DOES JAPAN HAVE THE ANSWER? – ESTABLISHING A RECYCLING SYSTEM AND GOING BEYOND

From the "economic miracle" period up to the present, Japan has built an excellent system for efficiently collecting and recycling recyclable waste. Yet, recycling does not constitute a definitive solution. Rather, it is important to lower the amount of resource use by turning to reducing and reusing.

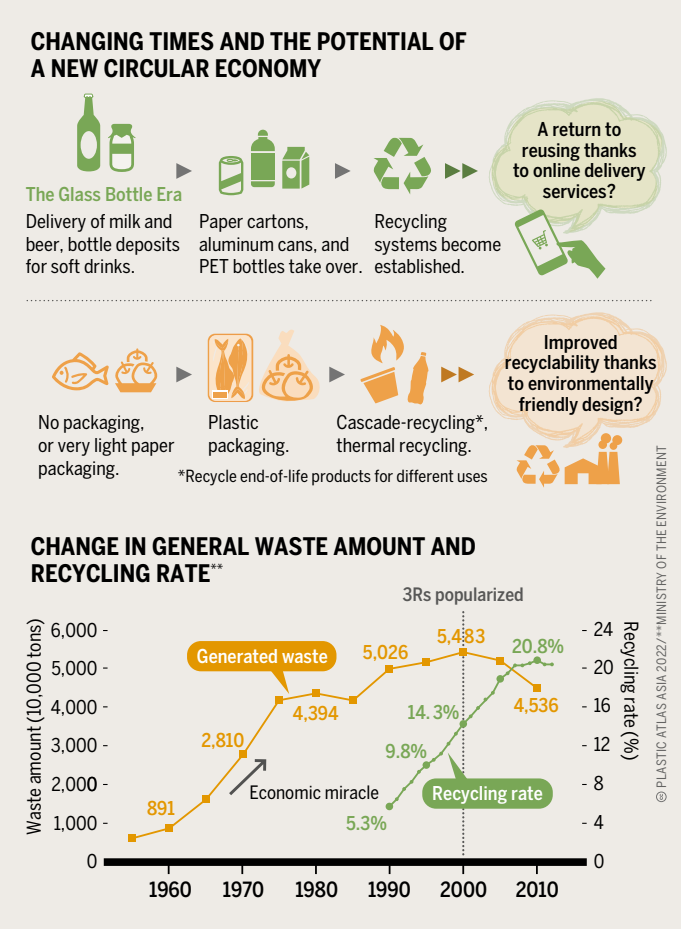
A circular economy takes into account all stages of a product's lifecycle, including those before and after consumption. This approach is not only essential to halting plastic pollution but also beneficial to the economy, society, and the climate. By 2040, a circular economy will have reduced the amount of ocean plastic influx by 80%, reduced greenhouse gas emissions by 25%, saved USD 200 billion annually, and created 700,000 new jobs. In order to make this happen, forward-thinking corporations, cities, investors, policymakers, scholars, students, NGOs, citizens, and other groups will need to cooperate closely.

This chapter looks back at the history of plastics and the circular economy in Japan in order to consider how major stakeholders can rethink and redesign the future of plastic, starting with packaging.

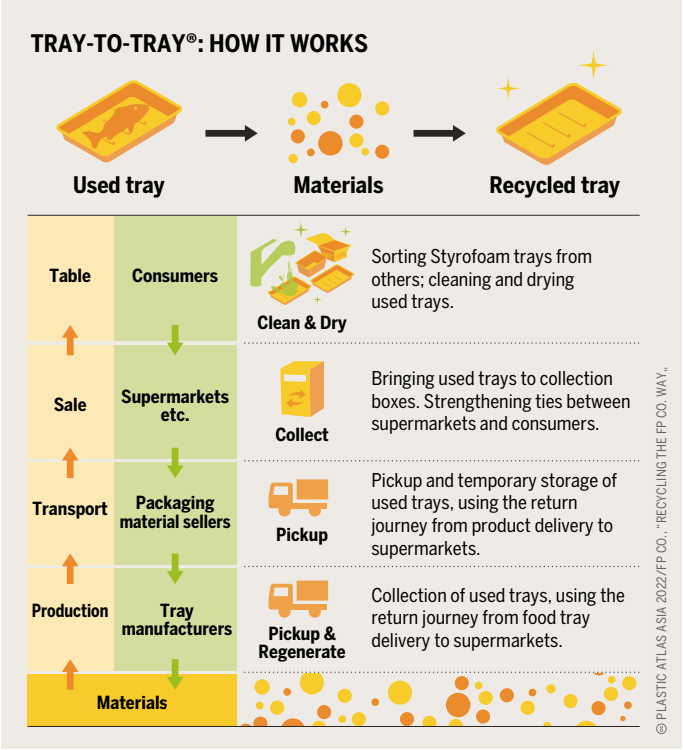
Going far back in time, during the Edo period (1603-1868), when the supply of goods and energy was scarce, ordinary people in Japan routinely recycled and reused, creating a circular society unparalleled in the world. Since then, even during the Japanese economic miracle, right up to the 1970s, glass bottles were used for milk, soft drinks, beer, and other beverages, with a robust bottle return scheme in place. Milk and beer were delivered by vendors, who later collected the empty bottles. Soft drink bottles could be deposited at the store in exchange for a JPY 10 refund. Paper waste collectors would slowly drive their light trucks through residential areas while playing their chimes. Residents would deposit their old newspapers, bundled and tied together, and the collectors would exchange these bundles for toilet paper rolls. In fact, residents could leave the old newspapers at the front door when leaving the house, so that by the time they came back home, they would find the newspapers replaced by toilet paper rolls.

