

PET Companies' Role Toward Zero Plastic

Samyang EcoTech Corp.

2024. 9

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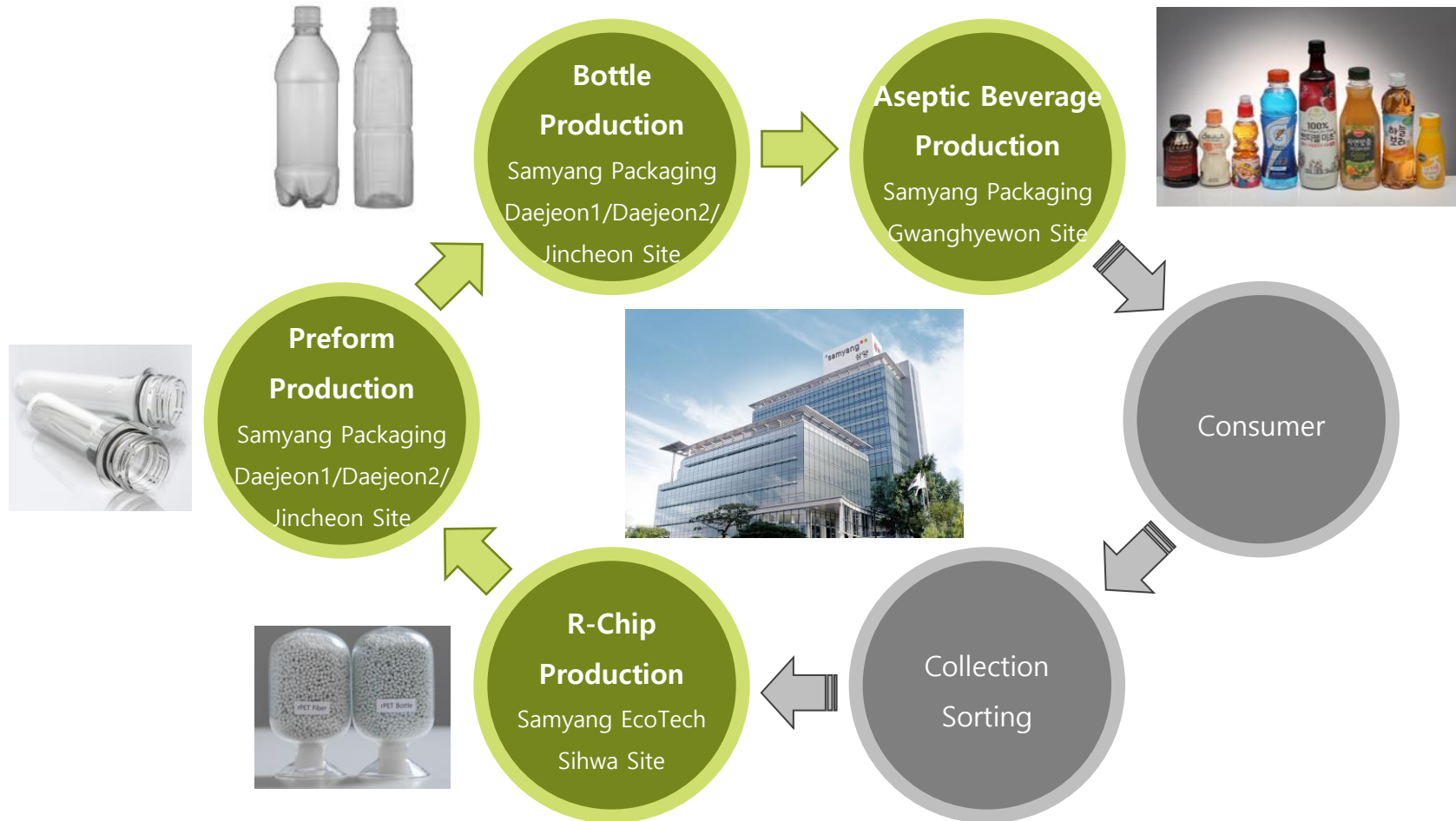
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삼양에코테크

- 1. PET Circulatory System**
- 2. Production of high Purity Flake and R-Chip**
- 3. Mixed use of R-Chip, light weight**

1. PET Circulatory System

Samyang Group's PET business is growing by establishing a circular system that leads to

- ① PET container production (Preform, Bottle),
- ② PET beverage production (Aseptic Filling),
- ③ PET recycling (Flake, R-Chip).



