

PETROCHEMICAL BUSINESS

As the international market expands with population growth, we make the most of our competitive advantage in petrochemical products.



President, Representative Director,
Chief Executive Officer
Maruzen Petrochemical Co., Ltd.

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Business Overview

In the petrochemical business, Maruzen Petrochemical, a group company, provides a stable supply of petrochemical products as an ethylene center in the petrochemical complex. In addition, Hyundai Cosmo Petrochemical (HCP), a joint venture with Hyundai Oilbank (HDO), supplies competitive petrochemical products with its Asia-leading para-xylene manufacturing facility.

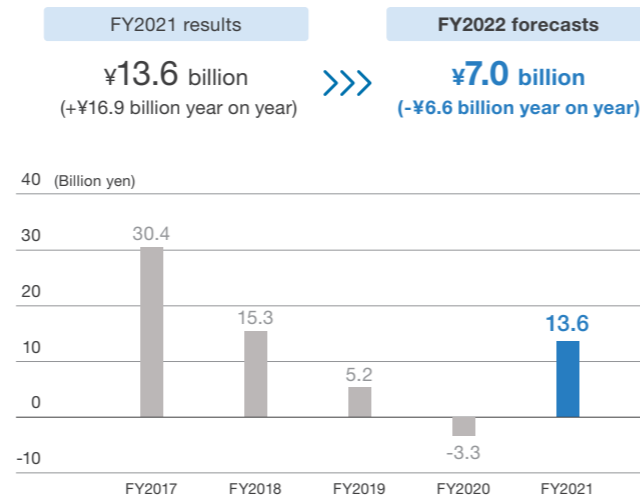
FY2021 Results and FY2022 Forecasts

In FY2021, ordinary profit increased ¥16.9 billion year on year, to ¥13.6 billion, mainly due to the improvement of benzene market conditions and an increase in production volume attributed to a difference in the scale of regular maintenance from the previous fiscal year.

In FY2022, we expect ordinary profit to decrease ¥6.6 billion year on year, to ¥7.0 billion, mainly reflecting the deterioration of market conditions of benzene and other aromatic products, offsetting an increase in profit expected due to the absence of the impact of regular maintenance at Maruzen Petrochemical that was generated in the previous year.

In addition, in an initiative promoting synergy with the Petroleum Business, a production facility for hydrogenated petroleum resins is scheduled to begin operation in FY2022 at Chiba Arkon Production, a three-company joint venture involving Arakawa Chemical Industries.

Ordinary profit



Identified risks

- High volatility of petrochemical product prices
- Relaxation of supply and demand resulting from new construction/ expansion of overseas plants
- Sharp increase of raw material prices attributed to the Ukrainian crisis and the weaker yen, and planned power outages as a measure to address power shortages (fluctuation of the operations of the complex)

Opportunities

- Long-term growth in semiconductor demand
- Growth in demand attributed to the recovery of the global economy
- Net zero carbon emissions (acceleration of the global move towards decarbonization)

Strengths

- Two ethylene production facilities, and ethylene production capacity that is among the largest in Japan
- Promoting cooperation in oil refining with the Cosmo Oil Chiba Refinery (Petroleum Business) and cooperation between complexes
- World-leading market share in polymers used in semiconductor photoresists

Business strategy

We assume the following risks in our business environment: the risk of a global decline in product prices stemming from the loosening and deterioration of the supply-demand balance attributed to construction/expansion of overseas plants (especially plants in Asia), the risk of a steep rise in energy and raw material prices attributed to the Ukrainian crisis and depreciation of the yen; the risk of fluctuations in the operation of complex resulting from planned power shortage, the risk of supply disruptions attributable to damage to manufacturing devices caused by a natural disaster and the resultant suspension of production and shipment, the risk of market fluctuations resulting from another wave of infection, and the risk of cost increases and changes in the patterns of consumer spending reflecting measures to achieve carbon neutrality.

On the other hand, we view the increase in demand for specialty chemicals, which is associated with the long-term increase of demand for semiconductors, as an opportunity in the business environment. We see an increase in investments in data centers necessary for building networks, as well as an increase in products for personal use such as PCs and smartphones, and brisk demand for EVs. We believe that the impact of COVID-19 will move toward an end and the global economy will see a growth in demand. While the global move towards decarbonization is accelerating, it is likely that new technologies and products for net zero carbon emissions will be created. We also believe that demand for environmentally friendly products will increase, providing opportunities for business growth.

