Sustainability-Related Innovation 8

8. Sustainability-Related Innovation

8.1 Policy and Approach

The ID&E Group has positioned innovation at the core of our corporate culture, guided by our management philosophy: "Act with integrity and contribute to society through technology and engineering." This philosophy drives our passion for technological innovation and our committed approach to addressing social challenges.

To respond to rapidly changing social environments and increasingly complex challenges, we regard innovation as the key to sustainable growth. We aim to realise our mission of "Making the World a Better Place" by creating distinctive value that meets evolving societal needs and expectations. Whilst our Consulting, Urban and Spatial Development, and Energy business domains operate autonomously, we maximise synergies across the Group and strengthen integration between sustainability and innovation.

In our medium-term management plan, we have positioned Further Advancement of Sustainability Management as one of the key pillars of our Group management policy, pursuing the resolution of social challenges and creation of new business opportunities through innovative technologies and solutions. Through these efforts, we aim to achieve sustained enhancement of corporate value whilst contributing to the sustainability of society as a whole.

8.2 Linking Sustainability Strategy and Innovation

Contribution to Material Topics

The ID&E Group applies innovation in a targeted and systematic way to address key sustainability issues, aiming to build a more sustainable society and strengthen corporate value.

Working towards the materiality "Cultivating a Beautiful and Habitable Planet and Leadership Based on Integrity and Technology", we are driving innovation by harnessing our Group's integrated strengths to meet needs of society and clients:

➡ Technology development for disaster prevention and mitigation

➡ Expansion of renewable energy business

➡ Research and development of renewable energy and next-generation energy

➡ Sustainable urban design through "The Good City Project"

➡ Provision of smart solutions contributing to decarbonisation and ecosystem recovery etc.

Furthermore, in the materiality "innovating to address the challenges of the modern world," we are advancing value creation leveraging our Group's comprehensive capabilities through cross-industry collaboration and AI-powered advanced research and development.

Risk Response and Opportunity Creation Through Innovation

Our Group enhances response capabilities through forward-looking, strategic innovation to address risks including regulatory changes, resource depletion, climate change impacts, quality risks arising from the loss of technical expertise and operational know-how, and intellectual property infringement. Simultaneously, we regard innovative technology as an essential driving force for capturing new social and market opportunities in decarbonisation, circular economy, and disaster response.

The Sustainability Management Framework formulated in 2024 clearly positions innovation as a core element.

Framework Supporting ID&E Group Innovation

▶ ID&E Holdings Sustainability-Related Innovation Policy as Framework Supporting ID&E Group Innovation

8.3 Innovation Sources and Promotion Structure

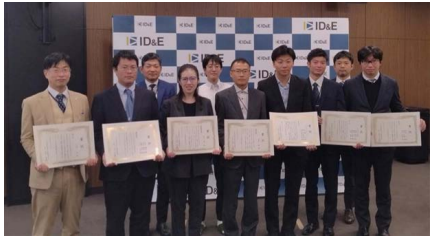
We integrate innovation into our core business practices to address material sustainability challenges, contributing to a sustainable society and enhancing long-term corporate value.

Management Resources Supporting Innovation

- **Research and Development Investment:** The specific target investment amounts outlined in our materiality goals (as of FY2030) are as follows:
  - Disaster prevention and mitigation research and development expenses and investment: 3.2%
  - Renewable energy and next-generation energy research, development, and investment: 15% of related revenue
  - Urban space development research and development expenses and investment: 0.9% of related revenue
  - Research and development expenses and investment for Group-wide development and utilisation of advanced technologies including AI: ¥1 billion

- **Innovation Talent Development:** Human capital represents our Group's most important asset and the key driver of innovation. We focus on developing talents with expertise to meet customer needs and the ability to play active roles globally, providing various forms of development opportunities to enhance employees' specialist knowledge and technical capabilities. Our internal business competition, now in its fifth year, is conducted under the theme "Beyond Boundaries: Create Unique Value for Tomorrow!" Additionally, innovation talent training programmes implemented by the Global Academy are designed to connect with this business competition, aiming to increase the possibility of innovative ideas being deployed as actual businesses.

