Kanadevia Corporation

TCFD&TNFD Integrated Report 2025

October 2025

Legend

C TCFD

N TNFD

Taking on the challenge, through the power of technology, to create a world that lives in balance with nature.

The Earth we all inhabit is life, shelter, and promise. That it can be both kind and cruel simply means that we do not control it and cannot presume to force our will upon it. Through its unique technology, Kanadevia will realize a society in harmony with the planet. It will act carefully and decisively to use the world's resources wisely, support the environment, and mitigate the threats of an uncertain future. This is Kanadevia's way to enable our coming generations to enjoy happier lives in unity and with total peace of mind.

Greetings

Kanadevia Group is a company that "Taking on the challenge, through the power of technology, to create a world that lives in balance with nature. "The history of us dates back to 1881 with the founding of the shipbuilding business, "OSAKA IRON WORKS." Today, based on the plant engineering expertise developed in shipbuilding to sustain and improve the environment, we are engaged in environmental business including the world-class Waste to Energy and the water treatment business, machinery business, social infrastructure business and carbon neutral solution business.

The technologies possessed by Kanadevia Group can contribute to solving environmental challenges such as biodiversity loss and pollution, not to mention climate change. In an age when the world's population is growing and cities are functioning more and more sophisticatedly, I believe that the need for our technologies will become even greater if economies are to grow further. As a catalyst for co-creation, pioneering the future of urban environments, we combine our technologies and work with our stakeholders to provide a range of solutions to environmental issues.

I fully recognize the seriousness of the misconduct identified last year in our marine engine business and other operations, and the impact it has had on stakeholders. Kanadevia Group takes full responsibility and has responded decisively by fundamentally restructuring our governance framework and rebuilding our corporate culture to prioritize safety, quality, and unwavering compliance. This experience has reinforced our commitment to transparency and integrity. We are fully dedicated to restoring trust and turning this challenge into a foundation for sustainable growth and long-term value creation.

Much like an orchestra performing in perfect harmony, Kanadevia Group is dedicated to tackling critical societal challenges, including climate change, biodiversity loss, pollution, and human rights abuses. Our commitment extends to forging new value collaboratively with a diverse array of stakeholders—our employees, customers, business partners, shareholders, investors, local communities, international organizations, and others. Together, we strive to chart a course towards a prosperous and sustainable future, fostering innovation and collective progress at every step.

October 2025

Representative Director, President and CEO

Highlights

Kanadevia Group's **core business is Environmental Equipment and Plant Business. We globally design, manufacture and operate infrastructure facilities for waste incineration and power generation, water treatment, biomass utilisation and seawater desalination**, as well as in the Machinery Business, Social Infrastructure Business and Carbon Neutral Solution Business. With a business structure comprising 158 consolidated subsidiaries and 35 equity-method affiliates (as at end-March 2025), we contribute to **building decarbonised, recycling-oriented societies in the region**, particularly in Europe, the Middle East and Asia.

Kanadevia Group maintains a strong connection with the environmental field, aligning its business promotion with efforts to reduce the environmental impact on local communities. Climate change and natural capital loss are recognized as key management issues. In line with **the TCFD and TNFD frameworks**, this **report evaluates the environmental, social, and economic impacts of our business activities in both quantitative and qualitative terms**, and outlines strategies and initiatives for sustainable growth.

In its Sustainable Vision[1)], which outlines its aspirations for 2050, Kanadevia Group states that it will **"Realize zero environmental impact[2)]"** and **"Maximize people's well-being."** To realise this vision, we are not only pursuing climate-related **"carbon neutrality"**, but also **"complete circulation of resources"** and **"maximization of environment's recovery power"** - areas deeply connected to natural capital - as well as **"response to intensifying natural disasters"** and **"sustainable procurement."** In other words, we aim to achieve a **Net-zero environmental impacts by keeping the environmental impact of its supply chain and the environmental impact of its customers, who use the Group's products and services, within the range of the region's inherent environmental resilience**.

We therefore systematically analysed **the risks and opportunities associated with climate change and natural capital, and formulated strategies and transition plans based on this analysis**.

Nature-related risks are assessed in terms of both physical and transition risks, in accordance with the TNFD framework. Regarding climate, among greenhouse gas (GHG) emissions (Scope 1, 2, 3), the footprint of "GHG generated during the use of sold products (Scope 3 Category 11)" is the largest (over 90% of total Scope 1, 2, 3), within this, GHG emissions from waste incineration during the operation of waste incineration power generation facilities constitute a significant proportion (over 70–90% of Scope 3). In terms of nature-related "impacts", the analysis shows significant impacts associated with the use of land, fresh water and seabed in some Environmental Business (Waste to Energy, biomass power generation and energy-generating waste incineration power generation projects) and in Infrastructure Business. **Demand for resilient plants will increase in areas of high physical risk, strengthening Kanadevia Group's competitiveness**, **while in areas of low transition risk, the market may be lost to low-cost products**. Based on these analyses, environmental and Carbon Neutral Solution Business are expected to be the main growth drivers in a net zero Nature Positive[3)] and society, while Machinery Business and Social Infrastructure Business are expected to be the main growth drivers in societies where this momentum is low.

In terms of financial risk, **GHG emissions, water usage, solid waste and ore usage are identified as key risk** factors, with water use in the design and production phase and waste disposal in the operational phase rated as particularly high risk. By business field, the Environmental Business is highly sensitive to policy and economic conditions, with municipal budgets and regulatory trends directly influencing growth. In the Machinery Business, meeting customers' environmental targets is essential, while in the Social Infrastructure Business, upgrade timing and budget constraints are critical. In the Carbon Neutral Solution Business, risks include the reduction of GHG emissions from marine engines, social implementation of hydrogen and methanation technologies, the declining ability of suitable wind power sites and the challenges of building local consensus, and the issue of disposal of nuclear power plant casks.

Kanadevia Group forecasts increased demand for **wind power generation, hydrogen production equipment, methanation equipment, CCUS**[4] **technologies, marine engines and liquid CO_2 storage tanks** under the 1.5 °C and 4 °C climate scenarios. 4 °C scenarios increase the physical risk of natural disasters and the impact on supply systems and plant operations. impacts, as well as the risk of a return on investment in Carbon Neutral Solution Business projects. In the 1.5 °C scenario, on the other hand, **the market for environment-related businesses is** expected to **grow due to increased environmental awareness and stricter regulations.** We provide integrated solutions that contribute to solving local issues in WtE, Waste to X ("WtX[5] "), Water Business, Machinery Business, Social Infrastructure Business and Carbon Neutral Solution Business through measures such as procurement reform, technology upgrading, equipment standardisation, servicing and resource recovery. In particular, the WtE Business combines CO_2 recovery and methanation technologies to reduce environmental impact and promote resource recycling at the same time. In the Water Business, we contribute to the conservation of water resources and ecosystems through biomethanation in sewage treatment, seawater desalination and phosphorus and nitrogen recovery.

Kanadevia Group aims to be **an integrated solution provider for** the various areas within the circular economy, from WtE to WtX and leveraging waste as a starting point, in order to link environmental improvement opportunities to proactive business. Based on the concept of the **Planetary boundaries**[6], which indicates the operating space for humanity and its ecological limits, the destination of this initiative is a **society where human activities remain inside the breaking points and the resilience of the local environment itself functions to activated to achieve "Net-zero environmental impacts", "Resilience Eco Society®**[7]**."**

In this society, waste circulates as a valuable resource and waste incineration and power generation facilities function as resource production plants. Kanadevia Group is committed to creating a new era by providing infrastructure that supports local pride and well-being, and by collaboration with international organisations and local communities. We believe that beyond **Resilience Eco Society®** lies a future of greater happiness for all.

Column

The **Expo 2025 Osaka, Kansai, Japan** was a gathering place for cutting-edge technologies and solutions to social challenges, centered on the theme "Designing Future Society for Our Lives."

Kanadevia designed and constructed a **biogas plant** like the one pictured for the Japan Pavilion, generating water and energy from food waste. Food waste collected at the Expo site is transported to the biogas plant installed in the Japan Pavilion. After being finely shredded, it undergoes microbial decomposition in a methane fermentation tank. The biogas produced during this decomposition process is used to generate electricity, which powers part of the Japan Pavilion. CO_2 is also separated and recovered from the biogas.

We envision a future society where such biogas plants operate throughout towns and cities, contributing towards Net-zero environmental impacts and enabling **waste to circulate as a valuable resource**.

Figure: EXPO 2025 Osaka, Kansai Biogas Plant

1. Kanadevia Group's approach to climate and nature

Kanadevia Group operates in the Environmental Business, Machinery Business, Social Infrastructure Business
and Carbon Neutral Solution Business. We keep our environmental impact within the region's inherent environmental resilience,
That is our concept of "Net Zero Environmental Impacts."

 # Planetary boundaries
 # The Four Sustainability Principles
 # Sustainable Vision

1.1 Kanadevia Group's business

Kanadevia Group is developing Environmental Business, Machinery Business, Social Infrastructure Business and Carbon Neutral Solution Business. These businesses contribute building a decarbonised, resource recycling, safe and prosperous society, guided by the brand concept of **"Taking on the challenge, through the power of technology, to create a world that lives in balance with nature."** Each business is closely tied to climate and nature, and is characterised by its role in the link between business promotion and reducing the environmental impacts of local communities. Therefore, this report covers the entire scope of our business activities. Specifically, the following businesses are covered. Please refer to **Appendix 1** for a description of the facilities, equipment and other processes.

In **the Environmental Business** field, Kanadevia Group is mainly involved in the design, construction, operation and maintenance of environment-related facilities, including waste incineration power generation, biomass power generation, biogas plants (methane fermentation systems), as well as desalination plants, sludge reclamation and recycling systems, final disposal plant leachate treatment systems and water, sewage and industrial effluent treatment systems. We are widely recognized as a leading company in the field of waste incineration power generation in particular. We hold a leading global market share and delivery record, contributing to the realisation of a resource recycling society worldwide. It is recognised as the world's largest plant engineering company for waste incineration and power generation facilities, with over 1,500 facilities worldwide. In the field of water treatment, more than 400 facilities have been delivered. This report covers the WtE, biomass power generation, water and WtX Business field; the WtE Business field is the core business.

In **the Machinery Business** field, Kanadevia Group provides equipment used in the semiconductor manufacturing process and a wide range of industrial applications such as anti-reflective and anti-fouling coating equipment, filter presses, vacuum valves for semiconductors and lapping plates for diverse sectors such as food processing, healthcare, and transport industries.

In this report, these are comprehensively referred to as Machinery Business.

In **the Social Infrastructure Business** field, Kanadevia Group contributes to safe and secure urban development through the design, fabrication and construction of steel structures such as sluices, bridges and chimneys, and the seismic reinforcement and maintenance and repair of their ageing facilities. To date, we have been involved in the construction of more than 2,500 bridges and some 570 sluice gates. We are also contributing to building a disaster-resistant society by deploying flap gate-type water protection systems that are activated by natural forces such as tsunamis and storm surges. In this report, reference is made to the Social Infrastructure Business, focusing on sluice gates, bridges and flap gate-type water disaster countermeasure equipment.

In **the Carbon Neutral Solution Business** field, Kanadevia Group is involved in wind power generation, hydrogen generation systems, methanation systems, nuclear-related equipment, process systems and marine engines. To date, we delivered more than 300 marine engines to international shipping, more than 1,000 units of process equipment to the Middle East and Asia, and more than 3,000 units of nuclear-related equipment, mainly in North America. We have installed nine wind turbines in Japan and operate a power generation project in Akita Prefecture. In Aomori Prefecture, a power generation facility is under construction and is scheduled to start operation around April 2026.

Kanadevia Group's business fields

A solution partner for a sustainable, safe and secure society
"Decarbonisation", "Resource circulation", "Safe & prosperous communities"

Environmental Business

Design, construction, operation, and maintenance of environmental facilities such as Waste to Energy plants, Desalination plants, and sludge recycling and resource recovery systems.

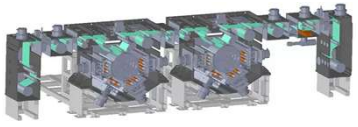
Waste to Energy Plants

Energy and Resource from Organic Waste, and Leachate Treatment Systems

Desalination Plants

Machinery Business

Deposition system for Anti-reflection and Anti-fingerprint, Filter presses, Vacuum valves for semiconductors, and various other industrial machinery.



Deposition system for Anti-reflection and Anti-fingerprint

Filter Presses

Social Infrastructure Business

Design, fabrication, and construction of steel structures such as Hydraulic Gates, Bridges, and Stacks.

Bridges

Flap-Gate Type Seawall against flood disaster

Hydraulic Gates

Carbon Neutral Solution Business

Wind Power Generation, Hydrogen Generation Systems, methanation systems, process vessels, marine engines, etc.

Hydrogen Generation Systems

Wind Power Generation

Pressure Vessels

Figure 1-1: Kanadevia Group's business fields

In this report, reference is made to four categories. First, the area including marine engines, denitration equipment, denitration catalysts and decarbonisation related catalysts is collectively referred to as the "Marine Engine Business." Secondly, the area relating to equipment and facilities for pressure vessels, casks and canisters used in transporting and storing spent nuclear fuel are referred to as the "Process Equipment Business. "Furthermore, the areas related to water electrolysers and methanation technology are referred to as the "Carbon Neutral Solution Business" and the areas related to wind power generation as the "Wind Power Generation Business."

Legend

ENV	Environmental Business
CN	Carbon Neutral Business
INF	Social Infrastructural Solution Business
MACH	Machinery Business

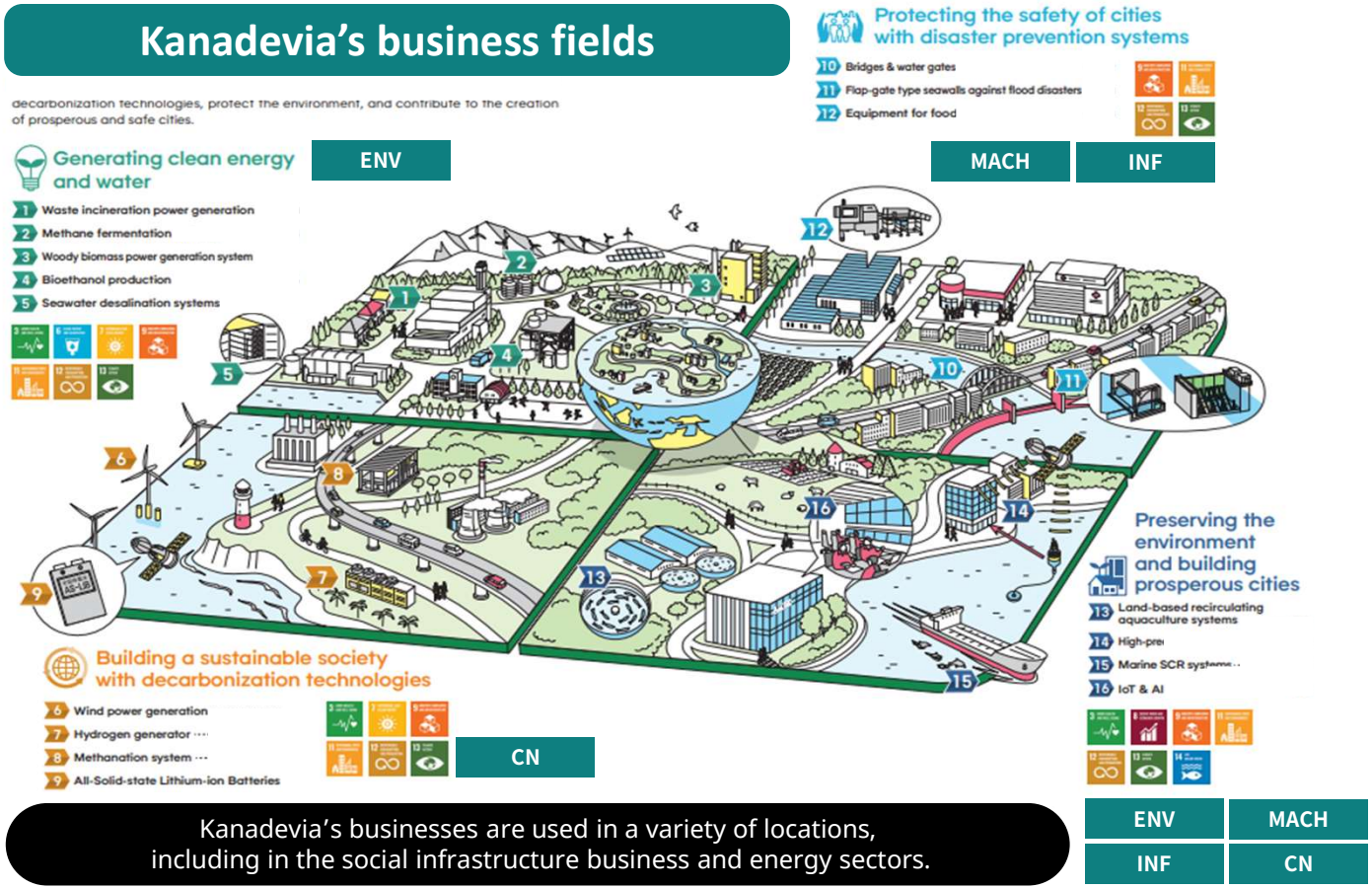


Figure 1-2: Kanadevia Group's businesses and the SDGs

1.2 Kanadevia Group's approach to climate and nature C N

Natural capital refers to the global environment and natural resources such as plants, animals, air, water and soil on which our environment, society and economy depend. Damage to natural capital can disrupt the value chain and affect our lives. Kanadevia Group is taking on the challenge of reducing the environmental impacts of its customers and business partners in order to keep the environmental impacts caused by human activity within the Earth's ecological limits.

In March 2023, Kanadevia Group formulated its vision of what it wants to be by 2050, the **"Sustainable Vision**[8)]**"**, which states that we will **"Realize zero environmental impact**[9)]**"**and **"Maximize people's well-being."** This vision, which is based on **the Four Sustainability Principles**[10)], sums up the values that we hold dear and displays our readiness to continue taking on the challenge of realising a society in which we can live with peace of mind and sustainable global environmental protection, even in 2050.

According to the concept of the **Planetary boundaries**[11)] , which defines the safe operating space for humanity and its ecological thresholds, the resilience of the Earth and local ecosystems can be maintained if human activities stay within these boundaries. In this context, **Net-Zero Environmental Impacts** can be achieved if the environmental impact of Kanadevia Group's supply chain and the environmental impact of customers who use the Group's products and services can be kept **within the range of the region's inherent environmental resilience**.

The seven **pillars of success (materialities**[12]), which we have defined as essential elements for realising our vision, include, in addition to **"carbon neutrality"**, **"complete circulation of resources"** and **"maximization of environment's recovery power"**, which are closely related to natural capital, as well as **"response to intensifying natural disasters"** and **"sustainable procurement."**

In most of Kanadevia Group's businesses, including Environmental Business and Social Infrastructure Business, Engineering, Procurement and Construction (EPC) services are provided based on customer specifications. Customers are the primary decision-makers in the value chain, determining the environmental performance and technical requirements of the products and services delivered. Therefore, we propose comprehensive solutions to reduce the environmental impact of its customers, leading to a reduction in the environmental impact of the value chain. In some businesses, such as the Machinery Business and process equipment businesses, we can directly influence environmental performance through its own manufacturing decisions.

In March 2021, Kanadevia Group expressed its support for the recommendations of **Task Force on Climate-related Financial Disclosures**[13)] (**TCFD**) and began disclosing relevant information. In December 2023, we also expressed support for the disclosure recommendations of the **Task Force on Nature-related Financial Disclosure** (**TNFD**), registered as **a TNFD Early Adopter** and published its first TNFD report in October 2024. This report refers to the TCFD Recommendations published in June 2017 and the TNFD Final Recommendations v1.0 published in September 2023, and provides integrated disclosure. In the future, in addition to the TCFD and TNFD disclosure frameworks, we will strive to proactively disclose information in line with international laws, regulations[14)], and standards[15)] and, will use this report, a basis for engaging with stakeholders and its value chain to promote innovations that enhance the resilience of the global environment. We will continue to search for innovations that can contribute to maximising the environmental resilience of the global environment.

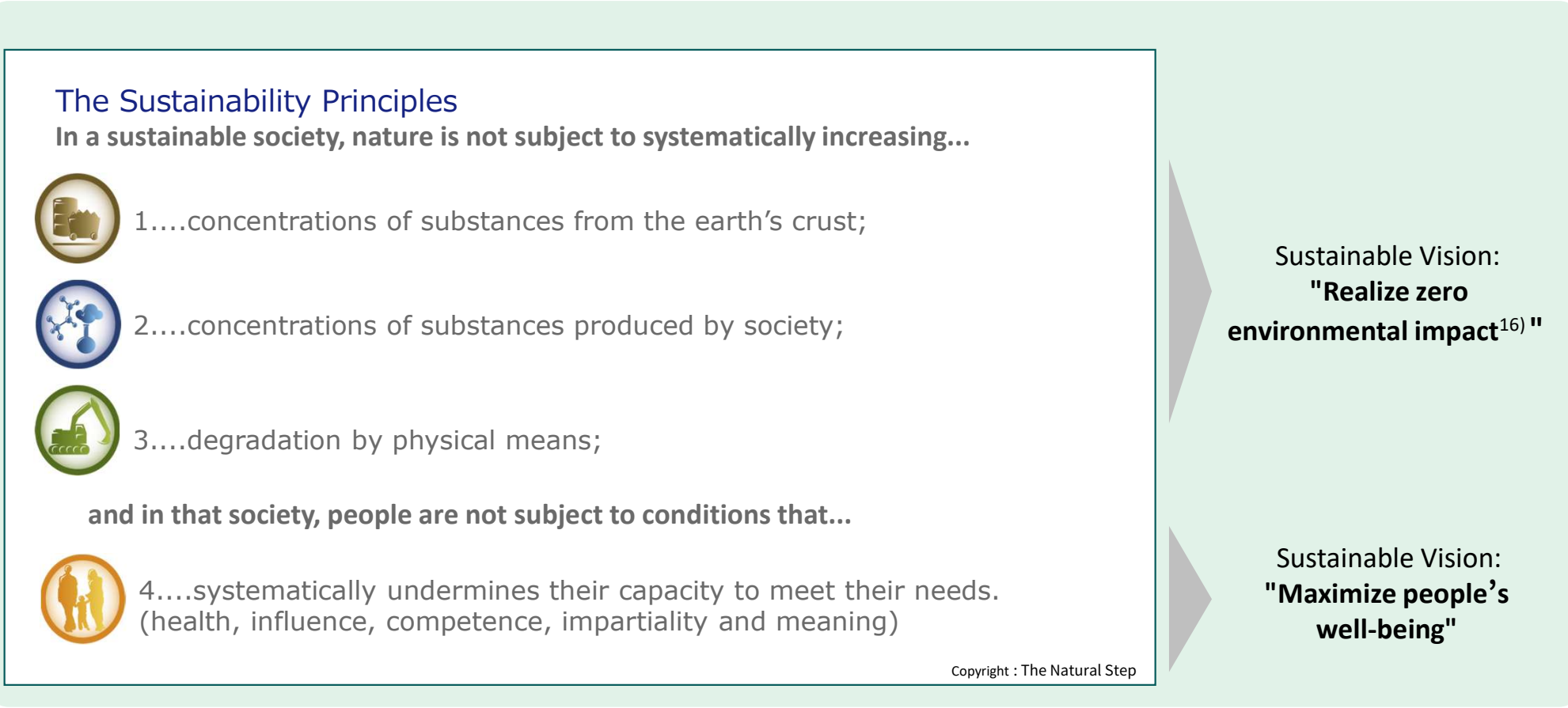
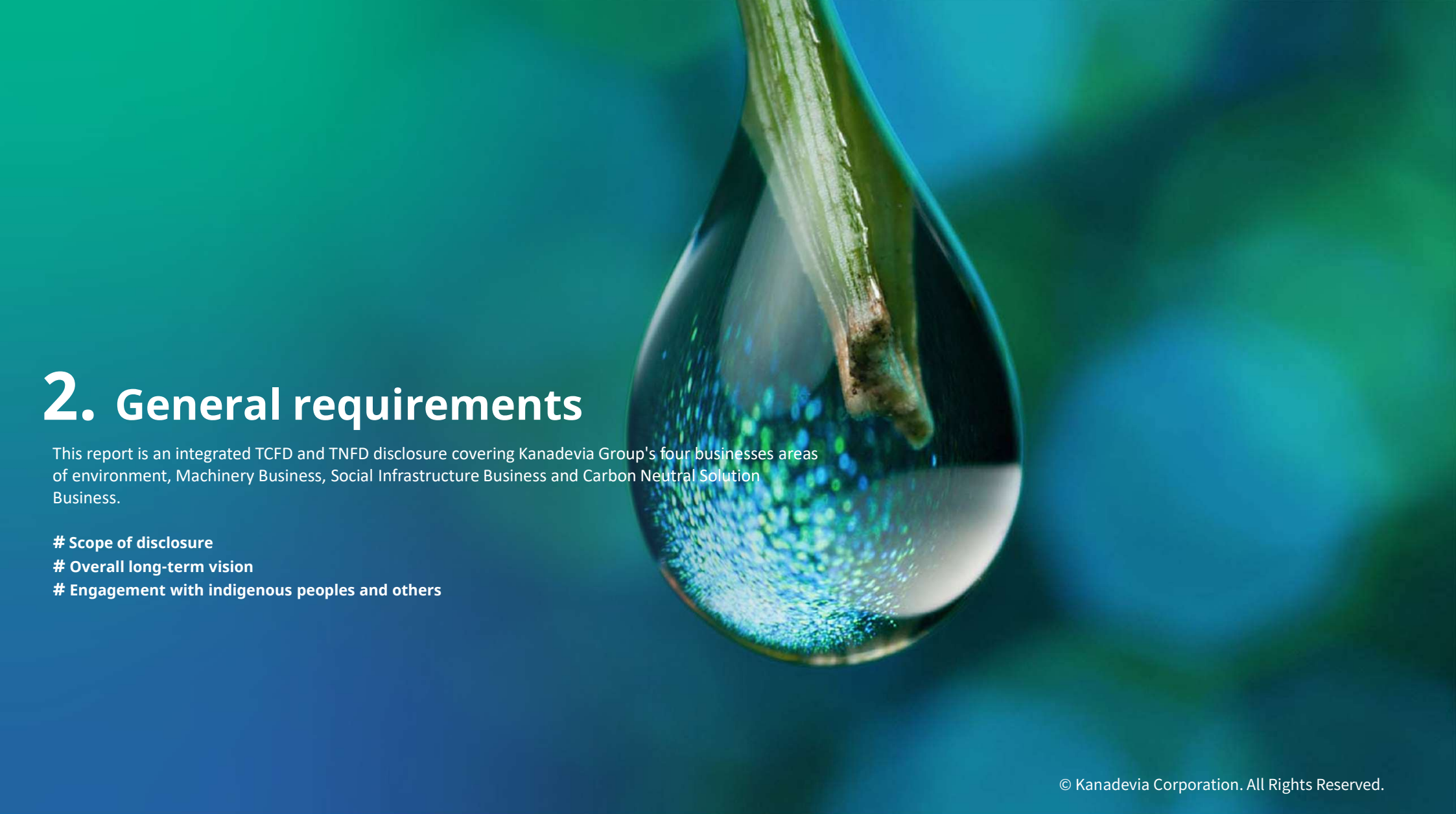


Figure 1-3: The Four Sustainability Principles and the Sustainable Vision



2. General requirements

This report is an integrated TCFD and TNFD disclosure covering Kanadevia Group's four businesses areas of environment, Machinery Business, Social Infrastructure Business and Carbon Neutral Solution Business.

 # Scope of disclosure
 # Overall long-term vision
 # Engagement with indigenous peoples and others

2 General requirements N

The TNFD Recommendation requires a description of six "general requirements[17)]" that are not included in the TCFD Recommendation. These are described below.

Item	Description
Application of materiality	Disclosures based on the Financial Materiality Standard, but also based on the Impact Materiality Standard for climate and nature.
Scope of disclosures	This report covers all the business fields defined in the medium-term management plan, namely the four business fields of Kanadevia Group: Environmental Business, Machinery Business, Social Infrastructure Business and Carbon Neutral Solution Business. In Kanadevia Group's operations include not only the sale of products manufactured in-house, but also the design and construction of facilities based on RFPs[18)] from municipalities and private operators, delivered in collaboration with construction partners. In such cases, the scope of this disclosure excludes procurement related to facilities[19)] not designed by us. In addition, although the facilities are used over a long period of time, we are not involved in dismantling facilities[20)] and therefore the various processes that occur when the facilities are disposed of are not included in the scope of this disclosure. Facilities may be operated by the company itself or by establishing a Special Purpose Company (SPC), which is contracted by the owner of the facility to operate it (hereinafter referred to as "contracted operation"), and only in these cases is the operation covered. The value chain for each item is assumed to be upstream (procurement), manufacturing and disposal for in-house plants, and procurement, design and manufacturing, construction, on-site adjustment and disposal during construction and downstream (operations) for facilities, and the main raw materials and their production locations, manufacturing locations, construction, installation and disposal locations and operation locations are organised within the scope of available data and estimated accordingly. Waste collection in WtE/WtX is excluded as it is outside Kanadevia's business scope due to lack of data. In the future, Kanadevia Group will increase the scope and availability of data acquisition for upstream and downstream of the value chain to support further analysis and expansion of the disclosure scope.
Location of nature-related issues	The impact of the procurement, manufacturing and disposal of the company's own works, and the facilitiy construction on nearby protected areas and biodiversity hotspots was assessed using environmental information for each facility, covering procurement, design and manufacturing, construction and on-site coordination, disposal during construction, and operations. For the upstream of the value chain (materials and fuel), impacts were assessed based on available and estimable information, and in cases where information was insufficient, conservative assumptions were applied. Details are provided in sections 4.1 and 4.2, but in the scope of this report, we found that the areas with significant nature-related concerns are mainly where Kanadevia Group has installed water treatment facilities and wind farms.

Item	Description
Integration with other sustainability-related disclosures	Kanadevia Group has made disclosures under the TCFD regarding its climate change initiatives, governance, strategy, risk management, indicators and targets[21]. This year's disclosures integrate the TCFD and TNFD. We will closely monitor trends in the development of future disclosure standards and proactively enhance transparency.
Time horizon considered	Kanadevia Group has set up a Sustainable Vision[22] consisting of the aspirations for 2050 "Realize zero environmental impact[23]" and "Maximize people's well-being", and has developed a 2030 vision and a medium-term management plan (Forward25)[24] using a backcasting approach to realise this vision. The period covered by this report is therefore the period between now and 2050, which is the period until this vision is achieved.
Engagement of Indigenous Peoples, Local Communities and affected stakeholders in the identification and assessment of the organization's nature-related issues	Recognising that sustainable development around the world cannot be achieved simply by conducting business activities to solve environmental challenges, but requires social inclusion where people's fundamental human needs - health, empowerment, capability, equity, purpose, and dignity - are recognised, Kanadevia Group, as well as its supply. The business is required to address respect for human rights, including in the supply chain as well as us, as it grows. Plans and progress on sustainability initiatives, including respect for human rights, are checked and managed by the Sustainability Promotion Committee. In accordance with the International Bill of Human Rights, the International Labour Organisation's (ILO) Declaration on Fundamental Principles and Rights at Work and the UN Guiding Principles on Business and Human Rights, we established a Human Rights Policy[25] in April 2024, with the target (goal) of "thorough human rights due diligence, zero tolerance for violations[26]"and promotes initiatives to respect human rights.

Item	Description
Engagement of Indigenous Peoples, Local Communities and affected stakeholders in the identification and assessment of the organization's nature-related issues	The understanding and cooperation of not only Kanadevia Group but also the suppliers that make up the supply chain is essential for initiatives to respect human rights. Therefore, we have established the Group Procurement Basic Policy[27] and conducts a sustainability survey[28] using the UN Global Compact SAQ (Self-Assessment Questionnaire) to assess supply chain compliance. Through a cycle of (i)surveys, (ii)evaluation and feedback, (iii)requests for improvement and (iv)re-evaluation, the company takes into account the human rights of local residents when procuring materials and constructing facilities, etc, as well as the actual and potential negative impacts on human rights to ensure that human rights violations such as forced labour and child labour do not occur in the supply chain. We are working to improve and enhance our efforts to address actual and potential negative impacts on human rights to ensure that human rights abuses such as forced and child labour do not occur in the supply chain.

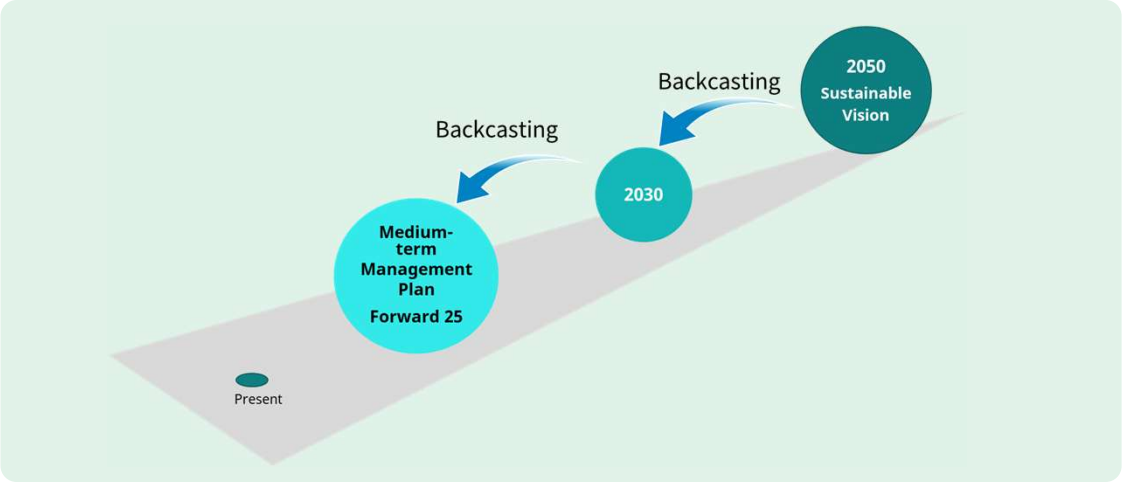
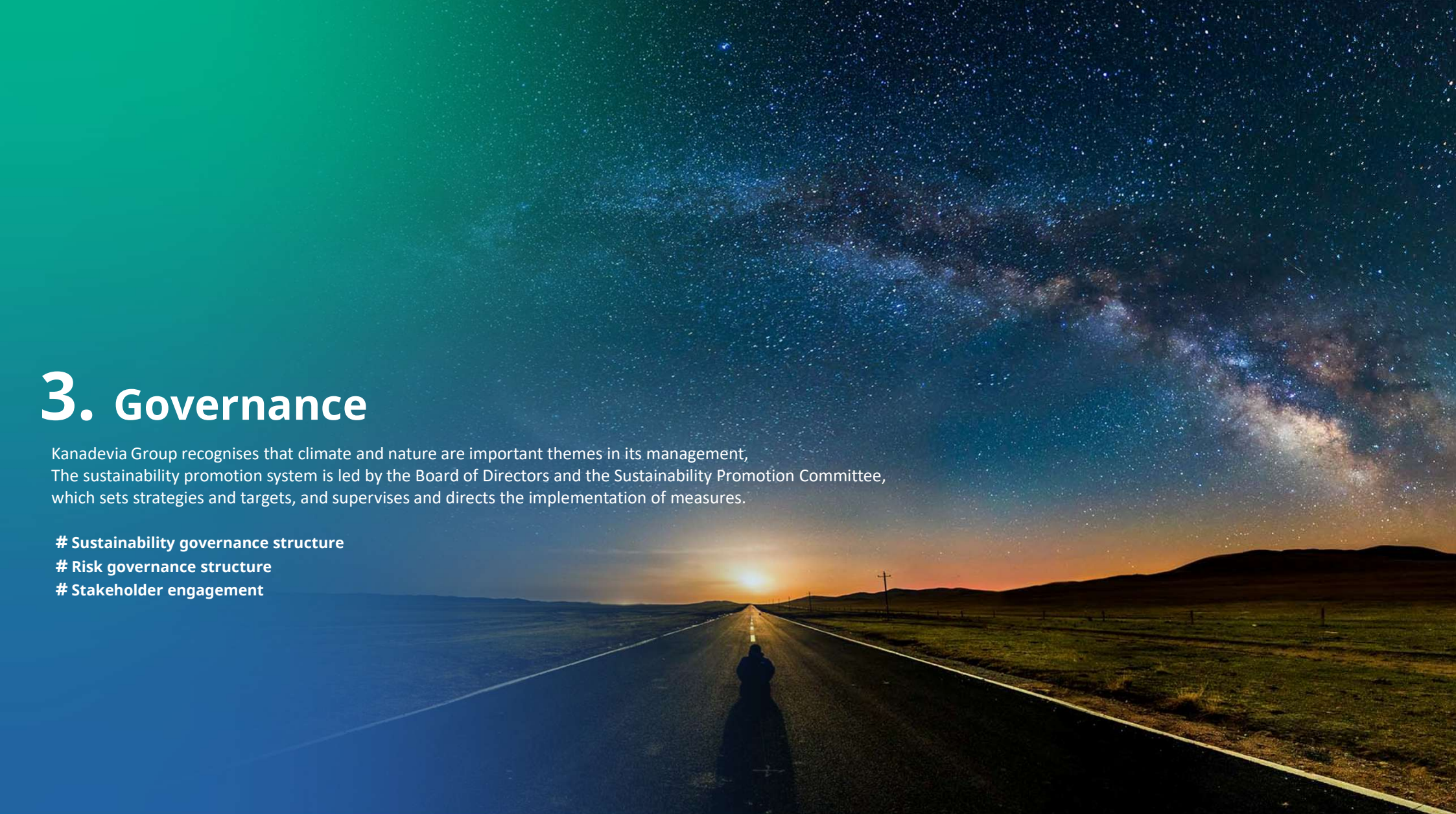


Figure 2-1: Overall picture of the long-term vision

3. Governance

Kanadevia Group recognises that climate and nature are important themes in its management,
The sustainability promotion system is led by the Board of Directors and the Sustainability Promotion Committee,
which sets strategies and targets, and supervises and directs the implementation of measures.

 # Sustainability governance structure
 # Risk governance structure
 # Stakeholder engagement



3.1 Sustainability Governance Structure C N

(1) Sustainability Promotion Committee and Sustainability Promotion Department

Kanadevia Group's sustainability governance structure, encompassing climate and nature, is led by **the Board of Directors** and **the Sustainability Promotion Committee**, which sets strategies and targets to realise the Sustainable Vision[29] and oversees and directs the implementation of strategies and measures on key issues concerning the Group's natural capital.

The Board of Directors and the Sustainability Promotion Committee deliberate on the medium-term management plan to review the strategies and targets for realising the Sustainable Vision, incorporating "climate and nature-related dependencies, impacts, risks and opportunities" (nature-related risks and others). The progress of the company's natural capital initiatives will be reviewed. The Sustainability Promotion Committee reviews the progress and other aspects of the company's natural capital initiatives and reports back to the Board of Directors. The Board of Directors receives these reports, provides oversight and direction. The Board of Directors addresses natural capital matters at least twice annually.

The Sustainability Promotion Committee is chaired by the President of the Board of Directors includes general managers, business unit heads, and Group company presidents. The Sustainability Promotion Committee is responsible for review and approve key sustainability initiatives in Kanadevia Group, oversee environmental and social risks, and approving reporting items. The Sustainability Promotion Committee meets quarterly.

The Sustainability Promotion Department, as the secretariat of the Sustainability Promotion Committee, leads the development of sustainability policies, supports implementation across the Group, and coordinates communication.

It is responsible for reporting to management on progress in business areas with high nature-related risk exposure, ensuring timely awareness and response.

The President of the Board of Directors holds ultimate executive responsibility for policy, commitment, target setting, evaluation and management of nature-related and other risks is assumed by the President of the Board of Directors of the Company. As an executive promotion, the Sustainability Promotion Department has established the **Sustainability Strategy Committee** consisting 68 members (as of 2025) from Group companies, business units and plants. This committee leads implementation efforts and ensures alignment across the Kanadevia Group. The Sustainability Strategy Committee consists of 15 subcommittees that are divided into value chain segments of our businesses. As the keystone of the executive side of achieving strategic objectives, the committee develops core sustainability policies and strategies and monitors their execution. Specifically, the **Seven Pillars of Success (Materialities)**[30] translated into concrete targets and roadmaps for each subcommittee, which also contribute strategic input for this report. In the preparation of this report, the subcommittees are also responsible for providing information input on the formulation of strategies for their respective areas.

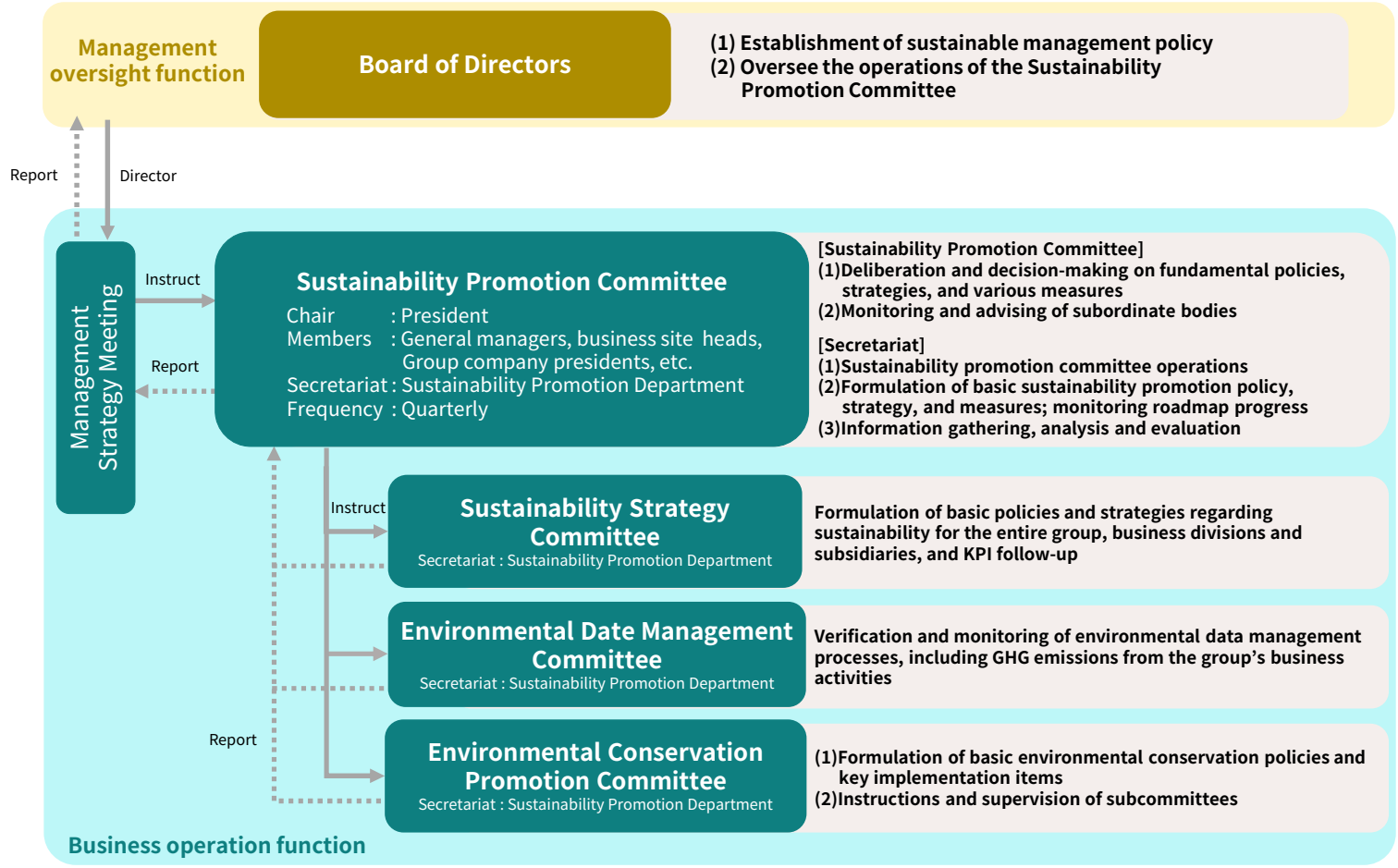


Figure 3-1: Sustainability governance structure

(2) Risk Management Committee and ERM Department

To strengthen group-wide risk management, Kanadevia Group established the **ERM Department** in March 2025 to lead the department has taken the lead in building enterprise risk management. In July of the same year, the first **Risk Management Committee** meeting convened to discuss the selection of top risks and the structure. Nature-related risks are among the key risks and are monitored mainly by the Risk Management Committee and the ERM Department.

