

Reff Project Targeting the Realization of a Recycling-Based Society

301-2,301-3,306-2

Issues Facing Society and Background of Recycling Technology Developments

In Japan, most used disposable diapers are incinerated, which impacts the environment due to the emission of CO₂ during this process. Further, as disposable diapers contain high moisture content, they are difficult to burn, which requires more energy for incineration and additional costs to maintain and build new incinerators. The production of new disposable diapers also requires many natural resources, including wood.

To remain the preferred brand by customers and to continue to grow, it is important that Unicharm establishes a sustainable system in which the life cycle of our disposable diapers does not burden the natural environment, and that we instill the sustainable value of this system in our customers. Based on our belief that new technologies were needed to achieve this goal, in 2015 we launched a project to recycle used disposable diapers.

Circular Recycling of Used Disposable Diapers

Unicharm's recycling system is designed to achieve hygiene and quality equivalent to that of non-recycled raw materials through a process that includes cleaning and separating collected disposable diapers and applying our proprietary ozone treatment to sterilize the extracted pulp.

After launching this project in 2015, in fiscal 2016 we began demonstration trials in Shibushi City, Kagoshima Prefecture, to recycle used disposable diapers at So Recycle Center LLC, which handles the recycling of waste in Shibushi City. Subsequently, in fiscal 2018, Osaki Town located in So County, Kagoshima Prefecture, joined the demonstration trials. In June 2022, nursing care facilities in Kagoshima Prefecture began using disposable diapers incorporating recycled materials as part of their absorbent materials, realizing the horizontal recycling of used disposable diapers. Based on this world-first*¹ horizontal recycling technology for disposable diapers, the Recycle for the Future (Reff) Project was born, as we aim to create a future in which hygiene products are not discarded after use.



In April 2023, Shibushi City began collecting used disposable diapers at five childcare facilities through the *Hands-Free Commute**² program. In August 2024, the city began providing *MamyPoko Pants Reff*, disposable baby diapers for childcare facilities using raw materials recycled from used baby diapers, thereby forming the cycle of use, collection, and recycling and realizing a circular economy in Shibushi City.

*¹ Horizontal recycling of used disposable diapers to new disposable diapers using ozone treatment technology (based on Unicharm research, December 2020)

*² Flat-rate service providing disposable baby diapers and baby wipes to childcare facilities

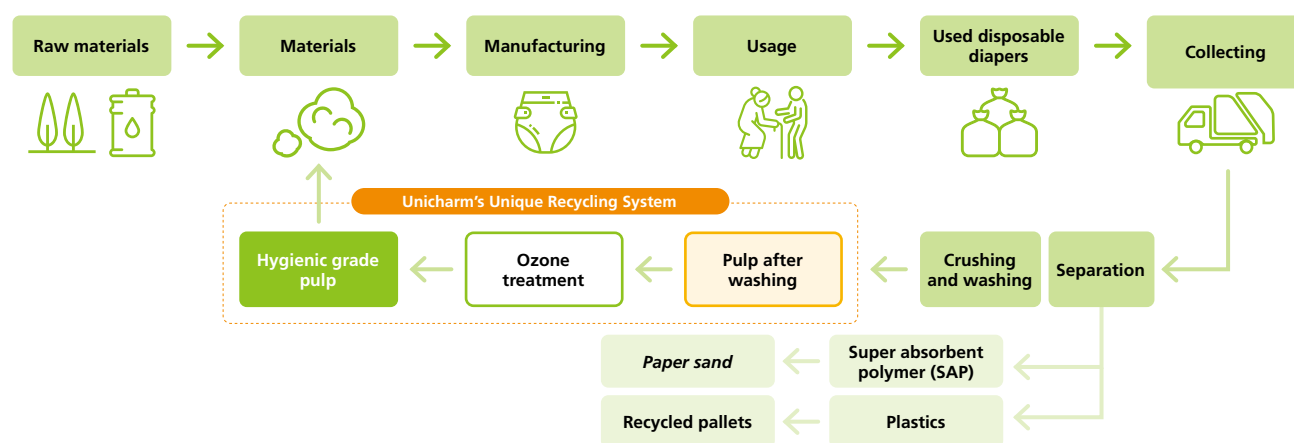
P66 *Hands-Free Commute: A Subscription-Based Model for Disposable Diapers*

Promotion Structure

Unicharm's disposable diaper recycling business is promoted by a cross-organizational team led by the chief Reff officer (CRO) and comprising members in charge of marketing, technical development, and public relations. In collaboration with the Ministry of the Environment, we work with various municipalities and organizations, including Shibushi City and Osaki Town in Kagoshima Prefecture, as well as So Recycle Center LLC.

