Tokyo Plastic Strategy

For Sustainable Use of Plastics

PLASTIC SUSTAINABILITY

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I. Aiming for sustainable use of plastics with net zero CO_2

ZERO CARBON, ZERO POLLUTION

Image courtesy of Nikkei National Geographic Inc.

Climate change and biodiversity loss caused by massive resource consumption

Our economy and society depend on a stable global climate system and the bounty of nature. We are undermining these foundations of human survival by consuming a vast amount of resources and energy.

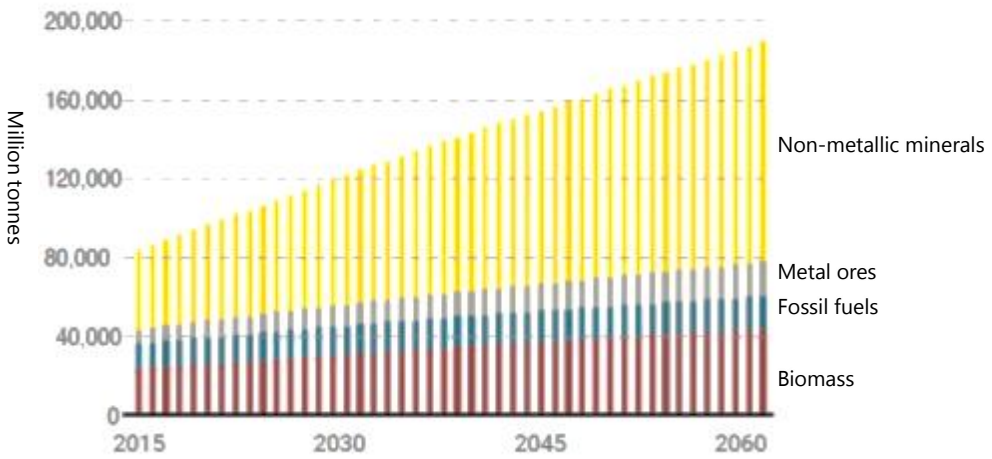
Global resource consumption has already exceeded 92 billion tonnes per year and is continuing to grow. At this rate, global resource consumption is estimated to reach nearly 170 billion tonnes by 2050.

In addition, climate change, tropical deforestation, and biodiversity loss are progressing rapidly as resource consumption increases. To hold the global average temperature to 1.5ºC above pre-industrial levels, we need to make a significant shift in the way we use resources.

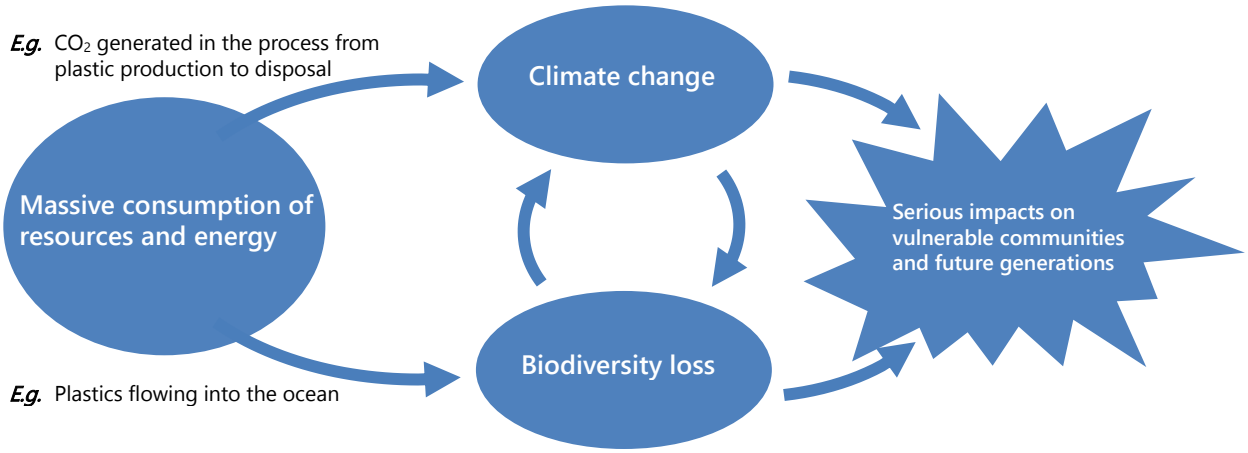
What we have to consider is not limited to the reduction of final disposal of waste and the control of hazardous substances.

Outlook for global resource extraction

Source: International Resource Panel (IRP). *Global Resources Outlook 2019*.



Climate change and biodiversity loss caused by massive resource consumption



CO_2 emissions upstream of resource consumption in Tokyo

A large amount of resources are used for consumer life and business activities in Tokyo. CO_2 is emitted in the process of producing these resources, but it has not been calculated as CO_2 emissions in Tokyo as much of it is emitted in other regions.

Tokyo consumes an enormous amount of resources, including products, iron and steel, cement, and agricultural products, which are produced in other regions (other prefectures and overseas) and transported to Tokyo. CO_2 emissions upstream and downstream of resource consumption in Tokyo are so huge that the amount is estimated at approximately 100 million tonnes per year.

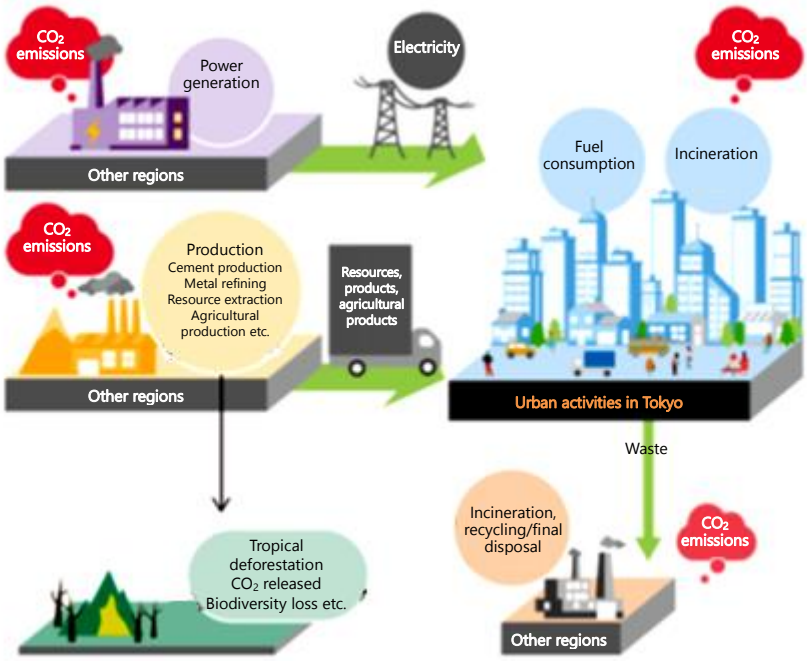
The demand side is required to work on reducing CO_2 generated in the life cycle of resources by making resource consumption in Tokyo sustainable.

As for plastics, CO_2 is emitted in each of the following processes: resin production, production, distribution and consumption of plastic products, and disposal of plastic waste. There are often cases in which plastic waste discharged in Tokyo is subjected to heat recovery and incineration in other prefectures.

Global plastic production continues to increase rapidly, as do related CO_2 emissions.

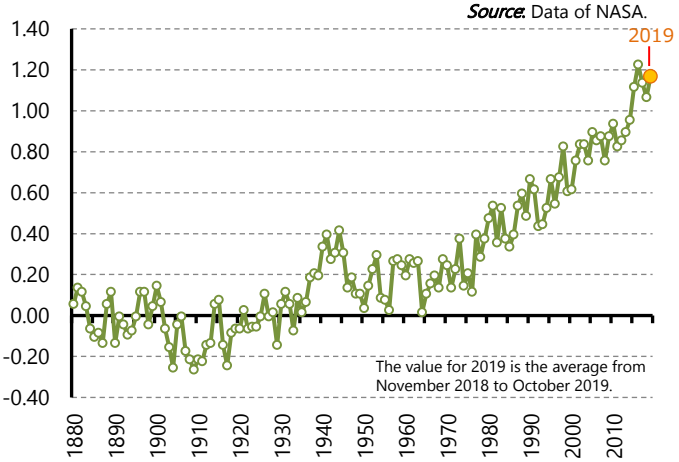
Leading the way in the sustainable use of plastics and reduction of CO_2 from their life cycle is a responsibility that Tokyo must fulfill as a major city in a developed country.

