

AIST REPORT 2025

Create the Future,
Collaborate Together

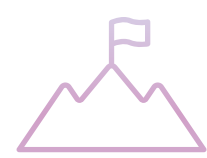
Create the Future, Collaborate Together

Designing and co-creating the future with society.
Encouraging mutual respect and endeavors.

Our values Our mission Our culture



We respect creating diverse values through individual strengths and organizational power.



We promote diverse activities beyond the conventional AIST roles through:

- achieving excellence in research
- discovering social issues and implementing solutions
- underpinning intellectual infrastructure and assisting with policy advocacy



We foster a culture that attracts diverse people with high aspirations and encourages mutual respect and endeavors.

What is AIST's role in society? And what kind of organization do we want AIST to be for those who come together for AIST? Following repeated discussions and votes among our staff, we formulated the "AIST Vision" in 2021 as a message that everyone can understand and share.

Charter of Environment and Safety

- 1 We strive to promote research activities that contribute to the global environmental protection and the security of mankind and pursue our work to realize a safe and reliable society of high quality of life harmonious with the environment.
- 2 In compliance with the applicable laws and regulations related to environmental protection, we establish the autonomous standards of the institute such as Safety Guidelines, etc. and with this in mind, we shall endeavor to conserve environment and promote health and safety at all times.
- 3 We promote the dissemination of information related to the environmental protection and make every effort to be in harmony with and coexist with the local community. Naturally, in case of disasters or emergencies, we take prompt and proper measures to deal with the situation. Furthermore, in conformity with the 'principles of disclosure,' we shall endeavor to return the knowledge acquired and accumulated to society.

Editorial Policy

The National Institute of Advanced Industrial Science and Technology (AIST) publishes the AIST Report every year to promote understanding of its activities among various stakeholders, and to build a deeper relationship of trust between society and AIST.

AIST Report 2025 aims to be an integrated report that provides a comprehensive overview of the activities of the entire AIST Group, including AIST Solutions Co. (hereinafter "AISol"). Focusing on materiality and the value creation process, it provides a detailed account of the strategies and initiatives through which AIST pursues its mission as a core institution within Japan's innovation ecosystem to "continuously create innovations that contribute to solving social problems and strengthening Japan's industrial competitiveness." With the aim of demonstrating the strong feasibility of our strategies, we have provided a wider range of information than in previous reports. Data on the environmental reporting for each research base is available on our website.

AIST official website: www.aist.go.jp/

- Scope of reporting
The AIST Group (National Institute of Advanced Industrial Science and Technology and AIST Solutions Co., Ltd.)
- Reporting period
Mainly FY 2024 (April 2024 – March 2025), but also includes some activities conducted after March 2025.
- Notice concerning future outlooks
Any statements in this report concerning forecasts or future outlooks are based on information available and on various assumptions as of the date of publication. They do not constitute an assurance or guarantee of future numerical results, policy outcomes, or the execution of any measures described herein.
- Rounding of numbers
Rounded to the nearest displayed digit
- Reporting areas
Strategies, business activities, governance, human rights, labor practices, occupational safety and health activities, fair business practices, coexistence with society, and environmental activities of the AIST Group (National Institute of Advanced Industrial Science and Technology and AIST Solutions Co., Ltd.)
- Guidelines, etc., used as reference
 - "International Integrated Reporting Framework", International Integrated Reporting Council (IIRC)
 - "GRI Standard", Global Reporting Initiative
 - "Guidance for Integrated Corporate Disclosure and Company-Investor Dialogue for Collaborative Value Co-Creation 2.0 (Guidance for Collaborative Value Creation 2.0)" - Collaborative Creation of Value-Creation Scenarios to Achieve Sustainability Transformation (SX) - Ministry of Economy, Trade and Industry
 - Report of the Study Group on Dialogue Contributing to Long-Term Management and Long-Term Investment for Sustainable Corporate Value Creation (SX Study Group) (Ito Report 3.0), Ministry of Economy, Trade and Industry
 - "Environmental Reporting Guidelines (2018 Edition)", Ministry of the Environment, Japan
 - "Act on the Promotion of Business Activities with Environmental Consideration by Specified Corporations, etc. by Facilitating Access to Environmental Information, and Other Measures"
 - Guidance for Environmental Reporting (3rd Edition), Ministry of the Environment, Japan
 - "Japanese Translation of ISO 26000: 2010 Guidance on Social Responsibility", Japanese Standards Association (ed.)
- Next issue
September 2026

CONTENTS

AIST's Vision	02
Top Message	04
The AIST Group's Value Creation	08
AIST Group Initiatives for Value Creation - Toward the Establishment of a National Innovation Ecosystem -	08
The AIST Group's Materiality	10
Strategies (R&D, Promoting Social Implementation, Strengthening Innovation Infrastructure, the AIST Group's Operational Infrastructure)	12
The 5th Term Summary and Outlook for the 6th Term	16
Building a Stable Financial Base and Resource Allocation Policy to Support Sustainable Value Creation	18
Driving R&D and Social Implementation to Create Value	20
Operational Infrastructure (Society)	46
Operational Infrastructure (Environment)	60
Operational Infrastructure (Governance)	70
AIST Research Bases	76
Third-Party Opinion, Auditor's Opinion, On the Publication of AIST Report 2025	77
The AIST Group's Brand Story	78

Driving AIST's continued growth as a national research institute dedicated to "solving social problems and strengthening industrial competitiveness"



The R&D and innovation ecosystem that society requires

In recent years, not only Japan, but the entire world has been facing increasingly complex challenges. In addition to ensuring energy and resource security, addressing global environmental problems, and responding to the declining birthrate and aging population in developed countries, it is vital that we strengthen society's overall resilience to pandemics and increasingly severe natural disasters. There are growing expectations for science and technology as a means of resolving these complex issues.

Meanwhile, rapid advances are being made in new technologies capable of creating novel value in society. Generative AI is beginning to permeate daily life at remarkable speed, and a century on from the birth of quantum mechanics, quantum technology is finally approaching social implementation. However, even as generative AI revolutionizes industrial efficiency, governance and safety concerns are also becoming apparent. For its part, quantum technology has the potential to dramatically boost computational capabilities and is expected to be applied in a wide range of industries, but the development of practical use cases is still in progress.

Given all this, it is becoming increasingly important to rapidly accelerate R&D, implement its outcomes in society, and efficiently generate innovation.

Since our establishment as an incorporated administrative agency in 2001, we, the National Institute of Advanced Industrial Science and Technology (AIST), have consistently conducted research activities to contribute to the development of Japan's economy and

ISHIMURA Kazuhiko

A handwritten signature in black ink, reading "K. Ishimura".

President & CEO
National Institute of Advanced Industrial Science and Technology (AIST)

society. For the 6th medium- to long-term target period that began in FY 2025, it has been determined, by the Minister of Economy, Trade and Industry, that AIST's mission is to "continuously create innovations that contribute to solving social problems and strengthening Japan's industrial competitiveness."

Achieving this mission requires AIST to become the core of Japan's innovation ecosystem.

In the innovation ecosystem that AIST envisions, the entire cycle—from setting research agendas to social implementation—will be driven by AIST together with universities, public institutions and industry, thereby enabling the continuous creation of innovation. To this end, research results need to be implemented in society in the form of new products, services, and businesses, and the profits from these ventures be reinvested back into the cycle to help drive the creation of new seeds.

Reviewing AIST's 5th medium- to long-term target period –management reform and enhancement of social implementation capabilities

As AIST's president and CEO, I have focused on driving management reform, including governance reform, promoting social implementation, and improving engagement within the organization.

For AIST to function as the core of an innovation ecosystem, it is particularly important that we enhance our social implementation capabilities, and set research agendas by backcasting from societal challenges and industrial needs.

In this sense, establishing AIST Solutions Co. (AISol) was a major step for transformation. Creating AISol as an organization equipped with marketing capabilities that AIST lacked has enabled faster and more efficient social implementation. Specific outcomes include the initiation of large-scale joint research projects that have helped strengthen corporate competitiveness and business development, and the provision of enhanced support for startups to facilitate their growth into unicorns.

Through these management reforms, I believe that we have laid the foundation for AIST to serve as the core of Japan's innovation ecosystem moving forward.

The 6th term Management Policy and Initiatives –striving for further advances in both quality and scale

The 6th term is the period for leveraging the mechanisms that we established in the 5th term to achieve tangible results. In terms of both output and scale, the AIST Group still has a long way to go before it can serve as the core of an ecosystem capable of continuously generating innovation for the future. As such, in the 6th term, we need to drive our growth by improving quality and expanding in scale.

Improving quality means producing world-class research results and implementing them in society.

Expanding scale means establishing a management infrastructure that makes balanced use of operating grants, competitive funding and private sector funding.

To achieve these goals, our priorities in the 6th term will be as follows:

1. Produce world-class research outcomes and implement them in society.
2. Scale up our activities and strengthen our capabilities as the core of Japan's innovation ecosystem.
3. Enhance our human resources, brand strength and organizational capabilities.

I now want to introduce some of our most important initiatives.

A centerpiece of the 6th term is the establishment of seven Integrated Research Centers(IRC)s. These IRCs are designed to leverage AIST's diverse collective strengths to efficiently and rapidly achieve social implementation. When establishing IRCs, we identified three social problems that AIST should address during the 6th term, from which we backcasted to determine the technological elements required to solve these problems. We then carefully selected research themes that make full use of AIST's collective strengths, and established IRCs as crossdisciplinary organizational structures positioned directly under the Research Strategy Headquarters, which serves as AIST's R&D command center.

Another key initiative of the 6th term is enhancing human resource development and utilization. An organization's strength lies in its people, and this is

particularly true of a research institute like AIST. In the 5th term, we launched a variety of new measures to strengthen our human resource capabilities. For example, we significantly expanded the recruitment of research staff with master’s degrees, and introduced a new system which treats the pursuit of doctoral degrees as part of one’s work duties and covers tuition and other costs. Human resource development will remain a key priority in the 6th term. We intend to broaden the foundation upon which diverse talent can thrive, starting with enhanced training for researchers hired with master’s degrees. Moving forward, we will continue to implement new measures aimed at securing top-tier talent from both Japan and abroad, while diversifying career paths to optimize human resource development and utilization.

To improve Japan’s overall industrial competitiveness, it is vital that we promote regional industry and foster innovation across all regions. In the 6th term, we aim to provide more proactive support to regional businesses and medium-sized SMEs possessing globally competitive technologies or products. By utilizing its network of 12 regional bases throughout Japan to serve as the core of regional innovation ecosystems, AIST will contribute to the growth of global niche top companies and drive the development of a nationwide innovation ecosystem.

When it comes to R&D and social implementation in cutting-edge fields wherein global competition is intensifying, strengthening international collaboration is also indispensable. We need to build a system for promoting joint R&D with a diverse range of domestic and international stakeholders, while at the same time balancing open innovation with economic security. AIST will focus on identifying Japan’s winning strategies, and deepening ties with the world’s leading minds. We have high expectations that the Global Research and Development Center for Business by Quantum-AI Technology (G-QuAT), which we established in 2023, will serve as a platform for this very purpose. By leveraging this and other research centers, and by cultivating an environment that enables staff responsible for various stages—from R&D to social implementation—to freely share ideas and take on challenges, we strive to be an organization that generates innovation more efficiently and effectively. We will also further pursue exchange and collaboration with star players in the global market.

At AIST, we take the FY 2023 incidents regarding

research misconduct and violations of the Unfair Competition Prevention Act very seriously. We continue to implement further measures to prevent a recurrence; they include tightening information security, improving technical data management, and thorough research ethics education. In April 2025, we established the “Research Security and Integrity Division” as a core organization for research security and integrity. In July of the same year, the division was expanded to include the task of risk management, and became the “Research Integrity and Compliance Division.” We will continue to implement measures to enhance organizational structures, rules and systems related to information management, while also promoting the establishment of new institutional measures.

AIST – the road ahead

In the 6th term, AIST must take its research activities beyond the development and provision of elemental technologies to focus also on evolving the innovation ecosystem itself.

To respond effectively to the remarkable advances in generative AI and quantum technologies I wrote earlier, we have already prepared a range of capabilities needed to deliver enduring value to industry.

Our largescale computing infrastructure, ABCI, operated by the AIST Group, was upgraded in 2025 to ABCI 3.0, delivering more than a sevenfold increase in performance. We will continue to provide this AI computing resource—one of Japan’s best—to academia and industry.

As for quantum technologies, our new G-QuAT facility, which houses several types of quantum computers, went into operation in May 2025. Within domestic and international frameworks for collaboration between industry, academia, and government, G-QuAT will play a central role in developing elemental technologies and applications for social implementation.

These unique facilities, combined with our accumulation of research results, will be the heart of our efforts to build a diversified innovation ecosystem.

We also fully recognize the importance of research that supports society’s knowledge base and enhances its resilience—areas in which AIST is expected to play a major

role. For example, following the 2024 Noto Peninsula Earthquake and the 2025 eruption of Shinmoedake in the Kirishima mountain range, we conducted emergency surveys and promptly released our findings. We will continue to strengthen our ability to respond rapidly to

societal crises such as these.

We sincerely ask for your continued support and cooperation in AIST’s activities.

Driving national strategy through science and technology and AIST’s Mission

The global framework of politics and economies that was established after World War II and led us through a period of peace and prosperity is now at a major turning point.

It is essential for Japan not only to continue its steadfast efforts to maintain and strengthen the sustainable development of society—addressing issues such as climate change mitigation and reduction of disparities in wealth—but also to further boost its economic security and ensure its continued solid position within the international community.

Japan’s scientific and technological capabilities will unmistakably serve as its central guiding light for navigating the diverse and complex challenges that will define its future.

Since AI, quantum technologies, fusion, biotechnology, and other rapidly evolving cutting-edge technologies are bringing monumental changes to human society, the global economy, and geopolitical dynamics, the 7th Science, Technology and Innovation (STI) Basic Plan is now being developed as a national policy to further strengthen the collaborative ecosystem between industry, academia, and government, covering all areas from basic

research to social implementation. This plan also aims to enhance the capabilities of research universities and national research institutes and cultivate talent.

Given the course set by the 7th STI Basic Plan and the changing roles of science and technology in society on which the plan is based, I think that AIST will, during its 6th medium- to long-term target period that began in 2025, be expected to play an even more pivotal role in supporting Japan’s sustainable development and strengthening the scientific and technological capabilities that underpin it.

Alongside measures to strengthen its basic research capabilities, the innovation ecosystem championed by AIST is of particular importance.

AIST’s efforts—grounded in advanced research capabilities and strong collaboration with academia, and organically integrating engineering functions with social implementation capabilities through partnerships with industry mediated through AISol—are indispensable for enhancing the resilience of the Japanese economy. AISol is already producing significant results in this area, and the Integrated Research Centers for Implementation established in the 6th term are expected to play a major role in further strengthening this ecosystem.

In addition to establishing this ecosystem, AIST is tasked with the important mission of defining a new future for national research institutes, including strengthening R&D capabilities through nurturing talent, enhancing the further development of talent through international exchanges, and establishing robust governance systems covering research security and other relevant fields.

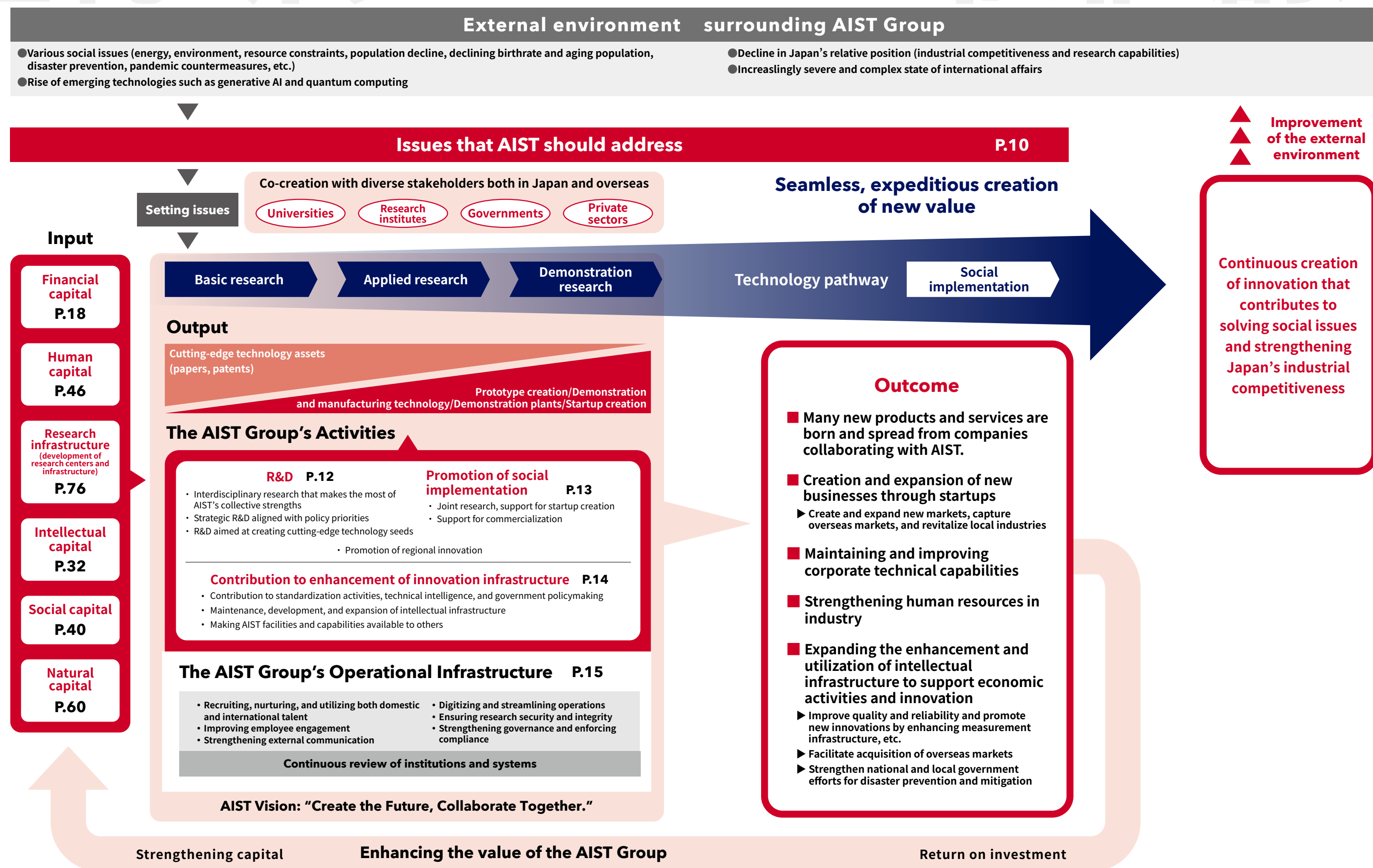
It is my sincere hope that all the staff members take great pride in the vital role that AIST plays and that AIST continues to steadily evolve under the strong leadership of President Ishimura.



Vice President (part-time),
Special Advisor,
Mizuho Financial Group, Inc.
SATO Yasuhiro

AIST Group Initiatives for Value Creation

– Toward the Establishment of a National Innovation Ecosystem –

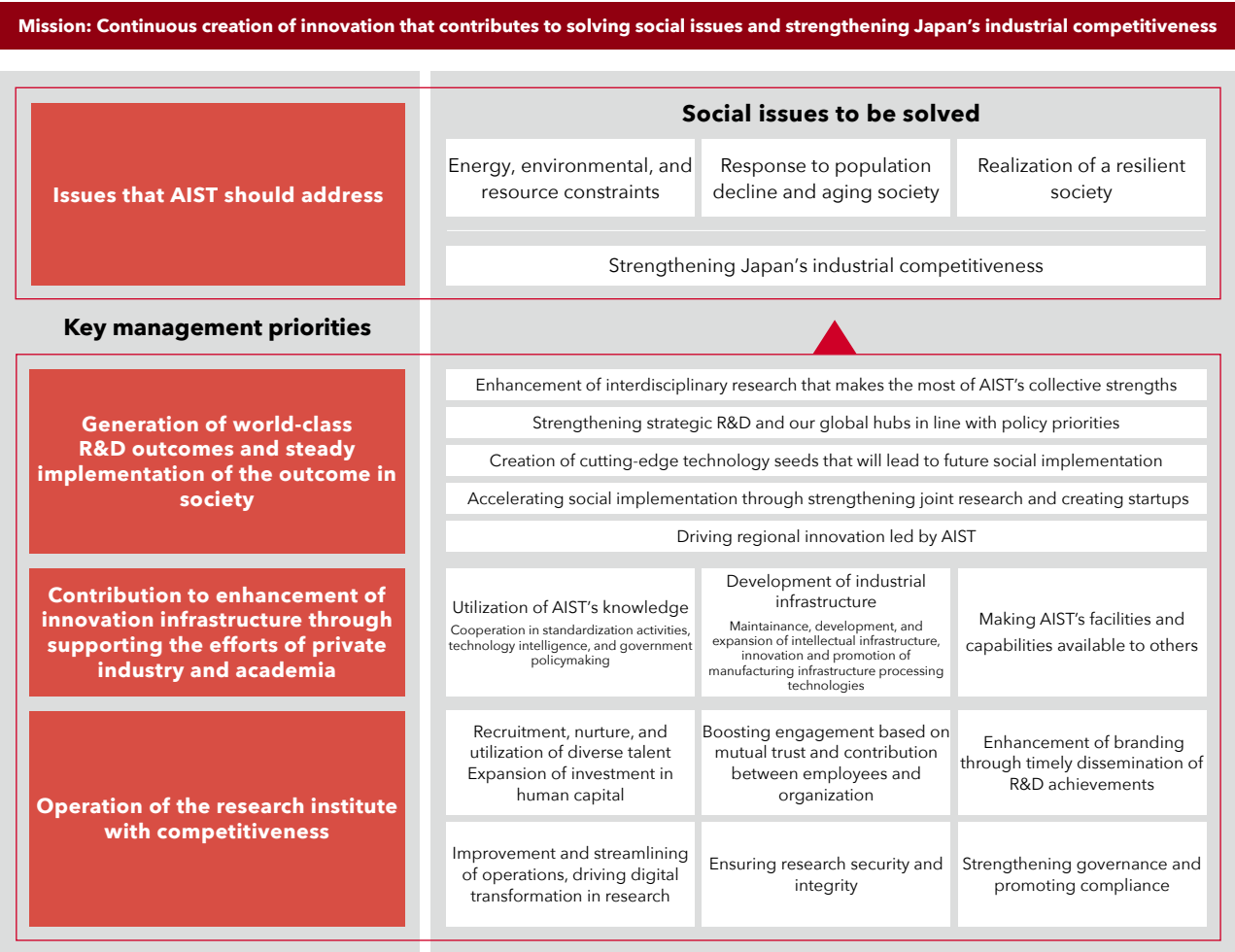


The AIST Group's Materialities

The AIST Group's Approach to Materialities

Within the AIST Group, we define our materialities as the combination of challenges AIST should address and our key management priorities to facilitate long-term value creation. In response to medium- to long-term targets for the AIST Group set by the Minister of Economy, Trade and Industry based on Japan's current circumstances, we formulate medium- to long-term plans to achieve those targets, implementing the plans under the President's leadership. Consequently, the items identified as issues that AIST must address are those issues within Japan's external environment that society expects AIST to tackle as a matter of priority.

As shown in the diagram below, we have identified a total of 18 materialities. These consist of four challenges AIST must address (three social issues to be solved and our mission of "strengthening Japan's industrial competitiveness") and 14 issues categorized under our three key management priorities: Generation of world-class R&D outcomes and steady implementation of the outcomes in society; Contribution to enhancement of innovation infrastructure through supporting the efforts of private industry and academia; Operation of the research institute with competitiveness.



* AIST's materialities are the combination of challenges we should address and our key management priorities.

How We Identified Our Materialities

Based on the characteristics of government-affiliated research institutions, the AIST Report 2025 Editorial Committee Secretariat drew up a list of candidate materialities after considering policies and strategies issued by the Cabinet Office, Ministry of Economy, Trade and Industry, and other arms of the Japanese government as well as guidelines used by the private sector such as GRI standards. The AIST Report 2025 Editorial Committee, which was comprised of cross-departmental members, met seven times to discuss the candidates, with the final decision being made by members of the AIST Group Executive Committee.

Indicators and Targets for Key Management Priorities (6th Term) and FY 2024 Results

The AIST Group is implementing strategic initiatives for each of the identified materialities. For example, we are pursuing sustainable value creation for industry, local communities, and the international community by expanding joint research, supporting startups, promoting regional innovation, contributing to international standardization, and providing access to our research facilities. In FY 2024, we achieved results demonstrating our outstanding R&D capabilities and strong collaboration capacities with diverse stakeholders essential for promoting social implementation, including businesses, universities, research institutions, and the government. These results included 718 joint research contracts with companies, three certified startups, 2,565 technological consultations, and 74 standardization proposals.

The table below shows FY 2024 for the indicators and targets of identified materialities, for each key management priority.

Key management priority	Indicators/targets (6th term)	FY 2024 results
Generation of world-class R&D outcomes and steady implementation of the outcome in society	☐ Boosting quality and quantity of joint research and other external collaborations to accelerate and expand social implementation of research outcomes ☐ Utilizing AIST's technology to create startups with high corporate value. Promoting strategic utilization of intellectual property ☐ Identifying strengths and needs of regional industries and promotion of joint R&D with regional companies and universities to contribute more to solutions of societal issues and support of regional industry	☐ Acquired approx. 44.2 billion yen in external funding ☐ Certified and supported three new startups. Intellectual property income: 1.03 billion yen ☐ Promoted R&D through three Bridge Innovation Laboratories (BILs), our university and regional collaborative framework, filed 2,565 technological consultations.
Contribution to enhancement of innovation infrastructure by supporting the efforts of private industry and academia	☐ Further strengthening standardization activities, focusing on fields critical for enhancing the competitiveness of Japanese companies ☐ Maintenance, development, expansion, and information provision of world-class measurement standards, measurement technology, geological information and other intellectual infrastructure, based on Japan's Intellectual Infrastructure Development Plan ☐ Development and provision of world-class research facilities to help advance and streamline private sector's R&D activities	☐ A cumulative total of 71 chairpersons, convenors, etc., and 532 experts dispatched to the International Standardization Forum etc. 50 international standards proposed ☐ 11 new geological maps, three new reference materials developed ☐ AI Bridging Cloud (ABCI) usage: 324 cases ☐ Super Clean Room (SCR) usage: 89 cases
Operation of the research institution with competitiveness	☐ Recruitment and nurturing of outstanding specialists ☐ Improving engagement by creating a supportive and rewarding workplace environment that fosters growth ☐ Proactive communication to attract outstanding researchers and partners from academia and private industry ☐ Driving digital transformation across AIST by developing a data utilization platform and improving researcher skills ☐ Enhancing research security and integrity through hard and soft mechanisms in line with policy requirementsresearch security and integrity through hard and soft mechanisms in line with policy requirements ☐ Maintaining internal controls through the Board of Directors and other means, and conducting sustained activities to raise awareness of compliance among executives and staff	☐ Expanded engineer recruitment (10 in total). Expanded recruitment and launched career development support for research staff with master's degrees. ☐ Regular messaging by President Ishimura, higher employee engagement scores ☐ Issued 158 press releases ☐ Held regular media briefings (2 sessions) to strengthen media relations and ensure accurate reporting ☐ Supported 25 robotics projects (autonomous experimentation) ☐ Developed and launched an institutional repository to support research data disclosure ☐ Implemented measures to prevent the recurrence of research misconduct ☐ Ensured governance through regular Board of Directors meetings including external (part-time) directors (9 sessions) ☐ Promoted awareness of compliance through lectures by external experts and workshops during Compliance Promotion Month

Strategies— Research and Development

Medium- to long-term strategy	Short-term strategy
AIST drives interdisciplinary research that leverages our collective capabilities, strengthens strategic R&D and our world-class bases in line with priority policies, and creates cutting-edge technology seeds that will lead to future social implementation.We utilize the broad research infrastructure that AIST has built to date to drive interdisciplinary research that makes the most of its collective strengths with the aim of generating world-class R&D outcomes. To this end, we establish an organizational structure to drive interdisciplinary research independent of each field. We lead efforts to involve businesses, universities, and others in conducting research that will lead to social implementation, and communicate research outcomes.	The Research Strategy Planning Department has been reorganized to establish the Research Strategy Headquarters as a new department to pursue our research strategy. Integrated Research Centers for implementation have been established as organizations for conducting interdisciplinary research, placed under the Research Strategy Headquarters to operate with organizational management independent of existing research domains.
AIST conducts strategic, focused R&D in AI, quantum technology, semiconductors, green transformation, materials science digital transformation, biomanufacturing, and other cutting-edge foundational technologies to generate world-class research outcomes and to achieve key policy goals within government strategies. To this end, we develop and strengthen the Global Research and Development Center for Business by Quantum-AI Technology (G-QuAT) and other global bases, and vigorously promote R&D aimed at enhancing global competitiveness while simultaneously identifying areas for collaboration. Also, we contribute to build a global innovation ecosystem that leverages the strengths of Japanese businesses and work to ensure speedier and more impactful social implementation of research outcomes.	AIST brings G-QuAT into full operation to drive R&D in quantum technologies while collaborating with diverse partners in Japan and overseas within the context of strengthening AIST’s global bases.
AIST utilizes accumulation of our core technologies and applied knowledge in order to create technology seeds for future implementation. Also, by predicting technological challenges that may emerge in the future, we drive R&D to generate world-class research results tailored to social implementation across various time horizons. For this purpose, we actively collaborate with domestic and overseas universities and other national research and development agencies.	AIST establishes new bottom-up interdisciplinary research support programs to promote the creation of new technology seeds and strengthen core technologies.