1. PET Circulatory System

[PET Recycling Biz. History]



2. Production of high Purity Flake and R-Chip

1) Branding

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RECYCLE + ECO + PET

Environmental sustainability issues aren't just shiny trends or fancy marketing terms. It is a mature form of our culture that is embedded in all aspects of our lives. However, the PET bottles we use are recycled or incinerated at low quality due to low technology and a lack of production facilities.

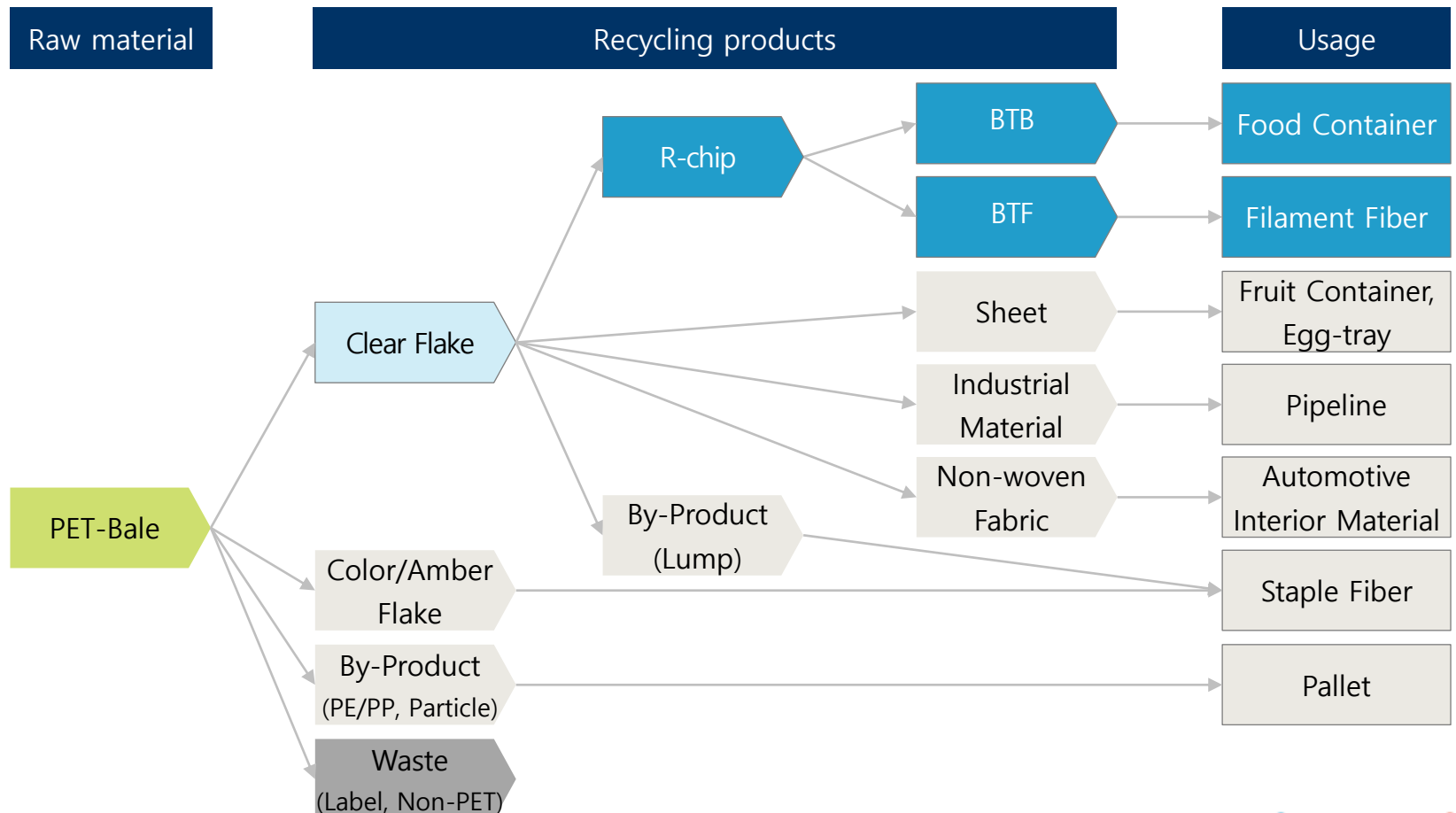
Samyang EcoTech has established the best mechanical recycling system in Korea and is striving to achieve a 100% recycling rate by producing high-quality recycled materials. Samyang EcoTech uses not only clean PET bales but also contaminated PET bales to create new RECOPET products.



