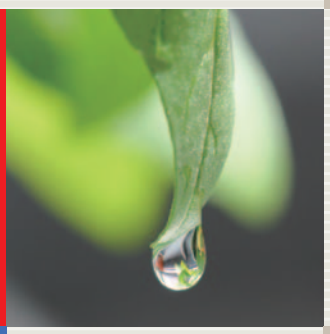
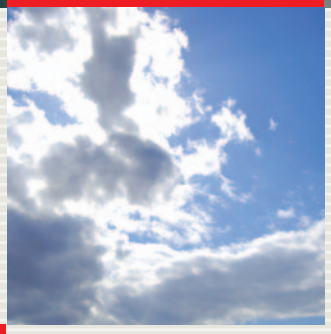
NATIONAL INSTITUTE OF
ADVANCED INDUSTRIAL SCIENCE
AND TECHNOLOGY (AIST)



AIST REPORT

2014 Social and Environmental Report



AIST REPORT

National Institute of Advanced Industrial Science and Technology
AIST

CHARTER

Full Research in Society, for Society

National Institute of Advanced Industrial Science and Technology (AIST),
An Independent Administrative Institution

The common goal of humankind is to realize a society in which every person can enjoy a comfortable life. Science and technology can lead the way to such a society. The mission entrusted to AIST and its staff, as members of the scientific community, is to develop science and technology that complements society and the environment.

We, the staff members of AIST, recognize our mission and responsibility to society. We work towards the realization of such a society through research and development in industrial science and technology.

■ Accurate Assessment of Social Trends

We endeavor to ascertain social trends and needs at every level of society from local communities to the international stage, to identify key issues promptly, and to propose scientific and technological solutions in collaboration with other organizations.

■ Creation of Knowledge and Technology

We value each person's autonomy and creativity and display our collective strength through collaboration and synergy, creating new knowledge and innovative technology based on advanced research efforts.

■ Application of Research Findings

We contribute to Japan's industrial development by applying our research findings to academic pursuits, intellectual infrastructure development, technology transfer, and policy proposals. We endeavor to enhance and disseminate science and technology through human resources development and the open sharing of information.

■ Responsible Conduct

We are actively involved in improving our own abilities and our working environment in order to perform our duties more effectively. We respect both the letter and the spirit of the law and maintain a strict sense of ethics in all our affairs.

Charter of the Environmental Safety

- 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.
- In compliance with the applicable laws and regulations related to environmental protection, we establish the autonomous standards of the institute such as Safety Guideline, etc. and with this in mind, we shall endeavor to conserve environment and promote health and safety at all times.
- 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) first published an Environmental Report in the fiscal year (FY) 2004. Since FY2010, AIST has published the AIST Report, which is the Environmental Report combined with a report on corporate social responsibility (CSR) activities.

In editing AIST's 2014 Social and Environmental Report, our aim has been to have a variety of stakeholders understand both AIST's CSR activities and the activities by which it effectively links its science and technology research outcomes and businesses, thus building a deeper relationship of trust through harmonious coexistence between AIST and society. This report presents AIST's social activities—particularly those relating to the mission of the Fukushima Renewable Energy Institute, which opened in 2014.

Detailed data on Environmental Report–related activities at each research base are available on AIST's website.

AIST's official website: http://www.aist.go.jp/

◆ **Activities covered by the report**

Research activities at all AIST research bases

◆ **Period covered by the report**

April 2013 to March 2014

◆ **Areas covered by the report**

Key areas covered include organizational governance, human rights, labor practice, fair operating practice, harmonious coexistence with society, environmental activities, occupational health and safety activities, and open innovation activities.

◆ **Rounding of numbers**

Numbers are rounded off to the specified whole number.

◆ **Referenced Guidelines and other sources**

- 2012 Environmental Report Guidelines, Ministry of the Environment
- Law Concerning the Promotion of Business Activities with Environmental Consideration by Specified Corporations, etc., by Facilitating Access to Environmental Information, and Other Measures
- Guidance on Information to be Provided in the Environmental Report (2nd Edition), Ministry of the Environment
- ISO 26000:2010 Guidance on Social Responsibility, Japanese Version, Japanese Standards Association

◆ **Scheduled date of the next edition**

September 2015 (Japanese edition)

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

Ryoji Chubachi

Contributing to Building a Sustainable Society and to Industrial Progress

I feel that people's expectations of innovation in science and technology in Japan have become higher than ever.

Global issues such as population, resources, energy, climate change, the environment, and water and food supplies are no longer concerns just for international institutions and governments but are becoming an important reality in people's daily lives. The growth of emerging nations, the advance of globalization, and the progress of information technology are profoundly altering the structures of industry and society, and Japanese society faces challenges with the rapid shrinking and aging of its population.

The Great East Japan Earthquake of 2011 reminded us of the importance of assuring safety and security for people's daily lives. Japan must continue to address this momentous issue.

We must consider how Japanese industry and society can overcome current problems and problems that may appear in the future, so that we can continue to maintain progress and sustainability. innovation in science and technology will provide the keys to solving these problems.

AIST, being a public research institute, integrates research—in fields such as green technology and life technology—from basic research to practical application. We are continuously active in creating plans to solve the problems affecting Japanese industry and society and in proposing new directions using science and technology. By transferring the results of our research and development (R&D) onto industry, we aim to commercialize and industrialize the outcomes, to create social and economic value, and to return the fruits of our activities to society.

AIST does not just conduct its own research activities but actively promotes exchanges with other organizations and people, both inside and outside Japan, through a wide range of efforts including collaborations with universities, research organizations and businesses, collaborations through the establishment of cooperative research organizations such as technology research associations, and collaboration through shared databases. Recently, with the aim of strengthening our function as an open innovation hub through which other organizations and researchers can make use of AIST's personnel and facilities, we have been promoting R&D, technical evaluations, and standardization through collaborations with industry, academia and government.

We are also expanding activities at our research bases all over Japan. The research bases focus on particular issues in accordance with the needs of those regions, conduct R&D to address those issues, make use of the resources of the regions, and thus contribute to the development of regional industries.
AIST has research bases at ten locations, one of which is the Fukushima Renewable Energy Institute, AIST (FREA) in Koriyama, Fukushima Prefecture, which opened in April 2014. We pushed forward with the establishment of this institute as a way to support reconstruction after the Great East Japan Earthquake. FREA cooperates with Japanese businesses and universities, and with research organizations inside and outside Japan, to drive comprehensive R&D in fields such as next-generation solar power, wind power, high-efficiency storage and usage of electric power, and the use of geothermal energy and ground source heat. We are vigorously supporting activities of Fukushima local government and industries aimed at making the prefecture a leading region for renewable energy.

Since its founding, AIST has pursued research activities intended to contribute to the creation of a sustainable society, in accordance with the motto "in society, for society." To live up to this ideal as a research institute, AIST must fulfill our social responsibilities in research activities and in the utilization of results, and in other activities too. In this report we outline, together with major research activities, the activities we are undertaking to meet our social responsibilities and what progress we are making. This includes systems of organization and social support, personnel development activities, the promotion of diversity including the employment of people with disabilities, and our efforts in compliance, environmental safety management, the establishment of fair business practices, and so on.

AIST's aims for the future are, as a public research institute representing Japan, to consistently return the fruits of research to society, and as a participant in society, to reliably fulfill our obligations to society.
I hope you, the readers of this report, will be willing to give us further support and encouragement.

Interview with Yoshiro Owadano, Director-General of the Fukushima Renewable Energy Institute

Leading the Full-scale Adoption of Renewable Energy

The opening in April 2014 of the Fukushima Renewable Energy Institute, AIST (FREA), in Koriyama City, Fukushima Prefecture, was the subject of intense interest in Japan and abroad. We asked Director-General Yoshiro Owadano about the activities of the institute and his enthusiasm for its missions, "Conducting R&D in renewable energy open to the world" and "Contribution to reconstruction by attracting new industry."

A base for developing and testing new technologies

Director-General Owadano is passionate: "For Japan, renewable energy is the only domestic source of energy. In the context of global warming, which is a problem for the whole of humanity, I want every single person to clearly understand the massive importance of renewable energy for the survival of Japanese society beyond the next 50 years and for the whole world beyond the next century." Since the establishment and setup of FREA, we have been striving to build networks with organizations both in Japan and overseas, particularly businesses and universities in the region of FREA, and preparing the ground for collaborations with industry, academia and government.

In response to the government's "Basic Policy for Reconstruction from the Great East Japan Earthquake," FREA is conducting R&D, as an open innovation hub for renewable energy, to create leading edge technologies and new industries.

Owadano explains FREA's great importance as a place that demonstrates technologies of renewable energy through integration of AIST's strengths: "We are finally entering the era of large-scale deployment of renewable energy. It is important both to conduct supporting R&D and to demonstrate systems for producing and using renewable energy at reasonably large scales. FREA is equipped with a demonstration field for solar energy and wind energy, and about half the power needs of the institute's main building are provided from our own energy sources, including ground source heat technology and energy storage technology."

FREA's future goals include increasing the scale of demonstrations so that the local government can use the institute as a source of emergency power during disasters, and improving the technology to a level such that a renewable energy network for a whole town can be constructed.

A world first: the ultimate hydrogen carrier technology

There are several major reasons why the spread of renewable energy has been slow so far: 1. large variations in output with time; 2. high costs; and 3. dependence on geographical conditions. On the topic of what R&D should be pursued to overcome these problems, we first asked Owadano about approaches to output variations with time.

"For output leveling, the aim is to develop technologies to produce and utilize a hydrogen carrier (a material that stores hydrogen). The ultimate goal is a system, of a type not previously seen in the world, that produces hydrogen from renewable energy, stores and transports the hydrogen safely and efficiently, and extracts as much hydrogen as is needed when it is needed. We are currently pursuing cooperative research with business into practical implementations. AIST is studying technologies for an integrated system from hydrogen production to use, particularly concentrating on the stage of extracting hydrogen from a hydrogen carrier for use."

Leveling may be further improved by combining two storage technologies, a hydrogen carrier for storing large amounts of energy over long periods and an accumulator battery for short-term variations.

There have also been issues with unstable voltages when the outputs of wind power and solar power are connected to electric power systems, causing

problems for surrounding areas. We are therefore developing system technologies to control and deliver electricity precisely. Another major topic is the development of technology to predict wind conditions and hence improve the generation efficiency of wind turbines and accurately predict generation levels.

Halving the cost of solar batteries

Owadano is also enthusiastic about tackling the second problem, the problem of cost.

"We are developing solar batteries in a running battle to halve both costs and weights and to improve efficiency. We have set up a large-scale demonstration building in which we can develop mass production technologies, and we are pushing forward our research in close collaboration with a consortium of more than 20 companies. Currently, deployment is dependent on subsidies, so the technology cannot be considered market-ready. We cannot afford the sort of pride that results in Japanese industry winning on technology but losing on price competition. If we pause in our technological progress, we will soon be overtaken."

Owadano says that solar power, the global capacity of which has increased by a factor of a hundred in little more than a decade, is still a minor energy source and there is great scope for further growth. He has high expectations for vigorous efforts from Japanese business both in the domestic market and in overseas markets.

Regarding the third problem, geographic conditions, AIST is taking responsibility for the supply of detailed independent data on geothermal and ground source heat conditions. We hope that this data will be used for the appropriate development and use of renewable energy, compatible with hot springs and the natural environment in National Parks and the like.

An open environment to broaden collaboration and exchanges

There are high expectations for FREA as a base for collaborations with industry, academia and government; it is active in cooperative research and exchanges of personnel. Through the "disaster area enterprise seeds support program" that provides free technological support, FREA has already launched more than 30 cooperative studies. It is working hard on human resources development, taking in a wide range of students from local universities and other institutions, such as by the introduction of a research assistant system. FREA is also working on the establishment of international standards, setting up a system for collaboration with overseas research institutes such as the National Renewable Energy Laboratory in the USA.

One of the institute's goals is to be an open base where different kinds of people can pursue their activities. Director-General Owadano has noticed the effects of this.

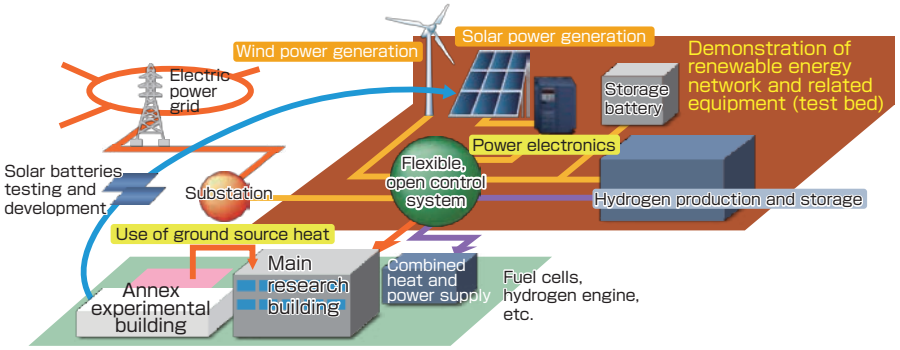
Exchanges between different research fields and different industries are rapidly becoming established as a natural pattern through, for example, weekly lunchtime presentations in which nearly all the staff gather in the cafeteria and engage in discussions. As a result of the institute bringing together enthusiastic people in an open environment, we have great hopes for the transmission of new technologies that can accelerate the full-scale deployment of renewable energy.

Developing and Demonstrating a Renewable Energy Network

At FREA, we are building a renewable energy network (a microgrid) that combines large-scale solar power generation (500 kW) and wind power generation (300 kW) with power storage using hydrogen carriers and storage batteries. We are developing and demonstrating higher levels of autonomy for renewable energy even with power generation amounts that vary by the day and by the hour.

We are cooperating with businesses and universities on research to test the capabilities of the new technologies that are needed for this kind of energy network, such as large power conditioners for solar power, and to evaluate the performance of energy management systems that incorporate such equipment.

In collaboration with Japanese and overseas research institutes, we also aim to establish international standards for these new technologies.



World-leading renewable energy network

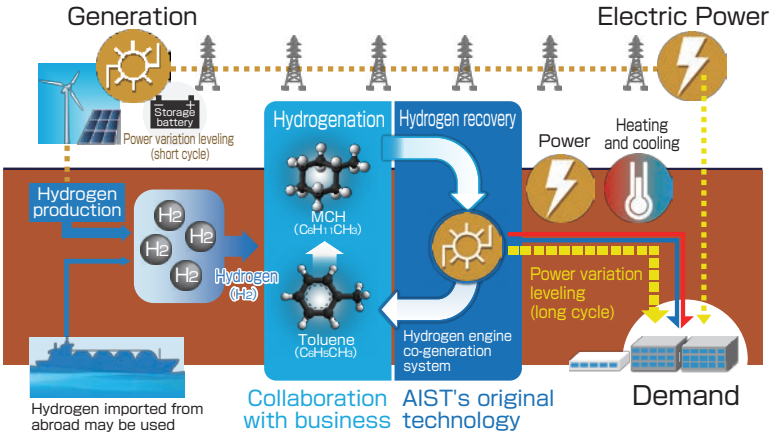
Hydrogen Carrier Production and Usage Technologies

We are developing systems to store for long periods of time and efficiently use large amounts of electric power generated by solar power, wind power and other renewable energy systems. We are working on the following technological developments to support the large-scale commercial deployment of renewable energy at an early point in time.

