



PET Chemical Recycling

Hidenari Kanetaka

KIRIN R&D DAY 2025
Institute for Package Innovation
R&D Department
Kirin Holdings Company, Limited

Current Status of Beverage PET Bottle Recycling

- Material recycling is mainly employed for beverage PET bottles in Japan.
- As a result, recycling feedstock is largely restricted to used beverage PET bottles.
 This situation causes an increasing competition supply of feedstock bottles.
- Repeated recycling leads to quality deterioration.
- Ultimately, repeatedly recycled PET needs to be incinerated, and replaced with petroleum-derived PET.

PET recycling targets of beverage brand owners in Japan

Company	Target	Target Year
Kirin	Japan: 50% (recycled 50%)	2027
Suntory	Global: 100% (recycled + bio-based)	2030
Coca-Cola	Japan: 100% (recycled + bio-based)	2030
Ito En	Global: 100% (recycled + bio-based)	2030
DyDo	Japan: 60% (recycled + bio-based)	2030
Pokka Sapporo	Global: 50% (recycled)	2030
Asahi Soft Drinks	Global: 100% (recycled + bio-based)	2030
Otsuka Pharmaceutical	Global: 100% (recycled + bio-based)	2030

Color changes due to repeated mechanical recycling

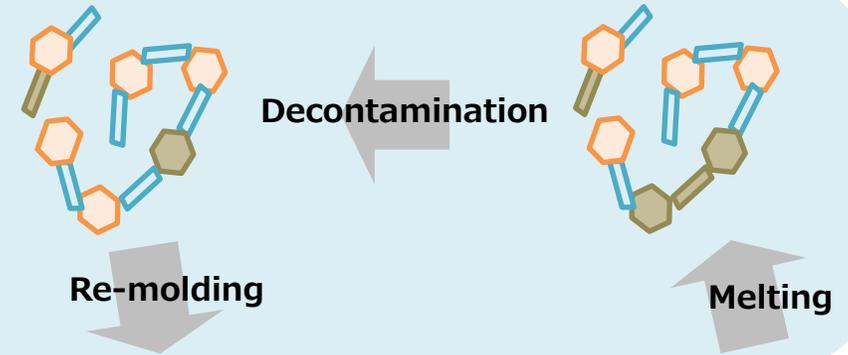


From left: number of recycling cycles 0, 1, 3, 5times

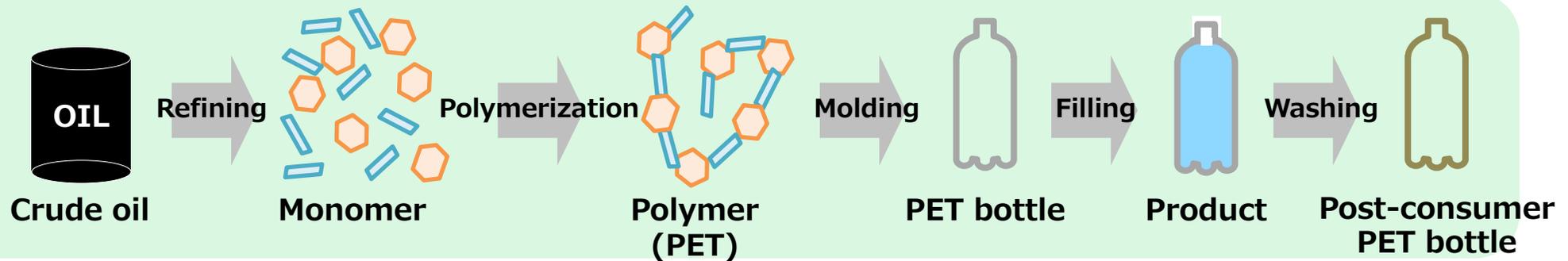
Differences between Recycling Methods

Material Recycling

- Applicable to limited PET materials.
- Gradual quality degradation.
- Lower cost due to simple processes.

