4. Scenario Analysis Example Disclosure (Domestic and Overseas)

4-1 Domestic Disclosure Examples
4-2 Overseas Disclosure Examples

Chapter 4. Scenario Analysis Example Disclosure (Domestic and Overseas)

Provide examples of national and international disclosures on scenario analysis based on the latest findings.

Industry classification in each case is based on TCFD endorsement information.
4. Scenario Analysis Example Disclosure (Domestic and Overseas)

4-1 Domestic Disclosure Examples

4-2 Overseas Disclosure Examples

Chapter 4. Scenario Analysis Example Disclosure (Domestic and Overseas)
Provide examples of national and international disclosures on scenario analysis based on the latest findings.

Examples of domestic and overseas scenario analysis: domestic list by sector (1/2)
For the 3 steps that differs greatly by sector, 28 domestic and 15 overseas (total of 43) examples of scenario analysis is introduced

<table>
<thead>
<tr>
<th>Sector</th>
<th>Company Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial</td>
<td>Sompo Holdings, Inc.</td>
</tr>
<tr>
<td></td>
<td>Dai-ichi Life Holdings, Inc.</td>
</tr>
<tr>
<td></td>
<td>The Norinchukin Bank</td>
</tr>
<tr>
<td></td>
<td>Mizuho Financial Group, Inc.</td>
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<td></td>
<td>J-POWER</td>
</tr>
<tr>
<td></td>
<td>The Chugoku Electric Power Company, Inc.</td>
</tr>
<tr>
<td>Transportation</td>
<td>Mitsui O.S.K. Lines, Ltd.</td>
</tr>
<tr>
<td></td>
<td>East Japan Railway Company</td>
</tr>
<tr>
<td>Materials, Building</td>
<td>KH Neochem Co., Ltd.</td>
</tr>
<tr>
<td></td>
<td>JFE Holdings, Inc.</td>
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<tr>
<td></td>
<td>TODA CORPORATION</td>
</tr>
<tr>
<td></td>
<td>LIXIL Corporation</td>
</tr>
<tr>
<td>Agriculture, Food, and Forest Products</td>
<td>Kameda Seika Co., Ltd.</td>
</tr>
<tr>
<td></td>
<td>Kirin Holdings Company, Limited</td>
</tr>
<tr>
<td></td>
<td>FUJI OIL HOLDINGS INC.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>STEP3. Identify and define range of scenarios</strong></th>
<th><strong>STEP4. Evaluate business impacts</strong></th>
<th><strong>STEP5. Identify potential responses</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1 Pick the scenarios</td>
<td>Step 1 Sort out the financial items</td>
<td>Step 1 Understand the current measures</td>
</tr>
<tr>
<td>Step 2 Obtain information on the future</td>
<td>Step 2 Consider formulas, and</td>
<td>Step 2 Consider future measures</td>
</tr>
<tr>
<td>Step 3 Sort out the future world view</td>
<td>calculate Gap with the current</td>
<td>Step 3 Consider specific actions</td>
</tr>
<tr>
<td></td>
<td>situation</td>
<td></td>
</tr>
</tbody>
</table>
### Examples of domestic and oversea scenario analysis: domestic list by sector (2/2)

<table>
<thead>
<tr>
<th>Sector</th>
<th>Company Name</th>
<th>STEP3. Identify and define range of scenarios</th>
<th>STEP4. Evaluate business impacts</th>
<th>STEP5. Identify potential responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trading, Retail</td>
<td>J. Front Retailing Co., Ltd.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Isetan Mitsukoshi Holdings Ltd.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Mitsubishi Corporation</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Electricity,</td>
<td>NTT DATA Corporation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machinery,</td>
<td>Ebara Corporation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td>Seiko Epson Corporation</td>
<td><em>Securities Report</em></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>NEC Corporation</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Panasonic Holdings Corporation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumer</td>
<td>Shiseido Company, Limited</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discretionary,</td>
<td>SEKISUI CHEMICAL CO., LTD.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Pharmaceutical,</td>
<td>Nichirei Corporation</td>
<td></td>
<td></td>
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<tr>
<td>or Food</td>
<td>Members Co., Ltd.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recruit Holdings Co., Ltd.</td>
<td><em>Securities Report</em></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Examples of domestic and oversea scenario analysis: Overseas list by sector

<table>
<thead>
<tr>
<th>Sector</th>
<th>Company Name</th>
<th>STEP3. Identify and define range of scenarios</th>
<th>STEP4. Evaluate business impacts</th>
<th>STEP5. Identify potential responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>NRG Energy Inc (US)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Shell plc (UK)</td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>Woodside Energy Limited (Australia)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation</td>
<td>Canadian National Railway (Canada)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>FirstGroup plc (UK)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ford Motor Company (US)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Materials, Buildings</td>
<td>The Dow Chemical Company (US)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Freeport-McMoRan Inc (US)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Newmont Corporation (US)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture, Food,</td>
<td>J Sainsbury Plc (UK)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>and Forest Products</td>
<td>Mondi Group (UK)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricity,</td>
<td>Eaton Corporation plc (US)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machinery,</td>
<td>Schneider Electric SE (France)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td>Burberry Group PLC (UK)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unilever plc (UK)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Legend for upper right tag in p.4-5~4-77:  
- ✓: STEPs numbers not listed in this practice guide.  
- ✗: STEPs numbers listed but not on the page.  
- ✗: STEPs numbers introduced on the relevant page.
Discloses quantitatively the impact that “policy risk” and “technological opportunities” has on the current asset management portfolio

The impact of risks and opportunities on assets held (Domestic stocks, domestic corporate bonds, foreign stocks, foreign corporate bonds) is disclosed by scenario

Described the method in which the impact of each risks and opportunities were calculated

- **Policy risk** : The cost needed to achieve the GHG reduction target is calculated by Scope 1,2,3 in steps
- **Technological opportunity** : A numerical calculation of the potential business opportunities created by companies' environmental procurement technologies in the context of the transition to a low-carbon economy
- **Transition risk and opportunities** : Sum of policy risk and technology opportunities

Based on scenario analysis, initiatives to improve resilience are described

- **Review of the asset management portfolio**
  - Reduce GHG emissions of the asset management portfolio by 25% by 2025 compared to FY 2019 levels
- **Review of underwriting of insurance contracts**
- **Development and provision of climate risk consulting services**
- **Responding to the company's reduction targets and roadmap**
  - By 2040, 80% reduction from FY 2017 levels
Quantitative disclosure of business impact in the life insurance business. Past results and external literature are also included as the basis for estimation.

In the business impact assessment, the basis for and results of the estimates are clearly stated.

There is still no internationally established method for analyzing and quantifying the impact of climate change on the life insurance business, but we recognize that each company is conducting research and analysis through the process of trial and error. The Group has begun statistically analyzing the correlation between Dai-ichi Life’s past performance and future climate, using various published papers as reference. We will work to understand the risks for the entire Group while also considering investigating various disease outbreaks, approaches from a medical perspective, and impact studies of overseas Group companies.

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Analysis of policy risk and opportunity and physical risk is conducted using CVaR, and the impact in each scenario is quantitatively presented in terms of "impact amount / subject asset amount. Other analyses using global warming coefficients are also conducted.

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Other analysis was conducted using a global warming potential, which evaluates the level of GHG emissions of the target company that would result in global warming.
Four unique scenarios were developed by referencing multiple external scenarios for each analysis target

- Scenarios are divided into two axes, "2°C" and "4°C," and "Dynamic" and "Static," and illustrated in four quadrants
- The external scenarios referred to for each analysis are also clearly indicated

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**Quantitative disclosure of the analysis results for each scenario for transition risk and physical risk, with detailed description of the analysis steps**

- **Quantitative analysis by sector**
- **The impact of transition risk on the credit portfolio is described as limited**

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**Limited impact of physical risk on the credit portfolio**

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**Physical Risk (Acute Risk) Analysis Results**

The accumulated total is expected to increase by about ¥5 billion in credit costs by 2060 if the impact of acute risks is summed up, resulting in limited impacts to the Bank’s credit portfolio.
**Domestic Disclosure Examples: The Norinchukin Bank (Financial, 3/5)**

Quantitative analysis of the impact of physical risks on the income of rice, milk, and beef cattle producers in the agricultural sector, separately for cases where measures were taken to deal with rising temperatures and for cases where no measures were taken.