CO_2 resulting from Tokyo's urban activities



Annual average temperature anomalies in the world
Changes since pre-industrial levels (°C)

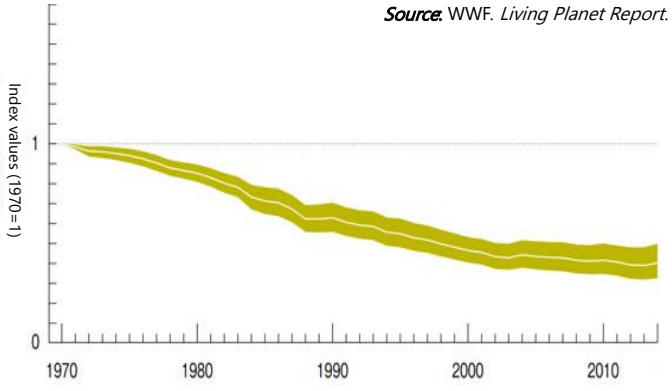
Source: Data of NASA.



Biodiversity loss
Living Planet Index

In just 44 years from 1970 to 2014, the population sizes of vertebrate organisms worldwide have decreased by 60% on average.

Source: WWF. *Living Planet Report.*



Marine plastics

Plastic waste and microplastics (debris of 5 mm or less in size) have been found in the seas around the world. Plastics that flow into the ocean do not decompose easily. It is said that each year 4.8 to 12.7 million tonnes of plastics wash into the ocean from rivers etc. around the world and the amount of plastics in the ocean will exceed that of fish by 2050.

An increase in marine plastics is causing the following problems:

(1) Direct impacts on marine organisms

Many species are suffering from marine plastics--some eat plastics mistaking them for food, while others become entangled in plastics.

(2) Impacts on marine ecosystems

There are reports of impacts on organisms in lower layers of the food chain and adverse effects on corals, accompanied by concerns about the entire ecosystem and fishery resources.

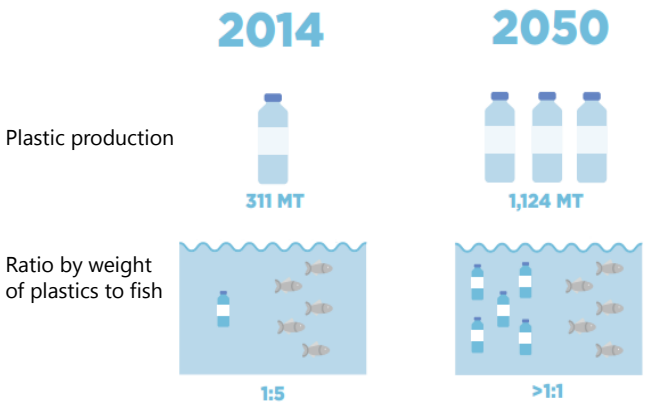
(3) Risk of bioaccumulation of chemical substances

There is a concern about bioconcentration of chemical substances contained in plastics and that of chemical substances adsorbed to plastics in the ocean. Substances specific to plastics have already been detected in seabirds.

In addition to the above, species adhering to plastics migrate to distant seas and disrupt ecosystems there, or plastic waste ruins natural landscapes.

Litter on the street in Tokyo can also flow into the ocean via drainage and rivers. Plastic bottles and a large amount of microplastics are scattered on river beds.

The Osaka Blue Ocean Vision to eliminate additional pollution from marine plastics by 2050 was presented at the G20 Osaka Summit in June 2019. We need to take early action to get rid of the outflow of plastics into the ocean.

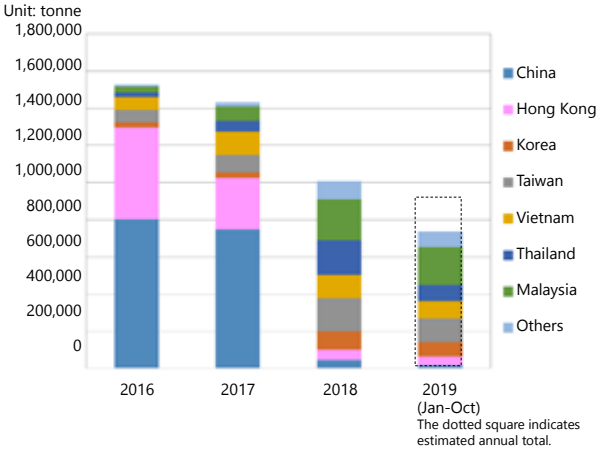


Source: UNEP. *SINGLE-USE PLASTICS: A Roadmap for Sustainability.* 2018.

Export of plastic waste

In 2018, out of 8.91 million tonnes of plastic waste in Japan, 17.4% underwent material or chemical recycling in the country, 56.5% underwent heat recovery in the country, and 10.2% was exported. Approximately 40% of the exported material is shipped from the Tokyo metropolitan area (Ports of Tokyo, Yokohama, Kawasaki, and Chiba), most of which is plastic waste from businesses.

Plastic waste exports from Japan by destination for export



Source: Ministry of Finance. *Trade Statistics of Japan.*

Plastic waste has been exported as a recyclable resource, however sometimes in such a condition that it is difficult to recycle, with various types of garbage mixed up. There have been reports of environmental pollution due to improper disposal of such garbage, as well as young or poor people, involved in processing plastic waste, carrying out sorting work under extremely poor labor conditions.

As the import of plastic waste has been banned in China since the summer of 2017, plastic waste discharged in Japan is now exported to other destinations, such as Malaysia, Taiwan, Thailand, and Vietnam, where, however, regulations are being tightened as well.

The amount of plastic waste exported from Japan has decreased by approximately 40% compared to the level before the start of import ban in China, resulting in such situations in Japan as higher disposal costs, increased inventory, and strengthened acceptance criteria at recycling facilities. These may cause improper disposal of plastic waste discharged from Tokyo.

Photo showing the beginning of a "disposable era" in LIFE magazine (August 1955). The article is titled "Throwaway Living." →
Photo by Peter Stackpole/The LIFE Picture Collection/Getty Images

Basic approaches for reducing CO_2 caused by plastic use

The Tokyo Metropolitan Government (TMG) has been promoting 3R initiatives, setting targets for recycling rates and reducing the amount of final disposal of waste in the Sustainable Materials and Waste Management Plan. As a result, the amount of final disposal of waste has been greatly reduced.

However, in the midst of a crisis in the global environment, we must promote the sustainable use of resources and the reduction of CO_2 associated with resource consumption.

In the Zero Emission Tokyo Strategy, TMG has clarified its attitude and vision to aim for the realization of a Zero Emission Tokyo which contributes to achieving net zero CO_2 emissions in the world by 2050. We will promote initiatives to decarbonize society as a whole by incorporating measures in every field, including sustainable resource management, into climate change policy.

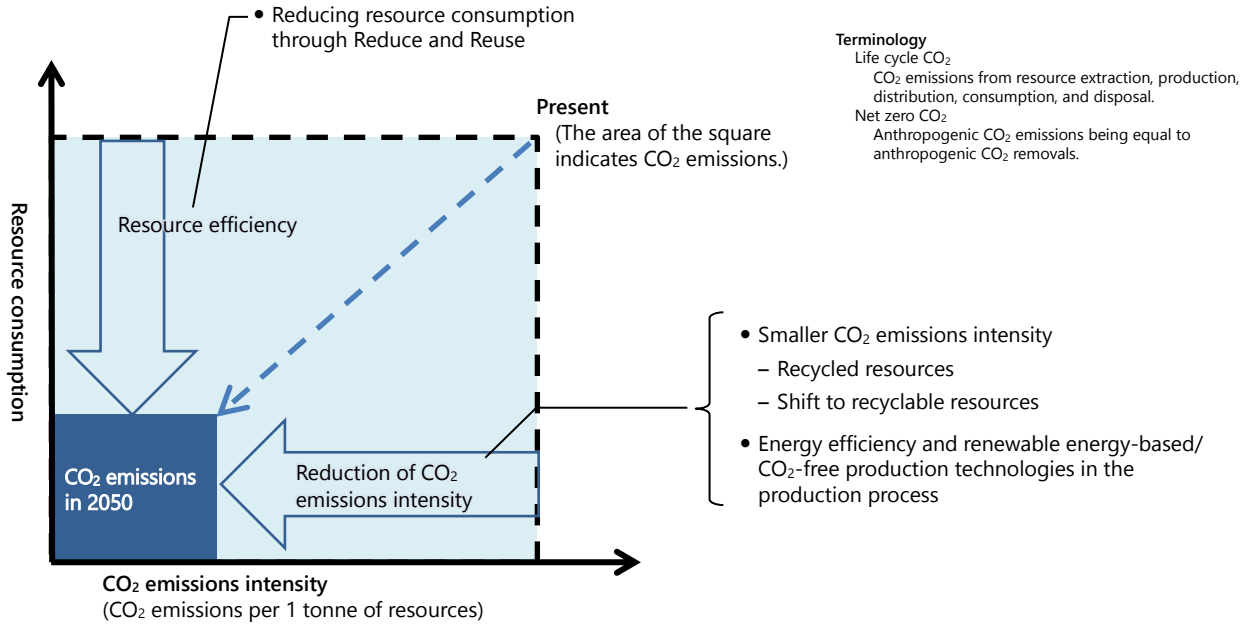
TMG will review the way we use resources in light of the impacts of CO_2 emissions, both upstream and downstream of resource consumption, on climate change.

