



Innovation by Chemistry

TORAY IR Day

Medium-Term Management Program Project AP-G 2025

Films Business

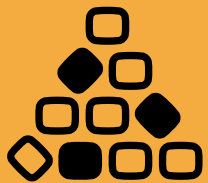
June 9, 2023

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I

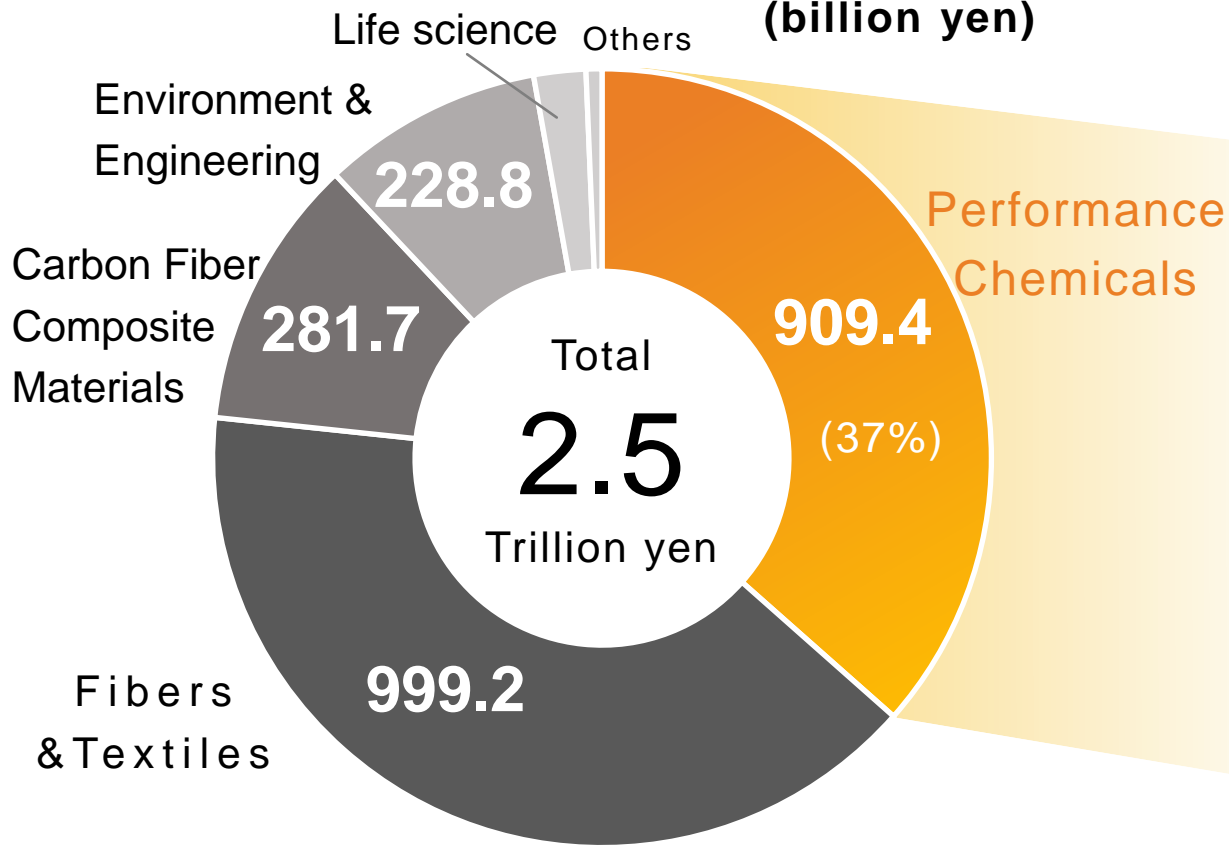
Overview of the Films Business

Consolidated Revenue of Films Business (FY 2022)

Films Business Belongs to the Performance Chemicals Segment and Accounts for 13% of Consolidated Revenue

Revenue by Segments

13%

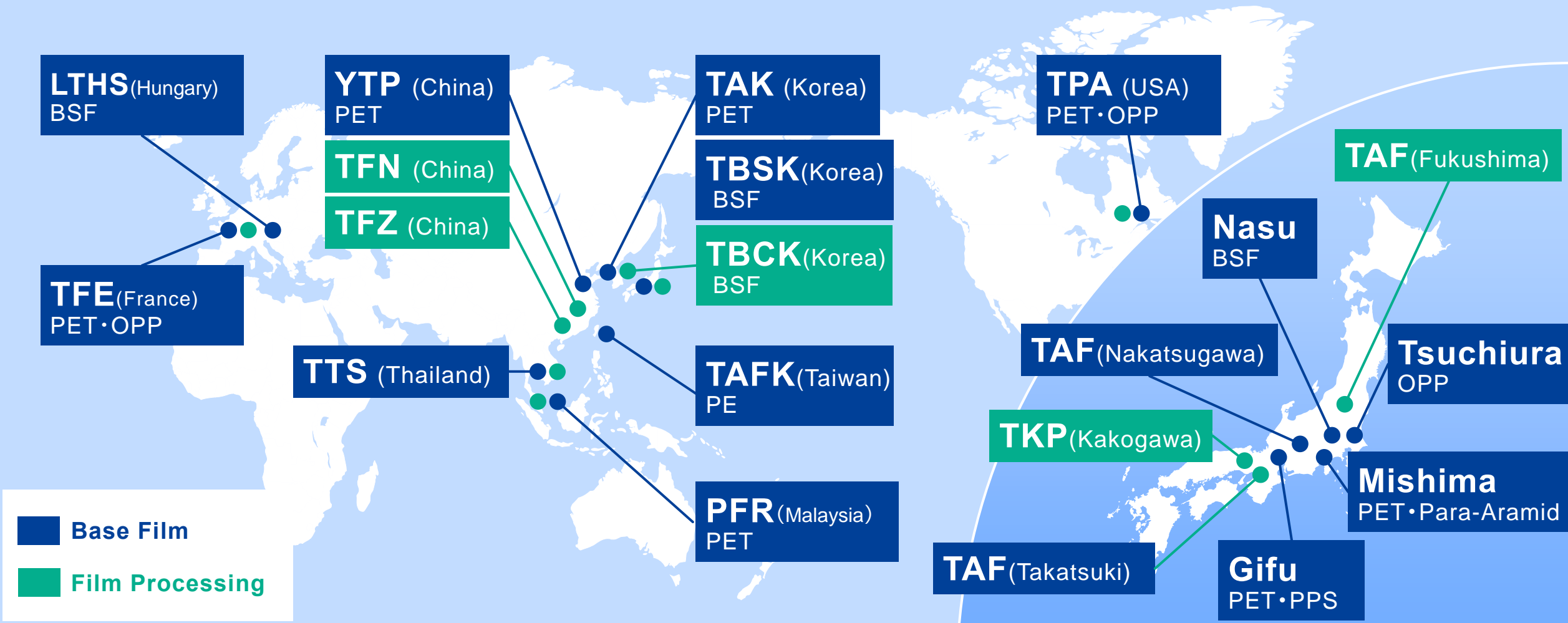


Revenue

Films	321.5
Resins & Chemicals	419.5
Electronic & Information Materials	55.2
Trading	547.1
Adjustment	-433.8
Total	909.4

