

## A harmony between human society and the earth's natural circulation system

Our society functions by extracting natural resources such as substances in soil that are in a physical cycle in nature, and minerals that are non-renewable. We use them to produce products to consume in large volume, and dispose of anything as waste that is no longer to be used. The earth's intrinsic

circulation system was capable of absorbing and biodegrading such waste that was generated to the air or to water to a certain extent, but there have emerged many issues as a result of human activities. Mankind now needs to pay attention to maintaining the health of the earth's natural circulation system.

### Third Fundamental Plan for Establishing a Sound Material-Cycle Society













#### Progress of efforts to establish a sound material-cycle society

With the objective of establishing a sound material-cycle society (a society in which consumption of natural resources is restrained and environmental load is reduced to the greatest extent possible), Japan enacted the Basic Act for Establishing a Sound Material-Cycle Society, and formulates a Fundamental Plan for Establishing a Sound Material-Cycle Society every five years.

The Third Fundamental Plan for Establishing a Sound Material-Cycle Society was formulated in May 2013, defining five key areas for action: (1) 2R promotion, (2) advanced use of recyclable resources and securing of resources, (3) integrated initiatives for creating a low-carbon society and society in harmony with nature, and more sophisticated local recycling zones, (4) use of circulative resources/biomass resources as a source of energy, (5) promotion of international initiatives.

Source: Ministry of the Environment, Council for PET Bottle Recycling (sales of plastic bottles), Glass Bottle Recycling Promoter Association (use of returnable bottles)

#### Japan's progress towards establishing a sound material-cycle society (last 10 years)

		FY 2000	FY 2010	Change (approx.)
Resource productivity		248,000 yen/ton	374,000 yen/ton	50% UP
Cyclical use rate (recycling rate)		10.0%	15.3%	50% UP
Final disposal amount		56 million tons	19 million tons	70% DOWN
Cases of illegal dumping		1,027	216	80% DOWN
TMR of soil and stone resources (amount used)		1,100 million tons	500 million tons	50% DOWN
TMR of metal resources (amount used)		170 million tons	170 million tons	FLAT
Waste produced (disposal)		590 million tons	570 million tons	FLAT
Cyclical use amount		210 million tons	250 million tons	20% UP
Export of circulative resources (loss of resources overseas)		7.29 million tons	25.16 million tons	250% UP
Plastic bottles collected by municipalities		120,000 tons	300,000 tons	150% UP
Sales of plastic bottles		530,000 tons (*)	590,000 tons	10% UP
Use of returnable bottles		2,750,000 tons	1,250,000 tons	50% DOWN

\* FY 2005 figures

### Construction of a social and economic system that brings further progress in 2Rs, not just recycling

Noting the increase of one-way products that are thrown away after being used, the Third Fundamental Plan clarifies how consumers and businesses need to embrace 2Rs (Reduce, Reuse), and attempts to prepare the ground so that consumers can feel comfortable utilizing reused items.

Even when waste and unwanted things are handled as resources and recycled, there is still some load on the environment, even if only small. For this reason, the first step should be to not produce waste (to reduce waste). Moreover, a much higher priority should be given to reusing a product, component or container after using it once than to recycling it.

However, there has not been enough progress made in this area, with the exception of the increasing proportion of sales made without shopping bags and that of shipments of refill products.

Given this perspective, in the sectors where reduction of food waste is important, numerical targets for waste reduction are set based on the Food Recycling Act, and discussion encompassing the whole of the food chains is initiated concerning the return of goods and other business practices. A returnable bottle system is supported as a model project locally to serve the purpose of recycling.

