II

# Petrochemicals & Plastics Sector

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Representative Director &
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# Ⅱ Petrochemicals & Plastics Sector

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# Ⅱ-1 Major Products

## Polyethylene (PE)

Resin used as a packaging material,
a major product of the petrochemical industry

【Our features】
・Strengths in high quality protective films
・3 production bases in Japan/Singapore/Saudi Arabia


## Polypropylene (PP)

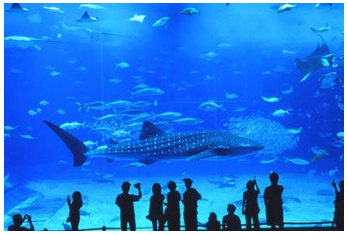
Widely used resins for automobile parts and
packaging materials, etc.

【Our features】
・Global operation of PP compounds for automobiles
・Strong in high-performance packaging applications


## MMA (MMA-m/PMMA)

Resins with high transparency and
excellent weather resistance, and their raw materials

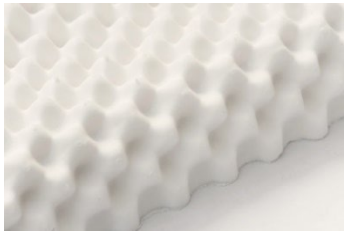
【Our features】
・2nd largest market share in Asia, 4th in the world (MMA-m)

## Propylene Oxide (PO)

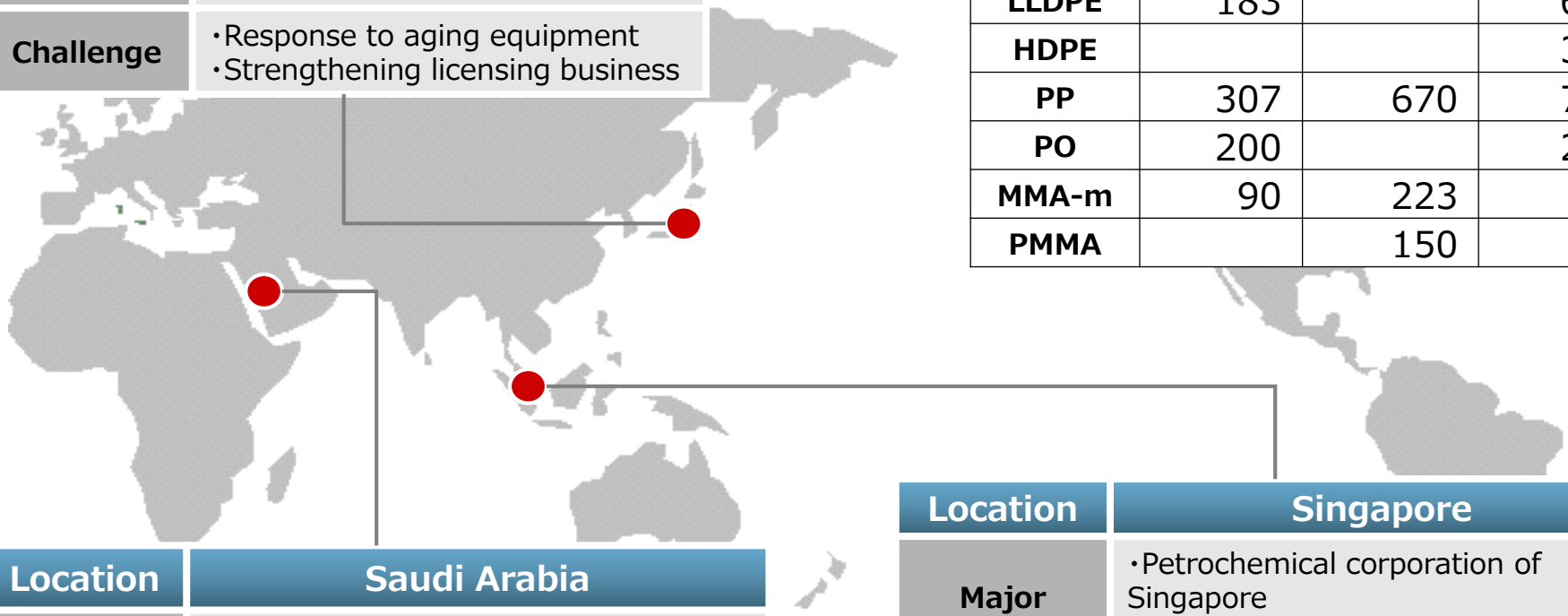
Raw material for urethane used in automobile seats and
furniture

【Our features】
・Proprietary technology that does not produce co-products
・Promoting licensing of the proprietary technology

# Ⅱ-1 Petrochemicals & Plastics Sector by Region

| Location | Japan |
|---|---|
| Positioning | ・Development base for new products & technologies |
| Challenge | ・Response to aging equipment<br>・Strengthening licensing business |