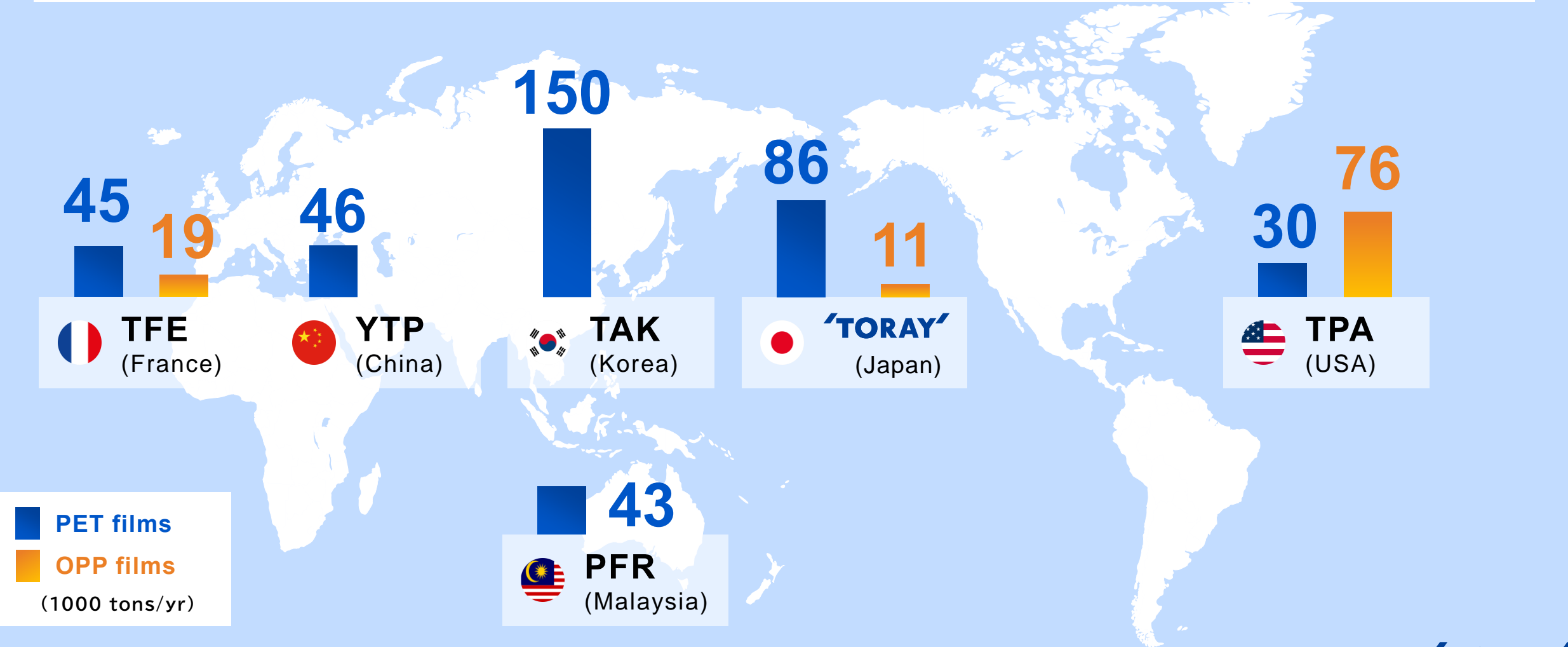
Film Production Sites

9 Base Film and Film Processing Sites in the World



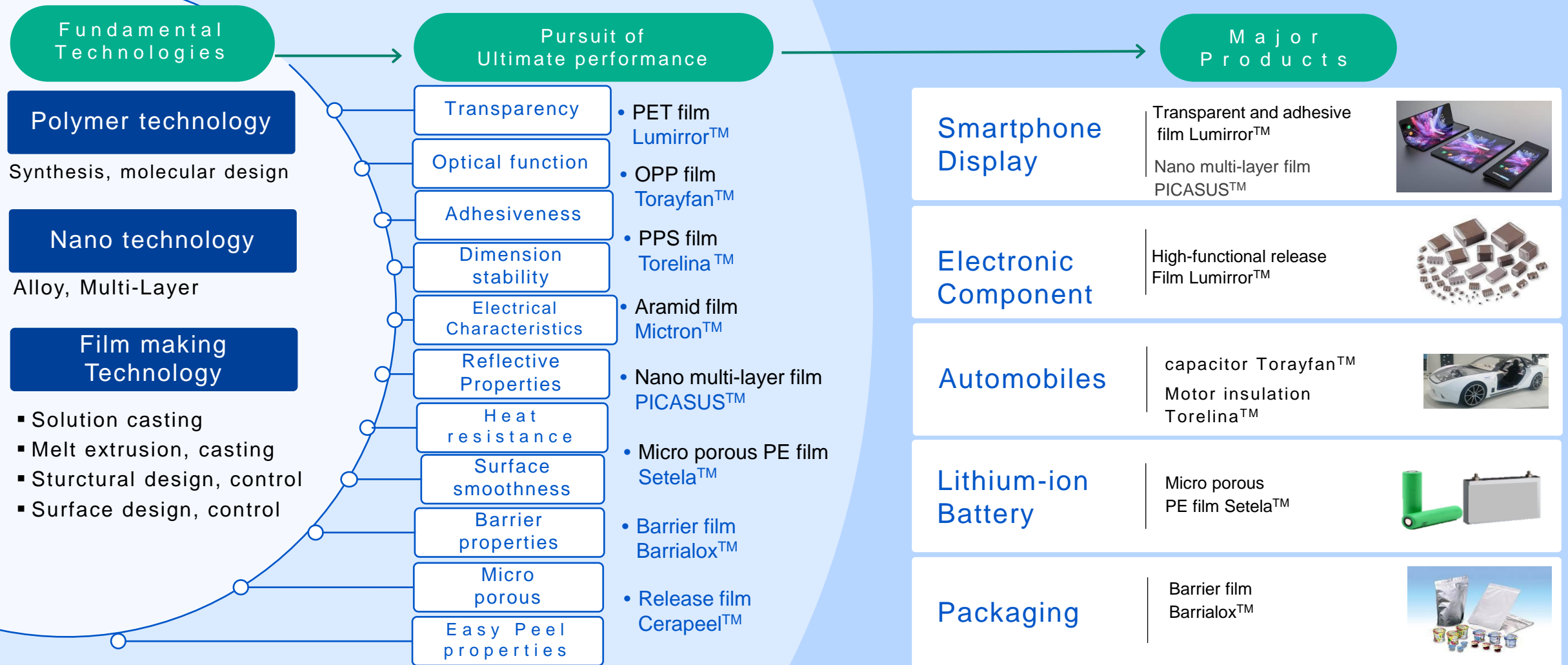
Production Capacity of PET films and OPP films

6 Production Sites of PET Films and 3 Sites of OPP Films in the World



Fundamental Film Technologies and Major Product Line-up

Development of various applications by fundamental technologies based on polymer technologies, nano technologies and film making technologies



