Materials

✓ Practice Case①: GUNZE LIMITED
✓ Practice Case②: Shin-Etsu Chemical Co., Ltd.
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✓ Practice Case⑤: UACJ Corporation

Overview of the Shin-Etsu Group (as of March 31, 2020)

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Established</td>
<td>September 16, 1926</td>
</tr>
<tr>
<td>2</td>
<td>Location of head office</td>
<td>6-1, Otemachi 2-chome, Chiyoda-ku, Tokyo</td>
</tr>
<tr>
<td>3</td>
<td>Number of group companies</td>
<td>150 Japan: 55/Overseas: 19 countries, 95 companies</td>
</tr>
<tr>
<td>4</td>
<td>Number of employees</td>
<td>22,783 (consolidated)</td>
</tr>
<tr>
<td>5</td>
<td>Capital</td>
<td>119.4 billion JPY</td>
</tr>
<tr>
<td>6</td>
<td>Sales</td>
<td>1.5435 trillion JPY</td>
</tr>
<tr>
<td>7</td>
<td>Ordinary income</td>
<td>418.2 billion JPY</td>
</tr>
<tr>
<td>8</td>
<td>Market capitalization</td>
<td>Approx. 8 trillion JPY (as of January 26, 2021)</td>
</tr>
</tbody>
</table>
Details of the Shin-Etsu Group's business

Semiconductor Silicon Business
- Rare earth magnets
- Encapsulants
- Photomask blanks
- Synthetic quartz preform for optical fiber
- Synthetic quartz glass substrate

Electronics & Functional Materials Business
- Photoresists
- Photomask blanks

Processing, Trading and Specialized Services Business

Silicon Business
- Fluids
- Powders
- Liquid rubbers
- Rubbers
- Forms

Specialty Chemicals Business
- Cellulose derivatives
- Silicon metal
- Synthetic pheromones
- Polyvinyl alcohol

PVC/Chlor-Alkali Business
- Polyvinyl chloride
- Caustic soda

Vehicles
- Processing, Trading
- and Specialized
- Services Business

Structure for scenario analysis of climate change

Scenario analysis is handled by the Climate Change-related Subcommittee established within the ESG Promotion Committee, as well as the committee members and administrative staff of the divisions being analyzed.

[ESG Promotion Committee overview]
- Established: April 1, 2005 CSR Promotion Committee established
- August 1, 2017 ESG Promotion Committee established

Committee Chairman: Yasuhiko Saitoh (President and CEO)
Vice Chairman: Toshiya Akimoto (Managing Director)
Committee members, administrative staff:
Group company ESG officers: 45
(including the 11 directors and general managers of divisions of Shin-Etsu Chemical)
## Climate change scenario analysis: Task details

<table>
<thead>
<tr>
<th>Step</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Understanding of climate change analysis and each item for disclosure</td>
</tr>
<tr>
<td>2</td>
<td>Hypothesizing worldviews for the 2°C and 4°C (2.7°C and above) scenarios&lt;br&gt;Setting the time frame</td>
</tr>
<tr>
<td>3</td>
<td>Hypothesizing risks and opportunities to business that may be expected due to climate change, as well as their degrees of significance&lt;br&gt;Assessment of financial impact</td>
</tr>
<tr>
<td>4</td>
<td>Evaluation of risk countermeasures and seizing of opportunities</td>
</tr>
<tr>
<td>5</td>
<td>Reporting of analysis results (ESG officers, environmental officers)</td>
</tr>
<tr>
<td></td>
<td><strong>Future plans</strong></td>
</tr>
<tr>
<td>6</td>
<td>Report to management at the Board of Directors meeting</td>
</tr>
<tr>
<td>7</td>
<td>Disclosure of the sustainability report, etc.</td>
</tr>
</tbody>
</table>

### Setting the timeframe for climate change scenarios

The 2°C and 4°C (2.7°C and above) scenarios as of 2050 have been selected based on the impact from climate change

[Projected average global surface temperature change]<br>(compared with the average from 1986 - 2005)

**Over 4°C (2.7°C and above) scenario:**
As of 2100, temperatures will be 3.2-5.4°C higher than pre-Industrial Revolution levels if no additional measures against global warming are taken

**2°C scenario:**
As of 2100, temperatures will be 0.9-2.3°C higher than pre-Industrial Revolution levels if strict measures are taken

Prior to 2030, the change in temperature is nearly the same in both the 2°C and 4°C (2.7°C and above) scenarios. The gap between the scenarios widens after 2030.

(Source) AR5 SYR, Table SPM.6
We estimated the revenue for 2050 and evaluated the impact of climate change would have on it

**Estimate hypotheses**

- Based on the increased production and growing demand for rare earth magnets, we assumed that the company would see a steady growth in sales until 2050.
- Operating profits for 2050: We employed the average value over the operating profits for the past three years.
- Amount of emissions for Scope 1: We assumed that they would increase in proportion to the increase in the business’s sales based on the amount of emissions in FY2019.
- We assumed that emission factors for electricity would decrease.

Main production sites for the covered business

Shin-Etsu Chemical <Fukui, Japan>
Shin-Etsu Technology (Suzhou) Shin-Etsu (Changting) Technology <China>
Shin-Etsu Magnetics Philippines <Philippines>
Shin-Etsu Magnetic Materials Vietnam <Vietnam>
Shin-Etsu Magnetics Thailand <Thailand>
Shin-Etsu Malaysia <Malaysia>
Greenhouse gas emissions for the covered business: ratio by scope

Production process for the covered business

Business opportunities from climate change (2°C scenario)

<table>
<thead>
<tr>
<th>Application</th>
<th>Details</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric vehicles, hybrid vehicles, fuel cell vehicles</td>
<td>The use of high-performance, compact rare earth magnets in the drive motors and other various motors of hybrid, electric, and fuel cell vehicles reduces the overall weight of the vehicles and increases their energy efficiency</td>
<td>High</td>
</tr>
<tr>
<td>Wind turbine generators</td>
<td>Rare earth magnets contribute to making offshore wind turbine generators highly efficient and reducing generator maintenance costs</td>
<td>High</td>
</tr>
<tr>
<td>Compressor motors for air conditioner</td>
<td>Energy consumption efficiency can be increased and the amount of electricity consumed can be decreased by using rare earth magnets in air conditioner compressor motors</td>
<td>Med.</td>
</tr>
<tr>
<td>Aircraft</td>
<td>The weight of aircraft can be reduced and energy efficiency improved by converting to electric or hybrid forms for small aircraft, or by converting to electric hydraulic drives (motor drive) for large aircraft</td>
<td>Med.</td>
</tr>
<tr>
<td>Industrial motors</td>
<td>The use of rare earth magnets in industrial motors can increase motor efficiency and reduce the amount of electricity consumed</td>
<td>Med.</td>
</tr>
</tbody>
</table>
## Risks from climate change (2°C scenario)

<table>
<thead>
<tr>
<th>Event</th>
<th>Risk to Shin-Etsu</th>
<th>Impact on profits</th>
<th>Countermeasures</th>
</tr>
</thead>
</table>
| Increased electricity prices due to the spread of electricity from renewable energy sources | Increased costs for purchasing electricity from renewable energy sources | High              | Reduction of Scope 2 emission amounts  
- Further promotion of production processes that use less electricity and introduction of high-efficiency equipment, etc.  
- Introduction of a cogeneration system that uses carbon-neutral natural gas (natural gas with emission credits) |
| Extreme weather conditions (typhoons, river flooding, etc.)          | Flooding of production sites  
Supply chain disruptions                                               | Low               | Regrading of production sites  
Decentralization of production sites  
Diversification of raw material sources  
Securing of product inventory  
Purchase of property insurance                                          |
| Carbon taxes introduced by various countries around the world, carbon emission quotas set | A carbon tax is imposed  
Costs created for purchasing emission credits in order to meet carbon emission quotas | Low               | Reduction of Scope 1 emission amounts  
- Further promotion of more efficient production processes and introduction of high-efficiency equipment, etc.  
- Use of hydrogen-reduced iron materials  
Set absolute reduction targets for greenhouse gases and achieve them.  
Collect information on environmental regulations such as carbon taxes for each country, and come up with measures to deal with them. |

## Risks from climate change (4°C (2.7°C and above) scenario)

<table>
<thead>
<tr>
<th>Event</th>
<th>Risk to Shin-Etsu</th>
<th>Impact on profits</th>
<th>Countermeasures</th>
</tr>
</thead>
</table>
| Increased frequency of extreme weather                               | Flooding of production sites  
Supply chain disruptions                                               | High              | Regrading of production sites  
Decentralization of production sites  
Diversification of raw material sources  
Securing of product inventory  
Purchase of property insurance                                          |
| Increased frequency of flooding due to changes in precipitation patterns, etc. | -                                                      | -                 | -                                                                                                                                               |
| Introduction of carbon taxes in certain countries, setting of carbon emission quotas | Carbon taxes and carbon emission quotas will not be introduced in the countries that the production sites of the covered business are located in. | -                 | -                                                                                                                                               |
| Electricity prices                                                   | According to the IEA’s scenario analysis (the scenario for current initiatives), electricity prices will not increase. Because of this, increased electricity prices are not a risk to Shin-Etsu. | -                 | -                                                                                                                                               |
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With the sustainable resource “wood” as its core, the company develops various products/service business from wood resources
Target businesses: Japanese “paper/cardboard business”, “specialty paper business”, “household paper / lifestyle product business” and “chemicals business”

**Business portfolio**

<table>
<thead>
<tr>
<th>Business domain</th>
<th>Products handled</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Paper, cardboard</td>
<td>Offers paper and cardboard</td>
</tr>
<tr>
<td>2 Specialty paper</td>
<td>Offers paper, specialty paper, etc.</td>
</tr>
<tr>
<td>3 Household paper, health care</td>
<td>Offers packaging, household paper, lifestyle products, etc.</td>
</tr>
<tr>
<td>4 Chemicals</td>
<td>Offers CNF/CMC products</td>
</tr>
<tr>
<td>5~7 Other</td>
<td>Biomass fuels, housing materials such as insulation, etc.</td>
</tr>
</tbody>
</table>

**Risks in each value chain**

- **R&D**
  - Afforestation and wood processing
    - Carbon price
    - Carbon emissions targets/policies in each country
    - Changes in energy price
    - Increase in average temperature
    - Changes in rainfall and weather patterns
    - Increasing severity of extreme weather conditions
  - Paper manufacturing and processing
    - Carbon price
    - Carbon emissions targets/policies in each country
    - Changes in energy price
    - Next generation technology penetration
    - Changes in investor's reputation
    - Increasing severity of extreme weather conditions

- **Transportation**
  - Carbon price
  - Carbon emissions targets/policies in each country
  - Changes in energy price
  - Next generation technology penetration
  - Changes in investor's reputation
  - Increasing severity of extreme weather conditions

- **Sales and disposal**
  - Carbon price
  - Energy-saving policy
  - Next generation technology penetration
  - Changes in customer reputation
  - Increasing severity of extreme weather conditions

Investigation of high-impact risks and opportunities in the papermaking business and lifestyle products, specialty papers, and chemicals businesses

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**Significance assessment of risks/opportunities**

Examine risks and opportunities from raw material procurement to product use

**Transition risk•Opportunities (1/2) Total 8 items**

<table>
<thead>
<tr>
<th>Risk Items</th>
<th>Index</th>
<th>Discussion (example) : Risks</th>
<th>Discussion (example) : Opportunities</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small classification</td>
<td></td>
<td></td>
<td></td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>1. Carbon price</td>
<td>Revenue Spending</td>
<td>Global carbon taxes fall in line with European standards, increasing operating and logistics costs for plants</td>
<td>By improving environmental performance, such as through the introduction of renewable energy, Nippon Paper Industries may qualify for public support and tax reductions</td>
<td>Large Large Large Large</td>
</tr>
<tr>
<td>2. Carbon emissions targets/policies in each country</td>
<td>Revenue Spending</td>
<td>If carbon emissions cannot be reduced, additional costs will be incurred, such as purchasing of emission credits. Wood procurement costs increase due to forest protection policies and logging restrictions in various countries (e.g., regulations on logging/exports from natural forests, etc.)</td>
<td>Demand for low-carbon products increases (CNFs, etc.) Business opportunities such as for the provision of biofuels may increase as a result of policies promoting decarbonization</td>
<td>Large Large Large Large</td>
</tr>
<tr>
<td>3. Changes in energy price</td>
<td>Revenue Spending</td>
<td>Conversion to renewable energy is called for, and costs for addressing this increase, such as those related to company facilities and for purchasing green energy</td>
<td>—</td>
<td>Medium Medium Medium Medium</td>
</tr>
<tr>
<td>4. Increases or decreases in important products</td>
<td>Revenue Spending</td>
<td>Digitalization of information / paperless practices progresses due to promotion of decarbonization Efficiency in food production decreases due to climate change; the cost of raw wood materials increases as forest areas are converted to agricultural land</td>
<td>Increasing interest in environmental issues among consumers results in increasing demand for ethical consumption and environmentally friendly products Business opportunities related to recovered and recycled paper may increase as the circular economy gains momentum</td>
<td>Large Large Large Large</td>
</tr>
</tbody>
</table>

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### Significance assessment of risks/opportunities

#### Transition risk • Opportunities (1/2) Total 8 items

<table>
<thead>
<tr>
<th>Risk Items</th>
<th>Business impact</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Small classification</strong></td>
<td><strong>Index</strong></td>
<td><strong>Discussion (example) : Risks</strong></td>
</tr>
<tr>
<td><strong>5. Next generation technology penetration</strong></td>
<td>Revenue</td>
<td>➢ Equipment costs increase due to the introduction of environmentally friendly equipment and highly efficient low-carbon technologies and devices.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>➢ Making clear appeals of the value of forest resources in the face of rising climate change will enhance the company’s reputation.</td>
</tr>
<tr>
<td></td>
<td>Spending</td>
<td>➢ Investments in the performance of environmentally friendly equipment (e.g., solar power generation) will reduce the cost of renewable energy, which will decrease plant operating costs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>➢ Commercialization of CNFs and other products will expand related business opportunities.</td>
</tr>
<tr>
<td><strong>6. Changes in customer reputation</strong></td>
<td>Revenue</td>
<td>➢ Manufacturing costs increase due to increased demand for environmentally friendly products.</td>
</tr>
<tr>
<td></td>
<td>Spending</td>
<td>➢ If Nippon Paper has unsuitable forest management practices, this will be pointed out by NGOs and the media, resulting in damage to the company’s reputation and decreased sales.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>➢ Potential for ESG investment and other capital raising opportunities will increase if the company shifts to an environmentally friendly business model.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>➢ If Nippon Paper takes action leading to a reduction in environmental impact and improves its corporate image, it will be looked upon favorably by investors.</td>
</tr>
<tr>
<td><strong>7. Changes in investor’s reputation</strong></td>
<td>Capital</td>
<td>➢ If investors view Nippon Paper as reluctant to take environmental measures, it will be more difficult to raise capital and the cost of raising capital will increase.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>➢ N/A</td>
</tr>
<tr>
<td><strong>8. Passing on increased costs to product prices</strong></td>
<td>Revenue</td>
<td>➢ When passing on cost increases due to each risk to product prices, there is a risk of undermining Nippon Paper’s competitiveness depending on the size of the pass-on amount.</td>
</tr>
<tr>
<td></td>
<td>Spending</td>
<td>➢ If there is movement to promote bearing of environmental costs over the supply chain, including consumers, Nippon Paper’s business will become more sustainable.</td>
</tr>
</tbody>
</table>