To reduce life cycle CO_2 associated with resource consumption, we will have to work on both:

(1) Reducing resource consumption by eliminating wasted resources (resource efficiency indicated by the vertical axis of the graph) and

(2) Reducing CO_2 emissions associated with the production of a unit amount of resources (reduction of CO_2 emissions intensity indicated by the horizontal axis of the graph).

Reduction of life cycle CO_2 emissions in two directions



When this is applied to plastics, the following countermeasures are required:

- Resource efficiency
  - Reducing single-use plastics and promoting Reuse
- Reduction of CO_2 emissions intensity
  - Shift to recycled plastics
  - Shift to biomass resources (for sustainable use only)
  - Improving energy efficiency and using renewable energy in production, distribution, and waste disposal processes
  - Reducing combustion in waste disposal process

Closed carbon material cycle

How should we work with plastics to achieve net zero CO_2?

Plastics play an important role in preserving food and other materials and contribute to the weight reduction of vehicles etc. used as lightweight material. If plastics are completely eliminated, it may instead end up in an increase in CO_2.

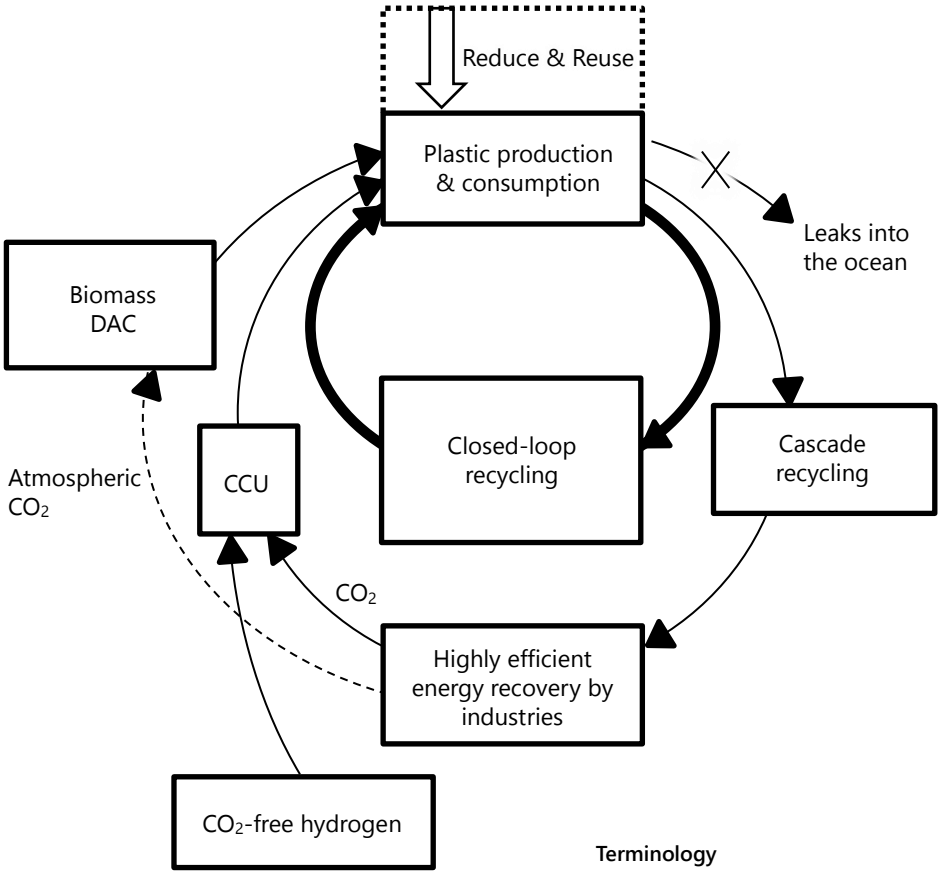
To transform our use of plastics into a sustainable approach, we need an economical system in which the amount of related CO_2 emissions is equal to that of absorbed CO_2.

Three key elements for this purpose are:

- Reducing plastic consumption through Reduce and Reuse
- Closed-loop recycling that provides virgin-quality recycled resin
- As complements to these, high efficiency heat recovery, as well as plastic production using equivalent CO_2 (Biomass plastics, CCU, etc.)

The following figure shows the concept of the carbon closed cycle, in which plastics are used with net zero CO_2.

Plastic use with net zero CO_2
Closed carbon cycle



- Energy for plastic production and recycling is completely covered with renewable energy
- Switching to biomass causes no change in land use, and falls within the growth rate of plants. Consideration is given to social and environmental issues, such as competition with food production
- CCU falls within the range of the supply of CO_2-free hydrogen. Highly efficient energy recovery by industries falls within the range of biomass + CCU

Terminology

Closed-loop recycling
Provides virgin-quality recycled resin.

Cascade recycling (downcycling)
Provides resin of lower quality for other uses.

CCU
Carbon Capture and Utilization. Captures CO_2 generated from industrial processes to utilize it as raw materials for plastics. CO_2-free hydrogen is required.

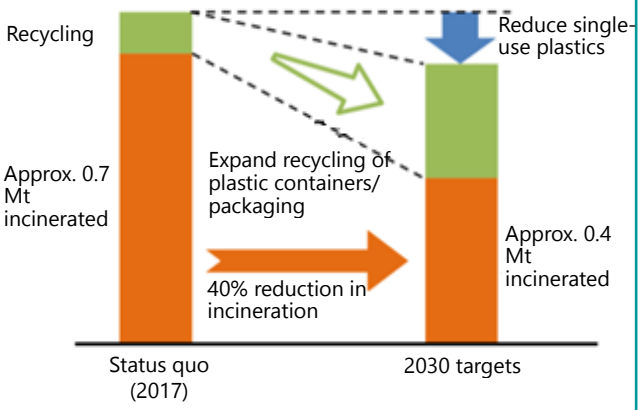
DAC
Direct Air Capture. Technology that directly captures atmospheric CO_2.

2030 targets and challenges toward 2050

Aiming to realize the sustainable use of plastics with net zero CO_2, as shown on the previous page, by 2050, TMG will promote its initiatives by setting 2030 targets for plastics in addition to existing targets, such as waste recycling rates.

2050
Plastic use with net zero CO_2

2030 targets



National targets

- Cumulative 25% reduction in single-use plastics
- Reuse and Recycle 60% of plastic containers and packaging

Tokyo's targets

Setting its own targets from the perspective of waste disposal in addition to the national targets

- Incineration of plastic waste from households and large office buildings reduced by 40%

Recycling rate target for FY 2030 in the current Sustainable Materials and Waste Management Plan

- Municipal solid waste recycling rate increased to 37%

2030 targets

■ Challenges toward 2050

- **Achievement of a significant reduction and elimination of unnecessary single-use plastics**
  Transforming plastics into sustainable, valuable materials
- **Implementation and expansion of the use of innovative technologies, such as closed-loop recycling**
  Promoting design for the environment, including the use of high-quality recycled plastics and unification of materials for products
- **Elimination of plastics flowing into the ocean**
  Cooperating with Asian cities

■ Initiatives to achieve the 2030 targets

- **Fostering empathy to promote behavior change**
  Provide information that encourages change in consumers' behavior and lifestyle.
- **Creating innovations in cooperation with businesses**
  - Build a new business model that does not depend on single-use plastics.
  - Build a mechanism for businesses to collect used products and containers, such as providing products in returnable containers.
  - Encourage the development and implementation of innovative technologies, such as closed-loop recycling.
  - Promote design for the environment, such as the use of recycled or marine biodegradable plastics.
- **Enhancing separation and recycling in cooperation with municipalities**
  - Enhance support and collaboration related to separate collection of plastic containers and packaging by municipalities.
  - Promote separation and recycling at commercial buildings with 3R advisors.
- **Building domestic resource circulation routes, curbing the generation of marine litter**
  - Support building of new domestic resource circulation routes, such as conversion into industrial fuels as emergency measures.
  - Implement efforts toward elimination of plastics flowing into the ocean through the TOKYO Zero Marine Litter Action and cooperation with Asian cities.