- Technology for the electrolysis of water at levels suitable for the power generated by renewable energy
- Technology for converting hydrogen gas to a hydrogen carrier (organic hydrides, ammonia or the like)
- Technology for recovering hydrogen from a hydrogen carrier
- Developing technology to efficiently utilize the recovered hydrogen

In developing these technologies, we are working on R&D in major topics, such as hydrogen production from variable power supplies, hydrogen carrier conversion in conditions with varying flow rates, and controlling a co-generation engine in accordance with transiently varying demand for heat and power.

We are also building a demonstration facility for a total system incorporating these component technologies, with a view to practical implementation.

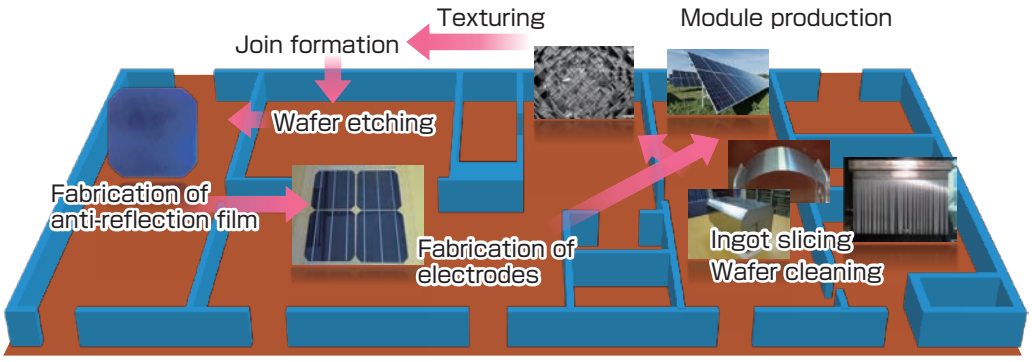


Production and use of a hydrogen carrier from renewable energy

Thin Crystal Silicon Solar Cell Modules

For solar power to continue to grow and develop, further improvements in the efficiency and cost of crystalline silicon solar cell modules are critical. FREA is building an integrated production line, from crystal silicon ingot slicing to modules (solar cell panels), and is making progress in the development of light, inexpensive crystalline silicon solar cells through cooperative research with over 20 Japanese companies.

By developing cutting-edge fabrication technologies for mass production in cooperation with private companies, we can improve the technological capabilities of industries concerned with solar cells and enhance our international competitiveness.

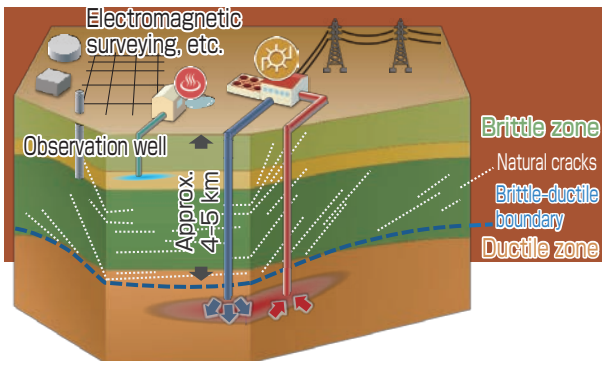


Integrated production line for thin crystal silicon solar cells

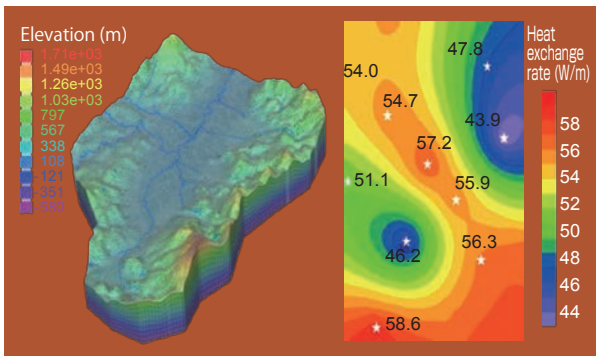
Promoting the Use of Geothermal and Ground Source Heat Energy

Japan is said to rank third in the world in the quantities of geothermal energy available below its surface, but for various reasons little use can be made of this energy at present. FREA is conducting research in the hope of overcoming the factors impeding the exploitation of geothermal energy, such as uncertainty and interactions with hot springs, is suggesting optimal methods for developing geothermal energy in different social and geological conditions, and is expanding the range of areas in which geothermal energy can be exploited by engineering methods. We are also contributing to the introduction and promotion of geothermal energy through international collaboration, particularly in East and Southeast Asia.

In studies of ground source heat, together with the prefectural government, universities and businesses in Fukushima Prefecture, we are making progress in evaluating ground source heat potential to make clear the latent potential of ground source heat energy in the area, and we are conducting R&D into ground source heat usage systems that are suitable for the geological conditions in particular areas.



Advanced monitoring of geothermal reservoirs and developing geothermal energy by engineering methods



Creating a ground source heat potential map

About AIST

AIST's Research Strategy

AIST aims to solve issues specific to the 21st century and to enhance its function as an open innovation hub to build a sustainable society. During the third medium term (from 2010 to 2014), we have been working on the following four research promotion strategies to help achieve the strategic goals set forth in the government's growth strategy.

I. Strategy to promote green innovation

— A challenge in the face of the limitations of the environment, resources, and energy —

Although humans have made rapid developments in science and technology, we have created environmental problems that endanger us, such as climate change, and resource and energy problems such as supply shortages of minor metals and oil.
To solve these global problems and build a sustainable society, we are promoting "green innovation" centered on renewable energy and energy-saving technologies.

- Renewable energy technology
- Energy-saving technology
- Technology for the secure supply and effective use of natural resources
- Fundamental materials and device technology
- Technology to reduce environmental loads in industry
- Techniques to evaluate and manage green technology

II. Strategy to promote life innovation

— For quality, healthy living —

Japan is a country of healthy and long-lived people. There are growing expectations among the people of Japan for high-quality healthcare services and good quality, healthy living. Simultaneously, the issue of the burden of care has been aggravated by our growing aged population and declining birthrate. To respond to public expectations and solve these arising issues, we are promoting "life innovation" across several technology areas, including biotechnology and the development of medical equipment and nursing-care robots.

- Technology to protect our health
- Technology to make it possible to live a healthy life
- Technology for safe living

III. Strategy to promote the development of state-of-the-art technology

— A world leader in science and technology and support for improving the international competitiveness of industry —

Research and development of state-of-the-art technology is essential for supporting Japan as a world leader in science and technology and improving the global competitiveness of Japanese industry. AIST aims to create new technologies and industries that serve as sources of innovation in the areas of information and communications, device and system technology, innovative materials and system production technology, and technology to support the service industry.

- Information and communications device and system technology
- Innovative materials and system production technology
- Technology to support the service industry

IV. Strategy to develop and promote intellectual infrastructure

— Contribution to innovation and safety and security —

Intellectual infrastructure is a structured framework of patents and publications, specifications and standards, and outcomes of research and development that supports Japan's economic activities. Japan, with its scarce natural resources, has a particular need for an enhanced intellectual infrastructure.
AIST represents Japan in international activities relating to measurement standards, statutory measurement, and geological surveys. We strengthen the industrial infrastructure of Japan by developing and improving these areas.

- Infrastructure for measurement and evaluation
- Measurement standards
- Geological surveys

AIST's Two Key Technologies and their Development

To build a sustainable society, AIST is working to solve issues specific to the 21st century, including global warming and the challenge of a growing aged population and a declining birthrate. To solve these issues, it is essential to promote green innovation centered on renewable energy and energy-saving technology, and life innovation centered on the development of biotechnology and nursing-care robots and drug discovery. We have selected two focus research topics, namely "green technology" to build a prosperous and environmentally friendly society and "life technology" to make it possible to live a healthy and safe life.

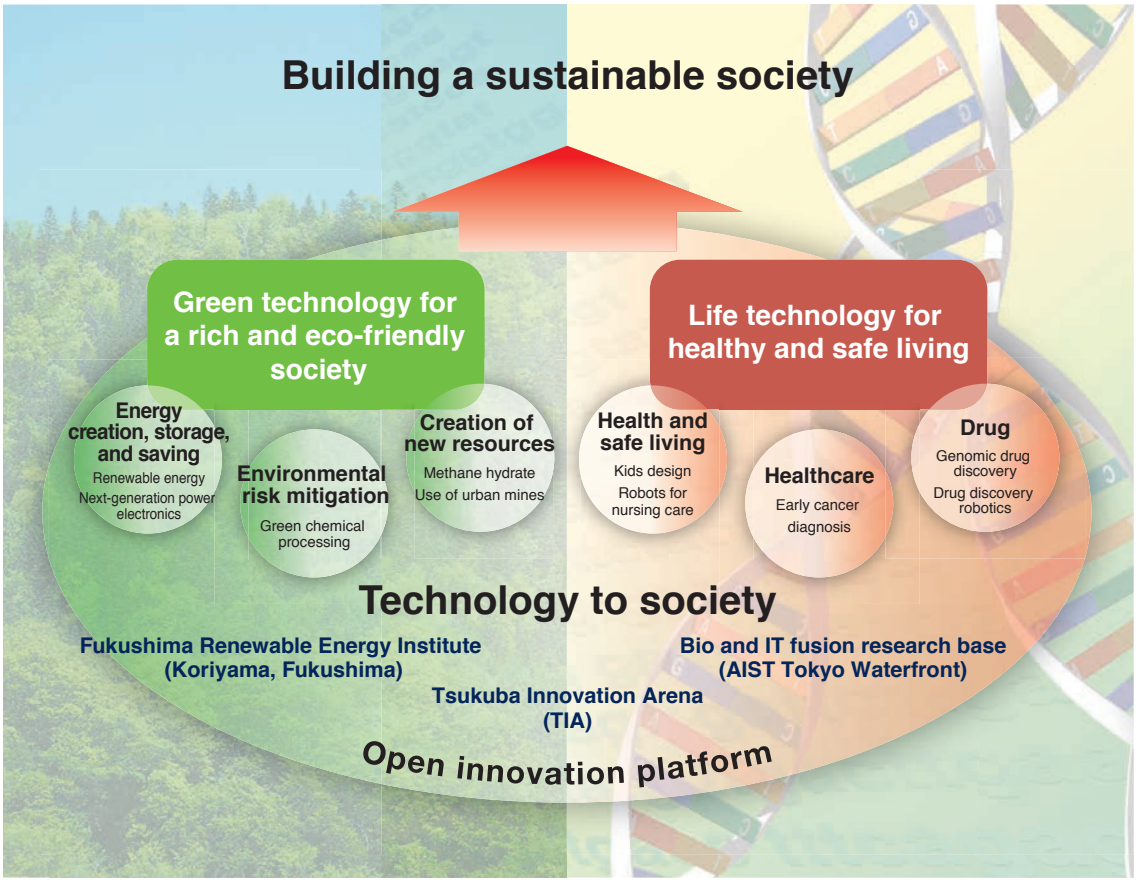
In 2013, we started the STAR (STrategic AIST integrated R&D) Program, an initiative to accelerate these two research and development activities. The purpose of the STAR Program is to support research projects that have the potential to develop into major academia–industry partnership projects, to have positive social and economic impacts, and to produce the world's top research products that will lead Japanese industry. Two STAR projects are underway: IMPULSE (Initiative for Most Power-efficient Ultra-Large-Scale data Exploration) and LEAD (Leading Engine program for Accelerating Drug discovery).

- IMPULSE (Initiative for Most Power-efficient Ultra-Large-Scale data Exploration)

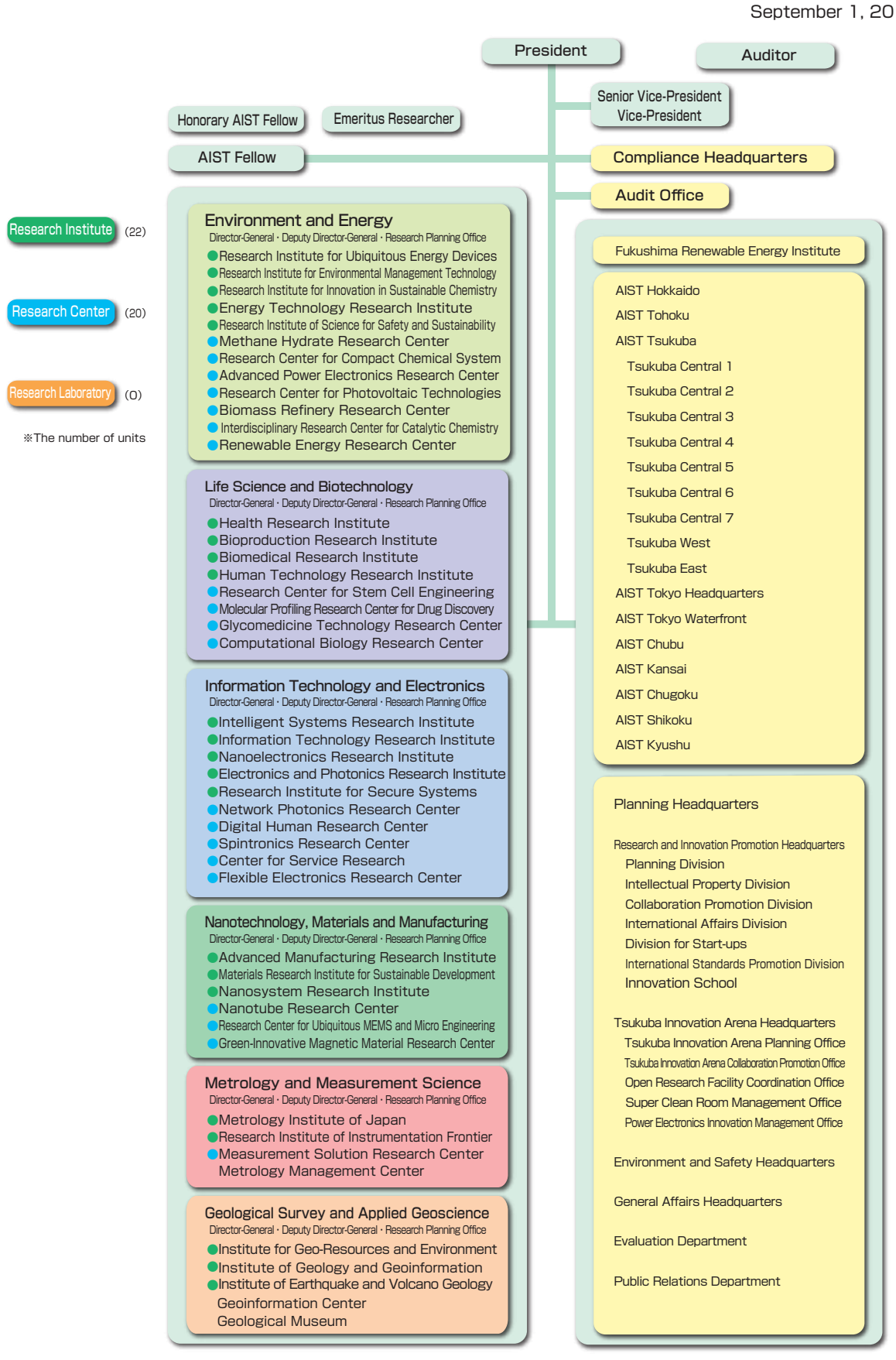
AIST will lead R&D for innovative ultra-low-power and ultra-high-performance data processing technology which will be required by a data center in 2030. Especially, we aim to realize an ultra-low-power and ultra-high-speed non-volatile memory by using AIST's technologies for voltage-controlled memories and a highly-integrated and ultra-broadband optical network by using the most advanced silicon photonics technology.

