

Industrial Materials Domain

Our products and technologies in the Industrial Materials domain are supporting a variety of industries and societies. We are proceeding with the diversification of raw materials, including renewable resources and strengthening our business structures.

Business Lines by Segment

Chemicals

The Chemicals segment is expanding its business in the areas of basic petrochemicals including ethylene and propylene derived from naphtha, basic chemicals such as materials for synthetic fibers, coke and other carbon products and the industrial gas business.

Polymers

We are utilizing our unique marketing capabilities, product development capabilities, and manufacturing technologies to provide synthetic resins and other products that meet advanced and specialized needs.



Hiroaki Ishizuka
President and Chief Executive Officer, MCC



Hitoshi Ochi
President and Chief Executive Officer, MRC



Yujiro Ichihara
President and Chief Executive Officer, TNSC

Main Businesses and Products



Chemicals

Petrochemicals

Net sales approx. **¥500 billion***

Continue extensive cost reduction

As we have resolutely enforced and completed our structural reforms, we are going to supply very cost-competitive basic petrochemicals through our extensive cost reduction. On the other hand, we will further promote a shift to high-performance and high-value-added petrochemical products.

* Review of Business Units in Fiscal 2015



Chemicals

Carbon Products

Net sales approx. **¥180 billion**

One of the largest coke ovens in the world

With one of the largest coke ovens in the world, we supply coke to steelmakers inside and outside Japan. From the coal tar, the coking byproduct, we produce a variety of carbon products that support steelmaking and automobile industries around the world.



Polymers

MMA/PMMA

Net sales approx. **¥310 billion**

World's No. 1 supplier

We dominate the global MMA market with a 40% share. Our robust business model, based on a value chain extending from monomers to polymers and processing, contributes to earnings stability.



Chemicals

Industrial Gases

Net sales approx. **¥640 billion**

The Gas Professionals

We have a leading 40% share of the domestic market for industrial gases, mainly oxygen, nitrogen and argon. We are expanding our business areas overseas while focusing on North America and Asia as key markets.

Opportunities and Risks

Strengths	Growth Opportunities	Risks
<ul style="list-style-type: none"> Global marketing capabilities based on a global supply framework for MMA, performance polymers*1 and industrial gases Market position in MMA business with excellent cost competitiveness and No. 1 share of global market, broad range of MMA-related products Increase in business opportunities from synergies with the industrial gas business Accomplishment of restructuring naphtha crackers and utilities to quickly optimize and advance functionality of polyolefin production 	<ul style="list-style-type: none"> Business network capable of addressing growing global demand (MMA business lines, performance polymers*1 and industrial gases) Growing demand in emerging markets: India, the Middle East, Eastern Europe and Africa 	<ul style="list-style-type: none"> Sharp fluctuations in earnings on commodity petrochemicals due to changes in the supply/demand balance, raw material prices and product prices Oversupply in terephthalic acid market*2 due to mega-expansions and new entrants in China Competition from products made with cheaper raw materials, such as shale gas in the U.S. and coal in China Ongoing shrinking demand for petrochemical products in Japan, market impact of products made in China, which has excess production capacity

*1 Performance polymers is scheduled to be moved to the high-performance polymers business of the Performance Products domain in April 2017.

*2 In July 2016, MCHC decided on the equity interest transfer of the terephthalic acid business in India and China.

Review of Segments in Fiscal 2015

Refer to page 76 for a breakdown of performance by segment.

Chemicals

Net Sales

¥1,321.1 billion

YoY **+18.5%** ↑

Operating Income

¥57.2 billion

YoY **+548.9%** ↑

Polymers

Net Sales

¥773.6 billion

YoY **-11.4%** ↓

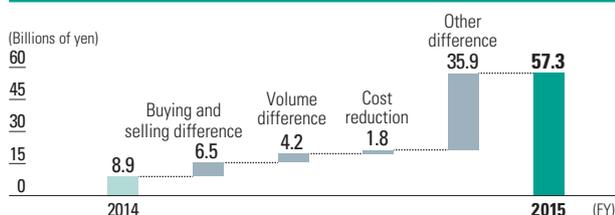
Operating Income

¥43.3 billion

YoY **+54.9%** ↑

Contributing Factors to Operating Income

(Figures disclosed in MCHC operating summaries)

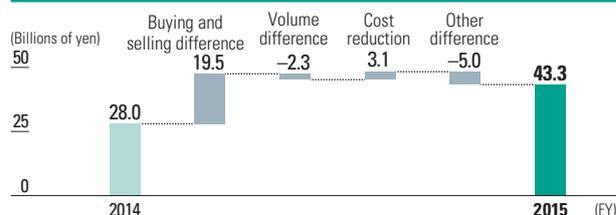


(Notes) 1. Other differences include the impact of the change in the end of the fiscal year.

