Change and Innovation

Business Strategy for the Petrochemicals & Plastics Sector

October 8, 2015

SUMITOMO CHEMICAL

Tomohisa Ohno
Rabigh Project, Petrochemicals & Plastics Sector,
Representative Director &
Senior Managing Executive Officer
1. Overview of Our Petrochemicals & Plastics Business
2. Petrochemicals & Plastics Business Climate
3. Business Strategy for Each Location
   (1) Domestic Operations
   (2) Singapore
   (3) Saudi Arabia
4. Technology Development Strategy
5. Final Words
1. Overview of Our Petrochemicals & Plastics Business
### Consolidated Results

#### After-tax Earnings of Major Group Companies

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<thead>
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</tr>
</thead>
<tbody>
<tr>
<td>PCS</td>
<td>130</td>
<td>23</td>
<td>-60</td>
<td>62</td>
<td>121</td>
</tr>
<tr>
<td>TPC</td>
<td>70</td>
<td>49</td>
<td>-12</td>
<td>-13</td>
<td>40</td>
</tr>
<tr>
<td>PRC</td>
<td>56</td>
<td>18</td>
<td>130</td>
<td>96</td>
<td>182</td>
</tr>
</tbody>
</table>
## FY2014 Results (consolidated basis)

*(Billions of yen)*

<table>
<thead>
<tr>
<th></th>
<th>FY2014 (Old Sector)</th>
<th>FY2014 (New Sector)</th>
<th>FY2015 Forecast (New Sector)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Net Sales</strong></td>
<td>806.2</td>
<td>932.3</td>
<td>715.0</td>
</tr>
<tr>
<td><strong>Operating Income</strong></td>
<td>21.2</td>
<td>20.8</td>
<td>17.0</td>
</tr>
</tbody>
</table>
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**Business Strategy for the Petrochemicals & Plastics Sector**

**Change in Business Sector (Effective as of April 1, 2015)**

The Basic Chemicals Sector was eliminated and businesses in this sector were split up and transferred to the Petrochemicals & Plastics Sector and the Energy & Functional Materials Sector, which was established as a new business sector. In addition, a part of businesses in the Petrochemicals & Plastics Sector was transferred to the Energy & Functional Materials Sector. Inorganic chemicals, raw materials for synthetic fibers, organic chemicals, and methyl methacrylate, which had been included in the Basic Chemicals Sector, were transferred to the Petrochemicals & Plastics Sector. Synthetic rubber, which had been included in the Petrochemicals & Plastics Sector, was transferred to the Energy & Functional Materials Sector.
Global Strategy for Petrochemicals Business

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Cumulative ethylene production volume by our petrochemical complexes (million tons)

- 1997: Started operation of second phase petrochemical complex in Singapore
- 1984: Started operation of petrochemical complex in Singapore
- 2009: Started operation of the Petro Rabigh ethylene plant

A cycle of about 25 years

Business Strategy for the Petrochemicals & Plastics Sector
History of Our Petrochemical Business (New businesses and withdrawal from unprofitable businesses)

- Started ethylene production in Ehime (1958)
- Started ethylene production in Chiba (No. 1 plant) (1967)
- Boosted ethylene production capacity in Chiba (No. 2 plant) (1970)
- Started operation of petrochemical complex in Singapore (1976)
- Chiba ethylene No. 1 plant, NH3 plant, urea plant shutdown (1976)
- Methanol plant, ethylene plant in Ehime shutdown (1976)
- Established PSPC in Houston, started PP production (1984)
- Rabigh Project started operation (1983)
- Keiyo Ethylene, a joint venture with Maruzen Petrochemical, started operation (1994)
- Started operation of second phase petrochemical complex in Singapore (1997)
- Started PP production line (1998)
- Shut down ethylene No. 2 plant in Chiba, procuring all ethylene from Keiyo Ethylene (1999)
- Shut down PVC production line (1999)
- Shut down two PP production lines (1999)
- Shut down PVC production line electrolysis / VCM plants (2002)
- Shut down PP production line (2007)
- Shut down PP production line (2009)
- Shut down PP production line (2012)
- Shut down PP production line (2015)
- PSPC ceased operation (2017)
- Exit PS business (2015)
**Ethylene production capacity by area**

**Saudi Arabia**
- **Rabigh Phase II Project**: Planning the production of higher value-added petrochemicals using 3 million tons of naphtha and 400 thousand tons of ethane.