II

Review of Project AP-G 2022

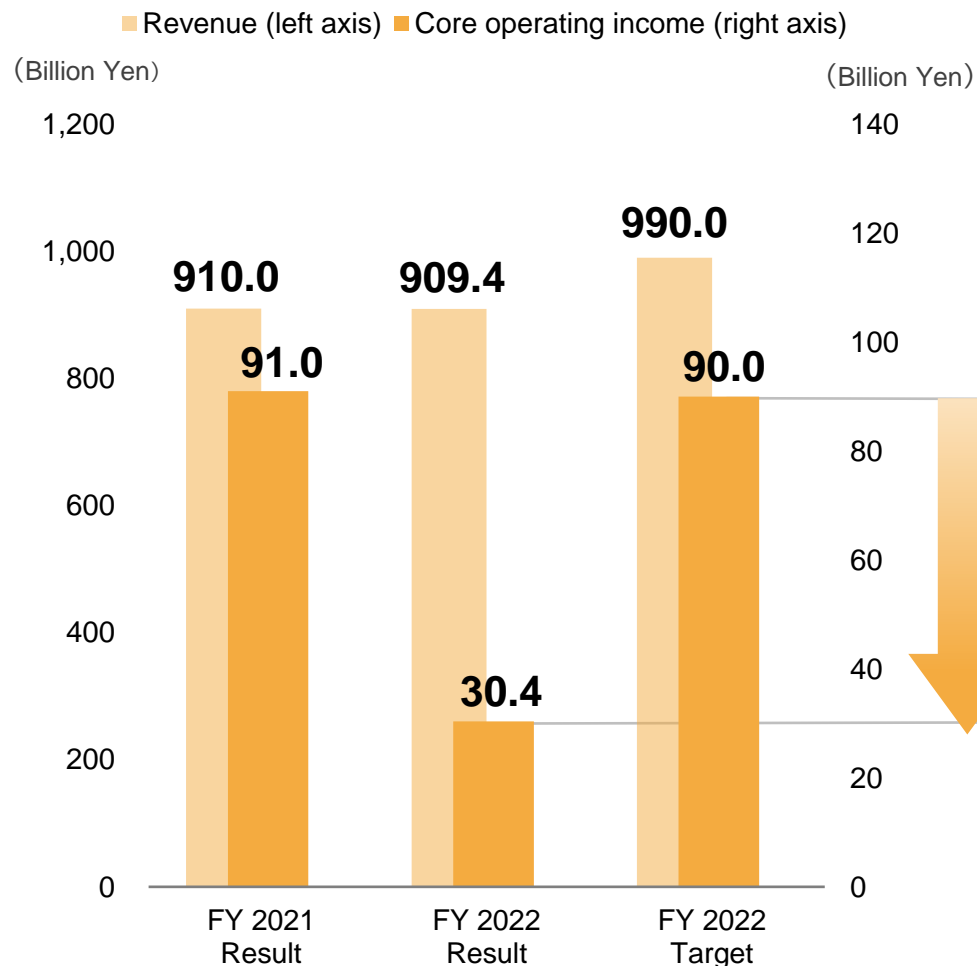
Basic Policies and Key Initiatives of AP-G 2022

Basic Policies	<ul style="list-style-type: none"> •Expansion of high-added-value products in the growth business fields •Developing new products and new applications
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Key Initiatives	Progress in AP-G 2022
(1) Expansion of PET film used in MLCC manufacturing processes	<ul style="list-style-type: none"> ①Toray: Capacity increase by productivity increase in existing lines and line modification. ②TAK(Korea, China): Increase production capacity of PET release films for manufacturing multilayer ceramic capacitors(MLCC)
(2) Expansion of PET films for DFR	Expansion and maintaining high-share in high-end market by reduction of surface micro-scratches and control of foreign substances inside films
(3) Expansion of ultra-thin OPP films for automotive capacitors	<ul style="list-style-type: none"> ①Maintaining top-share by combining the contradictory characteristics of thinness and high voltage resistance with our unique technologies ②New line start-up in Tsuchiura plant
(4) Expansion of Nano-multilayer films PICASUS™	<ul style="list-style-type: none"> ①Start-up of new development line for high performance nano-multilayer films etc. ②Delay of application development
(5) Expansion of BSF business	<ul style="list-style-type: none"> ①Hungary site: Expansion of business in Europe and USA by establishing JV with LG Chem Ltd. ②Japan & Korean sites: Concentrating high value-added automotive and electronic device
(6) Expansion of sustainability and energy savings related products	<ul style="list-style-type: none"> ①Launch of environmentally friendly PET films Ecouse™ ②Construction of PET film recycling system for MLCC
(7) Strengthening cost competitiveness	<ul style="list-style-type: none"> ①Cost reduction of existing products and quality improvement ②Quality improvement of high-share products such as MLCC, DFR and ultra-thin OPP films

Profit Variance vs AP-G 2022

Variance Analysis of the Performance Chemicals Segment

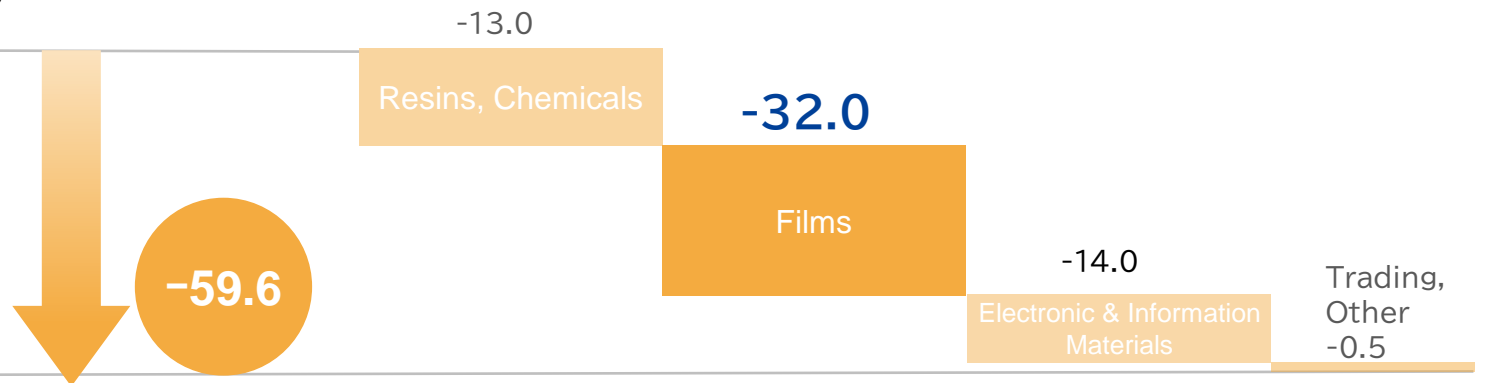


FY 2021

Increase in revenue and core operating income mainly due to sales increase for electronic devices (smartphone, PC etc.) and mobility applications (capacitor, BSF etc.)

FY 2022

Profit decrease by 32 billion yen mainly due to demand decrease of electronics products, inventory reduction across the supply chain and raw materials and utility cost increase.



III

Basic Policies and Major Issues of Project AP-G 2025

Basic Policies of Project AP-G 2025

Business Environment

Sophistication of digital technology and progress of high integration of electronic components

→ Increase in opportunity for high value-added release film

CASE

→ Increase in opportunity for high performance products for automotive application

Demand growth of electric power

→ Growing needs for products and technologies that contribute to energy savings

Tightening of environmental regulations

→ Growing needs for products that contribute to sustainability and energy savings

Basic Policies

- ① Concept shift from “plastic films” to “environmentally friendly high functional films”
- ② Providing value-added products that improve the value of the entire supply chain and adding the increased value to the selling price
- ③ Expansion of mechanical recycling system for used films
- ④ Examine possibility for the introduction of chemical recycling, mono-material packaging, and biodegradable film

Key Issues of Project AP-G 2025

1 | Expansion of digital innovation and mobility businesses

- ① Expansion of capacitor dielectric materials
 - PET film used in MLCC manufacturing process
 - Ultra-thin OPP capacitor film for xEV
- ② Expansion of semiconductor manufacturing process applications
 - PET film for DFR
- ③ Expansion of mobility applications
 - Oil cooled motor, PPS film for FCV,
 - New application development of PICASUS™

3 | Ultimate value creation

- ① Strategic pricing
- ② Promoting value in functional film for semiconductor

2 | Expansion of sustainable innovation business

- ① Expansion of PET film mechanical recycling system for MLCC
- ② Construction of the chemical recycling system
- ③ Development of mono-material packaging film
- ④ Reduction of food waste and plastic consumption

4 | Strengthening competitiveness

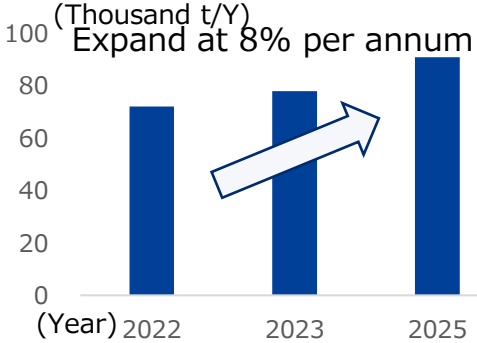
- ① Expansion of value-added products and strengthening quality competitiveness
- ② Creation of new products and markets
- ③ Strengthening cost competitiveness

