



Plastic issues R Plus Japan is tackling

**Plastic becomes a problem when it is discarded or simply incinerated.
However, if recycled, it can help create a better, sustainable future.**



In recent years, environmental pollution caused by plastics, such as ocean litter, microplastic issues and GHG emissions from incineration, has often been reported. Is plastic really the problem?

Since its invention, plastic become an indispensable material in our daily lives. While simply burning it harms the environment, we believe that by properly recycling it, plastic can be utilized sustainably as a new resource without consuming fossil fuels.

In Japan, approximately 8 million tons of plastic are collected annually, yet only 3% of it is processed through chemical recycling. If we can increase this figure, we may be able to create a circular economy.

To realize this vision, R Plus Japan was founded as a gathering of companies involved in the plastic supply chain, with the aim of supporting the development of chemical recycling technology and introducing it into Japan.

R Plus Japan

General Info.

Establishment : 2020

Our Goal

Realizing a circular economy by promoting the domestic implementation of chemical recycling technologies to recycle plastics currently being landfilled or incinerated.

Core Activities

- Technical development support
- Developing plastic collection scheme
- Awareness activities



Philosophy

PURPOSE

Make the Wastes into Something Useful

Create a society where we join hands and take responsibility, not passing it on to the next generation. Building a society where each person confronts the act of "throwing away."

VISION

Circular Economy

Realizing a circular society where "consumption" turns into "resources". Creating a future where things that are no longer needed aren't discarded but are "circulated".

VALUE

A diverse group of people with different values comes together to share their wisdom and create new norms.

Top Message



At R Plus Japan, we are an alliance of companies united by a shared vision: "To create a society where plastic, as a valuable resource, continues to circulate indefinitely." Since the invention of the world's first plastic in 1835, plastic has brought countless benefits to our daily lives. However, it is also true that plastic poses social challenges. It is made from limited fossil fuels, and most plastics must be incinerated after use. Additionally, improper disposal has contributed to marine plastic pollution.

The Mission of R Plus Japan

01

We aim to establish chemical recycling technology that efficiently regenerates used plastics into base chemicals, the raw materials of plastic, by viewing used plastic as a valuable resource.

02

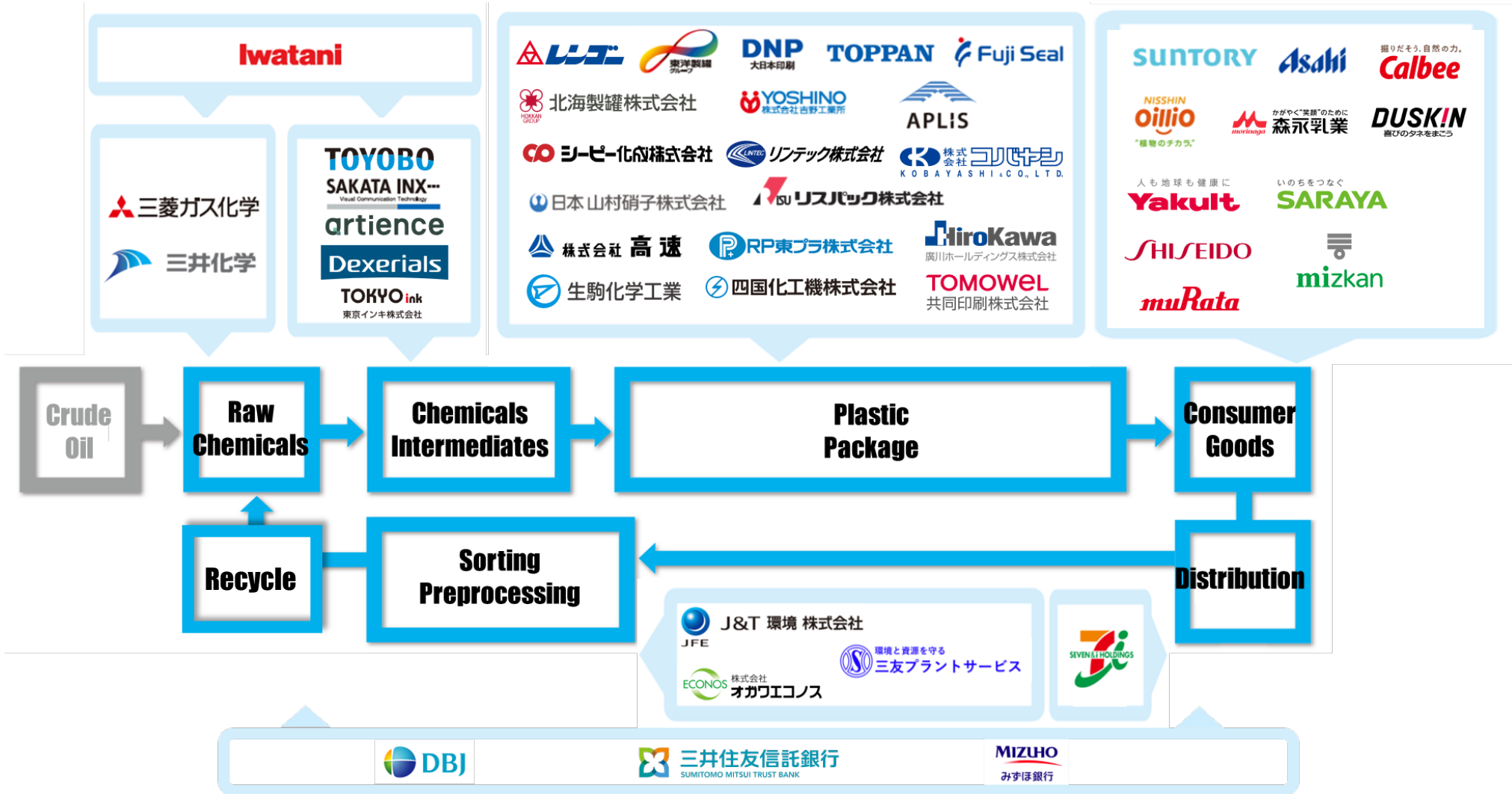
We also promote public awareness of the idea that "used plastic is a resource" and strive to build a system for the proper collection and recycling of these materials.