#### Physical risk • Opportunities (1/1) Total 4 items

<table>
<thead>
<tr>
<th>Risk Items</th>
<th>Business impact</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Small classification</strong></td>
<td><strong>Index</strong></td>
<td><strong>Discussion (example) : Risks</strong></td>
</tr>
<tr>
<td><strong>1. Increase in average temperature</strong></td>
<td>Revenue</td>
<td>➢ Costs of procuring wood chips and other raw materials increase due to forest fires, increased pests and diseases, etc.</td>
</tr>
<tr>
<td></td>
<td>Spending</td>
<td>➢ In some areas, rising temperatures will accelerate tree growth and reduce the cost of procuring raw materials such as wood chips.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>➢ N/A</td>
</tr>
<tr>
<td><strong>2. Changes in rainfall and weather patterns</strong></td>
<td>Revenue</td>
<td>➢ Extreme weather conditions such as heavy rains and droughts cause instability in the supply of raw materials, which increases raw material procurement costs.</td>
</tr>
<tr>
<td></td>
<td>Spending</td>
<td>➢ Changes in forest vegetation make it difficult to maintain quality / a stable supply of raw materials in existing routes.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>➢ N/A</td>
</tr>
<tr>
<td><strong>3. Rising sea level</strong></td>
<td>Revenue</td>
<td>➢ There are increased costs from measures to address rising sea levels, such as elevation of production sites and dealing with flooding / waterproofing at facilities.</td>
</tr>
<tr>
<td></td>
<td>Spending</td>
<td>➢ N/A</td>
</tr>
<tr>
<td></td>
<td>Capital</td>
<td>➢ N/A</td>
</tr>
<tr>
<td><strong>4. Increasing severity of extreme weather conditions</strong></td>
<td>Revenue</td>
<td>➢ Recognition of disaster risk is reviewed, and insurance premiums increase.</td>
</tr>
<tr>
<td></td>
<td>Spending</td>
<td>➢ Operating and inventory costs increase due to plant shutdowns and increased backup inventory levels caused by climate-related natural disasters.</td>
</tr>
<tr>
<td></td>
<td>Asset</td>
<td>➢ Sales of disaster response products will increase due to increasingly extreme weather conditions and increased spread of infectious diseases.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>➢ N/A</td>
</tr>
</tbody>
</table>
Projected average global surface temperature change compared with the average from 1986-2005

We will use two scenarios (1.5°C, 4°C) to study society in 2030, 2050

Definition of 2.7~4°C scenario

4°C scenario : 3.2~5.4°C higher than pre-industrial Revolution levels if no additional measures against global warming are taken

Over 2°C (2.7~4°C) scenario : 2.7~4.0°C higher than pre-industrial Revolution levels if no additional measures against global warming are taken

Below 2°C scenario : 0.9~2.3°C higher than pre-industrial Revolution levels if strict measures are taken

1.5°C scenario : We are highly likely to achieve an increase of less than 1.5°C compared to pre-industrial Revolution levels if a radical transition to a new system is made

Set 2030- and 2050-year time horizon for transition risk and physical risk

Identify and define range of scenarios

Social image in 2050

Increased costs from policies such as carbon taxes increase. On the other hand, new business opportunities are created in the form of biofuels / environmentally friendly products / new materials

Market

- Measures toward a decarbonized society
  - Slight increase in natural disasters
  - Increase in natural disasters
  - Increase in the "local production for local consumption" business model from the impact of carbon tax
  - The papermaking industry forms an alliance and aims to promote products that are alternatives to plastics

- A carbon tax is introduced
- Logging of natural forests is restricted
- Use of fossil fuels is restricted

Government

Update plant facilities

- Increased operating costs due to introduction of carbon tax
- It becomes necessary to purchase green energy, etc.
- Increased R&D investment costs due to competition for more efficient use of water resources, textile materials, etc.

IT companies

New entry

- Demand for ethical consumption rises, and there is increased demand for environmentally friendly products (e.g., new materials, eco-friendly products)

Users

- Increased raw material procurement costs due to rising carbon taxes, etc.
- Increased activity for leveraging forest certification programs
- Electricity prices rise due to shift to renewable energy
- Demand for ethical consumption rises, and there is increased demand for environmentally friendly products (e.g., new materials, eco-friendly products)

Energy domain

Raw materials domain

Legend: Relevant areas

We gathered scientific evidence to see what conditions in 2030 and 2050 would be like

<table>
<thead>
<tr>
<th>Change item</th>
<th>Parameter</th>
<th>Base year</th>
<th>2030</th>
<th>2050</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>4°C</td>
<td>1.5°C</td>
<td>4°C</td>
</tr>
<tr>
<td>Transition risk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricity price increase</td>
<td>Electricity price</td>
<td>Japan: 24,892 JPY/MWh (2017)</td>
<td>Japan: 24,713 JPY/MWh</td>
<td>Japan: 26,221 JPY/MWh</td>
<td>Japan: 20,828 JPY/MWh</td>
</tr>
<tr>
<td>Lumber price increase</td>
<td>Logging tax (Vietnam lumber, Brazil lumber)</td>
<td>- (2021)</td>
<td>0</td>
<td>Malaysia: 2,736 JPY/t</td>
<td>0</td>
</tr>
<tr>
<td>Physical risk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural disaster damage (heavy rain)</td>
<td>Forest fire incidence (Vietnam lumber, Brazil lumber)</td>
<td>- (2021)</td>
<td>+2% (Vietnam lumber)</td>
<td>+15% (Brazil lumber)</td>
<td>0%</td>
</tr>
<tr>
<td>Natural disaster damage (flood)</td>
<td>Probability of flooding</td>
<td>- (2021)</td>
<td>0.27 days/year</td>
<td>0.26 days/year</td>
<td>0.31 days/year</td>
</tr>
<tr>
<td>Insurance premiums increase</td>
<td>Increase rate of natural disasters</td>
<td>- (2021)</td>
<td>+1.2%</td>
<td>0%</td>
<td>+2.9%</td>
</tr>
<tr>
<td>Ethical consumption expansion</td>
<td>Sustainability market expansion rate</td>
<td>Base year 2017</td>
<td>+28.8%</td>
<td>+32.0%</td>
<td>+92.2%</td>
</tr>
<tr>
<td>Use of new materials expansion</td>
<td>EV rate</td>
<td>- (2021)</td>
<td>0%</td>
<td>+256.3%</td>
<td>0%</td>
</tr>
<tr>
<td>Disaster-response products expansion</td>
<td>Increase rate of natural disasters</td>
<td>- (2021)</td>
<td>+6.0%</td>
<td>0%</td>
<td>+16.4%</td>
</tr>
</tbody>
</table>

Source:
- Forest and Grass Fire Risk Assessment for Central Asia under Future Climate Scenarios (Estimated based on changes in area burned by forest fires and the rate of increase in the frequency of forest fires based on future climate)
- Ministry of Land, Infrastructure, Transport and Tourism, “Impacts of Climate Change”
- Ministry of Land, Infrastructure, Transport and Tourism, “Impacts of Climate Change”
- Utilise weighted average of the rate of increase in the occurrence of various types of disasters and the ratio of the amount of damage caused by disasters
- Utilise sustainable market growth rates from Nielsen “Product Inside”
- Estimated from EV utilisation trends in EA, “Global EV Outlook 2021” and “EA “Heat Zero by 2050”
- Based on reports from the Ministry of Education, Culture, Sports, Science and Technology and the Japan Meteorological Agency
Examine business impacts of items identified by significance assessment of risks/opportunities

Opportunity (1)
- Changes in purchasing behavior, such as ethical consumption
  - Ethical consumption accelerates, and sales for environmentally friendly products increase

Opportunity (2)
- Expanded use of new materials
  - Sales increase for products targeted toward EVs, such as CNFs

Opportunity (3)
- Increased sales of disaster response products
  - Sales increase for products targeted toward use during disasters

Risk (1)
- Carbon price
  - Operating costs rise due to application of carbon pricing

Risk (2)
- Promotion of renewable energy
  - Electricity costs rise due to policies promoting renewable energy, etc.

Risk (3)
- Procurement expenses for products that use wood as a raw material
  - Procurement costs rise due to increased wood procurement costs

Risk (4)
- Physical risk
  - Recovery expenses and insurance premiums rise in raw material production areas due to extreme weather conditions

Sales

Expenses

Net income

Impacts on business (2030 1.5°C scenario)
- Carbon price (+carbon reduction)
- Raw material prices (logging tax)
- Product expansion for EVs
- Insurance premiums
- Expansion of disaster-response products
- Ethical consumption expansion
- Processing and distribution

Impacts on business (2030 4.0°C scenario)
- Carbon price
- Raw material prices (Forest fires)
- Insurance premiums
- Product expansion for EVs
- Ethical consumption expansion

Consumers
Countermeasures: measures to risks

We will focus on addressing rising carbon prices, as measures here were found in our investigation of risk responses to have a significant impact.

**Measures for rising carbon prices**

1. **Change fuels to reduce the amount of fossil fuels used**
   - (Reduce GHG emissions (Scope 1 + 2) by 45% compared to FY2013 levels by 2030)
   - Non-fossil energy use ratio of 60% or more
   - (Aim to achieve carbon neutrality by 2050)

2. **Maximize the value of forests**
   - (Improve the CO2 fixation rate in overseas afforestation by 30% compared to FY2013 levels)

3. **Promote a modal shift (Nippon Paper Industries Co., Ltd. paper and cardboard business)**
   - Reduce CO2 emissions during product transportation by 23% compared to FY2020 levels
### Analysis steps

<table>
<thead>
<tr>
<th>Step</th>
<th>Analysis details</th>
<th>Analysis results</th>
</tr>
</thead>
</table>
| 2    | **Significance assessment of risks/opportunities** | - **Opportunities**: Rising sales of environmentally friendly products due to accelerating ethical consumption, increased sales of new material products such as CNFs, increased sales of disaster response products, and maximization of forest value  
- **Transition risks**: Carbon tax, rising electricity costs due to promotion of renewable energy sources and soaring procurement costs for raw materials (mainly wood, etc.) caused by decarbonization  
- **Physical risks**: Increased costs such as additional investment for damage at production areas and facility recovery as well as increased insurance premiums due to increasingly extreme weather conditions |
| 3    | **Identify and define range of scenarios** | - **In the 1.5°C scenario** (as of 2050), the greatest risk is rising carbon prices  
- **In the 4°C scenario** (as of 2050), the greatest risk is rising wood prices caused by forest fires |
| 4    | **Evaluate business impacts** | - **Reduce the risk from carbon pricing**  
  - Change fuels to reduce the amount of fossil fuels used  
  - Promote a modal shift, etc. (focused on the domestic paper/cardboard business)  
- Expand opportunities by maximizing the value of forests  
  - Improve the CO2 fixation rate in overseas afforestation |
| 5    | **Countermeasure definition** | |

### Challenges and planning for the future

For the next period and beyond, we will proceed with (1) through (4)

1. Ensure governance is in place
2. Assess materiality of climate-related risks
   - Market and Technology Shifts  
   - Policy and Legal  
3. Identify and define range of scenarios
   - Scenarios inclusive of a range of transition and physical risks relevant to the organization
4. Evaluate business impacts
   - Impacts on:  
     - Input costs  
     - Operating costs  
     - Revenues  
     - Supply chain  
     - Business interruption  
     - Timing
5. Identify potential responses
   - Responses might include:  
     - Changes to business model  
     - Changes to portfolio mix  
     - Investments in capabilities and technologies
6. Documentation and disclose

(1) Examine specific measures for risks / opportunities at each head office  
(2) Brushing-up of assessment (review of growth/market forecasts)  
(3) Expand scope to include overseas group companies  
(4) Information disclosure (Integrated Report, ESG Data Book)
Materials

✓ Practice Case①: GUNZE LIMITED
✓ Practice Case②: Shin-Etsu Chemical Co., Ltd.
✓ Practice Case③: Nippon Paper Industries Co., Ltd.
✓ Practice Case④: Mitsui Mining & Smelting Co., Ltd.
✓ Practice Case⑤: UACJ Corporation

[Business covered in this analysis]

We cover the company’s metal business, which accounts for approximately 30% of all sales

<table>
<thead>
<tr>
<th>Net sales</th>
<th>Metals</th>
<th>30.4 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>(as of FY2019)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>473.1 billion JPY</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Net sales</th>
<th>Engineered Materials</th>
<th>26.0 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>(as of FY2019)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,691.7 thousand tons -CO₂</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Metal business: Business structure and products

- Metal Sector
- Lead & Zinc Division
- Copper & Precious Metals Division
- Mineral Resources Division
- Zinc / Zinc-based alloys / Lead / Tin / Antimony trioxide / Bismuth
- Copper / Gold / Silver / Sulfuric acid
- Zinc concentrate / Copper concentrate / Geothermal steam

Affiliates Coordination 20.8 %
Automotive Parts & Components 17.1 %
Metals 63.7 %
Metal business supply chain and material flow

MITSUI KINZOKU's manufacturing process (nonferrous smelting)

- Shredder dust, fly ash, steelmaking dust, waste batteries, etc.
- Concentrates
- Recycled materials

Smelting process

Electricity

- Heavy oil, LPG, coal, coke, etc.
- Raw materials (Concentrates)
- Recycled materials

Electrolytic process

Nonferrous metal products
- Zinc
- Copper
- Lead
- Precious metals

Processed products, etc.

Final products
- Automobiles
- Building materials
- Electronics products
- Communications etc.