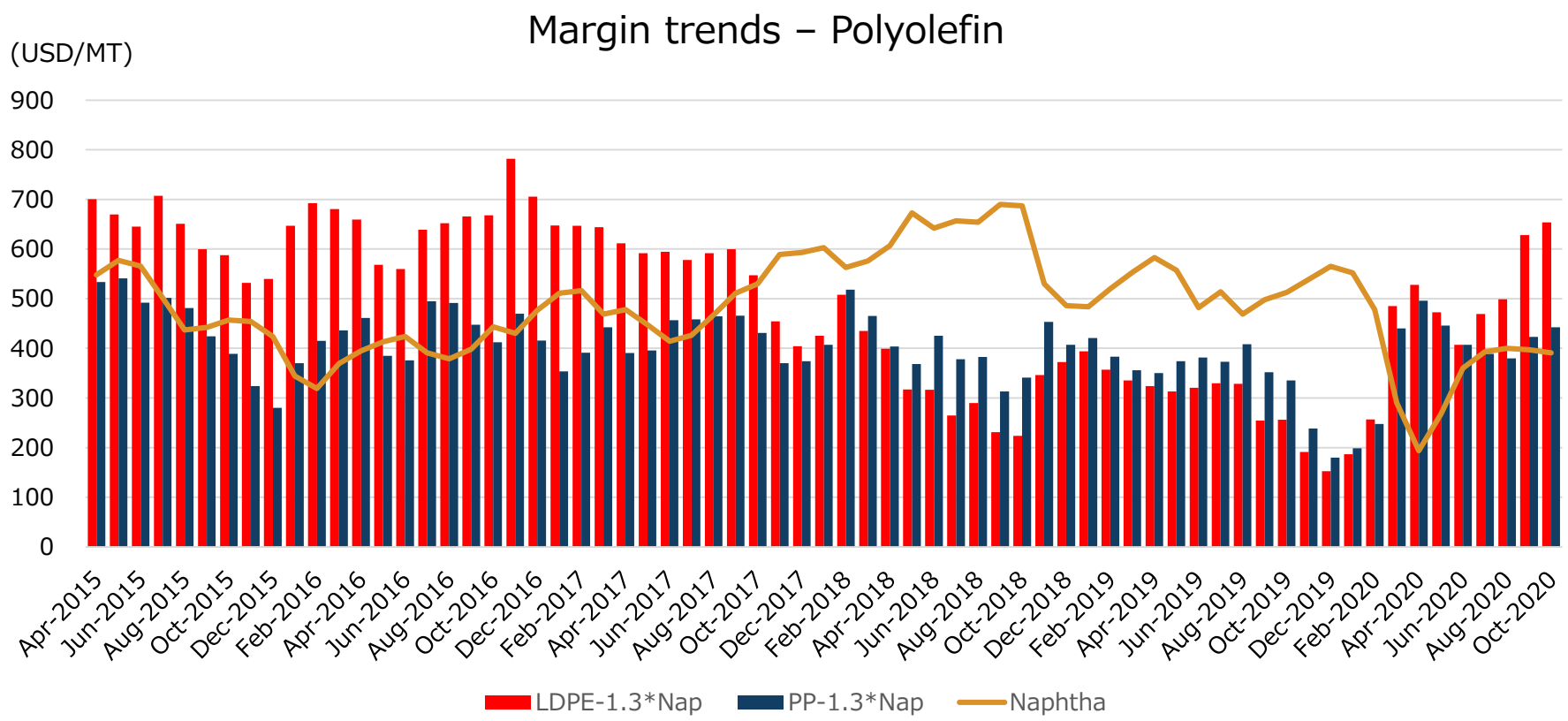
| Capacity (KTA) | Japan | Singapore | Saudi Arabia |
|---|---|---|---|
| LDPE | 172 | 255 | 150 |
| LLDPE | 183 | | 600 |
| HDPE | | | 300 |
| PP | 307 | 670 | 700 |
| PO | 200 | | 200 |
| MMA-m | 90 | 223 | 90 |
| PMMA | | 150 | 50 |

| Location | Saudi Arabia |
|---|---|
| Major affiliates | ・Petro Rabigh (PRC) |
| Positioning | ・Refinery-Chemicals integration complex, taking advantage of low-cost feedstocks and fuels |
| Challenge | ・Unstable profit and loss trends due to fluctuations in oil refining margin |

| Location | Singapore |
|---|---|
| Major affiliates | ・Petrochemical corporation of Singapore<br>・The polyolefin company<br>・Sumitomo chemicals Asia |
| Positioning | ・Petrochemical business hub with strong customer base |
| Challenge | ・Continue to add value to products<br>・Maintaining high share for leading customers |

