Care for People

Care for Earth

Hiroshi Yoshida
Director, Vice-Presidential Executive Officer
Executive Officer for Material business sector

November 14, 2019
Outline

1. Introduction

2. Material sector growth strategy
   (1) Management policy
   (2) Sustainability
   (3) Business strategy
       Priority fields for provision of value, reorganization, investment strategy, R&D policy
   (4) Heightening business platform

3. Contribution to solving plastic issues

Disclaimer
The forecasts and estimates shown in this document are dependent on a variety of assumptions and economic conditions. Plans and figures depicting the future do not imply a guarantee of actual outcomes.
1. Introduction
Blank for your note
Material accounts for over half of Asahi Kasei’s total sales

Asahi Kasei Corp. (holding function)

<table>
<thead>
<tr>
<th>Sales</th>
<th>Operating Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>¥2,170.4 billion</td>
<td>¥209.6 billion</td>
</tr>
</tbody>
</table>

Asahi Kasei Corp. (business function)

<table>
<thead>
<tr>
<th>Basic Materials SBU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
</tr>
<tr>
<td>Operating income</td>
</tr>
<tr>
<td>¥1,176.2 billion</td>
</tr>
<tr>
<td>¥129.6 billion</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Performance Products SBU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
</tr>
<tr>
<td>Operating income</td>
</tr>
<tr>
<td>¥2,170.4 billion</td>
</tr>
<tr>
<td>¥209.6 billion</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specialty Solutions SBU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
</tr>
<tr>
<td>Operating income</td>
</tr>
<tr>
<td>¥1,176.2 billion</td>
</tr>
<tr>
<td>¥129.6 billion</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Asahi Kasei Homes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
</tr>
<tr>
<td>Operating income</td>
</tr>
<tr>
<td>¥659.8 billion</td>
</tr>
<tr>
<td>¥68.2 billion</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Asahi Kasei Construction Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
</tr>
<tr>
<td>Operating income</td>
</tr>
<tr>
<td>¥316.2 billion</td>
</tr>
<tr>
<td>¥41.8 billion</td>
</tr>
</tbody>
</table>

Health Care

- Asahi Kasei Pharma
- Asahi Kasei Medical
- ZOLL Medical

Share of sales (FY 2018)

- Material: 54%
- Health Care: 30%
- Homes: 15%
- Others: 1%

1. Introduction
Asahi Kasei has 5 priority fields for provision of value to contribute to sustainable society; 3 of these are in the Material sector.

Contribution to sustainable society:
- Environment
- Innovation
- Longevity

Contribution to life and living for people around the world:
- Enabling “living in health and comfort” and “harmony with the natural environment”

Priority fields for provision of value:
- Material
  - Environment & Energy: Reduced burden
  - Mobility: Safety and comfort
  - Life Material: Comfort and convenience
- Homes
  - Home & Living: Security and fulfillment
- Health Care
  - Health Care: Healthy longevity
2. Material sector growth strategy
   (1) Management policy
1. **Sustainability**
   - Achieving both sustainable growth and contribution to sustainable society

2. **Business strategy**
   - Expanding business in priority fields for provision of value to achieve portfolio transformation and provide new value and solutions to society
   - Reorganization to stimulate connections and generate synergy

3. **Heightening business platform**
   - Heightening businesses by digital transformation
   - Fostering a culture of continuously taking on challenges for personal growth of employees and for business growth
2. Material sector growth strategy
   (2) Sustainability
3 approaches to further develop existing businesses and create new businesses

Further development of existing businesses

Existing markets

- Material innovation
- Manufacturing process innovation
- Product performance enhancement

New business creation

New markets
Achieving both business growth and environmental contribution

**Business growth & environmental contribution**

**Total sales in Mobility**

<table>
<thead>
<tr>
<th>Year</th>
<th>FY 2018</th>
<th>FY 2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales (¥ billion)</td>
<td>200</td>
<td>400</td>
</tr>
</tbody>
</table>