By combining this technology with such a system and leveraging the full strength of our participating companies, we will contribute to the creation of a sustainable society.

R Plus Japan
CEO Atsushi Ohtake

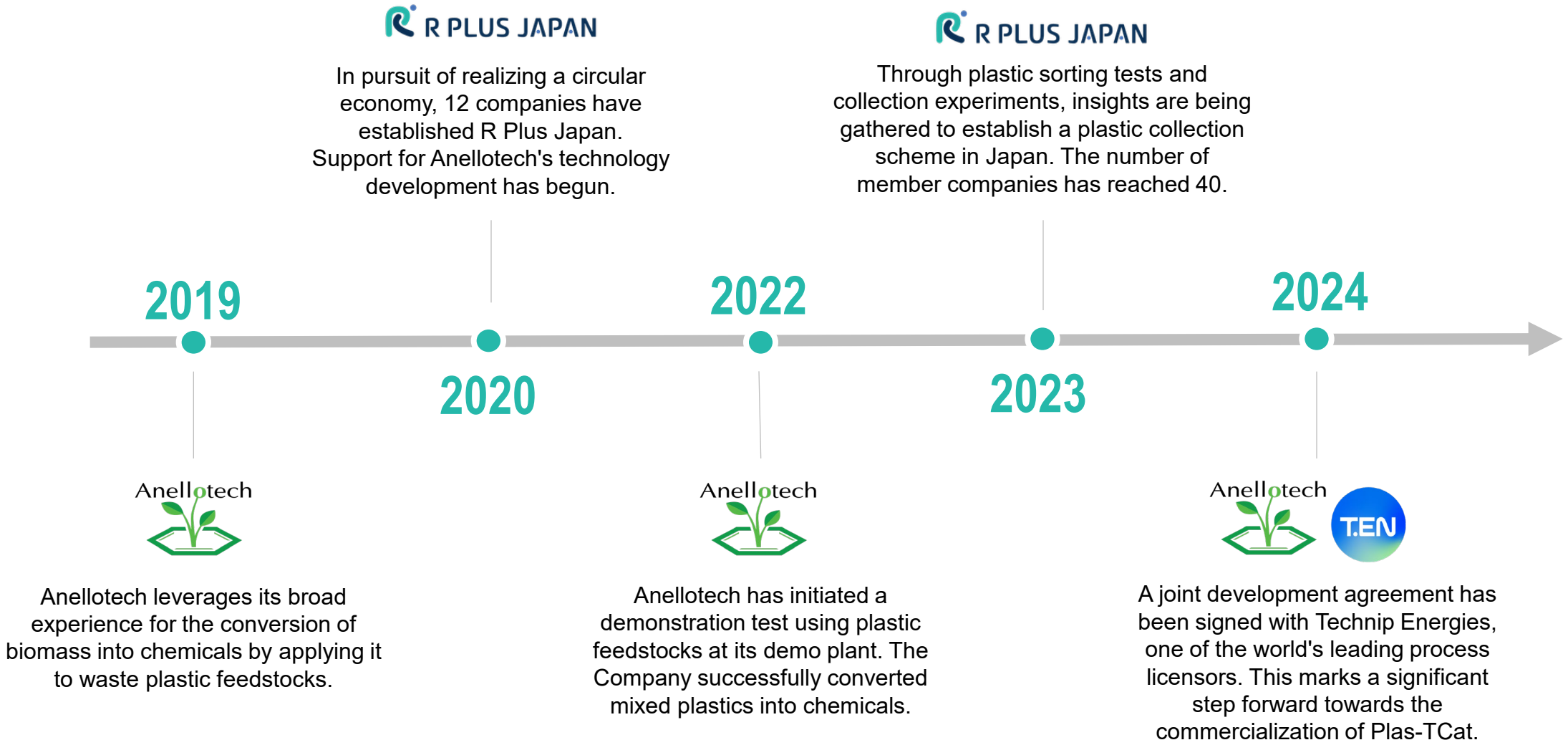
Member Companies

As of September 2024, 45 companies from various backgrounds within the plastic supply chain.



History

The challenge of plastic recycling initiated by RPJ and Anellotech has entered a phase aimed at commercialization.



Main Activities

Promoting the realization of a circular economy through comprehensive effort, including the development of recycling technologies, the establishment of plastic collection schemes, and encouraging behavioral changes in people.



Technical Development Support

- Provided technical development support to the U.S. chemical venture Anellotech, with a total investment of approximately 4.8 billion yen.
- Sorting tests on plastics collected in Japan were conducted, and compositional data of the sorted plastics was provided to promote the development of technologies suitable for Japanese waste plastics.



Establishing a Plastic Recycling Scheme

- Plastic collection tests were carried out at various collection points, such as retail stores and schools.
- The separation, collection, and recycling of plastics that are difficult to recycle and are currently incinerated or landfilled were investigated.



Awareness Activities

- Participating companies conducted classroom visits at elementary schools to educate students on the importance of sorting and to share information about corporate initiatives

Technical Development Support – Overview of Anellotech

Anellotech



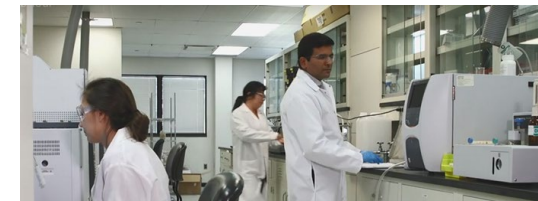
Sustainable Technology Venture

- Founded in 2008
- Headquarters: Pearl River, New York