Sustainability strategies informed by dependencies, impacts, and scenario analyses for the entire value chain. Identified risks and opportunities - particularly medium- to long-term ESG risks - are reviewed by the Risk Management Committee. In the future, the Risk Management Committee will formulate and oversee risk response policies based on discussions at the Sustainability Promotion Committee. The Risk Management Committee will establish a risk response policy based on discussions at the Sustainability Promotion Committee and establish a mechanism for monitoring. This will enable the Corporate Strategy Committee to apply the risk response policy to specific cases based on the discussions in the Risk Management Committee and to ensuring effective governance. For more information on risk management in FY2024, see **chapter 5**.

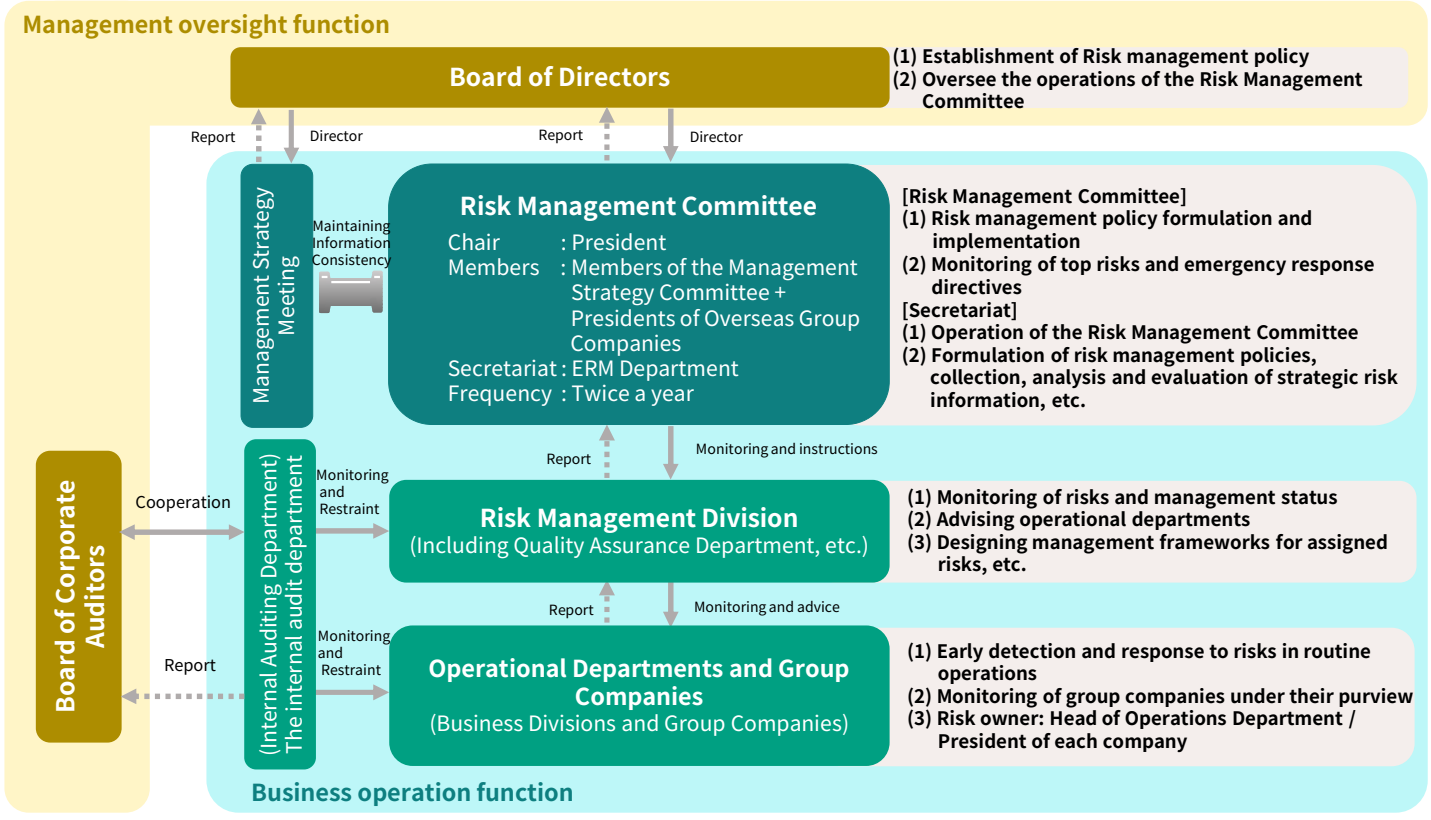


Figure 3-2: Risk governance structure

(3) Improper conduct and measures to prevent recurrence

Kanadevia Group published an investigation report in March and April 2025, based on the investigations and recommendations made by the Special Investigation Committee, on improper conduct in the marine engine business, etc.[31] Specifically, measurement data related to fuel consumption, exhaust gas components, water brake load indicators, and overall performance were falsified. These figures, which include GHG emissions, SOx, NOx, etc. These have a negative impact on climate and nature and are therefore also mentioned in this report.

Currently, as a measure to prevent the recurrence of these problems, the ERM Department is implementing and reviewing the following together with the Quality Assurance Unit, and is promoting improvements at the site.

(i) Development and operation of a system for assessing quality compliance risks.
(ii) Strengthening the Group's compliance and quality assurance systems.
(iii) Effective monitoring of sites and Group subsidiaries.
(iv) Developing and disseminating a shared code of conduct across Kanadevia Group.
(v) Continuously improving the compliance program based on internal and external lessons learned.

By strengthening its governance, Kanadevia Group will also continue to work on reducing its negative impacts on climate and nature.

3.2 Engagement with stakeholders impacted by natural capital risks N

The Board of Directors is responsible for oversees and approves disclosures and related matters through the Sustainability Promotion Committee with regard to engagement with indigenous peoples, local communities and impacted stakeholders.

Kanadevia Group believes that active engagement in sustainability in its business is an essential condition for building trust and mutual benefit between us and society, and is a social responsibility of companies. In the environmental sector, we continuously improve our environmental management system and take appropriate measures to deal with environmental risks, actively promote the use of renewable energy, energy saving, resource saving and recycling, and contributing to a recycling-oriented society, as well as actively engage in environmental conservation activities in the course of our business activities. In addition, we actively engage in environmental conservation activities in the course of our business activities. As a result, we believe that our environmental impacts remains within the resilience thresholds of natural capital, including biodiversity, leading to the creation of sustainable communities.

In the operations of Kanadevia Group's plants and operating facilities, among the nature-related risks are those related to climate change and environmental pollution caused by GHG emissions. Specifically, there is a risk of a significant impact on the natural and living environment of the communities in which our operating sites are located, due to GHG emissions, pollutant spills and noise may significantly affect the natural and living environments.

As a response to these risks, Kanadevia Group implements environmental management at its business sites and construction locations, based on international standards such as ISO 14001. For example, each of our offices and plants has established an **environmental protection promotion** plan and proactively monitors voluntary thresholds for air, water and soil pollutants, noise, vibration and odour control, in addition to the legal requirements.

In contracted operations environmental pollution risks such as pollutant spills and noise are identified. There may significantly affect the natural and living environments of the local communities in which the waste incineration and power generation and other facilities under contract to operate are located. To address these risks, we ensure that our operations comply with strict environmental standards set by facility owners and others, and in addition to daily monitoring and preventive maintenance, supports transparent communication with local communities.

Furthermore, collaboration across the supply chain is required for efforts to achieve **Net-zero environmental impacts.** Therefore, in addition to safety and quality, Kanadevia Group is committed to actively employing suppliers who demonstrate continuous improvement and are evaluated on safety, quality, fair trade, human rights, environmental stewardship, business ethics, and data protection.

Kanadevia Group has set a sustainable procurement target of a sustainability promotion score of 80 (achieving a UN Global Compact SAQ grade of 80% or higher) for all suppliers by 2050. As outlined in **Chapter 2**, the Group has established a basic procurement policy. In FY2024, we conducted a supplier survey covering 86.7% of total order value, with a response rate of 83.9% - exceeding 80% for the fifth consecutive year. The average score was 79.5%, an improvement of 3.2 percentage points from the previous year. Suppliers have commented on this activity, saying that the feedback of SAQ scores in the form of average scores and radar charts is "easy to use as a material for internal explanations." The SAQ scores and radar charts are easy to use for internal explanations, among others. In the future, we will make further efforts to improve engagement by responding to providing a user-friendly guidebook on our procurement policy and for holding briefing sessions.

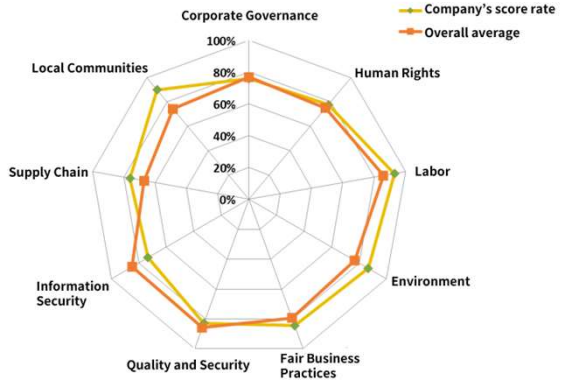


Figure 3-3: Example radar chart of SAQ scores

3.3 Engagement with other stakeholders

In our engagement with investors, we received feedback and suggestions on the TNFD Report 2024.

- "The publication of the TNFD Report 2024 is a precedent for other companies, We look forward to the company's leadership in this area."
- "The publication of the TNFD Report 2024 is a precedent for other companies, and we expect the company to take action as a leader."
- "We expect WtX to take action to address global water resource challenges through expansion of its water business."
- " We hope to see enhanced climate-related disclosures, including Climate SBT certification."

We also received a third-party opinion on the TNFD Report 2024 from Ms Sachiko Takami (former head of The Natural Step Japan and current senior advisor to The Sustainability Collaborative), who also reviewed Kanadevia Group's sustainability initiatives [32]. We received a third-party opinion on the TNFD Report 2024 (full text in **Appendix 5**). "The Four Sustainability Principles[33]" set by the international NGO The Natural Step reflect the core values of us. Ms Takami evaluated our strategy and information disclosure and suggested that the business has the potential to contribute to combating climate change and Nature Positive. She encouraged further challenge, as shown on the right.

Kanadevia Group will strive to achieve its Sustainable Vision[34] by continuously improving its initiatives based on the feedback received, and by collaborating broadly to address challenges beyond its own capabilities.

Proposed strategies for 2030

[Biography]

Regident in Sweden since 1974. Involved in establishing the Japanese office of The Natural Step, an international NGO from Sweden providing environmental education for business and government bodies, from 1999. Served as Representative of the international NGO The Natural Step Japan from 2000 to 2011. Since 2012, has worked as an Associate for The Natural Step Sweden. Served on Recycling Association Committee of the Clean Japan Centre Foundation, the Maritime Utilisation Technology Development Council for the Port and Harbours Bureau of the Ministry of Land, Infrastructure, Transport and Tourism, the Nagano Prefecture Forest Ordinance Review Committee, 3R Advancement Industrial Structure Council for the Ministry of Economy, Trade and Industry, and Policy Investment Bank of Japan Council. Currently serves as a Senior Advisor for The Sustainability Collaborative, a networ organisation of The Natural Step Sweden.

1) Of the approximately 1,000 waste incineration facilities in Japan, 38.5% are equipped with power generation facilities. The efficiency of power generation is 30% and 70% of the heat is not utilised, so a system for heat utilisation is being built in the region to increase its utilisation.

2) The subsidiary Kanadevia Inova has technology for biogas production, and as biogas utilisation is widespread in Europe, it will work with local authorities on methods and infrastructure building that can be expanded to Japan and other countries.

3) Introduce inducements to reduce the amount of plastic in waste, for example by charging a fee for the plastic content.

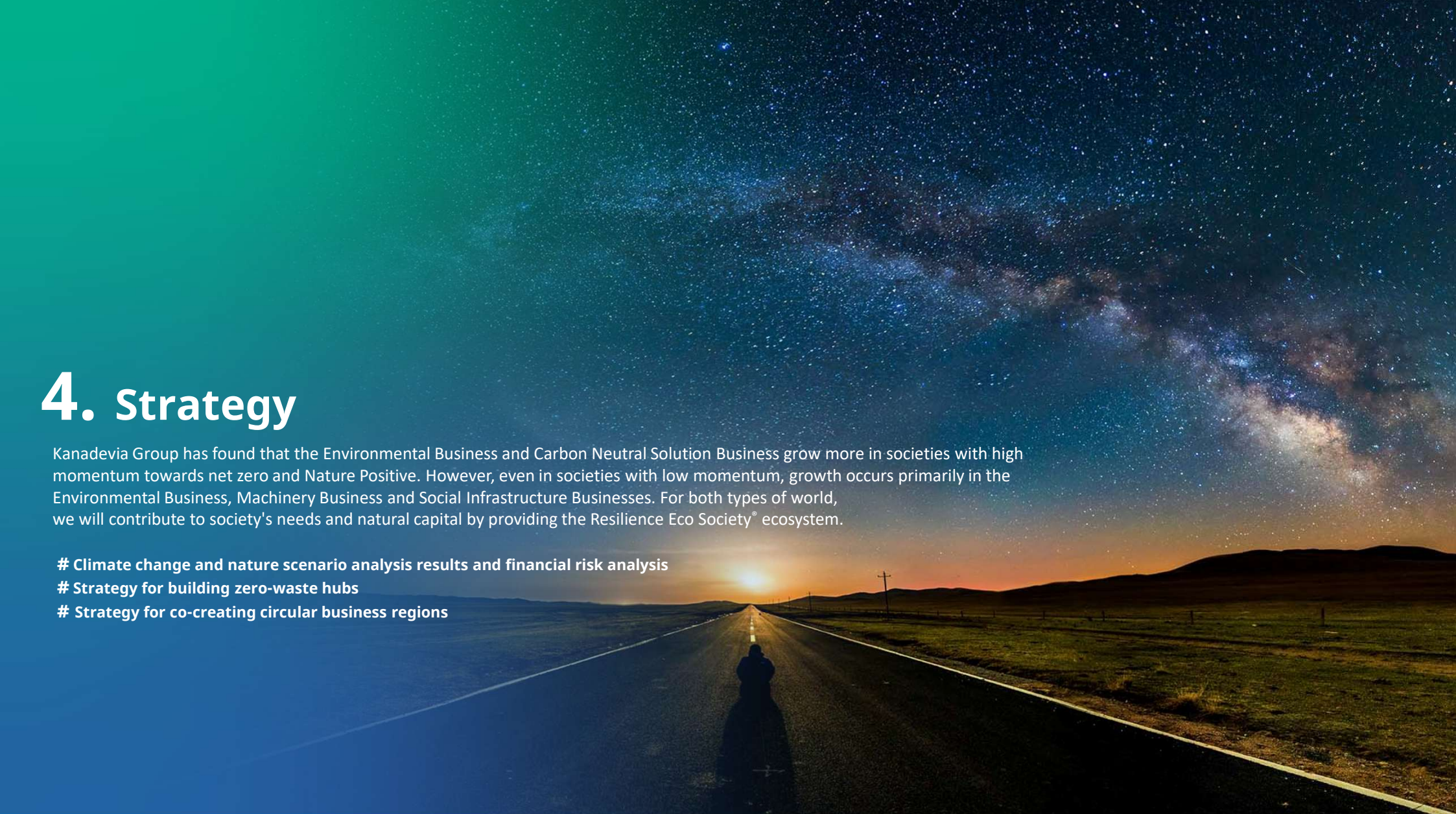
4) Consider with municipalities and recycling companies a system for recycling waste collected for incineration with further material separation into food waste, plastics and metals.

5) Policy risks of transition risk include "lower electricity generation due to a decrease in the amount of waste incinerated as a result of stricter recycling and other systems, the setting of recycling standards for incineration residues, and increased costs in the event of non-compliance with laws and regulations." However, backcasting from a sustainable society makes it desirable to reduce waste, so it is possible that CCS[35], which captures and buries carbon dioxide, could become a new business if it is not seen as a risk, or if a carbon tax or emissions trading is introduced. Policy advocacy activities will also be considered.

4. Strategy

Kanadevia Group has found that the Environmental Business and Carbon Neutral Solution Business grow more in societies with high momentum towards net zero and Nature Positive. However, even in societies with low momentum, growth occurs primarily in the Environmental Business, Machinery Business and Social Infrastructure Businesses. For both types of world, we will contribute to society's needs and natural capital by providing the Resilience Eco Society® ecosystem.

 # Climate change and nature scenario analysis results and financial risk analysis
 # Strategy for building zero-waste hubs
 # Strategy for co-creating circular business regions



4.1 Dependence on and impact on natural capital C N

(1) Overview of the risk assessment of dependence and impact in this section

This section presents a risk analysis of the Kanadevia Group's dependencies on and impacts on natural capital in relation to our businesses to identify and refine the impacts that are important for the company in relation to various natural capital (see section 5.1 for the process of identifying and assessing nature-and climate-related risks and other risks). The dependencies on and impacts on nature in relation to our own operation sites and the raw material procurement sites of its suppliers in relation to the target business were assessed by using ENCORE[36], as recommended by TNFD, consistent with the previous year. The details of the high risk assessment are described in section 4.4.

(2) Risk assessments using ENCORE

The scale and nature of ecosystem impacts from business activities were evaluated by referring to the guidelines provided in the already published TNFD v1.0 LEAP approach[37] and the ENCORE values recommended for use in the TNFD framework. For business fields not classified under ENCORE, we adopted the category of the most similar business, comparing it with operational data and environmental-related data from Kanadevia Group's works and facilities.

These were used to assess the impact on natural capital and dependence on ecosystem services. Note that the industry classification in ENCORE was changed from the World Industry Classification standard adopted at the time of the analysis of the TNFD Report 2024 to the International Standard Industrial Classification in the 2024 update, so adjustments were made accordingly using the provided control table. In addition, the stages of the value chain presented in Chapter 2 have been organised and estimated within the scope of the available data.

The risk assessment was made on a five-level scale (Very High, High, Medium, Low, Very Low) according to ENCORE. First, the ENCORE assessment was organised for each of the adopted industry classifications. The global average in each of the industrial classifications on which this assessment is based does not necessarily correspond to the current state of operations in Kanadevia Group. For this reason, the assessment was refined based on plant locations, equipment, regulatory compliance, and internal standards, the agreements with laws, regulations and local authorities, and the fact that operations are based on our own standards. In Tables 4-1 and 4-2, the natural capital ecosystem services involved with us are selected and listed, while other items are omitted. The results of the assessment of each project are presented in Appendix 2, and this chapter describes the main results, those with a risk rating of Very High and High.

Kanadevia Group's dependence on natural capital

Dependence on natural capital refers to the hidden benefits businesses receive from nature. The potential business impact of losing these benefits is carefully assessed.

[Feature]

Many operations show a strong dependence on climate-related ecosystem services, such as rainfall pattern regulation and climate regulation. There is also significant reliance on solid waste remediation, particularly due to landfill activities during disposal.

[ENCORE assessment changed]

While the ENCORE rating for WtE plant and infrastructure disposal was initially Very High, it has been revised to High in recognition of proper waste management practices in developed countries.

Legend of icons

- Spiritual, artistic and symbolic
- Rainfall pattern regulation
- Global climate regulation
- Local climate regulation
- Water flow regulation
- Solid waste remediation
- Water supply

* Only those rated Very High and High are listed. There are no Machinery Business whose dependence has been set to Very High or High.
* WtE, wind power generation were assessed only during operation, as its facilities and equipment are composed of concrete and steel, as are waste incineration and power generation facilities and equipment.

Table 4-1: Kanadevia Group's dependence on natural capital

Projects		Processes	ENCORE classification	Assessment result	
				Very High	High
Environmental Business	WtE	Procurement	Manufacture of basic iron and steel	-	Water flow regulation, Water supply
			Manufacture of cement, lime and plaster	Spiritual, artistic and symbolic	-
		Construction and site coordination	Other construction installation activities	-	Global climate regulation, Local climate regulation
		Disposal during construction	Treatment and disposal of waste	-	Solid waste remediation
		Infrastructure disposal	Demolition	Rainfall pattern regulation	-
			Treatment and disposal of waste	-	Solid waste remediation
	WtX	Operation	Materiality recovery	-	Solid waste remediation
Social Infrastructure Business		Procurement	Manufacture of basic iron and steel	-	Water flow regulation, Water supply
			Manufacture of cement, lime and plaster	Spiritual, artistic and symbolic	-
		Construction and site coordination	Construction of utility projects	Rainfall pattern regulation	-
		Disposal during construction	Demolition	Rainfall pattern regulation	-
			Treatment and disposal of waste	-	Solid waste remediation
Carbon Neutral Solution Business	Wind power generation	Operation	Wind energy provision	Global climate regulation	-
	Casks	Infrastructure disposal	Treatment and disposal of waste	Solid waste remediation	-

Kanadevia Group's impact on natural capital

Impacts on natural capital refer to activities that negatively affect nature, such as pollution or land use. These impacts can also affect local stakeholders who rely on natural resources.

[Features]

Significant impacts on land, freshwater, and seabed use were identified in environmental projects (WtE, biomass power and WtX)and infrastructure projects. We also found that **emissions of GHGs, non-GHG pollutants, and other environmental disturbances were common to many projects.**

[ENCORE assessment changed]

The ENCORE rating for ecological disturbance during construction, on-site adjustment and infrastructure disposal has been rated lower, as consideration has been given to this issue by implementation of voluntary standards that exceed legal environmental requirements based on the environmental management system.

Legend of icons

- GHG: Emissions of GHG
- Non GHG: Emissions of Non-GHG air pollutants
- Disturbances (e.g noise, light)
- Emissions of toxicpollutants to water and soil
- Emissions of nutrient pollutants to water and soil
- Volume of water use
- Generation and release of solid waste
- Area of freshwater use
- Area of land use

* Only those rated Very High or High are listed.
* For biomass, biogas, WtX and water, only operational and inherent processes were assessed, as their facilities and equipment are composed of concrete and steel, as are waste incineration and power generation facilities and equipment.

Table 4-2: Kanadevia Group's impact on natural capital

Business		Processes	ENCORE classification	Assessment result	
				Very High	High
Environmental Business	WtE	Procurement	Manufacture of basic iron and steel	-	GHG, Non GHG
			Manufacture of cement, lime and plaster	-	GHG, Non GHG
		Design and manufacture	Manufacture of special-purpose machinery	-	GHG
		Construction and site coordination	Other construction installation activities	Land use	GHG, Disturbances, Toxic pollutants, Water use, Freshwater use
		Disposal during construction	Other construction installation activities	Land use	GHG, Disturbances, Toxic pollutants, Water use, Freshwater use
			Demolition	Land use	GHG, Toxic pollutants, Water use, Freshwater use
			Treatment and disposal of waste	Land use	Disturbances
		Operation	Fossil fuels energy production	GHG	Non GHG, Freshwater use
		Infrastructure disposal	Demolition	Land use	Toxic pollutants, Water use, Freshwater use
			Treatment and disposal of waste	-	GHG, Toxic pollutants, Nutrient pollutants, Water use
	Biomass power generation	Procurement	Sawmilling and planning of wood	-	GHG, Water use
		Operation	Biomass energy production	-	Non GHG, Non GHG
	Biogas power generation	Operation	Treatment and disposal of waste	-	GHG, Toxic pollutants, Nutrient pollutants
	WtX	Procurement	Treatment and disposal of waste	-	GHG, Toxic pollutants, Nutrient pollutants
		Operation	Remediation activities and other waste management services	-	GHG
	Water	Operation	Water collection, treatment and supply	-	Freshwater use, Land use
			Sewage	-	GHG

(3) Trends in total environmental impact

While ENCORE is useful for identifying risk locations within the supply chain, it is not designed to quantify the types or volumes of environmental impact.

Therefore, in order to understand how much of our environmental impact is GHG emissions, Kanadevia Group calculates GHG in accordance with the Ministry of the Environment's Basic Guidelines for Calculating Greenhouse Gas Emissions of Organisations through Supply Chains, which are available on the ESG Databook[38]. According to the calculations, Scope 3 Category 11 (GHGs from product use) is by far the largest source of GHG emissions (Scope 3 Category 11 accounts for over 90% of all Scope 1, 2 and 3 emissions) for GHG emissions (Scope 1, 2 and 3) and further specific analysis shows that "use of WtE (GHGs emitted during WtE use (i.e. the incineration of waste using WtE plants)" are found to account for most of the emissions (over 70-90%). In 2024, this figure rose due to the delivery of a large WtE plant to Dubai, UAE, which significantly impacted lifecycle emissions. Thus, our environmental impacts are mostly accounted for by the WtE for which several orders were received in the year in question.

It should also be noted that a large proportion of emissions are from "Purchased goods and services (Scope 3 Category 1)" and Category 11 excluding WtE (the remaining approximately 50% of emissions are from "Use of marine engines"). This is because the marine engine business manufactures engines for tankers and other large vessels, and heavy oil is used as fuel for the engines.

Table 4-2: Kanadevia Group's impact on natural capital (Continued)

Business		Processes	ENCORE classification	Assessment result	
				Very High	High
Machinery Business		Design and manufacturing	Electronic components and Manufacturing of electronic components and infrastructures	-	
Social Infrastructure Business		Procurement	Primary steel manufacturing	-	
			Cement, limestone and gypsum manufacturing		
		Construction and site coordination	Utility construction industry		
		Infrastructure disposal	Demolition	-	
			Waste treatment and disposal	-	
Carbon Neutral Solution Business	Marine Engines	Procurement	Primary steel manufacturing	-	
	Wind Power	Operation	Provision of Wind Power	-	
	Pressure vessels	Procurement	Primary steel manufacturing	-	
	Casks	Procurement	Primary steel manufacturing	-	
		Disposal	Waste treatment and disposal		

Legend of icons

- Emission of GHG
- Emission of Non-GHG air pollutants
- Disturbance (e.g. noise, light)
- Emissions of toxic pollutants to water and soil
- Emissions of nutrient pollutants to water and soil
- Volume of water use
- Generation and release of solid waste
- Area of freshwater use
- Area of land use

* Only those rated Very High or High are listed.
* For biomass, biogas, WtX and water, only operational and inherent processes were assessed, as their facilities and equipment are composed of concrete and steel, as are waste incineration and power generation plants and equipment.

4.2 Location disclosures N

(1) Principal locations where the business is conducted

Kanadevia Group is engaged in the manufacture and sells equipment and devices. In organising the relationship between the environmental impact and the locations in which it operates, we have analysed the businesses with more extensive contact with the environment and with long-term plant engineering functions (Environmental Business, Social Infrastructure Business and Carbon Neutral Solution Business). In these businesses, the main products and equipment are manufactured at our own plants and delivered to customer facilities together with purchased products and other items. The customers to whom the products and other equipment are delivered are located all over the world, and the facilities are constructed at the customer and operated by the customer or by us, which is contracted to operate them. Therefore, the location analysis was conducted for both Kanadevia's plant locations and the sites where major facilities are constructed and operated in each business field. The main locations where the projects are implemented (where the customer's facilities are located) are as follows.

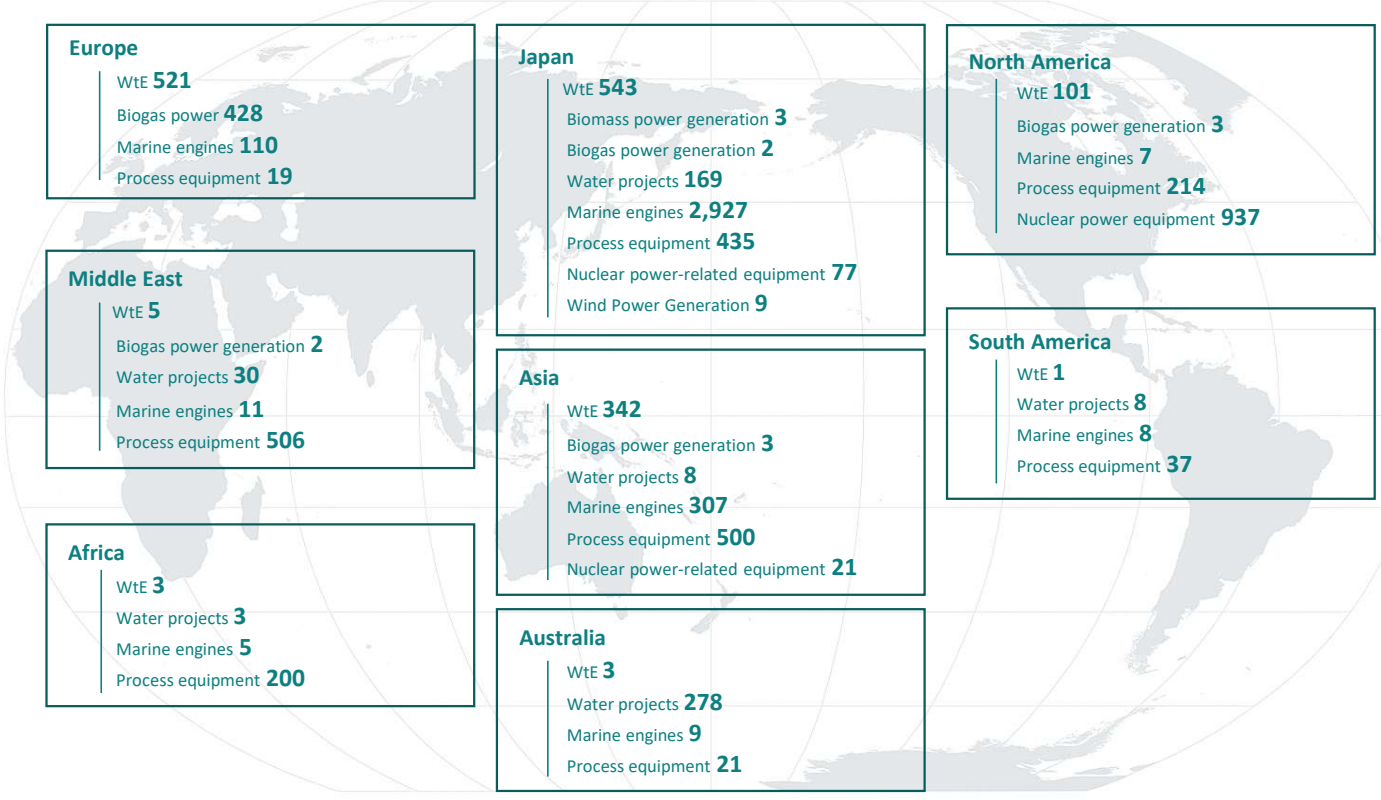


Figure 4-1: Main implementation sites of Kanadevia Group's various businesses (cumulative total).

* Includes facilities operated by subsidiaries under contract.
* The WtX project and projects related to Carbon Neutral Solution Business systems are in the demonstration phase.
* The biogas Waste to Energy includes licensees facilities outside Japan.
* Water projects are the results of human waste treatment facilities and reverse osmosis (RO) treatment facilities. Includes some facilities in Japan whose operational status cannot be confirmed.
* The ship engine business represents shipyard/plant-based deliveries since production commenced in 1950.
* Machinery Business and Social Infrastructure Business deliver to customer facilities, mainly in Japan and Asia, but are not counted in this table.
* Data is disclosed to the extent available.

Environmental Business

For the WtE Business, Kanadevia Group operates mainly in Europe, Japan, the Middle East and Southeast Asia. Of these, Europe and Japan have strict environmental regulations, but the environmental risk is effluent treatment low as the business operates in compliance with these strict regulations. We are promoting projects to reduce local environmental risks, such as reducing methane emissions by installing WtE in areas with high landfill ratios, especially in open dumping areas where waste is landfilled without prior treatment, and we have experience in Thailand (350 tonnes) and Malaysia (600 tonnes). In particular, the Solid Waste Modular Advance Recovery and Treatment waste-to-Energy ("SMART WTE") Plant[39] in Malaysia is the first incineration plant to be built in an open dumping area and has achieved open dumping reduction through waste incineration (600 tonnes/d of the 3,000 tonnes/d of incoming waste is incinerated). In Thailand, Indonesia, Malaysia and other countries, we are also promoting initiatives in collaboration with waste contractors. Furthermore, the WtE project in Dubai, UAE (facility completion in August 2024, 35 years of operation) is a landmark project in recent years. A similar project is also underway in Abu Dhabi City. These are being carried out while strengthening cooperation between Group companies. In the water business, we are developing sludge reclamation, recycling and final disposal plant leachate treatment systems and water, sewage and industrial wastewater treatment systems in Japan and South East Asia (Cambodia, Malaysia, Indonesia, etc.), as well as in Australia, New Zealand and the Middle East, particularly in the United Arab Emirates (Saudi Arabia, Oman and parts of North Africa), including mine wastewater treatment and industrial effluent treatment.

In the Pacific region (Fiji, Tonga, Samoa, etc.), water supply facilities are being deployed in response to the impact of climate change, which is threatening traditional rainwater and groundwater sources.

For the WtX project, discussions are underway in Thailand, China, Indonesia, Vietnam and other countries to install the first unit of the EFCaR system (Energy-Free Carbonisation System). Regarding bioethanol production, we also have been commissioned by the Tokyo Metropolitan Government to develop a project to convert municipal waste into Sustainable Aviation Fuel (SAF). Furthermore, biomethanation initiatives target sewage treatment plants with digesters and food factories with methane fermentation facilities in Japan and South-East Asia.

Machinery Business

Machinery Business products are mainly manufactured at the Chikko Works, Maizuru and Wakasa Works in Japan.

Social Infrastructure Business

Social Infrastructure Business products are mainly manufactured at Sakai and Mukaishima Works in Japan.

Carbon Neutral Solution Business

For the marine engine business, Kanadevia Group manufacture products at Ariake and Innoshima Works in Japan.

For the process equipment business, pressure vessels and casks/canisters (containers for transporting and storing spent nuclear fuel) are manufactured at Ariake Works in Japan and supplied worldwide. Casks are also manufactured by a Group company in Canada.

In the Carbon Neutral Solution Business, hydrogen generators have been delivered mainly to customers in Japan for PtG[40] demonstrations, and a larger-scale demonstration is currently underway in the GI Fund project[41]. In addition, a plant is being constructed in Tsuru City, Yamanashi Prefecture, for the mass production of hydrogen generators. Outside Japan, we are also considering business development in the Middle East and India. In addition, we are developing our methanation business in Japan, Europe and Oman. In Oman, a pilot plant (e-methane[42] production capacity: 18,000 Nm^3/h) and a commercialisation plant are under study, and a commercial-scale facility is under consideration, including seawater desalination, hydrogen production, and methanation systems.

Onshore wind power projects are primarily developed in Japan, involving the construction and operation of wind turbines. Specifically, two sites in Akita Prefecture (2 MW x 2 units) are in operation, and 15 wind turbines (4.3 MW x 15 units) are under construction in the Mutsu Ogawara region. Offshore wind turbines are currently in the development phase, but Kanadevia Group is providing the foundations of the wind turbines to Japanese customers.

(2) Environmental impact of procurement

Kanadevia Group procures based on customer RFPs. The results of the ENCORE risk analysis seen in **section 4.1** shows that the procurement process within the value chain also has a generally high environmental impact, mainly in steel and machinery.

(3) Assessment of biodiversity importance by site of direct operations etc.

Next, Kanadevia Group conducted the biodiversity assessment of sites and facilities, including direct operations. Using databases of Protected Areas and Key Biodiversity Areas (KBA)[43], which are important areas for biodiversity conservation, the relationship between the location of operations and the habitats of rare species was assessed. The assessment was made on a five-point scale (Very High, High, Medium, Low and Very Low in order of importance to biodiversity conservation), considering location, business characteristics, legal frameworks, community agreements, and our internal standards.

The results showed that the most important, i.e. highest risk, sites for biodiversity for Kanadevia Group are those where environmental products and services delivered to customers are installed. This is because land use occurs during construction. On the other hand, as the products and services delivered by us are facilities that contribute to environmental restoration, such as WtE and sewage treatment, helping local ecosystems recover beyond their pre-installation state.

It was also found that the biodiversity risks may increase in the event of environmental accidents at both Kanadevia Group's facilities and at the site where the facilities are installed.

Kanadevia Group will therefore continue to carry out appropriate environmental management through its own environmental management system, while at the same time promoting maintenance and repairs to ensure that the facilities delivered to customers operate properly over the long term. The following table shows the analysis of our own facilities and those of our customers.

[Own facilities]

Kanadevia Group's plants and sites, even where there are nature reserves or KBAs in the vicinity, have all been found to have less than Medium impact, as their environmental impact is kept below the voluntary standards, which are stricter than the legal requirements, through environmental management.

Figure 4-2: (Front left) Kanadevia Corporation Ariake Works and Hitachi Zosen Marine Engine Corporation

[Customer facilities]

Kanadevia Group found that some of the environmental projects were assessed as Very High or High in water facility installations (customer premises), High in infrastructure project installations and High in Wind Power Generation project installations in Carbon Neutral Solution Business projects. Examples are given below.

Water project: Ranger Uranium Mine, Kakadu, Northern Territory (Australia)

The uranium refinery receiving Kanadevia Group's wastewater treatment facilities is located in the Kakadu National Park and three KBAs (Arnhem Plateau, Alligator Rivers Floodplains and Kakadu Savanna). There, mainly in freshwater, a species of family Palaemonidae within the order Decapoda of crustaceans (*Leptopalaemon glabrus*) (CR (Critically Endangered), which is listed as endangered on the IUCN Red List, and the bird species White-throated Grasswren (*Amytornis woodwardi*) (EN (Endangered)), Red Goshawk (*Erythrotriorchis radiatus*) (EN), Sharp-tailed Sandpiper (*Calidris acuminata*) (VU (Vulnerable)), and Black-necked Stork (*Ephippiorhynchus asiaticus*) (NT (Near Threatened)). The habitat of these creatures, especially the Sharp-tailed Sandpiper and the Black-necked Stork, which inhabit rivers, brackish waters and tidal flats, varies greatly depending on the quality of the water in the river. This means that if wastewater from refineries is discharged into rivers without treatment, could cause significant ecological damage.

Kanadevia Group's wastewater treatment facilities play a role in ensuring that mine wastewater is properly treated and that pollution of the rivers into which the plant's effluent flows is avoided. In other words, because the introduction of wastewater treatment facilities is considered to have improved the quality of the water in the rivers more than it did before, aligning with Nature Positive's goal of halting and reversing nature degradation. However, if an environmental incident were to occur, such as an increase in the level of pollution of the plant's effluent, the aforementioned concerns about damage to living organisms would arise. From this it can be seen that our wastewater treatment facilities need for high-quality facilities and management to ensure stable operation.

Therefore, the significance of the location of the facility was judged to be Very High. The plant is also located almost adjacent to the Indigenous Protected Area Warddeken. Although it is not clear how the mine wastewater relates to the water supply of the indigenous people, the wastewater treatment facilities, which properly treats mine wastewater, plays a very important role in preventing health hazards (including radiation hazards) for the indigenous people.

Figure 4-3: Ranger Uranium Mine Wastewater treatment plant, etc.

Water project: Alumina Refinery, Gladstone, Queensland (Australia)

The Alumina Refinery, supplied with wastewater treatment facilities by the Kanadevia Group, is located approximately 8 km from Garden Island Protected Park. The nearby open sea includes the Great Barrier Reef, a UNESCO World Natural Heritage Marine Protected Area.

The alumina refinery installed Kanadevia Group's wastewater treatment facility as a countermeasure to the damage experienced by the alumina refinery, which was forced to reduce production capacity to 50% due to cyclone-induced wastewater overflow. We worked closely with the plant on site to ensure that the facilities were quickly installed and contributed to the plant's normal operation.

It can be assumed that the wastewater overflowing from the refinery flowed into the sea via rivers, etc. and had a negative impact on the aforementioned marine protected area, which was improved by the introduction of the wastewater treatment facilities by us. Therefore, we believe that this case is also consistent with the main objective of Nature Positive, which is to "halt and reverse the degradation of nature." The key point of this case is how quickly the wastewater treatment facility can be introduced, meaning that high technical competence in the preparation and start-up of equipment procurement items is required. For these reasons, the importance of the location of this facility was judged to be Very High.

Social Infrastructure Business: Amagase Dam (Uji, Kyoto (Japan))

The Amagase Dam, to which Kanadevia Group is supplying a sluice gate, is located on the Uji River, upstream of the Yodo River. The Uji River is home to fish (Striped Bitterling (*Acheilognathus cyanostigma*) and Deepbodied Bitterling (*Acheilognathus longipinnis*) (both EN)), amphibians (Japanese Giant Salamander (*Andrias japonicus*) (VU)), insects (Naniwa-tombo (*Sympetrum gracile*) (NT)) and other species listed as endangered in the IUCN Red List of Threatened Species.

Changes in water volume due to dam sluice operations affect the Yodo River system downstream of the dam, so maintaining the sluice gates in proper operation has a significant impact on nature. For these reasons, the importance of this facility in its location was judged to be High.

Wind Power Generation project: Hibikinada offshore wind farm (Fukuoka, Japan)

The Hibikinada offshore wind farm, where Kanadevia Group supplied a floating wind turbine, is located approximately 4 km from the special protection area for swans and wildlife. It is home to birds listed as endangered in the IUCN Red List, such as the Japanese Murrelet (*Synthliboramphus wumizusume*) (VU) and the Streaked Shearwater (*Calonectris leucomelas*) (NT). The Japanese Murrelet is also listed as a Natural Monument in Japan, along with The Black Wood-Pigeon (*Columba janthina*).

Bird strikes and habitat degradation due to the installation of offshore wind farms pose risks for the above-mentioned birds and their endangerd predator, the Peregrine Falcon (*Falco peregrinus*), and the Osprey (*Pandion haliaetus*) (both LC (Least Concern)), as they fly over the ocean. In addition, the Japanese Murrelet is a species that forages and rests in coastal waters, and the installation and operation of the delivered floating structure may affect their habitat. For these reasons, the importance of the site in the location of this facility was judged to be High.

Figure 4-4: Japanese Murrelet (©The Wild Bird Society of Japan).

4.3 Scenario analysis C N

(1) Climate scenario setting and analysis results

The following section presents the climate scenario setting and analysis results, a stress test in accordance with the TCFD.

Climate scenario setting

Regarding climate scenarios, we consider a stricter 1.5°C target to the current situation, i.e. a world with a median average temperature of 2.5°C to 3°C at 2100, as opposed to the current extended world, and the 4°C scenario, a world with higher emissions than the current situation, are used.

The **1.5°C scenario** assumes strong regulatory transition risks and reduced physical risks: by 2050, carbon neutrality has been achieved in many parts of the world and climate change is kept within a certain degree.

