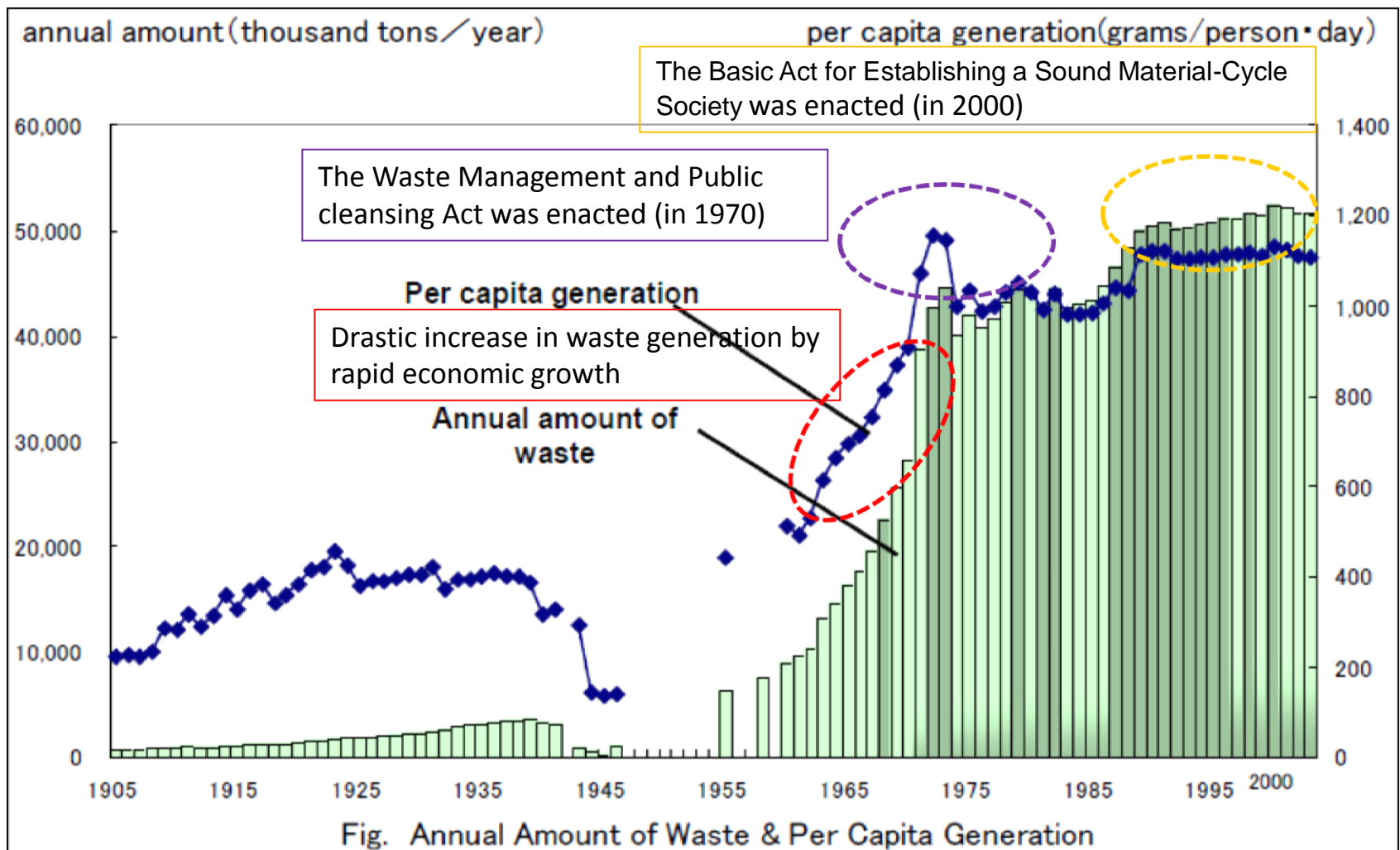


Recycling scheme of a WEEE in Japan

Yuzo Yagai
Deputy Director
Office of Sound Material-Cycle Society and Office of Recycling Promotion,
Waste Management and Recycling Department,
Ministry of the Environment

Turning Point of Waste Management in Japan



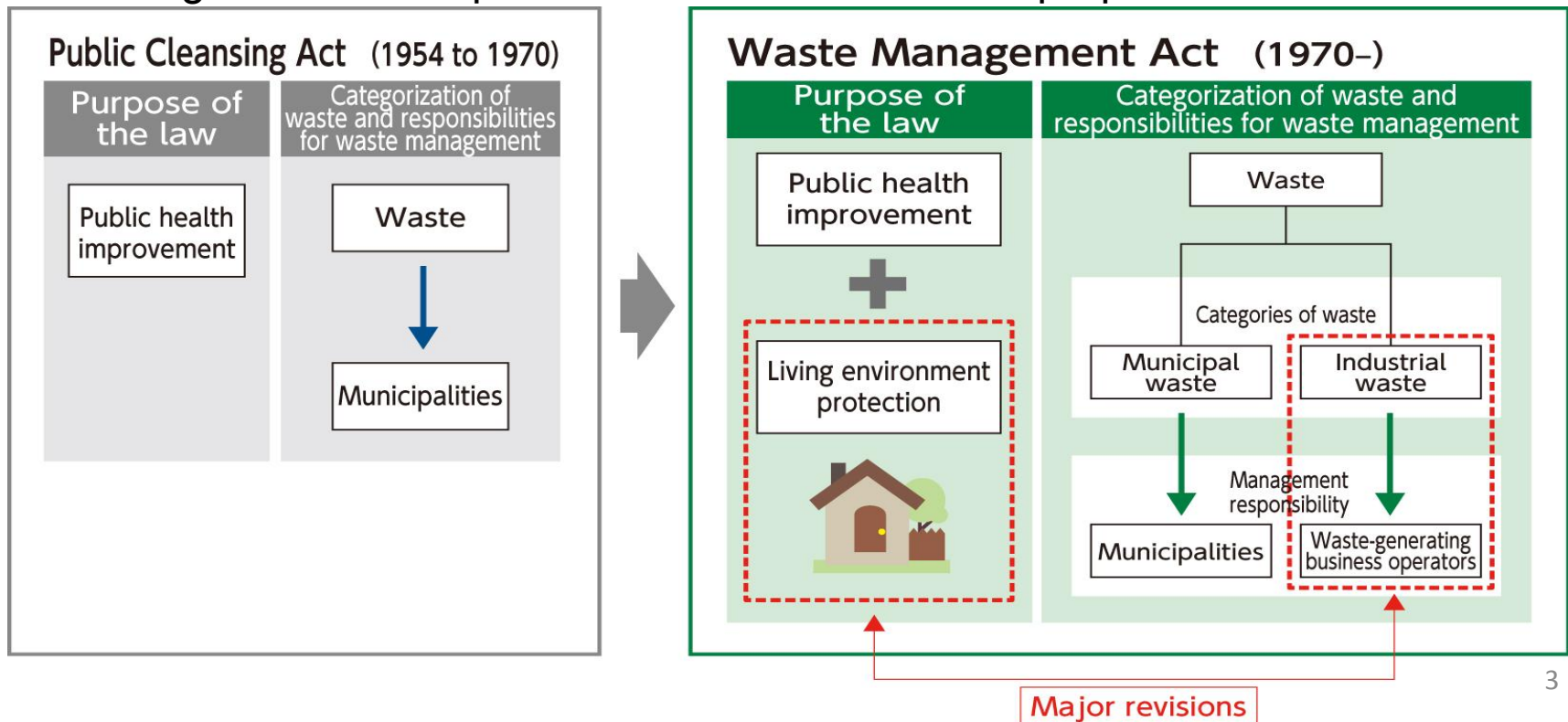
Rapid economic growth period (1960s to 1970s)

Measures implemented to solve problems

Development of basic system for waste management

The Waste Management Act was enacted in 1970.