► Recycling of Used Disposable Diapers

Disposable diaper recycling model



Unicharm Receives Japan Business Federation Chairman's Award at 32nd Global Environment Awards

At the 32nd Global Environment Awards, sponsored by the Fuji Sankei Group, Unicharm received the Japan Business Federation Chairman's Award for its contributions to resource recycling through years of technological development and the establishment of a demonstration model. Established in 1992, the Global Environment Awards aims to foster industrial development in harmony with the global environment by developing new technologies and products that help prevent global warming and realize a recycling-oriented society, promoting environmental conservation activities and businesses, pursuing sustainable social systems, and enhancing awareness of global environmental conservation.

Reff Project Targeting the Realization of a Recycling-Based Society

Disseminating Information to Promote Consumer Understanding and Cooperation

Consumer understanding and cooperation with regard to sorting and collection is an essential aspect of our efforts to promote the recycling of used disposable diapers. Accordingly, since June 2022, we have been disseminating information through the Unicharm social media account “Notes for reflecting on the future of disposable diapers.” In January 2024, Unicharm Corporation and the Unicharm Group’s subsidiaries in Japan began using business cards made from recycled pulp, while in April 2024, we launched the RefF brand website “Together we create a future cycle.”

In March 2024, Shibushi City, Kagoshima Prefecture installed collection boxes for disposable diapers at 470 waste collection sites. These boxes are made from recycled plastics that were extracted from used disposable diapers. Meanwhile, to promote greater awareness of the importance of separating and collecting used disposable diapers, from December 2022 Osaki Town has been distributing collection bags for disposable diapers made from plastics separated in the recycling process.

In addition, Unicharm continues to promote efforts with local governments to enhance people’s awareness of the importance of recycling used disposable diapers, such as conducting lectures at elementary schools in Shibushi City on the theme “Reff: Disposable Diaper Recycling” and conducting workshops in Osaki Town to create postcards using recycled pulp.



web Notes for reflecting on the future of Unicharm’s disposable diapers
(in Japanese only)

https://note.com/unicharm_reff

web RefF brand website “Together we create a future cycle.”

<https://www.unicharm.co.jp/en/csr-eco/reff.html>

Products Using Recycled Raw Materials

After commencing trials of *Lifree Side Leak Prevention Tape-on RefF*, disposable diapers that use recycled materials for a portion of their absorbent paper, at certain nursing care facilities in Kagoshima Prefecture in June 2022, Unicharm added *Lifree All Night Dry & Secured Pad Ultra RefF* to its product lineup and began selling them to hospitals and nursing care facilities in the Kyushu region. In April 2024, we expanded our sales channels and categories through the general release of *Deo-Toilet Deodorizing / Disinfecting Sheets RefF* toilet-related products for cats and *MamyPoko Pants RefF* disposable baby diapers at select retailers and our online store. The cardboard boxes, packaging, and diapers of *MamyPoko Pants RefF* are all printed in the same color to cater to the needs of childcare facilities to identify sizes more easily. In October 2024, all 56 public childcare facilities in Yokohama City that are part of the *Hands-Free Commute* program began using *MamyPoko Pants RefF*. In April 2025, Unicharm introduced *Lifree Nobiru Fit Thin Lightweight Tape-on RefF* disposable diapers for adults. Shortly prior to that, in March 2025, we released *Deo-Sand: Paper Sand That Deodorizes with Fragrance RefF Pure Floral Fragrance*, a cat litter made partially from super absorbent polymer recycled from used disposable diapers. This is Japan’s first* *Paper sand* product using super absorbent material that has been separated and recycled from used disposable diapers as a raw material.

Moreover, the Company promotes resource recycling efforts with other companies. In August 2024, Poppy Paper Co., Ltd. began selling toilet paper that uses pulp recycled from wastepaper and used disposable diapers collected in Shibushi City and Osaki Town. In October 2024, Oji Nepia Co., Ltd. introduced *Nepia Nepinepi Toilet Double Rolls 12-Pack RefF* in the Kyushu region, which are produced by using electricity generated from recycled solid fuel (RPF) in the production process. Furthermore, in February 2025, Wakakusa Co., Ltd. began using recycled pallets to transport materials from warehouses to factories.

These pallets are made from a combination of plastics separated in the recycling process of used disposable diapers and plastic materials collected under the Containers and Packaging Recycling Law.

* Based on Unicharm research, March 2025

Our Approach to Further Creating Value

Unicharm’s recycling system is currently operated by two municipalities, Shibushi City and Osaki Town, and we are conducting research and demonstration trials to increase the number of partner municipalities in the future. From December 2024 to January 2025, the Company participated in a demonstration project conducted by Hamamatsu City, Shizuoka Prefecture, where it was in charge of providing disposable diaper collection boxes and developing and providing products made from recycled pulp. In the future, our goal is to develop a recycling model that can be deployed not only in Japan but across the globe, and to introduce our resource recycling system in more than 10 municipalities by 2030.

In order to realize a sustainable society, it is important to foster social acceptance and normalization of recycling used disposable diapers as a part of daily life, so that customers will be encouraged to choose recycled products for the sustainable value they provide. Going forward, we will continue to develop new products using raw materials that are recycled from used disposable diapers and continue to expand our sales channels with the aim of realizing a recycling-oriented society.