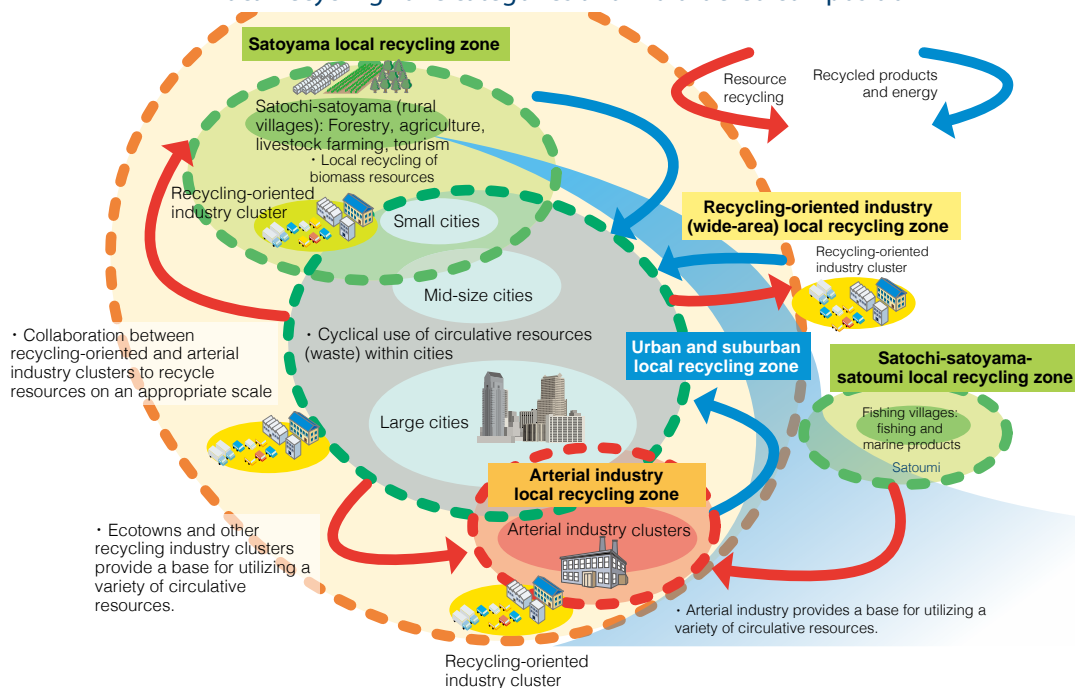
## Advanced use of circulative resources and securing of resources

The economies of developing nations continue to grow, increasing the global demand for metal resources and pushing up the prices of metals. This situation has focused attention on how to recover usable metals from used products in Japan. To boost the recovery rate, the Japanese government has designed a new recycling system for small electrical and electronic products (under the Act on Promotion of Recycling Small Waste Electrical and Electronic Equipment). This system started in April 2013. The local recycling zone concept is based on the idea of recycling resources as far as possible within an optimal material-cycle range. The optimal size of the zone depends on local characteristics and on the

nature of the resources.

Some examples of potential local recycling zones are: (1) in rural agricultural, forest, and marine products areas, local recycling of organic garbage through composting, conversion to biogas, and use of forestry waste, (2) in urban and suburban areas, collaboration of city areas and village areas within the region in the composting of food waste generated in the city areas to use as fertilizers in the village areas, (3) in arterial industry areas, making better use of the infrastructure and foundations of core arterial industries such as the cement and iron & steel sectors, collaborating with large city areas that possess large amounts of recyclable resources.

### Local recycling zone categories and multi-tiered composition



Source: Ministry of the Environment

### Optimization of local recycling zone

A practical example of this sort of initiative can be seen in Minamisanriku, Miyagi prefecture, which suffered massive damage in the Great East Japan Earthquake. Food waste, night soil, and sludge from combined household wastewater treatment tanks are used to generate biogas. Also, plastic packaging and other burnable wastes are treated as resources that can either be used in recycled products or as fuel. The liquid fertilizer generated by biogas plants can be used to benefit agriculture, and the electricity and heat generated can be used to benefit industry, and are available as emergency energy sources that can provide off-grid power to emergency facilities in case

of disaster. These ideas have the potential to create new industries and employment.

#### Waste separation in Minamisanriku Town

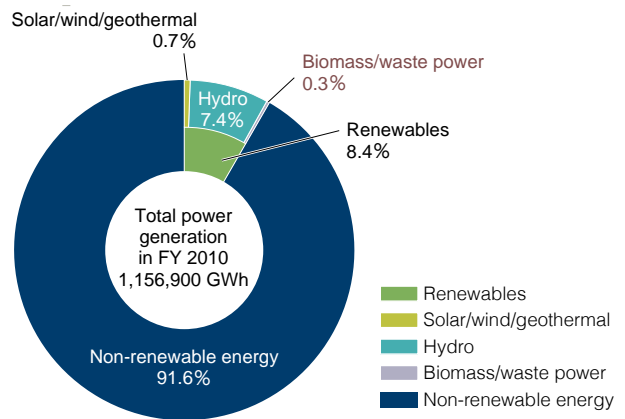


Photo: AMITA Institute for Sustainable Economies

## Circulative resources and biomass resources for sources of energy

The use of biomass resources for energy provides decentralized power, and because the resources are natural and renewable, the approach scores high for sustainability. However, there are issues with price competitiveness and stability of the power supply. A fixed-price feed-in tariff for renewable energy took effect in July 2012, which provides a further incentive to introduce waste-to-electricity or biogas-to-electricity projects covered by the system.