- Conducted a scenario analysis of chronic risks to the agricultural sector that may have an impact on business continuity. **Quantitative analysis of the impact on producers’ income**, despite the lack of analytical methodology, insufficient data, and model complexity.

**Physical Risk (Chronic Risk) Scenario Analysis**

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Estimate the impact on production volume</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>We analyzed the change in production volume due to climate change, while also considering the potential impact on different factors caused by climate change.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 2</th>
<th>Estimate the impact on prices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>We estimated the increase in production prices due to variability in quality or other factors caused by climate change.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 3</th>
<th>Provisionally estimate the impact on revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>We estimated the increase in production revenue for producers considering the analysis in Steps 1 and 2.</td>
</tr>
</tbody>
</table>

**Methodology for Physical Risk (Chronic Risk) Scenario Analysis**

We implemented scenario analysis for chronic risks in the agricultural sector, which is vital to the Bank. The TGDR recommendations include the agricultural sector as an industry vulnerable to climate change. In the analysis, we conducted the scenario analysis because the climate change risk in the AIF industries is deemed to have a considerable impact on the business continuity of this sector. Meanwhile, as the demand analysis for the agricultural sector has numerous limits in the model represented by (1) lack of available methodologies, (2) data and information, and (3) several assumptions and factors, it is necessary to make the analysis in the scenario. In addition, the impact of the scenario analysis might be different from the actual impact on the agricultural industry because the analysis targets revenue, not income (i.e., the amount after deducting expenses, etc., from revenue).

- We selected rice cultivation and animal husbandry (Livestock, beef cattle), for which there are numerous cooperative farmers and high production volume, as agricultural target items. In this scenario, we estimated the impact of various climate change scenarios (e.g., temperature and precipitation change) and their impact on revenue for both production and income. We used the Norinchukin Bank’s scenario analysis to estimate the impact of climate change on agricultural activities (e.g., rice cultivation, beef cattle production). We also considered the impact on revenue for producers considering the analysis in Steps 1 and 2.

**Analysis Results for Rice Cultivation**

- **Impact on production volume**
  - Temperature rise of 2°C: The production volume nationwide would decrease by 24.9%, as world temperatures will exceed the suitable temperature range for rice cultivation almost across the entire country.
  - Temperature rise of 3°C: The production volume nationwide would increase by 3.9%, as the temperature will remain at a suitable temperature range for rice cultivation for warmer regions centering in the southern Japan.

- **Impact on prices**
  - Temperature rise of 2°C: The price of rice would increase by 1.4% due to decreased production volume and rice quality (percentage of first-class rice) deterioration. Temperature rise of 3°C: The price of rice would decrease by 1.4% due to increased production volume and lower storage costs.

**Impact on producers’ revenue (without adaptive measures)**

- For a temperature rise of 4°C, rice revenue associated with rice cultivation might decrease by 3.9% at the end of the 21st century compared with that at the end of the 20th century due to a decline in production and quality deterioration.

- We estimated the impact of climate change on rice cultivation for both production and income. We used the Norinchukin Bank’s scenario analysis to estimate the impact of climate change on agricultural activities (e.g., rice cultivation, beef cattle production). We also considered the impact on revenue for producers considering the analysis in Steps 1 and 2.

**Domestic Disclosure Examples: The Norinchukin Bank (Financial, 4/5)**

For transition risk, work on upgrading scenario analysis through expansion of target sectors and additional analysis of 1.5°C scenarios. Publish future projections for investments and loans considering climate change risks.

- Assuming the impact of transition risk and carbon neutrality in 2050, upgrading of scenario analysis is underway through expansion of target sectors and analysis using the 1.5°C scenario.

**Finance Balance for the Coal-Fired Thermal Power Plant Project**

*The Bank does not conduct any investment and/or financing for new coal-fired thermal power plants, in principle, except for cases to cope with emergency situations such as disasters.*

In accordance with the Policy on Environmental and Social Considerations in Financing and Investment Activities, The Bank aims to achieve a zero balance until around 2040 regarding financing for coal-fired thermal power plant projects.*
Domestic Disclosure Examples: The Norinchukin Bank (Financial, 5/5)

As a measure to expand opportunities, set a mid- to long-term target of 10 trillion yen in new sustainable finance in 2030, and promote integration of business strategies with environmental and social responses, including climate change.

Based on the impact of climate change on the agriculture, forestry, and fisheries industries, such as stranded assets in the portfolio and wind and flood damage, the plan describes investment and financing plans that lead to the development of the agriculture, forestry, and fisheries industries from an environmental and social perspective, on the premise of securing earnings through the acquisition of business opportunities.

The Norinchukin Bank
Sustainable Finance Goals
As a member of cooperative organizations supporting the industries, The Norinchukin Bank understands that our business is part of the life and natural environment sustained through these industries. We pursue sustainability management, including support for the SDGs, to solve environmental and social issues, pursuing sustainability in society (including the AIF industries) and our business activities.

In addition to credit decisions based on traditional finance risk, the Norinchukin Bank has adopted the ESG integration framework. We use this framework not only for internal controls but also as a tool to engage in dialogue with our business partners.


Domestic Disclosure Examples: Mizuho Financial Group, Inc. (Financial, 1/3)

Quantitative description of the world view for each sector and scenario

Specify the external scenarios referred to and describe the worldview in each scenario quantitatively and qualitatively for each project analyzed.

Refer to the NGFS scenarios and provide an overview of each scenario.

Quantitatively and qualitatively describe the worldview under each scenario for each business in the analysis.

DOMESTIC DISCLOSURE EXAMPLES: MIZUHO FINANCIAL GROUP, INC. (FINANCIAL, 2/3)

In the business impact assessment, credit costs are quantitatively analyzed for each scenario. Demonstrate resilience by stating that the financial impact is limited.

- **Quantitative description of financial impact due to risk, with credit cost estimates presented by scenario**
- **Limited financial impact also indicates that the company is resilient to risk**

<table>
<thead>
<tr>
<th>Scenario analysis:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network of Central Banks and Supervisors for Greening the Financial System (NGFS)²</td>
</tr>
<tr>
<td>Net Zero 2050 / Below 2°C / Delayed Transition / Current Policies scenarios</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analysis method</th>
</tr>
</thead>
<tbody>
<tr>
<td>We specify a parameter for evaluating the impact of risks and opportunities faced by clients in the sector subject to analysis. We then analyze changes in Mizuho’s credit costs by formulating an outlook for the impact on clients’ financial results, based on changes to the parameter under the scenario.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Targeted sectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric utilities, oil, gas, coal, steel, and automobile sectors (worldwide)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>2050</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Credit costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cumulative increase in the above sectors through 2050 (difference with Current Policies scenario)</td>
</tr>
<tr>
<td>Net Zero 2050: ¥1.2 trillion</td>
</tr>
<tr>
<td>Below 2°C: ¥60 billion</td>
</tr>
<tr>
<td>Delayed Transition: ¥1.1 trillion</td>
</tr>
</tbody>
</table>

- The increase in credit costs is the total through 2050, and the impact on the Mizuho group’s finances is limited.
- We confirmed the importance of moving forward a rapid and smooth transition (orderly transition) towards a low-carbon society.
- We will further enhance our engagement with clients to support their progress on responding to climate change in an orderly fashion.
- We will conduct scenario analysis accounting for clients’ transition plans and apply it to more in-depth engagement.


DOMESTIC DISCLOSURE EXAMPLES: MIZUHO FINANCIAL GROUP, INC. (FINANCIAL, 3/3)

Demonstrate resilience to climate change through engagement and providing solutions tailored to customer segments.

- Stated that Mizuho will **enhance the resilience of both clients and Mizuho** by providing engagement solutions.


**From TCFD Report (p.31)**

“By undertaking while considering clients’ sustainable growth, improved corporate value, and strengthened industrial competitiveness over the medium to long term, we will actively develop and provide financial products and services to support clients’ initiatives to transition to a low-carbon society.”
Conducted a multi-year scenario analysis (2030 and 2050). The 2030 scenario is generally consistent with the Japanese government’s NDC (national reduction target), and for 2050, the 1.5°C is the main scenario.

- In the 2050 scenario analysis, the APS scenario was selected as the main scenario and used the Japanese 2050 power configuration in the APS scenario for reference.
- For renewable energy and thermal power that are particularly impactful to the company, created an original scenario that changed the assumptions from the main scenario.

