

KAITEKI Value for Tomorrow

Mitsubishi Chemical Holdings Corporation IR Day 2019

May 30, 2019

Mitsubishi Chemical Holdings Corporation

Sustainability

Health

Comfort

Mitsubishi Chemical Holdings Corporation

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Johei Takimoto

Director of the Board

Managing Executive Officer

Chief Operating Officer

Information, Electronics and Display Business Domain

Mitsubishi Chemical Corporation

2. Advanced Polymers Business Domain

Motohiro Seki

Managing Executive Officer

Chief Operating Officer, Advanced Polymers Business Domain

Mitsubishi Chemical Corporation

3. Approaches in the ESG Field

Mina Kanda

KAITEKI Promotion Office

Corporate Strategy Division

Mitsubishi Chemical Holdings Corporation



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Information, Electronics and Display Business Domain

Today's Agenda

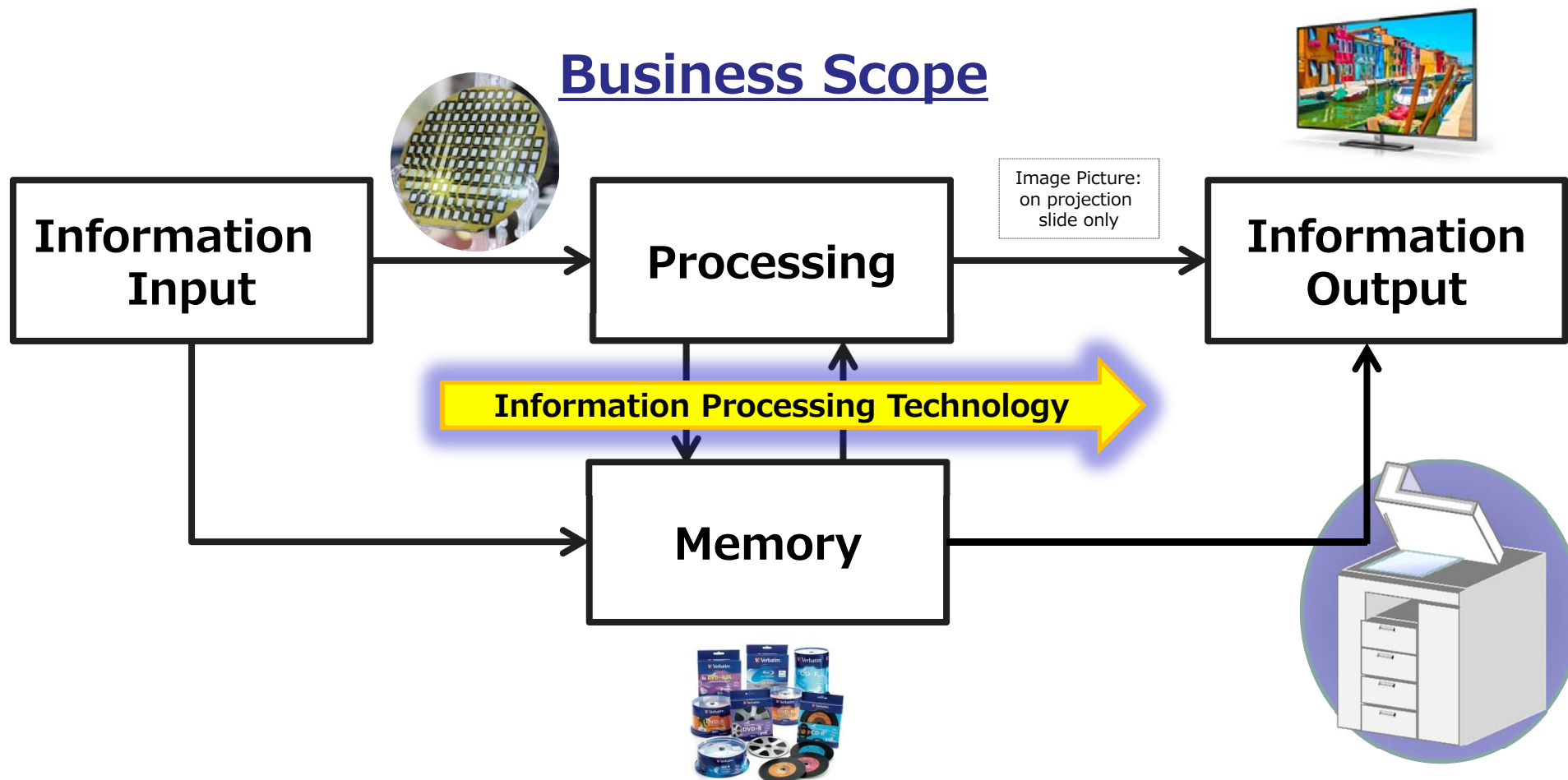
- 1. Business Overview**
- 2. Display Field**
- 3. Semiconductor Field**
- 4. Printing Field**
- 5. Research and Development**

Information, Electronics & Display Business Domain

Mission

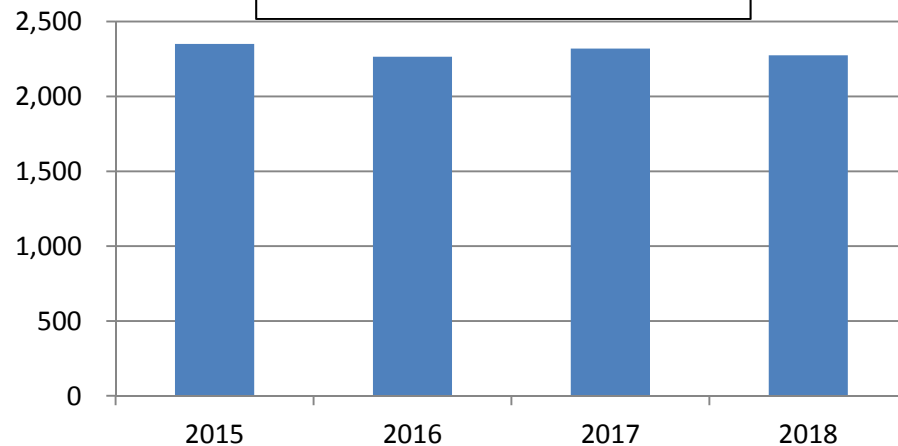
Provide products and services based on chemical technology to related industries that are centered on information processing technology

Business Scope

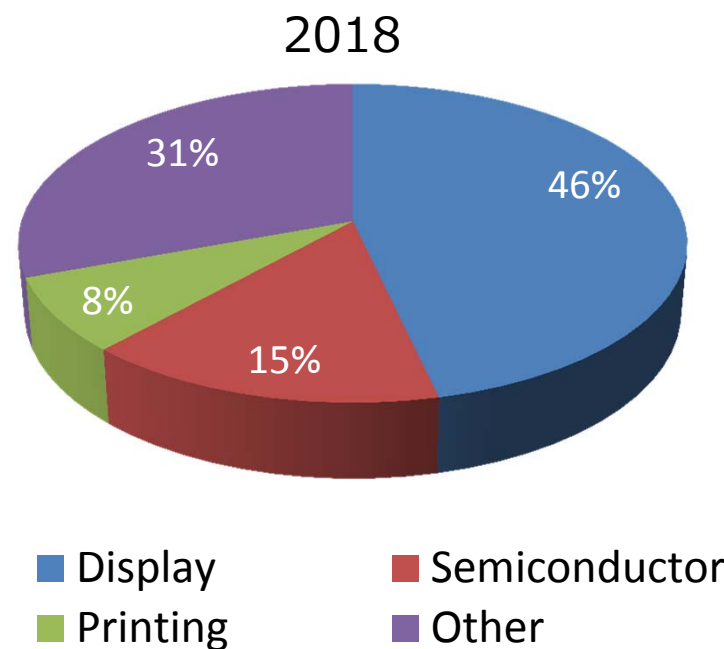


Overview of Information, Electronics & Display Business Domain

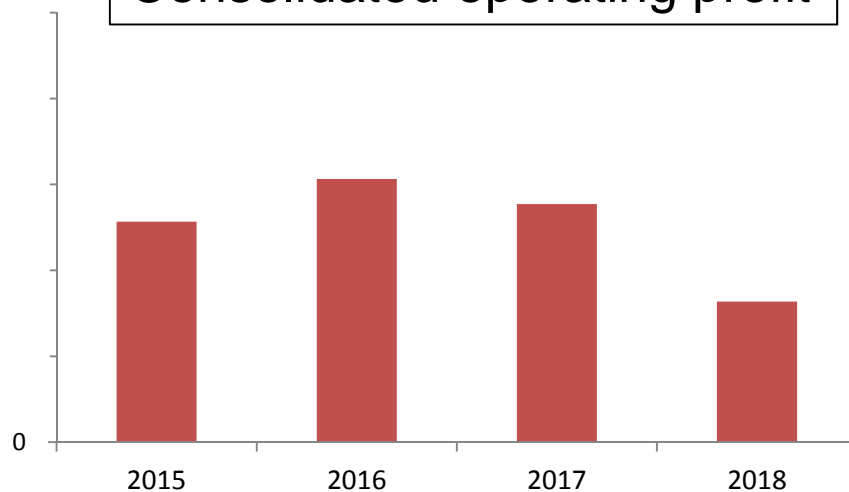
Consolidated sales



Sales ratio by segment



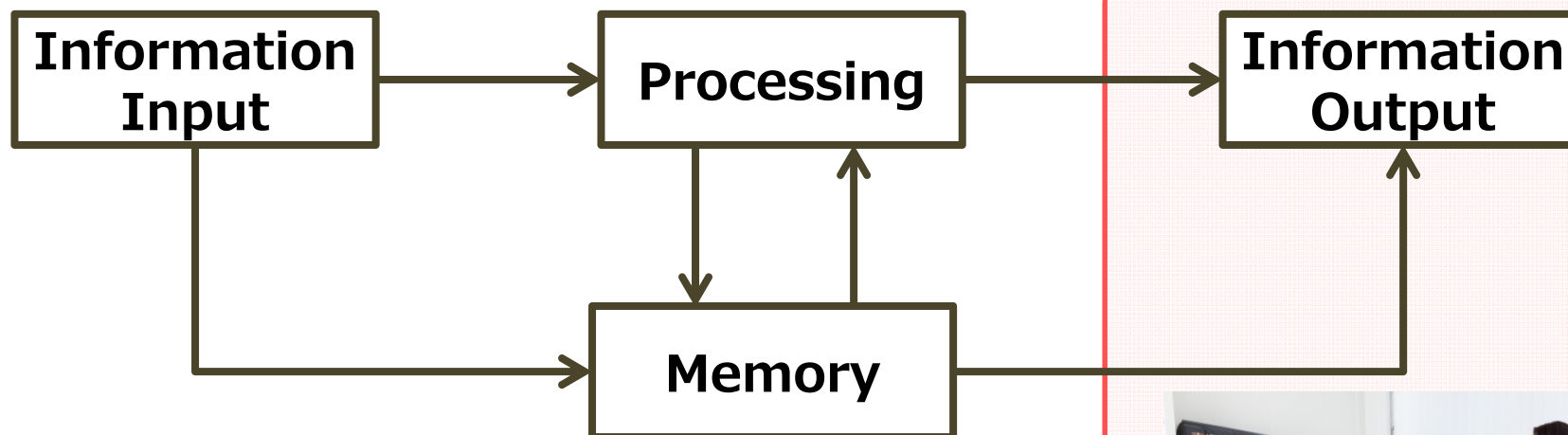
Consolidated operating profit




* FY2015 is based on Japan GAAP, FY2016 onward is based on IFRS

Display Field

Business Scope




**Polyester Film
"DIAFOIL™"**




**Color resists for
LCDs**



**"OPL Film™" for
polarizing
plates for LCDs**




**Materials for
OEL display**



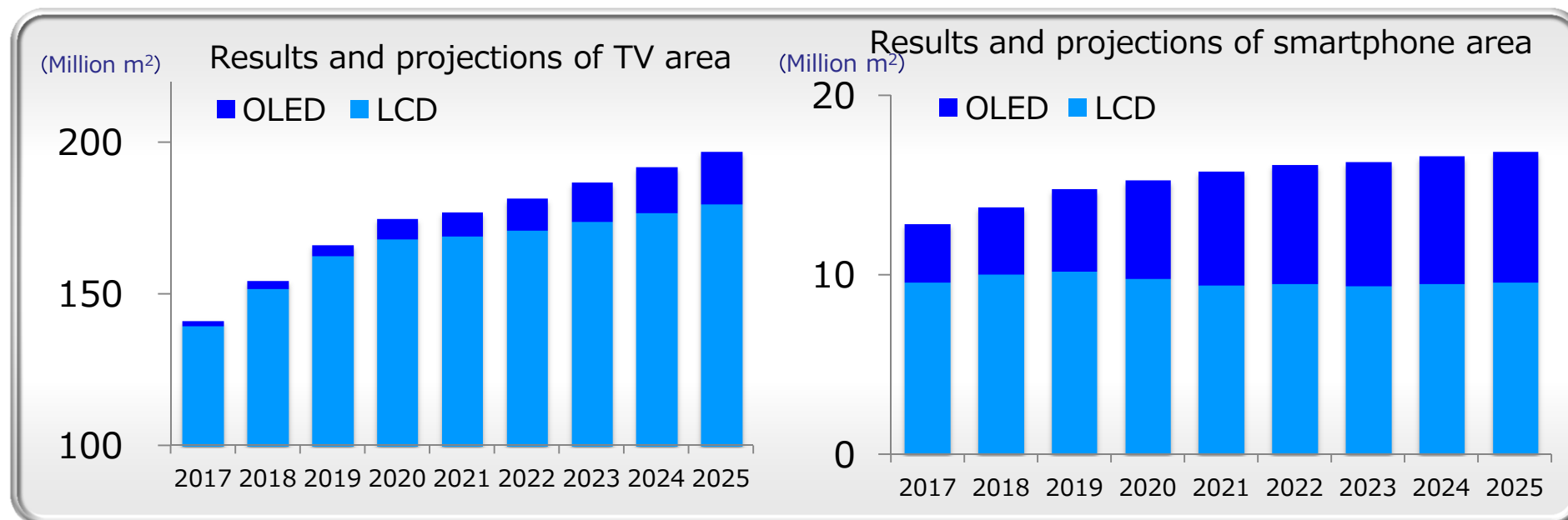
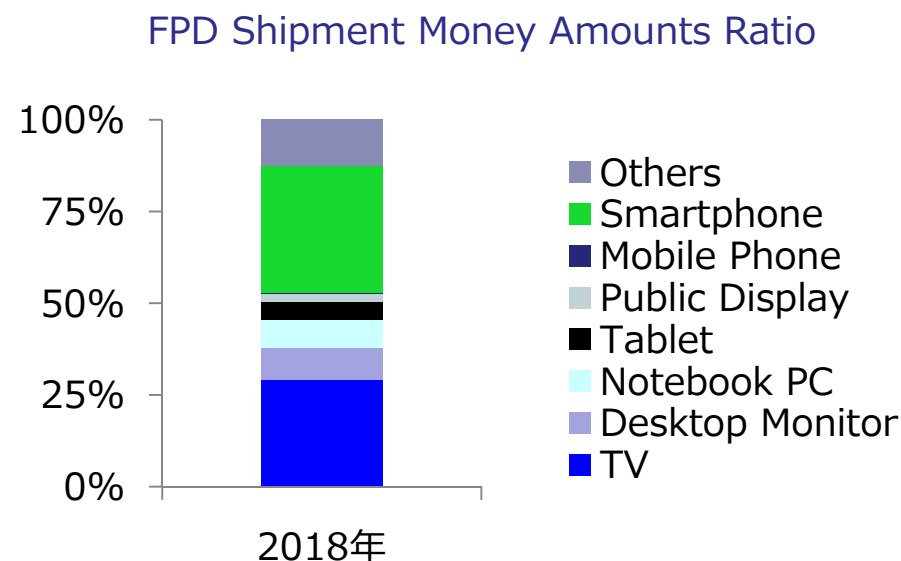
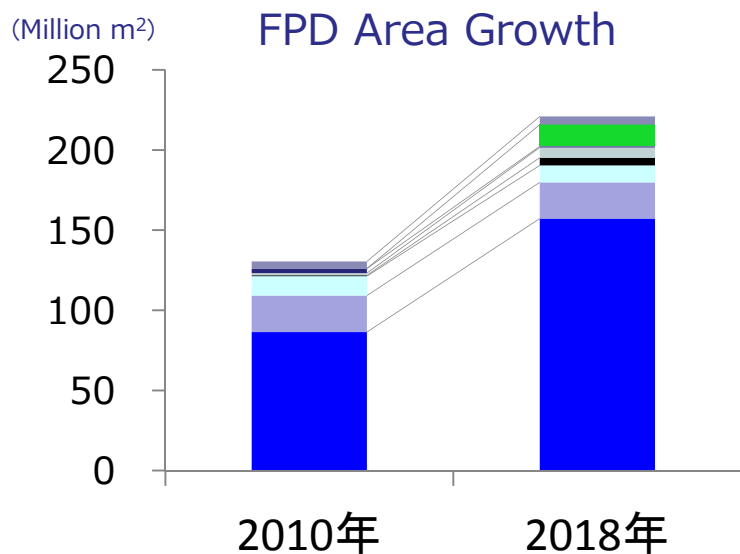
**Optical reflective
sheet
"Lumirex™"**



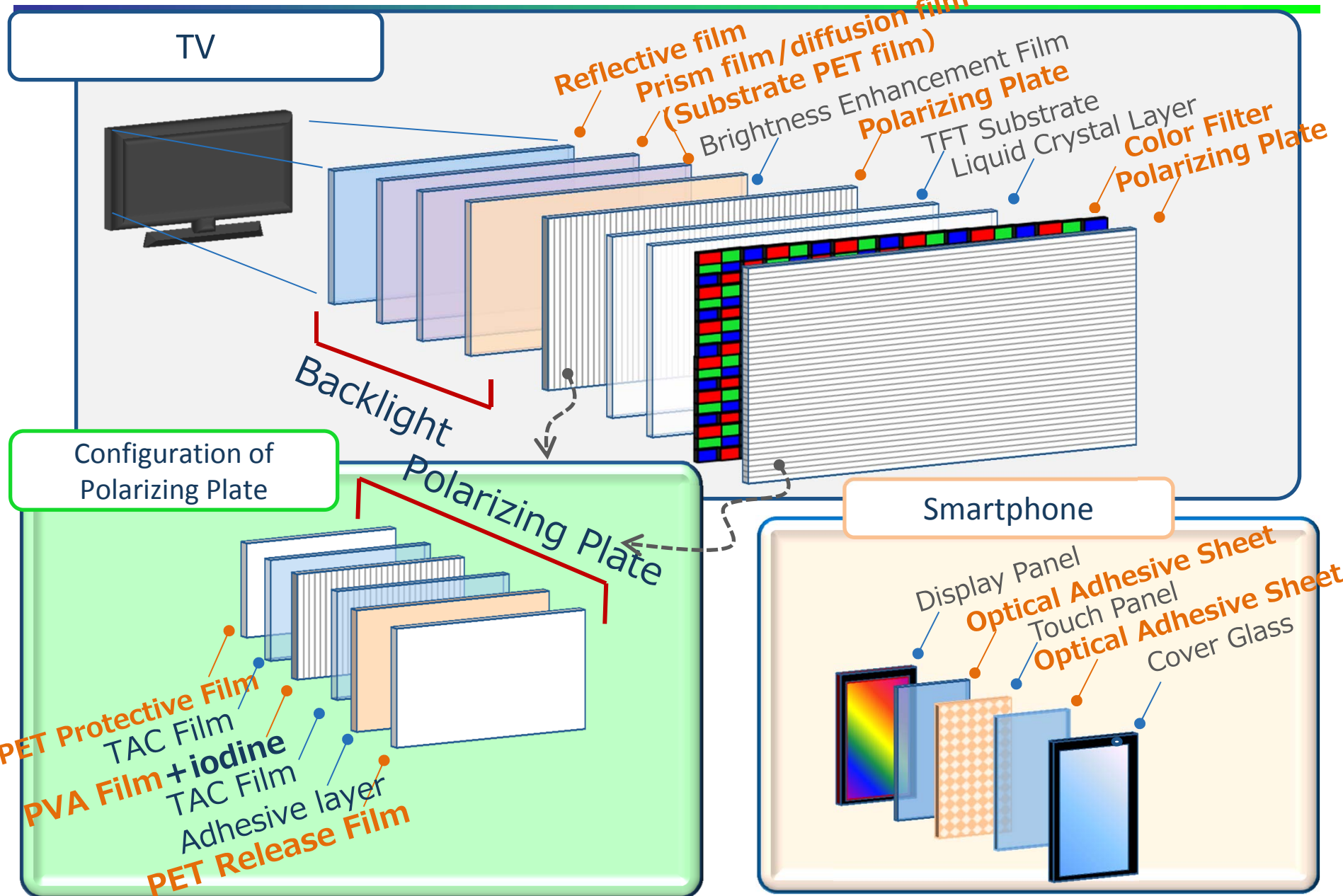
**Optical transparent
adhesive sheet
"CLEARFIT™"**



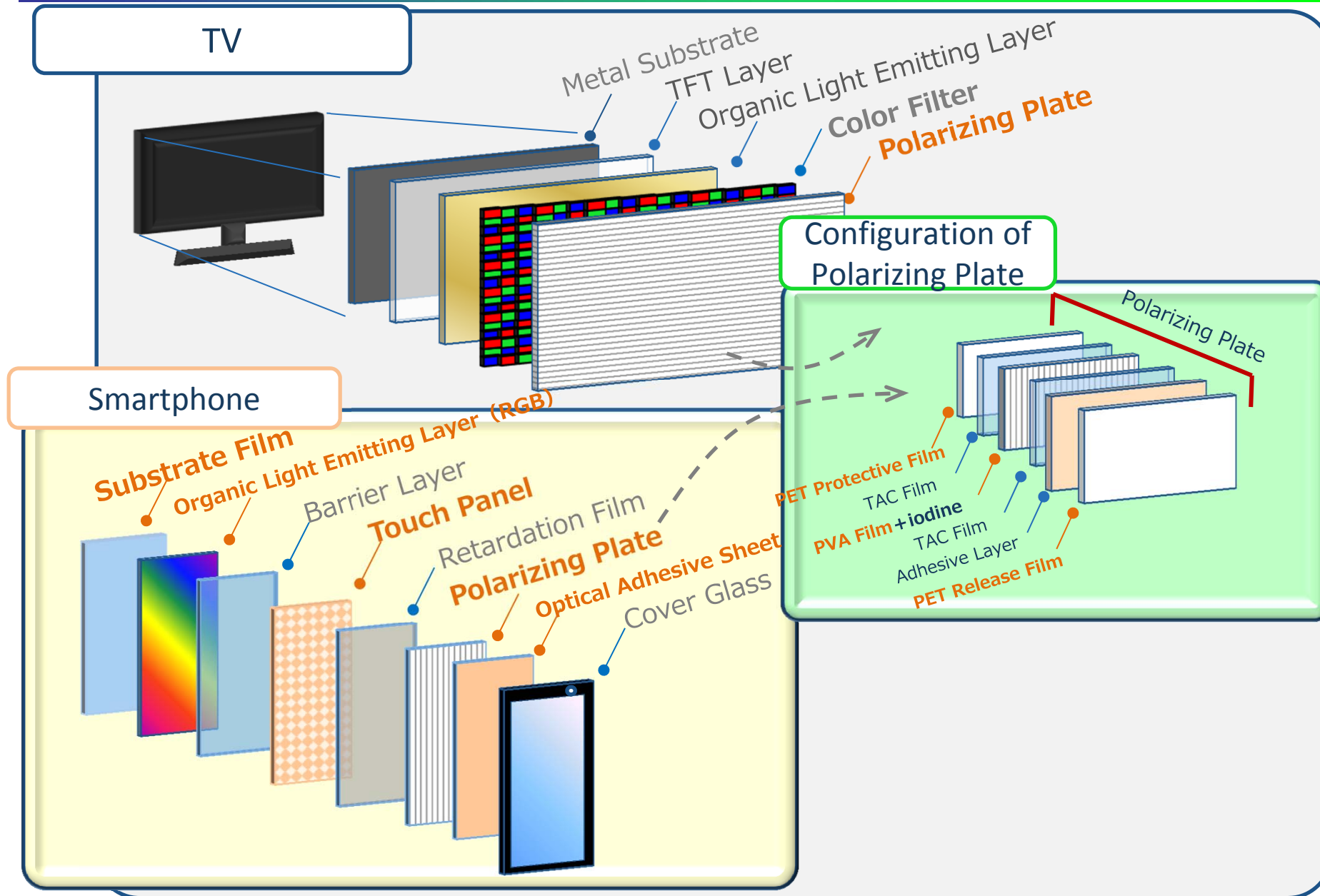

Flat Panel Display (FPD) Market



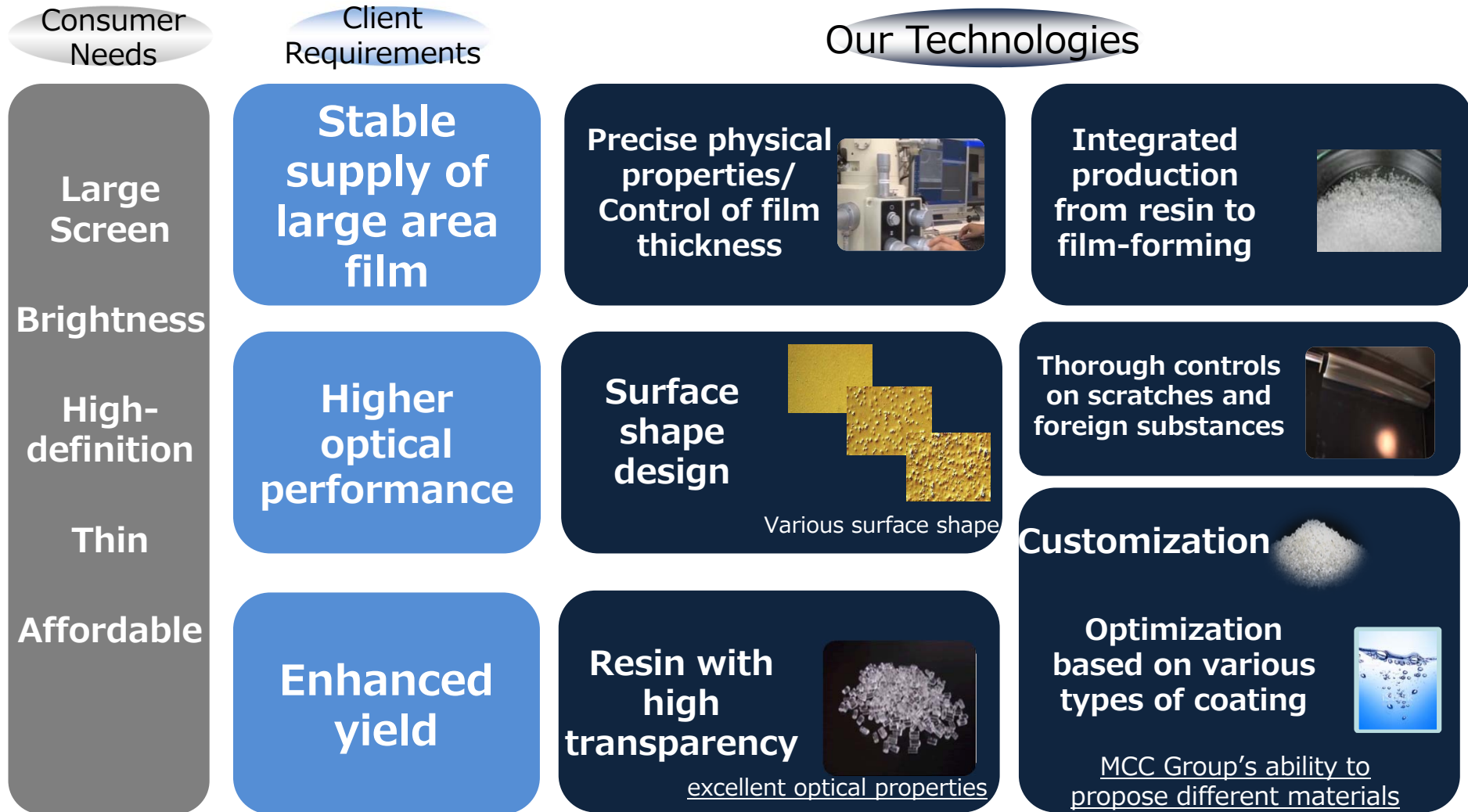
Configuration of Liquid-Crystal Display



Configuration of OLED Display



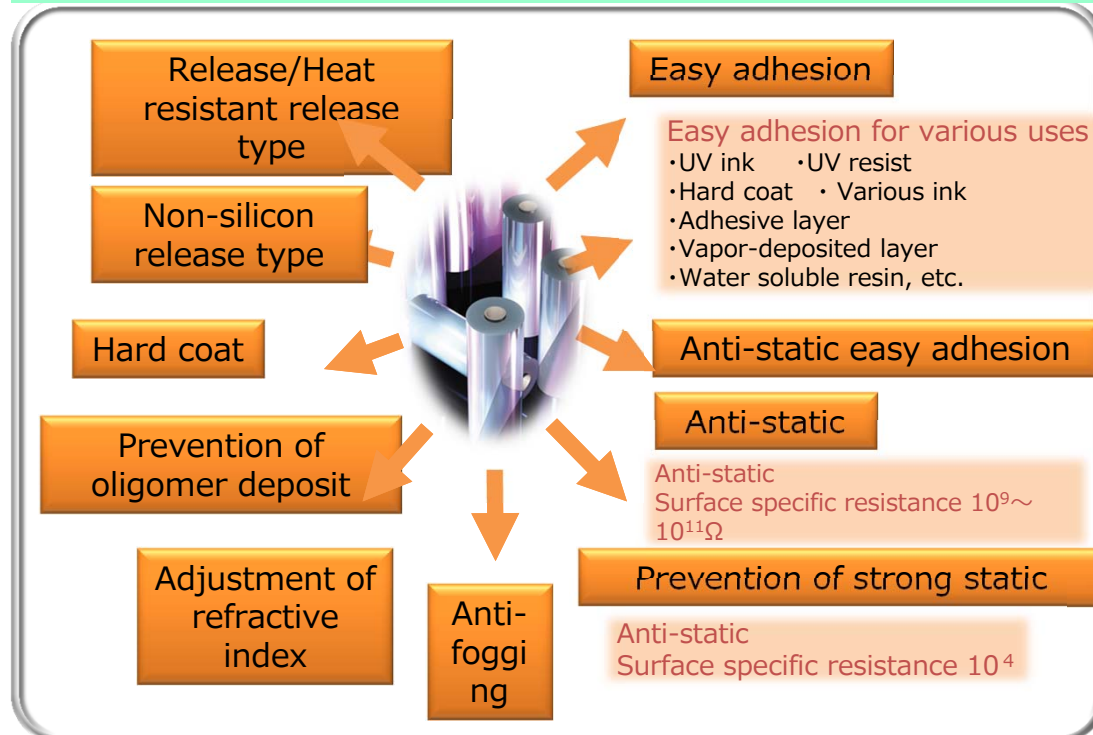
Strengths of PET Film "DIAFOIL™"



Strengths of PET Film "DIAFOIL™" ②

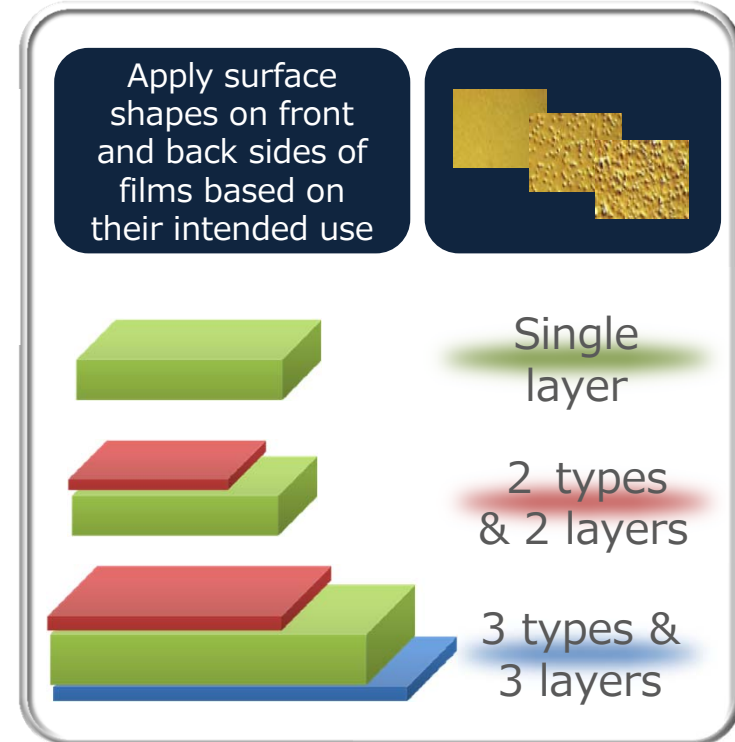
■ Ultra-thin film coating technology

Differentiating our products by applying an ultra-thin film coated layer of 1µm or below

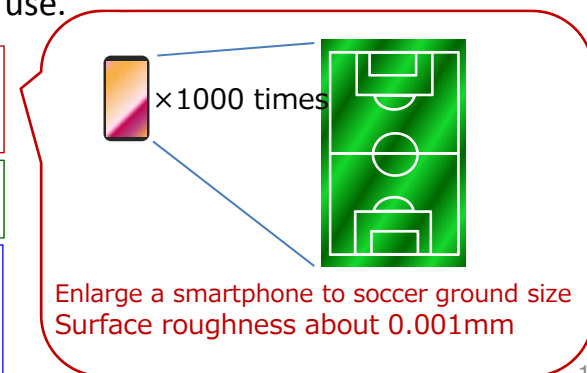
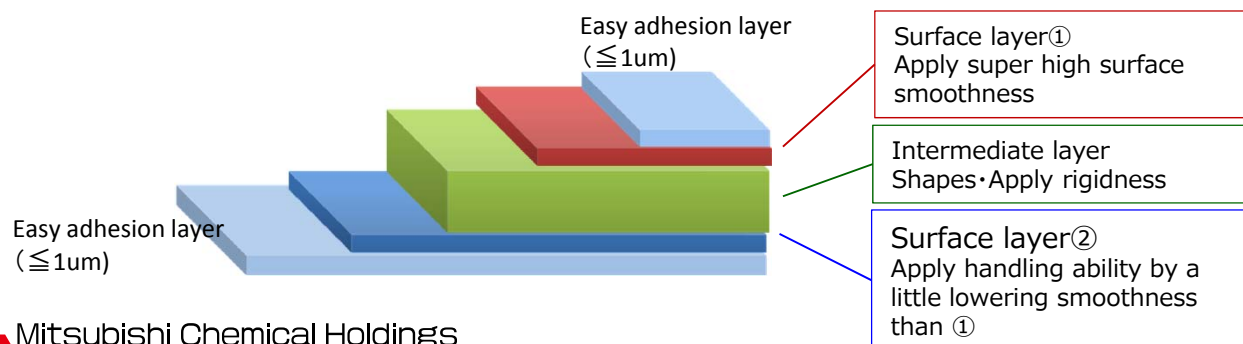


■ Multi-layer film forming technology







Application of surface shapes



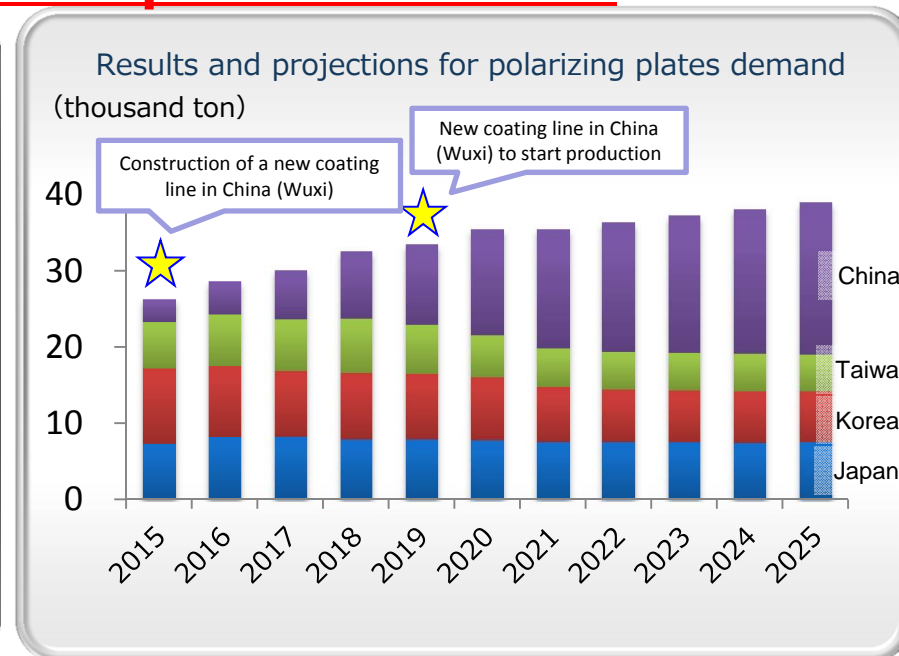
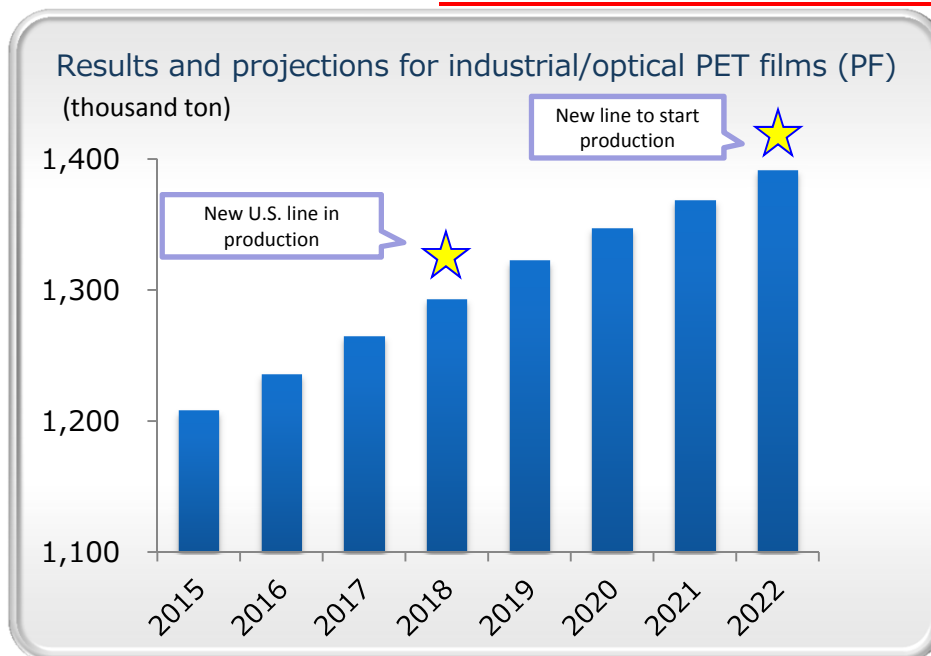
We propose products by combining different technologies based on the intended use.