- LEAD (Leading Engine program for Accelerating Drug discovery)

People everywhere want to see the development of new drugs for cancer and other intractable diseases. We aim to develop smart drug discovery process such as a rapid, low cost and high success rate by bringing together all human resources and technologies available from state-of-the-art research laboratories. In the area of the discovery of drugs required to cure cancer, this process will substantially reduce the cost of developing each new drug by more than tens of billions of yen and will accelerate the speed of development of anticancer drugs and other drugs.

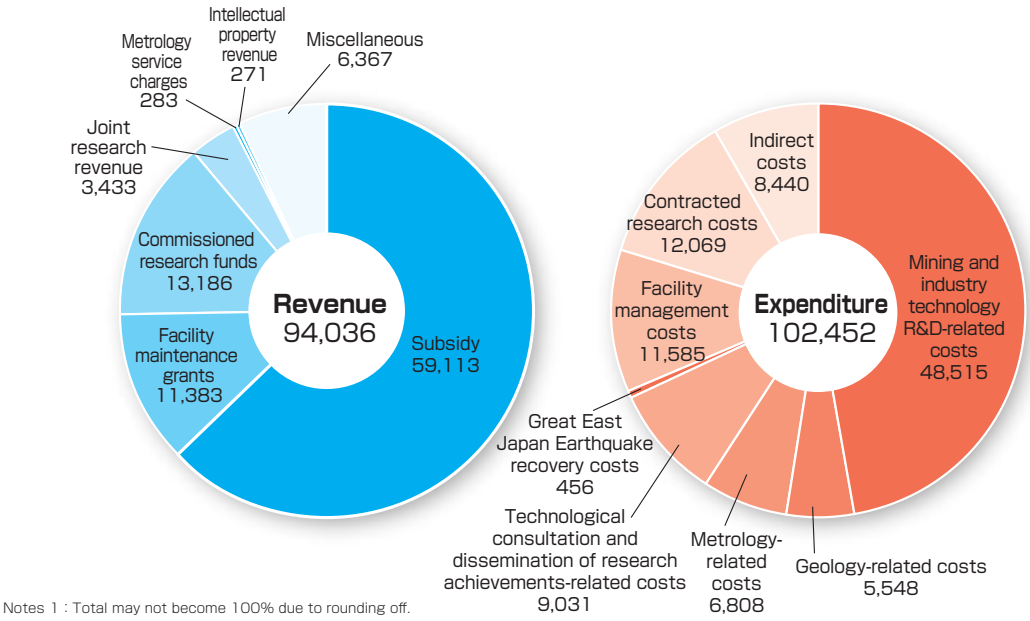


Organization Chart (September 1, 2014)



Revenue and Expenditure

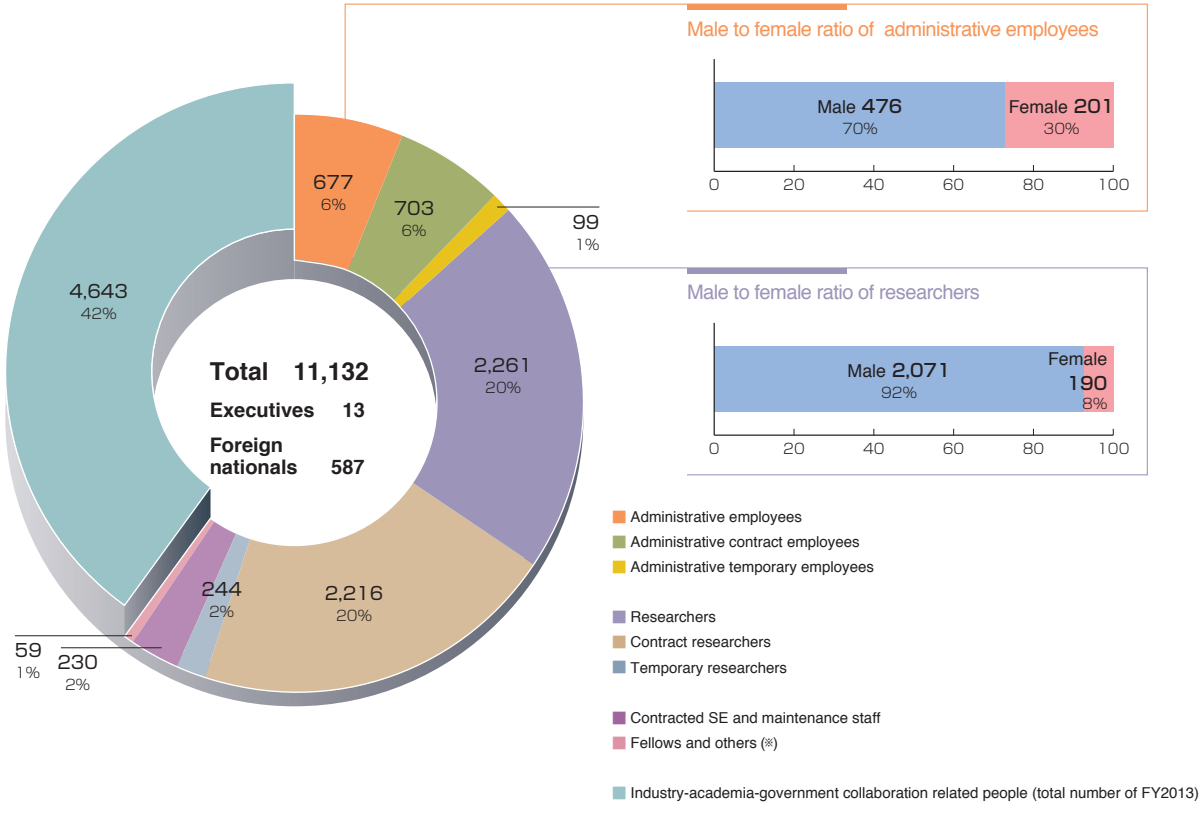
Financial Results for FY2013 (unit : million yen)



Notes 1 : Total may not become 100% due to rounding off.

Notes 2 : The amounts of revenue and expenditure are adapted from "Financial Statemant" prescribed in Article 38 of the General Rule Act for Independent Administrative Corporations. The expenditure outreaches the revenue as we carried forward the balance of previous years.

Staff (as of March 1, 2014)



※Honorary AIST Fellow、Special AIST Fellow、Grand Emeritus Advisor、Special Emeritus Advisor、Research Emeritus Advisor、Research Emeritus Counselor

Promotion of Compliance

Compliance Headquarters supports the compliance activities of AIST's departments and employees. As the department with the ultimate responsibility for risk management, it is working in collaboration with the relevant departments to become an organization that deserves society's confidence.

Promotion of participatory compliance

AIST considers it important to raise awareness among individuals. With that in mind it has taken the following measures to promote participatory compliance so that employees do not feel forced into compliance promotion activities:

(1)In 2013, we provided training to new employees and contract-based employees to develop their basic knowledge of compliance.

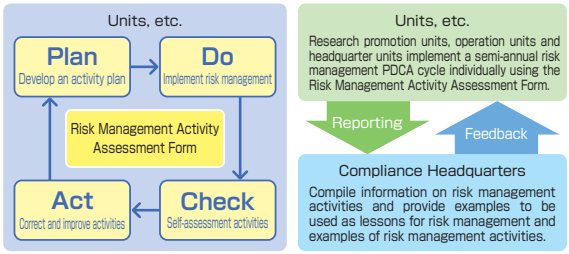
(2)As part of the compliance promotion activities, to deepen people's understanding of compliance we produced an educational document, the "Compliance Newsletter," based on familiar examples. We distributed it four times within AIST.

(3)To raise awareness of compliance among individual employees, we had managers and employees conduct "Compliance Self-Checks." All of them (5820 people) confirmed that they understood the basic concept of compliance.

Risk management activities

As part of risk management activities at AIST, each department develops a risk management activity plan, conducts a self-assessment twice a year (every 6 months) and implements the PDCA cycle for risk management. To promote information sharing, we make available within AIST (through the intranet) examples of risk management activities and examples of activities serving as lessons for risk management, which can be useful for all departments. Thus we strive to raise awareness of risk management.

PDCA cycle of risk management



Disclosure of Information and Protection of Personal Information

Disclosure of information

To increase the transparency of AIST's activities and fulfill 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 Independent Administrative Agencies (implemented on October 1, 2002).

Protection of personal information

In accordance with the Act on the Protection of Personal Information Held by Independent Administrative Agencies, etc. (implemented on April 1, 2005), AIST established the Privacy Policy and the AIST Rules for the Protection of Personal Information to protect the individual's rights and interests while ensuring that research and related activities at AIST are conducted properly and smoothly.

Each year, each manager and employee conducts a self-check for personal information protection and information security to raise awareness of the proper management of information, including personal information, and of information security compliance.

Information disclosure desk and personal information protection desk

A request for information disclosure in accordance with the Act on Access to Information Held by Independent Administrative Agencies and the Act on the Protection of Personal Information Held by Independent Administrative Agencies, etc. can be made through the desks and the website of AIST Tsukuba and other regional bases. Each desk also provides help on the procedures for disclosure and personal information protection. Only requests for information disclosure can be made on the website.

Numbers of requests for disclosures of information and personal information

FY	Information disclosure	Personal information
2011	3 Cases	0 Cases
2012	6 Cases	3 Cases
2013	6 Cases	0 Cases

Mandatory Lecture on the Code of Conduct for Researchers

A lack of understanding about researcher ethics among individual researchers has been indicated by the investigation report about misconduct in some recent scientific papers. However, experts are expressing concern about a deterioration of ethics not just among those particular individuals but in the Japanese scientific community as a whole.

Public confidence in the scientific community is one of the foundations for justifying the large amounts of funding that the government invests in scientific research. When research misconduct is revealed, it brings a loss of public confidence and can undermine the continuation of research work in the scientific community.

In response to these circumstances, from April 2014 AIST has started the action to require all employees, including contracted staff who are engaged in research activities and visiting researchers, to take a lecture on the code of conduct for researchers in order to prevent research misconduct. The classroom lectures were intensively held 10 times during April and May. The lecture by e-learning was prepared for those who could not participate in the classroom lectures. As a result, as of the end of June 2014, all members of AIST who are connected to research activities have taken the lectures on the code of conduct for researchers. AIST will continue to take action to make sure that researcher ethics are understood by all related personnel.

Lecture on the code of conduct for researchers

Internal Audit

At AIST, in collaboration with the auditor and the accounting auditor, the Audit Office, which is defined as an independent organization under the direct control of the president, monitors whether work is properly and efficiently performed and recommends improvements in work practice on the basis of the results of the monitoring. Its aim is to: (1) improve the effectiveness and efficiency of work; (2) comply with laws relating to research and related activities; (3) protect assets; and (4) ensure the reliability of financial reports.

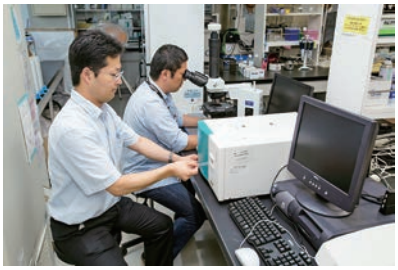
In FY2013, the Audit Office audited activities with a high level of need for auditing; evaluated the rule-compliance, effectiveness, and efficiency of the activities; identified issues; and recommended improvements to the departments subjected to the audit.

Collaboration in audit

	Internal audit	Auditor audit	Accounting auditor Audit
	Collaboration	Collaboration	
Scope of audit	○Operational audit ○Accounting audit	○Operational audit ○Accounting audit	○Accounting audit
Points of audit	○Appropriateness of risk management and development and operation of an internal control system ○Improvement of work process efficiency	○Appropriateness of operations ○Appropriateness of financial statements	○Appropriateness of financial statements

Early Diagnosis of Malaria Using Biochips

Alongside HIV and tuberculosis, malaria is regarded as one of the world's three major infectious diseases. It causes around 200 million infections a year in over 100 countries, leading to 660 thousand deaths. Amid calls for international efforts to tackle malaria, AIST Shikoku has developed a revolutionary early diagnosis technology that uses biochips.



In the lab

Three experts from different fields fighting malaria together

Malaria is most common in subtropical and tropical regions such as Africa and South-East Asia. As the infection is carried by Anopheles mosquitoes, it can occur in temperate zones where the larvae can thrive in bodies of still water in dirty environments. With the onset of global warming and movements of people in the globalized society, there are fears that malaria's range will spread in the future.

Accordingly, international bodies such as the World Health Organization (WHO) and research institutes, businesses and the like in various countries are developing medicines and devising anti-mosquito measures in the hope of overcoming malaria. The diagnosis of malaria is being addressed by the Biomarker Analysis Research Group of the Health Research Institute at AIST Shikoku. Their aim is to make a new kind of contribution, based on AIST's own research, in regions such as Africa and South-East Asia.

Research Group Leader Masatoshi Kataoka explains that three experts from completely different backgrounds came together, put their skills and knowledge together, identified malaria as their target, and conducted cross-disciplinary cooperative research in the AIST style. The three were Kataoka (doctor of dentistry), specializing in the use of microchips to analyze biomarkers (indicators that reveal disorders in the body), Shouki Yatsushiro (doctor of pharmacology), specializing in the basic biology of malaria, and Shohei Yamamura (doctor of engineering), specializing in the use of biochips to measure biochemical substances.

Arranging and sensing a large number of cells in a single layer

First there was the question of what the problems are with current malaria diagnostics. According to Yatsushiro, "The usual method of diagnosis is the classical method of Giemsa staining[*1] erythrocytes (red blood cells) and observing them through an optical microscope, which takes about 40 minutes. However, it is very hard to detect the early stages of infection with this method and it is heavily dependent on the skill of the observer, with the result that there is a major problem of infections being missed and treatments delayed. With immunochromatography,[*2] which looks for particular proteins, there are problems with false positives, and unnecessarily giving people drugs leads to the spread of drug-resistant malaria. The PCR method,[*3] which looks for particular genes, requires specialist equipment and complex operations that take a long time."

Overcoming these problems would enable accurate treatment and a reduction in death rates, so developing a technology that can perform diagnoses simply, quickly and accurately would be very valuable. Therefore, the group worked on the development of a biochip that could easily find and reveal infected cells among as large a number of cells as possible.

Yamamura explains, "We used a 3 cm × 7 cm chip with around 20,000 miniaturized holes (microchambers) with diameters of 100 μm and depths of 50 μm. By techniques such as re-designing the holes and applying surface treatments, we succeeded in uniformly arranging erythrocytes in a single layer. With 100 erythrocytes in each chamber, we can analyze two million cells on a single chip at the same time. If even a single one of those cells is infected, it will show up." Suddenly, the sensitivity is 200 times higher than in the current usual method of Giemsa staining. Although the malaria parasite lives within erythrocytes, this diagnostic method can detect the parasite easily without the cells having to be ruptured, and it provides results in as little as 15 minutes, compared to several hours with previous methods.

Malaria parasite culturing room

Field testing and developing diagnosis equipment

In 2013, the group started field testing of a malaria diagnosis device, using blood from malaria patients, in Lacor Hospital at Gulu University, Uganda.

Kataoka adds, "The remaining question is cost. We use a DNA micro-array scanner for the sensing, which is a very common device, but it is expensive so we cannot expect to see many of them in the affected regions. Therefore, through collaborative research with business, we are working to develop a cheaper sensing device. Cost is also an extremely important issue for the WHO. If we cannot overcome this hurdle, the technique will not be practical."