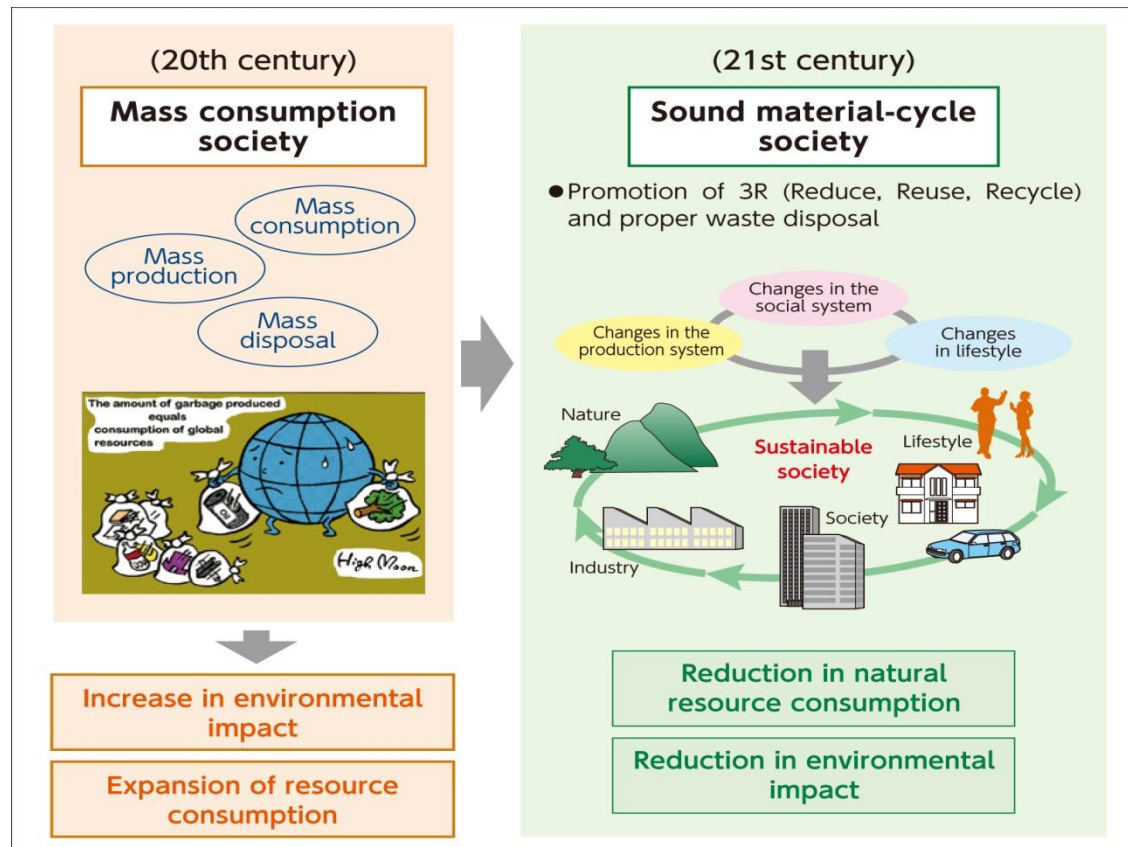
- The act distinguished “municipal waste” from “industrial waste,” and stipulated whose responsibility it was to manage them.
- “Living environment protection” was added to the purposes of the act.



Establishment of a sound material-cycle society

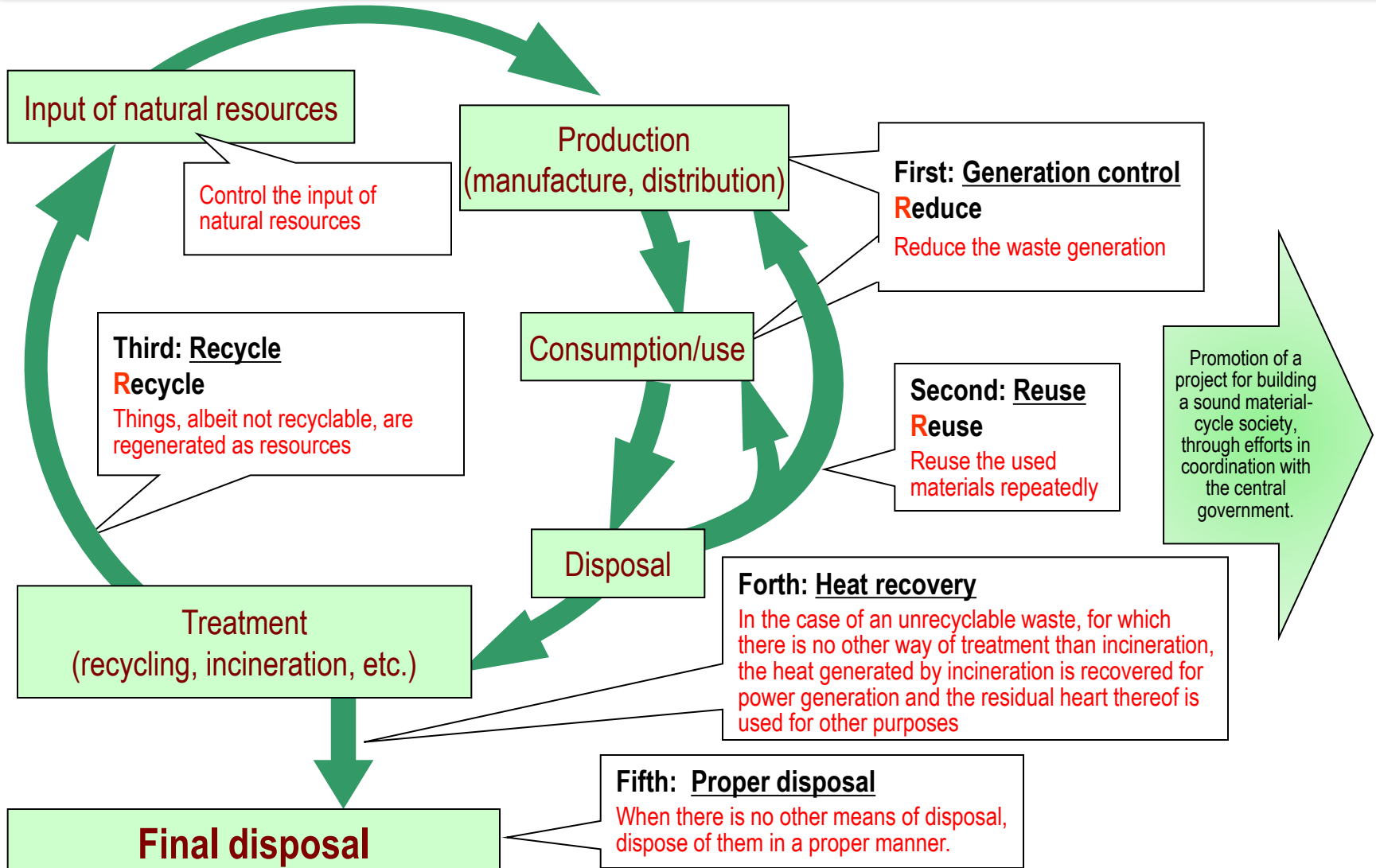
Promotion of the establishment of a sound material-cycle society

In 2000 the Basic Act for Establishing a Sound Material-Cycle Society was enacted to set out the basic principles of a recycling-oriented society, etc.

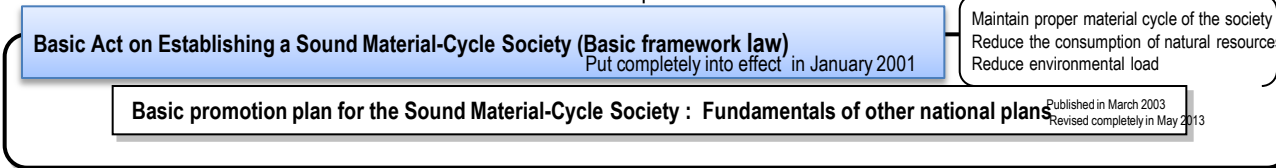
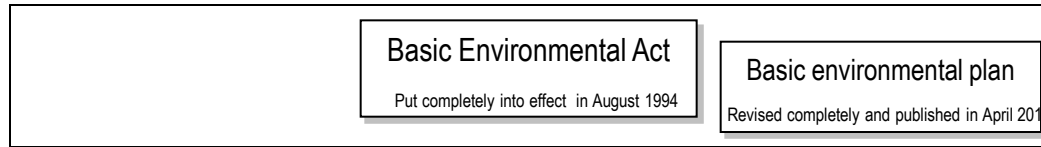


Concept of a sound material-cycle society

"Sound Material-Cycle Society" means a society in which the consumption of natural resources will be conserved and the environmental load will be reduced to the greatest extent possible, by preventing or reducing the generation of wastes, etc. from products, etc., by promoting proper cyclical use of products, etc. and proper disposal of waste. [Basic Act on Establishing a Sound Material-Cycle Society] (Promulgated in June 2000, and put completely into effect in January 2001)

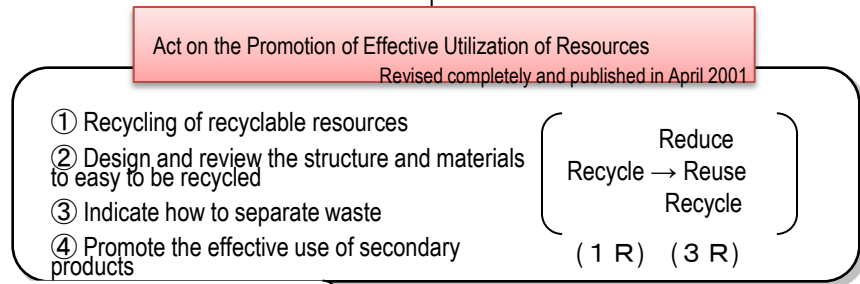
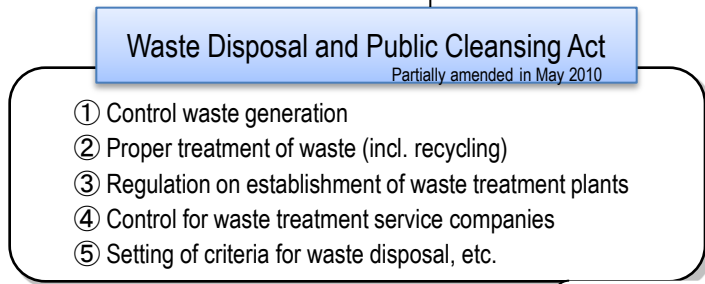