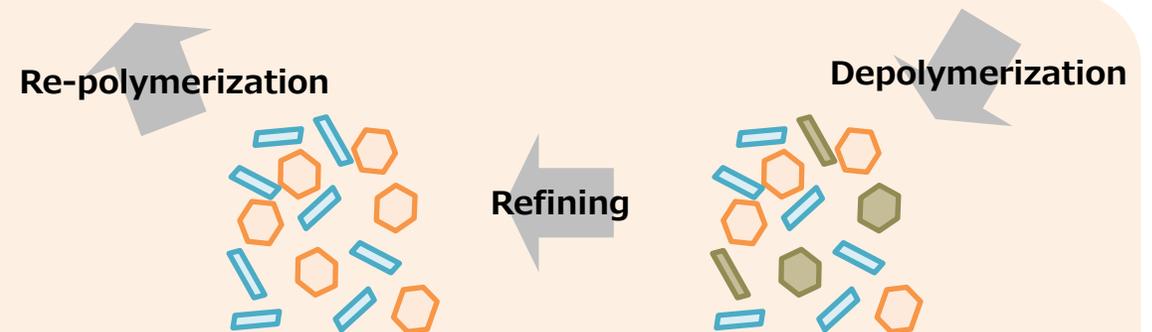


PET Bottle Manufacturing and Collection Process



Chemical Recycling

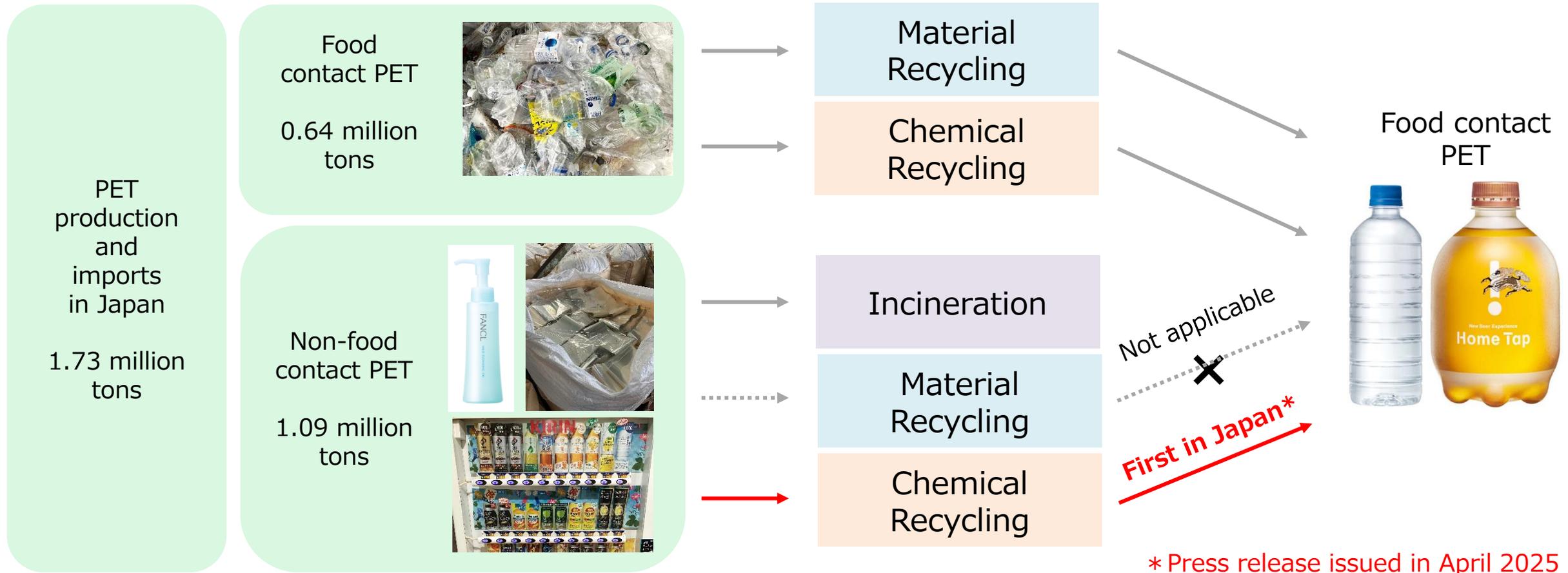
- Applicable to a wide range of PET materials
- Virgin-equivalent quality is retained due to higher purification.
- Higher cost due to complex processes.



Current Status of PET Recycling

If PET materials other than beverage bottles can be used, this leads to:

- reduced PET raw material procurement costs.
- sustainable circulation of all PET resources.

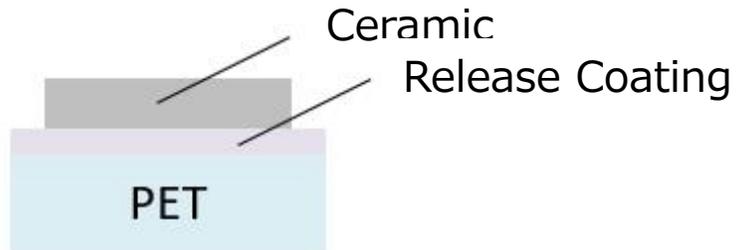


* Press release issued in April 2025

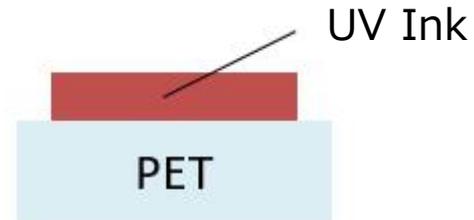
Established Food Evaluation Technology

- Non-food contact PET contains compounds not intended for food contact.
- Kirin established a scientific procedure for the food safety of recycled PET derived from non-food contact applications.
- Recycling from non-food contact PET into food-contact PET is a highly novel and original technology. (patent filed)