The three visited Africa many times for field testing and on-site surveys. There were many things they could not have known without going into the field. For example, because power cuts occur frequently, battery-powered devices are necessary, and because the roads are bad, the equipment could be seriously damaged during transport by road. They put these valuable lessons from the field back into the development of the diagnostic device.

Potential for international contributions and broader application

When the diagnosis device is ready, it will be delivered to malarial regions through international channels, such as WHO and the Japan International Cooperation Agency. We anticipate that it will be used for the early discovery of infections by, for example, mass testing in elementary schools, focusing on seasons in which malaria outbreaks are common, such as just after the rainy season.

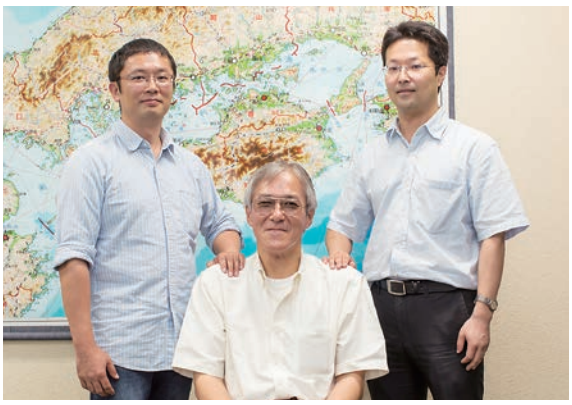
In the future, we think the diagnosis device will be useful for identifying malaria carriers and eliminating the disease, and that improvements in the biochip will make it useful for analyzing drug-resistant malaria. Yamamura is enthusiastic: "We have started research into applying this technology to the detection of circulating tumor cells in blood, which are linked to metastasis and recurrences of cancer. We think that we can array all different kinds of cells, and so we can bring cell analysis technologies to the world in areas that current technologies cannot reach."

Kataoka says, "It is fascinating how a single technology can lead to different outcomes. This is a result of AIST bringing together group members from different backgrounds. It might not have been possible with three specialists in malaria, or with three specialists in biochips." Yatsushiro describes a stimulating and satisfying cross-disciplinary research environment: "We are a really friendly team. We can always talk to each other, and we are always coming up with ideas." With this research team, AIST can expect further progress in the future and distinctive developments.

*1: One of a number of blood specimen staining methods, developed as a method for marking the malaria parasite

*2: An immunoassay method in which a specimen slowly flows along a cellulose film (due to the capillary effect) while dissolving a reagent. Also used for pregnancy testing, influenza testing, etc.

*3: A method of amplifying tiny amounts of DNA into large amounts, using polymerase enzymes to replicate the DNA.



Left to right:

Senior Researcher, Biomarker Analysis Research Group, Health Research Institute
Shouki Yatsushiro

Leader, Biomarker Analysis Research Group, Health Research Institute
Masatoshi Kataoka

Senior Researcher, Biomarker Analysis Research Group, Health Research Institute
Shohei Yamamura

Measuring Hardness at the Nano Scale: International Standards for Micro-Hardness

AIST is the sole research institute in Japan responsible for maintaining national standards for measurement, shared "yardsticks" that help industry. Micro-hardness testing is becoming more and more important in the semiconductor industry and other fields. AIST's National Metrology Institute of Japan (NMIJ) is an active participant in international standardization work on micro-hardness testing, representing Japan in lively discussions with other countries.

Rules for measuring hardness and international comparisons

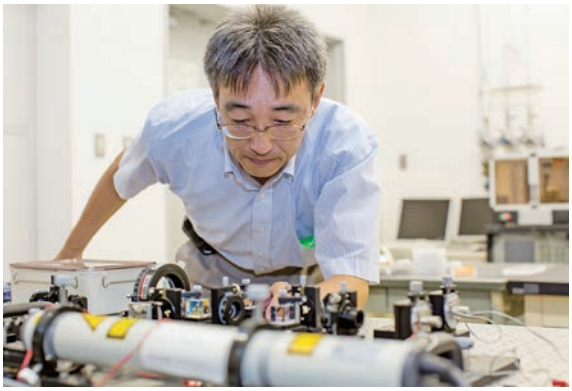
When someone is making a product, they need to know just how strong the materials are, but this may not be tested by breaking the finished product. Therefore, a value called "hardness" is used as an index representing strength.

The main methods for measuring hardness are the Rockwell test, in which a sample is pressed with a diamond (an indenter) and the depth of the indentation is measured, and the Vickers test, in which the area of an indentation is measured. Materials with large indentations are judged to be soft and materials with small indentations are judged to be hard.

Senior Researcher Koichiro Hattori describes the world of hardness: "Exactly the same material can produce completely different values of hardness depending on the measurement methods, so it is always necessary to specify a measurement method. The measurement rules are laid down by the International Organization for Standardization (ISO), and the national metrology research institutes in different countries, such as AIST, are subject to these rules. The Metre Convention guides the International Committee for Weights and Measures (CIPM). Under CIPM is the Consultative Committee for Mass and Related Quantities (CCM); under CCM is a hardness working group, of which AIST is a member. The hardness working group performs international comparisons, checking that hardness values are the same internationally. Thanks to this work, calibration laboratories and other users in different countries can measure to the same values." NMIJ has been conducting research into micro-hardness testing since 2000, and has continuously participated in international discussions.

Publication of an international standard for micro-hardness

In micro-hardness testing, the characteristics of very thin films, as little as one micron (μm) thick, can be measured. In a measurement method known as the nano-indentation test, a needle referred to as the indenter, which is mounted on a spring, is pressed into a sample (which is a thin film) by a repulsion force when an electric current flows in a coil, and the force pushing the indenter and the depth of the indentation are analyzed. The depth of the indentation is around a tenth of the thickness of the film, which is nano scale, and cannot be observed without using an atomic force microscope.

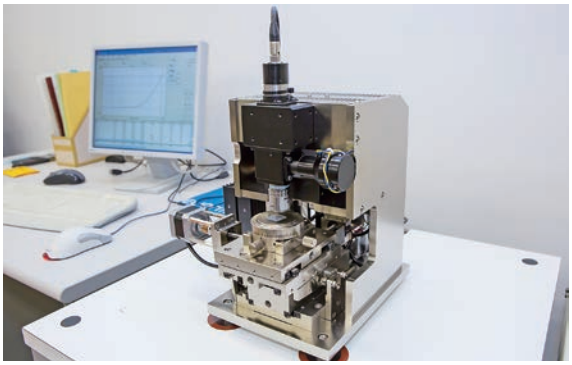


Calibrating a tester

"This measurement method was published in 2002 as international standard ISO 14577. At the time, semiconductor technology was advancing but there were semiconductor materials that, while excellent in electronic terms, did not have sufficient strength to withstand manufacturing processes. Devices for measuring the strength (meaning hardness) of films were being sold by different companies in different countries, but values varied depending on measurement methods, so there was a demand for uniform standards."

At the same time, Hattori found that there was scope for improvement in the software of an ultramicro-indentation hardness tester from Elionix, Inc. that he sometimes used in his research. Therefore, the year after the international standard was issued, he worked to support advances in nano-hardness testers as part of a project for R&D support of regional small and medium enterprises (2003), to revice the analysis software to conform with ISO 14577. The result was striking—a sharp increase in sales of a new version of the tester sold

Measuring hardness by the depths of indentations



A nano-hardness tester incorporating various improvements

by Elionix in the following years.

Measuring new materials

"International standards are updated once every five years, to match the pace of technology. However, in spite of vigorous discussions, ISO 14577 was not modified in 2007. The main reason was that it was very difficult to determine which of a succession of new technological developments should be incorporated and taken account of in the standards."

This was the background against which Hattori started a second program of cooperative research with Elionix in 2010. In response to the needs of users, the theme was the development of technology for measuring soft materials such as rubber. With the progress of materials science, new materials are being continuously developed and it is apparent that the need for testers suitable for measuring a range of materials from hard to soft will continue to grow. In international standards, the latest version of ISO 14577 was proposed in 2012 and is waiting for approval. Hattori began a third cooperative research program with Elionix in 2013 and is making progress with improvements. There seems to be no end to the maintenance of hardness standards.

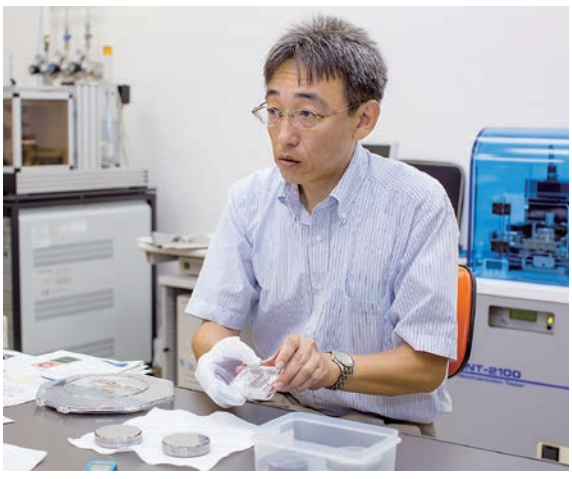
Global harmonization rather than impact

"The countries leading discussions on hardness standards include Japan, America, Germany, Italy, the UK and South Korea, countries with thriving automotive industries. Recklessly re-drawing the rules of hardness would inconvenience many users, but we must quickly prepare new standards for measuring new technologies. Representatives from various countries are meeting and sharing discussions with a view to revising international standards while maintaining this balance."

Discussions by working groups under the umbrella of the ISO and the CIPM tend to involve the same people from year to year. They know each other well enough that, when formal meetings have finished, they can share their thoughts over a drink.

"For a scientist, being present in person is important in international standardization activities. In this field, harmonization is more important than the impact of research. We have a responsibility to ensure that the same values can be measured internationally. There would be no advantage in Japan's technology being out in front if the differences could not be measured in other countries. The world must have common yardsticks so that the qualities of the products that Japan exports can be correctly evaluated. For this reason, we are always looking outward and our aim is to develop infrastructure technologies that everyone will see the need for and that everyone will use."

Measurement standards that make the "yardsticks" match up are vital for transferring technology to society. Hattori is moving ahead with research in partnership with the world to maintain values in Japan over the next decade and beyond.



Senior Researcher, Vibration and Hardness Section, Acoustics and Vibration Metrology Division, NMIJ

Koichiro Hattori

Setting International Safety Standards for Service Robots

As society ages, expectations of service robots are growing; such robots are useful in nursing care of the elderly, housework and the like. The first requirement when introducing robots into people's homes and bringing them into close contact with people is an evaluation of safety. AIST has played a central role in making the world's first safety standards for service robots.

Formal publication of an international safety standard

In present-day Japan, many businesses are working on the development of service robots with a view to mass production. However, service robots will not become widespread unless they can be guaranteed safe for people. Unlike industrial robots and medical robots, large numbers of unqualified people who are not experienced in robot operations will be using them. Therefore, separate safety standards for service robots are necessary.

Accordingly, third party organizations have attempted to make new arrangements for certifying safety: the New Energy and Industrial Technology Development Organization (NEDO) has been running the "Project for Practical Application of Service Robots" since 2009. Eight public institutes, including AIST, and 20 businesses have taken part in this project. The objects of study are three kinds of service robots—autonomous mobile robots, physical assistance robots and person carrier robots.

Thanks to this project, the world's first service robot safety certification center ("Robot Safety Center") was opened in 2010, and a great result was achieved when an international safety standard ISO13482 was formally issued on February 1, 2014. "Robot Suit HAL® for Medical Use" (Cyberdyne, Inc.) had already been certified under the draft version of ISO13482, and the "Resyone® nursing care robot" (Panasonic Corporation) and "Area Management System" (Daifuku Co., Ltd.) are the first to have been certified under the formal standard. Recently, Cyberdyne, Inc. announced that its new HAL for Labor Support and HAL for Care Support became the world's first wearable robots to satisfy the standard. The certification was provided by the Japan Quality Assurance Organization. This certification assures the world that service robots are safe for people.

"Robot Suit HAL® for Medical Use" receiving certification under the international safety standard for service robots

Thorough discussions of meanings and standards for safety

How did the creation of a safety standard for service robots proceed? Kohtaro Ohba, Deputy Director of the Intelligent Systems Research Institute, reflects on the five-year project: "It was like fumbling and groping up a huge mountain whose summit is hidden in the clouds.

"First, eight public institutes drew up R&D topics and test methods with the ultimate goal of setting an international standard. However, because there was no precedent anywhere in the world, forming a starting consensus took a whole three months.

"Subsequently, when we talked to industry, the companies had different understandings of robots

and all sorts of concepts and standards of safety. We had discussion after discussion every day. It turned out that protecting personal safety is equivalent to creating trustworthy robots. What is most difficult is making software more trustworthy. This can be measured by the Safety Integrity Level (SIL), which represents standard levels of safety of systems. I thought that we should meet SIL3, the level below SIL4, which is the highest level (the level for airplane systems). We had very extensive discussions about this with the participating businesses."

Even given the same robot, risk assessments may be completely different between, for example, deployment in a nursing care facility and deployment in the home. Therefore, the development of a safe technology starts with the creation of a risk assessment sheet that makes the usage environment and applications clear. On this basis, technologies that reduce risks can be developed, and the necessary safety tests can be carried out, such as movement testing, human interaction testing, strength testing, EMC (electromagnetic compatibility) testing and so forth.

A safety certification center attracting the world's interest

We collected methods for certifying the safety of service robots and data on safety testing, and presented a proposal for a standard to an ISO standards committee with members from Europe, North America and Asia. But there were still problems to be overcome.

"The fact was that only companies in Japan are seriously thinking about mass production of service robots. In America all the interest is in robots for military and space applications, and in Germany industrial robots. They could only understand service robots from those perspectives. The opinions they were expressing were based on nothing more than abstract theory."

We only got out of this blind alley when the ISO standards committee met in Tokyo in 2013 and the members from the different countries were shown Japan's Robot Safety Center. Before that, requests for visits from abroad had not been accepted. That was the first time the center was opened to people from other countries.

"The members from America and Germany were amazed at how far Japan has advanced. When they could understand that the proposal was based on rigorous testing, trust was created. From that day, the path was suddenly clear for the Japanese proposal."

Since then, the international safety standard produced in Japan, ISO13482, has been launched and the Robot Safety Center has become widely known as the world's first center certifying the safety of service robots.

Providing consultancy on safety evaluation technology

Although the international safety standard has been formally issued, Ohba says, "I don't feel that we have reached the top of the mountain yet. The process is still continuing and we will have to follow up with how to revise the standard in the future.

"Previous standards were reference certifications giving reference values. ISO13482, rather than giving reference values, is a process certification (a concept certification) in which only scales of measurement are provided. It is likely that the field of robotics will in the future continually produce technologies that do not fall within current frames of reference. For this reason, a new style of evaluation technology is necessary, measuring against the scales but always thinking about how they should be interpreted."

Ohba goes on to argue that the outcome of this new evaluation technology will be that a consultancy style of development will be necessary rather than a technology-driven style.

"For example, if we consider the certification of driving robots, they will not be able to run on the road in Japan unless they can satisfy road traffic laws. Fundamentally, the design stage must take the perspective of social system design, including legal considerations. Unfortunately, people who can straddle specialties such as social science, law and system design and who can talk with a viewpoint where the humanities and the sciences meet are very rare."

Will AIST be able to transfer technologies through consultancy activities? The struggle to the top of the mountain continues.

Deputy Director, Intelligent Systems Research Institute
Kohtaro Ohba

Open Innovation

Enhancement of the Open Innovation Hub Function

Re-creation of industry supported by industrial technology is essential for the revitalization of Japanese industry. To make this possible, we need to lead the world in the commercialization of innovative technologies—that is, to improve industrial competitiveness through continued innovation.