Strategies—Promotion of Social Implementation

Medium- to long-term strategy	Short-term strategy
AIST increases joint research, promotes creation of startups and regional innovation. We work as one across the AIST Group to accurately identify corporate business challenges and make appropriate proposals. Also, by reviewing the Cooperative Research Laboratory system and other mechanisms, we increase large-scale joint research projects that connect AIST’s technology seeds to the social implementation of private sector products and services, thereby contributing to constant, rapid business value creation. AIST Solutions (AISol) will lead efforts to drive licensing and commercialization of research results that have been appropriately protected through patents to secure rights and know-how. We work with other public institutions to create high-value startups by strengthening support for launching and growing the businesses of startups commercializing AIST technology seeds.	AIST reviews the Cooperative Research Laboratory system to make it more responsive to private sector’s collaboration needs to increase large-scale joint research. We identify industries and business groups that we should actively pursue collaborations and expand networks with corporate executives to increase joint research aimed at social implementation. We build mechanisms to utilize the expertise of the AIST Group’s IP specialists from early research stages, especially for priority research projects and large-scale collaborations. We strengthen and expand support for nurturing promising startups through AISol startup certification and other means. We identify and support the development of AIST technology seeds to promote startup creation.
AIST collaborates with regional stakeholders to strengthen outreach to companies leading regional economies and boosts the quality and quantity of joint research. We also work with regional businesses, universities, local governments, and other organizations to expand the Bridge Innovation Laboratories (BIL) initiative aimed at promoting joint research and talent development contributing to the growth of distinctive regional companies and industries. We drive the activities of the Council for Promotion of Industrial Technology Collaboration and similar bodies to maintain and strengthen networks with public testing and research laboratories nationwide, and work with them to appropriately respond to technological consultations from regional businesses, thereby maintaining and strengthening private sector’s technological capabilities and contributing to maintenance and enhancement of supply chains.	AIST establishes Regional Affairs Division under the Research Strategy Headquarters, formulates and promotes strategies within the Headquarters, which is responsible for setting the institute-wide R&D strategy for AIST. We strengthen outreach to companies driving regional economies and expand joint research by combining efforts of regional centers and other research bases with that of AISol, in collaboration with regional stakeholders. We expand BIL and other initiatives, and approach local governments and other relevant bodies to advance discussions for developing and demonstrating technologies that could help solve social issues peculiar to each region.

Strategies—Contribution to Enhancement of Innovation Infrastructure

Medium- to long-term strategy	Short-term strategy
AIST promotes standardization activities by formulating standardization strategies from early research stages. We focus on fields with high growth potential or where standardization is expected to help Japan secure a competitive advantage, for the purpose of efficient and effective social implementation of AIST's research outcomes	AIST considers the formulation of strategies for standardization from early research stages, focusing on fields with high growth potential or where standardization is expected to help Japan secure a competitive advantage. Also, we raise awareness of employees through seminars and actively dispatch staff to domestic and international standardization-related conferences, committees, consortiums and other relevant forums.
AIST consolidates and systematizes technology intelligence-related research information and technology assets within AIST and work also with other institutions to identify trends in emerging/important technologies and market needs. We utilize the technological insights gained from the above activities to consider creating new R&D projects within AIST. We further work to strengthen collaboration frameworks with the government and related agencies and contribute to the government's policymaking process by providing information for the consideration of policy formulation and implementation, actively providing advice regarding government strategies, and participating in decision-making processes.	We establish a new Technology Intelligence Division and placed the Intellectual Property and Standardization Promotion Division under the Research Strategy Headquarters to formulate and promote relevant strategies within the Headquarters, which is responsible for the institute-wide R&D strategy for AIST. In the area of technology intelligence, AIST collaborates and shares information with other national research and development agencies etc. on frontier field exploration projects being pursued by the Innovation Policy Division, Innovation and Environment Policy Bureau of Ministry of Economy, Trade and Industry. Also, we consolidate and systematize AIST's research information and technology assets, update the Emerging Technology Survey Report to address emerging/important technologies, and utilize it to consider creation of new R&D projects within AIST.
AIST contributes to the activities of businesses, government, universities, and other research institutions by actively promoting the maintenance, development, expansion, and provision of world-class geological information, measurement standards/technologies, and other intellectual infrastructure in line with the national government's Intellectual Infrastructure Development Plan.	AIST promotes initiatives based on the Intellectual Infrastructure Development Plan.
AIST contributes to innovation creation by building an environment in which private companies can easily access AIST's cutting-edge research facilities.	

Strategies—The AIST Group's Operational Infrastructure

Medium- to long-term strategy	Short-term strategy
AIST hires diverse talent for research, administrative, technical and other positions to ensure strategic acquisiton of human resources for research, social implementation, and AIST operation management. We offer various recruitment methods and work conditions, and provide training tailored to each position.	AIST utilizes various recruitment channels to connect with and hire diverse outstanding talent, and provide training tailored to each position. We enhance support measures for research personnel in collaboration with research departments, particularly for research staff hired with master's degrees. We also create a work environment that supports long-term employment of technical staff supporting research activities.
AIST implements measures to promote diversity, equity, and inclusion (DEI), reward performance with commensurate compensation. We thereby build a pleasant work environment, in which individual employee can enhance their engagement, and feel their work is worthwhile and an opportunity for personal growth.	AIST promotes flexible work systems and clarifies the definition of DEI at AIST to create workplaces where diverse personnel can work with confidence. We provide growth opportunities through appropriate personnel placement and support employee-driven career development.
AIST increases communication contributing to management policies and builds its brand image to boost its external presence and promote collaboration domestically and internationally.	AIST raises awareness of the AIST brand by strengthening communication through a cross-media strategy linking multiple media and communication of AIST's uniqueness.
AIST promotes digital transformation and streamlines operations across the organization by building information infrastructure, enhancing digital skills training for staff, deploying machine learning software and autonomous experimentation systems in research settings, and promoting digitization and utilizing generative AI, etc. in operations management, thereby boosts the competitiveness of R&D activities.	AIST expands utilization of R&D data across multiple fields by developing information platforms, enhancing researchers' digital skills, deploying learning software, providing digital transformation teaching materials, building data-sharing infrastructure, and thereby promotes digital transformation. We provide opportunities to learn IT and tool utilization methods to enhance employee digital skills, support task digitization initiatives being implemented by each department, and collect and share case studies across the departments. In addition, we conduct generative AI proof of concept (PoC) projects to verify its effectiveness in operations management and other areas.
AIST strengthens research security and integrity through hard and soft mechanisms in line with policy requirements.	AIST establishes an organization that serves as a command center for research security and integrity, and drive its collaboration with other relevant sections. We promote the designation and management of important technical data etc. that requires special management from a national security perspective, and work to raise staff awareness of the importance of such measures. We prepare facilities and equipment for information security in anticipation of the enforcement of the Act on the Protection and Utilization of Critical Economic Security Information.
AIST maintains internal controls through the Board of Directors and other means, and conduct sustained activities to raise compliance awareness among executives and staff. In the event of a risk incident, we seek to resolve the compliance problem expeditiously and appropriately, and take effective recurrence prevention measures through relevant information gathering and continuous review of work rules.	AIST constantly strengthens internal controls by evaluating and verifying the effectiveness of existing mechanisms and continuously upgrades them as required.

Review of the 5th Term and Outlook for the 6th Term (Outline of AIST's Management Policy for the 6th Term)

AIST's vision is to drive Japan's industrial technologies into the future by constantly growing together with companies, universities, and other public research institutes to become the core of Japan's innovation ecosystem. To achieve this vision beyond the medium- to long-term objectives period for National Research and Development Agencies (a maximum of 7 years), we have formulated a management policy that sets forth ambitious strategies derived through backcast from our vision.

Review of the 5th Term (2020-2024) and Outlook for the 6th Term (2025-2031)

To realize its future vision, in the 5th term, AIST undertook various reforms, including restructure of our management system to separate management and execution, establishment of the posts of Chief Technology Officer and Chief Operating Officer, elimination of fixed-term employment and significant increase in new hires, establishment of AISol, consolidation of operational sites, and thereby significantly improved operational efficiency.

In the 6th term, we need to leverage the mechanisms that we established in the 5th term to achieve tangible results. This implies major advances befitting an "ever-growing national research institute" aiming to become the

core of an innovation ecosystem. To this end, AIST needs to further develop its strengths—its human resources, technologies, equipment, and intellectual infrastructure—to enhance its unifying, communicative, and cocreative powers and generate a virtuous cycle of mutual interaction with other institutes.

Above all else, as one of the Japan's largest research institute with collective strength, AIST needs to work in collaboration with domestic and international companies, universities, and other organizations to continuously generate innovation, and it is essential to improve its quality and expand in scale.

Outline of AIST's Management Policy for the 6th Term

Improving quality means further bolstering our human resources, brand, and organizational capabilities to create the world's highest-level research outcomes and implement them in society. Expanding scale means establishing a management infrastructure that makes balanced use of operational expense subsidies, competitive funding, and private funding. By the end of the 6th term, we aim for these funding sources to be of equal scale, doubling our scale of operations to approximately 200 billion yen compared to the 5th term. We also aim to reinvest resources gained from our research activities to fuel further R&D and sustainably create shared value. The following three initiatives will be of top priorities throughout the 6th term:

1. Creation of the world's highest-level research outcomes and their social implementation

- Accelerating systematic social implementation: Initiatives

of interdisciplinary research for social implementation, increase engineering personnel, etc.

- Strengthening technology intelligence: Collection and analysis of important technical information, and providing the information to related agencies, etc.
- Fusion for creation of world's highest-level research outcomes: Promoting partnership with domestic & international universities, research institutes, companies, and promoting DX, including utilization of AI.

2. Expansion of AIST's scale of activities and enhancement of its capabilities as the core of an innovation ecosystem

- Acquisition of more research funding: Expanding acquisition of private funding and enhancing acquisition of competitive funding, etc.
- Enhancement of innovation infrastructure: Leveraging IP and promoting international standardization activities, and strengthening base functions for human resource

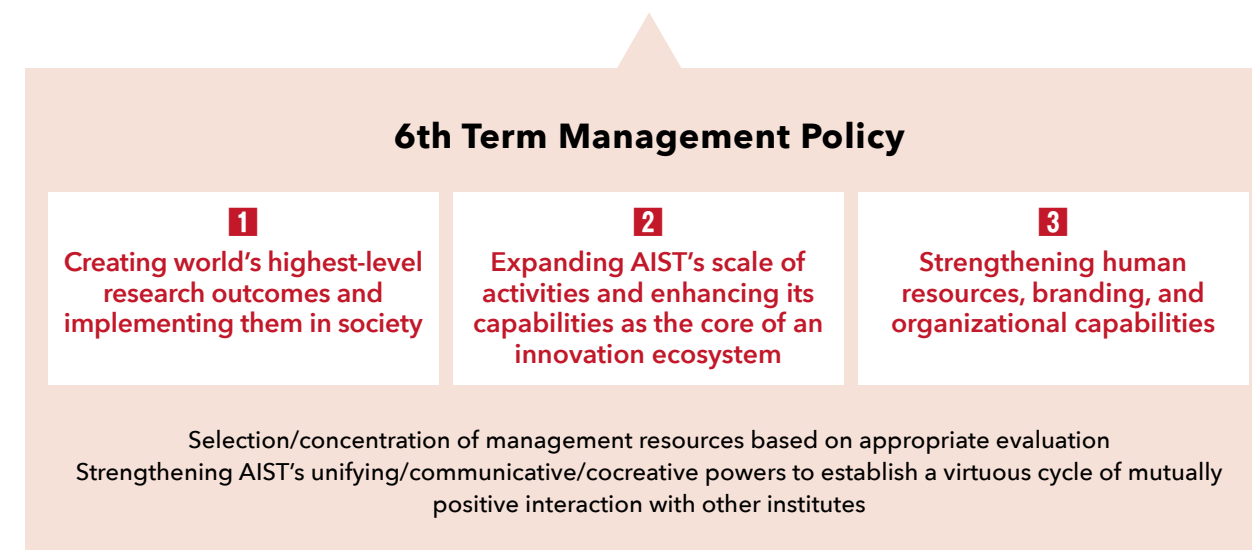
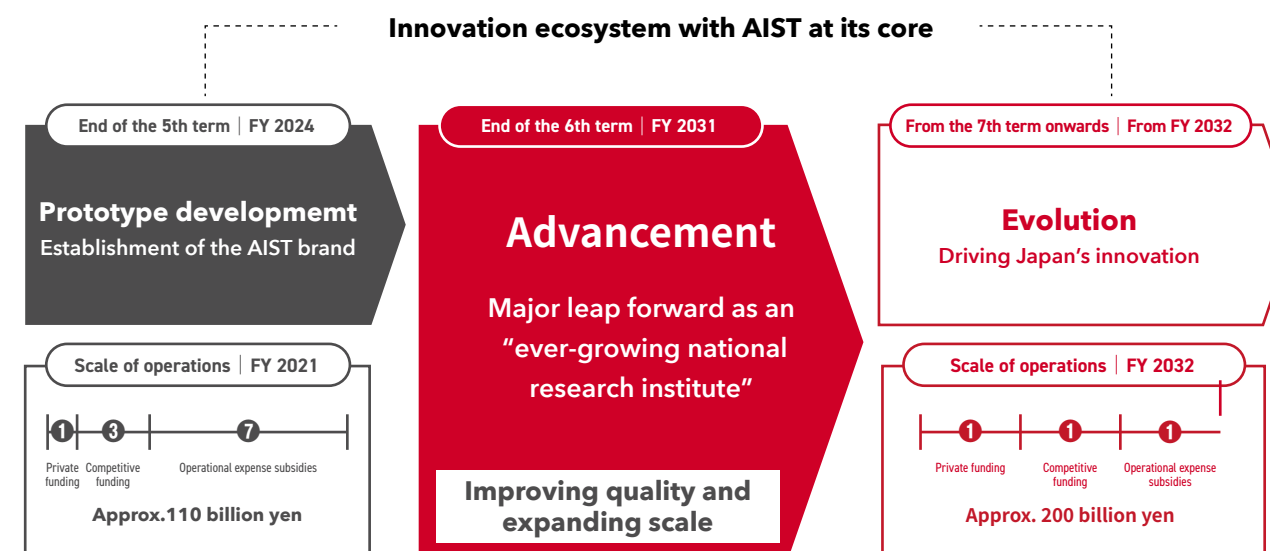
development and circulation, etc.

3. Strengthening human resources, brand appeal, and organizational capabilities

- Maximizing human resource value: Reviewing acquisition scheme for domestic and international talent, diversify career development to foster/develop human resources,

implement strategic personnel allocation mechanism, etc.

- Improvement in engagement: Rewarding workplace to work for, and promoting DEI and creating working environment for ease of work, etc.
- Branding across AIST group: Improve branding activities, etc.



Positioning of the 6th Term Management Policy within AIST's long-term vision

Building a Stable Financial Base and Resource Allocation Policy to Support Sustainable Value Creation

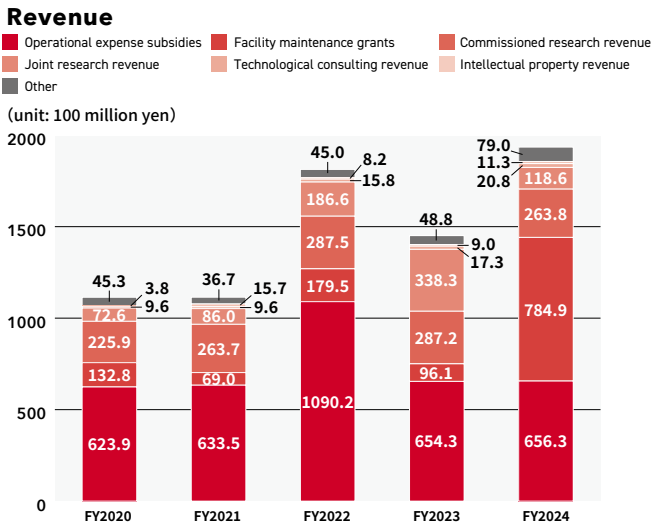
Trends in Revenue and Expenditure

From FY 2020 to FY 2024, revenue from operational expense subsidies, commissioned research, and other sources (joint research, etc.) grew, enabling smooth progress in R&D, social implementation of outcomes, and other activities aligned with AIST's mission.

We also received substantial supplementary budget subsidies to strengthen R&D and social implementation

infrastructure, which significantly increased which significantly increased revenue from FY 2022 to FY 2024.

In FY 2024, expenditures increased substantially due to the completion of construction of large-scale research facilities and equipment outlays in AI, quantum technology, and other cutting-edge fields.



*Figures for FY 2020-FY 2022 are based on the "Financial Statements" defined under Article 38 of the Act on General Rules for Incorporated Administrative Agencies.
*Figures for FY 2023 onward represent total AIST Group revenue and expenditure, calculated for the purpose of illustrating the scale of AIST Group operations.

Explanation of the Budget

For FY 2025 budget allocation, we are prioritizing R&D that addresses policy needs, acceleration of social implementation through our Integrated Research Centers for Implementation, and establishment of a robust

information security infrastructure. We will, however, allocate additional funds flexibly to address unforeseen issues arising during the fiscal year. We aim to utilize our limited budget effectively and maximize results.

FY 2025 budget

(unit: 1 million yen)

Category		Generating world-class research outcomes and implementing them in society	Contribution to enhancement of Japan's innovation infrastructure through supporting the efforts of private industry, academia, etc.	Operation of the research institute with competitiveness to be the core of Japan's innovation ecosystem	All units	Total
Income	Operational expense subsidies	79,129	8,847	4,663	5,848	98,487
	Facility maintenance grants	1,000	0	0	0	1,000
	Commissioned research funds	21,401	4,416	1,514	878	28,208
	Government-commissioned research funds	3,693	762	261	74	4,790
	Other commissioned research funds	17,708	3,654	1,253	804	23,418
	Other income	16,269	3,357	1,151	1,204	21,980
Total		117,799	16,619	7,327	7,929	149,675
Expenditure	Operating expenses	95,398	12,204	5,814	0	113,415
	Facility management costs	1,000	0	0	0	1,000
	Commissioned research expenses	21,401	4,416	1,514	0	27,330
	Government-commissioned research expenses	3,693	762	261	0	4,716
	Other commissioned research expenses	17,708	3,654	1,253	0	22,615
	Indirect costs	0	0	0	7,929	7,929
Total		117,799	16,619	7,327	7,929	149,675

Note 1: Because figures in the "Amount" column have in principle been rounded off, totals may not be an exact match.

Key Points of Consolidated Financial Statement

Operating expenses for FY 2024 totaled approximately 134.67 billion yen, an increase of about 23.22 billion yen from the previous fiscal year. The main reasons for this increase are depreciation expenses for assets procured with joint research funds, repair/renovation expenses from the FY 2022 supplementary budget, and increases in personnel expenses. These expenditure increases reflect ongoing efforts to strengthen AIST's R&D and social implementation infrastructure.

As FY 2024 is the final year of the medium- to-

long-term target period, all operating subsidy liabilities have been processed as revenue in accordance with the Accounting Standards for Incorporated Administrative Agencies.

Consolidated statements of income, consolidated balance sheets, and consolidated cash flow statements are posted on AIST's official website.

AIST Financial Statements: https://www.aist.go.jp/aist_j/information/outline/zaimu/index.html

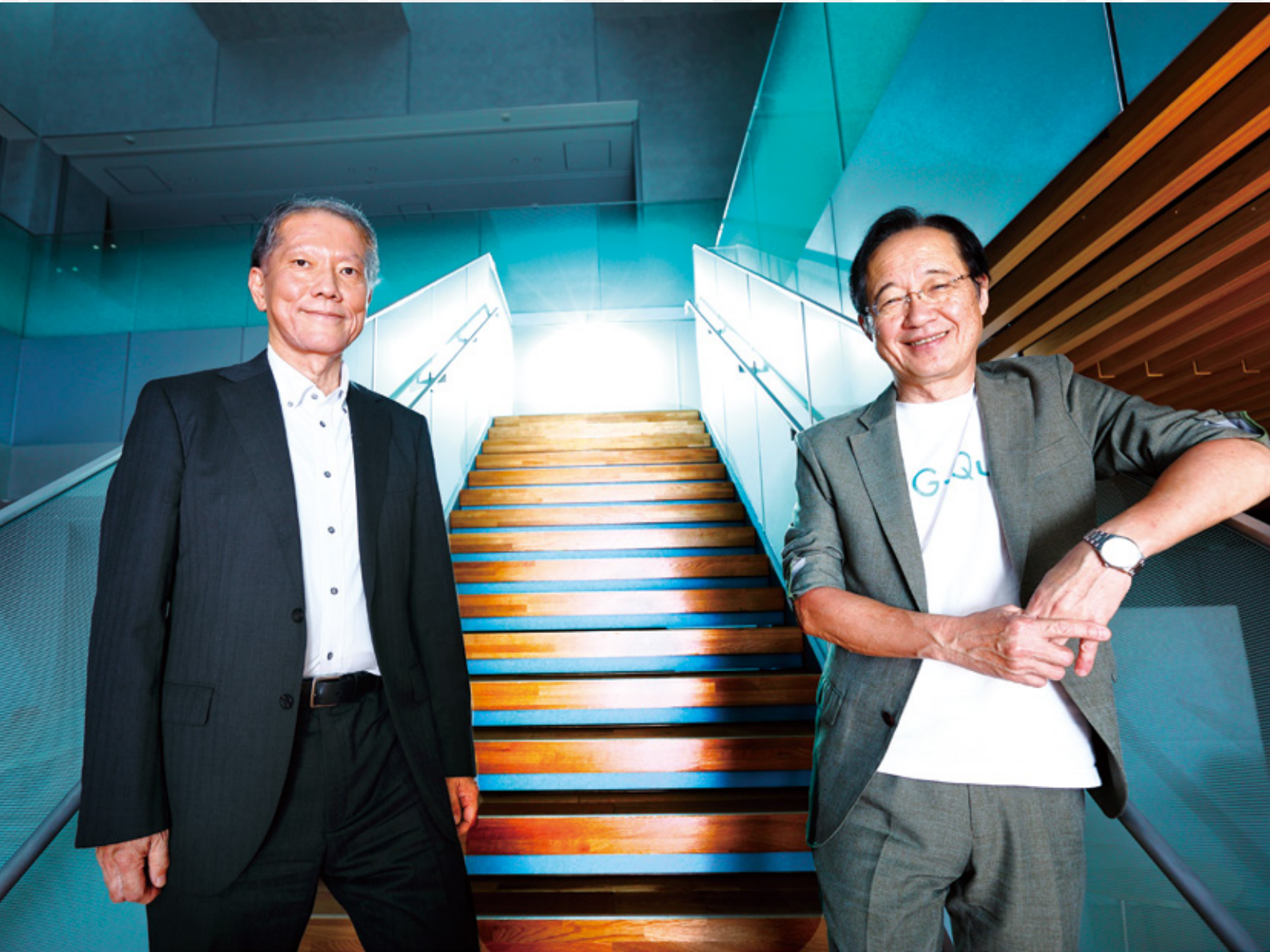
Differences from Corporate Accounting

The financial statements of incorporated administrative agencies are prepared in accordance with the Accounting Standards for Incorporated Administrative Agencies to accurately reflect an agency's operational performance and support appropriate evaluation of its activities.

Given the special attributes of incorporated administrative agencies—their public nature, lack of profit motive, not premised on self-financing etc.—the Accounting Standards for Incorporated Administrative Agencies modify

corporate accounting principles as necessary. Accordingly, the financial statements of incorporated administrative agencies are designed so that, in principle, revenues and expenditures balance out.

As such, incorporated administrative agency income statements are intended to represent the state of operation of the agency concerned rather than financial performance as understood in corporate accounting.



Talk

Toward a Constantly Growing National Research Institute
Leveraging AIST’s Research Capabilities to Support National
Strategies

– Generating World-Class Research Outcomes and Implementing
Them in Society –

On entering the first year of its 6th Medium- to Long-Term Plan (FY 2025-FY 2031), AIST drew up an ambitious management policy outlining its goals and strategies aimed at driving major advances toward becoming a constantly growing national research institute. Here, AIST Senior Vice President OBARA Haruhiko (Chief Technology Officer, Director-General of the Research Strategy Headquarters), and MASU Kazuya, Director of AIST’s Global Research and Development Center for Business by Quantum-AI Technology (G-QuAT)—an organization that is attracting keen attention in the 6th term—discuss the role of national research institutes, research capabilities, talent development, and future prospects from a global perspective.

Expectations for G-QuAT in “year one of
quantum industrialization”

Obara The inauguration ceremony for the new G-QuAT building was held on May 18th, attended by Prime Minister (PM) ISHIBA Shigeru; Minister of Economy, Trade and Industry MUTO Yoji; and many other dignitaries. It was, in fact, the first time a sitting PM had ever visited the AIST’s Tsukuba Center, which made me keenly aware of the level of attention that G-QuAT is attracting from the government and society as a whole. I’m very grateful to you, Masu-san, for all the work you put into the inauguration.

Masu I heard that the PM had prepped himself diligently on quantum mechanics before the event, and at the press conference after touring the Center, he said it marked “year one of quantum industrialization.” This really galvanized my determination to drive R&D and industrialization at G-QuAT.

Obara The PM also used the words “100 years of quantum mechanics,” didn’t he? AIST’s role is to contribute to Japan’s growth based on national strategies. The substantial government funding awarded to G-QuAT gives us reason to be proud about being able to contribute, but it’s also a heavy responsibility.

Masu I started out as a semiconductor researcher, but since working with quantum computers at G-QuAT, I’ve come to realize how basic science, social implementation, and innovation are all happening simultaneously. I think it’s important for everyone to understand this.

Obara Having someone like you, with your deep understanding of semiconductor R&D, now leading our quantum computing initiatives is very reassuring.

The relationship between national research
institutes and national strategies

Obara Looking back on the 5th medium- to long-term target period, we focused on developing in the four areas of quantum technology—AI, semiconductors, materials science and digital transformation. The catchphrase of the 6th Term Management Policy is “constantly growing national research institute.” We need to continue to grow in the 6th term to reap the fruits of the reforms we made in the 5th term. The policy calls for AIST to grow together with businesses, universities, and public institutions and drive innovation in Japan. G-QuAT is a prime example of how this approach is being embodied. In the 6th term, we have established Integrated Research Centers for Implementation as new interdisciplinary research organizations, and G-QuAT was similarly established as a special organization that does not belong to any single research domain.

The issues we need to focus on in the 6th term are, firstly, energy, environmental, and resource constraints; secondly,

population decline and an aging society; and thirdly, building societal resilience. Through our efforts in these areas, we also aim to boost Japan’s industrial competitiveness. Quantum, AI, and semiconductor technologies that G-QuAT is involved in are of vital importance since they comprise the bedrock of all of our R&D activities.

Masu Listening to your words, I’m reminded of what defines AIST. Tracing the evolution of human society, there was the Industrial Revolution in the late 19th century, the development of infrastructure in the 20th century, and from the mid-20th century we entered the Information Age that continues to unfold in the 21st century. The seeds of quantum mechanics and information science were first sown in the 19th century, and these fields now underpin the foundations of a resilient, livable planet. AIST has long focused on these technologies. AIST’s roots go back to the Geological Survey of Japan, which was launched in 1882. Now, we have quantum, AI, and semiconductors as foundational technologies to address energy issues. I was reminded again that this is precisely the kind of role that a national research institute should play.

As you know, AIST was formed through the merger of several existing institutes, including the Electrotechnical Laboratory (ETL) and the Mechanical Engineering Laboratory (MEL), but the National Research Laboratory of Metrology (NRLM) had the greatest influence on me. The NRLM developed quantum resistance standards based on the Quantum Hall Effect and voltage standards based on the Josephson effect, essentially creating the yardsticks that underpin the industry related to the quantum mechanics. Going back even further, the development of standards for length, time, and other dimensions was driven by various niche research. However, it was AIST that developed the metrological standards that made these standards accessible to everyone. It is the job of national research institutes to develop the technologies that comprise the foundation of industry. It’s unglamorous but incredibly important work.

Obara Actually, I started out at ETL, which developed the Josephson voltage standards jointly with NRLM. We worked on developing the technology to make superconducting devices, and even built Josephson computers back then. I think GQuAT was established here largely because AIST already had the foundational technologies for superconducting quantum computing-.

Balancing pure research with social
implementation

Obara As a former president of the Tokyo Institute of Technology (now Institute of Science Tokyo), I’d like to hear your views on the differences between universities and national research institutes, and your impressions of AIST from the inside.

Masu When I was at Tokyo Tech, we tried to set research

goals by backcasting from our idea of what we wanted for the future. On the other hand, I feel that AIST is strongly geared toward national strategies and contributing to the country. It also focuses more on short- to medium-term projects. Another difference is that university faculty and researchers are often allowed to pursue research based on their own interests and convictions as researchers, whereas AIST, as a public institution, is expected to pursue R&D that contributes more directly to national strategies or industry. I've found all researchers at AIST to be top caliber, and many have produced outstanding research results based on original thinking.

However, there are times when I've felt that the national strategy for science and technology has not been fully internalized, and that sometimes better use could be made of R&D results to improve the country's competitiveness. I think the research and development work being carried out in the trenches might be more highly valued if it were more closely aligned with AIST's original purpose and mission.

Obara The thing is, though, that unlike private sector research labs, researchers in public institutes need to be able to feel free to pursue independent lines of thought, particularly, especially when conducting basic, long-term or cutting-edge research. At AIST, we allocate roughly 30 percent of research resources to social implementation, 50% to project-based research, and 20% to basic research. The challenge we face

moving forward is maintaining the level of our research capabilities within this framework.

Masu It's precisely because AIST is a national lab that it's able to set that 30:50:20% allocation, and it's important to bear this in mind when thinking about system design. And it's precisely because AIST takes its research all the way through to social implementation that we can identify areas where we need to go back to basics and take another look. As a national lab that sees social implementation as part of its agenda, I think it's vital for us to preserve a basic research mindset.

What to generate through collaboration and competition

Obara Looking at co-creation, when I was in the energy and environment field, we worked on developing technology to produce hydrogen from sewage sludge. Since AIST had the elemental technologies, we established a Cooperative Research Laboratory with a private sector player to conduct joint research on commercialization. Although the system is still somewhat rudimentary, it has been deployed in a sewage treatment plant in Kagoshima Prefecture and will be operational this fiscal year. You could say this is a success story for the Cooperative Research Laboratory. While we understand the elemental technologies, our private sector partner knows a lot more than us about building plants, so working together led to success.

Masu In quantum computing, it's more a combination of collaboration and competition rather than pure partnership. G-QuAT Deputy Director Horibe Masahiro travels the world to keep up with the latest developments and ensure that our research and social implementation are heading in the right direction. We decide for ourselves who to partner with and which technologies to focus on. We keep open what can be shared, so it's a mix of open sharing and closed areas. We also need to boost our research capabilities. At G-QuAT, we pursue everything from basic science to social implementation simultaneously, which means that we need to publish research papers while also generating business. This is because social implementation always involves new technologies. While this doesn't apply just to quantum computing, we must create an environment, even as we ramp up the focus on social implementation, in which researchers can devote time to writing papers, since it is the research that goes into those papers that underpins our social implementation initiatives.