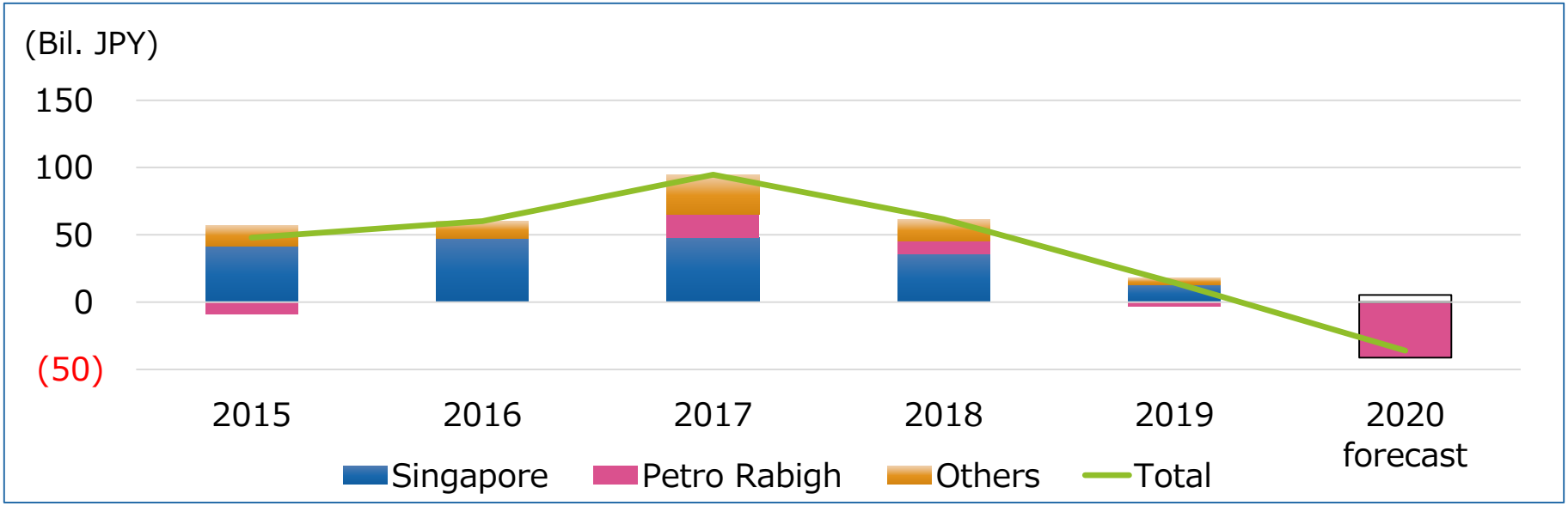
# Ⅱ-1 Petrochemical Market Conditions

**Margins for petrochemical products peaked around 2016 and had been on a downward trend, but improved in 2020 despite COVID-19.**




Source: Sumitomo Chemical calculated from IHS Markit

# Ⅱ-1 Performance Trends for the Petrochemicals & Plastics Sector




※ 2015, 2016: Operating Income + Equity in earnings (losses) of affiliates
2020 forecast: Petro Rabigh's figure shows Jan.-Sep. Actual

- **The profit level of the Petrochemical & Plastics sector is affected heavily by petrochemical product market conditions.**
- **The profit and loss forecast for FY2020 is a large deficit, despite relatively favorable product market conditions, due to the deterioration of Petro Rabigh's business performance.**

# Ⅱ-1 Petro Rabigh's Performance

**FY2020**

(unit; USMM)

| | Jan.-Mar. | Apr.-Jun. | Jul.-Sep. |
|---|---|---|---|
| Income before tax | -547 | -304 | -168 |

**Major causes for deterioration**

**Scheduled Maintenance** | **Crude oil price plunge** | **Margin reduction due to COVID-19**

**All these events hit during the scheduled maintenance period in Mar.-Apr.**
**- unprecedented and extremely special situation**

**Future outlook**

- **FY2020: Scheduled maintenance completed.**
  **Product margins recovering, deficit shrinking**
- **FY2021: Impact from special events will diminish.**
  **Improving profit & loss by continuing stable operations**

# Ⅱ-1 Rabigh Phase Ⅱ Project – Resolved completion guarantee in Sep. 2020

## Progress of the Phase Ⅱ Project

**2012**
Confirmed business feasibility with a feasibility study

**2017**
Construction completed

**End of 2017**
Test run

**March 2018**
All products complied with specifications

**October 2019**
Completed CRT*1

**November 2019**
Started commercial operations

**September 2020**
Resolved completion guarantee

**Maintaining stable operations at both PRC Phase Ⅰ and PRC Phase Ⅱ**

*1 Creditors Reliability Test

## Investment and Completion Guarantee

**Total investment in PRC:**
**Approx. US$9.1bn.**

**Cash flow before completion**
**Approx. US$0.9bn.**

Project financing
**Approx. US$5.2bn.**

Loan guarantees by parent companies
**Approx. US$3.0bn.**

Completion guarantee (amount borne by Sumitomo Chemical)
**Approx. US$2.3bn.*2**
**Resolved in Jun. to Sep. 2020**