Tokyo 2020 Games legacy

Tokyo 2020 Games

- Reducing single-use plastics
- Advanced recycling of plastic waste

REDUCE, REUSE, CLOSED-LOOP

II. Initiatives to achieve the 2030 targets

Clear flakes made by crushing and washing waste plastic bottles →

Thorough review of disposables, shift to a reuse-based society

■ Unnecessary things are truly unnecessary

In promoting plastic reduction, we should not only reduce the amount of plastics used in products and containers, but also review single-use products around us, considering whether the products, containers and packaging are really necessary, or whether they can be replaced with reusables.

Poster for plastic shopping bag reduction campaign

■ Reviewing disposables starting with charging for plastic shopping bags

With the amendment to ministerial ordinances based on the Containers and Packaging Recycling Act, retailers will be required in principle to charge for plastic shopping bags from July 1, 2020. TMG will extensively provide information on the need to reduce plastic shopping bags so that the charging will be widely implemented, not limited to items subject to the ministerial ordinances.

We have to make charging for plastic shopping bags the starting point for rethinking the throwaway living. There are many other single-use plastics around us.

Of course, reducing plastics may result in other resources being wasted in their place, and you may need single-use plastics in particular situations.

Taking into account these situations, TMG will discuss and cooperate with relevant businesses to reduce single-use containers, beverage cups, etc.

■ Providing information in cooperation with universities in Tokyo

Panel exhibition at Tokyo Metropolitan University

In May 2019, TMG called on universities in Tokyo to work together to reduce single-use plastics.

In August 2019, TMG concluded an agreement with Tokyo University of Agriculture and Technology to reduce single-use plastics. The university is promoting the TUAT Plastic 5R Campus activities.

TMG will continue deepening cooperation with universities in Tokyo to provide information on the reduction of single-use plastics through events, symposiums, and exhibitions in which students participate.

■ Developing a broad range of reuse-based mechanisms

The key to carefully using limited resources is Reuse. The first step in Reuse is switching from single-use plastic shopping bags to reusable ones. It is also important to carry your own bottle for drink refills.

TMG will continue providing information that will help establish such a lifestyle and promoting the introduction of reusable cups at various events. In addition, TMG will promote the endorsement of personal use bottles by installing water supply machines at its facilities to replenish such bottles.

トーキョー スマイルボトル PROJECT

The Bureau of Waterworks, Tokyo Metropolitan Government, has developed the Tokyo Smile Bottle Project, advocating an eco-friendly lifestyle to help use personal-use bottles to drink Tokyo's high quality tap water everywhere.

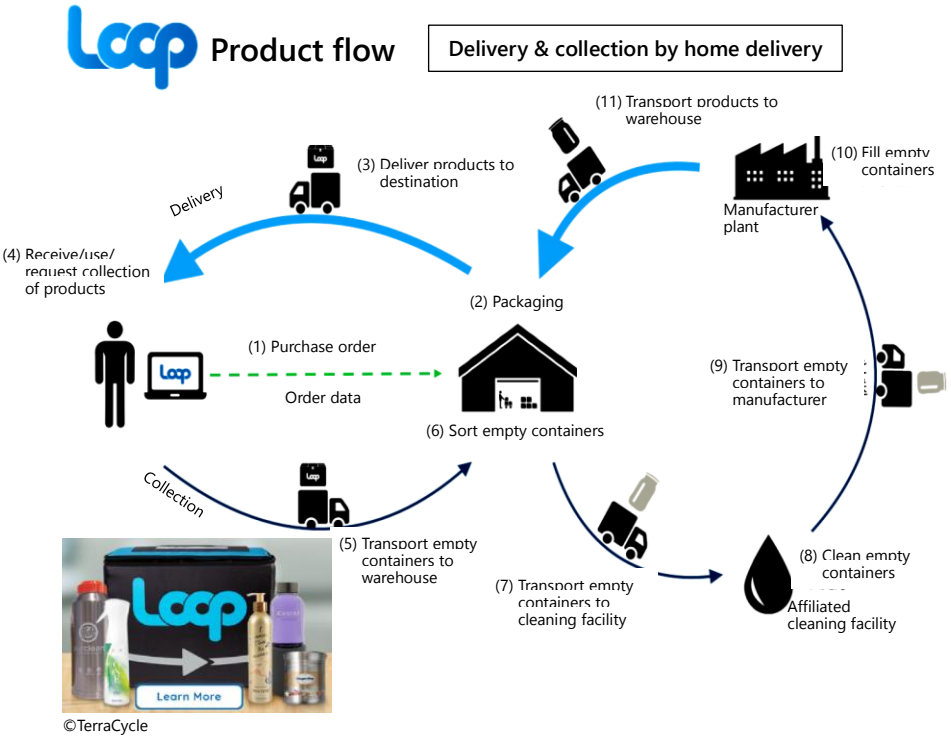
Reusable cups

© Reusable Eco-Foodware Network

■ Supporting the building of new business models

To realize the use of plastics with net zero CO_2, we need to build new business models for distribution and sale, different from those formed in the past.

TMG will promote the spread of new business models based on reuse by, for example, expanding the use of the Loop platform for providing products that use returnable containers, which was selected in the New Business Model for Sustainable Use of Plastics project in FY 2019.



©TerraCycle

In store sale & collection

©TerraCycle

Examples of returnable containers (prototypes)


©TerraCycle

■ The Saving Resources Declaration by National Capital Region Nine Governments

National Capital Region Nine Government Summit Council, consisting of nine local governments in the Tokyo metropolitan area, is expanding the initiatives of the Containers and Packaging Reduction Declaration implemented so far. To reduce single-use plastic products and food waste as well as containers and packaging, the conference will launch a new declaration project, the Declaration of Saving Resources, in April 2020. The council will raise public awareness across a wide area with the cooperation of businesses.

Logo of the Declaration of Saving Resources

■ TMG Plastic Reduction Policy

TMG formulated the TMG Plastic Reduction Policy in June 2019 to reduce single-use plastics and switch to recycled plastics and biomass materials in the procurement process of the government organization. In the policy, TMG also aims to use reusable dishes and cups when holding events, setting an immediate goal to ban the use of single-use plastic cups at events held by TMG in FY 2020.

TMG will take a thorough approach to reducing single-use plastics and expand its efforts in cooperation with advanced businesses.

■ Promotion of green purchasing

Expansion of green purchasing is crucial to increase the use of recycled plastic and biomass products. Although quality requirements for plastic materials vary by product, we need to spread the idea that it is important to select recycled plastics which do not emit much CO_2, rather than excessively sticking to virgin plastics. TMG will call on businesses and others to practice green purchasing in collaboration with businesses that actively use recycled plastics.

TMG will also promote new product development by working with advanced businesses which are switching to recycled plastics and biomass materials.

Enhancing circular use

In order to reduce CO_2 associated with the use of plastics, we need to reduce plastic consumption through Reduce and Reuse, as well as promote resource consumption with lower CO_2 emissions intensity by making a shift to recycled resources (recycled plastics) and recyclable resources (biomass) (see page 6).

To this end, we have to encourage the material recycling of used plastics and closed-loop recycling which restores the quality at the same level as that of original materials.

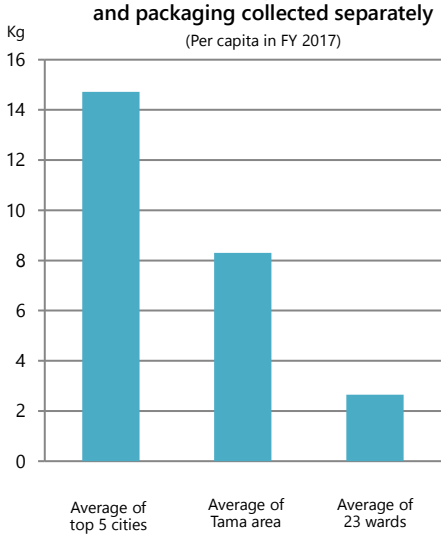
■ Expansion of separate collection of plastic containers and packaging

Most of the used plastics discharged from households are plastic containers and packaging. For these used plastics, all municipalities separate and recycle plastic bottles, but their approaches greatly differ for other plastic containers and packaging.