In the 2030 scenario analysis, the financial impacts of the thermal and renewable energy are quantified in the main/risk scenarios.

- Estimated the financial impact on thermal and renewable energy projects under the 2030 main scenario risk scenario.

For the impact on thermal power in the main scenario, the decrease in profit was estimated to be around 10 billion yen due to the decrease in sales volume.

In the risk scenario, the impact of the increase in cost due to the introduction of the carbon tax was estimated to be around 260 billion yen.

The assumptions are based on the world view for each scenario:
- The calculations were compliant toward NZE scenario world view.
- Carbon Price (developing countries): $130/tCO2 (The highest price out of the IEA WEO2021 2030 predicted price is used).
- Electricity price: 0~10 yen/kWh increase.

Quantified the financial impact of climate change risks and opportunities and stated that the business is resilient under both 1.5°C and 4°C scenarios.

- **Quantitative description of the financial impact of each risk/opportunity**
- **Highlighted the resilience of the business as being able to handle both scenarios**

The Chugoku Electric Power Company, Incorporated (Energy)

- Increase in costs in line with tightened regulations
- Lost revenue from a decrease in market competitiveness and the utilization rate of power generation using fossil fuels
- Drop in electricity sales due to increasing customer withdrawal
- Proactive adoption of hydro, solar, and wind power
- Use of nuclear power with safety as top priority
- Examination and utilization of advanced nuclear power technologies

Main financial impacts of climate-related risks and opportunities:

- Financial impact of increased power generation costs from non-fossil fuel usage certificates (Average price in the non-fossil fuel trading market in FY2022: 60 million yen = 100 million kWh)
- Financial impact on raw material costs in line with the launch of Shinagawa Unit 2 (figures from FY2021): 700 million yen = 1% utilization rate
- Financial impact on raw materials due to decreasing water flow rates (figures from FY2018): 300 million yen = 1% water flow rate

By working on measures that assume the main scenarios will come to fruition, we will be able to respond to both scenarios and engage in business with our resilience assured. While considering the uncertainties and risks surrounding technological development, we will anticipate multiple scenarios without limiting ourselves to specific initiatives, and move forward with our roadmap for carbon neutrality in 2050.


Mitsui O.S.K. Lines, Ltd. (Transport, 1/4)

Provides quantitative disclosure of its worldview in multiple scenarios in line with its business models and utilized the quantitative figures for impact analysis.

- **A quantitative and qualitative description of the worldview** provided under each scenario in line with the company's business model
- **The numerical numbers that were introduced to explain the worldview** were used as a parameter in the estimation of the business impact assessment

Offshore Wind Generation Capacity Outlook

<table>
<thead>
<tr>
<th>Year</th>
<th>Offshore wind power-related business</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>2.6°C 9.0</td>
</tr>
<tr>
<td>2030</td>
<td>2.6°C 17.0</td>
</tr>
<tr>
<td>2040</td>
<td>2.6°C 24.0</td>
</tr>
</tbody>
</table>

In the business impact assessment, the following factors are considered to have an impact on the business: (1) cargo movement change, (2) fuel costs, (3) carbon taxes, (4) introduction of alternative fuel vessels, and (5) new business opportunities. Quantitative impacts are illustrated by scenario using waterfall charts.

Based on the risk of cost increases, cost reduction through risk mitigation measures, and sales opportunities, it is stated quantitatively and in a narrative that the profit level in 2050 is resilient

- Carbon tax will be a major negative factor (~270 billion yen)
- Substantial reduction in carbon tax due to introduction of next-generation fuel vessels (+240 billion yen)
- Expanding new business opportunities in clean energy business areas (+300 billion yen)
- Efforts to pass on cost increases from the carbon tax (+110 billion yen)
- Take appropriate measures in the form of efficient operations and other new businesses

As a result of the scenario analysis, a substantial change to the investment policy has been made

An additional environmental investment of 360 billion yen has been decided for 2022-2024, with the investment breakdown being disclosed.
A transition path, along with five specific strategies to reduce GHG emissions were disclosed

- **Diagram of transition plan for achieving net zero in 2050 along with investment targets**

MDL has established an interim target of a 45% reduction in GHG emission intensity from transport by 2035 and indicated a specific pathway for achieving net zero GHG emissions by 2050. We have established five specific strategies for reducing GHG emissions, including the adoption of clean alternative fuels, enhancement of energy-saving technologies, and expanding decarbonization projects and have set a target of investing around 23B billion yen in the decarbonization field over the three years from 2022 to 2024 (reduction of our own GHG emissions: 335 billion yen; contribution to reduction of society’s GHG emissions: 995 billion yen).


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**Conducted scenario analysis using socioeconomic scenarios (SSP) for the transportation service business**

- **Quantitative analysis of the impact on passenger revenue is disclosed**

Quantitatively estimate the financial impact of river flooding using external information such as data on routes that are expected to be affected and maps of expected inundation zones published by the government and disclose the results of the estimates for each scenario.

- For the rivers selected for evaluation, the financial impact of inundation caused by the planned scale of rainfall is quantitatively evaluated.
- The estimation method is based on the value of assets of main lines, planned suspension of services due to the disaster, loss of passenger revenues according to the time required for restoration, and restoration costs of railroad assets such as stations and tracks.

**Domestic Disclosure Examples : East Japan Railway Company (Transportation, 2/2)**

The business impact assessment assumes the introduction of the carbon pricing and conducts a quantitative analysis with reference to the 2030 carbon price.

- quantitatively assessed certain risks and opportunities business impact as a financial burden in a decarbonized society
- Disclosed financial impact estimates based on carbon prices as of 2030
Domestic Disclosure Examples: JFE Holdings, Inc. (Materials, Building)

Upgrading of the scenario analysis is undertaken by expanding the scope to include a 1.5°C scenario in FY2022, since the project potentially has a significant impact on climate change.

- Analysis based on the International Energy Agency scenarios and assuming the introduction of a common carbon price for all major emitting countries.
- For long-term scenario analysis, risk assessment is conducted in considering the need for ultra-innovative technologies for the 1.5°C scenario (IPCC 1.5°C Special Report) as well as the achievement of the 2°C scenario in steel production.

Under the 1.5°C scenario, the analysis added the need for research and development to achieve carbon neutrality in 2050 and to speed up the implementation process.

Attention to steel processes is increased in order to reduce GHG emissions, primarily through the introduction of ultra-innovative technologies and decarbonization efforts. The promotion of government support and collaboration with society, including Transition Bonds and endorsement of the GX League Basic Concept, is underway.

Domestic Disclosure Examples: TODA CORPORATION (Materials, Building, 1/3)

While presenting a qualitative worldview, the key parameters used in the scenario analysis are also disclosed.

- Disclosed the qualitative worldview of the less than 2°C (1.5°C) and 4°C scenarios and the parameters used in the scenario analysis.
Illustrated the impact on the operating profit as a waterfall chart and reviews the scenario analysis annually

- Disclosed 2030 less than 2°C and 4°C scenario’s risk and opportunities effects on the operating profit as a waterfall chart
- Reviews the results of scenario analysis each year and integrates them with strategy

Financial Impact Assessment for 2030

Our assessment of the impact on operating income for fiscal 2030 shows that the increase in profits related to renewable energy is larger in the less-than 2°C (1.5°C) scenario than in the 4°C scenario, resulting in an increase in operating income. Our first assessment of the impact on operating income for the year 2030 was conducted in 2020. Since then, we have reviewed the results of our scenario analysis annually, but no significant changes have taken place in our assessment of the financial impact of our risks and opportunities, so the waterfall diagram on the right has remained unchanged. The results of the scenario analysis and financial impact assessment have been integrated into our strategy. (See p. 14)

Reflect climate risks and opportunities in strategic and financial planning. Developed and disclosed a roadmap for 2050 carbon neutrality

To address risks and opportunities, the Group developed a roadmap to become carbon neutral in 2050 and disclosed it newly this fiscal year. The roadmap consists of three phases:
- Maximize implementation of existing technologies and trial new technologies
- Promote and expand the adoption of low-carbon technologies and carbon-free energy
- Achieving carbon neutrality by 2050
For significant risks and opportunities, impacts are presented qualitatively, and calculations are provided.

- The impact on operating costs, the impact on damage to own plants, and the impact on demand for energy-saving products and services are partially calculated quantitatively as the financial impact for 2030.