Disposal

Recycling

Metal business: Core business locations

**Miike**
- Mike Smelting Co., Ltd.
- Shinkaimachi, Omuta-shi, Fukuoka

**Hikoshima**
- Hikoshima Smelting Co., Ltd.
- Hikoshima-nishiyamacho, Shimonoseki-shi, Yamaguchi

**Takehara**
- Takehara Refinery
- Shiomachi, Takehara-shi, Hiroshima

**Hibi**
- Hibi Smelter
- Hibi, Tamano-shi, Okayama

**Kamioka**
- Kamioka Mining and Smelting Co., Ltd.
- Shikama, Kamiokacho, Hida-shi, Gifu

**Hachinohe**
- Hachinohe Smelting Co., Ltd.
- Hamanayachi, Kawanagi, Hachinohe-shi, Aomori
Future climate changes will bring significant risks and opportunities to the metal business.

### Transition risks

**Increase in carbon pricing**
- The introduction of carbon taxes or increases in the coal tax rate could increase costs for raw material procurement, product manufacturing, and logistics.
- The nonferrous metal industry is at risk of incurring a larger cost burden than other industries as it consumes a large amount of energy for mining, ore processing, and melting.

**Changes in energy costs**
- Electricity prices and energy prices from crude oil and similar are predicted to increase due to changes in the supply-demand balance.
- It will be necessary to make investments toward increasing energy efficiency in the manufacturing process for nonferrous metals which have particularly high energy consumption.

**Changes in product prices/demand**
- Tighter regulations on mining for metals with increased demand due to trends toward electrification and renewable energy may lead to increases in response costs.
- Higher market prices due to increased costs for mining raw materials will accelerate the substitution of other products in place of MITSUI KINZOKU.
- Resulting in lower sales.

**Changes in reputation with customers**
- Increased interest from client companies in environmental measures such as RE100 will lead to a preference for companies who have made advances in such measures. Because of this, additional response costs will be incurred due to the need to make manufacturing processes low-carbon, and PLBS will be impacted as a result.

### Physical risks

**Extreme weather conditions**
- Extreme weather could have a significant impact on production sites and supply chains, leading to shutdowns, suspension of logistics functions, and increased response costs.
- Extreme weather may affect slag storage sites and lead to violations of laws and regulations due to spillage of hazardous substances.
- Insurance premiums for weather insurance will increase.

**Increase in average temperatures**
- Increased heat stress and an increase in infectious diseases may lead to lower productivity for workers, as well as accidents.
- Higher temperatures may cause forest fires that damage infrastructure, etc.

### Scenario group definition

For climate change, which has a high degree of uncertainty, we will use two scenarios to study society in 2030.

### Projected average global surface temperature change

(Compare with the average from 1986-2005)

**Definition of 4°C (2.7°C+):**
- 3.2-5.4°C higher than pre-Industrial Revolution levels if no additional measures against global warming are taken.
- Over 2°C (2.7-4°C) scenario: 2.7-4.0°C higher than pre-Industrial Revolution levels if no additional measures against global warming are taken.
- 2°C scenario: 0.9-2.3°C higher than pre-Industrial Revolution levels if strict measures are taken.

The TCFD recommendations for scenario analysis suggest that multiple temperature range scenarios be selected, including those below 2°C.
**Scenario group definition**

**Nonferrous metals industry**

**Sellers (raw material suppliers)**
- Carbon regulations are not introduced
- Procurement costs soar due to carbon regulations
- There are accidents at mining sites and reduced shipments due to disasters from extreme weather (risk is lower than in the 4°C scenario)

**New entrants**
- The potential for new entrants is low
- There is increased competition due to expansion into developing countries

**Industry**
- Renewable energy/energy efficiency initiatives and investments toward smelting technology are carried out as they had been previously
- Physical risks to MITSUI KINZOKU sites become tangible (flooding, property damage)
- Decreased worker production due to heat stress

**Substitutes**
- Market prices rise and substitution of alternative products progresses to a certain degree due to increased raw material costs from catastrophic events
- Deal with diverse countries, improve the product recycling rate

**Buyers (customers)**
- Demand for copper/lead/zinc and other materials increases due to increased demand for electrification and EVs, and for storage batteries
- Trends toward low-carbonization/decarbonization weaken, and preference toward companies with advanced environmental measures decreases to the extent seen in the 2°C scenario
- There is a trend toward substituting metal products from China or other countries with low environmental costs
- There is a certain increase in the substitution of other materials (e.g. aluminum in place of iron) due to rising market prices

**Government**
- Carbon taxes and emissions credit trading are not wisely introduced due to weakening trends for low-carbonization/decarbonization and weakened external pressure from the international community
- Mining regulations are tightened in certain regions as a result of increased demand in line with trends for increased electrification and use of renewable energy
- There is no significant change from (energy, etc.)

**Nonferrous metals industry**

**Sellers (energy, etc.)**
- There is no significant change from the current status, and there is no energy cost burden capable of affecting operations
- There is no significant change from the current status, and there is no energy cost burden capable of affecting operations

**New entrants**
- The potential for new entrants is low
- There is increased competition due to expansion into developing countries

**Industry**
- Manufacturing costs and operating costs for facilities such as plants increase due to rising electricity prices
- Competition for resources becomes more intense
- There is increased activity in investments toward smelting technology aimed toward energy conservation/decarbonization
- Heat stress reduces worker productivity

**Substitutes**
- Substitution of alternative products accelerates due to rising market prices resulting from increased demand and rising raw material costs
- MIKINZOKU’s competitiveness can be enhanced by changing to a product lineup with high added value from an environmental perspective

**Buyers (customers)**
- There are increased needs for energy-efficient manufacturing processes (including methods such as recycling) due to low-carbonization
- Increased interest in client companies leads to a preference toward companies that have made advances in environmental initiatives such as RE100
- Create dependable initiatives toward increased metal demand

**Government**
- The government considers a carbon tax hike and emissions credit trading. There are limited efforts related to emissions credits and similar measures on a global scale
- The government establishes incentives such as subsidies for the development of technologies for observation and forecasting of torrential rains/typhoons/tornadoes
- Legislation is created to prohibit outdoor work during the summer months (more pronounced than in the 2°C scenario)

**Nonferrous metals industry**

**Sellers (energy, etc.)**
- Retail prices for electricity increase due to rising carbon prices
- Move forward with introduction of energy efficient and renewable energy practices

**New entrants**
- The potential for new entrants is low
- There is increased competition due to expansion into developing countries

**Industry**
- Manufacturing costs and operating costs for facilities such as plants increase due to rising electricity prices
- Competition for resources becomes more intense
- There is increased activity in investments toward smelting technology aimed toward energy conservation/decarbonization
- Heat stress reduces worker productivity

**Substitutes**
- Substitution of alternative products accelerates due to rising market prices resulting from increased demand and rising raw material costs
- MIKINZOKU’s competitiveness can be enhanced by changing to a product lineup with high added value from an environmental perspective

**Buyers (customers)**
- There are increased needs for energy-efficient manufacturing processes (including methods such as recycling) due to low-carbonization
- Increased interest in client companies leads to a preference toward companies that have made advances in environmental initiatives such as RE100
- There is a trend toward substituting metal products with products from China or other countries with low environmental costs
- There is a certain increase in the substitution of other materials (e.g. aluminum in place of iron) due to rising market prices

**Government**
- The government considers a carbon tax hike and emissions credit trading. There are limited efforts related to emissions credits and similar measures on a global scale
- The government establishes incentives such as subsidies for the development of technologies for observation and forecasting of torrential rains/typhoons/tornadoes
- Legislation is created to prohibit outdoor work during the summer months (more pronounced than in the 2°C scenario)
Government

Energy conservation/renewable energy policies are not actively promoted (Carbon taxes have not been introduced)

Mining
Mining site operations are suspended due to extreme weather

Manufacturing
Factory operations are suspended due to extreme weather and storm surges

City
Conversion to smart cities does not progress, and the existing form of cities is maintained

Government

Carbon taxes are introduced, and recycling regulations and other policies are made more severe. Recycling regulations and mining regulations for metal are made even tighter

Mining
Mining site operations are impacted by extreme weather. Demand for nonferrous metals increases due to the global promotion of low-carbonization initiatives

Manufacturing
Plant operations are impacted by extreme weather and storm surges due to increased heat stress and an increase in infectious diseases. Worker productivity decreases due to increased heat stress and an increase in infectious diseases. Low-carbonization of plants is achieved through securing renewable energy sources and in-house power generation.

City
Low-carbonization progresses, and smart cities increase due to increased demand.
[Assessment of impact on business: 4°C scenario]
In the 4°C scenario, while the impact of physical risks increases, demand for base metals also increases.

- Rising energy prices/crude oil prices
- Increased frequency of damage from disasters such as floods
- Increased heat-related expenses

Impact on P/L in line with current trends

Impact on P/L if countermeasures are implemented

Capital investment
Does not include the cost of procuring land for the construction of new smelters

Increased revenue
Recovery through capturing demand for base metals [copper/zinc/lead]

* This is one example of a possible countermeasure that we have listed based on the various forecast information collected for this analysis. We will continue to investigate multiple strategies after further improving the accuracy of the forecast information.

In the 4°C scenario, it will be necessary to focus particular attention on investigating countermeasures for physical risks in addition to responding to the expected increase in demand for base metals.

[Assessment of impact on business: 2°C scenario]
In the 2°C scenario, carbon tax becomes a significant factor for reduced revenue, and strategies toward minimization are essential.

- Carbon tax
- Rising energy prices/crude oil prices
- Increased heat-related expenses

Impact on P/L in line with current trends

Capital investment
Does not include the cost of procuring land for the construction of new smelters

Increased revenue
Recovery through capturing demand for base metals [copper/zinc/lead]

* This is one example of a possible countermeasure that we have listed based on the various forecast information collected for this analysis. We will continue to investigate multiple strategies after further improving the accuracy of the forecast information.

In the 2°C scenario, approximately half of the impact of carbon tax can be made up for by weighting energy conservation and similar efforts to curb CO2 emissions and capturing growing demand.
### Changes in energy cost

- **Loss**
  - **4°C scenario**
  - Risk
  - Risk
  - Risk
- **2°C scenario**
  - Risk
  - Risk
  - Opportunity

### Changes in demand for copper, lead and zinc

- **Profit**
  - **4°C scenario**
  - Opportunity
  - Opportunity
  - Opportunity
  - Opportunity
- **2°C scenario**
  - Opportunity
  - Opportunity
  - Opportunity
  - Opportunity
  - Opportunity
  - Opportunity

### Extreme weather conditions

- **4°C scenario**
  - Risk
  - Construction work toward disaster preparedness at closed mines
  - Development of low-environmental burden/low-cost processing technologies at closed mines
  - BCP sophistication, including verification of the cost-effectiveness of disaster prevention measures
  - Strengthened processing of waste from natural disasters
- **2°C scenario**
  - Risk
  - Opportunity
  - Opportunity
  - Opportunity
  - Opportunity

### Increased average temperatures

- **4°C scenario**
  - Risk
  - Implementation of FA operations at high-temperature work sites in the smelters
  - (Development of a system for remote control of mining machinery)
- **2°C scenario**
  - Risk

### Impact estimation items

<table>
<thead>
<tr>
<th>Impact estimation items</th>
<th>4°C scenario</th>
<th>2°C scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increases in carbon pricing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Changes in energy cost</td>
<td>Loss</td>
<td></td>
</tr>
<tr>
<td>Changes in demand for copper, lead and zinc</td>
<td>Profit</td>
<td></td>
</tr>
<tr>
<td>Extreme weather conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased average temperatures</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Countermeasures corresponding to risks and opportunities

- Implementation of ambitious target settings (e.g. SBT targets)
- Introduction of internal carbon pricing
- Development of low-coke, carbon-free smelting technology and creation of industry rules
- Development of carbon-absorbing technology such as blue carbon
- Establishment of target figures for renewable energy introduction rates
- Establishment of long-term targets for the reduction of energy used
- Improvement of the rate of recycled materials (energy conservation)
- Improvement of the rate of recycled materials (collection of lithium and other valuable metals)
- Recycling of metal scrap collected from customers
- Reevaluation of portfolios in consideration of multiple scenarios
- Company-wide systemization of spare parts management aimed toward swift recovery after incurring damages
- Construction work toward disaster preparedness at closed mines
- Development of low-environmental burden/low-cost processing technologies at closed mines
- BCP sophistication, including verification of the cost-effectiveness of disaster prevention measures
- Formulation of product sales strategies tailored to national land resilience needs
- Implementation of FA operations at high-temperature work sites in the smelters
- (Development of a system for remote control of mining machinery)

### Future initiatives

- For metal business, we performed regular monitoring in order to increase the certainty of the scenarios

---

**Projected demand in 2030 for nonferrous metals**

- **Zn** Zinc
- **Pb** Lead
- **Cu** Copper
- **Ni** Nickel

(Sources, references) Sebastiaan Deetman, World Bank et al.

- For copper, we used the average demand from 2010 to 2015; for other metals, the projected figures are based on using the demand for 2013 as 100%
- Nickel is not currently a main product in the company's metal business, but we covered it here as a reference for metals used as raw materials by other divisions, together with cobalt and platinum.
We will move on to analyze other business divisions after ending scenario analysis for metal business with the support of this project.

The goal is to integrate climate change with management and enhance corporate value.

With the scenario analysis as a starter, we will go on to implement a continuous cycle of disclosure and system restructuring (integration with management strategy).
Materials

✓ Practice Case① : GUNZE LIMITED
✓ Practice Case② : Shin-Etsu Chemical Co., Ltd.
✓ Practice Case③ : Nippon Paper Industries Co., Ltd.
✓ Practice Case④ : Mitsui Mining & Smelting Co., Ltd.
✓ Practice Case⑤ : UACJ Corporation

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### UACJ Company Profile

<table>
<thead>
<tr>
<th>Principal Business</th>
<th>Manufacture and sales of rolling products, casting products, forged products and precision-machined products of nonferrous metals, including aluminum and alloys thereof.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital/Net sales (Year ending March 2020)</td>
<td>52,277 million JPY / 615.2 billion JPY</td>
</tr>
<tr>
<td>Employees (As of March 31, 2020)</td>
<td>Consolidated : 9,927 Unconsolidated : 2,953</td>
</tr>
<tr>
<td>Production capability</td>
<td>1.23 million tons/year (Japan's largest and the world's fourth largest)</td>
</tr>
<tr>
<td>History</td>
<td>Start of aluminum business 1898 (first aluminum rolling in Japan) Registered establishment in 1964, Founded in 2013 as a result of the business integration of Furukawa-Sky and Sumitomo Light Metal</td>
</tr>
</tbody>
</table>
[Scenario analysis targets]

Business: We targeted the “flat rolled products” business within the “rolled aluminum products” business segment. The significance of the business in the portfolio and the representativeness of the business were considered.