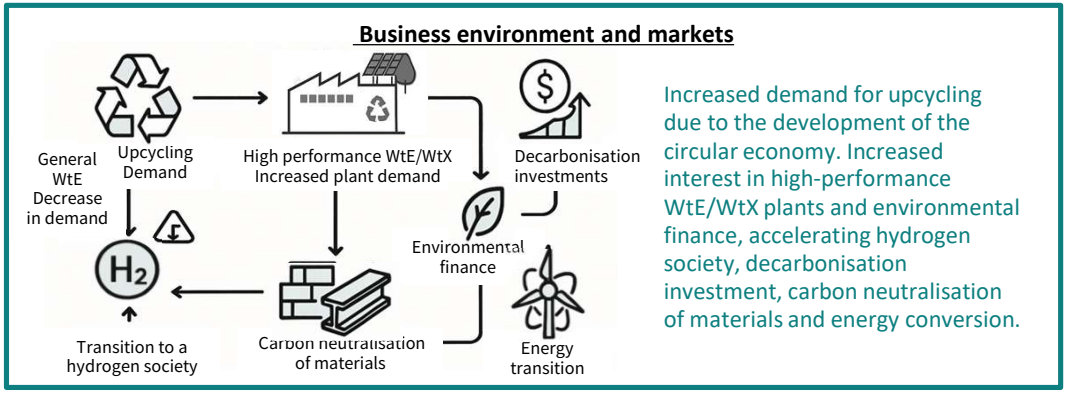
As a result, the increase in physical risks from natural disasters, such as typhoons becoming stronger and flooding from heavy rainfall, is controlled. In this scenario, carbon pricing increases gradually and more quickly than in the current situation, with the introduction of renewable energy in many countries and the production and use of e-fuel[44] such as green hydrogen[45], green ammonia[46] and e-methane. Net zero approaching as decarbonization policies are introduced in many countries and the international community as a whole is being guided towards achieving international low-carbon targets. Investment through sustainable finance, which encourages them, is also active, attracting investment in companies that are proactive in climate change action and its disclosure. Procurement materials such as steel and concrete are rapidly decarbonising around the world, with the introduction of renewable energy and Carbon Neutral Solution Business of fuels on the part of suppliers.

Furthermore, alongside customer demands for GHG emission reductions in Kanadevia Group products and systems, interest in businesses contributing to decarbonisation is growing. AI optimises energy and material efficiency of society by controlling demand and supply and enhancing the circular economy practices. Recycling policies are achieving their targets ahead of schedule, and major recycling centres are seeing a reduction in the demand for refuse incineration and minimising residues. Refuse collection expands due to shortages in combustible waste supply.

In the 1.5°C scenario, the proportion of plastic waste in the total volume of general waste has decreased significantly, as alternatives are provided in the process of achieving fuel decarbonisation. In addition, the CO_2 produced during incineration is captured by CCUS (Carbon dioxide Capture Utilisation and Storage). In waste incineration power generation, CCUS installation are now standardised, and WtX implementation has been realized.

Government
- Significant increase in carbon tax
- Progres in international cooperation towards carbon neutrality
- Accelerated introduction of financial and industrial policies towards carbon neutrality

Energy mix
- Achieved carbon neutrality of electricity by increasing the ratio of renewable energy
- Acceleration of hydrogenation and methanation of energy by renewable electricity



Investors
- Mainstreaming of sustainable finance accelerates investment in industries advancing carbon neutrality
- Increased preference for investment based on climate-related disclosures

Suppliers
- Increased shift to renewable energy and non-fossil fuels in manufacturing processes
- Components and materials decarbonised

Figure 4-5: Societal Outlook under the 1.5°C Scenario

The 4°C scenario, on the other hand, is a world that assumes higher GHG emissions than at present and a median 2100 average temperature above 4°C. For example, economic prioritisation policies are adopted, with fossil fuels meeting the rapidly increasing energy demand due to agricultural land development and AI demand from population growth, industrial and economic growth, etc. Policies that promote decarbonisation have been set back from the status quo, with possible futures such as continued high GHG emissions. While some countries are strongly promoting decarbonisation, countries that prioritise economic development are not adopting policies that encourage decarbonisation. There are also variations in decarbonisation efforts in society, with significant differences between regions and organisations.

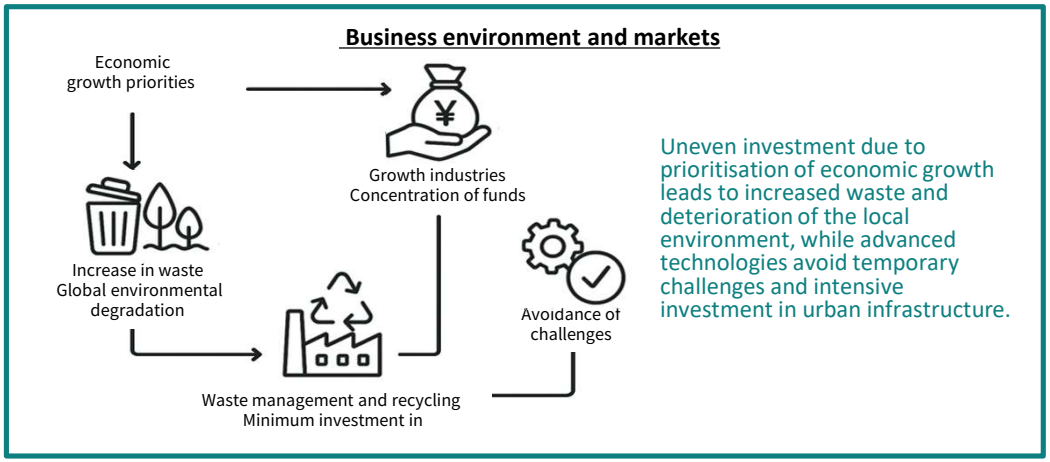
Due to limited recognition of environmental values and the prioritisation of economic growth, non-fossil energy industries such as biogas power generation, biomass power generation, renewable energy generation, green hydrogen production, green ammonia production, methanation and SAF production, as well as industries related to CO_2 capture and effective use such as CCS are not growing. As a result, fuel switching in thermal power generation has stagnated even in thermal power generation, and coal and natural gas are expected to remain in use.

The supply chain is consistently exposed to operational risks from extreme heatwaves, heavy rainfall, and storm surges. In addition, the urban core is shifting from coastal areas to higher ground.

In developing countries such as South-East Asia, policies tend to favour investment in the primary sector, which manufactures, distributes and sells products from natural resources, over the secondary sector of recycling and resource recycling, with less investment in WtE/WtX environmental investments, and cheaper waste incineration facilities being chosen. As the amount of waste and plastics is expected to increase, the demand for waste incineration in recycling centres is growing, with high volumes and high capacity utilisation being maintained. In addition, the burden of processing peaks is increasing due to the frequent occurrence of complex disasters. Given these circumstances, it can be assumed that customer expectations regarding for GHG emission reductions from Kanadevia Group products and systems are likely to remain diverse.

Governments
- Only a limited number of countries promote decarbonisation policies, and industrial development for carbon neutrality is not progressing
- Climate change progresses and increased adaptation measures become mandatory

Energy mix
- Large differences between countries in terms of the share of renewable energies
- Limited movement towards energy decarbonisation, with coal-fired mixed generation remaining



Investors
- Limited sustainable finance and lack of investment in decarbonising industries
- Limited number of investors oriented towards carbon neutrality

Suppliers
- No progress in switching to renewable energy and non-fossil fuels in manufacturing processes
- Limited decarbonisation of components and materials

Figure 4-6: Societal Outlook under the 4°C Scenario

Results of climate scenario analysis (1.5°C scenario)

The **1.5°C scenario** is considered to have a probability of realisation of less than 5%, but it is in line with Kanadevia Group's vision of **net-zero environmental impacts.** In this context, it is incorporated into the strategy as one of our expected scenarios. Therefore, our strengths in policy and markets work to its advantage. Specifically, demand will increase for renewable energy generation, such as Wind Power, and for hydrogen generators to produce green hydrogen from renewable energy sources, as well as for methanation and gas upgrading equipment as CCUS for CO_2 emissions from industrial facilities. In addition, there will be significant opportunities for current Carbon Neutral Solution Business, such as storage tanks for ammonia and liquid CO_2.

In WtE/WtX projects, **municipal solid waste generation** is assumed to declin **early, particullaly in developed countries.** On the other hand**, in developing countries, recycling is expanding** and open dumping sites are being replaced by WtE/WtX. In other words, it is envisaged that WtE/WtX operations will be positioned as resource recovery hubs, with incineration functions reduced and **reprocessing facilities or plants taking on the role of resource unit recycling centres**. Plants are assumed to be larger and more sophisticated and CCU[47] installations are standardised and deployed. Biogas production through methane fermentation from organic waste is also becoming widespread.

In this scenario, carbon pricing[48] becomes high, leading both society and customers to pursue carbon neutrality. Consequently, demand for decarbonisation initiatives increases. demand for hydrogen production equipment and technology developments related to methanation, which are currently underway, will increase and fuel conversion will proceed quickly. Fuel conversion also includes marine engine fuels, and orders for marine engines compatible with new fuels will increase. This can increase the certainty of success of Carbon Neutral Solution Business. However, there is a risk that increased environmental awareness will lead to a concentration of investment in the circular sector, and the innovation and competitive environment will become more intense as a result of entry from multiple sources. **Continuous innovation activities are necessary to ensure a good position on a sustained basis**.

In procurement, the **decarbonisation of steel** used in most of Kanadevia Group's operations is important: the 1.5°C scenario requires customers to use decarbonised or recycled steel. We will collaborate with suppliers to decarbonise key materials via procurement strategy, inventory control, and supplier management, promoting recycled content in product designs.

Results of climate scenario analysis (4°C scenario)

The 4°C scenario is similarly an extreme scenario with a probability of realisation of around 5%. Regarding physical risks of natural disasters assumed in this case, there is a risk of stagnation or stoppage of the supply system, including production and transport in procurement, due to flooding, as well as a risk of stoppage of plant operations. There is also concern that overflows of untreated water due to flooding in sewage purification projects could cause environmental degradation, which would have a negative impact on the business. Regarding transition risks, Carbon Neutral Solution Business (methanation, hydrogen, CCUS, wind power, marine engines and casks for nuclear power plants) will also be strongly negatively impacted. In other words, **if the social momentum towards decarbonisation declines,** there **is a risk that some of the investments in these businesses may not be recovered.**

On the other hand, in the WtE Business, demand for larger and more robust WtE is expected to increase due to the frequency of complex disasters and the increase in waste due to economic growth. In the Social Infrastructure Business, **demand for replacement of aging bridges and flap gates is also expected to increase due to the growing need for infrastructure strengthening as a result of** the expansion of natural disasters. Furthermore, demand for seawater desalination projects will increase in regions where droughts are increasing. Most Kanadevia Group plants are robust, so direct damage is expected to be minimal.

(2) Nature scenario setup and analysis results

This section presents the results of the TNFD-compliant stress test analyzing nature-related scenarios.

Nature scenario setup

For nature, scenarios were set up in four quadrants separated by **"physical risk"** and **"transition risk"**, which were assigned to the horizontal and vertical axes respectively, in accordance with TNFD recommendations (Figure 4-7).

The left-hand side of the horizontal axis is a scenario where the "physical risks" related to the local environment are controlled. The right-hand side is the opposite: scenarios with elevated risks of natural disasters, including intensified typhoons, heavy rainfall-induced flooding, droughts, and degradation of soil and biodiversity. The lower side of the vertical axis is a scenario with low "transition risk", where economic growth is prioritised and not transitioning to environmental considerations is not in itself a problem. On the upper side of the vertical axis are scenarios with a high "transition risk", i.e. failure to transition to decarbonisation or Nature Positive practices may result in penalties and reputational damage in the community. For example, **scenarios in the top left quadrant (#1)** are tend to apply in **Europe and Japan, where environmental considerations are more important**, while **scenarios in the bottom left quadrant (#4)** are tend to **apply in developing countries, where the economy is a priority.** As the Kanadevia Group proposes and installs environment-related plants all over the world, identifying the applicable scenario region is crucial for its business strategy.

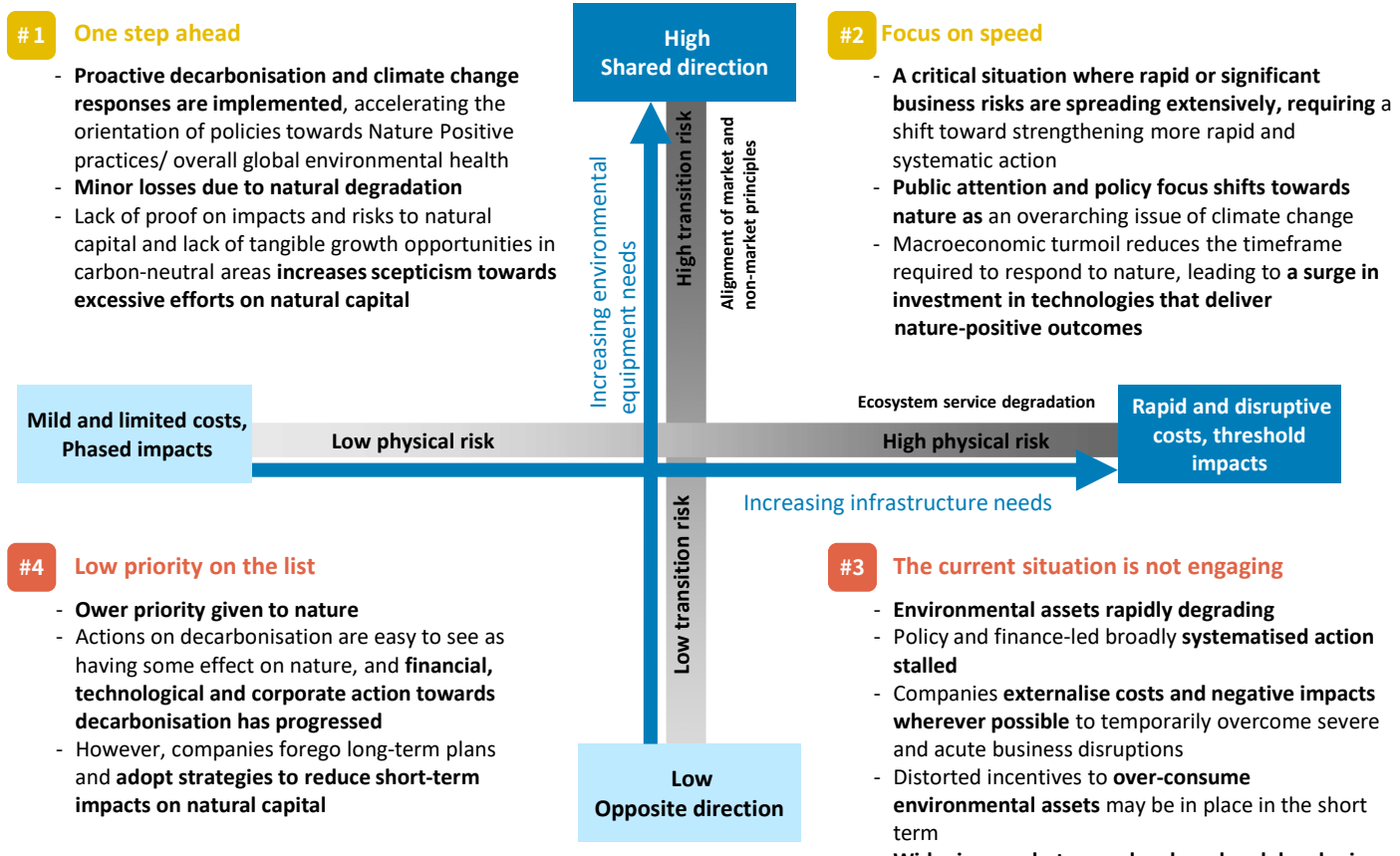


Figure 4-7: Scenario setting in nature

Modern society is a society undergoing a "2-3°C scenario", gradually moving from the centre of the horizontal axis to the right hand side. In addition, as the per capita GDP of a community increases due to economic growth, environmental concerns tend to increase and move up the vertical axis. In other words, **towards 2040-2050**, climate change is assumed to move gradually towards **the top right (#2)**, as climate change tends to become more intense under the 1.5°C scenario and above, and moves upwards as the global economy expands.

#1 is that people are highly aware of the future environmental crisis. Since we are not facing an actual serious crisis, we are increasing our various preventive preparedness measures.

#2 is a society in which an environmental crisis is actually coming and where awareness of environmental issues is high, and where there is multi-layered investment in various innovations to flexibly avoid environmental crises.

#3 is a region that is experiencing an environmental crisis but where an economic-first approach is being taken. In the case of an economic-first approach, the risk increases because the natural capital of the region is weakened and the environmental crisis can amplify the damage. If the damage becomes severe to a certain degree, the society may not be able to withstand it and may move to the **#2** society.

The **#4** scenario is an economic growth-oriented scenario. Environmental responses are put on the back burner, as priorities for a decarbonised and circular society are not high and the natural environment is not severely degraded. As a result, natural capital continues to be chronically degraded.

Results of nature scenario analysis

Kanadevia Group has a limited negative impact on operations due to low "dependence" on nature-related "physical risks" on the horizontal axis. On the other hand, the further to the right on the horizontal axis, the more competitive the market and the more opportunities for us, as plants with higher physical risk tolerance are required. With regard to the nature-related vertical axis "transition risk", the higher one moves up, i.e. the greater the awareness of environmental issues, the greater the demand for Environmental Business (e.g. waste-to-energy and waste water purification projects) and Carbon Neutral Solution Business. On the other hand, as our specialises in high-quality, high-priced products and services, there is a risk of losing the market to low-cost waste incineration plants if the transition risk declines (i.e. interest in environmental issues decreases). Unlike waste incineration generation, there is no conversion into electricity or energy, so opportunities for climate are lost.

In summary, we have found that **the higher the momentum in society towards Net Zero Nature Positive and society, the more Kanadevia Group can achieve growth consistent with its Net-zero environmental impacts vision, particularly in its environmental and Carbon Neutral Solution Business.** We also found that **when the momentum is low, growth in the Carbon Neutral Solution Business is limited, while business growth can be achieved through existing businesses (Environmental Business, Machinery Business and Social Infrastructure Business) due to the potential for investment in industrialisation and infrastructure development, particularly in developing countries.**

4.4 Financial risk analysis for climate and nature C N

(1) Scope of financial risk analysis

Based on the assessment results in sections 4.1 and 4.2, as well as strategic policies outlined in the 2030 Vision and related documents, the most significant dependencies and impacts are identified as "GHG emissions" and "environmental impacts associated with water usage and ore usage." Furthermore, after categorizing the specific risk factors (physical and transition risk) and evaluating their potential financial impacts, it was found that the risks of "water usage" in "design and production" and "solid waste" in "operation" were high. Figure 4-8 summarizes the financial risk analysis[49] for "GHG emissions", "water usage", "solid waste emissions in operation" and "environmental impacts associated with ore usage", dealing risk factors and qualitative financial impacts per project.

Scenario	Analysis results	Financial risks under the relevant scenario	Adaptation measures for the relevant scenario
#1 1.5°C scenario	**Society with high momentum for Net-zero and Nature Positive = Aligned with vision of Net-zero environmental impacts** **Growth centred on environmental and decarbonisation businesses**	Growth opportunities through integrated solution provision from WtE to WtX and further to the Circular Economy are expected as a Net-zero environmental impacts society develops.	- Faster social implementation of decarbonisation technologies - Expansion of integrated solution business for resource and energy recycling
#2 4.0°C as a result	**Society forced to face measures to reduce environmental impacts = Aligned with the vision of a Net-zero environmental impacts** **Growth centred on environmental and decarbonisation projects**	Rapid progress towards a society with Net-zero environmental impacts and rapidly swelling growth opportunities by providing integrated solutions from WtE to WtX and further to the Circular Economy.	- Faster social implementation of decarbonisation technologies - Expansion of integrated solution businesses for resource and energy recycling - Disaster prevention, mitigation and early recovery technologies and systems, and supply chain resilience
#3 4.0°C scenario	**Society with low momentum for net-zero and Nature Positive = Increased investment in industrialisation and infrastructure development, particularly in developing countries** **Growth mainly in environmental, machinery and infrastructure businesses**	Low societal environmental awareness will reduce the need for advanced environmental technologies, but economic activity will be strong, so growth will be driven by environmental, machinery and infrastructure businesses. On the other hand, there is a risk of raw material unavailability due to the high physical risks of water resources used in steel production.	- Advancement of WtE technology and water treatment technology to cope with large volumes of waste and wastewater treatment - Develop technologies and systems for infrastructure conservation, disaster prevention and mitigation, and early recovery - Advanced wastewater treatment technology for suppliers, advanced seawater desalination technology - Strengthening of the supply chain
#4 Temperature BAU	**Difficulty in business viability**	Customers and licensors are less environmentally aware, which reduces the need for the Group's advanced environmental technologies, making it difficult to expand and recoup investments.	- Introduction of IoT technologies such as remote monitoring and upgrading of disaster prevention and recovery technologies in preparation for the coming expansion of physical risks - Supply chain resilience

Figure 4-8: Results of scenario analysis and financial risk analysis

(2) Risks in the business

Kanadevia Group is in the business of designing, procuring and installing equipment based on customer RFPs, such as for waste incineration and power generation and water treatment, and in the business of manufacturing and delivering products to customers based on licences, such as marine engines. Consequently, there is a risk of falling behind in addressing the latest circular economy trends-such as innovations arising from the convergence of cutting-edge technologies from different fields, including AI and biotechnology, or the bioeconomy based on biomass emerging from South America-which are difficult to incorporate into existing customers' RFPs or the perspective of licensees. If our own technologies and products are somehow inferior to global standards in terms of cost and environmental performance, we may lose market share to other companies.

In addition, the nature of the business may make it difficult to apply environmental certification schemes that have become global de facto standards. Climate SBT (SBTi[50)]) is one such example. Kanadevia Group is pursuing various measures with the goal of carbon neutrality in 2050. While we are progressing stakeholder engagement, including situations where certification cannot be obtained, there is concern that insufficient understanding may lead to adverse decisions, for example, from investors.

The risks in each business are described below.

Environmental Business

The Environmental Business field is impacted by **"transition risks", both climate and nature-related**. The most impacted area is "policy." This is because demand for Environmental Businesses will increase as environmental policies are put in place. Secondly, they are impacted by "economy." In regions lacking economic wealth, they tend to lose out to cheaper Chinese plants. In the areas of "technology" and "reputation", the company has developed advanced technologies, such as carbon circulars, and at present there is no concern that it will lose competitiveness due to a delayed transition.

Amongst others, the main customers for the WtE Business are municipalities, but in developed countries and other regions where there is a high level of interest in environmental "policy" and waste incineration facilities are being developed, if the customer's budget and the timing of waste incineration facility replacement match Kanadevia Group's plans, it will be possible to win orders. However, if interest in environmental "policy", i.e. the circular economy, is low, it is difficult to generate requests for the renewal of waste incineration facilities and municipal budgets are likely to be constrained. In this case, national environmental policy will also stagnate, so that government support for the burden of environmental response costs cannot be expected. Business growth may slow if our innovations and the value of its products and services are not well understood.

It can be assumed that demand for waste incineration plants to address open dumping is expected to grow, although the difference is whether the position is due to the methane emission reduction policy or the ever-increasing waste measures. Therefore, there is a concern that if a company misses the opportunity to respond to growing demand for of waste incineration plant introduction, market entry opportunities may be constrained. In addition, government subsidies are only available to competitors in the country concerned. There is also concern that Kanadevia Group may be at a disadvantage in terms of cost competition if the system is granted to competitors.

The amount of waste used as raw material for WtE will decrease as environmental awareness increases and the population decreases. As the amount of waste to be incinerated decreases, demand for WtE may decline rapidly. For example, there are currently 1,060 incineration plants in Japan, but this is expected to be reduced by a third in the future as a result of Japanese government policy to increase the number of wide-area and centralised plants, which is likely to trigger restructuring of the waste management industry.

The situation is the same for the water business. Low environmental awareness leads to budgetary constraints among our municipal customers, hindering their understanding of the value of Kanadevia Group's innovations, products, and services. Consequently, business growth risks stagnating. In water-scarce regions, demand for drinking water of adequate quality for drinking and industrial use will become increasingly high and market competition will intensify, so there is a concern that if we are slow to respond, our entry into new markets may be restricted. There is also concern that business growth will stagnate if there is a delay in addressing the need to decarbonise the energy required to treat drinking water, the increasing bans and restrictions on the use of chemicals, and the treatment of the high salt concentrations generated during water purification, which is a challenge when operating outside Japan. Furthermore, in the treatment of sewage and wastewater, not only concerns about decarbonisaion and chemical use need to be addressed, but also the need for stricter regulation of hazardous chemicals in treated wastewater, which, if delayed, could hamper not only business growth but also market access.

Machinery Business

The Machinery Business is also impacted by **"transition risks"** rather than **"physical risk."** For example an important customer, has declared that it will reduce its real GHG emissions in its own activities (Scope 1 and 2) and in activities outside its own operations (Scope 3) to zero by FY2040. In addition, adherence to international environmental regulations of the countries concerned is also required with regard to hazardous chemical substances, and the use of substances with a high environmental impact is tending to be banned in Europe.

Social Infrastructure Business

The Social Infrastructure Business is mainly impacted by **"transition risks" with regard to climate.**

The customers of the Social Infrastructure Business are mainly municipalities, and it is important for orders to match the budgets of municipalities and the timing of equipment upgrades to business plans. In Japan, municipal budgets for infrastructure maintenance are constrained and there is a risk that the need for equipment renewal may decrease significantly. In addition, a lack of interest in the environment, i.e. in the circular economy, does not generate needs at the time of equipment renewal, limits budgets and does not allow for support through national environmental policy. The growth of environment-related infrastructure projects may stagnate due to a lack of understanding of the value of Kanadevia Group's innovations, products and services.

Carbon Neutral Solution Business

The **Carbon Neutral Solution Business** is one of the core components of Kanadevia Group's climate action towards carbon neutrality and is directly impacted by **"physical risks" and "transition risks" with regard to climate**.

In the marine engine business, we are working to improve engine performance to rectify inappropriate practices and achieve fundamental solutions. Repeated trial runs and performance tests of marine engines have increased fuel consumption, leading to higher Scope 1 GHG emissions. Reducing GHG emissions from marine engine use is a major challenge for the shipping industry. To address this challenge, the International Maritime Organization has established the GHG Net Zero Framework. Kanadevia Group is also advancing the development of engines compatible with decarbonised fuels in collaboration with licensors, aiming for GHG reductions aligned with this framework. However, there is concern that, depending on customer needs and social conditions, companies' efforts may not progress smoothly in line with this framework. Regarding exhaust gas treatment systems, in addition to those already on the market, we are leveraging our experience with SCR systems to independently develop methane slip decomposition catalysts and nitrous oxide decomposition catalysts. We are preparing to supply these alongside engines and are focusing our efforts on marketing efforts to promote customer uptake.

The market for hydrogen utilisation and CCUS has not yet materialised. For green hydrogen production, the high renewable energy costs and infrastructure investment have reduced the momentum towards social implementation and delayed its development, while for methanation, international rules on the allocation and attribution of GHG emissions over the entire lifecycle are still being developed. As a result, the market is slowly emerging and future business feasibility is uncertain, which poses financial risks for investments in research and development and facility construction. As an immediate measure towards decarbonisation, the switch from heavy oil to LNG is progressing. Consequently, demand for the Kanadebia Group's LNG storage tanks is increasing. These tanks use 9% nickel steel, but there is only one supplier in Japan. Depending on how the adverse effects of nickel on the natural environment are addressed, future procurement may become difficult, limiting tank production and potentially leading to a loss of order opportunities.

Nuclear power generation is also attracting attention for decarbonisation. However, radioactive spent fuel casks pose disposal challenges. There are concerns that maintaining or expanding business scale will become difficult if suitable interim storage sites or final disposal facilities with very low radiation impact cannot be secured. As a countermeasure, customer power companies are exploring recycling initiatives in collaboration with steel manufacturers.

Onshore wind power facilities face diminishing suitable sites for new installations. Unless equipment can be recycled and reused through maintenance, the business risks becoming increasingly marginalised. Installing wind power facilities requires extensive surveys and considerable time to secure agreement from local authorities and residents. Strict environmental assessment procedures are followed, involving prior investigations into impacts on wild bird habitats, virgin forests, and particularly the presence of water sources. Should a water source be found, facility installation is postponed. Kanadevia Group gradually provides funding and addresses issues at an early stage.

(3) Risks in works operations

Works operations generate environmental impacts such as emissions, effluents, noise and waste. The impact of these environmental burdens varies greatly depending on the type and condition of the surrounding ecosystem in the works location. In developed countries such as Japan, emission thresholds for environmental impact are strictly set by law so that the impact is very small.

Financial risks in works operations include fines if the environmental impact of works emissions exceeds the legal emission thresholds, costs incurred in restoring or renovating facilities to reduce the environmental impact, costs from stakeholder criticism or litigation, production delays and lost sales opportunities due to shutdown orders, etc. The risks include production delays and loss of sales opportunities due to shutdown orders.

To prevent the occurrence of such risks, for example, the **Environmental Protection Committee at our sites** takes the lead in **ensuring ethical and stable plant operations**, reducing environmental impact and properly managing the ecosystem. Each plant in Kanadevia Group also works to reduce resource use and waste through environmental management systems such as ISO 14001, and sets its own standard values for environmental impact on top of the legal standards to ensure thorough management. As a result, the impact on the ecosystem is kept below Medium[51)], even when rare organisms live in the vicinity of the works.

Kanadevia Group believe that this kind of factory governance not only reduces the occurrence of risks, but also leads to coexistence with the local community and generates profits through stable operations.

4.5 Climate and nature opportunity analysis C N

Opportunities in business

Due to the explosive growth of the world's population has led to shortages of energy, resources, food and water, as well as challenges in inhabited areas, waste issues, and the collapse of biodiversity, the demand for a transition to a society with a net zero environmental impact is expanding, and Kanadevia Group's environment-related business market is expected to expand due to increased environmental awareness and tighter regulations. We have a number of diverse plant technologies, that can be integrated to offer business models addressing local issues related to climate and nature-related. At the 29th Conference of the Parties to the UN Framework Convention on Climate Change (UNFCCC COP29), we also promoted the circular economy and net zero GHG emissions achieved by our innovative waste treatment systems (for details, see page 61 of this report).

The following section shows what opportunities each project has with regard to climate and nature.

Table 4-3 shows Kanadevia Group's businesses and which measures lead to "opportunities" along the value chain. The measures are described from left to right in the measures column. Collaborating with suppliers to source materials that support climate and nature-related goals is the **"Procurement Reform." Global Expansion** is to promote the development of environmentally friendly businesses across several developing countries with high environmental impact and high potential for contribution to improvement.

Next, with regard to development, there are three measures. **"Technological sophistication"**, which is the refinement of technologies that contribute to the environment (e.g. sophistication through technological development of treatment processes); **"Early launch"**, which is activities to accelerate technological development of environment-related businesses and deliver them to customers more quickly than other companies; and "Standardisation of plant design for delivery to customers, thereby improving the quality of **environment-related** businesses and reducing their introduction costs. The **"equipment standardisation"** measure is to facilitate the adoption of environment-related businesses by enhancing quality and reducing implementation costs through the standardisation of **plant design** for provision to customers. Measures related to the provision of products and services include combining in-house technologies to address diverse local environmental challenges, which vary from site to site (**"in-house technology"**) The measures for the provision of products and services include the combination of solutions provided to meet the needs of different local customers' environmental challenges (**"in-house technology combination"**)and the provision of **"servitisation and in-house operation"** to enable the immediate introduction of high quality services. Furthermore, the environmental impact is reduced through **"resource reclamation"**, which addresses the reclamation of resources used in the plant.

Table 4-3: Measures to create climate and nature-related opportunities (2030)

Project \ Measures		[Procurement]	[Planning]	[Development]			[Provision]		
		Procurement Reform	World Expansion	Technology Upgrading	Early Market launch	Equipment Standardisation	In-house technology Combination	Resources Regeneration	Servicing In-house operations
Environmental Business	WtE	v	v	v		v	v		v
	Biogas		v		v				v
	Water	v	v					v	
	WtX		v	v	v			v	v
Machinery Business		v						v	
Social Infrastructure Business		v		v					
Carbon Neutral Solution Business	Marine engines	v	v	v	v			v	v
	Process and Nuclear-related equipment		v	v				v	
	Decarbonisation systems	v	v	v	v	v	v	v	v
	Wind power generation	v	v	v	v				

*Use the following icons from the next page

- PR — **P**rocurement **R**eform
- Gl — **Gl**obal Expansion
- AT — **A**dvanced **T**echnology Development
- EM — **E**arly **M**arket launch
- ES — **E**quipment **S**tandardization
- IPT — **I**ntegration of **P**roprietary **T**echnology
- RR — **R**esource **R**ecycling
- SO — **S**terilization **O**peration and Management

(1) Environmental Business

The Environmental Businesses promote a circular economy that creates opportunities for climate and nature. In the following, refers to WtE (waste incineration and biogas power generation), water projects and WtX projects.

WtE Business PR GI AT ES IPT SO

As a plant engineering company for waste incineration power generation facilities, Kanadevia Group has a internationally recognized track record. It has contributed to reducing the environmental impact in each of the regions in which it operates.

Waste incineration power generation is a technology that generates electricity by incinerating waste as fuel. It contributes to reducing the environmental impact in each region where it is deployed in terms of waste reduction, its role as a renewable energy source, reduction of GHGs (methane gas) from landfill disposal, proper treatment of hazardous substances and effective use of energy.

Leveraging its combustion expertise, Kanadevia Group has enhanced exhaust exhaust purification performance. In addition, it can optimise plant operating efficiency by providing a one-stop shop for project development, design, construction and AOM (after-sales service, operation, maintenance and preservation).

Furthermore, Kanadevia Group's strength lies in its ability to make proposals that provide opportunities for new value creation in consideration of climate change and the natural environment, through proposals that combine WtE plants with decarbonisation technologies such as CO_2 capture and methanation, as well as the introduction of biogas (methane fermentation)facilities. We are committed to expanding beyond conventional waste incineration and power generation, promoting recycling and resource recovery, expanding business areas with higher added value in the entire waste treatment value chain, and expanding opportunities to reduce environmental impact. We aim to go beyond conventional WtE by promoting recycling, resource recovery, and expanding high-value-added business areas across the waste treatment value chain. In addition, we will work to reduce the number of final disposal sites in each country and the Based on data on the number of final disposal sites in each country and the projected methane generation by 2050, we will actively propose to the owners of final disposal sites, who are the source of the waste that is the raw material for WtE, that the installation of waste incineration facilities will lead to an early resolution of environmental risks in the region.

Kanadevia Group's technical and proposal capabilities enable it to identify new opportunities in each element of the WtE Business value chain that is considered high-risk.

These opportunities can be described as those that can be realised by enhancing engineering capabilities. For example, at the current stage, there is no incineration technology that does not generate incineration residues such as main ash and fly ash, but we will work on developing technologies for the reuse of main ash and fly ash and consider proposals to minimise the emission of "waste" itself, the source of incineration residues, as an opportunity to encourage a shift towards a circular economy. We will promote initiatives to reduce the natural capital impact across the value chain by taking a bird’s-eye view of sales and proposals, procurement, design and manufacturing, construction and on-site coordination, disposal during construction, and operation and maintenance, and by consistently leading all processes. In addition, extending the service life of facilities is important for reducing the environmental impact of WtE. Currently, facilities are being extended through backbone improvement works, which are expected to maintain and improve waste treatment efficiency and environmental performance.

Furthermore, Kanadevia Group is considering the use of environmentally conscious concrete. This type of concrete, which is under active consideration in Japan and other developed countries, includes formulations that enable the reuse of concrete rubble generated during demolition as high-quality recycled aggregate, or those compatible with recycling into raw materials for recycled concrete. We believe that such concrete expected to see increased adoption in Japan and other developed countries.

Although the facilities and services required will differ depending on the maturity of the approach to waste management issues, the quality of waste will tend to become more uniform in the future due to accelerated globalisation. With the homogenisation of waste quality and the use of digital technology, waste treatment processes are likely to become more standardised, rather than being adapted to individual local circumstances. Increased standardisation is also expected to work better for product procurement and re-use, improve engineering quality and, as a result, reduce the number of accidents that could cause environmental pollution. Therefore, a business model for standardised WtE is being proposed. In addition, as the ratio of plastic in waste is expected to decrease due to the development of a recycling-oriented society, it will be necessary to develop equipment with a combustion system suitable for this change.

Water business (desalination and water treatment)

PR GI PR

Demand for water is expected to increase in the future due to population growth and climate change, and the market for desalination and water treatment will grow due to the construction of new facilities and the reuse of water treatment facilities. Desalination and water treatment projects contribute to the security and sustainable use of water resources, improve water quality and public health, and contribute to ecosystems by improving water quality. We will expand the market by promoting the fact that wastewater treatment contributes to Nature Positive (see **section 4.2**).

In desalination, Kanadevea Group combines advanced water purification technology using membrane technology such as reverse osmosis (RO[52)]) for desalination of seawater and brackish water and ultrafiltration (UF: Ultrafiltration[53)]) with its construction experience to provide desalination and industrial water treatment projects. We are involved in more than 400 water treatment plant projects worldwide, including drinking water supply for municipalities, mining and resource development, energy (power plants and oil and gas industry), food and beverage, and agricultural water, contributing to global water demand. We also operates plants on a contract basis and currently operates and manages around 80-100 facilities, mainly in Australia.

Kanadevia Group is also active in supplying water to remote islands and remote communities, and has a wealth of experience in supporting communities where securing water resources is a challenge, such as in the Marshall Islands and Indigenous Australia, etc. In 2025, we will start supplying drinking water from a newly built desalination plant on South Tarawa Island in the Republic of Kiribati, and we aim to supply over 50,000 people with The first phase of the project to provide sustainable water to more than 50,000 islanders has been achieved. In the Maldives, a decarbonised seawater desalination system is being introduced in combination with a system that runs on renewable energy independently of the commercial power grid to enable the country to continue producing fresh water independently in the event of power outages due to disasters.

Furthermore, Kanadevia Group also operates sewage treatment businesses in Japan, focusing on developing biomethanation technology that effectively utilises CO_2 from biogas produced through the methane fermentation of sewage sludge. In regions with vulnerable energy infrastructure, sewage treatment plants becoming decentralised energy supply hubs significantly enhances regional energy security and resilience. Moreover, during wastewater treatment, phosphorus - an essential element in fertilisers - is recovered using phosphorus recovery equipment (MAP method[54)]). Nitrogen recovery technology is currently under development. The recovered phosphorus and nitrogen are reused in local agriculture as alternatives to chemical fertilisers, forming a valuable resource recycling loop.

This transformation dramatically improves the health of the local water environment and soils. Recovering nutrients such as nitrogen and phosphorus - the primary causes of eutrophication - before they are discharged into rivers and the seas prevents the occurrence of blue-green algae blooms and harmful algal blooms. This contributes to the restoration and conservation of healthy aquatic ecosystems. Consequently, it also supports the recovery of local fishery resources.

WtX projects PR AT EM PR SO

The WtX Business extends the conventional waste incineration and Waste to Energy to extract biogas, renewable gas, hydrogen and other valuable resources, making maximum use of waste as a "resource" and contributing to decarbonisation, resource recycling and energy self-sufficiency.

One example is the EFCaR project (Energy Free Carbonizing for Resource Recovery), which supports local carbon circularity. This project develops a quality control service for biochar, which promotes the recycling of resources from waste over a wide area. Specifically, organic waste (sludge, animal manure and AD residues) is heated under oxygen-free conditions to produce biochar for the purpose of proper waste treatment, resource recycling and carbon reduction. The phosphorus in the waste is concentrated in the biochar in a soluble state and can therefore be used as fertiliser. As biomass-derived carbon is fixed in the biochar, it can be used as fertiliser on agricultural land, contributing to carbon negativity on agricultural land.

(2) Machinery Business PR RR

Among the products and services handled by the Machinery Business, foreign material sorting equipment is where a major opportunity to contribute to climate change mitigation can be found. The aforementioned WtE is a technology for converting waste into energy. Of the waste used as raw material, biomass-derived waste is regarded as a renewable energy source and contributes to CO_2 reduction, whereas plastic-derived waste poses a challenge due to CO_2 emissions during incineration. Therefore, it is essential to sort and re-use plastics. There is a great need for plastic sorting machines, and Kanadevia Group aims to commercialise them around 2025-2026.

In addition, storage batteries, which are currently attracting attention as a technology for storing renewable energy, have a lifespan of 10 years, which means that their mass disposal will become an issue in the future. Manufacturers are working to recover waste batteries and separate metal components, and our filter presses are used in the process of recovering useful metals from black mass (an aggregate of several metals). In the future, there are opportunities for Kanadevia Group industrial Machinery Business and technology in industries related to the renewable energy and recycling sectors.

(3) Social Infrastructure Business PR AT

In the Social Infrastructure Business, there are opportunities related to climate change mitigation including sluice gates used in hydropower generation, steel pipes, and flap gates for tsunami protection. Demand for hydropower is increasing as a renewable energy source, and demand related to the renewal of hydropower plant facilities in Japan is expected to continue over the next 20 years. Kanadevia Group is developing technologies for dam sluice gates, steel pipes and other structures to improve power generation capacity and minimise environmental impact. This can be done to meet customer needs and contribute to climate change mitigation and improve the local environment. As an adaptation measure to climate change, the company is also developing a tsunami detection system that integrates remote flap gate monitoring with GPS (GNSS) positioning.

(4) Carbon Neutral Solution Business

PR GI AT EM ES IPT RR SO

Kanadevia Group's Carbon Neutral Solution Business address climate change-related opportunities across the business units.

It proposes systems to capture CO_2 in the flue gas emitted from refuse incineration plants and produce e-methane. Specifically, Kanadevia Group proposes a waste incineration plant CCU system and a methanation process. For methanation, a system to produce hydrogen from fresh water produced by a seawater desalination plant in a water electrolyser and react it with CO_2 emitted from a waste incineration plant to produce e-methane is also being proposed. Although the market is still emerging, we are actively working to accelerate its formation through partnerships, alliances, and direct investment. In these initiatives, Kanadevia Group's technological strengths, such as the superior reaction rate of the methanation catalyst, are being utilised. Although the methanation initiatives combined with seawater desalination in Oman are in the incubation phase, we are tackling technical issues such as increasing the size of the equipment, mass production and ensuring economic viability, i.e. significant cost reductions.

The hydrogen business is being undertaken in collaboration with a number of companies with the aim of forming a market around 2040. Local production and local consumption of hydrogen, i.e. activities and participation in funds for the consumption of hydrogen in the neighbourhood of the production area are also under consideration.

This system integration approach represents a shift from selling individual products to offering comprehensive business solution.

In Wind Power, Kanadevia Group delivers onshore wind facilities and also builds and operates its own facilities, with a target of developing one new project every two years. In offshore Wind Power, we also supply foundation structures. There are two types of offshore wind structures: implantable and floating. In the implantation type, piles of about 10 m are generally driven into the seabed, but we have developed the suction bucket type, in which water is drained from an upside-down bucket-like cylinder and driven into the seabed. The floating type is also known to attract fish to the foundation structure, thereby mitigating the impact on the marine ecosystem associated with the construction of wind turbines. Floating structures also support marine biodiversity and can be used for aquaculture, as the space between units often spans several kilometers.

In the marine engine business, SCR (denitration technology) and EGR (exhaust gas recirculation) are provided to meet customer needs for NOx control. CO_2 recovery from marine engines is also being explored through CCU systems.

In addition, the International Maritime Organisation has set targets for the reduction of GHG emissions from ships, which has drawn attention to the decarbonisation of fuels, and Kanadevia Group is working on the development of marine engines and other products to meet these targets.