The strength of the Cosmo Energy Group lies in Maruzen Petrochemical and Keiyo Ethylene together as a single plant having the largest ethylene production capacity in Japan. We have increased the utilization rates of fractions as by-products (such as C4 and C5), as well as ethylene and propylene as mainstay products. Thus, we also have a large capacity to

produce other by-products, including methyl ethyl ketone, for which we have the largest production capacity in Japan. In addition, we have built an integrated supply chain spanning from the production of petrochemical products from naphtha as the main raw material to sales of the products in the complex via a pipeline. We are advancing a collaborative project to increase synergy with the Petroleum Business. In the field of specialty chemicals, we boast a world-leading market share in polymers for semiconductor photoresists. In the field of chemical products, we possess global niche products used for environmentally friendly products.





Competitive advantages

Continued acceleration of specialty chemical initiatives

Regarding the semiconductor market, changes in the market environment need to be watched at present because the growth of PCs and smartphones has slowed. In the medium to long term, however, further market expansion is expected mainly due to the resumption of investment in data centers, the ubiquitization of 5G, IoT products and AI, and the expansion of the utilization of big data and cloud computing. Further, moves towards greater miniaturization and higher integration of semiconductors are continuing globally, and semiconductors are playing an increasingly important role as the foundation of all of industry. They are also playing a role in the achievement of net zero carbon emissions.

In this market environment, at Maruzen Petrochemical, we are expanding our specialty chemical business. Above all, regarding polymers for photoresists, we boast world-class market shares in polymers for KrF¹ photoresists and polymers for ArF² photoresists.

Currently, demand for polymers for KrF and ArF photoresists and other photoresists, mainly including photoresists used for memory, is increasing significantly. Automotive semiconductors, including semiconductors for memory and sensors, are expected to increase in the future. We therefore expect the continued expansion of sales.

Maruzen Petrochemical commercially supplies polymers for photoresists and anti-reflection coating, in addition to polymers for KrF and ArF photoresists, which are the mainstream at present. Further, we also aim to enter the markets of polymers for cutting-edge EUV³ photoresists and polymers for thick-film photoresists for redistribution layers, which are increasingly in demand in the semiconductor post-process. For this purpose, we are collaborating with customers, starting from the development phase. With our lineup of diverse polymers, we cater to customer needs for a wide range of applications.

We also have competitive manufacturing technologies, analytical technologies, and quality assurance capabilities in cutting-edge fields. Our polymers for photoresists are made-to-order products.

We fulfill high customer quality requirements and customer requests to increase production volume by fully leveraging our integrated supply chain which includes raw material procurement, manufacturing and quality assurance, thus demonstrating our competitive advantages.

¹ KrF (krypton fluoride): It is an excimer laser, which is a light source for exposure with a wavelength of 248 nm.

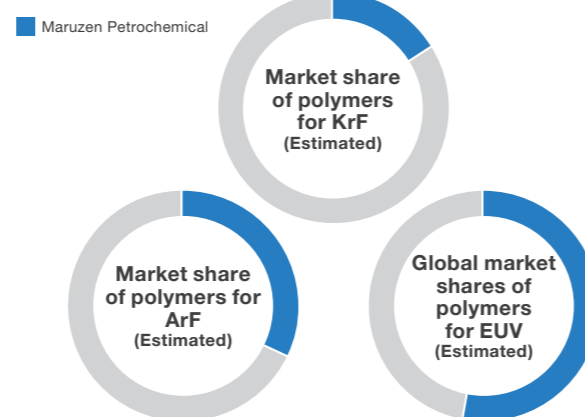
² ArF (argon fluoride): An excimer laser, which is a light source for exposure with a wavelength of 193 nm.

³ EUV: Extreme ultraviolet. It is a next-generation light source with a wavelength of 13.5 nm to be used for exposure technology for semiconductor manufacturing.

