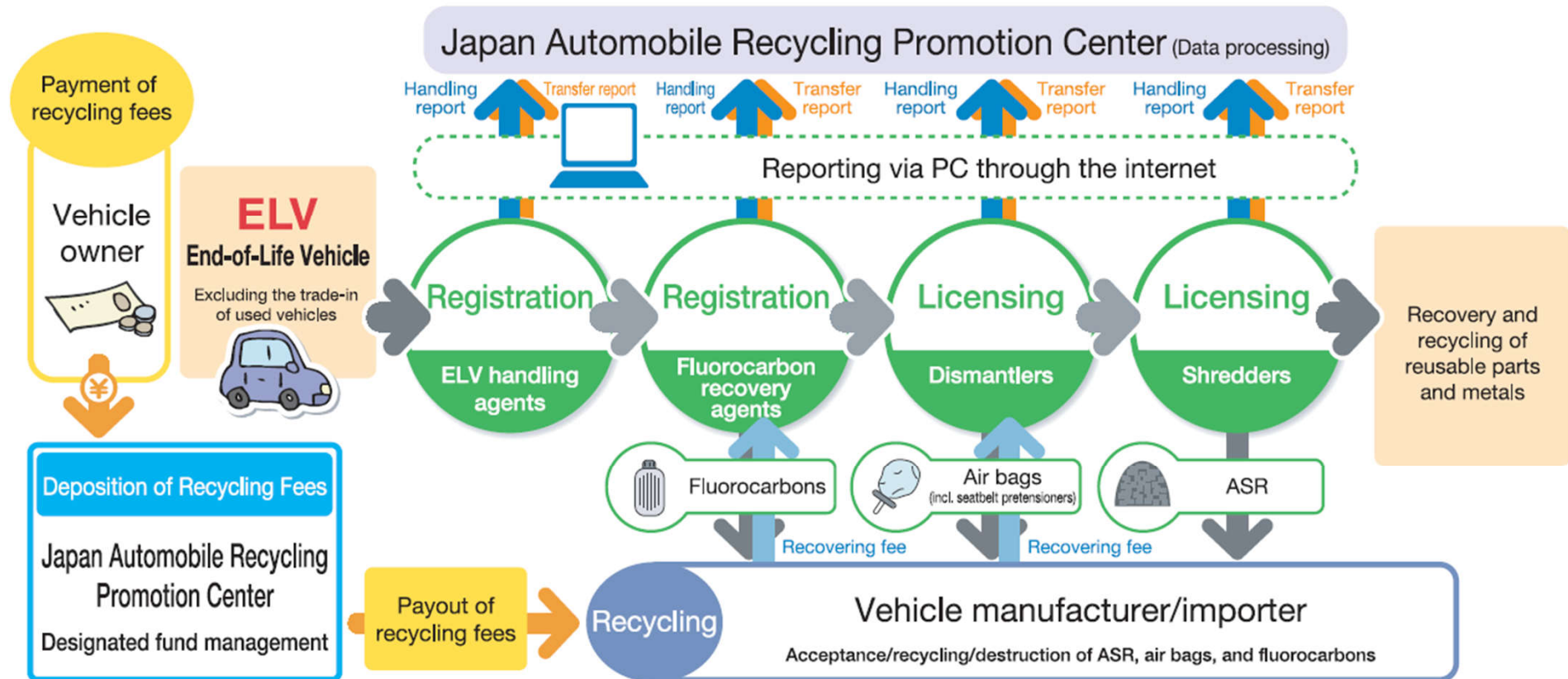
Background

- Teshima Case: Industrial waste illegal dumping (569,000 t=>910,000t) 28.1 Billion yen