Business competition theme 2025 "Beyond Boundaries: Create Unique Value for Tomorrow!"



Business competition award ceremony 2024

- **Access to Cutting-Edge Technology:** Through the AI Technology Centre and the Digital Design Centre at Nippon Koei Central Research Institute, among others, we promote AI and digital technology development and innovation across the entire Group. We actively incorporate cutting-edge technologies and accelerate innovation through development and implementation of internal generative AI systems.

- **Central Research Institute Supporting Enhanced Technology Development Capabilities:** The Nippon Koei Central Research Institute within our Group contributes to building sustainable social infrastructure by utilising technologies in the field of civil engineering, environmental management, and social science. The testing and experimental centre at the institute comprises research facilities of the largest scale among Japanese engineering consultant companies. The centre allows us to employ applied research to address complex social challenges and provide solutions for diverse domestic and international projects.

- **Protection and Utilisation of Intellectual Property:** Protection and utilisation of intellectual property is crucial for our Group's innovation advancement. We promote strategic utilisation of intellectual property through establishment of organisational structure at Group companies, installation of invention review committees, and employee education.

Innovation Promotion Structure

In addition to initiatives to promote innovation at each Group company, the Co-Creation Strategy Council, one of ID&E's important meeting bodies, examines and promotes collaboration strategies to optimise our Group's business based on the business and technology strategies of each Group company, demonstrating synergistic effects.

Protection and Utilisation of Intellectual Property

Our Group recognises that the protection and utilisation of intellectual property supporting innovation is of critical importance.
In the ID&E Group Code of Conduct, we have established provisions for contributing to society's sustainable development through the protection, management, and utilisation of intellectual property.
We also stipulate the importance of respecting and not infringing upon the intellectual property rights of others.

▶ ID&E Group Code of Conduct

(1) Structure

Our Group has established intellectual property contact points at major main group companies and executes activities necessary for intellectual property protection and utilisation, including acquisition and management of intellectual property rights, licensing to others, and prevention of intellectual property rights infringement. Overall coordination of intellectual property rights acquisition and management across our Group is handled by the Legal and Compliance Department of Nippon Koei Business Partners.

Establishment of Invention Review Committees

To promote innovation within the ID&E Group, we have established invention review committees at major main group companies. These committees are responsible for evaluating employee inventions, determining the necessity of patent filings and subsequent continuation applications, and calculating performance-based rewards. Each committee consists of a chairperson, internal members, and external experts such as lawyers or patent attorneys. These committees comprise a chairperson, committee members, and external experts (lawyers or patent attorneys).

Employee Education

Within our Group, we believe that enhancing intellectual property literacy amongst employees through intellectual property education contributes to sustainable corporate growth, and various programmes are implemented:

- Patent seminars for Central Research Institute employees (basic knowledge of patent rights, employee invention systems, key points for patent applications, etc.)
- Awareness activities using the company intranet (basic knowledge of patent and copyright laws, etc.)
- E-Learning system training
- Seminars using specific cases at ID&E Global Academy aimed at revitalising intellectual property business

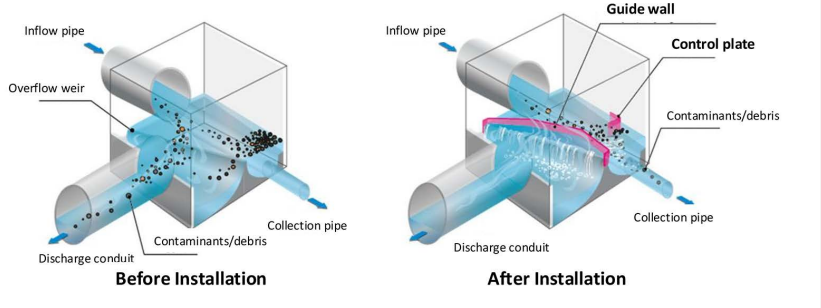
(2) Patent Acquisitions

Currently held patents: 48 cases
Nippon Koei, Nippon Koei Urban Space, and Nippon Koei Energy Solutions operate a system to pay rewards to inventors when employee inventions are filed, registered, and when registered patents are used in business to generate profit, in order to encourage inventions made by employees as part of their duties (employee inventions).
In FY2024/06, 12 patents were subject to rewards.