4.6 Strategy C N

(1) Visoin for in 2050 "Resilience Eco Society®"

Kanadevia Group's **Sustainable Vision**[55], based on the premise of The **Four Sustainability Principles**[56], is to **"Realize zero environmental impact**[57]**"**, i.e. to achieve **"net-zero environmental impacts" with environmental impact** remain below the threshold of environmental resilience, and to **"Maximize people's well-being."**

Kanadevia Group envisions a **"Resilience Eco Society®**[58]**"**, a society that is carbon neutral and achieves a net zero environmental impact, where waste is transformed into value. The Resilience Eco Society® promotes the recycling of resources by "not wasting waste and resources" and by "helping the environmental resilience of local natural capital", The aim is to significantly reduce the environmental impact of a region and to keep it within the environmental resilience of the region. This can be illustrated by borrowing a diagram from the Stockholm Resilience Centre's **Planetary boundaries**[59] , which shows the environmental impact of an area (orange in Figure 4-9) shrinks and falls within the region's environmental resilience (green in Figure 4-9).

In Resilience Eco Society®, aligns with the Four Sustainability Principles advocated by the international NGO The Natural Step for building a sustainable society.

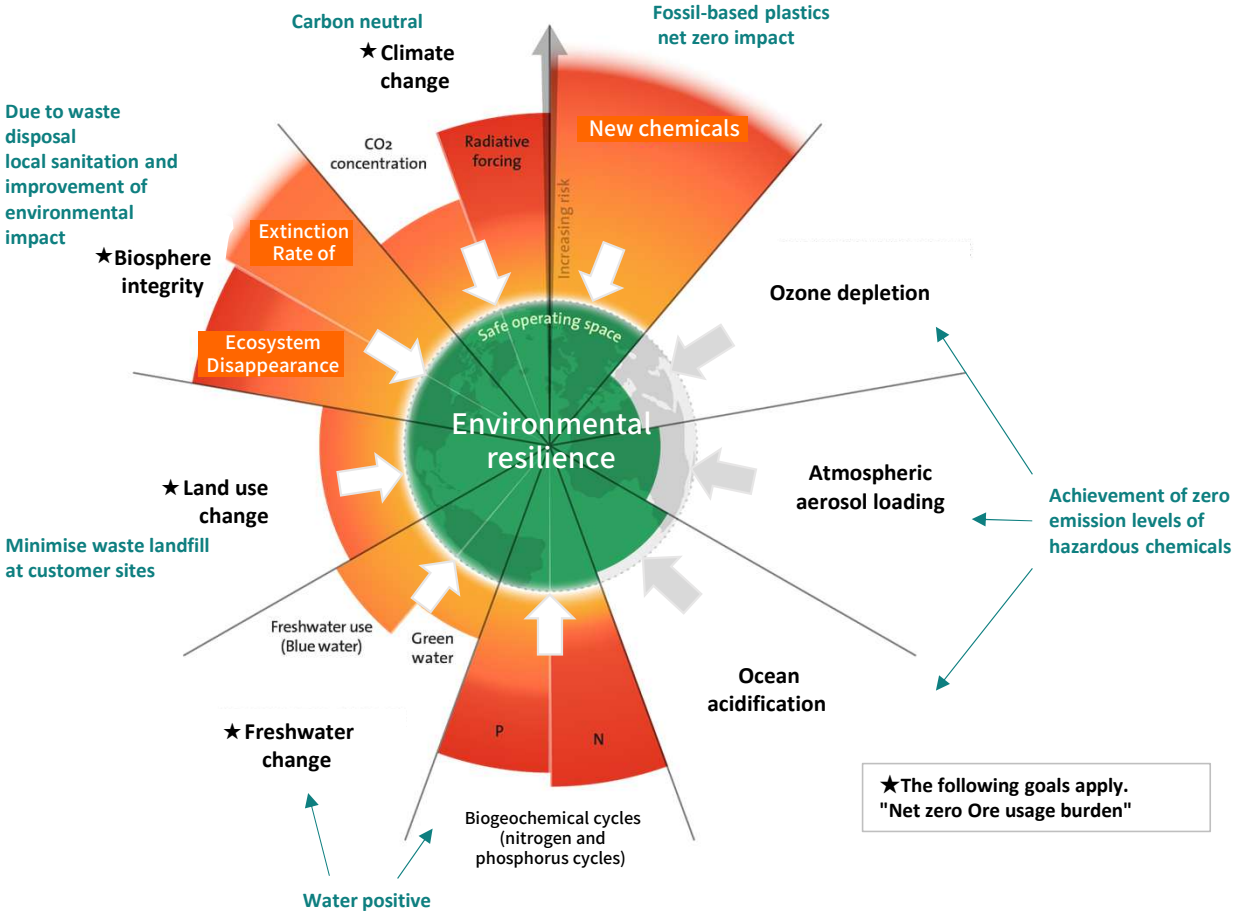


Figure 4-9: Regional Resilience Eco Society® (Source: Stockholm Resilience Center (2024) prepared by Kanadevia)

The Natural Step's **"The Four Sustainability Principles"**

We will not participate in the following activities.

In a sustainable society, nature is not subject to systematically increasing…

(i) concentrations of substances from the earth's crust;

(ii) concentrations of substances produced by society;

(iii) degradation by physical means;
and in that society, people are not subject to conditions that…

(iv) systematically undermines their capacity to meet their needs. (health, influence, competence, impartiality and meaning)

Regarding (i), **our society no longer relies on the extraction of oil or heavy metals, thereby avoiding environmental pollution**. Certified products are widely available, with components made within the limits of environmental resilience and thoroughly designed to be easily sorted. Technology is provided to recover and dispose of substances. When products and equipment are disposed of, they are mostly turned into new raw materials. Waste is considered as resource, thus no material need to be taken out of the earth's crust.

Regarding (ii), this **society** is **free from GHG emissions and harmful chemicals**, and uses renewable energy sources. Waste that is not recycled by material or chemical recycling is subject to incineration, but is utilised as energy without GHG emissions by an integrated resource recovery facility (Integrated Recovery Facility[60]) equipped with CCU facilities. In addition, the reuse of main ash and fly ash minimises the emission of the "waste" itself, which is the source of incineration residues. As a result, the concentration of substances does not increase.

Regarding (iii), key to the realisation is a **society without deforestation and loss of biodiversity**. Biomass is also recycled. With regard to water resources, the use of freshwater is kept within the limits of environmental resilience and the impact on the ecosystem is minimised. Biochar and organic fertilisers also contribute to restoring soil health. Healthy soils and irrigation protect local biodiversity.

Regarding (iv), key to the realisation is a **society that prevents the infringement of people's basic needs due to environmental pollution caused by waste**; WtE facilities contribute to regional value creation by converting waste into energy and heat and reusing it on an elemental basis. Furthermore, WtE plants can be used as a cultural hub for creativity and skills development, such as products and art using recycled materials unique to the region, or as a recreational hub with an edible garden.

In the society of 2050, when the Resilience Eco Society®[61] has been realised, a recycling-oriented society has been achieved.

A culture of responsibility for the life cycle of the resources used has taken root in both companies and individuals, and recycling costs are embedded in product pricing. The concept of waste itself has disappeared from society, and we live in a world where all waste circulates as a valuable resource. The culture has become one where ownership has shifted to sharing, and if they are not used, they are passed on to the next user. Almost all products are designed to minimise waste from the production stage, and the "use > recycle > reuse" recycling model is thoroughly implemented, with many industries achieving zero-waste. The region is self-sufficient in renewable energy. In addition, nature-rich areas have evolved into smart villages that live in harmony with nature. Local biomass resources circulate within the region, production, management and harvesting are streamlined, and high-quality food production takes place without the use of pesticides with the help of microbial materials. Ecotourism supports the local economy.

Landfill and incineration are close to zero, except in developing countries and areas with poor infrastructure, and plastics are almost 100% replaced. Recycling centres are the cornerstone of a circular society. Incineration itself is minimised and they have become **"resource recycling plants (zero-waste hubs)"** where carbon, hydrogen and metals are recovered from waste at the molecular level, converted into fuels, chemicals and building materials and recycled.

For example, carbon and hydrogen form a closed-loop system in the energy system, phosphorus in food production, and iron and aluminium in infrastructure and manufacturing.

- Carbon: CO_2 capture technologies are evolving and the carbon "use it and put it back" cycle has become completely routine, both in cities and on farms. Carbon circularity is achieved, capturing carbon emitted directly from the atmosphere or during combustion at the source of CO_2 and converting it into underground storage or into fuels, plastics, building materials and advanced materials for effective use.
- Iron: Kanadevia Group's primarily uses recycled iron from scrap, with electromagnetic sorting and AI analysis recovering iron from waste.
- Water: innovative water purification technologies enable the use of river and seawater for drinking and domestic purposes, as well as the reuse of waste water. The need for Zero Liquid Discharge (ZLD[62)]) systems are expected to increase, leading to a situation where wastewater from households and private companies is purified to drinking water levels using membrane separation technology and utilised in areas without water abstraction sources. Sewage is treated properly and the nitrogen and phosphorus contained in sewage is recovered as much as possible as a resource.

Decentralised water purification units using renewable energy sources have also become widespread, and small-scale, small-scale, community-based systems that do not rely on extensive, large-scale infrastructure that requires large amounts of money to maintain have become commonplace. Furthermore, carbon-neutral water treatment plants are in operation through the use of renewable energy sources such as methanation, biogas power generation and solar power generation.

- Nitrogen and phosphorus: on farms, precision agriculture[63)] reduces run-off into the soil and water to almost zero. Technology for recovering nitrogen from waste and organic matter has also advanced, and systems for extracting nitrogen from food waste and sewage sludge, synthesising it with green hydrogen and reusing it are widespread in urban and rural areas. In phosphorus, too, it is recovered from soil and sewage with high efficiency, resulting in an almost complete recycling system. In the society of 2050, the main role of recycling centres is to be business centres for upcycling materials, exchanges for circulating local resources and cultural identity, providing heat, electricity and energy. The income from recreation, business and education outweighs the income from waste management.

And the recycling centre, tentatively called Resilience Eco Place, has become a centre for Environmental Business innovators, akin to Silicon Valley for ICT, where the passions of young people who create the future come and go. Through this hub, the "maximisation of people's well-being" of the region is being realised.

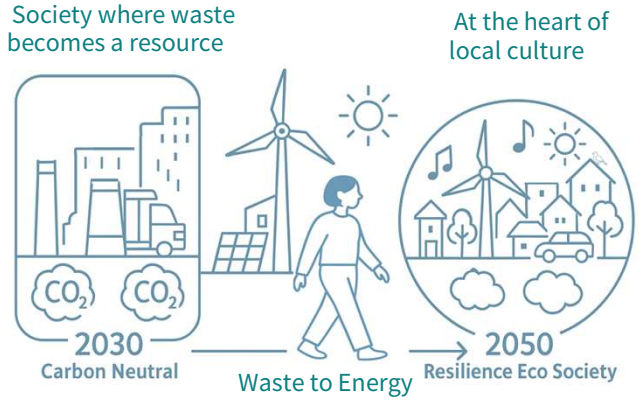


Figure 4-10: Path to Resilience Eco Society ®

(2) Kanadevia Group's strategy to realise the "Resilience Eco Society®"

This section outlines Kanadevia Group‘s role and strategy in achieving society in realising the "Resilience Eco Society[64])." Our strategy is based on nature-related scenario planning, which envisages a world in which environmental challenges are becoming more severe over time and, therefore, in the direction of increased regulation (of the scenarios shown in Figure 4-7, the #1 (top right) scenario). Our portfolio of businesses is being advanced to accommodate scenarios in quadrants other than #4, depending on the changing scenario.

[Strategy for building zero-waste hubs]

In order to keep the region‘s environmental footprint within the scope of environmental resilience in 2050, Kanadevia Group will position its WtE plants, where its core business is waste treatment, to become a hub of environmental resilience in the region. Specifically, the facility will not only supplies energy **through carbon-neutral thermal recycling,** but **also material** and **chemical recycling**, extracting energy (electricity, hydrogen and methane) from waste, supporting the realisation of **carbon, water, nitrogen and phosphorus cycles**, and The proposal is to reduce the total load on the environment. At this time, WtE plants and other plants **are zero-waste hubs**.

They then provide technology for Wind Power Generation and the transfer of renewable energy by means of methanation and hydrogen to support the region's transition to a renewable energy society. In addition, with its advanced wastewater treatment technology, the company will promote water recycling and become a provider of nitrogen and phosphorus reclamation from sewage and wastewater treatment. In addition, Kanadevia Group is already working on water electrolysers/hydrogen generators, methanation and Wind Power Generation, by integrating these technologies - including all-solid-state batteries - and collaborating with partners, we will integrate solutions to reduce environmental impact.In 2050, waste incineration and power generation facilities and other facilities will be advanced recycling infrastructure facilities, where the local community "harvests" energy and materials. We will hone its ability to make proposals so that these facilities will be open and attractive, so that the people living in this region will be proud of this place and it will become a spring from which industry is born.

Kanadevia Group's goal of **"Net-zero environmental impacts"** is **net zero environmental impacts in the value chain**. It means keeping the environmental impact of our business activities, as well as that of its suppliers and customers who use its products and services, within the range of each region's inherent environmental resilience. To this end, we are working on the goals and targets described in **section 6.2.**

Circular business regional co-creation strategy

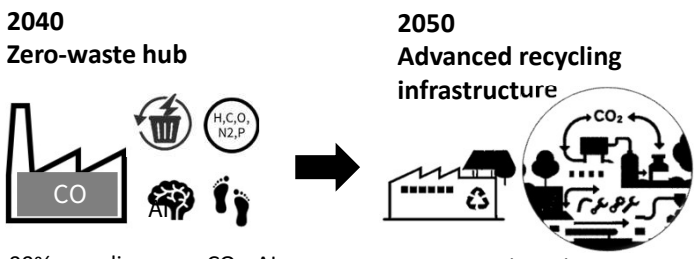
In order for the regional circular economy to flourish in different parts of the world, it is necessary not only to provide plants that enable the circular economy, but also to **provide outlets where** the energy and materials to be recycled can be most effectively utilised in the regional economy. For example, as zero-waste hubs are the starting point for the creation of new things, it can be proposed to use them as incubation centres to solve regional characteristics and problems.

In order to ensure that Kanadevia's **Resilience Eco Society®** will be the solution most likely to be adopted in the future by proponents of Environmental Businesses with regional character, net zero strategies and resource recycling strategies, Kanadevia Group will develop and combine technologies, as well as building a diverse business ecosystem. **Together with our business partners, we want to create a world that only we can offer,** based on our plant engineering and manufacturing technologies. This is the **Circular Business Regional Co-creation Strategy**.

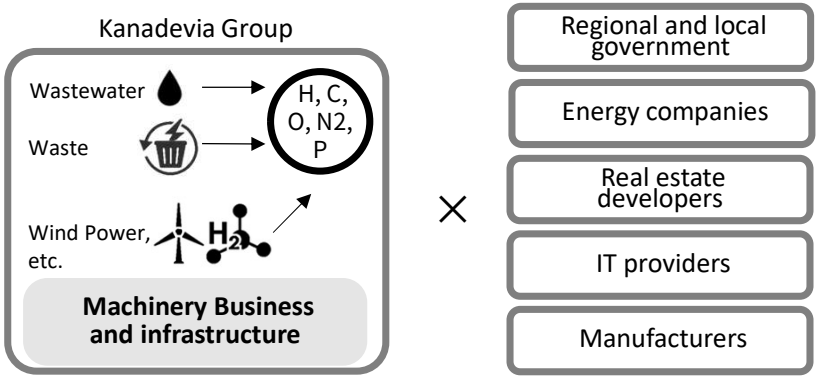
Kanadevia Group combines the Zero-Waste Hub with the Circular Business Regional Co-Creation Strategy and offers it to each region, creating sustainable environmental value in every part of the world.

Sustainable environmental value creation in various places of the world
= (Renewable energy technologies + zero-waste hubs) x N (number of regions)

[Strategy for zero-waste hub building]



[Strategy for circular business regional co-creation]



A. By 2050, WtE plants will evolve into circular infrastructure providing energy supply and advanced recycling capabilities. To achieve this, by 2040, they must function as resource circulation plants within "Zero Waste Hubs" that recycle 99% of waste and realise CO_2 neutrality, AI automation, and traceability.

B. The Resilience Eco Society® concept responds to regional environmental strategies, generating energy from waste, recycling resources such as carbon, water, nitrogen and phosphorus and reducing environmental impacts. Kanadevia Group's renewable energy technologies such as Wind Power, methanation and hydrogen technologies, as well as mechanical and infrastructure technologies, will support the realisation of this concept.

C. Lead the transition to a sustainable society through partnerships with other industry operators and others responding to regional environmental strategies.

Kanadevia Group proposes a carbon neutral and resource recycling society, controlling carbon and controlling waste.

Figure 4-11: Kanadevia Group strategy

4.7 Migration planning

(1) Innovations supporting the strategy

To establish zero-waste hubs, the innovations illustrated in Figure 4-12 are essential. While carbon neutrality and resource recycling/nature-positive innovations are closely linked, this section outlines innovations with Carbon Neutral Solution Business under the carbon neutral transition plan, as well as innovations in other projects aligned with the resource recycling/Nature Positive transition.

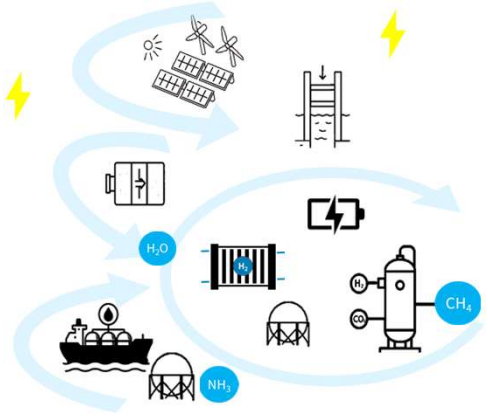
(2) Transition plan towards carbon neutrality

Innovations towards carbon neutrality

The Kanadevia Group aims to make the Carbon Neutral Solution Business a core pillar by around 2040, supporting the transition to a carbon-neutral society.

Kanadevia Group's methanation catalyst technology is characterised by low temperatures, high speed and compactness. It can be deployed not only by manufacturers that require large amounts of energy such as city gas and thermal power to go carbon neutral, but also in general factories and facilities where people gather such as swimming pools, commercial facilities, condominiums and resorts, making carbon circulation more accessible. These technology groups are already established and, through partnerships with users, will overcome the barriers related to scalability and cost-effectiveness that have previously hindered adoption.

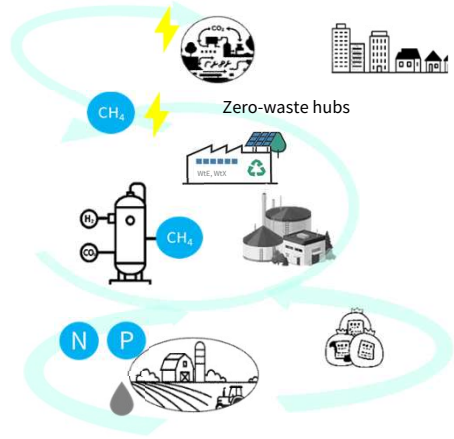
Carbon neutral



Kanadevia
Technology for people and planet

Net zero

Resource recycling, Nature Positive



Carbon Neutral Solution Business in the value chain

Kanadevia Group will accelerate decarbonisation across the value chain by linking green hydrogen, storage batteries, CCU(S) and other technologies around methanation technology and waste-to-energy (WtE).

- Utilisation of renewable energy through catalytic technologies.
- Establish CO_2 recovery technology by 2030 and develop e-methane utilisation business by 2040.
- Value chain linkages, regional linkages

Establishment of a local resource-recycling society

Kanadevia Group will build a Resilience Eco Society® based on regional resource recycling by integrating technologies such as recycling, water treatment, methanation and hydrogen production, with a focus on waste-to-energy (WtE) incineration power generation.

- Optimised treatment by standardised plants
- The company's main focus is on the development of a Resilience Eco Society® that integrates recycling, water treatment, methanation and hydrogen production technologies.
- Reduction of environmental impact and accident risk

Figure 4-12: Innovation supporting the strategy

A gradual transition from a fossil fuel-using society to a non-fossil fuel-using society is essential for carbon neutrality, but this requires the transport of energy from "renewable energy exporting regions" to "renewable energy importing regions." In "renewable energy exporting regions", green electricity from wind power generation and other sources is used to power hydrogen generators and produce green hydrogen. This hydrogen is converted into green ammonia, e-methane and other carriers that can be stored and transported to the "renewable energy import zone." Kanadevia Group supports the transition to a decarbonised society with waste-to-energy (WtE), biogas and biomass power generation, wind power generation, process and nuclear equipment, hydrogen generation and methanation equipment.

An example of an initiative following policy guidance (GX Strategy) in Japan is bioethanol production. This is a next-generation fuel that utilises renewable resources and contributes to decarbonising the transport sector and building a resource-recycling society. Kanadevia Group has established technology for using general waste paper waste as a raw material, enabling it to obtain stable raw materials and produce bioethanol fuel. Bioethanol is used for Sustainable Aviation Fuel (SAF), denitrification agents in water treatment, plastic raw materials, etc. To convert all the CO_2 collected into e-methane, a large amount of cheap green hydrogen is needed, but CO_2 that still cannot be used up will also need to be stored. We have technologies for Wind Power Generation, hydrogen production equipment methanation and all-solid-state batteries[65] and is working to expand its business through technological and business collaboration on the entire value chain, including CO_2 recovery and large storage battery technologies.

There are also innovations towards carbon neutrality in the WtE Business. The CO_2 high-concentration waste combustion demonstration under the GI Fund project[66] of the New Energy and Industrial Technology Development Organization (NEDO) in Japan is a case in point: the development of this technology will be completed by 2030, and a carbon-neutral WtE business equipped with this technology will be developed by 2040. CO_2 If the densified waste combustion technology is implemented and approximately 10 million tonnes of waste is incinerated annually, calculations show that approximately 3 million tonnes of e-methane can be used from the recovered CO_2 through methanation technology[67] .

Carbon neutrality in the supply chain

Scope 3 Category 11 accounts for more than 90% of Kanadevia Group's total GHG emissions. The most significant GHG emissions are generated when customers use WtE plants, and this is due to the plastics contained in the raw material waste. Plastic reduction is therefore one of the key themes, and in addition to promoting the installation of CCUS at WtE, we will work with our customers' municipalities to achieve a recycling-oriented society, including plastic reduction.

The next largest Scope 3 Category 11 after WtE is combustion equipment such as marine engines and boilers. As well as providing technical proposals to switch to decarbonised fuel-fired engines and boilers, it is necessary to secure the decarbonised fuels needed to operate these engines and boilers. In cooperation with customers, we will work on creating a system to ensure a stable supply of alternative fuels and low procurement costs.

Furthermore, to foster a carbon-neutral society, we will lobby for the promotion of investment through the use of carbon pricing and financing through sustainable finance.

Kanadevia Group’s contribution to customers achieving carbon neutrality

Carbon Neutral Solution Business are an important part of our business portfolio that contributes to carbon neutrality. We will promote the increasing use of water electrolysers worldwide in preparation for a hydrogen society. In doing so, we will actively encourage the installation of equipment where non-fossil fuel power generation (renewable and nuclear power) can be utilised, with the aim of becoming a system integrator by 2035-2040, with a business model of not only plant construction but also system construction and manufacturing. We will also promote the use of pressure vessels and fuel tanks, which are necessary for hydrogen production and the production of ammonia from hydrogen, as well as methanation equipment and catalysts for producing e-methane from hydrogen and carbon dioxide.

In addition, orders are being placed for cracking equipment and catalysts to produce hydrogen in Japan from imported green ammonia. We are also working to win bulk orders for these systems as system EPC.

The wind power generation is another part of our business portfolio that contributes to carbon neutrality. In offshore wind, Kanadevia Group will promote orders for implantable suction buckets, which are currently underway, and promote the development of floating systems through the GI Fund, and we expect the Japanese offshore wind market to peak in demand in the second half of 2040 with 200 units of 200 MW. In order to achieve a 25% share of the Japanese market, we are developing mass production and considering alliances to provide a total of 50 floating units of 1 GW by 2040. As for onshore Wind Power, we will continue to supply renewable energy through the continued operation of the Mutsu Ogawara wind farm and develop new projects in collaboration with business partners.

Furthermore, operating WtE operations in open dumping areas is another important part of contributing to carbon neutrality. Methane emitted from open or landfilled refuse piles has a greenhouse effect 28 times greater than CO_2 . Incinerating these waste and using methanation technology to capture CO_2 and convert it into e-methane can be extremely effective in mitigating climate change.

In addition, as estimated in the TNFD Report 2024, the electricity produced by waste incineration is a valuable source of local energy and reduces dependence on fossil fuels.

In addition to Europe, North America, Japan and Australia, where the footprint of the project is already large, the project will also consider operations in the Middle East, Africa, Asia and South America, where there is significant scope for contribution to reducing environmental impact. The potential for reducing carbon emissions through the development of a circular economy in the Asia - Pacific region is considered to be particularly significant. How Kanadevia Group can contribute to reducing the environmental impact of other companies while minimising its own environmental impact within the scope of the environmental resilience inherent to the regions in which it operates is discussed in detail in **Appendix 3**.

(3) Transition plan towards Net-zero environmental impacts innovations in the WtE/WtX Business towards Net-zero environmental impacts

Waste generation in the world is expected to increase in Africa, Latin America and Asia, reaching 32 billion tonnes per year by 2050[68]. "A world where no waste is wasted" **"Resilience Eco Society®[69]"**, it can be assumed that material and chemical recycling is progressing in various ways other than waste incineration and power generation.

This illustrates the innovations underpinning the **"Strategy for Zero-Waste Hub building."**

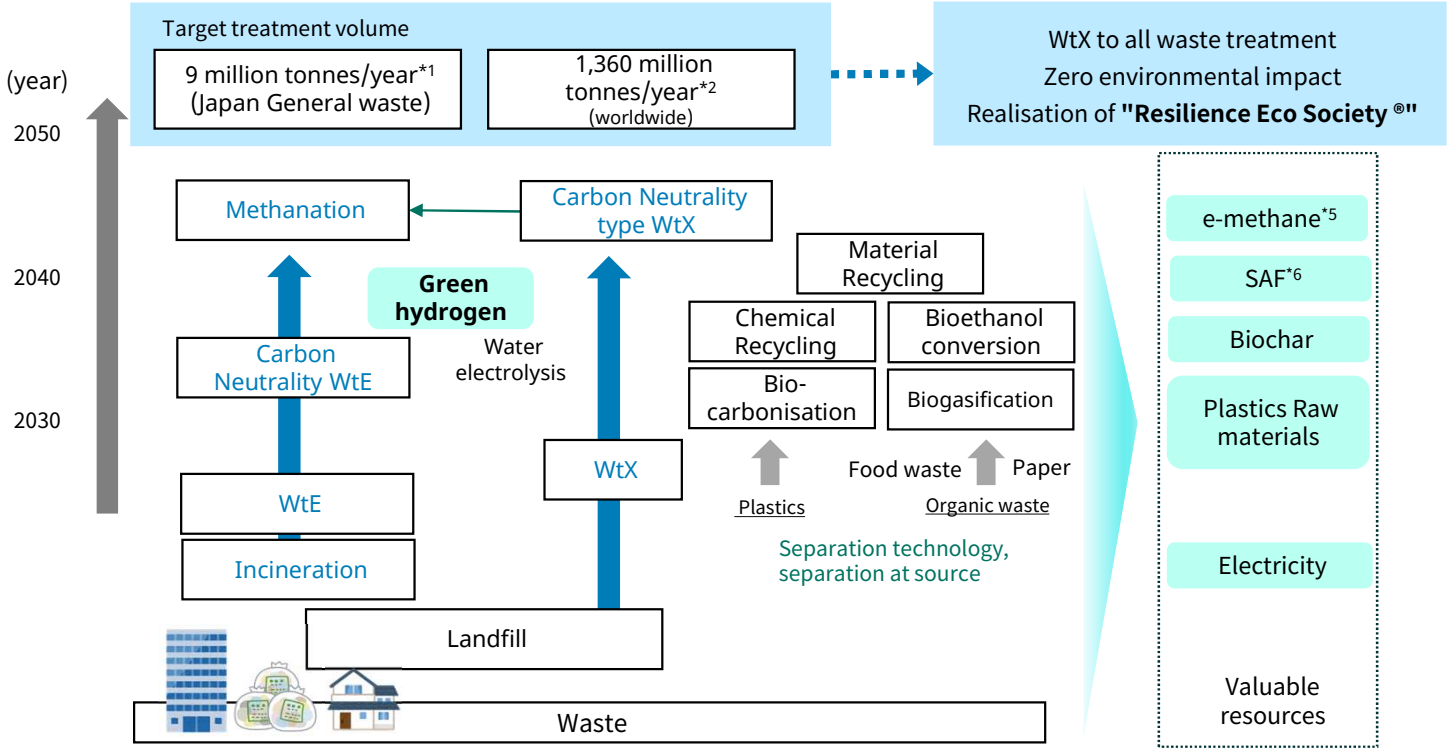
Viewing refuse as a resource that should not simply be disposed of, but as a stable supply from the region, WtX will be promoted by developing various technologies that enable the use of green electricity, biomethane, green ammonia and green hydrogen, and the recovery of recyclable chemicals, metals, etc.(**Figure 4-14**). Given the accelerating pace of globalisation and the trend towards more uniform waste quality, we believe that the benefits of WtX technology can be expected[70].

In 2050, each region will have a WtX plant at its core as an advanced recycling infrastructure, providing circular services for valuable resources and water treatment. The WtX plant will also be the hub, with smaller methanation plants connected to urban areas and smaller biomethanation plants connected to biomass-rich rural areas to extract energy.WtX plants will not only be large plants for one million cities in Asia, but also standardised to lower costs and provide smaller WtX for 100,000 cities, enabling them to address environmental issues.

By 2040, 99% of waste will be recycled or upcycled and only non-recyclable residues will be incinerated, with waste-to-energy facilities acting as **"zero-waste hubs"**, achieving zero CO_2 emissions and reusing recovered carbon in industry and agriculture.

The power generation process is fully automated with AI, and sensors and blockchain technology ensuring traceability of waste. In biomass-rich regions, a hybrid energy and resource hub can be established, with waste incineration power generation at its core, but with integrated use of local biomass and waste. All local wastes (rubbish, sewage, agricultural residues, forest waste, etc.) are processed in a closed-loop, ecosystem-like system to produce energy, food, biomimetic[71] materials. Another important theme is the automated operation of plants, where AI analyses the composition of the waste in real time using sensors and cameras before the waste is fed in, sorting out plastics, metals and organics, and optimizing their routing for gasification, reuse, or upcycling. An additional opportunity lies in WtS[72] , where a waste incineration plant is attached to an industrial complex and supplies steam to the complex.

Towards 2030, in addition to the aforementioned CO_2 high-concentration waste combustion technology, we are developing technologies to produce biochar, gas, bioethanol and other products from waste, with the aim of commercialising all but a few of these in Japan.



*1 2050 Projected amount of general waste generated in Japan*3 18 million tonnes/year share of treatment 50%.
*2 Global waste generation forecast for 2050*4 3,401 million tonnes/year 40% share of treatment (including Inova)
*3 Draft medium- and long-term scenario towards virtually zero greenhouse gas emissions in the waste and resource recycling sector by 2050, 2021, Ministry of the Environment data.
*4 Estimated from World Bank (2018) "What a Waste 2.0: Current status and prospects for global waste quantity management towards 2050" data.
*5 Synthetic methane produced from hydrogen produced using renewable energy (green hydrogen) and CO_2
*6 SAF (Sustainable Aviation Fuel): Carbon-neutral aviation fuel produced from biomass, waste cooking oil and municipal waste.

Figure 4-13: Maturity level of tackling the waste challenge and business patterns

Net-zero environmental impacts in the WtE/WtX value chain

These innovations will enable Kanadevia Group to develop different types of business models and to make comprehensive proposals for different waste challenges in different regions, according to the maturity of local initiatives. For promoters of regional Net-zero environmental impact strategies and business players, partnering with us provides access to variabale solutions to the waste challenges of their region. The ability of us to demonstrate viability, both in innovation and in the development of business models, is therefore key to the simultaneous growth of us and the reduction of its environmental impact.

[Initial phase x WtE Business model]

For large cities in the Middle East and Africa, where landfill disposal is the mainstream, the introduction of large-scale WtE is being promoted to customers as an economical environmental impact reduction solution as an alternative to landfill disposal. For example, the world‘s largest WtE plant in Dubai, United Arab Emirates (approx. 2 million tonnes/year) and the largest WtE plant in the European region in Istanbul, Turkey (approx. 1 million tonnes/year) are examples, and we are appealing to both cities.

[Advanced waste management x WtX Business model (1)]

On the other hand, as a hub of the circular economy in developed countries, it provides a "resource recycling plant" that recycles and reconstructs resources at the molecular level (WtX). We will also develop solutions such as larger facilities and combinations with methanation and RO membranes to solve local environmental issues in an integrated and efficient manner We are also considering material recycling for WtX with a view to collaboration.

[Advanced waste treatment x WtX Business model (2)]

Demand for WtX is expected to decline in the future as chemical and material recycling of plastics progresses. Therefore, we want to accelerate the development of the WtX Business to meet a wide range of customer demands. To this end, we are considering collaborating with industrial waste treatment companies. In the future, we would also like to work on the conversion of plastic waste into chemical raw materials.

Furthermore, we believe that the business model of asset management is also effective. In January 2025, Kanadevia Group, through its UK biogas plant asset management subsidiary, acquired a Dutch biomethane company and at the same time took over 11 biogas facilities as well as new projects. Asset management is another strategic approach, such as enabling new market approaches and facilitating project development deals.

WtE/WtX projects' contribution to net zero environmental impacts in developing countries

Due to the rapid increase in urban population in many large cities in developing countries, waste and sewage treatment cannot keep pace in many areas, and leading to open burning and landfilling. The most important thing towards the transition to Net-zero environmental impacts is the rapid reduction of waste in the sector. To this end, one of the concrete measures of Kanadevia Group’s Pillars of Success[73] **"Maximization of environment’s recovery power"** is the closure of open dumping sites. This goes beyond simply installing incineration facilities in the area concerned, and by reducing the number of open dumping areas, the Group proposes a comprehensive solution to prevent marine pollution caused by waste leakage, as well as to preserve and restore the local ecosystem.

To handle this huge amount of waste, Kanadevia Group will develop WtE projects in Asia, the Middle East and other countries/regions. Depending on the specifications of the facility where it is installed, incineration of the waste will reduce waste volume to approximately 3% of its original mass. Compared to landfilling the entire volume without incineration, the amount of land changed for landfill is reduced by less than a factor of 30[74] .

Kanadevia Group provides not only large-scale WtE/WtX plants for cities with populations of one million in Asia, but also compact, standardised facilities for cities of 100,000 residents, with lower costs through standardisation, enabling them to respond to environmental issues.

Furthermore, by integrating Kanadevia Group's suite of technologies and combining waste incineration power generation with methane fermentation and water purification at sewage treatment plants, we believe that energy self-sufficiency and environmental improvements can be achieved in developing countries across the region. Specifically, the waste brought to the plant is subjected to a systematic sorting system. High-value plastics and metals are recycled and turned into new raw materials for industrial use. Food waste is processed in methane fermentation facilities and converted into biogas energy. Only combustible waste that cannot be recycled by any means is then sent to incineration facilities with energy recovery. Compared to uncontrolled open burning, incineration in facilities with advanced exhaust gas treatment systems significantly reduces air pollutant emissions and protects the health of local residents. In addition, the project will also look at recovering useful metals from the incinerated ash and producing biochar from wood and paper waste, which can then be used as a soil conditioner.

In this way, multi-stage utilisation of waste, and the final amount of landfill is reduced to near zero. This means that the creation of new landfill sites and the expansion of existing open dumping areas will be prevented.

This helps preserve the natural environment, including valuable forests, agricultural land and water sources. It also mitigates the risk of toxic leachate from waste heaps and contaminating soil and groundwater. This is the hardest initiative of the Circular Business Regional Co-creation Strategy, but it will promote the transition to a sustainable society through partnerships with various stakeholders and businesses from other industries and others who are responding to the regional environmental strategy.

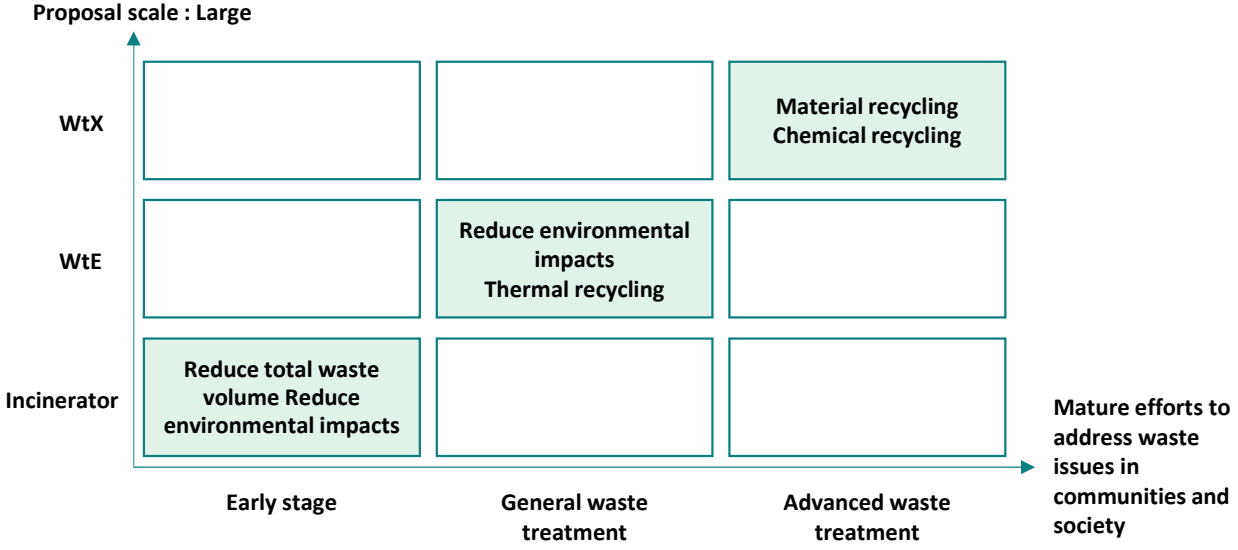


Figure4-14:Maturity of Waste Management Initiatives and Business Patterns

Contributing to Net-zero environmental impacts in desalination and water treatment projects

In the desalination and water treatment business, Kanadevia Group promotes decentralised, locally produced and locally consumed water treatment solutions in order to respond to the regional water challenges, levels of infrastructure maturity, and budget constraints, as well as the scale of budgets. In large cities in developed countries, the main challenge is to extend the service life and energy efficiency of the advanced large-scale facilities already in place, so we propose the replacement of equipment and the combination with renewable energy, as well as the creation of combined facilities with WtE and WtX. On the other hand, in developing countries and small and medium-sized cities, the introduction of low-cost facilities is important, and we are advancing technological innovation, promoting Water PPPs[75)], and supporting wastewater treatment solutions that include nitrogen and phosphorus recovery.

Furthermore, with the aim of energy-generating water treatment, we are developing biomethanation technologies that utilises biogas derived from the anaerobic digestion of sewage sludge and food waste. This technologies enables the storage and use of renewable energy by separating CO_2 from the biogas and reacting it with green hydrogen to produce methane through the action of microorganisms. Furthermore, in conjunction with sewage sludge incinerators and hydrogen production technology, the system contributes to the realisation of a carbon-neutral and resource-recycling society. By integrating these initiatives with renewable energy facilities such as solar and Wind Power Generation and WtE, and providing them as locally optimised systems, Kanadevia accelerates the creation of sustainable water treatment infrastructures. Through these innovations, Kanadevia Group aims to simultaneously reduce environmental impact and drive sustainable business growth.

In Japan, the project aims to introduce as a system and commission the operation of a facility that produces biomethane through methane fermentation of sewage sludge in a bioreactor and its separation and recovery as biogas. The project will also contribute to sustainability by focusing on extending the life of existing water and wastewater infrastructure and avoiding carbon emissions from new construction. Another approach involves promoting stoker-type sewage sludge incinerators to enable the recycling of resources from the sludge of agricultural and community wastewater treatment plants and other facilities in a single cycle. This will recover phosphorus and nitrogen, with phosphorus being recovered as it is and nitrogen being recovered as ammonia from wastewater and commercialised.

Furthermore, we will expand our sales and maintenance systems so that we can offer equipment in more countries and regions, such as for the treatment of mine wastewater, where the introduction of such equipment can significantly reduce environmental impacts, and we will work to achieve and expand water positivity in our customers' equipment operations.

Contribution to Net-zero environmental impacts in the Machinery Business

In order to contribute to a Net-zero environmental impacts, we will assess the environmental footprint of procured components and establish a system to procure parts with a lower environmental impact. In addition, we will promote product design aimed at reducing environmental impact during use by adopting product structures that facilitate resource recycling, BAT (Best Available Technologies[76)]), etc., and reduce environmental impact, which is Scope 3 for Kanadevia Group.

Contribution to Net-zero environmental impacts in the Social Infrastructure Business

In the Social Infrastructure Business, in order to adapt to climate change, we will develop and apply technologies to extend the service life and resilience of existing infrastructure to withstand extreme weather events such as heavy rainfall and strong winds. For new installations, we will implement procurement systems for steel, concrete, and other essential materials with lower environmental impact.

Column

At the 29th Conference of the Parties (COP29) to the UN Framework Convention on Climate Change held in Baku, Azerbaijan, in November 2024, Kanadevia Group will be present at the Japan Pavilion under the theme "Circular economy and net zero GHG emissions achieved by innovative waste treatment systems." The exhibition featured technologies such as waste power generation (incineration power), methane fermentation, wind power, seawater desalination, water electrolysis and methanation.

In many parts of the world, waste is disposed of in landfills, but in Japan, waste power generation technology has evolved and can contribute to Carbon Neutral Solution Business and the circular economy when combined with technologies such as CO_2 recovery and methanation. Through our exhibition at COP29, we recognised that our technologies and products are in demand worldwide and contribute to the circular economy and Carbon Neutral Solution Business. contribution to the circular economy and Carbon Neutral Solution Business.

The package extracts locally needed energy and water from refuse and seawater. Waste-derived electricity and renewable energy are extracted from waste incineration power generation and biogas plants. It also utilises water electrolysis technology using water obtained from seawater desalination and renewable electricity from wind power generation to produce oxygen and green hydrogen from seawater. The oxygen is utilised for waste combustion, while the hydrogen is converted to e-methane through an efficient methanation reaction with the recovered CO_2, enabling its cyclical use as an alternative resource to fossil fuels.

This exhibit is a regenerative energy system that Kanadevia Group can offer towards the **Net-zero environmental impacts** society that we are aiming for.

Figure 4-15: Innovative Waste Management to Achieve Circular Economy & Net-Zero GHG Emissions

5. Risk and impact management

All of Kanadevia Group's operations are strongly linked to climate and nature, because they are characterised by the linkage between the promotion of business and the improvement of the environmental impact of local communities, processes for managing climate and nature-related risks and the integration of risk management across the organisation is an important theme. Integration is an important topic.

 # Climate change risks
 # Natural capital risks
 # Risk management

5.1 Process for identifying and assessing climate and nature-related risks C N

Kanadevia Group's operations are closely linked to the environmental performance of the communities in which it operates at its customers, as all of its operations are strongly linked to climate and nature and are characterised by the linkage between the promotion of operations and the reduction of environmental impacts on local communities. Therefore, climate- and nature-related risk management is integrated into the Group’s overall risk management framework.

In 2024, the identification and assessment of climate- and nature-related risks are conducted using the LEAP approach, which refers to the already published TCFD recommendations and TNFD v1.0 guidelines and tools. In other words, for the qualitative assessment of nature-related risks of the impact of the company's activities on ecosystems, the ENCORE analysis and rationale recommended in the TNFD are referred to and compared with own operating levels related to its business. The operational and environmental data held by Kanadevia Group are compared with the ENCORE analysis above and the impact on natural capital and dependence on ecosystem services, using a five-level scale (Very High, High, Medium, Low, Very Low)according to ENCORE (How to proceed with the assessment using ENCORE is explained in section 4.1).