2. Production of high Purity Flake and R-Chip

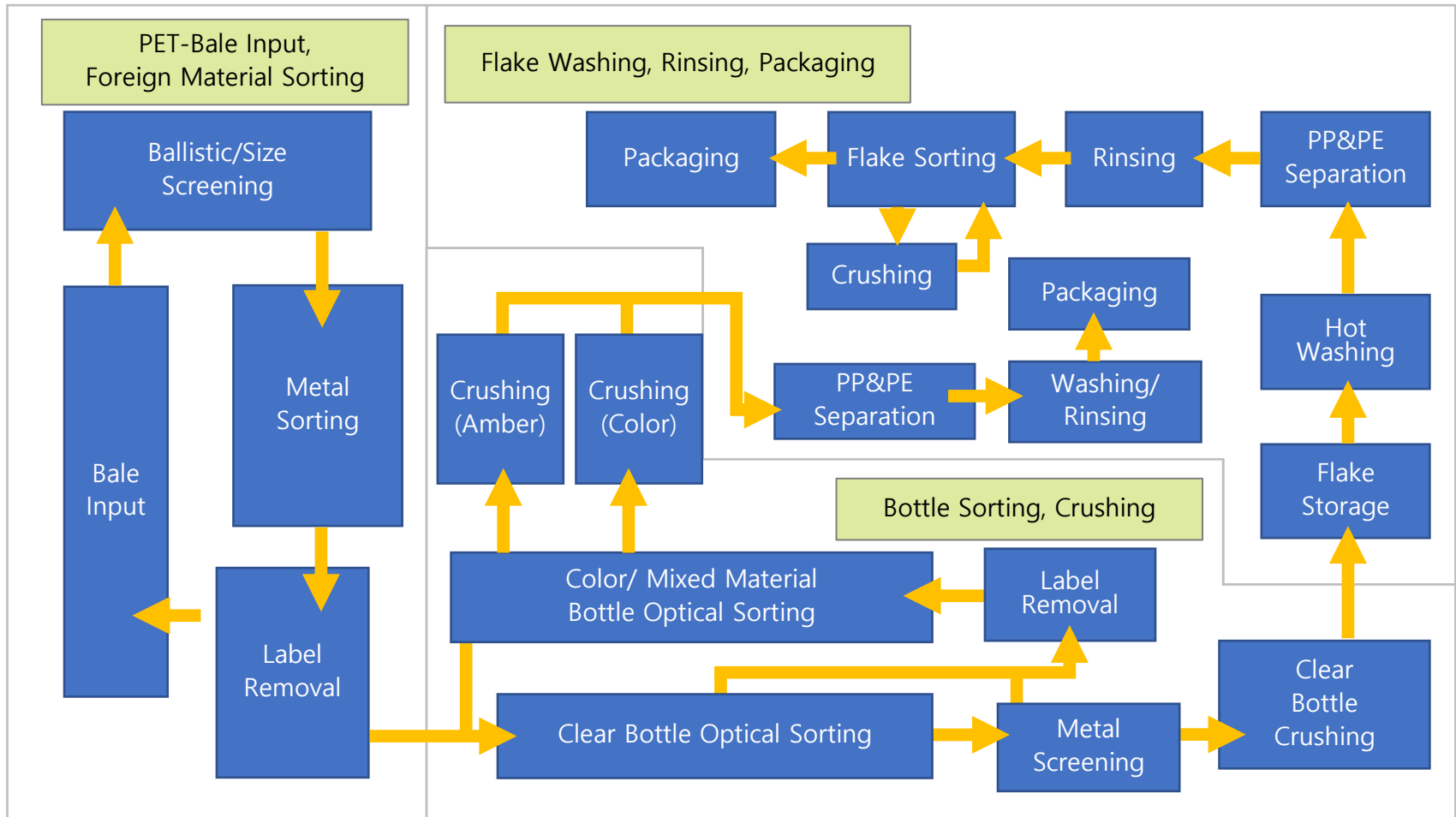
2) Products

- Raw material input: PET-Bale (7 ton/hour)
- Production: R-Chip (1.75 ton/hour * 2 lines), PET-Flake (Clear/Color/Amber), By-product (Particle, PE/PP, Lump)