Legal system for building a sound material-cycle society

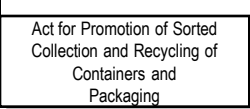


< Proper disposal of waste >

< Promotion of material recycling >



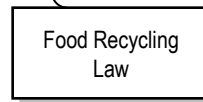
Regulations depend upon characteristics of articles and materials



{ Bottles, PET bottles, paper/ plastic containers }



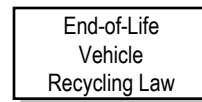
{ Air conditioner, refrigerator, freezer, TV sets, Washing machine, clothes dryer }



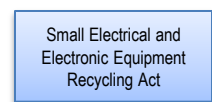
{ Food residue }



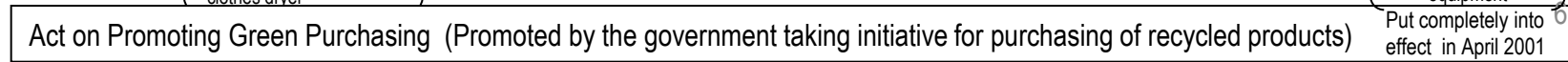
{ Wooden/concrete/ asphalt materials }



{ Automobile }



{ Small electrical and electronic equipment }



Overview of the Waste Management & Public Cleansing Law

Purpose: Conservation of the life environment through reduction of waste production, proper waste separation, storage, collection, transport, recycling, disposal, etc.

Waste

Garbage and unneeded materials in solid or fluid form

Municipal Waste

Non-industrial waste (household refuse, etc.)

Industrial Waste

Cinders, sludge, waste oil, waste plastics, etc., produced by business activities

Government

• Basic policy formulation • Setting of management standards, facility standards, etc. • Emergency measures, etc.

Municipalities

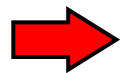
Municipalities: **Management responsibilities**

- Formulation of general waste management plans
- Management in accordance with management standards to ensure that waste within the region does not interfere with life environment conservation

Business: **Management Responsibilities**

- Voluntary management of industrial waste
- Observation of industrial waste management standards, etc.
- Observation of outsourcing standards

Supervision



Municipal waste management contractors

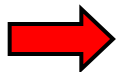
- Business permits
- Observation of general waste management standards, etc.

Permit supervision

Industrial waste management contractors

- Business permits
- Observation of industrial waste management standards, etc.

Permit supervision



Municipal waste management facilities

- Installation, transfer permits, etc.

Permit supervision

Industrial waste management facilities

- Installation, transfer permits, etc.

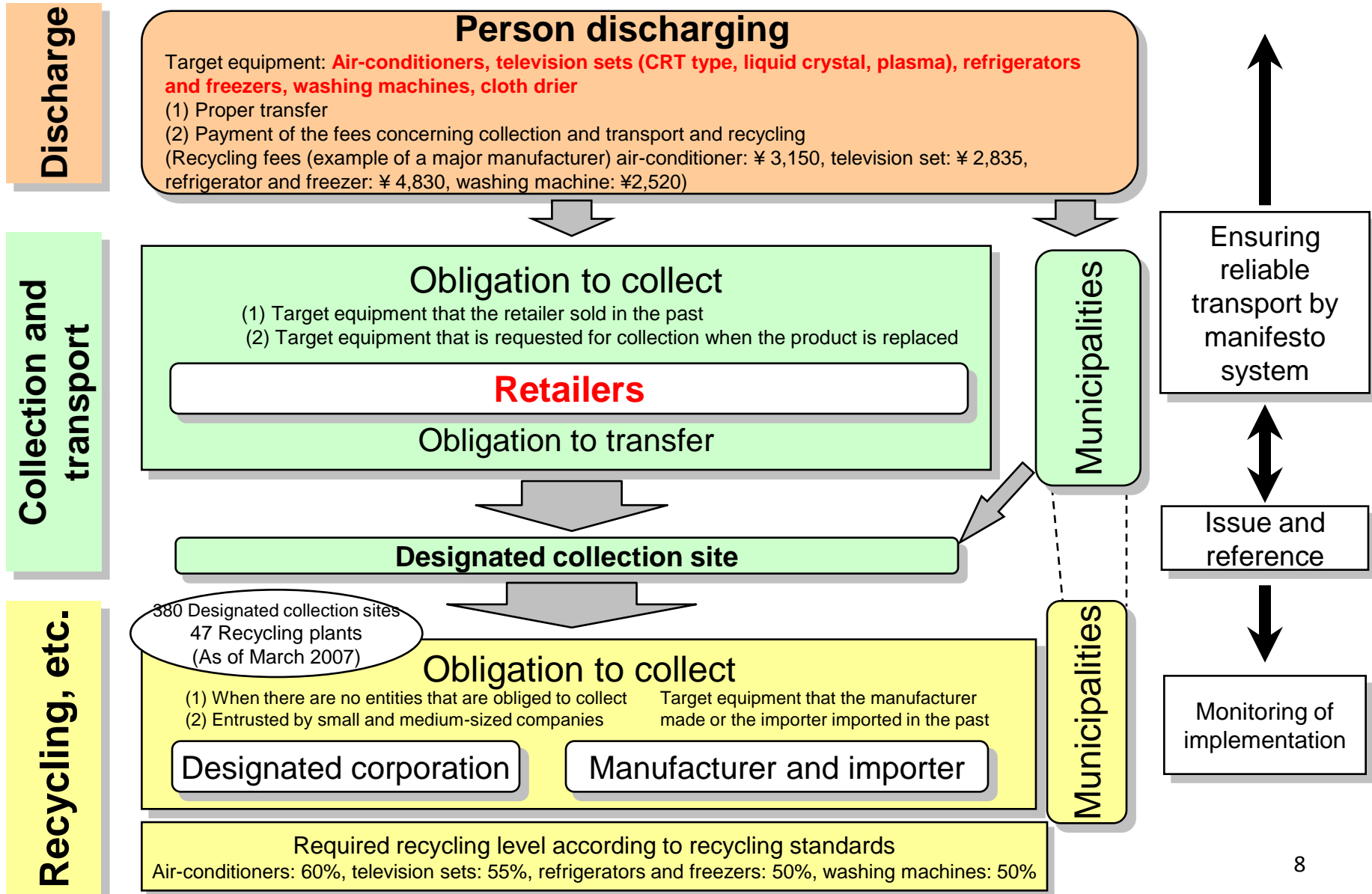
Permit supervision

Prefectures

Prefectures

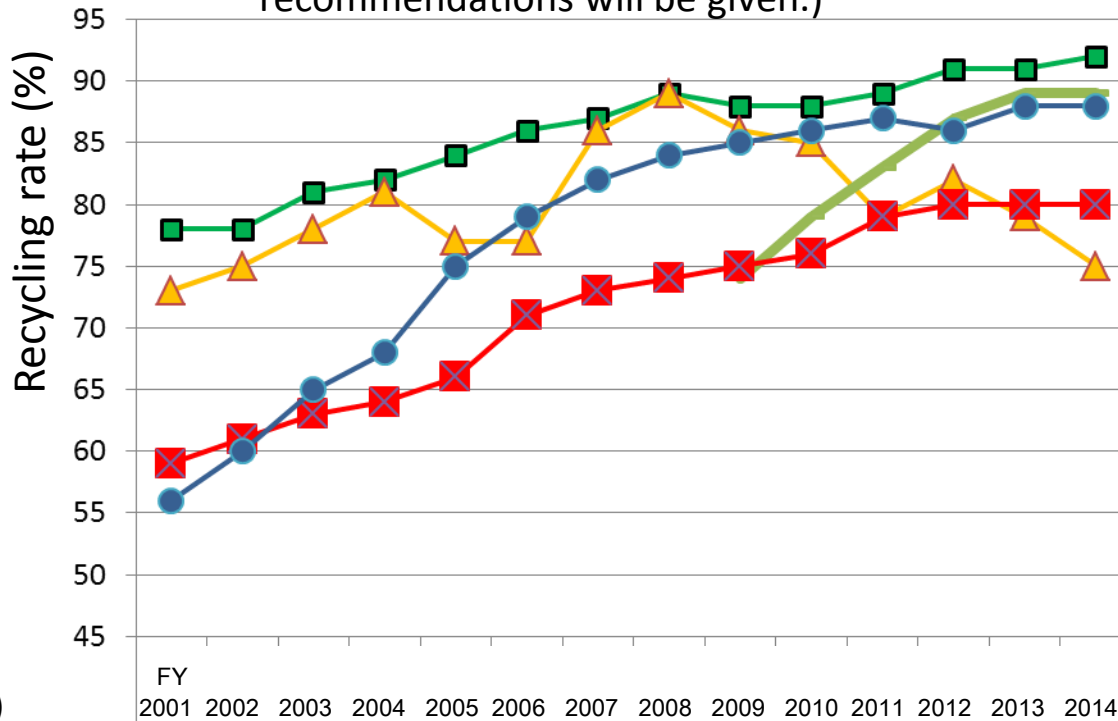
Mechanism of the Home Appliances Recycling Law

(Promulgated in June 1998 and fully implemented in April 2001)



Transition of Recycled Rate

< Recycled Rate > : 'Recycled Rate' means the rate of the recycled items among the post-consumed "specified home appliances," taken back by manufacturer and so forth (- while 'Recycle' means, removing parts and materials from the post-consumed **specified home appliances**, to be reused as parts or raw materials for new products- by manufacturers themselves, or assigning them, with or without charge, to those who will reuse them. (*If the rate does not reach recycling standards, administrative advices or recommendations will be given.)