- Employees: Approximately 20



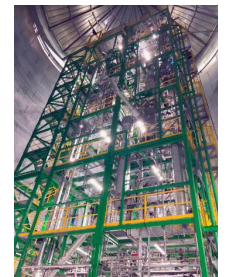
📍 Headquarters and Research Center (Pearl River, NY)

A research facility equipped with a lab-scale fixed and fluidized bed reactors and analytical instruments.



📍 Demonstration Plant

Capacity: 500 kg per day.
Includes fluidized bed reactor, catalyst regeneration system, quench tower, and recycling compressor.
Capable of continuous 24hr operation.



David Sudolsky

President & CEO

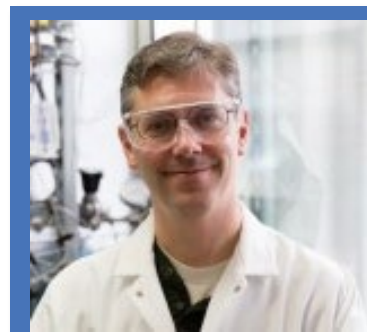
- Founded Anellotech and raised over \$130 million of strategic investments
- Served as the business officer lead of a bio-chemical start up venture Dura Pharmaceuticals which was sold for \$1.8 billion).
- Gained practical chemical engineering experience in process design and the startup of oil refineries at Union Carbide.

<https://bioenergyinternational.com/anellotech-successfully-converts-multilayer-mixed-plastic-packaging-into-platform-chemical-for-pet/>

Dr. George W. Huber

Chair of Science Advisory Board

- Professor at the University of Wisconsin-Madison
- Developed core technology for converting biomass and plastics into chemicals and fuel through catalytic pyrolysis



<https://energy.wisc.edu/news/trio-faculty-startups-earn-seed-funding-awards>

Technical Development Support – Features of Plas-TCat™

R Plus Japan believes that Plas-TCat™ technology has the potential to be a game changer in realizing a circular economy, thanks to its flexibility and scalability

Features

- A chemical recycling technology that uses a fluidized bed catalytic process to both pyrolyze plastics and then reform the pyrolysis gases directly into aromatics and light olefins in one reactor.
- This process converts used plastics in a single step primarily into aromatics and light olefins.