**Amount of GHG emissions reduced by the 3 products below (estimated by Asahi Kasei)**

- 3.63 million tons of CO₂ equivalent

**Lightweighting**
- **Fuel efficiency**
  - S-SBR¹ for fuel-efficient tires
- **Electric drive**
  - LIB³ separator

**Xyron m-PPE²**

¹ Solution-polymerized styrene-butadiene rubber
² Modified polyphenylene ether
³ Lithium-ion battery

Contributing to sustainable society through expansion of businesses that support environmental protection
2. Material sector growth strategy
   (3) Business strategy
       Priority fields for provision of value
Basic strategy and financial objectives

Flexible allocation of management resources to priority fields

Expansion of high value-added businesses

Operating income (¥ billion)

<table>
<thead>
<tr>
<th>Year</th>
<th>2018</th>
<th>2021 Target</th>
<th>2025 Outlook</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>129.6</td>
<td>150.0</td>
<td>180.0</td>
</tr>
</tbody>
</table>

(figures are approximate)

High value-added businesses: Fibers, synthetic rubber, engineering plastics, coating materials, ion-exchange membranes, electronic materials, battery separators, electronic devices, etc.

Focus of this presentation

Environment & Energy

Mobility

Life Material
2. Material sector growth strategy

Priority fields for provision of value

Various approaches to expand businesses in priority fields for provision of value

Further development of existing businesses

Material innovation

New business creation

- Foamed materials
- Cellulose nanofiber
- CO₂ sensor

Manufacturing process innovation

- CO₂ chemistry
- Green hydrogen
- CO₂ separation/recovery

Growth engines

- Sage
- Battery separators
Asahi Kasei has essential technology for sustainable society: (i) CO₂ chemistry, (ii) alkaline water electrolysis system, and (iii) CO₂ separation/recovery.
Contribution in Mobility

Achieve reduced environmental burden and comfortable vehicle interiors

Reduction of environmental burden
Care for Earth

Comfort of vehicle interiors
Care for People

AKXY POD vehicle interior concept mockup
2. Material sector growth strategy

Steps to achieve contribution

<table>
<thead>
<tr>
<th>Care for Earth</th>
<th>Care for People</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Material innovation</strong></td>
<td><strong>Globalization</strong></td>
</tr>
<tr>
<td>Foamed materials: PA, m-PPE</td>
<td>Enhanced marketing</td>
</tr>
<tr>
<td>(lightweight, sound absorption, thermal insulation)</td>
<td>Manufacturing in optimum locations</td>
</tr>
<tr>
<td>Cellulose nanofiber composite</td>
<td>Reinforcing the Asahi Kasei brand</td>
</tr>
<tr>
<td>(lightweight, low environmental burden)</td>
<td></td>
</tr>
<tr>
<td>CO\textsubscript{2} sensors</td>
<td></td>
</tr>
<tr>
<td>(energy saving)</td>
<td></td>
</tr>
</tbody>
</table>
2. Material sector growth strategy
   (3) Business strategy
       Reorganization, investment strategy, R&D policy
2. Material sector growth strategy

Reorganization

Reorganization for flexible allocation of management resources to priority fields for provision of value

- Raise flexibility of management resources and establish configuration to fully leverage collective strength
- Stimulate connections to enhance growth in priority fields for provision of value
- Advance business portfolio transformation

Material (former)

- Petrochemicals SBU
- Fibers & Textiles SBU
- Performance Polymers SBU
- Consumables SBU
- Performance Materials SBU
- Separators SBU
- Asahi Kasei Microdevices

Material (current)

- Basic Materials SBU
- Performance Products SBU
- Specialty Solutions SBU
- Asahi Kasei Microdevices
2. Material sector growth strategy

Maximization of earnings from previous investments (FY 2016–2018)

Making the most of previous investments to increase earnings during the current medium-term initiative

Investments of ≈¥500 billion for Material (decision-adopted basis)

- ¥150 billion
- ¥85 billion
- ¥25 billion

of which, large investments

Investments of ≥¥1 billion
Total ≈¥330 billion (decision-adopted basis)

Automotive
- Capacity expansion for Lamous artificial suede
- Capacity expansion for S-SBR for fuel-efficient tires
- Capacity expansion for Leona nylon 66 filament
- Acquisition of Sage Automotive Interiors, Inc.
- Acquisition of Swedish gas sensor module maker Senseair AB

Environment & Energy
- Capacity expansion for Li-ion battery separator

Sustainability
- Renovation of hydroelectric power plants
- Conversion of coal-fired power plant to natural gas-fired power plant

Care for Earth
Care for People

1 Only main investments shown; figures by field are approximate
Perform investments to drive growth as the core sector of the Asahi Kasei Group

Asahi Kasei Group 3-year total investment: Approx. ¥800 billion

- Active investment in new business, including M&A, in addition to investment in the existing business for expansion, maintenance, etc.