2. In fiscal 2015, some businesses were moved from the Chemicals and Others segment to the Designed Materials segment and Polymers segment. Accordingly, figures for fiscal 2014 have been restated to facilitate comparisons.

Contributing Factors to Operating Income

(Figures disclosed in MCHC operating summaries)

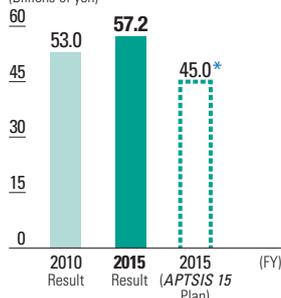


APTSIS 15 Step 2 Review and Forecast

Chemicals

Operating Income

(Billions of yen)

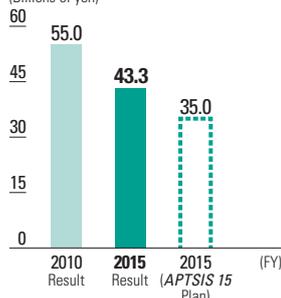


* Leaping Ahead includes equivalent of ¥20.0 billion for M&As

Polymers

Operating Income

(Billions of yen)



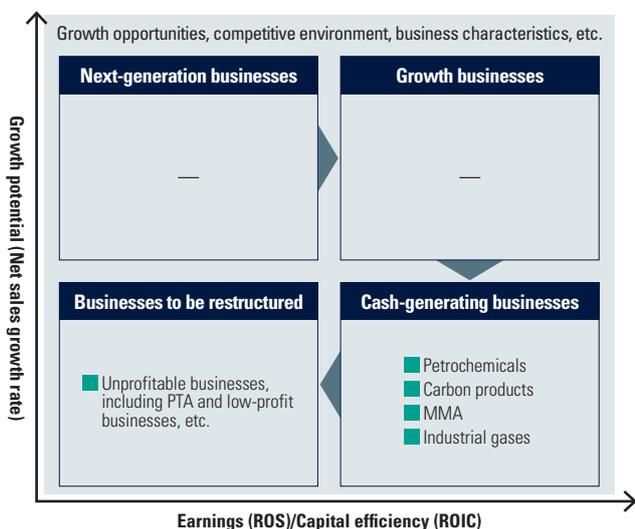
Chemicals recorded a ¥12.3 billion surplus compared to the operating income target in *APTSIS 15*, reflecting the addition of TNSC to the scope of consolidation.

Operating income in the Polymers segment exceeded the target in *APTSIS 15* by ¥8.3 billion, owing in part to fixed cost reductions and improvement in the spread between product and raw material prices, such as polyolefin.

The business environment for this segment is likely to remain challenging, amid shrinking demand for petrochemical products in Japan and unstable commodity prices for products. Accordingly, we aim to increase cost competitiveness and accelerate global business development.

Growth Strategies

Business Portfolios (by Business Unit)



Policy

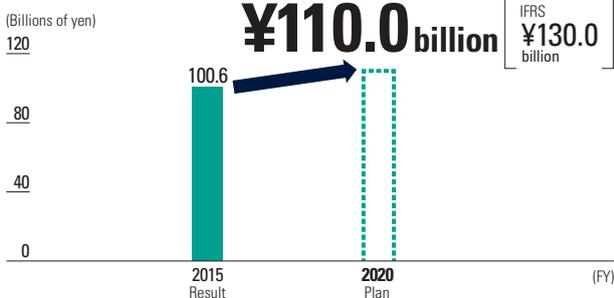
- Stabilization of earnings by strengthening of cost-competitiveness
- Acceleration of growth and strengthening of presence in the global market

Key Strategies

- Strengthening of cost-competitiveness
- Acceleration of global development (MMA, Industrial gases)
- Business rebuilding

Plan Values APTSIS 20 Five-Year Plan (J-GAAP)

Operating income



Investment amount (Five-year plan, total)

¥580.0 billion

R&D investment (Five-year plan, total)

¥80.0 billion

APTSIS 20 Action Plans

Petrochemicals

- Aim to restructure crackers by unification of naphtha crackers in Mizushima in 2016
- Continue extensive cost reduction
- Shift to high-performance products, increase proportion of high-value-added products
- Implementation of drastic measures in terephthalic acid business (In July 2016, MCHC decided on the equity interest transfer of the terephthalic acid business in India and China.)