Locations: Japanese and Thai production sites

UACJ business portfolio (Revenue)

- Rolled Aluminum Products Business Segment (26.4%)
- Copper products Segment (3.2%)
- Precision-machined Components and Related Businesses Segment (70.4%)

Total 615.2 billion JPY*1 (March 2020 term)

39.5% 236 billion
46.8% 69 billion
13.7% 615.2 billion

Analysis target

Target sectors and risks discussed (example)

<table>
<thead>
<tr>
<th>Sector (1)</th>
<th>Sector (2)</th>
<th>Products example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rolled Aluminum Products Business Segment</td>
<td>Flat-rolled products business</td>
<td>Beverages, etc.</td>
</tr>
<tr>
<td>Extrusion business</td>
<td>Automotive business</td>
<td>Automotive parts, etc.</td>
</tr>
<tr>
<td>Aluminum foil business</td>
<td>Precision-machined components business</td>
<td>Building materials, etc.</td>
</tr>
<tr>
<td>Casting and forging business</td>
<td></td>
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</tr>
</tbody>
</table>

(1) Transition risks, opportunities (1/2)

<table>
<thead>
<tr>
<th>Risk items</th>
<th>Business impact</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon price (carbon tax / carbon border adjustment mechanism)</td>
<td>Procurement costs for imported raw materials / materials increase</td>
<td>Sales and revenue increase due to reduced competitiveness of imported competitor products from countries/regions with insufficient GHG emissions controls</td>
</tr>
<tr>
<td>Carbon emissions targets / policies in each country (Emissions trading / Mandatory Carbon Footprint Reporting etc.)</td>
<td>Raw material procurement costs / manufacturing costs increase due to expenses for purchasing carbon credits</td>
<td>Carbon tax and other costs can be reduced by reducing procurement of energy-intensive raw materials (virgin aluminum)</td>
</tr>
<tr>
<td>Recycling regulations / policies in each country</td>
<td>Prices increase due to increased demand for scrap metal</td>
<td>Revenue increases through sales promotion focused on superior recyclability</td>
</tr>
</tbody>
</table>

Sources: UACJ’s presentation materials of financial results for FY2020 (May 2021), UACJ’s integrated report (March 2021)
## (1) Transition risks, opportunities (2/2)

<table>
<thead>
<tr>
<th>Risk items</th>
<th>Business impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small classification</td>
<td>Index</td>
</tr>
<tr>
<td>Changes in energy mix</td>
<td>Revenue Expenditures</td>
</tr>
<tr>
<td>Developing next-generation technologies</td>
<td>Expenditures</td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
<td>Changes in customer behavior</td>
<td>Revenue Expenditures</td>
</tr>
<tr>
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</table>

## (2) Physical risks, opportunities

<table>
<thead>
<tr>
<th>Risk items</th>
<th>Business impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small classification</td>
<td>Index</td>
</tr>
<tr>
<td>Increase in average temperature</td>
<td>Revenue</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Increasing severity of extreme weather conditions (cyclones, floods)</td>
<td>Revenue Expenditures</td>
</tr>
<tr>
<td></td>
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<td></td>
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</tbody>
</table>
Selected scenario
We will use two scenarios (1.5°C, 4°C (2.6°C~4°C)) to consider society in 2050.

Almost the same temperature changes would occur in the 2°C and 4°C scenarios by 2030.

It is important to draw an appropriate transition path focusing on decarbonization by 2050 for each timeframe selected in the scenario analysis.

Projected average global surface temperature change (compared with the average from 1986~2005)

2°C scenario: 0.9~2.3°C higher than pre-industrial Revolution levels if strict measures are taken.

1.5°C scenario: We are highly likely to achieve an increase of less than 1.5°C compared to pre-industrial Revolution levels if a radical transition to a new system is made.

The TCFD recommendations for scenario analysis suggest that multiple temperature range scenarios be selected, including those below 2°C.

Definition of 4°C (2.6°C~4°C) scenario:
3.2~5.4°C higher than pre-industrial Revolution levels if no additional measures against global warming are taken.

Over 2°C (2.6°C~4°C) scenario: 2.7~4.0°C higher than pre-industrial Revolution levels if no additional measures against global warming are taken.

List of used parameters: Transition risk
Definition of each of the worldviews based on scientific evidence, etc., from IEA and other sources.

<table>
<thead>
<tr>
<th>Transition risk</th>
<th>Baseline (year, values)</th>
<th>2030</th>
<th>2050</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>② Carbon emissions targets/policies in each country (%)</td>
<td>Japan: 46% (2013)</td>
<td>Japan: 46% (2020)</td>
<td>Japan: 100% (2065-2070)</td>
<td>Japan: 100% (2065-2070)</td>
</tr>
<tr>
<td>③ Recycled aluminium utilization rate (%)</td>
<td>World: 33% (2020)</td>
<td>World: 44% (1.75°C)</td>
<td>World: 52%</td>
<td>World: 71%</td>
</tr>
<tr>
<td>⑥ Projected Demand for Aluminium</td>
<td>World: 93 Mt (2018)</td>
<td>World: 244 Mt</td>
<td>World: 335 Mt</td>
<td>CM group, &quot;AN ASSESSMENT OF GLOBAL MACROECONOMIC AND REGIONAL AND MARKET SECTOR GROWTH OUTLOOK FOR ALUMINIUM DEMAND (2020)&quot;</td>
</tr>
</tbody>
</table>

Legend: Estimated
*Exchange rate: $1=114 JPY (based on 12 November 2021)
### Transition Risk

<table>
<thead>
<tr>
<th>Event</th>
<th>Description</th>
<th>2030</th>
<th>2050</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EV Inventory</strong></td>
<td>(Million Vehicles)</td>
<td>193 (million vehicles)</td>
<td>304.2 (million vehicles)</td>
<td>945 (million vehicles)</td>
</tr>
<tr>
<td><strong>Ethical Consumption Awareness</strong></td>
<td>Purchase intention based on ethical consumption</td>
<td>19% in the home appliances sector, 17% in the automotive sector, etc. (No scenario bifurcation)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Physical Risk

<table>
<thead>
<tr>
<th>Event</th>
<th>Description</th>
<th>2030</th>
<th>2050</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rate of temperature increase and increase in midsummer days</strong></td>
<td></td>
<td>12.12 (2020)</td>
<td>12.45</td>
<td>Trends in the market</td>
</tr>
<tr>
<td><strong>Relationship between temperature rise and air conditioner sales</strong></td>
<td></td>
<td>+1.1°C (2020-2039)</td>
<td>+1.0°C (2°C) (2040-2059)</td>
<td>+2.0°C (2020-2039)</td>
</tr>
<tr>
<td><strong>Relationship between rising temperatures and demand for beverage products</strong></td>
<td></td>
<td>Mineral water: +1.1% Carbonated water: +2.9% Soft drinks: +1.2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Increase in aluminum demand by sector</strong></td>
<td></td>
<td>2018</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rainfall, flow rate, and flood frequency</strong></td>
<td></td>
<td>(2020)</td>
<td>4 times</td>
<td>Trends in the market</td>
</tr>
</tbody>
</table>

### Sources
- IEA WEo2021
- Enpuku "Global Consumption Awareness Survey 2020"
- Dekitika "Menzu Generation Z Annual Survey 2021"
- World Bank, FCL Climate Knowledge Portal
- IEA, "World Energy Outlook 2018"
- World Bank, "Climate Change Knowledge Portal: Temperature risk"
- Ministry of Environment, etc. "Climate Change Observation, Prediction and Impact Assessment Integrated Report 2018 - Climate Change in Japan and its Impacts"
- National Observatory of Athens, "The Impact of Climate Change on the Pattern of Demand for Bottled Water and Non-Alcoholic Beverages" (2014)
- CM Group, IAI "TAN ASSESSMENT OF GLOBAL MACROEVENTS AND REGIONAL AND MARKET SECTOR GROWTH OUTLOOK FOR ALUMINUM DEMAND" (2020)
- Ministry of Land, Infrastructure, Transport and Tourism, "Impacts of Climate Change" (2020)
- Ministry of Land, Infrastructure, Transport and Tourism, "Study on Flood Control Planning in Light of Climate Change"
- Ministry of Land, Infrastructure, Transport and Tourism, "Study on Flood Control Planning in Light of Climate Change"

### Future Social Image in a 4°C (2.6~4°C) Scenario

**No increase in the use of recycled materials, and demand for aluminum will continue as-is; measures to address extreme weather will be important**

#### Primary (virgin) aluminum procurement

- Raw material prices for using ore soar due to extreme weather conditions in countries/regions of origin

#### Recycled aluminum (aluminum produced from scrap) procurement

- Disruptions in the supply chain due to extreme weather
- Higher average temperatures and more hot days in summer result in increased demand for aluminum due to increased sales of air conditioners and beverage products

#### Government

- No significant change in climate change awareness for investors and consumers

#### Investors

- Introduction of a carbon tax does not progress

#### Customers

- Disposals/recycling
- Manufacturing /sales

#### Investors

- Increased disaster-related subsidies

#### Manufacturing /sales

- Crude oil supply is maintained, and operating costs increase along with soaring crude oil prices
- Scrap usage rate shifts in line with current trends

#### Customers

- There is flooding and damage from heavy rainfall and typhoons to manufacturing plants in Japan and overseas, resulting in increased costs to address these
- Increased demand for aluminum due to upward trends in automobile sales spread of EVs continues in line with current trends

#### Government

- Introduction of a carbon tax does not progress
Future social image in a 1.5°C scenario

Shift to renewable energy and recycled materials. Establishment of scrap recovery systems and R&D for low carbon products will be important.

Increased expenses are incurred. Even if further countermeasures are implemented and new opportunities are seized, there is still expected to be a negative impact.

Revenue

Operational profit (Sp)
Introduction of carbon tax
Changes in electricity price
Changes in oil price
Flood damage costs
Lost opportunities due to a drop in crude oil prices

Increase/decrease in expenses

Increase/decrease in revenue

Seize opportunities

We assume that there will be no carbon tax introduced in Japan.

Possibility of a change in the sales growth percentage in comparison with other materials.

In the 4°C scenario (2050), physical risks become manifest, and measures against disasters for manufacturing sites, etc., are called for.
In the 1.5°C scenario (2030), progress toward decarbonization is called for as countermeasure for the introduction of a carbon tax.

In the 1.5°C scenario (2050), seizing of sales opportunities from responding to shifts and further progress toward decarbonization are called for.
Countermeasures for organizational risks

We need to ensure future group-wide rollout of scenario analysis, maturity level improvement, and monitoring/execution structure.

Future actions

Group-wide rollout of scenario analysis

✓ In this scenario analysis, we focused on the flat rolled products business and the Japanese and Thai production sites. We will roll out the methods used this time to conduct scenario analysis for the entire group.
✓ With this project team as the core, we will establish task forces, working groups, etc., to roll out the analysis to the entire group, and to each level of operations.

Monitoring/execution structure

✓ For this time, we established two scenario patterns. Climate change has a high level of uncertainty, and we will keep regular watch on what kind of future outlook we can expect, perform impact evaluation, and review our strategies.
✓ For this time, we considered measures for climate change risks from the perspective of a project and formed a team accordingly, but we will incorporate this as a formal organizational role in the future so that it does not become a temporary effort.

Maturity level improvement

✓ As the measures implemented this time were only for scenario analysis “Level 1”, we will gradually increase the maturity level in the future to aim for levels 2 and 3.

5 Future countermeasures to individual risks

We will strengthen competitiveness by implementing measures to reduce GHG emissions, developing materials with low environmental impact, and acquiring environmentally friendly certifications.

<table>
<thead>
<tr>
<th>Items</th>
<th>Category</th>
<th>Risk countermeasures example</th>
<th>Category</th>
<th>Initiatives for seizing opportunities example</th>
</tr>
</thead>
</table>
| Carbon price, Carbon emissions targets/policies in each country | Adapted | ✓ Setting of long-term GHG emissions reduction targets  
✓ Setting of long-term energy use reduction targets  
✓ Introduction of internal carbon pricing | Adapted | ✓ Implementation of long-term GHG emissions reduction targets  
✓ Leveraging of CO2 absorption through forests, etc., and credit programs  
✓ Establishment of an evaluation method to measure contribution to making reductions  
✓ Shifting to energy-saving technologies with an aim toward decarbonization through public-private partnerships and international cooperation |
| Recycling regulations/policies in each country | Adapted | ✓ Promotion of higher recycling rate for products  
✓ Establishment of a scrap recovery system with upstream/downstream customers | Adapted - Established | ✓ Collaboration for and establishment of a scrap recovery system with retailers and local governments |
| Changes in energy mix, Energy-saving responses | Adapted | ✓ Improved energy conservation through changing fuels / switching power companies  
✓ Promotion of the introduction of renewable energy sources | Adapted - Established | ✓ Promotion of use of on-site power generation such as solar power, selling of electricity  
✓ Leveraging of decarbonization technologies such as CCS/CCUS |
| Changes in important products/prices | Adapted | ✓ (Price setting for products in line with rising raw material prices) | Adapted | ✓ (Strengthening of product competitiveness by curbing product price increases through measures such as improving recycling recovery efficiency) |
| Changes in customer behavior | Adapted | ✓ Development of decarbonized aluminum products / services (certification) | Established - Retained | ✓ Promotion of use of aluminum for products  
✓ Establishment of UACJ’s own branding by moving toward with acquiring environmentally friendly certifications  
✓ Collaboration with competing materials companies |
| Increase in average temperature | Adapted | ✓ Implementation of disaster prevention equipment  
✓ Sophistication of risk models by leveraging data | Established | ✓ Promotion of the use of aluminum for products: Expansion of disaster prevention technologies/products  
✓ Formation of public-private consortiums, etc., aimed at disaster prevention |
| Increasing severity of extreme weather conditions (storms, flood) | Adapted - Retained | |
Agriculture, Food, and Forest Products

✓ Practice Case①: Maruha Nichiro Corporation

Maruha Nichiro Group Business Outline

Company Information (As of March 31, 2021)

- **Company name**: Maruha Nichiro Corporation
- **Establishment**: March 1943
- **Head Office Location**: 2-20, 3-chome, Toyosu, Koto-ku, Tokyo, Japan
- **Capital Stock**: 20 billion JPY
- **Number of Employees**:
  - Non-consolidated: 1,661
  - Consolidated: 13,117
- **Group companies**:
  - 149 (Domestic: 74, Overseas: 75)
  - Consolidated Subsidiaries: 77
  - Non-consolidated Subsidiaries: 18
    - (Equity-method affiliates: 2)
  - Affiliated companies: 54
    - (Equity-method affiliates: 23)

Main Business
- Fisheries, Aquaculture, Marine Products
- Trading/Processing/Wholesaling
- Manufacture/Processing/Sales of consumer frozen foods, retort pouch foods, canned foods, fish-paste products, fine chemical products and beverages, import of raw materials for meat and feed
- Manufacture/Processing/Sales of meat

![Maruha Nichiro Group Products](image-url)
We focused on the fishery and aquaculture segment (particularly Japanese aquaculture business), one of the key segments in the business portfolio, and performed impact estimation and definition of countermeasures.