**Japan**
- **Advantage**: "Mother plant/laboratory," leading the effort to develop high value-added new technologies, products and know-how.
- **Priority**: Restructure domestic operations (exit underperforming businesses and restructure production operations).

**Singapore**
- **Advantage**: A solid customer base and high-value added products meeting the needs of key customers in Asian markets.
- **Priority**: Strengthen competitiveness by enhancing higher value-added petrochemicals business.

**Location**
- **Saudi Arabia**
  - **Advantage**: Robust cost competitiveness, taking advantage of low-cost feedstocks and fuels
  - **Priority**: Maximize Petro Rabigh’s profitability (achieve more stable operations)

**Location**
- **Japan**
  - **Advantage**: “Mother plant/laboratory,” leading the effort to develop high value-added new technologies, products and know-how
  - **Priority**: Restructure domestic operations (exit underperforming businesses and restructure production operations)

**Location**
- **Singapore**
  - **Advantage**: A solid customer base and high-value added products meeting the needs of key customers in Asian markets
  - **Priority**: Strengthen competitiveness by enhancing higher value-added petrochemicals business
### Net Sales by Region （Old Sector）

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<thead>
<tr>
<th>Year</th>
<th>Japan</th>
<th>China</th>
<th>Other Asian nations</th>
<th>Europe</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY2005</td>
<td>60%</td>
<td>20%</td>
<td>15%</td>
<td>1%</td>
<td>4%</td>
</tr>
<tr>
<td>FY2012</td>
<td>45%</td>
<td>25%</td>
<td>23%</td>
<td>3%</td>
<td>4%</td>
</tr>
<tr>
<td>FY2014</td>
<td>40%</td>
<td>25%</td>
<td>25%</td>
<td>5%</td>
<td>5%</td>
</tr>
</tbody>
</table>

※Figures in fiscal 2005 were results before the launch of the Rabigh Project.

A large portion of the sales is to Asia, including Japan and China, due to having a Singapore base. Even so, there is no over-dependence on Japan and China, as significant sales to Southeast Asia and other areas have been achieved.
2. Petrochemicals & Plastics Business Climate
Overall global demand growth for petrochemicals and plastics is not going to stop any time soon. Growth trends are especially strong in newly emerging economies.
Asian Polyolefin Market Trend and Estimated Cash Margin from Naphtha
Currently the market is facing a number of uncertainties.

A number of uncertainty factors can be seen currently.

1. Drop in crude oil prices
2. Slowing of growth in China

1. Drop in crude oil prices

The drop in crude oil prices is eroding the cost advantages of shale gas and CTO/MTO projects.

Also, the growth in demand for petrochemical products is likely to exceed the growth in the production volume of those manufactured from shale gas. Even if these make it into Asian markets, their impact on the supply-and-demand balance and on market conditions will be limited.

2. Slowing of growth in China

By promoting a further move to higher added value, our Group will shift to fields not readily impacted by such a slowdown. We will also seek to avoid over-dependence on the China market through wider development of Asian markets.
3. Business Strategy for Each Location
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Business Strategy for the Petrochemicals & Plastics Sector

Restructuring of Chiba Works:
Shut down ethylene plant and procure ethylene from Keiyo Ethylene

Reduce our ethylene production capacity in Japan (May 2015)

- Shut down ethylene plant and procure ethylene from Keiyo Ethylene

Our ethylene production capacity in Japan

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<tr>
<th></th>
<th>Start of operations</th>
<th>Annual production capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keiyo Ethylene</td>
<td>1994</td>
<td>768,000 tons*</td>
</tr>
<tr>
<td>Sumitomo Chemical</td>
<td>1970</td>
<td>415,000 tons</td>
</tr>
</tbody>
</table>

* Includes 192,000 tons of allotment to Sumitomo Chemical

- Keiyo Ethylene’s plant is the newest and largest ethylene production facility in Japan.
- Sumitomo Chemical’s ethylene plant came on stream more than 40 years ago.