Debt guarantees (amount borne by Sumitomo Chemical)
**Approx. US$1.5bn.*2**
**To continue until capital increase is executed**

*2 As of Sep. 2020

# Ⅱ Petrochemicals & Plastics Sector

# Licensing & Catalyst Business

## Expansion of Technology Licensing Business

### Propylene Oxide Technology

**Licensed to 4 Plants at 4 Companies (As of 2020)**

- Energy saving & environmental-friendly
- World's first co-product-free process

### Caprolactam Technology

**2020: Entry to Licensing Business**

- World's first vapor-phase Beckman rearrangement process
- Ammonium sulfide free
- High performance catalyst

### HCl Oxidation Technology

**Licensed to 10 Plants at 6 Companies (As of 2020)**

- Recycling of by-products
- Significant energy savings

### PE & PP Technology

- Wide range of polymer grades and portfolio
- High performance catalyst

### Catalyst Manufacturing Plant (Chiba Works)

Started-up

| | |
|---|---|
| PE・PP Cat. | 2019 3Q |
| PO Cat. | 2019 4Q |

**Stable profit through technology licensing and catalyst sales**

# Ⅱ-2 High Value-Added Polymers


Flexible Displays

**Mono-material film**
Contribution to materials recycling

**5G materials**
Contribution to achieving an IoT society

**Commodity polymers**

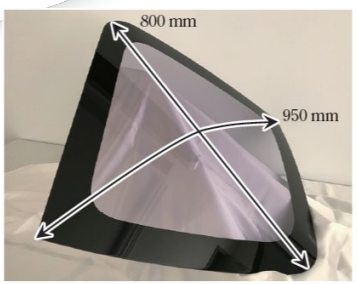
**Highly rigid and tough materials for automobiles**
Reduction of $CO_2$ emissions by reducing weight

**High performance retort pouches**
Reducing food loss, reducing packaging weight

**New resin heat storage material**
Contribution to energy saving

Microwaveable retort pouches

HEATORAGE®

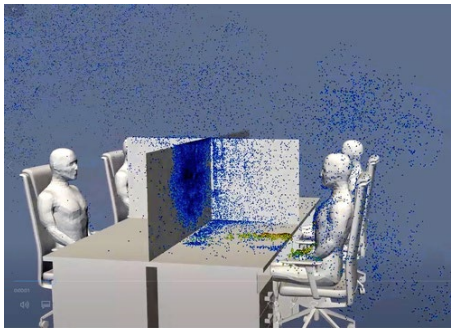



Prototype PMMA rear window for cars

# Ⅱ Petrochemicals & Plastics Sector

# Ⅱ-3 COVID-19 Countermeasure Products

## 1) Product introduction



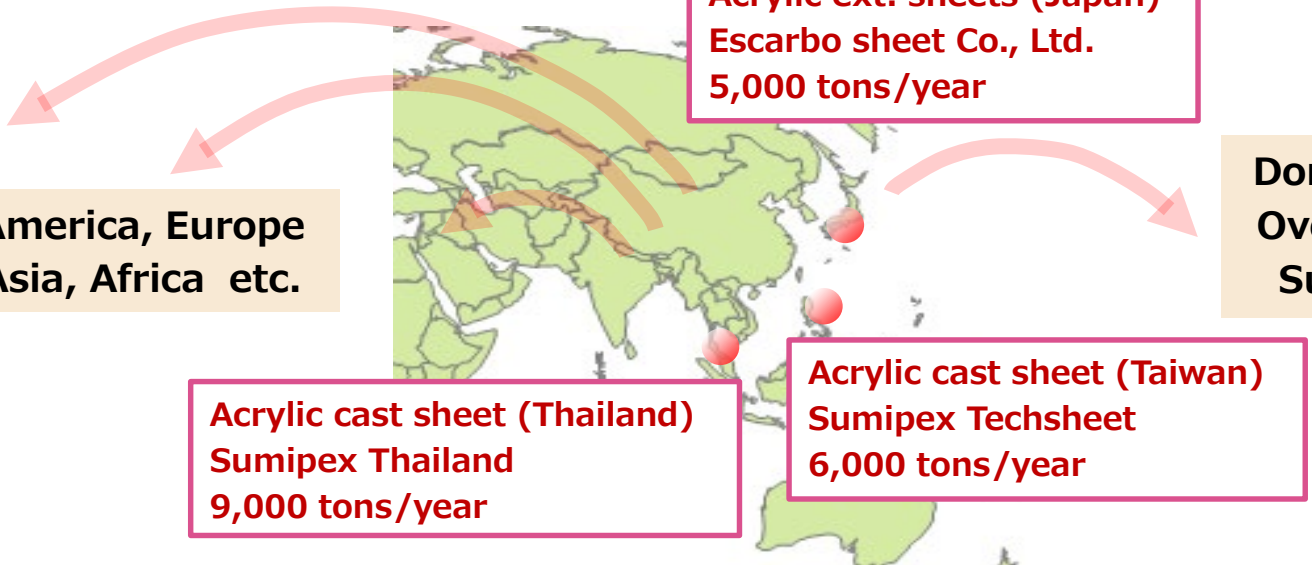
**Transparent acrylic cast sheet: Sumipex**