Since the second half of the economic miracle, beverage containers changed, with paper being used for milk, aluminum cans and PET bottles for soft drinks, and aluminum cans for beer. Many factors played a role in this transformation. For example, as more high-rise condominiums were built, and as more families became nuclear and more women joined the workforce, more homes were left empty during the day, and it became difficult for vendors to deliver milk and beer, while consumers chose to buy these goods on their own in stores. Following these developments, glass bottles were deemed too heavy and fragile and thus dangerous, and were quickly replaced by lighter and more resilient containers. Moreover, vegetables, meat, bread, and other food items used to be sold at small stores without any packaging, or in very light packaging such as paper, whereas today many of these items are sealed in packaging and sold at supermarkets. Plastic trays are also widely used in this context.

Generally speaking, as the economy grows, systems of reusing and recycling tend to stop functioning. One reason is the fact that, as cities become densely populated and consumption increases, there are fewer people making a living through recycling, such as old newspaper collectors. In the Japanese context, the rapidly rising value of the Japanese yen during the 1980s meant that resources could be imported at lower prices, which outcompeted domestically recycled materials. In order to overcome this issue, municipalities around Japan took on the task of collecting recyclable materials. The Japanese government supported local governments through its 3Rs (reduce, reuse, and recycle) policies, thus strengthening the collection of recyclable materials. Local governments in Japan would collect garbage according to a minimum of two categories, namely "combustibles" and "recyclables" but the number of categories can be as high as a few dozen. Moreover, Japan takes environmental education very seriously, as can be seen from the fact that primary



As lifestyles change, so do containers for products, leading to an increase in plastic container use. On the other hand, thanks to the promotion of the 3Rs, Japan's recycling rate has also been on the rise.



Example of horizontal recycling, where collected used products are restored into the same product. Collection and recycling systems are established for select plastic materials.

school students are taught how to sort their trash. In some cases, schools even collect recyclable materials themselves. As a result, milk cartons and aluminum cans are collected as recyclable materials at a very high rate (30% for milk cartons, 90% or more for aluminum cans).

When PET bottles were being introduced as soft drink containers, there was opposition from consumer groups because of the increase in waste. However, by establishing a system for collection and recycling, the recycling rate for PET bottles sold in Japan has reached approximately 85% (excluding thermal recycling), which is by far the highest in the world. (That said, when collecting trash along a riverbank, there is still a large number of discarded PET bottles.) The high recycling rate is due in part to the Voluntary Design Guidelines, which were established in 1992 by PET bottle industry groups and have since been revised multiple times. For example, all PET bottles are transparent and have labels that are easy to peel. Thanks to the high quality of PET bottles, bottle-to-bottle recycling is also on the rise.

As for food trays, systems for collection have been developed by major manufacturers since 1990. Trays accompanying food products purchased by consumers are cleaned at home and brought to collection boxes at retail stores, where they are collected and recycled. Tray-to-tray recycling is also possible. In Japan, major retailers also serve as collection points for recyclable resources such as PET bottles and food trays, thanks to consumers being very aware of sorting and recycling. When going on their next shopping trip, consumers return to the storefront the empty containers from products they purchased during their previous visits.

Thus, systems for collection and recycling are in place for certain plastic materials. Horizontal recycling, a method that recycles materials back to the same product, has also been made a reality. Still, the story is different when it comes to plastic packaging and containers. Most plastics collected from households under the Containers and Packaging Recycling Law (1995) are cascade-recycled into products such as pallets and construction materials, but only after a contribution under the law is paid. Recently, manufacturers of cosmetics containers and refill packs for shampoo and other products, which have traditionally not been considered as recyclable resources, have been cooperating with major retail chains to collect these products and to make them easier to recycle by producing the containers from common materials.

Outside the domain of containers and packaging, manufacturers and others are operating collection and recycling systems for four types of home appliances (air conditioners, televisions, refrigerators and freezers, and washing machines and clothes dryers) based on the Home Appliance Recycling Law (1998). Consumers pay a recycling fee when they dispose of their home appliances. This fee is spent on materially recycling plastics at a high rate too.

Nonetheless, recycling remains an imperfect solution. Energy is consumed in the process of recycling. Moreover, particularly in the case of plastics, recycling does not restore the material to its original quality. Many recycled products tend to be thrown away without being further recycled. The potential of moving from recycling back to reusing can be gleaned from new services such as Loop. Loop is a new type of delivery service where perishable goods such as food, shampoo, and cosmetics are packaged in returnable containers. The fact that it is a delivery services makes it easier for customers to return the empty containers. Since the 2000s, there has been a rapid expansion of online delivery services, a fairly recent phenomenon enabled by the dramatic development of Internet technologies. In the past, the delivery of milk and beer was based on direct relationships between shops and families. The Internet has played a similar role in forging such relationships. Furthermore, although this is seldom mentioned as a feature of a circular economy, many industries are reducing the weight of their plastic containers. For example, between 2004 and 2020, PET bottles have become 25.3% lighter. Weight reduction not only reduces the amount of plastic used but also reduces CO_2 emissions from transportation.

These considerations show that there is still much work to be done to cut down on plastic usage through reusing and recycling. Moreover, Japan needs to rebuild the circulation system for its resources, including plastics, since traditional resource circulation systems may stop functioning in future due to Japan's shrinking and aging population. Efforts to systematically address this issue are ongoing in Japan, which aspires to adapt to changing socio-economic circumstances, improve continuously its 3Rs policies, and build an advanced circular society.

Between 2004 and 2020, PET bottles have become 25.3% lighter.

CHANGE IN REDUCTION EFFECTS AND WEIGHT REDUCTION RATES DUE TO LIGHTER CONTAINERS

Reduction effects and weight reduction rates per annum