Keiyo Ethylene: Allocation and Equity Share Holding

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<th>Allocation</th>
<th>Shareholdings</th>
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</thead>
<tbody>
<tr>
<td>Maruzen Petrochemical</td>
<td>50.0%</td>
<td>55.0%</td>
</tr>
<tr>
<td>Sumitomo Chemical</td>
<td>25.0%</td>
<td>22.5%</td>
</tr>
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<tr>
<td></td>
<td>40.6%</td>
<td>55.0%</td>
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<tr>
<td></td>
<td>59.4%</td>
<td>45.0%</td>
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Restructuring of Chiba Works: Downsize/exit underperforming businesses

Export sales have significantly fluctuated, generating lower-than-expected profits

>>> Decided to exit businesses with a high export ratio

Sales volume of major products: domestic vs. export sales (FY 2012)

- **Styrene monomer (SM):**
  - Export ratio: 40%
  - Domestic sales: Approximately 200 thousand tons
  - Export sales: Approximately 80 thousand tons

- **Propylene oxide (PO):**
  - Export ratio: 40%
  - Domestic sales: Approximately 300 thousand tons
  - Export sales: Approximately 100 thousand tons

- **Polyethylene (PE):**
  - Export ratio: 20%
  - Domestic sales: Approximately 400 thousand tons
  - Export sales: Approximately 80 thousand tons

- **Polypropylene (PP):**
  - Export ratio: 10%
  - Domestic sales: Approximately 300 thousand tons
  - Export sales: Approximately 30 thousand tons

Exit businesses with a high export ratio

- **April 2012:** Dissolved joint venture Chiba Styrene Monomer
- **May 2015:** Stopped SM and PO production at Nihon Oxirane*

*Acquired entire stake in Nihon Oxirane in December 2013

Products and Production Capacity

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<tr>
<th>Products and Production Capacity</th>
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<th>Production capacity</th>
</tr>
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<tbody>
<tr>
<td>Chiba Styrene Monomer</td>
<td>SM</td>
<td>108,000 tons*</td>
</tr>
<tr>
<td>Nihon Oxirane</td>
<td>SM</td>
<td>425,000 tons</td>
</tr>
<tr>
<td></td>
<td>PO</td>
<td>181,000 tons</td>
</tr>
<tr>
<td>Sumitomo Chemical</td>
<td>PO</td>
<td>200,000 tons**</td>
</tr>
</tbody>
</table>

*Allotment to Sumitomo Chemical  **Continued production after restructuring
### Petrochemicals & Plastics Business after Reorganization

#### The core businesses of
- PE (Polyethylene)
- PP (Polypropylene)
- PO (Propylene Oxide) will remain in Japan

#### To facilitate continued overseas expansion, retain the mother factory role
- Promote faster development of next-generation processes and advanced-function catalysts
- (PE) Accelerate the shift to high-profit fields like extruded laminates and protection films
- (PP) Specialize in fields where we have strength that have strong growth prospects (automotive industry, films)
- (PO) Build a stable profit structure not subject to the vagaries of the SM market situation; make this the pillar of license revenue
Sales of major products: domestic vs. export sales

Before restructuring
- Resin: Domestic sales 1.7 million tons, Export sales 1.1 million tons
- Monomer: Domestic sales, Export sales

After restructuring
- Resin: Domestic sales 1.1 million tons, Export sales
- Monomer: Domestic sales, Export sales

Lower export sales ratio
Shift toward higher value-added products

Revitalize and maintain petrochemical business in Japan by optimizing production operations
Restructure Businesses in Japan

### MMA Business

**Current state**
- Increase in demand in China and other Asian countries
- Sharp decline in the demand for use in light-guide plates, the major application of PMMA

**Restructuring measures under consideration**
- Shift production, sales and research bases to Singapore
  - Stopped PMMA production in Ehime in December 2013 (capacity 45,000 tons)
- Develop new applications (Optimize product portfolio)

**Radically improve competitiveness and profitability**

### Caprolactam Business

**Current state**
- Change in the supply-demand structure due to large increases in supply in China

**Restructuring measures under consideration**
- Measures to improve competitiveness
  - Drastically reduce raw material costs
  - Build business alliance with upstream and down-stream players
- Optimize production operations (Closed down liquid-phase process plant with a production capacity of 95,000 tons in September 2015)
Present System of the Petrochemical Complex in Singapore

Business Strategy for the Petrochemicals & Plastics Sector

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Oil Refinery

Shell, SRC

LPG

Naphtha

Gas Oil

Ethylene plant

Ethylene

PCS1:475

PCS2:605

Propylene

PCS1:273

PCS2:547

Acetylene

C4

Butadiene

MTBE

Butene-1

Cracked gasoline

Benzene

Toluene

Xylene

Figures are production capacity

(KT/year)