Nurturing researchers and improving Japan's research capabilities amid declining birthrates

Obara Talking about improving research capabilities, Japan's researcher population is decreasing, isn't it? In the 5th term, we worked to attract research talent by terminating our tenure track fixed-term researcher system and substantially boosting permanent researcher hiring slots, as well as enhancing our master's graduate hiring program. Such changes will hopefully help boost research capabilities not only at AIST, but throughout Japan.

Masu Japan's declining population is a headache for universities too, where nurturing fledgling researchers is concerned. Last year, the number of births fell below 700,000 for the first time, and some universities will eventually be forced to close their doors. We need more people to grow Japan's economy, so we need to recruit high-caliber people from overseas while there are still people wanting to come to Japan. AIST too must successfully attract and integrate outstanding overseas talent if it wants to maintain its research capabilities over the next 20 or 30 years.

Obara I agree. The Cabinet Office has signaled its eagerness to attract outstanding foreign researchers, and AIST is trying to get ahead of the curve to hire such talent.

Masu Another problem in Japan is that people don't move around enough. For example, if you want to return to basic research after a spell at AIST working on quantum computing, switching to a university position might be the right answer. We need a social system that is more openminded about people moving from one place to another to further their careers.

Obara When I joined ETL, the first thing I was told was, "Don't think about spending your whole career here. Once you've produced some results, move on." That was the atmosphere at the time. The best and brightest soon left. We need to enable people to move around more dynamically again.

Becoming a research hub that attracts people from around the world

Masu I'd like to work more closely with Tsukuba City. Belgium is home to IMEC, the globally renowned semiconductor research center that employs 6,000 researchers and attracts tens of thousands of visitors each year. It's a combined research and tourism business model that I'd like to see Tsukuba emulating.

Obara Similarly, ITER, the international joint nuclear fusion

Driving R&D and Social Implementation to Create Value

research center in southern France, also attracts a great many people, some of whom stay for extended periods. The French government has poured money into developing housing and other community facilities, including a large international school offering free bilingual education. The government provides every possible support to attract outstanding researchers and their families. For AIST, G-QuAT too would be a huge draw if it wants to attract more global talent.

Masu I think that AIST's research facilities are among the best in Japan, and I'm not just talking about G-QuAT. In terms of expectations for G-QuAT, we have three types of quantum computers: superconducting, optical, and neutral atom. There's no other quantum computing hub in the world where multiple quantum computers can be connected to a supercomputer. We've built the world's most advanced quantum computing system, and we lead the world in this field, so hopefully G-QuAT will serve as a magnet for attracting people to AIST. With basic science and social implementation drawing closer, and the internet enabling researchers worldwide to network with each other, this is indeed an era in which people all over the world can work with each other.

Obara With G-QuAT, semiconductors, biomanufacturing, and other such cutting-edge areas, AIST has come to play an extremely important role in Japan's growth strategy. Let's also get other agencies involved and do our best to live up to the 6th Term Management Policy catchphrase "Constantly growing national research institute."

HARUHIKO
OBARA

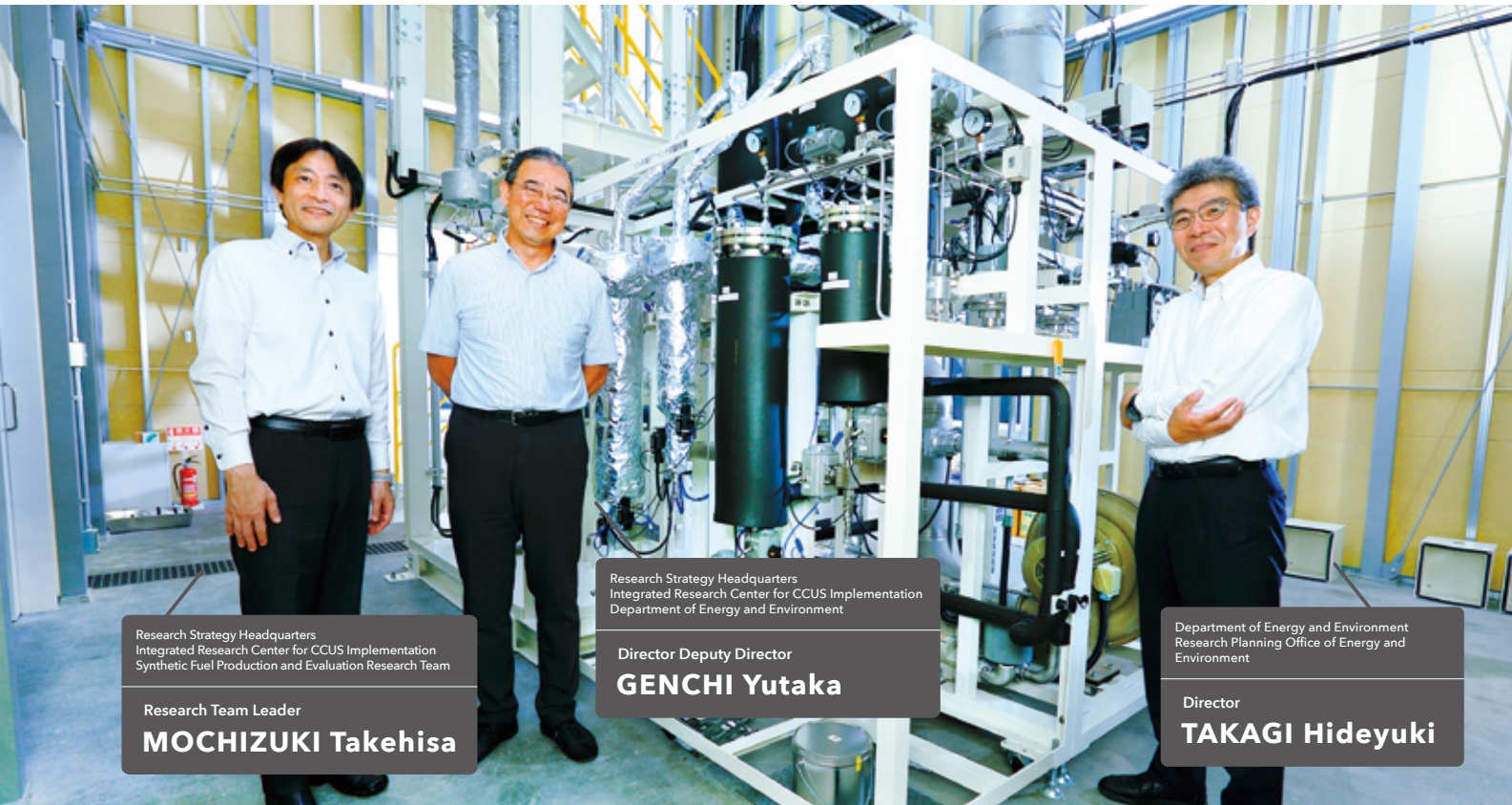


National Institute of Advanced Industrial Science and Technology (AIST)
Senior Vice President **Obara Haruhiko**
(Chief Technology Officer, Director-General of the Research Strategy Headquarters)

KAZUYA
MASU



Global Research and Development Center for Business by
Quantum-AI Technology (G-QuAT)
Center Director **Masu Kazuya**



Research Strategy Headquarters
Integrated Research Center for CCUS Implementation
Synthetic Fuel Production and Evaluation Research Team

Research Team Leader
MOCHIZUKI Takehisa

Research Strategy Headquarters
Integrated Research Center for CCUS Implementation
Department of Energy and Environment

Director Deputy Director
GENCHI Yutaka

Department of Energy and Environment
Research Planning Office of Energy and Environment

Director
TAKAGI Hideyuki

Creating Next-Generation Fuels from Carbon Dioxide to Achieve Carbon Neutrality

A wide range of technologies aimed at achieving carbon neutrality are being developed both in Japan and overseas. One promising technology is producing liquid synthetic fuel, known as electrofuel or e-fuel from carbon dioxide and hydrogen. AIST has developed and successfully demonstrated the continuous operation of a bench plant for the end-to-end production of this liquid synthetic fuel. Developing such clean fuel production technologies that uses renewable energy is one way AIST is endeavoring to contribute to achieving carbon neutrality.

Leveraging a combination of electrochemistry and catalytic chemistry to develop Japan's first e-fuel production process

Electrification is seen as the best way of achieving carbon neutrality, but certain modes of mobility such as aircraft, ships, and large vehicles do not easily lend themselves to running on electricity alone. Investigating ways to reduce carbon emissions from these sources led to the launch in 2020 of a liquid synthetic fuel production project (NEDO's "Research and Development on Next-Generation FT Reactions and Integrated Liquid Synthetic Fuel Production Process" project). AIST is now working on this project in collaboration with private sector partners, universities, and other institutions. "The challenge is to develop a process for producing liquid synthetic fuel with a lower environmental footprint than conventional fossil fuels, with the potential of eventually reducing that footprint to nearly zero," says GENCHI Yutaka regarding the aim of the project.

"Having this technology and the means to produce such fuel at volume in Japan is of vital importance."

Liquid synthetic fuels, produced by recycling carbon dioxide as a resource and combining it with hydrogen derived from renewable energy sources, are also called e-fuels.

"There are various ways to produce liquid synthetic fuels, but production can be divided broadly into two processes—firstly, producing syngas (short for "synthesis gas," a mixture of carbon monoxide and hydrogen), and secondly, converting that gas into fuel," says TAKAGI Hideyuki, explaining the key technologies that are the focus of this R&D project.

"Existing technologies use catalytic reactions to perform these two processes. Here at AIST, however, we have developed a novel, low-impact, end-to-end manufacturing process driven by renewable energy. This process directly combines distinct technologies: electrochemistry to generate the gas and catalytic chemistry to convert the gas into fuel. Our goal is to develop highly efficient, innovative technology that reduces costs, a major stumbling block in liquid synthetic

fuel production."

Reducing costs by leveraging SOEC co-electrolysis to enable energy-efficient synthetic gas production

"Converting highly stable carbon dioxide into a highly reactive mixed gas of carbon monoxide and hydrogen inevitably requires energy," says MOCHIZUKI Takehisa about the process of making syngas.

"The common method is the reverse water-gas shift reaction that converts carbon dioxide and hydrogen into carbon monoxide and water. The problem is that this requires a massive input of energy, so we decided to focus on solid oxide electrolysis cell (SOEC) co-electrolysis as a more efficient method. This technology involves electrolyzing carbon dioxide and water vapor simultaneously at high temperatures to produce syngas, which is composed of carbon monoxide and hydrogen. As well as saving a lot of energy, this also simplifies the whole process. "

Making syngas is the costliest part of producing liquid synthetic fuels. Achieving carbon neutrality requires the use of electricity derived from renewable energy, which means that boosting energy efficiency is crucial for cost reduction.

Achieving higher yield of desired fuel with FT synthesis using hybrid catalysts

The next step is to convert the syngas into fuels, such as gasoline, diesel, and jet fuel. The Fischer-Tropsch (FT) synthesis used in this process is a long established catalytic reaction, but it tends to produce many different products ranging from methane to waxes. Mochizuki set about developing a catalyst that would maximize the yield of the desired liquid synthetic fuel. After three years, Mochizuki came up with a hybrid FT synthesis-acid catalyst.

"As catalyst researchers, we naturally aim for world-beating catalyst performance," he says. "However, we found that the catalyst we had developed overperformed in our bench plant, ironically hindering production of the fuel we wanted, so we had to customize it to blunt its activity slightly. In the lab, we use only about 1 milliliter of catalyst at a time, but in the bench plant, we need about 2 liters—2,000 times as much. At that scale, various issues arise. You end up producing a different fuel, or byproducts increase, so you have to rethink reaction parameters or devise ways of suppressing byproducts. Also, since charging the reaction chamber with 2 liters of catalyst requires a certain amount of space, we're developing preparation methods that enable the catalyst to be pelletized."

Charting a path toward social implementation by evaluating fuel performance and environmental benefits

The team's bench plant combines SOEC co-electrolysis

Driving R&D and Social Implementation to Create Value

and FT synthesis units to enable end-to-end production of liquid synthetic fuel. The plant is equipped with adequate safety measures and is capable of continuous operation. When it was unveiled in December 2024, the response was dramatic. In addition to extensive media coverage, the project generated a stream of invitations to present at conferences and requests to speak. Even over six months later, requests for technological consultations and tours continued to pour in.

Takagi says that the liquid synthetic fuel produced by the plant can be evaluated in two ways. "The first looks at its quality as a fuel. This is one of the missions of the project, and we're working on it in collaboration with the Japan Petroleum and Carbon Neutral Fuels Energy Center (JPEC) and other organizations. The second looks at environmental benefits from the perspective of carbon neutrality. This is being discussed in a public-private council organized by the Ministry of Economy, Trade and Industry in which Genchi and I participate as technical experts."

"Converting chemically stable carbon dioxide into fuel requires much more energy than producing fuel from fossil resources like crude oil," says Genchi regarding the outlook for liquid synthetic fuels.

"Since the purpose of producing liquid synthetic fuels is to achieve carbon neutrality, emitting more carbon dioxide than fossil fuels would defeat that purpose. Therefore, it's crucial that the synthesis be powered using renewables or some other energy source with low carbon emissions. From the societal perspective, the technology guarantees reductions in carbon emissions. Where society is concerned, progress is already being made in some sectors, such as the aviation industry's commitment to capping total carbon emissions from 2020. Also, plants are necessary for producing liquid synthetic fuel; even if the manufacturing technology is ready, producing fuel on a commercial scale won't happen overnight. That's why we're backcasting to construct a roadmap toward 2050 and driving our R&D with the aim of developing the means for commercial production ahead of that curve."

As director of the Integrated Research Center for CCUS Implementation, Genchi sees his mission as being to chart a path for the social implementation of this technology. To achieve this goal, the team is working to provide a total system that includes cost assessment tools and life cycle assessments. With its interdisciplinary research structure and private sector outreach capabilities, AIST is uniquely positioned to drive the development of next generation fuels that contribute to carbon neutrality.



Pushing Chip Miniaturization Beyond 2 nm to Lead the World

From the late 1980s to the 1990s, Japan was a world-leading semiconductor powerhouse. After a decades-long decline in the face of intensifying global competition in the chip industry, the nation is now trying to reestablish itself in state-of-the-art semiconductor technology. AIST established its Semiconductor Frontier Research Center (SFRC) on October 1, 2023, to conduct R&D aimed at going beyond the 2 nm node chips that are currently the state of the art.

Driving the revival of Japan's semiconductor industry by developing manufacturing technologies and volume production systems

AIST has been researching advanced semiconductors ever since its establishment in 2001. However, at that time, Japanese chip manufacturers were withdrawing from the industry one after another. This meant that AIST was unable to find private sector joint research partners and had nowhere to take its research results. In 2022, things suddenly started to look up with the launch of Rapidus Corporation, a manufacturer dedicated to domestic volume production of cutting-edge chips, and with the launch of the Leading-edge Semiconductor Technology Center (LSTC) as a public-private-academic Collaboration Innovation Partnership. MASAHARA Meishoku, the Director of the SFRC, is leading the charge to revive Japan's semiconductor industry and serves also as the head of the LSTC's Technology Development Management Division.

"Generative AI is evolving rapidly and has already permeated society to the point of becoming indispensable to everyday life and industry," Masahara says, explaining the growing importance of advanced semiconductors.

"The problem is that generative AI is so power-hungry that they say you need one nuclear power plant per data center. Since software remodeling can't significantly improve energy efficiency, you need to improve the hardware. That means low-power chips designed for generative AI. If one day we were suddenly unable to import such chips, Japan would be in big trouble. From the perspective of economic security, the nation must be able to manufacture the semiconductors required by domestic industries of strategic importance. This is why we urgently need to develop our own state-of-the-art chip manufacturing technology and build up our own capacity for mass production."

Taking miniaturization beyond the 2 nm node to drive the continued evolution of Japan's semiconductor technology

The history of semiconductor evolution is at its core a history of miniaturization.

"The tinier the semiconductor, the lower its power consumption and cost, and the higher its performance (speed), so you're killing three birds with one stone. Rapidus aims to launch volume production of what are currently the world's most advanced 2 nm node logic chips in 2027, but we need to go beyond that in our R&D. LSTC is working on going beyond 2 nm to develop 1.4 nm, 1.0 nm, and 0.7 nm processes, while AIST is aiming for 0.5 nm, 0.3 nm, and 0.2 nm."

Since conventional methods of miniaturization had reached their limits, transistor technology is shifting to the Gate-All-Around (GAA) structure to enable 2 nm node production. "To prolong GAA lifespan, we're researching new materials that could improve performance without changing the architecture. For example, the silicon nanosheets currently in use are about 5 to 10 nm thick, but there are materials that can self-assemble to create channel arrays only 0.7 nm thick."

LSTC is responsible for transferring the outcomes of this R&D to Rapidus, and AIST's advanced semiconductor pilot line is a vital link in this process. Housed in a super clean room, the line has 16 cutting-edge fabrication devices, and is the only facility in Japan that can fabricate prototype GAA 300 mm silicon wafers. Using this line, SFRC offers recipes for volume production, thereby accelerating social implementation. AIST and LSTC are also tasked with scientifically analyzing and demonstrating the pros and cons of these processes.

The key to success: offering a wide range of specialized, high-performance products

Can Japan leverage these cutting-edge technological capabilities to win in the global semiconductor market?

"Japan's goal is to produce a wide range of specialized chips rather than to become a mass producer of general-purpose chips," says Masahara. "Take chips for cars, base stations, or quantum computing, for example. Even if these are not huge markets globally, we'll aim to supply customers with the chips they need in the quantities they need. We'll also provide high-performance, low-power chips that can keep pace with the evolution of generative AI. It's in such areas that Japan can win."

Masahara also cites two examples of how cutting-edge semiconductors can help address the societal challenges that Japan faces.

"One is the use of robotics to compensate for labor shortages. Robots working alongside humans need high-performance sensors and computers to recognize human movement in real time, and advanced semiconductors are at

Driving R&D and Social Implementation to Create Value

the core of such devices. The second is AI sensing for disaster preparedness.

For example, simultaneous sensing and AI-driven analysis of geological, meteorological, seismic, and other conditions—technologies underpinned by advanced semiconductors—will be increasingly vital to predicting disasters, such as landslides caused by heavy rainfall, and supporting the advance evacuation of residents."

Leveraging the brainpower of motivated, creative thinkers to spawn next-generation technologies

Japan's semiconductor revival depends on human talent, and Masahara believes that *now* is the last chance. "The engineers who drove Japan's semiconductor manufacturing heyday have coalesced at Rapidus, and the academic researchers at LSTC. If we had left things as they were for another ten years, our expertise and knowledge would have hollowed out to such an extent that we would have had to rely on overseas talent."

AIST recognizes that the future depends on nurturing new talent, so it is working with academia and industry to address this issue. It has already launched a program that focuses on industry talent development and retraining. This program utilizes AIST's pilot line to provide hands-on experience with the entire advanced semiconductor manufacturing process.

When asked what kind of people AIST is looking for, Masahara stresses diversity. "They don't need to be semiconductor experts; we're looking for people who can come up with bright ideas about the kind of hardware they want to create. For example, there is even a food manufacturer that developed a semiconductor material while doing research on amino acids, and it holds a 100% share of the market for that material. This shows that there are opportunities for various industries to get into the game."

The Ministry of Economy, Trade and Industry's Semiconductor and Digital Industry Strategy set a goal of increasing Japan's global share of the semiconductor market from the current 5% to around 15%. While meeting domestic demand is important, Japan also needs to lead the world in advanced semiconductor technology. The next wave of innovation appears to involve integrating photonics into semiconductors. To ride this wave, AIST established the Photonics-Electronics Integration Research Center in April 2025. "Nothing thrills process engineers more than breaking through the next barrier," says Masahara, referring to the continuously evolving landscape. "Like the first penguin to jump, we aim to be the first to surmount whatever barriers lie ahead." Japan's semiconductor engineers are girding themselves to take on the ambitious challenge of stepping back onto centerstage at the global leading edge.



Department of Electronics and
Manufacturing
Sensing Technology Research Institute
Manufacturing Sensing Research Group

Research Group Leader
TERASAKI Nao

Department of Life Science and Biotechnology
Molecular Biosystems Research Institute
Biomolecule Design Research Group

Senior Researcher
HIMIYAMA Tomoki

Department of Life Science and Biotechnology
Molecular Biosystems Research Institute

Visiting Researcher
SHIBAKAMI Motonari

A Breakthrough Euglena-Derived Adhesive that Bonds Strongly but Debonds Easily

Building a sustainable society requires replacing fossil fuel-based products with bio-based ones. AIST researchers have developed an adhesive derived from *Euglena* that matches the strength of petroleum-derived adhesives, but debonds easily when heated. Because of these attributes, the adhesive is attracting strong interest as a potential solution to the social issue of recycling used auto parts. This research has also raised expectations for creating a wide range of other *Euglena*-derived materials.

Creating materials from paramylon: the world's first "algal chemistry"

Japanese children learn about *midori-mushi* (Japanese for euglenoids that translates literally as "green bug") in elementary or junior high school science classes, so the name rings a bell with most Japanese people. AIST has embarked on an ambitious research program to create eco-friendly materials using the very same familiar microorganisms. SHIBAKAMI Motonari, who single-handedly gave birth to this field of research in 2010, says that it was something called paramylon that attracted him to *Euglena*.

"Among the many types of microalgae, *Euglena* is noteworthy for being very easy to culture, for the way they can obtain nutrition through both feeding and photosynthesis, and for the way they synthesize and store large amounts of a highly useful substance called paramylon in their bodies. The potential of *Euglena* to supply this raw material in large quantities prompted me to start looking into it. I was also

attracted to the subject because it combines the three fields—phycology, cell culture engineering, and materials chemistry—into a novel field that I call "algal chemistry." Since no one else was doing it, I saw it as an opportunity to become a pioneer."

In 2013, Shibakami attracted significant attention when he succeeded in developing *Euglena*-based bioplastics in which main raw material is paramylon. He is currently working on developing a variety of other materials, including adhesives, super-absorbent films, fibers, and medicines.

Shibakami made major progress in this research through meeting two other researchers. First, in 2021, HIMIYAMA Tomoki joined his research project and has been working on synthesizing paramylon derivatives. Later, in 2023, when they were trying to develop adhesives as an application for a new paramylon derivative but had spent about a year getting nowhere owing to lack of knowledge and expertise, they met TERASAKI Nao, an adhesion expert.

Refuting conventional wisdom on bio-based adhesives with an astounding adhesive strength of 30 MPa

Terasaki has spent many years researching adhesives for the automotive and aircraft industries and has produced significant results using a technology he developed to visualize adhesion through mechanoluminescence. He explains the high demand for adhesives in recent years, saying, "Automakers in the West have sought to reduce vehicle weight by replacing some steel components with aluminum. However, because these materials can't be welded together, automakers turned to adhesives, sending demand through the roof."

Compared with the epoxy adhesives used on car bodies that have adhesive strengths of 20 to 30 MPa, common bio-based adhesives tend to have only single digit strengths. However, when the lap shear strengths of paramylon-based adhesives synthesized under various conditions were measured, the instruments returned values of 8 MPa, then 16 MPa, and even 30 MPa. "I thought we must have miscalculated somewhere, so I had the team repeat the entire measurement process while I watched. That's how astounding the results were," Terasaki recalls.

The adhesive that registered 30 MPa was made by attaching fatty acids to paramylon to create a powdered paramylon ester, which was then hotpressed the powder into a transparent 0.05 mm thick film. Terasaki sandwiched this film between two surface-treated aluminum alloy plates and measured the adhesive strength after heating and cooling to bond the two plates.

"It was when I was chatting with Terasaki about the strength testing process and his adhesive that I realized the same process could be applied to our *Euglena*-based plastic," says Shibakami. "We added fatty acids in the same way, and that's how we developed the *Euglena*-based adhesive. Without Terasaki, our invention might have never found a use."

Organic synthesis of temperature-sensitive adhesive that can be detached on demand

The *Euglena*-based adhesive melts and bonds when heated and hardens when cooled, but its most remarkable property is that it easily debonds when reheated. Test specimens can even be peeled apart by hand. Moreover, reheating enables the surfaces to bond again, and repetition of this process does not significantly impact adhesive strength.

It was Himiyama who first looked into this property. "When synthesizing paramylon derivatives, adhesive strength was of course a priority, but controlling the melting point is also an important goal. We made a wide range of derivatives to provide adhesives with various temperature sensitivity profiles tailored to different applications."

Driving R&D and Social Implementation to Create Value

In cars, for example, conditions differ by location: areas around the engine get hot, and the space around electronic components needs to stay cool, and so forth. Conventional epoxy adhesives are thermally irreversible, which makes epoxy-bonded body panels difficult to dismantle and thereby hinders the reuse of parts. In this regard, *Euglena*-based adhesive is a groundbreaking material because it combines automotive-grade adhesive strength with easy debonding and rebonding on demand through temperature control.

The EU's End-of-Life Vehicles (ELV) Directive was enacted to promote the recycling of end-of-life vehicles, setting a target of recycling 85% of dismantled materials by 2035. *Euglena*-based adhesives could therefore help to address environmental issues through use in such settings.

Discovery, cultivation, creation: paving the way for practical application through end-to-end development

Looking ahead, Shibakami says that the team is aiming for "end-to-end development—discovery, cultivation, and creation."

Discovery involves searching for *Euglena* strains that synthesize and store more paramylon, divide more rapidly, or otherwise are likely to be ideal for production of raw material. Shibakami and Himiyama have traveled throughout Japan to collect such strains.

Cultivation involves developing culture methods, which the team is doing with private sector partners. It is also conducting research on using various types of waste liquid as a nutrient source, since using wastewater would reduce culture costs considerably.

Creation involves synthesizing paramylon derivatives at AIST and working with private sector partners to develop various products. A number of such partnerships are already underway. Terasaki notes that, in addition to automotive applications, "Demand for adhesives is growing across all next-generation industrial fields, including electronic device materials, hydrogen tanks for fuel cell vehicles, and wind turbine blades."

Looking ahead, Himiyama says that the team's primary goal is to commercialize products using paramylon. "We're dead set on achieving that goal. Also, this kind of research on *Euglena* is still in its infancy worldwide, but new insights into their biology are beginning to emerge. There is still much more that needs to be studied from the pure science perspective too."

There are high expectations for future discoveries by the team as pioneers in creating *Euglena*-derived materials that would serve both industry and the environment.



National Metrology Institute of Japan
Research Institute for Physical Measurement
Applied Optical Measurement Group

Senior Researcher
NAKAZAWA Yuri

National Metrology Institute of Japan Research
Institute for Physical Measurement
Photometry and Radiometry Research Group

Senior Researcher
KINOSHITA Kenichi

National Metrology Institute of Japan
Research Institute for Physical Measurement
Applied Optical Measurement Group

Group Leader
GODO Kenji

Ensuring the Reliability of Illuminance Measurement Standards as LEDs Replace Incandescent Bulbs

Lighting is indispensable to human life in modern times. For over a century, incandescent bulbs were the standard light sources in photometry, serving as the yardstick for measuring light. Production of these bulbs is, however, being phased out worldwide, prompting AIST to start developing LED-based standard light sources. AIST has already clocked up major advances in the field, and has recently succeeded in using LEDs to recreate the standard spectrum of incandescent bulbs, which is essential for calibrating illuminance meters. This achievement has attracted worldwide acclaim and has already been commercialized as a replacement for existing luminous intensity standard lamps.

Launching development of brightness standards as soon as LEDs began to spread

White LEDs used in LED lighting began to gain a foothold in the early 2000s. Because quality varied depending on the manufacturer, AIST began developing brightness standards in 2003. In 2005, AIST partnered with Nichia Corporation, a global LED manufacturer, to conduct joint research. GODO Kenji was involved in this research from the beginning.

“AIST would come up with development concepts and passed them on to Nichia,” he says. “Then, Nichia would build standard LED prototypes that we would then evaluate and provide feedback on. After Nichia made any necessary changes, the standard LEDs would be released. This collaboration is still going strong even now, 20 years later. The way we, a national lab, have teamed up with a LED manufacturer to develop standard LEDs like this is unprecedented worldwide.”

The team has achieved one success after another,

including the first standard LED for LED packages in 2007, a standard LED that covers the entire visible light spectrum for LED lighting in 2016, and an omnidirectional standard LED in 2021.

Brightness can be expressed in various metrics, including luminous flux (unit: lumen), luminous intensity (unit: candela), and illuminance (unit: lux), with each requiring different standard light sources depending on the application. Leveraging its store of knowledge and expertise in this technology, AIST has also developed a new standard LED for use in calibrating illuminance meters.

Reproducing the spectrum of incandescent light bulbs to solve the problems of illuminance meter manufacturers

Illuminance meters are used in many familiar contexts in modern everyday life, such as in smartphone sensors and the automatic car headlights. In Japan, these meters are classified as “specified measuring instruments” under

the Measurement Act, and manufacturers are required to “calibrate” them to ensure that the values they provide are correct and reliable. The luminous intensity standard lamps currently used for calibration are the ultimate incandescent bulbs, each meticulously handcrafted by skilled artisans. However, luminous intensity standard lamps are becoming unavailable as the incandescent bulb production is phased out worldwide, which poses a major headache for illuminance meter manufacturers.

Godo accordingly came up with the idea of reproducing the spectrum of Standard Illuminant A, a theoretical light source defined by the International Commission on Illumination (CIE) using LEDs instead of the traditional standard lamps. Illuminant A is the light emitted by an incandescent bulb when it is switched on under certain conditions.

“You can create a wide range of spectra by combining phosphors and LEDs,” says Godo. “We added phosphors that emit light in the blue-green and red regions, and mustered the technical expertise we had built up over many years of joint research to reproduce Illuminant A’s spectrum.”

Utilizing AIST’s store of technologies to develop standard values, measuring instruments, and other components required for evaluation

Once an Illuminant A standard LED prototype is ready, AIST evaluates its performance. Evaluation requires a standard value, which is provided by KINOSHITA Kenichi.