**Transparent acrylic ext. sheet: Sumipex E**

**Features: Excellent transparency, scratch resistance, weather resistance, suitable for long-term use.**

**Example uses: Store/reception counters, restaurants, hospitals, schools, etc.**

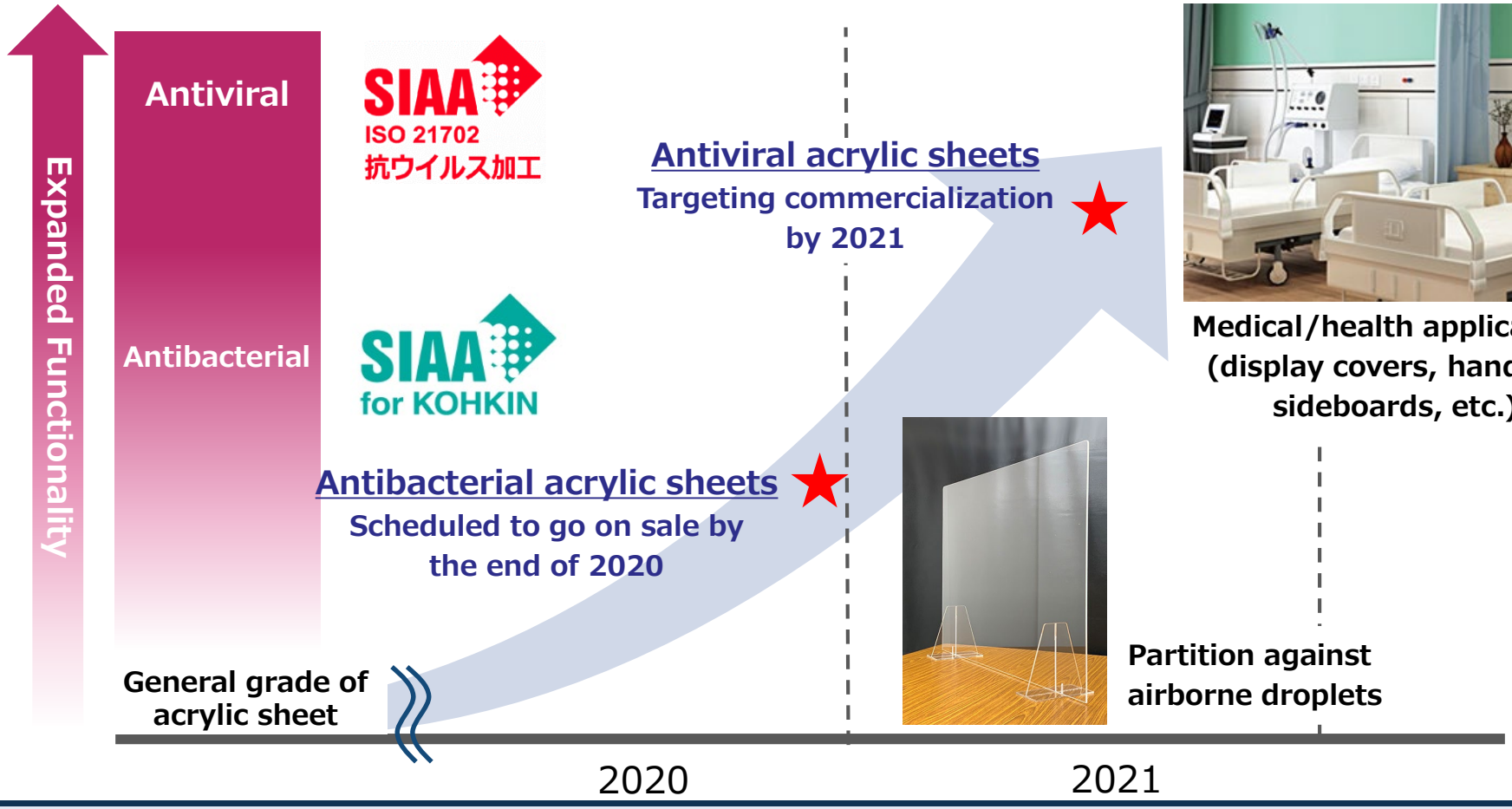
## 2) Global supply chain



# COVID-19 Countermeasure Products

## 3) Expanding the functionality of acrylic sheets

> Increased demand for antibacterial and antiviral materials due to COVID-19 situation
> Providing solutions through technical collaboration with Sumika Environmental Science Co., Ltd. (antiviral agent).