3. Production of high Purity Flake and R-Chip

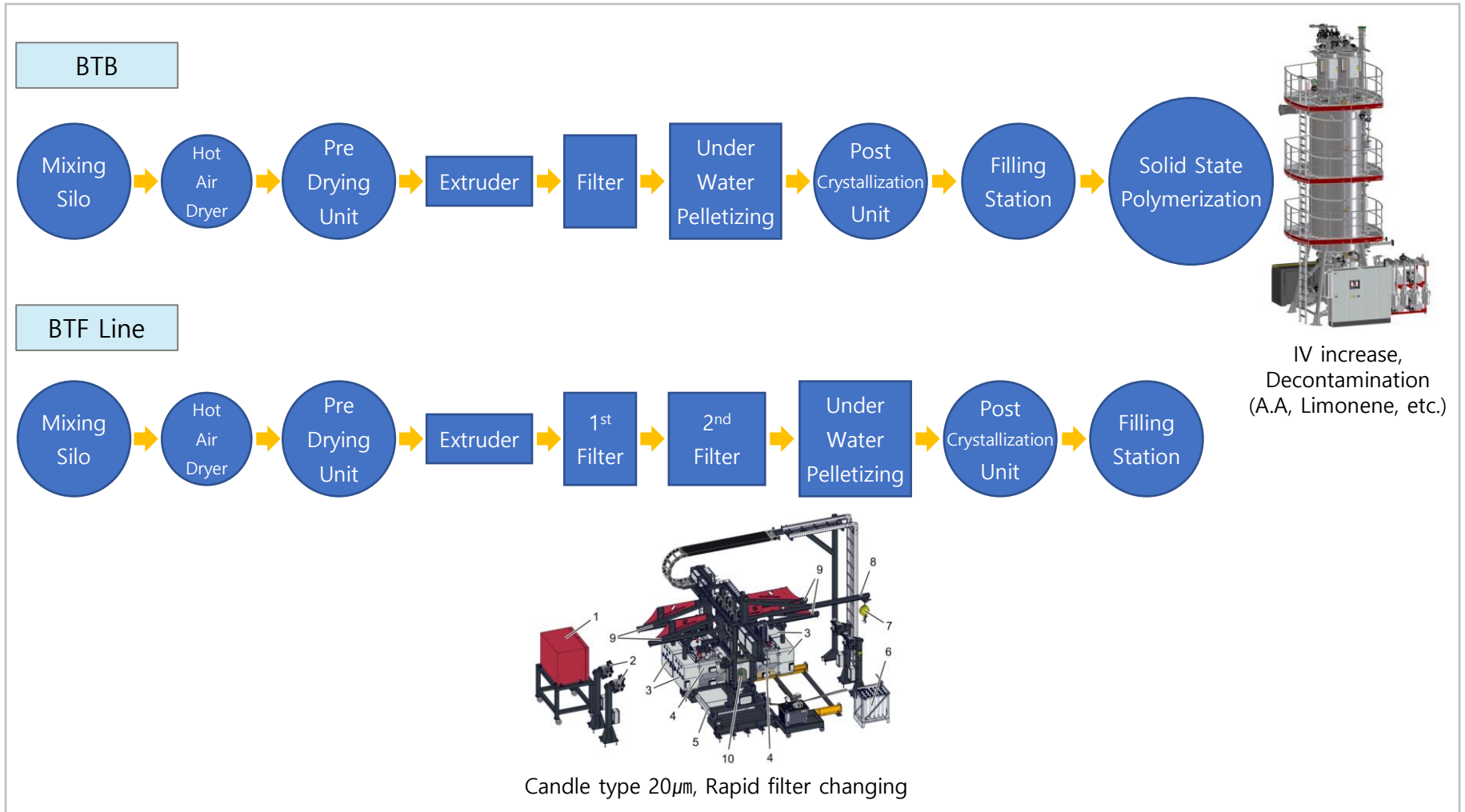
1) PET-Flake manufacturing process



- * Application of the new technologies such as optical sorting by beverage, surfactant in cleaning process, ultrasonic cleaning in rinsing process
- * Meet the Environment Ministry's operation/quality standards, and produce uniform quality flakes through large amounts of mixed Bale input

3. Production of high Purity Flake and R-Chip

2) R-Chip manufacturing process



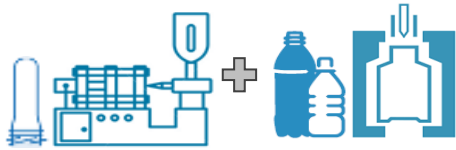
* Meet EFSA/FDA quality standards. Apply optimized manufacturing Recipe to Samyang Eco-Tech Flake

3. Mixed use of R-Chip, light weight

Samyang Packaging is pursuing the development of eco-friendly containers, and the direction of development is to reduce PET usage through increasing the R-Chip usage ratio and light weight

1) Bottle development process, Material property evaluation terms

Pilot & Mass production Test



- Preform injection molding
 - Injectionability and physical property evaluation (Weight, Thickness, Neck dimension, Eccentricity)
- Bottle molding
 - Formability and physical property evaluation

Client Lab Test



- Client physical property evaluation
 - Internal standards applied

Client Line Test



- 1-Shift application & Scale-up evaluation
 - Beverage filling evaluation
 - Logistics/packaging suitability evaluation
 - Monitoring consumer response

Mass production



- Start of product production

[Physical property evaluation terms]