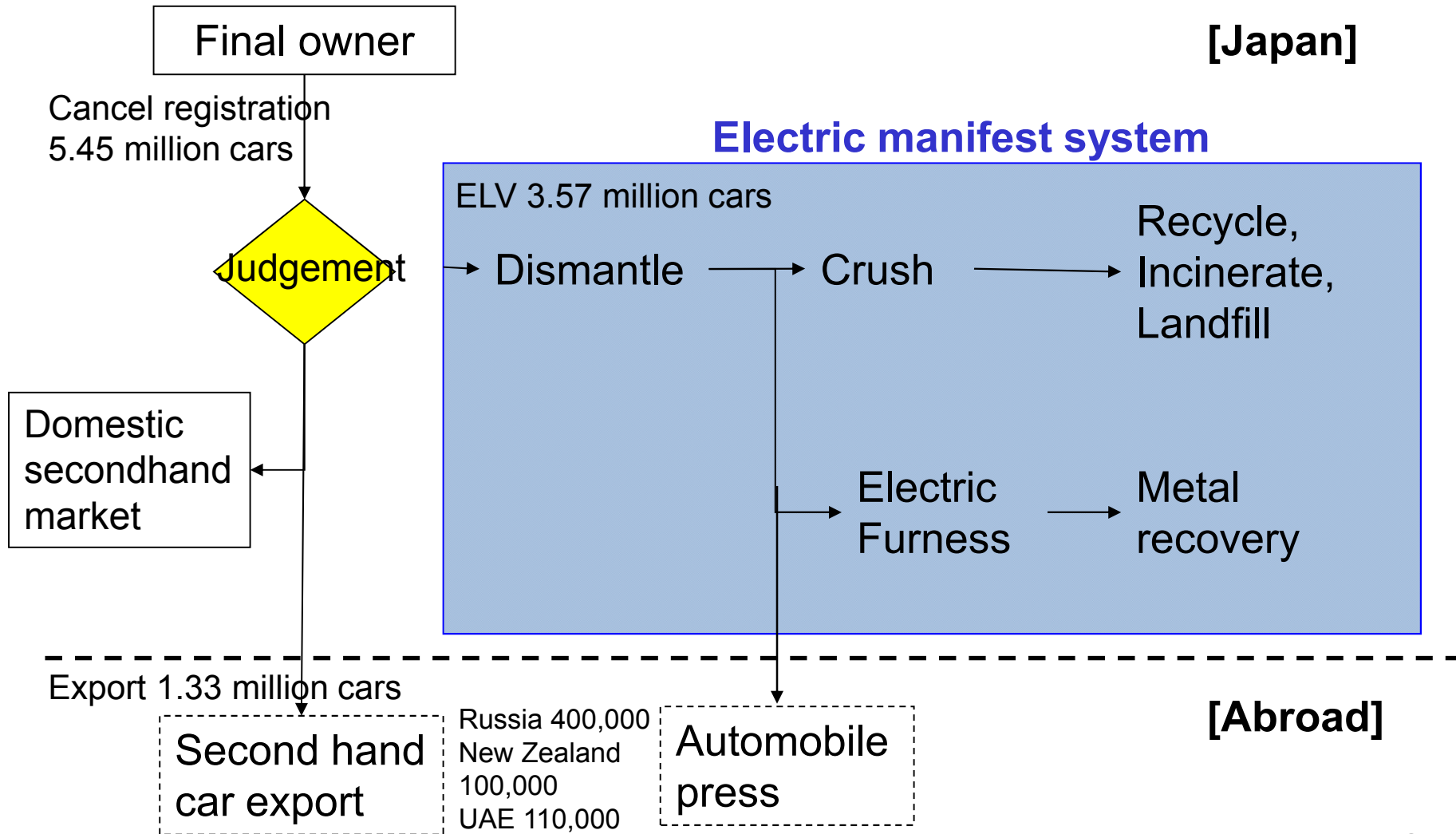


Teshima Waste Treatment Project:
<http://www.pref.kagawa.lg.jp/haitai/teshima/project/epanf.pdf>

Concept of ELV recycling



Flow of used vehicle in 2006



Conclusion

Recycling systems have entrenched in the social system and lifestyles in Japan.

There are still a number of problems to be solved or improved.

- (Containers & Packaging) “Reduce” should be more prioritized.
- (Home appliances) Increase the collection rate etc.
- (ELV) Increase the number of covered items etc.

Since the system has unique characteristics, it cannot be directly used in other countries, but Japanese experience may be useful for developing a new model.

References

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(<https://www.env.go.jp/en/recycle/smcs/attach/hcswm.pdf>)
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(<http://www.jcpra.or.jp/>)
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7. PC 3R Promotion Association (<http://www.pc3r.jp/>)
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10. JICA <http://stream.jica-net-library.jica.go.jp/lib2/07PRDM011/en/video.html>