On the other hand, businesses have to develop overseas manufacturing bases to deal with the shrinking domestic market and enter emerging markets. In addition, with the increasing difficulty of closed corporate innovation, we need to create an innovation hub in Japan for research and development, standardization, and human resource development in order to maintain the quantity, and improve the quality, of domestic employment.

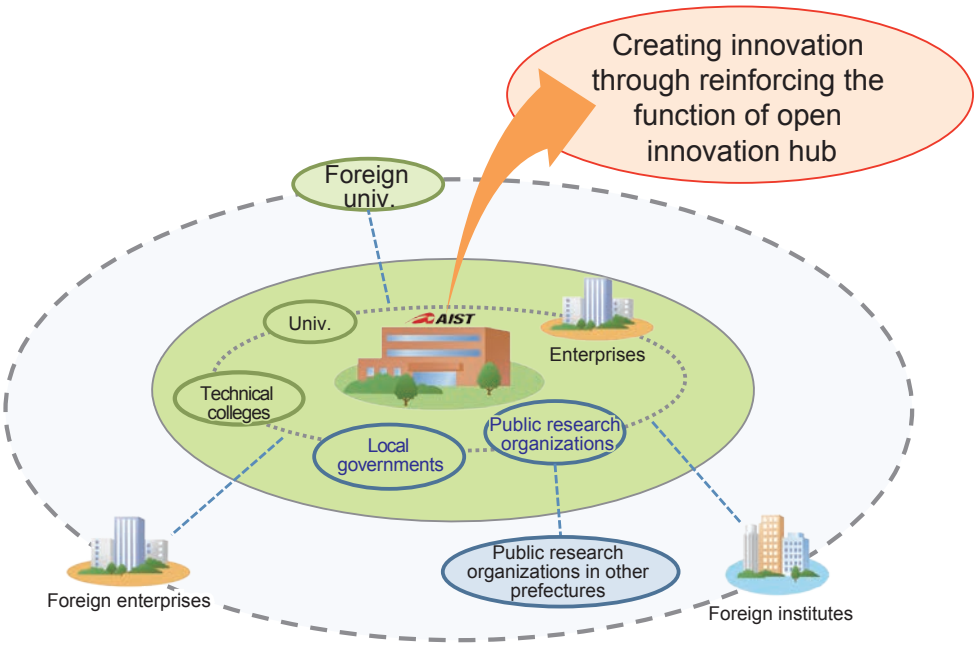
AIST, as a public research institution representing the country, plays a central role in the use and development of a diversity of researchers, state-of-the-art research infrastructure, systems for technology integration and human resource development, and regional research bases and their networks. To play this role, we have set “enhancing the open innovation hub function” as the goal of innovation strategies and are undertaking projects beneficial to industry, bringing together a diversity of human resources, organizations, and institutions and making effective use of the network of research institutions globally. We are continuing to build up research results and develop state-of-the-art research infrastructure and human resources. In addition, from a medium- to long-term perspective, we are performing research and development and enhancing the system of support for industrialization research.

More specifically, we are working on strategic activities in the following three stages to enhance hub functions and thus promote green innovation and life innovation:

Stage 1 : Create promising research seeds
- Enhance the function to make use of research outcomes.
- Bring together and develop a diversity of human resources.

Stage 2 : Develop promising technologies
- Expand and enhance collaborative projects with industry.
- Promote regional open innovation.
- Enhance the hub function through globalization.

Stage 3 : Create an exit for markets
- Develop a hub function.
- Enhance the network with industry.



System for Using TIA Open Facilities

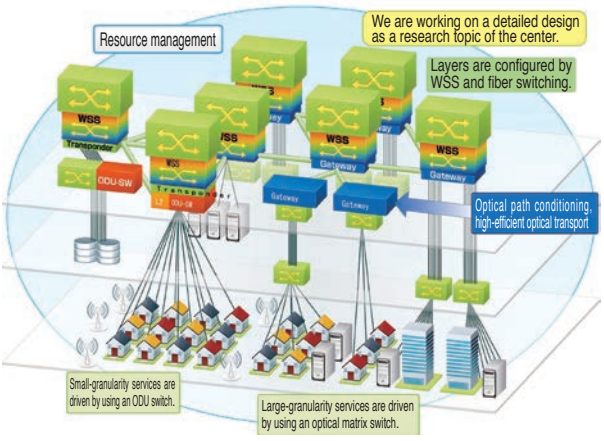
At AIST, there are many facilities packed with accumulated knowledge and know-how and state-of-the-art equipment, which we openly offer for use to disseminate our research activities and results. They consist of about 120 instruments of IBEC (Innovation-Boosting Equipment Common) and about 150 nano-device related machineries in the Super Clean Room (SCR).
Before, open use of them was only possible as part of either collaborative research or technical training. However, a new system was established in December 2013 which clearly specified the attribution of intellectual property rights and rules about the management of confidential information and made them easier to use. With estimated cost set based on a unit price list, users can conduct by themselves or ask operators for device processing and measurement, and receive flexible technical support.
In August 2013 the "Database of Open Research Facilities in Tsukuba" started its operation, which covers open facilities at TIA-nano four core institutes including AIST. By using this database, all open facilities at four institutes can be searched easily and at one time, and the user can find which facility has the equipment with the desired function.

Super Clean Room

IBEC

Vertically Integrated Center for Technologies of Optical Routing toward Ideal Energy Savings

The traffic volume of the Internet increases by 20-40% each year, and has increased by more than 10 times over the past 10 years. However it is getting difficult to keep the sustainable growth of the network because the power consumption of the entire network has increased almost proportionally with the information traffic growth. The power limitations will become the bottleneck of the network development unless we take countermeasures.
AIST established the “Vertically Integrated Center for Technologies of Optical Routing toward Ideal Energy Savings (VICTORIES)” to develop a new network technology for drastically suppressing the power consumption of the network. In this center, we promote R&D activities in collaboration with 10 partner companies in a vertically integrated manner, utilizing AIST’s elemental technologies such as silicon photonics technology, optical signal processing technology, and network resource management technology. We demonstrated an open experiment of a large-scale test bed in October 2014.



VICTORIES project targets dynamic optical path network.
＊ WSS, wavelength selective switch; ODU, optical data unit

Participation in Technology Research Associations

AIST has become a member of Technology Research Associations, the members of which provide researchers, research funds, and equipment and perform joint research and development of technologies used in industry. AIST contributes to the projects of these Associations, including by developing research plans, performing research, and using research outcomes.

Particularly by providing our people and place to the Associations, we aim to serve as a place for collaboration and creation where different organizations and people can meet and exchange knowledge through the Associations' projects. We thus aim to help promote open innovation.

AIST's "people" participate in the Associations' projects as researchers, project leaders or board members. We also provide our facilities and equipment as "place" for use by researchers from industries and universities participating in the Associations to intensively carry out their research.

Technology research associations of which AIST is a member (as of March 31, 2014)

	Technology Research Association	
1	Photovoltaic Power Generation Technology Research Association (PVTEC)	A B C
2	Lithium Ion Battery Technology and Evaluation Center (LIBTEC)	A C
3	Fuel Cell Cutting-Edge Research Center Technology Research Association (FC-Cubic TRA)	A C
4	Advanced Laser and Process Technology Research Association (ALPROT)	A C
5	R&D Partnership for Future Power Electronics Technology (FUPET)	A B C
6	Technology Research Association for Single Wall Carbon Nanotubes (TASC)	A B C
7	Epigenomics Technology Research Association (EPiRA)	
8	International Standard Innovation Technology Research Association (IS-INOTEK)	
9	Stem Cell Evaluation Technology Research Association (SCETRA)	C
10	Photonics Electronics Technology Research Association (PETRA)	A C
11	Chemical Materials Evaluation and Research Base (CEREBA)	A C
12	Japan Advanced Printed Electronics Technology Research Association (JAPERA)	A C
13	Technology Research Association for Next Generation Natural Products Chemistry	A B C
14	NMEMS Technology Research Organization Technology Research Association (NMEMS)	A B C
15	Control System Security Center (CSSC)	A C
16	Fine Ceramics Research Association (FCRA)	A
17	Minimal Fab Development Association	A B C
18	Technology Research Association of Highly Efficient Gene Design (TRAHED)	A
19	Technology Research Association of Magnetic Materials for High-Efficiency Motors (MagHEM)	A B C
20	International Research Institute for Nuclear Decommissioning (IRID)	C
21	Manufacturing Technology Research Association of Biologics (MAB)	
22	Thermal Management Materials and Technology Research Association (TherMAT)	B C
23	Innovative Structural Materials Association (ISMA)	

Participation in FY2013 in Technology Research Associations

- AIST participated in 23 Associations (total cumulative numbers of members excluding AIST: 400 companies, 30 organizations, 10 universities).
- Intensive research projects were performed at AIST (16 Associations marked with the letter "A" in the table).
- AIST's researchers served as project leaders and managed whole projects (8 Associations marked with the letter "B" in the table).
- AIST's managers served as directors (17 Associations marked with the letter "C" in the table).
- AIST provided technical guidance and support, as well as know-how of equipment use.

An example of a technology research association

Manufacturing Technology Research Association of Biologics (MAB)

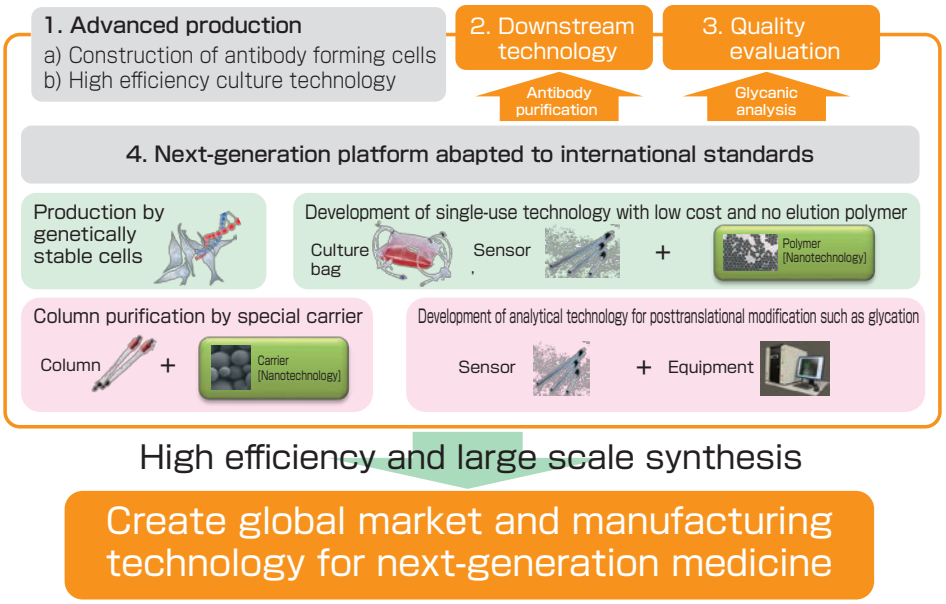
[Establishment] September 2013

[Members]

Asahi Kasei Medical Co., Ltd.; ABLE Corporation; Kaneka Corporation; Kyoto Monotech Corporation; Chromocenter Inc.; Shimadzu Corporation; GL Sciences Inc.; JX Nippon Oil & Energy Corporation; JSR Life Sciences Corporation; JNC Corporation; Sharp Corporation; Sumitomo Bakelite Co., Ltd.; Sumitomo Electric Industries, Ltd.; Daiichi Sankyo Co., Ltd.; DAISO Co., Ltd.; Tokyo Chemical Industry Co., Ltd.; Tosoh Corporation; TOTO Ltd.; Neo-Morgan Laboratory Inc.; Hitachi, Ltd.; Fujimori Kogyo Co., Ltd.; Mitsubishi Chemical Corporation; Yokogawa Electric Corporation; YMC Co., Ltd.; Nippi, Inc.; Kobe University; The University of Tokushima; Japan Bioindustry Association; Japan Blood Products Organization; AIST (25 companies, 2 universities, 3 organizations)

[Outline of R&D]

In collaboration with its members, the Association develops advanced and highly efficient manufacturing technologies for antibody drugs.



An example of a technology research association

Thermal Management Materials and Technology Research Association (TherMAT)

[Establishment] October 2013

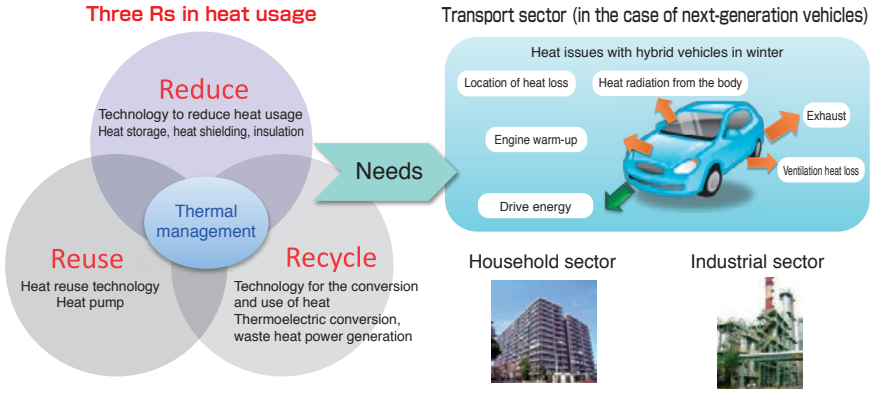
[Members]

Toyota Motor Corporation; Aisin Seiki Co., Ltd.; Calsonic Kansei Corporation; The Japan Research and Development Center for Metals; Central Glass Co., Ltd.; Toray Industries, Inc.; Nippon Thermostat Co., Ltd.; Panasonic Corporation; Hitachi Appliances Inc.; Hitachi, Ltd.; Fujifilm Corporation; Furukawa Co., Ltd.; Furukawa Electric Co., Ltd.; Mayekawa MFG. Co., Ltd.; Mazda Motor Corporation; Mitsubishi Heavy Industries, Ltd.; Mitsubishi Plastics, Inc.; Mino Ceramic Co., Ltd.; Yasunaga Corporation; AIST (18 companies, 2 organizations)

[Outline of R&D]

The Association innovates component technologies in transport and other sectors for the reduction, recovery, and use of thermal energy that would otherwise be released in enormous quantities into the environment without being used. It integrates the components into a system and thus aims to reduce energy consumption and CO_2 emissions and thereby improve the international competitiveness of industry.

Concept of research and development of technology for the innovative use of otherwise unused thermal energy



- "Needs-pull"-type research and development (transport, industrial, and household sectors) → a defined commercialization scenario
- Challenge to address high-risk issues (materials for high-spec components) → research and development with a view to 10 years into the future
- Research and development through vertical collaboration and Associations consisting of companies in different areas → prompt business development, synergy effect → highly energy-efficient materials and products, in which Japan is strong

Providing a Place for Industry–Academia–Government Collaboration and Actively Accepting Researchers

AIST actively accepts researchers to conduct joint research, participate in technical research associations, and also invites visiting researchers. In addition, it supports research and development and product development at companies by conducting commissioned research and tests on request, and by providing technical training, technical consultations, and samples for research.

Active acceptance of external researchers

Number of external researchers accepted for joint research

Number of researchers accepted in FY2013: 1,971.

We accept researchers from joint research partners to conduct joint research effectively by using our advanced facilities and equipment .