“Illuminance is measured by detecting light from a luminous intensity standard light source with a photodetector. The first task I was given at AIST was to assign values to photodetectors. By quantifying every measurement uncertainty, I established a new measurement standard for their illuminance responsivity. Because illuminance changes with distance, I also developed a camera-based alignment system that ensures precise positioning and enables reproducible measurements regardless of who performs them.”

NAKAZAWA Yuri developed the photometric bench, the apparatus used for evaluation.

“Since illuminance needs to be measured at a specific distance, my top priority was to ensure distance accuracy,” he says. “My photometric bench has a measuring distance of up to 7 m and a resolution of around 10 μm . If the light source or photodetector tilts, the distance changes, so the angle is also crucial. After setting up the photometric bench, I spent three full days finetuning the distance and angle.”

Godo used the standard values and this measurement system to evaluate the Illuminant A standard LED, and ultimately demonstrated that it could serve as a viable replacement for the luminous intensity standard lamp.

Continued development even after release of Illuminant A standard LED

The Illuminant A standard LED uses technology that stabilizes the illuminance by ensuring that the temperature of the light-emitting unit remains constant. Also, because LED light output is generally 3-5% higher during the first 200-300 hours of use, we subject the LED chips to a stabilization process for approximately 400 hours. This reduces the lumen depreciation rate to about one-twentieth that of luminous intensity standard lamps.

Nichia Corporation released the resulting Illuminant A standard LED in August 2024, but Godo says that development is not over yet.

“We will continue to improve the product based on industry needs. Since only one brightness level is currently available, we plan to develop brighter versions of the Illuminant A standard LED.”

Maintaining trust, the most important contribution of standard light source development

How do the three researchers view their role in AIST’s development of the standard light sources that support everyday life and industry?

“Standard light sources are essentially a component of social infrastructure,” says Kinoshita. “LED lighting actually owes its existence to luminous intensity standard lamps, but incandescent light bulbs are now giving way to LED lighting, and measurement standards need to evolve to keep pace with the times.”

“Whether it’s wavelength, brightness, or some other aspect, LED technology continues to evolve,” says Nakazawa. “As new uses emerge, we’re sure to see continued demand for accurate measurement and new standards.”

“Our work is not about achieving dramatic breakthroughs that make the world a happier place,” says Godo. “Its most important contribution is ensuring that people can continue to trust measurement standards. It’s unglamorous, but maintaining things as they should be is actually not at all easy. Like peace, you only appreciate its importance when it’s at risk. That’s what the work of measurement standards is about.”

AIST is the only research organization worldwide that took on the challenge of reproducing the standard spectrum of incandescent light bulbs with LEDs to enable the development of replacements for luminous intensity standard lamps. This is a field that rarely attracts the limelight, yet AIST continues to tackle ambitious projects as a world leader. Its achievements have been highly acclaimed, winning awards such as the Nikkei Excellent Products and Services Award 2024 (Global Category) and the Illuminating Engineering Institute of Japan’s Japan Lighting Award.

an external expert that drew an audience of 199 staff. These activities will hopefully promote networking among staff

members and spawn new research ideas and collaborations.

■ AISol Initiatives and the Cooperative Research Laboratory Program

● Marketing Activities to Drive Innovation

In addition to collaboration based on proposals from AIST to offer its technology assets as solutions to industry needs, we are leveraging our technological consulting system to enhance co-creation consulting initiatives through which we work with companies to explore and propose new business projects and carry out necessary groundwork. AIST also pursues marketing activities aimed at driving innovation across a wide range of industries and company sizes.

To strengthen our mechanisms and activities for the social implementation of research results and thereby achieve our mission of “solving social problems and strengthening industrial competitiveness,” we established AISol in April 2023 as a wholly owned subsidiary dedicated to driving the utilization of research outcomes in accordance with the Act on the Creation of Science and Technology Innovation.

Based on AIST’s technologies that we have cultivated so far, AISol aims to drive industry collaborations under the

● Cooperative Research Laboratories

To drive open innovation in industry and conduct R&D that is more closely aligned with the business strategies of “partner companies,” we have set up collaborative hubs known as Cooperative Research Laboratories on AIST premises. Publicly bearing the names of respective partner companies, these labs serve to demonstrate AIST’s strong partnership with private industry. Partner companies provide researchers and research funding, while AIST provides researchers, research facilities, intellectual property, and other research resources, with researchers from company and AIST working together on R&D. This arrangement enables partner companies to strengthen their core businesses by equipping their research personnel with knowledge and expertise in basic manufacturing technologies that support those businesses, and to develop products using cutting-edge equipment and innovative processes that they do not yet possess. The program’s flexible contract structure allows for the review and addition of research themes as research progresses, and collaboration with universities, local governments, and other external organizations that could help generate innovation.

As of March 2025, AIST was hosting 22 Cooperative Research Laboratories, and we continue to explore the establishment of similar partnerships with other companies. Through the R&D outcomes of our many Cooperative Research Laboratories, we hope to demonstrate AIST’s presence as a powerful platform for collaboration and

concept of “Technology x Marketing,” focusing on the seven solution areas of AI and Semiconductors, Material DX, Digital Platform, Energy Solutions, Circular Economy, Biotechnology, and Well-being. Specifically, AISol seeks to provide high-value business solutions through arranging and supporting the use of AIST’s technological assets, coordinating joint research, conducting demonstration projects aimed at social implementation, building value chains, and launching startups.

AIST is building an ecosystem geared to addressing future societal challenges by conducting a wide range of basic, applied, and demonstration research, and connecting outcomes to timely social implementation and innovation through joint research with industry partners. AISol also participates in this ecosystem, actively working to generate greater business value.

integration across industry, academia, and other research institutions.

In fiscal 2024, four new labs were established: NOF-AIST Smart Green Chemicals Cooperative Research Laboratory, Shimadzu-AIST Advanced Solutions Cooperative Research Laboratory, Asahi Kasei-AIST Sustainable Polymer Cooperative Research Laboratory, and RICOH-AIST KIBS Cooperative Research Laboratory.

Kanadevia-AIST Collaborative Research Laboratory for Sustainable Green Energy Production

The Kanadevia-AIST Collaborative Research Laboratory for Sustainable Green Energy Production was established in March 2020 to integrate Kanadevia Corporation’s manufacturing and engineering technologies with AIST’s energy conversion technologies, related facilities, and analysis and evaluation technologies to develop clean energy solutions that match evolving needs.

Japan generates approximately 2.3 million dry metric tons of sewage sludge annually. Utilizing this resource efficiently as energy requires the development of a process for directly gasifying sewage sludge to convert it into a hydrogen-rich fuel gas.

The lab first conducted research on hydrogen production process from sewage sludge, with the aim

Social Implementation Through the Generation of Research Results and Co-Creation

■ Mechanisms for Accelerating R&D through Interdisciplinary Research and Other Means

● Principal Researchers and Senior Principal Researchers

Principal Researchers are AIST’s top scientists who, by virtue of their outstanding research achievements and rich expertise, can dedicate themselves exclusively to research activities. In FY 2024, we also established Senior Principal Researcher as a new position for Principal Researchers who are particularly influential in industry.

By creating such positions, we are building a workplace in which top scientists can make the most of their abilities to generate even more outstanding research results. Providing such a career path to top scientists is also intended to raise workplace motivation and encourage all of our researchers to always give their best.

● Principal Researcher Forums

Since 2022, we have held “Principal Researcher Forums” to share the impressive research achievements of our Principal Researchers broadly within the institute. These events give our Principal Researchers the opportunity to talk about their research, domestic and international activities, careers, success stories, and even their setbacks. Our aim in holding these events is to familiarize more people within AIST with the outstanding capabilities and achievements of our Principal Researchers, thereby motivating young researchers to also

aspire to such heights and further raising the level of AIST’s R&D.

In FY 2024, we held three such events online, with a total of eight Principal Researchers from various research fields delivering their presentations.

Each of them shared their approach to research and personal experiences, along with messages of encouragement for their younger colleagues.

■ Mechanisms for Promoting Cross-disciplinary Interactions

● AIST Collaboration Time

Starting in FY 2024, we have been holding “AIST Collaboration Time” events for staff members from various fields to gather in common spaces to chat about their jobs or research and share ideas. These events are open to all the AIST Group employees, regardless of types of jobs; all regular or contract workers in research, administrative, and technical departments can join them. Our hope is that holding these gatherings on a regular basis will spawn new research ideas and raise

employee motivation.

In FY 2024, we held four Collaboration Time events, one each in October, November, February, and March, with approximately 60 people participating each time. These events appear to be having the intended effect, with participants going on to independently arrange study sessions and other get-togethers.

● Early-career Exchange Meetings

We have held “Early-career Exchange Meeting” since FY 2022 as a forum for young researchers to gather and share information and ideas on interdisciplinary research and for AIST Group staff to forge ties. This networking also serves as a platform for events such as the award ceremony for the “Interdisciplinary Collaboration Award”, recognizing teams selected through AIST’s young researcher support

program whose work demonstrates strong synergy through interdisciplinary research, and a “Collaboration Poster Session” where both researchers and administrative staff members exhibit posters that outline their research projects or the nature of their jobs.

Another event held under the same banner in FY 2024 was a lecture titled “A Challenge to Pioneer the Future” by

of developing energy capturing technology via direct gasification of sewage sludge. A common problem with conventional gasification technologies is tar deposition that clogs pipes. To address this issue, the lab developed an original circulating fluidized bed system that uses inexpensive natural minerals as a tar-reforming medium. By March 2023, the team had developed the elemental technologies for enabling direct gasification of sewage sludge without prior digestion, and had demonstrated the feasibility of continuous stable operation. In July 2024, the decision was made to install a 2 t-WS/day pilot plant at a sewage treatment facility in Kagoshima City to conduct field testing aimed at energy saving and decarbonization of sewage treatment plant.

In April 2023, the Kanadevia-AIST Lab also launched R&D on synthesizing “Green liquefied petroleum gas (LPG)” by passing hydrogen and CO₂ over the catalysts. The team used hydrogen derived from renewable energy sources such as solar and wind, and CO₂ emitted from factories. Using newly developed catalysts and a dedicated synthesis process and apparatus, the team succeeded in synthesizing LPG directly from CO₂ at pressures below 1 MPa. Work is now underway to scale up the process for demonstration of production in the range of 3–4 tons per year.



Provide a Platform for Industry-Academia-Government Collaboration and Promote Acceptance of Researchers

● Active Invitation of External Researchers

AIST provides researchers from our joint research partner institutions with an access to AIST’s state-of-the-art facilities to conduct effective joint research. In FY 2024, we received 1,091 external researchers.

● A Platform for Industry-Academia-Government Collaboration

AIST recruits members from, and collaborates with, various companies and organizations to organize thematic meeting structures (AIST Consortiums). We explore potential application of cutting-edge technologies and aim at promoting R&D and creating new markets.

● Joint Research and Commissioned Research

Our joint research is R&D projects between AIST and our cooperative partners—companies, universities, or public research institutions with common objectives and goals—with the aim of creating innovative results that cannot be achieved by individual research. Commissioned research is a type of R&D project conducted solely by AIST under contract with a company or other organization. Through this research, companies can use AIST’s research potential to offset their lack of necessary technology to proceed with their own R&D project. Technology consulting is a system by which AIST—a multidisciplinary group of professionals—provides solutions based on its cutting-edge research capability and abundant knowledge to overcome challenges that companies cannot solve by themselves.

OIL (Open Innovation Laboratory)

AIST has set up Open Innovation Laboratories (“OILs”), which are industry-academia-government collaborative research bases sited on university campuses. As of July 2025, two OILs were in operation. Sharing research facilities in this way enables AIST and university partners to collaborate seamlessly in conducting basic and applied research, development and demonstration. As part of this collaboration, we also utilize our

Cross-appointment Program to accelerate research through mobility of human resources as well as the Research Assistant Program to train doctoral candidates by practical approaches. Through these efforts, we integrate the university’s basic research with AIST’s goal-oriented basic and applied research, and will promote social implementation of technology to solve social issues.

Participation in Technology Research Associations

A technology research association (hereafter referred to as “association”) is a mutual assistance organization in which companies, universities, and national research institutes cooperate to conduct experimental research on technologies used in industrial activities by providing researchers, research funds, and equipment, and jointly manage the results and utilize them among the association members. AIST participates as a member and contributes to the activities of the association from planning to research implementation

and utilization of the results. By sharing our “personnel” and “facilities” with these collaborative innovation partnerships, we aim to contribute to strengthening our innovation infrastructure and to serve as a hub for sharing our knowledge for co-creation. Specifically, AIST “people” participate in the association as researchers, project leaders, and officers. AIST also provides its facilities and equipment as a “place” for conducting research to researchers from industry and universities who participate in the association.

Promotion of International Standardization

Standardization themes that cross over a number of industries are increasing such as for various connected products with the advancement of digital technology. In this context, AIST's Intellectual Property and Standardization Promotion Division works with the research departments to ensure the smooth social implementation of research results by promoting cross-industry and interdisciplinary standardization activities based on government policy and industry needs.

In international standardization-related organizations such as the International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC), a cumulative total of 71 AIST staff have served in important roles such as committee chairs, and a cumulative total of 532 staff members have served as experts who contribute

their specialist knowledge and skills to the development of standards.

In FY 2024, AIST proposed a total of 74 national and international standards. Notably, AIST contributed to the development of ISO 25554, an international standard aimed at promoting well-being in aging societies.

To support strategic standardization in its R&D, AIST assigns Standardization Officers (SOs) not only to standardization activities within their technical fields but also to institute-wide priority themes and large-scale collaborations with industry.

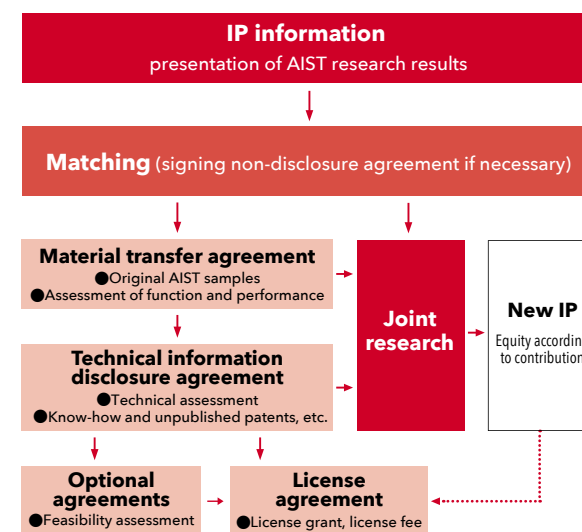
AIST has also begun issuing press releases related to standardization to keep the public informed about our international standardization achievements.

Technology Transfer Activities

One of the main missions of the AIST Group is to contribute to the development of the economy and industry by disseminating its research achievements in society. To achieve this mission, the AIST Group develops a strategic approach to obtain intellectual property (IP) rights, and appropriately maintain and manage such IP rights, and strongly promotes technology transfer with intellectual property at the core led by AISol which was established in April 2023.

More specifically, AIST promotes technology transfer to ensure the broad dissemination of its research outcomes by utilizing a range of contractual tools –such as nondisclosure agreements, research materials transfer agreements, technical information disclosure agreements, and licensing agreements–tailored to the needs of partner organizations, with a focus on the effective use of the AIST Group's intellectual property.

Technology transfer process



Strengthening International Collaboration

Accepting Foreign Researchers

AIST actively recruits foreign researchers from universities and research institutions around the world, strengthening collaboration with overseas research organizations and

building an international network of research talent. A total of 689 foreign researchers were engaged in research activities at AIST in FY 2024.

Strengthening International Collaboration to Solve Global Issues

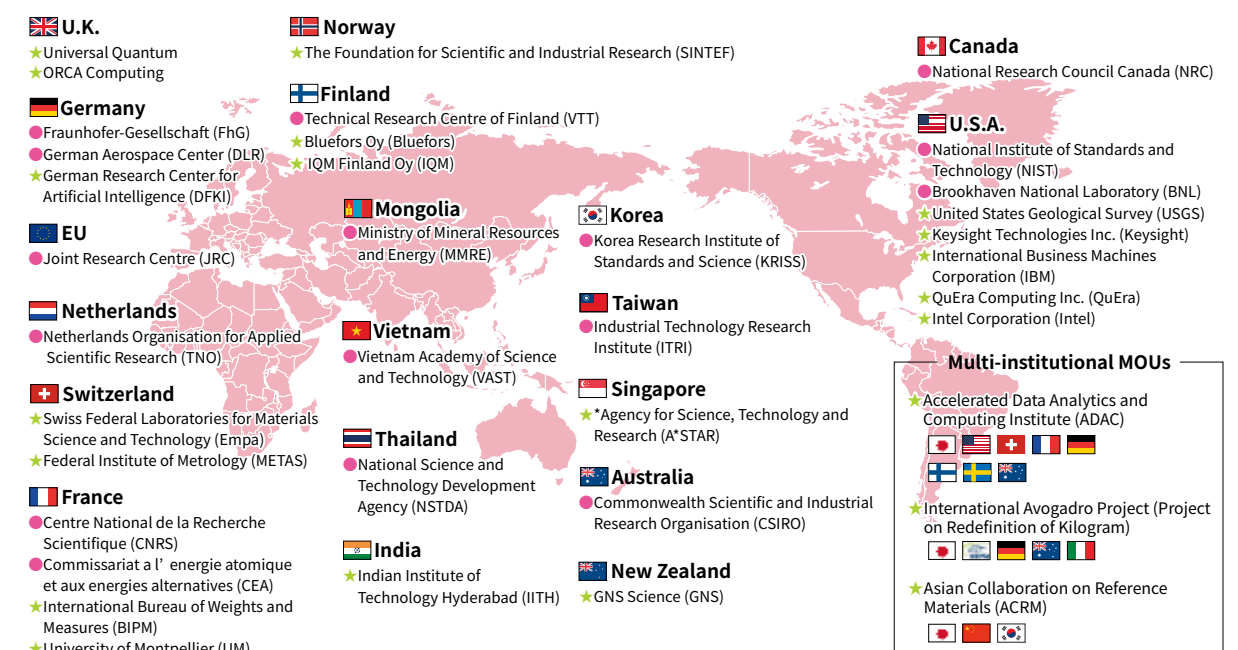
To address global issues, AIST has signed comprehensive research cooperation MOUs with 16 leading institutes representing countries and regions worldwide, and is building a global innovation network with major research institutions through international conferences and other activities.

As part of its network enhancement efforts, AIST cohosts the Global Summit of Research Institute Leaders with RIKEN, bringing together the leaders of the world's most influential research institutes. At the 13th Global Summit held in October 2024, AIST President Kazuhiko Ishimura and the leaders of 23 other research institutes from countries and regions around the world engaged in lively discussions on this year's theme of "Reducing ecological footprint without compromising research excellence."

AIST also plays a leading role in Research and Development 20 for Clean Energy Technologies (RD20), an initiative among major research institutes in G20 countries to promote international collaboration aimed at achieving carbon neutrality. At the 6th RD20 International Conference held in New Delhi, India in December 2024, participants discussed institutional collaboration and specific forms of international joint research. Recommendations adopted therein include: strengthening collaboration with Mission Innovation, an international clean energy organization; providing technical advice and recommendations to G20 working groups through RD20 member institutes in South Africa, holder of the 2025 G20 presidency; and promoting researcher exchange among participating institutes.

List of MOUs

● : Comprehensive MOUs ★ : Specific MOUs (promotion of collaboration in specific fields. excerpts)



As of March 31, 2025

Deploying and developing human resources

Cross-appointment Program

To create a cross-institutional research system, in November 2014 AIST established a cross-appointment program. This program allows a researcher to enter into employment contracts with multiple institutions and he/she can work in research, development, and education according to his/her role in each institution. By accepting faculty members from universities and other institutions and transferring AIST researchers to universities and companies, AIST is expected to increase the mobility of human resources and, as the

core of the innovation ecosystem, smoothly promote social implementation toward practical application and the creation of new industries by drawing on the excellent technological seeds generated from basic research at universities and other institutions.

Currently, 19 researchers from 9 universities and 7 private companies are accepted, and 14 researchers are sent to 7 universities, 1 private company, and 3 institutions (as of April 2025).

AIST Research Assistant Program

With the purpose to develop human resources with world-class, high-level expertise and high competency to perform in diverse situations in society, AIST has established the AIST Research Assistant Program to hire graduate students with high levels of ability. This program allows talented graduate students to focus on their research activities to earn a degree without financial concerns. In addition, it gives

them opportunities to participate in AIST’s R&D activities of high social needs, from which they can develop the ability to plan and conduct advanced research appropriately at the professional research site.

In FY 2024, 452 graduate students were hired under this program.

Employment requirements for AIST Research Assistants

Candidate	Graduate students in master’s programs	Graduate students in PhD programs
Requirements	R&D abilities that may help to promote AIST’s R&D projects and capability to work independently under staff guidance.	Superb R&D and paper-writing abilities that contribute highly to the promotion of AIST R&D projects, and capability to work independently under staff guidance.
Days of employment	Avg. 4-14 days/month	Avg. 10-14 days/month
Salary	1,700 yen/hour (approx. 90,000 yen/month for 7 working days)	2,100 yen/hour (approx. 220,000 yen/month for 14 working days)
Number of graduate students employed (FY 2024)	452	

Technical Training

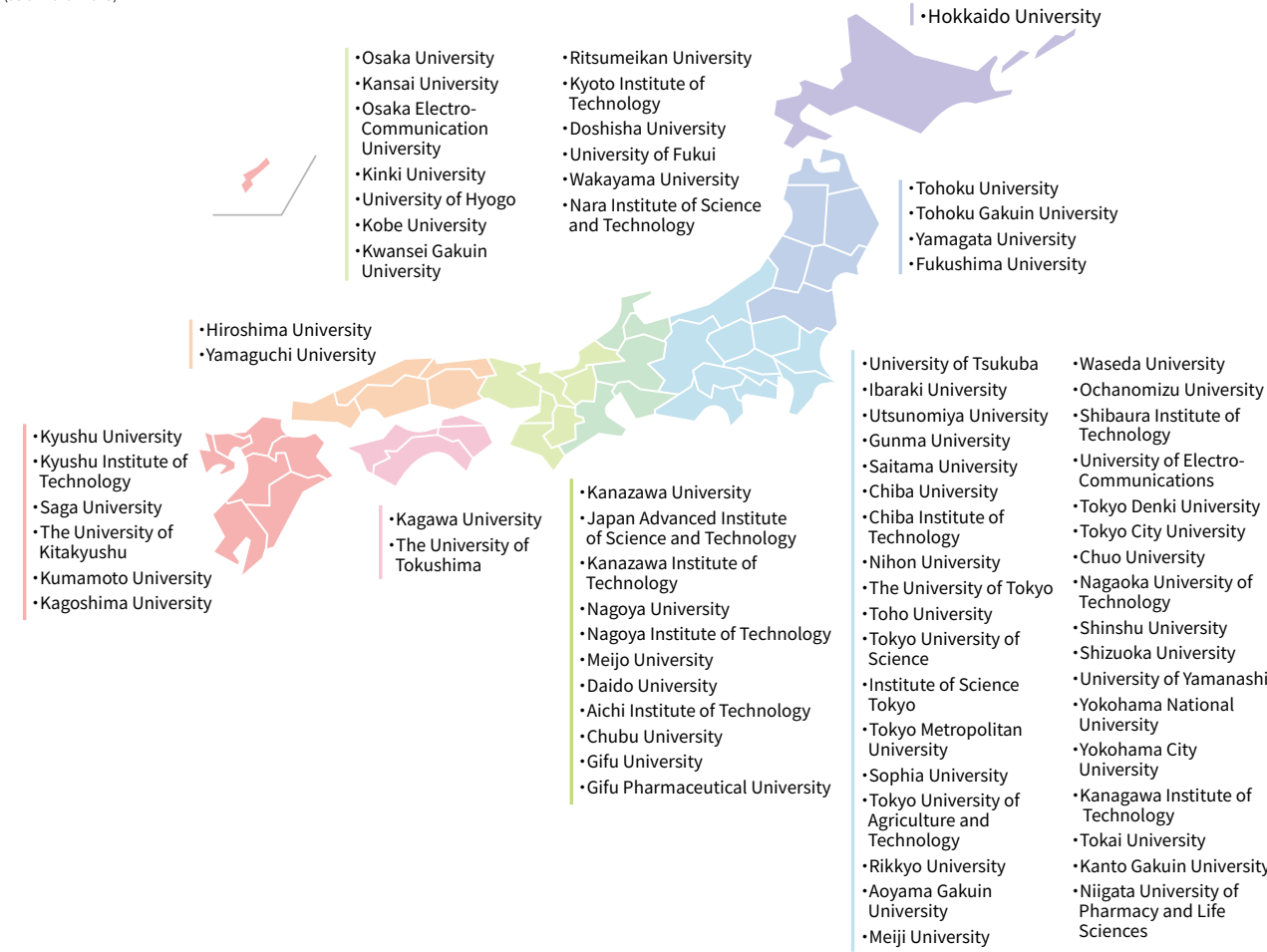
The technical training is a program in which AIST accepts researchers, engineers, and students from companies, universities, and public research organizations for defined periods and provides them with an opportunity to study technologies under the instruction of AIST researchers. The program may also be used for the purposes of short-term research training (internships) and educational programs for academic credits, which are both designed mainly for university students.

● Partner Graduate School Program

Using the knowledge and experience gained at AIST, AIST researchers teach as visiting scholars at graduate schools that have cooperation agreements with AIST. Within this program, AIST also provides technical training to the graduate students on the site of AIST. This program is deemed to be part of the students’ academic degree programs.

74 universities with partner graduate school agreements

(as of March 2025)



AIST Innovation School

The AIST Innovation School is a program designed to cultivate human resources capable of driving the open innovation needed to generate solutions to social issues and accelerate their implementation in society. This program offers two courses: the Innovative Human Resource Development Course (PD Course) for postdoctoral researchers, and the Basic Research Skills Development Course (DC Course) for undergraduate and graduate students. In addition to research activities, lectures, and exercises at AIST, the PD course includes approximately two months of training at companies. In FY 2024, 11 postdoctoral researchers and 83 undergraduate/graduate students (the highest number ever) participated, gaining practical skills and experience. Since its establishment in 2008, the Innovation School has produced more than 800 graduates, many of whom have gone on to play active roles in companies, universities, public research institutions, and other sectors. This program has been featured

in the Nikkan Kogyo Shimbun (The Daily Industrial News) and highlighted in recommendations by the Japan Association of Corporate Executives and is highly regarded as a pioneering initiative for doctoral talent development. We also participate in discussions within PEAKS (Leaders’ Forum on Promoting the Evolution of Academia for Knowledge Society), an industry-academia-government platform that supports career development of doctoral talent, and thereby contributing to the strengthening of Japan’s overall innovation foundation by expanding career opportunities for PhD holders.

In addition to the Innovation School, we have launched the AIST Design School, which aims to cultivate employees of companies, public institutions, and the AIST Group as “co-creation leaders” capable of shaping next-generation society through the social implementation of technology. In FY 2024, 11 people participated in the Master Course, 17 in the Short Course, and 10 in the Single-Session Course.

Community Involvement

Fukushima Renewable Energy Institute: the First Decade

● Establishment and Opening

In response to the Japanese government's "Basic Guidelines for Reconstruction from the Great East Japan Earthquake", formulated in July 2011, AIST established the Fukushima Renewable Energy Institute (FREA) in October 2013, backed by the expectations of many stakeholders, and officially opened it in April 2014 in Koriyama City, Fukushima Prefecture (Figure 1).

● Technological Asset Evaluation Program for Companies in Disaster-affected Areas

FREA has evaluated renewable energy-related technological seeds developed by companies in the three prefectures most impacted by the Great East Japan Earthquake—Fukushima, Miyagi, and Iwate—and fostered technology transfer to the companies concerned to support the creation of new industries in disaster-affected regions.

This initiative has continued under various names

● R&D on Original Technologies

To help achieve carbon neutrality, FREA has been pursuing R&D not only on utilizing wind, solar, geothermal, ground source heat, and other renewable energy sources, but also on energy networks that integrate these sources. In addition, FREA is continuously working on energy carrier technologies to complement challenges such as the variability and uneven distribution of renewable energy. We introduce two such R&D initiatives below—an ammonia-related technology and a localized building energy management system (BEMS) that utilizes hydrogen.

Ammonia-related technology

Ammonia is currently attracting attention as an energy carrier that could aid carbon neutrality, and FREA has been conducting R&D on technologies to utilize ammonia in such a role. Since its founding, FREA has been developing related technologies through the Japan Science and Technology Agency's Cross-ministerial Strategic Innovation Promotion Program (SIP) and has achieved successful world's first power generation using an ammonia-fueled gas turbine. In addition, FREA succeeded in efficient production of ammonia at plant

FREA conducts R&D aimed at achieving the following two goals:

- FREA pursues R&D on original renewable energy technologies and disseminates its information to the world.
- FREA contributes to the reconstruction of disaster-affected areas through developing industry and nurturing human resources.

and targets, including the Fukushima Institute for Research, Education and Innovation (F-REI) Commissioned Project, Program for Promoting Technologies Invented by Industries in Disaster Areas in Tohoku (Seeds Support Program) to support companies in the 15 municipalities of the Hamadori region of Fukushima. This program is still ongoing, and has so far led to the commercialization of 65 projects in 53 areas.

level even with the uneven supply of hydrogen resulting from use of fluctuating solar power generated within the FREA premises to electrolyze water. This was also an achievement for the first time in the world. FREA is currently applying this technology to the development of small-scale ammonia production plants capable of being powered by renewable energy.

Cooperative Research Laboratory with Shimizu Corporation: implementing research outcomes in society

FREA has been working with Shimizu Corporation on BEMS development that involves production of hydrogen from fluctuating solar power, storage of the hydrogen using a hydrogen absorbing alloy developed by AIST, and power generation by fuel cells as required. The results of this R&D have been commercialized as Hydro Q-BiC, a BEMS that was exhibited at Expo 2025 Osaka, Kansai and is set to be installed in a building complex in Akasaka, Tokyo, thereby demonstrating the solid progress being made in the social implementation of this homegrown Fukushima technology.

● FREA 10th Anniversary Ceremony

FREA celebrated its 10th anniversary in April 2024, and held a commemorative ceremony in Koriyama City in November of the same year. The ceremony was attended by approximately 200 people, including representatives from industry, government agencies, and organizations connected to FREA both from within and outside Fukushima Prefecture,

● Future FREA Initiatives

When FREA opened in 2014, renewable energy and hydrogen energy had yet to gain broad public acceptance. Despite this, thanks to the warm encouragement of local governments and businesses in Fukushima Prefecture and many others who have supported Fukushima's recovery, FREA was able to sustain its activities, make itself useful, and gradually grow its presence.