Polyester Films Business Operation

Germany	Indonesia	Japan	China/Suzhou	China/Wuxi	U.S.
					
Mitsubishi Polyester Film GmbH	PT.MC PET Film Indonesia	Shiga Plant Mitsubishi Polyester Film Suzhou Co, Ltd.	Mitsubishi Polyester Film Suzhou Co, Ltd.	Mitsubishi Chemical Converting Film Wuxi Co., Ltd	Mitsubishi Polyester Film, Inc.
Film forming	Film forming	Film forming Offline coating	Film forming	Offline coating	Film forming

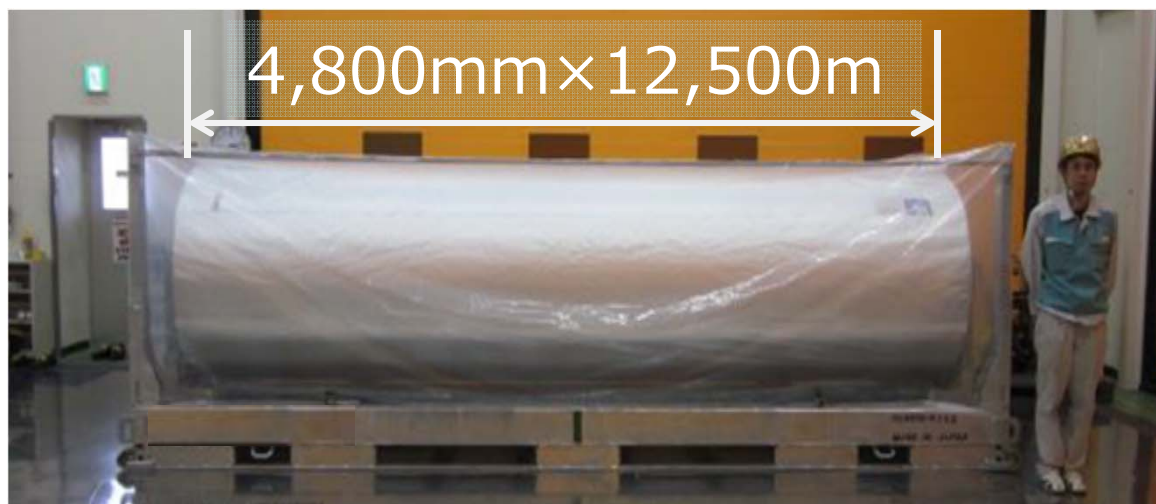
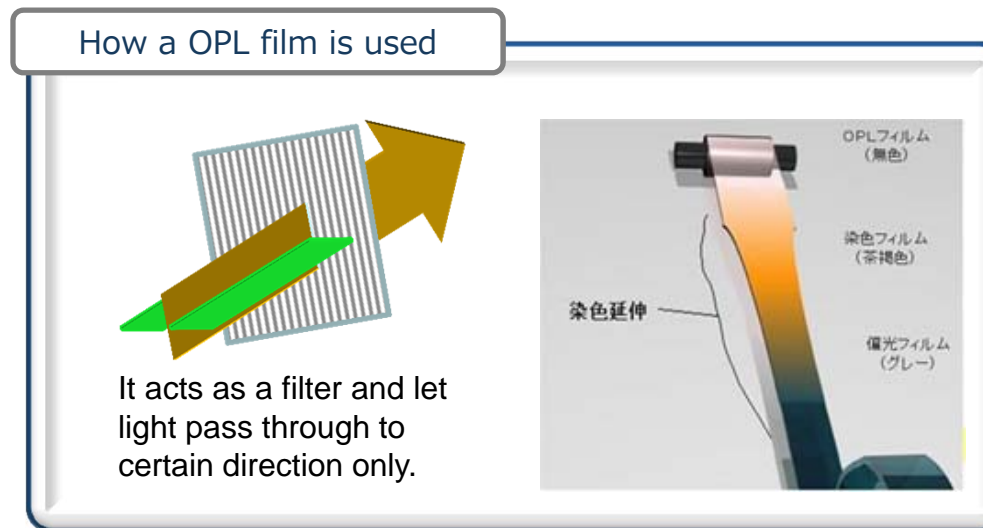
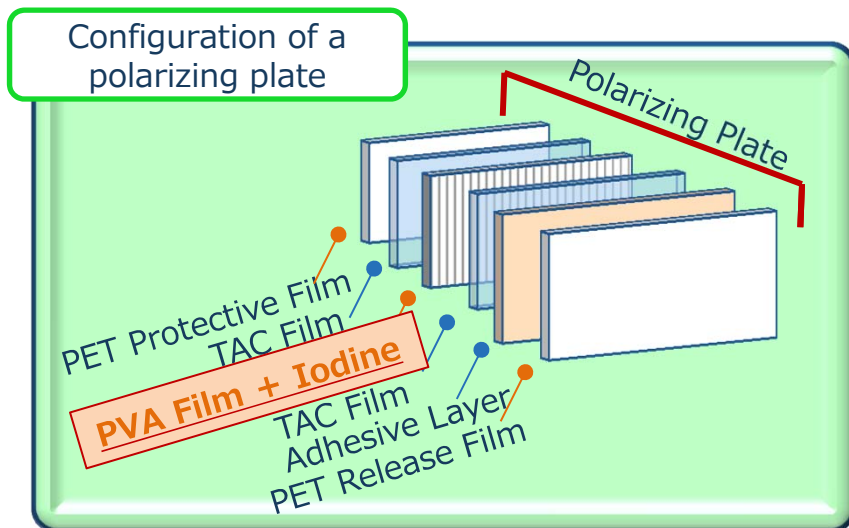
No.1 in the world in optical PET films



Source: Fuji Chimera Research Institute, Inc_2018 Plastic film-sheet present conditions and future prospects (2018 prospect, 2019 onward projections)

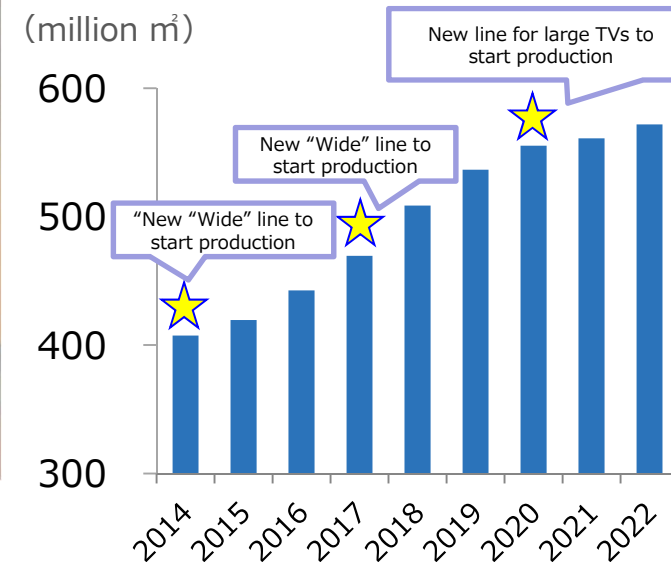
(Our estimated value)

PVA Film "OPL Film™"

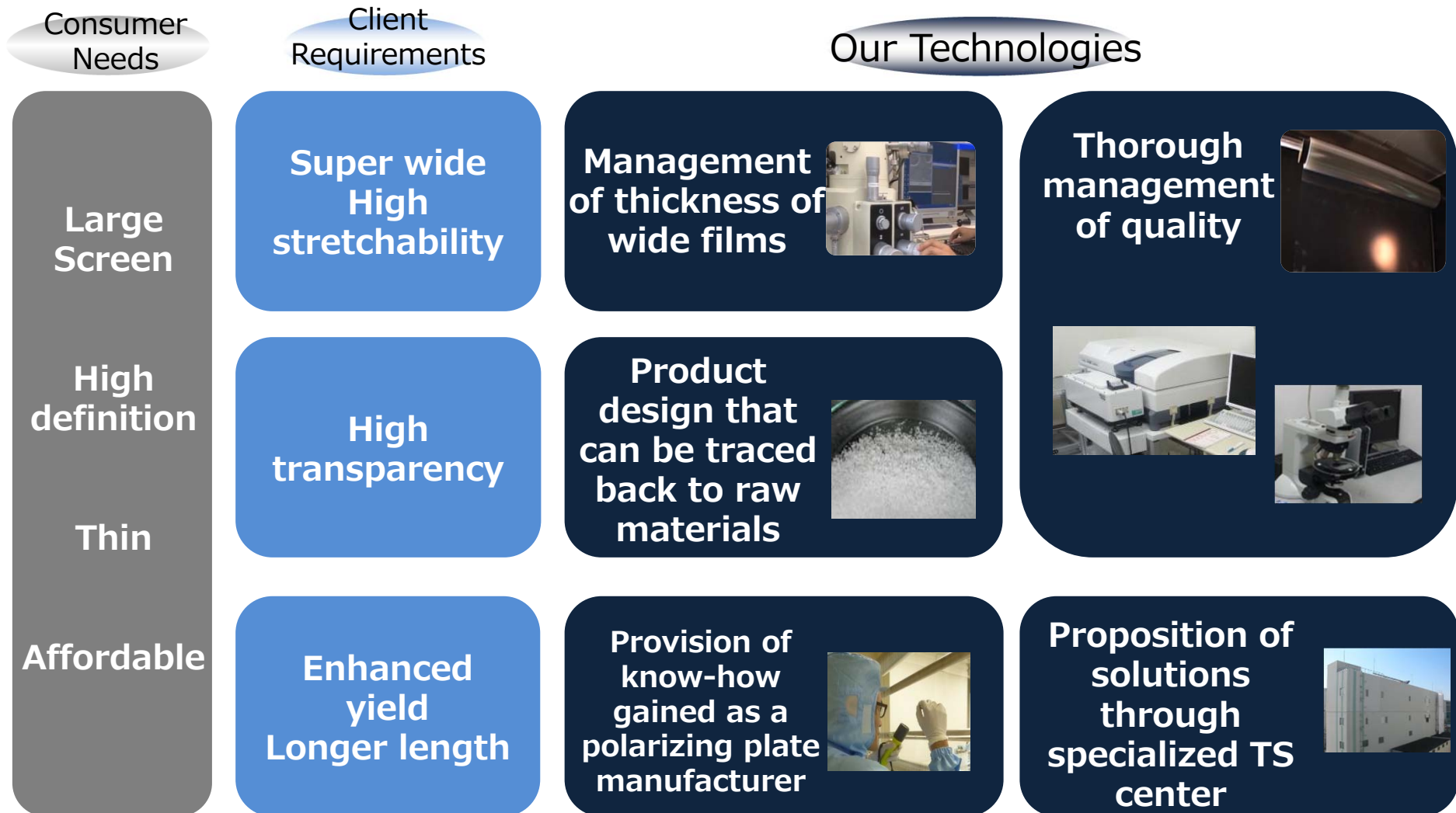


One of the two leading manufacturers of PVA optical films

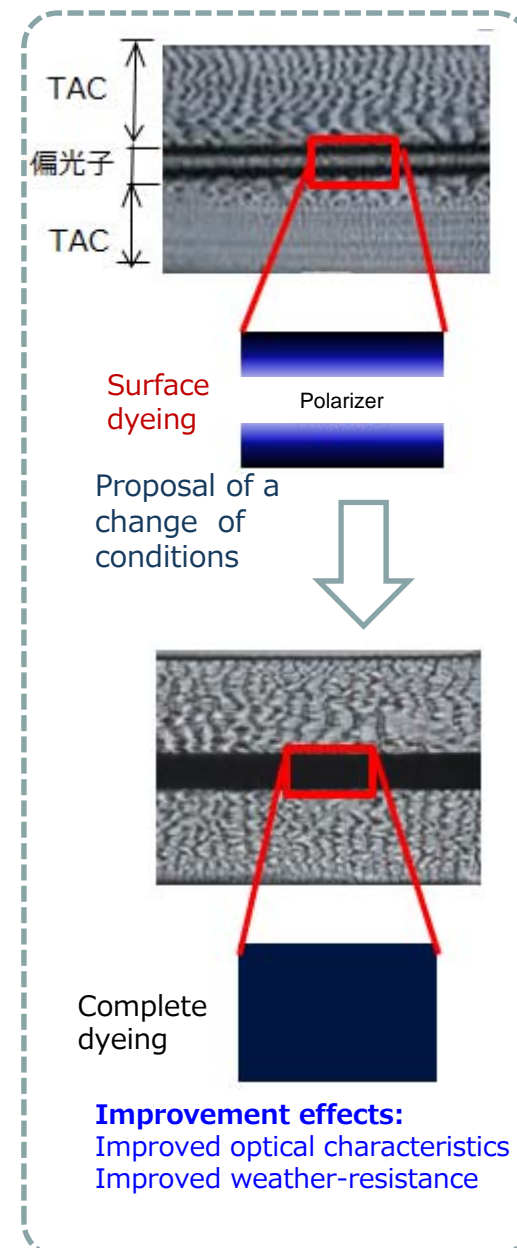
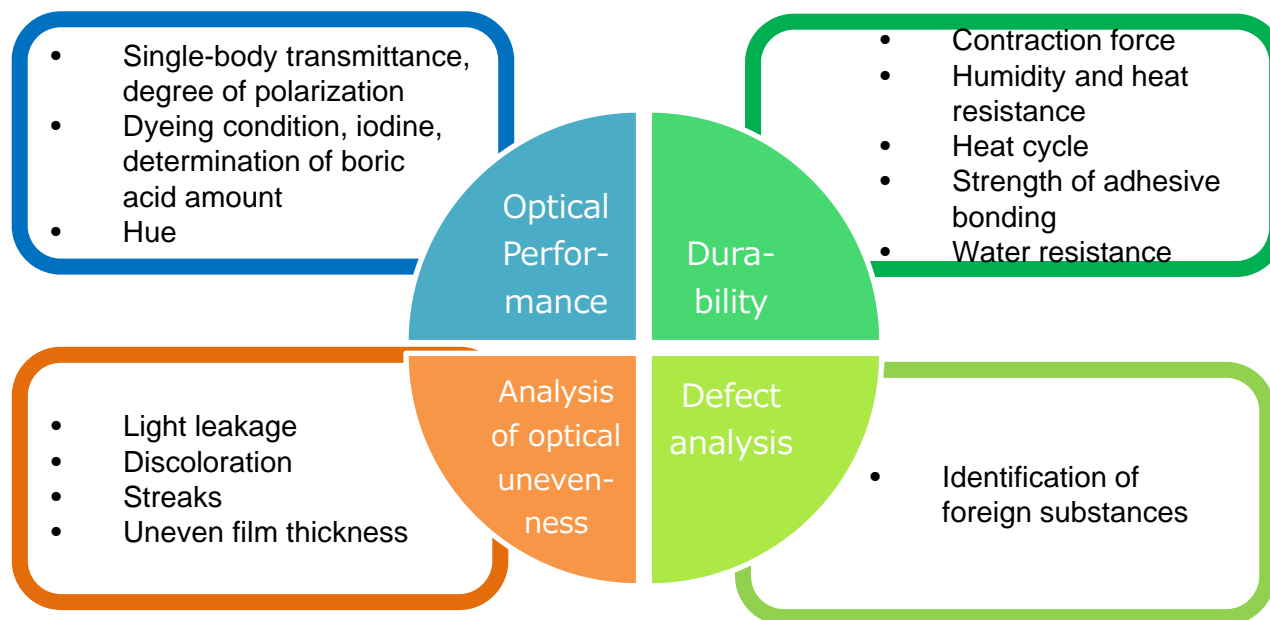
Projections of PVA Film Demand



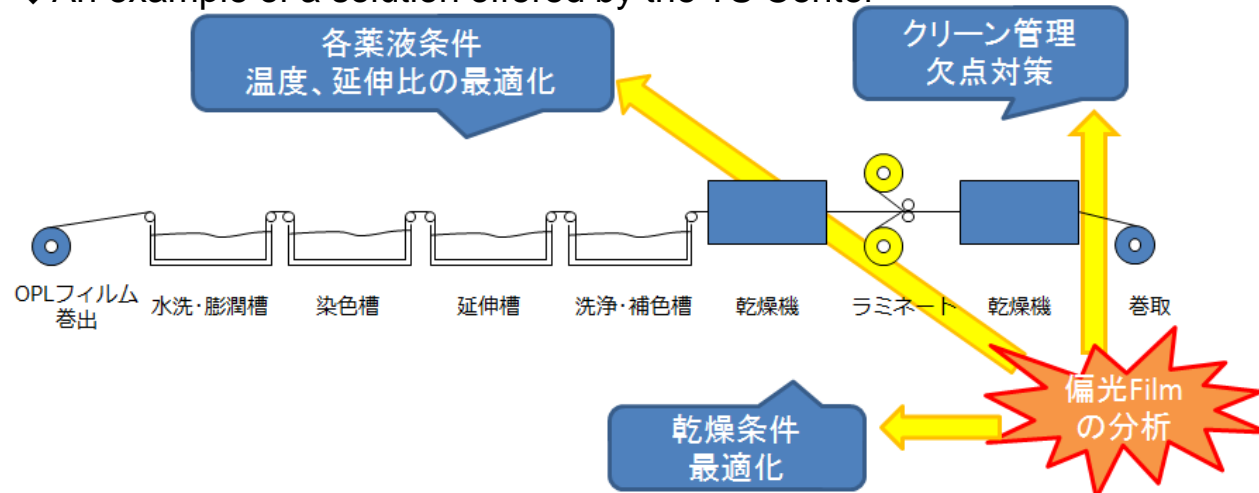
Strengths of PVA Film "OPL Film™"



Provision of Solutions Through Our Technical Service Center

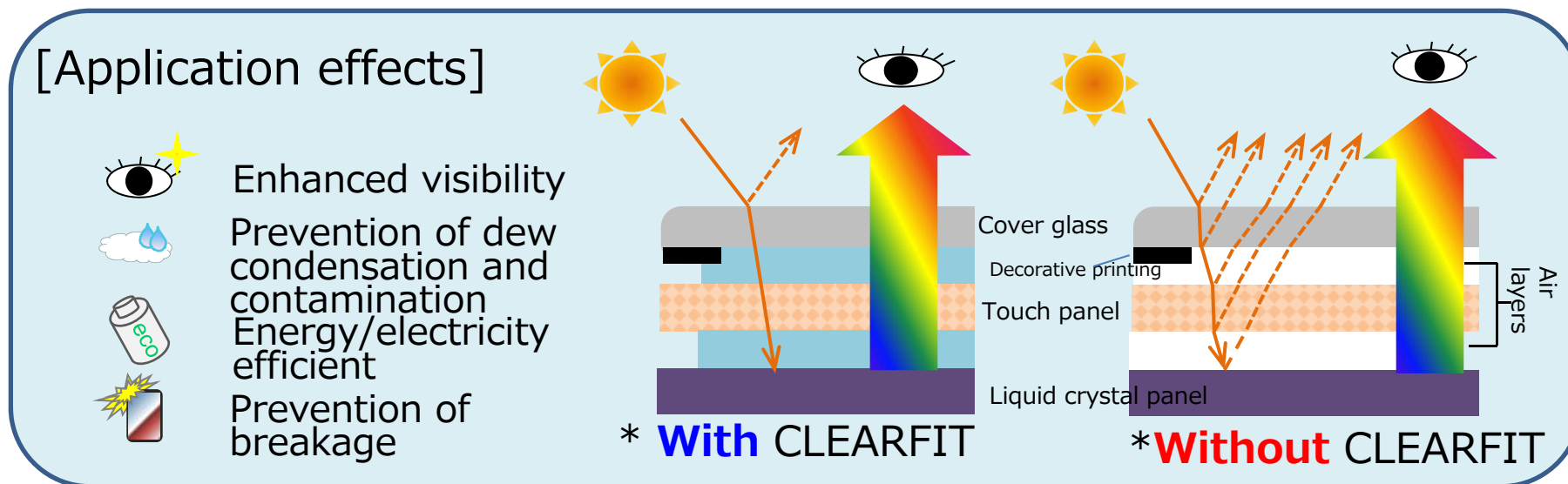


◆ An example of a solution offered by the TS Center



Optical Adhesive Sheet "CLEARFIT™"

Confidential



Consumer Needs

- High definition
- Design
- Cost Performance

Client Requirements

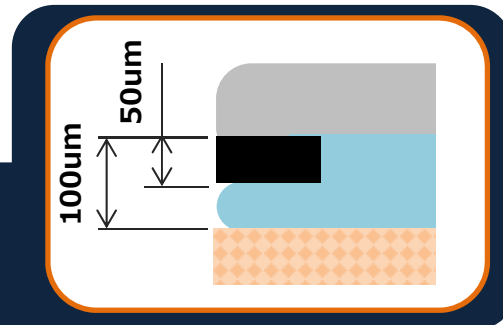
- High transparency
- Thin films & Strong adhesiveness to uneven surface
- Enhanced work efficiency/ Affixing yield

Our Technologies

Optimized design which covers adhesive agents, composition, and film forming processes

Absorption of 50% of printing convexo-concave of CFT film thickness

Adhesive design which satisfies customers' conditions for their affixing operation

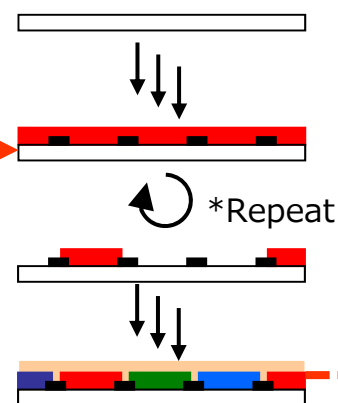
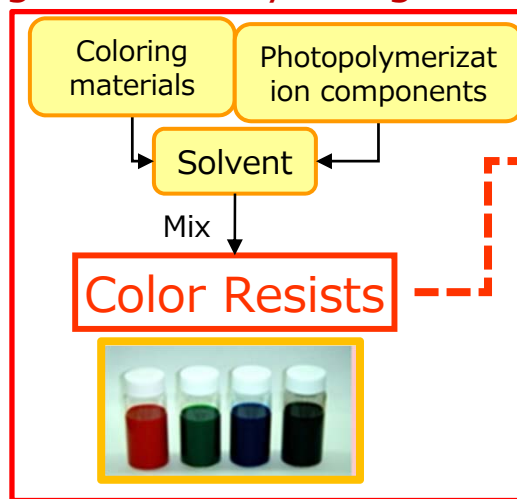


Controlled peeling strength

What Are Color Resists

[Product and Usage]

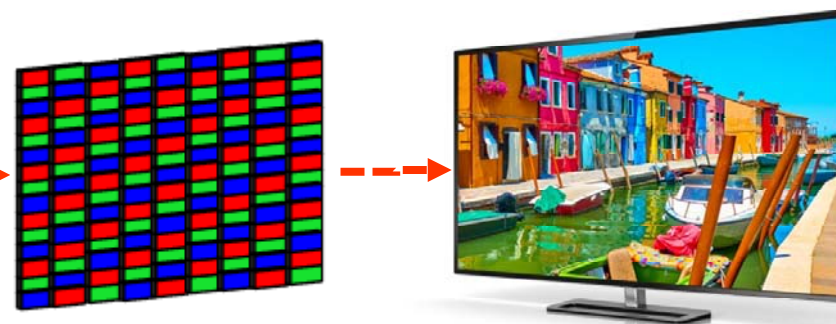
Create fine patterns of each color in a glass form by using color resists



*Fine pattern: Thickness: 1-2 μ m, Size: 5-200 μ m

[Applied Parts]

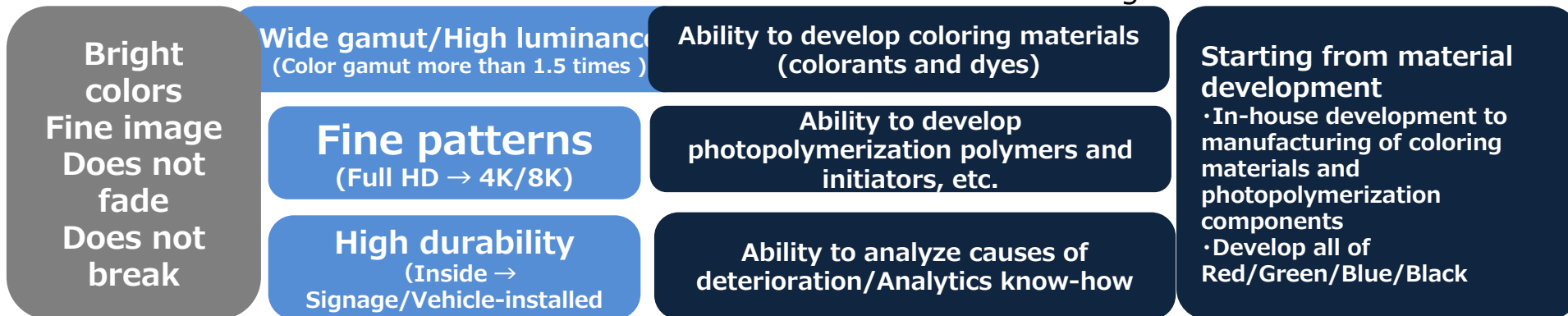
Contribute to enhanced image quality (bright colored and fine image) of liquid crystal display



Consumer Needs

Client Requirements

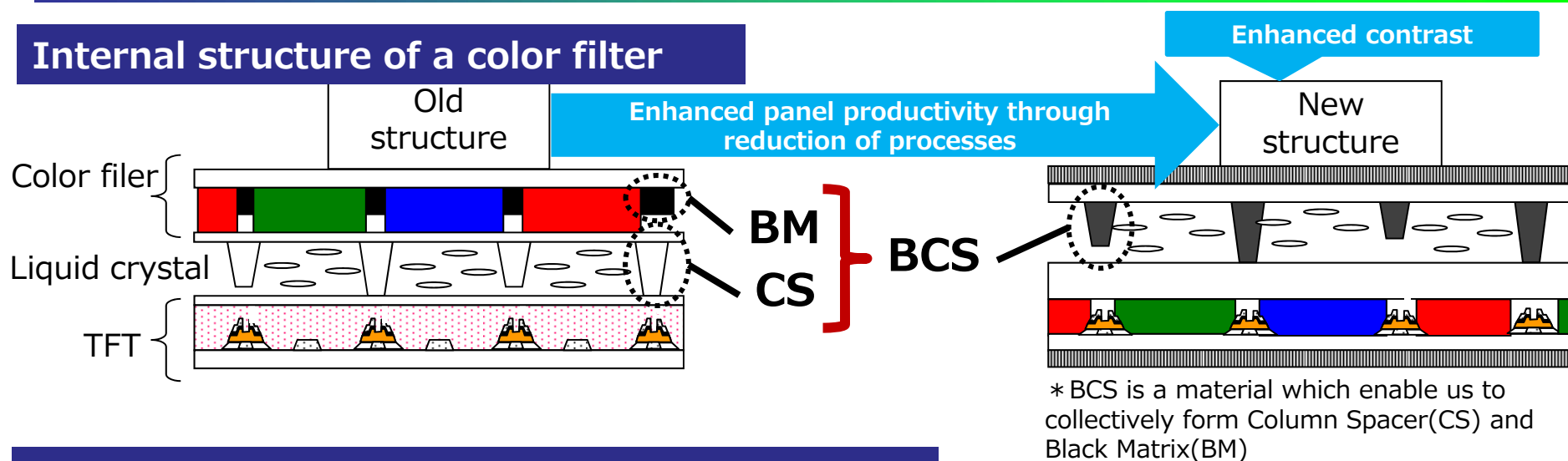
Our Strengths



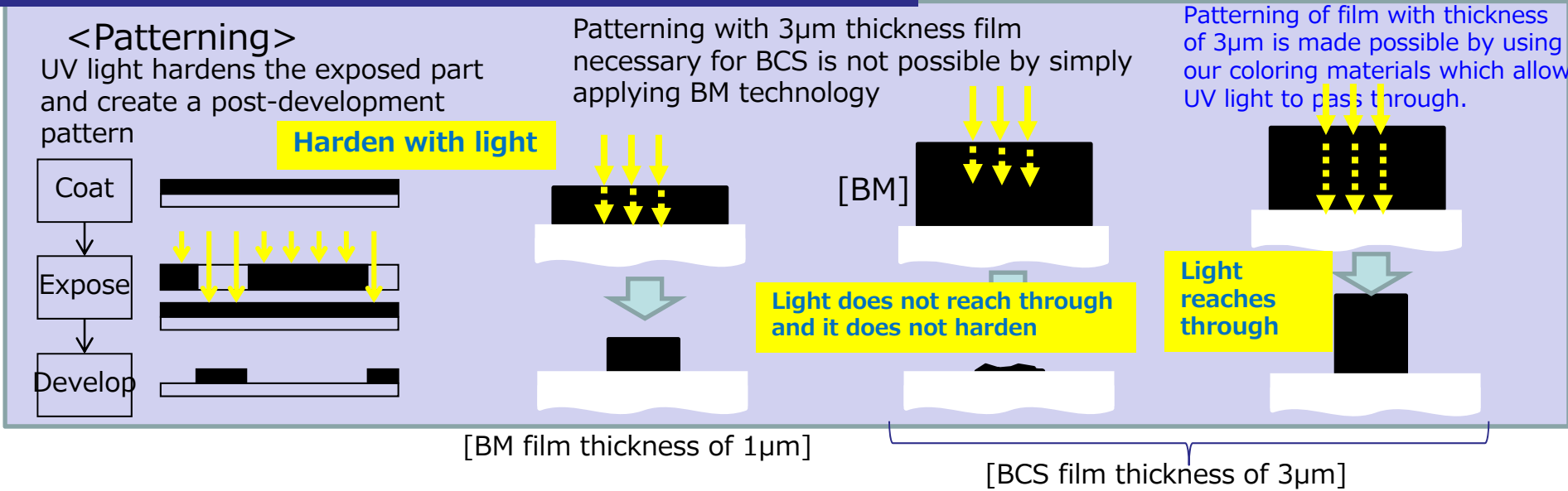
Overall share of color resists was 20%(No.2 in the world), and share of Black was 45%(No.1 in the world)

Black Column Spacer(BCS)

Internal structure of a color filter

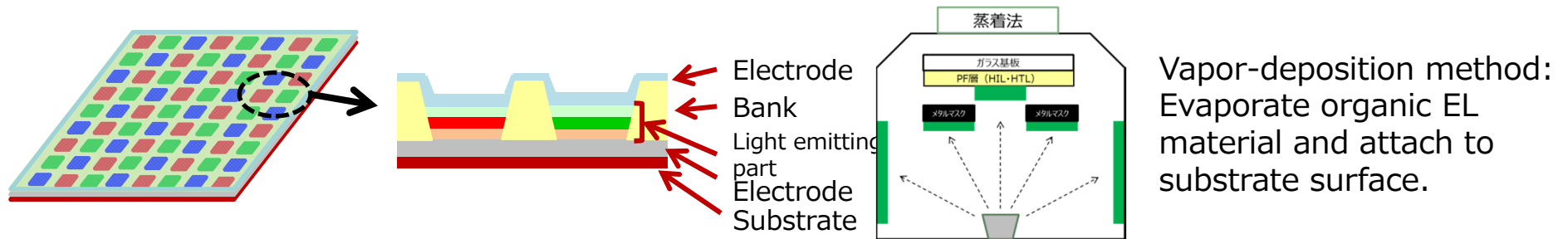


Achieving thick film patterning of black resist



We maintained over 90% share of Black Column Spacer(BCS).