<table>
<thead>
<tr>
<th>Risk/opportunity category</th>
<th>Risk/opportunity category</th>
<th>Impacted stage of value chain</th>
<th>Time horizon</th>
<th>Estimated financial impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Increased operating costs due to introduction of carbon taxes</td>
<td>Policy and Legal, Technology</td>
<td>Direct operations</td>
<td>Medium to long</td>
<td>No additional tax burden</td>
</tr>
<tr>
<td>2. Increased raw material and component procurement costs due to increased carbon emissions</td>
<td>Policy and Legal, Technology, Market</td>
<td>Direct operations, Upstream</td>
<td>Medium to long</td>
<td>Financial impact not calculated due to lack of parameters necessary for quantification</td>
</tr>
<tr>
<td>3. Loss of revenue opportunities due to damage to the company’s plants caused by typhoons, floods, etc.</td>
<td>Physical (acale)</td>
<td>Direct operations</td>
<td>Short to long</td>
<td>1.5 billion yen**</td>
</tr>
<tr>
<td>4. Increased demand for energy-saving products and services for new ZEH construction and energy-efficiency remodeling</td>
<td>Products and Services, Market, Energy Source</td>
<td>Downstream</td>
<td>Medium to long</td>
<td>20 billion yen*** Maintain current trend</td>
</tr>
<tr>
<td>5. Increased demand for products that use low-carbon, eco-friendly materials or resources</td>
<td>Products and Services, Markets, Resource Efficiency</td>
<td>Downstream</td>
<td>Medium to long</td>
<td>Financial impact not calculated due to lack of parameters necessary for quantification</td>
</tr>
<tr>
<td>6. Increased demand for products related to disaster prevention, response, and recovery</td>
<td>Products and Services, Markets, Resilience</td>
<td>Downstream</td>
<td>Medium to long</td>
<td>Financial impact not calculated due to lack of parameters necessary for quantification</td>
</tr>
</tbody>
</table>


Responding to risks and opportunities identified through scenario analysis is reflected in the environmental strategy.

In the definition of scenario groups, the external multiple scientific evidence and worldviews referenced are described. In the business impact assessment, disclose the amount of damage caused by physical risks.

In the definition of scenario groups, the external multiple scientific evidence and worldviews referenced are described. In the business impact assessment, disclose the amount of damage caused by physical risks.

### Example of Securities Report: Kameda Seika Co., Ltd. (Agriculture, Food, and Forest Products)

In the definition of scenario groups, the external multiple scientific evidence and worldviews referenced are described. In the business impact assessment, disclose the amount of damage caused by physical risks.

### Domestic Disclosure Examples: Kirin Holdings Company, Limited (Agriculture, Food, and Forest Products)

Based on the company’s business characteristics, the financial impact of possible risks and opportunities is estimated qualitatively and partially quantitatively, and the results are disclosed.

**Assumed significant risks and opportunities as of 2030 and 2050 based on the company’s strategy, business model, and supply chain characteristics, and estimated the financial impact qualitatively and partially quantitatively.**

![Chart](Excerpts from the Risks and Opportunities section regarding the cost impact of carbon pricing)
Domestic Disclosure Examples: FUJI OIL HOLDINGS INC. (Agriculture, Food, and Forest Products)

The business impact is assessed as “small, medium, or large,” according to the size of the amount, including time of onset and period of impact. Countermeasures are also disclosed.

- Time of onset and period of impact for the period of impact are disclosed separately.
- Not only is the degree of impact disclosed quantitatively, the time of onset and duration of impact is shown as well.
- Quantitative assessment based on 3 categories of risk impact:
  - Small: Impact less than 2 billion yen
  - Medium: Impact of 2 billion yen or more to less than 10 billion yen
  - Large: Impact of 10 billion yen or more
- Detailed policy on risk response measures


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Domestic Disclosure Examples: J. Front Retailing Co., Ltd. (Trading, Retail)

Qualitatively and Quantitatively listed the impact for each risk and opportunity, and the results of the analysis are reflected in the long-term business strategies to enhance resilience in all scenarios.

- For 2 scenarios (1.5°C/less than 2 and 4°C scenario), the significant risks and opportunities in 2030 are disclosed quantitatively and for some qualitatively, with measures stated as well.
- The qualitative analysis of the business impacts are shown in 3 different arrows depending on the degree of the financial impact.
- To increase resilience, the results of the scenario analysis is integrated into the long-term strategy.

A detailed worldview of the impact on the company in each scenario with relationships with government and administration, suppliers, and consumers are disclosed.

Based on external scenarios, changes in the external environment in a world of less than 2°C/4°C are summarized using the relationship between government/administration, suppliers, consumers and the company.

Domestic Disclosure Examples: Mitsubishi Corporation (Trading, Retail)

Evaluated the business environment perception of transition risks and opportunities on a 7-point scale, and disclosed specific policies and initiatives, which is factored into the strategy as well.

For the 8 monitored businesses that are impacted by climate change, transition risks and opportunities in the 1.5°C scenario is incorporated in developing business strategies to optimize portfolios.

Source: Mitsubishi Corporation Website (https://mitsubishicorp-disclosure.site/en/themes/161#b-915-2)
Business and financial impact are qualitatively and quantitatively described with calculations basis being disclosed.

For the business impact assessment, description of financial impact as well as the basis for calculation are qualitatively disclosed.

Each risk and opportunities business and financial impact are qualitatively described and supplemented with quantitative information.

Cost of the response measures and investment approach based on the business/financial impact are described for each response measures.

Not only are specific measures disclosed, estimated investment amounts and investment approach are quantitatively discussed.

Structure to promote response measures, current measures, and the cumulative investment needed from 2022-2025 are qualitatively and quantitatively supplemented.

In addition to its existing Climate Action Committee, we have established the Green Innovation Office, a dedicated organization tasked with quickly responding to investor requests for climate-related information and demonstrating action on climate change. In 2021, we spearheaded the launch of a GHG emissions visualization platform that shows a wide variety of emissions intensity and trends based on our internal initiatives. We have also started building an information dissemination infrastructure for distributed energy to achieve carbon neutrality. In an initiative to support business and technology development, the office is also working with the Green Innovation Office to provide support and guidance for reducing GHG emissions. These efforts will help to demonstrate our commitment to achieving net zero, and promote innovation for GHG emissions visualization and reduction actions aimed at achieving our net-zero goal.
Multiple scenario’s world view are set up with reference to IEA and other scientific scenarios

- Two scenarios are set up with reference to IEA, WEO, IPCC
- For oil and gas market and semiconductor manufacturing market, parameters are used to quantitatively analyze the possible risks
- When qualitatively describing the worldview, the company has independently categorized and narratively the situation on "policy," "customers," and "procurement" based on its business model for each scenario

**Major parameters used in transition risk analysis of business for the Oil and Gas Market**

<table>
<thead>
<tr>
<th>Source of high importance</th>
<th>Parameter</th>
<th>Format (around 2020)</th>
<th>4°C</th>
<th>2050</th>
<th>1.5°C</th>
<th>Major Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon price</td>
<td>Given in the EU</td>
<td>Unit conversion of carbon price</td>
<td>Yes</td>
<td>Yes</td>
<td>1.9°C</td>
<td>IEA</td>
</tr>
<tr>
<td>GHG emissions targets</td>
<td>Ebara Corporation: 1/2</td>
<td>Carbon reduction in EU regions, 0.8-1.5°C</td>
<td>Yes</td>
<td>Yes</td>
<td>1.5°C</td>
<td>IEA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Carbon reduction in other countries</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Changes in consumer companies, governments, and markets**

- Oil and gas market and semiconductor manufacturing market
- Parameters used to quantitatively analyze the possible risks

**Disclosed Resilience**

- We believe that the decline in profits resulting from sales decrease of conventional oil and gas-related products due to the evolution of the market can be fully offset by the following measures, and that an increase in profits of several 10 billion yen can be expected

**Integration with business strategy**

- We anticipate that the business field of conventional customers will evolve from the Oil and Gas Market to the next generation energy market, and that we can also expect to acquire new customers. This is reflected in our business strategies for products that respond to the progress of CCUS/CCS and hydrogen/ammonia power generation technologies, hydrogen production and storage technologies, products for geothermal and solar thermal power generation, and compressors for hydrogen liquefaction plants and hydrogen supply pipelines.
Future investment amount and impact on CAGR are qualitatively disclosed and initiatives to strengthen resilience are discussed.