Expansion of PET films for the MLCC production process

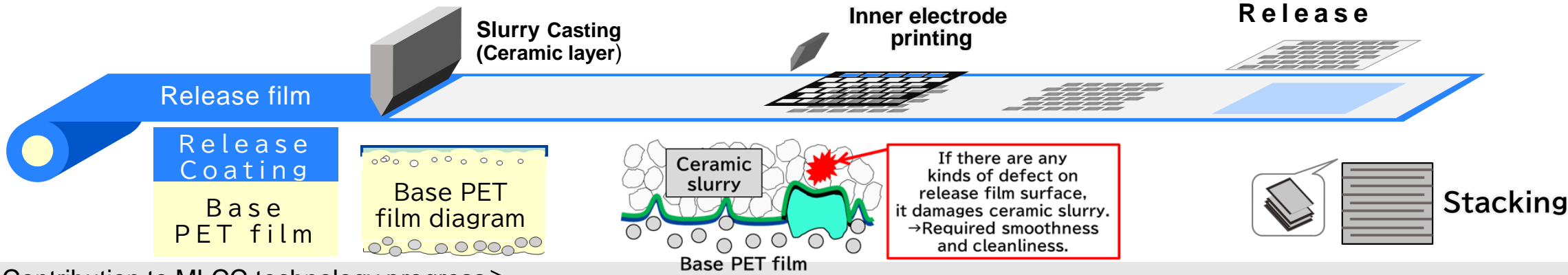
①Expansion of capacitor dielectric applications

<p>Business Environment</p>	<p>Expansion of 5G telecommunication equipment, acceleration of 6G development, increase in data transmission volume, higher performance →<u>Reduction in the size of MLCC, increase in number of ceramic layers and increase in capacity, increase in the number mounted per unit.</u></p>
<p>Our Strength</p>	<ul style="list-style-type: none"> ▪ Smoothness and film surface design technology ▪ High quality from lack of defects, such as foreign matter and scratch, and uniform thickness. ▪ Global production system
<p>Our Strategy</p>	<p>Modifying production and supply system in three locations; Japan, Korea, and Malaysia. * In 2025, a new machine in Gifu to start production for expansion of domestic businesses</p>

PET film for MLCC process Demand forecast



Multi-Layer Ceramic Capacitor (MLCC) production processes



<Contribution to MLCC technology progress>

Downsizing • Higher capacity → Thinner ceramic slurry • Increase stacking layers → Required smoothness and cleanliness

Ultra-thin OPP capacitor film for xEV

①Expansion of capacitor dielectric applications

Business Environment

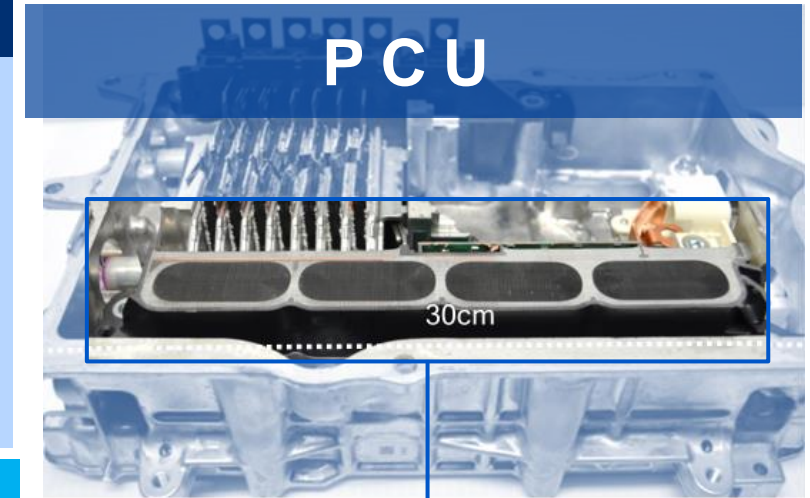
- xEV's drive system consists of Battery, Electric Motor, and Power Control Unit (PCU). PCUs are the key components, which control/manage electric motors.
- Film Capacitors are the biggest components in PCUs and have essential functions to ensure performance & reliability of PCUs. Our OPP film "Torayfan" is used in the capacitor.
- Market demands PCUs to have higher energy density to improve xEVs' design flexibility & driving Performance.

Our Strength

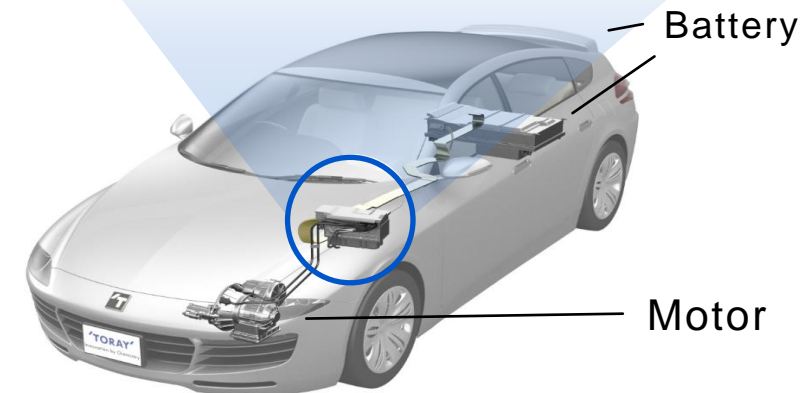
- The solution for PCU downsizing & weight saving Dielectric OPP films
→ Thinner and higher temp/voltage resistance

Our Strategy

- Achieving extra high voltage resistance(480V/um) at thin gauge(2.0μ) and higher temp(125°C) by our unique technology.
Constant improvement resulted in over 60% market share.
- New production line in Tsuchiura started operations in FY 2022, which increased the production capacity 1.6 times
- Consider increase in capacity in line with further market growth of xEV



Capacitor Films



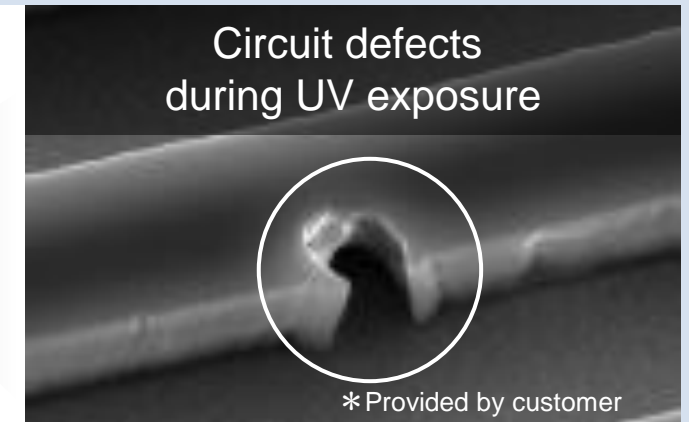
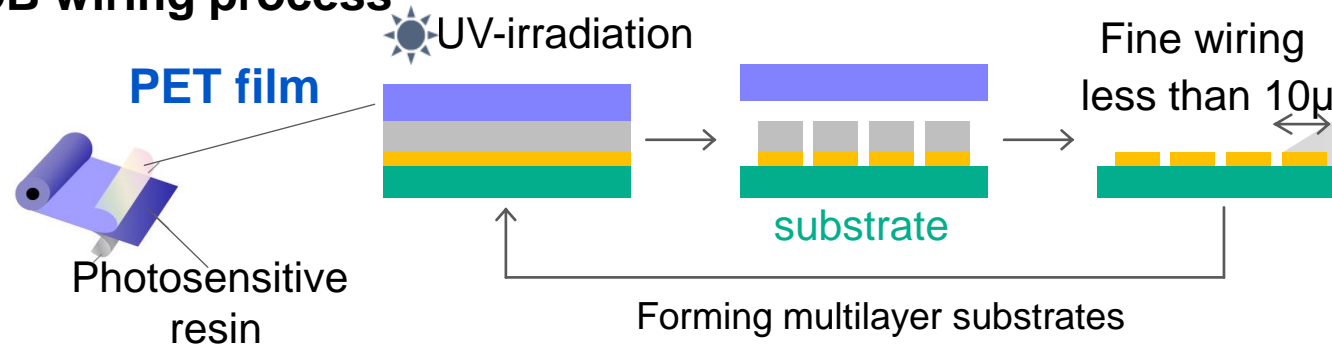
Business environment