Enhance the brightness of colors (contrast) of OLED display



(Current technology)

It is difficult to express "jet black" because the bank material which compartments pixels is transparent, causing a reflection of external light.

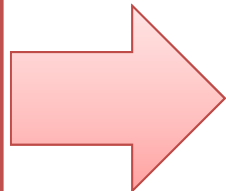
<Cross-sectional schematic diagram of organic EL pixel>

Reflection of external light

Light emitting part

Bank material (transparent)

<Magnified picture of exterior appearance of organic EL model elements>
*Looking from the light emitting side of vapor-deposition type light emitting layer/bank material/ITO film/glass substrate



(Developed technology)

It is possible to express "jet black" by suppressing the reflection of external light by using black-colored bank material.

Application of BCS technology

<Cross-sectional schematic diagram of organic EL pixel>

Light emitting part

Black bank material (black-colored)

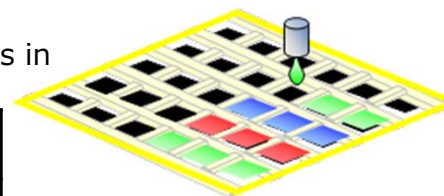
<Magnified picture of exterior appearance of organic EL model elements>
*Looking from the light emitting side of vapor-deposition type light emitting layer/bank material/ITO film/glass substrate

Realization of lower cost/higher definition (4K/8K) of OLED display

[Coating-type OLED]

RBC color coating method using inkjet

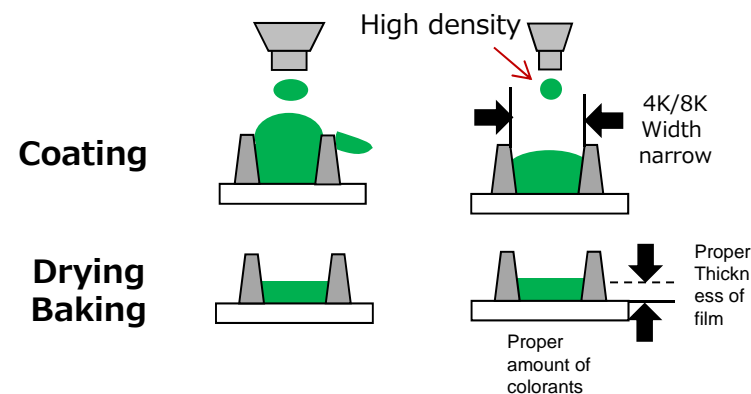
Under development by various panel manufacturers as it has benefits in terms of manufacturing cost and energy consumption (efficiency)



Our materials are highly regarded by panel manufacturers

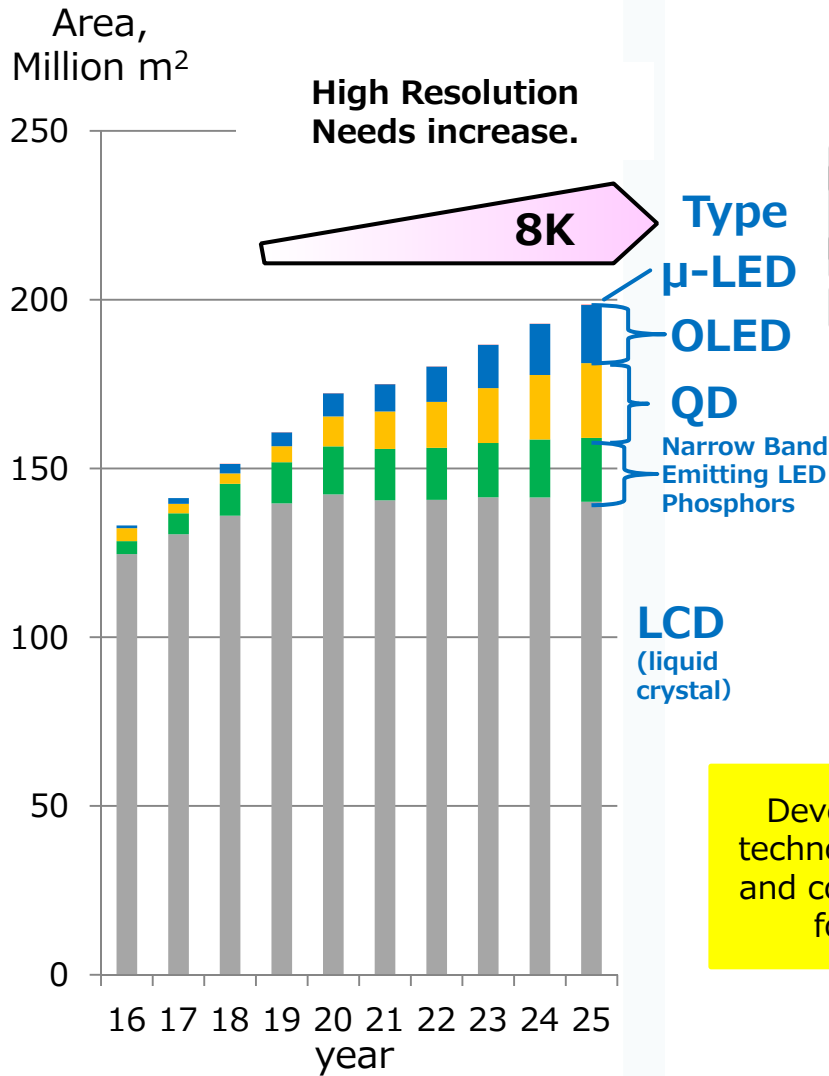
	Vapor-deposition-type OLED (White) + color filters	Coating-type OLED	
		High molecule type	Low molecule type
Structure			
Manufacturing cost	× (Vapor-deposition)	○ (Coating)	
Energy consumption (efficiency)	×	○ (RGB spontaneous light emission)	
Driving life	○	○	
In-plane uniformity	○	○	
High resolution	○	△	○

	High molecule type	Low molecule type
Manufacturing of inkjet	△ Restrictions on viscosity	○ No restrictions on viscosity
Film thickness control	△	○ High density is possible

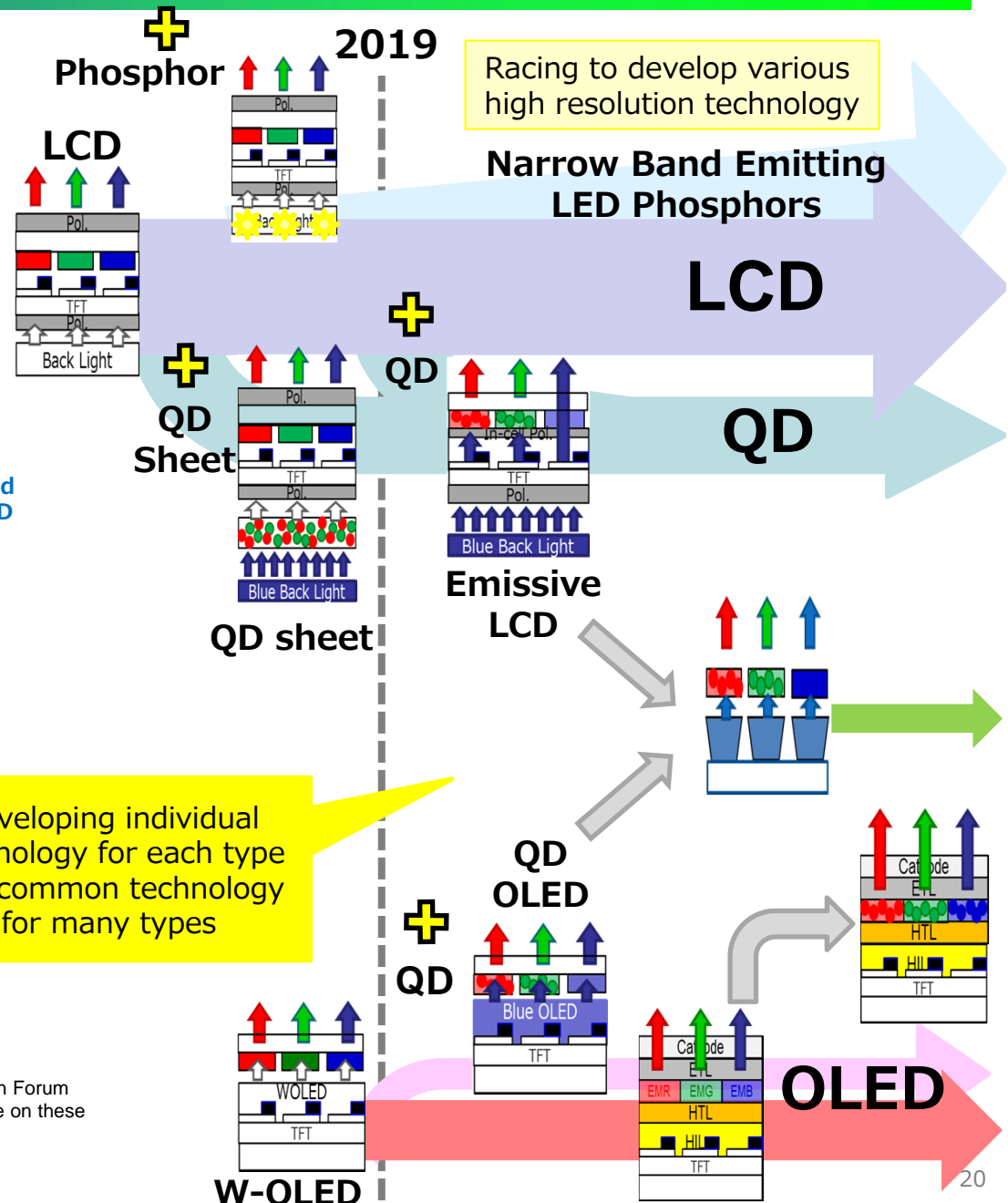


High Resolution of Display

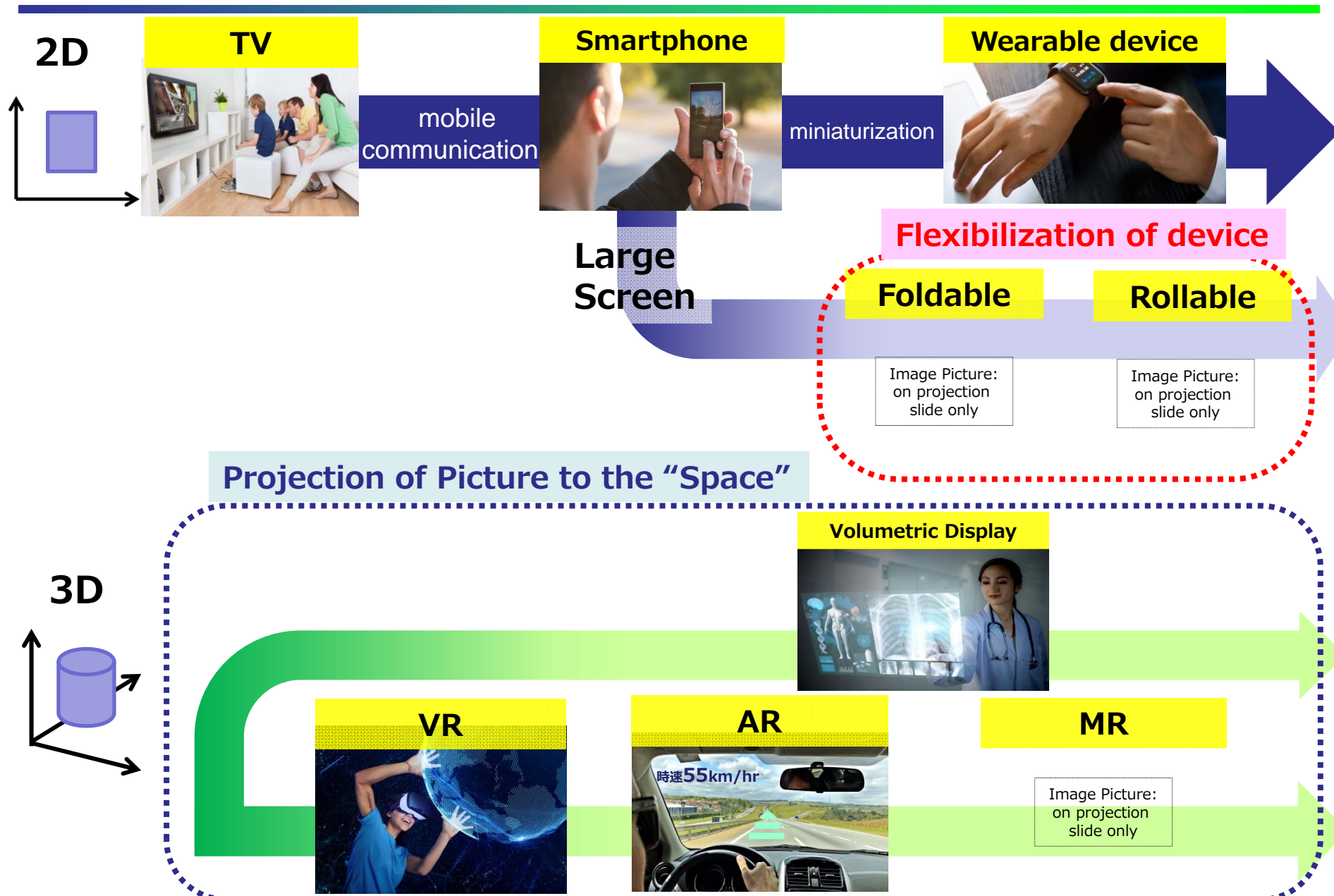
TV Market Size by Type (Area)



Information based on IHS Markit, Technology Group, 35th IHS Markit Display Japan Forum
 Information is not an endorsement of Mitsubishi Chemical Corporation. Any reliance on these results is at the third party's own risk. Visit technology.ihs.com for more details.



Diversification/Sophistication of Display



Development of Films for Flexible Devices

Image Picture:
on projection
slide only



【Characteristics】 Bending resistance

Surface functions necessary for devices such as antistatic and easy-adhesion coat

Superior optical characteristics

High degree of hardness

Manufactured with lower temperature compared to existing products

【Products】

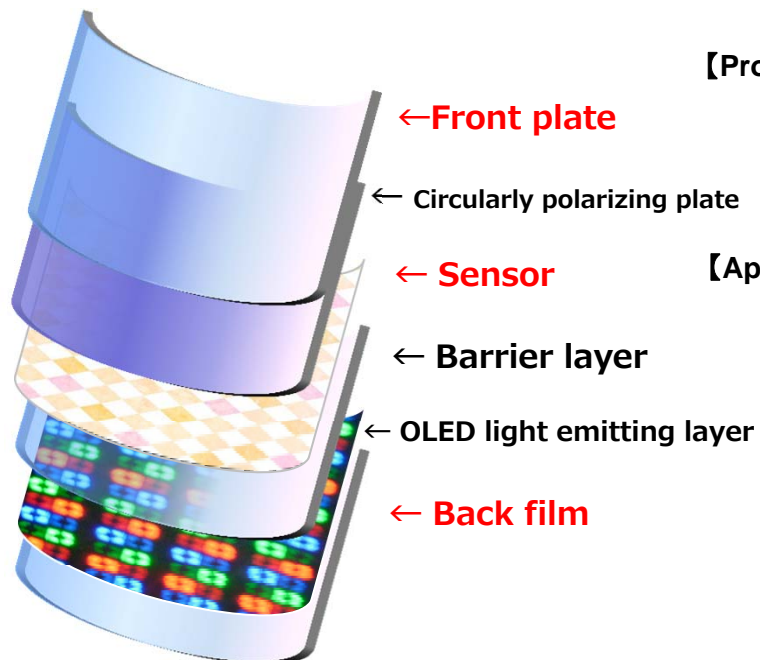
Bending resistant polyester film

Epoxy film

Polyimide film (under development)

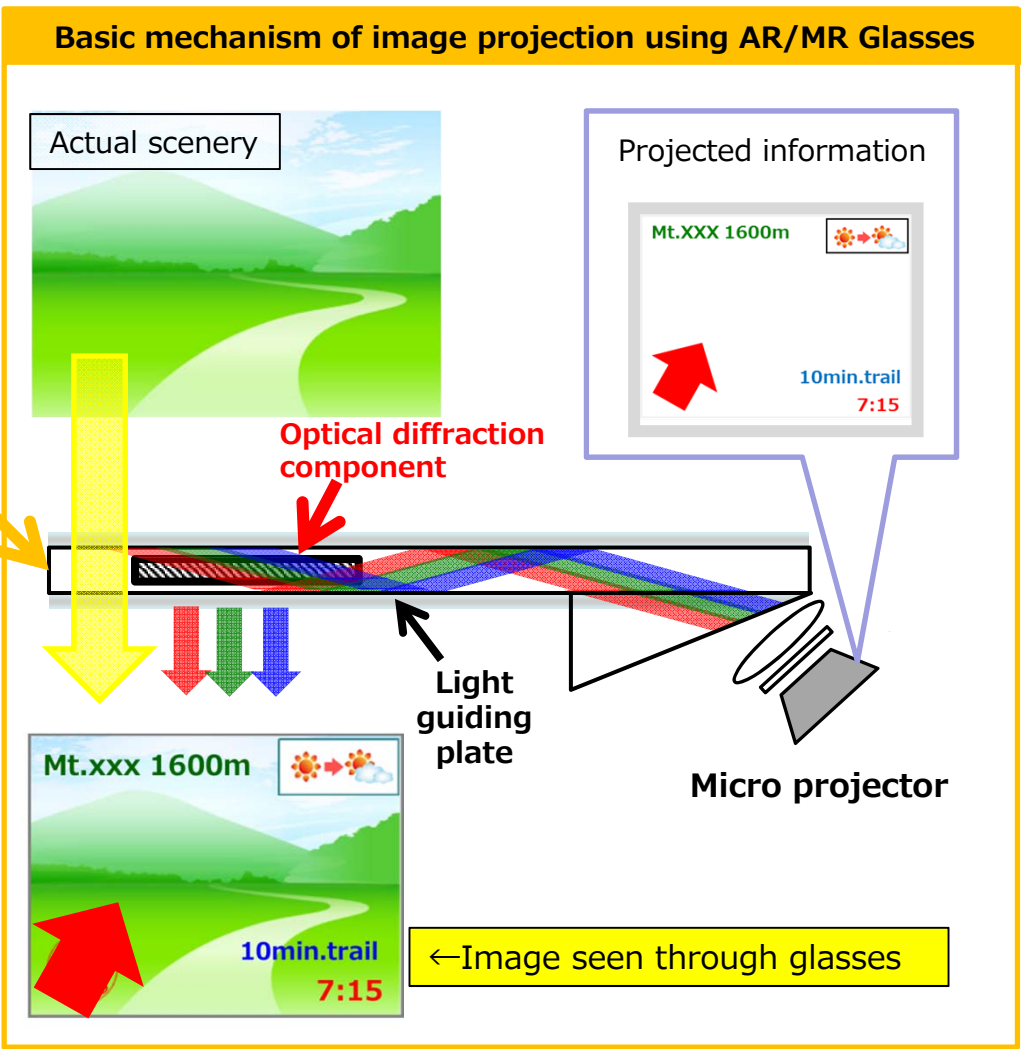
【Applicability】

Example of foldable OLED configuration

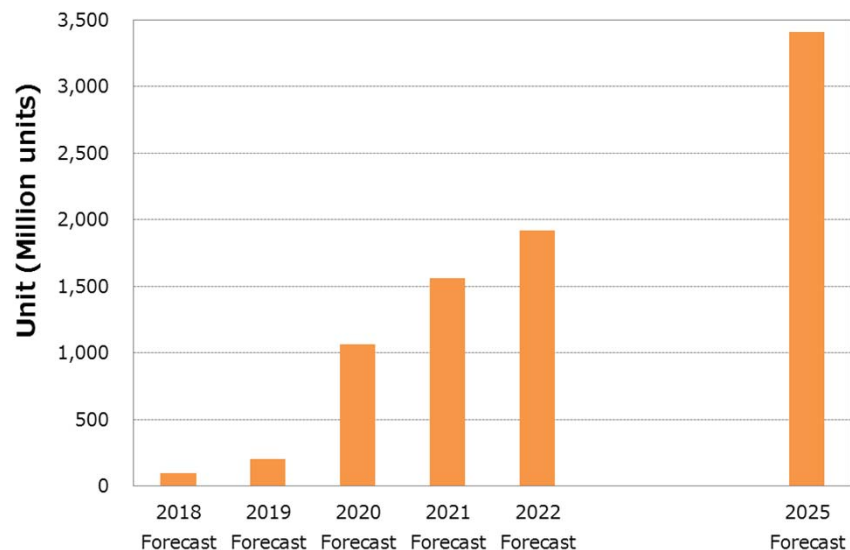


Usage	Requirements	Bending resistant polyester film	Epoxy film	Polyimide film
Front plate	Surface hardness	×	×	○
Sensor	Optical characteristics	△	○	○
Back film	Bending resistance	○	○	○

Strategy for Development of Materials for AR/MR Glasses



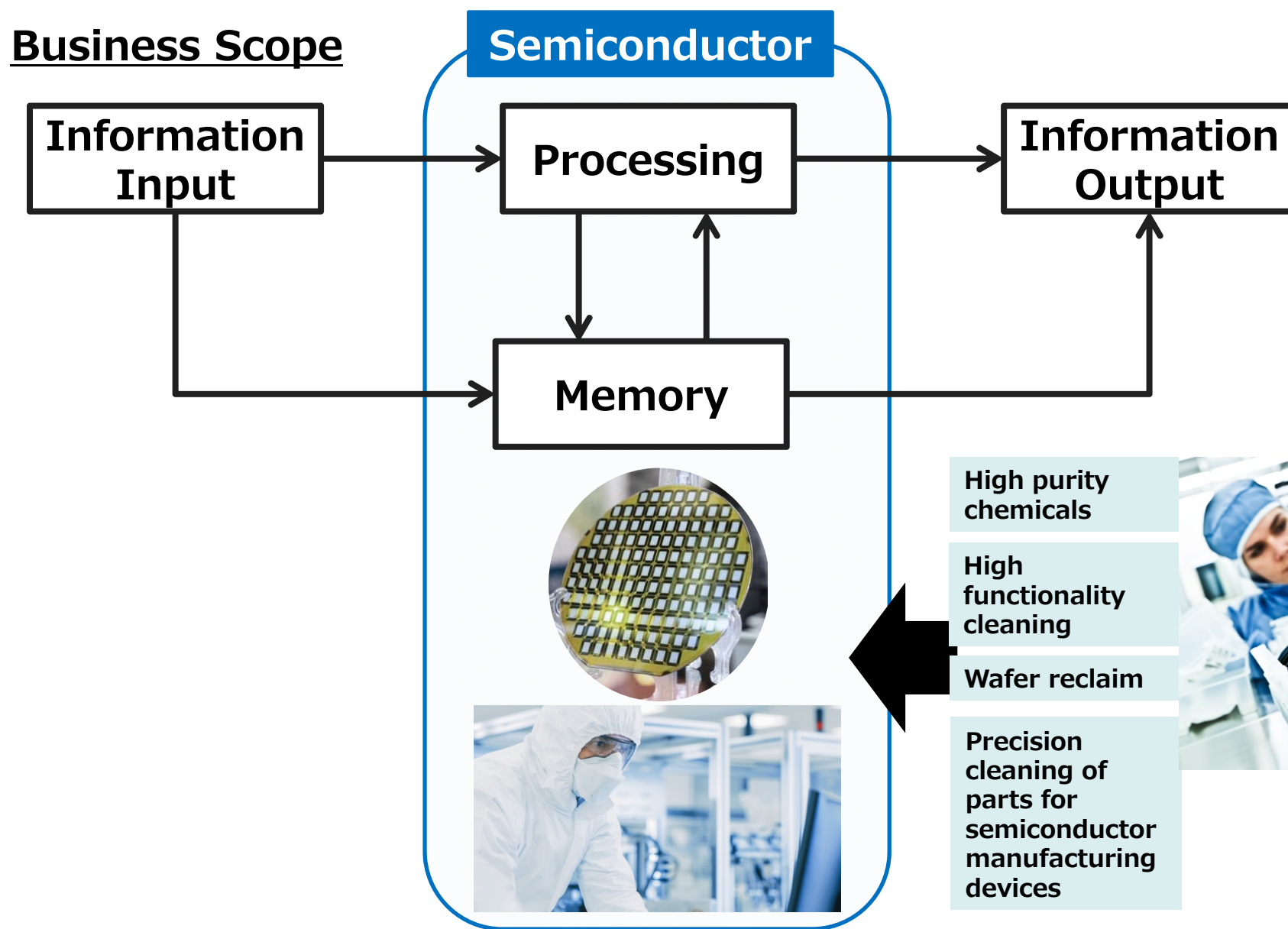
AR Market Size Forecast



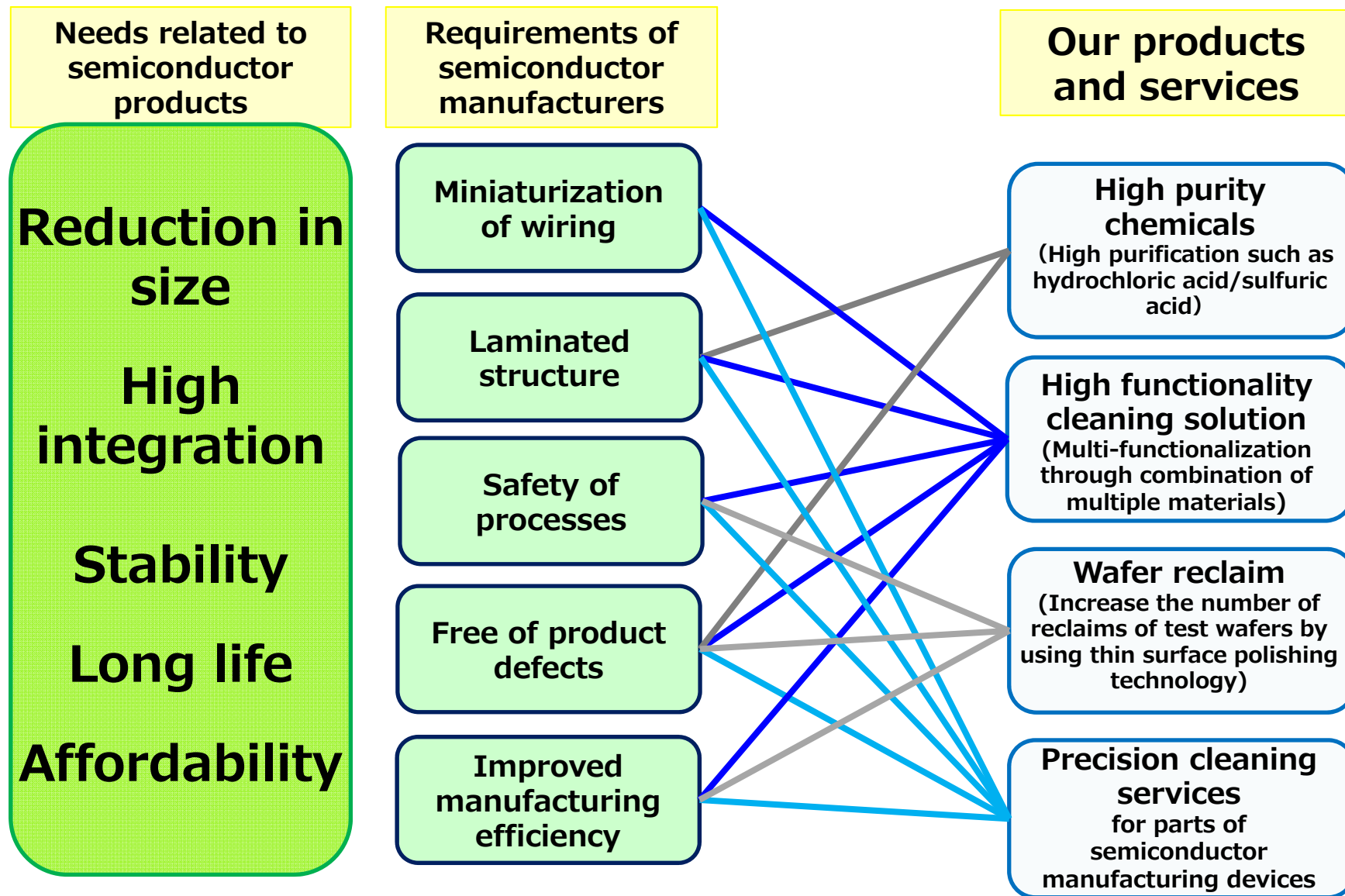
Source: Fuji Keizai "2017 future perspective on spatial display technology and related components market"

We are developing **optical diffraction components such as hologram and resin as a substitution of glass for light guiding plate**, jointly with start-ups such as **Digilens** (MCHC investment) and other device manufacturers.