TPC / Low-density polyethylene

250

CPSC/High-density polyethylene

390

EGS / EO, EG

167

EMPL /Ethoxylate

18

CSPL / VAM

170

SCSL / SM, PO, PG

TPC / Polypropylene

600

SAA / Acrylic acid

118

DSPL / Acetylene black

14

TCS / MTBE

55

RHCS / MBS

31

SMM / MMA

223

MELS /Functional plastics
Operations in Singapore: Outline of the Four Major Companies

**PCS**
- **Shareholders:**
  Japan Singapore Petrochemicals Co. 50%, QPS 50%
- **Ethylene center**
  Production capacity  
  - First phase 465,000 tons
  - Second phase 635,000 tons
- **Supply of ethylene, propylene, and utility supply inside the complex**
- **Started operation in 1984.**
  Started operation of second phase petrochemical complex in 1997

**TPC**
- **Nihon Singapore Polyolefin Co. 70%, QPS 30%**
- **Production and sale of polyethylene and polypropylene**
  Production capacity  
  - LDPE 235,000 tons
  - PP 650,000 tons
- **Started operation in 1984**

**SCS**
- **Sumitomo Chemical 100%**
- **Production and sale of MMA monomer and polymer**
  Production capacity  
  - Monomer 223,000 tons
  - Polymer 150,000 tons
- **Started operation in 1999**

**SCA**
- **Sumitomo Chemical 100%**
- **Sale of Petro Rabigh’s products and production and sale of S-SBR**
- **Products**
  - PE, PP, MEG, PO, caprolactam, resorcinol, S-SBR
- **Started operation in 2006**
Singapore Business Strengths

A history of more than 30 years as ASEAN’s first petrochemical complex

On-going availability of outstanding and highly loyal local employees
Product quality and stable supply
Customer service

Existence of excellent Asian customers that have grown alongside us
Volume growth and quality improvement

One of the world’s most cost-competitive suppliers using naphtha as feedstock

High brand value in Asian markets is the source of competitive advantage

Also a foothold for expanding to Saudi Arabia
TPC Shift to High Value-added Products

High value-added products  Sales (ton)  Proportion of high value-added products (%)

- Shifted production at GLS plant from PE to PP in 2006
- Launched and expanded sales of a new grade of RCP and terpolymer
- Launched HEVA for solar cells in 2007
- Launched a new grade of capacitor in 2009
- Remodeled SPP production line for capacitor

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Business Strategy for the Petrochemicals & Plastics Sector
Petro Rabigh’s Performance

(MMUSD)

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</tr>
</thead>
<tbody>
<tr>
<td>After-tax profit/loss</td>
<td>-8</td>
<td>-39</td>
<td>-118</td>
<td>-335</td>
<td>-382</td>
<td>56</td>
<td>18</td>
<td>130</td>
<td>96</td>
<td>182</td>
</tr>
<tr>
<td>Cumulative losses</td>
<td>-8</td>
<td>-47</td>
<td>-165</td>
<td>-500</td>
<td>-882</td>
<td>-840</td>
<td>-821</td>
<td>-707</td>
<td>*42</td>
<td>193</td>
</tr>
</tbody>
</table>

*In 2013, legal reserves (in the amount of $663 million) were tapped to cover cumulative losses.
## Measures to Improve Petro Rabigh’s Performance

<table>
<thead>
<tr>
<th>Issue</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shortage of personnel</td>
<td>• Review hiring policy and system</td>
</tr>
<tr>
<td></td>
<td>• Make use of recruitment agencies and strengthen overseas hiring activities</td>
</tr>
<tr>
<td>Raising skill levels of existing human resources</td>
<td>• Thoroughly implement basic education ⇒ Document basic knowledge and rules necessary for operators</td>
</tr>
<tr>
<td></td>
<td>• Redo assessment by parent companies to cover the entire organization</td>
</tr>
<tr>
<td></td>
<td>• Assign outstanding experienced persons and aim for human resource development through OJT</td>
</tr>
</tbody>
</table>

☆In addition, boost the program of dispatching experts from both parent companies.
Accomplishments to Date

Accomplishments have emerged as a result of parent company support for Petro Rabigh and the presentation of various solution measures.