- Increasing performance of semiconductors
- Fine wiring of printed circuit boards

Our strengths & value

- Advanced surface design technology & QC
- Global de facto in high-end market
- Production system in demand areas

PCB wiring process



Our business strategy

- Realization of fine wiring by surface design technology and advanced Quality Control
- Contribution to customers' yield improvement and product value enhancement
- Expanding of sales to a wide range of markets from high-end to mid-range

Business Environment

- Continuous growth of xEV market & oil-cooled motors
- Shift in energy policy: Green hydrogen
- Emerging needs of heavy-duty FCVs

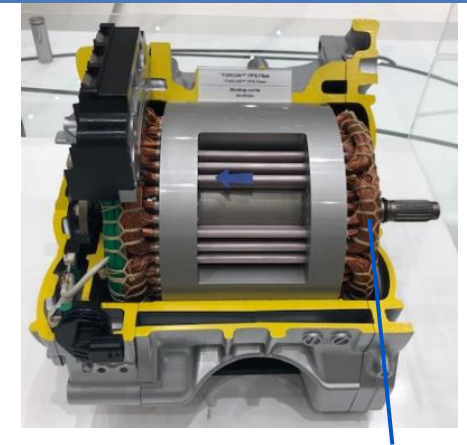
Our Strengths

- Variety of thickness lineup
- High heat and chemical endurance
- Integrated production from PPS resin to PPS film

Our Strategy

- Expansion of sales for oil-cooled motors
- Establish a solid position of the standard material for heavy-duty FCVs and water electrolysis system
- Enhance cost & quality competitiveness

Oil-Cooled Motor



Insulator



FCV

Wavelength Selection Technology Meets xEV Heat Shielding Needs and Autonomous Car Needs

Business environment

- Expansion of xEV
- Evolution & Expansion of autonomous cars technology
- Various design needs of xEV

Requests from OEMs

- Improved xEV cruising range
 - Reduced air conditioning load
 - Heat shielding
- xEV panoramic roof expansion
 - Heat shielding
- Expansion of autonomous vehicle technology + Metallic Design
 - Metallic luster + EMI free
- Multifocal, sunglass-compatible HUD → Control of transmission and reflection

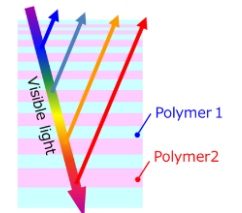
Target items



Our strengths and values

- Unique Nano-multilayer technology
(Hundreds of layers with individually controlled layer thicknesses)
 - Reflection and transmission can be controlled
(Wavelength-selective design)
- ↓
- High transparency X NIR cut
<For Heat shielding>
 - High metallic luster X EMI free + Light transmission
<For Autonomous vehicle with various EMI free design>
 - Reflects light at certain angles. <For AR-HUD>

<PICASUS™ Structure>



Our strategy

- Strengthening Global Partnerships
- Strengthen collaboration with supply chain partners
- Total solution proposal & technical service
- Strengthen quality & cost competitiveness

Expansion of PET film recycling system for MLCC

Business Environment

As the world shifts from a linear economy to a circular economy, it is the social responsibility of plastic film manufacturers to build a recycling system for films discarded in customers' manufacturing processes, such as MLCC

Strength & Value Provision

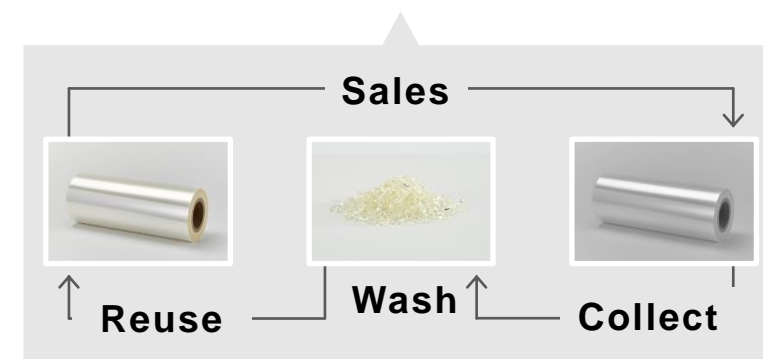
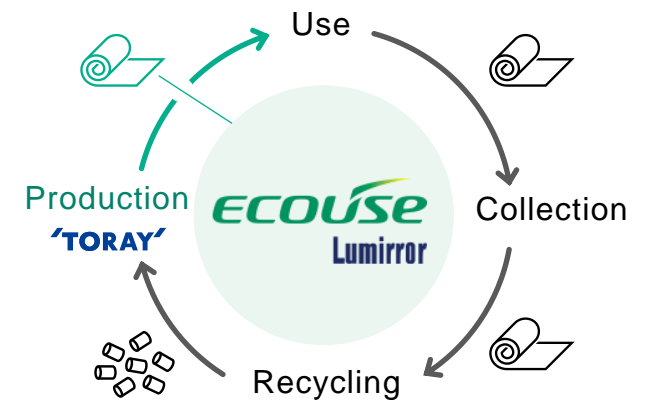
- ① Technology of mechanical recycling to remove coating materials and resins from film surface and of removing foreign materials in each process
- ② Establishment of a recycling system ahead of competitors
- ③ Proprietary film production technology produces clean products using recycled raw materials
- ④ Ability to reduce CO₂ emissions up to 50% in the manufacturing process

Business Strategy

- ① Increase collection and cleaning volume of used films by cooperating with each company in the supply chain
- ② Expand supply of high-quality, safe and reliable recycled film
- ③ Consider early introduction of chemical recycling system to stabilize quality and increase production volume
- ④ Promote development of bio-based PET for further reduction of CO₂