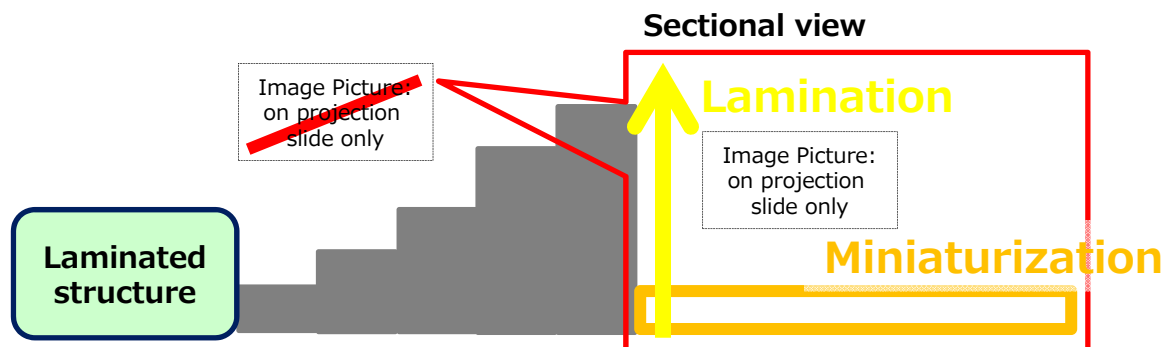
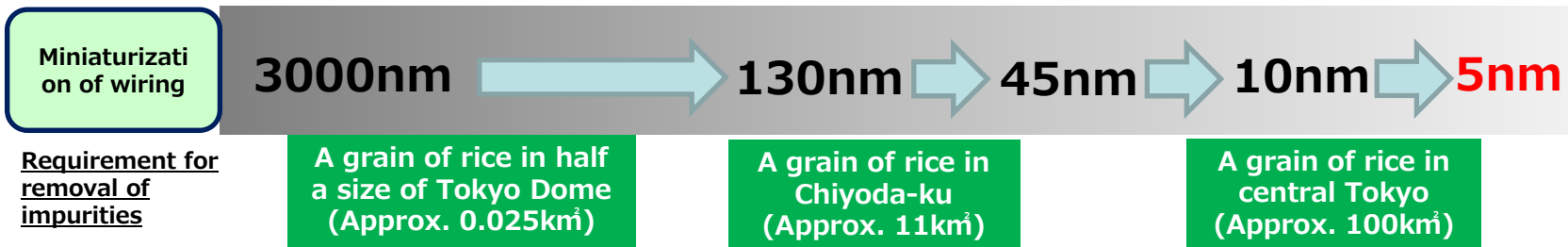
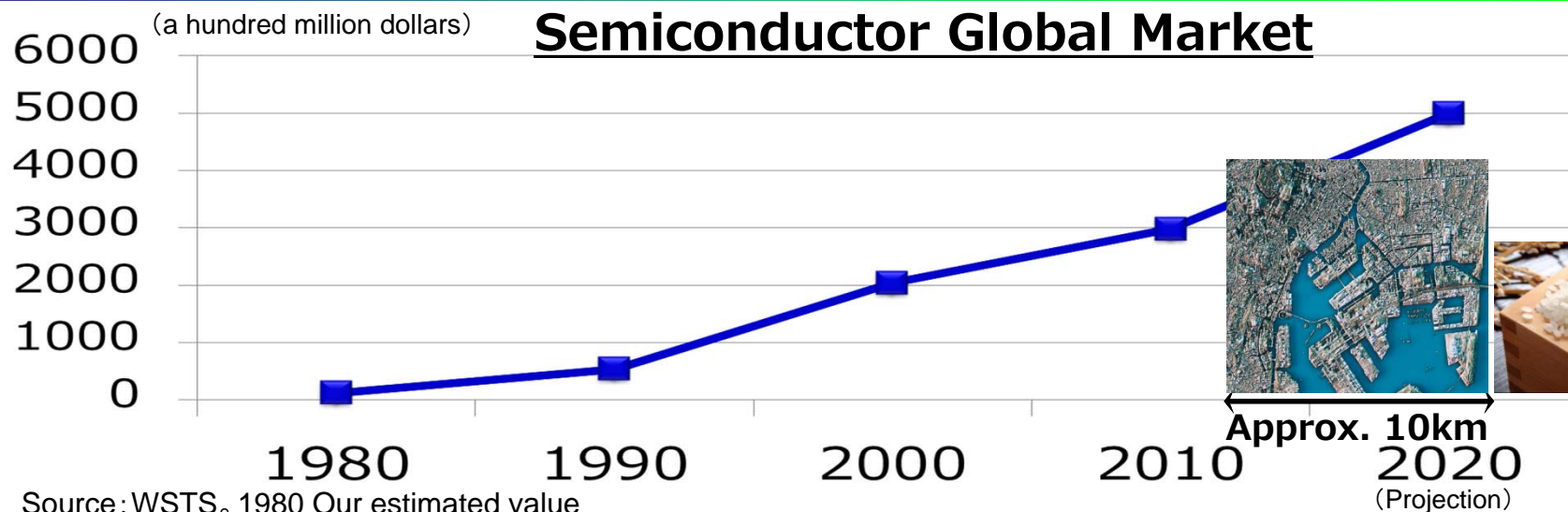
Semiconductor Field



Businesses Related Semiconductor Industry



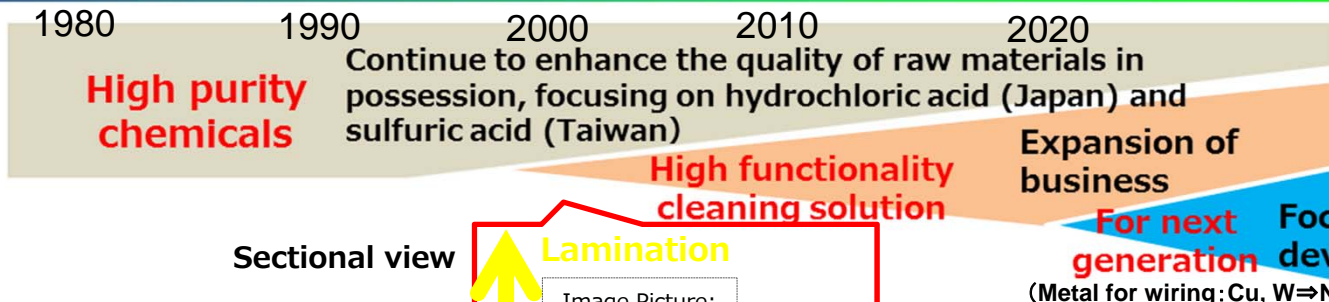
High Integration of Semiconductor



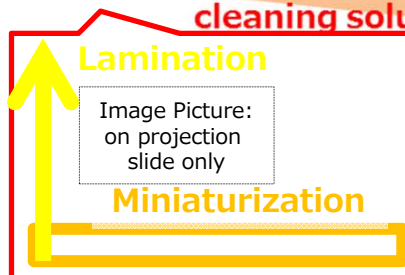
Prepared internally based on public information

High functionality cleaning solution

Our products and strategy

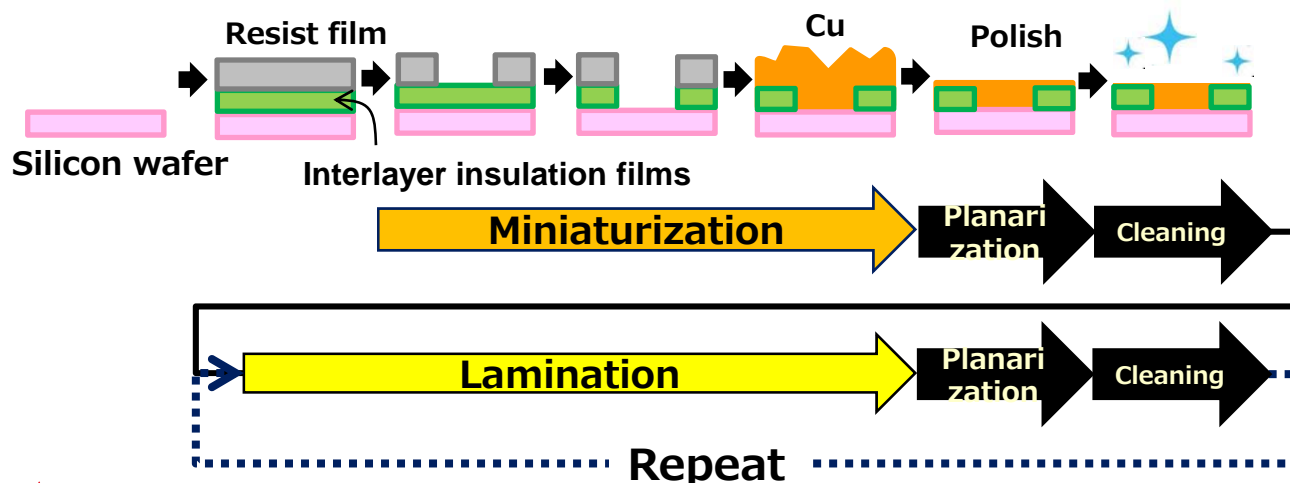


Sectional view



Semiconductor manufacturing preprocess

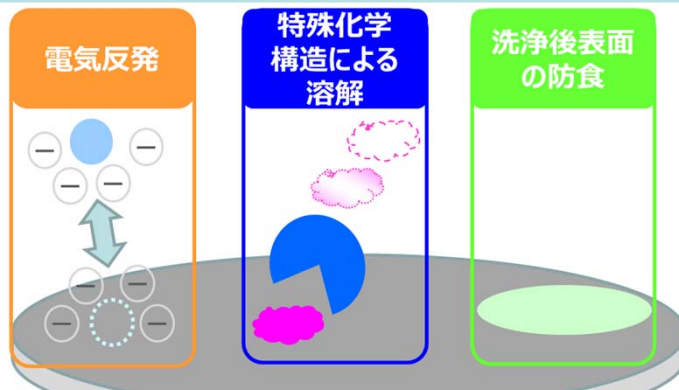
Silicone wafer manufacturing	IC chip manufacturing					
	Film forming Resist coating	Exposure	Etching	Formation of wiring	CMP	Cleaning



Our Strength

High integration of semiconductor ⇒ Proceed with miniaturization of wiring ⇒ **Need to adopt new materials and remove minute impurities** ⇒ **Adoption of new cleaning solution**

Three major requirements (Cleaning mechanism)



Si wafer surface

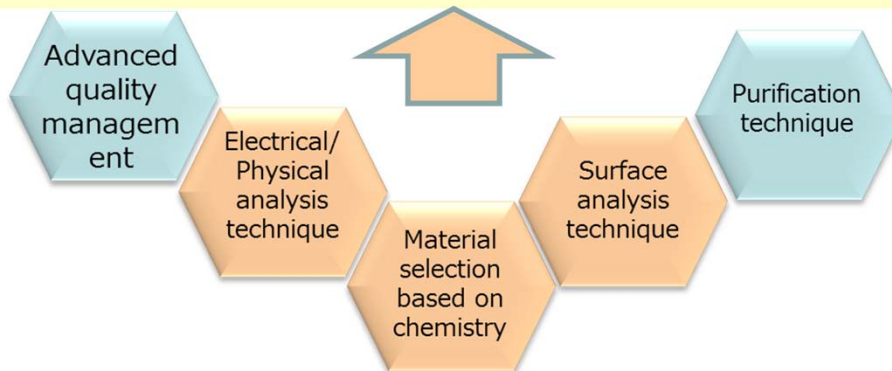
Potential control by surfactant

Bond cleavage by additive agent

Film forming by anticorrosive agent

Our strengths

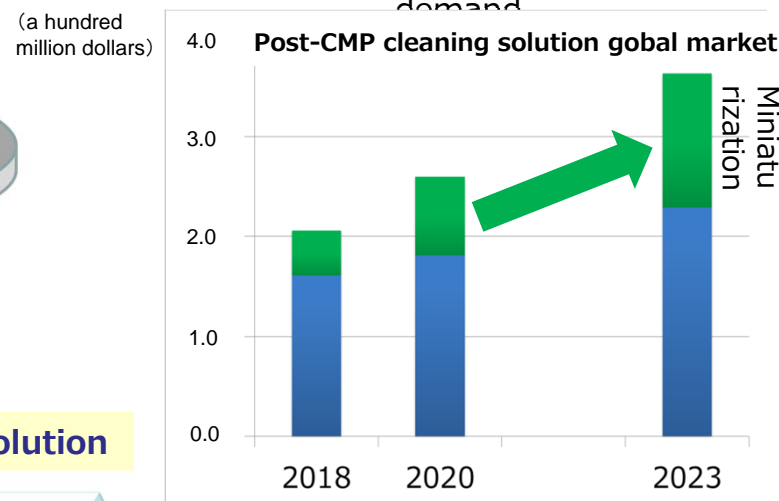
Select an optimal combination of cleaning solution



We design and propose combination of cleaning solution(=High functionality cleaning solution) which solve new problems for cleaning of the surface when new process is developed for customers.

Demand forecast

High functionality cleaning solution for miniaturization are driving the demand

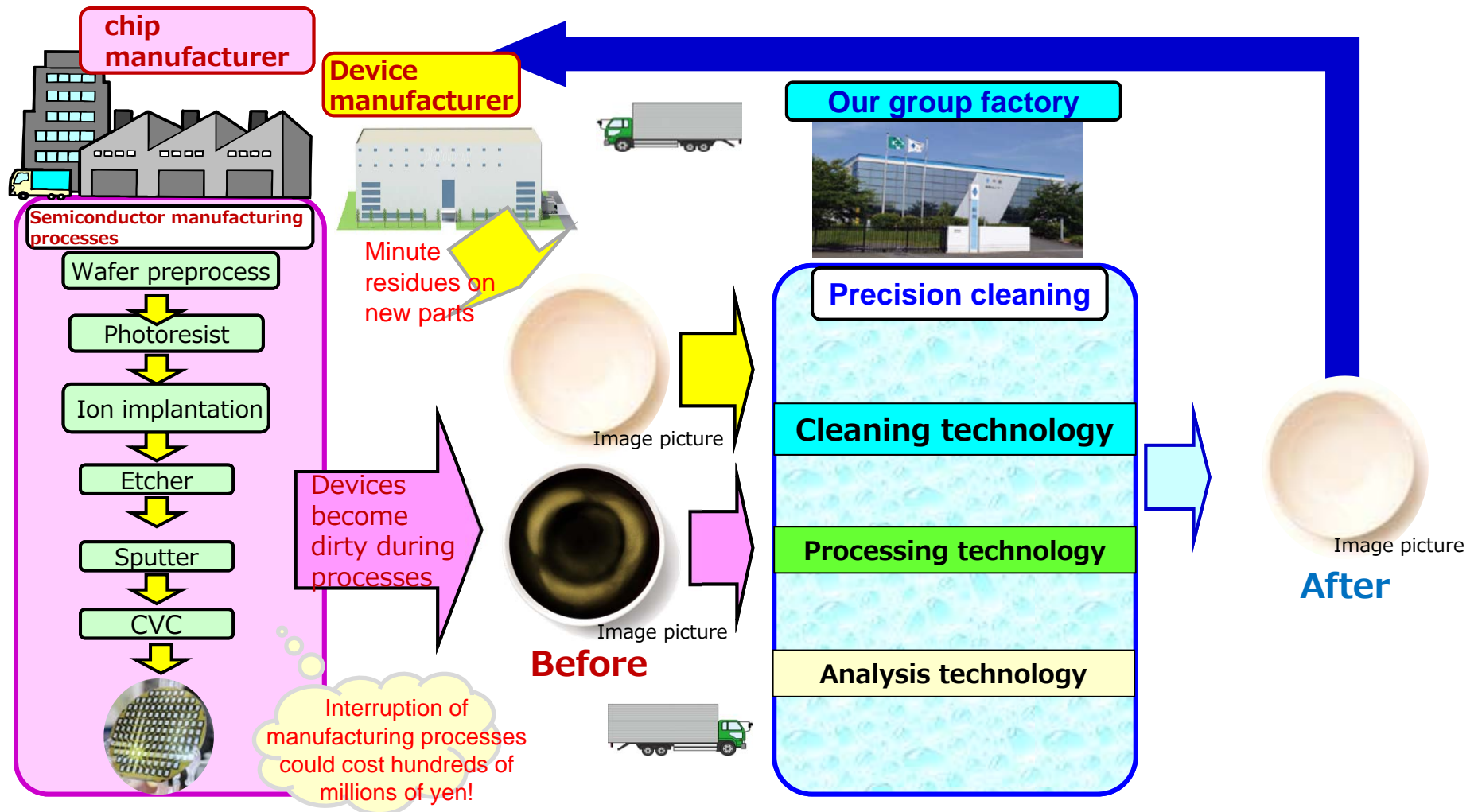


Source: LINX

Continue to concentrate our development resources on next-generation cleaning solution, and contribute to further miniaturization of semiconductor

Precision Cleaning Service for Semiconductor Manufacturing Devices

High integration of semiconductor ⇒ Proceed with miniaturization of wiring ⇒ **Need to remove substances adhered to devices and minute impurities** ⇒ Provision of precision cleaning service



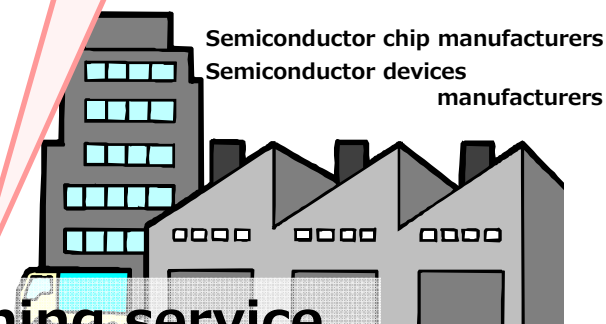
Our Strengths

We have precision cleaning recipes and quality assessment technology for **more than 30 thousand parts of various sizes**

Further expansion of business

Approx. 300 transactions per year

including new transactions; Recipes are created each time.



Precision cleaning service

MCC Group's technologies

A variety of cleaning/processing technologies in response to rapid and complex evolution

- Removal of adhered film { Etching, Blast
Brushing, Solvent immersion
- Removal of fine refuse { Ultrasonic cleaning
Water pressure cleaning
- Functional surface processing { Thermal spray processing

High precision cleaning assessment technology

- Cleanliness management
- Measurement/assessment technology



MCC Group

Establish our group bases near customers' factories

- Close coordination and shorter delivery time
- Reduced logistics cost

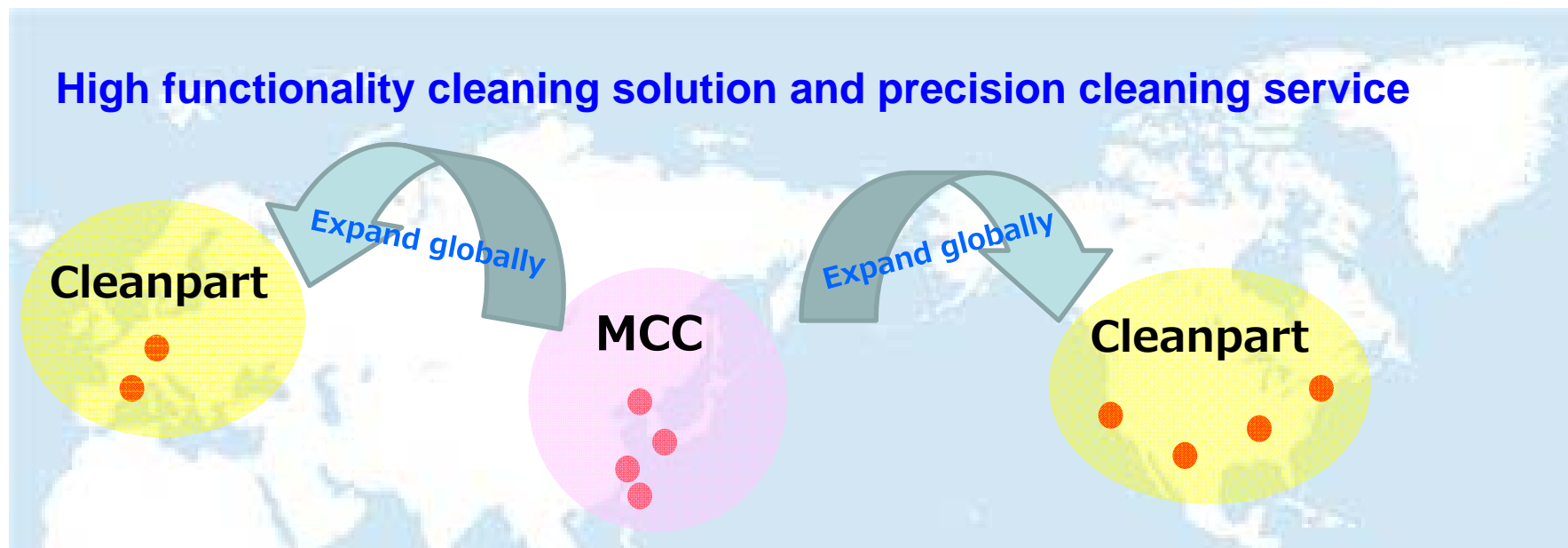


Development of cleaning technology in cooperation with customers

(Customize cleaning methods based on customer/semiconductor product/manufacturing process)

Development of new technology

Global Strategy in the Semiconductor Industry



In October 2018, we acquired Cleanpart with an aim to expand our precision cleaning service business globally.

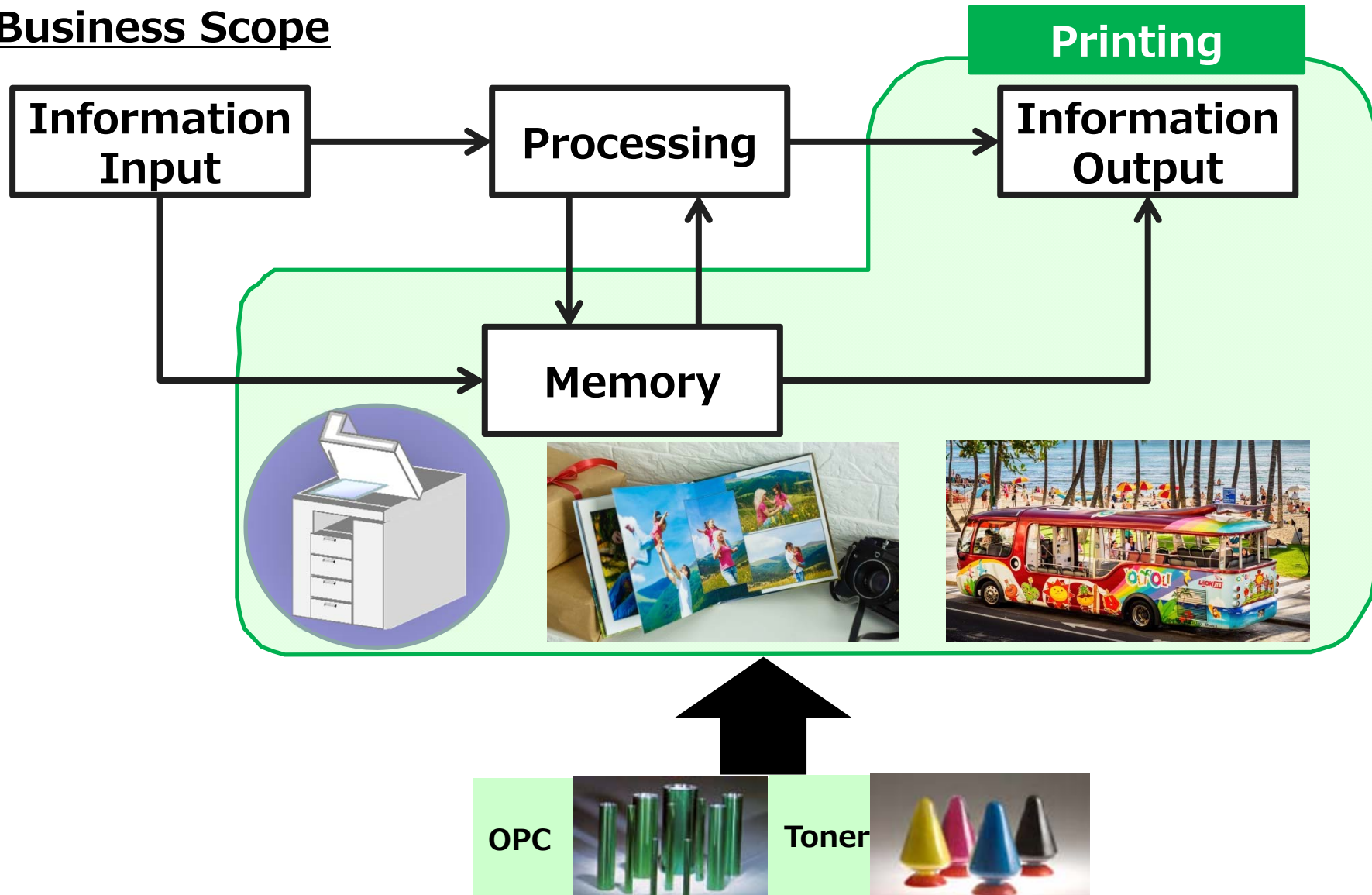
		Shinryo		Cleanpart
Major customers	Chip manufacturers	Japanese/Taiwanese manufacturers		European/U.S. manufacturers
	Device manufacturers	Tier-1	Japanese/ U.S. semiconductor device manufacturers	European/U.S. semiconductor device manufacturers
		Tier-2	Ceramic parts manufacturers	Vacuum pump manufacturers

No.1 in Japan

No.1 in Europe

Printing Field

Business Scope



Mechanism of Electrophotographic Printing and Our Products

We manufacture/provide OPC and toner required for electrophotographic printing (copy machines/printers).

Image Picture:
on projection
slide only



OPC (Organic Photoconductor)

A photoelectric conversion device, which generates electrical charge when exposed to light



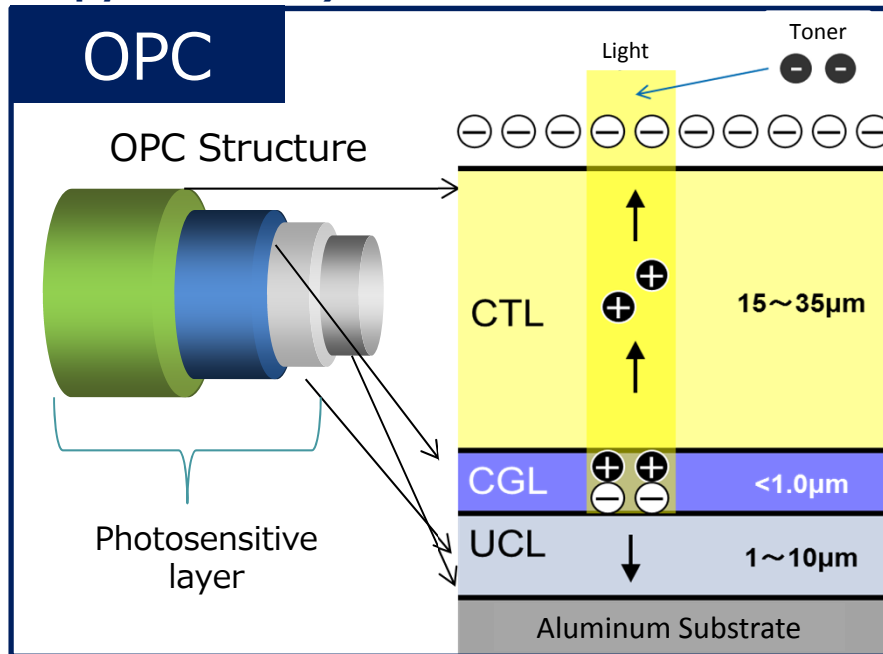
Toner

Colored fine particles that are chargeable



Our Strength

Functional components which play key roles in electrophotographic printing (printers and copy machines)



Toner One of the two leading manufacturers that specialize in toner

Grinded toner	Polymerized toner
Grind to small pieces	Grow particles
Easy to manufacture Various particle sizes	Control the size of particles Consistent size of particles

Consumer Needs

Client Requirements

Our Technologies

- Clear
- Fast
- Multifaceted
- Affordable

- High Resolution
- Faster speed
- High durability
- Energy efficient

OPC	Polymerized toner
<ul style="list-style-type: none"> Develop high quality materials within the company -High sensitivity/Fast response materials -Highly durable resin Advanced control of film forming Thorough quality control 	<ul style="list-style-type: none"> Advanced technology in particle design Advanced control of particle structure -Low temperature fixing -Highly durable (multilayer) structure Thorough quality control

Topics Related to Printing Business

We established our first OPC manufacturing base in Vietnam, where manufacturers of office automation equipment are concentrated as part of their China plus one strategy.

<p>[Company Name] Vina MC Infonics Co., Ltd.</p>	<p>Historical share of printer shipment</p>	<p>LOCATION</p>									
<p>[Location] Vinh Phuc Province, northwest of Hanoi</p>			<table border="1"> <caption>Historical share of printer shipment</caption> <thead> <tr> <th>Year</th> <th>Vietnam (%)</th> <th>China (%)</th> </tr> </thead> <tbody> <tr> <td>2013</td> <td>~40</td> <td>~50</td> </tr> <tr> <td>2017</td> <td>~50</td> <td>~40</td> </tr> </tbody> </table>	Year	Vietnam (%)	China (%)	2013	~40	~50	2017	~50
Year	Vietnam (%)	China (%)									
2013	~40	~50									
2017	~50	~40									
<p>[Scheduled launch of operation] August, 2020</p>											

Exit from grinded toner business

<p>The market for grinded toner struggled to grow while the price competition intensified with emergence of Chinese manufacturers.</p>	<p>Difficult to sustain growth</p>	<p>We ceased the operation of grinded toner manufacturing in March 2019, and shifted our focus to polymerized toner.</p>
--	------------------------------------	--

Our Initiatives Related to Commercial Digital Printing

Focus on OPC sheets used in commercial digital printing, which is expected to grow in the future

< Adapt to the era of "Individual" and "Diversity" >

Features	Capable of variable printing. High resolution close to that of offset printing
Usage	Documents (Photo books, textbooks, rare books), labels, packaging (soft packaging), transportation, textiles



Examples of application	Image Picture: on projection slide only	Image Picture: on projection slide only
Type	Small quantity	Large quantity
Printing method	Commercial analog printing Offset, rotogravure	Commercial digital printing Electrophotographic, inkjet
Information ⇒ Processing ⇒ Printing	Prepare press plates	Direct
Delivery time	Long	Short
Lot	Large lot	Small lot

Development of soft packaging materials

Soft packaging

Image picture

- Lamination material
- Adhesive agent
- Coating material
- Ink
- Primer material
- Base



[Characteristics of OPC sheets]

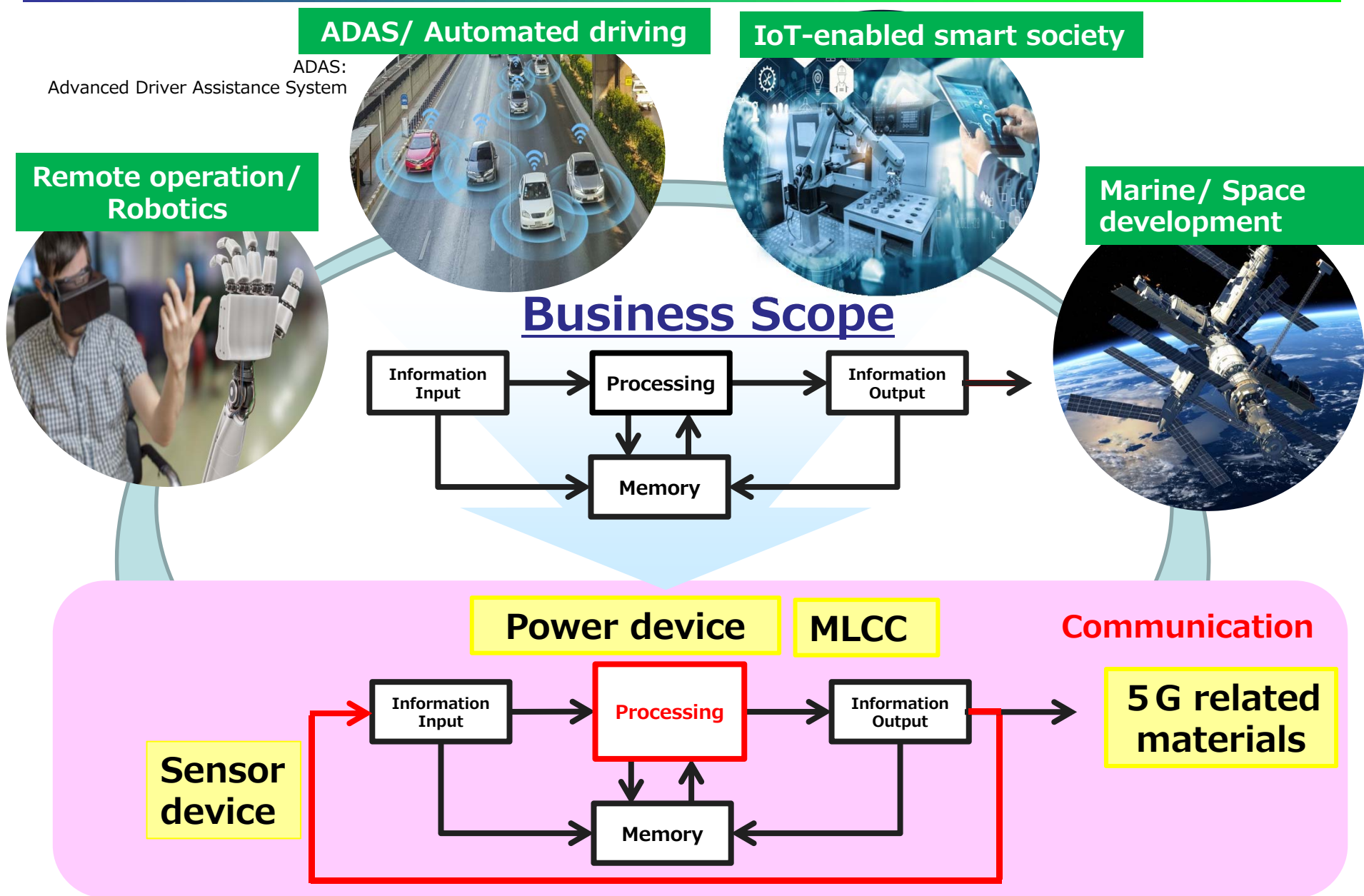
- We have mass production technology which we developed over the years.
- We are the only company that manufactures OPC sheets in the industry.
- We manufacture PET film in-house, which is the base material.
- We can apply them on more flexible films by using our own photosensitive materials.

[Development of soft packaging materials]

- Heat-resistant lamination materials
- Environment-friendly waterborne coating materials
- Primer materials with superior adhesive performance (basecoat paint)

→ developed across MCHC Group

Expansion of Business Scope



Polyester Film for MLCC Process Materials

What is a multi-layered ceramic condenser (MLCC)?

It is an important component when driving an electric circuit of a device

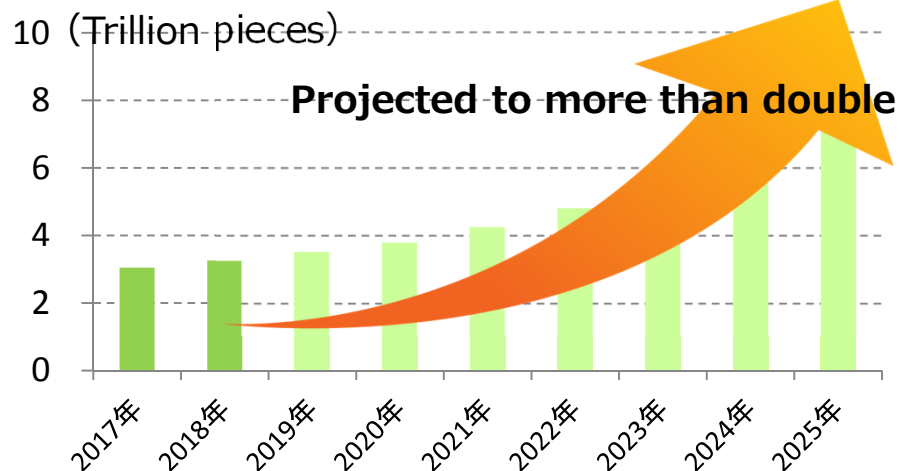
- Absorbs fluctuation of voltage by charging and releasing electricity
- Removes unnecessary noises
- Sorts out signals by frequency

Image Picture: on projection slide only

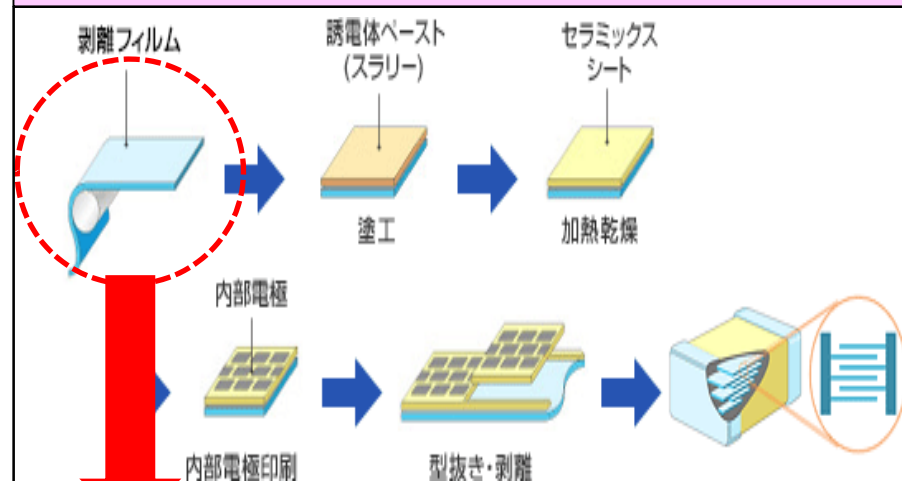
Approximately 700 or more MLCCs are used in one smartphone.