**Significance assessment of risks/opportunities**

<table>
<thead>
<tr>
<th>Type</th>
<th>Large classification</th>
<th>Small classification</th>
<th>Discussion on business impacts (Qualitative information)</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy/ Regulation</td>
<td>Carbon price</td>
<td>Introduction of a carbon tax (increased operating costs)</td>
<td>Gain on sale from cap and trade (increased revenue)</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Carbon emissions targets/policies in each country</td>
<td>Strengthened emission regulations (increased operating costs)</td>
<td>N/A</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Energy-saving policy</td>
<td>Strengthened energy conservation policies (increased operating costs)</td>
<td>Expanded energy conservation subsidy programs (decreased investment costs)</td>
<td>Small</td>
</tr>
<tr>
<td></td>
<td>Fossil fuel subsidies</td>
<td>N/A</td>
<td>Expanded energy conservation subsidy programs (decreased operating costs)</td>
<td>Small</td>
</tr>
<tr>
<td></td>
<td>Regulation on packaging</td>
<td>Strengthened regulations (increased operating costs)</td>
<td>Improved resource efficiency of containers and packaging (decreased operating costs)</td>
<td>Medium</td>
</tr>
<tr>
<td>Industry/ Market</td>
<td>Changes in energy demand</td>
<td>Rising energy prices (increased operating costs)</td>
<td>N/A</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Changes in important products/prices</td>
<td>Changes in growth environments due to climate change (decreased sales)</td>
<td>Changes in growth environments due to climate change (increased revenue)</td>
<td>Large</td>
</tr>
<tr>
<td>Technology</td>
<td>Diffusion of renewable energy and energy saving technologies</td>
<td>N/A</td>
<td>Development of energy conservation technologies and expanded procurement of renewable energies (decreased operating costs)</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Next generation technology/ progress</td>
<td>Strengthened regulations toward alternative CFCs (increased operating costs)</td>
<td>Decreased environmental impact due to improved technologies (increased sales)</td>
<td>Medium</td>
</tr>
<tr>
<td>Reputation</td>
<td>Changes in customer behavior</td>
<td>Damage to the reputation of products and the company (decreased sales)</td>
<td>Changes in preferences to favor certified products and low carbon products (increased sales)</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Changes in investor’s reputation</td>
<td>Lower reputation with investors (increased financing costs)</td>
<td>Higher reputation with investors (decreased financing costs)</td>
<td>Medium</td>
</tr>
<tr>
<td>Chronic</td>
<td>Increase in average temperature</td>
<td>Further measures for transportation and storage (increased operating costs)</td>
<td>Changes in consumer behavior due to rising temperatures (increased sales)</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Changes in rainfall, weather patterns and ocean environment</td>
<td>Increased costs due to changes in ocean environments (increased operating costs)</td>
<td>Improved growth environment conditions due to changes in operating environments (increased revenue)</td>
<td>Large</td>
</tr>
<tr>
<td></td>
<td>Rising sea level</td>
<td>Wave proofing measures due to elevated sea levels (increased operating costs)</td>
<td>N/A</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Water stress (drought)</td>
<td>Damage to operations in regions with high water stress (increased operating costs)</td>
<td>N/A</td>
<td>Medium</td>
</tr>
<tr>
<td>Acute</td>
<td>Increasing severity of extreme weather conditions</td>
<td>Damage to operations due to extreme weather events (increased operating costs)</td>
<td>N/A</td>
<td>Large</td>
</tr>
</tbody>
</table>

*1 While we rated this as “Medium”, we will also evaluate the financial impact from carbon pricing.*

Target sectors and risks to consider (example)

Although the fishery and aquaculture segment accounts for only about 5% of Maruha Nichiro’s sales, given its importance in its upstream part of the value chain, the analysis will focus on the domestic farm fishing business.
**Identify and define range of scenarios**

<table>
<thead>
<tr>
<th>Key items (items with high significance)</th>
<th>Parameters researched</th>
<th>Risk - Opportunity</th>
<th>Related data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon price</td>
<td>Carbon tax</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in important products/prices</td>
<td>Migratory tuna catch volume</td>
<td>■</td>
<td>O 4/2/1.5°C 2050 IEA etc.</td>
</tr>
<tr>
<td>Changes in rain fall, weather patterns and ocean environment</td>
<td>Bait fish resource quantity *3</td>
<td>■</td>
<td>O 4°C 2050 MAFF</td>
</tr>
<tr>
<td>Physical risk</td>
<td>Fish size</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rising sea temperatures</td>
<td>■  ■  ■</td>
<td>4/2°C 2050 IPCC etc.</td>
</tr>
<tr>
<td></td>
<td>Changes in dissolved oxygen in seawater</td>
<td>■</td>
<td>x 4/2°C 2050 IPCC</td>
</tr>
<tr>
<td></td>
<td>Ocean acidification</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rate of increase in flooding frequency and the amount of rainfall</td>
<td>■</td>
<td>O 4/2°C 2040 METI</td>
</tr>
<tr>
<td></td>
<td>Occurrence of typhoons/cyclones</td>
<td>■</td>
<td>Implementati on if past results available 4/2°C 2050~ JMA (Japan Meteorological Agency) etc.</td>
</tr>
</tbody>
</table>

*1. We assumed this as a parameter that describes the decline in juvenile fish stocks
2. Since the fish farming business is the target of the evaluation, the decline in migratory tuna catches is viewed as an opportunity for the fish farming business
3. Resource quantity: Total amount of fish that come to the area

---

**Identify and define range of scenarios (Identify 4°C worldview by 5forces)**

Measures to address physical risks are called for: operating costs increase due to physical risks becoming manifest, and production decreases due to the deterioration of fish growth environments

**4°C worldview @ 2050s (Example)**

**Aquaculture industry**

- **Sellers (Raw material suppliers)**
  - Carbon emission regulations are not introduced
  - Physical risks become manifest for aquaculture facilities and certain distribution functions
  - Competition intensifies for fishery resources such as juvenile fish, and procurement costs increase
  - Raw feed prices for farmed fish soar, and operating costs increase

- **New entrants**
  - We assume no special measures will be necessary (No new entrants)

- **Industry**
  - Production at aquaculture sites decreases due to changes in the marine environment (seawater acidification, anoxia, etc.)
  - Physical risks due to extreme weather toward aquaculture sites become manifest, and disaster prevention costs increase
  - Catch volumes in nearshore waters decrease, catch costs increase, and reliance on aquacultures increases
  - Production increases in some regions and fish species due to changes in climate patterns
  - New fish diseases emerge due to high water temperatures, resulting in fish die-offs and reduced inventory

- **Buyers (Customers)**
  - Prices soar for certain marine products, and demand for low-priced marine products increases
  - Demand for low carbon / decarbonization are low, and no special measures are called for by stakeholders

- **Substitute products**
  - Cultured meat grown from cultured fish cells
  - Plant-based meat using materials derived from plants
  - Development of aquaculture technology and aquaculture environment improvement technology
  - Implementation of disaster prevention measures at sites

- **Declining cost of key products**

**Government**

- Low carbon / decarbonization trends weaken, and regulations, etc., do not move forward
- Regulations related to carbon taxes are not introduced
- Disaster prevention subsidies (for breakwaters, etc.) are established as sea levels rise and water stress increases

Prompt Obtainment of policy information and securing of subsidies (mainly through active collaboration with the government toward physical risks)
Identify and define range of scenarios

(Identify 4°C worldview by 5forces)

Measures to address physical risks are called for: operating costs increase due to physical risks becoming manifest, and production decreases due to the deterioration of fish growth environments.

- New fish diseases emerge due to high water temperatures, resulting in fish die-offs and reduced inventory.
- Production at aquaculture sites decreases due to changes in the marine environment.
- Physical risks become manifest for aquaculture/fishery facilities and certain distribution functions.
- Prices soar for certain marine products, and demand for low-priced marine products increases.
- Substitute fish products appear, such as cultured meat grown from cultured fish cells and plant-based meat using materials derived from plants.
- Feed prices for farmed fish soar, and operating costs increase.
- Decreased production due to increased extreme weather events.
- Subsidies are established as sea levels rise and water stress increases.
- No active progress for introduction of a carbon tax.

Identify and define range of scenarios

(Identify 2°C worldview by 5forces)

As decarbonization trends grow, low-carbonization of the aquaculture business to accompany regulations and development of high value-added products / substitute products is called for.

2°C worldview @2050s (Example)

Aquaculture industry

- Sellers (Raw material suppliers)
- Increased procurement costs due to carbon emission regulations.
- Increased introduction of low carbon aquaculture equipment/technologies.
- Increased share of renewable energies in aquaculture sites.
- Raw feed prices for farmed fish rise, and operating costs increase.
- We assume no special measures will be necessary (No new entrants).

New entrants

- While there is no significant change in migratory tuna catches, fishery costs increase due to rising ship fuel costs.
- Production increases in some regions and fish species due to changes in climate patterns.
- Reduced costs / low carbonization of production sites.
- Expansion distribution of fish species for which production will increase due to changes in weather patterns.

Industries

- Low carbonization of production sites.
- Development of high-value-added products through low carbonization.
- Cultured meat grown from cultured fish cells.
- Plant-based meat using materials derived from plants.

Buyers (Customers)

- Consumers select products with a high price advantage for which carbon prices have not been passed on.
- Demand for low carbon products increase as consumers become more low-carbon conscious, leading to increased demand for products produced using low carbon aquaculture technology.
- There is increased marketing of products as ethical, including low carbon products.

Subsidies (for breakwaters, etc.) are established to some degree accompanying a certain increase in sea levels and water stress.

Government

- Some countries impose restrictions on emissions from production sites, etc., and emissions trading becomes active.
- A carbon tax is introduced. Sites, etc. with high CO₂ emissions are subject to regulations.
- Subsidies for breakwaters, etc. are established to some degree accompanying a certain increase in sea levels and water stress.

Prompt obtaining of policy information and securing of subsidies.

Securing of sources with advanced decarbonization measures, low carbon raw materials, etc.

Securing of self-consumption power sources, investment in renewable energies.

R&D on cultured meat, etc.
As decarbonization trends grow, low-carbonization of the aquaculture business to accompany regulations and development of high value-added products/substitute products is called for.
Changes in profit due to fluctuations in sales are calculated by multiplying the amount of fluctuations in sales by the operating profit margin. R&D and other development expenses and new plant construction expenses, etc., are not included in the estimate this time due to the fact that there are many areas that are unclear.

In the 4°C Scenario, the risk of decreasing resources due to changes in the natural environment will become manifest, and consideration of measures such as changing over to artificial seeds and using/developing substitute feeds will be called for.

In the 1.5°C – 2°C scenarios, the carbon task burden will become manifest as a risk, and shifting to low carbonization will be called for; it will also be necessary to address to some extent the risk of a certain level of decreases in resources due to changes in the natural environment.
### Countermeasure definition

<table>
<thead>
<tr>
<th>Key items (Items with high significance)</th>
<th>Major initiatives in progress/to be implemented</th>
<th>Examples of other companies etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Carbon price</strong></td>
<td>✓ Setting of medium-term targets to reduce CO₂ emissions per unit of sales by at least 4% from the FY2017 level by FY2021</td>
<td>✓ Setting of medium to long-term GHG reduction targets and obtainment of SBT certification</td>
</tr>
<tr>
<td></td>
<td>✓ Investment in energy conserving equipment (changeover to non-CFC equipment, reduction of energy consumption, etc.)</td>
<td>✓ Performing of life cycle assessment in aquaculture operations</td>
</tr>
<tr>
<td></td>
<td>✓ Obtainment of carbon neutral certification from Austral Fisheries Pty Ltd, entry into the Climate Active NETWORK and offset emissions through afforestation activities</td>
<td></td>
</tr>
<tr>
<td><strong>Transition risk</strong></td>
<td>✓ Domestic residual meal and meal made from fish not yet used as food are currently being used as feed ingredients. Target fish species are yellowtail, amberjack, and bluefin tuna</td>
<td>✓ Development of feeds based on physical properties of feed and feeding behavior</td>
</tr>
<tr>
<td></td>
<td>✓ Promotion of sustainable fishery / acquisition of aquaculture certification</td>
<td>✓ An aquaculture management system centrally managed in the cloud</td>
</tr>
<tr>
<td></td>
<td>✓ Promotion of handling of MSC/ASC certified marine products</td>
<td>✓ Introduction of Sustainable Portfolio Management</td>
</tr>
<tr>
<td></td>
<td>✓ Increased production of artificial seeds (egg-to-harvest bluefin tuna, hatched yellowtail, hatched amberjack) = supplementation/replacement of natural seedlings</td>
<td>✓ Commercialization of cultured fish meat and substitute fish meat (collaboration between large companies and ventures)</td>
</tr>
<tr>
<td></td>
<td>✓ Strengthening of R&amp;D system for propagation and culture technology</td>
<td></td>
</tr>
<tr>
<td></td>
<td>✓ Development of formula feeds that stabilize feed costs and quality, and that enable the design and addition of nutrients optimal for growth</td>
<td></td>
</tr>
<tr>
<td><strong>Changes in important products/prices</strong></td>
<td>✓ Activities as a member of SeaBOS Task Force I (addressing IUU fishing, child labor and forced labor) and VI (addressing climate change); participation in various domestic and international symposiums, government committees and other domestic and international dialogues</td>
<td>✓ Introduction of aquaponics</td>
</tr>
<tr>
<td></td>
<td>✓ Thorough resource management, promotion of eradicating IUU (illegal, unreported and unregulated) fishing</td>
<td>✓ Strengthening of capital participation and procurement capabilities in the fish farming business</td>
</tr>
<tr>
<td></td>
<td>✓ Reducing the risk of marine pollution by optimizing feeding amounts through the introduction of AI-tracking fish counting devices</td>
<td></td>
</tr>
<tr>
<td><strong>Physical risk</strong></td>
<td>✓ Dispersion of production and storage sites</td>
<td>✓ Design of aquaculture farms deep enough to allow cages to be submerged to a certain depth below the water surface</td>
</tr>
<tr>
<td></td>
<td>✓ Formulation of a Business Continuity Plan (BCP)</td>
<td>✓ Establishment of a comprehensive BCP system</td>
</tr>
<tr>
<td></td>
<td>✓ Participation in mutual aid and insurance programs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>✓ R&amp;D for fish and aquaculture methods that are resistant to diseases caused by typhoons, ride tide, etc.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>✓ Introduction of submersible cages</td>
<td></td>
</tr>
</tbody>
</table>

### Other Sector

- **✓ Practice Case①**: YASKAWA Electric Corporation (Electronic Equipment)
- **✓ Practice Case②**: SCSK Corporation (Information Technology)
- **✓ Practice Case③**: ASKUL Corporation (Retailing)
We targeted the “Motion control”, “Robotics”, and “System engineering” businesses, and narrowed our focus to significant products in these areas to conduct our analysis.

