

Addressing the challenges of resource recycling

Daiei Kankyo Group's commitment to advancing resource recycling

Amid growing risks of resource depletion and the escalating impacts of climate change, realizing a truly recycling-oriented society has become an urgent priority. The sustainable use of resources is an essential issue for both businesses and society, making the transition to a circular economy unavoidable.

In this context, the Group possesses extensive know-how in operating a wide range of facilities, enabling optimal waste management and recycling tailored to the type and characteristics of each waste material. Our role as a social infrastructure company supporting the circular economy is becoming increasingly important. Guided by our management philosophy, "We shall contribute to society while striving for the coexistence of human life, industry, and nature," we are leveraging our accumulated technologies and expertise to take on the challenge of realizing a circular economy. This also contributes to long-term corporate value enhancement and sustainable growth.

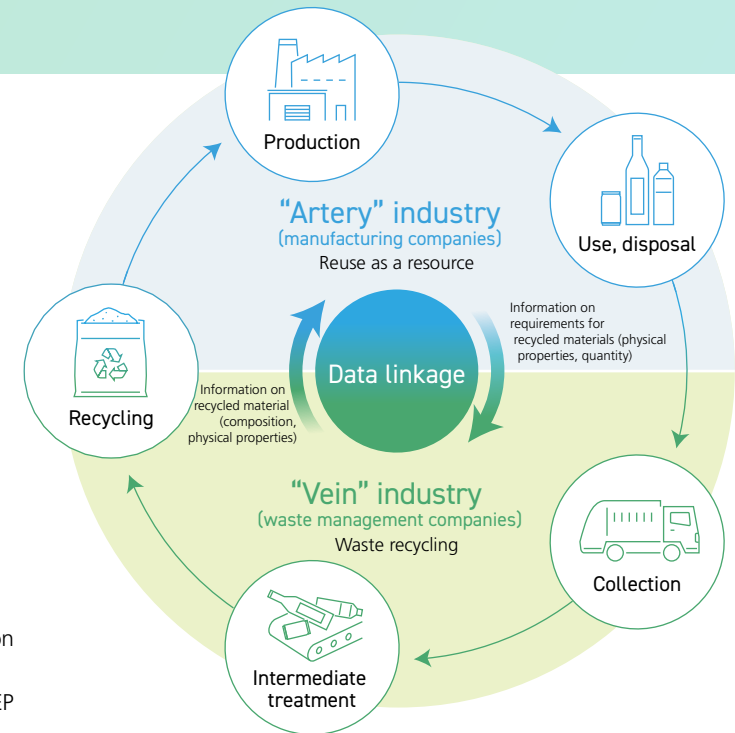
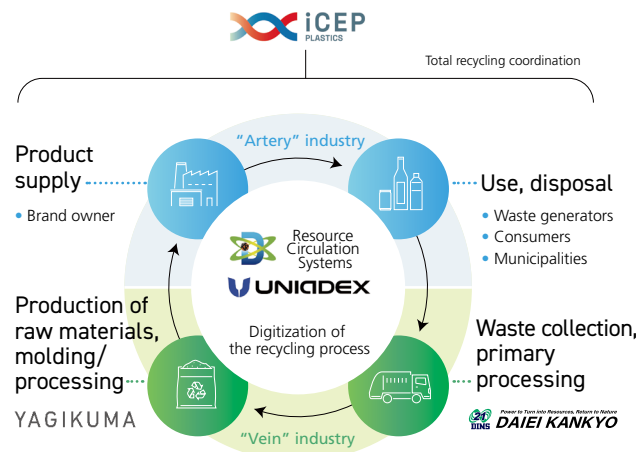
In recent years, we have seen an increase in consultations regarding resource recycling from the "artery" industry (manufacturing companies). This is because the effective utilization of resources, which was once merely part of CSR activities, has now become a critical management issue. In particular, companies have increasingly stepped up their efforts to enhance plastic recycling initiatives.

Promoting resource recycling requires securing an adequate quantity of materials, that is, the resources necessary for recycling. While demand for recycled resources continues to grow, it is increasingly necessary to establish efficient collection and treatment systems that

cover a wider range of waste materials to ensure a stable supply of suitable materials. The Group is focusing on expanding its business foundation through M&A and broadening waste acceptance through PPPs to secure sufficient quantities and strengthen a stable supply system for recycled materials.