As Japan strives to achieve carbon neutrality by 2050, R&D on hydrogen and other energy carriers for renewable energy and concomitant social implementation will become increasingly important, and FREA's role in this endeavor will expand accordingly. FREA will further strengthen its collaboration with companies possessing strengths in carbon neutrality technologies, while also pursuing

local government officials including Fukushima Prefectural Assembly members representing Koriyama, Koriyama City Assembly members, and National Diet members from Fukushima Prefecture. The ceremony was a great success, with many people offering heartfelt congratulatory messages (Figure 2).

initiatives involving Fukushima-based businesses to foster a renewable energy industry rooted in the region and drive the development of homegrown Fukushima technologies.

In collaboration with Fukushima Prefecture, FREA is utilizing "Support Project Subsidy to Promote the Deployment of Renewable Energy Capacity in Fukushima Prefecture (Fukushima Renewable Energy Institute Cutting-Edge Research and Hub Support Project)" to contribute to the development of the region's renewable energy industry by establishing hubs for wind and solar power maintenance technology and human resource development, and for solar power generation system testing, and by developing technologies for the utilization of chemical energy carriers for fluctuating power transmission.



Figure 1. Fukushima Renewable Energy Institute



Figure 2. FREA 10th Anniversary Ceremony: OBARA Haruhiko, then-Director General of AIST's Department of Energy and Environment, addresses the audience.

Opening of AIST-KEF Umekita Site

Background of Establishment

In September 2024, we opened the AIST-KEF Umekita Site (Umekita Site) in collaboration with the Kansai Economic Federation (KEF) on the fourth floor of JAM BASE, an innovation creation support facility housed in the Grand Green Osaka complex that opened at the same time in the area north of Osaka Station. AIST, KEF, and AISol also signed a tripartite collaboration agreement (Figure 3).

Features and Objectives of Umekita Site

The most significant feature of Umekita Site is its potential for synergy through collaboration between the AIST Group, with its abundant research assets and networks, and KEF, with its corporate network and policy execution capabilities tailored to social needs, all while also benefiting from its advantageous proximity to both Osaka and Umeda Stations.

AIST will leverage Umekita Site to expand opportunities for networking with the Kansai region's private sector and

The idea for the Umekita Site was hatched when KEF came to AIST with a proposal to establish a joint site aimed at developing JAM BASE as a collaboration base for innovation creation by R&D-oriented companies, startups, universities, and other organizations. This is KEF's first ever joint base initiative with a National Research and Development Agency.

strengthen collaboration with startups, mid-tier, and SMEs. We also aim to serve as a hub for collaboration and exchange between local public technology centers (LPTCs) and other public bodies within the Union of Kansai Governments by supporting the activities of the "Kansai Wide-Area Industrial Co-creation Platform Project" through which LPTCs in the region work together with other stakeholders to support private industry.

continues to help companies to meet the various challenges they face.

AIST and KEF will continue to work closely through Umekita Site to further build the foundation for generating innovation in the Kansai region.

Activity Status

In FY 2024, we co-hosted three seminars with KEF at which we presented AIST research on healthcare and inorganic materials-related circular economy conducted by AIST Shikoku, AIST Chubu, and the Hokuriku Digital Manufacturing Center, AIST. The Kansai Wide-Area Industrial Co-creation Platform project also relocated to the Umekita Site, where it

<AIST-KEF Umekita Site website>
<https://www.aist.go.jp/kansai/ja/umekita/index.html>



Figure 3. At the opening ceremony of the AIST-KEF Umekita Site on September 17, 2024

(From right) AIST President ISHIMURA Kazuhiko, KEF Chairman MATSUMOTO Masayoshi, and AISol President OSAKA Seiji



Figure 4. Seminar held on October 21, 2024, to mark the opening of Umekita Site

Data of Research Activities (FY 2024)

Research presentations (in journals) **3,622** cases

Research presentations (oral) **8,006** cases

Joint research projects with companies **718** cases

Joint research revenue **115.9** million yen

Commissioned research projects from companies **66** cases

Commissioned research fund from companies **41.5** million yen

Acceptance of external researchers for joint research **1,091** people

AISol employees **186** people

Technology consulting **928** cases

Technical advice **2,565** cases

Contribution of AIST researchers to international standardization activities **603** people

AIST standard proposals **74** cases

MOUs concluded with overseas organizations **16** institutes

Foreign researchers **689** people

Data on Personnel Training and Use (FY 2024)

Cross-appointment program users **50** people

AIST Research Assistant Program users **452** people

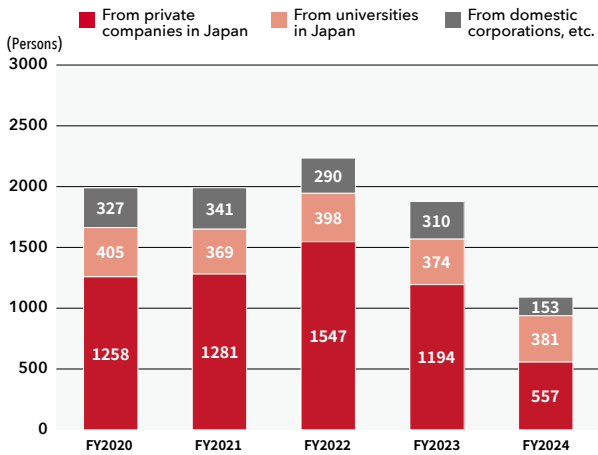
Technical trainees accepted **1,545** cases

Students who finished courses at AIST Innovation School **94** people

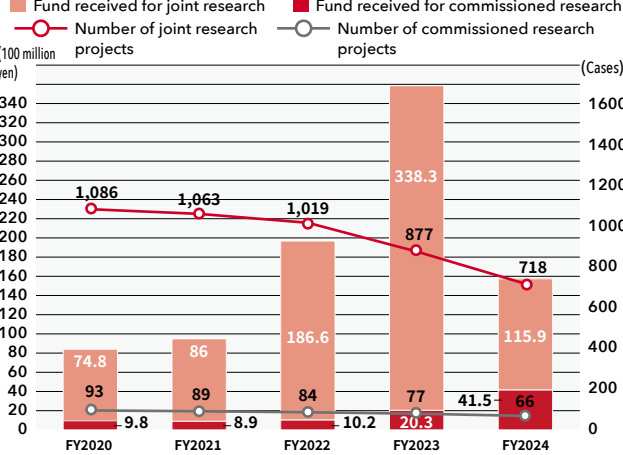
Students who finished courses at AIST Design School **7** people

R&D Promotion Data

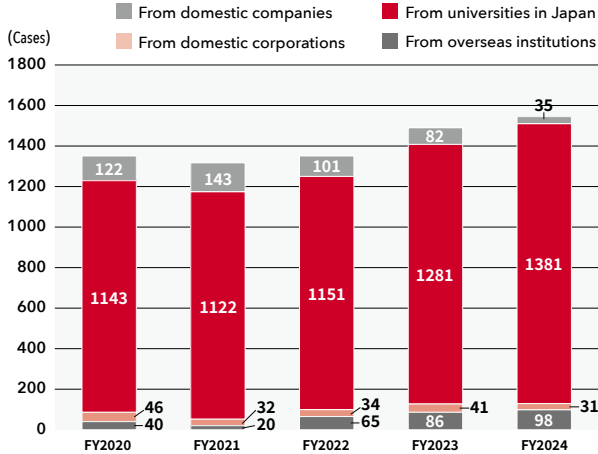
● Acceptance of external researchers for joint research



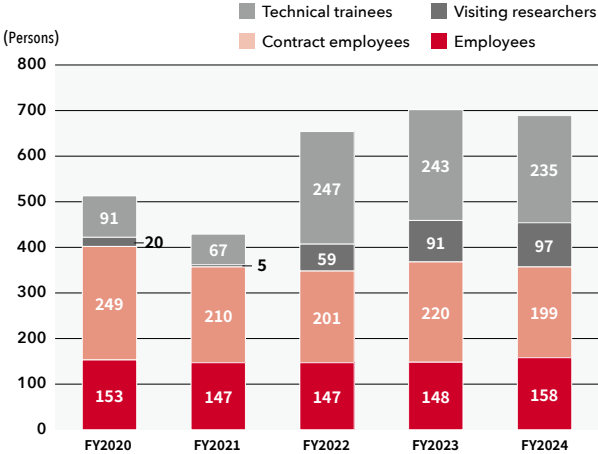
● Joint and commissioned research with companies



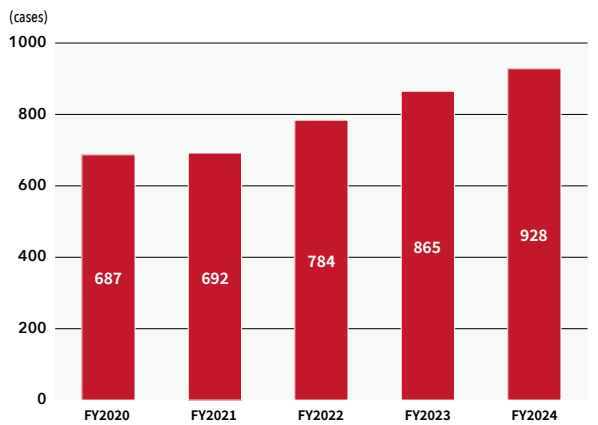
● Number of trainees on technical training



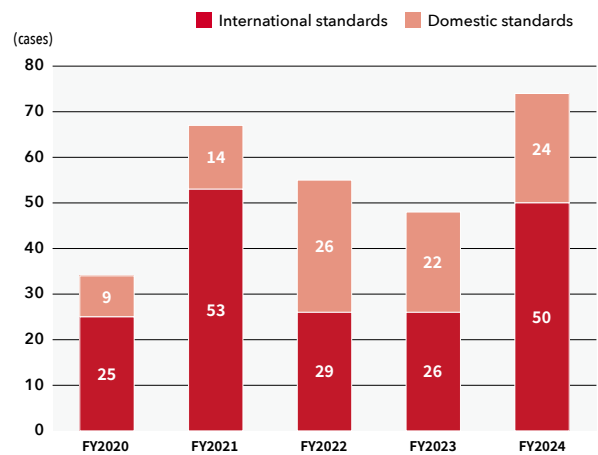
● Number of foreign researchers



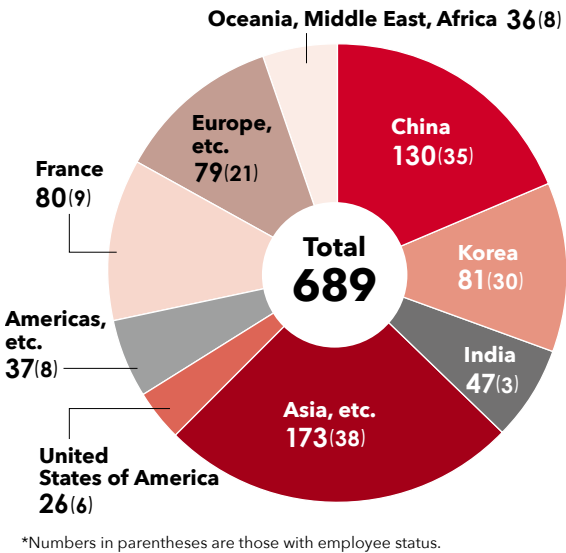
● Number of technology consulting



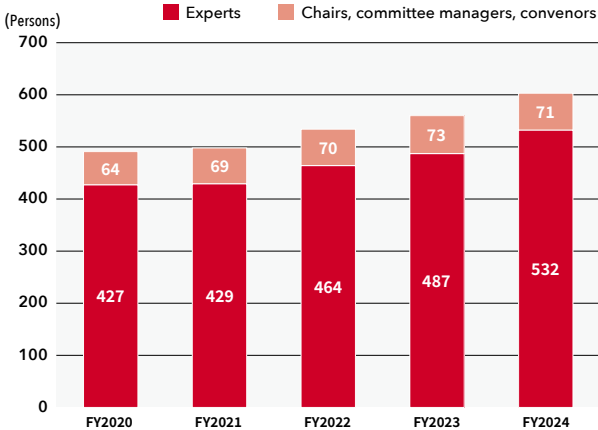
● Number of proposed standards



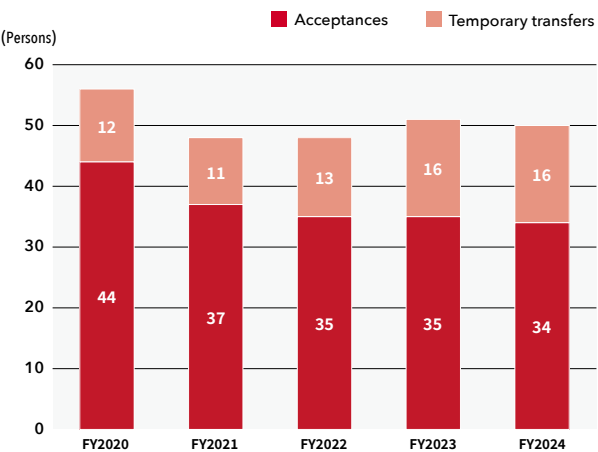
● Number of foreign researchers by country and region (FY 2024)



● Number of AIST staff to international standardization activities



● Number of cross-appointment program users



Human Capital Management

Message from the Chief Operating Officer

We aim to maximize the value of our talent and drive AIST's growth and impact by hiring and nurturing a diversity of outstanding people and creating an organization in which everyone can thrive.

As one of Japan's largest research institutes, AIST produces a constant stream of cutting-edge world-class research through a collaborative effort by talents with many different backgrounds. Leveraging these research results to achieve AIST's mission to "continuously create innovations" requires not only putting the principles of DEI into practice to lay the groundwork for innovation, but also strengthening our organizational capabilities by enhancing engagement to drive innovation forward.

Under the slogan "DEI for Innovation," AIST is working to create an environment where all employees can make the most of their capabilities—a supportive and rewarding workplace that fosters growth through the strategic nurturing and placement of talent and promotion of cross-departmental collaboration. Through these efforts, we are committed to building a strong organization capable of driving innovation while enabling all our people to thrive.



Chief Operating Officer
KATAOKA Ryuichi

Basic Approach to Human Resources Management

1. Recruiting, nurturing, and empowering a diversity of outstanding people

The key to enhancing the value of the AIST Group is to recruit, nurture, and empower a diversity of outstanding people, including administrative personnel who support AIST's operations as well as researchers and social implementation specialists.

Strengthening support for researchers with master's degrees and creating an environment that supports long-term employment by technical staff who are so essential to research are particularly important for sustaining AIST's research infrastructure.

2. Creating a workplace that enhances talent and engagement

Enhancing talent and improving engagement are the pillars that underpin AIST's human resource strategy, and we are

working to create a supportive and rewarding workplace environment that fosters growth.

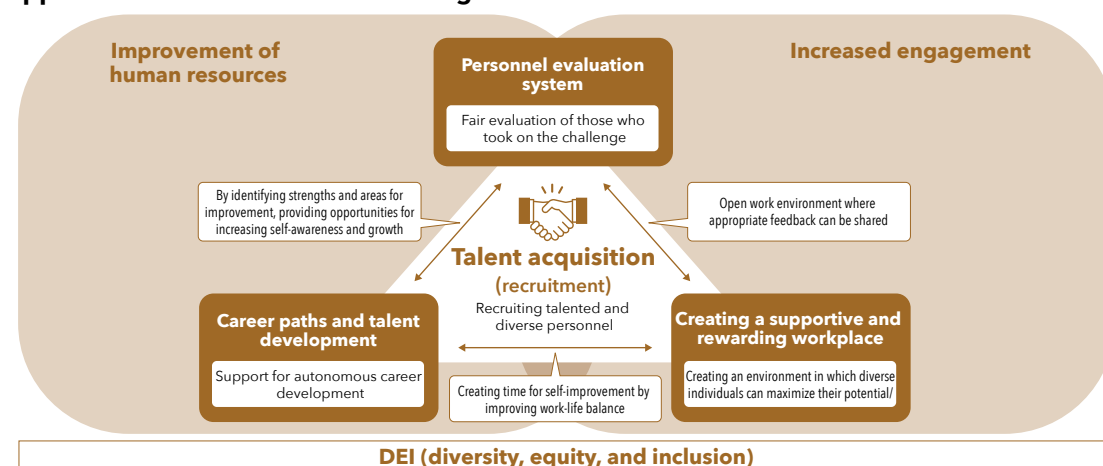
To ensure that our diverse workforce makes the most of its capabilities, we are instituting systems for fairly evaluating ambitious initiatives, supporting employee-driven career development, promoting flexible work styles, and thus endeavoring to create a rewarding workplace.

3. Delivering outcomes of high value to society

By recruiting, nurturing, and empowering a diversity of outstanding people and enhancing engagement, we aim to improve institute-wide performance, generate outcomes of high value to society, and ensure their social implementation.

Through these initiatives, we will contribute to solving social issues and strengthening Japan's industrial competitiveness as the core of its innovation ecosystem.

Basic Approach to Human Resources Management



Engagement Survey Results

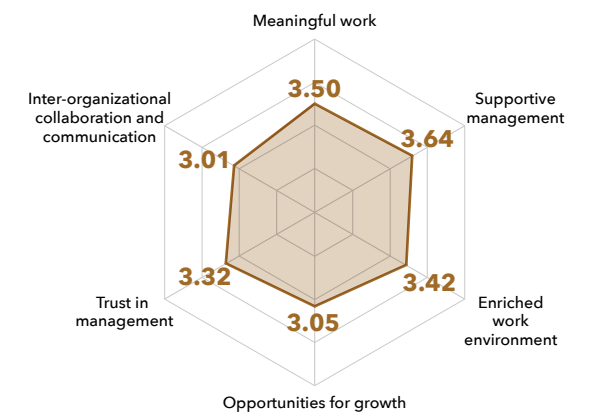
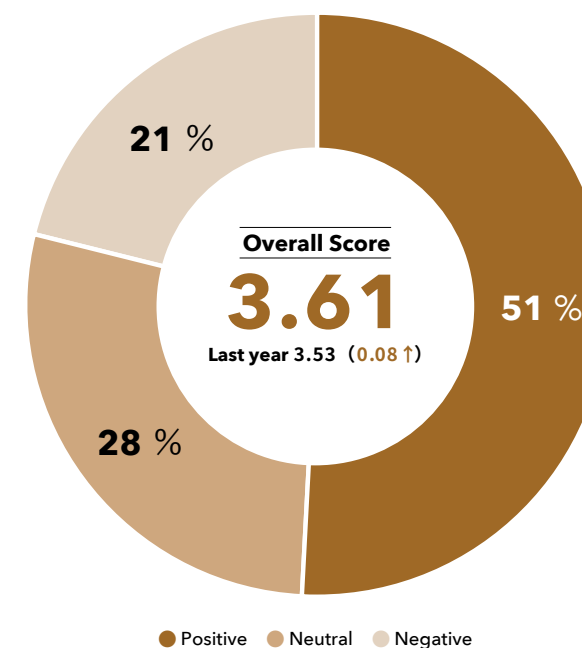
To improve organizational performance, it is necessary to make the workplace a place where all staff members are motivated to work, in other words, to improve engagement. In FY 2021, we began conducting engagement surveys of regular and contract employees to ascertain levels of engagement in the organization and devise improvement measures. To improve engagement means creation of a rewarding workplace for all employees, which will lead to improvement in organizational performance. We plan to continue conducting these surveys to identify both strengths and weaknesses as an organization and further improve engagement.

In the FY 2024 survey, "Supportive management" earned a high score, while "Growth Opportunity" and "Cross-Organization Collaboration and Communication" received low scores. Strengths were identified in "Sense of Purpose and Fulfillment in Work" and "Communication within One's Own Section," and weaknesses in "Environment where One Can Visualize One's Career Path," "Opportunities to Express Opinion When New Rules Are Decided," and "Information

Sharing across Departments."

One possible reason for the relatively low score received by "Growth Opportunity" is the way that career plan surveys and other measures might have caused staff to reflect more often on their careers, making them more aware of career uncertainties. Going forward, we will provide more growth opportunities, support employee-driven career planning, and strengthen strategic nurturing and placement of talent to create a supportive and rewarding workplace environment that fosters growth and enables everyone at AIST to make the most of their abilities.

"Cross-Organization Collaboration and Communication" showed improvement over the previous fiscal year, suggesting that organizational reforms implemented during the fifth Medium- to Long-term Plan period are having the intended effect of fostering cross-organizational exchanges. We will continue our efforts to create innovation through further promoting interdisciplinary and other cross-organizational exchanges.



Survey period	Late October 2024-late November 2024
Respondents	Regular and contract employees (including seconded staff)
Overall response rate	82 %
Questioned content	(1) Meaningful work (2) Supportive management (3) Enriched work environment (4) Opportunities for growth (5) Trust in management (6) Inter-organizational collaboration and communication

Diversity Promotion: Goals and Progress

Realization of work-life balance

Target	Progress made in FY 2024
AIST promotes work-life support measures and workplace environments that enable each and every AIST employee to work in harmony with their work life and reduce career loss due to life events.	- To help create a workplace environment where both male and female employees can proactively participate in childcare, we held 12 lunch meetings on childcare and nursing care, using an anonymous online platform to encourage participation. We also updated our intranet pages and other materials on our systems to support balancing work with childcare or nursing care. - We disseminated information on infertility treatment and obtained Kurumin Plus certification for reproductive health support in FY 2024.

Promotion of empowerment of female employees and expansion of employment of female researchers

Target	Progress made in FY 2024
AIST promotes efforts to motivate and raises the awareness of employees and improves the workplace environment to support the promotion of women to management positions. We promote proactive public relations activities and initiatives tailored to the actual situation in each research area to recruit female researchers. Our target is to maintain the ratio of female managers at 12% by the end of the 5th term (March 31, 2025) and the cumulative ratio of female researchers for the 5th term (April 1, 2020-March 31, 2025) at 18%. (Targets in the Action Plan for the Act on the Promotion of Women's Participation and Advancement in the Workplace)	- The proportion of female managers was 13.9% (64/462) as of March 31, 2025. - The proportion of female researchers hired during FY 2024 was 28.7% (43/150), and the cumulative ratio of female researchers for the 5th term was 20.0%, achieving the target.

Support for foreign nationals

Target	Progress made in FY 2024
To support the recruitment and acceptance of excellent foreign researchers, AIST will increase awareness of AIST among foreign researchers by, for example, preparing information for foreign researchers on the English version of the official website.	- The proportion of foreign nationals hired for research positions during FY 2024 was 11.3% (17/150). - We held seminars featuring role-model talks and introductions to AIST systems to support the career development of foreign researchers. To help foreign researchers adapt to everyday life in Japan, we held online Japanese language classes that were taken by 47 researchers, including some working at AIST's regional research bases. We also held a seminar on the theme of "Conducting Presentations in Japanese."

Career development support

Target	Progress made in FY 2024
To help our employees think positively about their careers, we provide comprehensive support from career path design to career development, including career counseling and talks by specialists, and a mentoring system.	- In our level-based training program for newly hired employees, we held lectures on promoting diversity. - We maintained our online career counseling consultation system, offering either online or face-to-face consultation according to employee preference. (245 consultations provided) - We conducted a career plan survey to better profile individual employees, and promoted front-line career support by creating a guide for managers/supervisors. To promote the active participation of employees after the retirement age was raised, we also clarified job descriptions and carried out job matching to determine individual employee aptitude based on those descriptions.

Support for the performance of people with disabilities

Target	Progress made in FY 2024
To further support people with disabilities so that they can play an active role as members of society by creating a comfortable work environment for them and promoting their employment in compliance with the legally mandated employment rate.	- We achieved the legally mandated FY 2024 employment rate of 2.8%. We hired 16 new employees through open recruitment at Hello Work and referrals from Local Vocational Centers for Persons with Disabilities. - Creating a supportive workplace environment for employees with disabilities: Our initiatives included posting manuals on AIST's intranet for supporting persons with disabilities in the event of a disaster, and installing alarming devices for hearing-impaired employees so that they can visually recognize hazards while assisting with experiments.

Internal Human Resource Development

Basic idea of internal human resource development

Internal human resource development is an important measure to support the achievement of AIST's mission, the sustainable growth and innovation of the institute as a whole. AIST has established diversity, equity, and inclusion as its basic principles, and has created an environment in which all AIST employees can maximize their individual abilities.

Since AIST needs diverse and highly skilled human resources to achieve its mission, we respect individual autonomy rather than uniform career development, and have

established a training system and various career paths to foster diverse human resources.

We are removing barriers between job categories and organizational affiliations and promoting personnel placement based on aptitude, while also creating an environment that nurtures talent. A key initiative in this area is the AIST Training and being implemented to help research staff with Master's degrees become top-flight researchers.

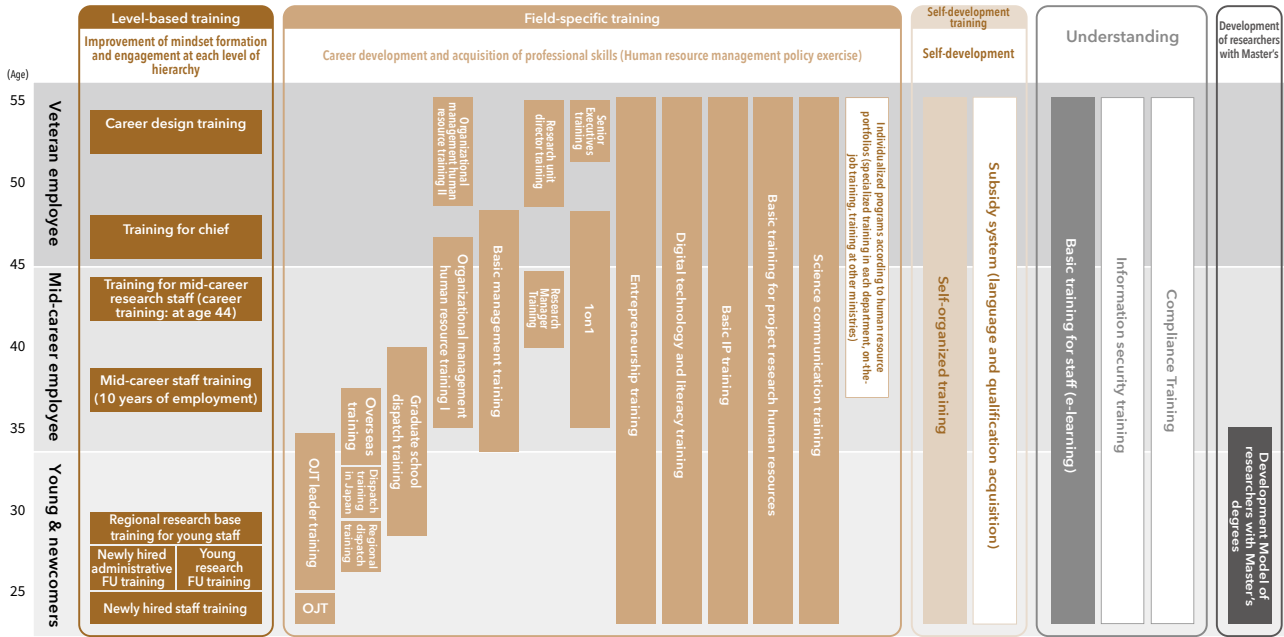
Training system

Based on the principle that human resource development must contribute to the organization's management activities, we offer training programs across four categories: "level-based training" to acquire the knowledge and abilities required for job performance at specific job levels; "field-specific training" to acquire knowledge and skills in specific fields, improve job performance, and design career paths; "self-development training" to provide opportunities for self-development

through self-improvement and practical work; and "basic training for staff" to ensure a thorough understanding of AIST's organizational ethics and rules. AIST has provided training for a total of over 13,000 AIST employees.

In addition to the above, we provide training specific to each department (e.g., basic intellectual property training).

Human resource development system chart



List of trainings

Training list	Purpose	Training list	Purpose
Level-based training	To acquire the knowledge, abilities, etc. required for job performance at each specific level. Example: Training for newly hired staff, training for young staff at regional research bases, training for mid-career staff Field-specific training	Self-development training	To provide opportunities for self-development through self-study or practical work. Example: Self-planned training
Field-specific training	To acquire the knowledge, skills, etc. in specific fields (industry-academia-government collaboration, intellectual property, human resources, etc.) to improve one's ability to perform one's duties and design a career path. Examples: Basic intellectual property training, entrepreneurship training, digital technology and literacy training, training for research managers, training for graduate school dispatch	Basic training for staff	To ensure awareness of AIST's organizational ethics and rules. Example: AIST overview, management and utilization of research results, labor management training

● Diverse career paths

We are endeavoring to visualize career paths by dividing desirable paths into three key types and providing representative examples. We also conduct a career plan survey every year as an opportunity for employees to raise their awareness of employee-driven career development, think about their careers, and communicate their interests. We use the information collected from the survey to aid appropriate employee placement.

To help employees achieve their career goals, we not only provide training opportunities, but also offer opportunities for employee-driven career development, including transfers through internal recruitment and career

changes from research to administrative or technical positions. We are implementing these initiatives out of a desire both to respect the autonomy of individuals in our diverse workforce and to improve their engagement and performance.

<Profiles in the career path model>

- “Research implementation” type to conduct high quality research, expand research presence and social implementation
- “Promotion of social implementation” type to promote social dissemination of research results
- “Management” type to formulate organizational and research policies and strategies, and manage the institute

● Expand employment of master’s degree holders and create a training and support plan for master’s degree holders

The number of students enrolling in graduate school doctoral programs in Japan has been on a long-term downward trend since peaking in 2003. Given this situation, while continuing to hire outstanding PhD holders to maintain and strengthen our research resources, since FY 2023 we have also been hiring master’s degree holders for research positions in all our research fields as a new recruitment channel. In the same year, we launched “AIST Training and Support Plan for Researchers with Master’s Degrees” to nurture the capabilities of the newly hired researchers who have finished master’s courses for self-driven research.