Risks and significant products in each value chain

**R&D**
- Procuring raw materials
  - Factory automation devices (industrial robots, AC servos)
  - Industrial inverters
  - Products related to renewable energy generation equipment
  - Changes in prices for significant commodities/products
  - Carbon pricing
  - Changes in reputation with investors
  - Changes in rainfall/weather patterns
  - Extreme weather conditions, etc.

**Processing/manufacturing**
- Factory automation devices (industrial robots, AC servos)
- Industrial inverters
- Products related to renewable energy generation equipment
- Changes in prices for significant commodities/products
- Various countries’ carbon emission targets/policies
- Spread of low-carbon technologies
- Changes in rainfall/weather patterns
- Extreme weather conditions, etc.

**Shipping/product sales**

**Product use/disposal**
- Factory automation equipment (industrial robots, AC servos)
- Industrial inverters
- Products related to renewable energy generation equipment
- Changes in prices for significant commodities/products
- Recycling regulations
- Extreme weather conditions, etc.

We evaluated high-impact risks and determined significant products for each value chain.
We investigated risks/opportunities ranging from procuring raw materials to product use

**Risks/opportunities related to transition risks**

<table>
<thead>
<tr>
<th>Item</th>
<th>Subcategory</th>
<th>Study (example): risks</th>
<th>Study: opportunities</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Carbon pricing</td>
<td>The P/L is impacted by an increased cost of production at factories due to taxes imposed on fuel procurement costs with the introduction of carbon taxes by the governments of various countries</td>
<td>N/A</td>
<td>High</td>
</tr>
<tr>
<td>B</td>
<td>Various countries’ carbon emission targets/policies</td>
<td>The P/L is impacted by a decrease in costs such as green power purchasing due to an increased ratio of renewable energy in commercial electricity</td>
<td>N/A</td>
<td>High</td>
</tr>
<tr>
<td>C</td>
<td>Various countries’ restrictions on exports</td>
<td>P/L is impacted when the global shift to electrification, EVs, and hybrids leads to a shortage of rare earths (neodymium, and dysprosium) and copper for magnets, affecting production when prices for these materials soar and they become difficult to obtain due to restrictions on exports by producing countries</td>
<td>N/A</td>
<td>Low</td>
</tr>
<tr>
<td>D</td>
<td>Recycling regulations</td>
<td>P/L is impacted when expenditures increase due to increased costs from the adoption of alternative materials caused by regulations on plastic</td>
<td>N/A</td>
<td>Low</td>
</tr>
</tbody>
</table>

**Risk significance assessment (1/2)**

**Changes in prices for significant commodities/products**

- There is a risk that energy prices will rise due to changes in the supply-demand balance as a result of the introduction of carbon taxes and a decreased supply of fossil fuels due to global warming. As a result, P/L may be impacted by increased procurement costs.

**Spread of low-carbon technologies**

- Competition intensifies for the energy-saving performance of products due to the growing need for energy-saving measures. As a result, there is an increased burden of investment costs toward R&D, etc., and P/L and B/S are impacted.

**Changes in investor/custom behavior**

- Increased investor interest leads to preference for companies that have made progress with environmental initiatives such as RE100, which in turn leads to additional initiative costs from the need to implement low-carbon manufacturing processes. As a result, P/L and B/S are impacted.

**Risk significance assessment (2/2)**

**Changes in climate/weather patterns**

- An increase in lightning strikes creates a risk of power outages and an increased possibility of shutdowns for plant equipment. As a result, there are increased costs for additional investments toward facility restoration and insurance premiums, impacting P/L and B/S.

**Increased average temperatures**

- There are increased energy costs due to increased use of energy for air conditioning at the company’s plants, impacting P/L.

**Increase in infectious diseases**

- The need for a stable food supply increases demand for food product plants, impacting P/L.

**Elevated sea levels**

- Inverter sales increase due to rising demand for inverter air conditioning equipment, impacting P/L.

**Water management (droughts)**

- During droughts and similar events, there is a risk of plant shutdowns, and measures toward water recycling and reuse are required, impacting P/L and B/S.

**Extreme weather conditions**

- There is a risk of shutdowns/reduced production / additional investments toward facility restoration due to damage to employees/plants from typhoons/tornadoes/flooding. Furthermore, there are increased costs for insurance premiums, etc., toward assets in high-risk areas, impacting P/L and B/S.

We investigated risks/opportunities ranging from procuring raw materials to product use

**Risks/opportunities related to physical risks**
For climate change, which has a high degree of uncertainty, we studied two scenarios for a 2030 society.

Projected average global surface temperature change (compared with the average from 1986-2005)

2030 is the timeframe for this analysis.

The TCFD recommendations for scenario analysis suggest that multiple temperature range scenarios be selected, including those below 2°C.
Government
Energy-efficiency/renewable energy initiatives are not actively promoted, and introduction of carbon taxes is limited to only certain regions.

Market
Increased capital investment in FA due to relocation of production sites.

Increased demand for FA that can be used for remote production.

Increased demand for plant factories.

FA plant

Industrial inverter market

Increased demand for private energy generation and energy storage.

Increased demand for power suits that are used in disaster recovery.

YASKAWA production sites

Parts/raw materials supply

Increased physical risk due to extreme weather. Stronger disaster preparedness / BCP is needed.

Supplier factories

Arctic shipping routes are developed, lowering logistics costs to Europe and the U.S.

Investors
There is no great increase in demand for low-carbonization measures from investors.

Suppliers (energy)

Energy supply

Increased physical risk due to extreme weather.

Energy supply

Carbon regulations are not implemented, and there is no shift toward recycled materials.

Supplier factories

There is an increased shift from depleted resources to recycled materials, and procurement costs increase.

Investors
There is continued dependence on fossil fuels.

Suppliers (parts/raw materials)

Increased demand for industrial inverters continues in line with current trends.

Demand for industrial inverters continues in line with current trends.

Product supply

Plant operations suspended due to flood damages.

Government
Energy-efficiency/renewable energy initiatives are not actively promoted, and introduction of carbon taxes is limited to only certain regions.

Market
Increased demand for industrial inverters due to mounting energy efficiency needs / various government policies.

There is increasing need for energy efficiency, and demand for industrial robots and AC servos increases.

YASKAWA production sites

Parts/raw materials supply

Increased physical risk due to extreme weather.

Supplier factories

As EVs become popular, costs soar for copper wire / neodymium magnets, which are raw materials used in motors.

Investors
Low carbon / environmentally-friendly business becomes a requirement for investment.

Suppliers (parts/raw materials)

Increased demand for power generation facilities.

Increased demand for renewable energy generation facilities.

Renewable energy becomes more widespread, and demand for equipment used in generating renewable energy increases.

Government
Tightening of regulations / implementation of support initiatives

Increased carbon taxes

Increased activity of the emission credit trading system

Support for introducing renewable energy, etc.

Market
There is continued dependence on fossil fuels.

Conversion to smart factories (e.g. FEMS/M2M)

Industrial robots/AC servos

Increased demand for renewable energy generation facilities.

Increased demand for plant factories.

Industrial inverter market

Increased demand for private energy generation and energy storage.

Increased demand for power suits that are used in disaster recovery.

YASKAWA production sites

Parts/raw materials supply

Increased physical risk due to extreme weather.

Supplier factories

As EVs become popular, costs soar for copper wire / neodymium magnets, which are raw materials used in motors.

Investors
Low carbon / environmentally-friendly business becomes a requirement for investment.

Suppliers (energy)

Energy supply

Carbon tax / subsidies

Increased demand for renewable energy generation facilities.

Increased demand for renewable energy generation facilities.

Renewable energy becomes more widespread, and demand for equipment used in generating renewable energy increases.

Government
Tightening of regulations / implementation of support initiatives

Increased carbon taxes

Increased activity of the emission credit trading system

Support for introducing renewable energy, etc.

Market
There is increasing need for energy efficiency, and demand for industrial robots and AC servos increases.

There is increased demand for industrial inverters due to mounting energy efficiency needs / various government policies.

YASKAWA production sites

Parts/raw materials supply

Increased physical risk due to extreme weather.

Supplier factories

As EVs become popular, costs soar for copper wire / neodymium magnets, which are raw materials used in motors.

Investors
Low carbon / environmentally-friendly business becomes a requirement for investment.

Suppliers (parts/raw materials)

Increased demand for renewable energy generation facilities.

Increased demand for renewable energy generation facilities.

Renewable energy becomes more widespread, and demand for equipment used in generating renewable energy increases.

Government
Tightening of regulations / implementation of support initiatives

Increased carbon taxes

Increased activity of the emission credit trading system

Support for introducing renewable energy, etc.
[Scenario group definition]
Low-carbonization trends weaken, and physical risks increase

The 4°C (2.7°C+) worldview in the 2030s (examples)

<table>
<thead>
<tr>
<th>Sellers (parts/raw materials)</th>
<th>New entrants</th>
<th>Buyers (customers)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon regulations are not introduced, and there is no change in procurement costs for raw materials</td>
<td>There is no particular impact from climate change</td>
<td>There is increased capital investment in FA due to relocation of production sites prompted by natural disasters, rising sea levels, etc.</td>
</tr>
<tr>
<td>Physical risks become tangible for certain plants / resource suppliers</td>
<td></td>
<td>Increased demand for private energy generation and energy storage boosts demand for generators and power converters</td>
</tr>
</tbody>
</table>

Industry

- Initiatives toward renewable energy / energy efficiency are implemented as usual (no significant change)
- There is an increased risk of production line downtime and logistics disruptions due to catastrophic weather events
- Increased expenses for BCP countermeasures
- New arctic shipping routes open, lowering logistics costs to Europe and the U.S.
- Implement initiatives toward renewable energy / energy efficiency as usual, and evaluate portfolios, etc., for sites with high physical risks

(Substitutes)

- There is no particular impact from climate change
- Take actions to address the increasing demand for products related to disaster preparedness as the need for this increases

Government

- Carbon taxes are introduced in certain regions, but there is no increase in activity for emission credit trading, etc.
- There is no significant growth in demand for renewable energy due to renewable energy policies remaining at the current level
- The world continues to depend on gray energy/fuel due to difficulty in achieving targets for each country
- Initiatives for promoting EVs, etc., do not advance, and the number of vehicles being produced/sold does not increase
- Subsidies (for breakwaters, etc.) are created as sea levels rise and water stress increases

Investors

- N/A

[Scenario group definition]
As the world moves toward energy efficiency / low-carbonization, there is increased demand for FA equipment / industrial inverters / renewable energy generation facilities

The 2°C worldview in the 2030s (examples)

<table>
<thead>
<tr>
<th>Sellers (parts/raw materials)</th>
<th>New entrants</th>
<th>Buyers (customers)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased procurement costs due to carbon regulations</td>
<td>Increased activity for entry into new business from energy-saving and low-carbon products/business models</td>
<td>Increased demand for FA equipment and industrial inverters due to strong need for energy efficiency needs</td>
</tr>
<tr>
<td>Increased shift to recycled materials</td>
<td></td>
<td>Increased demand for equipment used in generating renewable energy</td>
</tr>
<tr>
<td>With the spread of EVs, there is increased demand for rare earths and copper that are raw materials used in motors, affecting production when prices for these materials soar and they become difficult to obtain</td>
<td></td>
<td>Increased demand for motor drive systems for EVs and FCVs</td>
</tr>
<tr>
<td>With the spread of EVs, there is increased demand for rare earths and copper that are raw materials used in motors, affecting production when prices for these materials soar and they become difficult to obtain</td>
<td>Advances in electrification / use of renewable energy in plants</td>
<td>Customers' needs for low-carbon / recycled materials increase, and they demand the use of these materials in manufacturing processes</td>
</tr>
<tr>
<td></td>
<td>Increased procurement costs due to increased prices of raw materials / intensified competition for resources</td>
<td>A slowdown in oil/gas related areas leads to a decrease in sales mainly in North America for inverter products in the same industry</td>
</tr>
<tr>
<td></td>
<td>Increased R&amp;D activity toward conversion to smart factories, such as FEMS/M2M</td>
<td></td>
</tr>
</tbody>
</table>

Industry

- Strengthen partnerships (alliances, M&A)
- Low-carbonization of plants
- Promoting R&D toward conversion to smart factories (e.g. FEMS/M2M)

/Substitutes

- There is no particular impact from climate change

Low-carbonization of manufacturing processes

Develop/sell products that meet the preferences of customers with strong needs for energy efficiency

Government

- Carbon taxes are introduced, stimulating the low-carbon market
- Policies toward spreading energy efficiency / renewable energy and encouraging low-carbonization are implemented with the aim of achieving CO₂ emissions reduction targets. Subsidies are also enhanced
- Fossil fuel subsidies end
- Policies aimed at popularizing EVs and FCVs are moved forward
- A charging network is established to promote popularization of EVs
- Certain subsidies (for breakwaters, etc.) are created as sea levels rise and water stress increases

Investors

- Low carbon / environmentally-friendly business becomes a requirement for investment
We evaluated the impact of each key driving force on the profit/loss statement (P/L).

