



PETROCHEMICAL BUSINESS

As the international market expands with population growth, we will make the most of our competitive advantage in ethylene and para-xylene production.

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 Oil Bank (HDO), supplies petrochemical products with its para-xylene manufacturing facility, which is one of the most competitive in Asia.

FY2019 Results and FY2020 Forecasts

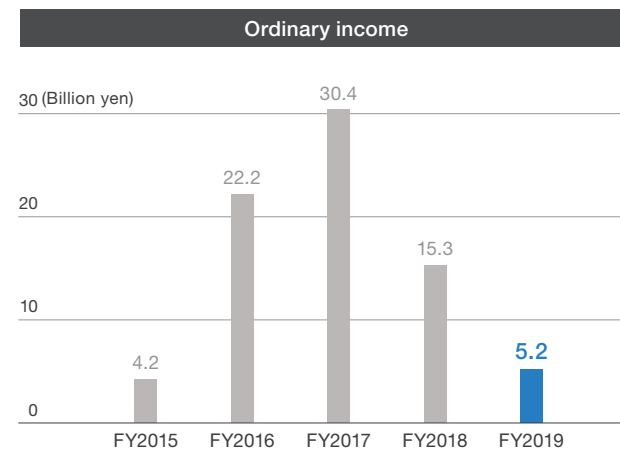
In FY2019, Maruzen Petrochemical improved its production volume based on elimination of the impact of regular maintenance in the previous fiscal year. However, due to the deterioration in market prices of petrochemicals, such as ethylene and para-xylene, ordinary income decreased by ¥10.1 billion from the previous fiscal year to ¥5.2 billion.

In fiscal 2020, we expect ordinary income to decline by ¥7.7 billion to ordinary loss of ¥2.5 billion due to a decrease in production volume associated with regular maintenance at Maruzen Petrochemical and the deterioration in petrochemical market conditions since the previous fiscal year.

In addition, in FY2020, a production facility for hydrogenated petroleum resin is scheduled to be completed at Chiba Arkon Production, a joint venture with Arakawa Chemical Industries, as a tie-up with the petroleum business.

Ordinary income

FY2019 results	¥5.2billion (-¥10.1 billion year on year)
FY2020 forecast	-¥2.5billion (-¥7.7 billion year on year)



Business strengths and strategies

Risks	Opportunities	Strengths
<ul style="list-style-type: none"> Risks related to petrochemical product prices and demand Inflow of non-naphtha-derived petrochemicals Construction of ethylene and para-xylene production facilities in China 	<ul style="list-style-type: none"> Increasing global demand for petrochemical products in tandem with population growth Long-term growth in semiconductor demand 	<ul style="list-style-type: none"> World-leading market share in polymers used in semiconductor photoresists Largest ethylene production capacity in Japan and integrated supply chain Para-xylene plant with large-scale production capacity and geographical competitiveness

Main Group companies

Maruzen Petrochemical,
Cosmo Matsuyama Oil, CM Aromatics,
Hyundai Cosmo Petrochemical (equity-method affiliate)

Major assets (as of March 31, 2020)

 Ethylene production capacity 1.29million tons/year* Domestic share: Approx. 19%	 Para-xylene production capacity 1.36million tons/year (as of July 31, 2020)	*Includes production capacity of Keiyo Ethylene (55% owned, consolidated subsidiary of Maruzen Petrochemical)
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Business strategies

In the petrochemical business, we recognize the following risks: A decline in global product prices stemming from a decrease in demand for petrochemical products, mainly due to the U.S.-China trade friction; excessive product supply due to the inflow of petrochemical products derived from shale oil and coal; and oversupply due to the construction of large ethylene and para-xylene plants in China.

However, opportunities in the business environment include increasing global demand for petrochemical products stemming from population growth in China and India, and increasing demand for specialty chemicals as demand for semiconductors increases over the long term.

One of the strengths of the Group is its world-leading market share in polymers for semiconductor photoresists, which is the field of specialty chemicals Maruzen Petrochemical and Keiyo Ethylene together have the largest ethylene production capacity in Japan. Our ethylene plant has an integrated supply chain through pipelines in the plant, from cracking of naphtha, the raw

material, to petrochemical production and sales. Hyundai Cosmo Petrochemical has a large-scale para-xylene plant in Daesan, South Korea, located near China, where petrochemical products are in strong demand.



PETROCHEMICAL BUSINESS

Competitive advantages

1 World-leading market share in polymers used in semiconductor photoresists

A photoresist is photosensitive material used in photolithography that forms a fine pattern on a semiconductor element or the like. A fine pattern is formed on a substrate, as the solubility of the polymer contained in the photoresist changes from a photoreaction. As one of the businesses that does not depend on petrochemicals, Maruzen Petrochemical entered the semiconductor field by taking advantage of the application of its p-vinylphenol polymer to KrF¹ photoresists. Currently, Maruzen Petrochemical manufactures and develops photoresist polymers that can be used with KrF excimer laser (248 nm) and ArF² excimer laser (193 nm) light sources. It has large-scale manufacturing facilities dedicated to KrF and facilities dedicated to ArF, and is meeting the needs of photoresist manufacturers, which are its customers. In addition, because it is an application for semiconductors,