MLCC Demand Forecast

The demand is rising with advancement of ADAS and spread of IoT



Polyester films are used as materials for MLCC manufacturing process.



There are requirements for surface functionality of polyester films in order to enhance the capacity and performance of a condenser.

Planeness of surface

Reduction of scratches and foreign substances

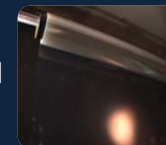
Etc.

Meet such requirements with MCC's manufacturing technology

Surface shape design

Various surface shapes

Thorough control of scratches and foreign substances

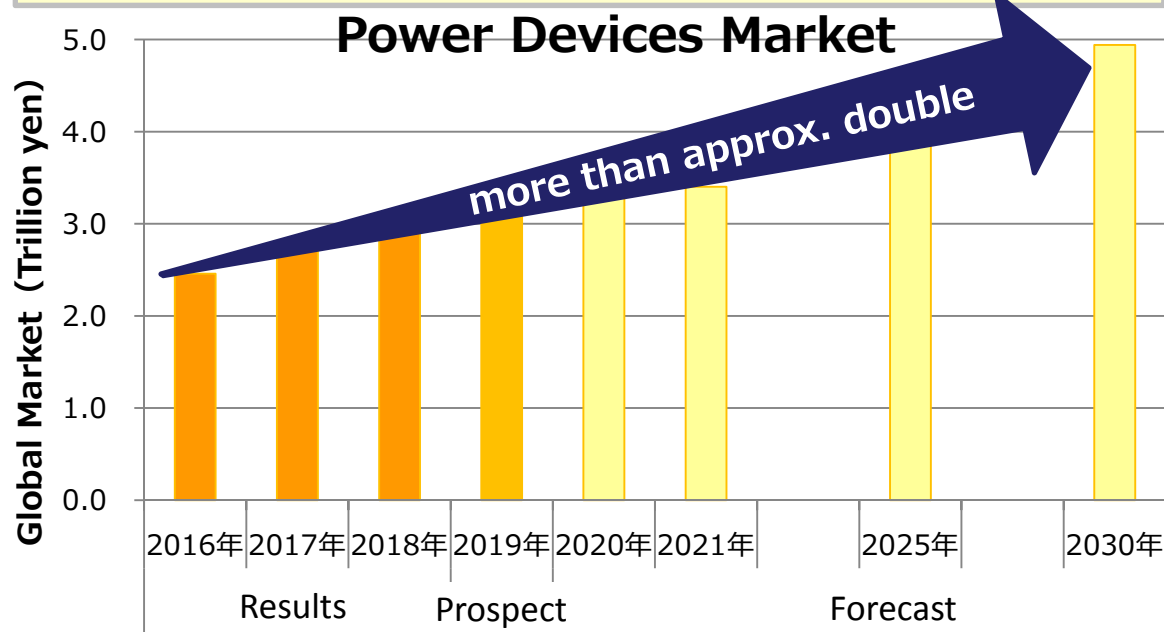


Power Devices Market

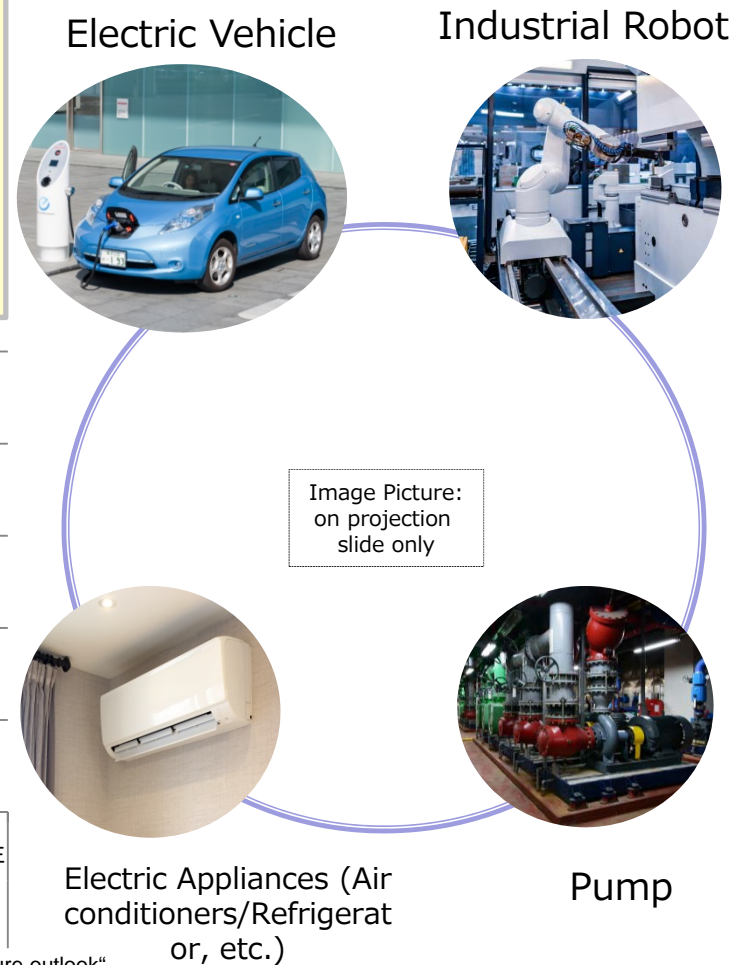
Power Device:

A device mounted with a power chip (semiconductor) that controls various electric currents (AC⇔DC, frequency control, etc.)

Usage: Various usages ranging from air conditioners (commercial) and robots (industrial) to EV (vehicle installation), etc.



Source: Fuji Keizai "2019 Next generation Power Device & Power electronics related device market present state and future outlook"



Materials related to MCC's power devices and products that have been (are being) developed

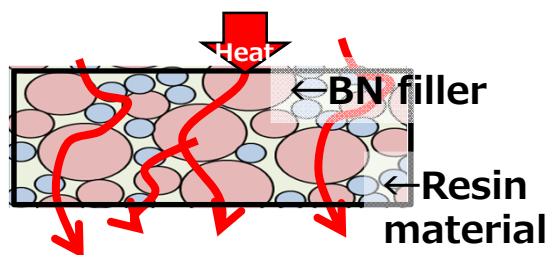
- Semiconductor material: GaN (under development)
- High heat-resistant material: Epoxy
- Heat-releasing materials: **BN filler (under development)**, carbon fiber

Heat-releasing Materials for Power Devices

Heat-releasing Materials:

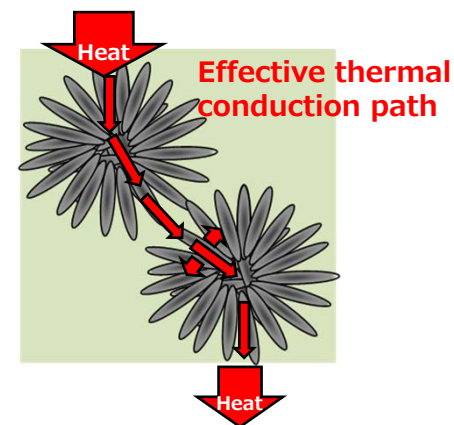
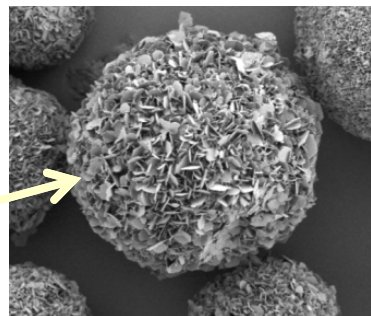
Heat produced from a large current flowing into a semiconductor around the switching part of a power device causes property degradation and breakdown of an electronic component. Heat-releasing materials are recently drawing attention as a material which lets out produced heat.

Structure of MCC's heat-releasing sheet



First Point - A filler structure that easily releases heat: Card-house type

Developed high thermal conductivity by adopting a card-house structure

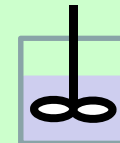


Second Point

MCC's own resin library



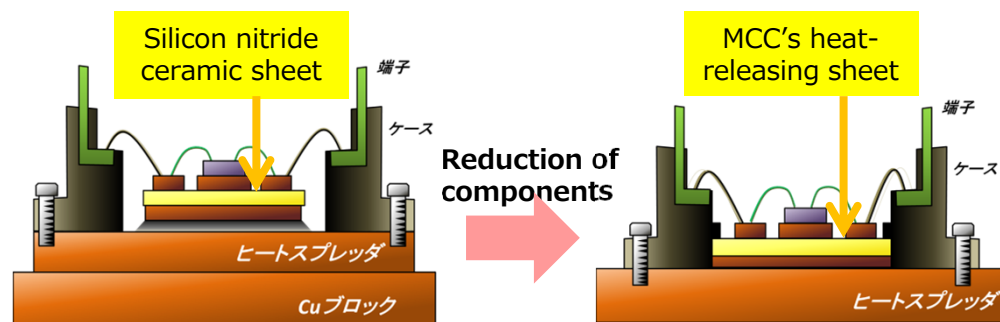
Formulation technology



enable

us to achieve desired sheet properties (heat-resistance, adhesiveness, etc.)

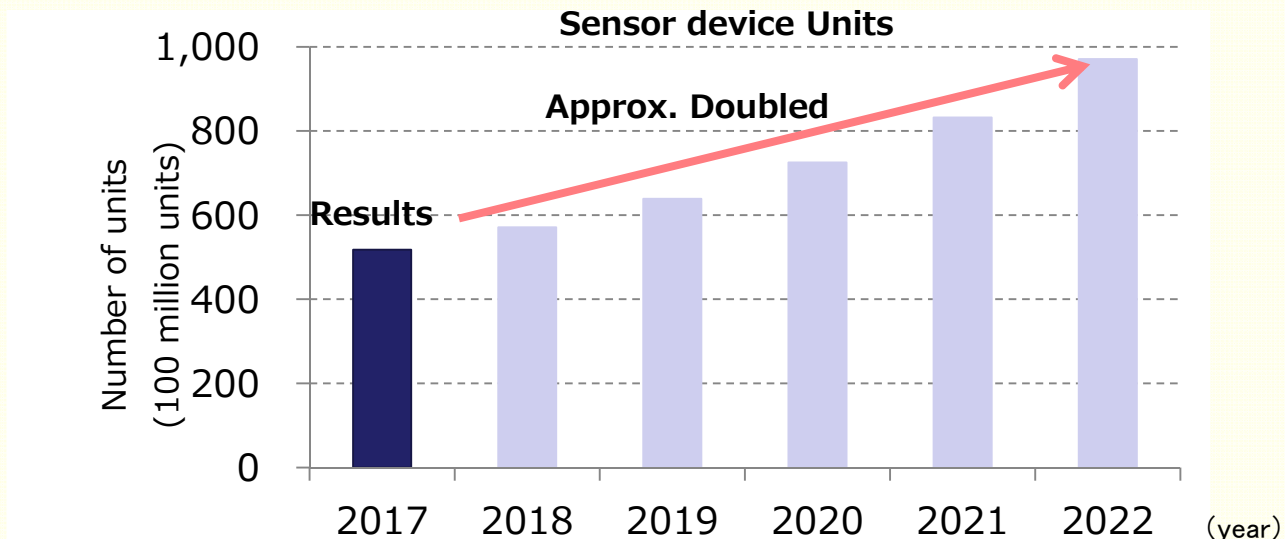
We can enhance the usability of sheets by controlling sheet properties, enabling reduction of modules and enlargement of area



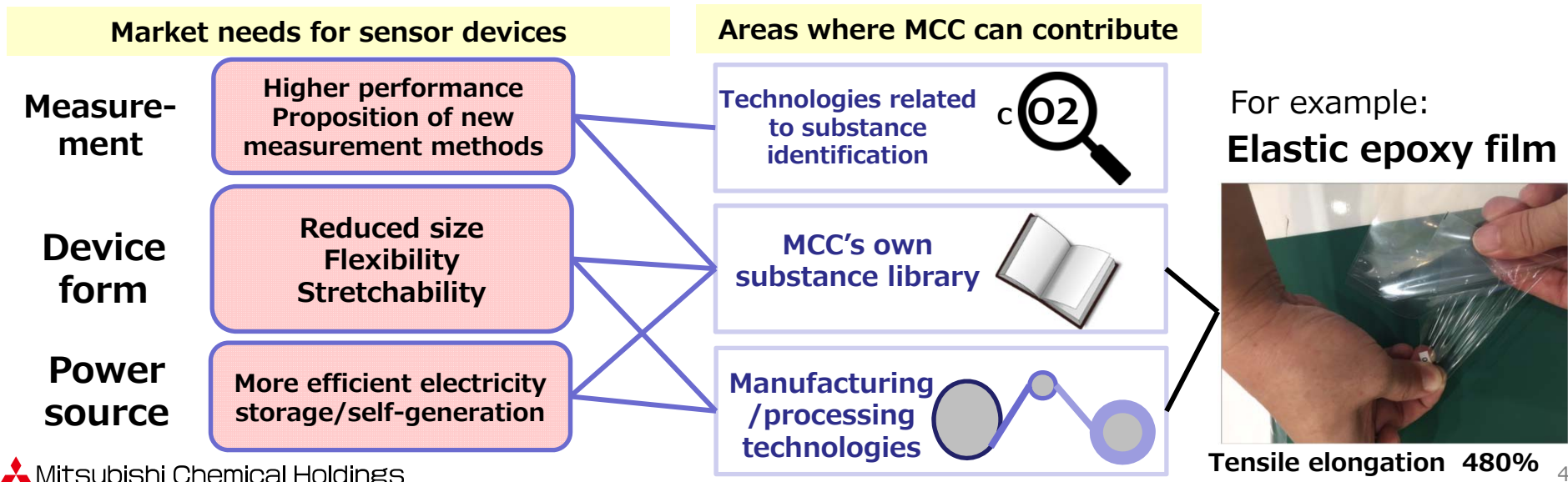
	Existing technology Silicon nitride ceramic sheet	MCC's heat-releasing sheet
Heat-releasing performance	○	○
Reduction of module components	○	◎
Enlargement of area (in response to integration)	△	○

Sensor Devices Market

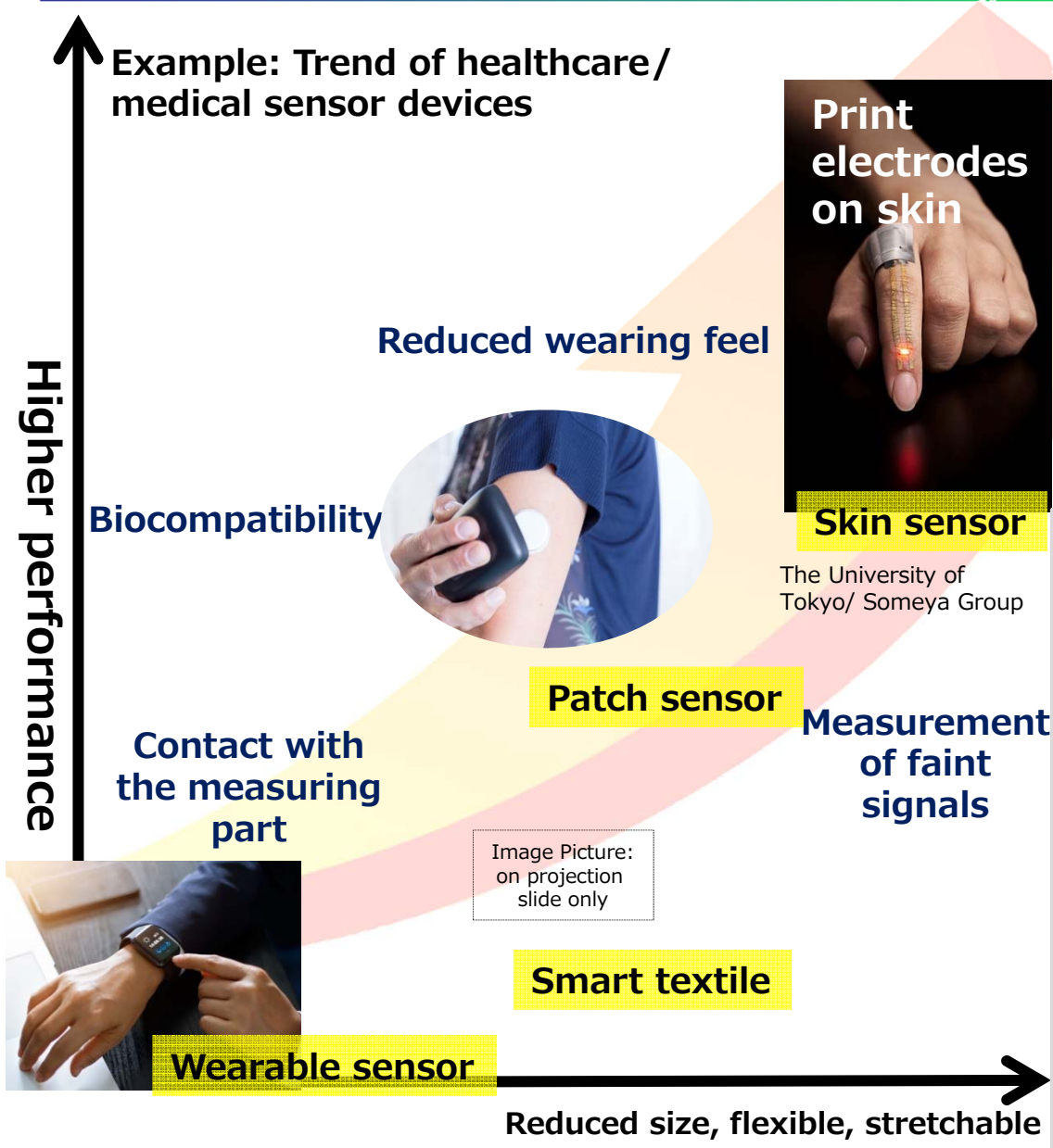
Numbers of sensor devices are under development, and it is predicted that the market spreads from now on.



Source: Fuji Chimera Research Institute, Inc_2019 Sensor device / big data · IoT market survey general statement



Examples of Materials Developed for Sensor Devices



The future enabled by skin sensors
Comfortable medical care without the feel of wearing sensors.

Electrocardiogram measurement

We are developing PVA nanomesh sheets for sensors jointly with Someya Group of the University of Tokyo

nano-mesh conductors

skin

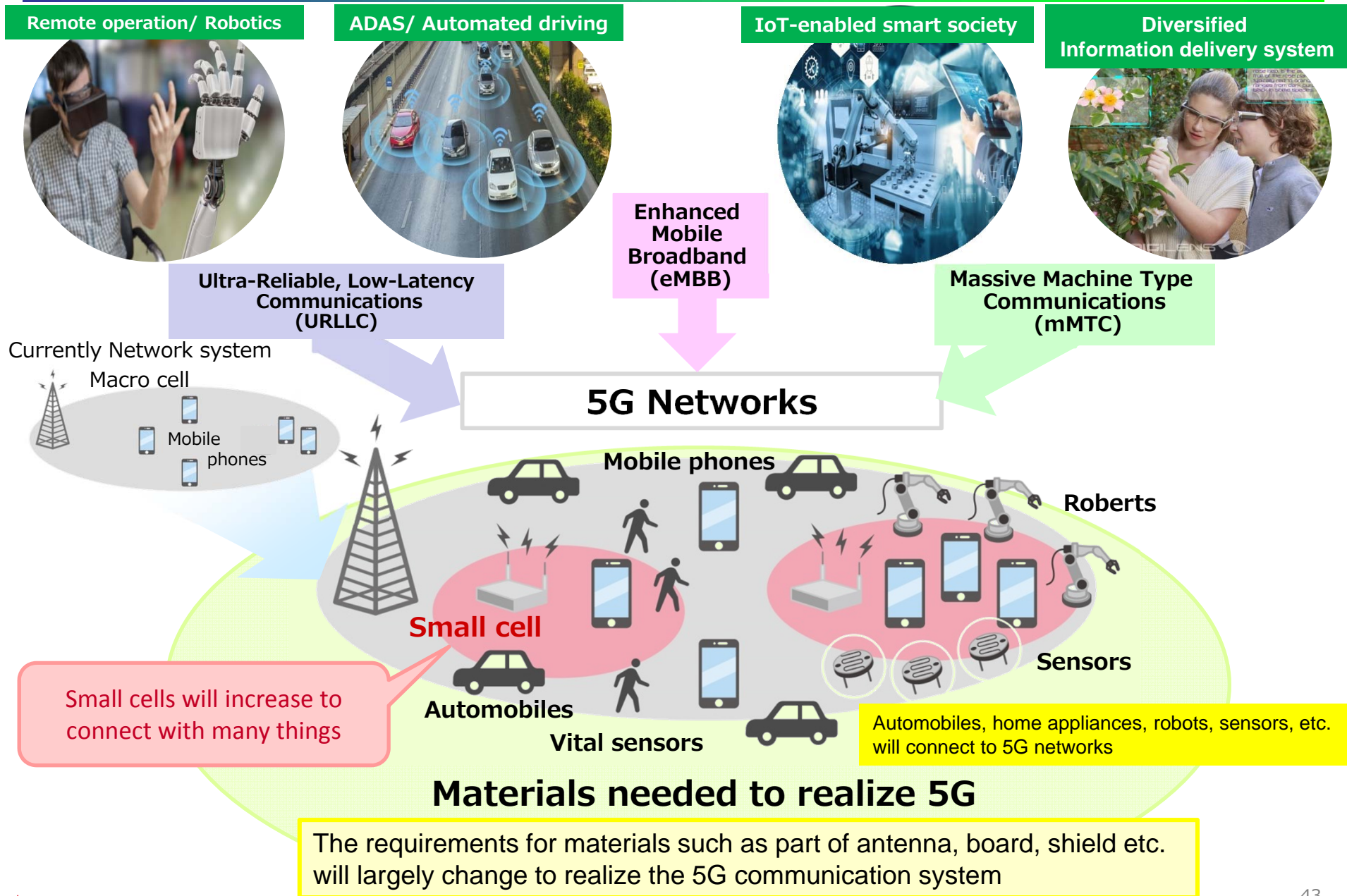
Au

PVA nanofiber

spraying water

PVA dissolved

5G communication as a foundation for future technology



Development of Materials For 5G Communication Devices

In order to put it into practice,

High Speed **Ultra low delay**

= need to reduce transmission loss

To that end

Materials which have low
Dielectric constant /
Tangent loss



Good Processability



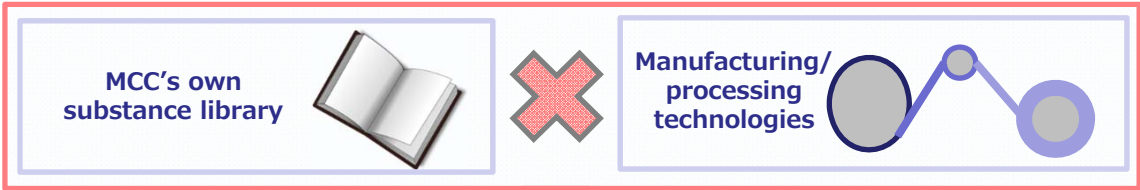
Good Adhesiveness



Cost



.....



· (Development Product A)
· (Development Product B)

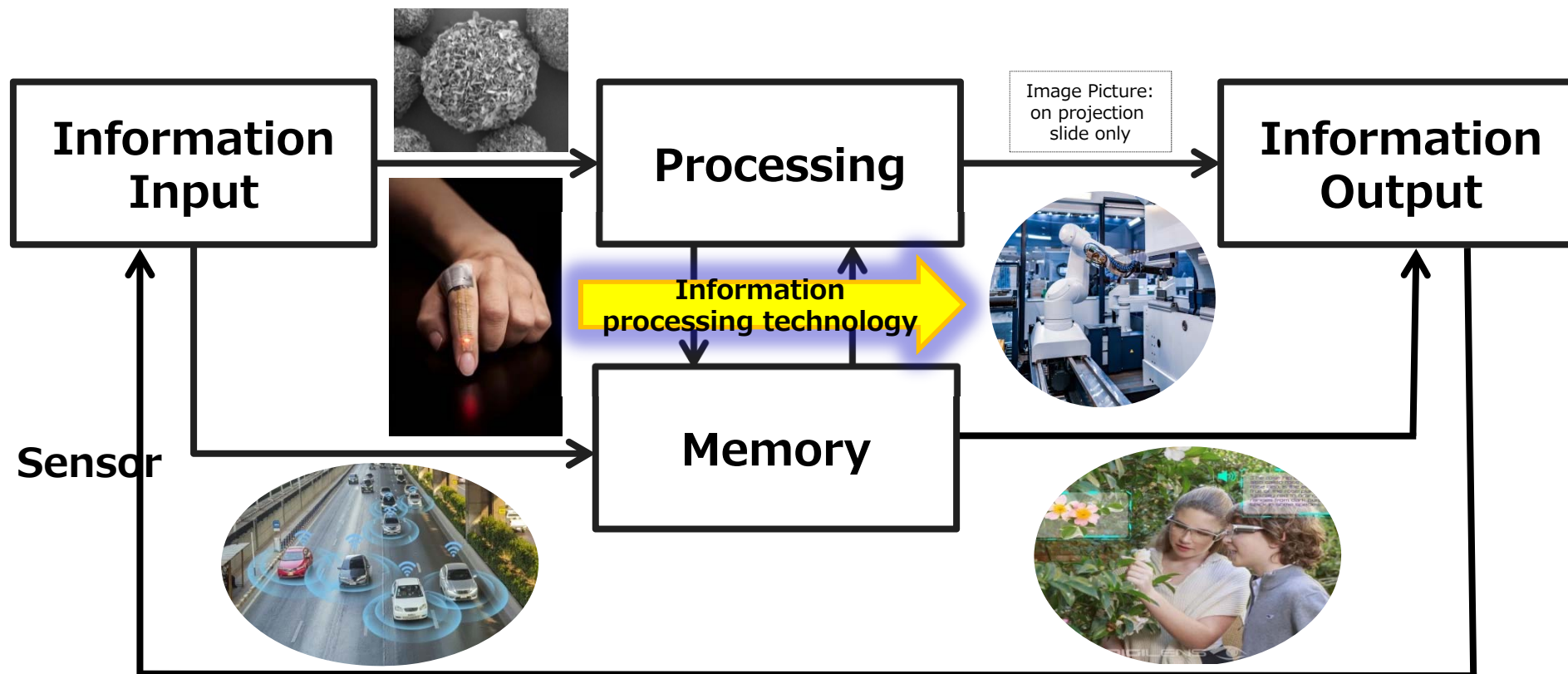
We can propose materials with low transmission loss through molecular design of substances and structural design such as porous structure

Image Picture:
on projection
slide only

We will actively invest in research and development so we can offer materials needed for realization of 5G networks.

Information, Electronics & Display Business Domain

Provide products and services based on chemical technology to related industries that are centered on information processing technology



We aim to realize KAITEKI by responding to customer needs which are constantly advancing.

KAITEKI Value for Tomorrow

Mitsubishi Chemical Holdings Corporation IR Day 2019

Advanced Polymers Business Domain

May 30, 2019

Motohiro Seki

Managing Executive Officer

Chief Operating Officer, Advanced Polymers Business Domain

Mitsubishi Chemical Corporation

 Mitsubishi Chemical Holdings Corporation



Today's Agenda

1. Overview

Business model, Organization & Products,

Revenue mix by End Market, Target for 2020 and 2025

2. Business Environments

Trend of Society, Trend of Performance Polymers, Circular Economy

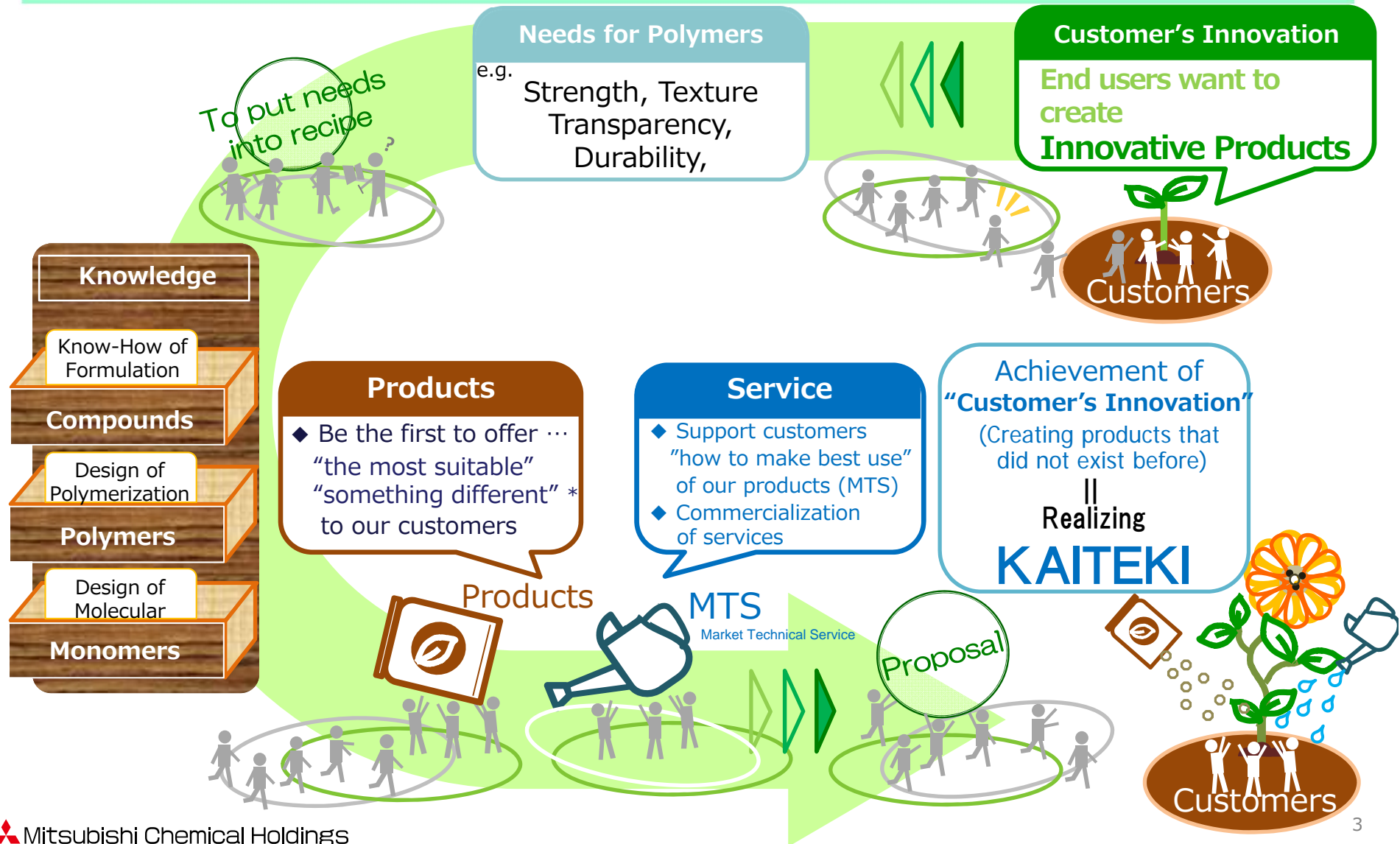
3. Business Strategies and Measures for growth

Domain, Division, Approach to growth (M&A)

4. Summary

1. Overview Business Model

We offer best products and services in the fastest manner to enable our customers to realize innovation



1. Overview Organization and Products

3 divisions provide numerous solutions and realizing KAITEKI

Advanced Polymers Business Domain

Sustainable Resources Div.

- Bio-based Plastic^{*1}
- Biodegradable, Ocean Degradable Plastic
- DURABIO™
- BioPBST™
- GOHSENOL™^{*2} (PVOH)



Engineering Polymers Div.

- Polycarbonate (PC)
- Polybutylene Terephthalate (PBT)
- Special type of Engineering Plastic



Performance Polymers Div.