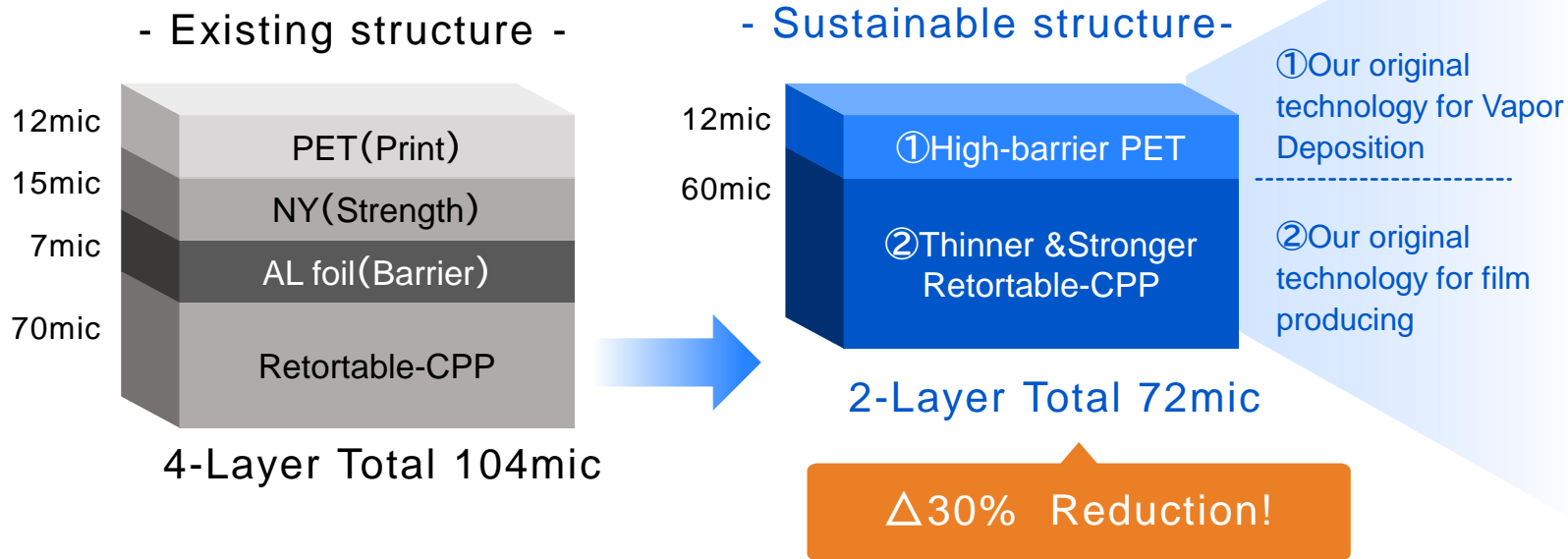
Reduce CO₂ emitted in the recycling film manufacturing process that uses collected film from customers as raw materials



Reducing Food Waste and Plastic Consumption -Films for Retort Pouches

- Transparent high-barrier film reduces food waste and CO₂ emissions by enabling a switch from boiling to microwave heating
 - Thinner & Stronger sealant film reduces 30% of plastic
- ①Transparent High Barrier films, retortable and ready to cook by microwave oven
②Thinner & Stronger heat sealant films

Reducing plastics



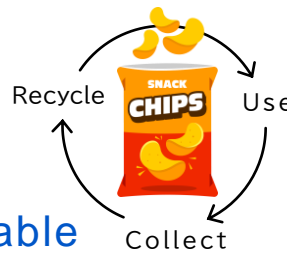
Development for MONO-MATERIAL Package

• MONO-MATERIAL films for recyclable package

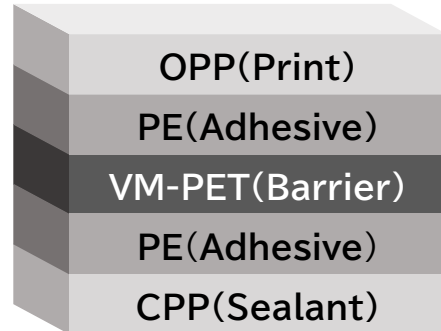
Existing packages are multi-material and difficult to recycle ⇒ Recyclable by Mono-material structure

- ① High Barrier VM-CPP
- ② High Barrier Alox-OPP
- ③ Thinner & Stronger heat sealant film

■ Mono-material solution for Snacks



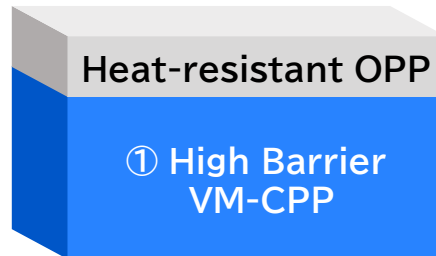
- Existing structure -



5Layers-3Materials
(PP, PE, PET)

Non-Recyclable

- Sustainable structure-



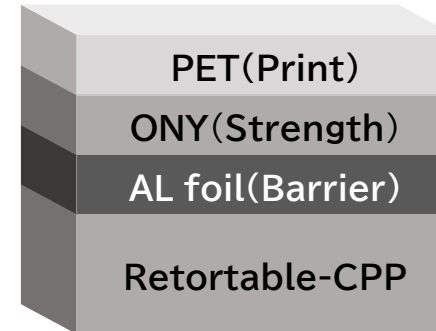
2Layers-Mono material
(All-PP)

Recyclable

■ Mono-material solution for pet foods



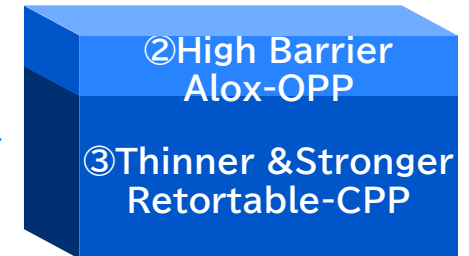
- Existing structure -



4Layers-4Materials
(PET, NY, AL, PP)

Non-Recyclable

- Sustainable structure-



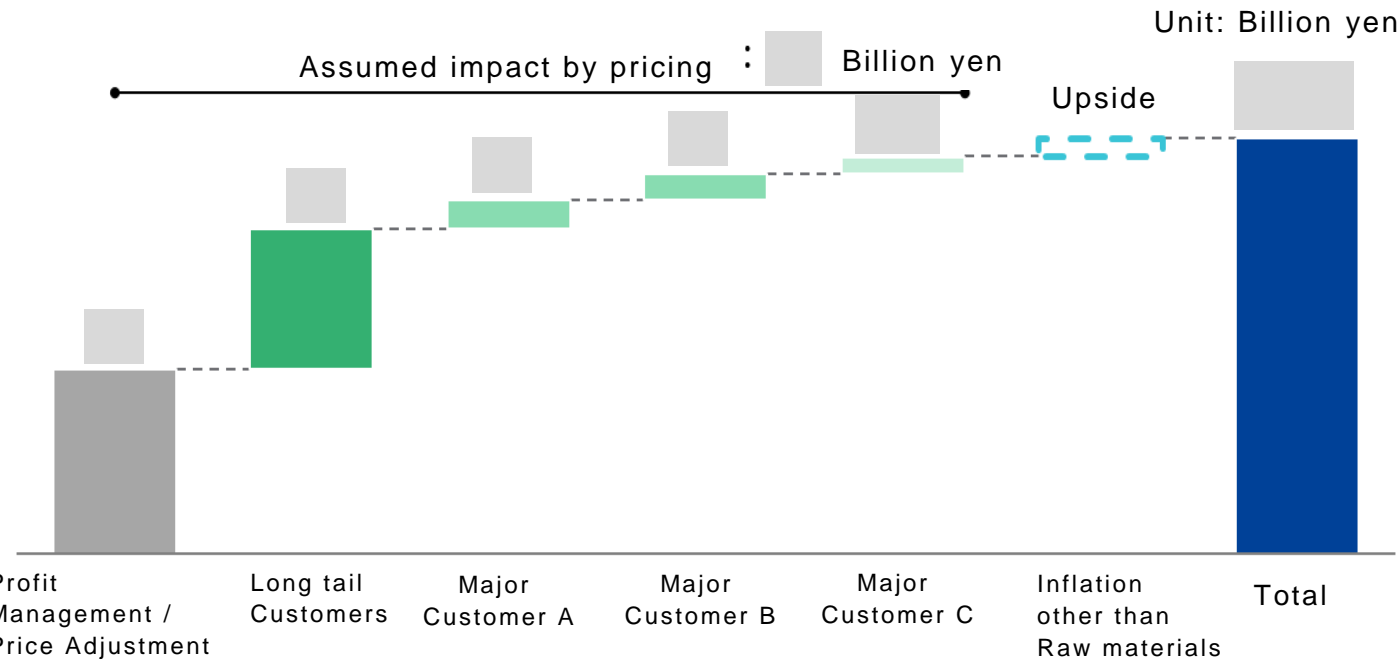
2Layers-Mono material
(All-PP)