In addition, the environmental impacts are visualised and quantitative targets have been set for 2030 and 2040, aiming to achieve the net zero-environmental impacts by 2050.

In the future, we will expand the scope and improve the availability of data on dependencies and impacts across the value chain, both upstream and downstream, and based on this data, we will conduct further analysis, we will regularly review the assessment of identified risks.

5.2 Integration of organisation-wide risk management with processes for managing climate and nature-related risks C N

Failure or damage of plants managed by the Kanadevia Group, plant engineering companies, leads to environmental degradation for its customers. For this reason, the management of risks and opportunities is promoted through governance on a per-plant order basis.

However, focusing solely on environmental degradation risks at the individual project level does not allow for effective medium- to long-term risk management. To address this, the Kanadevia Group set up seven Pillars of Success (Materialities)[77] from the perspective of society and stakeholders and the impact on business continuity, based on various social issues, including climate and nature, and has identified risks and opportunities for each materiality.

In Kanadevia Group, medium and long-term risks for ESG issues are comprehensively discussed throughout the value chain in the **Sustainability Promotion Committee**, which is chaired by the President of the Board of Directors and comprises the general managers of the business units, heads of business units and presidents of Group companies. In the discussions, **the Sustainability Promotion Department,** the secretariat of the Sustainability Promotion Committee, raises issues based on the performance and progress of our businesses in priority locations in terms of nature-related risks and other factors. This stimulates discussion at the Sustainability Promotion Committee, reports key risks to the Corporate Strategy Committee and enables management to recognise and address issues in a timely manner.

In addition, the Board of Directors, which deals with sustainability-related issues, convenes twice annually, and at least one of these meetings receives a report based on discussions at the Sustainability Promotion Committee and the Corporate Strategy Committee relating to medium and long-term risks related to ESG issues, thus ensures effective governance.

Business risks are identified, analysed, and evaluated during the medium-term **management planning process,** and specific countermeasures are discussed before the medium-term management plan is drawn up. The progress of the medium-term management plan is followed up every six months by a meeting body led by the President of the Board of Directors of the Company, which also follows up on measures to deal with business risks. Under the company-wide **ERM systems**, climate, nature-related, and operational risks requiring focused management are defined, and evaluation indicators are established to support effective oversight of cross-cutting and emerging risks. Finally, in order to promote environmental protection activities in its business activities, Kanadevia Group has established a basic policy for the promotion of environmental protection, and has built, maintains and operates an environmental management system based on ISO 14001 and the local environmental regulations.

These are organically linked and promoted as shown in Figure 5-1.

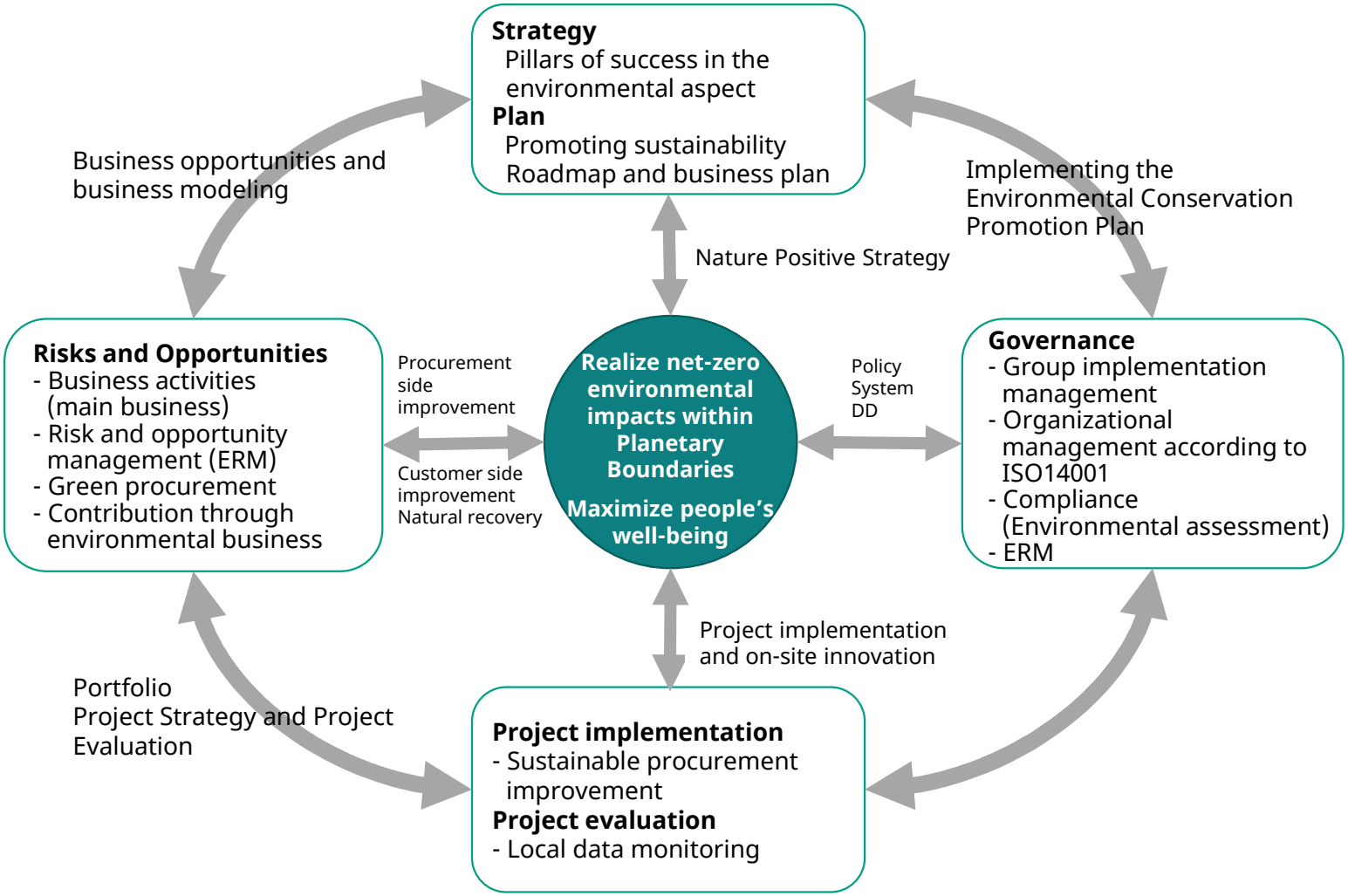
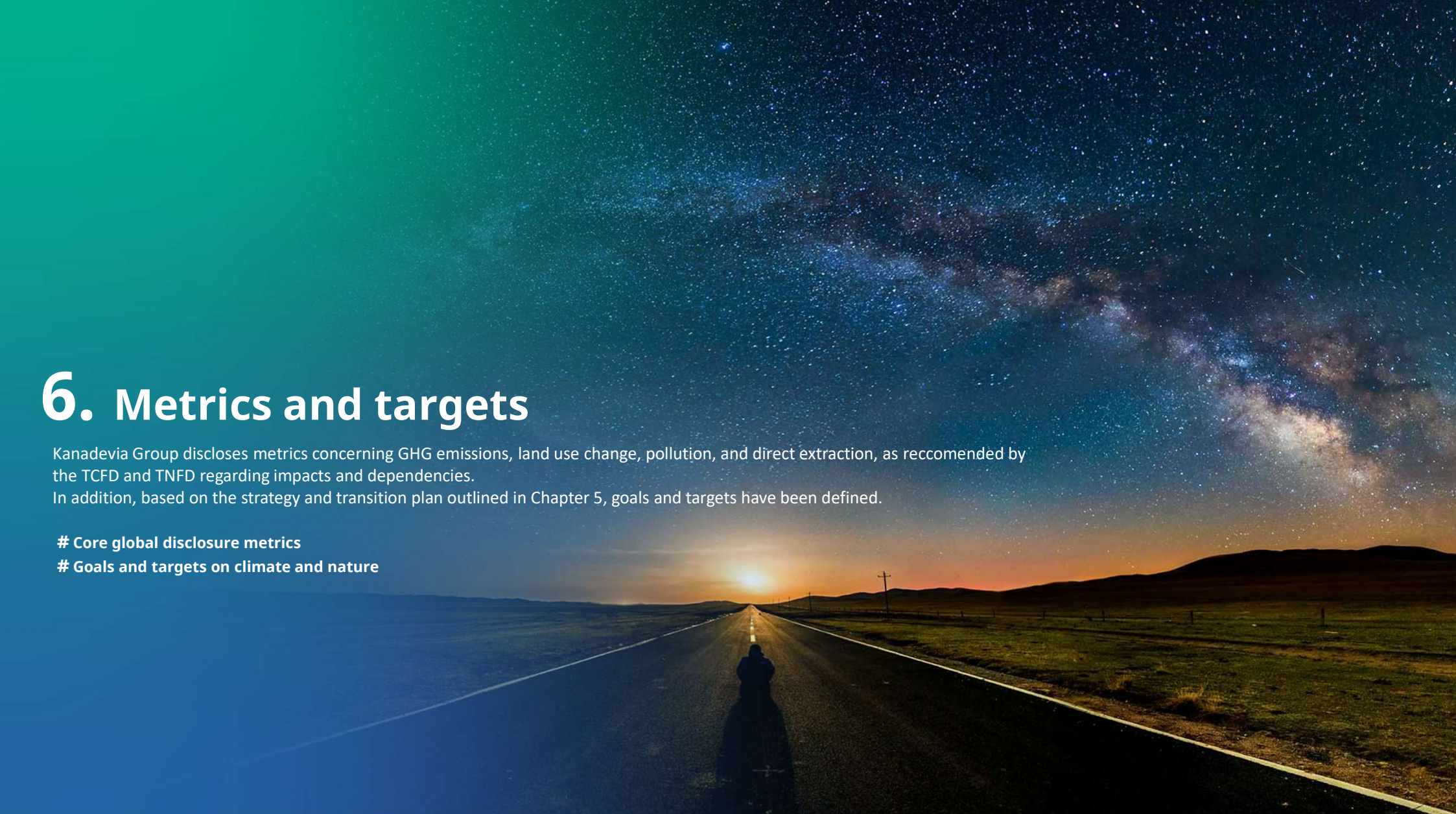


Figure 5-1: Integration of natural risk management processes and organisation-wide risk management

6. Metrics and targets

Kanadevia Group discloses metrics concerning GHG emissions, land use change, pollution, and direct extraction, as reccomended by the TCFD and TNFD regarding impacts and dependencies.
In addition, based on the strategy and transition plan outlined in Chapter 5, goals and targets have been defined.

 # Core global disclosure metrics
 # Goals and targets on climate and nature



6.1 Core global disclosure metrics C N

For indicators related to GHG emissions, land alteration, pollution, direct extraction, etc. related to impact and dependence recommended for disclosure in the TCFD and TNFD, the indicators in Kanadevia Group are shown in Table 6-1. Note that for the "Business" column in Table 6-1 under "Kanadevia Results", the combined scope of operations of us (including SPCs) is recorded.

Table 6-1: Core global disclosure metrics

TNFD core global disclosure Indicators and metrics				Kanadevia Results*	
No.	Indicator	Metric	Unit	FY2023	FY2024
-	Climate change				
	GHG emissions	Scope 1 (Direct emissions from in-house fuel use and manufacturing processes)	t-CO_2e	193,100	211,100
		Scope 2 (Indirect emissions associated with the use of electricity and heat purchased by the company)		19,200	20,900
		Scope3 Category 1 (Purchased goods and services)		1,321,600	1,457,100
		Scope 3 Category 2 (Capital goods)		18,500	38,700
		Scope 3 Category 3 (Fuel and Energy)		49,700	56,900
		Scope 3 Category 4 (Upstream transportation)		31,000	22,800
		Scope 3 Category 5 (Waste generated in operations)		900	900
		Scope 3 Category 6 (Business trip)		1,600	1,700
		Scope 3 Category 7 (Employee's commuting)		3,800	3,900
		Scope 3 Category 8 (Upstream leased assets)		Not covered	Not covered
		Scope 3 Category 9 (Downstream transportation)		1,600	2,800
		Scope 3 Category 10 (Processing of sold products)		Not applicable	Not applicable
		Scope 3 Category 11 (Use of sold products)		9,848,000	42,365,000
		Scope 3 Category 12 (End of life treatment of products)		3,300	4,200
		Scope 3 Category 13 (Downstream leased assets)		3,000	600
		Scope 3 Category 14 (Franchise)		Not applicable	Not included
		Scope 3 Category 15 (Investment)		7,600	8,100

* See ESG Databook 2025. Note that Scope 3 Category 11 includes values after the revision of the calculation method referred to in Note 4(5) of the ESG Databook.

*In the following, for "Kanadevia Results", please refer to the **ESG Databook 2025**. For Procurement", the results of the 2023 LCA calculations are presented in **Appendix 4**.

TNFD core global disclosure Indicators and metrics				Kanadevia Results	
No.	**Indicator**	**Metric**	**Unit**	**FY2024**	**Remarks**
C1	Land/freshwater/ocean/ocean-use change				
C1.0	Total spatial footprint	Total spatial footprint (sum of):	Thousand m^2	5,394	-
		Total surface area under supervision and controlled/managed by the organisation, where the organisation has control		5,394	The area covers land owned by Kanadevia Group and plants for which we are carrying out O&M (operations and maintenance).
		Total disturbed area		67	2 plants completed in 2024
		Total rehabilitated/restored area		-	-
C1.1	Extent of land/freshwater/ocean-use change	Extent of land/freshwater/ocean ecosystem use change	Thousand m^2	-	-
		Extent of land/freshwater/ocean ecosystem conserved or restored		-	-
		Extent of land/freshwater/ocean ecosystem that is sustainably managed		-	-
C2	Pollutants released to soil split by type				
C2.0	Pollutants released to soil by type	Pollutants released to soil by type	Thousand kg	No pollution incidents have been identified.	A few minor oil leaks have been identified, but are managed through seepage and leakage prevention measures and rapid response after oil leaks have occurred.

*In the following, for "Kanadevia Results", please refer to the ESG Databook 2025. For "Procurement", the results of the 2023 LCA calculations are provided in Appendix 4.

TNFD core global disclosure Indicators and metrics				Kanadevia Results	
No.	Indicator	Metric	Unit	FY2024	Remarks
C2.1	Wastewater discharged	Volume of wastewater discharged (total, freshwater, other)	Thousand m^3	See ESG Databook 2025	-
		Concentration of key pollutants in wastewater discharged	-	See ESG Databook 2025	-
		Temperature of discharged water, where relevant	-	Under investigation	-
C2.2	Waste generation and disposal	Weight of hazardous and nonhazardous waste generated by type	Thousand kg	See ESG Databook 2025	-
		Weight of hazardous and non-hazardous waste disposed of	Thousand kg	See ESG Databook 2025	-
		- Waste incinerated (with and without energy recovery)			
		- Waste sent to landfill			
		- Other disposal methods			
		Weight of hazardous and non-hazardous waste diverted from landfill (excluding energy recovery)	Thousand kg	See ESG Databook 2025	-
		- Reused			
		- Recycled			
		- Other recovery operations			

*In the following, for "Kanadevia Results", please refer to the ESG Databook 2025. For "Procurement", the results of the 2023 LCA calculations are provided in Appendix 4.

TNFD core global disclosure Indicators and metrics				Kanadevia Results	
No.	Indicator	Metric	Unit	FY2024	Remarks
C2.3	Plastic pollution	Plastic footprint as measured by total weight of plastics (polymers, durable goods and packaging) used or sold broken down into the raw material content	Thousand kg	In aggregate	-Plastic waste from facilities where operations are carried out, such as administration, sales, development, design, etc., is thermally recycled. -The weight of plastics in domestic waste as raw material in the WtE/WtX process is not known.
		For plastic packaging, the percentage of plastics	%	In the process of being compiled	-
		- Re-usable			
		- Compostable			
		- Technically recyclable			
		- Recyclable in practice and at scale			
C2.4	Non-GHG air pollutants	Non-GHG air pollutants by type	Thousand kg	See ESG Databook 2025	At the WtE plants that we are entrusted with operating, proper treatment is carried out for the following substances at control values that are either below or 10 times stricter than the regulation values. Soot and dust, sulphur oxides, nitrogen oxides, hydrogen chloride, mercury, dioxins
		- Particulate matter (PM2.5 and/or PM10)			
		- Nitrogen oxides (NO_2, NO and NO_3)			
		- Volatile organic compounds (VOCs or NMVOCs)			
		- Sulphur oxides (SO_2, SO, SO_3, SO_x)			
		- Ammonia (NH_3)			

*For "Kanadevia Results" in the following, please refer to ESG Databook 2025. For "Procurement", the results of the 2023 LCA calculations are provided in Appendix 4.

TNFD core global disclosure Indicators and metrics				Kanadevia Results	
No.	Indicator	Metric	Unit	FY2024	Remarks
C3	Resource use/replenishment				
C3.0	Water withdrawal and consumption from areas of water scarcity	Water withdrawal and consumption from areas of water scarcity, including identification of water source	Thousand m^3	See ESG Databook 2025	The project does not abstraction water from areas of water scarcity. Each facility is located based on the results of an environmental assessment by the customer and is selected in an area rich in water resources.
	Quantity of high-risk natural commodities sourced from land/ocean/ freshwater	Quantity of high-risk natural commodities sourced under a sustainable management plan or certification programme, including proportion of total high-risk natural commodities			
		Biomass	Thousand kg, (%)	38,000 (100%)	Biomass procured by the project is fuel for the Miyanogo biomass power plant(wood chips obtained from unused wood). 100% of the procured quantity has obtained the Forestry Agency's "Certificate proving that the woody biomass is derived from thinned wood etc."
		Minerals		- (-)	
		Construction materials		- (-)	
		Fossil fuels		- (-)	
		Iron ore		- (-)	
		Copper ore		- (-)	
		Nickel ore		- (-)	
		Lead ore		- (-)	
		Zinc ore		- (-)	
		Gold		- (-)	
		Aluminium ore		- (-)	
		Natural gas		- (-)	

*In the following, for "Kanadevia Results", please refer to the **ESG Databook 2025**. For Procurement", the results of the 2023 LCA calculations are presented in **Appendix 4**.

TNFD core global disclosure Indicators and metrics				Kanadevia Results	
No.	Indicator	Metric	Unit	FY2024	Remarks
C3.1	Sourced from land/ocean/freshwater Quantity of high-risk natural commodities	Quantity of high-risk natural primary products (tonnes) Includes quantities sourced from land, marine, and freshwater environments, broken down by type, along with their proportion of total natural primary products.	Thousand kg	-	As the volume of natural primary products as a whole is not disaggregated, the percentage of "high-risk natural primary products" in "total natural primary products" is not calculated.
C4	Invasive alien species and other (placeholder indicator)[78]				
C4.0	Measures against unintentional introduction of invasive alien species (IAS)[79]	Proportion of high-risk activities operated under appropriate measures to prevent unintentional introduction of IAS, or low-risk designed activities	-	No special measures	-
C5.	State of nature (placeholder indicator)				
C5.0	State of nature	Ecosystem condition	-	Under consideration	-
	Species extinction risk	Species extinction risk	-	Under consideration	-

Table 6-2: Core Global Disclosure Indicators related to nature-related risks and opportunities

No.	Category	Metric	Kanadevia Results
C7.0	Risks	Value of assets, liabilities, revenue and expenses that are assessed as vulnerable to nature-related transition risks (total and proportion of total)	None
C7.1		Value of assets, liabilities, revenue and expenses that are assessed as vulnerable to nature-related physical risks (total and proportion of total)	Under review
C7.2		Description and value of significant fines/penalties received/litigation action in the year due to negative nature-related impacts	None
C7.3	Opportunities	Amount of capital expenditure, financing or investment deployed towards nature-related opportunities, by type of opportunity, with reference to a government or regulator green investment taxonomy or third-party industry or NGO taxonomy, where relevant	500 million sustainable finance 1,358 million in green-related development grants, including GI funds
C7.4		Increase and proportion of revenue from products and services producing demonstrable positive impacts on nature with a description of impacts	Revenue from businesses with demonstrable positive impact on nature (FY2024): 530 billion (86.8% of consolidated revenue, up 15.2% year-on-year). Promotes businesses such as waste-to-energy and water reuse.

6.2 Climate and nature objectives C N

(1) Climate, nature and business relations

Kanadevia Group, with its corporate philosophy and **Sustainable Vision**[80] in mind, recognises the external environment from a long-term perspective, takes exhaustive issue identification based on The Four Sustainability Principles[81] (The Natural Step) as its starting point, and takes into account **"the perspective of society and stakeholders"**, **"the perspective of impact on business continuity"** and **"the achievement"** and **"difficulty of achievement"** (utilising the Future-Fit Business Benchmarks[82]), we have identified seven **Pillars of Success (Materialities)**[83] . Of these, **"carbon neutrality"**, **"complete circulation of resources"**, **"maximization or environment's recovery power"**, **"response to intensifying natural disasters"** and **"sustainable procurement"** are pillars of success that have a strong relationship with climate and nature. In this report, we analysed our worldwide operations from the business areas outlined in our medium-term management plan, taking into account the scale of our operations, their impact on climate and nature, and their assessability. The results showed that in the WtE Business and other plant engineering businesses, climate and nature-related decisions are primarily customer-driven. Activities such as awareness-raising and sharing of know-how to reduce the environmental impact of suppliers, as well as enhancing environmental technologies and proposal quality to customers, are directly linked to climate and nature-related targets.

Kanadevia Group will actively participate in and advocate for rule-making processes, including international agreements on climate and nature-related policy decisions, particularly in contexts influenced by customer decision-making.

(2) Our Ideal Vision for 2050

Building on the above, Kanadevia Group's business goals (Table 6-3) have been redefined to align with climate and nature-related goals.

Table 6-3: Goal setting for climate and nature in business

Field	Goals	Meaning
GHG emissions	Carbon neutrality	Carbon neutrality within our Group and for our customers
Water usage burden	Water positivity	Water positives in the watersheds where our Group and our customers operate
Plastic emissions	Net zero fossil-based plastic burden	Net zero fossil-based plastic burden within our Group and customers
Land usage burden	Minimisation of waste landfill sites at customers	Land usage burden refers to changes to land, seabed, and other areas due to such activities as business operations Whenever new facilities are built, changes in land and other areas inevitably occur. However, the implementation of strict environmental assessments by customers has become standard practice. Therefore, the goal is to minimise waste landfill sites, particularly in developing countries
Ore usage burden	Net zero ore usage burden	Minimisation of new ore extraction through recycling
Burden of hazardous chemicals	Achievement of zero-emission levels for hazardous chemicals	Identify chemical substances requiring control by referring to such as RoHS Directive and REACH Regulation, and aim for zero emission levels

GHG emissions

In the area of GHG emissions, Kanadevia Group has set **carbon neutrality** as our goal.

For Scope 1 and 2, we aim to improve the efficiency of our own power plants and decarbonise thermal power sources guided by the Transition Roadmap for the Power Sector (February 2022, Energy Conservation Agency)[84] .
In manufacturing activities, we will also actively adopt new technologies, including our own products, switch fuels, use renewable energy, improve energy self-sufficiency and systematically introduce energy-saving equipment.

For Scope 3, the greatest challenge lies in minimizing emissions in Category 11: although the GHG protocol[85] does not specify a calculation method for GHG emissions from WtE plants, we have developed our own method in our pursuit of Net-zero environmental impacts, incinerated at WtE plants. The composition of waste varies from country to country and region to region, but we have adopted a conservative calculation method based on literature on municipal solid waste[86] .

Calculations based on this calculation method showed that most of Kanadevia Group's Scope 3 Category 11 is CO_2 generated when using WtE plants; CO_2 emissions from WtE plants decrease with a smaller proportion of plastics in the waste. Therefore, we will collaborate with our customers to improve plastic sorting technologies and promote sorting at the source.

In addition, since Scope 3 Category 1 emissions are significant in steel production, power generation and infrastructure construction (see **Appendix 2.2**), we will conduct awareness-raising activities for Carbon Neutral Solution Business, share methods and know-how on how to manage and reduce GHG emissions, and ensure that our suppliers are aware of the Group's basic procurement policy.

Furthermore, we aim to achieve Scope 1, 2 and 3 carbon neutrality by 2050 by promoting initiatives to reduce our customers' GHG emissions, as described in **chapter 4**, and by increasing our contribution to reductions. Carbon credits will be used as needed to support these initiatives. Based on the above goals and measures, targets have been set for the following areas (**Table 6-4**).

Table 6-4: Targets for GHG emissions (up to 2050)

Field	Targets	Meaning
GHG emissions (Scope 1, 2)	FY2030 50% reduction compared to FY2013 FY2035 60% reduction compared to FY2013 FY2040 75% reduction compared to FY 2013	In the primary phase, the company aims to achieve the target by implementing measures to reduce GHG emissions derived from its own business activities. If the target cannot be achieved by the company's own efforts alone, credits will be used.
GHG emissions (Scope 1, 2, 3)	FY2050 Carbon neutrality	Of the Scope 3 Category 11 emissions, which account for most of the GHG emissions, the largest source is CO_2 emitted during the use of WtE plants. The aim is to become carbon neutral in Scope 1, 2 and 3 in FY2050 by promoting reductions through plastic sorting and CCUS, as well as increasing the amount of reduction contributions by improving technologies and proposing projects that contribute to reductions.
GHG emissions Reduction contribution	FY2030 40,000 kt-CO_2	

Water usage burden

In the area of "Loads from water use", the goal is to achieve **water positivity** of the watersheds in which the company and its customers operate.

The magnitude of the load from water use, i.e. the magnitude of water risk, varies from basin to basin. Water risk levels vary by basin, depending on factors such as groundwater availability and access to potable and industrial water. Although the definition of water risk itself is unclear, we define a water-positive state of a basin as one where the water cycle in the basin is healthy, largely due to water scarcity and water pollution.

In watersheds with high water risk, it is essential to address water scarcity, so 100% of the water used is replenished within the same watershed. Depending on the location of the project activities, consideration will also be given to supporting conservation activities in watershed forests. Where necessary, the use of water credits in the same watershed will also be considered. We will also strictly manage the water quality of wastewater. Where we conduct our own business activities, we will set voluntary standards that exceed regional water quality regulations and ensure that water quality is strictly controlled. When customers use Kanadevia Group products, we design them to operate at a level in line with the voluntary standards and provide training in their operation.

As water quality management is exclusively important in low water risk basins, we will ensure that our own operations comply with voluntary standards that are stricter than the legal and regulatory limits at the location of our installations, and that when our customers use our products, we will design and train them to achieve strict water quality management.

To achieve this goal, it is very important to prevent the discharge of untreated water due to malfunctions or insufficient treatment capacity, especially in water treatment installations for wastewater with high hazardous substance content (e.g. mine wastewater). Kanadevia Group will therefore continue to develop more durable and reliable equipment in order to maintain a high level of reliability in water treatment facilities.

Based on the above goals and measures, targets have been set for the following areas (Table 6-5).

Table 6-5: Targets for water usage burden (up to 2050)

Field	Targets	Meaning
Water consumption (areas with high water risk)	-100% replenishment of water used in production and operation -Compliance with voluntary standards that are stricter than the water quality standards in the area.	Target 100% replenishment of water used within the same catchment area, as water scarcity measures are essential in catchments with high water risk. However, this includes supporting water credit and water recharge activities in the same catchments. Water quality management of effluent is important in both high and low water risk basins. Voluntary standards that are stricter than the water quality standards for the area in question should be observed.
Water consumption (low water risk areas)	Compliance with voluntary standards that are stricter than the water quality standards for the area concerned.	

Plastic emissions

In the area of "plastic emissions", we collaborate with manufacturers to promote 100% recycling, with the goal of achieving **a net-zero load of fossil-based plastics**.

First, we minimise the use of fossil-derived and non-biodegradable plastics (both new materials) in our own manufacturing activities in order to reduce the amount generated itself. When plastics are used, we use biodegradable or recycled plastics and give priority to plastic products that are designed to be easily sorted and thoroughly separated. In this way, we aim to minimise the use of fossil-derived plastics and other plastics in our own operations.

For fossil-derived and non-biodegradable plastics in Kanadevia Group facilities and products, it is essential that customers and suppliers understand biodegradable and recycled alternatives, and that plastics manufacturers develop recycling technologies. Suppliers are actively encouraged to propose recycled plastic products of the same quality as those made from new materials, and customers are carefully encouraged to deepen their understanding of recycled plastic products. In addition, to achieve 100% recycling of plastics, sorting technology for plastics that go into recycled materials is also necessary; the improvement of sorting and separation technology at source, as mentioned in the section on GHG emissions, can be a measure in this area as well. We will work on business and technology development, including the establishment of take-back routes by plastic manufacturers after sorting.

Based on the above goals and measures, targets have been set for the following items (Table 6-6).

Targets for minimising the load of fossil-based plastics in products will continue to be revieed with reference to the Action Plan for Building a Market for Recycled Plastics for Automotive (March 2025,Ministry of the Environment)[87] and other documents.

Table 6-6: Target for plastic emissions (up to 2050)

Field	Target	Meaning
Fossil-based plastics in own manufacturing activities	FY2050 Zero use of fossil-based plastics and non-biodegradable plastics in new materials	Minimise the utilisation rate of fossil-based plastics and non-biodegradable plastics (new materials) by 2050 by promoting the use of biodegradable bioplastics and recycled materials.

Land usage burden

In the area of "land-use impacts", our goal is to **minimise waste landfill at customer sites**.

As indicated in section 4.7, at the initial stage of maturity in tackling the waste challenge in the community and society, the volume of landfill can be reduced to 3% of total waste simply by installing incinerators. will minimise the burden caused by land use by proactively implementing the business proposals described in section 4.7**,** Therefore, we have also set a target of reducing landfill due to open dumping to zero by 2050 in the areas where Kanadevia Group operates, and we aim to achieve this by expanding the introduction of waste incineration and power generation facilities, etc.

Regarding the burden caused by waste, the following two targets will be set based on the analysis of the Core Global Disclosure Indicators (Table 6-7). First, in order to reduce the impact from waste generated by its own business activities, the Group will set a target of achieving a zero emissions level by 2050. To achieve this, the recycling rate of waste generated by Kanadevia Group sites will be increased and the number of sites achieving the zero emission level of a final landfill rate as close to zero as possible (less than 1% landfill rate) will be expanded.

Furthermore, with regard to reducing the impact of waste generated by customers' business activities, we will develop businesses and technologies to realise the recycling of incineration residues such as main ash and fly ash, and targeting a resource utilisation rate of 95% or higher.

Based on the above goals and measures, targets have been set for the following areas (Table 6-7).

Table 6-7: Targets for land usage burden (up to 2050)

Field	Targets	Meaning
Waste burden (Own manufacturing activities)	FY2040 90% recycling rate FY2050 Achieve zero emission level	Reduce emissions, increase the recycling rate and bring the final landfill rate as close to zero as possible for waste generated by Kanadevia Group sites.
Waste burden (Customer business activities)	Incineration residue recycling rate of at least 95%	Develop business and technology to realise recycling of incineration residues such as main ash and fly ash at customers.
Landfill burden (Customer business activities)	Open dumping area reduction rate (However, open dumping areas are those defined by Kanadevia Group) FY2040 70% FY2050 100%	For open dumping sites taking place in the areas where Kanadevia Group operates, the introduction of waste incineration and power generation facilities will reduce the amount of landfill and prevent new land use.

Ore usage burden

To address ore usage burden, the goal is to achieve **a net-zero ore usage burden.**

For example, for ore such as iron, for which the 3Rs have been established, expanding the use of recycled materials will be a measure to achieve the goal, while for ore such as platinum, for which the 3Rs have not been established, individual measures will be considered, including the possibility of substituting other ore. Therefore, the first step is to identify the ore used in Kanadevia Group's products and services that require resource consumption minimisation and the components that contain them. We then examine, together with manufacturers and suppliers, the possibility of substituting other minerals. Based on the results of these studies, ore that we have identified as requiring special management are designated as "environmentally controlled ore, and we systematically promote the use of recycled materials and alternatives.

Furthermore, realising a zero impact on ore usage also requires technology for sorting metals after product recovery; the improvement of sorting technology described in the section on GHG emissions can also be a measure in this area. We will pursue business and technology development to promote ore recycling.

Based on the above goals and measures, targets have been set (Table 6-8). However, they will be subject to future review in consultation with relevant stakeholders.

Table 6-8: Target for ore usage burden (up to 2050)

Field	Target	Meaning
Ore usage burden	FY2050 Zero final disposal per Environmentally controlled ore	Environmentally controlled ore are those ores used in products and services for which resource consumption needs to be minimised and which are judged to be substitutable for other ore, to be defined in the future.

Burden of hazardous chemicals

Regarding hazardous chemical burdens, our goal is to achieve **a level of zero emissions of hazardous chemicals at** the company and at its customers.

Many countries and regions have strict regulations for the use and emission of hazardous chemicals, and compliance with these limits is required in business activities and in the operation of facilities and use of products by customers. However, in some countries/regions, there may not be any regulatory values or, if there are regulatory values, they may be loosely enforced.

In the case of Kanadevia Group's business activities and when we operate facilities under contract, it sets even stricter voluntary standards with reference to the most stringent regulatory values set in the country/region concerned, and monitor these using prescribed methods and frequencies. For example, in Japan, the Air Pollution Prevention Law sets standards for dioxin, HCl, NOx, SOx and other substances contained in the exhaust gas of WtE plants, assuming concentrations that have no impact on the human body, and local authorities have set stricter standards than these. Many of the waste incineration and power generation facilities that we are contracted to operate have adopted standard values for hazardous gases that are stricter than the standards set by these laws and regulations, and are controlled using the methods and frequency specified.

Zero emissions of hazardous chemicals in products and services are also required. While any chemical can pose risks if misused, but if handled with correct knowledge and in the right application and use, the number of substances that have negative impacts on the environment and human health is limited. Therefore, chemical substances that need to be controlled are defined based on risk assessment with reference to the RoHS Directive for EU, REACH regulations, PRTR for Japan, etc., and transfers, emissions, etc. are thoroughly controlled. In addition, for those chemical substances that have particularly large impacts on the environment and human health and are used in high-risk applications, we collaborate with manufacturers and suppliers to evaluate usage restrictions (e.g. total ban, ban if an alternative is found, etc.).

Based on the results of these studies, substances that Kanadevia Group has identified as requiring special management are designated as "environmentally controlled substances" and the use of alternatives is promoted systematically.

Kanadevia Group also requires its suppliers to understand the Kanadevia Group Basic Procurement Principles. As well as direct suppliers, we aim to extend this understanding to secondary suppliers. At our suppliers, we will raise awareness so that they are actively involved in the management of hazardous chemicals as part of their environmental management.

Based on the above goals and measures, targets have been set for the following items (Table 6-9). However, they will be reviewed in the future after reaching out to relevant stakeholders.

Table 6-9: Target for burden of hazardous chemicals (up to 2050)

Field	Target	Meaning
Burden of hazardous chemicals	FY2050 Substitution of environmentally controlled substances in high-risk applications	Environmentally controlled substances are substances used in products and services that are judged by Kanadevia Group to have a significant impact on the global environment and human health, and will be defined in the future. The definition of "high-risk uses" will also continue to be considered.

Appendix

1. Overview of the business
2. Risks and opportunities related to natural capital
3. Scope of Kanadevia Group businesses based on planetary boundaries
4. Quantitative analysis of environmental impacts
5. Third-party opinion report

1. Overview of the business

1.1 Environmental Business field

Waste to Energy

Waste to Energy is that this facility burns waste and treats it hygienically, while at the same time generating electricity as an important energy resource. It consists of platforms, refuse bunkers, boilers and other equipment mainly made of steel, cranes, generators and other Machinery Business, concrete building foundations and chimneys. Refuse collected in refuse pits by refuse collection vehicles is burnt and discharged as ash as it travels over a combustion device called a stoker in the incinerator. The heat energy generated by the combustion is recovered as steam in the boiler and used to generate electricity in a steam turbine generator. The electricity generated is also sent outside the facility.

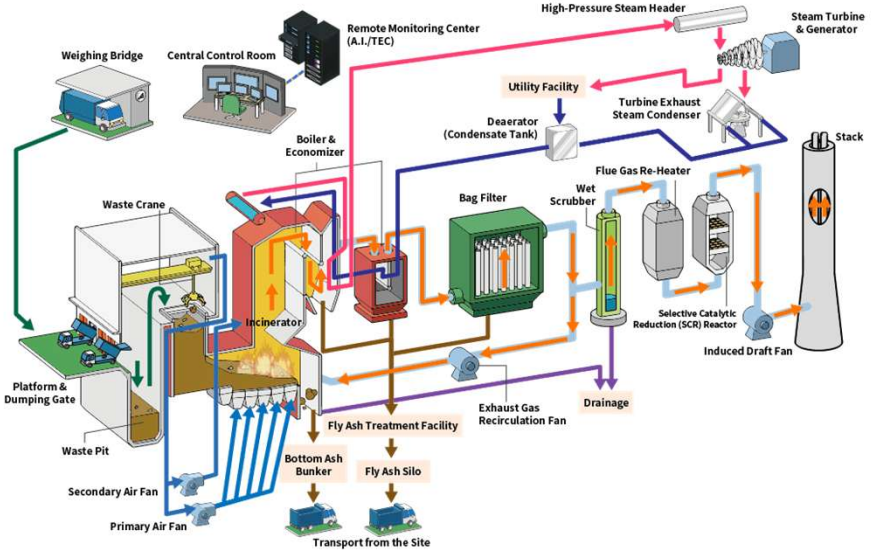


Figure A-1-1: Schematic of Waste to Energy plants

Methane fermentation systems

Methane fermentation systems enable organic wastes such as food waste, prunings, paper and manure sludge to be converted into biogas by methane fermentation, which can then be used as renewable energy. Organic waste and other raw materials are fed into a fermentation tank, where they are decomposed by micro-organisms in an oxygen-free environment. The biogas generated by the fermentation is recovered and used for power generation or heat supply. Depending on the type of waste, two methane fermentation treatment systems, wet and dry, are available.

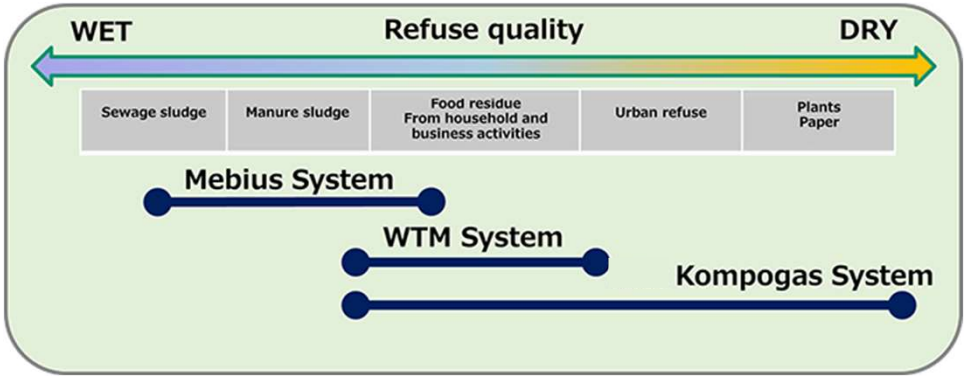


Figure A-1-2: Methane fermentation system

*WTM system
(Water-needless Two-phase Methanation system)
Dilution-free two-phase methane fermentation system

Wood biomass power generation systems

A wood biomass power generation system is a renewable energy power generation method that uses wood resources as fuel to generate electricity. Kanadevia Group's Miyanosato power plant makes use of waste wood, thinned wood and forest residues from the wood processing process from the nearby forests. The fuel is dried and stored, burnt or gasified in a boiler to generate steam or gas, which is then used to turn a turbine or engine to generate electricity.

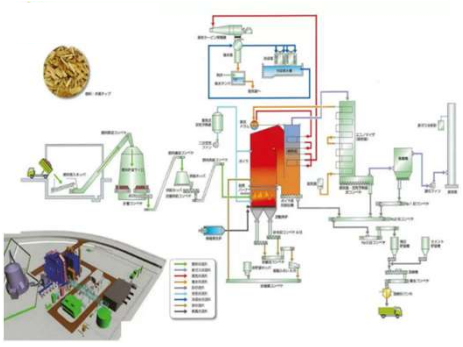


Figure A-1-3: Diagram of a wood biomass power generation system

Biomethanation

Biomethanation is a technology whereby carbon dioxide contained in biogas from waste gas emitted from power stations and factories, digestion gas from sewage treatment, food waste, agricultural waste, etc. is reacted with hydrogen by microorganisms to produce methane. Impurities in the biogas, such as hydrogen sulphide and ammonia, have a low impact and provide nutrients for the microorganisms. Methane is the main component of natural gas, and as existing gas supply networks can be used, expectations are high for this as a next-generation energy source. (For more information on catalytic methanation, see "Electrolysis technology and methanation", page 90).

Figure A-1-4: Biomethanation @ Limeco

Desalination plants

Desalination plants remove salt and impurities from seawater to produce fresh water that can be used for drinking and domestic purposes. They are particularly important in areas where the water cycle does not function well and fresh water is chronically scarce, such as in the Middle East and on remote islands. One of the typical technologies used in these plants is reverse osmosis (RO : Reverse Osmosis). This technology obtains fresh water by passing seawater under pressure exceeding the osmotic pressure through a semi-permeable membrane. It is characterised by its high energy efficiency.

Figure A-1-5: RO desalination plant

Energy and resource from organic waste, and leachate treatment systems

Sludge reclamation, recycling and final disposal plant leachate treatment systems are systems that recover and re-use resources such as phosphorus and energy while treating organic waste such as manure and septic tank sludge in a hygienic manner. Final landfill leachate treatment systems use advanced technology to remove toxic substances from leachate generated from landfill sites and purify it to safe water quality. These systems contribute to the creation of a recycling-oriented society by allowing the hygienic treatment of organic waste and the effective use of resources.

Figure A-1-6: High-load denitrification treatment method IZ system*

*IZ system: high-speed aeration system developed at the Central Institute of Engineering and Technology Wehren (Ingenieurtechnishes Zentralburo), East Germany.

Water, sewage and industrial wastewater treatment systems

Water, wastewater and industrial wastewater treatment systems are comprehensive water treatment technologies, which cover the entire process from the stable supply of water for domestic use to the purification and reuse of wastewater. In water purification treatment, safe, clean drinking water is supplied through processes such as coagulation, sedimentation, filtration and activated carbon adsorption. In sewage treatment, advanced treatment technologies such as membrane separation and ozone treatment are used to purify water to meet environmental standards. In industrial wastewater treatment, customised technologies tailored to the wastewater characteristics of each industry enable the removal of harmful substances and the reuse of water, contributing to the reduction of environmental impact and the recycling of resources.

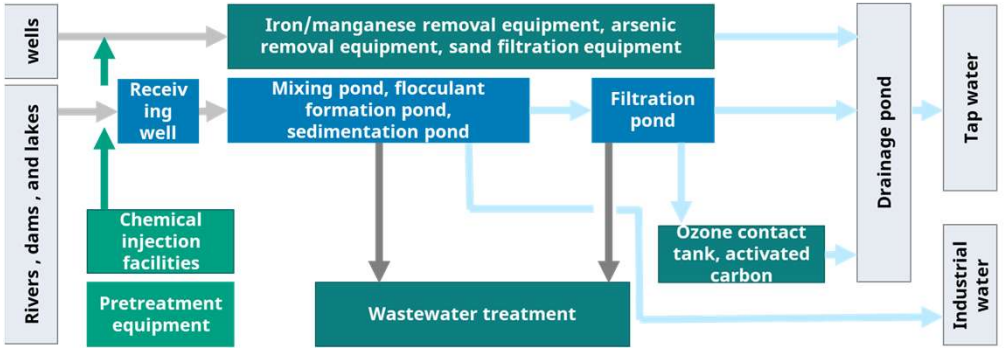


Figure A-1-7: Water and industrial water treatment system flow

1.2 Machinery Business field

Deposition system for Anti-reflection and anti-fingerprint

By combining a sputtered cathode designed by Kanadevia Group and the vacuum deposition method which we cultivated during the development of organic EL film deposition equipment, we provide equipment used to achieve integrated film formation in the same equipment from the formation of antireflection layer to antifouling layer, thus maximizing production efficiency. This equipment achieves high antifouling, durability and sliding properties on the topmost surface of displays with touch panels, while the high productivity of the roll-to-roll process enables both performance and efficiency, which have been difficult to achieve with conventional wet coating methods.