Joint research with transfer of human resources

Number of joint research projects involving transfer of human resources in FY2013: 1 (4 researchers transferred to AIST).

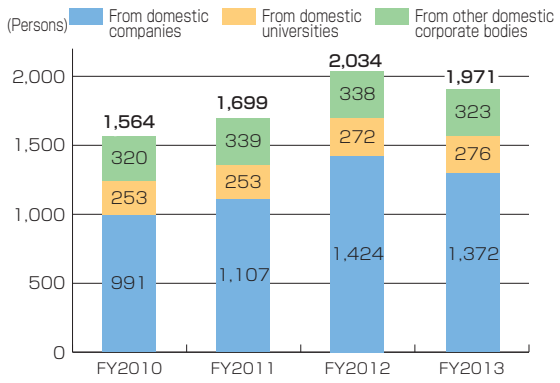
Researchers from joint research partners have transferred to AIST. (The partner bears the cost of research equivalent to the personnel expenses.) The researchers are deepening our research collaboration and accelerating research and development of both the partners and AIST, making full use of AIST research infrastructure and human resources.

Examples of activities conducted by external researchers

AIST researchers work together with external researchers on various research projects.

- Research and development of the entire process from materials to the finished product for a next-generation crystalline silicon solar cell that achieves both a major reduction in manufacturing cost and maximum conversion efficiency.
- Research for the commercialization of ultra high-voltage SiC power semiconductors with the aim of building a low carbon society.

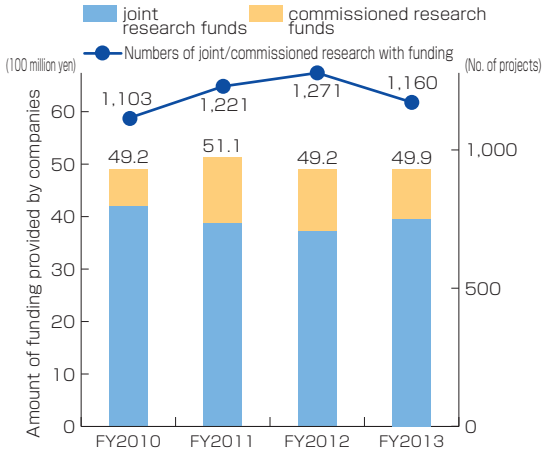
Number of accepted external researchers for joint research



Joint and commissioned research conducted in past years

In joint research, AIST works together with companies, universities and public research institutions to conduct research and development with shared objectives and goals. It aims to produce results that cannot be achieved by one organization alone. In commissioned research, AIST conducts research commissioned by companies. Such companies can use AIST's research potential to conduct research that requires technologies not available to them.

Number of joint/commissioned research projects with companies



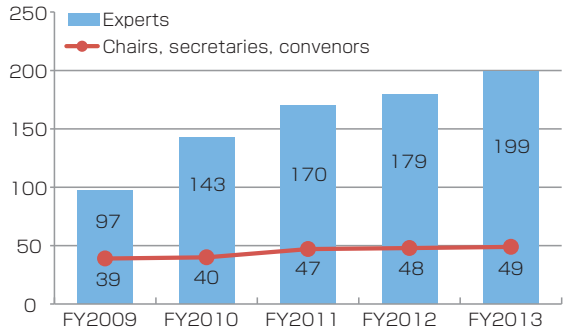
Promotion of International Standardization

AIST is engaged in standardization activities using the products of research and development. Staff of AIST has been playing a key role in committees of international standards developing organizations such as the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC): 49 employees have served as chairs, secretaries and convenors, and 199 employees have participated as experts.

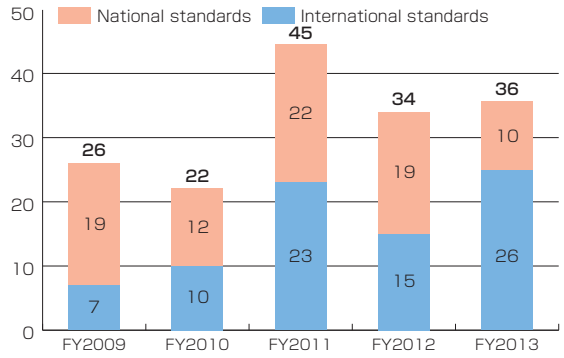
In FY2013, AIST proposed 36 national and international standards, including “Auditory guiding signals in public facilities” and “Test method for self-cleaning performance of photocatalytic materials under indoor lighting environment.”

Since FY2011, AIST has held the Symposium on Strategies for International Standardization every year to enhance standardization efforts by sharing the importance and issues of standardization and certification with involved parties in the industry, academia and government sectors. In FY2014, the symposium was held as a joint event at the IEC General Meeting in Tokyo in November.

Contribution of AIST staff to international standardization activities



Number of proposed standards



Supporting the Overseas Expansion of Companies to Improve the Competitiveness of Japanese Industry

AIST supports the overseas expansion of Japanese companies to improve the competitiveness of Japanese industry. Through the participation of Japanese companies, we have been conducting collaborative research with public research institutions, particularly in Asian countries with rapidly growing economies.

In December 2013, we held the AIST Innovation Workshop in Jakarta, Indonesia, to facilitate exchange between Indonesian public research institutions and Japanese companies in Indonesia and to seek further research collaboration. With around 200 participants, it was the second overseas workshop hosted by AIST alone. In lectures given by AIST and related organizations, we presented case-studies of collaborative research on renewable energy, a topic of concern for both Japan and Indonesia.

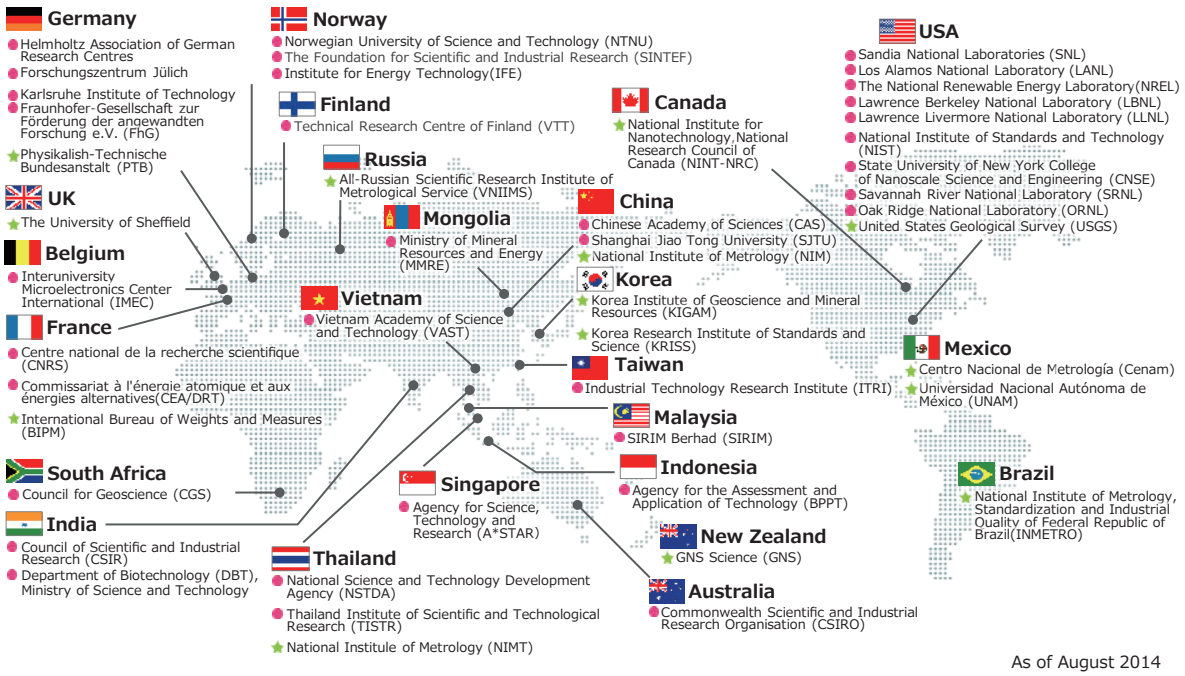
AIST Innovation Workshop in Indonesia
(December 20, 2013)

Building International Research Networks to Address Global Issues

AIST has concluded memoranda of understanding on comprehensive research collaboration with 34 research institutions worldwide, and is engaged in international research collaboration and inter-organizational exchange of personnel. Using this network, in October 2013 AIST and RIKEN jointly hosted the 2nd Global Summit of Research Institute Leaders. The purpose of this summit is to provide an opportunity for leaders from research institutions to meet and discuss the future of science and technology, the role of each research institution, and collaboration among research institutions. At the summit, representatives from 16 research institutions in 13 countries came together for vigorous discussions concerning “brain circulation and international collaboration” to address global issues. Concerning this subject, the participants reaffirmed their pledge to share knowledge and technologies with reference to the activities of each research institution, and in future, based on such exchanges, to further promote the development of a common framework of collaboration across borders and fields of expertise.

2nd Global Summit of Research Institute Leaders (October 5, 2013)

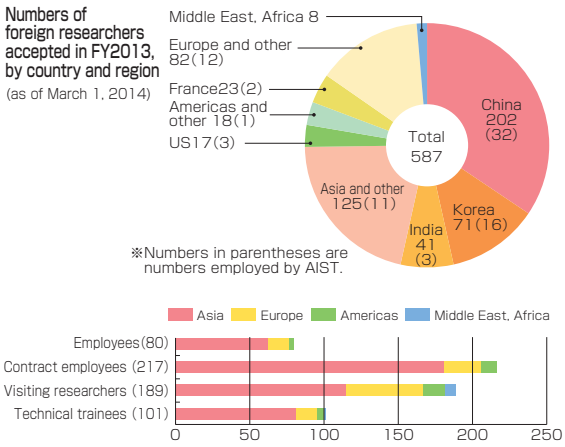
● : Comprehensive research cooperation : 34
★ : Research cooperation in certain fields : 33



As of August 2014

Accepting Foreign Researchers

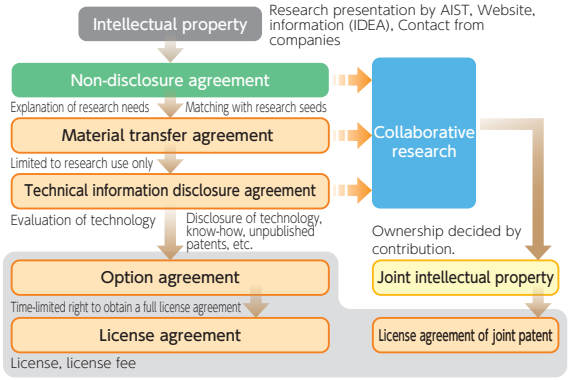
AIST actively accepts foreign researchers from universities and research institutes worldwide to enhance collaboration with overseas research institutions. Moreover, we aim to develop an international network of researchers with AIST at its core. In 2013, a total of 587 foreign researchers were engaged in research at AIST. In terms of regional statistics, 70% were from Asian countries, with those from Europe making up the second largest percentage of accepted researchers. We will continue to develop close collaboration with overseas research institutions through personnel exchange.



Technology Transfer Activities

It is AIST's mission to contribute to the development of the economy and industry by disseminating its research achievements in society. To achieve this mission, AIST develops a strategic approach to obtain intellectual property ("IP") rights, and appropriately maintain and manage such IP rights so that the research achievements lead to technology transfer. In addition, AIST is strongly and powerfully promoting technology transfer centering on intellectual property.

Technology transfer process at AIST



Technical Consultation

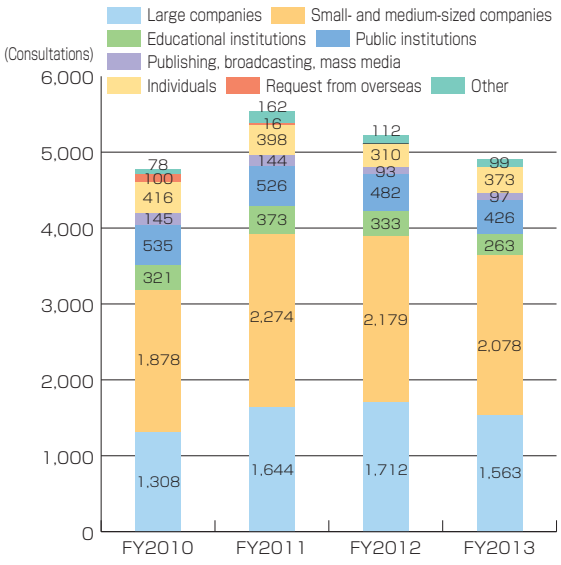
AIST gives advice to companies, universities, and public research institutions based on our technological potential we developed over the years. The industrial technology instructor works with our innovation coordinators and researchers to find a solution.

Example

Consultation request A client wanted to know the flow-molding mechanism and strength characteristics of wood-based materials, how to add functionality, and whether wood colors and patterns are controllable.

Actions taken AIST researchers explained the relationship between microstructure and appearance of fluidity of wood-based materials, the relationships between tree species and added amount of additives and their strength, and imparting functions by additive impregnation. We also explained that although some data have been collected about color changes caused by the additives, it is still difficult to control patterns accurately.

Number of technical consultations



Innovation School

AIST's Innovation School is working to broaden the horizons of young researchers and to raise their awareness in order to train them, by using a specially developed curriculum, to be ready to contribute to innovation.

To address increasingly complicated social issues, we need to develop innovative technologies by combining the ideas and technologies of AIST and external organizations. For this we need personnel who can play central roles in collaboration. AIST actively accepts young researchers with PhDs (i.e. postdoctoral researchers) and PhD students and trains them so that they have scientific and technological knowledge in specific areas of expertise, along with the communications and cooperation skills they need to work with experts in different fields from a broader perspective.

In FY2013, AIST hired 20 postdoctoral students (PhD researchers) and accepted nine PhD students as technical trainees. As students in the Innovation School's lecture course, two postdoctoral researchers participated in lectures and exercise.

Curriculum of the Innovation School

1) Lectures and exercise at AIST

- Lectures on philosophy and management and on the activities of researchers in industry, academia, and government and of corporate executives
- Lectures and exercises on topics such as standardization and research, intellectual property and research, design thinking, risk assessment, and career development
- Paper reviews by students on synthesiology (a research approach to integrating and configuring component technologies on the basis of research scenarios)
- Exercise to improve skills in presenting research in ways that can be understood by people from different fields

2) Research at AIST

- Working on research topics in laboratories
- Experiencing fully-fledged research (research covering the process from basic research to product development in a seamless way)

3) On-the-job training with companies (about 3 months on average)

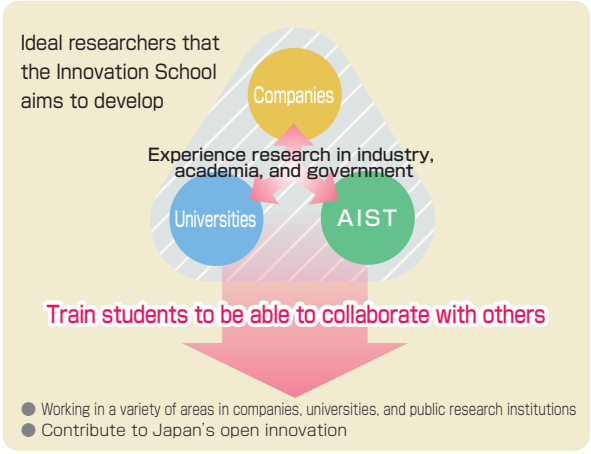
Students of the school are sent by AIST to companies to learn the following by experience:

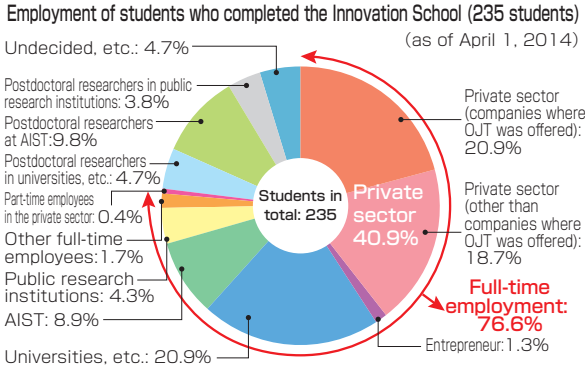
- Importance of the procedures used to conduct research, the speed of technology development, and cost awareness
- Importance of teamwork and collaboration with other departments.