(3) Case Study of Patent Utilisation

Protecting Urban Water Environments with Patented Technology: Application of Vortex-Type Water Surface Control Devices

Our Group prioritises the use of intellectual property to address social challenges and enhance business value. The vortex-type water surface control device developed by Nippon Koei addresses overflow issues in urban sewerage systems during heavy rainfall. This innovative solution works by simply installing two plates—a guide wall and control plate—within existing facilities, creating vortices that suppress the outflow of contaminated water. Powered entirely by water flow, the device requires no electricity, reducing environmental impact. Protected by patent rights, the technology enable ongoing improvements and wider deployment while preventing imitation. Already contributing to the improvement of urban water environments, it is expected to expand to other regions in the near future.



8.4 Innovation Examples: Innovation in Practice

Our Group connects innovation to realising a sustainable society through specific services, products and other solutions. The following introduces major example of our innovation.

Addressing Traffic Challenges in Bengaluru, India—Realising Co-Creative Smart Cities Through ITS Implementation

Nippon Koei and Nippon Koei Energy Solutions, in collaboration with the Japan International Cooperation Agency (JICA), are implementing a project to introduce an Intelligent Transport System (ITS) in central Bengaluru, India.

Supported by Japanese government grant aid, this initiative aims to alleviate severe traffic congestion and environmental issues caused by rapid urbanisation and economic growth.

The project involves the deployment of an Area Traffic Control System (ATCS), a traffic information provision system (MODERATO), and real-time congestion monitoring using GPS data. While these technologies are established, their integrated application in Bengaluru represents a significant step forward in urban traffic management.

Operations commenced in December 2024, and the system is expected to reduce average travel times, lower CO_2 emissions, and improve both traffic flow and traffic management efficiency and safety.

The project is being advanced through co-creation among Nippon Koei, local stakeholders, and Nippon Signal Co., Ltd. as a sub-consultant, with diverse expertise contributing across technical and local practice domains.

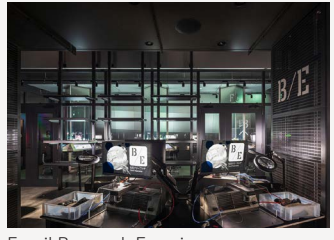
By blending Japanese and Indian technologies and operational know-how to address the complex social challenge of urban mobility, we are shaping a vision for sustainable urban futures.

8.4 Innovation Examples: Innovation in Practice

Nurturing Future Researchers Through Experiential Exhibits at Fukui Prefectural Dinosaur Museum—"Fossil Research Experience" received the Minister of Economy, Trade and Industry Award (Excellent Award) at the Kids Design Award

Kisho Kurokawa Architect & Associates (KKAA), a Group company, carried out the design and construction supervision for the Fukui Prefectural Dinosaur Museum, which opened in 2000. KKAA also carried out the architectural design and construction supervision for major renovations and new building additions when it reopened following renovation in 2023.

This project responded to increased visitor numbers whilst evolving the exhibition approach from "viewing" to "experiencing." Particularly noteworthy is the Fossil Research Experience area that simulates specialist research activities. This programme enables visitors to experience simulated research equivalent to that conducted by actual researchers, including fossil cleaning, fossil scanning, and fossil replica assembly using equipment and environments equivalent to specialist research. This space, where visitors can experience deep learning by touching the fossils themselves, was designed with the hope that children will be inspired to return as future researchers.



Fossil Research Experience area


Fukui Prefectural Dinosaur Museum interior

This project was realised through collaboration with Fukui Prefectural Dinosaur Museum and Tanseisha.* Its innovation and educational value received high recognition, winning the iF Design Award Gold (highest prize) and Kids Design Award (Minister of Economy, Trade and Industry Prize). Our Group continues contributing to nurturing next-generation talents through expanding learning possibilities via spatial creation.