Deepening "artery-vein" collaboration and innovating resource recycling business through iCEP PLASTICS

In February 2024, Daiei Kankyo Group's Resource Circulation Systems Co., Ltd., together with Daiei Kankyo Co., Ltd., UNIADDEX, Ltd., and Yagikuma Co., Ltd., jointly launched iCEP PLASTICS. iCEP PLASTICS is an open information platform that digitally connects the "artery" industry (manufacturing companies)



and the "vein" industry (waste management companies) with the aim of accelerating the development of a resource recycling society and facilitating smooth supply and demand of recycled resources.

Between "artery" companies that produce finished goods and "vein" companies responsible for recycling, there are challenges such as information gaps, mismatched needs, and variability in the quality of recycled materials. iCEP PLASTICS aims to address these challenges and deepen "artery-vein" collaboration to ensure sufficient quantities, stable quality, and traceability. The current target industries are the automotive, construction, packaging, and home appliance sectors. Among these, the automotive and construction industries are making significant progress in building resource recycling schemes through collaboration between "artery" and "vein" companies.

1. Automotive industry

Recycling non-automotive waste plastics into auto parts—the XtoCar project

The automotive industry is now at a turning point. The European Commission's directive on end-of-life vehicles (ELV Directive) requires that by 2031, 25% of new car parts use recycled plastics, with 25% of that coming from ELVs (as of December 2024). Similar initiatives are gaining momentum in Japan. According to the Ministry of the Environment, the annual recycled material needed to achieve this is enormous: 63,000 tons from ELVs (Car to Car) and 187,000 tons from non-automotive sources (X to Car).

In response, the XtoCar project has been launched to recycle waste plastics from different industries into automotive parts. Centered on the Daiei Kankyo Group, diverse strengths such as recycling technology, high-quality reprocessing, AI-assisted material development, and traceability system building are being integrated to advance a new supply chain through industry-government-academia collaboration. The current target material is polypropylene (PP). We aim to build results starting with parts that have relatively low usage standards and expand into high-value-added parts. Challenges such as costs and stable supply of recycled

materials remain, but we will continue to address them to pave the way for a recycling-oriented society.

Source: Ministry of the Environment, Industry-Government-Academia Consortium for Developing a Market for Recycled Plastics in Automotive Applications (1st Meeting), November 2024
<https://www.env.go.jp/council/content/03recycle03/000266742.pdf> (in Japanese only)

2. Construction industry

Charting a path for recycling waste plastics from construction sites

The Group is collaborating with other companies to tackle the recycling of large volumes of mixed waste plastics generated at construction sites, especially in large-scale, non-residential facilities.

In collaboration with Daiwa House Industry Co., Ltd., as a first step, we conducted a survey on waste plastic generation at non-residential construction sites from groundbreaking to completion. By clarifying the types and quantities of waste plastic generated during each phase, such as civil engineering and interior work, this survey marked a significant step toward promoting plastic recycling at construction sites.

In collaboration with KAJIMA CORPORATION, we aimed to mold recycled products from construction-derived waste plastics. We targeted protective materials expected to

generate substantial waste and successfully recycled them to manufacture 5,000 construction barricades. We established resource recycling within the site, paving the way for material recycling of construction-related waste plastics.

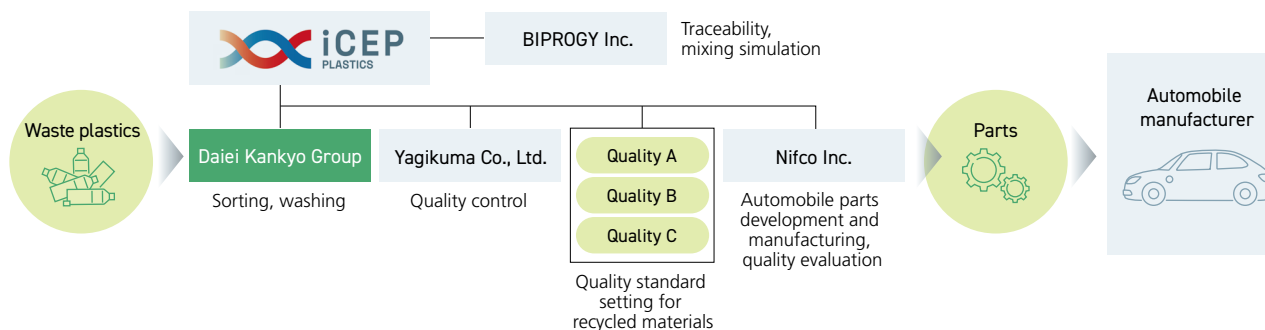


3. Container and packaging plastic industry

The future of circularity envisioned through used container and packaging plastics