- The risk mitigation cost and the impact on CAGR in the 1.5°C scenario are qualitatively disclosed.

- In order to strengthen resilience, meetings on environmental strategies are promoted regularly and business models are being shifted.

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**Domestic Disclosure Examples: NEC Corporation (Electricity, Machinery, Communication, 1/2)**

Scenarios are uniquely divided into 4 quadrants with reference to various external scenarios. A narrative is outlined for each scenario.

- Scenarios are divided into 2 axes “1.5°C and 4°C” and “Enforced actions and Voluntary actions” and are illustrated in four quadrants.
- The worldview are described in the narrative, and the referenced external scenarios are specified.

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**Referenced Published Scenarios**

- 1.5°C Scenario
  - IPCC AR6 WG1 SSP1-1.9
  - IPCC AR6 SCP2.6
  - IEA World Energy Outlook 2021 Net Zero Emissions by 2050 Scenario (NZE)
  - National Institute for Environmental Studies, Japan, Version SSP SSP1: Sustainable, SSP2: Reliance on Fossil Fuels

- 4°C Scenario
  - IPCC AR6 WG1 SSP1-4.5
  - IPCC AR5 RCP4.5
  - IEA World Energy Outlook 2021 Stated Policies Scenario (STEPS)
  - National Institute for Environmental Studies, Japan, Version SSP SSP3: Regional Divisions, SSP4: Disparities

---

4-43 Source: Seiko Epson Corporation “Securities Report” [EDINET](https://edinet-fsa.go.jp)

Out of all the risks and opportunities in the 4 difference scenarios, the most impactful carbon pricing risk in 2030 is quantitatively analyzed

- Quantitatively calculates and discloses the business impact of carbon pricing risks
- For risks and opportunities that are especially impactful, it is stated that they are integrated in the medium-term management plan

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**Introduction of Internal Carbon Pricing**

With the aim of improving energy efficiency and promoting the introduction of low carbon facilities and equipment, we have set an internal carbon price. This price allows us to convert the CO2 emission reductions that would result from a given capital investment into a monetary value, which we can then use as a reference when making investment decisions.

Furthermore, the aforementioned carbon pricing mechanism will allow our decarbonization activities going forward and reduce the risk associated with potential increases in carbon taxes and emissions trading in a carbon-free society in the future.

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**Domestic Disclosure Examples : NEC Corporation (Electricity, Machinery, Communication, 2/2)**

A total of 4 scenarios were set, including the 1.5°C scenario that was based on the IEA NZE. In the 1.5°C world view, the impact of ZEV share increase and the expansion of CO2-free fuels are considered

- Defines 4 scenarios including the 1.5°C, each scenario independently sets the world view for 2030

---

**Domestic Disclosure Examples : Panasonic Holdings Corporation (Electricity, Machinery, Communication, 1/2)**

A total of 4 scenarios were set, including the 1.5°C scenario that was based on the IEA NZE. In the 1.5°C world view, the impact of ZEV share increase and the expansion of CO2-free fuels are considered

- Defines 4 scenarios including the 1.5°C, each scenario independently sets the world view for 2030

---


**Developed climate change strategies for 7 operating companies based on the results of each scenario analysis**

We can address the risks and opportunities corresponding to the above scenarios through any of our seven main operating companies shown below:

1. Panasonic Corporation (Home-appliance business, Air conditioning and ventilation systems, Energy Systems business, Electric utility facilities business)
2. Panasonic Automotive Systems Co., Ltd. (Automotive centers business)
3. Panasonic Entertainment & Communication Co., Ltd. (Video, audio, and communication business)
4. Panasonic Housing Solutions Co., Ltd. (Housing equipment and building material business)
5. Panasonic Connect Co., Ltd. (Gestera process innovation business)
6. Panasonic Industry Co., Ltd. (System device business)
7. Panasonic Energy Co., Ltd. (Automotive battery business)

**Sated that resilience has been tested for all 4 scenarios**

The scenario analysis found that we could always focus on one or more of our businesses in each of the four scenarios. In other words, the analysis successfully verified the resilience of our business strategies. The analysis also helped us understand that we can contribute to building a sustainable society through our businesses. We continue our efforts to build the 1.5°C world, represented by our society (A).

**Transition plans have been developed for each of the company’s activities, raw material procurement, water resources, and product development**

3.1.1 Efforts for Transition

Climate change is a central issue in the environmental area. All economic activities, including food production, resource and energy consumption, and waste disposal, are emitting CO₂ and accelerating climate change. If weather condition changes due to climate change, many environmental issues will be affected, such as water shortages and heat waves that will adversely affect ecosystems as well as human society.

CO₂ reductions should be prioritized for emissions from fuels consumption (Scope 1) and emissions from the use of energy supplied by others, such as electricity (Scope 2). In addition, the value chain of our business, including procurement, transportation, use of sold products, and disposal of waste, must be taken into account. We must comprehensively reduce CO₂ emissions by selecting materials and processes that emit less emissions in collaboration with stakeholders.

For actual efforts for CO₂ reduction, the first priority is to reduce or eliminate emissions through energy saving, including the development of new technologies, and for energy and materials required for business activities. Also, we will utilize renewable energy and renewable materials. Regarding fuels, the utilization of carbon-free fuels such as hydrogen and ammonia requires the development of social infrastructure, which still needs long time.

In the meantime, we will study the feasibility of options such as electrification, renewable energy, and carbon capture, utilization and storage (CCUS), as well as carbon-free fuels, from both technical and economic aspects.

Example of transition plan for product development:

- By 2025, replace all plastic cosmetic containers with sustainable packaging that is reusable, recyclable or biodegradable
- Increase container recyclability, conserve input resources, and encourage recycling
Four axes are set, and a unique worldview is set based on various environmental issues

- **Set an original worldview** with reference to the Fifth and Sixth Assessment Reports of the UN's Intergovernmental Panel on Climate Change (IPCC)
- Based on the 1.5°C/4°C scenario, two axes were established: "phasing out fossil fuels/depending on fossil fuels" and "urban concentration/decentralized communities"
- In addition, four climate change scenarios were assumed, considering the impact of other environmental issues interacting with climate change issues

![Image of a diagram showing various climate scenarios and their impacts](image-url)

**Domestic Disclosure Examples : SEKISUI CHEMICAL CO., LTD. (Consumer Discretionary, Pharmaceutical, 2/3)**

Disclose the financial impact on business as an image of corporate value over the product life cycle

- **Analyze the financial impact of a product's life cycle**

![Image of a diagram showing the life cycle of a product](image-url)

Figure 10(b): Details of positive and negative impacts on corporate value using impact-weighted accounting method (changes are based on FY2016)

**Source:** SEKISUI CHEMICAL CO., LTD. "TCFD Report", 2022年度版TCFDレポートアウト (英語版) 8019 (sekisuichemical.com)
Response measures based on the results of scenario analysis are integrated with business strategies through long-term business and financial plans

- Analysis of (1) trends in carbon efficiency (eco-efficiency), (2) correlation between carbon efficiency and economic efficiency, and (3) comprehensive benefits to stakeholders using impact-weighted accounting methods confirms the appropriateness of the strategy to address climate change issues and demonstrates the resilience of the business.

- Verify and review the appropriateness of strategies in each scenario and reflect them in the management plan.

In FY2022, scenarios for rice and chicken procurement are being analyzed, and efforts to improve the level of scenario analysis can be seen following FY2020 and FY2021.

- Scenario analysis starting in 2019; in FY2020, risks and opportunities are identified by business and by scenario of high importance; business impact assessment compares achievement of Group CO2 emissions reduction targets with the carbon tax burden at the status quo CO2 emissions (baseline).

- In FY2021, “water risk due to extreme weather events” was selected as a risk common to multiple projects, and climate change scenarios were developed.

- In FY2022, the risks and opportunities posed by climate change to rice and chicken procurement are being considered, and scenario analysis is becoming more sophisticated.

In FY2020, carbon tax impact assessment is conducted.

In FY2021, impact assessment of water risk is conducted.

In FY2022, risks and opportunities of climate change for rice and chicken procurement will be examined, and future yield projections for each climate scenario will be analyzed (see next page for details).
By quantifying financial impacts through multi-year yield analysis, strategies for GHG reduction related to raw materials and ensuring resilience in transition scenarios are presented.