## Proportion of Japan's electricity generated from biomass and waste (FY 2010)



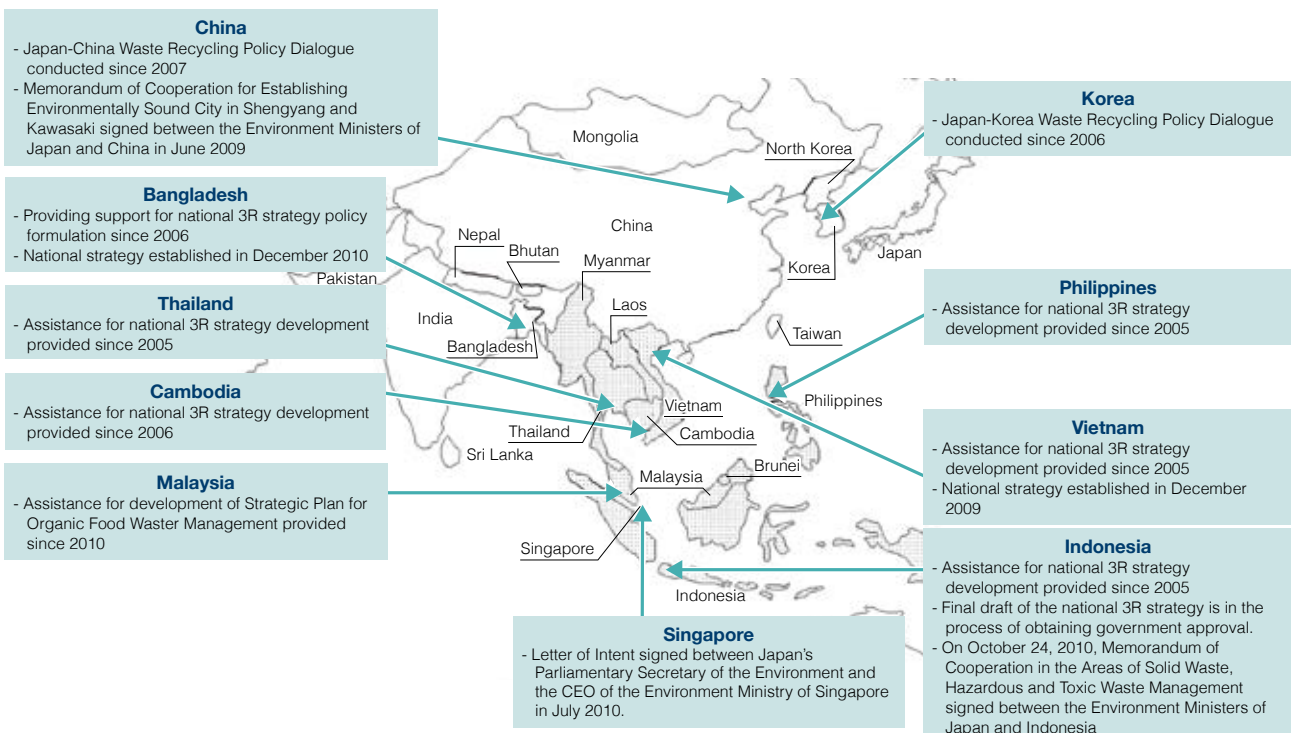
Source: Agency for Natural Resources and Energy, Basic documentation concerning renewable energy for formulating policy on the optimum energy mix, February 22, 2012 (Electricity generated from renewables)

## International initiatives

Developing countries expected to undergo rapid economic growth need to be able to avoid the sort of serious pollution and waste problems that hit Japan during its own rapid-growth phase, achieving a sound material-cycle society as well as sustainable economic growth. Japan is attempting to use its experiences to help other Asian countries by providing policy dialogue and support for national strategy to promote the 3Rs, and is using opportunities such

as the Regional 3R Forum in Asia to conduct high-level multilateral policy dialogue and facilitate networking between the people involved. By using technology transfer to achieve global-scale reductions in environmental impact, Japan is also assisting its advanced recycling industry (waste management and recycling industry) to deploy sophisticated technology internationally.

## Close Collaboration on 3R and Waste Management Policies with Asian Countries



Source: Ministry of the Environment