*Note 1: LCD/Plasma TV and Cloth dryer were added to the subject of collection in 2009.

*Note 2: Recycling rate of CRT TV were suppressed from 2009 to 2011, because part of the same category items has become target of "inverse-value" transaction.

The Home appliance recycling law result in promoting DfE

http://www.slideshare.net/OECD_ENV/panel-5-h-kikuchi-keidanren-japan-business-fed-japans-home-appliance-recycling-act



Implementation of Recycling workshop



Dismantling by planners and designers themselves



Identification of issues and measures in dismantling of equipment

大型液晶テレビ解体実験

実験結果

解体実験成績

※設計とレールで評価

会社	リサイクル率 (%)	リサイクル時間 (分)	廃棄物量 (kg)
日本電産 (本部センター)	48.4%	70.2%	20.4分
日本電産 (業務部品山崎建設)	48.4%	70.2%	19.7分
本件 (本部センター)	32.7%	59.4%	0分

【注】

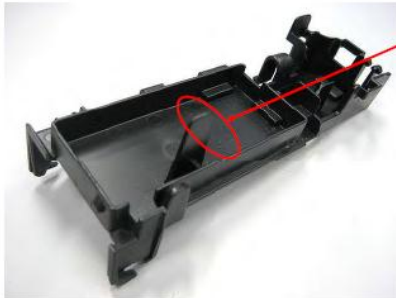
＜＜＜設計＞＞＞
 ・ビス締め込み方向は一方のみ
 ・ビスネーリングは両端に留めず
 ・解体方法が必ず分かる

＜＜＜設計＞＞＞
 ・ビス締め込み方向は一方のみ
 ・ビスネーリングは両端に留めず
 ・解体方法が必ず分かる

＜＜＜設計＞＞＞
 ・リサイクルの要となる部品は必ずしもリサイクルできない
 ・リサイクルできない部品は必ずしもリサイクルできない

Evaluation of empirical results and feedback to the design

Material indicators for plastic parts



>PS-HI FR(17)<

Indicator: >PS-HI FR(17)<
 Meaning:
 High-impact polystyrene (PS-HI) containing a flame retardant with a combination of aromatic bromine compound and antimony compound (FR(17))

[Source: Association for Electric Home Appliances Homepage (as of June, 2014)]

Refrigerant charging pipe



冷蔵庫の背面下部



Indicates that refrigerant and refrigerant oil can be effectively recovered from the compressor's refrigerant charging pipe if the refrigerator is laid down on its right side

Illegal Collecting Agents of Disused Goods

- Disused goods collectors:** The agents who collect disused home electric appliances discharged from households or offices, who operate with visiting door-to-door by trucks, or designating specific pickup spots to consumers and requesting them to bring in their goods. They mainly sell off the collected goods to the yard suppliers. Mostly unlicensed operators under the Waste Management Law.
- Yard Suppliers:** Dealers who operate with their disposal company yards (often iron fenced,) primarily aiming to export the collected items. Collected goods are often destroyed, dismantled, stocked and containerized in the yards, but often improperly processed. Sometimes they are also waste disposal agents or scrap dealers.

Patrolling truck agent (un-licensed)



Leaflet ad agent (Licensed for industrial waste only, but un-licensed for Municipal waste)



<- A poster camouflaging as administrative resource collection, with designating pick-up date



Shipping by bulk carriers or container ships

Discharged waste from households

Discharged waste from offices

Disused goods collecting agents

Yard suppliers

Scrap Exporters

Scrap Export



Collection depot-based agent

Second handed goods

Valuable goods are sold off at the resale market



Yard suppliers destroy electric appliances without taking environmental measures, discharging hazardous substances such as Freon gases into environment.

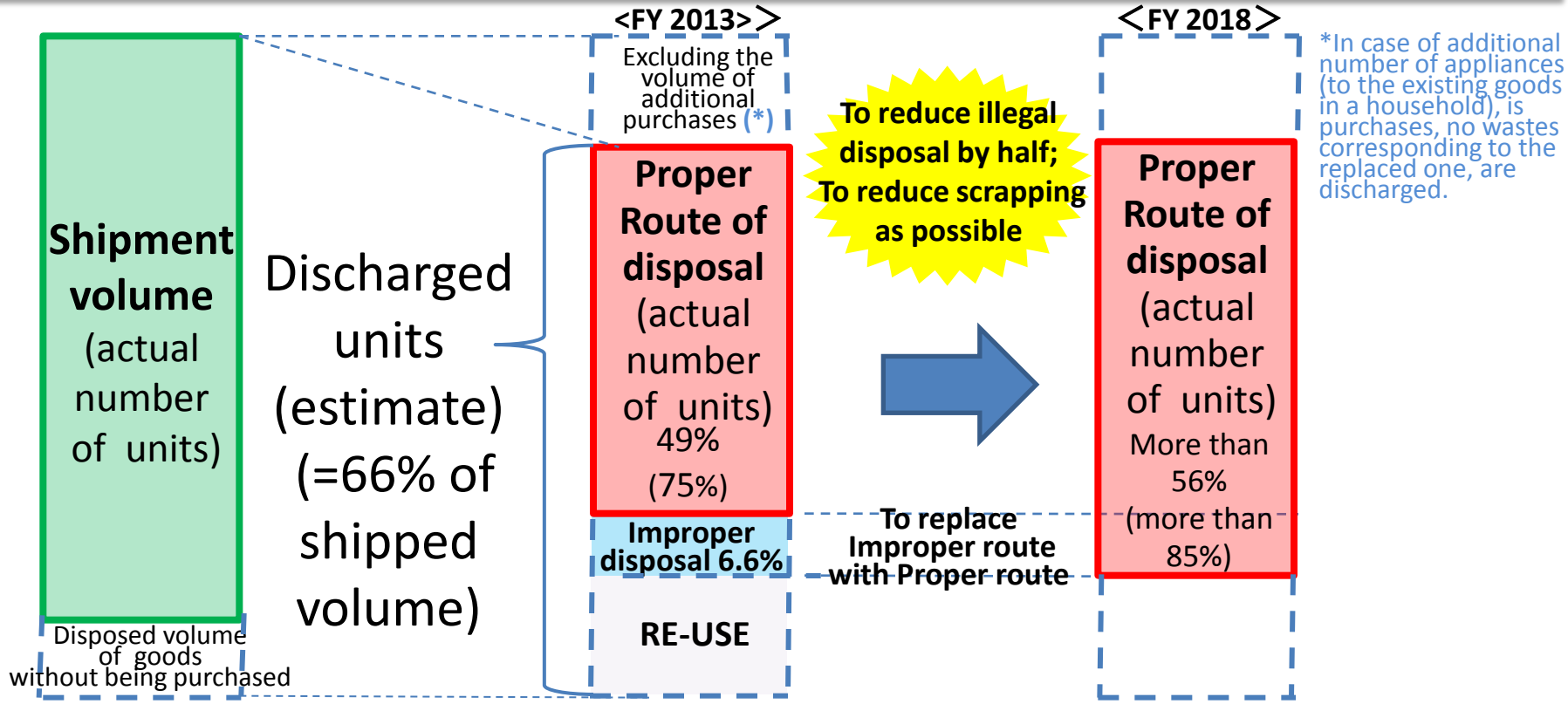


Improper treatments in the Exported country

Target Setting for the Collection Rate- with 'Home Appliances Recycling Law'

Collection rate in FY 2013 was about 49% (12.238Mil units /25Mil units) .Therefore, to achieve (1) and (2):