- Using IPCC RCP scenarios (2.6, 4.5, 6.0, and 8.5), simulations were conducted to 2090 for major suppliers of rice and chicken, and future yield projections were quantitatively analyzed for multiple years.

- Resilience is also shown by stating that GHG reductions related to raw materials will be achieved through the development of livestock feeds and breeding of high temperature tolerant and high yielding rice, thereby ensuring an advantage in the transition scenario.

Physical Risk Impact Assessment (Analysis of Estimated Change in Yield by Climate Scenario)

The following formula was used to analyze the agricultural yield as the average temperature rises to 23°C or higher:

$$ y = -0.3239x^2 + 15.042x - 74.632 $$

$$ x = \text{Average temperature during the season to be analyzed (unit is °C)} $$

If climate change mitigation measures are strengthened (transition scenario), tighter regulations on greenhouse gas (GHG) emissions could increase the cost of raw material procurement. On the other hand, we expect decarbonization measures to be promoted in the agriculture and livestock farming sectors. By working with our suppliers and reducing GHG emissions related to raw materials, we believe we could gain an advantage even in the transition scenario.

Example of Securities Report: Members Co., Ltd. (Service (other))

The financial impact is analyzed and disclosed in four levels, and the basis for the calculation is provided for the increase in procurement costs of environmental value certificates for electricity, which was analyzed as having a particularly large impact.

| Source: Members Co., Ltd. “Securities Report” | EDINET (edinet.fsa.go.jp) |

- Disclose quantitative impact of “Environmental Value Certificate Price” among transition risks
- Basis for calculation is described in the notes

*J-credit price per 1t-CO2 (forecast for 2030) x procurement volume (taking into account the increase due to business expansion)*


- For climate change risk/opportunity categories other than the above, the financial impact is divided into “small to medium to large to very large”. A sense of the scale of the amount is also provided.
4. Scenario Analysis Example Disclosure
(Domestic and Overseas)

4-1 Domestic Disclosure Examples

4-2 Overseas Disclosure Examples

Chapter 4. Scenario Analysis Example Disclosure
(Domestic and Overseas)
Provide examples of national and international disclosures on scenario analysis based on the latest findings
Scenario analysis was conducted based on the IEA SDS scenario and scenarios provided by the U.S. EIA. The world view is quantitatively described with formulas.

Shows the change in the 2050 electricity sales fuel mix, and discloses the calculation methods:
- **Formula:**
  \[ \text{NRG electricity sold} = \text{NRG retail sales} + \text{Other market sales} \]
- **Data sources:**
  - 2014, 2019, 2020: NRG actuals
  - 2025: NRG 2020 budget
  - 2026 to 2050: NRG and U.S. EIA scenario data

**NRG’s Transition Levers**
To meet NRG’s 1.5°C-aligned net-zero by 2050 goal, NRG is using multiple transition levers. These transition levers can be grouped into four main categories:
- **Decarbonization** of existing business lines
- **Diversification** into low emissions businesses
- **Divestment** of select high emissions assets
- **Deployment** of new technologies and innovations

**Divestment of high emission assets**
On NRG’s journey to net-zero emissions by 2050, NRG will also look to exit certain high GHG activities via strategically targeted sales of non-core assets where the opportunity generates appropriate risk-adjusted returns for shareholders. Over 2014-2020, NRG divested 27,510 MW net capacity of fossil generation. In addition, in 2021, NRG divested 4.8 GW of fossil-fired power plant capacity. We will continue to monitor the market for future portfolio optimization opportunities.

**Several transition initiatives to reach the net-zero by 2050 goal**
- Decarbonization of existing businesses
- Diversifying into low emission businesses
- Divestment of select high emissions asset
- Development of new technologies and innovations

**Each transition initiatives are described in detail**
- Example: Divestment of select high emissions asset in detail
  - Over 2014-2020, 27,510 MW net capacity of fossil generation has been divested
Oversea Disclosure Examples: Shell plc. (United Kingdom, Energy)

Oil and gas price projections based on external climate change scenarios have been considered, and an assessment of the impact of climate change on the financial statements has been conducted and disclosed:

- The impact assessment of climate change and energy transition on the financial statements is conducted as a sensitivity analysis to test financial resilience.
- As a basis for the sensitivity analysis, oil and gas price projections based on external climate change scenarios are considered, as oil and gas prices are one of the key assumptions supporting the financial statements.

Assumptions for oil and gas prices by scenario (only oil prices are listed below):
- IHS Markit/ACCS 2021: Oil prices gradually decline toward $20/barrel in 2039, recover to $46/bar in 2046, and decline again toward $40/barrel in 2050.
- Woodmac WM AET 2°C: Oil prices gradually decline toward $10/barrel in 2050.
- IEA NZE50: Oil prices gradually decline to $25/barrel in 2050.
- IEA SDS: Oil prices gradually increase towards $56/barrel in 2030 and gradually decrease to $50/barrel in 2050.

Assess impact on $65 billion of integrated gas assets and $89 billion of upstream assets as of December 31, 2021, considering various external climate scenarios:
- Adopted the average of the prices foreseen by the four scenarios: IHS Markit/ACCS 2021, Woodmac WM AET 2°C, IEA NZE50, and IEA SDS.
- Recoverable values of $13-16 billion and $14-17 billion, respectively, were assessed below book value as of December 31, 2021.
- IEA NZE scenario adopted.
- Recoverable values of $10-12 billion and $5-6 billion, respectively, were assessed below book value as of December 31, 2021.
- Considering a sensitivity of -10% or +10% as an average over the entire period to Shell’s medium-term price outlook,
- Applying -10%, the recoverable amount would be $8-10 billion and $4-5 billion, respectively, above the book value as of December 31, 2021.
- Applying +10%, the recoverable amount would be $3-5 billion and $3-4 billion, respectively, above the carrying amount as of December 31, 2021.

Oversea Disclosure Examples: Woodside Energy Limited (Australia, Energy)

To test the financial resilience of the portfolio, the potential impact on average annual free cash flow was estimated, and targets for investment plans that contribute to low-carbon:

- Estimated financial impact using four IEA scenarios (STEPS, SDS, APS, and NZE scenarios).
- Scenario analysis results stated that business impact (impact on FCF) is small, indicating resilience.

Assessed in FCF as follows:

- Average annual free cash flow (FCF) generation increases from the late 2020s.
- After that, the analysis assumes no new oil and gas investments, which would decrease due to natural attrition of older assets in the portfolio.

Announced an investment target of US$5 billion by 2030 as part of its portfolio of new energy products and low-carbon services development:
- H2 Perth (a world-scale hydrogen and ammonia production facility).
- H2OK (Planned construction liquid hydrogen production facility).
- H2TAS (water and ammonia production facility).


Oversea Disclosure Examples: Canadian National Railway (Canada, Transportation)

Comprehensive disclosure of risks and opportunities based on the company’s strategy and business model. Quantitative business impact assessment of all major risks and opportunities

✓ A risk materiality assessment is performed for four risks and four market opportunities, and the potential impact on the business and the estimated cost required to manage the risk/realize the opportunity are disclosed quantitatively. However, there is no clear description of the specific calculation process

<table>
<thead>
<tr>
<th>OPPORTUNITY</th>
<th>Description</th>
<th>Type</th>
<th>Potential Impact to Business</th>
<th>Strategic Planning, Risk Mitigation and Opportunities</th>
<th>Matrix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand for Low-Carbon Goods and Services</td>
<td>The opportunity to decrease the cost of owning and operating a new and efficient fleet of diesel-powered locomotives, while reducing environmental impacts via electrification and hydrogen fueling options.</td>
<td>Internal</td>
<td>May result in the loss of rail freight revenues by 55% of demand.</td>
<td>We actively engage with customers to position the environmental benefits of CN. Furthermore, we plan to invest in new locomotives and rolling stock designed to reduce emissions and provide a low-carbon transportation solution.</td>
<td></td>
</tr>
<tr>
<td>Transportation of Freight by Rail instead of Truck</td>
<td>Reducing GHG emissions by up to 75%, and positioning rail as the most environmentally friendly way to transport freight overland could provide an opportunity to increase revenues in our intermodal and auto transportation segments.</td>
<td>External</td>
<td>May result in the loss of rail freight revenues by 55% of demand.</td>
<td>We actively engage with customers to position the environmental benefits of CN. Furthermore, we plan to invest in new locomotives and rolling stock designed to reduce emissions and provide a low-carbon transportation solution.</td>
<td></td>
</tr>
</tbody>
</table>

Oversea Disclosure Examples: FirstGroup plc (United Kingdom, Transportation)

Original scenarios including 1.5°C are set and world views are described qualitatively and quantitatively

✓ Based on IEA SDS and NZE scenarios, 4 original scenarios are set according to external technological trends and degree of regulation

<table>
<thead>
<tr>
<th>Policy Pathways</th>
<th>Global temperature increase</th>
<th>Global emissions reduction target by 2100</th>
<th>Net-zero by 2050</th>
<th>Net-zero by 2060</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Policy</td>
<td>4°C</td>
<td>50%</td>
<td>70%</td>
<td>100%</td>
</tr>
<tr>
<td>Current Policy</td>
<td>2°C</td>
<td>85%</td>
<td>90%</td>
<td>100%</td>
</tr>
<tr>
<td>Stated Policy</td>
<td>1.5°C</td>
<td>90%</td>
<td>95%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Conducted modeling work on climate-related risks.