Under this plan, acquiring a doctoral degree is

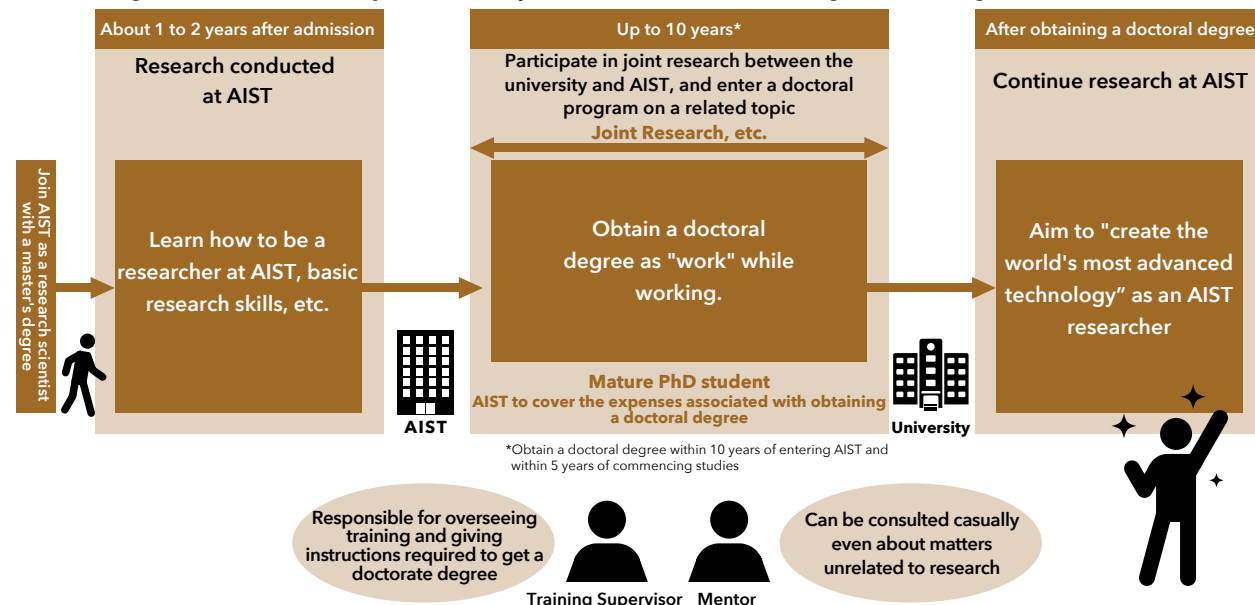
positioned as part of their jobs, and they complete a doctoral program while working at AIST, with AIST covering all related expenses.

Since FY 2024, 46 master’s degree holders have joined AIST as researchers (as of the end of April 2025), and are working on research with the aim of getting a doctorate as part of their job under the “AIST Training and Support Plan for Researchers with Master’s Degrees”.

Through these efforts, we will continue to strengthen our R&D system and contribute to the development of highly skilled research personnel in Japan.

Training and Support for Researchers with Master’s Degrees

For the purpose of strengthening our R&D framework, we established the “AIST Training and Support Plan for Researchers with Master’s Degrees”, in which AIST fully covers the expenses associated with obtaining a doctoral degree.



Number of employees hired in the past 5 years

FY	2020	2021	2022	2023	2024	2025	(persons)
Research position	81	82	97	128	151	136	(only those who started work on April 1)
Of which, master's degree holders	6	7	9	7	20	26	

Protecting Human Rights in Research

AIST conducts ergonomic research involving human subjects, and medical research carried out in compliance with our Ethical Guidelines for Life Science and Medical and Health Research Involving Human Subjects.

In FY 2024, we implemented 213 research projects involving ergonomic experiments and 156 medical research projects.

Regarding an ergonomic experiment, the experimental protocol is reviewed based on opinions of the Committee on Ergonomic Experiments, which consists of external members, in accordance with the Declaration of Helsinki* to ensure the safety and scientific validity of the experiment. Likewise, a medical research experiment is reviewed in accordance with

ethical guidelines based on the opinions of the Bioethics Committee consisting of external members.

When an experiment is performed, its participants are given thorough oral and written explanations of the details of the experiment and of their right to revoke consent. In this way, we ensure that their human rights and dignity are protected.

* Subtitled “Ethical Principles for Medical Research Involving Human Subjects,” this is a code of conduct regarding human subjects adopted by the 18th World Medical Association General Assembly in Helsinki. Medical researchers have established this rule to regulate themselves with regard to medical research involving human subjects.

Harassment Prevention

Harassment stains a person’s personality and hurts the dignity of the person being harassed and causes emotional distress and disadvantage. Not only the person harassed but also those who learn of the presence of harassment may suffer from reduced motivation to work, and the loss such as

adverse effects on the results of research and resignation of talented people can be immeasurable. AIST has internal rules in place and provides training to make the workplace free of harassment.

● Harassment prevention measures

- AIST has in place rules for handling harassment and has defined procedures for the prevention of harassment.
- In addition to conducting training on harassment prevention in the basic training for all employees, we also hold a

seminar on harassment prevention targeting all employees to enhance awareness. AIST provides counselors placed at AIST work sites with training in harassment prevention and counseling for harassment victims.

● Counseling system

Each research base has workplace harassment counselors. The counselors work to counsel, investigate, and mediate so that harassment victims are not distressed and suffer alone as a result of their experience. If the line of management or a counselor cannot address a harassment issue, it is possible to file to the Compliance Promotion Committee for the recovery from the disadvantages suffered. The committee reviews the

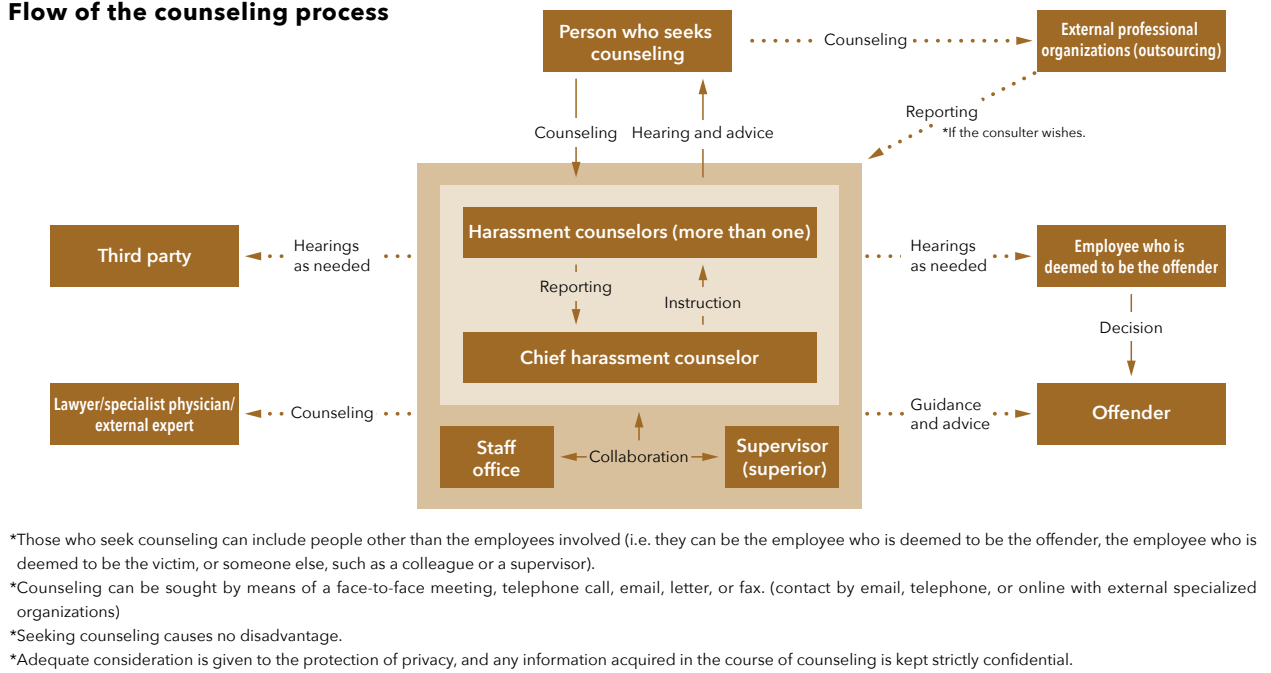
issue and recommends the appropriate actions, which are then taken.

In addition, we have established an external counseling organization and made counseling by email, telephone or face to face or online interview possible to make it easier to seek counsel and protect privacy.

Training programs provided on harassment in FY 2024

Training program, etc.	Trainees	Objectives	Number of participants (FY 2024)
Newly hired staff training	New AIST employees	As part of the training for necessary awareness, basic knowledge, and basic skills to perform their work, employees learn the basics and preventive measures for harassment.	230
Basic training for staff (e-learning) *Including basic training for foreign employees	Persons working at AIST	As part of acquiring basic knowledge of AIST's organizational ethics and rules, participants learn the basics and preventive measures for harassment.	7,104
Training for harassment counselors and others (online training and e-learning)	Harassment counselors	The program provides knowledge on harassment prevention and interviewing skills as a counselor.	35 111 (Views)
Harassment prevention seminar	AIST employees who wish to attend	Participants learn about the basics of harassment and how to prevent it.	For general staff: 475 For managers: 195

Flow of the counseling process



Harassment counseling cases

	FY 2022	FY 2023	FY 2024
Sexual harassment	1	3	7
Power harassment	15	18	19
Others	3	6	6
Total	19	27	32

Occupational Safety and Health

Safety and Health Committee and distribution of “Accidents and Safety and Health Information”

The Safety and Health Committee meetings attended by labor and management representatives are held monthly to discuss safety and health issues. Each month, “Accidents and Safety and Health Information,” which includes information on past accidents, hazard prediction training, and hazard experience training, is streamed over the intranet. By making it mandatory for all employees to view online streaming, we work on increasing safety awareness.

Communicating safety rules through a dedicated app

We provide Safety Rules in AIST through a dedicated app to enable staff to easily access rules regarding the handling of hazardous chemicals and high -pressure gases, waste liquid disposal, fire and disaster prevention measures, and other rules and precautions whenever needed.

Emergency preparedness

AIST conducts disaster, fire, and other security drills so that we can promptly respond to emergencies such as disasters and accidents, thereby minimizing damage. We also perform safety confirmation drills, using our “safety confirmation system*” for quick and smooth grasping of the safety of employees.

To ensure a means of communication with each regional research base in the event of a disaster, we also conduct emergency communication drills, using Microsoft Teams and

Preventing occupational accidents

In the event of a work-related accident, an investigation and analyses are conducted to determine the cause, and recurrence-prevention measures are implemented. Information on accidents is communicated to all employees through the “Accident and Health and Safety Information” to prevent similar accidents.

AIST holds a National Safety Liaison Meeting that connects the Safety Management Division with each research base using a web conference system to share information

Safety education

AIST accepts many researchers, engineers and students from businesses, universities and the like for cooperative research, technical training and so forth.

To prevent accidents, AIST offers various safety training classes and programs for both employees and visitors from other organizations.

on accidents and near miss incidents. The aim is to share details of recurrence prevention measures and thus improve safety and health. In order to prevent accidents, we provide safety education to make sure that appropriate protective equipment is worn, prepare work procedure manuals and risk assessment for high-risk tasks, conduct hazard prediction training, and hazard experience training, and enhance sensibility by conducting risk prediction activities to foster safety culture.

Safety education provided when employees are hired and when there is a change in work details is managed by an internal safety education management system, which allows learning history and program contents to be checked as needed.

Health Management and Mental Health

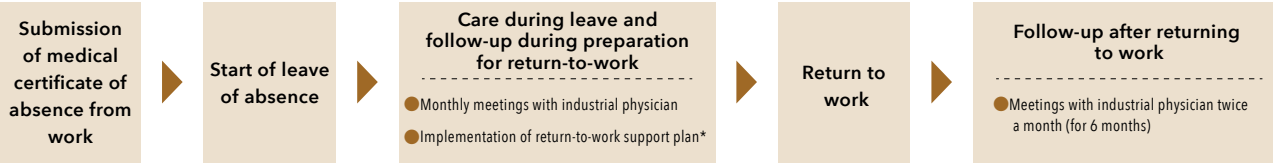
General and special medical examinations are performed in spring and autumn every year. We strive to increase the percentage of employees who undergo medical examinations by raising awareness that they are required to take these examinations, including health screening. As follow-up care after medical examinations, an industrial physician and industrial health staff provide health advice detecting and preventing employees’ health disorders and illnesses in their early stages. In response to employees’ diverse needs, we also provide health information through health support seminars to raise health awareness, and thus provide support to improve the performance of individual employees and AIST as a whole.

To address mental health issues, we have developed a unified Mental Fitness Program in accordance with the directives and guidelines of the Ministry of Health, Labor, and

Welfare. Four programs based on the Mental Fitness Program are implemented in a continuous and planned way. They focus on (1) self-care; (2) line care through implementation of education and training and seminars; (3) care by in-house industrial health staff and others through face-to-face counseling with an industrial physician and industrial health staff and support in returning to work; and (4) care by external resources through the use of external mental health organizations.

We use a stress check system (once a year) to raise staff awareness of stress levels and to encourage improvements that create a more supportive workplace and help prevent staff mental health issues. For the entire AIST, the average stress score has been lower than the national average since the stress check was introduced.

Outline of return to work program



*Depending on the length of leave, etc.

Data Relating to Human Resources

Number of people who used the various leave programs (Persons)

	FY 2020		FY 2021		FY 2022		FY 2023		FY 2024	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Leave to care for sick children	89	147	98	153	125	265	169	306	177	321
Special childcare leave	30	13	30	15	33	40	48	43	52	53
Extended childcare leave*	12	35	21	30	36	22	37	29	34	30
Nursing care leave	48	40	48	46	78	111	99	178	134	223
Extended nursing care leave*	1	2	1	2	1	1	0	1	2	0

*Number of employees starting the leave within the fiscal year

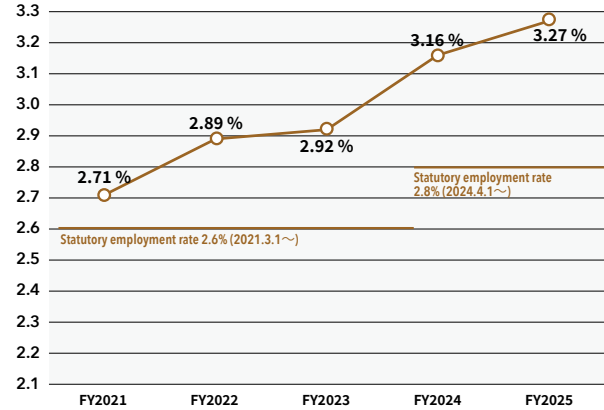
Number of employees (Persons)

	Total	Men	Researcher	Technical staff	Administrative staff	Women	Researcher	Technical staff	Administrative staff
All employees	3,023	2,347	1,973	31	343	676	314	14	348
Of foreign nationality	158	118	118	0	0	40	38	0	2
With PhD	2,134	1,857	1,855	1	1	277	273	1	3

Newly hired in FY 2024 (Persons)

	Total	Men	Researcher	Technical staff	Administrative staff	Women	Researcher	Technical staff	Administrative staff
FY 2024	230	137	108	10	19	93	43	6	44
FY 2023	179	128	110		18	51	18		33
FY 2022	177	106	83		23	71	14		57
FY 2021	122	85	68		17	37	14		23
FY 2020	113	78	63		15	35	18		17

Change in employment rates for people with disabilities % of June 1 of each year



Percentage of people with disabilities remaining at work

	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
Number of people at the beginning of the fiscal year	110	115	120	119	123
Number of people who left AIST within the fiscal year	4	11	6	10	14
Employee turnover rate	3.64 %	9.57 %	5.00 %	8.40 %	11.38 %
Employee retention rate	96.36 %	90.43 %	95.00 %	91.60 %	88.62 %

*Retirees include those who retire or those whose term of employment has expired.

Number of employees who used child daycare services (Persons)

	FY 2020		FY 2021		FY 2022		FY 2023		FY 2024	
	Employees	Contract employees	Employees	Contract employees	Employees	Contract employees	Employees	Contract employees	Employees	Contract employees
AIST Tsukuba	473	73	534	241	482	170	393	442	707	149
AIST Chubu	18	11	15	27	24	18	34	14	35	19
AIST Kansai	4	1	38	0	54	4	37	22	10	23
AIST Tohoku	—	—	—	—	—	—	—	—	18	8
AIST Shikoku	—	—	—	—	—	—	—	—	10	0
AIST Kyushu	—	—	—	—	—	—	—	—	3	5
AIST Chugoku	—	—	—	—	—	—	—	—	24	0
Private child daycare facilities and babysitters	24	0	44	0	49	0	45	0		
Partial subsidies for childcare fees at private nurseries, etc.	—	—	—	—	—	—	—	—	44	0
Babysitter discount coupons (the number of used coupons)	—	—	—	—	—	—	—	—	113	0

In April 2024, we reviewed the temporary childcare program and expanded the available options to improve convenience for staff.
○ In AIST Tohoku, Shikoku, and Kyushu, operations as on-site childcare facilities began in April 2024, and in AIST Chugoku, they began in November 2024.
○ AIST has reviewed its 'Private Daycare and Babysitting' program; rather than contracting with private daycare centers or babysitting service providers to outsource childcare, AIST now partially covers the childcare fees paid by individual employees who have contracted with private nurseries or similar service providers.
○ We have newly introduced the 'Babysitter Placement Service Discount Coupons' administered by Children and Families Agency. (Up to two coupons per child per day)

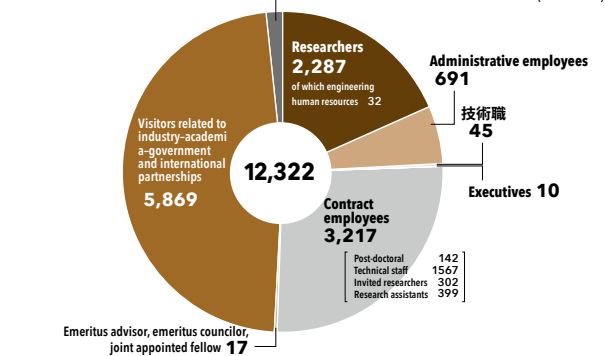
Number of executives in FY 2024 (Persons)

	Total	Men	Full-time	Part-time	Women	Full-time	Part-time
Executives	10	8	6	2	2	1	1

Number of staff in managerial positions

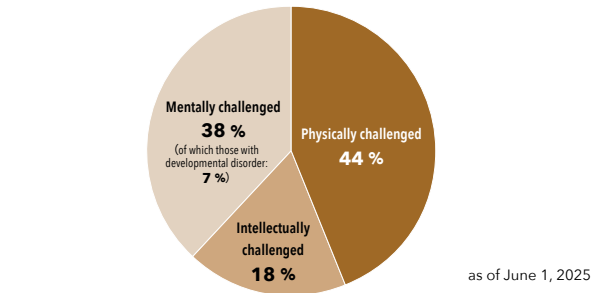
	Total	Researcher	Women	Rate	Technical staff	Women	Rate	Administrative staff	Women	Rate
FY 2024	457	317	28	8.8%	2	0	0%	138	33	23.9%
FY 2023	442	305	24	7.9%				137	32	23.4%
FY 2022	432	295	20	6.8%				137	25	18.2%
FY 2021	402	292	18	6.2%				110	17	15.5%
FY 2020	377	282	11	3.9%				95	11	11.6%

Personnel data (Persons)



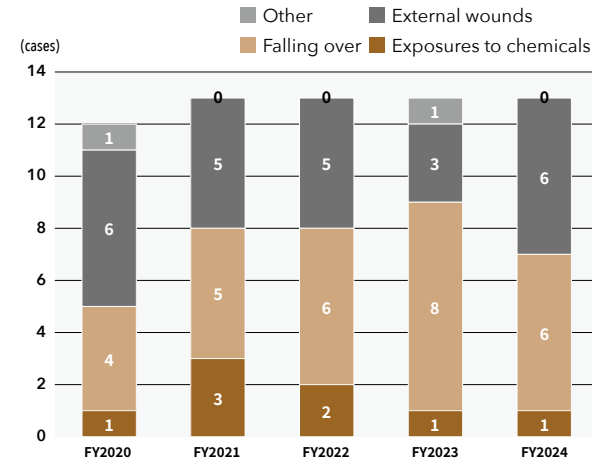
*As of March 31, 2025. However, number of visitors related to industry-academia-government and international partnerships is of FY 2024.

Employment rate by disability type

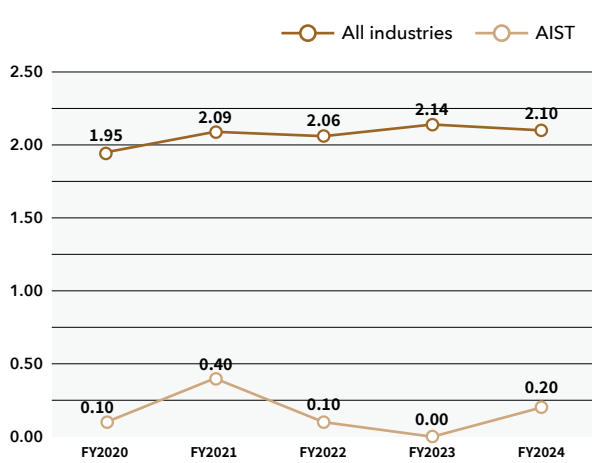


as of June 1, 2025

Trends in the number of occupational accidents



Frequency rate of accidents resulting in absences from work



Calculation method
AIST:(number of applications for compensation for absence from work due to industrial accidents/ total number of working hours) × 10⁶
All Industries:(number of applications for compensation for absence from work due to industrial accidents/total number of working hours) × 10⁶
* The occupational injury rate for all industries is calculated by limiting the number of casualties to those who lost at least one day of work or lost part of their body or its function due to industrial accidents.

Main education and training programs and workshops in FY 2024

Program	No. of sessions	No. of participants
Course on skills required for a Health Supervisor's License	2	30
Course on skills required for a Safety Basic Assessor's License (Machinery Operation Safety)	2	63
Education and training for recombinant DNA experiments (e-learning)	-	1,022
Education and training for animal experiments (e-learning)	-	297
Education and training for life science and medical experiments (e-learning)	-	486
Education and training for ergonomic experiments (e-learning)	-	527
Specialist safety training course (radiation) (online workshop/e-learning)	22/-	37/341
Specialist safety training course (X-ray) (e-learning)	-	346

Number and percentage of permanent and contract employees who underwent periodic medical examinations (including health screening), 2020–2024

FY	Top: percentage of examinees Bottom: no. of examinees/ total no. of eligible employees				
	2020	2021	2022	2023	2024
(1) Employees (excluding (2)) *1	99.7 % 3,021 / 3,030	99.6 % 2,975 / 2,984	99.6 % 2,982 / 2,994	99.7 % 2,889 / 2,899	99.4 % 2,993 / 3,010
(2) Contract employees *2	99.9 % 2,399 / 2,401	99.9 % 2,409 / 2,411	99.5 % 2,426 / 2,437	99.7 % 2,459 / 2,466	99.5 % 2,513 / 2,525

*1 Excluding those on extended childcare leave and sick leave and those on long leave due to overseas relocation

*2 The target is short-term members of mutual aid association.

● Number of permanent and contract employees (including temporary employees) who underwent special medical examinations in FY 2024

FY	Spring			Autumn		
Special medical examination	Permanent employees	Contract employees	Total	Permanent employees	Contract employees	Total
Medical examination for organic solvent poisoning prevention	675 / 677	720 / 720	1,395 / 1,397	658 / 659	732 / 732	1,390 / 1,391
Medical examination for specified-chemical poisoning	484 / 484	475 / 475	959 / 959	476 / 476	485 / 485	961 / 961
Medical examination for ionizing radiation exposure	317 / 317	93 / 93	410 / 410	314 / 314	96 / 96	410 / 410
Medical examination for lead poisoning	17 / 17	25 / 25	42 / 42	17 / 17	24 / 24	41 / 41
Medical examination for laser injury	338 / 338	173 / 173	511 / 511	45 / 45	25 / 25	70 / 70
Medical examination for pneumoconiosis	6 / 6	15 / 15	21 / 21	0 / 0	1 / 1	1 / 1
Medical examination for asbestos exposure	3 / 3	3 / 3	6 / 6	3 / 3	3 / 3	6 / 6

*no. of examinees/ total no. of applicable employees

● Number of employees with significant findings from AIST's medical examinations, and number of employees who received face-to-face counseling

(1) Number of employees with significant findings, and their percentages of the total

	2020	2021	2022	2023	2024
With significant findings (D-diagnosis)	159 3.7 %	157 3.8 %	169 4.0 %	136 3.4 %	107 2.6 %
With significant findings (E-diagnosis)	872 20.6 %	857 20.7 %	849 20.0 %	896 22.6 %	998 23.9 %

(2) Number of employees who received counseling, and their percentages to employees with significant findings

	2020	2021	2022	2023	2024
With significant findings (D-diagnosis)	130 81.8 %	129 82.1 %	142 84.0 %	119 87.5 %	82 76.6 %
With significant findings (E-diagnosis)	779 89.3 %	789 92.1 %	766 90.2 %	842 94.0 %	854 85.6 %

Definition of criteria: A: no anomalies; B: mild abnormalities but no interference with daily life; C: follow-up examination required; D: health advice required; E: treatment required; F: counseling required (applicable only to special medical examinations)

● Number of face-to-face health consultations in FY 2020-2024

(cases)

FY		2020	2021	2022	2023	2024
Industrial physician	Physical	921	736 ※ 1	727	954	942
	Mental	525	777 ※ 1	768	740	754
Industrial health staff		5,599	5,414	4,338	3,966	3,192
Total		7,045	6,927	5,833	5,660	4,888

※1 2021年度以降、分類を見直しました。

● Flu shots (at AIST)

(Persons)

FY	2020	2021	2022	2023	2024
AIST Tsukuba/Tokyo	1,962	0	0	0	0
Regional research bases	640	0	0	0	0
Grand total	2,602	0	0	0	0

● Other activities of health management

(Persons)

FY	2020	2021	2022	2023	2024
Exercises to refresh	video streaming	video streaming	video streaming	video streaming	video streaming
Walking lessons	※	video streaming	video streaming	video streaming	video streaming
Emergency first-aid workshops	※	video streaming	video streaming	video streaming/60	59
Mental health seminars	146	video streaming	video streaming	video streaming	video streaming/7
Workshops (training)	239	214	246	308	382
Anger management workshops	43	50	—	—	—
dental health	—	video streaming	video streaming	—	—
Food and nutrition seminar	—	—	video streaming	video streaming	video streaming

* Due to Covid-19, the event was not held. (Exercises to refresh were conducted via video streaming.)

Promoting Digital Transformation to Improve Productivity

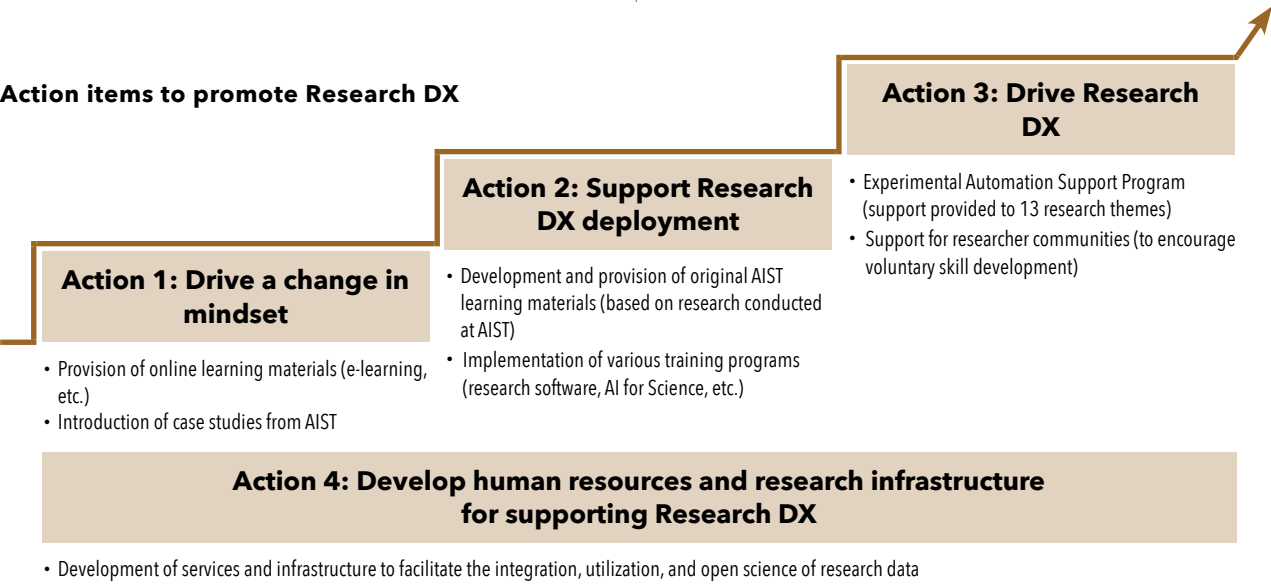
To enhance organizational productivity and create an environment in which researchers can better focus on R&D, AIST is promoting institute -wide digital transformation (DX) through a comprehensive review of all operational processes.

During the 5th term, AIST promoted reconstruction, integration, and consolidation of its business systems to address increasing obsolescence. It is estimated that approximately 325,000 work hours will be saved annually by

enabling online application submission and submission from mobile devices, as well as eliminating duplicate data entry through data integration.

In R&D, we are pursuing “Research DX,” which uses data-driven methods, digital twin-based simulations, and other digital technologies to fundamentally transform the way we conduct research. We have implemented four action plans tailored to the status of different initiatives.

Action items to promote Research DX



Key initiatives carried out in FY 2025 are outlined below.

Experimental Automation Support Program

In addition to leveraging advanced AI technology to drive the evolution of Research DX, we have launched a new internal project focused on robotics-driven laboratory automation and autonomous experimentation. This project aims to generate the large amounts of diverse, high-quality experimental data required for data-driven R&D. We selected 13 research proposals from a wide range of research fields submitted in response to our internal open call for proposals, and provided experimental automation support.



The AUTO KOBO workshop to promote laboratory automation

Developing an Open Science Platform

Data obtained from publicly funded research is expected to be shared openly within society. To support this, AIST has established and launched an institutional repository for

allowing researchers to easily publish their data through a dedicated application system.