# Ⅱ-3 Global Warming Initiatives ①

## Promote fuel conversion to reduce $CO_2$ emissions in major domestic production bases (Ehime & Chiba)

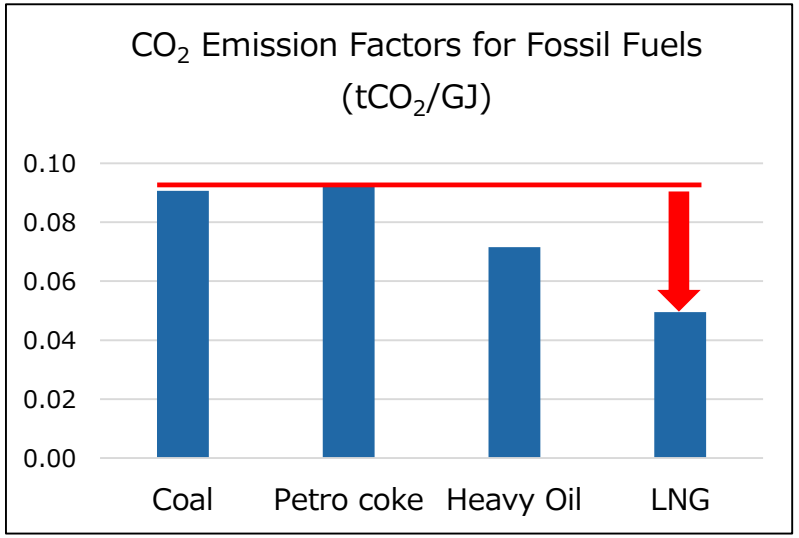
- Build LNG terminal in Ehime through joint investment by 5 firms
- Introduce high-efficiency gas turbine power generators
- Replace some of the existing boilers

| | |
|---|---|
| **Fuel conversion** | Shift from coal, petroleum coke and heavy oil to LNG |
| **Thermal efficiency** | Supply steam, using high-temperature exhaust gas from gas turbines |

**Reduce $CO_2$ emissions**

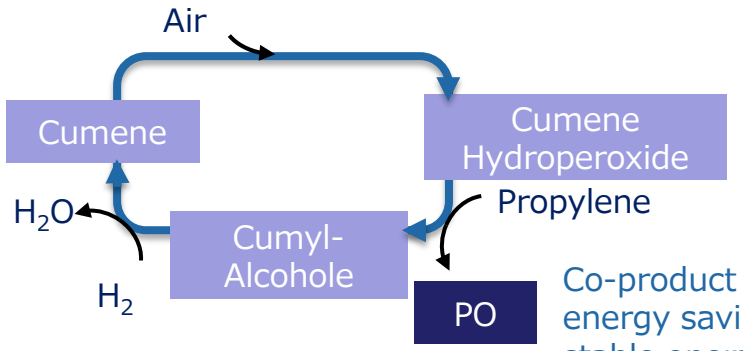
**Ehime: 650 thousand tons/ year**
**Chiba: 240 thousand tons/ year**

Composite image: LNG terminal at the Ehime works



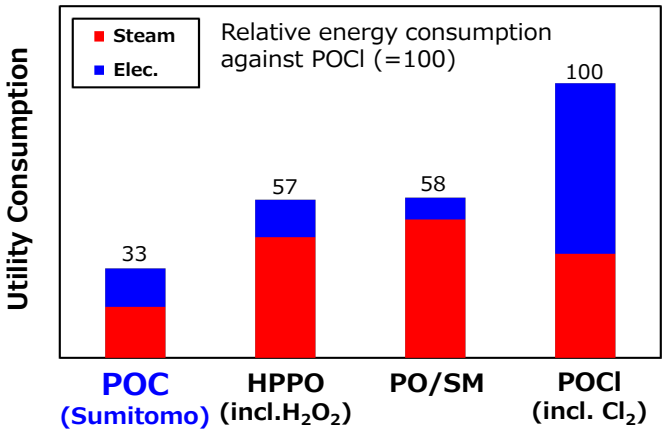
# Ⅱ-3 Global Warming Initiatives ②

## Propylene Oxide-only Method (Cumene Method)

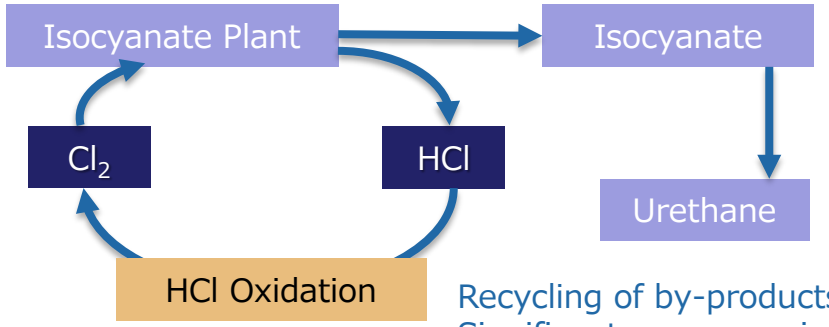



Co-product free, energy saving and stable operation

## Comparison with typical PO technologies




## HCl Oxidation Technology




Recycling of by-products, Significant energy savings

## Comparison with typical alternative

| | Sumitomo HCl Oxidation | NaCl Electrolysis |
|---|---|---|
| Electricity [kWh/t-Cl2] | **165** | 2,500 |
| $CO_2$ Emissions*1 [t/t] | **0.08** | 1.3 |