Investment strategy for Material sector

- Focus on investments in the priority fields for provision of value to further enhance existing businesses and create new businesses
- Continue investments that contribute to sustainability
Creating new businesses based on Asahi Kasei’s accumulated core technologies

Examples of core technologies

- Polymerization/spinning
- Polymers/processing
- Catalysts/processes
- Compound semiconductors/LSIs
- Membranes/separation

New business creation

R&D policy

Care for People

Care for Earth

2. Material sector growth strategy
2. Material sector growth strategy
(4) Heightening business platform
Heightening business platform

2. Material sector growth strategy

Strengthen the IT infrastructure
Data platform, Tools, Human resources

Digital Marketing
↓
Establishing an effective and efficient strategy

Materials Informatics
↓
Dramatically improving development speed

Production technology innovation
↓
Enhancing productivity by IoT

IP Landscape
↓
Formulating strategies based on IP

Heightening by digital transformation

Trends and issues to consider

Game changing
Productivity revolution
Technology handover
IP strategy

Increase digital professional personnel to over 150 people by March 2022 to accelerate digital transformation
2. Material sector growth strategy

Example of IP landscaping for business strategy in polymers

Formulation of business strategy considering the trajectory of customers and competitors as indicated by patent information

Circle size indicates number of patents; progression of circles and arrows indicate passage of time

- Company A
- Company B has more distinctive technology than the industry leader Company A
  → Consider Company B to be an important customer as well as Company A
- Company C

Average patent strength →

Total patent strength →
Application of materials informatics (MI) to catalyst development

Time to develop high-performance catalyst reduced to one-third by using MI

Complex catalyst composition × Many synthesis conditions

Even experts depend on intuition; repeated trial and error is required

Optimizing composition and synthesis conditions with MI

Conceptual illustration of utilizing MI

Target value

Conventional development

Development period reduced to 1/3
3. Contribution to solving plastic waste problem
Plastic waste problem

Focused on recycling of polyethylene and elucidating the mechanism of microplastic formation

The most-produced plastic is polyethylene

- **Polyethylene**: 32%
- **Polypropylene**: 23%
- **Polyvinyl chloride**: 16%
- **Polystyrene**: 7%
- **Others**: 22%

World plastic production by polymer (2015)

Source: EuropePlastics (PEMRG)

Secondary microplastics

The mechanism of microplastic formation is still unclear

Source: Ministry of the Environment, Japan
Polyethylene recycling

Research on polyethylene recycling as part of a project led by NEDO

Studying implementation in society in terms of both technological development and the value chain

Participants range from recyclers to end product manufacturers

NEDO research project: Implementation of polyethylene recycling in society

- Period: July 2019 to July 2020
- Participation: 18 corporations, universities, and research institutions

1 New Energy and Industrial Technology Development Organization
Launch of joint R&D project between Asahi Kasei and Kyushu University

**Objective:**
Establish a model of global microplastic flow

**Asahi Kasei**
- Experimental tests simulating the natural environment
- Status observation and chemical evaluation at time of microplastic formation

**Isobe Laboratory, Kyushu University**
- Numerical model of microplastics spreading in the ocean

**Collaboration with Kyushu University to elucidate the mechanism of microplastic formation**
Creating for Tomorrow

The commitment of the Asahi Kasei Group:
To do all that we can in every era to help the people of the world make the most of life and attain fulfillment in living.
Since our founding, we have always been deeply committed to contributing to the development of society, boldly anticipating the emergence of new needs.
This is what we mean by “Creating for Tomorrow.”