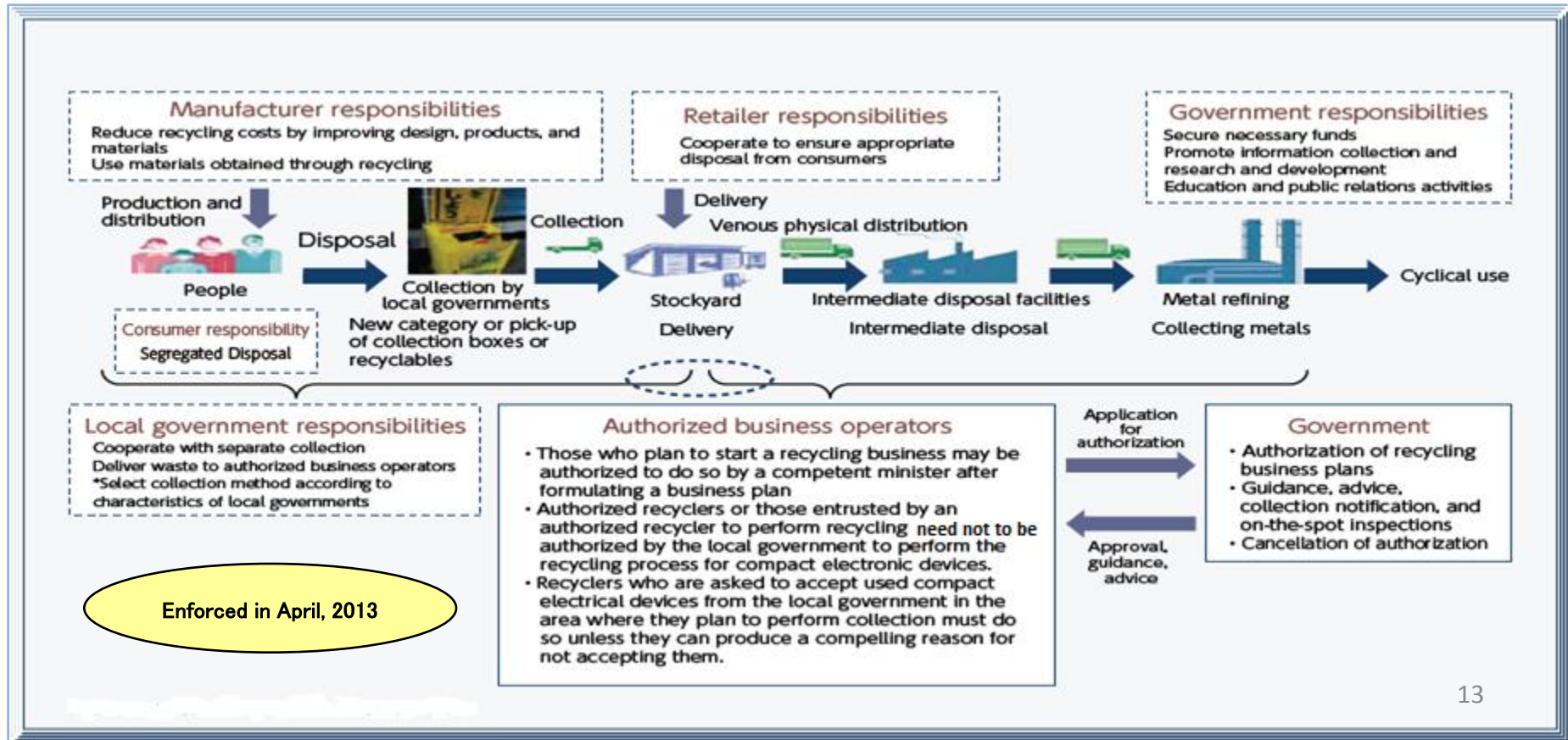
- (1) Reducing illegal disposal rate by half. [currently 0.4% (92K unit/ 2.5 Mil units.) => to be reduced into 0.2%]
- (2) Reduce the volume of scraps generated inside and outside the nation as possible. [currently 6.4% (1.61Mil units/2.5 Mil units) => 0%]
- Assuming if (1), (2) will be all properly collected and recycled, collection rate will rise by about 7%.
-> therefore, **Target Standard Recycling Rate should be set as 56%.**
- If replacing the above target with the target rate in terms of the volume restricted to the all discharged units, aimed collection rate (currently75%) should be raised for(85%.)



* Number in parentheses are collection rate translated into discharged units volume-based figures (in estimate). 12

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



(c.f.) Actual Result of Recycling Rate by Certified Operators

- [7,514tons] of metal resources were recycled by certified operators, among the total disposal volume of consumed small home appliances [=13.236tons.]
Breakdown by metal categories : Iron 6,599 tons, Aluminum 505 tons, and Copper 381 tons.
 - Precious metals are recycled as, Gold 46 kg, Silver 446kg, and Palladium 2kg.
 - If converted into currency, recycled metals (Iron, Aluminum, Copper, Stainless steel, Brass, Gold, Silver, Palladium) were worth 690Mil Yen.
- Thermally recovered amount of plastics accounts for 86% of the total recycled plastics.
- Residue of intermediate treatment accounts for 8% of the total weight, while rest of substances (92%) are all recycled.

TABLE/ Actual recycling amount of used small home appliances, taken back by the certified operators (FY2013 result)

	FY2013 result (tons)
Collected amount of Enclosed type cells, Fluorescent tubes, Gas cylinders, Toner cartridges.	20
Collected amount of fluorocarbons	0.4
Amount of metals assigned to the refinery operators	8,582
Recycled amount of metals	7,514
Recycled amount of plastics	504
Thermally recovered amount of plastics	3,017
Reused amount of used small home appliances (etc.)	0
Amount of inter-treatment residue, (etc.)	1,113
TOTAL	13,236

<major items>	
Iron	6,599t
Aluminum	505t
Copper	381t
Stainless steel, Brass	26t
Gold	46kg
Silver	446kg
Palladium	2kg

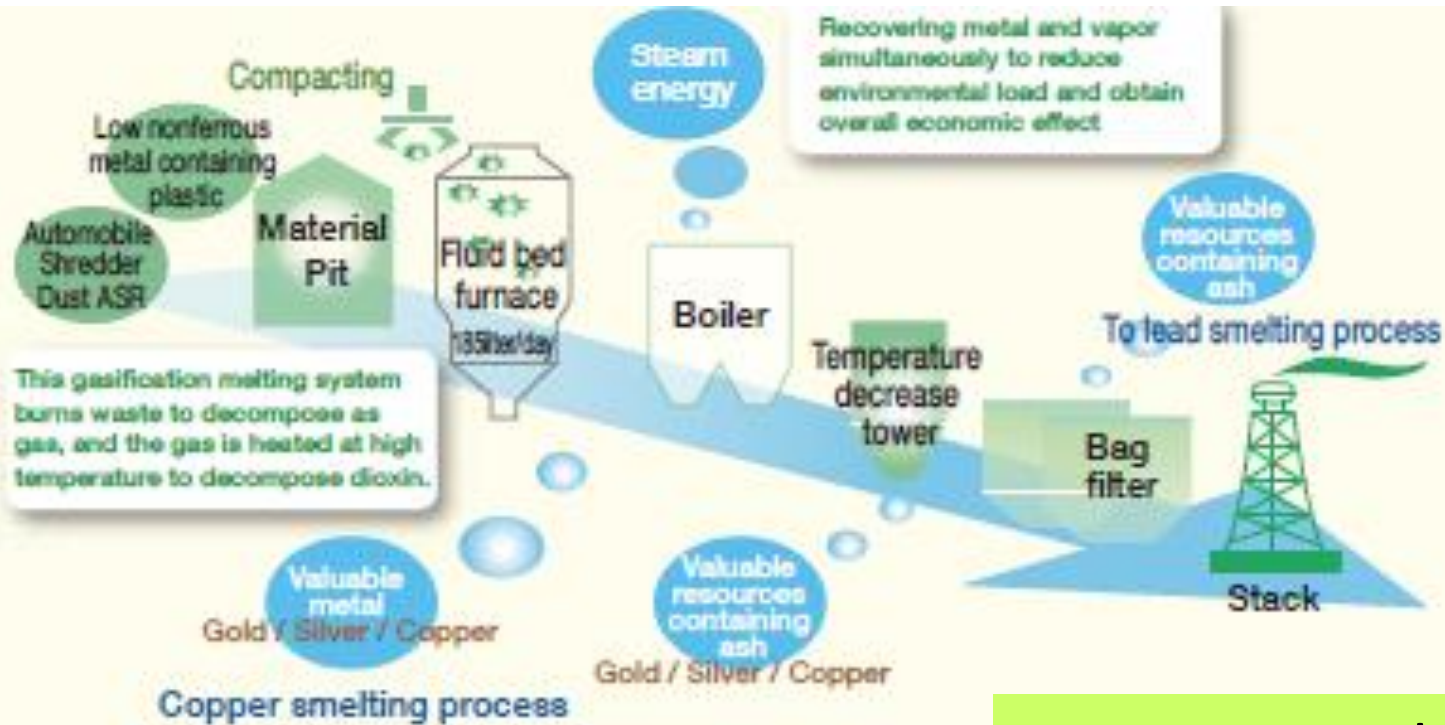
690Mil Yen

[GROUNDS FOR CURRENCY CONVERSION]