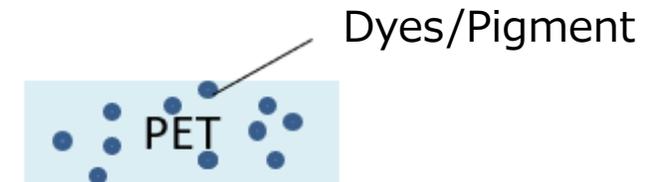
Industrial Material Films



Vending Machine Display Samples

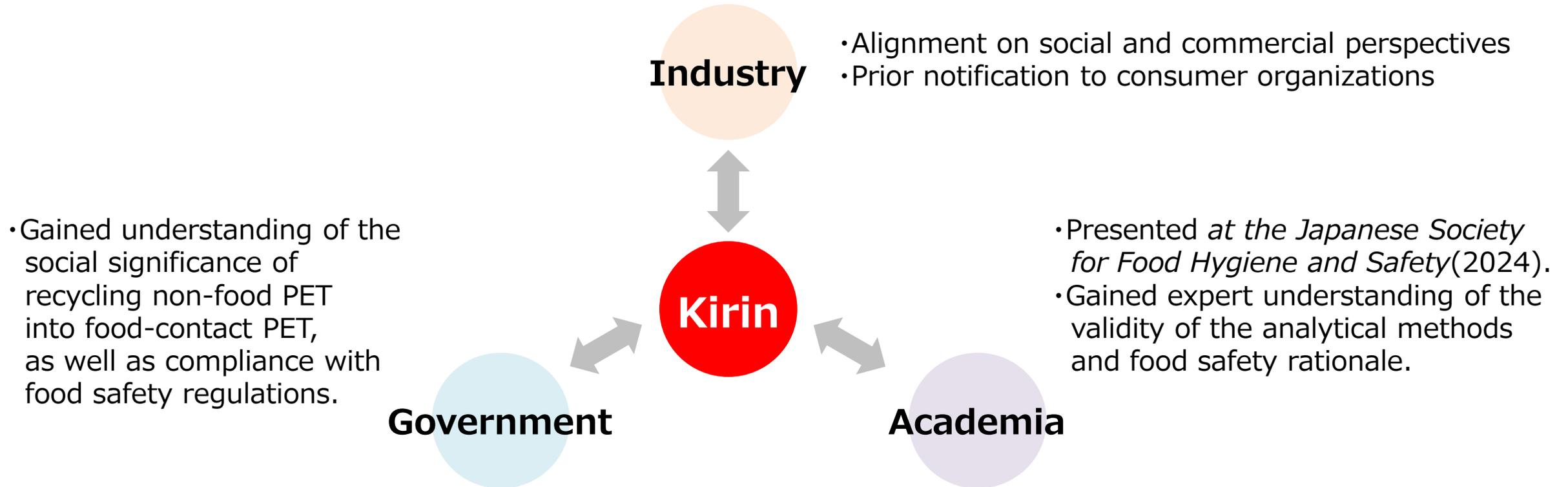


Cosmetic Bottles



Industry-Government-Academia Collaboration

Collaboration among industry, government, and academia on the food safety rationale for chemical recycling of non-food PET resulted in consensus on its validity and social significance, enabling the 1st commercialization of the recycling into food-contact PET.



Kirin organized a cross-supply-chain partnership and shared a common vision and relevant expertise based on Kirin's food safety evaluation technology. This resulted in a successful commercialization.

KIRIN

Food Safety Evaluation Technologies

Food safety concept, evaluation methods, criteria setting, and implementation of assessments when using non-food PET as feedstock

Feedstock Supply

Murata Manufacturing, TDK,
FANCL, Kao, Kirin Beverage

Chemical Recycling

JEPLAN, PET REFINE TECHNOLOGY

Use of rPET Resin

Asahi Soft Drinks, Kirin Beverage,
Kao, (FANCL)

- Establishing a shared vision
- Understanding of Food Safety
- Industry-Government-Academia Collaboration

Creating Shared Value through the Circular Use of All PET

From Social Contribution to Business Viability

- Kirin is developing next-generation technologies to reduce chemical recycling processing costs.
 - Achieved a technological breakthrough enabling low-cost and energy-efficient PET depolymerization (patent filed).
- Ensuring the price competitiveness of chemically recycled PET.

PET Depolymerization		
	Temp.	Time
Technologies Established through This Initiative	~195 °C	~5 h
Next-Generation Technologies under Development※ (Low-cost/Energy-efficient)	~120 °C (Locally up to ~280°C)	~5 min

Expected to commence operation by 2032

※Provisional conditions as of now