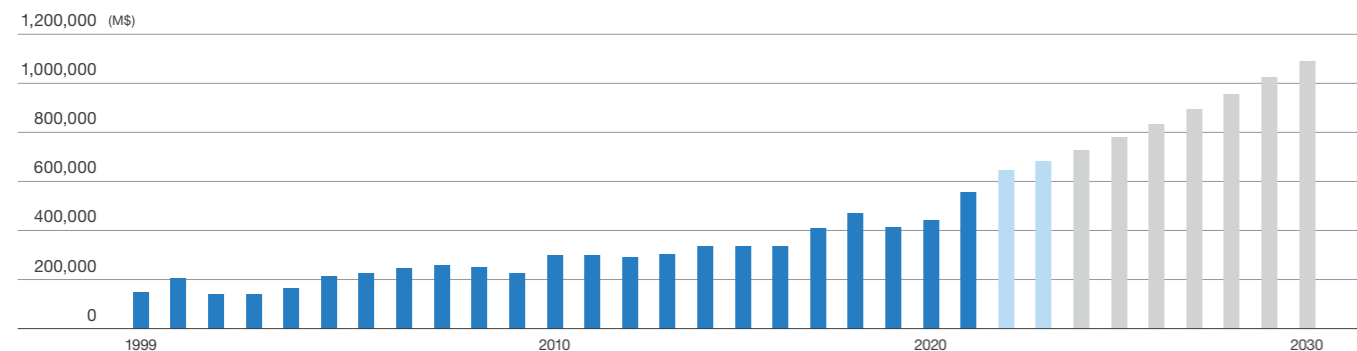


The facility manufacturing polymers for cutting-edge photoresists

Market shares of polymers for photoresists



Semiconductor market forecast



* Created by the Cosmo Oil Group in reference to forecasts by the World Semiconductor Trade Statistics (WSTS)



Initiatives and achievements under the medium-term management plan

Implementation of measures to improve competitiveness

In the Sixth Consolidated Medium-Term Management Plan, we set the improvement of profitability in the functional product area and investment to increase competitiveness for the future as measures to take in the Petrochemical Business. Maruzen Petrochemical has been supplying competitive petrochemical products by operating two naphtha crackers — one at its own ethylene plant and one of Keiyo Ethylen, which is the newest and largest in Japan. From 2018 to 2020, we undertook the large-scale replacement of ethylene cracking furnaces and partially introduced furnaces with high production efficiency. This has not only led to even more stable supply but also reduced CO₂ emissions and environmental impact due to the reduction of fuel consumption.

Chiba Arkon Production, a joint venture between Maruzen Petrochemical, Cosmo Energy Holdings, and Arakawa Chemical Industries, is scheduled to begin the commercial operation of a production facility for hydrogenated petroleum resins in FY2022. Hydrogenated petroleum resins are used as raw materials for hot-melt adhesives, which are used for hygiene products such as paper diapers. Demand for many hygiene products is expected to increase globally due to the

population increase and economic growth mainly in Asian countries.

In 2022, we started operating a propylene rectifying tower. Significant value is added to polymer grade propylene (PGP) using the propylene rectifying tower, and expectations are high that PGP will lead to the creation of new businesses with applications across a broad range of fields.



Propylene rectifying tower

Enhancement of chemical products and specialty chemicals

Maruzen Petrochemical will continue to enhance its chemical products and specialty chemicals, which have grown into revenue drivers. In addition to the abovementioned Chiba Arkon Production, we have started to export methyl ethyl ketone to Europe and the United States by developing shipping infrastructure. We are also expanding domestic and overseas sales of vinyl ether products, hypoallergenic substances that are used widely in the field of environmentally friendly products, by increasing our manufacturing capacity.

For polymers for photoresists, we have also secured facilities for meeting the demand for high-viscosity, high-concentration resin solutions for thick-film photoresists. We have also constructed a new in-house facility for manufacturing polymers for EUV photoresists, a cutting-edge technology that is expected to see growing demand. We started the trial operation of this facility in July 2022. (The facility building is pictured in the photo in the upper part of the left page and the interior of the building is in the photo at right.) Further, in time with the expansion of our research

center that is planned at the end of 2022, we will appropriately invest for the introduction of advanced analytical instruments, construction of a clean environment and other purposes, further enhancing our quality assurance structure and accelerating research and development efforts.



Inside the facility manufacturing polymers for cutting-edge photoresists