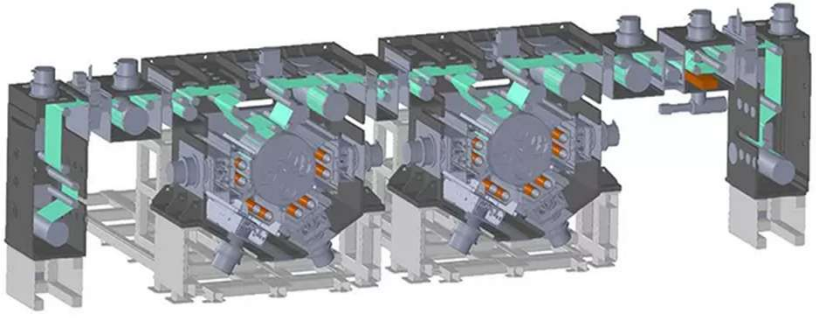


Figure A-1-8: AR and AFR films on flexible substrates

Filter presses

A Filter press is a solid-liquid separation device featuring filtration, washing and dewatering functions. It enables the separation of fine particles and precision filtration through the cake layer. Kanadebia Group's products achieve low moisture content through high-pressure pressing of up to 2.0MPa, in addition to standard pressing at 0.7MPa. A washing method using undiluted pores allows extraction of active ingredients and cake purification. The system is active in many sectors, including chemicals and wastewater treatment, and offers a wide range of products and technical support according to application and treatment volume.

Figure A-1-9: Filter press

1.3 Social Infrastructure Business field

Bridges

We have been involved in building many suspension bridges, cable-stayed bridges, and truss bridges in Japan.
These include notable bridges such as the Wakato Bridge, the first proper suspension bridge in Japan, and the Honshu-Shikoku Bridge, which ushered in the era of large bridges. Building large bridges requires being able to cope with their complex behavior during high winds or earthquakes, as well as advanced technologies for using new materials. Kanadevia has responded to the expectations of society with its prominent technological capabilities. Moreover, we have demonstrated these technological capabilities in building large bridges overseas, including the Stonecutters Bridge, which has the second-longest cable-stayed span in Japan.

Figure A-1-10: Tokyo Gate Bridge

Water gates

Kanadevia has a history of more than 100 years as a manufacturer of floodgates and steel pipes. We deliver a large number of gates (including high-pressure gates for dams and large river gates), penstocks, and steel pipes for installation in dams and rivers. Based on this safe and reliable construction of water gate facilities, we continue to ceaselessly develop new technology such as large flap gates for tsunami and disaster prevention, efficient management methods for existing equipment, and functional enhancement and efficient utilization through renewal (redevelopment) of existing dams and hydraulic iron pipes. Through these developments, Kanadevia aims to contribute to the further sophistication of equipment and safe land construction.

Figure A-1-11: Nagashima water gate (horizontal roller gate)

Flap-gate type seawall against flood disaster

Recent years have seen increasingly serious damage from tsunamis generated by major earthquakes or flooding caused by torrential rain, making disaster-proofing our towns an urgent issue. Kanadevia's Flap-Gate Type Seawall against flood disaster uses the power of nature itself, in the form of tsunamis or storm surges, to the maximum, preventing flooding damage. Given the rarity of these phenomena, the system has been designed to extremely high standards of reliability in order to ensure the requisite level of protection when called upon.

Figure A-1-12: Flap gate-type movable sea wall installed on land

1.4 Carbon Neutral Solution Business field

Marine engines

Kanadevia Group manufactures low-speed 2-stroke diesel engines for large cargo ships and tankers. The engines produce power by means of equipment components such as cylinders, pistons and crankshafts, while combustion and exhaust efficiency is improved by means of fuel injectors, exhaust valves and turbochargers. The electronically controlled ME-type offers improved combustion efficiency and environmental performance through optimised combustion control. We are also developing engines compatible with next-generation fuels such as LNG, methanol and ammonia, which contribute to Carbon Neutral Solution Business in conjunction with SCR equipment to meet emission regulations.

Figure A-1-13: MAN B&W electronically controlled engine

SCR (Selective catalytic reduction) deNOx system, Carbon Neutral Solution Business-related catalysts

Kanadevia Group is working on the development of catalyst technologies for denitrification equipment to remove NO_x from exhaust gases, as well as for decarbonised fuels such as LNG and ammonia. Through methane oxidation catalysts, N_2O decomposition catalysts and ammonia cracker catalysts, GHG reductions are achieved. We are also working on innovative technologies to synthesise LPG directly from CO_2 and hydrogen, and through these advanced technologies we are contributing to decarbonisation of the industrial and marine sectors and the creation of a sustainable energy society.

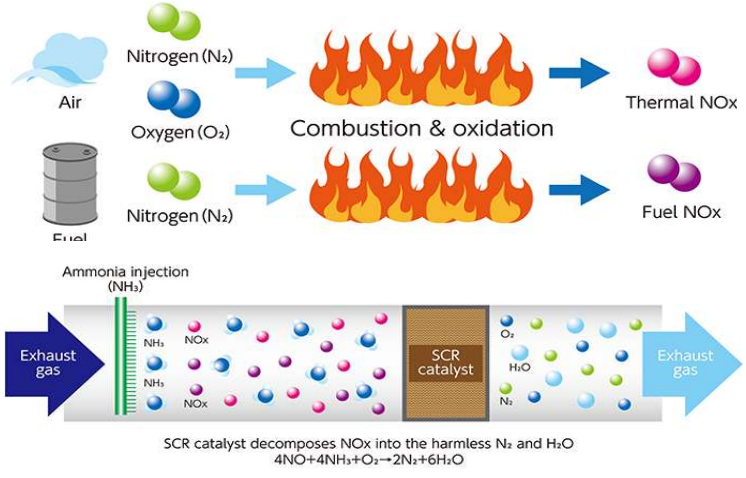


Figure A-1-14: Principle of denitration equipment and catalyst

Pressure vessels

Kanadevia Group supplies pressure vessels and heat exchangers to the petroleum refining and petrochemical industry, fertilizer plants, and industrial plants such as seawater desalination plants and pulp plants. We manufacture desulfurisation reactors, made from chrome molybdenum steel, which is our main product, along with CCR reactors, FCC reactors, ammonia converters, and other items. We are proud of our prominent welding techniques and process technologies that enables us to deliver high-quality reactors within a reasonable time frame.

Figure A-1-15: Pressure vessel (desulphurisation reactor for Bahrain)

Nuclear fuel cycling-related equipment

Kanadevia Group manufactures transport casks and storage casks for spent nuclear fuel generated by nuclear power plants, auxiliary equipment such as heat exchangers for nuclear power plants, and various containers and equipment used in reprocessing plants. We possess particularly advanced technical capabilities in the design and manufacture of metal and concrete casks, boasting a substantial track record of deliveries to countries worldwide. Furthermore, we develop and provide technologies that enhance safety, such as neutron shielding materials and shock-absorbing buffers.

Figure A-1-16: Cask

Boiler

Boilers are equipment that utilises various energy sources and converts them into steam or other forms of energy. It works by transferring the heat generated by burning fuel in a combustion chamber to water through heat transfer tubes to generate steam. The exhaust heat is recovered and reused, resulting in highly efficient operation and helping to reduce environmental impact. High-quality welding technology enables even large boilers to be shipped complete, supporting efficient installation work and reliable operation. In addition, a post-delivery inspection and maintenance system is in place to support long-term, stable operation.

Figure A-1-17: Boiler

Electro-Chlorination Systems / methanation

CO_2 recovered from various emission sources is converted into methane fuel through a reaction with H_2 produced from renewable energy.
Since synthesized methane gas is the main component of natural gas, it can be transported, stored, and used via a conventional natural gas infrastructure.
Furthermore, CO_2 generated by combustion of methane is recovered and converted to methane again. This achieves utilization of a carbon cycle.

Figure A-1-18: Carbon cycle through methanation

Wind power generation

Wind Power Generation Business promotes comprehensive project development based on regional characteristics and environmental conditions. For the installation of Wind Power, we promote wind farm-specific project development by investigating and analysing various factors such as wind conditions, grid connectivity, access roads, landowner cooperation and environmental impact.

In onshore Wind Power, we have established an integrated system that handles everything from site selection to construction, operation and maintenance, enabling sustainable business operations that are rooted in the local community. Through several large-scale projects to date, the company has accumulated technical capabilities and operational know-how.

In offshore Wind Power, the company has design, fabrication and installation technologies for various types of foundation structures, and can propose foundation structures suited to the respective sea areas.

Figure A-1-19: Matsugasaki wind farm (onshore Wind Power)

2. Risks and opportunities related to natural capital

2.1 Assessing dependence on and impact on nature using ENCORE

Results of the assessment of natural capital-related dependence and impact in the project

The following section describes the characteristics of the assessment results, focusing on items rated Very High or High by ENCORE. Reasons for lowering the ENCORE rating from Very High or High are also explained for the items where the ENCORE rating was lowered from Very High or High.

※These are the icons used in the ENCORE analysis on p.94~108. Please refer to this page.

[Dependence on natural capital legend of icons]


Air filtration


Animal-based energy


Biological control


Biomass provisioning


Dilution by atmosphere and ecosystems


Flood mitigation


Global climate regulation


Local (micro and meso) climate regulation


Noise attenuation


Mediation of sensory impacts


Railfall pattern regulation


Soil and sediment retention


Soil quality regulation


Solid waste remediation


Spiritual, artistic and symbolic


Storm mitigation


Water flow regulation


Water purification


Water supply

[Impact on natural capital legend of icons]


Area of freshwater use


Area of land use


Area of seabed use


Disturbances (e.g noise, light)

Emissions of GHG / Emissions of Non-GHG air pollutants


Emissions of nutrient pollutants to water and soil


Emissions of toxic pollutants to water and soil


Generation and release of solid waste


Introduction of invasive species


Other biotic resource extraction (e.g. fish, timber)


Volume of water use

[Environmental Business field]

WtE / dependence (heat map)

[Features]

In the "Procurement" process, the cultural service "Spiritual, artistic and symbolic" is rated Very High, reflecting the fact that the mountains where limestone is mined are often treated as a symbol of the region in the cement production at the procurement site. In practice, the rating varies depending on the mining location, but conservatively it was left at ENCORE. It also relies on the supply service "Water Supply" and the coordination service "Water flow regulation" due to the importance of water in the production of iron at the procurement site, and is rated High.

In the "Construction and on-site coordination" process, the dependency on the coordination services "Global climate regulation" and "Local (micro and meso) climate regulation" is High due to the weather dependence of the construction period.

In the "Disposal during construction" and "Infrastructure disposal" processes, the reliance on the coordination service "Solid waste remediation" for landfill disposal is High in each category.

[Changes made to ENCORE's evaluation]

In the "Construction and on-site coordination" process, "Rainfall pattern regulation (at sub-continental scale)" is Very High in ENCORE, but has been lowered to Medium because the construction period is set assuming rainfall.

In the "Operation" process, the supply service "Water Supply" and the coordination service "Water flow regulation service" are High in ENCORE, but have been lowered to Low. This is due to the fact that in the RFPs and other documents issued by the client based on the environmental assessment, a site with low risk of these services was selected, and the water used in the "Operation" process was assessed as being less dependent on natural capital, as it will be recycled.

WtE / impact (heat map)

[Features]

It can be seen that the risks are generally higher at all stages of the process. In particular, the impact of "Operation" is Very High due to the high "Emissions of GHG" from the plastics contained in the waste. In addition, in "Construction and on-site coordination", "Disposal during construction", "Operation" and "Infrastructure disposal", the impact is Very High or High due to the associated risk to natural capital and ecosystem impact due to the use modification of terrestrial, freshwater and marine areas, depending on the location of the facility. The ENCORE rating for "Volume of water use", "Emissions of non-GHG air pollutants", "Emissions of toxic pollutants to water and soil", "Emissions of nutrient pollutants to water and soil", "Generation and release of solid waste", "Noise/light" is conservatively set at High as the status of treatment in countries other than Japan is not fully known for some processes.

[Changes made to ENCORE's evaluation]

For the "Operation" process, the following changes have been made to "Emissions of non-GHG air pollutants" and "Emission of toxic pollutants to water and soil."

For "Emissions of non-GHG air pollutants", the level is Very High in ENCORE, but has been reduced to Low for the following reasons. The cliant has established the regulatory values for operation and management after carrying out an environmental assessment, and as long as these are complied with, the environmental impact is low. The system also has an emergency shutdown in the event of a disaster during operation. This means that if an abnormality is detected in monitoring or analysis, the system can be shut down by activating the emergency stop button. After shutdown, no further gases are generated as the waste is not burned, and any remaining gases in the Waste to Energy generation plant are discharged in a purified state through a bag filter.

Furthermore, Kanadevia Group has set its own strict standards for substances harmful to humans (living organisms), which are generally less than one tenth of the legal limits, and has established a control manual to ensure thorough management. The values are monitored or regular sampling and analysis, and if the standard values are exceeded, measures are taken to reduce them (dilution, chemical input, reduction of raw material input itself), considering the cause, so that the substances are discharged below the regulation values when discharged off-site. The environmental impact is therefore assumed to be lower and the level is reduced to Low.

For " Emissions of toxic pollutants to water and soil ", the level is lowered to Medium as it is assessed as having no impact, as environmental management is in place at all facilities and the project itself would cease operations if a problem were to occur.

Table A-2-1: WtE Dependence on natural capital

Process	Classification	Provisioning services	Regulating and maintenance services														Cultural services
																	
Procurement	Manufacture of special-purpose machinery	M	VL	VL	VL	VL	L	L	M	M	M	M	VL	-	L	VL	-
	Manufacture of basic iron and steel	H	VL	M	VL	VL	L	L	M	H	-	M	VL	-	-	VL	
	Manufacture of non-metallic mineral products n.e.c. (> manufacture of articles of concrete, cement and plaster)	M	VL	L	L	VL	L	M	M	M	M	M	VL	-	L	VL	VH
Design and manufacture	Manufacture of special-purpose machinery	M	VL	VL	VL	VL	VL	L	VL	M	M	M	VL	-	L	VL	-
Construction and site coordination	Other construction installation	M	H	M	H	VL	M	VL	M	M	M	M	VL	-	VL	VL	-
Disposal during construction	Other construction installation	M	VL	M	L	VL	M	VL	M	M	M	M	VL	-	VL	VL	-
	Waste treatment and disposal	M	VL	M	-	VL	VL	H	M	M	VL	L	VL	VL	M	VL	-
Operation	Fossil fuel energy production	L	VL	-	VL	VL	L	VL	-	L	M	L	VL	-	-	-	-
Infrastructure disposal	Demolition	L	M	VH	L	VL	M	-	M	L	L	L	VL	-	L	VL	-
	Waste treatment and disposal	M	VL	M	-	VL	VL	H	M	M	VL	L	VL	VL	M	VL	-

※See p.92 for the legend of icons.

Table A-2-2: WtE Impact on natural capital

Process	Classification	Area utilised			Direct extraction	Climate change	Pollution				Other	
												
Procurement	Manufacture of special-purpose machinery	L	-	-	M	L	L	M	-	L	M	-
	Other construction installation	L	-	-	M	H	H	M	-	M	M	-
	Manufacture of non-metallic mineral products n.e.c. (>manufacture of articles of concrete, cement and plaster)	L	M	-	M	H	H	M	M	M	M	-
Design and manufacturing	Manufacture of special-purpose machinery	L	-	-	M	H	L	M	-	L	M	-
Construction and site coordination	Other construction installation	VH	H	VH	H	H	L	H	-	M	H	L
Disposal during construction	Other construction installation	VH	H	VH	H	H	L	H	-	M	H	L
	Waste treatment and disposal	M	-	-	M	H	M	H	H	M	H	M
Operation	Fossil fuels energy production	M	H	-	L	VH	L	M	-	H	H	-
Infrastructure disposal	Demolition	VH	H	VH	H	H	H	H	-	M	H	L
	Waste treatment and disposal	M	-	-	M	H	M	H	H	M	M	M

※See p.92 for the legend of icons.

Biogas power generation / Dependence (heat map)

[Features]

Biogas power generation was assessed only during operation, as the equipment is similar to other projects. As a result, it was found that there were no items rated Very High or High.

[Changes made to ENCORE's evaluation]

In ENCORE, "Solid waste remediation" is rated Very High, but as the waste is treated industrially and the natural purification function is not used, it was determined not to be dependent on it.

Biogas power generation / Impact (heat map)

[Features]

The methane produced is a GHG and is assessed as High for "Emissions of GHG" due to the possibility of leakage, including accidents. In addition, the ENCORE rating for "Emissions of toxic pollutants to water and soil" and "Emissions of nutrient pollutants to water and soil" remains High, as the treatment methods for pollutant emissions after treatment have not been confirmed at outside Japan facilities.

[Changes made to ENCORE's evaluation]

The rating for "Disturbances (e.g noise, light)" has been lowered from High to Medium, as environmental management has been implemented at the factory.

Table A-2-3: Biogas power generation Dependence on natural capital

Process	Classification	Provisioning services	Regulating and maintenance services											
Operation	Waste treatment and disposal	M	VL	M	VL	VL	M	M	VL	L	VL	VL	M	VL

Table A-2-4: Biogas power generation Impact on natural capital

Process	Classification	Area utilised	Direct extraction	Climate change	Pollution				Other	
				GHG	Non GHG					
Operation	Waste treatment and disposal	M	M	H	M	H	H	M	M	M

※See p.92 for the legend of icons.

Biomass power generation / Dependence (heat map)

Biomass power generation was analysed for the Miyanosato Biomass Power Plant.

[Features]

For biomass power generation, only the procurement of materials (e.g. wood chips) and during operation were evaluated, as the facilities are similar to other projects. The results showed that there were no items rated Very High or High.

[Changes made to ENCORE's evaluation]

According to ENCORE, the risk for "Biomass provisioning" in relation to the "logging" in the "Procurement" process is inherently "Very High", as biomass power plants rely on materials (e.g. wood chips). This is due to the reliance on raw material chips produced from logs (so-called unused wood) that have been systematically harvested according to a forest harvesting plan as biomass fuel. The Miyanosato Biomass Power Plant purchases approximately 63,000 tonnes (equivalent to 40% moisture content) of wood chips annually from the adjacent chip factory (Miyanosato Biomass Limited Liability Partnership). The chip plant procures raw wood from about 27 forestry companies, mainly in Ibaraki Prefecture. "Unused wood" that can be used for biomass power generation is limited to thinned wood and logs that are harvested in accordance with forest plans stipulated in the Forest Act and other laws, and that remain in the forest after harvesting through afforestation and other means. The Miyanosato Biomass Limited Liability Partnership, which delivers wood chips to the Miyanosato Biomass Power Plant, has been accredited by the National Wood Chip Industry "Federation as an"accredited business operator for certification of wood biomass for use in power "generation" and uses only wood chips based on thinned wood in the forest. The risk of "Biomass provisioning" is therefore lowered to Medium. For the same reason, the risks for "Soil and sediment retention", "Air filtration", "Biological control" and "Soil quality regulation" have also been lowered from Very High and High to Low.

Table A-2-5: Biomass power generation Dependence on natural capital

Process	Classification	Provisioning services			Regulating and maintenance services														
Procurement	Sawmilling and planning of wood	M	L	-	VL	VL	L	M	-	L	M	-	L	L	L	VL	VL	L	-
	Logging	M	M	M	-	-	-	L	L	L	M	-	M	VL	L	VL	L	-	VL
Operation	Biomass energy production	M	L	-	VL	M	VL	VL	-	L	L	VL	L	VL	VL	-	-	-	-

※See p.92 for the legend of icons.

Biomass power generation / Impact (heat map)

[Features]

For biomass power generation, "Volume of water use" and "Emissions of GHG" in the material (e.g. wood chips) are High. In addition, "Generation and release of solid waste" during operation are rated High.

[Changes made to ENCORE's evaluation]

For the "Operation" process, the risk levels for "Emissions of GHG", "Emissions of non-GHG air pollutants", and "Volume of water use" have been lowered for the same reasons as for waste incineration power generation.

Table A-2-6: Biomass power generation Impact on natural capital

Process	Classification	Area utilised			Direct extraction		Climate change	Pollution				Other	
							GHG	Non GHG					
Procurement	Sawmilling and planning of wood	L	-	-	H	-	H	M	VL	-	M	M	-
	Logging	M	M	-	M	M	M	L	L	-	L	L	M
Operation	Biomass energy production	L	-	-	L	M	M	H	M	M	H	VL	-

※See p.92 for the legend of icons.

Water projects (water treatment) / Dependence (heat map)

[Features]

For the water project, only the operation was assessed, as the facilities are similar to other projects. High reliance on "Water flow regulation", "Flood mitigation" and "Storm mitigation", as it is important for the stable operation of "Sewage treatment" that the incoming water is stable and not impacted by floods and storms.

[Changes made to ENCORE's evaluation]

For the "Water Collection, Treatment and Supply Industry", "Rainfall pattern regulation" was lowered from Very High to Very Low and "Solid Waste Purification" and "Water Purification" from Very High to No Dependency in order to provide industrial treatment. For the same reason, "Solid waste remediation" was reduced from Very High to No Dependency in "Sewage treatment."

Water projects (water treatment) / Impact (heat map)

[Features]

For water treatment facilities, as a certain area is required, in the "Water collection, treatment and supply industry", the "Area used" of land and freshwater areas is High. In addition, "GHG" is rated High in "Sewage treatment" due to the potential for the generation and leakage of methane, a GHG.

[Changes made to ENCORE's evaluation]

"Noise/light" has been lowered from Very High to Low because of the care taken in the equipment to be installed in "Sewage treatment." The "Emissions of toxic pollutants to water and soil" and "Emissions of nutrient pollutants to water and soil" categories have been lowered from Very High to Medium, as environmental management during operation is well implemented. For "Invasive species", Very High has been lowered to No dependence, as invasive alien species are not considered likely to be introduced, either intentionally or unintentionally, in view of the treatment process.

Table A-2-7: Water projects (water treatment) Dependence on natural capital

Process	Classification	Provisioning services		Regulating and maintenance services													
Operation	Water collection, treatment and supply industry	VL	M	VL	VL	L	M	M	-	M	M	L	VL	VL	-	VL
	Sewage treatment	-	L	VL	M	-	VL	VL	M	H	H	H	VL	VL	M	VL

Table A-2-8: Water projects (water treatment) Impact on natural capital

Process	Classification	Area utilised			Direct extraction	Climate change	Pollution				Other
Operation	Water collection, treatment and supply industry	H	H	-	L	M	M	M	-	L	M
	Sewage treatment	L	M	M	L	H	L	M	M	M	L

※See p.92 for the legend of icons.

WtX / Dependence (heat map)

[Features]

For WtX, only the collection of waste as raw material and during operation were evaluated, since the equipment is similar to that in other projects. As a result, in the "Operation" process "Material recovery", "Solid waste remediation" was set to High based on the ENCORE assessment.

[Changes made to ENCORE's evaluation]

In both "Waste treatment and disposal" and "Remediation activities and other waste management services", "Solid waste remediation" has been changed from Very High to No dependence, as industrial treatment is carried out.

WtX / Impact (heat map)

[Features]

In the "Procurement" and "Operation" processes, "Emissions of GHG" are High because fossil fuels or electricity derived from fossil fuels are used. In the "Procurement" process, "Emissions of toxic pollutants to water and soil" and "Emissions of nutrient pollutants to water and soil" are set to High, as the ENCORE rating remains the same, as the current situation outside Japan is not fully understood.

[Changes made to ENCORE's evaluation]

In all processes, "Disturbances (e.g noise, light)" has been lowered from High to Medium, as a certain level of consideration has been given to it in the equipment to be introduced.

Table A-2-9: WtX Dependence on natural capital

Process	Classification	Provisioning services	Regulating and maintenance services												
														
Procurement	Waste treatment and disposal	M	VL	M	VL	VL	-	M	M	VL	L	VL	VL	M	VL
Operation	Material recovery	M	VL	M	M	VL	H	-	L	VL	VL	VL	VL	VL	VL
	Remediation activities and other waste management services	M	-	M	VL	-	-	M	M	M	M	VL	VL	M	-

※See p.92 for the legend of icons.

Table A-2-10: WtX Impact on natural capital

Process	Classification	Area utilised	Direct extraction	Climate change	Pollution				Other	
										
Procurement	Waste treatment and disposal	M	M	H	M	H	H	M	M	M
Operation	Material recovery	M	M	M	M	M	M	M	M	M
	Remediation activities and other waste management services	M	M	H	M	M	M	M	M	M

※See p.92 for the legend of icons.

[Machinery Business field]

Machinery Business / Dependence (heat maps)

[Features]

For the Machinery Business, only design and manufacturing in the company was evaluated, as there is a wide variety of products.
As a result, it was found that there were no items rated Very High or High.

[Changes made to ENCORE's evaluation]

No changes have been made to the rating.

Machinery Business / Impact (heat map)

[Features]

In the "Manufacture of electronic components and boards", the ENCORE rating remains High because the current status of pollution in "Water and Soil" outside Japan is not fully understood.

[Changes made to ENCORE's evaluation]

No changes have been made to the rating.

Table A-2-11: Machinery Business Dependence on natural capital

Process	Classification	Provisioning services	Regulating and maintenance services												
Design and manufacture	Manufacture of special-purpose machinery	M	VL	VL	L	VL	L	L	M	M	M	M	VL	L	VL
	Manufacture of electronic components and boards	M	VL	VL	L	VL	L	L	M	M	M	M	VL	L	VL

Table A-2-12: Machinery Business Impact on natural capital

Process	Classification	Area utilised	Direct extraction	Climate change	Pollution			Other
Design and manufacture	Manufacture of special-purpose machinery	L	M	L	L	M	L	M
	Manufacture of electronic components and boards	L	L	VL	L	H	L	M

※See p.92 for the legend of icons.

[Social Infrastructure Business field]

Social Infrastructure Business / Dependence (heat map)

[Features]

In the "Construction and site coordination" and "Infrastructure disposal" processes, the dependence on the coordination service "Rainfall pattern regulation" is Very High, due to the weather dependency of the construction period. In the "Procurement" process, the cultural service "Spiritual, Artistic and Symbolic" is Very High in the cement production of the procurement partner, as in the waste incineration power generation process. In addition, due to the importance of water in the steel production of the procurement partner, the supply service "Water Supply" and the coordination service "Water Flow Coordination" are relied upon and are High.

In the "construction and site coordination" process, the "soil and sediment retention" of the construction site has a significant impact on the construction period and is therefore High. In the "Infrastructure disposal" process, "Solid waste remediation" is rated Very High. This was judged conservatively because, while treatment is carried out in Japan in accordance with the Japanese Waste Disposal and Public Cleansing Act, the actual status of treatment in countries other than Japan is unknown.

[Changes made to ENCORE's evaluation]

No changes have been made to the assessment.

Table A-2-13: Social Infrastructure Business Dependence on natural capital

Process	Classification	Provisioning services	Regulating and maintenance services														Cultural services
Procurement	Manufacture of basic iron and steel	H	VL	M	L	VL	L	L	M	H	-	M	VL	-	-	VL	-
	Manufacture of non-metallic mineral products n.e.c. (>manufacture of articles of concrete, cement and plaster)	M	VL	L	L	VL	L	M	M	M	M	M	VL.	-	L	VL	VH
Construction and site coordination	Construction of utility projects	M	M	VH	L	VL	H	-	M	M	M	M	VL	-	L	VL	-
Infrastructure disposal	Demolition	L	M	VH	L	VL	M	-	M	L	L	L	VL	-	L	VL	-
	Waste treatment and disposal	M	VL	M	-	VL	VL	VH	M	M	VL	L	VL	VL	M	VL	-

※See p.92 for the legend of icons.

Social Infrastructure Business / Impact (heat map)

[Features]

As with refuse incineration power generation, some infrastructure facilities are rated Very High or High because of the associated risks to natural capital and ecosystem impacts due to the use modification of terrestrial, freshwater and marine areas that may occur depending on the location of the facilities. Many of the same items are also rated High.

[Changes made to ENCORE's evaluation]

"Disturbances (e.g noise, light)" and "Water and soil pollution" in "Procurement" and "Disturbances (e.g noise, light)" in "Waste treatment and disposal" in "Infrastructure disposal" have been lowered from Very High to Medium, as a certain level of consideration has been given in the equipment to be introduced.

Table A-2-14: Social Infrastructure Business Impact on natural capital

Process	Classification	Area utilised			Direct extraction	Climate change	Pollution				Other	
												
Procurement	Manufacture of basic iron and steel	L	-	-	M	H	H	M	-	M	M	-
	Manufacture of non-metallic mineral products n.e.c. . (>manufacture of articles of concrete, cement and plaster))	L	M	-	M	H	H	M	M	M	M	-
Construction and site coordination	Construction of utility projects	L	VH	M	L	M	L	H	-	M	H	L
Infrastructure disposal	Demolition	VH	H	VH	H	H	H	H	-	M	H	L
	Waste treatment and disposal	M	-	-	M	H	M	H	H	M	M	M

※See p.92 for the legend of icons.

[Carbon Neutral Solution Business field]

Marine engines / Dependence (heat map)

[Features]

There are no items where dependence is Very High or High.

[Changes made to ENCORE's evaluation]

The manufacturing plant for marine engines is located only in Japan and procurement is mostly from Japanese suppliers. As recycled water is mostly used in the manufacture of iron at one of the main suppliers, the High rating for the Supply Service "Water Supply" and the Regulating Service "Water flow regulation" has been lowered to Low.

Marine engines / Impact (heat map)

[Features]

In the "Procurement" process, "GHG emissions" and "Non-GHG emissions" are High because fossil fuels are used in the production of steel at the procurement destination.

[Changes made to ENCORE's evaluation]

In the "Procurement" process, "Disturbances (e.g noise, light)" and "Water/soil pollution" have been lowered from Very High to Medium because the manufacturing plant for marine engines is located only in Japan and the engines are procured from suppliers who give appropriate consideration based on Japanese law.

Table A-2-15: Marine engine business Dependence on natural capital

Process	Classification	Provisioning services	Regulating and maintenance services												
Procurement	Manufacture of basic iron and steel	L	VL	M	VL	VL	L	L	M	L	-	M	VL	-	VL
Design and manufacturing	Manufacture of general-purpose machinery (>manufacture of engines and turbines)	M	VL	VL	L	VL	L	L	M	M	M	M	VL	L	VL

Table A-2-16: Marine engine projects Impact on natural capital

Process	Classification	Area utilised	Direct extraction	Climate change	Pollution			Other
Procurement	Manufacture of basic iron and steel	L	M	H	H	M	M	M
Design and manufacturing	Manufacture of general-purpose machinery (> manufacture of engines and turbines)	L	M	L	M	M	L	M

※See p.92 for the legend of icons.

Pressure vessels, casks and boilers / Dependence (heat map)

[Features]

Due to the importance of water in the steel production of the procurement partner, the supply service "Water supply" and the regulating service "Water flow regulation" are dependent and are High. In the cask "Infrastructure disposal" process, "Solid waste remediation" is Very High. This was judged conservatively because, while the process is carried out in Japan in accordance with the Japanese Waste Disposal and Public Cleansing Act, the actual status of the process is not known in countries other than Japan.

[Changes made to ENCORE's evaluation]

No changes have been made to the assessment.

Table A-2-17: Pressure vessels, casks and boilers Dependence on natural capital

Process	Classification	Provisioning services	Regulating and maintenance services													
															
Procurement (pressure vessels)	Primary steel manufacturing	H	VL	M	L	VL	L	L	M	H	-	M	VL	-	-	VL
Design and manufacture (pressure vessels)	Manufacture of structural metal products, tanks, storage tanks and steam generators (> Manufacture of metal tanks, storage tanks and vessels)	M	VL	-	L	VL	L	L	M	M	M	M	VL.	-	-	VL
Design and manufacture (boilers)	Manufacture of structural metal products, tanks, storage tanks and steam generators (> Steam generator manufacturing)	M	VL	-	L	VL	L	L	M	M	M	M	VL.	-	-	VL.
Infrastructure disposal (casks)	Waste treatment and disposal	M	VL	M	-	VL	VL	VH	M	M	VL	L	VL	VL	M	VL

※See p.92 for the legend of icons.

Pressure vessels, casks, boilers / Impact (heat map)

[Features]

In the "Procurement" process, "Emissions of GHG" and "Emissions of Non-GHG air pollutants" are High because fossil fuels are used in the production of steel by the procurement partners. In addition, the "Emissions of toxic pollutants to water and soil" is rated Very High for the disposal of casks, as they are radioactive waste and there is a non-zero possibility of their leakage.

[Changes made to ENCORE's evaluation]

With the exception of cask disposal, the ratings for "Disturbances (e.g noise, light)" and "water and soil pollution" have been lowered from Very High to Medium, as certain considerations have been made in the equipment to be installed.

Table A-2-18 Pressure vessels, casks and boilers Impact on natural capital

Process	Classification	Area utilised			Direct extraction	Climate change	Pollution				Other	
Procurement (pressure vessels)	Manufacture of basic iron and steel	L	-	-	M	H	H	M	-	M	M	-
Design and manufacture (pressure vessels)	Manufacture of structural metal products, tanks, reservoirs and steam generators (> manufacture of tanks, reservoirs and containers of metal)	L	-	-	M	L	L	M	-	L	M	-
Design and manufacture (boilers)	Manufacture of structural metal products, tanks, reservoirs and steam generators (> manufacture of steam generators)	L	-	-	M	L	L	M	-	L	M	-
Disposal (cask)	Waste treatment and disposal	M	-	-	M	H	M	VH	H	M	M	M

※See p.92 for the legend of icons.

Wind power generation / Dependence (heat map)

[Features]

Wind power generation was assessed only during operation, as the facilities are similar to other projects. Dependence on "Global climate regulation" as the source of wind, which is essential for wind power generation, was rated Very High, while dependence on "Flood mitigation" was rated High for the stable operation of the wind farm.

[Changes made to ENCORE's evaluation]

No changes to the rating.

Wind power generation / Impact (heat map)

[Feature]

Assessed as High for the area of "onshore" use from the exclusive area of onshore wind farms.

[Changes made to ENCORE's evaluation]

No changes to the rating.

Table A-2-19: Wind Power Generation Dependence on natural capital

Process	Classification	Provisioning services	Regulating and maintenance services						
									
Operation	Wind energy production	VL	VH	M	M	M	H	M	M

Table A-2-20: Wind Power Generation Impact on natural capital

Process	Classification	Area utilised		Direct extraction	Pollution		Other
							
Operation	Wind energy production	H	M	L	VL	VL	M

※See p.92 for the legend of icons.

2.2 Financial impact and mitigation measures for climate and nature-related risks

The following section describes the financial impact and mitigation measures along the value chain for those businesses/processes with a high risk(dependence/impact Very High (VH) or High (H))in the assessment in **section 2.1**. The financial impact (in a single year) of Kanadevia Group as a whole for each item is rated on a three-point scale: large (over 10 billion JPY), medium (10 billion JPY to 1 billion JPY), and small (less than 1 billion JPY), with those with large and medium results listed.

Table A-2-21: Projects/processes with high nature-related risks

Processes		Environmental Business					Social Infrastructure Business	Carbon Neutral Solution Business					Machinery Business	
		WtE	Biomass Power generation	Biogas	Water	WtX		Wind Power	Marine Engine	Boilers	Pressure vessel	Casks	Industrial machinery	Semiconductor equipment
Procurement	Steel manufacturing	v	x	x	x	x	x	x	v	x	x	x		
	Cement production	v	x	x	x	x	x	x						
	Manufacture of special industrial Machinery Business	v	x	x	x	x		x	x	x				
	Logging		v											
	Sawing of timber		v											
	Waste disposal					v								
Design and Manufacturing	Manufacture of special industrial Machinery Business	v											v	
	Manufacture of electronic components													v
	Engine manufacturing								v					
	Boiler manufacturing									v				
	Tank manufacturing										v			

Legend

- VH / H for dependence and impacts
- VH / H for dependence only
- VH / H for impacts only

v Items listed in the analysis results

x Items not mentioned in the analysis results as being equivalent to WtE projects

Processes		Environmental Business					Social Infrastructure Business	Carbon Neutral Solution Business					Machinery Business	
		WtE	Biomass Power generation	Biogas	Water	WtX		Wind Power	Marine Engine	Boilers	Pressure vessel	Casks	Industrial machinery	Semiconductor equipment
Construction	Construction	v	x	x	x	x	x	x						
	Public works						v							
During construction Disposal	Construction	v	x	x	x	x	x	x						
	Waste management	v	x	x	x	x	x	x						
Operation	WtE	v												
	Biomass power generation		v											
	Waste treatment			v										
	Water treatment				v									
	Sewage treatment				v									
	Material reclamation industry					v								
	Purification					v								
	Wind Power Generation							v						
Disposal	Dismantling	v	x	x	x	x	v	x						
	Waste management	v	x	x	x	x	v	x	x	x	x	v	x	x

Legend

- VH / H for dependence and impacts
- VH / H for dependence only
- VH / H for impacts only

v Items listed in the analysis results

x Items not mentioned in the analysis results as being equivalent to WtE projects

[Nature-related risks related to the upstream of the supply chain]

Steel production (production of iron used across all operations)

Dependency and impact on Main items	Risk Classification	Risk Type	Risk overview	Financial impacts		Risk mitigation measures
In the manufacture of steel, which is the raw material for Machinery Business and equipment in the production of iron, which is the raw material for Machinery Business and equipment Water resources (water usage)	Physical Risks	Acute	- Production restricted due to lack of water availability - Landslides and land subsidence due to excessive water use - Depletion of water resources	- Engineering stoppages and loss of sales due to inability to procure steel due to production stoppages - Penalties to suppliers and contractors	**Large**	Procurement of iron from suppliers that are manufactured with low water use/water reuse
		Chronic	- Declining water resources - Drought due to continuous water scarcity	Continuous suspension of engineering activities due to inability to procure iron, reduced sales	**Large**	
	Transition Risks	Policy	Curtailment or suspension of iron production due to restrictions on water abstraction from the government	Suspension of production and engineering of Machinery Business and other equipment due to difficulties in procuring iron, resulting in reduced sales	**Medium**	
		Policy	Restriction/stoppage of iron production due to water abstraction restrictions from government	Production and engineering of Machinery Business etc. suspended and sales reduced due to difficulties in procuring iron	**Medium**	
Raw materials for Machinery Business and equipment GHG & non-GHG emissions in iron production	Transition Risks	Policy	Tighter regulation of GHG & non-GHG emissions (e.g. levies, tax increases)	- Investment in installing additional GHG & non-GHG treatment facilities - Increased levies/taxes - Increase in production costs	**Medium**	Procurement of steel from suppliers with low GHG & non-GHG emissions in the manufacturing process due to introduction of additional GHG & non-GHG treatment facilities, etc.
		Market	Increased preference of local communities and residents for equipment using iron with low GHG & non-GHG emissions	Additional costs for sourcing iron with low GHG & non-GHG emissions	**Medium**	
		Technology	Establishment and application of technologies to reduce GHG & non-GHG emissions (low emission production and emissions absorption)	Reduction of GHG & non-GHG emissions (investment in technology development such as low emission manufacturing, emissions absorption, etc.)	**Medium**	

※The financial impact was assessed for a single year on a scale of large (over 10 billion JPY), medium (10 billion JPY to 1 billion JPY) and small (less than 1 billion JPY), with results for large and medium being shown.

Cement production (production of steel used in Environmental Business, infrastructure Business and and Wind Power Generation Business)

Dependency and impact on Main items	Risk Classification	Risk Type	Risk overview	Financial impacts		Risk mitigation measures
GHG & non-GHG emissions in raw material cement production	Transition Risk	Policy	Tighter regulations on GHG & non-GHG emissions (levies, tax increases, etc.)	- Investment in installing additional GHG & non-GHG treatment facilities - Increased levies/taxes - Increase in production costs	**Medium**	Procurement of cement from suppliers with low GHG & non-GHG emissions in the manufacturing process due to introduction of additional GHG & non-GHG treatment facilities, etc.

Sawmilling (production of biomass power fuels for use in biomass power generation)

Dependency and impact on Main items	Risk Classification	Risk Type	Risk overview	Financial impacts		Risk mitigation measures
Water use in the production of wood chips and other materials used as fuel for biomass power generation	Physical Risk	Acute	- Production of wood chips etc. restricted due to inability to procure water - Landslides and land subsidence due to excessive water use - Depletion of water resources	Suspension of power generation due to inability to procure wood chips, etc., resulting in reduced sales	**Medium**	Procurement from suppliers with low water use/water reuse to produce woodchips etc.
		Chronic	- Decrease in water resources - Continuous production restriction of woodchips etc. due to water scarcity	Continuous suspension of power generation, reduced sales and withdrawal from business due to inability to procure woodchips, etc.	**Large**	
	Transition Risks	Policy	Suspension of production of woodchips, etc. due to restrictions on water abstraction from government	Decrease in sales due to suspension of power generation due to inability to procure wood chips, etc.	**Medium**	
GHG & non-GHG emissions from the production of woodchips etc. as fuel for biomass power generation	Transition Risk	Policy	Tighter regulation of GHG & non-GHG emissions (e.g. levy, higher taxes)	- Investment in installing additional GHG & non-GHG treatment facilities - Increased levies and taxes - Rising production costs of wood chips and other materials, rising power generation costs	**Medium**	Procurement from suppliers of woodchips, etc. with low emissions in the production process through introduction of additional GHG & non-GHG treatment facilities, etc.

※The financial impact was assessed for a single year on a scale of large (over 10 billion JPY), medium (10 billion JPY to 1 billion JPY) and small (less than 1 billion JPY), with results for large and medium being shown.

Construction and disposal during construction (production of steel used in Environmental Business, Social Infrastructure Business, and Wind Power Generation Business)

Dependency and impact on Main items	Risk Classification	Risk Type	Risk overview	Financial impact		Risk mitigation measures
Stable weather (rainfallpatterns/ climate)	Physical Risks	Chronic	Expansion of areas inaccessible for work due to unstable weather	Decrease in number of orders and sales	**Medium**	Implementation of construction and construction-time disposal using more weather-insensitive construction methods
	Transition Risks	Market	Increased preference for orders from companies with stable construction periods	Decrease in number of orders and sales	**Medium**	

※The financial impact was assessed for a single year on a scale of large (over 10 billion JPY), medium (10 billion JPY to 1 billion JPY) and small (less than 1 billion JPY), with results for large and medium being shown.