To reduce the amount of landfill waste, the special wards incinerate plastic waste and have introduced heat recovery since 2008 to utilize the heat resulting from incineration. Some municipalities have adopted separation and recycling to deal with plastic containers and packaging, but other municipalities do not collect plastic containers and packaging completely separated due to problems with costs or facilities.

To resolve such issues, TMG will work with municipalities and strongly support their efforts to introduce and expand the separation and recycling of other plastic containers and packaging.

Amount of other plastic containers and packaging collected separately
(Per capita in FY 2017)



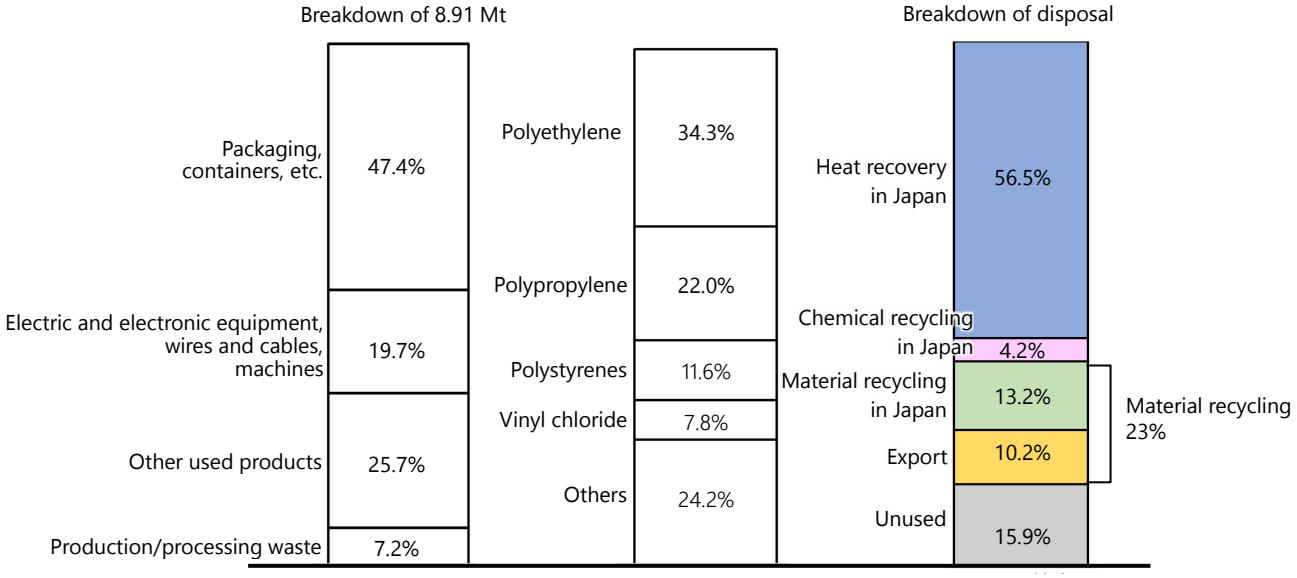
■ Recycling of plastic waste from businesses

Plastic waste is also discharged from office buildings, but is not recycled so much as it is not subject to the Containers and Packaging Recycling Act.

By identifying the actual conditions of waste discharge from office buildings, TMG will work with municipalities and provide proper advice through 3R advisors who are familiar with waste. TMG will promote the 3Rs of business waste by reexamining whether a tenant or owner of leased buildings should be considered a waste discharging business, and considering cooperative collection, separation, and recycling of municipal solid waste and industrial waste.


Waste separation at an office building

Discharge and disposal of plastic waste at national levels in 2018



Source: Plastic Waste Management Institute. Plastic Material Flow Chart (Flow chart of plastic products, waste, and recycling) (Japanese).

■ Encouraging collection and recycling by manufacturers and distributors

An increasing number of manufacturers and distributors are working on in-store collection of used containers and packaging. It is expected that the quality of collected products will be maintained with businesses collecting their products by themselves. TMG will support the efforts of businesses which are willing to fulfill their responsibility as an extended producer.

■ Promoting bottle-to-bottle recycling

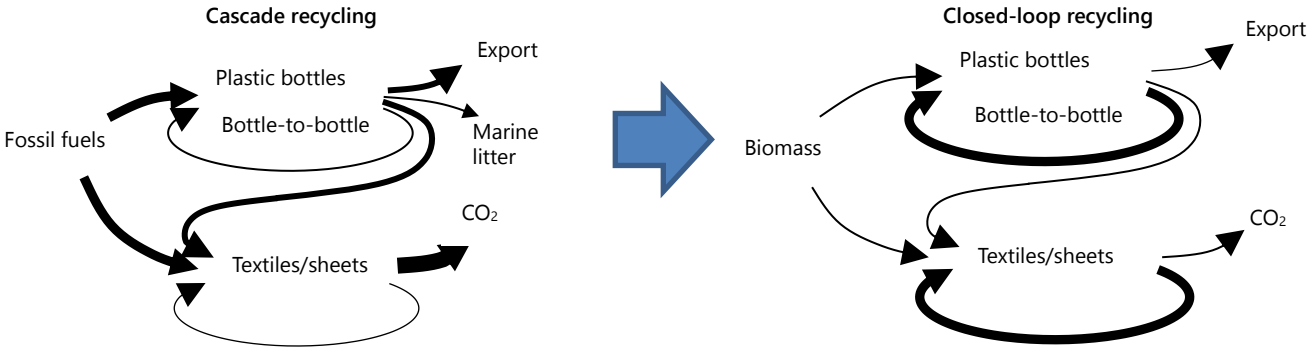
While used plastic bottles are recycled into textiles for clothing, as well as sheets that are used in items, such as food trays, bottle-to-bottle recycling has become more popular, allowing used plastic bottles to become raw materials for new plastic bottles. Beverage manufacturers have set goals to significantly increase the ratio of bottle-to-bottle recycling.

To realize the use of plastics with net zero CO_2 as shown in the diagram on page 7, closed-loop recycling is essential to restore the quality of used plastics to the same level as that of original materials, and bottle-to-bottle recycling is a precursor for that approach.

It is not just advanced recycling technologies that enable bottle-to-bottle recycling. There are two additional factors which play a major role: ① Product design that uses only transparent bottles and makes removing labels easier and ② A mechanism for collecting high quality used bottles with the cooperation of consumers who remove caps and labels and rinse bottles.

However, in order to expand bottle-to-bottle recycling in Japan given a strong business interest in recycled PET resin overseas, cooperation between beverage manufacturers, waste discharging businesses, waste disposal businesses, and recycling businesses is indispensable. With the aim of expanding bottle-to-bottle recycling, TMG will work on a model project for efficient collection and raise awareness of waste discharging businesses through cooperation with beverage manufacturers.

Shift from cascade recycling to closed-loop recycling



■ Expansion of closed-loop recycling

Closed-loop recycling is essential to realize the use of plastics with net zero CO_2. We also need to establish and implement closed-loop recycling technology for resins other than PET resin.

In the same manner as bottle-to-bottle recycling, the implementation of closed-loop recycling must involve:

- Building the ease of collection and recycling into product design and
- Creating a mechanism to collect used products.

In light of these challenges, TMG will work with stakeholders to promote closed-loop recycling.

Terminology

Material recycling: A method to collect recycled resin from used plastic products.

Closed-loop recycling: A type of material recycling which provides virgin-quality recycled resin.

Cascade recycling: A type of material recycling which provides resin of lower quality for other uses.

Chemical recycling: A method to recycle used plastic products as chemical feedstock, such as coke oven chemical feedstock, blast furnace reducing agents, gases, monomers, etc.

Heat recovery: Methods to utilize used plastic products as an energy source, such as waste power generation, conversion to cement raw fuel, conversion to RPF, etc.

Emergency measures to promote circular use of plastic waste in Japan

With regulations on plastic waste import tightened in Asian countries, the plastic waste processing and recycling markets in Japan have seen an increase in processing costs and inventory. Following the revision of the Basel Convention, the export of contaminated plastic waste after January 1, 2021 will require the consent of importing countries. There is a concern about the occurrence of illegal dumping due to the inability to find destinations, as import regulations are expected to become even more stringent in each country and it is becoming increasingly difficult for disposal businesses to ensure storage locations for plastic waste.

Therefore, as an emergency measure, TMG has set up a help desk and enhanced its provision of information for waste discharging businesses regarding their responsibility for completely separating plastic waste, which is industrial waste, and bearing proper disposal costs.