Initiatives to Enhance the AIST Brand

Collaboration with a diverse range of partners is indispensable to achieving our 6th term mission to “continuously create innovations that contribute to solving social problems and strengthening Japan’s industrial competitiveness.” To this end, we aim to ensure that the AIST brand resonates with all stakeholders by effectively communicating our outstanding R&D achievements, research environment, and other strengths through the most appropriate channels.

We will also endeavor to foster a deeper understanding and appreciation of the AIST brand among all our

employees. In addition, we will also strengthen our collective communication capabilities with the outside world. Working as one across the AIST Group, we will contribute to the achievement of our mission.

Leveraging a wide variety of media and content, we are focusing on effectively tailoring our messaging to specific stakeholder touchpoints, more forcefully communicating AIST’s uniqueness, and improving the consistency and quality of our public image.

● AIST Magazine

AIST publishes AIST Magazine on its official website as a continuously updated online medium. AIST Magazine presents research results and initiatives aimed at resolving societal issues, as well as providing explanations of trending technological keywords. In FY 2024, AIST magazine published 51 articles, garnering approximately 150,000 page views per month.

We are also developing a cross-media strategy centered on AIST Magazine to guide readers from published articles to related content and events.

● Initiatives for building media connections

We actively issue press releases and otherwise feed newsworthy stories to the media with the aim of winning positive media coverage and communicating AIST’s latest activities and achievements to the general public. In addition to academic research outcomes, we have focused on delivering messages related to social implementation and social infrastructure, with 158 press releases being issued in FY 2024.

To build constructive relationships with the media, we also hold media roundtables at which the President or other senior executives present research results and AIST’s initiatives.

● AIST Tsukuba Special Open Day / public open house events

AIST research bases hold public open house events every year. AIST Tsukuba holds a Special Open Day aimed at junior high and high school students and above to cultivate their interest in science and technology and encourage them to consider working at AIST. These events include research lab tours and roundtables with researchers. The FY 2024 event was held in October and attracted approximately 1,700 visitors.



● President’s Message

We hold quarterly President’s Message video broadcasts to foster a deeper understanding and appreciation of the AIST brand among all our employees. These broadcasts include



conversations with staff and help both to share management policies and to energize internal communication.



Environmental and Safety Policies and Initiatives

Environmental Policy

AIST has established the Charter of Environment and Safety to make steady progress in environmental considerations and other initiatives. Under the Charter of Environment and Safety, we have also established the Environment and Safety Policy,

sharing within AIST that “global and local environmental conservation” and “ensuring the safety and health of all AIST employees” are important issues.

Environment and Safety Policy

- 1

We proactively conduct research that contributes to conservation of the environment and the development of a healthy and safe society.
- 2

We comply with laws, regulations, ordinances, and agreements, and strive to protect the environment and to improve health and safety.
- 3

We seek to reduce the consumption of energy and resources and the generation of waste, and thus aim to reduce loads on the environment.
- 4

We seek to prevent pollution and work-related accidents, to take prompt and appropriate actions in the event of an emergency, and to prevent the spread of damage.
- 5

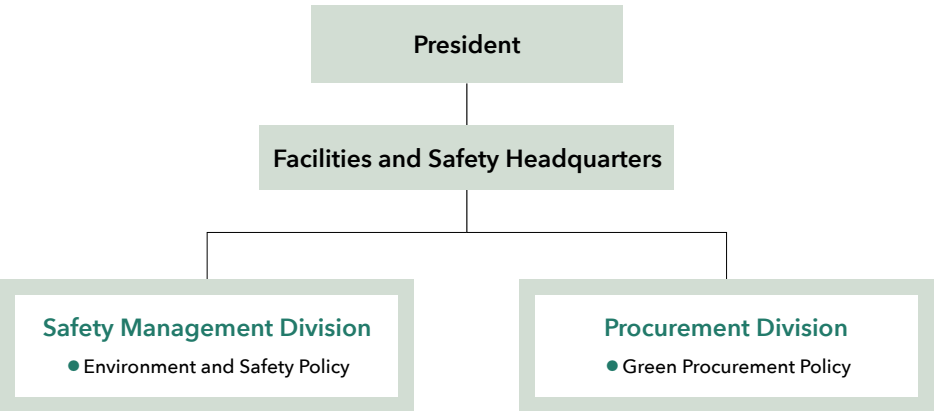
We are conducting activities to ensure environmental conservation, safety and health with the participation of all members of AIST; we seek continuous improvement.
- 6

We actively disclose environmental, safety and health information by publishing environmental reports and disclosing information to promote communication with society.

We also set a policy for promoting the procurement of eco-friendly goods and services in accordance with the Act on Promotion of Procurement of Eco-friendly Goods and Services by the State and Other Entities and the Green Purchasing Act.

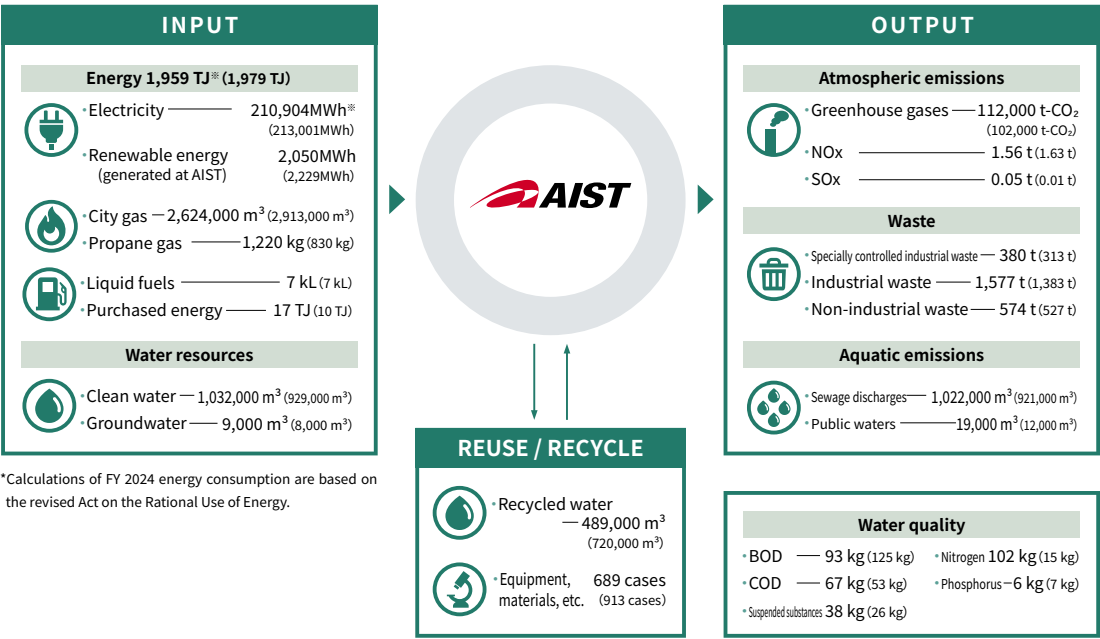
Implementation Structure of Policies Related to Environment and Safety

Efforts regarding environmental and safety considerations are promoted under the following system.



Overview of Environmental Burdens

(): results of FY 2024



Energy-saving Efforts

Reducing energy consumption per unit

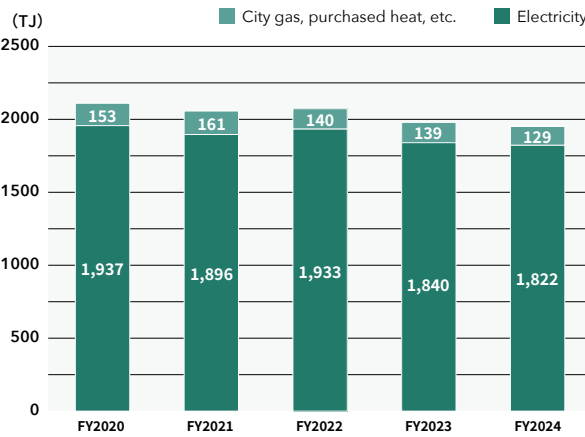
We work on reducing energy consumption per unit to an annual average of over 1%* in the medium to long term, an amount required under the Act on Rational Use of Energy. To achieve the target, we actively install devices with high energy-saving effect when renovating facilities, in addition to taking energy conservation measures by appropriate temperature settings of air-conditioners. Our existing solar power systems are being used effectively, and renewable energy systems have been installed in our new buildings.

Presently solar power systems are installed at AIST Tsukuba, Fukushima Renewable Energy Institute (FREA), AIST Tohoku, AIST Kashiwa, AIST Tokyo Waterfront, AIST Chubu, AIST Kansai, AIST Chugoku, and AIST Kyushu. Wind power generation is installed at FREA.

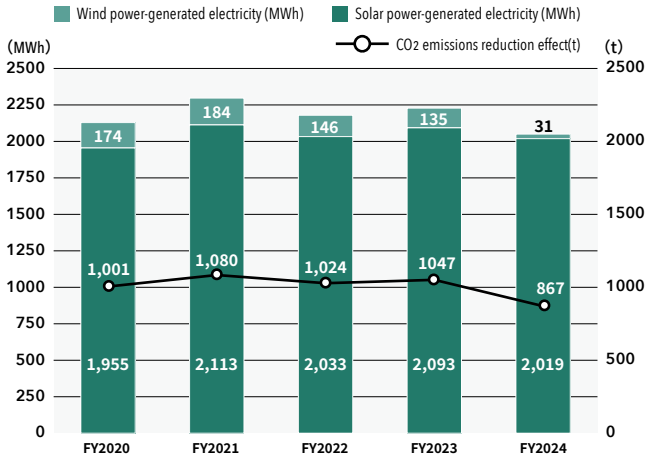
*The average annual change in unit energy consumption for the five years from FY 2020 to FY 2024 was 100.8% (compared to 97.7% in the previous year).

Use of renewable energy

Changes in amounts of energy used



Changes in renewable energy generation and CO2 emissions reduction



Regarding photovoltaic power generation, we aim to install photovoltaic power generation equipment in approximately 50% or more of the area available for installation by FY 2030, in accordance with the “Plan for Measures to be taken by the Government for the Control of Greenhouse Gas Emissions

in its Affairs and Businesses.” The total area of solar power generation equipment installed by FY 2024 was 16,788 m².
○ Renewable energy-based power generation in FY 2024: 2,050,317 kWh (approximately 0.9% of AIST’s annual power consumption)

Appropriate Management of Chemical Substances

In order to appropriately manage the wide variety of chemical substances used in our research activities, we have introduced the Chemicals and Gas Management System that enables us to manage the amount of hazardous chemicals and high-pressure gases we possess and use. Through this system, we are also able to ascertain the type and quantity of chemical substances in our possession, and ensure that we comply with laws and regulations and that we properly control the quantity possessed.

● Response to PRTR system

Based on the PRTR system* and ordinances and guidelines of some local governments, we monitor the amount of relevant chemical substances released into the atmosphere and transferred as sewage and waste.

In FY 2024, we reported on chloroform, methylene chloride, hexane, hydrogen fluoride and its water-soluble salts in accordance with PRTR requirements,; methanol in accordance with Tokyo Metropolitan ordinances; volatile

organic compounds (VOCs) in accordance with Osaka Prefecture ordinances; and ammonia, ammonia compounds and nitric acid compounds, sulfuric acid, and biphenyl compounds in accordance with Fukushima Prefecture guidelines.

*PRTR system: Pollutant Release and Transfer Register is a system introduced in FY 2001 for reporting the amount of chemical substances released into the environment or transferred out of business establishments as waste, based on the Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof. The system requires that the amount of hazardous chemical substances released into the environment and the amount transferred out of business establishments as waste be counted and disclosed to the public. Some local governments have also established similar systems through ordinances.

Consideration for Biodiversity and Animal Welfare

To comply with the Cartagena Act* to protect biodiversity, we provide education and training (e-learning) to personnel engaged in recombinant DNA experiments. A total of 1,022 people took the course in FY 2024 . In addition, we review the content of experiments based on the opinions of the Recombinant DNA Experiment Committee which is composed of outside experts. Furthermore, in principle, on-site inspections are conducted once a year at laboratories conducting recombinant DNA experiments to ensure that the content of the experiments is consistent with the experimental plan and that the experiments are conducted in accordance with the law.

In animal experiments, we examine whether the 3Rs (Replacement: use of alternative methods, Reduction:

reduction of the number of animals used, and Refinement: reduction of suffering) stipulated in the Act on Welfare and Management of Animals are taken into account, and we disclose the results of our self-assessment on our official website. In addition, we have undergone external verification by the Japan Pharmaceutical Information Center (JAPIC) and obtained certification for the animal experiment facilities.

*The Cartagena Act: In Japan, the Act on the Conservation and Sustainable Use of Biological Diversity through Regulations on the Use of Living Modified Organisms came into effect in 2004. It aims to ensure safe handling of living modified organisms that could have adverse effects on the conservation and sustainable use of biodiversity.

Consideration for Water Resources

● Prevention of water pollution

Wastewater from laboratories is sent to wastewater treatment plants and processed to abide by the Water Pollution Prevention Act and to meet municipal effluent standards. It is then discharged into the public sewerage system. To

prevent water containing hazardous substances from leaking into groundwater, AIST builds dikes and conducts periodic inspections of buried research wastewater pipes and groundwater quality to check for abnormalities.

● Use of recycled water

For the efficient use of water resources at AIST Tsukuba and AIST Tokyo Waterfront, research wastewater is neutralized, treated with reducing agents, and reused as recycled water. It

is used for cooling laboratory equipment and flushing toilets.
In FY 2024, 47% of the total water use was recycled water.



Wastewater treatment facility in AIST Tsukuba



Recycled water tank in AIST Tsukuba

Consideration for Atmospheric Emission

● Reduction of fluorocarbon emissions

In accordance with the Act on Rational Use and Proper Management of Fluorocarbons, AIST conducts periodic inspections and spot checks of refrigeration and air conditioning equipment that uses fluorocarbons as

refrigerants, to restrict emissions of fluorocarbons into the atmosphere. In FY 2024, a total of about 331 t-CO₂ was released. This was less than the amount (more than 1,000 t-CO₂) required to be reported under the Act.

● Prevention of air pollution

Regarding boilers for air conditioning that are major sources of NO_x and SO_x, we measure the effluent gases twice a year so that they do not exceed the emission standards under the Air Pollution Control Act. Regarding NO_x, in FY 2024, the measurement results were all within the limits in FY 2024.

Of SO_x, there has been little emission since 2017, and the results fall far below the emission standard. In addition, when replacing equipment, we choose chiller units with high energy-saving effects and downsized units to reduce emissions.

Promotion of 3Rs

AIST is promoting 3R (Reduce, Reuse, Recycle) initiatives to reduce environmental burdens. In particular, since the reuse of research equipment can be expected to reduce costs, AIST has introduced a system to promote the reuse of unneeded

research equipment, office equipment, fixtures, and consumables by posting information on its internal website.
○Cases of reuse in FY 2024: 689 FY 2025: 204

Compliance with Green Purchasing Act

Each year AIST discloses its policy for promoting the procurement of eco-friendly goods and services based on the Act on Promoting Green Purchasing. Furthermore, based on the Green Contract Act, we use a vehicle leasing evaluation method that comprehensively evaluates price and environmental performance (fuel efficiency). We award contracts to bidders with the best overall scores. For power

supply and industrial waste contracts, we use a threshold method. In this method, bidders are evaluated based on criteria such as greenhouse gas emission reduction measures and conformity with relevant certification systems. Contracts are awarded to the lowest bidder who meets or exceeds required standards.

Category	Item		Target value	Total amount purchased	Amount of specified purchase items	Target attainment
Paper	Photocopier paper		100 %	59,427.4 kg	59,427.4 kg	100 %
	Forms		100 %	0.0 kg	0.0 kg	- %
	Coated paper for inkjet color printers		100 %	0.0 kg	0.0 kg	- %
	Toilet paper		100 %	14,470.0 kg	14,470.0 kg	100 %
	Tissue paper		100 %	36.0 kg	36.0 kg	100 %
Stationery	Mechanical pencils		100 %	667	565	85 %
	Mechanical pencil leads		100 %	147	99	67 %
	Ballpoint pens		100 %	11,816	9,894	84 %
	Marker pens		100 %	13,387	10,122	76 %
	Media cases		100 %	31	5	16 %
	Glue (solid) (including refills)		100 %	3,300	3,231	98 %
	Glue (tape)		100 %	808	761	94 %
	Files		100 %	116,283	98,019	84 %
Office furniture, etc.	Chairs		100 %	1,625	1,237	76 %
	Desks		100 %	812	562	69 %
Imaging equipment, etc.	Photocopiers, etc.	Purchased	100 %	27	25	95 %
		Leased/rented (new)		10	10	
		Leased/rented (continued)	-	64	64	-
	Scanner	Purchased	100 %	171	127	74 %
		Leased/rented (new)		0	0	
		Leased/rented (continued)		0	0	
	Toner cartridges		100 %	4,336	3,502	81 %
	Ink cartridges		100 %	2,770	2,540	92 %
Office equipment, etc.	Paper shredders	Purchased	100 %	34	15	44 %
		Leased/rented (new)	-	0	0	-
		Leased/rented (continued)	-	0	0	-
Automobiles, etc.	Automobiles	Purchased	100 %	1	1	100 %
		Leased/rented (new)		9	9	
		Leased/rented (continued)		19	19	
Fire extinguisher	Fire extinguishers		100 %	298	278	93 %
Service	Passenger transportation		100 %	49	49	100 %

*Copiers, MFPs, expandable digital copiers

Environmental and Safety Self-check

As a unique initiative, AIST streams “Accidents and Safety and Health Information” (Summary of Incidents and Near Misses (Hiyari-Hatto) and Safety and Health Management) to all employees via the intranet and conducts a monthly “Environmental and Safety Self-check” to check the status of their own safety and health efforts after viewing the information.

We implement the PDCA (Plan, Do, Check, Act) cycle which includes viewing summary of incidents and near misses and safety and health management, implementing safety and health efforts, conducting environmental and safety self-checks, and improving safety education based on inspection results, to ensure the succession of safety and health know-how, reduce potential risks, and prevent accidents.

Environmental Education

Monthly Accidents and Safety and Health Information and e-learning is used to educate staff on themes that have impact on the environment, such as how to dispose of waste fluid

and emission gas from research, and how to sort and dispose of waste.

Response to Environmental Accidents

AIST conducts contact, communication, and emergency action drills at all research bases once a year to minimize damage in the event of an environmental accident such as a leakage of oil or chemicals. We have a system that receives a report and responds immediately in the event of an accident. After expeditious measures, related organizations are notified. The Facilities and Safety Headquarters analyzes the cause of the accident and takes measures to prevent a recurrence of such an incident.

[Accidents in FY 2024]

In FY 2024, there were no cases of refrigerant leakage from refrigerators.

[Environmental accident drills in FY 2024]

We conducted 11 accident drills across all research bases simulating accident situations such as damage to research drainage pipes and leaks during the transport of waste fluids.



Water quality analysis during an environmental accident drill simulating a leakage accident at a laboratory wastewater treatment plant caused by an earthquake

Environmental Reporting Data

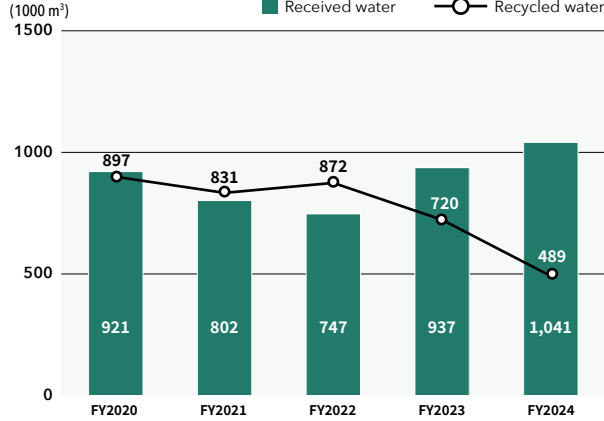
Water resources

Breakdown of water received

Unit: 1000 m³

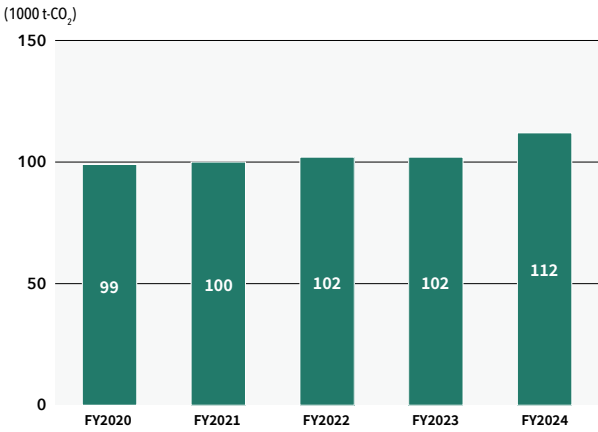
FY	2020	2021	2022	2023	2024
Potable water	913	795	740	929	1,032
Groundwater	8	7	8	8	9
Industrial water	0	0	0	0	0
Received water	921	802	747	937	1,041
Recycled water	897	831	872	720	489

Changes in amounts of water received and reused



Atmospheric emissions

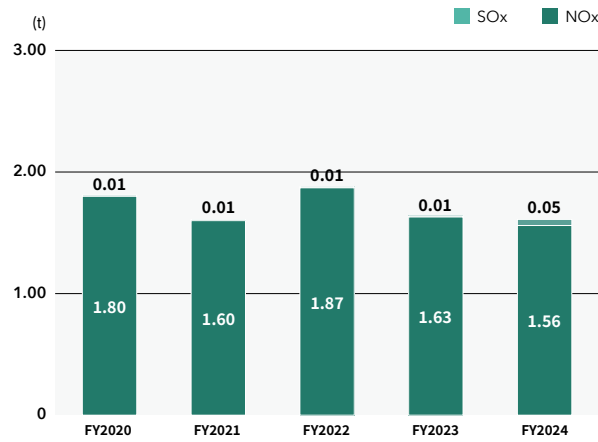
Changes in CO₂ emissions by year



Estimated leakage of CFCs (FY 2024)

Type	R-number	Estimated t-CO ₂ released by R-number	Estimated t-CO ₂ released by type
HCFC	R22	0	0
HFC	R32	5.9	331.1
	R134a	2.6	
	R404A	0	
	R407C	7.3	
	R410A	315.3	
Mixed	Mixed refrigerant	0	0
Total			331.1

Changes in atmospheric environmental loads

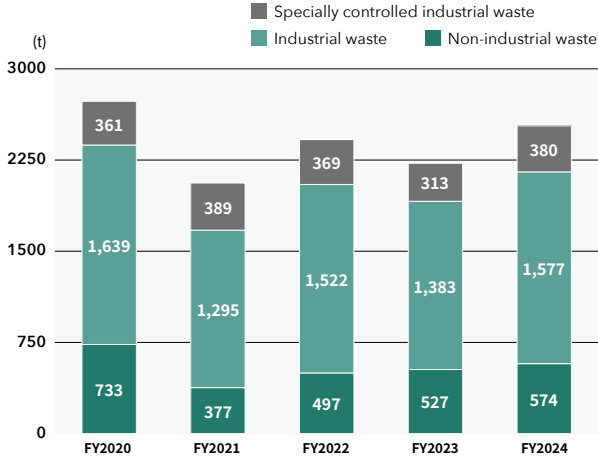


Waste

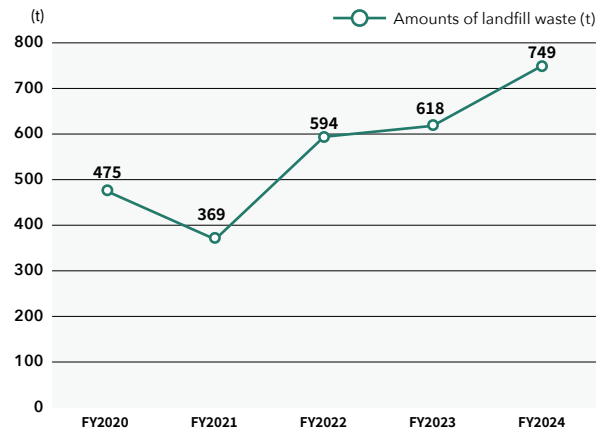
Breakdown of generated waste (FY 2024)

Waste type	Amount disposed of (t)	Amount landfilled (t)	Percentage of waste landfilled (%)
Non-industrial waste	573.97	95.48	16.6 %
Industrial waste	1,576.77	559.57	35.5 %
Plastic waste	421.20	71.13	16.9 %
Metal scrap	464.50	17.51	3.8 %
Sludge	378.55	339.99	89.8 %
Glass/concrete/ceramic waste	43.16	14.42	33.4 %
Slag	7.84	0	0.0 %
Other	261.52	116.53	44.6 %
Specially controlled industrial waste	380.46	94.16	24.7 %
Flammable waste oil	52.29	21.94	42.0 %
Strong acids	217.07	3.22	1.5 %
Infectious waste	16.28	6.53	40.1 %
Waste oil (hazardous)	4.39	3.98	90.7 %
Sludge (hazardous)	56.33	54.78	97.2 %
Acid waste (hazardous)	2.94	0.06	2.0 %
Other	21.15	3.66	17.3 %
Total	2,531	749	29.6 %

Changes in amounts of disposed waste



Changes in amounts of landfill waste



Storage and disposal of PCB-containing items and PCB waste

Waste type	Quantity stored at the end of FY 2022	Quantity added in FY 2023	Quantity disposed of in FY 2023	Quantity stored at the end of FY 2023	Quantity added in FY 2024	Quantity disposed of in FY 2024	Quantity stored at the end of FY 2024
Capacitors	0	4	2	6	162	166	2
Electrical ballasts	0	0	0	0	0	0	0
Transformers	6	0	5	1	0	1	0
Oils/paints (L)	0	0	0	0	0	0	0
Other contaminated materials	Stored research chemicals, etc.	Added waste cloth used for analysis	Disposed research chemicals and waste cloth used for analysis	Stored research chemicals, etc.		Disposed research chemicals, etc.	Stored research chemicals, etc.

● Water quality

Monitoring groundwater at AIST Kansai

Sampling month	Measurement of arsenic and other compounds (standard value: 0.01 mg/L or less)	Sampling month	Measurement of arsenic and other compounds (standard value: 0.01 mg/L or less)
2024. 4	0.024	2024. 10	0.043
2024. 5	0.032	2024. 11	0.030
2024. 6	0.016	2024. 12	0.002
2024. 7	0.031	2025. 1	0.036
2024. 8	0.031	2025. 2	0.024
2024. 9	0.021	2025. 3	0.022

● Proper management of chemical substances (FY 2024)

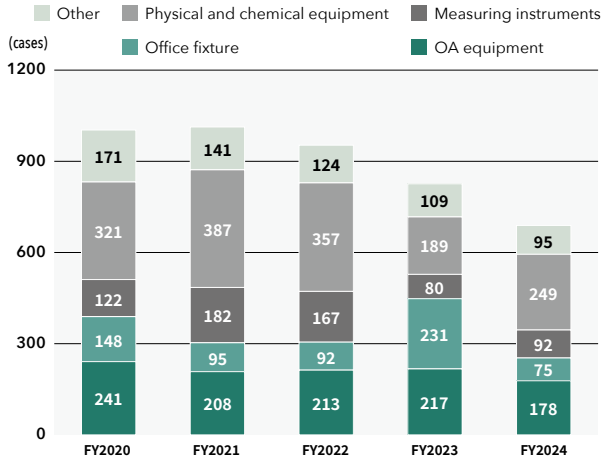
Amount of chemical substances reported under the Chemical Control Program

Research site	Substance	Volume handled	Amount discharged	Amount transferred	
			Atmosphere	Sewer	Waste
Fukushima Renewable Energy Institute, AIST	Ammonia (kg), Ammonia compounds and nitrate compounds	6,200	0.3	0	290
	Sulfuric acid	1,100	0	0	1,100
	Biphenyl	380	0	0	380
AIST Tsukuba	Chloroform (kg)	1,900	270	0	1,600
	Methylene chloride	1,300	110	0	1,200
	Hexane	1,500	230	0	1,300
AIST Tsukuba West	Hydrogen fluoride and its water-soluble salts (kg)	3,600	0	510	470
AIST Tokyo Waterfront Annex	Methanol (kg)	120	1.4	0	120
AIST Kansai	VOC(kg)	2,300	110	0	2,200

*AIST Tsukuba, AIST Tsukuba West: PRTR Law
AIST Tokyo Waterfront: Ordinance on the Environment to Ensure the Health and Safety of Tokyo Citizens
AIST Kansai: Osaka Prefectural Ordinance on Preservation of Living Environment, etc.
Fukushima Renewable Energy Institute, AIST (FREA): Fukushima Prefecture Guidelines for Proper Management of Chemical Substances (Substances whose handled, released, or transferred amounts are 100 kg or more are listed)

● Reuse of equipment, materials, etc.

Number of reuse transactions



● Environmental accident drills

Number of environmental accident drills conducted from FY 2020 to FY 2024

FY	Number of drills
2020	19
2021	19
2022	19
2023	13
2024	11

● Contracts with environmental considerations

Types and number of environmentally friendly contracts (FY 2024)

Types of green contracts	Number of cases
Lease of motor vehicles	5
Electricity supply contract	14
Industrial waste	30

Governance Policies and Initiatives

Basic Concept

Improve Governance by Separating Management and Execution, Optimization of Organizational Management Structure

Initiatives for the 5th term (FY 2020-FY 2024)

AIST reviewed its organizational management structure and separated management and execution as of April 1, 2021, in order to establish effective governance to demonstrate its comprehensive strength.

The Board of Directors discusses important matters related to the overall management of AIST. We increased the number of external board members to incorporate more objective external perspectives into the Board's deliberations and ensure a management structure that maximizes AIST's collective capabilities under the President's management.

Initiatives for FY 2025 and outlook for the 6th term (FY 2025-FY 2031)

AIST entered its 6th medium- to long-term target period on April 1, 2025, with its mission to "continuously create innovations that contribute to solving social problems and strengthening Japan's industrial competitiveness."