Terms	Common evaluation			Additional evaluation				
	Dimensions, Capacity	Weight Distribution, Thickness	Capacity, Vertical load	Thermal Expansion safety	Post-Sterilization safety	Bursting strength	Alkaline resistance	Low-temperature Pressure deformation resistance
Heat resistance(HR)	○	○	○	-	-	-	-	○
Pressure resistance(PR)	○	○	○	○	-	○	○	-
Heat&Pressure resistance(HPR)	○	○	○	-	○	○	-	-
Normal resistance(NR)	○	○	○	-	-	-	-	○
Aseptic(ASP)	○	○	○	-	-	-	-	○

3. Mixed use of R-Chip, light weight

2) Mixed use R-Chip development status

Terms	R-Chip mixture ratio					Note
	10%	20%	30%	50%	100%	
Heat resistance(HR)	○	○	○	-	-	Additional heat resistance required by mixing Homo PET and Co PET
Pressure resistance(PR)	○	○	○	○	-	
Normal resistance(NR)	○	○	○	○	○	
Aseptic(ASP)	○	○	○	○	○	

* Currently developing expanded use of HR/PR R-chip mixture

3) Light weight development status

Terms	Capacity (ml)	Weight(g)			Production(1,000 ea)		PET Reduction(t)	CO ₂ Reduction(t)
		Current container	Lightweight container	Difference	2022	2023		
Pressure resistance(HR)	245	22.0	18.0	4.0	1,129	1,110	9.0	27.5
Aseptic(ASP)	240	28.0	25.5	2.5	327	-	0.8	2.5
	260	28.0	25.5	2.5	651	1,892	6.4	19.5
	350	28.0	24.0	4.0	1,133	452	6.4	19.5
	410	28.0	24.0	4.0	664	321	3.9	12.1
	500	24.0	22.0	2.0	12,911	12,900	51.6	158.7
	900	52.0	44.0	8.0	484	2,208	21.5	66.2
계	-	-	-	-	17,298	18,883	99.6	306.2

* Calculation applied: 3.075g per 1g PET weight reduction

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