For plastic waste with difficulty in material recycling, it is important to encourage thorough separate collection at the discharge stage, and, as an emergency response for the time being, expand its effective use as an industrial raw fuel. By effectively using plastic waste remaining in Japan, instead of coal, as an industrial raw fuel, we will be able to promote smooth recycling in Japan, while curbing the additional use of fossil resources, to reduce CO_2 emissions.

TMG will strive to ensure new resource circulation routes in cooperation with industry organizations.

Special site featuring measures for plastic waste (website of Tokyo Environmental Public Service Corporation)

Contents of special site

- Latest trends of stakeholders
  - Comments from disposal businesses regarding amount of disposal, supply and demand, and quality of plastic waste
- Circumstances surrounding plastic waste disposal
  - Changes in exports from Japan
  - Trends in import regulations in Asian countries
- Seminar information

URL: https://www.tokyokankyo.jp/waste-plastic/

New resource circulation routes

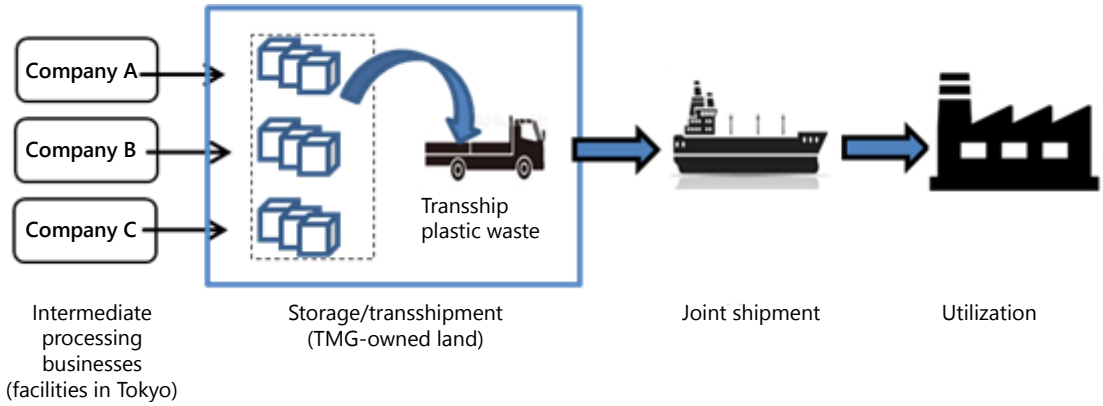


Image courtesy of Nikkei National Geographic Inc.

TMG requires waste discharging businesses to take full responsibility. →

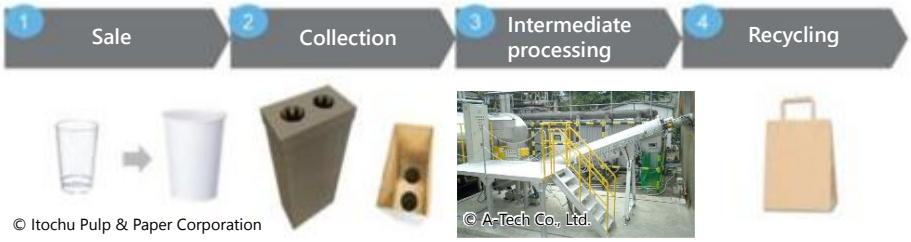
Shift to sustainable use of biomass

We also need to consider replacing plastics with biomass materials. In cases where the use of single-use products is unavoidable, we might want to make a shift to paper, wood, biomass plastics, or other materials.

When using biomass, however, we have to give due consideration to the sustainability of the upstream and downstream of biomass resources. To be more specific, we need to make sure that tropical deforestation and other environmental or social issues have not occurred in the extracting of resources, and check whether used products are recycled.

TMG will continue providing information on the importance of the sustainable use of biomass, holding a symposium on the use of biomass resources.

Project for supporting building of new business models (shift to paper cups for recycling)



Plastic-coated paper cups are treated as prohibited materials in a normal waste paper collection route. For this reason, TMG implemented a model project to replace plastic cups in a coffee chain with paper cups for recycling, as part of the project for supporting the building of new business models in FY 2019.

In FY 2018, paper straws were provided on a trial basis with the cooperation of stores in the Tokyo Metropolitan Government City Hall.

Preventing plastic waste from flowing into the ocean

With a diverse array of scenic outlooks, the sea of Tokyo is a valuable resource for Tokyo residents, providing us numerous benefits. It includes a tidal flat at the Kasai Rinkai Park, registered in the Ramsar Convention on Wetlands, where a wide variety of creatures can be observed. There are also the Izu and Ogasawara Islands full of the bounty of the ocean, such as fishery products and leisure opportunities, against a background of vast and luxuriant nature.

To prevent marine plastic pollution, TMG will promote the collection of marine litter in accordance with the Law for the Promotion of Marine Litter Disposal and work on curbing the generation of marine litter and raising awareness of marine litter in cooperation with municipalities, NGOs, regional organizations, and businesses.

Waste plastic bottles deposited near the mouth of the Arakawa River
© Arakawa River Clean-Aid Forum

■ Developing the TOKYO Zero Marine Litter Action

Aiming to prevent additional plastic waste from flowing into the sea of Tokyo, TMG will depict Tokyo's marine litter issues to raise awareness of Tokyo residents as well as develop the TOKYO Zero Marine Litter Action which encourages participation in cleanup activities of marine and river litter.

TMG will continue monitoring to understand the actual situation of marine litter and microplastics.

■ Promoting environmental learning for children in cooperation with educational institutions

Marine litter is caused not only by littering on the streets, but also by litter spilling from waste collection points around the city and unintentionally scattered in our daily life.

TMG will promote environmental learning for children in cooperation with educational institutions in order to prevent such scattering of litter and encourage a shift to a lifestyle with minimum litter.

Children surveying river litter

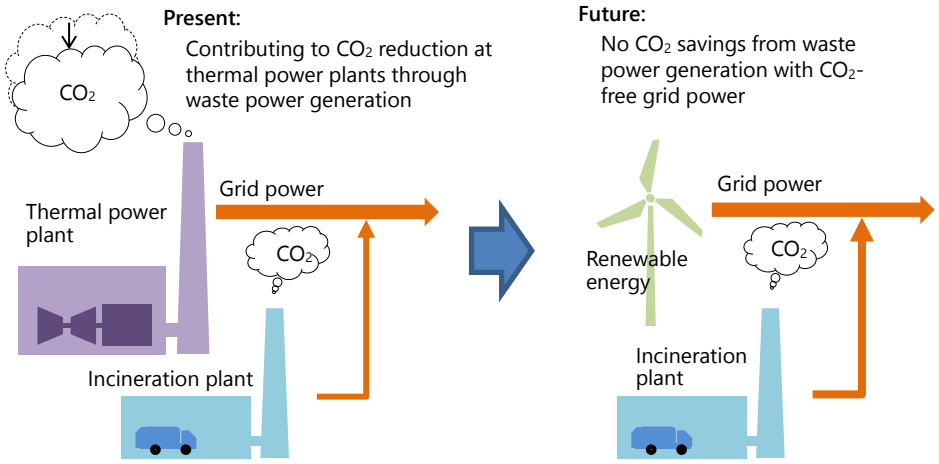
Shift from incineration and heat recovery

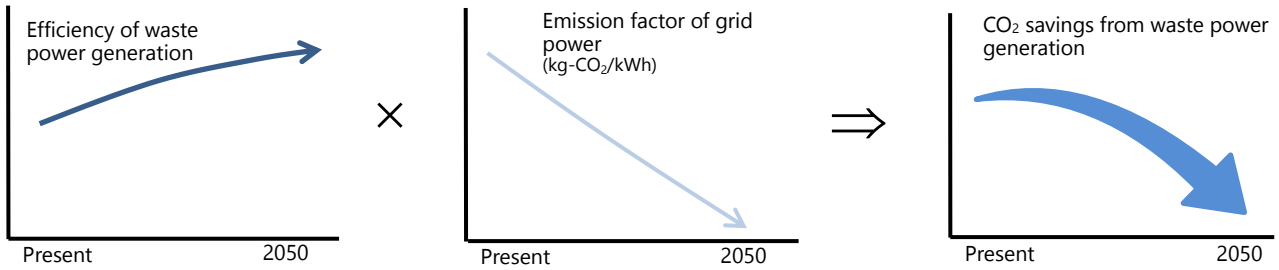
TMG has been promoting the heat recovery of plastic waste that is not suitable for recycling to reduce the amount of landfill disposal. Heat recovery is effective to a certain degree in preventing global warming as it generates power using the heat recovered from waste and supplies that power, helping reduce CO_2 emissions at thermal power plants.