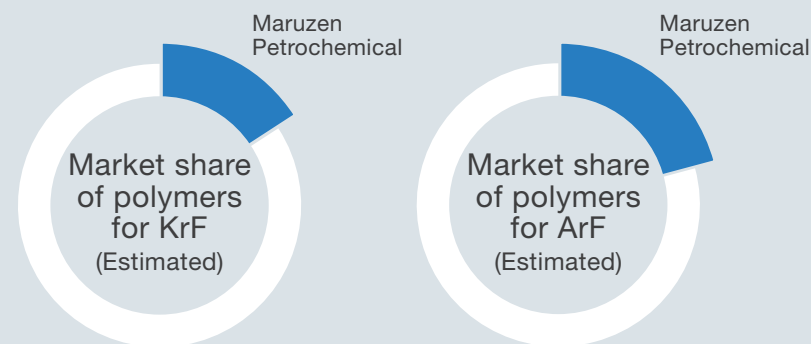
where technological innovation is exceptional, we have built an integrated quality control system covering equipment management, raw material management, process management, and quality management to meet requirement for high quality from customers. Moreover, we are responding to product standards that are becoming more stringent every year while striving to enhance customer satisfaction. Maruzen Petrochemical boasts world-class market share in both polymers for KrF and ArF. Recently, line width has been further shrinking, and among semiconductor

microfabrication technologies, technology using an extreme ultraviolet (13 nm) laser called EUV³ has been developed in the cutting-edge field with line widths of 7 nm or less. In 2019, some semiconductor manufacturers started making practical use in the production line for 7nm design semiconductor devices lines, and in 2020, full-scale application is expected to begin on 5 nm production lines while demand is projected to rise rapidly. We have currently succeeded in development and manufacturing polymers for EUV photoresists that are used as its main component.



Manufacturing facility of polymers used in photoresists (in a clean environment)

Global market shares in polymers used in semiconductor photoresists

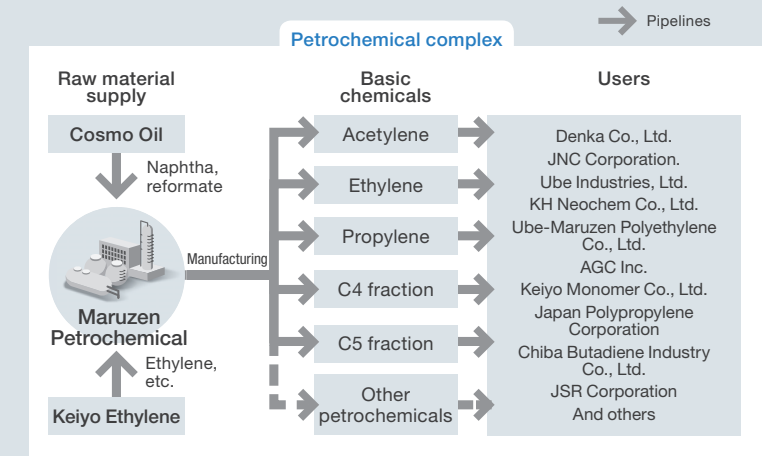


¹ KrF is an excimer laser that irradiates photoresists to draw a fine pattern on the substrate in the semiconductor manufacturing process.
² ArF is an excimer laser used to draw finer patterns for cutting-edge processes than KrF.
³ EUV is an extreme ultraviolet light used to draw finer patterns for cutting-edge processes that will be the next generation after ArF. Currently, patterns are becoming increasingly miniaturized to realize smaller and larger capacity semiconductors

2 Largest ethylene production capacity in Japan and integrated supply chain

Maruzen Petrochemical has two ethylene production facilities (one of which is Keiyo Ethylene) in the same plant. Our ethylene production capacity is the largest scale in Japan and we have cost competitiveness based on our production capacity. As a supply chain that is unique for petrochemical complexes, the company has established a supply system through pipelines, where integrated operation is conducted within the complex from the acceptance of naphtha as a raw material to the production of petrochemical products and the sale of products to users. Maruzen Petrochemical has a stable system of facility operation that uses the competitiveness of both ethylene plants.

Complex supply chain (excerpt)



3 Para-xylene plant with large-scale production capacity and geographical competitiveness

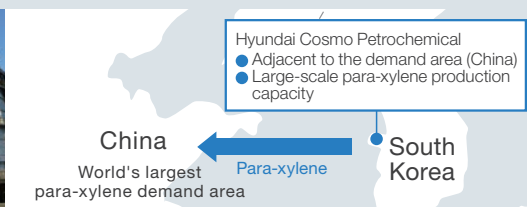
The Cosmo Energy Group established Hyundai Cosmo Petrochemical (HCP), a joint venture with Hyundai Oil Bank, Co., Ltd. (HDO)* in November 2009. HCP has a large-scale para-xylene manufacturing facility with an annual capacity of 1.36 million tons, located in Daesan, South Korea, close to China, the world's largest para-xylene demand area. Consequently, HCP is one of the world's leading para-xylene manufacturers that also features geographical competitiveness. Para-xylene, a basic chemical, is used as a raw material for purified

terephthalic acid, which is further processed into polyester fibers and plastic for PET bottles, materials for clothing, PET bottles and other end products. Global demand for petrochemical products is expected to expand, reflecting global population growth.

HCP is making advanced investments that will increase para-xylene production capacity and save energy. It will continue to work toward strengthening its competitiveness and will respond rapidly to growing demand for petrochemical products, particularly in China.



Para-xylene production facility



* Hyundai Oil Bank Co., Ltd. is a Korean oil refining and sales company. It signed an Oil Business MOU with Cosmo Oil in April 2008.