- Iron: ¥25/kg (delivered price for shredding machine maker B, "Metal recycling monthly", Oct. 2014)
- Aluminum: ¥110/kg (Unstuck aluminum cans'current market price in Kanto area, "Metal recycle monthly", Oct. 2014)
- Copper: ¥615/kg (Copper scrap's current market price in Kanto area "Metal recycle monthly", Oct. 2014)
- Stainless steel: ¥128/kg (SUS304 new cutting (trading price between same businesses, "Rare metal News" Nov.1, 2014)
- Brass: ¥366/kg (Delivered price at wholesalers in Tokyo area, "Metal recycle monthly", Oct. 2014)
- Gold: ¥4,279/g (Price quoted at mine, "Rare metal news" Sep 24, 2014)
- Silver: ¥65.7/g (Price quoted at mine, "Rare metal news" Sep 24, 2014)
- Palladium: ¥2,960/g, "Rare metal news" Sep 24, 2014)

*Actual result includes the amount of PC and cellphones duly treated in accordance with recycling project plan, after taken back from households and business agents

Material recycling in small home appliances: Collaboration with nonferrous refining industry



Urban mining : Valuable metals can be recovered through advanced heat and chemical treatment processes, which can be sold ultimately → Small Home Appliance Recycling Law

Diverse recycling materials



Overview of the individual recycling acts

	Objective products	Efforts	Results
Act for Promotion of Sorted Collection and Recycling of Containers and Packaging (Enacted in June 1995) (Revised in June 2006)	<ul style="list-style-type: none"> - Steel cans, aluminum cans, glass bottles - Cardboards, cartons, paper containers and packages - PET bottles, plastic containers, plastic packages 	Legal obligations; (1) <u>Consumers</u> sort and take out the waste (2) <u>Local authority</u> collects classified waste (3) <u>Business entities</u> are required to recycle materials	Separated collection rate of waste by local authorities in FY 2011 <ul style="list-style-type: none"> - 90% or more for cans, bottles and PET bottles - Approx. 80% for cartons - Approx. 70% for plastic containers - Approx. 40% for paper containers and packages
Home Appliance Recycling Act (Enacted in June 1998)	<ul style="list-style-type: none"> - Air conditioner - TV sets - Refrigerator, freezer - Clothes washing machine, clothes dryer 	<u>Manufacturers</u> are obliged to collect and recommercialize their products, and <u>retailers</u> are obliged to collect and deliver their used products.	Recommercialized ratio: Air conditioner 89%, CRT-based TV sets 79%, LCD and plasma TV sets 83%, refrigerator and freezer 79%, washing machine and dryer for clothes 87% (FY 2011)
Law for the Promotion of the construction material recycling (Enacted in May 2000)	<ul style="list-style-type: none"> - Concrete - Construction materials made of concrete and iron - Wooden material - Asphalt concrete block 	<u>Contractors</u> , when earning a construction work contract of a certain level or larger, are obliged to classify and recycle construction materials on site.	Recycle ratio: Asphalt concrete block 98.4%, concrete block 97.3%, wooden materials from construction 89.4% (FY 2008)
Law for the Promotion of Utilization of Recyclable Food Resources (Enacted in June 2000) (Revised in June 2007)	Food waste discharged from food-related business operators, including food production, distribution and restaurant industries	<u>Food-related business operators</u> are required to make an effort to achieve the goal in regard to the recycling and utilization of food resources	Recycle ratio: Food manufacturing industry 94%, food wholesaler 53%, food retailer 37%, restaurant industry 17% (FY 2010)
End-of-Life Vehicle Recycling Law (Enacted in July 2002)	Automotive shredder residues (ASR), airbags, CFC, etc. which were included in end-of-life cars. (* Iron scraps are exempt from recycling because of being valuable in the market.)	<u>Automotive manufacturers</u> are obligated to collect and recycle crushed residue from end-of-life cars	Recycle ratio by automotive manufacturers: Shredder dust 92-94%, airbags 92-100% (FY 2011)
Small Electrical and Electronic Equipment Recycling Act (Enacted in August 2012)	Small electrical and electronic appliances (* The items in this category are specified by the ordinances.)	<u>Local authorities</u> collect classified waste and <u>business operators</u> promote recycling	—
Act on the Promotion of Effective Utilization of Resources (Enacted in June 2000)	<ul style="list-style-type: none"> - PC - Small-sized rechargeable battery (sealed type) 	By providing the system of designating certain kinds of trades and products, <u>manufactures</u> hereof are promoted to recover and recycle the material on their own initiative.	Recycle ratio: Desktop PC 76.6%, notebook PC 57.2% Recycling of the small-sized rechargeable batteries: nickel cadmium battery 72.8%, nickel hydrogen battery 76.6% (FY 2011)

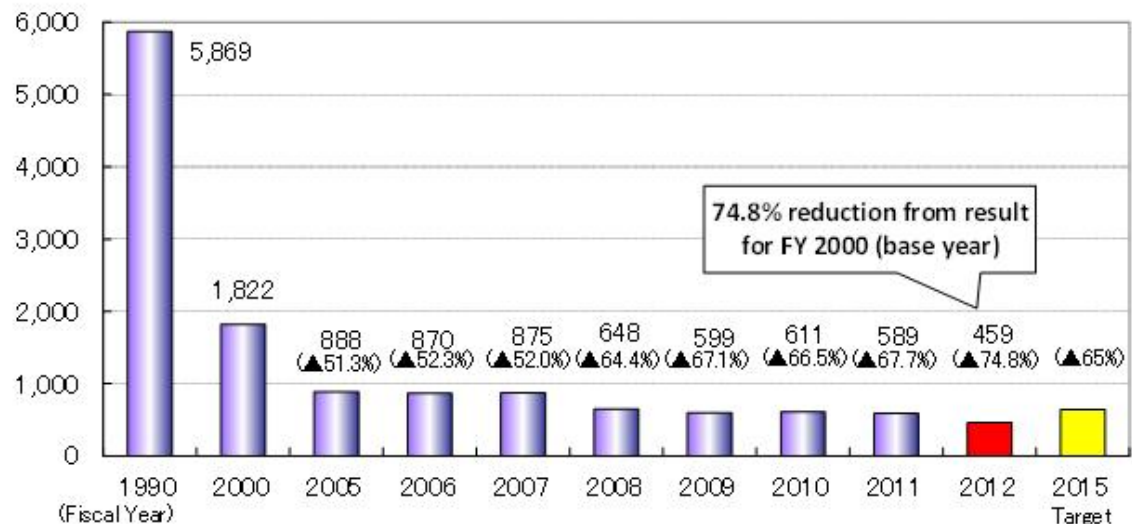
Keidanren (Japan Business Federation)'s Voluntary Action Plan on the Environment

(Section on the Establishment of a Sound Material-Cycle Society)

- Keidanren has set a target for Japanese industry as a whole for "reducing the final disposal volume of industrial waste in fiscal 2015 by about 65% from fiscal 2000" to promote independent and proactive efforts by industry toward building a sound material-cycle society.

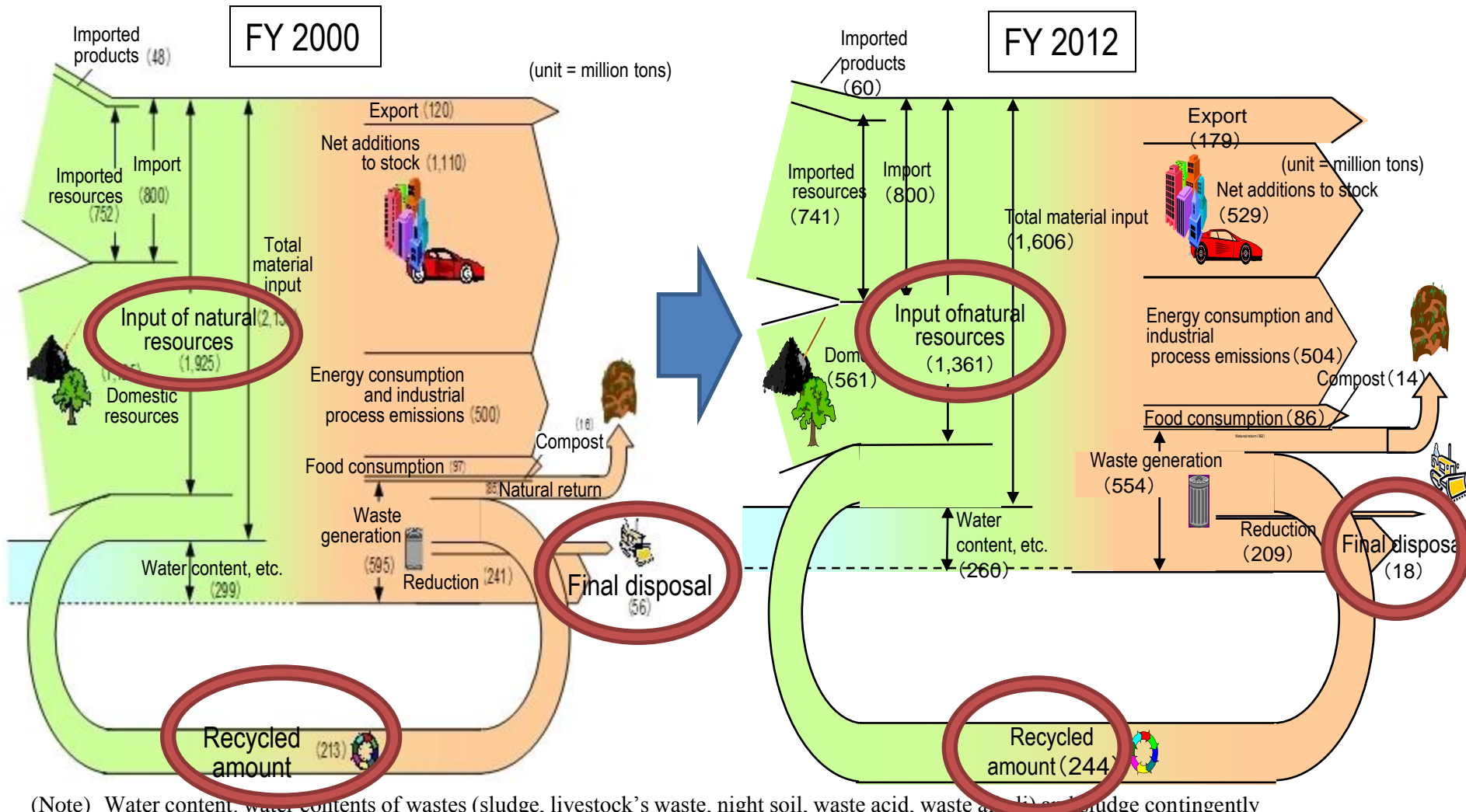
- The final disposal volume of industrial waste (32 industries) in fiscal 2012 was about 74.8% lower than the figure in fiscal 2000 (about a 92.2% reduction from the amount in fiscal 1990), exceeding the target level in this action plan.