However, in the midst of a crisis in the global environment, reducing CO_2, or lower carbon, is no longer enough, resulting in the need to aim for net zero CO_2, or decarbonization. Reliance on heat recovery does not enable us to realize net zero CO_2. With the broader spread of renewable energy and the lower CO_2 emission factor of grid power, CO_2 savings with heat recovery are expected to decrease rapidly.

Toward a radical solution, we need to realize material recycling with closed carbon cycle, as shown on page 7, by reducing plastic consumption and maximizing closed-loop recycling including efforts in the product design stage.

In addition to Reduce & Reuse, we have to make a shift from heat recovery through material recycling to closed-loop recycling.





III. Developing initiatives

PARTNERSHIP AND INNOVATION

Spurred on by the Tokyo 2020 Games

We need to bring efforts for sustainability at the Tokyo 2020 Olympic and Paralympic Games in 2020 as a legacy into 2030 and 2050.

In collaboration with the Organising Committee and others, TMG will promote 3R initiatives for plastics at the Tokyo 2020 Games which includes:

■ Focusing on reducing unnecessary single-use plastics

We will drastically reduce plastic shopping bags and single-use trays in venues by replacing them with recyclable ones made of paper. (Please note that this does not apply to single-use tableware used due to religious considerations.)

For the Tokyo 2020 Live Site co-hosted by TMG and the Organising Committee, TMG will consider introducing reusable cups.

■ Ensuring proper separation of garbage at venues

At venues and other sites, we will promote recycling by separating garbage into five to six types including one for plastics only. Waste Separation Guides will explain to the audience how to sort their waste in cooperation with NGOs.

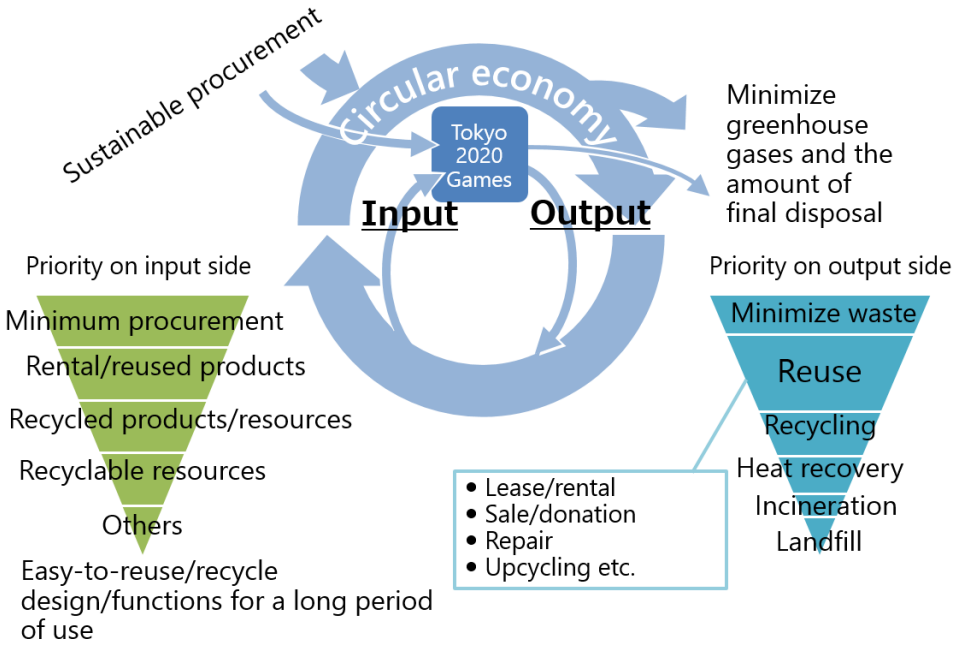
■ Promoting advanced and high-quality recycling

We will carry out material recycling of staff lunch containers with food residue adhered. We will promote enhanced circular use by utilizing recycled plastics that meet the criteria of the Eco Mark and the Green Purchasing Guidelines of TMG for the City Dressing project and considering various recycling methods after the Games.

■ Hospitality of a clean city, curbing the generation of marine litter by preventing scattering of litter

Through sporting litter pick-up events, we will extensively call for the prevention of scattering and curbing the generation of marine litter. In addition, TMG will implement hospitality cleaning in cooperation with local municipalities immediately before the Games.

Circular economy and resource management at the Tokyo 2020 Games



Partnerships

■ Team Mottainai

To work on Saving Food, Saving Materials, and Saving Energy with the Japanese spirit of "Mottainai" (sense of "too precious to waste"), TMG will call for participation in Team Mottainai, established by TMG with the endorsement of businesses, organizations, and individuals.

Logo of Team Mottainai.
Available for all registered participants.

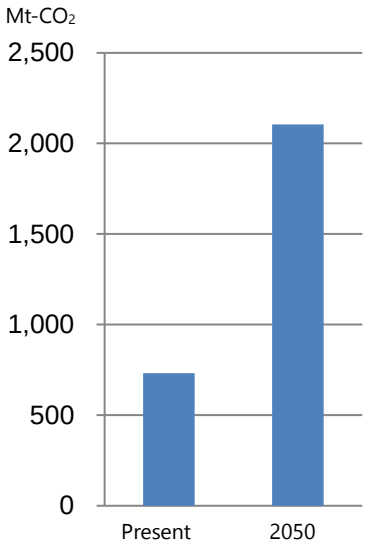
■ Collaboration with businesses and universities in Tokyo

TMG will promote collaborative efforts by concluding agreements with universities and businesses in Tokyo which are actively engaged in the reduction and sustainable use of plastics.

■ Environmental learning

The issues of plastics and marine litter are familiar to children and easy to understand for them. From the perspective of the SDGs, these issues are learning materials which will develop the ability to think about and cope with plastics or marine litter in a multifaceted and comprehensive manner. TMG will cooperate with schools and education institutions by providing educational materials and creating opportunities for children to learn systematically according to their growth stages.

Estimated global CO_2 emissions caused by plastic use



Source: Data from Energy Transitions Commission.

International cooperation

A large amount of single-use plastics are used in developed countries. If similar plastic use continues expanding worldwide, the CO_2 emissions associated with the use of plastics will be nearly three times those at present by 2050.

Developed countries including Japan are required to proceed with changes toward the sustainable use of plastics with net zero CO_2 and spread the changes worldwide.

TMG aims for a world where plastics are carefully used as sustainable materials by working with cities around the world.

■ Cooperation with C40

TMG will promote information sharing and exchange of opinions toward the sustainable use of resources through C40, a network of trailblazing cities around the world which are committed to working on climate change measures.

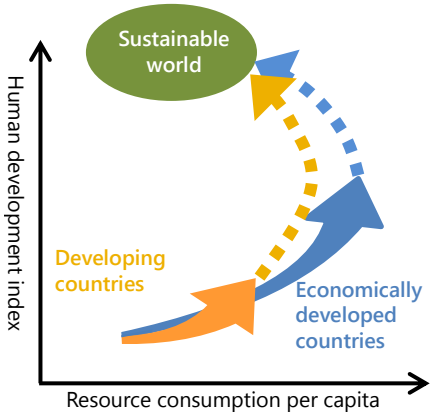
■ Cooperation with Asian cities

Many large cities in Asia are facing serious issues of waste. TMG will dee working-level relationships and information exchanges with Asian cities regarding 3Rs of plastics.

■ SPO-GOMI in Asia

TMG will hold sporting litter pick-up events together with Asian cities to highlight that scattered litter in cities is a major source of marine plastics.