- **Improve operating rate**
  - Improved operation of ECR cracking furnace (longer furnace life)
  - Improved plant control (longer catalyst life achieved by improvement to operating conditions)
  - More stable refinery operation

- **Improve yield**
  - Improvement in proportion of on-spec polymer products

☆ These measures have improved financial performance by more than $20 million.
1 Construction schedule

✓ Production facilities will start operations one after another as planned, from the first half of 2016.

✓ Utility plants, an ethane cracker, and derivative plants will come on stream in stages.

2 Marketing

✓ Marketing by Sumitomo Chemical Asia mainly in China and other Asian countries, as well as in the Middle East and Europe

3 Value of Rabigh Phase II Project

✓ Effective use of newly allocated cost-competitive ethane

✓ Production of high value-added petrochemical products from naphtha
4. Technology Development Strategy
For stable operations of aging chemical plants in Japan, early discovery and prevention of corrosion and other problems are vital.

- Focus on inspections of aging plants and common pipes
- Consider and adopt new inspection methods
- Take corrosion prevention measures

Through these efforts,
- Improve inspection efficiency
- Increase accuracy of inspection
- Prevent problems
- Extend the life of plants
- Continue safe and stable operations

Safe and stable operations of plants are the largest source of long-term competitiveness. Only the companies that continuously improve operations and maintenance survive.
R&D Strategy

R&D strategy supporting business strategy
“Pursue customer value and cost advantage based on our products and technologies accumulated over the years”

Pursue customer value
Development of differentiated products
Polyolefin Elastomer
Development of new manufacturing technology
Catalyst, process

Foundation for the future

Create and pursue theme for the future
Consider both technology and marketing
(Restructured research organization and established Resin-related Business Development Dept.)

Market penetration

R&D in response to globalization of business (technological refinements)
Provide materials with functions that match local customers' needs

Market development

Existing
New

Technology, products
Existing
New

Early development of technologies to maintain and expand business
High quality, stable supply, rationalization

Market

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Existing
New

Early development of technologies to maintain and expand business
High quality, stable supply, rationalization

Market

R&D strategy supporting business strategy
“Pursue customer value and cost advantage based on our products and technologies accumulated over the years”

Pursue customer value
Development of differentiated products
Polyolefin Elastomer
Development of new manufacturing technology
Catalyst, process

Foundation for the future

Create and pursue theme for the future
Consider both technology and marketing
(Restructured research organization and established Resin-related Business Development Dept.)

Market penetration

R&D in response to globalization of business (technological refinements)
Provide materials with functions that match local customers' needs

Market development

Existing
New

Technology, products
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Market
Increase profits by taking advantage of the strengths of manufacturing bases in Japan, Singapore and Saudi Arabia

- **Domestic operations**
  The role of the Japanese base as the mother factory and mother laboratory is becoming stronger in developing new technologies for safe and stable operations as well as high value-added products. The Japanese base also focuses on the efficient management, differentiation, and licensing activity for existing businesses including PO and polyolefin.

- **Singapore**
  Remain a front runner in the Asian market by reinforcing current strengths in personnel, customer assets and costs, while strengthening a structure less affected by market conditions, as a steady source of profit and added value to customers.

- **Saudi Arabia**
  Establish solid profitability effects of scale and low costs, by maintaining stable operation of Rabigh Phase I Project facilities and smoothly launching Rabigh Phase II Project facilities.
<table>
<thead>
<tr>
<th>Company name and business</th>
<th>Ownership ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PCS</strong> Petrochemical Corporation of Singapore (Pte.) Ltd. Ethylene center in petrochemical complex in Singapore</td>
<td>39.3%</td>
</tr>
<tr>
<td><strong>TPC</strong> The Polyolefin Company (Singapore) Pte. Ltd. Manufacturing and sales of polyethylene and polypropylene</td>
<td>67.0%</td>
</tr>
<tr>
<td><strong>SCA</strong> Sumitomo Chemical Asia Pte Ltd. Manufacturing and sales of petrochemical products</td>
<td>100.0%</td>
</tr>
<tr>
<td><strong>SCS</strong> Sumitomo Chemical Singapore Pte. Ltd. Control over manufacturing and sales of MMA monomer and polymer Sales of chemical products</td>
<td>100.0%</td>
</tr>
<tr>
<td><strong>PRC</strong> Rabigh Refining and Petrochemical Company Manufacturing and sales of refined petroleum products and petrochemicals</td>
<td>37.5%</td>
</tr>
</tbody>
</table>
Creative Hybrid Chemistry

SUMITOMO CHEMICAL
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.