### Sales
- Revenue from FA equipment
  - AC servo market size
  - Industrial robot market size
- Revenue from industrial inverters
  - Industrial inverter market size
- Revenue from equipment for renewable energy generation
  - Market size for generators/converters for offshore wind power generation
  - Market size for power conditioners for distributed solar power generation

### Costs
- Resource procurement expenses
  - Prices of copper wire/neodymium magnets
  - Electricity prices
- Carbon tax
  - Carbon pricing
  - Scope 1&2 emissions
- Physical risks
  - Flood risk

### Net profits

#### Impact of climate change on YASKAWA’s business
- When we based our hypotheses in the year 2030, we determined that the impact from climate change on YASKAWA’s business (operating profits) was not particularly significant in either the 2°C scenario or the 4°C scenario.
- The following identified risks and opportunities will need to be evaluated depending on the situation in the future.
  - Opportunities: FA equipment, renewable energy-related equipment, expansion of business corresponding to extreme weather conditions
  - Risks: Carbon tax hike, increase in procurement costs for copper/neodymium magnets, severe weather

#### Future TCFD initiatives (suggested)
- **TCFD disclosure**
  - Conduct an initial disclosure by preparing information on deficiencies and setting long-term CO₂ reduction targets based on the results of this analysis.
- **Post-disclosure initiatives**
  - After disclosing the results of this analysis, confirm the results of feedback from various stakeholders, including investors, and work to review (improve) the disclosure contents.
Other Sector

✓ Practice Case① : YASKAWA Electric Corporation (Electronic Equipment)
✓ Practice Case② : SCSK Corporation (Information Technology)
✓ Practice Case③ : ASKUL Corporation (Retailing)

Company Profile

Company name: SCSK Corporation
Head Office: Toyosu Front, 3-2-20, Toyosu, Koto-ku, Tokyo 135-8110, Japan
Established: October 25, 1969
Net sales: 396.8 billion yen (FY2020 Consolidated)
Employees: 14,550 (FY2020 Consolidated)
Stock listing: First section of the Tokyo Stock Exchange
Business lines: Consulting, System development, Verification Services, IT Infrastructure development, IT Management, IT Software and Hardware Sales, BPO

Group Companies

Domestic: SCSK KYUSHU CORPORATION, SCSK HOKKAIDO CORPORATION, SCSK Minori Solutions Corporation, SCSK ServiceWare Corporation, VeriServe Corporation, SCSK PRESCENDO CORPORATION, Allied Engineering Corporation, SCSK Nearshore Systems Corporation, VA Linux Systems Japan KK, SCSK SYSTEM MANAGEMENT CORPORATION, SDC Corporation, Skeed Co., Ltd., TOKYO GREEN SYSTEMS CORPORATION, Gran Manibus Co., Ltd.

Overseas: SCSK USA Inc., SCSK Europe Ltd. (London), SCSK Shanghai Limited, SCSK Asia Pacific Pte. Ltd. (Singapore), PT SCSK Global Indonesia, SCSK Myanmar Ltd.
SCSK data center locations

- Domestic Operation Bases (As of January 2022)
  - Urban 5 Data Centers (Kanto 4, Kansai 1)
  - Suburban 4 Data Centers (Kanto 2, Kansai 2)

- Suburban data center “netX DC Chiba Center 3 (SI3)” to be completed in Inzai City, Chiba Prefecture in spring 2022 (third location in Inzai City)
  ※With the completion of netX DC Chiba Center 3 (SI3), SCSK’s total data center floor space will be approximately 95,000m², making it one of the largest data centers in Japan.

7 locations 10 Centers nationwide  Total floor space: approximately 95,000m²

Scenario analysis: Target business

- We made the “data center business”, which is part of the IT management business, the target of the scenario analysis

- The data center business accounts for approximately 80%(*1) of SCSK group’s GHG emissions, and is considered to be significantly affected by climate change (e.g., by carbon taxes and environmental regulations)

  *1 Percentage of emissions from the data center business of the total GHG emission amounts targeted in Scope 1 + 2

Business portfolio

- IT Platform
- Other
- IT Management
- IT Solutions
- Financial IT

- IT Platform: 396.9 B JPY*1 (March 2021 period)
- Other: 14.7%
- IT Management: 33.2%
- IT Solutions: 13.3%
- Financial IT: 13.8%
- Industrial IT: 20.9%
- Other: 4.1%

- Business domain: IT Management
- Products handled: Provides services such as DC facility services and around-the-clock/year-round operation services
- Direction for consideration: Increasing green DC sales, Increasing resilient DC sales
### Risk significance level evaluation (1)

For each evaluation item, we identified risks and opportunities from the perspective of their impact on DC-related business and listed in blue the risks/opportunities that impact SCSK’s DC-related business.

<table>
<thead>
<tr>
<th>Evaluation Item</th>
<th>Risks</th>
<th>Impact</th>
</tr>
</thead>
</table>
| **Carbon Price** | ➢ DC operation costs increase due to introduction of a carbon tax  
➢ Carbon taxes vary by country, so this could lead to cost fluctuations if the business is being operated globally | ➢ There is increased demand for cloud services due to increased demand for IT services which contribute to reducing GHG emissions |
| **Carbon emission targets/policies of each country** | ➢ Costs increase for measures such as renewable energy/energy-efficient facilities and purchasing green electricity | ➢ Measures against climate change are called for, and there is increased demand for DCS that use renewable energy or are energy-efficient |
| **Energy-saving measures** | ➢ Costs increase for responses in SCSK’s facilities to address tightening energy efficiency regulations | ➢ SCSK can build a competitive advantage by acting preemptively to introduce standards and rules for decarbonization leveraging new technologies |
| **Changes in important products** | ➢ The price of semiconductors rises due to increased demand from the spread of EVs, etc.  
➢ If the unit cost of electricity is raised to curb electricity demand, electricity costs will increase | ➢ Demand for processing/storing large amounts of data increases due to increased communication volume from the spread of SmartX(*2)  
➢ Demand emerges for peripheral services for utilizing big data stored in DCS |
| **Introduction of next-generation technology** | ➢ Costs increase due to the introduction of new decarbonization technologies | ➢ There is potential for obtaining and retaining customers by acting ahead of other companies to address ICT energy efficiency standards |

---

*1 DC is the abbreviation for “data center”  
*2 “SmartX” is the collective term for next-generation technologies, such as smart cities, smart cars, smart homes, and smart machines, which integrate the IoT and AI.
## Evaluation Items

<table>
<thead>
<tr>
<th>Evaluation Items</th>
<th>Risks</th>
<th>Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changes in customer awareness</td>
<td>Sales decline as customers become more environmentally aware and avoid using DCs with poor environmental performance</td>
<td>Demand for decarbonized DCs increases in response to increased awareness of decarbonization and environmental friendliness</td>
</tr>
<tr>
<td>Changes in investor's reputation awareness</td>
<td>ESG investment ratings may drop and stock prices may fall if SCSK's information disclosure measures are inadequate</td>
<td>Business opportunities are created for new services that take customer needs for decarbonization and environmental friendliness into account</td>
</tr>
<tr>
<td>Increase in average temperature</td>
<td>Air conditioning costs and electricity consumption for air conditioning increase</td>
<td>Corporate value improves by utilizing/issuing green bonds</td>
</tr>
<tr>
<td>Changes in rainfall and weather patterns</td>
<td>Costs increase for addressing changes in building performance requirements</td>
<td>Extreme weather increases demand for DCs that are safe from disasters</td>
</tr>
<tr>
<td>Rising water level</td>
<td>There is new costs for flood control measures and relocation costs incurred by DCs located close to rivers</td>
<td>Increased demand for DCs due to usage of big data analysis, etc., for climate analysis</td>
</tr>
<tr>
<td>Increasing severity of extreme weather conditions</td>
<td>DC operation/recovery costs increase because of natural disasters</td>
<td>Demand increases for highly DCs with high resilience</td>
</tr>
<tr>
<td></td>
<td>Risk of DC facility shutdowns increases due to power supply disruptions caused by natural disasters, etc.</td>
<td>Demand increases for shift to DC use from on-premise data management from the perspective of damage prevention and business continuity</td>
</tr>
</tbody>
</table>

### Scenario group definition (Selected scenarios)

Define society in 2030 and 2050 using 1.5°C and 4°C scenarios

#### Definition of 2.7~4°C scenarios

- **4°C scenario**: 3.2~5.4°C higher than pre-industrial Revolution levels if no additional measures against global warming are taken
- **Over 2°C(2.7°C~4°C) scenario**: 2.7~4.0°C higher than pre-industrial Revolution levels if no additional measures against global warming are taken

#### 1.5°C scenario

- We are highly likely to achieve an increase of less than 1.5°C compared to pre-industrial Revolution levels if a radical transition to a new system is made
Definition of scenario groups

4°C world: Business opportunities for resilient DCs increase due to increasingly severe natural disasters ("(1)" in the diagram below); meanwhile, physical risks from extreme weather and costs for addressing them increase due to SCSK’s possession of DCs ("(2)"

- **Investors**
  - ESG investment proceeds as usual
  - No special actions taken toward companies with inadequate environmental measures

- **Japanese government**
  - Promotion of disaster prevention / BCP measures
  - Expansion of compensation programs for damage from rising sea levels
  - Carbon tax and promotion of renewable energy are not promoted

**Markets**

**Measures against extreme weather**

- **SCSK**
  - Operations are suspended due to extreme weather, sales decrease, and costs for recovery/insurance premiums increase
  - Relocation costs may be incurred due to physical risks for DCs in coastal areas
  - Air conditioning costs increase due to rising temperatures

- **Japanese government**
  - Substitute products / new entry

- **Electricity prices**
  - Shift in line with current trends
  - Use of renewable energy does not advance, and prices shift in line with current trends

- **Customers**
  - Demand increases for resilient DCs due to increasingly extreme weather
  - Data sharing

**Major IT companies**

- Measures against extreme weather may increase demand toward companies that operate DCs globally

- Customers make purchasing decisions based on resilience and BCP measures

- Customers
  - BCP measures being in place / their quality become a top criteria for selecting DC services
  - Resilience of DC facilities is called for

**Definition of scenario groups**

1.5°C world: There is transformative promotion of climate change policies and other measures based on global consensus ("(1)" in the diagram below); meanwhile, environmental performance becomes a top criteria for customers in selecting services, as well ("(2)"

- **Investors**
  - Investment in decarbonized DC businesses accelerates, while investment in traditional DC businesses slows down

- **Japanese government**
  - Introduction of a carbon tax with a high tax rate
  - Regulations on the use of fossil fuels
  - Promotion of smart city expansion policies

**Markets**

**Measures toward a decarbonized society**

- **SCSK**
  - Development accelerates for decarbonized DCs leveraging renewable energy resources, etc.
  - Air conditioning equipment development progresses, and cooling functions improve radically

- **Major IT companies**
  - Expanded provision of DCs with high energy efficiency rates that leverage the cloud and decarbonization technologies
  - Customers make purchasing decisions based on CO2 emissions and energy efficiency rates

- **Customers**
  - DC demand increases due to increased data traffic
  - Carbon emissions and environmental friendliness become guidelines for DC selection criteria

- **Rising electricity prices**
  - Renewable energy utilization rate remains at a relatively high level, and electricity prices rise

- **Rising carbon prices**
  - The cost for SCSK’s carbon emissions rises along with rising carbon taxes

- **Increased data traffic**
  - Demand for technologies related to conserving energy increases and smart cities, etc., spread, resulting in increased data traffic
We foresee increased air condition costs due to rising average temperatures, costs incurred to address natural disasters, and increased demand for resilient DCs due to increasingly severe natural disasters.

### 4°C scenario  Resilient business model

<table>
<thead>
<tr>
<th>Impact item</th>
<th>Level of impact on revenue (*1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased demand for resilient DCs</td>
<td>++</td>
</tr>
<tr>
<td>Increased DC demand due to larger data traffic and data processing volume</td>
<td>+</td>
</tr>
<tr>
<td>Fluctuations in electricity prices</td>
<td>-</td>
</tr>
<tr>
<td>Rising electricity consumption (air conditioning costs)</td>
<td>-</td>
</tr>
<tr>
<td>Rising costs for addressing physical risks</td>
<td>-</td>
</tr>
</tbody>
</table>

### 1.5°C scenario  Sustainable business model

<table>
<thead>
<tr>
<th>Impact item</th>
<th>Level of impact on revenue (*1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased demand for decarbonized DCs and new services that take changes in the social environment into account</td>
<td>++</td>
</tr>
<tr>
<td>Increased demand for DCs due to larger data traffic / data processing volume</td>
<td>+</td>
</tr>
<tr>
<td>Fluctuation in electricity prices</td>
<td>-</td>
</tr>
<tr>
<td>Higher carbon taxes</td>
<td>(−−)</td>
</tr>
</tbody>
</table>

---

*1 The impact of the major business impact items in each scenario on earnings is indicated by “+/-”. Evaluated on a relative basis by three levels.

*2 New construction and operation costs for resilient DCs are not included in the estimate this time. The cost impact could be significant depending on the assumed scenario.

*3 Based on reports from the IEA, etc., electricity prices in the 4°C scenario are assumed to increase in 2030, but decrease in 2050.

*4 We assume that we can mitigate the impact of increased costs due to higher carbon taxes by reducing GHG emissions.
We can increase the resilience of business activities by identifying risks and opportunities in each scenario, and continuously considering initiatives to avoid/mitigate risks and initiatives to increase the probability of realizing opportunities. 

### Definition of countermeasures

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Direction of initiatives</th>
<th>Perspective of countermeasures</th>
<th>Example countermeasures</th>
</tr>
</thead>
</table>
| **4ºC scenario**<br>Resilient business model | New service creation | Establishment of resilient DCs | - Building of new DCs designed to withstand severe disasters  
- Selection of DC sites taking into account the impact of natural disasters  
- Mutual backup between DCs |
| Common to both scenarios | Conversion to efficient energy use | Curbing of electricity costs  
Curbing of electricity use | - Procurement of electricity generated at low cost using midnight power services and new technologies  
- Control of air conditioning using the IoT or AI, etc., or new technologies  
- Urban development that utilizes DC waste heat / deployment to other business areas |
| **1.5ºC scenario**<br>Sustainable business model | New service creation | Efficient use of DC waste heat | - Virtual PPAs from purchasing renewable energy certification  
- Direct purchase of electricity from renewable energy sources (PPAs)  
- Establishment/acquisition of renewable energy power plants  
- Create new services that take changes in legal systems and the social environment into account |

### Other Sector

- **Practice Case①**: YASKAWA Electric Corporation (Electronic Equipment)
- **Practice Case②**: SCSK Corporation (Information Technology)
- **Practice Case③**: ASKUL Corporation (Retailing)
### Business risks/opportunities related to transition risks