[Final Disposal Volume of Industrial Waste by Industry as a Whole]
(in 10,000 tons)



Material Flow of Japan-could reduce natural resource use

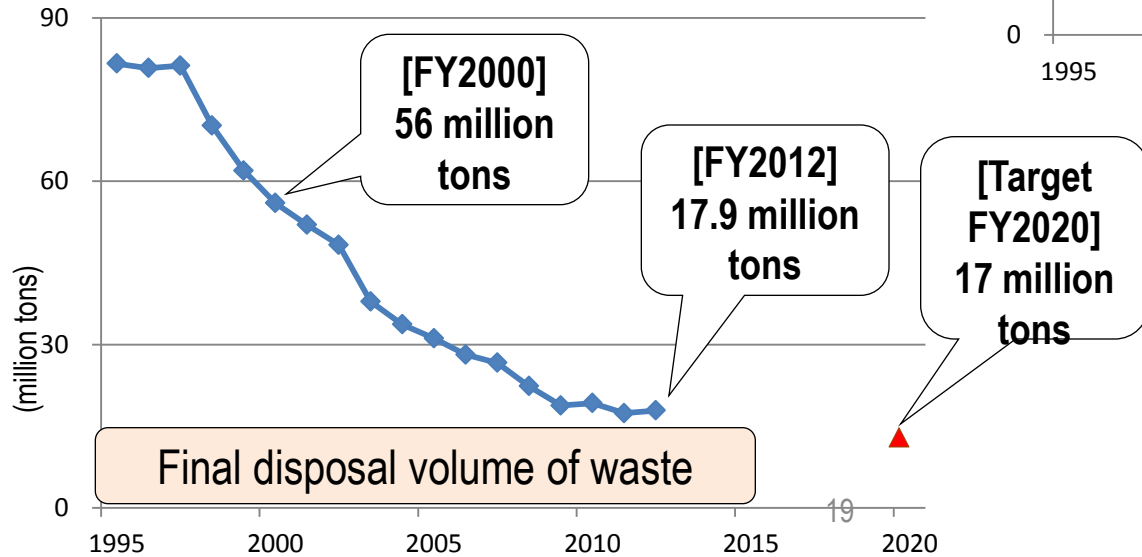
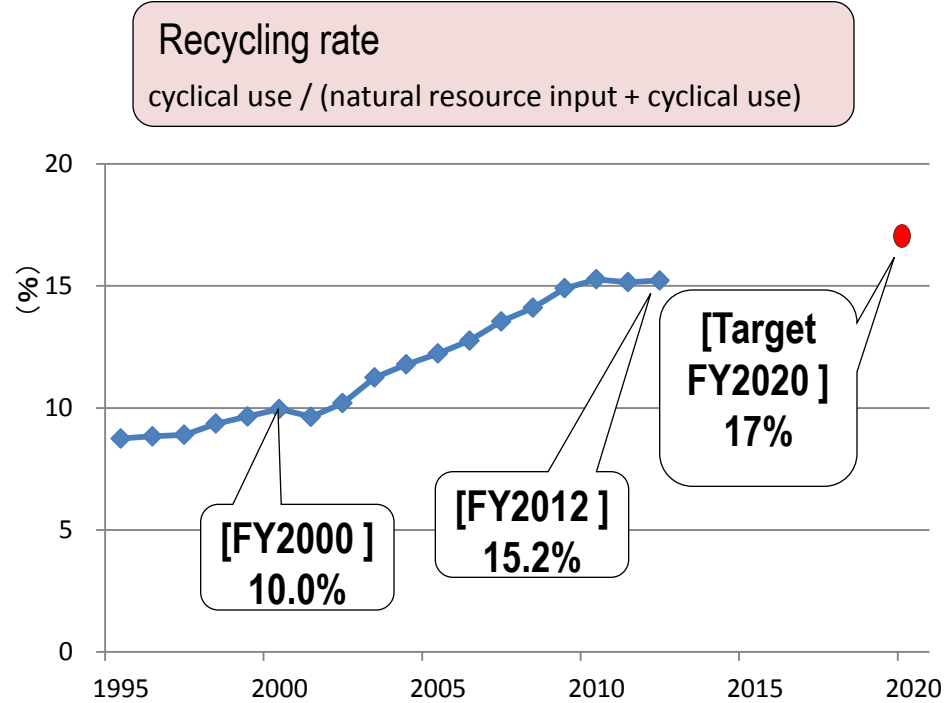
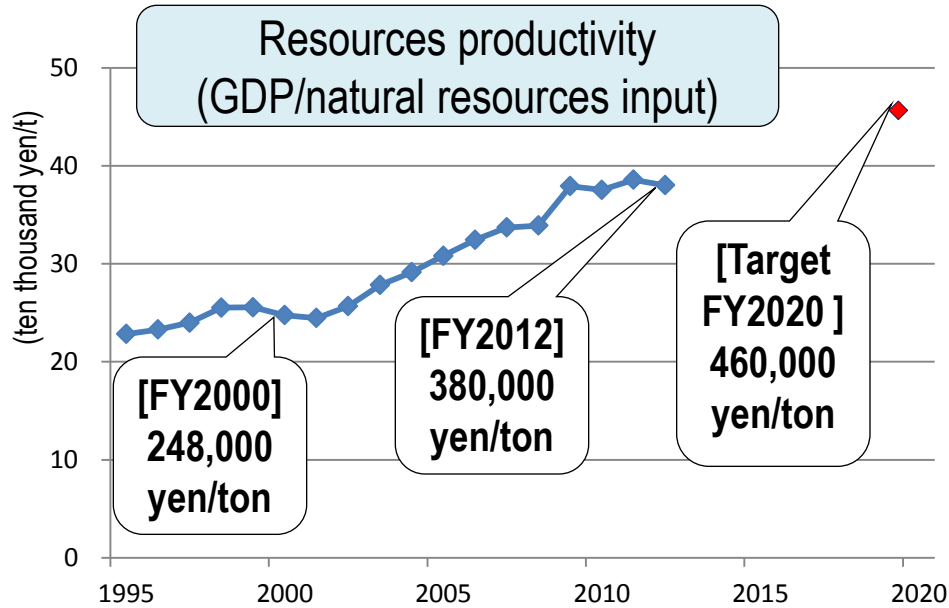
- Natural Resource input: 1.925 → 1.361 (billion tons)
- Final disposal: 56 → 18 (million tons)
- Recycled amount: 213 → 244 (million tons)



(Note) Water content: water contents of wastes (sludge, livestock's waste, night soil, waste acid, waste alkali) and sludge contingently dumped in the process of economic activities (sludge in mining, construction and in waterworks as well as slag)

Japan's progress towards establishing a SMC society

– changes in major indexes and goals targeted by the 3rd Fundamental Plan –



Key points of the Third basic plan for a sound society (decided by the cabinet in May 31, 2013)

Current states and issues

Development of 3Rs

- Japan is now **steadily developing the project for a sound material-cycle society**, through 3Rs effort and individual recycling acts; **we could already achieve a significant reduction in final disposition.**

High grade use of recycle resources, and securing of resources

- As the prices of resources spikes up in overseas markets, availability of resources is expected to be restricted further in the world; on the other hand, lots of precious and rare metals are dumped for backfilling as part of wastes.