- Thermoplastic Elastomer
- Vinyl Chloride Compounds
- High Performance Polyolefin
- High Gas Barrier Resin -Soarnol™^{*2} (EVOH)



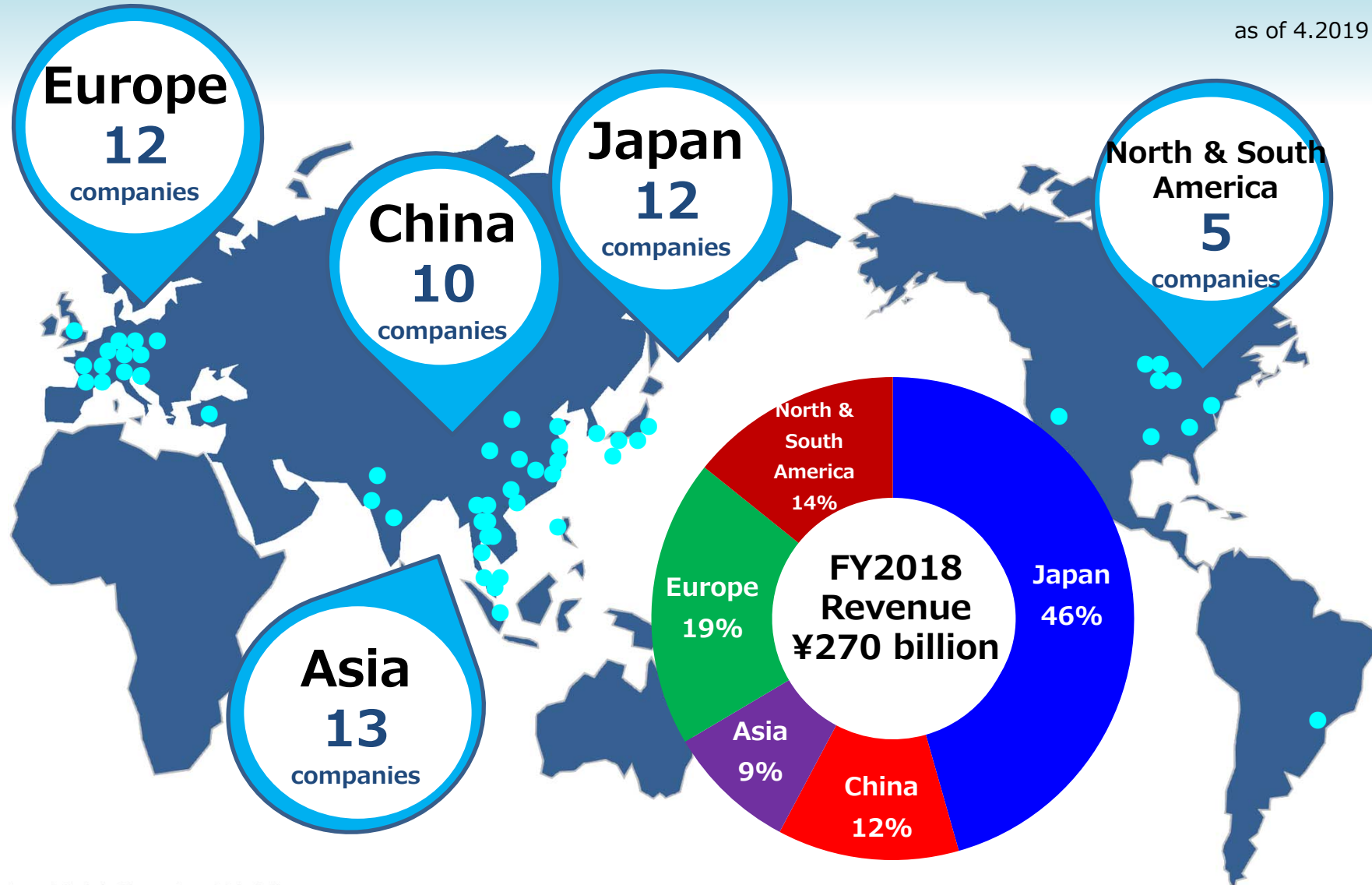
*1 Products are made from Renewable Resources

*2 Products were developed by former Nippon Gohsei

1. Overview Global Locations

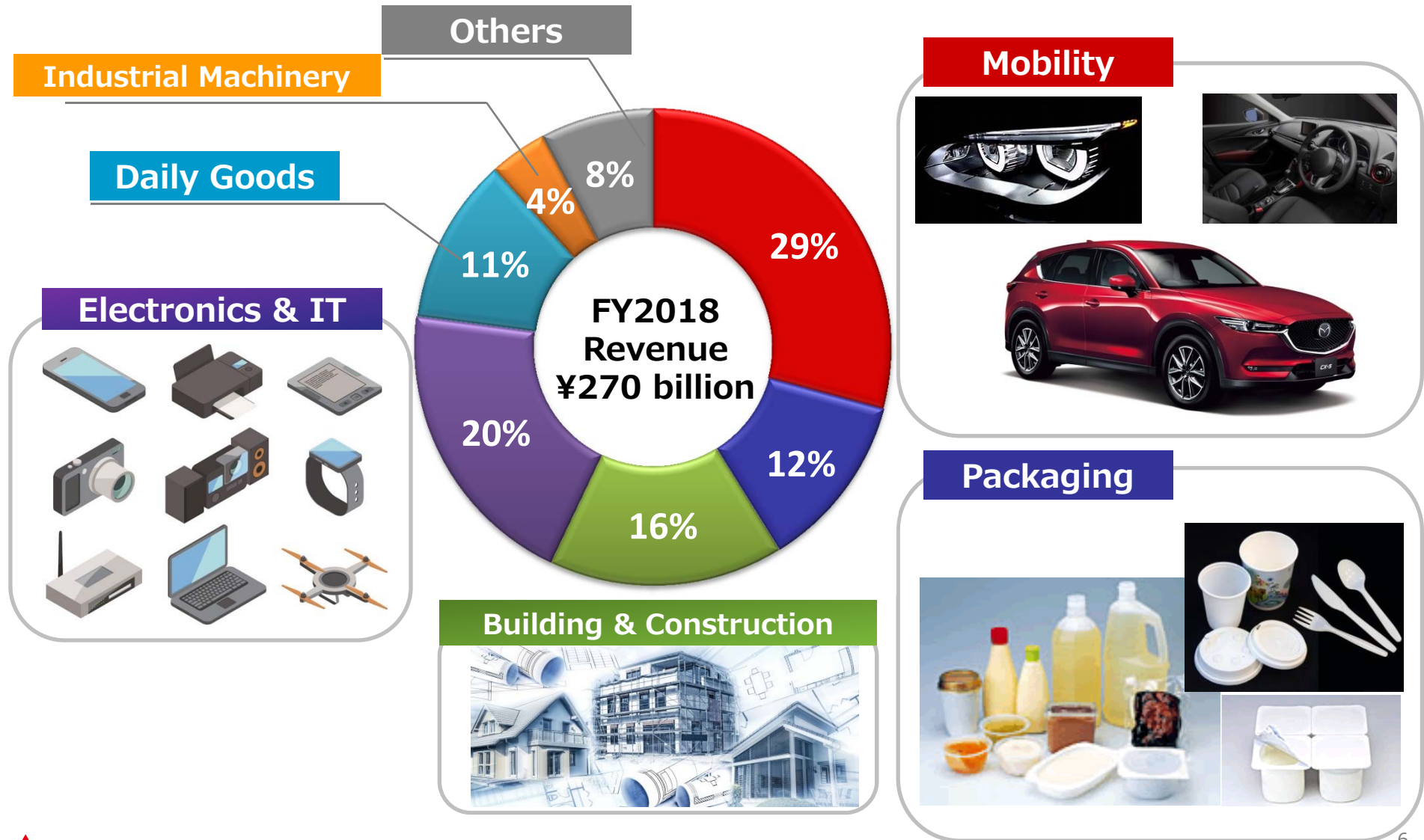
We expand our locations to provide solutions to customer globally

as of 4.2019



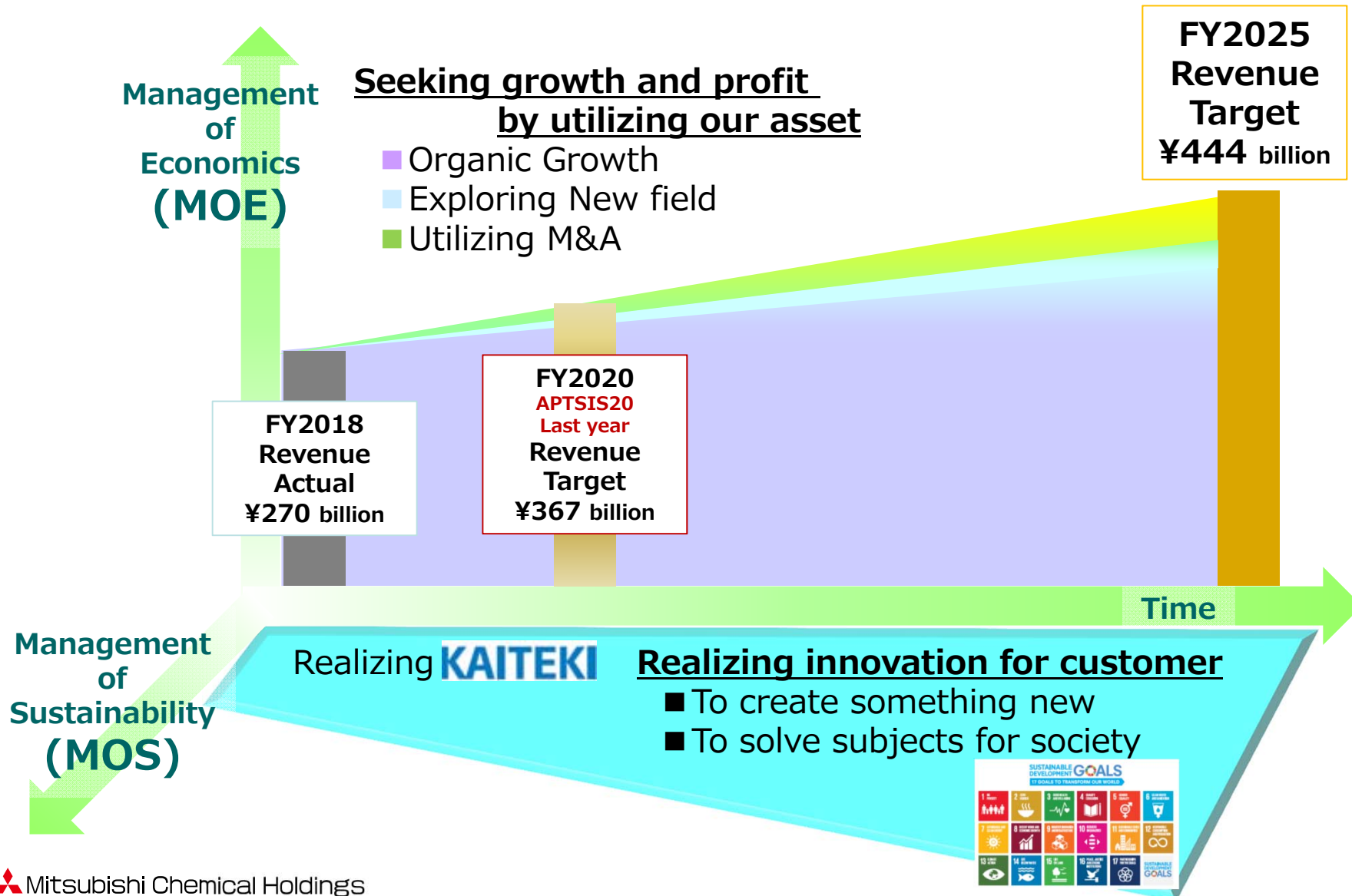
1. Overview Revenue mix by End Market

We provide solutions with high performance in a wide range of fields



1. Overview Revenue Target for 2020 and 2025

We will continue to grow by utilizing our asset and realizing innovations for customer



2. Business Environments Megatrends and social needs

Mission, Vision, Corporate Slogan

Mission : We create innovative solutions globally based on our core values of Sustainability, Health and Comfort, striving for the well-being of people, society and our planet Earth.

Vision : Realizing **KAITEKI**

Corporate Slogan : **KAITEKI Value for Tomorrow**

Megatrends of Society

- Large scale climate change
- Water resource shortage and pollution
- Population growth and aging
- Rising Protectionism and Increasing Volatility
- Circular Economy
- Digitalization of industry, modularization, ICT

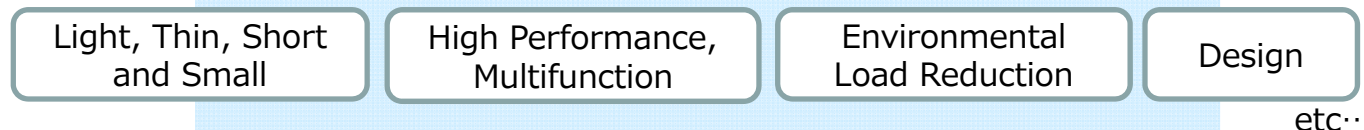
Our approach to social needs

- GHG Reduction
- Expansion of Recycle
- Plastic Waste Reduction
- Utilization of Renewable Resources
- Acceleration of Digital Revolution
(5G, AI/IoT etc)
- Evolution of Mobility
(EV, ADAS^{*1}, CASE^{*2} etc)

2. Business Environments Market of Performance Polymers

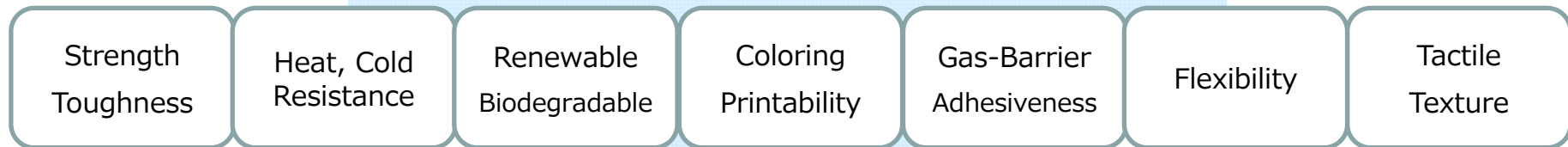
Issues arises by evolution of Society and Tech.

Diversification and Advancement of Needs for Products



etc...

Diversification and Segmentation of Needs for Materials



etc...

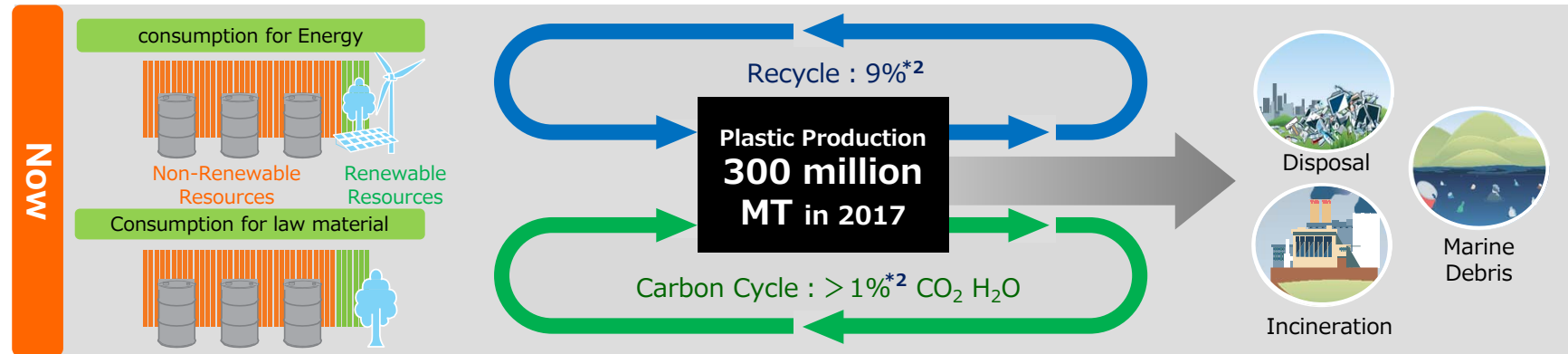
Performance polymers market is expected to grow, which combine polymer designing and compound tech to provide solutions for diversifying needs

(19million MT/Y in 2018 → Over 30million MT/Y in 2030*)

* : Our Estimation

2. Business Environments Circular Economy

Plastic Industry is facing serious issues



Plastics are useful and essential materials, and make our life rich

• Plastic production volume is booming around 20 times in this 50 years^{*1}

Whereas,

- 99% of Plastic raw materials are derived from Renewable Resources^{*2}
- About 10% of Plastic wastes only recycles^{*2}
- A large amount of Plastic wastes flow into Ocean

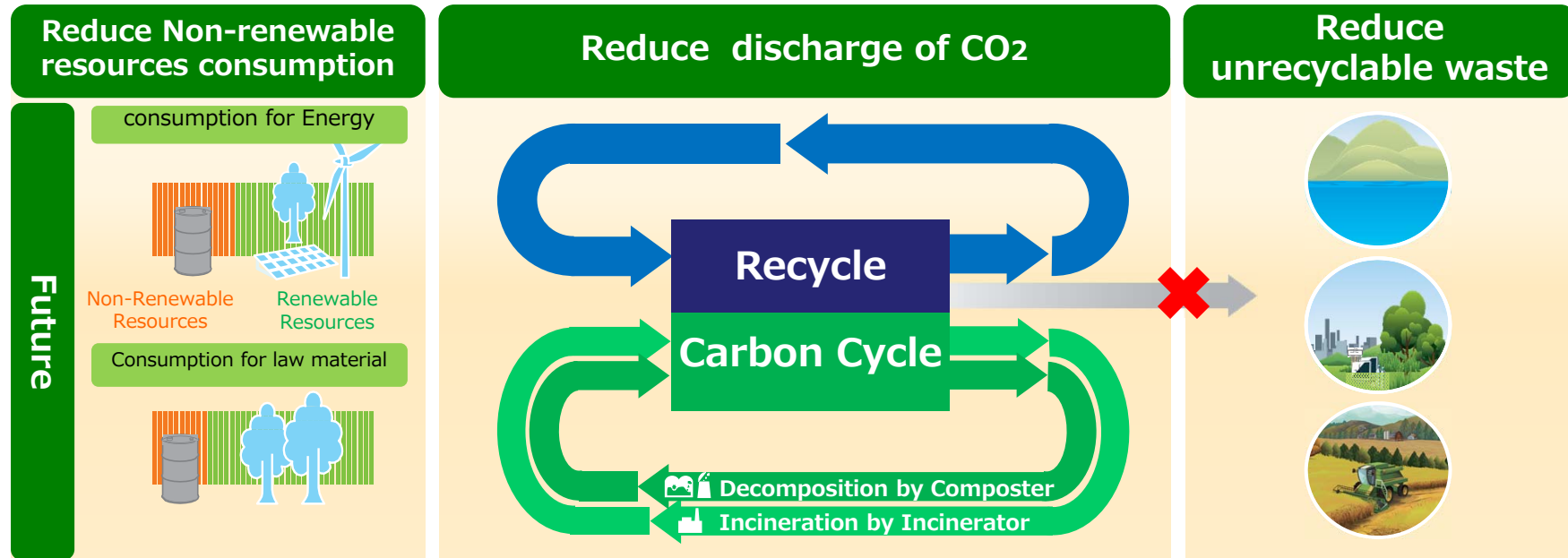
*1 : cf. World Economic Forum (2016)

*2 : cf. OECD, Improving Markets for Recycled Plastic(2018)

European Bioplastic, nova-Institute(2017) , Geyer,R.,et al., Science Advances, Vol.3(2017)

2. Business Environments Circular Economy

Performance Polymers have great role in Circular Economy

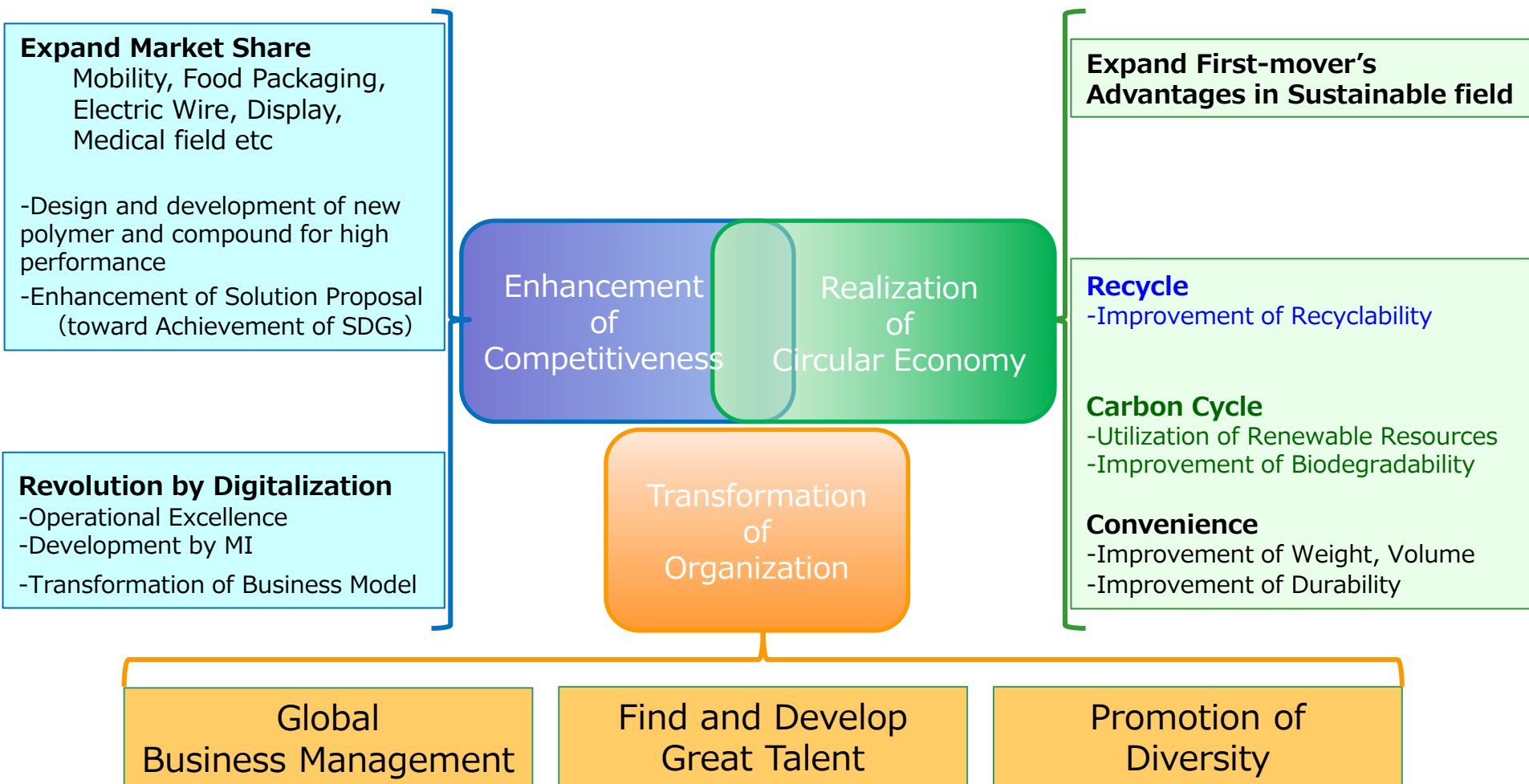


To realize Circular Economy

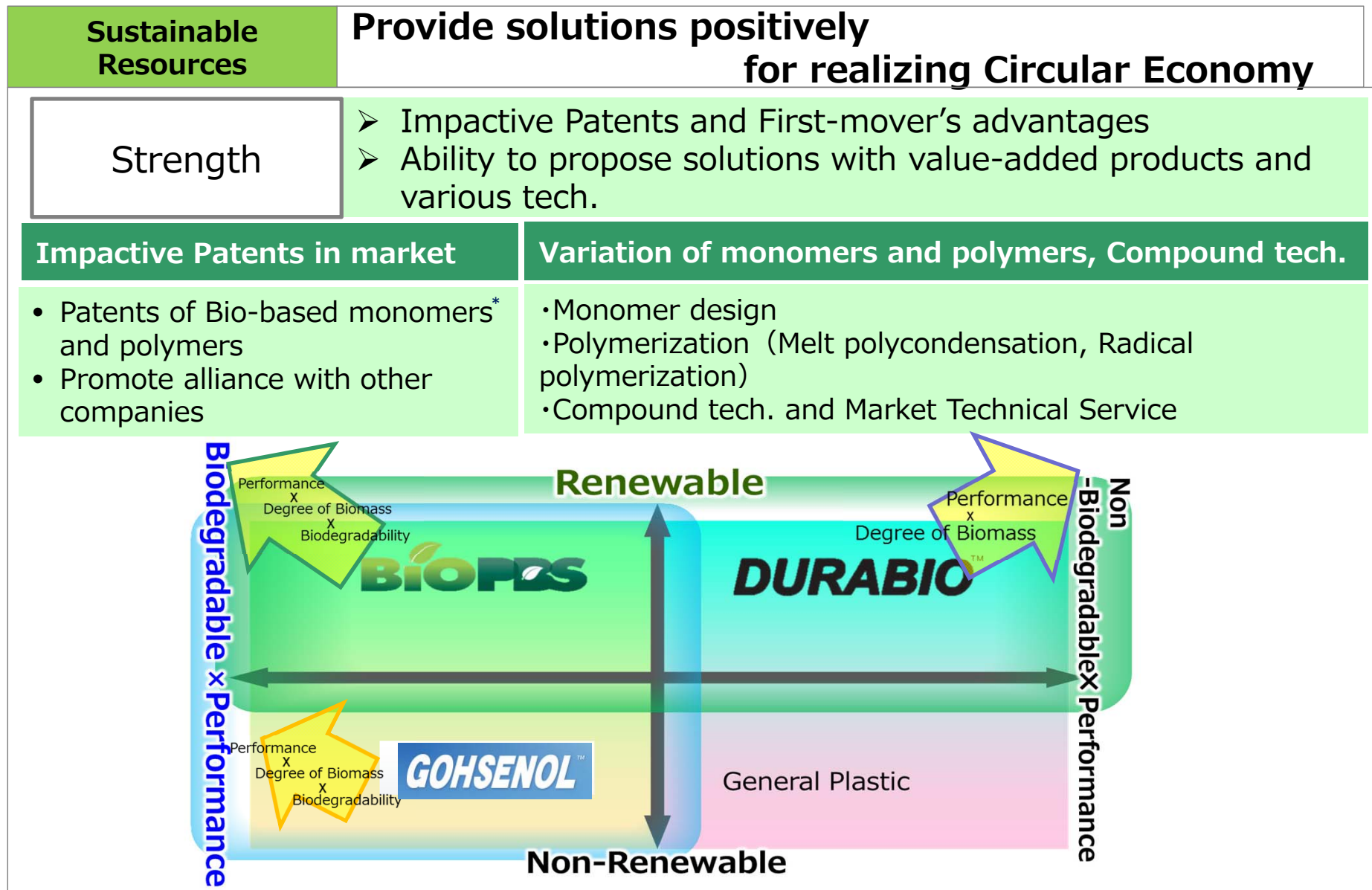
- **Recycle**
 - **Carbon Cycle**
 - **Convenience**
- Improvement of Recyclability**
Utilization of Renewable Energies
Utilization of Renewable Resources for Law Materials
Improvement of Biodegradability and Degree of Biomass
Improvement of Weight, Volume, Durability
- Reduction of CO₂ discharges
 - Achievement of SDGs

3. Strategies and Measures for growth

Strategy of Advanced Polymers Business Domain



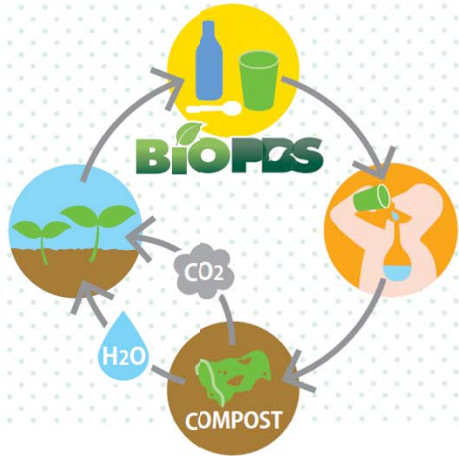
3. Strategies and Measures for growth Sustainable Resources



* : derived from plants.

3. Strategies and Measures for growth Expansion of BioPBS

Design and develop copolymer and compound for property requirements



Key Word
#Lamination on Paper and Film
[Contribution to Global Environment]

Expansion of Bio-Polyester



Key Word
#Food Packaging
[multi-functionalized]

Market Needs

Adhesiveness
 Sealing with low temp.

Flexibility
 Easy to process

Heat Resistance
 Support modification of another biodegradable resins

Ocean Degradable
 Control of degradability

Compatibility
 Easy to mix

Bio-Based
 Needs for Bio



Biodegradable
 Compostable



Food Packaging,
 Special sealant

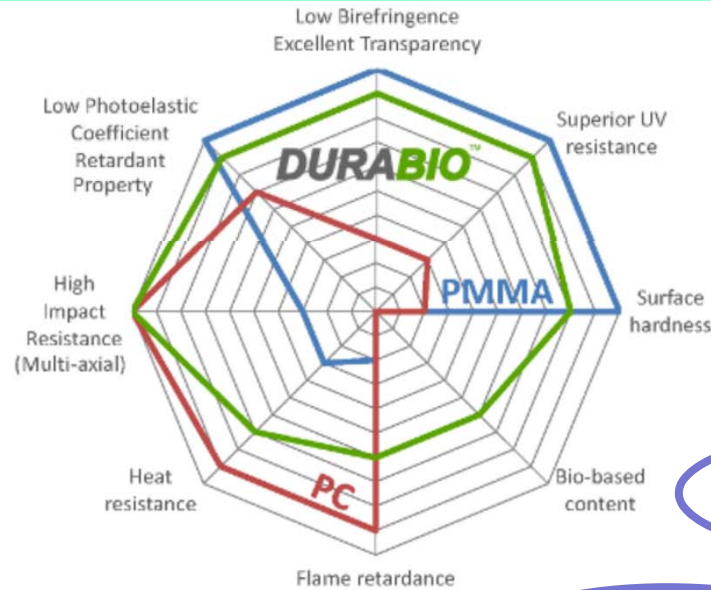
- Business Environments
- Regulations of Plastic Waste
 - Needs by Brand owner



Lamination on Paper products

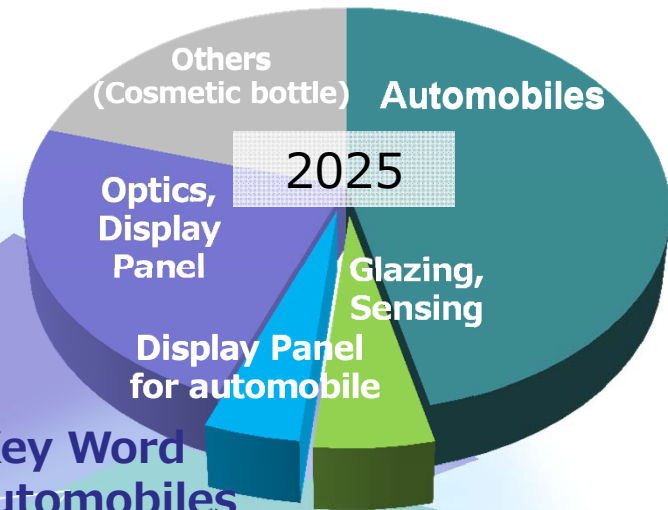
3. Strategies and Measures for growth Expansion of DURABIO

Design and develop copolymer and compound for property requirements



Key Word
#optical film
【Thin】

Expansion of Bio-polycarbonate



Key Word
#Automobiles
【Paint-Less】



Optical properties
Transparent,
low distortion

DURABIO™
Bio-Based
Needs for Bio

High Transparency
High coloring property

Business Environment

Improvement of Production Process for resolving Environmental issue and Rationalization

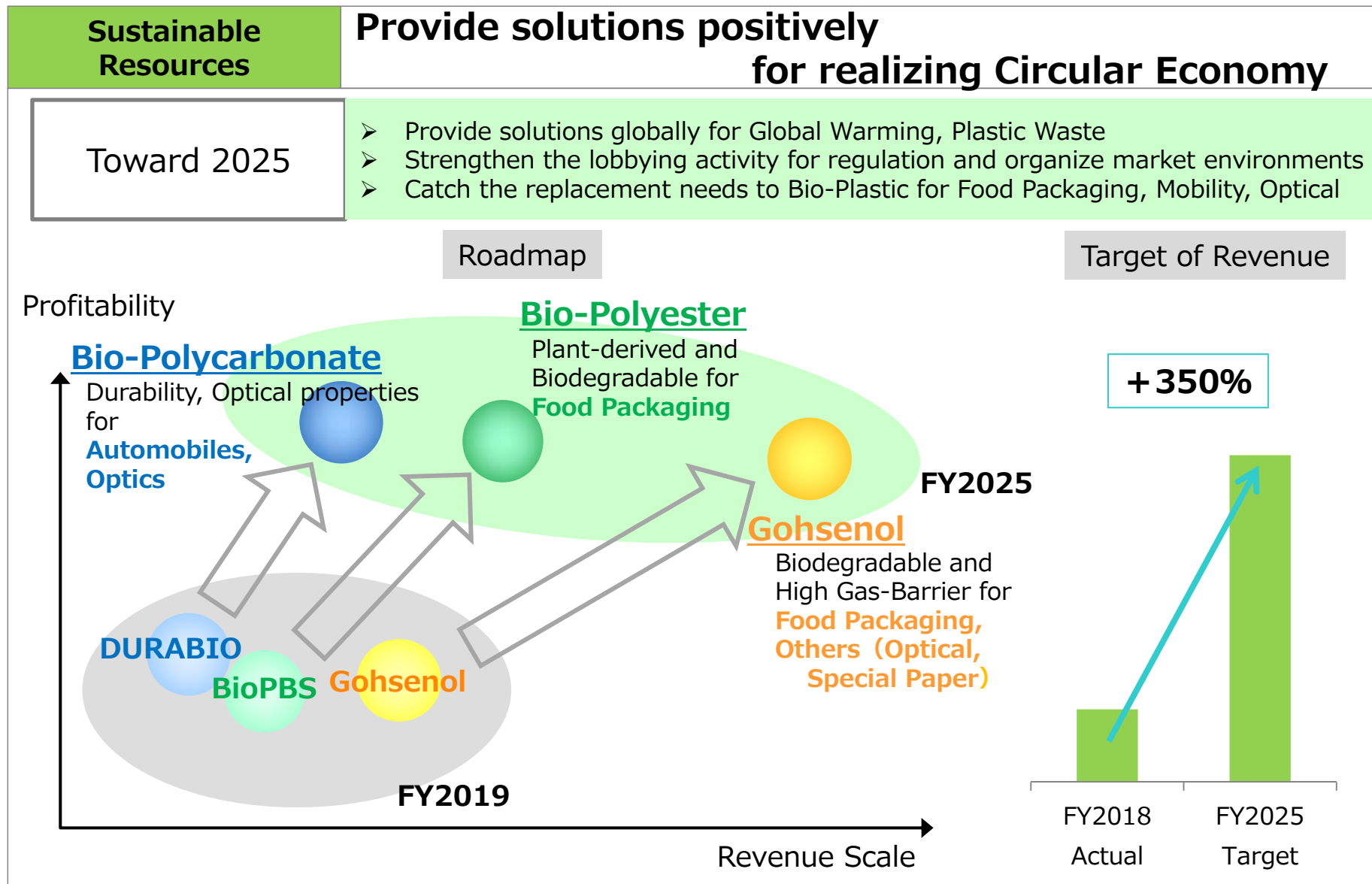
- Paint-less

Evolution of EV, ADAS

- Upsizing of panel for Automobiles
- Lightweight (Glazing)