Five scenarios were considered in the 1.5°C to 4°C temperature range.

This report describes 1.5°C / 2.5°C / 4°C (the two most extreme scenarios and the “stated policy” scenario):

- 4°C (no policy): even existing policies are partially or completely abolished. Catastrophic physical impacts ranging from extreme weather events to mass migration
- 2.5°C (Stated Policy): Middle-of-the-road model. Globally, policies are relatively the same as today, additional measures may be introduced in the future. However, low-carbon technology diffusion will be slow, resulting in higher temperatures and more frequent extreme weather events
- 1.5°C (Paris Aspiration): Assumes that all countries will work together to ensure that the rise in global temperatures is limited as much as possible by an immediate transition to virtually zero carbon emissions. Global transport is still primarily fossil fuel driven, and the 1.5°C pathway is projected to have a significant impact on the transport sector

Potential financial impact from transition risks and opportunities assessed for each scenario, cumulatively over a five-year period

Low impact
- Expected carbon price of <20 per tonne by 2030 in some regions
- Low-emission zones leading to reduced traffic congestion

Medium impact
- Potential impairment of carbon-intensive vehicles
- Ongoing investment in zero-emission fuel to meet current commitments

High impact
- Significant investment in low-carbon technologies
- Zero-emission zones leading to significant route constraints and potential loss of license to operate

Low impact
- Low focus from investors on green credentials
- More favourable interest rates for green companies

Medium impact
- Increasing impairment of carbon-intensive vehicles
- Some investment in zero-emission fuel ahead of current schedule

High impact
- Significant increase in cost of zero-carbon vehicles and green electricity, as demand and supply/demand mismatch

Low impact
- Little shift to public transport
- Lower carbon intensity of transport sector

Medium impact
- Increased shift to public transport
- Customer demand for green public transport

High impact
- Complete shift to public transport
- Customers demand for green public transport

This report describes 1.5°C / 2.5°C / 4°C (the two most extreme scenarios and the “stated policy” scenario)
Oversea Disclosure Examples: Ford Motor Company (United States, Transportation)

Disclosed a roadmap toward 2050 carbon neutrality

- Toward carbon neutrality in 2050, a step-by-step roadmap to cut emissions has been decided
  - By 2040 achieve zero emissions for full range of European Light Commercial Vehicles
  - By 2030 achieve EV commitments of 50% globally, 50% in the U.S., 100% in the EU
  - By 2035 meet SBTi science-based emission targets for operations and vehicles
  - By 2050 achieve Carbon Neutrality


Oversea Disclosure Examples: The Dow Chemical Company (United States, Material, Building)

For multiple scenarios, a step-by-step approach toward decarbonization and explains resilience

- Explains the scenario and claims the strategies are resilient with the business opportunities in both scenarios

Oversea Disclosure Examples: Freeport-McMoRan Inc (United States, Materials, Building, 1/3)

Detailing an envisioned worldview under three original scenarios, Aggressive Climate Action \((1.5^\circ C)\), Moderate Climate Action \((\sim 2.5^\circ C)\), Current State \((\sim 4^\circ C)\)

- For transition and physical risks, original scenarios were developed qualitatively and quantitatively using external market analysis developed by the World Bank and other organizations, as well as the IEA and IPCC (models used in the Fifth Assessment Report)

**Scenario Selection**

We evaluated the key risks and opportunities outlined above across three different climate scenarios: Current State (i.e., mostly unconstrained GHG emissions), Moderate Climate Action (i.e., moderately constrained GHG emissions), and Aggressive Climate Action (i.e., action in line with the Paris Agreement goals of limiting global temperature rise to well below 2°C, preferably to 1.5°C, compared to pre-industrial levels). Our scenario analysis was conducted using the prospective time periods of 2030 and 2050 and incorporating a range of business considerations based on third-party GHG emissions trajectory scenarios and their corresponding implications for Freeport. Physical risks were evaluated mainly using data from the Fifth Phase of the Coupled Model Intercomparison Project (CMIP5) which was used in the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report. Our scenario analysis covered our operational and non-operational assets as well as our supply chain.


**Worldview of 1.5°C Scenario (example)**

- Reference scenarios: IEA (NZE scenario), IPCC (RCP2.6)
- Carbon price: Assumes $130 by 2030 and $250 by 2050 in developed countries
- Renewable energy: Solar and wind power will be the main sources of electricity by 2030, providing 70% of global electricity generation by 2050; 60% of global car sales and 50% of heavy truck sales will be electric by 2030; new sales of internal combustion engine vehicles will be zero by 2035

**Source**


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Oversea Disclosure Examples: Freeport-McMoRan Inc (United States, Materials, Building, 2/3)

Examples of climate change-related responses based on scenario analysis include the introduction of ICP schemes, which are linked to decisions regarding current and future business plans

- An Internal Carbon Pricing Program (ICP) system was introduced based on the results of the scenario analysis. The impact on current and future long-term business plans is assessed and incorporated into decision-making. Committed to continue to review pricing in accordance with external climate change related policies

**Introduction Internal Carbon Pricing (ICP)**

- **Background:**
  - "Freeport operates in some countries and regions with existing carbon pricing policies in place including Chile, the United Kingdom and Europe. The government of Indonesia is also considering carbon pricing initiatives. Depending on the future state of various climate policies and the speed at which the world adopts various policies and initiatives, we recognize that all of our operating regions must prepare for carbon pricing regimes. With the benefit of our global scenario analysis (discussed in more detail in the Resilience section), as well as input and ongoing dialogue with external stakeholders and associations, Freeport has established an internal carbon shadow price range between $50-$150 per metric ton of CO2 equivalent. We believe that this price range will provide a key input to our decision-making for both current operations as well as future projects. We are working to integrate this into our business processes to evaluate the potential impacts of an imposed carbon pricing regime on our current operations, longer-term business plans and potential future projects. As a first step, we have begun to integrate the carbon shadow price range into our internal life-of-mine plans. As a next step, we plan to integrate the price range into the evaluations and approval process for projects."

- **ICP Price:**
  - "With the benefit of our global scenario, as well as input and ongoing dialogue with external stakeholders and associations, Freeport has established an internal carbon shadow price range between $50-$150 per metric ton of CO2 equivalent. We believe that this price range will provide a key input to our decision-making for both current operations as well as future projects. We are working to integrate this into our business processes to evaluate the potential impacts of an imposed carbon pricing regime on our current operations, longer-term business plans and potential future projects."

- **Case Study:**
  - "As a first step, we have begun to integrate the carbon shadow price range into our internal life-of-mine plans. As a next step, we plan to integrate the price range into the evaluations and approval process for projects."

**Source**

Target to achieve carbon neutrality by 2050, presenting emission reduction targets through 2030 by reducing emission factors and showing reduction pathways through electrification of facilities and energy efficiency

It presents a reduction pathway toward decarbonization and mentions the direction of the scenario analysis. Plans to upgrade the analysis related to the five main risks and opportunities identified by the 2021 scenario analysis (regulatory, market, technology, physical risk, and market opportunity)

Reduction pathway toward 2050 net zero

In addition to the importance of copper to global decarbonization, we strive to produce and deliver our products responsibly while working to encourage circular economy frameworks including the reuse and recycling of copper. Over the course of 2022, we plan to continue our work with ICA to develop a global copper decarbonization roadmap and an associated carbon footprint methodology.