Carbon Products

- Repairing coke oven batteries in planned manner, maintain sales to overseas steelmakers
- For high-performance graphite and carbon black, promote development/sales expansion of high-performance products

MMA

- "Jump start" of new Saudi JV planned for full operation in 2017
- Ensure competitiveness and stable, high ROS by production system optimization
- Development of new fields and creation of new applications by expansion of high-performance product lineup

Industrial Gases

- Promote greater streamlining and optimizing to maintain a stable revenue base in Japan
- Promote M&As on global scale and strategically invest management resources in overseas markets and steadily take in growth opportunities

Priority Measures

Contribute to stable earnings through superior competitiveness in monomers and an integrated value chain by differentiating and advancing functionality of polymers

MRC has a global network of production and sales bases as the No. 1 supplier of MMA in the world with an approximately 40% share of global production capacity. MRC has built a robust business model with high cost competitiveness and a broad value chain, ranging from commodity products to high-performance products, beginning with MMA monomers and extending to polymers and processed products.

MMA contributes broadly to the advancement of industry and society as a basic material used in acrylic resins (MMA polymers) and other resin modifiers, as well as in high-performance coatings.

Acrylic resins, primary product from MMA, offer high transparency and excellent weatherability, and are used in diverse end products such as signage for convenience stores, lighting, automobile lamp covers, the transparent parts of home appliances, sanitary ware, and aquarium panels. MMA demand is likely to increase in the future.

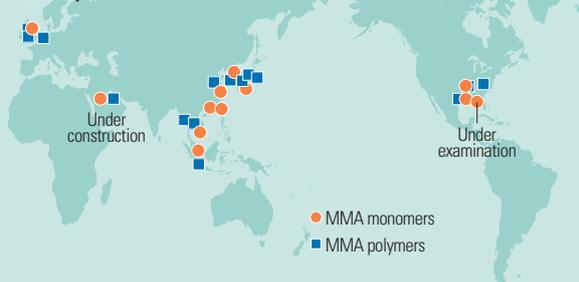
The value that MRC provides to customers is the capability to support their growth strategies. Along with borderless business, companies can choose where to locate their plants and production bases around the world. By supplying products and services where customers need them, whether it be in Europe, the U.S. or Asia, MRC supports the growth strategies of its customers. Another unique value is its ability to supply MMA-related products like a one-stop shop. With technological prowess, MRC is able to provide high-quality, finely customized solutions that fulfill the

needs of its customers, drawing from its broad product lines, starting from MMA monomers, polymers and processed products which include molding materials, resin sheets, resin improvers, and plastic films, as well as coating materials, optical fiber, and rod lenses.

In a bid to increase competitiveness in the MMA business, we are collaborating with Saudi Basic Industries Corporation on the construction of an MMA plant in Saudi Arabia that uses a new ethylene method*. With annual production capacity of 250,000 tons, it will be one of the largest MMA plants in the world. We are also considering the construction of a new MMA plant in North America that uses the same production method with shale gas as a feedstock. We aim to improve profitability through this strategy to expand MMA business lines, from monomers to polymers.

* In 2008, the new ethylene method was industrialized for the first time in the world and uses commodity chemicals as feedstock, such as methanol and ethylene. Scaling up facilities is also relatively straightforward, so the new ethylene method is highly likely to have cost advantages over the other traditional production methods.

MMA/PMMA Production sites



POINT of VIEW | Solutions for Social and Environmental Issues

Cover 6 million PET scans per year with a stable supply of Water-¹⁸O*¹ by expanding production capacity*² in 2015

Water-¹⁸O contributes to early detection and prevention of diseases

PET*³ scan is the most popular tool in the early detection of cancer. Based on its advanced gas separation technologies as an industrial gas manufacturer, TNSC has developed proprietary cryogenic separation technologies for stable isotopes of oxygen. These technologies facilitate the efficient production of Water-¹⁸O, a starting material for diagnostic agents of PET scan.

In addition to cancer, PET scan is to be widely used to detect brain disease and heart disease. Accordingly, PET scan market is expected to expand by 5-10% globally per year. To satisfy such strong demand since launching Water-¹⁸O in 2004, we expanded production capacity in 2013 and 2015, which led us to have approximately 40% share of the global production capacity. We currently

supply Water-¹⁸O to 20 countries around the world.

TNSC contributes to the realization of *KAITEKI* for society by aiding in the early detection and prevention of cancer, brain diseases and heart diseases through the reliable supply of PET scan market amid increasing demand.



Water-¹⁸O

*¹ Water-¹⁸O is water with a 98% enrichment of ¹⁸O, which only exists as 0.2% of oxygen in the atmosphere. It is used to make PET diagnostic agents "¹⁸F-DG".

*² Water-¹⁸O production capacity (from 300kg/year to 600kg/year)

*³ Positron Emission Tomography. Cancer cells uptake several times more glucose than healthy cells. PET scan visualizes the location of fluorodeoxyglucose-¹⁸F (¹⁸F-DG), a radioactive glucose analogue, absorbed by cancer cells. PET scans market has rapidly increased due to their noninvasiveness and ability of initial cancer detection with a single full body scan.