3. Strategies and Measures for growth Sustainable resources



3. Strategies and Measures for growth Sustainable resources

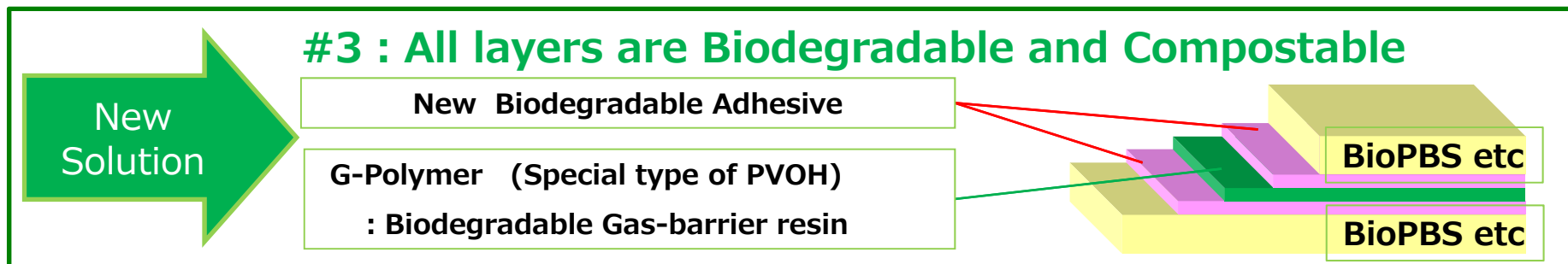
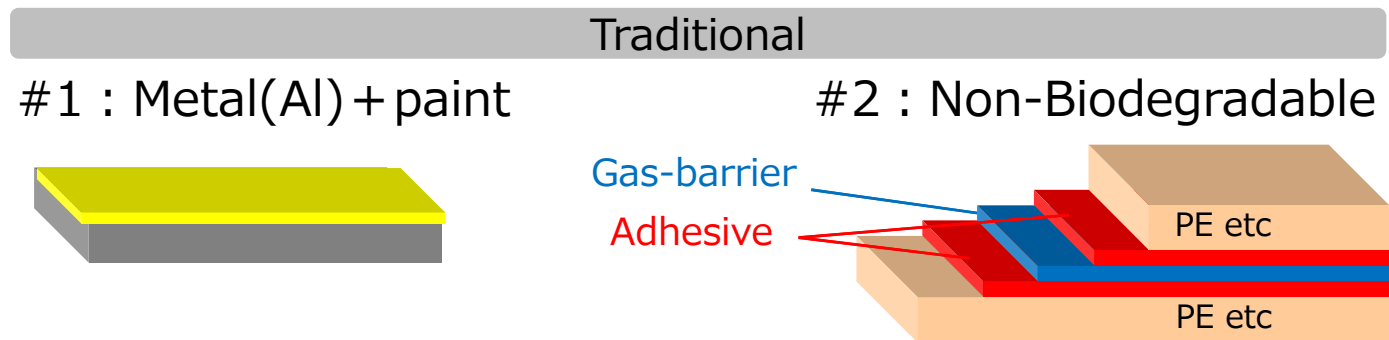
Synergy example with Gohsenol : Gas-barrier packaging with Biodegradable

Capsules for coffee



【Market Environment】

- ① Improvement of recycle after use
- ② Necessity of compost and garbage collection in EU
- ③ Ensure quality without food deterioration



3. Strategies and Measures for growth Engineering Polymers

Engineering Polymers	Deepening polymerization & compound tech., and Expand business globally in high value-added field
Strength	<ul style="list-style-type: none"> ➤ Polymerization tech. with low environmental footprint (Melting Method PC) ➤ Material Design tech. for property requirements ➤ Global Business Development (China, South East Asia, Europe, US)
Polymerization tech. with low environmental footprint	<div style="text-align: center;"> <p>Low Energy consumption</p> <p>Low Drainage consumption Non-Solvent</p> </div> <div style="text-align: center; margin-top: 20px;"> <p>● Sales office ★ Production site and sales office</p> </div>
<ul style="list-style-type: none"> • Low Energy and drainage consumption, Non-Solvent • Copolymerization using several monomers • Competitive cost 	
Material Design tech. for property requirements	
<p>Add properties using new monomer</p> <ul style="list-style-type: none"> - Special type of PC: Hardness, Formability, Heat resistance - Special type of Polyester: Transparency, Flexibility, Heat resistance <p>Add properties by Compound formulations</p> <ul style="list-style-type: none"> - Compound of PC, PBT: Flame resistance, Dimensional accuracy, Hydrolysis resistant 	
Global Business Development	
<ul style="list-style-type: none"> • RD&TS office : 4 technical centers • Production site : Polymerization 5 sites, Compound 5 sites • Sales office : Japan 4 offices Abroad 9 companies and 6 offices 	

3. Strategies and Measures for growth Engineering Polymers

CASE

Connected
Autonomous
Shared
Electric

: Material Design tech. for property requirements

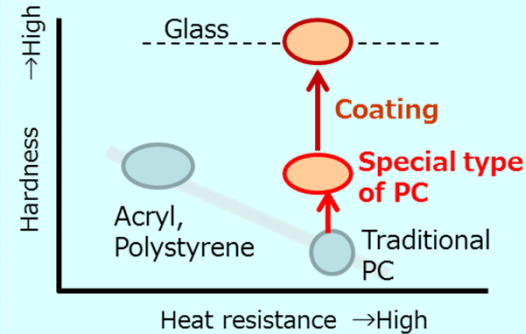


Evolution of EV, ADAS (C, A, E)

Upsizing of Display Panel for Automobiles

Properties

Light weight, Bending, Hardness, Heat resistance

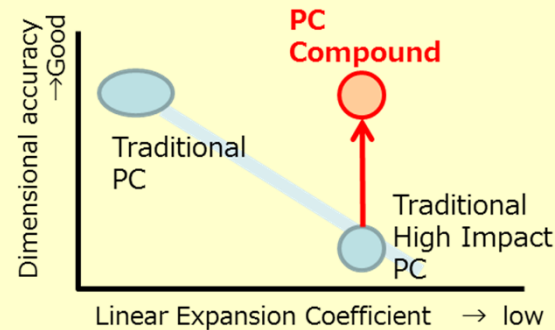


Evolution of ADAS (C, A)

Increasing camera module for ADAS

Properties

Dimensional accuracy, Rigidity, low Linear Expansion Coefficient, Formability, Electromagnetic wave shielding, Wavelength-selectivity, Low dielectric, heat dissipation, LDS (Laser Direct Structuring)

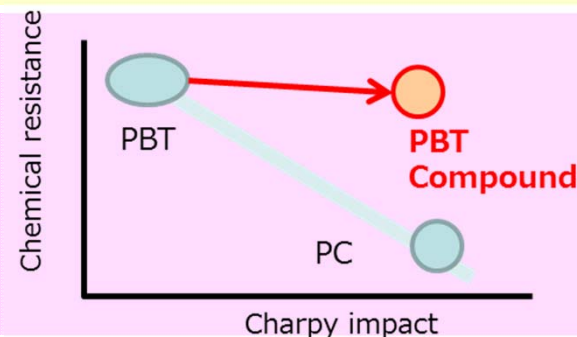


Spread EV (E)

Increasing charger station for EV

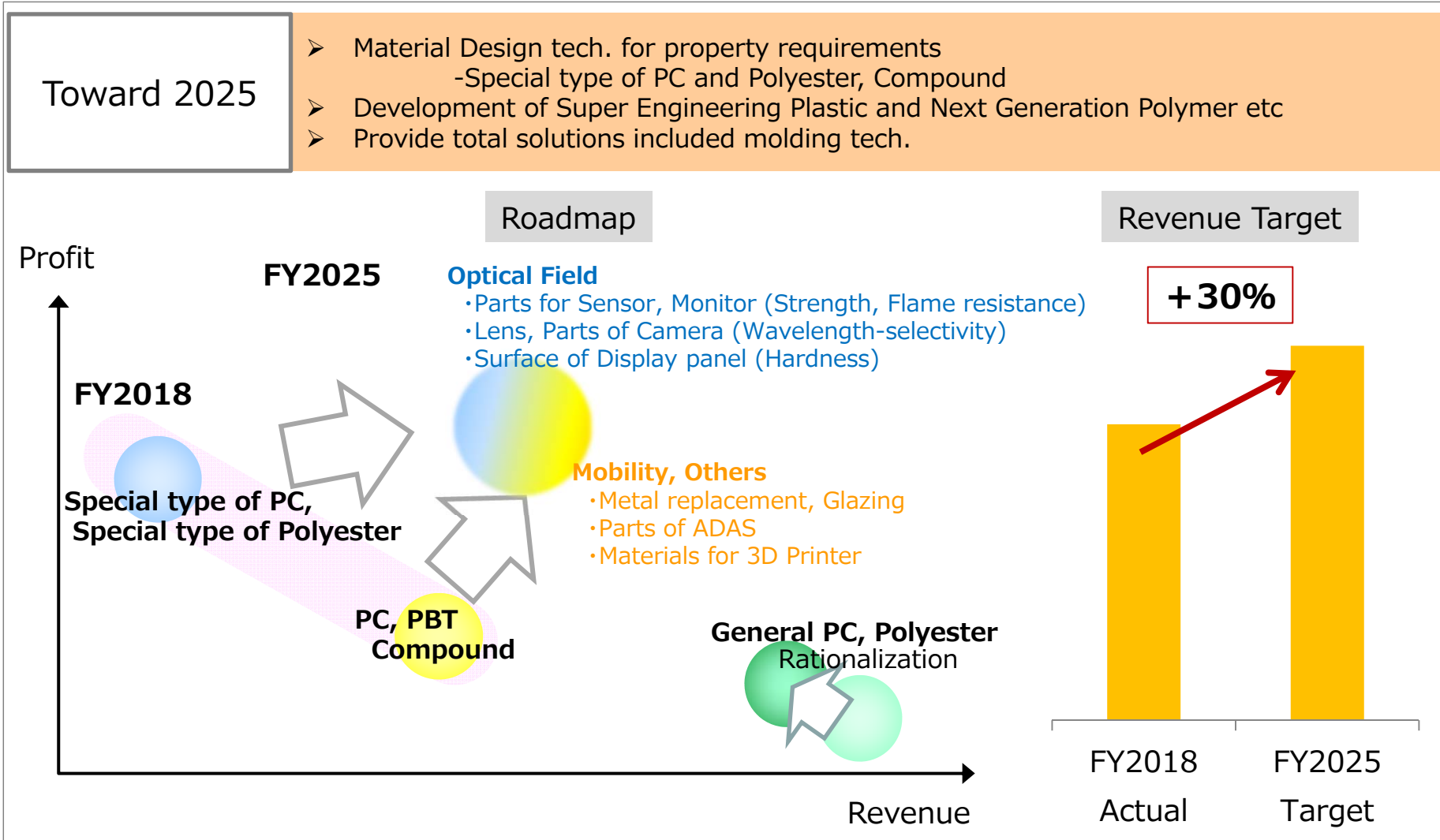
Properties

Flame resistance, Impact resistance, Chemical resistance, Electrical properties



3. Strategies and Measures for growth Engineering Polymers

Engineering Polymers **Deepening polymerization & compound tech., and Expand business globally in high value-added field**



3. Strategies and Measures for growth Performance Polymers

Performance Polymers	To be No.1 Solution Provider of Plastic industry with 「Performance」 × 「Advancing」 × 「Agility」
Our strength	<ul style="list-style-type: none"> ➢ Various Products based on Compounding tech. ➢ Create Defect Standards by incubating niche needs and supply it globally ➢ Provide best solution globally with agility from local bases
Products	
<ul style="list-style-type: none"> • Various types of Thermoplastics • Performance Polyolefin with unique properties • PVOH with Gas-barrier and Processability 	
Polymerization, Modification, Compound	
<ul style="list-style-type: none"> • Various polymerization tech. • Technical knowledge and experience for modification • Formulation and Compounding tech. 	
Design	
<ul style="list-style-type: none"> • Grasp needs by increasing with customer • Needs→Properties→Convert to material design • Agile trial →Mass-production→Localization 	
Global Network (17 countries, 35 locations)	
<ul style="list-style-type: none"> • Marketing and Technical support • Provide products and solution in each region 	

Revenue mix By technology

Technology	Percentage
Thermoplastic elastomer	35%
Soarnol	30%
PVC Compound	22%
Performance Polyolefin	13%

Revenue mix By End Market

End Market	Percentage
Automobile	40%
Food, Medical	36%
Building, Daily necessities	15%
Electric Wire	9%

Value-added Packaging

Transparent medical devices

Automobile Air bag covers

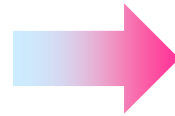
3. Strategies and Measures for growth Thermoplastic Elastomer

Direction of Development

Accelerate to replace to Thermoplastic from Vulcanized Rubber for realizing Recycle

Exploiting and Exploring
Dynamic Cross-link tech.

Polymer structure and
Morphology control



High
elasticity



Durability
Gas-Barrier
Lightweight
Low VOC contents
NVH* Control

Potential Use

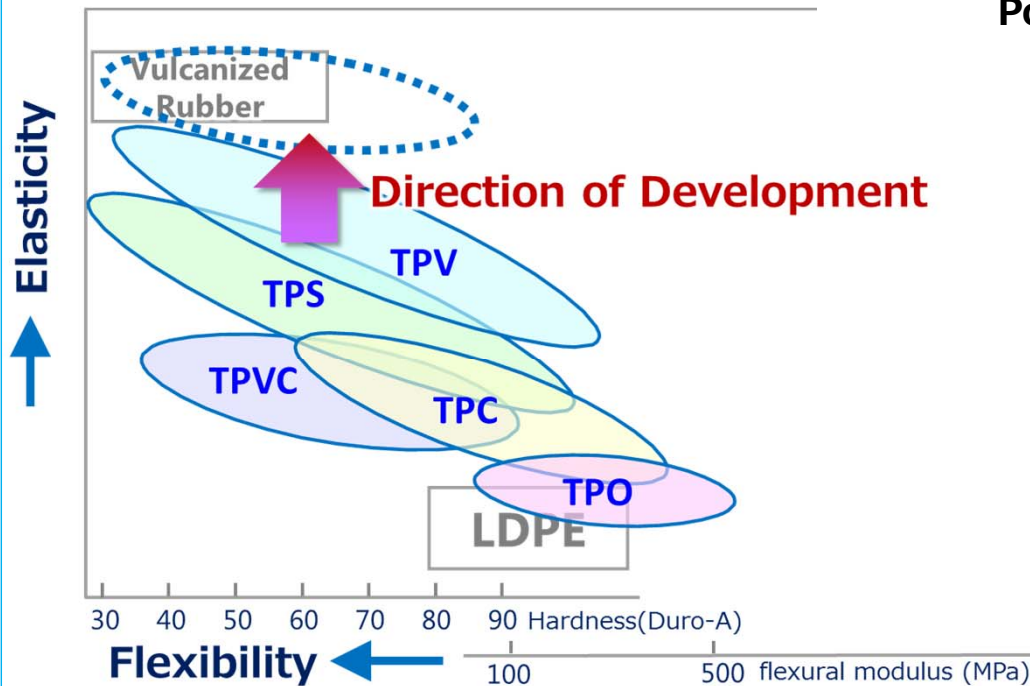
rubber plug for medical



Exterior and Interior parts for Automobile



Window shield

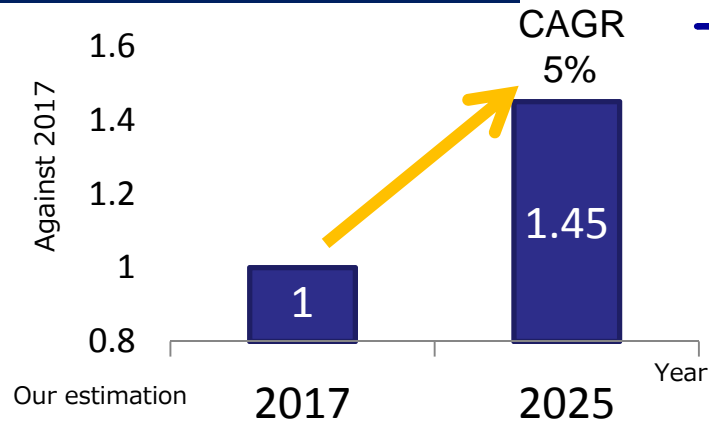


*NVH=Noise, Vibration, Harshness

3. Strategies and Measures for growth Soarnol

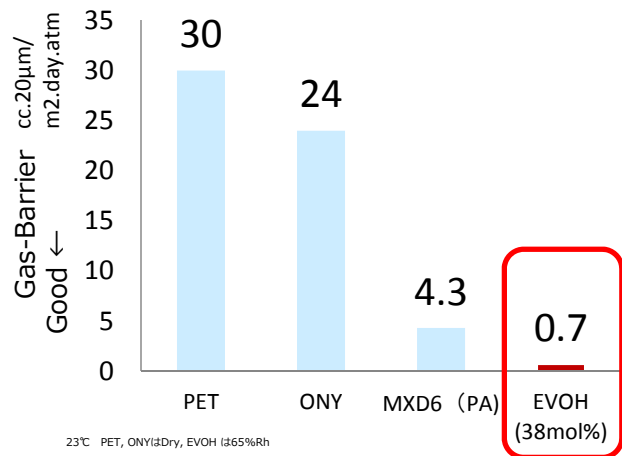
Enhance production and sales structure for increasing demand,
Realizing SDGs and CO2 reduction by Improving recycle property

Global Demand of EVOH



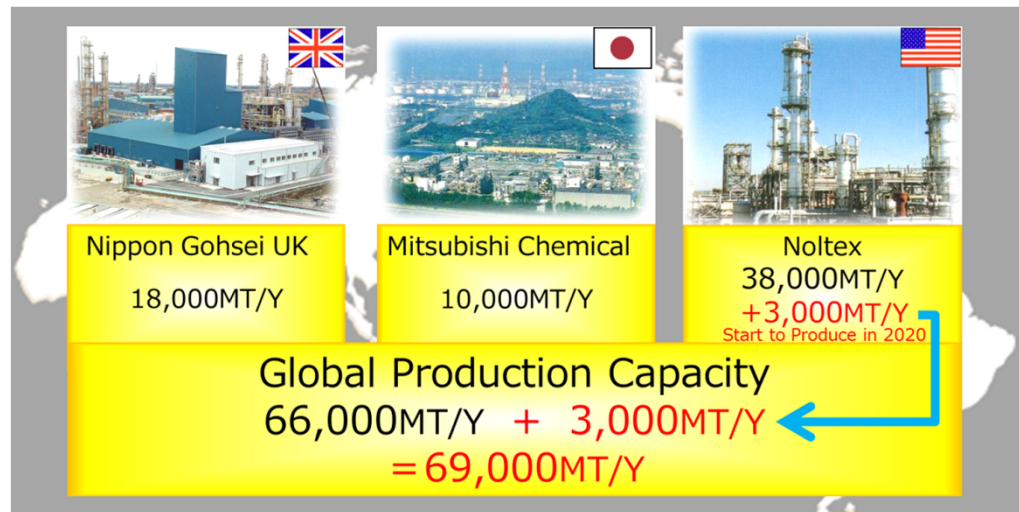
Cause of Growth	Keyword
Transportation	Lightweight, Centralized Kitchen Cold-chain transportation
Safety	Improving Health awareness Additives reduction
Waste reduction	Extend expiry date (Food loss reduction) Package reduction

Advantage of EVOH



Global Production Capacity of Soarnol

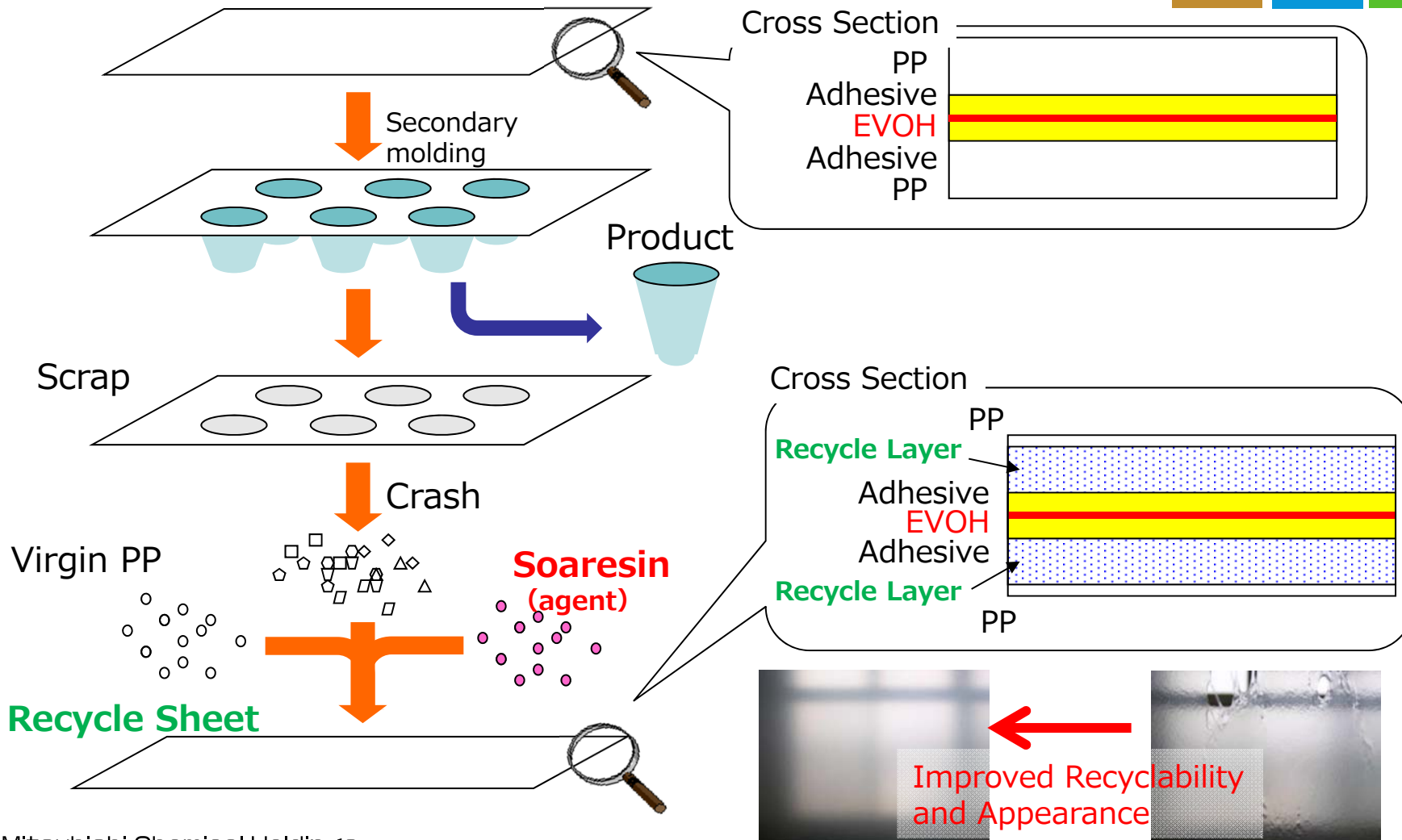
Boost production capacity by Noltex



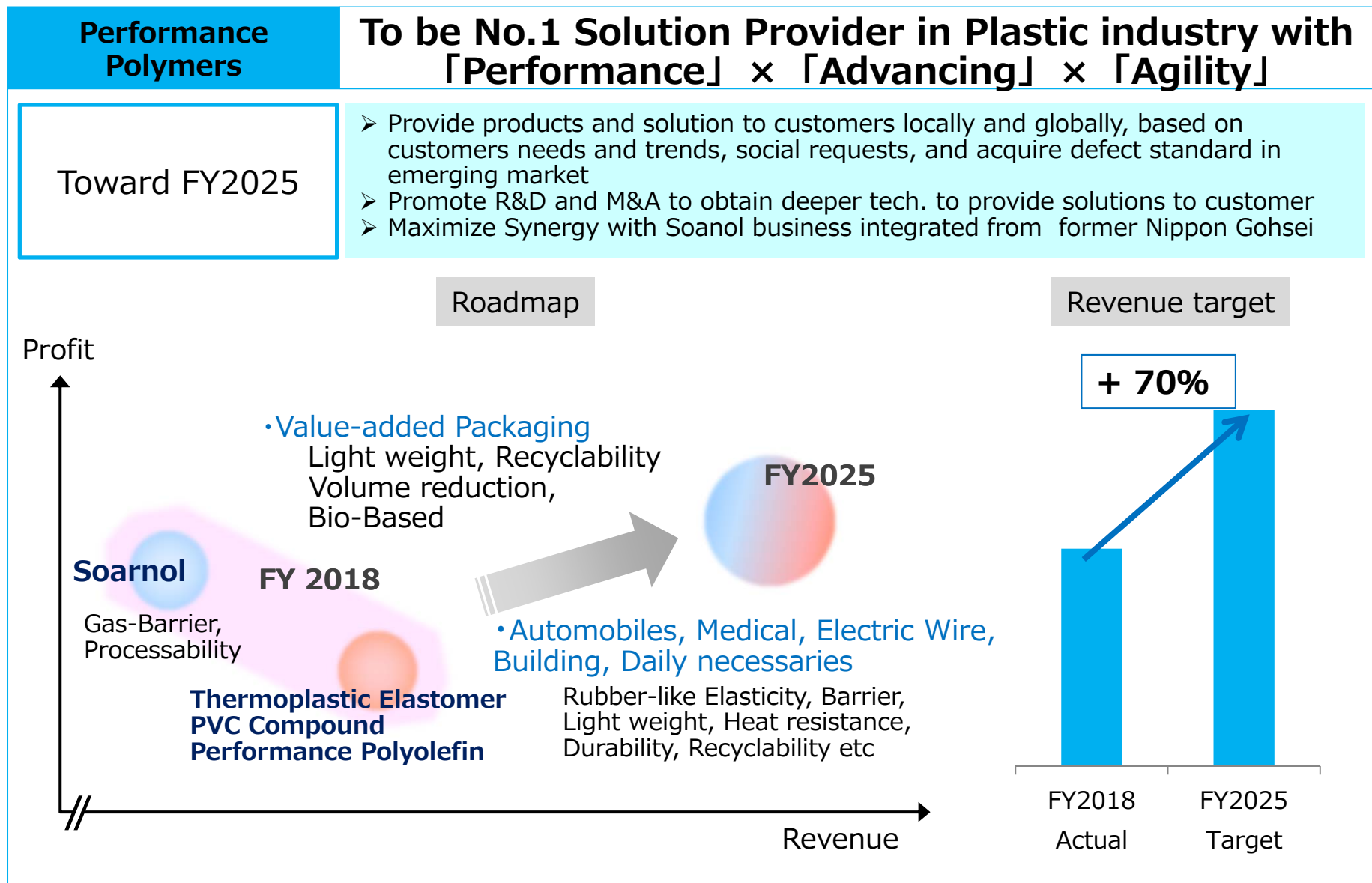
3. Strategies and Measures for growth Soarnol

Tech. for support recycle of scrap sheets during molding process

Compatibility improvement of PP and EVOH by Soaresin

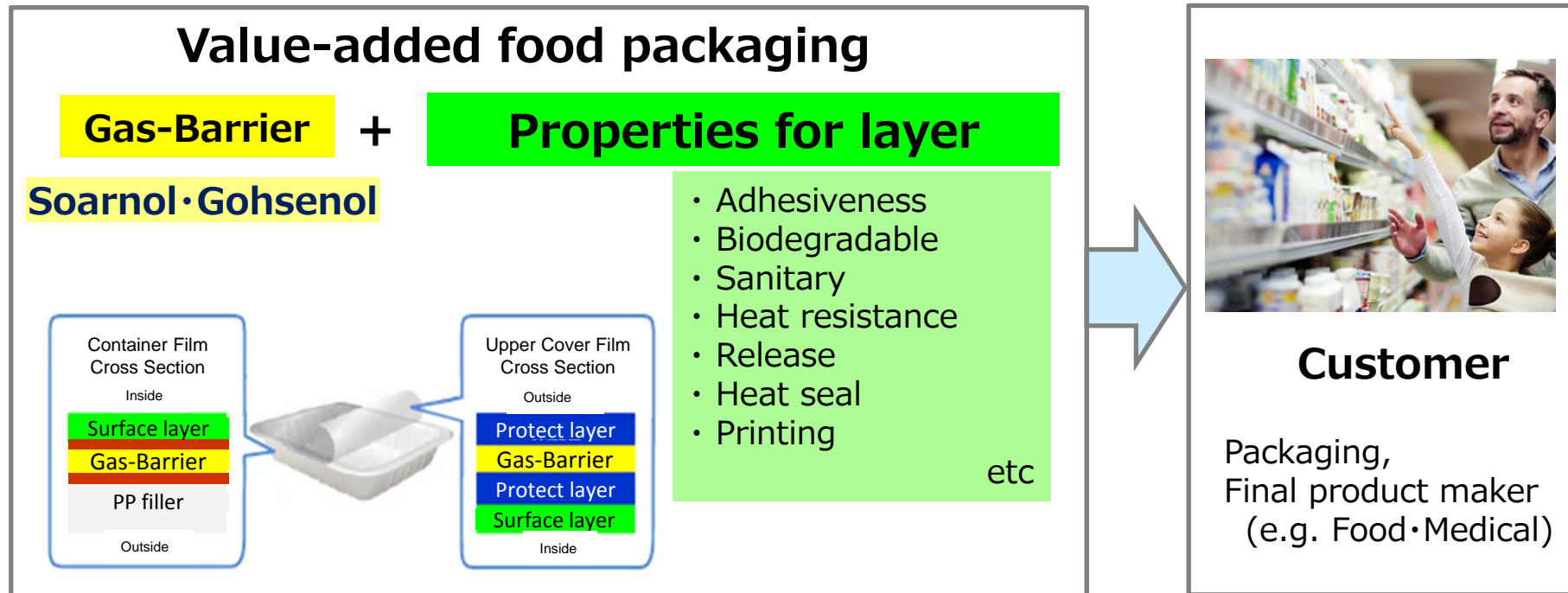


3. Strategies and Measures for growth Performance Polymers



3. Strategies and Measures for growth Synergy

To be “Total Solution Provider” of value-added food packaging by realizing synergy with Soarnol and Gohsenol



Create Synergy by integrating each function and location in global

Sales & Marketing

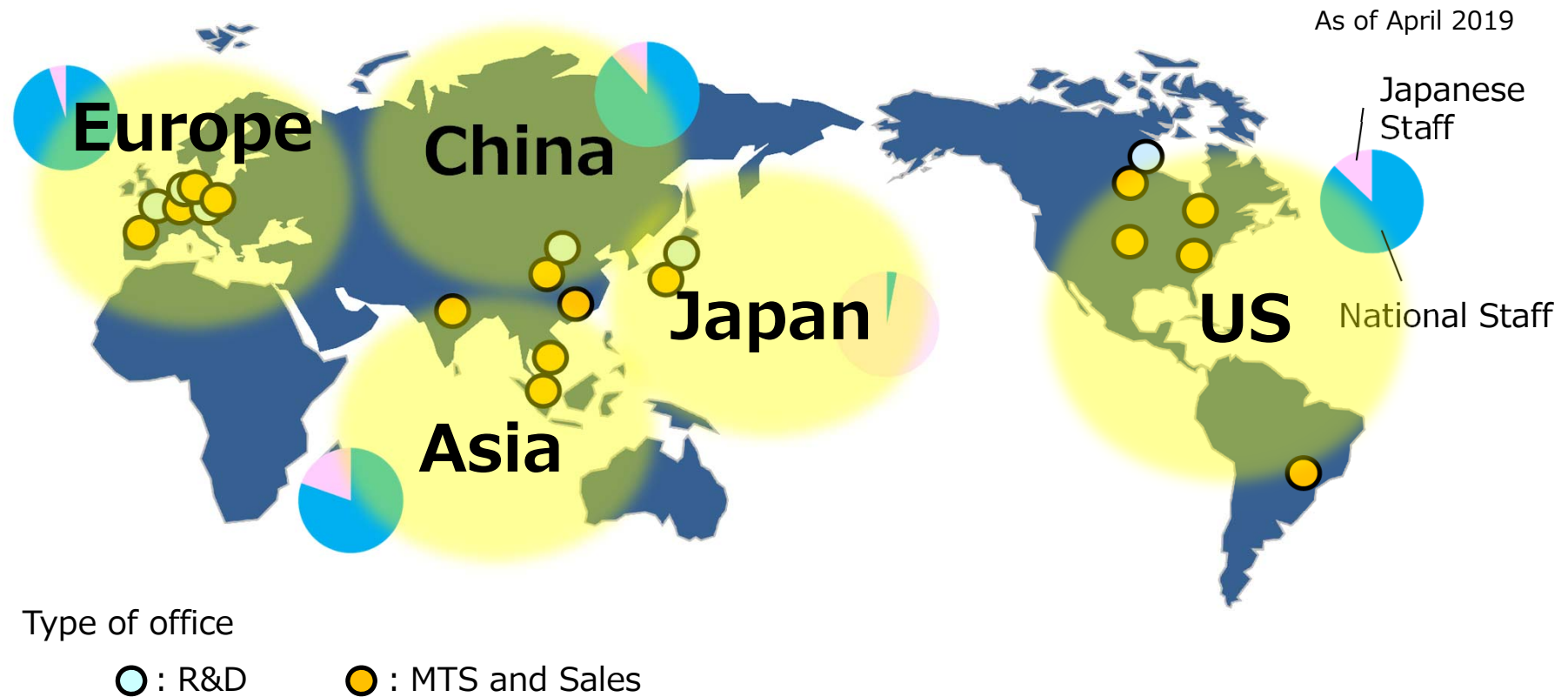
R&D

Production & QA

3. Strategies and Measures for growth Performance Polymers

< Region × Global > Deepening Management : Transnational

- Region : National Staff leads management effectively and penetrates business deeply
- Global : Region integrates each other to share knowledge and expand business globally



3. Strategies and Measures for growth Growth by M&A

M&A with 3 axes

New tech.

New Market,
Customer

New Business
Model

[India]

FY2018 Actual

- Acquisition of PVC compound business for medical
- Ensure production site for Thermal Plastic Elastomer

Acquire PVC compound business in booming India market.