*1 The value was calculated with $CO_2$ emission factors from the Japanese Ministry of the Environment

**Contributing to reducing global warming by licensing energy-saving processes**

# Ⅱ Petrochemicals & Plastics Sector

# Ⅱ-4 Prospective business

## Aiming at a Decarbonized Society, Circular Economy

Plastic products make our lives richer and more convenient, but there are issues with both the carbon footprint caused by consuming petroleum as a raw material and with how to handle and reuse waste plastic products.

| Area | Direction of business |
|---|---|
| Addressing Climate Change | Contribute to reducing GHG emissions |
| | Use biomass-derived raw materials |
| Reducing Environmental Impact | Contribute to reducing waste plastics |
| | Contribute to reducing impact in food production |
| Effective Use of Resources | Implement carbon resource recycling |
| | Expedite carbon capture and utilization technology |

### Direction of R&D

We strive to promote R&D in plastics products that contribute to the 3 Rs (Reduce, Reuse, Recycle), and to enhance their environmental friendliness and utility value.

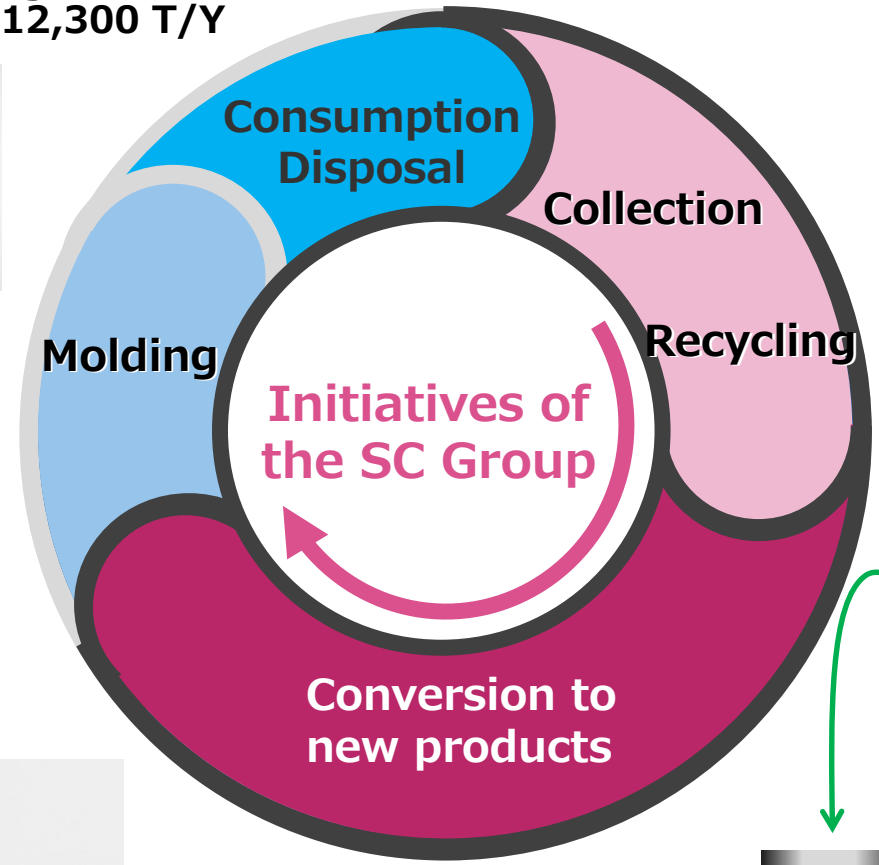
**Lighter Packaging**

**Promotion of Reusable Products**

**Development of technology to utilize waste plastics and captured carbon**

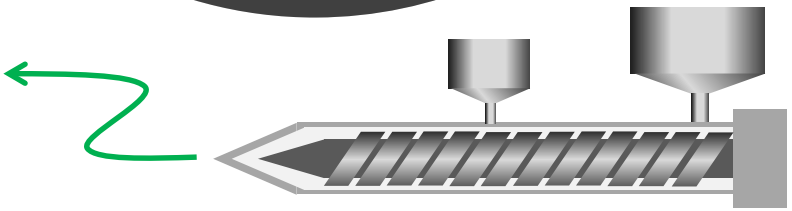
# Materials Recycling Technology Automotive materials

**Environmental Contribution Results (FY2018)**
**Reduction of Virgin PP usage: 4,700 T/Y**
**GHG emission reduction: 12,300 T/Y**