Securing of safety and security

- **Through experience of the Great East Japan Earthquake, and the incidents of TEPCO Fukushima I Nuclear Power Plant, we Japanese are now highly aware of the necessity for safety and security.**

Necessity of develop projects on a global scale

- With economic growth and increase of population in developing countries, the amount of wastes increases in the world. 40 percent of them are generated in the Asia area. In 2050, it will grow double of 2010.

New goals

- The lesser the input of resources, the larger value we get.
- **The goal for material flow should be heightened further, focusing upon the productivity as top priority.**

	FY 2000	FY 2010	FY 2020 [Goal]
Resource productivity (10,000 yen/t)	25	37	46 (+85%)
Recycling rate (%)	10	15	17 (+7 points)
Final disposition (million ton)	56	19	17 (▲70%)

The value in parenthesis is the one compared to 2000.

Key policies in the Third basic plan for a sound society

Formation of a sound material-cycle society, focusing on the quality

- (1) **Building of a social economic society which is designed to advance 2Rs (reduce, reuse) prior to the recycle.**
- (2) **Recovery of useful metals from consumed products and promotion of a high grade recycle (horizontal recycle, etc.),** based upon the effective implementation of the Small Electrical and Electronic Equipment Recycling Act.
- (3) **Appropriate treatment of hazardous substance such as asbestos, PCB, etc.**
- (4) **Formation of a new guideline for disaster wastes treatment measures,** taking into consideration the lessons from the Great East Japan Earthquake
- (5) **Conversion of recycle and biomass resources into energy,** considering the environmental aspects of energy.
- (6) **Development of the efforts integrating the elements for a low carbon society and a nature-harmonized society, and grade-up of the local recycling network.**

Promotion of global efforts

- (1) **We aim at building a global sound material-cycle society through Asia 3Rs Promotion Forum, and supports for overseas development of waste recycle Industries.**
- (2) **Enhancement of the waterfront measures for harmful wastes, import of environment resources of high value, albeit difficult to treat adequately in developing countries, export of environment resources which can be hardly treated at home, under a requirement for such resources not to induce environmental pollution.**



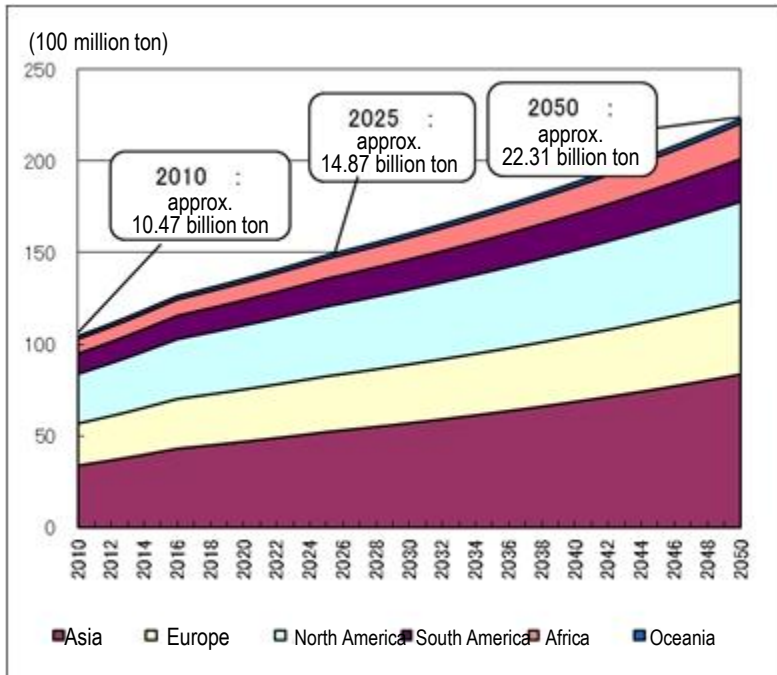
Response to the Great East Japan Earthquake

- (1) **Effective treatment and reuse** of disaster wastes
- (2) **Relevant and safe treatment** of radioactive substance-polluted wastes

Domestic and international situation surrounding sound material-cycle society

- Economic and population growth around the world have resulted in a waste increase. This trend is particularly pronounced in the Asian region.
- Escalation in global resource limitations: previously excavated terrestrial resources exceed underground resources, metal resource prices increase.
- Great East Japan Earthquake: stable and safe disposal of disaster-generated waste and radioactive materials-polluted waste.

Projected changes in the global volume of waste

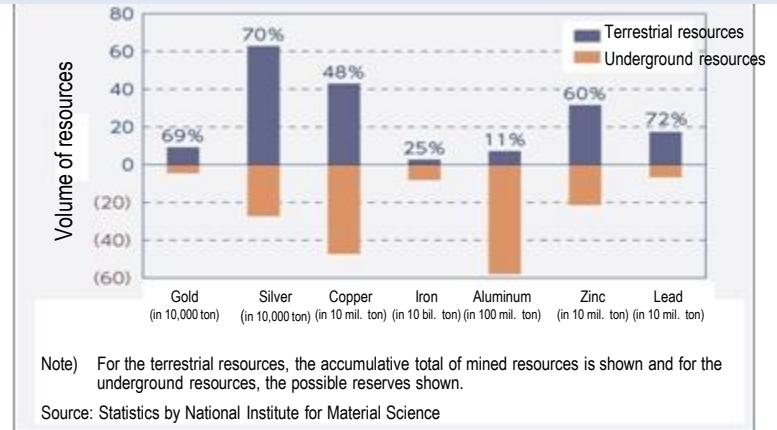


Increase in waste volume globally due to economic and population growth

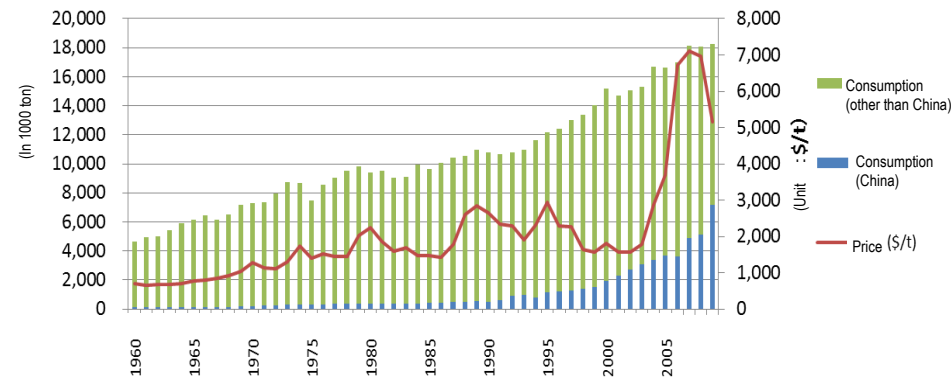
The volume of waste generated in the Asian region in particular, accounts for approx. 40% of the overall global volume.

The volume of generated waste is expected to increase in the future, and reach more than twice the 2010 volume in 2050.

Calculated volume of terrestrial and underground resources of major metals (the % values are the terrestrial resource rates)



Changes in the global consumption volume of copper (bare metal), and copper prices (in USD)



Source: World Metal Statistics for consumption of copper, LME Settlement for the price of copper
 * The price of copper is the annual average actual price in the London Market.

Promotion of an international 3R cooperation and response to exports and imports of recyclable waste

- Promote in an integrated manner international 3R cooperation and overseas expansion of Japan's recycling industry with the objective of establishing sound material-cycle society in Asia, and implement measures to facilitate procedures for international transportation of recyclable waste in cases when such initiatives would contribute to environmental burden reduction and effective utilization of resources.

Promotion of international 3R cooperation and overseas expansion of the recycling industry

- ☑ Advance sharing of information and consensus-building through the Regional 3R Forum in Asia, etc., in order to facilitate formation of sound material-cycle society in the Asian countries that have strong relations with Japan.
- ☑ Provide support for formulation of national 3R strategies and other policies, improve legal systems, dispatch experts, and expand acceptance of trainees in order to enable the establishment of waste and recycling systems tailored to the specifics of each Asian country.
- ☑ Provide support for the overseas expansion of Japan's recycling industry (waste and recycling) in order to contribute both to improving the waste disposal and recycling technologies of Asian countries and to the economic development of Japan.
- ☑ Proactively participate in the initiatives of UNEP and other international organizations, and apply the latest knowledge of Japan regarding 3R and waste disposal.



Regional 3R Forum in Asia

Response related to exports and imports of recyclable waste

- ☑ Strengthen border control through enhancing cooperation among relevant countries and institutions in order to prevent environmental pollution due to international transportation of hazardous substances, etc.
- ☑ Accept, via the means of government institutions, waste, etc., that cannot be appropriately treated at developing countries but that Japan possesses the capacity to treat, and alleviate the negative impact on the environment and health at developing countries and effectively utilize such waste as resources.
- ☑ Facilitate export of recyclable waste that has only limited utilization domestically and meets the requirement to not cause environmental pollution.