- Expansion of business opportunity for Medical
- Acceleration of local production for Automobiles



FY2018 Actual

[Netherlands]

- Acquisition of Filament maker for 3D printing business

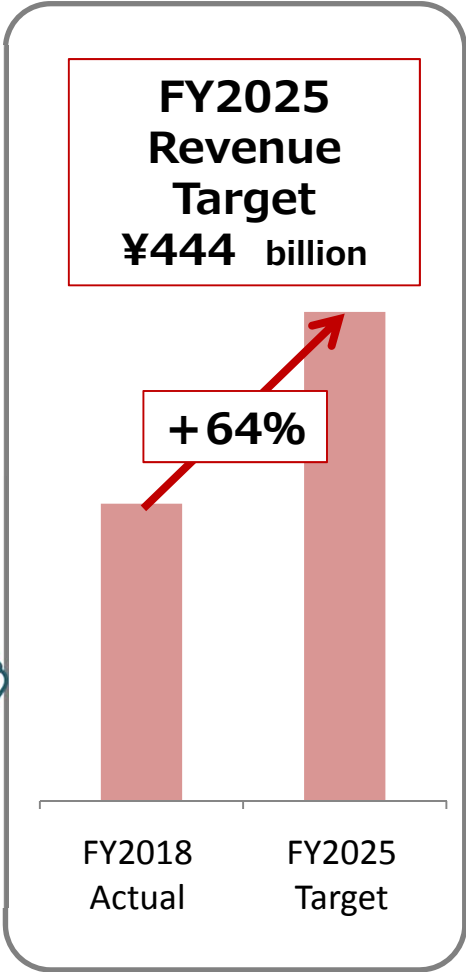
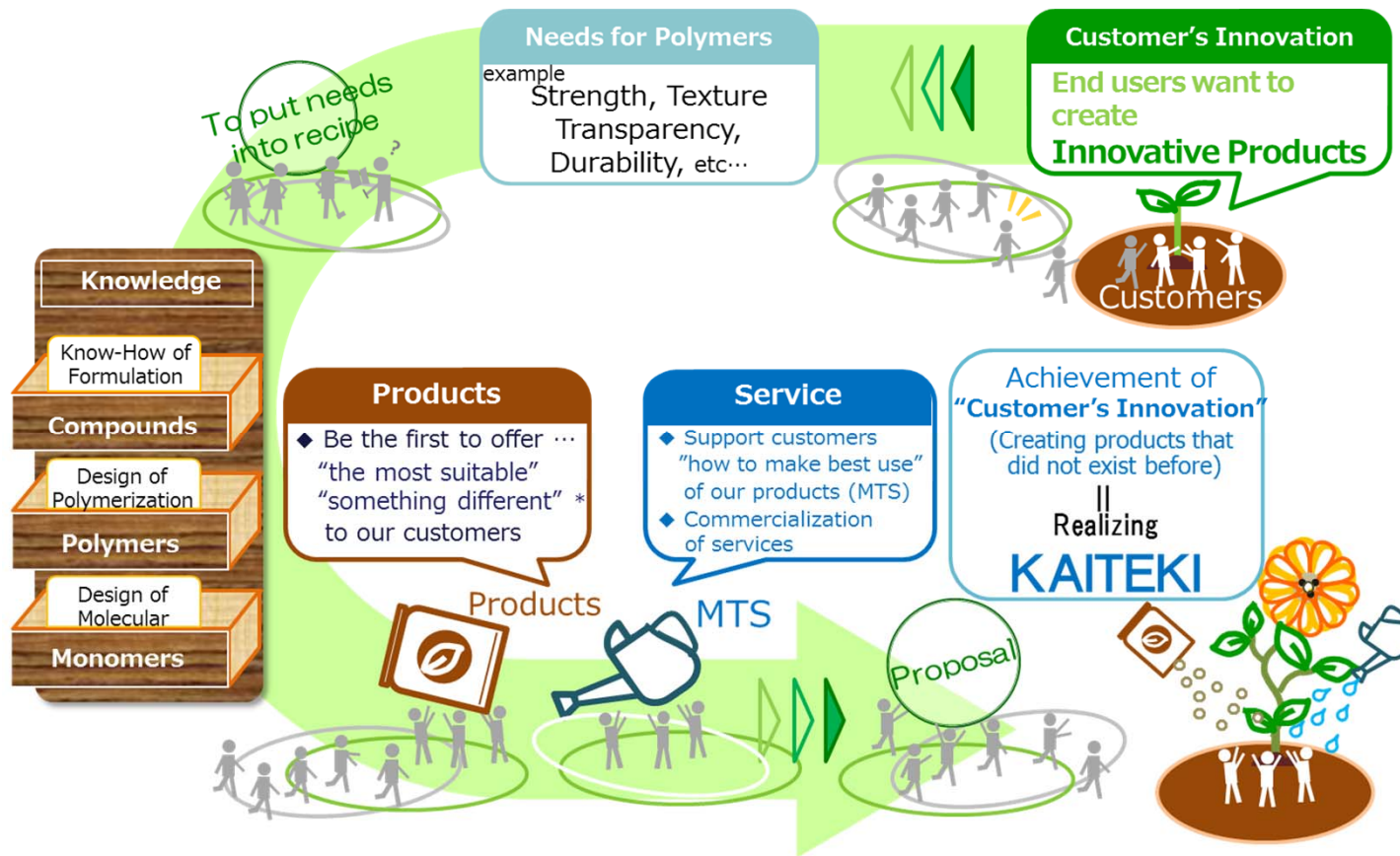
Enter 3D printing material market

- Acquirement of solution for customer needs
- Acquirement of new business opportunity



4. Summary

**We offer best products and services in the fastest manner
to enable our customers to realize innovation**



KAITEKI Value for Tomorrow

Mitsubishi Chemical Holdings Corporation IR Day 2019

Approaches in the ESG Field

May 30, 2019

Mina Kanda
KAITEKI Promotion Office
Corporate Strategy Division
Mitsubishi Chemical Holdings Corporation

 Mitsubishi Chemical Holdings Corporation



Today's agenda

1. Awareness of ESG trends

2. Developing KAITEKI management and ESG-related corporate value evaluation

- Rebuilding and implementing our philosophy
- Promotion of KAITEKI health and productivity management
- Major ESG corporate value evaluation

3. KAITEKI Vision 30 (under consideration)

- Our response to the circular economy concept
- Reflecting on business portfolio reforms

1. Awareness of ESG trends

- The demands of society (= market) on companies and businesses are expanding and becoming more sophisticated.
- The pursuit of sustainability has become a key factor in enhancing corporate value.

Social issues and risks

Sustainability issues are becoming more serious and complex.

Accompanying the globalization and enlargement of corporations, the scope of corporate responsibility is expanding and regulations are strengthening.

People's way of thinking and sense of values are changing rapidly due to the spread of AI/IoT.

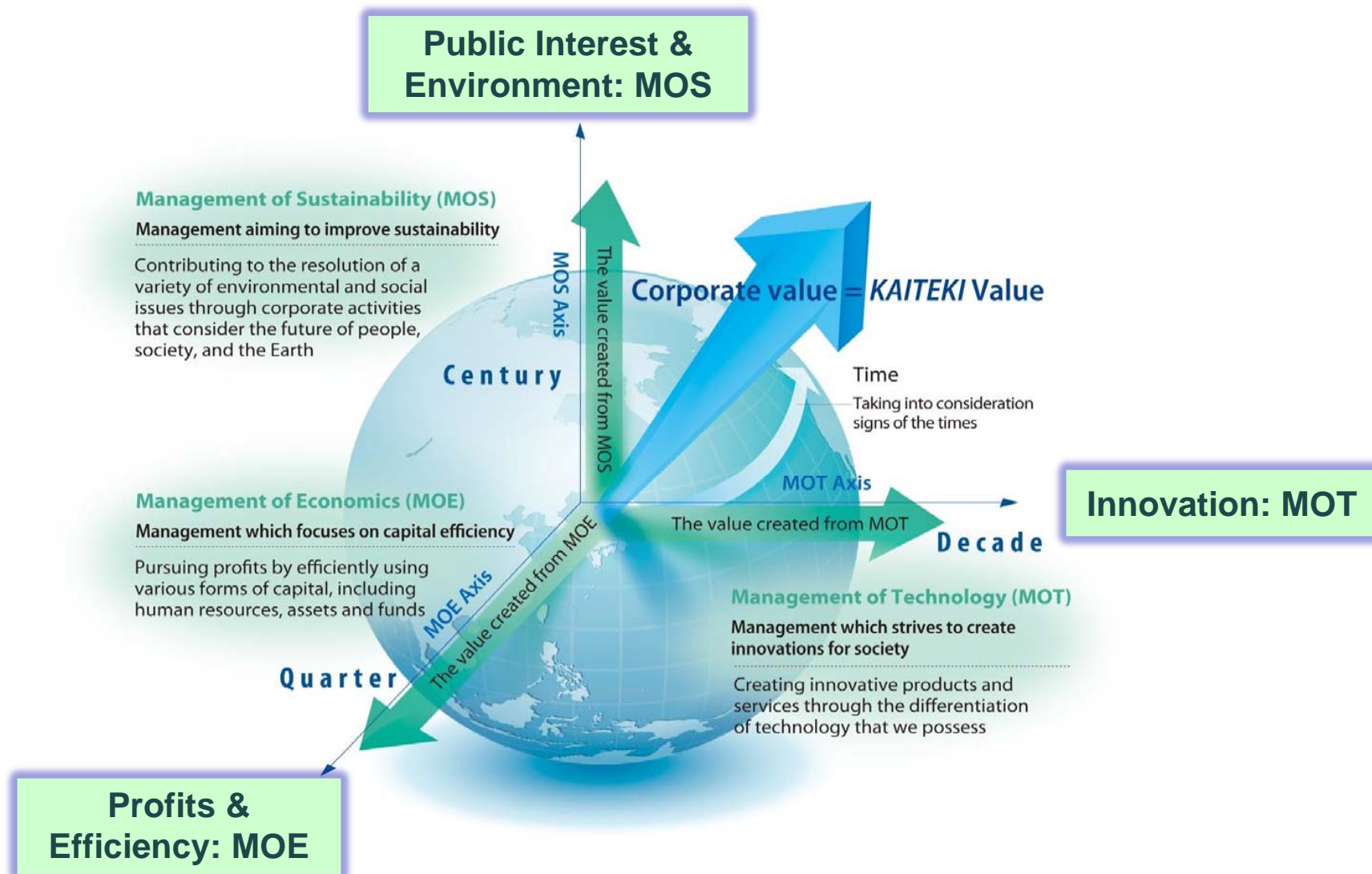
ESG efforts have been established as a factor that influences medium-to-long-term corporate value.

Corresponding movements

- Climate change measures responding to the Paris Agreement, CDP, etc. are necessary.
- United Nations Sustainable Development Goals (SDGs) are becoming common ideals.
- Responsibilities related to ESG in the supply chain are increasing.
- Regulations are strengthening via soft laws and hard laws.
- Fundamental productivity reforms are increasingly urgent.
- Disclosure and dialogue about non-financial information need to be more sophisticated. (ESG Investment Standards, GRI, TCFD)

Value-creating style: KAITEKI Management

- MCHC promotes KAITEKI Management based on three axes of MOS, MOT and MOE and defines the total value generated through the three axes as its corporate value.



2. Developing KAITEKI Management: Rebuilding our philosophy

- Rebuilt our philosophy system to encompass corporate activities to enhance our global unity of purpose.

KAITEKI definition

The sustainable well-being for people, society and our planet Earth.

Management Philosophy

Mission

We create innovative solutions globally based on our core values of Sustainability, Health and Comfort, striving for the well-being of people, society and our planet Earth.

Vision

Realizing KAITEKI

Value

Sustainability, Health, Comfort

Corporate slogan

KAITEKI Value for Tomorrow

KAITEKI “personalization”, “organization” and “implementation in society”

- KAITEKI Book (for all employees)



- Advertising young to mid-career employees' passions



- "More KAITEKI" workshops (for division managers and general managers)

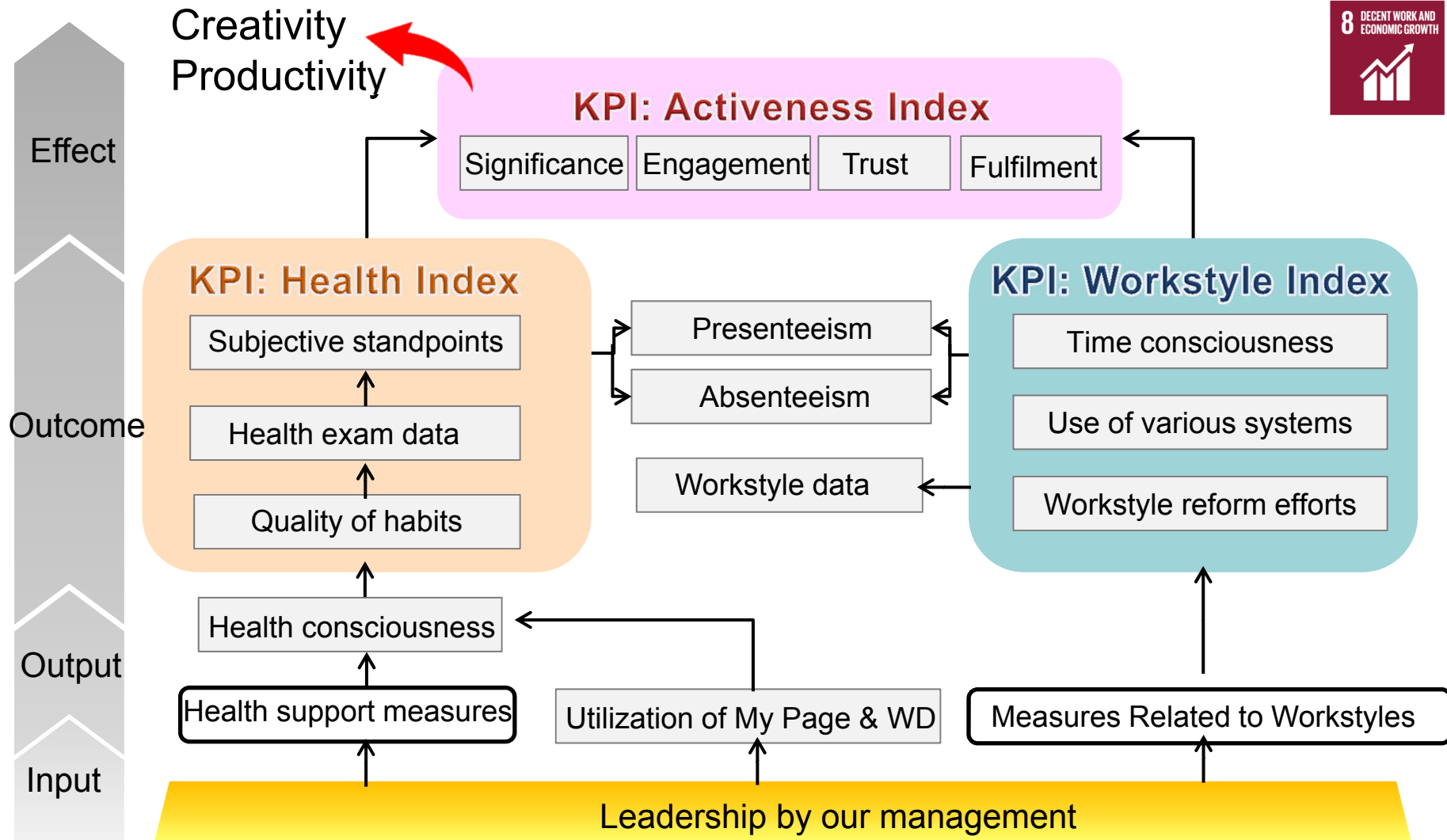


- Opened a booth on the theme of GHG reduction in a work experience facility for children

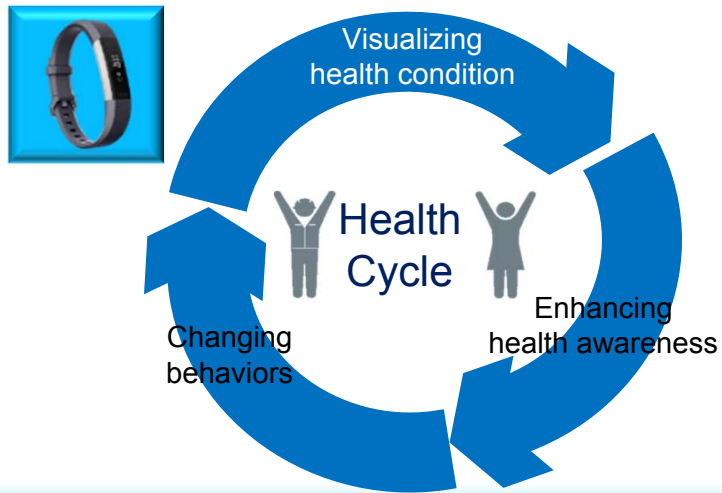


KAITEKI health and productivity management: Purpose and key performance indicators

- Promoting KAITEKI Health Management with three KPIs to improve creativity and productivity: Activeness Index, Health Index, and Workstyle Index.



- ▶ Support of individual health cycle with i²Healthcare



- ▶ Promoting diverse working styles
 - Promotion of telework
 - Intensive work zone installation, etc.



- ▶ Health support
 - Physical ability awareness training
 - Inter-work interval system, etc.



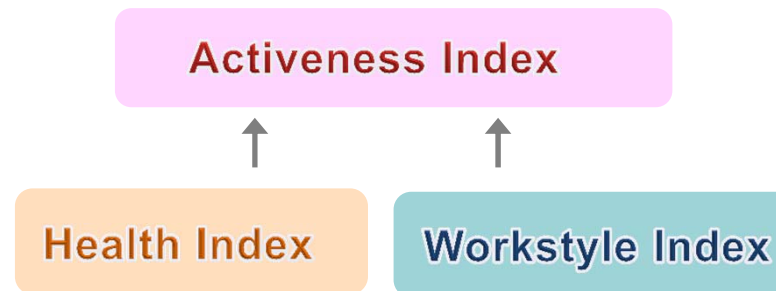
- ▶ Creating vigorous and open workplaces
 - Diversity & inclusion promotion
 - 10% culture system, etc



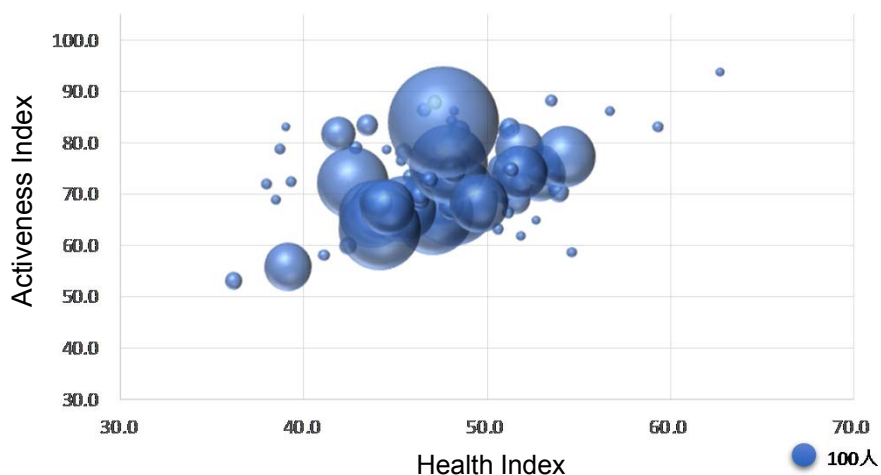
KAITEKI health and productivity management: KPI analysis examples

- Implement PDCA using aggregated and analyzed facts including KPIs

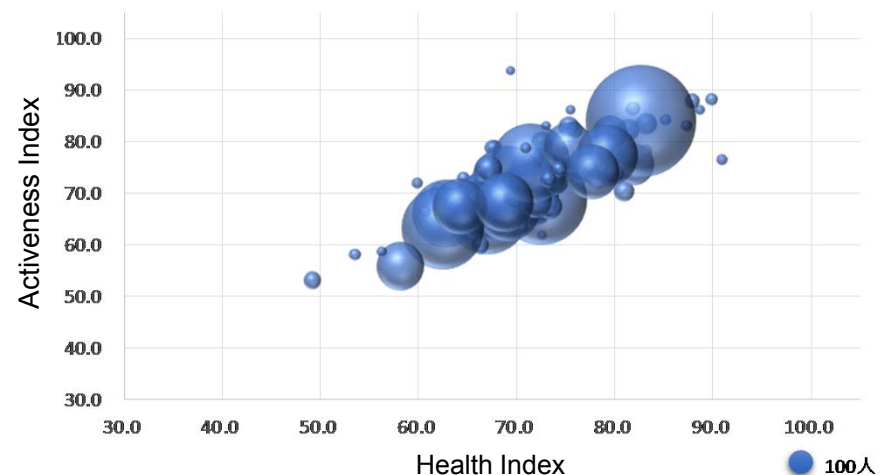
KPI results	FY2017→FY2018 Improved score	FY2020 Target
Activeness Index	+8.1	+15 ↑
Health Index	+2.2	+10 ↑
Workstyle Index	+2.8	+10 ↑



Distribution of Health Index and Activeness Index by Organization



Distribution of Workstyle Index and Activeness Index by Organization



Major ESG-related Corporate Value Assessments (as of May 2019)

- Maintain and improve third-party company evaluation ratings by promoting ESG activities.
- Incorporated as a DJSI World Member for two consecutive years.

*Dow Jones Sustainability Indices

MEMBER OF

**Dow Jones
Sustainability Indices**

In Collaboration with RobecoSAM 

*FTSE4Good Index



FTSE4Good

*CDP-Climate Change



*CDP-Water



*FTSE Blossom Japan Index



FTSE Blossom
Japan



*MSCI

Japan ESG Select
Leaders Index ※1



2018 Constituent
MSCI ジャパンESG
セレクト・リーダーズ指数



*MSCI

Japanese Equity Women's
Participation Index ※1



2018 Constituent
MSCI日本株
女性活躍指数 (WIN)



*S&P/JPX

Carbon Efficiency Index



*Nikkei

Smartwork Management
Survey



*Nikkei

Annual Report Award

*GPIF

Excellent Integrated Report

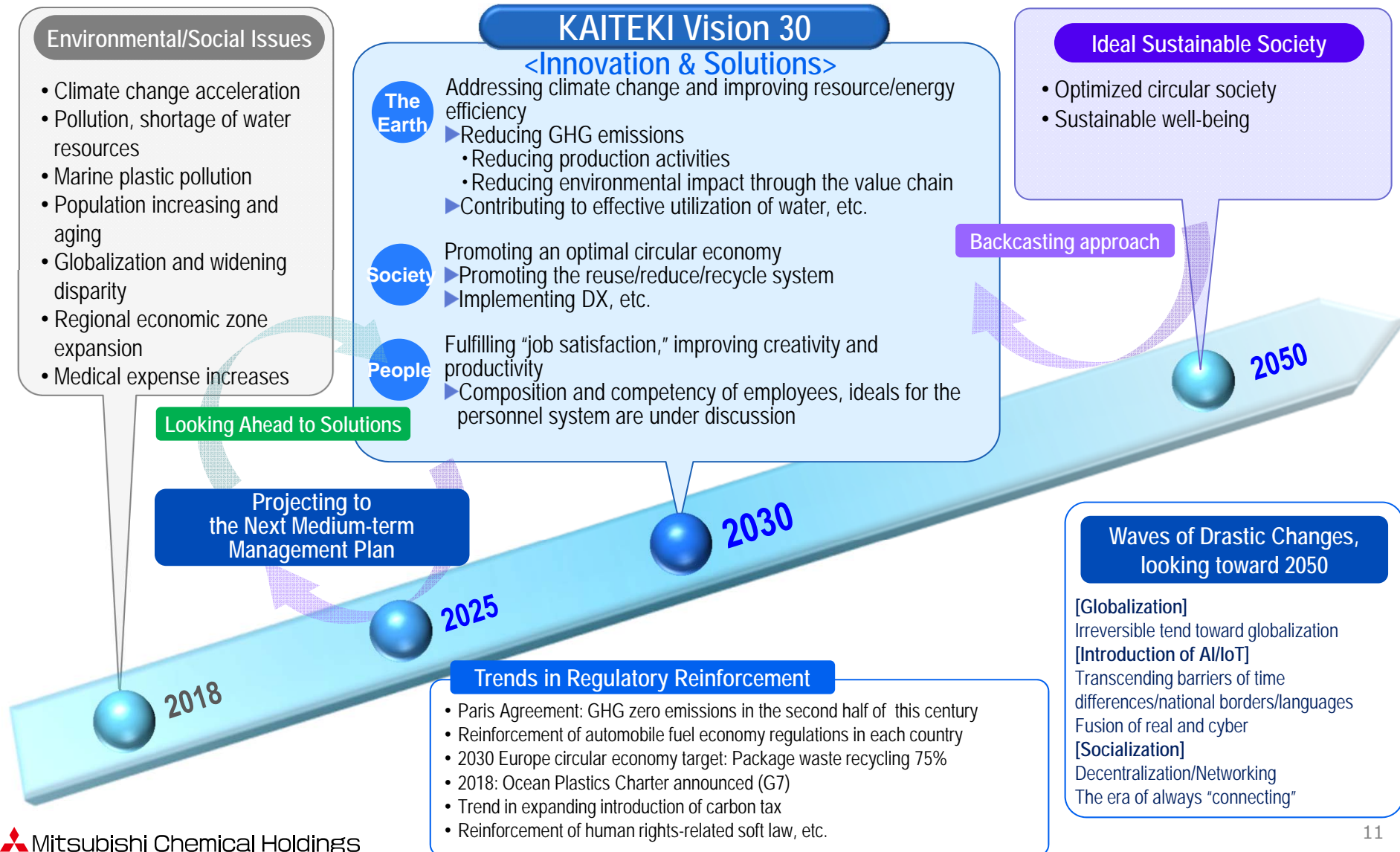
KAITEKI REPORT 2018



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3. KAITEKI Vision 30 (under consideration)

■ The framework of the next medium-term management plan, targeting FY2030, is being formulated.



Our response to the Circular Economy

- Positioning the circular economy, which dramatically changes social structures and industrial structures, as a key element for realizing KAITEKI.
- Established the Circular Economy Promotion Committee and promoting cross-over of MOS and MOE throughout the Group.

Defining the Circular Economy for MCHC:



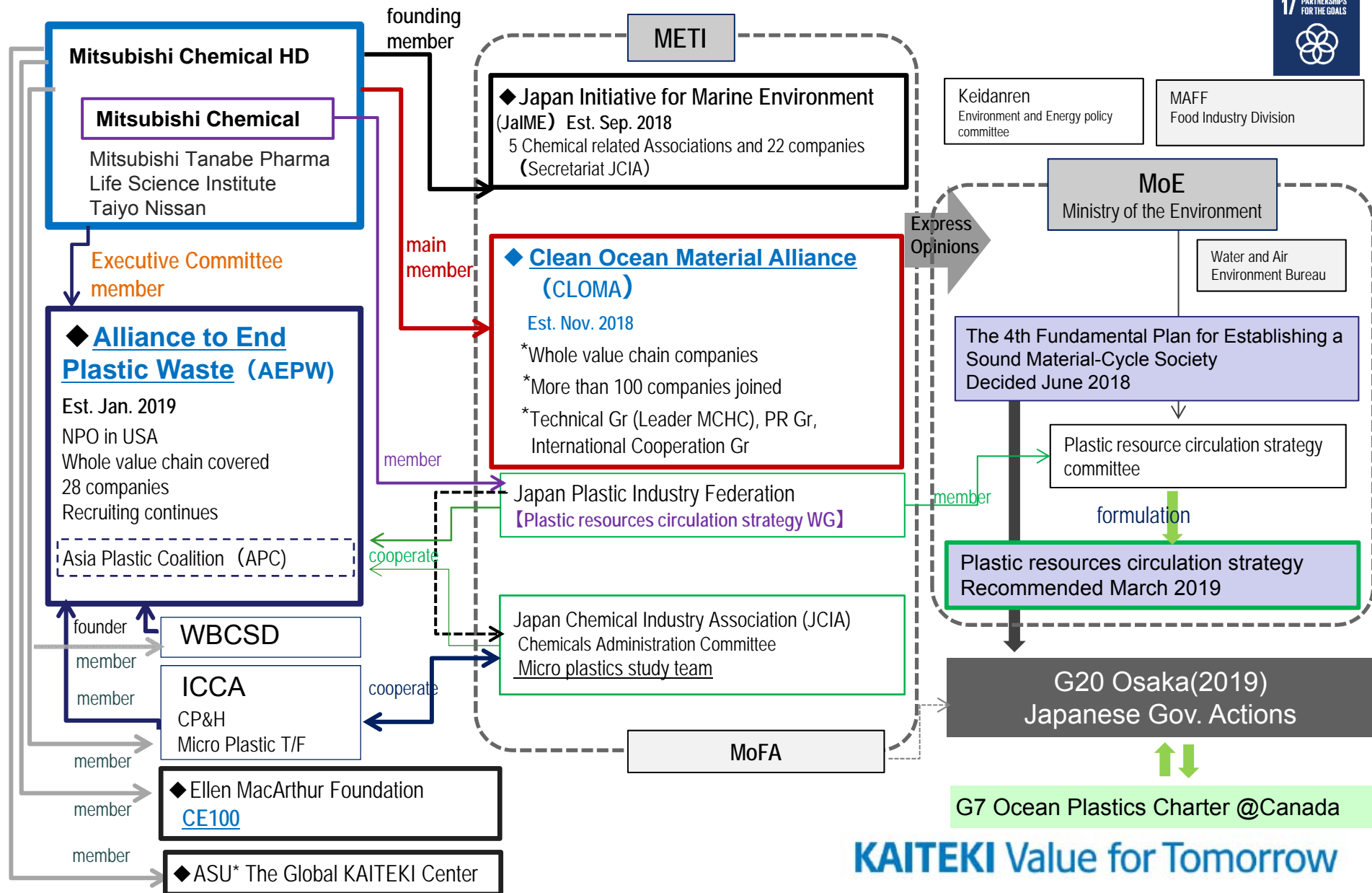
In order to build an optimized recycling-oriented society through reducing the environmental impact of society as a whole and maximization of materials, implementing the 4R(Reduce, Reuse, Recycle, Renewable) system of resource and energy by innovation and business model transformation.

Examples of themes:

- (1) Development of recyclable materials and technologies
 - Recycling of packaging and industrial materials
 - Development of material recycling and chemical recycling businesses
- (2) Blueprint for biotechnology-related businesses
 - Biomass, biodegradation, plant-derived resins, biocatalysts, etc.
- (3) Establishment of a c-LCA system and recommendations for reforming business portfolios

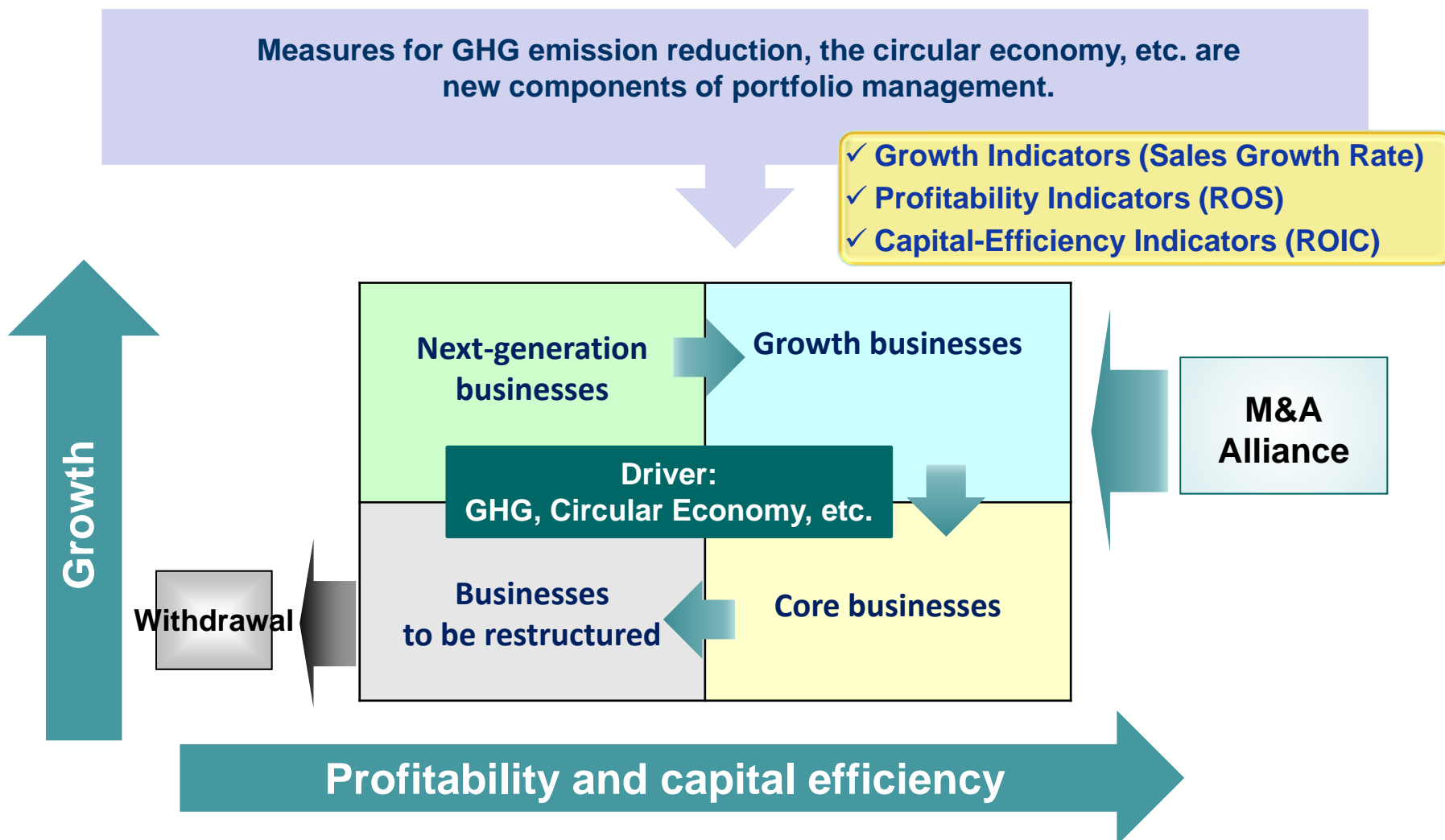
Map of initiatives related to plastic waste

May 2019 version



Projected business portfolio reforms

- Reflecting the cross-over of MOS (Social Value) and MOE (Economic Value) in portfolio reform, consistent with the concept of ESG investment



The forward-looking statements are based largely on information available as of the date hereof, and are subject to risks and uncertainties which may be beyond Company control. Actual results could differ largely, due to numerous factors, including but not limited to the following: Group companies execute businesses in many different fields, such as information and electronics, displays, advanced moldings and composites, advanced polymers, MMA, petrochemicals, carbon products, industrial gases, pharmaceuticals, etc. and these business results are subjected to influences of world demands, exchange rates, price and procurement volume of crude oil and naphtha, trends in market prices, speed in technology innovation, National Health Insurance price revision, product liabilities, lawsuits, laws, and regulations.