Expanding the vision and providing opportunities to young researchers

Students of the school say such things as "My research approach works in the company better than I thought it would" or "My successful completion of the corporate training program gave me a lot of confidence." They realize from experience that there are a variety of opportunities to work as researchers; to develop such insights as "The most important thing is the awareness that I work in an organization" or "You need to share a language with those with expertise in each area;" and to broaden their horizons. Companies that have accepted trainees say that "We gained valuable technological knowledge from the students" or "The students inspired those of our employees who were from the same generation." The companies rate the trainees' research capabilities and work attitudes highly.

Since the school started, 235 students have completed the program and have discovered their new potential. They are working in a variety of areas in companies, universities, and public research institutions.





AIST Research Assistant Program

To train human resources with world-class, high-level expertise and practical research ability that produces results leading to innovation, AIST has developed a new program, the AIST Research Assistant Program, to hire graduate students with high levels of ability in research and development (R&D). This program allows talented graduate students to be free from financial concerns while focusing on research for their degrees. By participating in AIST's R&D activities, which reflect strong social needs, they can develop the ability to plan and conduct advanced research which is needed for R&D activities today.

Employment requirements for AIST Research Assistants (as of September 2014)

Qualified students	Graduate students in PhD programs	Graduate students in master's programs
Requirements	The advanced ability to conduct R&D and write research papers that can substantially help to promote AIST's R&D projects; and the ability to work independently under the instructions of AIST researchers throughout the year.	The ability to conduct R&D that can help to promote AIST' s R&D projects; and the ability to work independently under the instructions of AIST researchers throughout the year.
Duration of employment	14 days a month	7 days a month
Wage	1,900 yen per hour (about 200,000 yen for 14 days a month)	1,500 yen per hour (about 80,000 yen for 7 days a month)

Summer School of TIA Graduate School

Two summer schools were held in 2013 at TIA Collaboration Center, AIST West, as part of "TIA Graduate School Summer Open Festival," aiming at young human resource development in Japan. Intensive courses on basics and application, practical training, poster presentations, and laboratory tours were conducted.

The second TIA Summer School for Power Electronics sponsored by AIST was held from 24th to 27th of August 2013, to which 142 graduate students and company employees participated. Of particular note was the final day when all the four lectures were conducted entirely in English in anticipation of globalization of research including lectures by two lecturers invited from Germany.

The first TIA Summer School for Nanoelectronics sponsored by AIST and the University of Tsukuba was held from 28th of August to 3rd of September 2013, to which 21 graduate students participated. Besides lectures and practical training, there were cultural exchange with participants of the TIA Nanogreen Summer School and a collaborative poster session conducted with them, which added much significance to this summer school.

Those two summer schools were held again in August 2014 as part of the TIA Summer Festival.

Practical training in nanoelectronics

Lecture on power electronics

Poster session

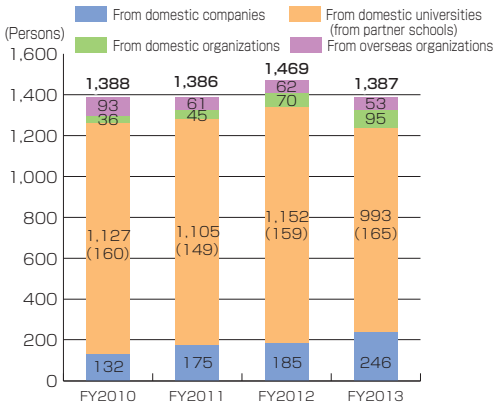
Technical Training

AIST accepts researchers, engineers, and students from companies, universities and public research institutions for a certain period of time to help them obtain certain techniques under the instructions of AIST researchers. In FY2013, we accepted 1,387 people in this program.

Combined use with the partner graduate school system

AIST researchers as guest professors of partner graduate schools instruct graduate students for their research. Also AIST supports education of partner graduate schools using AIST's research potential, such as AIST researchers giving lectures.

Number of people in technology training

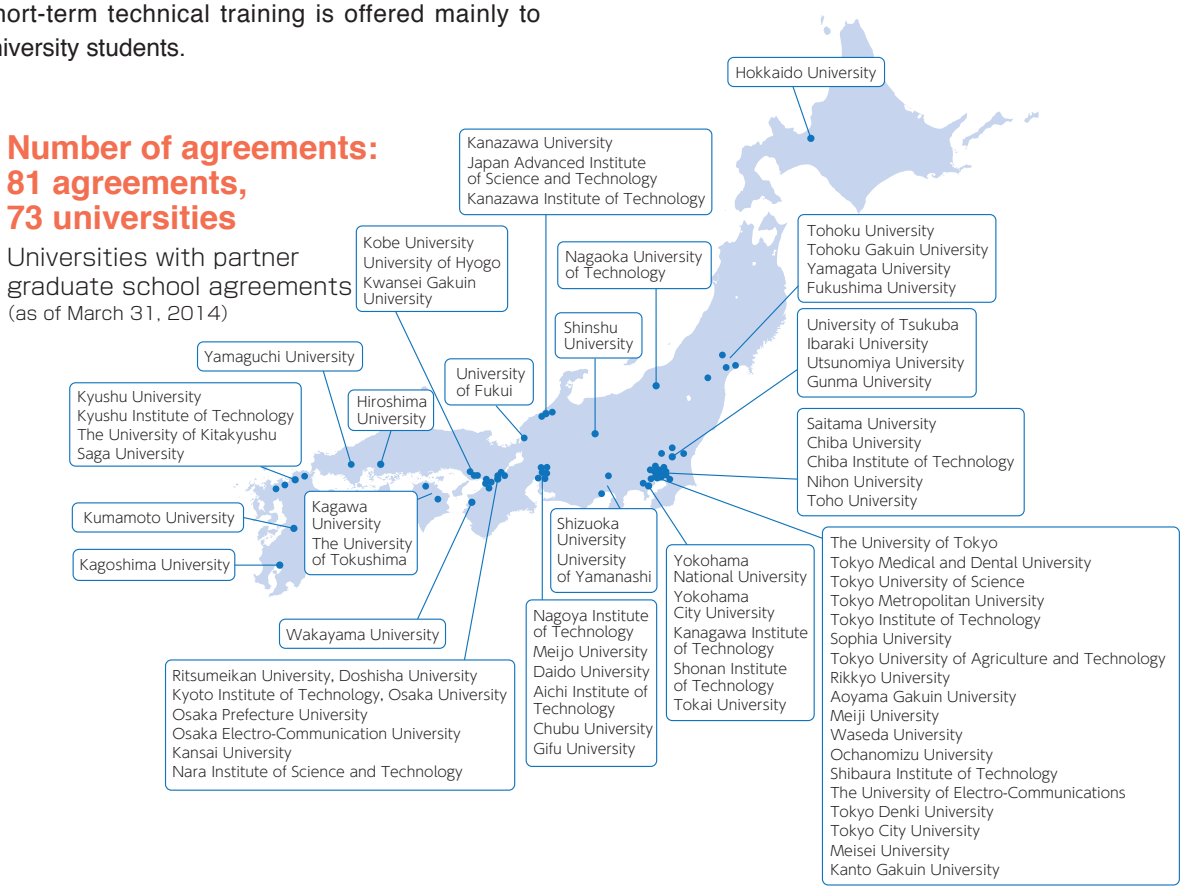


Internship program

Short-term technical training is offered mainly to university students.

Number of agreements: 81 agreements, 73 universities

Universities with partner graduate school agreements
(as of March 31, 2014)



Voices of the trainees

"I learned techniques for sample preparation and different types of evaluation and it was very helpful for future business in my company." (from a corporation)

"I was able to learn a professional attitude towards research, ways of proceeding research activities and making research plans including research methods." (from a university)

"AIST researchers kindly taught me detailed know-how, so that I learned some techniques." (from a public research institution)

Labor Practices

Occupational Safety and Health

Our priority is the safety and health of our employees.

AIST has an Environmental Safety Charter in place to create a work environment in which all people working here can do so in a safe and healthy manner. AIST is also working to improve the health and safety of its employees as a top priority.

Health and Safety Committee meetings and site meetings of AIST bases

A Health and Safety Committee meeting, which is attended by labor and management representatives, is held at each AIST base every month to discuss health and safety issues.
At the monthly meetings of the AIST bases, representatives from each AIST base discuss the results of the discussions at the Health and Safety Committee meetings, along with other safety and health issues. The results of the meeting of AIST bases are communicated to all employees through department meetings.

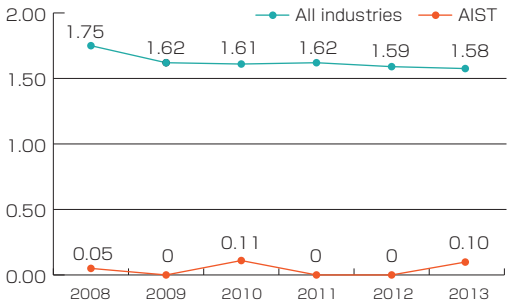
Establishing the safety guidelines

AIST has safety guidelines in place that set forth a code of conduct to ensure safety in handling hazardous chemicals, high-pressure gas containers, and in performing experiments.
The guidelines provide the basis for employee safety education and for laboratory work and are revised once every year. In FY2013, a number of provisions were added to the guidelines. “Handling of Research Products Provided to External Individuals and Organizations” was added to prevent the recurrence of a FY2012 incident of non-compliance with the procedures under the Poisonous and Deleterious Substances Control Law. Following a near-miss gas leakage incident that occurred at AIST, “Requirements for the Documentation of Inspection of High-Pressure Gas Containers” were also added to help prevent accidents.

Prevention of accidents and their recurrence

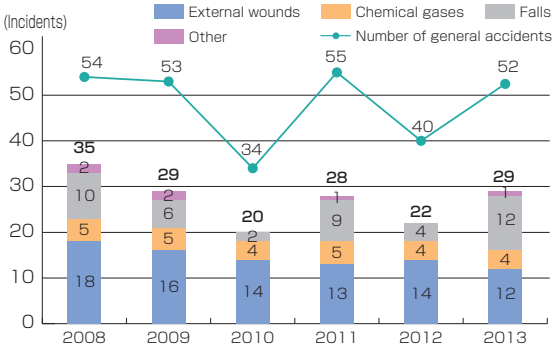
In the event of a work-related accident, investigations and analyses are conducted to determine the cause of the accident. The relevant work is put on hold until recurrence-prevention measures are taken, and information on the accident is communicated to all employees to prevent similar accidents.
AIST holds a Safety Management Report meeting every morning with the participation of regional base executives, including directors-general and superintendents. At this meeting, AIST connects 13 research bases across the country through the teleconferencing system to exchange information on accidents in the regional research bases, AIST Tsukuba and sites, including near-miss incidents and health issues; the aim is to share details of recurrence-prevention measures and thus improve employee health and safety. We kept the total number of accidents in FY2013 in AIST, as well as the number of accidents resulting in injury associated with laboratory work, at low levels. In FY2013, many fall-related accidents unrelated to laboratory work occurred. To help prevent their recurrence, we installed night lights along the sidewalks on and off the premises and eliminated height differences between the sidewalks and the roads.

Incidence of accidents resulting in absences from work



Frequency of accidents resulting in absence from work
Indicates accident frequency expressed as the number of casualties from industrial accidents per one million cumulative work-hours
Frequency of accidents resulting in absence from work = number of casualties from industrial accidents/number of cumulative work-hours × 1,000,000

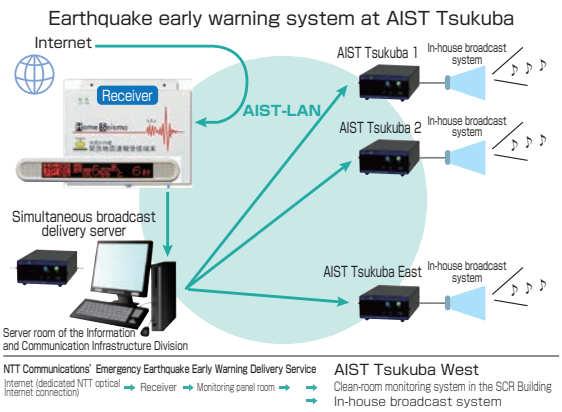
Number of general accidents and number of accidents resulting in injury



Emergency response management

We run disaster and fire-fighting drills so that we can take prompt action to minimize damage in the event of emergencies such as disasters or accidents.
To ensure a means of communication with the regional research bases in the event of a disaster, we also conduct communication drills by using a radiotelephone system for disaster management; this system is in place in research bases across the country.
To respond to a disaster such as an earthquake we have emergency items such as food and rescue supplies stockpiled, and we regularly check, review, and replace them.
By 2013, we had installed earthquake early warning systems at all research bases (with the exception of the newly established Fukushima Renewable Energy Institute), and we had put in place an emergency broadcast system to simultaneously broadcast alerts from the Meteorological Agency throughout the premises. We can take actions (such as stopping laboratory work immediately and thus minimizing damage) to prepare for major quakes before they hit.

Scene from a fire-fighting drill



Safety education and support for license acquisition

AIST provides a variety of safety education programs and workshops for accident prevention to all levels of employees, including new employees and those accepted to work at AIST.
Safety education provided when employees are hired and when there is a change in work content is managed by an internal safety education management system, allowing participation history and program contents to be checked. To broaden learning opportunities, an e-learning system is used in part of safety education and training for life-science experiments.
Also, we actively support employees in acquiring licenses. For example, we hold a course on skills required for a Health Officer's License and a course on skills required for a Chief Technician's License for Using Organic Solvents

Main education and training programs and workshops held in FY2013

Program	No. of sessions held	No. of participants
Course on skills required for a Health Officer' s License	2	52
Course on skills required for a Chief Technician' s License for Using Organic Solvents	1	27
Course on skills required for a Chief Technician' s License for Using Specified Chemical Substances	1	20
Course on the safe use of chemicals and high-pressure gases	17	About 500
Education and training for recombinant DNA experiments	1	410(421)
Education and training for animal experiments	1	149(168)
Education and training on human ethics	1	114
Biosafety education and training	1	283
Course on safe driving	16	1,884
Joint radiation education and training [for radiation workers]	4	397
X-Ray education and training [for new users of X-ray-equipment]	80	247
Course on compliance with laws and regulations on radioactive materials [for managers]	1	52

Numbers in parentheses are numbers of participants in e-learning programs.