*Architectural design: KKAA, Exhibition design: KKAA + Tanseisha, Exhibition construction: Tanseisha

Next-Generation Agricultural Models Realised Through Technology and Collaboration—Smart Agriculture Package Challenge

To address challenges such as labour shortages and climate change in Japan's agricultural sector, Nippon Koei Energy Solutions is developing a "Smart Agriculture Package." This initiative integrates our proprietary environmental control system, a-MAC, with greenhouse cultivation techniques using polyester-based growing medium developed by Kinki University and partners. A pilot project is currently underway at Noen Musubi, a strawberry farm in Kakegawa City, Shizuoka Prefecture.

The package collects and shows environmental data—such as temperature, humidity, and CO_2 concentration—both inside and outside the greenhouse. This data enables remotely control of cultivation conditions through connected systems, including automated ventilation, misting, and lighting. By allowing precise and remote management, the system reduces farmers' physical workload for and supports stable, high-quality production. In addition, the package is expected to revitalise idle agricultural greenhouses and attract new entrants to farming by lowering operational barriers.

Looking ahead, we aim to further refine cultivation techniques by analysing monitoring data and feeding insights back into the system. Through this, we seek to enhance productivity and sustainability in regional agriculture and promote more flexible use of agricultural assets. The ID&E Group remains committed to addressing social challenges by advancing sustainable agriculture through technological innovation and strong regional partnerships.

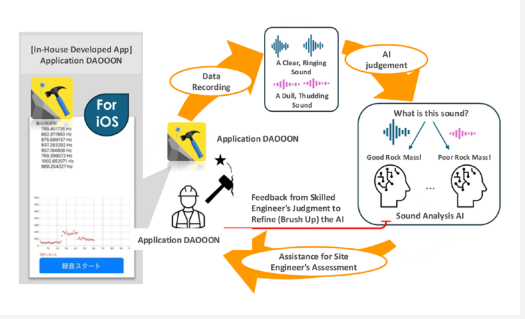

Easily managed using smartphones and tablets


Environmental monitoring sensor box

8.4 Innovation Examples: Innovation in Practice

Fusion of Expert Skills and AI—DX Solution for Material Determination Through Impact Sound

Nippon Koei has developed an innovative solution that leverages AI and smartphone applications to address the challenge of subjectivity in quality assessment at infrastructure inspection and construction sites. This initiative enables consistent and reliable quality evaluation by anyone, through AI learning based on expert engineers' auditory judgements used to distinguish rock and concrete materials by the sound of impact.



The DAOOON Feedback Loop: Refining AI Rock Mass Judgment with Expert Input

This technology delivers high accuracy, achieving approximately 90% agreement between expert assessments and AI determinations. Furthermore, a beta version of the smartphone application DAOOON, designed to support on-site data collection, has been developed. It allows simple recording and utilisation of impact sounds through an intuitive UI (user interface), digitally supplementing judgements that previously relied dependent on engineers' five senses and reducing quality variations.

This initiative accelerates DX in the civil engineering industry while contributing to the resolution of social challenges such as the inheritance of expert skills and labour shortages. We will continue to actively advance DX, creating new value through innovation.

Supporting Island Futures Through Smart Mobility Demonstration —Implementing Three Types of Smart Mobility Demonstration Projects on Hachijojima

Commissioned by the Tokyo Metropolitan Government, Nippon Koei launched three smart mobility demonstration projects on Hachijojima from July 2024. This initiative addresses regional challenges such as declining birth rates, an ageing population, and driver shortages, with the aim of providing sustainable transport services. The projects include the following three elements:

Demonstration Project Image

1. **AI Demand Taxi:** Real-time AI dispatch enables efficient ride-sharing even with a limited number of vehicles. Supporting mobility for the elderly residents.
2. **Sharing Mobility:** Offers visitors convenient travel potions through to electric-assist bicycles.
3. **Autonomous Bus:** Tests public transport possibilities through autonomous operation on routes connecting Hachijojima Airport and Sokodo Port.

These initiatives represent steps toward achieving smart town development that fuses next-generation mobility and AI technology whilst efficiently utilising regional transport and tourism resources.