Advantages

- 1 **Feedstock Flexibility:** Capable of using various types of plastics as raw materials.
- 2 **Low-Carbon Process:** Potentially reduces greenhouse gas emissions by 50% compared to virgin plastic.
- 3 **Scalability:** The capacity of a single reactor can be scaled up to hundreds of thousands of tons.

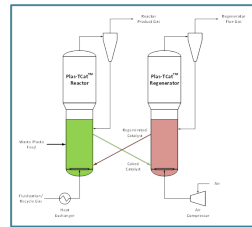
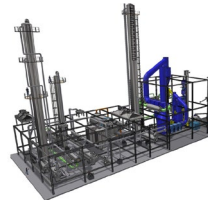
For more information, visit [Anellotech's website](#)

Technical Development Support – Outlook for Development



Completion of R&D program at the demo plant

- Development of reaction models
- Issuance of P&ID
- HAZIP
- Preliminary design of components
- 3D model
- Economic study, etc..



Commencement of plastic feedstock input at the demo plant



Initiation of catalyst testing at the research center

2020



R PLUS JAPAN R Plus Japan established

2022

2024.3



Joint development agreement signed with Technip initiation of Plas-TCat technology licensing

2024.12



Expected completion of pre-PDP technology package.

2025.3



[Technip Energies and Anellotech to Jointly Develop Sustainable Plastics Recycling | Technip Energies \(ten.com\)](https://www.technipenergies.com/en/press-releases/2024/01/technip-energies-and-anellotech-to-jointly-develop-sustainable-plastics-recycling)

Establishing a Plastic Recycling Scheme

To assess the quantity and types of plastics that can be collected in Japan for recycling and to establish an effective recycling scheme, R Plus Japan is taking a comprehensive approach.



Sorting Trial

- By utilizing Japan's experimental system and collaborating with waste management companies, sorting plastics collected by local governments and analyzing its abilities.
- Gathering insights on the types of plastics that should be excluded from chemical recycling and mechanical means for their removal.



Plastic Collection Campaign by Location

- Encouraging citizens to collect used plastics, including through organized efforts by schools, retail stores, and local communities.
- Collecting insights on how different locations and campaign methods contribute to the quantity and quality of the collected plastics.



Collection by Emission Source

- There are many plastics that are incinerated due to the difficulty of separating them from others during collection. This includes food containers and packaging or plastics used in paper cartons.
- RPJ is working with experts in the field to explore methods for separating and collecting these plastics effectively.

Establishing a Plastic Recycling Scheme – Collection Campaigns



The children came up with various ideas to encourage all the students to participate in plastic collection, resulting in a large amount of plastic being gathered. The collected plastics were recycled into new products through material recycling and returned to the school.



Collection Squad



Posters created by Children



Posters for the campaign



Special collection box with compression function

Special collection boxes were installed at supermarkets, informing citizens to bring specific types of plastics for collection at these locations. It was observed that citizens washed the plastics thoroughly before bringing them to the supermarket, providing valuable insights on how to reduce impurities in the collected plastics.



Retail Stores



Collection campaigns were also conducted at roadside stations, nursing homes, and children's cafeterias. In some of these campaigns, a smartphone app was launched to award points based on the number of times plastics were brought in. Citizens were motivated not only by the desire to earn points but also by their eagerness to improve their community, resulting in an unexpectedly large amount of plastics being collected.



Smartphone app for the campaign



Roadside station with collection boxes
minorinosato-togane.com

RPJ's Contribution Areas Toward Realizing a Circular Economy



Feedstock Collection

Supporting the stable collection of feedstocks by utilizing the plastic waste from member companies' factories and the collection schemes developed through various demonstration tests.



Product Sales (Off-Take)

Many of RPJ's member companies are interested in purchasing recycled plastic resins, offering significant purchasing potential across the consortium.

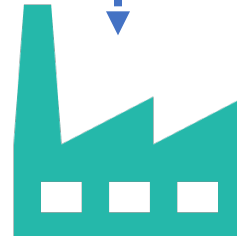
 **R PLUS JAPAN**
Collection Support



**Waste management
Companies**

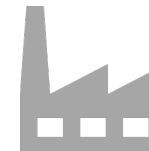
Anellotech

Plas-TCat™ 
Licensing



Commercial Plant Owner

 **R PLUS JAPAN**
Off-take



**Chemical, resin
manufacturers**