[Climate and nature-related risks for own/downstream]

Operation (LNG thermal power generation, biomass power generation, biogas)

Dependency and Impact on Main items	Risk Classification	Risk Type	Risk overview	Financial impact		Risk reduction measures
Water resources in operation (water use, surface water, groundwater)	Physical Risks	Acute	- Production restricted due to lack of water availability - Landslides and land subsidence due to excessive water use - Depletion of water resources	- Production stoppage of Machinery Business and other equipment, resulting in reduced sales - Suspension of engineering and incineration facility operations due to inability to procure equipment, resulting in reduced sales - Penalties to suppliers and contractors	**Medium**	- Machinery Business manufactured with low water use/water reuse, procurement from suppliers - Machines manufactured in-house, machines manufactured by low water use/water reuse
		Chronic	- Declining water resources - Ongoing production restrictions due to water scarcity	Ongoing suspension of engineering activities and reduced sales due to inability to procure equipment	**Medium**	
	Transition Risks	Policy	Restriction or cessation of production of Machinery Business and other equipment due to water abstraction restrictions from the government	- Decrease in sales due to suspension of production of Machinery Business and other equipment - Suspension of engineering and incineration facility operations due to inability to procure equipment, resulting in reduced sales	**Medium**	
Pollution of air, soil, etc. due to GHGs and hazardous substances generated during construction (GHGs, soil pollution, water pollution)	Physical Risk	Acute	Increase in pollutant emissions due to malfunctions or accidents in drainage and exhaust systems	- Pollutant removal costs - Fines - Litigation costs	**Medium**	Use of construction methods with lower emissions during the construction process, e.g. by installing additional GHG & pollutant treatment equipment
	Transition Risk	Policy	- Tighter regulations on pollutant emissions - Levies and taxes on GHG emissions	- Investments in installation of additional pollutant treatment equipment - Increased levies and taxes - Rising production costs of wood chips and other materials, rising costs of power generation	**Medium**	

※The financial impact was assessed for a single year on a scale of large (over 10 billion JPY), medium (10 billion JPY to 1 billion JPY) and small (less than 1 billion JPY), with results for large and medium being shown.

Operation (biomass power generation)

Dependency and impact on Main items	Risk Classification	Risk Type	Risk overview	Financial impact		Risk reduction measures
Solid waste generation and release	Physical Risks	Chronic	Shutdown due to depletion of final disposal sites for incineration residue and ash	- Investments in the installation of additional waste treatment equipment - Opportunity loss due to curtailment of operations due to depletion of final disposal sites	**Medium**	Operation with less incineration residue/incinerator ash/reuse due to improved combustion technology, etc.
	Transition Risk	Policy	Tighter restrictions and penalties on types and quantities of waste	- Investments in additional incineration residue/incinerator ash treatment equipment - Increase in levies and taxes - Increase in production costs	**Medium**	

Operation (water treatment)

Dependency and impact on Main items	Risk Classification	Risk Type	Risk overview	Financial impact		Risk mitigation measures
GHG emissions generated by operations	Transition Risks	Policy	Tighter regulations on GHG emissions (e.g. levies, tax increases)	- Investment in installing additional GHG treatment facilities - Increase in levies and taxes - Increase in production costs	**Medium**	Additional GHG use of construction metuods with lower emissions in the construction process, e.g. through the introduction of treatment facilities

Operation (wind power generation)

Dependency and impact on Main items	Risk Classification	Risk Type	Risk overview	Financial impact		Risk mitigation measures
Stable weather (climate control/flood mitigation)	Physical Risks	Chronic	Expansion of areas unable to continue operations due to unstable weather	Decrease in the number of orders and operations, and sales decline	**Large (e.g. in terms of sales)**	Operations with more weather-insensitive operating technologies
	Transition Risks	Market	Increased preference for orders from companies that can operate more reliably	Decrease in number of orders and sales	**Large**	

※The financial impact was assessed for a single year on a scale of large (over 10 billion JPY), medium (10 billion JPY to 1 billion JPY) and small (less than 1 billion JPY), with results for large and medium being shown.

Construction, on-site coordination and disposal (WtE/biomass power generation/infrastructure construction and disposal)

Dependency and impact on Main items	Risk Classification	Risk Type	Risk overview	Financial impact		Risk mitigation measures
Stable during construction Weather (rainfall patterns/ climate)	Physical Risks	Chronic	Expansion of areas inaccessible for work due to unstable weather	Decrease in number of orders and sales	**Medium**	Implementation of construction and disposal using construction methods less impacted by weather conditions
	Transition Risks	Market	Increased preference for orders from companies with stable construction periods	Decrease in number of orders and sales	**Medium**	
Water use in construction	Physics Risk	Chronic	- Construction halts due to permanent unavailability of water required for production - Depletion of water resources	Business withdrawal and lost opportunities due to continuous construction stoppages	**Large**	Implementation of construction using construction methods that use less water and reuse water
	Transition Risks	Policy	Restriction or suspension of construction due to water abstraction restrictions from the government	- Penalties to the supplier/contractor due to delays in construction - Business withdrawal/opportunity loss due to continuous suspension of construction - Additional capital investment in water treatment facilities and other facilities to reuse used water	**Medium**	
Solid waste in the construction of waste incineration and power generation facilities	Physica Risks	Chronic	Construction halted due to depletion of landfill sites for metal, plastic and other waste generated by construction	- Investments in the installation of additional waste treatment equipment - Increase in construction costs - Operational constraints and lost opportunities due to depletion of final disposal sites	**Medium**	Implementation of construction using construction methods that generate less waste through reuse of waste materials, etc.
	Transition Risks	Policy	Tighter regulations and penalties for types and quantities of waste	- Investments in the introduction of additional waste treatment equipment - Increased levies and taxes - Increase in production costs	**Medium**	

※The financial impact was assessed for a single year on a scale of large (over 10 billion JPY), medium (10 billion JPY to 1 billion JPY) and small (less than 1 billion JPY), with results for large and medium being shown.

2.3 Opportunities and financial impact related to climate and nature

Kanadevia Group's strength lies in its practice of controlling and reducing environmental impacts in on-site operations, such as construction and on-site adjustment of facilities, operation, maintenance and disposal, and in reflecting the knowledge gained from this in its own marketing, procurement, design and development. On this basis, we have assessed climate and nature-related opportunities and their financial impact along the value chain.

Table A-2-22: Climate and nature-related opportunities and financial impacts of operations

Value chain	Process	Impact	Opportunity	Financial impact level magnitude	
Marketing	-	**GHG/non-GHG emissions** GHGs cause climate change, non-GHGs cause pollution, which in turn disrupts the ecological balance	Increased customer preference for Machinery Business and facilities with reduced GHG/non-GHG emissions and less negative impact on nature	Competitive advantage over competitors by providing solutions that help reduce GHG/non-GHG emissions in the right place at the right time - Conversion of open dumping areas to WtE (methane emission reduction)	**Large**
	-	**Water use** Declining water resources limit water use by ecosystems and local populations	Increased customer preference for facilities that improve water use	Competitive advantage over competitors by being the first to introduce water treatment facilities that improve water use for nature and people in more areas - Mine wastewater treatment plants - Factory wastewater treatment plants - Sewage treatment plant	**Large**
	-	**Solid waste discharges** Negative impact on natural capital through waste	Growing customer preference for low-waste emissions manufacturing and the circular economy	Competitive advantage over competitors by offering solid waste reduction as a solution across the supply chain in the right locations - WtE/WtX conversion of open dumping areas	**Large**

※The financial impact was assessed for a single year on a scale of large (over 10 billion JPY), medium (10 billion JPY to 1 billion JPY) and small (less than 1 billion JPY), with results for large and medium being shown.

Value Chain	Processes	Impact	Opportunity	Financial impact level magnitude	
Technology	-	**GHG/non-GHG emissions** GHGs cause climate change and non-GHGs cause pollution, which in turn upset the ecological balance	Growing customer preference for Machinery Business and facilities with reduced GHG/non-GHG emissions and less negative impact on nature	Competitive advantage by being ahead of competitors in GHG/non-GHG emission-reducing technologies - Carbon Neutral Solution Business technologies - Durable chimneys with membrane construction to reduce lifecycle CO_2 emissions and purify NOx in the air	**Large**
	-	**Water use** Declining water resources limit water use by ecosystems and local populations.	Increased customer preference for facilities that reduce water use at facilities or treat sewage faster, more often and safely	Competitive advantage by being ahead of competitors in water use and water treatment technologies - RO membranes	**Medium**
	-	**Solid waste discharge** Negative impact on natural capital through waste	Enjoy policy support and incentives for manufacturing technologies with low waste emissions (advantage in tenders)	Competitive advantage by being ahead of competitors in technologies that contribute to the reduction of solid waste - Sorting technology - Material recycling technology	**Medium**
Procurement	Iron production	**GHG/non-GHG emissions** GHGs cause climate change, non-GHGs cause pollution, upsetting the ecological balance	Growing customer preference for Machinery Business and facilities with reduced GHG/non-GHG emissions and less negative impact on nature	Competitive advantage by being ahead of competitors in reducing GHG/non-GHG emissions	**Large**
		Water use Reduced water resources, limiting water use by ecosystems and local populations	Increased preference of municipalities and residents for facilities using iron produced with less water, including for reuse.	High degree of difficulty, but opportunities may be created through collaboration with suppliers.	**Medium**
	Cement Manufacture	**GHG/non-GHG emissions** GHGs cause climate change, non-GHGs cause pollution, upsetting the ecological balance	Growing customer preference for Machinery Business and facilities with reduced GHG/non-GHG emissions and less negative impact on nature	Competitive advantage by being ahead of competitors in reducing GHG/non-GHG emissions	**Medium**
	Sawmilling	**GHG/non-GHG emissions** Climate change caused by GHGs and pollution caused by non-GHGs upset the ecological balance	Growing customer preference for biomass fuel production with less negative impact on nature	High degree of difficulty, but opportunities may be created through collaboration with suppliers	**Medium**
		Water use Declining water resources, limiting water use by ecosystems and local populations	Growing customer preference for biomass fuel production with less negative impact on nature	Although the difficulty level is high, we can gain a competitive advantage by collaborating with suppliers and leveraging our water utilization and water treatment technologies	**Large**

※The financial impact was assessed for a single year on a scale of large (over 10 billion JPY), medium (10 billion JPY to 1 billion JPY) and small (less than 1 billion JPY), with results for large and medium being shown.

Value Chain	Processes	Impact	Opportunity	Financial impact level magnitude	
Operation	-	**GHG/non-GHG emissions** GHG emissions cause climate change, while non-GHG emissions cause pollution, disrupting the balance of ecosystems	Increasing customer preference for facility operations that reduce GHG/non-GHG emissions and have minimal adverse effects on nature	By taking the lead in reducing GHG emissions from facilities through outsourced operations, we can gain a competitive edge in bidding.	**Large**
	-	**Solid Waste Emissions** Adverse Effects on Natural Capital through Waste Solid Waste Discharge	- Increasing customer preference for low-waste manufacturing and the circular economy Reducing negative impacts on natural capital through waste reduction and enhancing corporate reputation and value through business activities that generate positive impacts - Reducing negative impacts on natural capital through waste reduction and enhancing corporate reputation and value through business activities that generate positive impacts	By taking the lead in reducing solid waste compared to competitors, it is possible to gain a competitive advantage.	**Large**

※The financial impact was assessed for a single year on a scale of large (over 10 billion JPY), medium (10 billion JPY to 1 billion JPY) and small (less than 1 billion JPY), with results for large and medium being shown.

3. Scope of Kanadevia Group business based on the planetary boundaries

Kanadevia Group aims to be a **Resilience Eco Society**®[88] , i.e. a state in which the environmental impact of the regions in which it operates falls within the environmental resilience of the Planetary boundaries[89] . The limits of the environmental impact of a region are set by the government of that region by law, and we must conduct its business activities in compliance with these laws and regulations. Where no statutory limits exist, we propose that the RFP should include environmental criteria to be taken into account in the relevant business activities in order not to damage the environmental resilience of the area.

Kanadevia Group can also encourage others to ensure that their business activities do not damage environmental resilience by providing products and services that contribute to solving environmental issues. Such proactive initiatives can be seen as our responsibility in the value chain.

In the following, in each of the planetary boundaries areas, we describe (i) our minimum compliance requirements to ensure that we do not damage our own environmental resilience and (ii) our proactive efforts to minimise damage to environmental resilience by others.

Climate change

With regard to climate change, the breaking point is to limit the increase in global average temperature to less than 2°C above pre-industrial levels.Annex I countries to the United Nations Framework Convention on Climate Change (United Nations Framework Convention on Climate Change)are obliged to implement policies to reduce GHGs, among other things. The Paris Agreement, adopted at the 21st Conference of the Parties to the United Nations Framework Convention on Climate Change, stipulates climate change measures linked to market mechanisms, and based on the 1.5°C scenario, many companies are currently calculating their GHG emissions and working to reduce them.

Therefore, realising the targets set based on the 1.5°C scenario is the minimum required to avoid damaging environmental resilience in the area of climate change. Kanadevia Group must achieve the targets of a 50% reduction in GHG emissions in 2030 compared to 2013 and carbon neutrality in 2050.

In relation to business, as indicated in section 4.7, the reduction of methane generation from organic waste through fuel switching from fossil fuels, substitution of fossil fuel-derived power generation with waste incineration and substitution of landfill with waste incineration will make a significant contribution to reducing GHG emissions. This will help others to stop relying on non-renewable energy sources and, on the other hand, increase the number of people with access to energy. Furthermore, the GHG emissions of others are reduced. Kanadevia Group therefore makes positive proposals as indicated in section 4.7 in its projects.

Table A-3-1: Planetary boundaries limit points (Climate change)

Earth system process	Limit points
Climate change	To limit the increase in global average temperature to less than 2°C above pre-industrial levels; a 2°C increase is considered a threshold that could have a significant impact on the earth system. The planetary boundariesfor atmospheric CO_2 concentrations is set at 350 ppm. The anthropogenic radiative forcing (Wm^{-2}) at the upper edge of the atmosphere is set at 1.0 Wm^{-2} .

Biosphere integrity (biodiversity loss)

For biosphere integrity(biodiversity loss), the breaking point is to limit the species extinction rate to less than 10 per million species per year. We did not find any common international indicators to be incorporated into Kanadevia Group business activities, such as in the area of climate change.

However, given Kanadevia Group's Sustainability Vision[90] and The Four Sustainability Principles[91] , which form the basis for setting the materialities, we will ensure that its environmental management does not depend on natural resources that are sloppily managed by others and that its own business activities do not infringe on the health of the ecosystem. We are not dependent on natural resources that are sloppily managed by others.

In addition, we request our suppliers to comply with the Group's Basic Procurement Policy and actively support our customers in carrying out environmental assessments to ensure that they do not infringe on the health of the ecosystem.

Table A-3-2: Planetary boundaries limit points (Biosphere integrity)

Earth system process	Limit points
Biosphere integrity (loss of biodiversity)	Maintain ecosystem diversity and prevent species extinctions. Defines the global boundary for changes in genetic diversity as the maximum extinction rate that is compatible with the conservation of the genetic basis of the biosphere's ecological complexity. Limit species extinction rates to less than 10 per million species per year. It also defined the Earth's limit on changes in functional diversity as the rate of energy (net primary production) available to the ecosystem. More energy remains available to maintain the functioning of the ecosphere than 90% of pre-industrial times.

Destruction of stratospheric ozone

With regard to the destruction of stratospheric ozone, the breaking point is to limit the reduction of stratospheric ozone to less than 5% below pre-industrial levels. The Vienna Convention for the Protection of the Ozone Layer (1985)and the Montreal Protocol on Substances that Deplete the Ozone Layer (Montreal Protocol on Substances The Parties to the Convention have enacted national laws to regulate the manufacture, import and export of ozone-depleting substances and to control their emissions.

Kanadevia Group does not engage in the business of manufacturing or collecting ozone-depleting substances such as CFCs and CFC substitutes, or products that use ozone-depleting substances, but it does use products and equipment that use ozone-depleting substances. The company shall thoroughly manage ozone-depleting substances in accordance with the laws and regulations on the manufacture, import and export of ozone-depleting substances, emission control, etc. set by the countries or regions in which it operates. In addition, we promote the switchover to products and equipment that do not use ozone-depleting substances in our business activities.

Table A-3-3: Planetary boundaries limit points (Stratospheric ozone depletion)

Earth system process	Limit point
Stratospheric ozone depletion	Protects the ozone layer and inhibits harmful ultraviolet radiation from reaching the Earth. Depletion of the ozone layer has adverse health effects, including skin cancer, cataracts and a weakened immune system. Limit stratospheric ozone depletion from pre-industrial levels (290 Dobson Units (DU)) to less than 5% (the boundary of the safe operating area is 276 DU); a 5% depletion is considered the threshold at which the ozone layer may be prevented from recovering.

Ocean acidification

For ocean acidification, the breaking point is to maintain the average aragonite saturation of ocean surface waters above 80% of pre-industrial levels. In June 2023, the "Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Area Beyond National Jurisdiction (ABNJ)" was adopted. This agreement aims to ensure the conservation and sustainable use of marine biological diversity in ABNJ, which comprise more than two-thirds of the ocean. It aims to introduce international legally binding regulations conserning the the conservation of the marine environment, respect for marine ecosystems, pollution prevention and the conservation of the value of marine biodiversity. Although not yet entered into force, but once ratified by each country, it will link with the Kunming-Montreal Global Biodivesity Framework on Biodiversity under the UN Convention on Biological Diversity. This famework targets the conservation of at least 30% of the terrestrial and marine areas. Consequently, approximately 30% of the high seas will be protected by 2030.

After the Agreement enters into force, Kanadevia Group will check the status of national legislation in each country/region and manage the Convention and national laws.

Prior to the entry into force of this Agreement, GHG emissions will be controlled in view of the fact that the main cause of ocean acidification is the "increase in CO_2 concentrations in seawater" associated with the increase in CO_2 concentrations in the air.

After the Agreement enters into force, Kanadevia Group will check the status of national legislation in each country/region and manage the Convention and national laws.

Prior to the entry into force of this Agreement, GHG emissions will be controlled in view of the fact that the main cause of ocean acidification is the "increase in CO_2 concentrations in seawater" associated with the increase in CO_2 concentrations in the air.

Table A-3-4: Planetary boundaries limit points (Ocean acidification)

Earth system process	Limit point
Ocean acidification	Reduce ocean acidification and protect marine ecosystems. Carbonate ion concentration in surface seawater (specifically, global average surface ocean aragonite saturation (2.75 Ω) relative to aragonite). A reduction in aragonite saturation can lead to the collapse of marine ecosystems. Maintain average aragonite saturation of the ocean surface waters at 80% or more of pre-industrial levels (3.44 Ω).

Biogeochemical flows (nitrogen and phosphorus flows)

With regard to nitrogen and phosphorus cycles, the limiting point is to limit the intervention of human activities in the global cycle of nitrogen to less than 62 million tonnes per year on a global average for nitrogen and less than 11 million tonnes per year on a global average and 6.2 million tonnes per year on a regional average for phosphorus, compared to pre-industrial revolution levels. Furthermore, regional distribution needs to be taken into account. Water quality is subject to strict national legal standards in each country/region. Therefore, Kanadevia Group conducts its business activities in compliance with water quality legislation. If we operate in a country/region where water quality standards are not set by law, it is proposed that the RFP should state the water quality standards to be taken into account in the relevant business activities.

Kanadevia Group also operates a water treatment business. Water treatment helps to control the excessive discharge of nitrogen and phosphorus in the wastewater of others. Therefore, in its water treatment business, we actively make proposals to control nitrogen and phosphorus emissions by others.

Table A-3-5: Planetary boundaries limit points (Biogeochemical flows)

Earth system process	Limit points
Biogeochemical flows (nitrogen and phosphorus flows)	Excessive discharge of nitrogen and phosphorus is controlled to prevent water pollution and eutrophication. Excessive emissions can upset the ecological balance, leading to mass mortality of aquatic organisms and adverse effects on human health. Limit human activities' intervention in the global cycle of nitrogen to no more than 62 million tonnes per year for nitrogen, compared to pre-industrial levels. Phosphorus should be kept below 11 million tonnes per year. The regional level boundary is a flow of 6.2 million tonnes per year from fertilisers to eroding soils to avoid extensive eutrophication of freshwater ecosystems.

Land-system change

For land-use change, the breaking point is to maintain at least 75% of the global forest area. Regulations on forests vary from country to country/region to region, for example, in Japan, the Forest Law has been enacted to protect forests and ensure their proper use, and there are strict regulations on the development and use of forests. If Kanadevia Group's business activities involve development activities in forests, the Group obtains development permission as required by law and plans the scope and extent of development to the minimum necessary. Offset development may also be required, depending on the location and extent of the development. We consider it important to propose to our customers the need for offset development, not only when we ourselves carry out forest development activities, but also when our customers' business activities involve forest development.

Many of Kanadevia Group's projects use large tracts of land, such as infrastructure projects. Therefore, the Group will continue to consolidate its facilities by improving their performance in order to minimise their impact. In WtE projects, as indicated in section 4.7, at the initial stage of maturity in adressing the waste challenge in the community and society, the volume of landfill can be reduced to 3% of the amount generated simply by introducing a waste incinerator, as the global waste generation in 2050 is expected to be enormous. By proactively implementing the business proposals outlined in section 4.7, we believe we can reduce the waste produced by others and minimise the burden caused by land use.

Table A-3-6: Planetary boundaries limit points (Land-system change)

Earth system process	Limit points
Land-system change	Decreasing forest area can cause a range of problems, including accelerated climate change, loss of biodiversity and soil erosion. Maintain at least 75% of the global forest area. In terms of residual forest cover compared to the potential area of Holocene forests, the boundary is 85%/50%/85% for boreal/temperate/tropical forests, respectively.

Freshwater change

For freshwater use, the breaking point is to limit the annual global freshwater use by human activities to 4000 km^3 or less. Each country/region has its own legal standards for the water cycle and water quality, for example, Japan has the Water Cycle Basic Law, which aims to maintain a healthy water cycle, the Groundwater Law, which aims to ensure the proper use and conservation of groundwater, and the Water Pollution Control Law, which aims to protect water quality and regulates wastewater discharge. The use of freshwater in Kanadevia Group's business activities requires compliance with these laws and regulations.

In addition, as indicated in section 4.7, when Kanadevia Group operates WtE plants, the water used in the treatment process is circulated. This amount is dozens of times greater than the amount of water withdrawn, which is an initiative to reduce the amount of water withdrawn for use by others. Furthermore, our water treatment projects enable it to properly control the quality of other people's wastewater, while the desalination projects increase the number of people with access to clean water, so we makes positive proposals in these projects as well.

Table A-3-7: Planetary boundaries limit points (Freshwater change)

Earth system process	Limit points
Freshwater change	Excessive use can cause a range of problems, including water scarcity, ecosystem destruction and conflict. Blue water: limit the upper limit (95th percentile) of the world's land area with deviations from pre-industrial variations for anthropogenic disturbances of blue water flows to no more than 10.2%. Green water: for anthropogenic disturbances of water available to plants, limit the percentage of land area with deviations from pre-industrial changes to no more than 11.1 per cent.

Atmospheric aerosol loading

For atmospheric aerosol load, the limiting point is to minimise the global change caused by human activities compared to pre-industrial levels of atmospheric aerosol load. Strict standards have been set in each country/region for the regulation of atmospheric aerosol load, for example, the Air Pollution Control Law in Japan, and business activities are carried out in compliance with these laws and regulations. Some aerosols are regulated under the Montreal Protocol on Substances that Deplete the Ozone Layer(1987), and the impact of aerosols on climate change is also discussed. The impact of aerosols on climate change is also discussed. In the future, when the treatment of aerosols is clarified in these conventions and national laws are enacted in each country/region, the Group will manage them accordingly.

Kanadevia Group is also working to reduce the generation of particulate matter emitted from waste incineration plants in its operations. As shown in Table 6-1, the facilities operated by us are implementing appropriate treatment of soot and dust at control values that are either below or 10 times stricter than the regulation values.

Table A-3-8: Planetary boundaries limit point (Atmospheric aerosol loading)

Earth system process	Limit point
Atmospheric aerosol loading	Aerosols can have a variety of impacts, including respiratory diseases, climate change and changes in precipitation patterns. To limit the annual average of inter-hemispheric differences in aerosol engineering thickness (AOD) to 0.1.

Novel entities (contamination by chemical substances)

For chemical pollution, a limit point is set when 0% of untested synthetic substances are released into the earth system. As Kanadevia Group does not develop or manufacture new chemical substances, this is not a direct problem, except in special cases where untested synthetic substances are developed, manufactured or used by collaborators or others and we are also involved.

However, with regard to pollution by existing chemical substances, as mentioned in the sections on ozone depletion, atmospheric aerosol load, ocean acidification, etc., each country/region has established strict regulations on handling, use and discharge according to the nature of the environmental impact and the nature of the chemical substance. Therefore, with regard to pollution caused by existing chemical substances, business activities are carried out in compliance with these laws and regulations.

Table A-3-9: Planetary boundaries limit point (Novel entities)

Earth system process	Limit point
Novel entities (Pollution by chemicals)	Limited to truly new anthropogenic introductions into the earth system. These include synthetic chemicals and substances (e.g. microplastics, endocrine disruptors, organic pollutants), artificially transferred radioactive materials such as nuclear waste and nuclear weapons, human-induced evolutionary modifications, genetically modified organisms and other direct interventions into evolutionary processes. The percentage of untested synthetic material released into the earth system is 0%.

4. Quantitative analysis of environmental impacts

(1) Review of TNFD Report 2024 and quantitative analysis for 2025

In the **TNFD Report 2024**, a quantitative analysis of the environmental impact was conducted as part of the "Simulation towards zero environmental impact at customers." This analysis used a simple simulation by aiESG[92)] Ltd. to identify the conditions that would contribute to a "Net-zero environmental impacts on local communities" in Kanadevia Group's core WtE Business as of 2050.

Specifically, a comparison was made between the reduction contribution of replacing fossil fuel-derived electricity with electricity from waste incineration and the environmental impact of the WtE project, and it was found that if the following conditions are met in 2050, the reduction contribution in CO_2 emissions, NOx emissions, SOx emissions and methane emissions (excluding environmental impact of ore usage) will the total amount of reductions in CO_2.

In areas with open dumping and no waste-to-energy facilities,
Introducing new types of standardised WtE plants,
Providing electricity from new waste incineration power generation,
The project is being developed at the same scale as in 2023 in the above-mentioned areas.

The simulation estimated that Kanadevia Group's aim of "Net-zero environmental impacts" is a feasible target that can be aimed for in WtE operations. On the other hand, the environmental impact at the item level in the actual supply chain was not analysed.

Therefore, in order to improve procurement, the Life Cycle Impact Assessment (LCIA) was conducted to assess and analyse the environmental impact at the item level in Kanadevia Group's procurement, based on the 2023 procurement items, and to analyse which items should be given more importance.

(2) Scope3 Category 11: Calculation Scope and Methodology

The Scope 3 Category 11 values in the Kanadevia Corporation **ESG Databook 2025** (hereafter referred to as "**ESG Databook 2025**")are calculated by multiplying the weight or value of each product sold by Kanadevia Group in FY2024 by the emissions database intensity based on the Ministry of Environment's Input-Output table. The method used is based on the Ministry of the Environment's database of emissions based on the Ministry's input-output table.

This result is the same as the result derived from the LCA calculation, i.e. that Scope 3 Category 11 (GHGs generated during use of the products sold) is by far the largest GHG emission (Scope 1, 2 and 3), accounting for over 90% of the total Scope 1, 2 and 3. Specific analysis of Scope 3 Category 11 also shows that GHG emissions from "use of marine engines" account for most of the emissions (over 90%). This is because Kanadevia Group manufactures engines for tankers and other large ships, and heavy fuel oil is used to power the large engines.

Nevertheless, the concept of calculating GHG emissions from the use of marine engines was problematic. Essentially, marine engines are intermediate products to the final product, the ship. The GHG Protocol permits the physical allocation of emissions during the use phase of sold engines based on the ratio of engine weight to the vessel's total weight[93)]. However, as Kanadevia Group has not previously employed physical allocation, we have decided to revise the GHG emissions calculation for sold products from this fiscal year (2025). The results showed that the GHG emissions from the use of marine engines would be reduced to around 2-3% of Scope 3 Category 11.

The next issue is the calculation of the GHG emissions from the use of Kanadevia Group's flagship WtE plant, in other words from the incineration of waste: The GHG Protocol does not specify a method for calculating GHG emissions from waste incineration power generation. However, it is necessary to understand the Scope 3 Category 11 to properly reflect the business structure of us the composition of the waste to be incinerated at WtE plants varies from country to country and region to region, but a conservative calculation method was set up in-house with reference to literature on municipal solid waste. For more information on the revised calculation methodology approach and asset results, see **ESG Databook 2025**.

Calculations based on this calculation method did not change the result that by far the largest part of the GHG emissions (Scope 1, 2 and 3) is Scope 3 Category 11 (GHGs generated during the use of products sold), which accounts for more than 90% of the total Scope 1, 2 and 3 emissions.

However, the main driver of Kanadevia Group's emissions will change from the marine engine business to its main business, the WtE Business. The new calculation method lumps together the GHG emissions from the incineration of fossil fuel-derived plastics by WtE plants during their lifecycle period; estimates for facilities sold in 2024 show that most (70-90%+) of the Scope 3 Category 11 emissions are from the incineration of waste at WtE plants with CO_2 emitted during incineration at WtE plants. And we found that about 50% of the remaining Scope 3 Category 11 is the proportion of emissions from "use of marine engines" and the remaining 50% from "purchased goods and services (Scope 3 Category 1)."

Thus, minimising emissions from Scope 3 Category 11 is a challenge in the pursuit of a net zero environmental impact, in particular minimising CO_2 emissions generated when incinerating plastics, and minimising emissions from procured goods, in addition to converting the fuel used in marine engines. The next section therefore describes the life cycle impact assessment conducted to find the edge of procurement improvements.

(3) Estimates from LCA database for improved procurement

Life Cycle Impact Assessment (LCIA) based on procured products in 2023

In order to reduce the environmental impact of Kanadevia Group's procurement, we have carried out a trend assessment of the environmental impact of our "procurement" products. Theassessment was carried out using Life Cycle Assessment (LCA), a method for quantitatively evaluating the impact of products and services on the environment over their entire life cycle, from raw material extraction to disposal and recycling. This analysis covers procured products purchased by us. Note that Scope 3 Category 11, which is emitted when the product is used by the customer's site, is not included in the assessment.

In the Life Cycle Impact Assessment (LCIA) of procurement(equivalent to Scope 3 Category 1), the environmental impact was calculated by multiplying the weight or value of each product sold by Kanadevia Group in FY2023 by the IDEA product intensity associated with each product.

The LCIA assessment was carried out under the following conditions

Data used: procurement data of Kanadevia Group for FY2023
LCA database: AIST-IDEA Ver. 3.4
LCIA assessment: LIME3

AIST-IDEA (Inventory Database for Environmental Analysis) is one of the world's largest inventory databases for LCA (Life Cycle Assessment), developed by the National Institute of Advanced Industrial Science and Technology (AIST), and contains approximately 9,500 AIST-IDEA allows you to know which processes are important at a higher resolution.

LIME3 is a Japan-originated Life Cycle Impact Assessment (LCIA) method that assesses the environmental impacts of products and services over their life cycles based on "targets to be protected" such as human health, biodiversity, social assets and primary production, and integrates different impacts in a common unit such as monetary values. LIME3 can be used to identify environmental impacts other than GHG. In this case, the following calculations are used to assess the value of environmental impacts.

Environmental impact = (1) weight of product sold or sales value x (2) IDEA product intensity

Note that in the number of items, Japan is consumed in many cases and there is no significant difference between Japan and the rest of the world, so tentatively, estimates were made on the assumption that Japan was consumed.

In LIME3, evaluations are based on "protected targets (endpoints)" and are conducted using the following four metrics in addition to GHG and water resources.

Table A-4-1: LIME3 indicators other than GHG and water resources

Indicators (other than GHG and water resources)	Description
Human Health	Impacts of air pollutants, toxic chemicals and climate change on human health. Assessment method: quantified in terms of life expectancy loss (DALY: disability-adjusted life years) and disease risk. Examples: respiratory diseases due to PM2.5, increased risk of death due to heat waves
Social assets	Damage to social assets (e.g. buildings, infrastructure, land) Assessment method: Assessed in terms of asset losses and repair costs. Examples: deterioration of buildings due to acid rain, submergence of land due to sea level rise
Biodiversity	Risk of species extinction due to global warming, land use, eutrophication, etc. Assessment method: number of species threatened with extinction (EINES: Expected Increase in Number of Extinctions) E/MSY (Number of extinctions per million species per year) Example: habitat loss due to deforestation and climate change
Primary Production	The extent to which the productive capacity of natural photosynthesis (e.g. forests, crops, fisheries resources, etc.) is lost. Assessment method: Assessed by the amount of reduction in net primary production (NPP). Example: reduction in agricultural productivity due to climate change or land use change

A Pareto analysis was performed on the LCIA assessment results in order to identify which of Kanadevia Group's procurement information items had the greatest impact. Pareto analysis is an analysis that reveals the significant impact of a small number of key factors on the overall results, in order to prioritise improvements and decision-making. Pareto analysis allows you to visualise which of the many purchase items are having a particular impact. The respective results are shown below.

(i) Climate change

In Kanadevia Group's procurement items, the largest impact on climate change is "Other business services" in AIST-IDEA Ver. 3.4, followed by "Compressed gas and liquefied gas" and "Marine diesel engine." The above nine categories accounted for 90% of the emissions from purchased goods. The largest item, "Other business services", corresponds to on-site construction work at customers' sites and engineering work at our own facilities in the Environmental Business, which is the Group's core business, and is considered to be an item that can be lowered by our ingenuity.

The results of the analysis showed that the next item"Compressed gas and liquefied gas" was affected by the large amount of LNG fuel used in the gas turbine at our Ibaraki Works, while "Marine diesel engine" was affected by the materials required for the manufacture of marine engines and the energy used in the manufacturing process. Of these, the emissions other than the fuel used in the commissioning of the marine engine are emissions at the company's own facilities and can be examined on their own. Subsequent sources of emissions are materials purchased for deliverables to customer specifications.

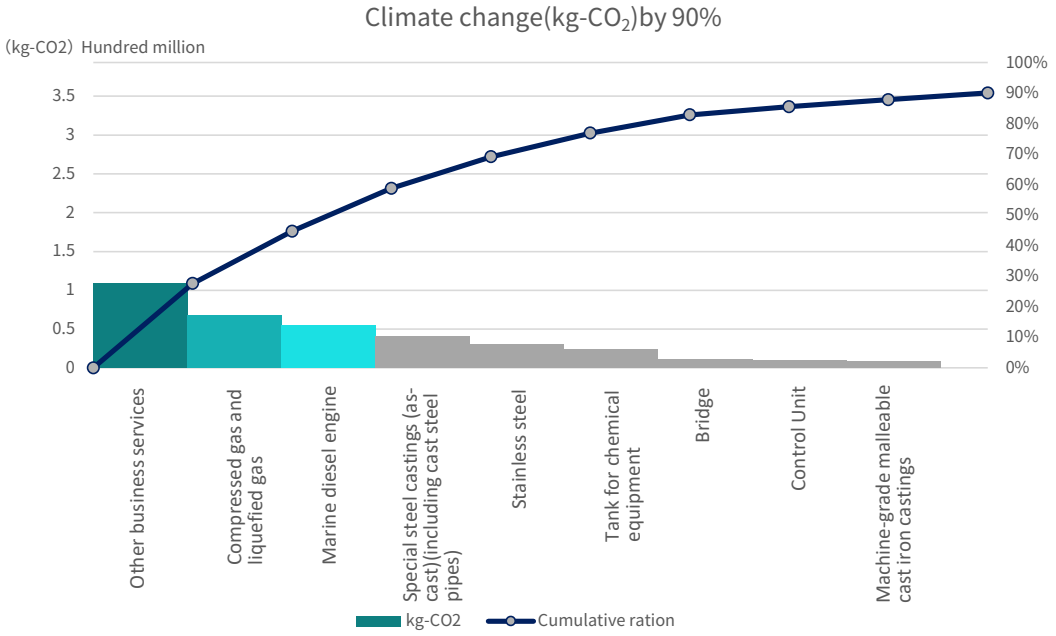


Figure A-4-1: Results of climate change impact analysis by procurement item

(ii) Human health

Human health measures the impact of air pollutants, toxic chemicals and climate change on human health in terms of loss of life expectancy(DALY: disability-adjusted life years).

In Kanadevia Group's procurement items, the greatest impact on human health was found in "Other business services", followed by "Compressed gas and liquefied gas" and "Marine diesel engine." The top 10 procurement items account for 90% of the impact.

"Other business services" also includes a number of operations related to land use changes, such as on-site construction. The analysis shows that not only the generation of NOx, SOx and other harmful substances due to energy use, but also environmental changes due to land use are contributing to a reduction in human life expectancy. In addition to this, as with (i) climate change, the burden associated with the production of fuels related to the commissioning of gas turbines and marine diesel engines is considered to be significant, and it will be important to devise the amount of fuels used in the business sector.

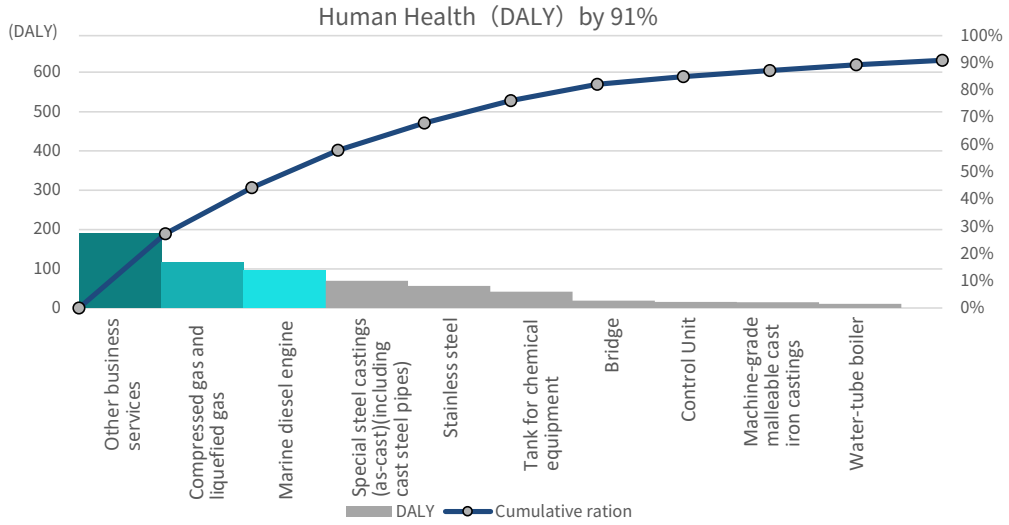


Figure A-4-2: Results of the analysis of the impact of procurement items on human health

(iii) Social assets

Social assets assess damage to social assets (e.g. buildings, infrastructure, land) in terms of asset losses and restoration costs.

In Kanadevia Group's procurement items, "Compressed gas and liquefied gas" had the greatest impact on damage to social assets, followed by "Other business gas and liquefied gas", followed by "Tank for chemical equipment", "Marine diesel engine" and other product categories. The top six products account for 90% of the impact of purchased goods.

"Compressed gas and liquefied gas" had the largest impact not only due to the release of air pollutants (NOx, SOx, etc.) from combustion, but also due to the loss of social assets, including the impact of mining and fuel transportation. The results of this study show that approximately USD 180 million(equivalent to JPY 26 billion)of damage to social assets has been caused.

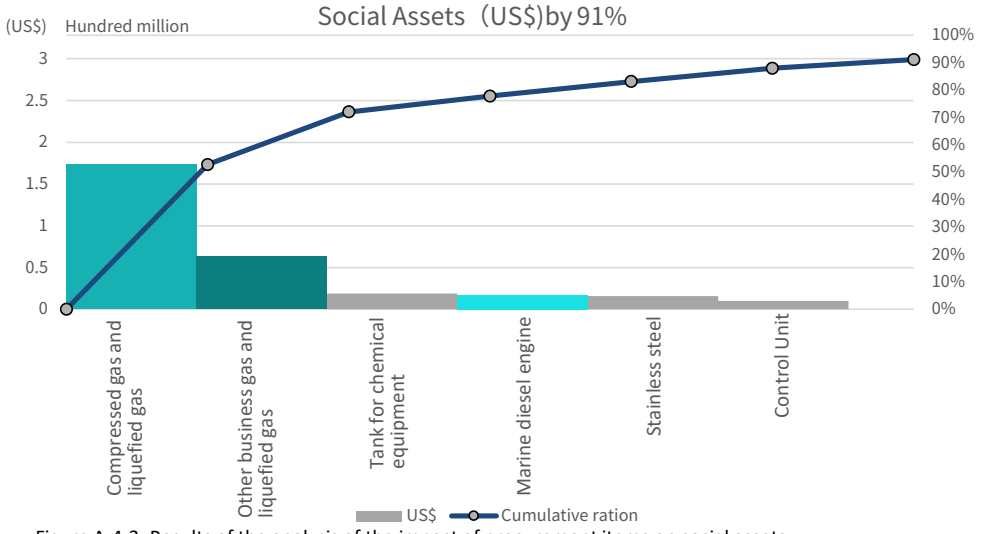


Figure A-4-3: Results of the analysis of the impact of procurement items on social assets

(iv) Biodiversity

In Kanadevia Group's procurement items, "Other business services" has the greatest damage impact on biodiversity, followed by "Compressed gas and liquefied gas" by a narrow margin. This is followed by various product groups, with the gap widening. The top seven procurement products account for 90% of the impact on biodiversity. Biodiversity (extinction risk) is assessed using EINES (EINES stands for Expected Increase in Number of Extinct Species).

In the "Other business services" category, we consider that the significant impact on land use change due to on-site construction and other activities has shown the potential to have an impact on biodiversity as well. For "Compressed gas and liquefied gas", emissions of air pollutants due to combustion were shown to have an impact on living organisms. Although the raw materials of the product groups are mainly ferrous materials, we also found that the impact of these on biodiversity is relatively insignificant. However, even for the largest elements, the impact of Kanadevia Group's procurement items on biodiversity is about 0.0004 EINES, which also shows that the impact of the procurement items on biodiversity is small.

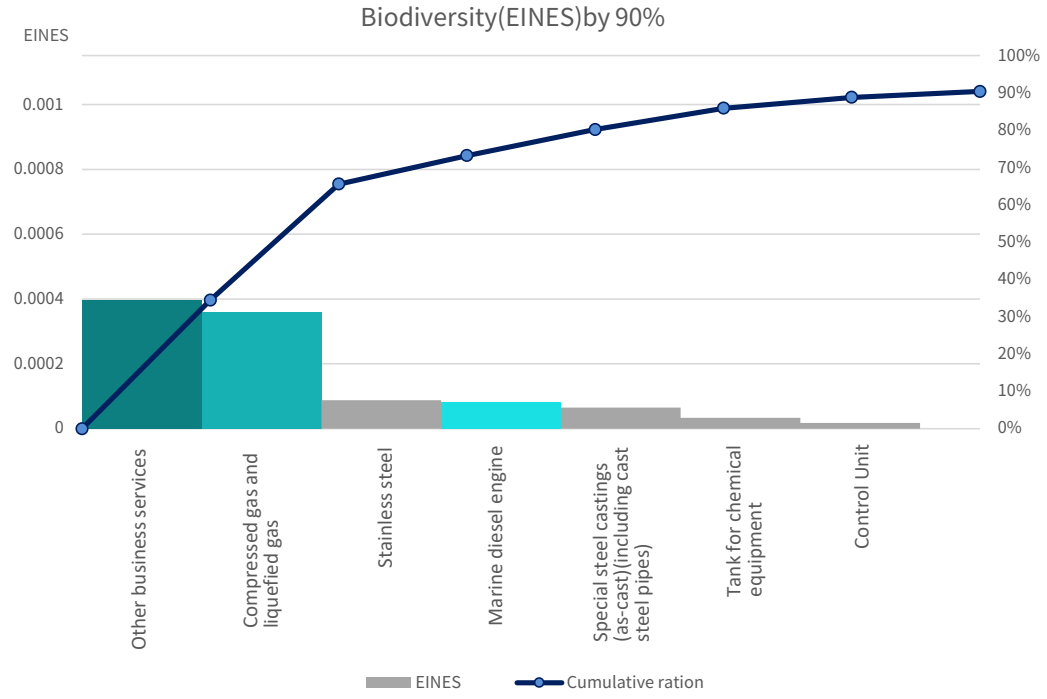


Figure A-4-4: Results of the analysis of the impact of procurement items on biodiversity

(v) Primary production

Primary production is measured by the extent to which the productive capacity of natural photosynthesis (e.g. forests, crops, fisheries resources) is damaged, as measured by the reduction in net primary production (NPP).