While we fully expect that new and improved technologies and processes will be identified and developed during the work, we believe our current strategy and the decarbonization pathways we have identified are foundational to the work that needs to occur to achieve our 2030 GHG emissions intensity reduction targets and accomplish further reductions in future years.

Qualitative and quantitative worldview to 2050 based on current business and project portfolios

Seven variables (carbon price, gold price, oil price, electricity, renewable energy, transportation, energy sector policies, grid emission factors, global GDP, and global population) are used to illustrate the scenario worldview

Each scenario is respectively consistent with IEA’s STEPS, SDS, and NZE scenarios

Scenario 1: IEA’s STEPS scenario
Scenario 2: IEA’s SDS scenario
Scenario 3: IEA’s NZE scenario


Oversea Disclosure Examples: Newmont Corporation (United States, Materials, Building, 2/2)

Goal to achieve carbon neutrality by 2050, with a transition pathway

- Plans to focus first on deploying commercially available technologies to decarbonize existing operations. Collaborate with joint venture partners on technology development strategies and timelines to develop a technology roadmap for capital projects to identify new technologies that will help build carbon neutral mines and redefine the project pipeline to be carbon neutral.


Oversea Disclosure Examples: J Sainsbury Plc (United Kingdom, Agriculture, Food, and Forest Products)

For each risks and opportunities in the 1.5°C scenario and 4°C scenario, disclosed the revenue impact with and without mitigation actions.

- Disclosed the revenue impact with and without mitigation actions for the 2030 and 2050 1.5°C/4°C scenario, while explaining the calculation methods.
  - Example: Impact on changes in consumer preferences away from higher GHG emission animal protein for the 1.5°C scenario
    - Without mitigation actions: At 2030 300 to 350 million euro of revenue loss can be expected.
    - With mitigation actions: Overall opportunity for business

For each risk and opportunity, the financial impact is disclosed as EBITDA, time frames, and scenario sensitivity.

**Risks/Opportunities**
- Physical risks
  - South African plantation yield loss
  - Chronic changes in precipitation
  - Higher wood procurement costs
  - Risks of flooding
- Transition risks
  - GHG regulatory changes

**Opportunity**
- Sales of by-products
- Reduced operating costs through energy efficiency
- Changing customer behavior

For each risk and opportunity, the company, a mitigation plan is discussed.


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**Overseas Disclosure Examples: Eaton Corporation plc (United States, Electricity, Machinery, Communication, 1/3)**

Original scenarios, including 1.5°C, are established with reference to external data from the IEA, IPCC, and other sources. Each scenario details a world view of external technology trends and government regulations.

Based on IEA SDS and NZE scenarios, 4 original scenarios are set according to external technological trends and degree of regulation.

1. **1.5°C scenario planning**
   - **Low regulation/High stimulus**
     - Extensive technological breakthroughs
   - **High regulation/High stimulus**
     - Extensive technological breakthroughs

2. **Regulatory intensity**
   - Government intervention
   - High regulation/High stimulus
   - Extensive technological breakthroughs

3. **External forces**
   - Indicators
   - Regulation/policies
   - Technology trends
   - Social and political context
   - Economic
   - Energy
   - Busines

4. **Worldview of Scenario 1 (example)**
   - Regulation/policies
     - Strong government market intervention is limited because of voter unpopularity
   - Technology trends
     - Consumer digital technologies increase
     - Exponential gains in virtual reality, smart devices, robots
     - Widespread buildout of 5G New low-carbon bio-based and hydrogen aviation fuels are introduced
     - 3D printing and additive manufacturing widely adopted with new, more sustainable materials
   - Social and political context
     - Younger generation remains technology-oriented
     - Income inequality grows due to widening digital divide
     - High connectivity in social movements with crowdsourced production development
   - Economic
     - GDP rising
     - Cashless commerce and rise in use of blockchain

Based on the scenario analysis, specific measures to contribute to increasing corporate value by reducing climate change-related risks and capturing opportunities are integrated with the business strategy.

- Describes specific measures to address both reducing energy demand and greening energy supply to reduce climate-related risks and capture opportunities.
- Results of scenario analysis are integrated into financial planning, including investments and acquisitions.

**Mitigation of transition risks associated with climate change**

Eaton has invested $528 million in research and development in alignment with our Positive Impact Framework. Eaton has committed to investing $3 billion between 2020 and 2030 in R&D dedicated to more sustainable solutions, including products that reduce emissions and enable electrification and grid management, which will aid greater incorporation of both on- and off-grid energy sources.

- Green Motion: In March 2021, Eaton acquired Green Motion SA, a leading designer and manufacturer of electric vehicle charging hardware and related software. This acquisition complements existing energy storage and power distribution offerings, and positions Eaton to grow with the global energy transition to electric vehicles.
- Reactive Technologies: In August 2021, Eaton made a strategic investment in the UK and Finland-based grid technology company, Reactive Technologies Ltd. Eaton is collaborating with Reactive on supporting utilities to cost-effectively increase renewable energy capacity.

**Acquisitions and divestments—financial planning**

- Climate transition opportunities position Eaton to deliver an incremental 8-10% EPS growth over the next five years.
- Green Motion: In March 2021, Eaton acquired Green Motion SA, a leading designer and manufacturer of electric vehicle charging hardware and related software. This acquisition complements existing energy storage and power distribution offerings, and positions Eaton to grow with the global energy transition to electric vehicles.
- Reactive Technologies: In August 2021, Eaton made a strategic investment in the UK and Finland-based grid technology company, Reactive Technologies Ltd. Eaton is collaborating with Reactive on supporting utilities to cost-effectively increase renewable energy capacity.

**Transition plan shown with the goal of achieving carbon neutrality by 2030**

- Demonstrate plans to achieve carbon neutrality through manufacturing efficiencies, implementation of alternative solutions, renewable energy, green fleet (deploy electric vehicles, charging infrastructure, and more efficient vehicles in sales, service, and other operations fleets), electrification and fuel switching (switch to sustainable fuel sources whenever possible, and if difficult, electrify processes with renewable energy), carbon offsets, etc. process electrification), and carbon offsets to achieve carbon neutrality.

- The future of scenario analysis is also mentioned: "As climate science and the global response to climate change mitigation and adaptation are rapidly evolving, scenario analysis will be conducted regularly at 2-3-year intervals."
A roadmap toward 2050 consistent with 1.5°C scenario and detailed mitigation actions are disclosed

- Reach 150 Zero-CO2 sites by 2025
- Propose alternative technologies by 2025
- Source 90% of electricity from renewables by 2025 and 100% by 2030
- Increase energy efficiency in sites by 15% by 2025
- Shift 1/3 of corporate vehicle fleet to electrical vehicles by 2025 and 100% by 2030


Expresses the revenue impact of the risks as low, medium, high
- Low: <1m-25m Euro
- Medium: 25-125m Euro
- High: 125m-250m Euro

For the following significant risks, the financial impact in the >4°C, 2°C-3°C, 1.5°C scenario are disclosed
- Physical risk
- Policy changes
- Market changes
- Reputation changes
- Liability

Conducted a 1.5°C, 2°C, 4°C scenario analysis, and utilized 2 unique scenarios for 1.5°C. Also disclosed the business impact for 2030, 2039, 2050

- Conducted a 1.5°C, 2°C, 4°C scenario analysis, and utilized 2 unique scenarios for 1.5°C
  - In the Proactive Route, regulations become aggressive and persistent from today and will be relying on available and proven technologies
  - In the Reactive Route, there will be a gradual regulation by 2030 and becomes very aggressive post-2030. There will be a major reliance on technologies that are not yet proven to scale

- For the main 1.5°C scenario’s risks and opportunities, the business impact for 2030, 2039, 2050 are analyzed and the calculation method/assumptions are disclosed
  - Main risks and opportunities:
    - Carbon tax and voluntary carbon removal costs
    - Land use regulation impact on food crop outputs
    - Impact of rising energy prices for suppliers and in manufacturing
    - Water scarcity impact on crop yields
    - Extreme weather (temperature) impact on crop yields
    - Growth in plant-based foods category

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Source: Unilever Annual Report and Accounts 2021
(https://www.unilever.com/files/3082e46a7f7170fd10be32cf65113b738f1f90c2.pdf)