Recyclable

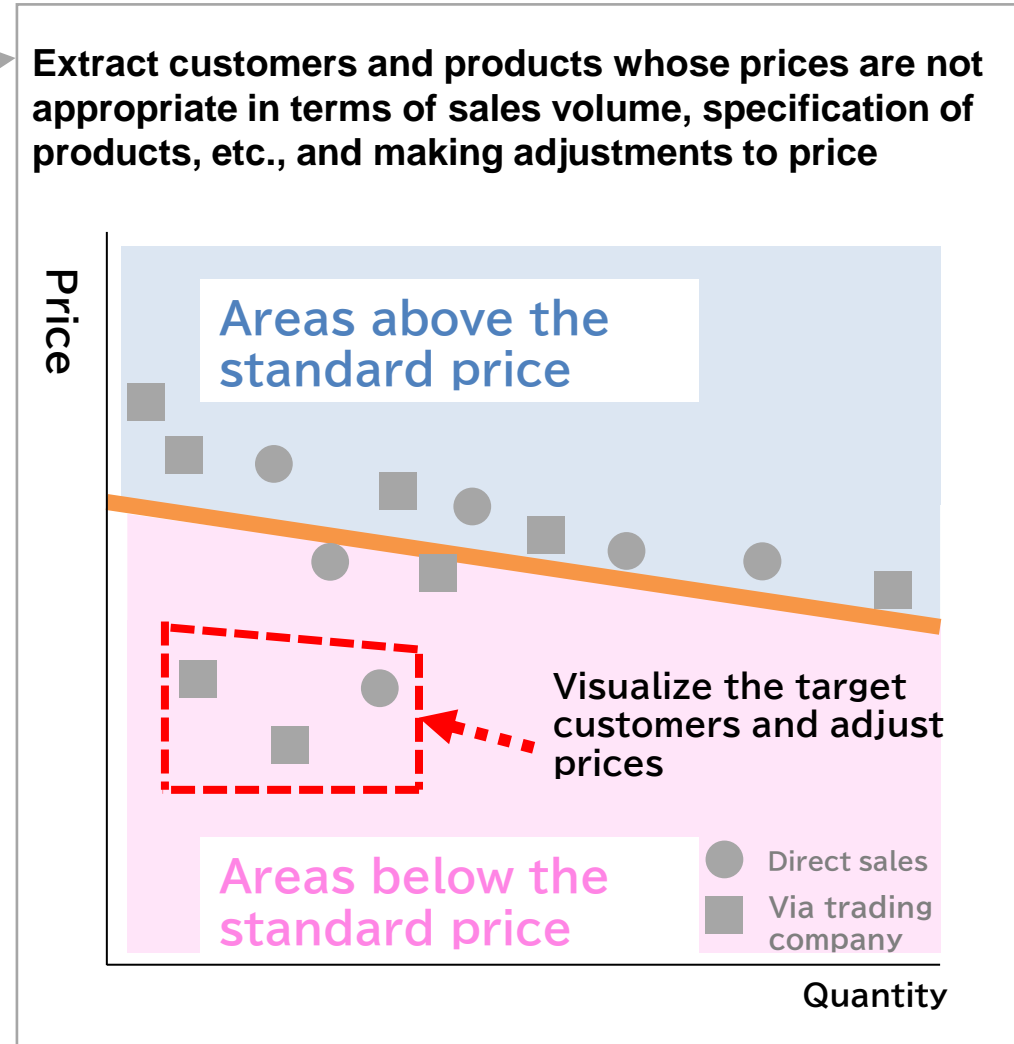
Combination of Heat-resistant OPP and High Barrier technology

Example: Strategic pricing of general-purpose films for electronic components

< Price Adjustment among customers and products >



Extract customers and products whose prices are not appropriate in terms of sales volume, specification of products, etc., and making adjustments to price



Examples of improvement opportunities

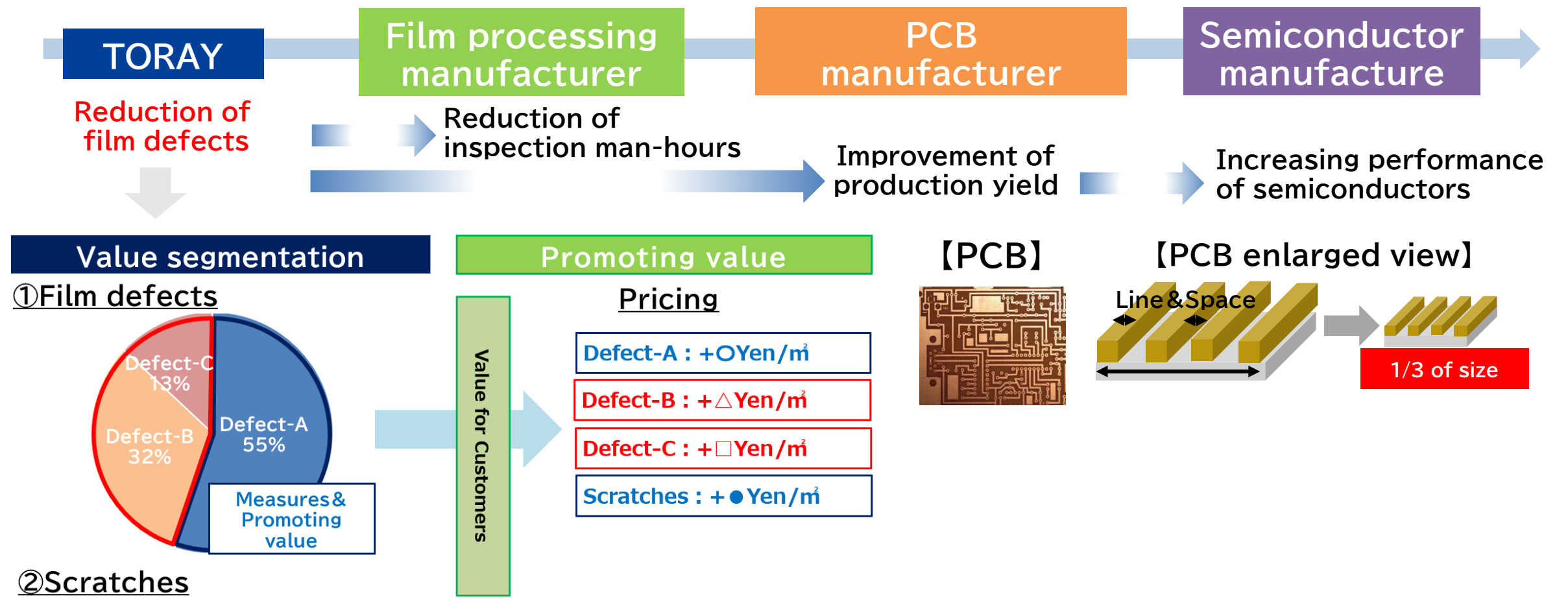
Demonstrating Pricing power	Price adjustment among customers and products
Profit management (management accounting)	Price control of conventional commodity products
Long tail user management	Quantification of the risk of losing the business

Promoting Value in Functional Films for Semiconductor Processing

Example: PET films for DFR

-Contribution to finer wiring and higher performance of semiconductor printed circuit boards-

Through the pursuit of Quality Control, we create value for customers and transfer that value to our prices