In Kanadevia Group's procurement items, the largest impact of damage to primary production is in "Other services to establishments", which accounts for just under 70% of the total, far ahead of the others.

"Primary production" in LCA refers to the total amount of organic matter produced, mainly through plant activity. It is one of the key elements in assessing non-human ecosystems and is a measure of environmental impact, particularly for plant-based organisms. The "Other business services" indicator shows that on-site works etc. have an impact of approximately 24,000 tonnes of plant-derived organic matter, while at the same time the impact from "compressed gas and liquefied gas" and products etc. manufactured from ferrous materials is small.

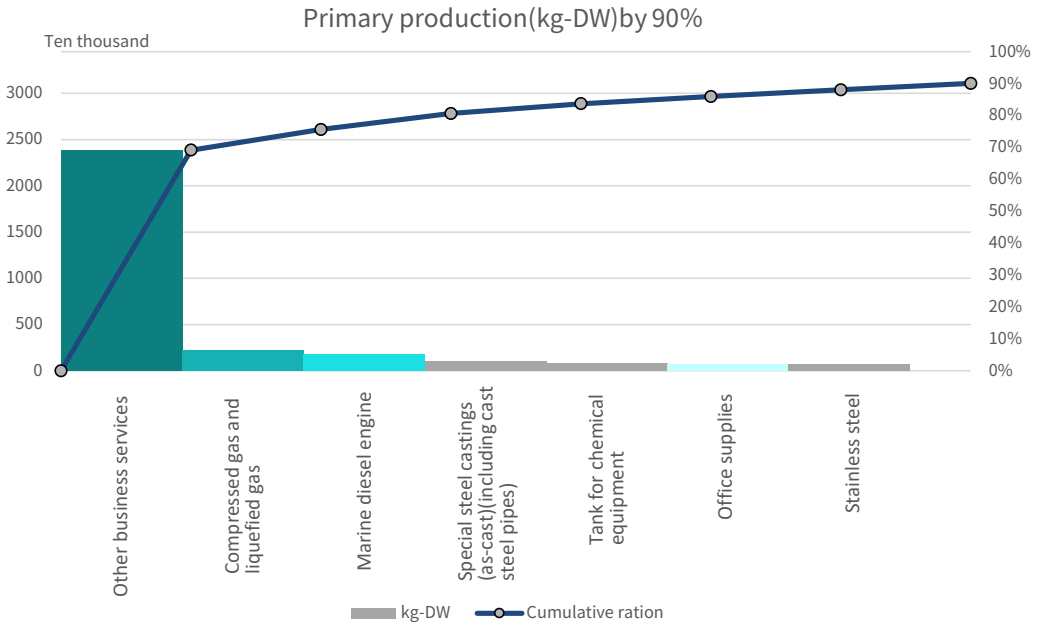


Figure A-4-5: Results of impact analysis on primary production by procurement item

(vi) Water resources

The largest water resource consumption in Kanadevia Group's procurement items was in "Other business services", which was far ahead of the others. This result shows that water resource consumption during product manufacturing of us is smaller than in the services business. The top 10 items account for 90% of the water resource impact.

Among the top items with the highest water resource impact were "other wood products" (5th place, mainly pallets used in transport) and "office supplies"(6th place). Effective use of procurement items that are not directly included in these products, as well as reducing their use and replacing them with products with reduced environmental impact, were also found to be important initiatives. It can be said that these are environmental impacts that can be reduced through the cooperation and ingenuity of not only the business sector but also the procurement sector.

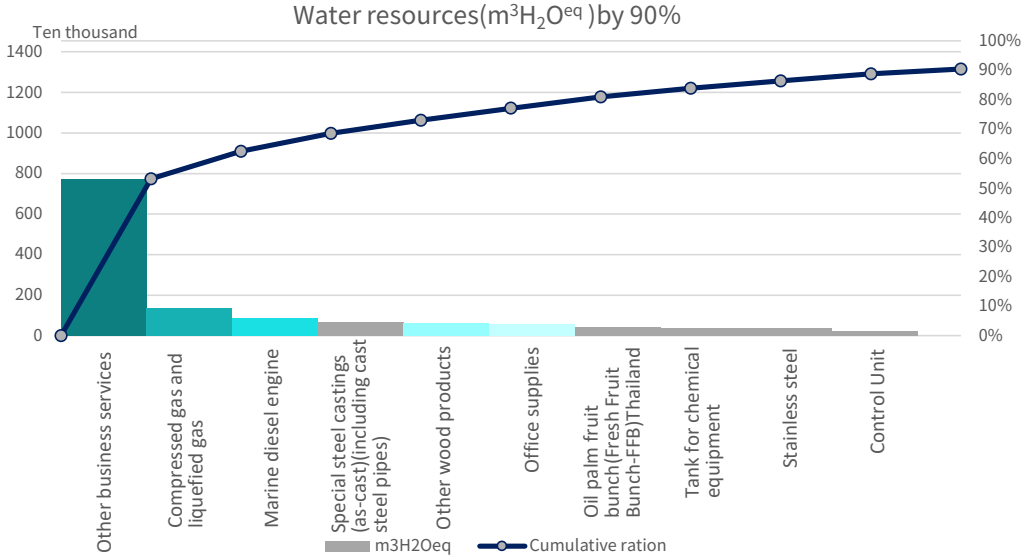


Figure A-4-6: Results of the analysis of the impact of procurement items on water resources

(4) Summary of results

Looking back on this analysis, the use of the LCA database, which has a higher resolution than before, made it possible to assess not only GHG emissions but also a wide variety of environmental impacts and to narrow down specific procurement items and assume their sectors. Some of the items that were shown to have a large environmental impact in the trial calculations could be reduced through the efforts of factories, business units or procurement departments, while others could only be reduced through product design specifications and technological development.

Based on these trial calculations, we believe that we can contribute to reducing environmental impact in the future by further subdividing procurement items and developing measures for items with a large impact. We will continue to study innovations and initiatives to reduce the environmental impact of procured products. In addition, as certain results were observed in the LCIA assessments, we will consider reporting on the results of the application of such methods in the future.

5. Third-party opinion report

The Sustainability Collaborative

Senior Advisor Sachiko Takami

I have conducted this analysis independently of Kanadevia Group as a senior advisor with extensive experience in sustainability. The following analysis and assessment has been conducted on the basis of relevant information obtained within the procedures described below.

Analysis procedures

- "Kanadevia Corporation TNFD Report 2024" was read and questions were asked to the Company to obtain further information as needed.
- The Natural Step's concept of sustainability was used as a method for analysis. A backcasting approach, which looks at the current initiatives from the perspective of what has been successful in a sustainable society was used. The Four Sustainability Principles served as a benchmark to assess how progress was made and to suggest measures.
- Information on the state of waste management and its challenges provided by the Japanese Ministry of the Environment, the National Institute for Environmental Studies and the Swedish Environmental Protection Agency were used as reference.
- In addition, information from the website of "Stockholm Exergi", a cutting edge company in sustainability running a biomass heat and power supply plant, and from the websites of environmental NGOs in both countries were used as reference.

Analysis Results

Kanadevia Group changed its name from "Hitachi Zosen" to "Kanadevia" last year. With a renewed sense of purpose as a global actor they are determined to make a significant contribution to the realisation of a sustainable society. As befits this new step, they have registered as Early Adopters of the international Task Force on Nature-related Financial Disclosures (TNFD) and are disclosing environmental and social risks and information on financial impact for their core business Waste to Energy (WtE), and biomass power generation businesses, from now until 2050. Sorting through the vast amount of information and making these judgements is not an easy task. The report is ambitious and serious in its disclosure. The report is highly commendable in that it communicates a well-defined strategy for backcasting from a sustainable future.

The volume of waste incinerated using Kanadevia Group's technology accounts for 26% of the total volume of waste incinerated worldwide. We are already the world's largest plant engineering company for waste incineration and power generation facilities. In addition to refuse incineration power generation, they have technologies for biomass power generation and biogas production facilities. Therefore, they have the potential to contribute to combatting climate change and achieve the objective “nature positive" by using these technologies to promote the circulation of resources.

The contribution of Kanadevia Group's technology to combatting climate change lies not only in the use of refuse as an alternative to fossil fuel for power generation, but also in preventing the serious global warming effects of methane emissions from landfill food waste. In Sweden, greenhouse gas emissions from landfills have been reduced by 88% between 1990 and 2023. This is because landfills are rarely used as combustible waste containing no hazardous substances is incinerated. The introduction of waste incineration power generation facilities in developing countries with open dumping site is expected to have a significant result on climate challenge in the future.

Biomass power generation business has the potential not only to support decarbonisation but also to contribute to the revitalization of Japan declining forestry industry. By Utilizing waste wood sourced from sustainable forestry that respects biodiversity, these projects can help restore natural capital and promote "nature positive" future.

Kanadevia Group should moreover be commended for having created the "Sustainable Vision" which they aim to achieve in 2050, based on The four principles of sustainability. For example, we have taken on the challenge of developing new technologies to produce recyclable products, green electricity and biomethane as well as green ammonia and green hydrogen, chemicals, recycled metals and other valuable products from waste. In addition, the company is a forerunner in a medium-term strategy of proposing capturing CO_2 and biogas facilities for waste incineration and power generation facilities.

In recent years, average temperatures have risen globally every year and climate change related disasters have become more frequent. Ground breaking climate action is needed in every country to meet the Paris Agreement's 1.5 degree target.

A positive example of climate action is taken by Stockholm Exergi, which supplies district heating for the city of Stockholm, will start a full-scale BECCS (Bioenergy with Carbon Capture and Storage) in 2028. They will be the first in the world to capture carbon dioxide from the atmosphere and store it in the earth's crust. BECCS is a technology that permanently removes biogenic CO_2 from the atmosphere. Stockholm Exergi is Europe's largest biomass-based combined heat and power plant which combines heat recovery to capture and permanently store large amounts of biogenic CO_2. This removes carbon from the atmosphere and achieves what is known as negative emissions. It is "climate positive." The scale of this business is so large that it could absorb and store in the earth's crust the annual emissions of carbon dioxide from all vehicles in Stockholm. What makes this business groundbreaking is that it has not been achieved by one company, but through a collaboration between the EU, the Swedish Government and environmentally conscious customers.

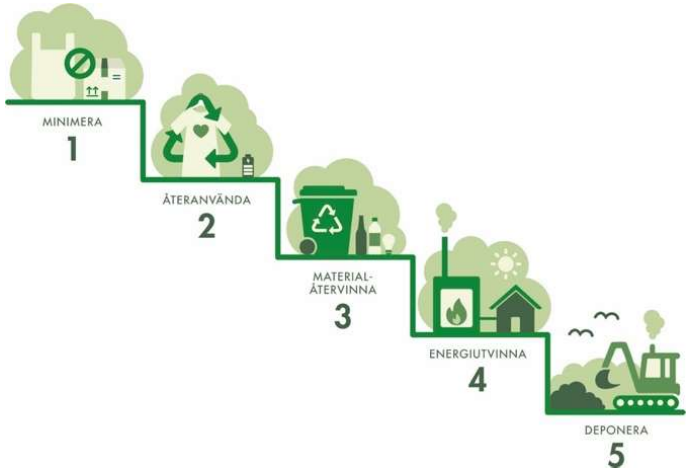
Major changes in waste management such as this requires national and local policies to go in the same direction. Both the EU and Sweden share a vision of leading the world in climate change, and carbon pricing and carbon dioxide emissions trading have become systemic as guiding policies. For carbon dioxide capture and storage to become considered as business opportunities, such an adaptive system of infrastructure will be necessary.

I believe that challenges for Kanadevia Group include that waste collection is a municipal matter and we are not yet involved in it. Also, it is important to acknowledge that direct involvement in natural capital is largely and variously biased towards decision-making on the part of customers. We hope that we will take on the challenge of collaborating with customers in the great future challenge of building a sustainable society.

Proposed strategies for 2030

1. There are approximately 1,000 waste incineration facilities in Japan, but only 39.8% of these have power generation facilities. Power generation efficiency is less than 30% and more than 70% of the heat is not utilised, so heat utilisation systems should be in place in the region to increase utilisation.
2. As subsidiary Kanadevia Inova has the technology for biogas production, and biogas use is widespread in Europe. I recommend that Kanadevia work with local authorities on methods and infrastructure building that can be deployed in Japan and other countries.
3. The introduction of inducements to reduce the amount of plastic in waste, for example by charging a fee for the plastic content.
4. A system to recycle the waste collected for incineration by further separating the materials into food waste, plastics and metals should be studied in collaboration with municipalities and recycling companies.
5. In the Transition Risks section, policy risks mentioned include lower electricity generation due to a decrease in the amount of waste incinerated as a result of stricter recycling and other systems, the setting of recycling standards for incineration residues and the increased cost burden in the event of non-compliance with laws and regulations. However, as it is also desirable to reduce waste when backcasting from a sustainable society, this should not be seen as a risk, but rather as a possibility. For example, supporting environmental measures in other countries by importing waste from those countries where waste measures are still lagging behind. Alternatively, if carbon dioxide taxes and emissions trading are introduced, CCUS, which captures and utilises or stores carbon dioxide, could become a new business. Policy advocacy activities should also be considered.

Conclusion



Source: sopor.nu, Sveriges avfallsportal

The illustration above shows a staircase diagram of the priorities of the Swedish government and administration for waste management. The Japanese Ministry of the Environment also defines the same priorities (1 minimize , 2 re-use, 3 recycling, 4 heat recovery, 5 proper disposal) for the cyclic use of resources and waste management.

According to data from Avfall Sverige (the national waste administration) for Sweden in 2023, 24% of materials were recycled, 3% of building materials, 15% of biogas/compost, 56% of energy (heat and electricity) and 2% of landfill. According to OECD data, Japan incinerates the largest waste volumes in the world. On 30 March 2021, data released by the Japanese Ministry of the Environment showed that incineration was the most common method of waste management, with 79.4%, recycling stood at 19.6% and landfill 1%. A notable difference between the two countries is that in Sweden 15% of waste management consists of biogas/composting. There is also potential for this in Japan.

In a separate report, the Japanese Ministry of the Environment states that the role of energy supply through heat recovery and fuel conversion of circulating and biomass resources will come to play an even greater role in the future. Furthermore, the report states that at present, the efficiency of power generation and the ratio of heating is low and needs to be further increased. With regard to biomass resources, the report states that it is necessary to promote technological development and a stable supply, and to establish an integrated system from raw material production to collection, transport, production and utilisation.

states that the early development of high-efficiency waste power generation facilities by local authorities and the development of facilities for high-efficiency waste power generation by the private sector should be promoted. Also, the sophistication of heat recovery from waste power generation should be improved. Furthermore, the effective use of medium and low temperature heat generated from incineration facilities and industrial processes, for example the use in district cooling and heating, should be promoted. The report summarises that the production of biofuels will be expanded and that biogasification, which involves highly efficient methane recovery from food waste is to be promoted. In summary, I believe that the time is ripe now for a major change in this sector.

The society today is in upheaval due to climate change, drastic reduction in biodiversity, wars and global economic instability. It is time to take up the challenge of backcasting from what future should lie ahead of us, and aim to become "climate positive" and "nature positive" by 2030.

25 April 2025

Annotation

Climate Positive: "a state in which the amount of carbon dioxide absorbed is greater than the amount of carbon dioxide emitted."

Nature Positive: "To halt and reverse natural losses by 2030, using 2020 as a baseline, and achieve full recovery by 2050." This is a social global goal.

Footnote

Footnote

1. For more information on the Sustainable Vision, see Integrated Report 2024 p.17 (https://www.kanadevia.com/english/ir/data/pdf/kanadevia_integrated_report_2024_E.pdf).
2. Zero environmental impact is defined as keeping the environmental impact of Kanadevia Group's supply chain and the environmental impact of customers who use Kanadevia Group products and services, as well as the environmental impact derived from its own business activities, within the inherent environmental resilience of the country/region. In this report, depending on the context, the term "Net-zero environmental impacts" or simply "net zero" is used. In the English version, "Net-zero environmental impacts" is translated as "Net-zero environmental impacts within planetary boundaries" to clarify the definition. See **section 6.2** for goals and targets towards Net-zero environmental impacts.
3. Nature positive refers to halting the negative (loss) flow of biodiversity and reversing it to positive (recovery); the global social goal is to halt and reverse the loss of nature by 2030 and achieve full recovery by 2050, with 2020 as the baseline year.
4. CCUS is a combination of the words CCS (Carbon dioxide Capture and Storage) and CCU (Carbon dioxide Capture and Utilisation). CCS is a technology for returning carbon derived from fossil fuels, etc. to the ground; CCU is a technology for the effective use of CO_2 as a resource, such as by converting CO_2 into fuels, plastics, etc. for use (carbon recycling) or directly using it as CO_2 .
5. WtX is an abbreviation for Waste to X. Waste to X is a generic term for technologies and businesses that convert waste not only into electricity but also into a variety of resources such as materials, fuels and chemicals. It is a pillar of the medium- to long-term strategy to realise a resource-recycling society.
6. Planetary boundaries, proposed by the Stockholm Resilience Centre, are boundaries that define "the range of limits within which changes (especially human impacts) to the Earth's environment can return it to its original state and keep the global environment stable." Nine processes are presented: climate change, biodiversity loss, biogeochemical cycles, ocean acidification, land-use change, fresh water, ozone holes, atmospheric aerosol particles and chemical pollution.
7. Resilience Eco Society® : proposed in the TNFD report 2024 (https://www.kanadevia.com/english/ir/data/pdf/tnfd2024_E.pdf)
8. For more information on the Sustainable Vision, see Integrated Report 2024 p.17 (https://www.kanadevia.com/english/ir/data/pdf/kanadevia_integrated_report_2024_E.pdf).
9. Zero environmental impact is defined as keeping the environmental impact of Kanadevia Group's supply chain and the environmental impact of customers who use Kanadevia Group products and services, as well as the environmental impact derived from its own business activities, within the inherent environmental resilience of the country/region. In this report, depending on the context, the term "Net-zero environmental impacts" or simply "net zero" is used. In the English version, "Net-zero environmental impacts" is translated as "Net-zero environmental impacts within planetary boundaries" to clarify the definition. See **section 6.2** for goals and targets towards Net-zero environmental impacts.
10. The Four Sustainability Principles are principles of corporate activity derived from a focus on the four root causes of unsustainable conditions. (For more information, see p. 50 of this report.
11. Planetary boundaries, proposed by the Stockholm Resilience Centre, are boundaries that define "the range of limits within which changes (especially human impacts) to the Earth's environment can return it to its original state and keep the global environment stable." Nine processes are presented: climate change, biodiversity loss, biogeochemical cycles, ocean acidification, land-use change, fresh water, ozone holes, atmospheric aerosol particles and chemical pollution.
12. The Pillars of Success are the issues that must be addressed with the highest priority in order to realise Kanadevia Group's sustainability vision. It is generally the same as materialities (key issues). See Integrated Report 2024 p.17 p.18 (https://www.kanadevia.com/english/ir/data/pdf/kanadevia_integrated_report_2024_E.pdf) for more information on the pillars of success.
13. The TCFD was dissolved in October 2023 and its functions taken over by the International Sustainability Standards Board (ISSB).
14. For example, EU national legislation based on the EU Corporate Sustainability Disclosure Directive (CSRD).
15. ISSB (IFRS S1 and S2), SSBJ (Universal Standard for Sustainability Disclosure, Sustainability Disclosure Thematic Standard No. 1 and No. 2) and GRI Standards.
16. Zero environmental impact is defined as keeping the environmental impact of Kanadevia Group's supply chain and the environmental impact of customers using Kanadevia Group's products and services, as well as the environmental impact derived from its own business activities, within the scope of the country/region's inherent environmental resilience.
17. Items required for alignment with the general requirements and other provisions of the ISSB's IFRS S1 "General requirements for the disclosure of sustainability-related financial information."
18. RFP stands for Request for Proposal. In Japan, it is referred to as a statement of requirements or order specification.
19. An example would be a heated swimming pool attached to a waste incineration and power generation facility.
20. In some projects, Kanadevia Group and the general contractor may form a joint venture (JV) to carry out demolition work, but this is outside the scope of this analysis and evaluation.
21. For disclosures under the TCFD, see Integrated Report 2024 p. 53 (https://www.kanadevia.com/english/ir/data/pdf/kanadevia_integrated_report_2024_E.pdf).
22. For more information on the Sustainable Vision, see Integrated Report 2024 p.17 (https://www.kanadevia.com/english/ir/data/pdf/kanadevia_integrated_report_2024_E.pdf).

Footnote

23. Zero environmental impact is defined as keeping the environmental impact of Kanadevia Group's supply chain and the environmental impact of customers who use Kanadevia Group products and services, as well as the environmental impact derived from its own business activities, within the inherent environmental resilience of the country/region. In this report, depending on the context, the term "Net-zero environmental impacts" or simply "net zero" is used. In the English version, "Net-zero environmental impacts" is translated as "Net-zero environmental impacts within planetary boundaries" to clarify the definition. See **section 6.2** for goals and targets towards Net-zero environmental impacts.
24. Medium-term management plan from 2023 to 2025:https://www.kanadevia.com/english/ir/policy/pdf/Hitachi%20Zosen%20Forward%2025.English_0323_0531.pdf
25. Kanadevia Group human rights policy: https://www.kanadevia.com/english/sustainability/social/human_rights.html
26. Zero human rights risk means minimising human rights risks.
27. Kanadevia Group Basic Procurement Policy: https://www.kanadevia.com/english/sustainability/social/procurement.html
28. UN Global Compact SAQ refers to the CSR Procurement Self-Assessment Questionnaire in the CSR Procurement Self-Assessment Tool Set prepared by the Supply Chain Subcommittee of the Global Compact Network Japan (GCNJ), a country network of the UN Global Compact. Procurement Self-Assessment Questionnaire, developed by the Supply Chain Subcommittee of the Global Compact Network Japan (GCNJ). A questionnaire with core items extracted based on the 10 principles of the UN Global Compact, international guidelines such as ISO 26000, and CSR questionnaires for specific industries, and structured to be shared between buyers and suppliers, regardless of industry. It is currently operated by the Company and some of its subsidiaries, and will be operated by all Group companies in the future.
29. For more information on the Sustainable Vision, see Integrated Report 2024 p.17 (https://www.kanadevia.com/english/ir/data/pdf/kanadevia_integrated_report_2024_E.pdf).
30. The Pillars of Success are the issues that must be addressed with the highest priority in order to realise Kanadevia Group's Sustainable Vision. It is generally the same as materialities (key issues). See Integrated Report 2024 p.17, p.18 (https://www.kanadevia.com/english/ir/data/pdf/kanadevia_integrated_report_2024_E.pdf) for more information on the pillars of success.
31. In addition to marine engines, inappropriate actions were found to have taken place in some businesses and products, including combustible waste incineration plants, manure treatment plants, bridges, foundry products and special valves. For more information, see documents published on 25 March 2025 and 30 April 2025 (https://www.kanadevia.com/newsroom/news/FY2025-6.pdf).
32. For third-party opinion reports received after the establishment of the Sustainability Vision and Pillars of Success, see here (https://www.kanadevia.com/sustainability/management/comments.html).
33. The Four Sustainability Principles are principles of corporate activity derived from a focus on the four root causes of unsustainable conditions. (For more information, see p. 50 of this report.
34. For more information on the Sustainable Vision, see Integrated Report 2024 p.17 (https://www.kanadevia.com/english/ir/data/pdf/kanadevia_integrated_report_2024_E.pdf).
35. CCUS is a combination of the words "CCS (Carbon dioxide Capture and Storage (CO_2)" and "CCU (Carbon dioxide Capture and Utilisation (CO_2))." CCS is a technology that returns carbon derived from fossil fuels, etc. to the ground; CCU is a technology that effectively uses CO2 as a resource, for example by converting CO_2 into fuels or plastics for use (carbon recycling) or directly using it as CO_2 .
36. ENCORE stands for Exploring Natural Capital Opportunities, Risks and Exposure. An assessment tool led by the Natural Capital Finance Alliance and developed jointly by UNEP-WCSC and others to help financial institutions assess the extent of a company's impact on and dependence on nature.
37. LEAP approach: developed by TNFD as a process for systematically assessing nature-related risks and opportunities. It consists of four phases: discovering the interface with nature (Locate), diagnosing dependencies and impacts (Evaluate), assessing risks and opportunities (Assess) and preparing to address nature-related risks and opportunities and reporting to investors (Prepare).
38. The ESG Databook 2025 can be found here (https://www.kanadevia.com/sustainability/data/).
39. SMART WTE can be found here (https://www.cypark.com/waste-management-waste-to-energy-wte.html).
40. PtG stands for "Power to Gas." A method of converting surplus electricity into gaseous fuel (gaseous conversion) for storage and utilisation.
41. The GI Fund is a fund created by the Japanese Government for the New energy and Industrial Technology Development Organisation (NEDO), a national research and development corporation, towards the 2050 carbon neutrality target. e-methane is a term used to refer to green energy.
42. e-methane is a term used for synthetic methane produced from non-fossil energy sources such as green hydrogen. For more information, see Japan Gas Association (https://www.gas.or.jp/gastainable/e-methane/).
43. Key Biodiversity Areas (KBAs) are areas designated by international NGOs and others as areas of key importance for biodiversity conservation. (https://www.keybiodiversityareas.org/)
44. e-fuel is a fuel produced by synthesising carbon dioxide and hydrogen derived from renewable energy sources. The raw material is carbon dioxide emitted from power plants and factories.
45. Green hydrogen is hydrogen that does not emit CO_2 during combustion as well as during the production process by using renewable energy sources during the production of hydrogen.

Footnote

46. Green ammonia refers to ammonia that does not emit carbon dioxide during the production process. Hydrogen is produced by electrolysing water using electricity generated from renewable energy sources, and the hydrogen is then synthesised with nitrogen from the air to produce ammonia. Conventional ammonia production uses fossil fuels such as natural gas and emits large amounts of carbon dioxide, whereas green ammonia is produced in a sustainable way with no or very low CO_2 emissions.
47. CCUS is a combination of the words "CCS (Carbon dioxide Capture and Storage (CO_2)" and "CCU (Carbon dioxide Capture and Utilisation (CO_2))." CCS is a technology that returns carbon derived from fossil fuels, etc. to the ground; CCU is a technology that effectively uses CO2 as a resource, for example by converting CO_2 into fuels or plastics for use (carbon recycling) or directly using it as CO_2 .
48. Carbon pricing is a policy approach that puts a price on carbon and transforms the behaviour of emitters. There are carbon taxes, domestic emissions trading, credit trading, market mechanisms by international organisations and internal carbon pricing.
49. Financial risks can be categorised into (i) risks such as compensation for damages in the event of an environmental incident at facilities, plants or sites directly operated by Kanadevia Group, (ii) financial risks associated with price increases and delays in the delivery of equipment and materials, and (iii) risks associated with damages for non-compliance with the operating contract.
50. The Science Based Targets initiative (SBTi) is a joint initiative of WWF, CDP, the World Resources Institute (WRI) and the UN Global Compact. The SBTi supports and accredits companies to set targets that are consistent with scientific findings on how much GHGs must be reduced and by when (science-based targets).
51. In ENCORE, Very Low to Very High is determined by a qualitative assessment based on "the scale of monetary expenditure related to economic activities" and "the typical magnitude of pressure on ecosystems due to economic activities."
52. RO stands for Reverse Osmosis. A technology for removing impurities and salts by applying pressure to water and passing it through a semi-permeable membrane. It is used in seawater desalination and pure water production.
53. UF stands for Ultrafiltration. A membrane separation technology that removes macromolecular substances and micro-organisms from water using membranes with a fine pore diameter; can be operated at lower pressure than RO.
54. MAP method (phosphorus recovery): Magnesium Ammonium Phosphate method. A technology that reacts phosphorus, ammonia and magnesium in wastewater and recovers them as "MAP crystals." Can be reused as fertiliser.
55. For more information on the Sustainable Vision, see Integrated Report 2024 p.17 (https://www.kanadevia.com/english/ir/data/pdf/kanadevia_integrated_report_2024_E.pdf).
56. The Four Sustainability Principles are principles of business conduct derived from a focus on the four root causes of unsustainable conditions. For more information, see page 44 of this report.
57. Zero environmental impact is defined as keeping the environmental impact of Kanadevia Group's supply chain and the environmental impact of customers who use Kanadevia Group products and services, as well as the environmental impact derived from its own business activities, within the inherent environmental resilience of the country/region. In this report, depending on the context, the term "Net-zero environmental impacts" or simply "net zero" is used. In the English version, "Net-zero environmental impacts" is translated as "Net-zero environmental impacts within planetary boundaries" to clarify the definition. See **section 6.2** for goals and targets towards Net-zero environmental impacts.
58. Resilience Eco Society® : proposed in TNFD Report 2024. (https://www.kanadevia.com/english/ir/data/pdf/tnfd2024_E.pdf)
59. Planetary boundaries, proposed by the Stockholm Resilience Centre, are the boundaries that indicate "the range of limits within which changes (especially human impacts) to the Earth's environment can return to their original state and maintain the stability of the global environment." Nine processes are presented: climate change, biodiversity loss, biogeochemical cycles, ocean acidification, land-use change, fresh water, ozone holes, atmospheric aerosol particles and chemical pollution.
60. Integrated Recovery Facility The Integrated Recovery Facility (IRCF) is a new model for waste incineration power generation proposed by ESWET (European Suppliers of Waste-to-Energy Technology: an association of European waste-to-energy producers). New model. It produces hydrogen and synthetic fuels from waste and reduces CO_2 emissions by maximising energy and heat recovery.
61. Resilience Eco Society® : proposed in TNFD report 2024. (https://www.kanadevia.com/english/ir/data/pdf/tnfd2024_E.pdf)
62. ZLD stands for Zero Liquid Discharge. Zero Wastewater System. Technology and policy to establish a closed loop system by reusing or treating all wastewater from factories and facilities without discharging any wastewater to the outside.
63. Precision Agriculture: a farming method that uses ICT, sensors, GPS, drones and other technologies to monitor crop and soil conditions in detail and provide fertilisers and water where and in the amount needed. The aim is to reduce resource wastage and minimise environmental impact.
64. Resilience Eco Society® : proposed in TNFD report 2024. (https://www.kanadevia.com/english/ir/data/pdf/tnfd2024_E.pdf)
65. Sustainable GUIDE BOOK: https://www.kanadevia.com/english/sustainability/environment/pdf/Kanadevia_sustainable_guide_book.pdf

Footnote

66. The GI Fund is a fund created by the Japanese Government for the New energy and Industrial Technology Development Organisation (NEDO), a national research and development corporation, towards the 2050 carbon neutrality target. e-methane is a term used to refer to green energy.
67. Estimated CO_2 emissions per tonne of incinerated waste at 1 t, CO_2 recovery at 90% and methane conversion at 90%.
68. Yoshizawa, S. et al. Study on the Estimation and Future Projection of World Waste Generation. Proceedings of the Waste Management Society of Japan. At the time of publication, the world's waste generation was predicted to be approximately 27 billion tonnes in 2050. Later, co-author Masaru Tanaka predicted it to be about 32 billion tonnes (Masaru Tanaka. Estimation and future projection of global waste generation : About the revised version for 2020 : from the special project of the 42nd National Urban Cleaning Research and Case Study Presentation Meeting. Urban Cleaning = Journal of Japan Waste Management Association. 74(361):2021.5,p.277-286.), this report relies on the 2020 revised edition.
69. Resilience Eco Society® : proposed in TNFD Report 2024. (https://www.kanadevia.com/english/ir/data/pdf/tnfd2024_E.pdf)
70. Japan generates about 10 times as much industrial waste as general waste, and this trend has not increased or decreased much since 1990, although the amount of final disposal in 2022 is only 9 million tonnes due to the progress of re-use and volume reduction/reduction. In terms of industrial waste by type, sludge (42%), animal manure (22%) and debris (17%) account for 80% of the total.
71. Biomimetic. This term refers to the concept of designing sustainable systems by mimicking the mechanisms of living organisms and the natural world.
72. Processes that utilise the thermal energy generated by the combustion or pyrolysis of waste materials to produce steam. The steam produced is used to generate electricity or as an industrial heat source.
73. The Pillars of Success are the issues that must be addressed with the highest priority in order to realise Kanadevia Group's Sustainable Vision. It is generally the same as materialities (key issues). See Integrated Report 2024 p.17, p.18 (https://www.kanadevia.com/english/ir/data/pdf/kanadevia_integrated_report_2024_E.pdf) for more information on the pillars of success.
74. The apparent specific gravity of incinerated waste and incineration residue is 0.25 t/m³ and 1.0 t/m³ respectively, and calculations show that the reduction ratio is approximately 1/37.
75. Water PPP (Public-Private Partnership in Water Sector): a mechanism for cooperation between the public sector (government and municipalities) and the private sector in the development and operation of water-related infrastructure and services. It is used in areas such as water supply, sewage, wastewater treatment and desalination, with the aim of raising funds, introducing technology and ensuring efficient operations.
76. BAT (Best Available Technologies): concept referring to the most effective and feasible technologies currently in practical use.
77. The Pillars of Success are the issues that must be addressed with the highest priority in order to realise Kanadevia Group's Sustainable Vision. It is generally the same as materialities (key issues). See Integrated Report 2024 p.17, p.18 (https://www.kanadevia.com/english/ir/data/pdf/kanadevia_integrated_report_2024_E.pdf) for more information on the pillars of success.
78. Placeholder indicators: indicators that are recommended to be considered and disclosed wherever possible (as they are not yet standardised).
79. IAS (Invasive Alien Species): alien species that have been artificially introduced into an area where they did not originally occur and that may have a significant impact on the local natural environment and threaten biodiversity. Invasive Alien Species.
80. For more information on the sustainability vision, see Integrated Report 2024 p.17 (https://www.kanadevia.com/english/ir/data/pdf/kanadevia_integrated_report_2024_E.pdf).
81. The Four Sustainability Principles are principles of business conduct guided by a focus on the four root causes of unsustainable conditions. For more information, see p. 44 of this report.
82. Future-Fit Business Benchmarks is a KPI tool created to put The Four Sustainability Principles into the perspective of companies promoting sustainable management. It is based on social and natural science and ultimately sets "absolute" targets that all companies are expected to achieve, regardless of their products or services. (https://futurefitbusiness.org/)
83. The Pillars of Success are the issues that must be addressed with the highest priority in order to realise Kanadevia Group's Sustainable Vision. It is generally the same as materialities (key issues). See Integrated Report 2024 p.17, p.18 (https://www.kanadevia.com/english/ir/data/pdf/kanadevia_integrated_report_2024_E.pdf) for more information on the pillars of success.
84. Transition roadmap for the power sector URL to cite (https://www.meti.go.jp/shingikai/energy_environment/transition_finance_suishin/pdf/006_04_00.pdf).
85. Greenhouse Gas (GHG) Protocol: a standard for the accounting and reporting of GHG emissions provided by the Greenhouse Gas Protocol Initiative (GHG Protocol). The initiative was established in 1998 by the World Business Council for Sustainable and Development (WBCSD) and the World Business Council for Sustainable and Development (WBCSD) with the aim of developing and promoting the use of internationally recognised GHG emissions accounting and reporting standards through an open and inclusive process. The GHG Protocol has been developed in cooperation with businesses, NGOs and government agencies.
86. For details of the calculation methodology and calculation results, see note "4 Greenhouse gas emissions" in ESG Dataset 2025, which can be found here (https://www.kanadevia.com/english/ir/data/pdf/esg2025_E.pdf).
87. Industry-government-academia consortium for building a market for recycled plastics for automobiles | Ministry of the Environment (https://www.env.go.jp/en/index.html).

Footnote

88. Resilience Eco Society® : proposed in TNFD Report 2024. (https://www.kanadevia.com/english/ir/data/pdf/tnfd2024_E.pdf)
89. Planetary boundaries, proposed by the Stockholm Resilience Centre, are the boundaries that indicate "the range of limits within which changes (especially human impacts) to the Earth's environment can return to their original state and maintain the stability of the global environment." Nine processes are presented: climate change, biodiversity loss, biogeochemical cycles, ocean acidification, land-use change, fresh water, ozone holes, atmospheric aerosol particles and chemical pollution.
90. For more information on the Sustainable Vision, see Integrated Report 2024 p.17 (https://www.kanadevia.com/english/ir/data/pdf/kanadevia_integrated_report_2024_E.pdf).
91. The Four Sustainability Principles are principles of corporate activity derived from a focus on the four root causes of unsustainable conditions. (For more information, see p.50 of this report).
92. aiESG Inc. has established an ESG assessment methodology that uses diverse statistical data to estimate the supply chain back to the end. (https://aiesg.co.jp/en/)
93. GHG protocol (WRI/WBCSD), "Technical Guidance for Calculating Scope 3 Emissions - Supplement to the Corporate Value Chain (Scope 3) Accounting & Reporting Standard." (https://ghgprotocol.org/sites/default/files/ghgp/standards/Scope3_Calculation_Guidance_0.pdf)

Conclusion

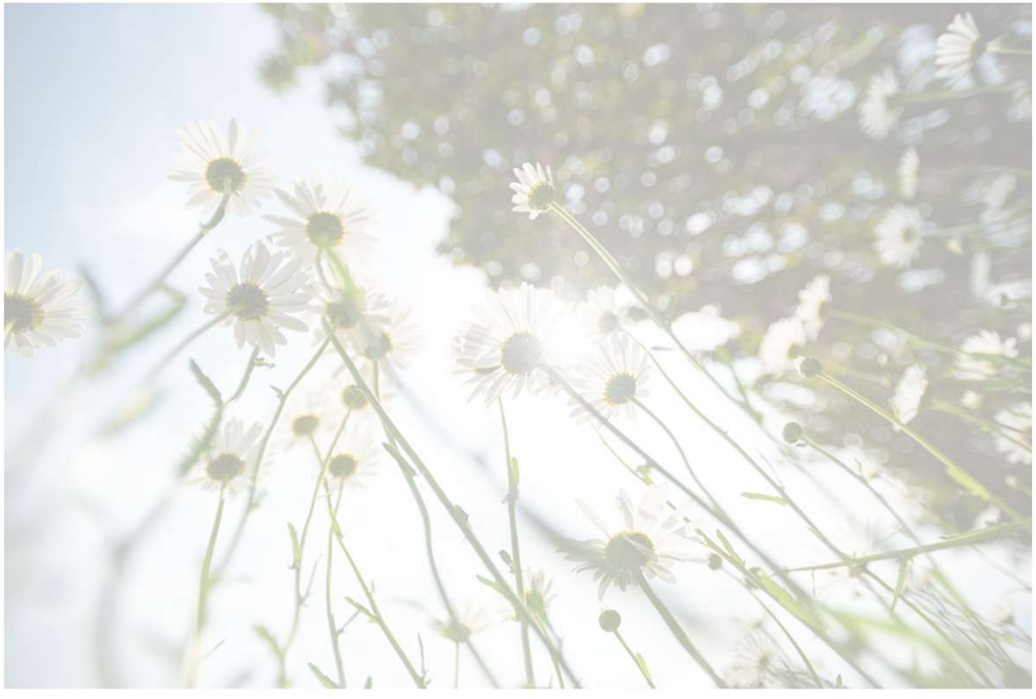
Conclusion

While the TNFD report published last year focused on waste incineration and Power Geration projects, among others, the TCFD/TNFD integrated report has now been compiled with a business-wide scope, allowing us to organise the supply chain and its relationship with natural capital in more depth than in 2024. Looking at the supply chain as a whole, we confirmed that physical risks are greater downstream in the supply chain, and that increased transition risks lead to business opportunities, particularly in Environmental and Carbon Neutral Solution Business. We also confirmed that business opportunities exist for Kanadevia Group's businesses regardless of whether climate change is transitioning to a 1.5°C scenario or a 4.0°C scenario.

The ideal society in 2050 is the Planetary boundaries, i.e. a society in which the environmental burden is controlled below the environmental resilience. There, the ultimate cycle is achieved, where nothing goes to waste. Last year we proposed such a worldview under the name **Resilience Eco Society®**.

In this worldview, waste incineration and power generation facilities are "resource production plants." We believe that incineration itself is minimal and that carbon, hydrogen and metals are recovered from the waste at the molecular level, converted into fuels, chemicals, building materials, etc. and recycled. It is a world where the concept of waste itself disappears and all waste is recycled as a valuable resource. Kanadevia Group offers the **Resilience Eco Society®** service, which focuses on advanced recycling infrastructure. It is not only a place where the local environmental impact is controlled - it is a place where the people who go to **Resilience Eco Society®** feel proud of our town and happy to live in our town.

In order to realise another Sustainable Vision, namely "Maximising People’s well-being", Kanadevia Group is taking steps forward in cooperation with businesses from sectors, business partners, local communities and international organisations to create a new era beyond the WtX.



Resilience Eco Society®

by Kanadevia Group

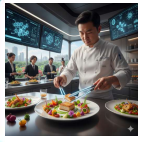
1. In each region, unused or discarded resources are collected.

WtX

2. By breaking down gathered resources, various materials emerge to create new value.

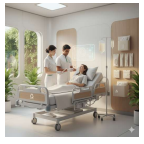
3. Companies/Municipalities/ Research Institutions (Organizations to Individuals) are reborn as new value and delivered to consumers by organizations and individuals

Creating elegant and sustainable clothing using advanced materials derived from discarded plants.

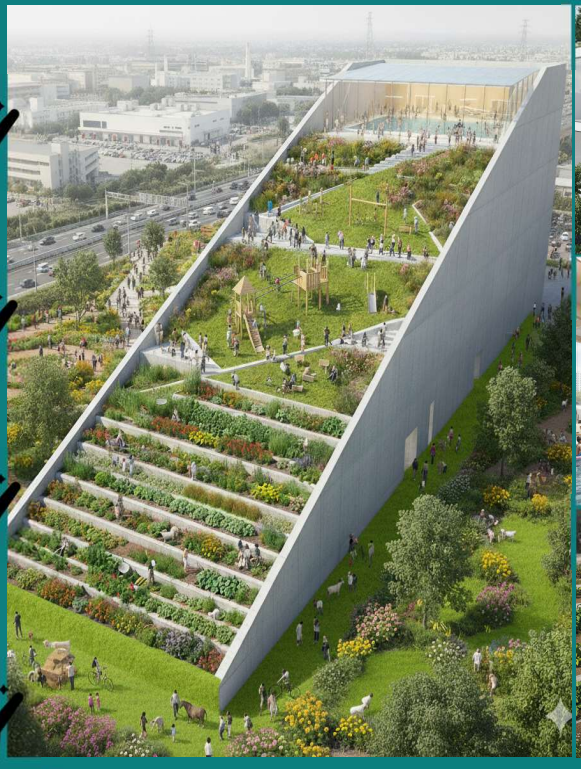


Developing healthy dishes using air-derived protein obtained from CO_2 and water.

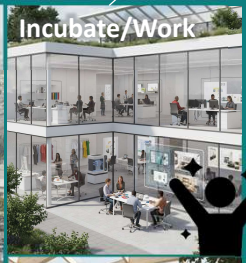
Development and demonstration of a permaculture eco-house constructed using wood-grain patterned biomass building materials.



Development and demonstration testing of biodegradable medical devices derived from cellulose and medical devices made from biomass materials that return to nature.



RES comes with a suite of features that generate new value.



4. Products and services created through RES, along with new waste resources generated by RES itself, will be recycled again.

Kanadevia

Technology for people and planet