<table>
<thead>
<tr>
<th>Subcategory</th>
<th>Parameter</th>
<th>Study: risks</th>
<th>Study: opportunities</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon pricing</td>
<td>Decreased Expenditures</td>
<td>The application of carbon pricing will increase costs such as operating costs for logistics facilities/offices and costs of fuel used in deliveries</td>
<td>Operating costs and fuel costs will decrease due to investments made toward increased environmental performance. The company may also be eligible for public support or tax relief</td>
<td>High</td>
</tr>
<tr>
<td>ASKUL's carbon emission targets/goVERNMENT policies</td>
<td>Decreased Expenditures</td>
<td>Tighter greenhouse gas reduction obligations will increase costs for improving the environmental performance of logistics facilities, delivery vehicles, and so on. ASKUL will need to purchase emissions credits if carbon emissions cannot be reduced. The cost for procuring timber will increase due to government policies/aggregating taxes related to forests being used as solutions for absorbing carbon, resulting in increased acquisition cost for copier paper (ASKUL's key products) and other items</td>
<td>If significant reductions in carbon emissions are achieved, the company may be able to sell emission credits if a system such as emissions trading is introduced</td>
<td>Medium</td>
</tr>
<tr>
<td>Shifts in energy prices</td>
<td>Decreased Expenditures</td>
<td>Rising fossil fuel and electricity prices will increase costs such as operating costs for logistics facilities and costs of fuel used in deliveries</td>
<td>--</td>
<td>High</td>
</tr>
<tr>
<td>Increases/decreases for main products</td>
<td>Decreased Expenditures</td>
<td>Progress toward a paperless society is made due to the influence of de-carbonization, resulting in declining sales from reduced demand for copier paper, stationery, and other related office supplies. ASKUL is forced to use materials sourced from renewable resources and bio-based plastics, resulting in increased costs due to the use of alternative materials</td>
<td>There will be increased demand for environmentally friendly products such as ethical consumption goods/services, including low-carbon/decarbonized products and packaging. There will be increasing momentum towards a circular economy across all of society, which combined to increased business opportunities through various collection services.</td>
<td>High</td>
</tr>
<tr>
<td>Spread of low carbon technologies</td>
<td>Decreased Expenditures</td>
<td>Costs increase due to the introduction of environmentally friendly vehicles and high-efficiency low carbon technologies/equipment</td>
<td>Lower fuel costs and other delivery-related costs due to improved fuel efficiency of environmentally friendly vehicles. Lower energy costs through introducing more efficient logistics and energy-saving equipment</td>
<td>High</td>
</tr>
<tr>
<td>Changes in reputation with customers</td>
<td>Decreased Expenditures</td>
<td>There is an increased risk to ASKUL’s reputation if it fails to respond appropriately to the growing public awareness of climate change.</td>
<td>There will be more opportunities to improve the company’s reputation if it responds appropriately to growing public awareness of climate change</td>
<td>High</td>
</tr>
<tr>
<td>Changes in reputation with investors</td>
<td>Decreased Expenditures</td>
<td>If investors perceive ASKUL as being reluctant to take environmental action, it will be more difficult to procure funds, and financing costs will increase</td>
<td>It will be easier to procure funds from ESG investors, etc., and financing costs will decrease if the company gains a reputation with investors of being proactive in its environmental measures as a result of shifting its business to low carbon/environmentally friendly practices and communicating this shift effectively</td>
<td>Low</td>
</tr>
</tbody>
</table>

---

### Business risks/opportunities related to physical risks

<table>
<thead>
<tr>
<th>Subcategory</th>
<th>Parameter</th>
<th>Study: risks</th>
<th>Study: opportunities</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased average temperatures</td>
<td>Increased Expenditures</td>
<td>Increased costs for energy needed for air conditioning/refrigeration in logistics facilities and delivery vehicles</td>
<td>--</td>
<td>High</td>
</tr>
<tr>
<td>Changes in precipitation/weather patterns</td>
<td>Increased Expenditures</td>
<td>There will be more delivery delays and accidents due to increased rainfall/strong winds, resulting in increased costs from paying delivery fees/personal costs/insurance. The cost for procuring timber will increase due to changes in flora and timber sourcing areas, resulting in increased acquisition cost for ASKUL’s copier paper (key products) and other items.</td>
<td>By increasing the resilience of its business by diversifying its portfolio in respect to supplier countries/trees species and strengthening its supply chains, the company will be able to avoid a decline in sales for timber-based products such as copier paper</td>
<td>High</td>
</tr>
<tr>
<td>Elevated sea levels</td>
<td>Increased Expenditures</td>
<td>Relocation costs will arise from the need to re-consider the location of sites over the medium-to-long term due to increased risk of flooding from storm surges/tidal waves</td>
<td>Supply chains can be maintained by addressing the impact of increasing sea levels on deliveries and logistics centers</td>
<td>Low</td>
</tr>
<tr>
<td>Extreme weather conditions</td>
<td>Increased Expenditures</td>
<td>There will be more delivery delays and accidents due to increased rainfall/strong winds, resulting in increased costs from paying delivery fees/personal costs/insurance. There will be a decrease in asset values for logistics centers/offices at high risk of flooding, and insurance premiums for these will increase. The cost for procuring timber will increase due to plants ceasing operations and a decrease in forest resources, resulting in increased acquisition cost for ASKUL’s main products (copier paper and similar products). Capital investments made for resilience due to extreme weather conditions</td>
<td>By increasing the resilience of its business through diversifying its portfolio in respect to supplier countries/trees species and strengthening its supply chains, the company will be able to avoid a decline in sales for timber-based products such as copier paper. Supply chains can be maintained by addressing the impact of extreme weather conditions on deliveries and logistics centers</td>
<td>High</td>
</tr>
</tbody>
</table>
[Step 3: Scenario group definition]
We investigate society in 2030 using two scenarios for climate change with a high degree of uncertainty

[Projected average global surface temperature change] (compared with the average from 1986-2005)

2030

<Timeframe for this analysis>

As stated in the following pages, the physical risks from climate change itself are limited due to this being only 10 years in the future

(Source) AR5 SYR: Table SPM.6

[Step 3: Scenario group definition]
Definition of each worldview based on scientific evidence from IEA, etc.

<table>
<thead>
<tr>
<th>Key items</th>
<th>Assumed parameters</th>
<th>Currently</th>
<th>2030</th>
<th>4°C</th>
<th>2°C</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon pricing</td>
<td>Carbon tax</td>
<td>(Not implemented)</td>
<td>—</td>
<td>100 USD/CO2</td>
<td>IEA WEO2020</td>
<td></td>
</tr>
<tr>
<td>Shifts in energy prices</td>
<td>Oil price</td>
<td>63 USD/barrel</td>
<td>76 USD/barrel</td>
<td>52 USD/barrel</td>
<td>IEA WEO2020</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Electricity price</td>
<td>216 USD/MWh</td>
<td>209 USD/MWh</td>
<td>231 USD/MWh</td>
<td>IEA WEO2018</td>
<td></td>
</tr>
<tr>
<td>Increase/decrease in staple commodities</td>
<td>Recycled plastic usage rate</td>
<td>—</td>
<td>—</td>
<td>14%</td>
<td>We hypothesize that this will reach a level similar to European plastic strategies</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sales for certified sustainable products</td>
<td>125.4 billion USD</td>
<td>183.4 billion USD</td>
<td>198.1 billion USD</td>
<td>Nielsen: “Product Insider”</td>
<td></td>
</tr>
<tr>
<td>Spread of low carbon technologies</td>
<td>EV penetration rate</td>
<td>0.3%</td>
<td>5%</td>
<td>39%</td>
<td>Global Calculator</td>
<td></td>
</tr>
<tr>
<td>Increased average temperatures</td>
<td>Increased temperatures</td>
<td>—</td>
<td>Increase of 1.1 °C</td>
<td>Increase of 1.0 °C</td>
<td>World Bank: “Climate Change Knowledge Portal”</td>
<td></td>
</tr>
<tr>
<td>Extreme weather conditions</td>
<td>Flood frequency (Japan)</td>
<td>—</td>
<td>4x</td>
<td>2x</td>
<td>“A proposal for flood planning based on climate change”</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flood damage costs (Indonesia)</td>
<td>404.6 million USD/year</td>
<td>875.3 million USD/year</td>
<td>404.6 million USD/year</td>
<td>WRI: “The Aqueduct Global Flood analyzer”</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Forest area reduction targets (Indonesia)</td>
<td>450ha/year</td>
<td>325ha/year</td>
<td>Slicker than in the 4°C scenario, Peatland restrictions on artificial forests introduced</td>
<td>“First Nationally Determined Contribution REPUBLIC of INDONESIA”</td>
<td></td>
</tr>
<tr>
<td>Extreme weather conditions</td>
<td>Flood damage costs (Indonesia)</td>
<td>404.6 million USD/year</td>
<td>875.3 million USD/year</td>
<td>404.6 million USD/year</td>
<td>WRI: “The Aqueduct Global Flood analyzer”</td>
<td></td>
</tr>
</tbody>
</table>
[Step 3: Scenario group definition (visual representation of a future society)]

The 4°C (2.7°C+) world: Government policies do not move forward, and physical risk increases

**Procurement**
- **Energy**
  - Gasoline prices soar as energy-saving initiatives fail to spread.

**Storage/transport**
- **Facilities/delivery vehicles (extreme weather)**
  - Increased damage to supplier plants/ASKUL facilities/deliveries due to flooding, etc.

**Product use/collection**
- **Product sales/use**
  - While not as much as in the 2°C scenario, ethical consumption increases, and demand for sustainable products increases along with it.

**Copier paper (Indonesia)**
- Paper plant operations cease due to flooding, resulting in a halt in copier paper shipping.

**Key materials**
- (The risk for forest fires remains the same as it is currently)

---

[Step 3: Scenario group definition (visual representation of a future society)]

The 2°C world: Low-carbon initiatives move forward, and there is increased demand for sustainable and energy-efficient products

**Procurement**
- **Energy**
  - Use of renewable energy expands, resulting in increased energy costs.

**Storage/transport**
- **Facilities/delivery vehicles**
  - (While not as much as in the 4°C scenario) an increase in extremely hot days result in increased energy demand.

**Product use/collection**
- **Product sales/use**
  - Increased demand for sustainability-certified and energy-efficient products due in part to support from the government.

**Plastic products**
- **Product prices increase** due to regulations on recycled plastic.

**Copier paper (Indonesia)**
- Reduced supply due to stricter forest protection regulations.

**Key materials**
- (The risk for forest fires remains the same as it is currently)

---

**Regulations tighten and the logging tax is raised in order to protect national forests.**

**Japanese government**

**Indonesian government**

**Support initiatives are implemented**
- Sustainable product certification
- Investment in energy-saving technologies
- Support for introducing ZEVs/energy-efficient equipment

**Regulations are tightened**
- Increased carbon taxes
- Activation of systems such as emissions credit trading
- Recycling plastic regulations, etc.
[Step 4: Business impact evaluation]

In the 4°C (2.7°C+) scenario, it will be important to take measures against flood damage and seize opportunities for increased product demand.

Increase/decrease in expenses

Increase/decrease in revenue

100 million yen

Operating profits (30)
Electricity prices
Oil prices
Procurement of ZEV vehicles
Carbon tax
Increase in raw material costs for plastic products
Increase in raw material costs for copper paper
Increased temperatures
Flood damage costs (Japan)
Flood damage costs (Indonesia)
Operating profits (change in expenses only)
Profit from 4°C scenario (countermeasures not taken into account)

[Step 4: Business impact evaluation]

In the 2°C scenario, it will be important to seize opportunities for increased product demand in addition to taking measures against carbon taxes/increases in raw material costs.

Increase/decrease in expenses

Increase/decrease in revenue

100 million yen

Operating profits (30)
Electricity prices
Oil prices
Procurement of ZEV vehicles
Increase in raw material costs for plastic products
Increase in raw material costs for copper paper
Increased temperatures
Flood damage costs (Japan)
Flood damage costs (Indonesia)
Operating profits (change in expenses only)
Profit from 2°C scenario (countermeasures not taken into account)
[Step 5: Definition of countermeasures]
Although existing response policies such as those in the medium-term management plan already include some countermeasures, we will continue developing countermeasures that are even more robust while referring to initiatives taken by leading companies.

<table>
<thead>
<tr>
<th>Item</th>
<th>Perspectives for approaching risk countermeasures</th>
<th>Category</th>
<th>Response policy</th>
<th>Risk countermeasures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon pricing</td>
<td>✓ Reduce CO₂ emissions from logistics facilities, vehicles, etc.</td>
<td>Adapted</td>
<td>RE100 EV100</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>✓ Reduce utility costs for cooling, etc. by introducing automation to increase unmanned operations in logistics facilities</td>
<td>Adapted</td>
<td>Medium-term management plan</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>✓ Reduce fuel consumption throughout the entire supply chain by achieving efficient transportation and delivery of products</td>
<td>Adapted</td>
<td>Medium-term management plan</td>
<td>✓</td>
</tr>
<tr>
<td>Product raw material costs</td>
<td>✓ Investigate sustainable sources/procurement methods for copier paper</td>
<td>Established</td>
<td>Medium-term management plan</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>✓ Avoid the impact of increased costs from pushes toward using recycled plastics</td>
<td>Adapted</td>
<td>Medium-term management plan</td>
<td>✓</td>
</tr>
<tr>
<td>Extreme weather conditions (flooding)</td>
<td>✓ Establish redundancy against flooding risk</td>
<td>Adapted</td>
<td>Risk management plan</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>✓ Establish measures to reduce the duration of shut downs in the event of a disaster</td>
<td>Adapted</td>
<td>Risk management plan</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>✓ Establish countermeasures against increased disaster risks for suppliers</td>
<td>Retained</td>
<td>Risk management plan</td>
<td>✓</td>
</tr>
</tbody>
</table>

[Step 5: Definition of countermeasures]
Although existing response policies such as those in the medium-term management plan already include some countermeasures, we will work proactively to take advantage of business opportunities with solutions for individual risks.

<table>
<thead>
<tr>
<th>Item</th>
<th>Perspectives for approaching risk countermeasures</th>
<th>Category</th>
<th>Response policy</th>
<th>Measures for taking advantage of opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable products/circular economy</td>
<td>✓ Formulate strategies for what kinds of products to make into sustainable products, and in what ways</td>
<td>Adapted</td>
<td>Medium-term management plan</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>✓ Achieve a circular economy utilizing ASKUL’s supply chain</td>
<td>Established</td>
<td>Medium-term management plan</td>
<td>✓</td>
</tr>
<tr>
<td>Increased average temperatures</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extreme weather conditions (flooding)</td>
<td>✓ Respond to increased demand for products corresponding with increasing temperatures and increasing disaster awareness</td>
<td>Adapted</td>
<td>Medium-term management plan</td>
<td>✓</td>
</tr>
</tbody>
</table>
[Disclosure process]
We expect to make a disclosure of ASKUL’s scenario analysis using the following three processes:
1. Identify the substantial risks for each scenario
2. Clearly state that the efforts concerning countermeasures have been initiated in conjunction with medium- to long-term strategies
3. Provide specific examples of how opportunities (particularly those for high-impact key products) are proactively utilized to create value

3-189

3-190
[Disclosure process]
We expect to make a disclosure of ASKUL’s scenario analysis using the following three processes:
1. Identify the substantial risks for each scenario
2. Clearly state that efforts concerning countermeasures have been initiated in conjunction with medium- to long-term strategies
3. Provide specific examples of how opportunities (particularly those for high-impact key products) are proactively utilized to create value

![Diagram of recycling system]

*FY2020 demonstration project for establishing a recycling system for plastics and other resources to support a decarbonized society* (Establishing a new "resource recycling value chain" that extends from collecting clear file folders to creating new products)