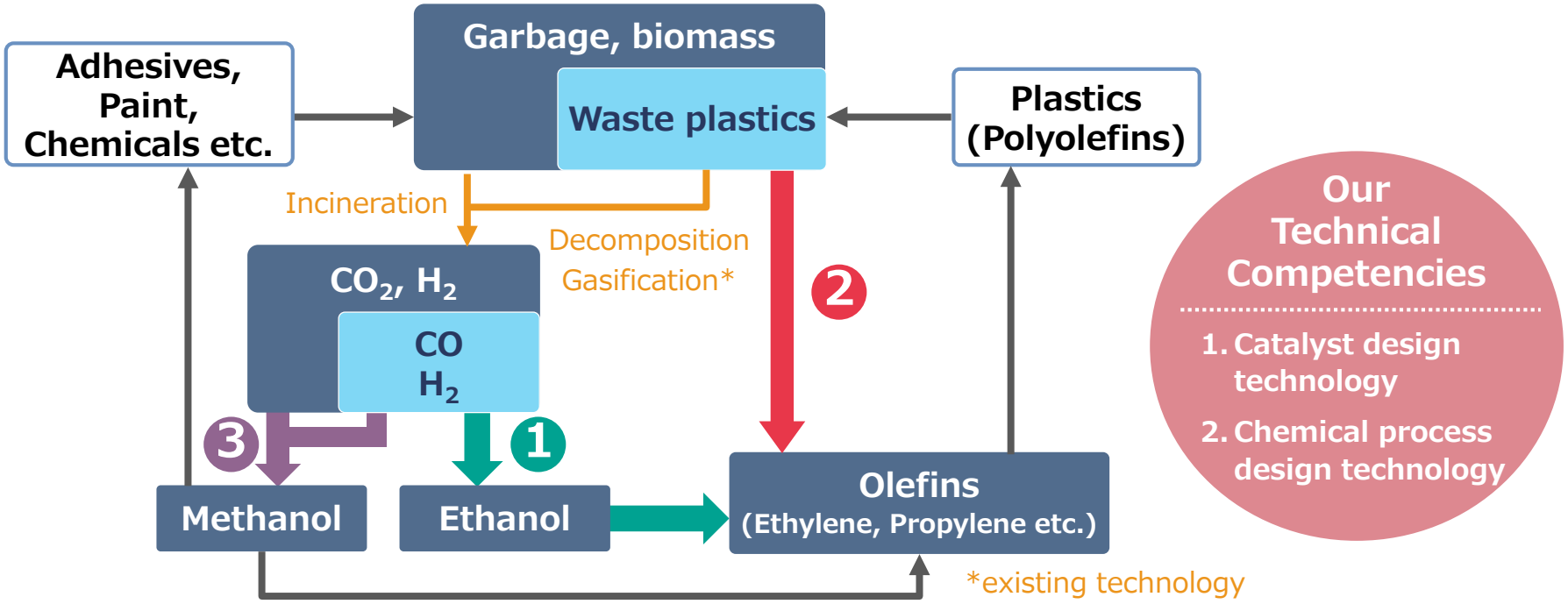

**Commercialization through Sumika Polymer Compounds Europe Ltd.**

**Glass fiber reinforced PP compound (pellets)**
**Regenerated PP rate: Over 60%**

**Advanced manufacturing and quality control technology, and abundant know-how**

# Ⅱ-4 Chemical Recycling Technology




**Our Technical Competencies**

1. Catalyst design technology
2. Chemical process design technology

## Produce plastics from waste plastics or garbage instead of fossil resources

**① Alliance with SEKISUI CHEMICAL**

| | |
|---|---|
| RM | Garbage, waste plastics, biomass |
| Prod. | Polyethylene |
| React. | Gasification→ ethanol (by microbes) → PE |

**② Joint research with Muroran Inst. Tech.**

| | |
|---|---|
| RM | Waste plastics |
| Prod. | Ethylene, propylene |
| React. | Catalytic cracking |

**③Joint research with Shimane Univ.**

| | |
|---|---|
| RM | Garbage, waste plastics, biomass |
| Prod. | Methanol |
| React. | Catalytic synthesis of $CO_2$ and $H_2$ |

## Cautionary Statement

Statements made in this document with respect to Sumitomo Chemical's current plans, estimates, strategies and beliefs that are not historical facts are forward-looking statements about the future performance of Sumitomo Chemical. These statements are based on management's assumptions and beliefs in light of the information currently available to it, and involve risks and uncertainties.

The important factors that could cause actual results to differ materially from those discussed in the forward-looking statements include, but are not limited to, general economic conditions in Sumitomo Chemical's markets; demand for, and competitive pricing pressure on, Sumitomo Chemical's products in the marketplace; Sumitomo Chemical's ability to continue to win acceptance for its products in these highly competitive markets; and movements of currency exchange rates.