Key Issues 4. Strengthening Competitiveness

1 Expanding High Value Products & Enhancing Quality Competitiveness

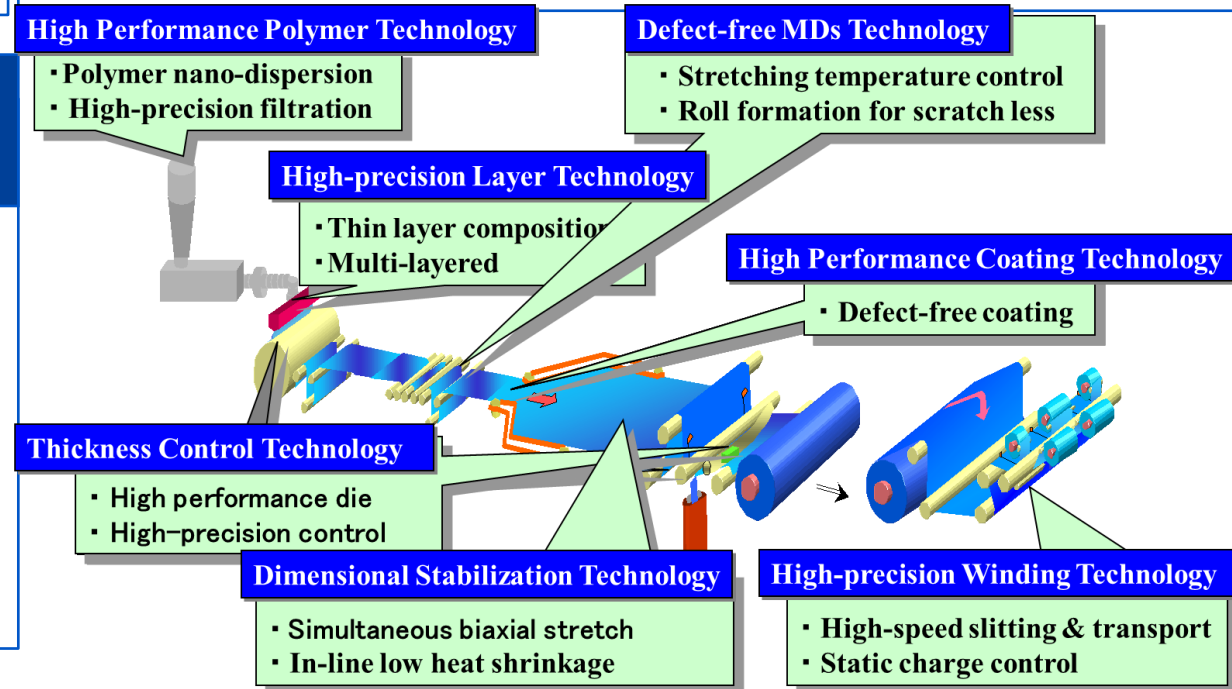
In response to growing demand of higher performance process films and film capacitors for advanced mobility, communication and display, Toray group is planning to **upgrade and expand its domestic and overseas facilities**

2 Creating New markets & New products

Toray's new products to be using cutting-edge technology, such as **“multi layer”, “coating”, and “polymer design”** support market changes and developments such as high integrated electronic components, EVs, energy conservation and decarbonization, etc.

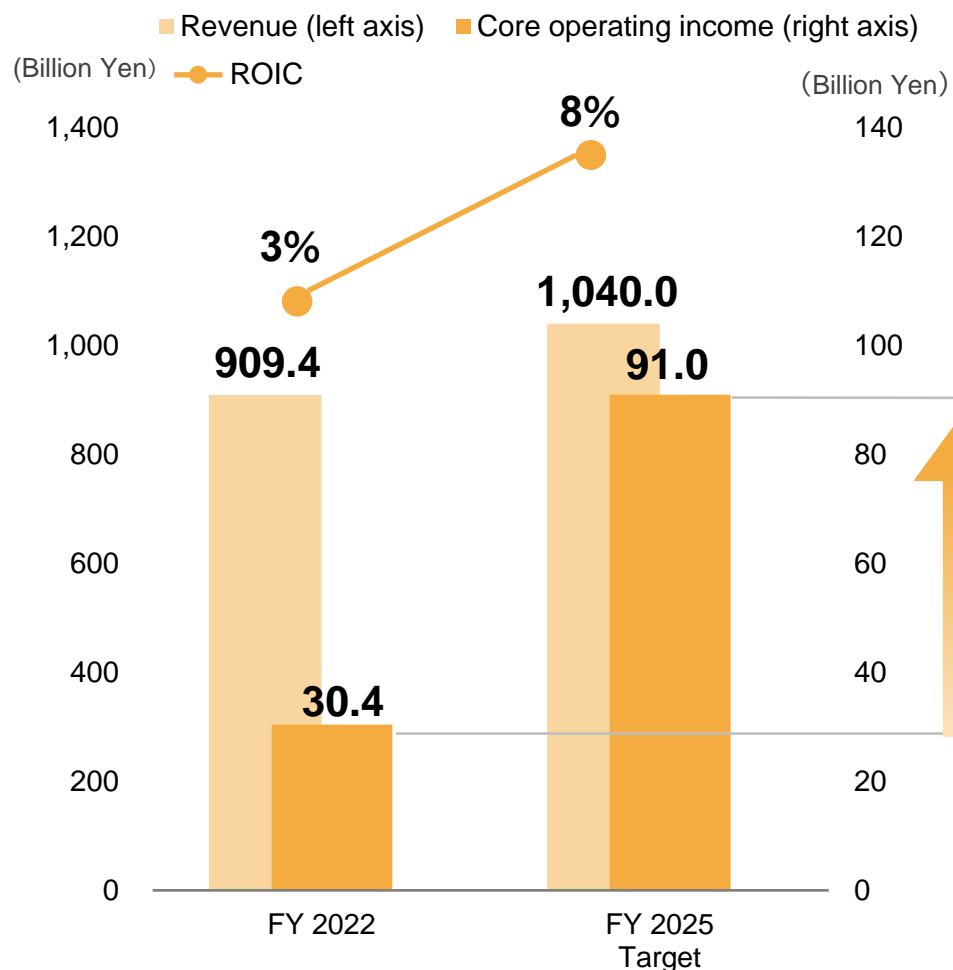
3 Enhancing Cost competitiveness

Based on our existing advanced production management infrastructure, accelerating the transition to **smart factories** using DX technology

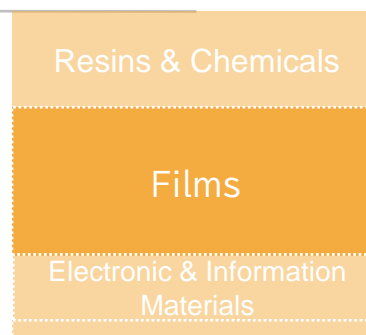


Performance target of Films Business for FY 2025

Target of Performance Chemicals Business



Targeting an increase of 28 billion yen in core operating income, first by capturing recovering demand, then expanding digital innovation, mobility, and sustainability innovation businesses and strengthening competitiveness.



Increase in production volume of polypropylene film TORAYFAN™ and polyester release film Lumirror™ used in MLCC production lines, from increase in semiconductor production due to the boost in installment of semiconductors for smartphones and automobiles, in addition to increase in production volume in each market

Expansion of high-value-added products

Increase in functional films for packaging

Structure reform of BSF, etc.

Reference

Revision of Revenue Target: Performance Chemicals Subsegment



Performance Chemicals (Revision of Revenue Target by Subsegment)

Revenue Target by Subsegment

Billion yen

	FY 2022 Forecast	AP-G 2025 FY 2025 Target	AP-G 2025 Revised Target*1 for FY 2025
Resins & Chemicals	427.0	550.0	<u>520.0</u>
Films	327.0	400.0	<u>380.0</u>
Electronic & Information Materials	56.0	100.0	100.0
Trading, other	553.0	590.0	590.0
Reconciliations	▲437.0	▲600.0	▲ <u>550.0</u>
Total	926.0	1,040.0	1,040.0

*1Internal transaction in Toray Industries was deducted.

Descriptions of predicted business results, projections and business plans contained in this material are based on assumptions and forecasts regarding the future business environment, made at the time of publication. Information provided in this material does not constitute any guarantee concerning the Toray Group's future performance.

'TORAY'

Innovation by Chemistry