Daiei Kankyo Co., Ltd. has determined that contaminants generated during the recycling process can be utilized for the mass production of revia, a circular material developed by LIXIL Corporation that combines waste plastics and wood waste. Daiei Kankyo has confirmed quality and ensured a stable supply after conducting material evaluations. In December 2024, we began supplying recycled materials made from used container and packaging plastics, contributing to CO₂ reduction and resource recycling.

XtoCar scheme



Looking ahead to the next phase

Leveraging the Group's diverse technologies to address social challenges

The Daiei Kankyo Group is taking on the challenge of addressing not only resource recycling but also broader social issues. In efforts to realize Local Circular Ecological Spheres, we are exploring projects that create energy by supplying surplus power generated from waste to local areas as a multifaceted use of local energy centers. This initiative aims not only to promote resource recycling but also to achieve a decarbonized society through local production and consumption of energy.

In collaboration with Daiei Kankyo Research Institute Co., Ltd. and the Technical Department of Daiei Kankyo Co., Ltd., we have developed and implemented Hibanami, an AI-powered fire detection system that addresses the increasing issue of lithium-ion battery fires at waste treatment facilities. By enabling early detection and rapid response to fire risks, it supports the stable operation of sorting and crushing facilities. At Expo 2025 Osaka, Kansai, Japan, "smart collection boxes" are being used to collect and compost biodegradable plastic tableware. We have established a system to remotely monitor the amount of tableware collected, and are also working to compost the collected biodegradable plastic together with food waste at the Mie Recycle Center.

We are also continuing to explore the potential of CCU projects. We plan to establish a collection facility adjacent to the incinerator. Beyond supplying CO₂ to existing markets such as carbonated beverages, welding gas, and dry ice, we are also exploring new opportunities, including calcium carbonate production and hydrogen utilization, as our next step.

Messages

Taking on a wide range of recycling challenges with an eye to the future

Ryota Tsubouchi

Director
Daiei Kankyo Research Institute Co., Ltd.



Daiei Kankyo Research Institute Co., Ltd., the think tank of the Daiei Kankyo Group, is tasked with analyzing developments such as tightening regulations, technological innovation, and changing social needs from the three perspectives of systems, markets, and technology, and with taking on the challenge of practical implementation of technology and services aimed at realizing a recycling-oriented society.

Currently, in response to the enforcement of the Plastic Resource Circulation Act and tightening international regulations, the Institute is conducting feasibility studies in plastic recycling in collaboration with "artery" (manufacturing) companies. We are also engaged in forward-looking research on solar panel recycling, as large volumes are expected to be discarded starting in the early 2030s. With household solar panel disposal anticipated in the late 2020s and commercial panels projected to peak in the 2030s, we are closely monitoring regulatory trends and evaluating the potential to launch a recycling business in this field.

At Expo 2025 Osaka, Kansai, Japan, which is currently underway, I was in charge of the "smart collection box" project for collecting biodegradable plastic tableware. This initiative also served as an opportunity to communicate an important message to children: "It's a resource, not trash!"

Sharing business knowledge and systematizing support to enhance Group capabilities

Yoshimasa Ikeda

Section Manager
Urayasu Seibun, Inc.



Seconded to a consolidated subsidiary, I am responsible for communicating our business rules and procedures across various areas, including general affairs, human resources, accounting, sales management, purchasing management, safety, and environmental practices, to employees of newly integrated companies in the Group, and for establishing systems that satisfy the standards required by internal audits. I find it fulfilling when I see these employees gaining new insights and perspectives, and beginning to take ownership of the challenges they face with a sense of personal responsibility.

As M&A activity within the Group accelerates, one key challenge is to systematize our support structure for newly acquired companies. Immediately after joining the Group, these companies are required to implement a wide range of measures to strengthen governance from the Group's various departments, so it is necessary to reduce the burden on these employees as much as possible. To address such a situation, I am proposing initiatives to facilitate smoother integration. These include establishing a streamlined governance structure with minimal personnel in a short period of time, training on-site corporate representatives, and bridging information gaps between companies.