From resource-intensive development to resource-efficient, sustainable development



There is a need for sustainable development that improves the health, education, and standard of living in countries without increasing resource consumption. To this end, developed countries must take the initiative in sustainable consumption and production. (See SDG 12.1)

A large amount of garbage collected at a litter pick-up event
(Tomsk, Russia)

Sunset seen along the route to the Ogasawara Islands

Ogiike, South Island, Ogasawara Islands

Green turtle swimming in coral reef sea

Photo by Georgette Douwma/Getty Images

Making rules for sustainable use of plastics

■ Proposal to the national government

There are limits to what TMG can do by itself to realize the sustainable use of plastics with net zero CO_2. TMG will actively propose the promotion of new programs and policies to the national government, which include:

- A program to encourage the reduction of single-use plastics in general, not just plastic shopping bags
- Review of the Containers and Packaging Recycling System

  Mechanism to encourage manufacturers to consider reusable containers

  Mechanism to promote 3Rs of plastic containers and packaging from businesses

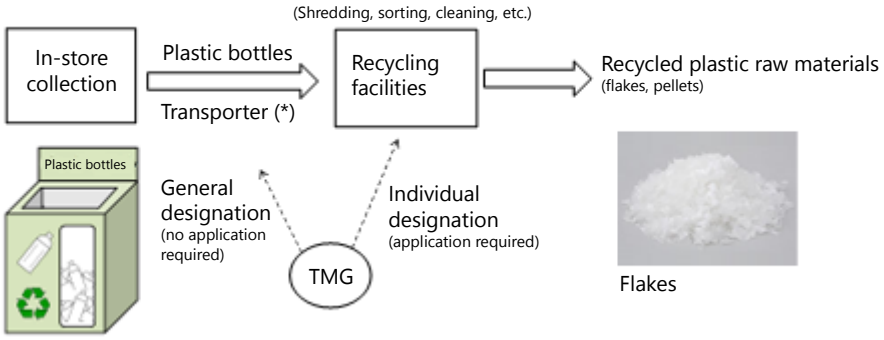
  Expanded coverage, including single-use products in connection with service provision
- Grant system to promote the establishment of a recycling-based society that contributes to the sustainable use of plastics

■ Streamlining the operation of the Waste Management Law

To promote the proper circular use of plastics, TMG will correctly operate the Waste Management and Public Cleansing Act.

- If a manufacturer or distributor collects used products etc. at its own facility according to Article 11 of the Basic Law for Establishing the Recycling-Based Society, TMG will consider this a part of its business activities and clarify that it does not require a license for the waste disposal business. For example, TMG will judge that a distributor's act of collecting containers or packaging for products sold by itself at its own store is not a collection or transportation of waste. If a collected product is delivered to another party as waste, the product will be considered as waste discharged by the distributor.
- The waste of synthetic fibers, such as polyesters (waste generated from business activities including the above-mentioned waste collected by a manufacturer or distributor at its store etc.), has been treated as plastic waste. However, if a business that recycles waste fibers deals in the waste, TMG will regard the business as a one that collects or transports only industrial waste for the sole purpose of recycling and judge that it does not require a license for the waste disposal business.
- TMG will actively use the Recycling Designation System. TMG has promoted the recycling of plastic bottles collected in store and used small electronic devices discharged from business activities through the effective use of the Recycling Designation System. By appropriately operating this system, we will continue promoting the proper circular use of waste.

Example of utilizing the Recycling Designation System (in-store collection of plastic bottles)



* A party transporting from stores to individually-designated recycling facilities.
Transshipment is also allowed (on the premise of notifying transshipment facilities).

■ Examination of Tokyo's own leading systems and mechanisms

In order to promote 3Rs of plastic waste generated from business activities in Tokyo, TMG will examine and implement systems and mechanisms specific to TMG in cooperation with private businesses, taking into account legislation by the national government.

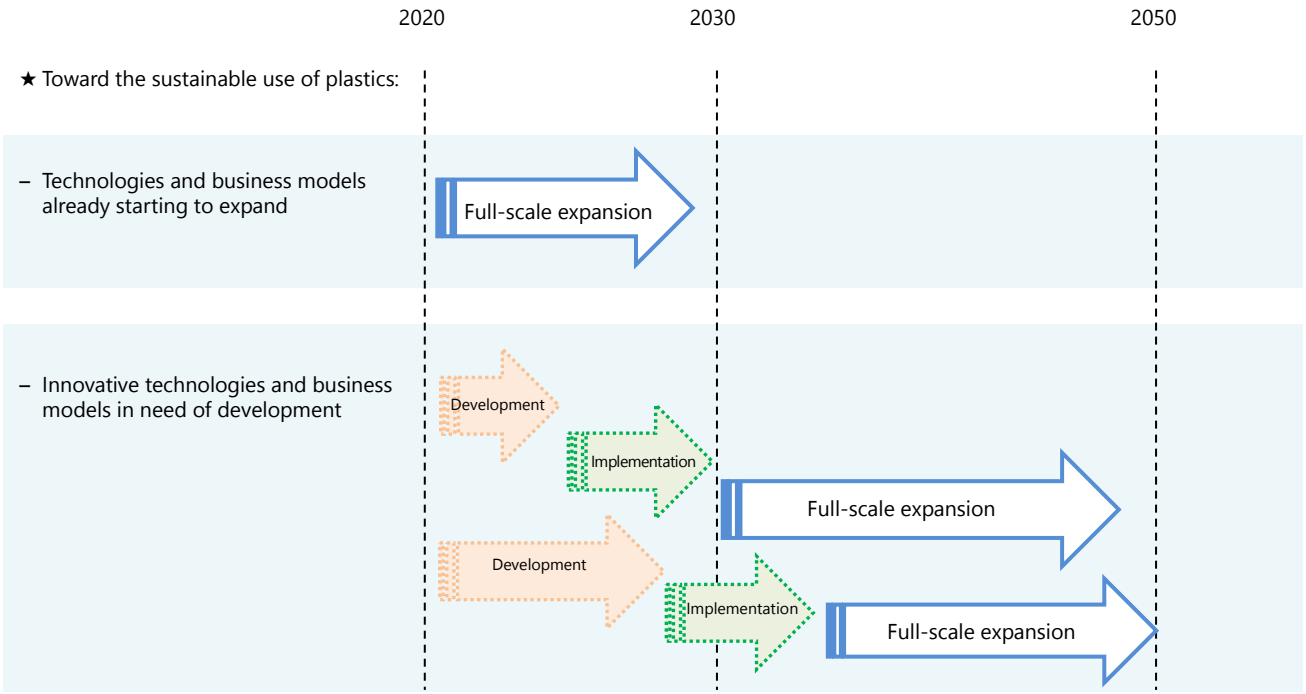
Promoting introduction of innovative technologies and business models

The sustainable use of plastics with net zero CO_2 cannot be realized by simply extending existing 3R initiatives. We need innovative technologies and business models which break down existing business models and bring about a game change.

Leading companies around the world are rapidly developing their businesses with ambitious goals of reducing single-use plastics and using recycled plastics. Also in Japan, there are plenty of advanced environmental technologies in embryo. With its own ambitious goals, TMG will further accelerate the movement of both domestic and foreign businesses in Tokyo, an international business hub, by working with businesses that are introducing innovative technologies and business models.

To this end, TMG will:

- Show the direction of an innovation in technologies and business models required for the use of plastics with net zero CO_2 by carrying out an in-depth examination on the use of plastics in the closed carbon cycle shown on page 7.
- Catch up on the most advanced movements in world and disseminate information on innovative technologies and business models that contribute to the sustainable use of plastics.
- Promote the launch of innovative business models in the processes from product design to the collection, reuse, and recycling of used products.



◆ Examples of technologies and business models expected to expand in the future

- Business that replaces single-use plastics with reusables
- Closed-loop recycling technology and business that provide virgin-quality recycled resin from used polyethylene and polypropylene
- Technology and business that manufacture various plastics from synthesis gas obtained by pyrolysis of unused biomass
- Technology and business that manufacture various plastics from CO_2 and CO_2-free hydrogen by capturing atmospheric CO_2 using renewable energy

Conclusion

It is not just plastics that emit a large amount of CO_2 in the material production process. Plenty of greenhouse gases are also emitted from the production of food, ferrous and non-ferrous metals, and cement.

For example, greenhouse gases associated with food supply account for 21-37% of the total greenhouse gas emissions of the world. These greenhouse gases include CO_2 from deforestation due to an increase in cultivated land and pasture land, methane from stockbreeding, and dinitrogen monoxide from rice cultivation. Large amounts of fossil fuels are consumed for metal smelting and cement production. CO_2 is also generated from limestone which is a raw material of cement.

We need a shift to the sustainable use of these resources with net zero CO_2 as well. In the Sustainable Development Goals (SDGs) of the United Nations, Sustainable Consumption and Production or Responsible Consumption and Production is set as Goal 12.

Efforts to reduce plastics are the first step in making our consumption and production sustainable.

It is our responsibility for future generations and those living in vulnerable communities to realize the sustainable use of resources with net zero CO_2 and maintain a delicate balance of the global climate and ecosystems. To fulfill that responsibility in the metropolis of Tokyo, which consumes large amounts of resources as one of the major economic centers of the world, we need to realize a sustainable consumption and production model and spread it all over the world.

TMG will take the lead in pursuing a sustainable society in partnership with a number of Tokyo residents, businesses, universities, and NGOs.

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For Sustainable Use of Plastics

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