While retaining the organizational management framework developed during the 5th term, we reviewed our research and headquarters organizations to build a research structure that leverages AIST's collective capabilities more effectively. We restructured our research organization by establishing "Integrated Research Centers for Implementation" to further promote interdisciplinary research and address social issues. Additionally, we implemented

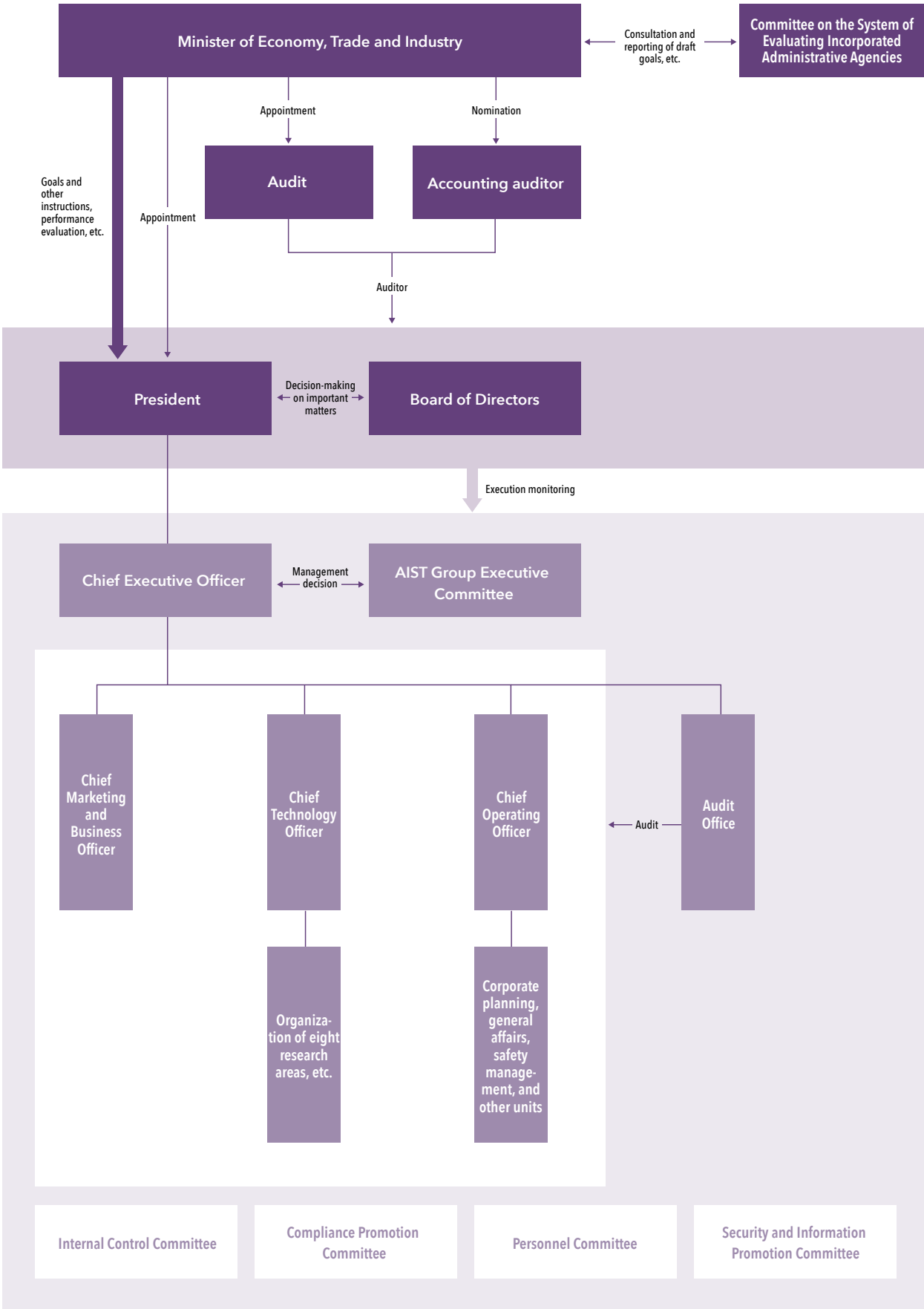
We also instituted reforms to create the positions of Chief Executive Officer, Chief Technology Officer, Chief Operating Officer, and Chief Marketing and Business Officer.

To promote the social implementation and commercialization of research outcomes, we established AISol in April 2023 as a wholly owned subsidiary dedicated to driving the utilization of those outcomes. Thereby, we created an organizational management structure that seamlessly integrates the operations of the entire AIST Group from basic research to social implementation.

reforms focused on strengthening our engineering and technology intelligence capabilities. Moreover, we restructured our headquarters organization to integrate management operations, further strengthen the functions of corporate divisions, and improve employee services. We also appointed an additional external director effective July 1, 2025, to further enhance the incorporation of independent and objective perspectives into AIST's management that was promoted in the 5th term. We will continue to flexibly review our organizational structure for strategically acquiring external public funding throughout the 6th term.

Organizational Management Structure

We will ensure the appropriateness of overall business operations so that AIST can fully demonstrate its capabilities and fulfill its mission.



Promotion of Compliance, Ensuring Research Security and Integrity

AIST is pursuing the following initiatives to raise compliance awareness among employees, take our organizational culture to the next level, and ensure research security and integrity.

Compliance initiatives
1 In principle, we hold a Compliance Promotion Committee meeting every week to gather risk information and determine how to address it. Risk information is also shared at regular in-house meetings to prevent recurrence.
2 In the event of an allegation of internal reporter research misconduct, an investigation committee is formed to investigate the matter, the results are reported to the President, and necessary corrective measures are taken.
3 In line with the Compliance Specialist Committee of the National Research and Development Agency (NRDA) Council, we have designated December as Compliance Month. Activities include messages from management, special training, seminars, workshops, and the display of NRDA Council Compliance Month posters.
4 In addition to e-learning courses for the executives and employees, we provide compliance education as part of training for newly hired employees and management training for unit directors and research group leaders, with content adjusted to each group of participants.
5 In an effort to instill compliance, we post monthly compliance posters titled “Compliance Letter,” created under a different theme for each month. This is aimed at increasing employee awareness of compliance and urging them to be vigilant at work.

Internal Report System

AIST has established an internal reporting system based on the regulations not only for consultation and reporting of harassment and research misconduct, but also for early detection and correction of misconduct to maintain public trust in AIST and to ensure fairness in business operations.

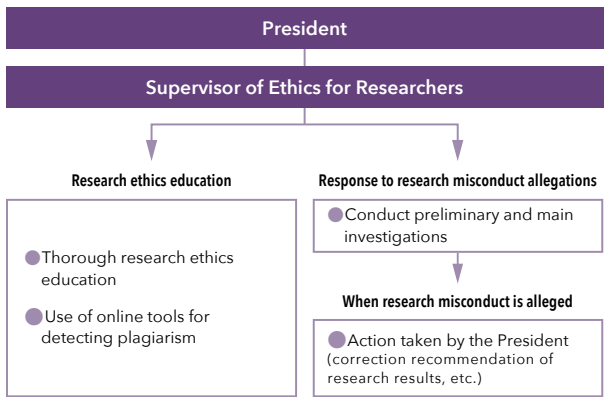
In FY 2024, AIST enhanced its internal reporting system by establishing a new reporting channel that allows employees to bypass standard internal reporting lines and raise management related concerns directly with Auditors, who are independent of the executive line.

Research misconduct

When a allegation on research misconduct is made, we handle the allegation rigorously in accordance with the relevant rules and regulations.

As part of our efforts to prevent the occurrence of research misconduct, we provide research ethics education through various training programs. We have also made and distributed the Handbook on Ethics for Researchers to the executives and employees that summarizes the ethical standards and precautions required as “5 minds” of researchers to fulfill their research activity.

We also promote the use of online tools for detecting plagiarism to prevent research misconduct.



Management of Research records

As a public research institute, AIST is strictly required to prevent fabrication or falsification of research data, plagiarism, and other forms of research misconduct as outlined in the guidelines issued by the Ministry of Education, Culture, Sports, Science and Technology and Ministry of Economy, Trade and Industry.

Accordingly, AIST has set “Rules on Management of Research Records” and has made it obligatory to record research information. AIST has made it obligatory to register the research information required to be stored as research

notebooks in the recording system to have the research notebooks examined by supervisors. In addition, to ensure the careful management of research information, AIST has restricted the removal of research notebooks and copies upon retirement, and has established guidelines for handling research information other than research notebooks.

AIST will continue to do its utmost to ensure the integrity and transparency in research and will make efforts to prevent research misconduct.

Ensuring research security and integrity

In April 2025, we established the Research Security and Integrity Department to serve as a command center for research security and integrity. In July of the same year, we also expanded this unit's responsibilities to include risk management and renamed it the Research Integrity and Compliance Division. We take the FY 2023 incidents involving

research misconduct and violations of the Unfair Competition Prevention Act very seriously. To prevent any recurrence, we will continue our efforts to tighten information security, improve technical data management, and enforce rigorous research ethics training.

Disclosure of Information and Protection of Personal Information

Disclosure of information

To increase the transparency of AIST’s activities and fulfil its accountability requirements, AIST proactively discloses information on its website and by other means in accordance

with the Act on Access to Information Held by Incorporated Administrative Agencies (implemented October 1, 2002).

Information Disclosure and Personal Information Protection Desk

Requests for information disclosure in accordance with the Act on Access to Information Held by Incorporated Administrative Agencies and the Act on the Protection of Personal Information can be made at Information Disclosure and Personal Information Protection desks of AIST Tsukuba, AIST Tokyo and other regional research bases as well as

the website (the website accepts request in accordance with the Act on Access to Information Held by Incorporated Administrative Agencies only). Each desk also provides help on the procedures for disclosure and personal information protection.

Protection of personal information

In accordance with the Act on the Protection of Personal Information enforced on April 1, 2022, AIST protects the individual's rights and interests while ensuring that activities at AIST are conducted properly and smoothly.

We promote understanding of personal information protection and appropriate management of personal

information by educational training and e-learning to executives and employees every year. We also strive to raise awareness of the appropriate management of information including personal information and compliance of information security.

Internal Audits

At AIST, the Audit Office is deemed an independent organ that reports directly to the president. In collaboration with the auditor and the accounting auditor, the office endeavors to achieve: (1) effective and efficient work; (2) observance of laws and ordinances governing AIST operations; (3) preservation of assets; and (4) reliable financial and other reports. Toward these ends, the office monitors whether individual operations

function properly and efficiently and based on the findings, recommends improvements and other corrective actions. These internal audits are performed to support the auditees, not only by detecting and pointing out problems in work processes, but also by suggesting effective improvements based on mutual understanding that is built through thorough discussion on the problems.

● In FY 2024, audits were performed concerning the following topics:

- On specific themes that urgently need auditing as well as cross-sectional themes, for administrative headquarters, and research units, audits were conducted. While the audits confirmed that these operations were generally all being carried out properly, issues in terms of compliance, effectiveness, and efficiency of some were identified. The auditees concerned were advised to swiftly make
- suggested improvements and the improvements were confirmed.

 - As information security audit and personal information management audit, audits were conducted on implementation status of various rules, and the audits confirmed that these matters were generally being handled properly.

	Internal audit	Auditor audit	Accounting auditor audit
Scope of audit	- Operational audit - Accounting audit - Compliance audit	- Operational audit - Accounting audit	Accounting audit
Points of audit	- Activities as a whole - Risk management, confirmation and appropriateness of operation of internal control systems - Improvement of work process efficiency	- Activities as a whole - Decision-making by the President - Creation and operation of internal control systems - Appropriateness of financial statements	Appropriateness of financial statements (effectiveness of internal control systems)

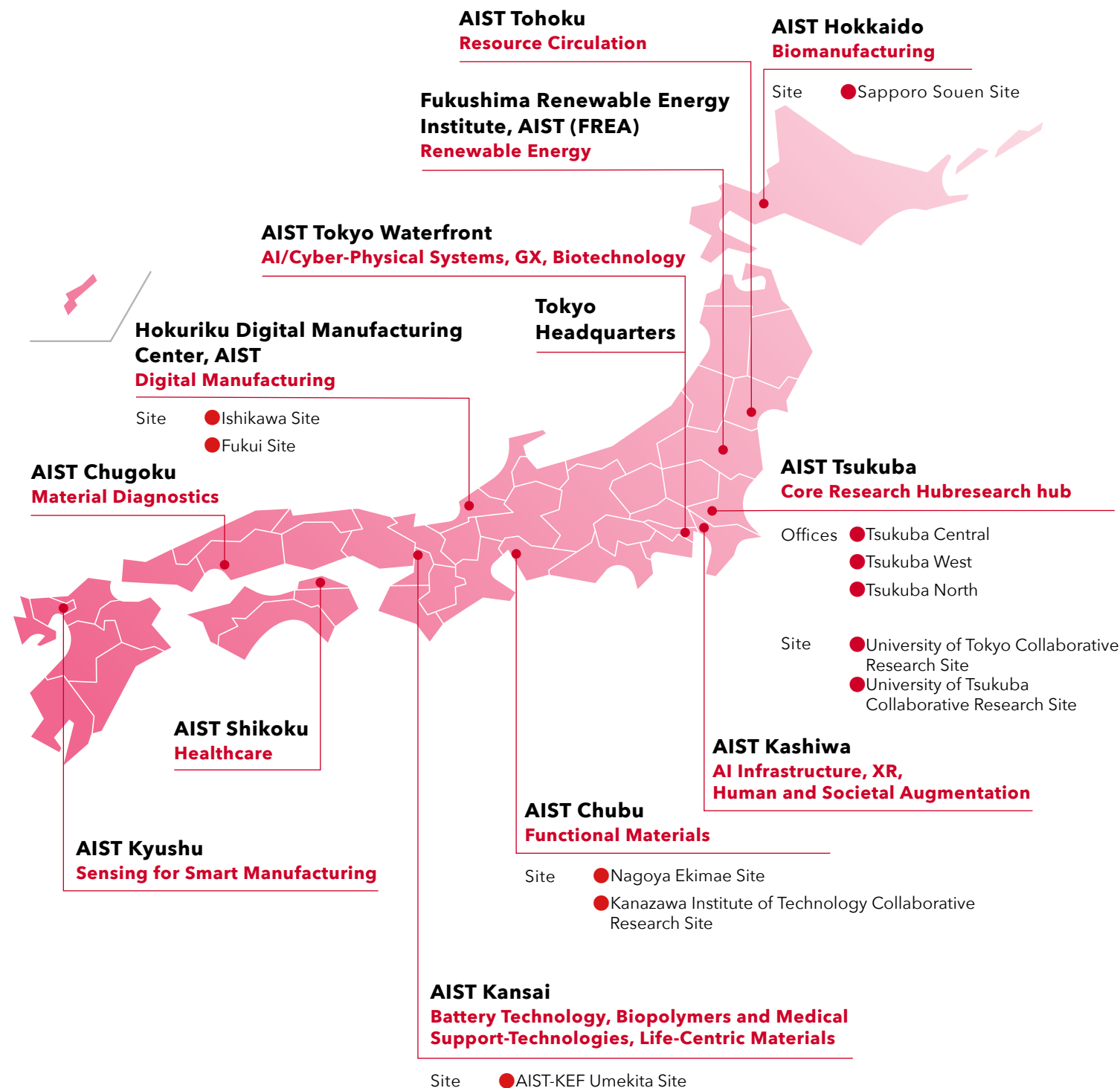
Fair Operating Practices

We conduct appropriate work management based on the law.

Subject	Purpose	Action in FY 2024
Management of Conflict-of-Interest	Management of conflict-of-interest is conducted based on the rules for conflict-of-interest management.	- We have a conflict-of-interest management system in place to ensure transparency and address public concerns that AIST employees may prioritize their personal interests over duties and research responsibilities in industry-academia-government collaborations. In FY 2024, all 3,545 executives and employees subject to the requirement submitted their conflict-of-interest self-assessments. Three employees, who were more likely to give rise to perceptions of conflicts of interest, were interviewed by external counselors to observe and review their activities. They were notified of points to be noted in promoting industry-academia-government collaborations after deliberation by the Conflict-of-Interest Management Committee, which included external experts. - To ensure transparency and dispel concerns that we prioritize profits over public responsibility, we launched the full-scale operation of an organizational conflict-of-interest management system in FY 2020. We identified 60 organizations with which we have close collaborative relationships as target organizations. The Conflict of Interest Management Committee was then tasked with continuously observing and reviewing our industry-academia-government collaboration and procurement activities involving those organizations.
Information Security	In order to ensure information security regarding information systems and important information, AIST implements measures that comply with Common Standards for Cybersecurity Measures for Government Agencies and Related Agencies.	- Information security measures - Deployment of platforms for implementing zero trust security tailored to the institute's operations - Response to information security incidents by the Computer Security Incident Response Team (CSIRT) - Conduct drills based on business continuity plans in preparation for information security incidents, etc. - Information security training - Training by job level according to roles related to information security - Information security audit - Conducting information security audits for all departments
Implementation of Security Export Control	To maintain peace and security within the international community, AIST has tight security export controls in place in accordance with AIST's Rules on Security Export Control (internal rules and regulations), formulated based on the Foreign Exchange and Foreign Trade Act, thereby preventing AIST's technology from being used for the development of weapons of mass destruction.	Through (1) dissemination of the latest information on legislative amendments within AIST; (2) export control training for AIST staff; (3) export control instruction to individual staff members; (4) classification and transaction screening; and (5) internal audits, efforts are being made to raise awareness of security export control at staff level, and (6) providing guidance to and conducting audits of its subsidiary AISol, efforts are being made to raise awareness of security export control at staff level, and by maintenance of departmental systems, we are implementing appropriate export controls.
Promotion of Rational Procurement	We promote autonomous, continuous rational procurement with its operational attributes in mind while keeping its fairness, and transparency through the PDCA cycle, based on the Promotion of Rational Procurement in Incorporated Administrative Agencies (decided by the Minister for Internal Affairs and Communication May 25, 2015)	Each year, we formulate an AIST Rational Procurement Policy, and conduct ex-post facto inspections of individual contracts by a Contract Oversight Committee, whose members include outside experts. We answered to questions from members and obtained their agreement. Once a fiscal year ends, we conduct a self-assessment of how our rational procurement policy for the fiscal year has been implemented using the set indicators, and the results are publicized. As part of the CSR procurement and pursuant to the Act on Promotion of Government's Procurement of Goods Supplied by Facilities for Persons with Disabilities to Work, every year AIST also discloses its policy for promoting the procurement of goods from those facilities and its procurement results. As outcome of efforts in line with the policy, we were able to achieve a goal that exceeded the results of the previous year. Furthermore, AIST has introduced a procurement method that evaluates suppliers based on how they promote work-life balance, with the aim of realizing public procurement contributing to women's active participation in the workforce. (To see how the rational procurement plan is conducted, list of documents of the Contract Oversight Committee, AIST policy of Goods Supplied by Facilities for Persons with Disabilities to Work and procurement records, please look up announcements on the following website: aist.go.jp/aist_j/procure/)

Research Bases

As of August 2025



Third Party Opinion

The year 2025 marks the beginning of AIST's 6th Term Management Policy period (FY 2025-FY 2031), and there is great interest in the strategies the Institute is implementing to evolve into a "constantly growing national research institute." As such, I am basing my evaluation of this report on the degree to which it addresses that interest. By the way, I take "constantly growing national research institute" to mean a national research institute that continues to create social value as the core of Japan's innovation ecosystem.

In this report, AIST identifies 18 challenges to be addressed for long-term value creation as its materialities. Identifying such materialities is a judicious approach, since it can play an important role in enhancing communication quality by highlighting an organization's key challenges and opportunities and articulating the value creation strategies required to achieve its vision. As the editorial policy also explicitly states, the value creation process is a key focus of the report. Much of the report's content is devoted to this subject. The report convincingly describes strategies, presenting both short-term and long-term strategies through the lenses of forecasting and backcasting. Regarding the research strategy, given that other major countries are prioritizing key technologies for investment, AIST's decision to conduct strategic, intensive R&D in fields such as AI, quantum computing, and biotechnology gives reason to look forward to the outcomes of this "selective and focused allocation of management resources." The section on "Building a Stable Financial Base and Resource Allocation Policy" first explains the difference between public institute and corporate accounting. Then, it emphasizes the need for a solid financial base to support AIST's long-term value creation. The report also stresses the importance of ensuring that the funds entrusted to AIST are being utilized effectively.

The above three points demonstrate that the report does a fair job of addressing reader interest. However, I found it somewhat wanting with respect to storytelling, an aspect that is broadly seen in this day and age to be essential to effectively communicating the value creation process. I think that drawing closer connections between the report's various sections would have improved its narrative coherence and articulation of the value creation process.

Human resources will be a key issue in the 6th term. The President and many other stakeholders view/consider improving the value of AIST's workforce as an urgent issue. This report also covers human capital management from various perspectives. However, highlighting HR strategy alone may not be enough to resonate with many stakeholders if the focus is on the value creation process. As noted in the Report of the Study Group on Improvement of Sustainable Corporate Value and Human Capital (the Ito Report), it is essential in an integrated report to show how the business model, management strategy, and human resources strategy are interconnected. As mentioned above, while the report meticulously details management strategy, I would like to see it do a better job of articulating how HR strategy is linked to management strategy, the kind of talent needed to drive that strategy, and how AIST plans to recruit and nurture such talent.

Workers Club for Eco-harmonic Renewable Society (NPO)

Director **YAMAGUCHI Tamio**

On the Publication of AIST Report 2025

This is the first AIST Report of The 6th Medium- to Long-Term target period (FY 2025-FY 2031). Under our pledge to make major advances, we have just drawn up a new 6th Term Management Plan as a roadmap for achieving a paradigm shift in our evolution. To improve the AIST Report, we submitted last year's report to an external award program. Based on the expert opinions we received as a result, we made several major revisions to produce the AIST Report 2025.

In his opening message, President and CEO ISHIMURA Kazuhiko reflected on the 5th term, outlined the management policy for the 6th term, and expressed his determination to achieve its goals.

The "AIST Group Initiatives for Value Creation" section took shape through extensive discussions of the Executive Committee and articulates AIST's unique approach to value creation as a national research institute, which differs from that of private enterprises. We also presented our materialities for the first time.

In early in the report, "Toward a Constantly Growing National Research Institute Leveraging AIST's Research Capabilities to Support National Strategies," Senior Vice President OBARA Haruhiko and

Auditor's Opinion

This report is an integrated report that outlines the activities of the 5th Medium- to Long-Term Plan target period with a focus on FY 2024, and it also looks at the prospects for the 6th term. Since FY 2024 was the final year of the 5th Medium- to Long-Term Plan target period, the report reviews the achievements of the entire 5th term, and outlines strategies for establishing Japan's innovation ecosystem in the 6th term.

The section titled "AIST Group Initiatives for Value Creation" presents AIST's vision for an ecosystem covering the entire cycle—from setting research agendas to social implementation and returning value—in the face of increasingly complex societal challenges. This has been revised repeatedly since 2023, with each revision reflecting a deeper understanding within the AIST Group. Sustaining this cycle requires continuous innovation. AIST drove a change in mindset throughout the Group during 5th term, but it must continue sharing its new mindset in the 6th term.

The section titled "The AIST Group's Materialities" presents the challenges that the AIST should address and its key management priorities. These challenges and priorities are organized as 18 materialities, which were identified through repeated discussions by the Editorial Committee and AIST Group Executive Committee. These materialities need to be constantly reviewed throughout the 6th term to examine and steadily implement measures that will achieve the set indicators and targets.

As a research institute, AIST's research achievements and their social implementation inevitably garner the most attention. However, sustained sound organizational management is essential to producing those achievements. The six indicators and targets for boosting AIST's competitiveness listed in the Materialities section are all fundamental to organizational management, and AIST needs to strengthen its efforts to achieve them through constant review and improvement.

Looking back, the 5th term began amid the unprecedented circumstances of the COVID-19 pandemic. Despite this, AIST managed to maintain its operations through devising novel means of communication, and marshalled its collective strengths to accomplish a great deal, including formulating the AIST Vision, Code of Conduct, Research Management Policy, and 5th Term Management Policy; implementing governance and HR system reforms; establishing the Hokuriku Digital Manufacturing Center; promoting regional innovation, enhancing the AIST brand; driving interdisciplinary research; and establishing AIST Solutions as a wholly owned subsidiary. At the same time; however, leaks of technical information, research misconduct incidents and other issues came to light, casting a shadow over AIST's public reputation. In the 6th term, AIST must do its utmost to prevent the recurrence of such lapses in compliance and strengthen its ethical standards.

AIST positioned the 5th term as a prototype construction period aimed at laying the ground for achieving its vision. Rather than merely extending the advances of the 5th term, AIST now needs to undergo a paradigm shift to become the true core of Japan's innovation ecosystem. Whether the foundation built during the 5th term was sufficient to achieve this shift will be tested by the value that AIST delivers in the 6th term now underway.

Auditor **YONEYAMA Chikako**

G-QuAT Center Director MASU Kazuya discuss prospects for generating world-class research outcomes and implementing them in society. Vice President (part-time) SATO Yasuhiro also expressed his high expectations for AIST's new endeavors. At the end of the report, we included the valuable third-party opinion and advice of Workers Club for Eco-harmonic Renewable Society (NPO) Director YAMAGUCHI Tamio and an internal perspective from Auditor YONEYAMA Chikako.

Working together with stakeholders to realize our vision to "Create the Future, Collaborate Together" and embody the spirit expressed in our brand story of "Bringing an invisible future into view with AIST by your side," the AIST Group will work as one to drive innovation in Japan. And by introducing the activities of the AIST Group through this report, we will strive to build an even deeper relationship of trust with society.

Branding and Public Relations Department, Director
MIYAZAKI Koyomi

You are on the endless road of research and development.
AIST knows how long and rough it is.

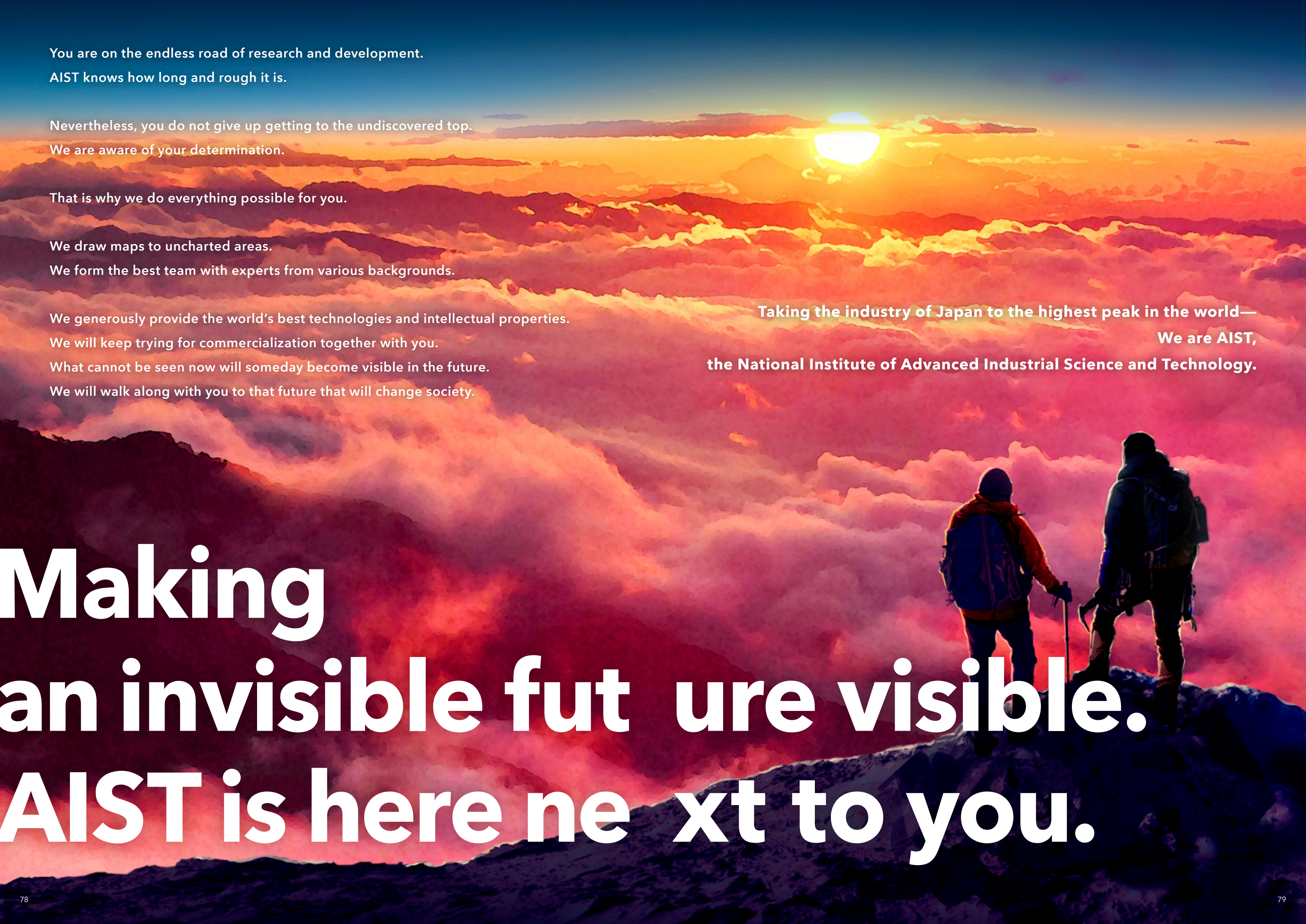
Nevertheless, you do not give up getting to the undiscovered top.
We are aware of your determination.

That is why we do everything possible for you.

We draw maps to uncharted areas.
We form the best team with experts from various backgrounds.

We generously provide the world's best technologies and intellectual properties.
We will keep trying for commercialization together with you.
What cannot be seen now will someday become visible in the future.
We will walk along with you to that future that will change society.

**Taking the industry of Japan to the highest peak in the world—
We are AIST,
the National Institute of Advanced Industrial Science and Technology.**

A full-page background image showing two hikers with backpacks standing on a rocky mountain peak, looking out over a vast, colorful landscape of clouds and mountains under a bright, low sun. The scene is bathed in warm orange and red light, suggesting a sunrise or sunset. The hikers are silhouetted against the bright sky.

Making an invisible future visible. AIST is here next to you.



NATIONAL INSTITUTE OF
ADVANCED INDUSTRIAL SCIENCE AND TECHNOLOGY

Branding and Public Relations Department

1-1-1 Umezono, Tsukuba, Ibaraki 305-8560, Japan
puboff-ml@aist.go.jp

○Reproduction in whole or in part without written permission is prohibited.