Hiring Fixed-term Regional Employees by Open Recruitment at AIST

The work conducted by headquarters and operational organizations in AIST includes routine work that can be conducted more effectively if highly experienced employees are responsibly engaged in the work for an extended period of time.
AIST recruits and hires skilled contractors and temporary employees who have been with AIST for a certain period of time as fixed-term regional employees (i.e. administrative staff who are not transferred from one region to another) and who will be responsible for purchasing, asset management, employee benefit programs, and work development.
AIST hired two of these staff members in 2012, five in 2013, and five in 2014. These employees are working in headquarters and operational organizations of AIST Tsukuba.
Fixed-term regional employees can work for up to 3 years. However, their work performance is comprehensively evaluated during their employment and they have the chance to be hired as non-fixed-term employees.
AIST will continue to hire fixed-term regional employees as staff to support our research and development and other activities.

Support for Work Life Balance

Combining work with nursing care and children raising

To create a work environment that makes it easier for employees to raise children and do nursing care, AIST provides support to help employees to achieve work–life balance. A flex time system and a discretionary work system are implemented to allow for flexible working style. These measures have been used by most of those who are eligible to use them. A reduced work-hour program and a child care program to support child raising are also available until children start school. A nursing-care leave program and an extended nursing-care leave program are in place to support nursing care. A list of information of AIST's support programs is available in both Japanese and English in the "Child-care" and "Nursing-care" pages on the intranet. A site for exchanging information is also available on the bulletin board for the employees, and information exchange among employees is possible on a message board.
To support child care, Child daycare facilities are available at three research bases (AIST Tsukuba, Chubu and Kansai). Sudden demands can be met by providing private child day care or babysitting services.
To support nursing care, we hold work–life balance seminars conducted by invited experts. To give employees information to help them manage the current and future nursing care problems, we held a seminar on nursing care cost estimates and insurance. We also held a seminar delivered by researchers on nursing care support technologies.

Seminar on work life balance

Numbers of people who used various leave programs

	FY2011		FY2012		FY2013	
	Male	Female	Male	Female	Male	Female
Sick Child Care Leave	97	159	90	159	86	167
Special Child-care Leave	29	13	28	16	27	11
Extended Child-care Leave*	0	33	0	25	0	35
Nursing Care Leave	36	23	44	9	34	17
Extended Nursing Care Leave*	0	2	0	1	1	0

* Number of employees who started their leave within the fiscal year

Numbers of employees who used child daycare services

	FY2011		FY2012		FY2013	
	Permanent employees	Contract employees	Permanent employees	Contract employees	Permanent employees	Contract employees
AIST Tsukuba	819	762	795	876	1,018	678
AIST Chubu	25	22	11	68	37	66
AIST Kansai	178	81	283	45	175	87
Private child daycare facilities and babysitters	15	0	12	3	20	3

Helping employees to take annual paid leaves

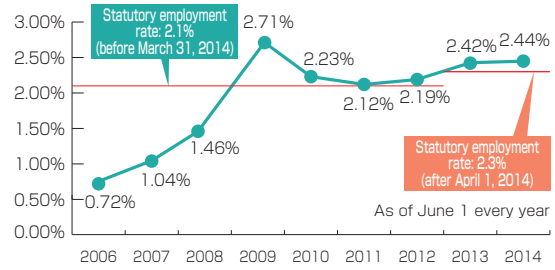
In July 2011, AIST launched a campaign to encourage employees be refreshed by taking their annual paid leaves. We are placing posters with the phrase "Good Work, Good Rest" on the notice boards in the offices at AIST to encourage those in the same workplace to arrange for taking paid leaves in turn and to combine paid leaves with weekends and national holidays. We make an effort to create an atmosphere that would help employees to take their annual paid leaves.

Good Work, Good Rest

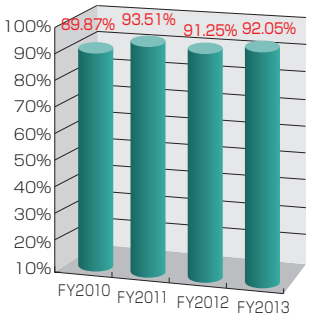
Efforts to Hire People with Disabilities

AIST actively hires people with disabilities. In April 2013, the statutory employment rate for people with disabilities was increased to 2.3%. We hired people with disabilities at every opportunity and achieved the statutory employment rate. (The disability employment rate as of June 1, 2014 was 2.44%.) To maintain the percentage of physically challenged employees who remain at work, we created a work environment to help the physically challenged work more easily. (Our retention rate was 92.05% in FY2013.)

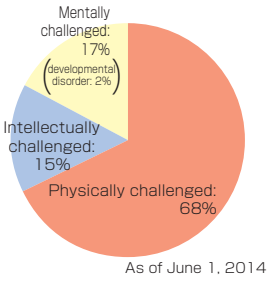
Change in employment rates for people with disabilities



Percentage of people with disabilities remaining at work



Employment rates by disability type



Activities of intellectually or developmentally challenged teams

AIST has teams of people who are intellectually or developmentally challenged: a 10-member team at AIST Tsukuba, a three-member team at AIST Kansai, and a one-member team at AIST Kansai.

(As of the end of July 2014)

Voices of disabled people working in AIST

☆ "I've been working at AIST for 2 years. Currently, I work in the Health and Welfare Office as an assistant to an AIST employee. I have disabilities, and this was the first time I was hired! I was a little worried, but I feel very secure because the people around me treat me normally.
I was given the opportunity to experience different jobs. I'm very happy with my work, and I'm going to continue to take on different jobs."

☆ "I do accounting work at AIST Tsukuba 4. In the beginning, I was very nervous. I wasn't sure if I could do my job well and if I could do well with other people in the workplace. Because my team members taught me a lot of things very kindly and carefully, I was gradually able to ask questions and speak to other people. I was gradually able to enjoy my work, too.
"I was really concerned about what other people thought of my disabilities. But I was very happy, because everybody in the workplace wasn't conscious of my disabilities and treated me normally and lightheartedly.
"I like learning more about various things from the people at AIST and contributing to society."

☆ "It's been 6 years since I started work at AIST. I'm really pleased to work in a wonderful natural setting with trees—I can listen to the birds chirping! I work as an electronics engineer, my area of specialty since I graduated from university. I'm inquisitive and develop an interest in everything. As a research institution in a wide range of cutting-edge areas, AIST has many researchers. I have experienced environment- and safety-related work for a few years, and it has been my great pleasure to communicate with researchers in various areas during my breaks. I go to the cafeteria with other members to share, in my broken English, Japanese–English conversation with 10 or so researchers from overseas whom I've met in the cafeteria."

☆ "I've been with AIST for about 2 years. My boss and coworkers have said several times, 'Are you really disabled? We forget you are visually impaired.'
"I was very happy to hear that. I can do a job that allows me to make full use of my abilities in an environment where people with and without visual impairment can work in a nearly equal manner. This is made possible by the understanding, consideration, and support of the people of the International Department, where I work, the Human Affairs Department, the Environmental Improvement Department, and the Barrier-Free Promotion Department, as well as by the support of other involved people. I feel this every day."

Health Management

We perform general medical examinations and special medical examinations in spring and autumn every year. We strive to increase the medical examination rate by spreading awareness among staff that they have to undergo these examinations. Also, we encourage them to take complete medical examinations. As follow-up care after medical examinations, an industrial physician and healthcare staff provide health advice. In 2013, we produced a report on the "Status of Health Management and Support Activities at AIST and of Sick and Administrative Leave due to Illness"* and communicated the status to all employees.

AIST has criteria in place for preventing health disorders from overwork. We provide face-to-face counseling with a doctor in accordance with the Industrial Safety and Health Act.

We take measures for the early detection and prevention of health disorders and illnesses in employees and in this way aim to improve the performance of individual employees and of AIST as a whole.

＊Status of Health Management and Support Activities at AIST and of Sick and Administrative Leave due to Illness

1. Health management and support activities
   (1)Periodic medical examination rate (including complete medical examinations) (%)
   (2)Percentage of AIST employees and contract employees (including temporary employees) who underwent special medical examinations in spring FY2013
   (3)Flu shots (in AIST)
   (4)Number of people who received diagnoses (i.e. a C or D determination) on the basis of medical examinations performed at AIST, and number of people who received face-to-face counseling
   (5)Number of people who received face-to-face counseling with an industrial physician and health advice
   (6)Examples of health advice and mental advice
2. Data on sick leave and administrative leave due to illness
   (1)Sick leave
   (2)Administrative leave due to illness
3. Implementation status of a program to provide support in returning to work after administrative leave (temporary return to work)

Activities in FY2013

Main activity	Availability	No. of people
Face-to-face counseling with an industrial physician	All year round	1,241
Face-to-face counseling with industrial health staff	All year round	859
Quit-smoking consultation	All year round	62
Diet consultation	Nationwide	1
Flu shots	Nationwide	2,314
Emergency first-aid workshop	6 times	145
Health-support seminar on "Refreshing Exercise"	14 times	277

Mental Healthcare Activities

To address mental health issues at AIST, we have developed a Mental Fitness Program in a unified manner in accordance with the directives and guidelines of the Ministry of Health, Labour, and Welfare. In a continuous and planned way, we deliver four health care programs based on the Mental Fitness Program: Self-Care, Care by Supervisors, Care by Workplace Industrial Health Staff, and Care by External Resources.

Care by Workplace Industrial Health Staff includes face-to-face counseling with an industrial physician, counseling with health staff (licensed counselors), work restriction, and support in returning to work (e.g. in the form of a temporary return-to-work program).

We provide training for employees to learn the skills to prevent and manage stress, and we provide education, training, and seminars for executives and supervisors to learn skills for evaluating and improving work environments and advising employees.

As part of Care by External Resources, we provide counseling with external mental health professionals by means of email, telephone, or face-to-face contact, and through external e-learning courses.

Metal healthcare activities

Main activity	No. of sessions	2011 No. of participants	2012 No. of participants	2013 No. of participants
Face-to-face counseling with an industrial physician (mental health)	Year-round	797	760	709
Counseling	Year-round	188	160	211
Telephone counseling	Year-round	11	7	4
Employee Assistance Program (EAP) (counseling with external professionals by telephone, email, or face-to-face contact)	Nationwide, year-round	61	49	37
Seminar to support health self-care: "Communication Techniques You Can Start Using Tomorrow" (2013)	Nationwide, once	242	179	93
Joint new employee training: "Mental Health" (held by the Office of Human Resource Development and Planning)	Once	80	75	102
Group Leader Training (2nd session): "Mental Health Management"(held by the Office of Human Resource Development and Planning)	Once	481 (14 times)	29	49

Fair Operating Practices

Implementation of Conflict-of-interest Management

An important mission of AIST is to promote industry–academia–government collaboration and disseminate the results of that collaboration. If an executive or a manager derives personal gain from industry–academia–government collaboration, he or she needs to properly manage any situation in which there is a conflict of interest between his/her personal gain and the research duties and responsibilities required by his/her role as an executive of AIST as a public research institution.
AIST has formulated rules to implement conflict-of-interest management and applies this management to such cases.

In FY2013, AIST conducted "Periodic Conflict-of-Interest Self-Reporting" twice among executives and the relevant employees (the first half of FY in August, and the second half of FY in March). All of the relevant personnel (3153 in the first half and 3135 in the second half) reported conflicts of interest. Seven employees with possible conflicts of interest were interviewed by an external conflict-of-interest counselor.

Information Security

AIST provides information security training on a continuous basis so that all users of our network can deepen their understanding of our information security policy and can implement the policy properly, with awareness and responsibility.

Information security training

To maintain and increase awareness of information security, AIST requires employees to undergo information security training at least once a year; new users must also take the training. Since 2012, we have calculated the attendance percentages of web-based training at every division and have made these data public within AIST.

Implementation status of self-checks

Training and self-checks are important to ensure AIST's information security. We implement information security measures and self-checks for the protection of personal information in a unified manner. In 2012, through the information administrator, we requested all relevant personnel to conduct self-checks within a specified time period. All of them conducted self-checks. Thus we further disseminated awareness of information security, including of the handling of personal information.

Implementation of an information security audit

AIST conducts an information security audit of research units to determine whether the information system is being properly managed and operated in accordance with the information security policy. In 2013, we conducted a security audit of 24 units at AIST and an audit of nine units to review improvements in issues identified the previous year. We thus enhanced the information security of AIST as a whole. From next year onward, we will conduct security audits and security review audits in a planned manner.

Numbers of units audited

	2011	2012	2013	2014
Units subjected to audit	31	24	24	18
Units subjected to review audit	3	20	9	16

Numbers of personnel undertaking information security training

	2010	2011	2012	2013
Group training	1,857 (22)	329 (3)	78 (1)	97 (1)
Web-based training	4,432	5,745	6,209	6,738
CD-ROM-based training	-	-	-	-
Departmental face-to-face training	112	85	154	61
Total number of people	6,401	6,159	6,441	6,896

Implementation of Security Export Control

The security export control is an important effort in maintaining peace and security in the international community. In Japan, in addition to the regulations on weapons trade itself, the export of goods and transfer of technologies that may be used for the development and manufacture of weapons are regulated according to the "Foreign Exchange and Foreign Trade Act" to prevent the proliferation of weapons of mass destruction and excessive accumulation of conventional weapons. Therefore, companies and institutions that may develop relationships with overseas companies and institutions must have tight export control.

In 2004, AIST formulated Rules for the Security Export Control and gave notification of them under the title "Internal Compliance Program" to the Ministry of Economy, Trade and Industry. In accordance with these rules we have tight security export controls in place. Security export control activities include: (1) communicating the latest information on export control within AIST; (2) export control training for AIST staff; (3) export control instruction to individual staff members; (4) classification and transaction screening; and (5) conducting internal audits.

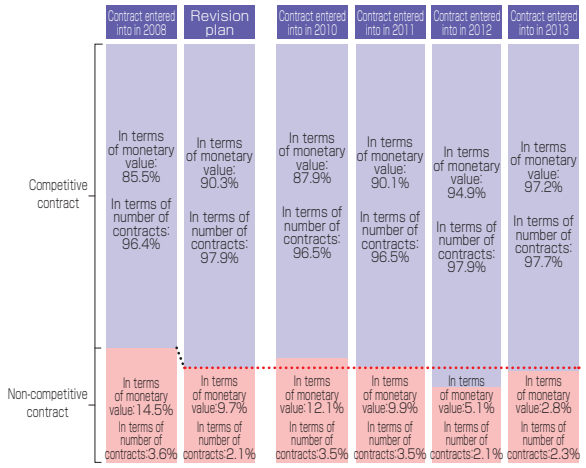
Recently, with the increased cases of collaborative research with overseas research institutes and universities, there is higher importance of raising the staff's consciousness about security export control. We now have an established security export control procedure, and the consciousness for security export control has risen among individual staff members.

AIST will continue to promote further implementation of security export control in the future to maintain peace and safety as a member of the international community.

Training in export control within AIST

Proper Implementation of Procurement Processes

AIST enters into contracts based on general competitive bids, competitive proposals, or public tenders, except in the case of truly unavoidable negotiated contracts. In April 2008, as part of a review of negotiated contracts in accordance with the Plans for Streamlining Independent Administrative Institutions, we changed our base amount for maximum negotiated contract–based procurements to make it the same as the government's. In April 2010, we formulated a new Plan for the Revision of Negotiated Contracts based on this 2008 amount. As a result, in 2013, non-competitive negotiated contracts exceeding the base amount accounted for 2.8% of all contracts entered into in terms of monetary value and 2.3% in terms of the number of contracts. The projected target in the Plan for the Revision of Negotiated Contract was achieved in terms of monetary value but exceeded in terms of the number of contract. The reasons for this include the fact that, in 2013, polychlorinated biphenyl waste, which must be disposed of at waste facilities designated by law, was generated and the number of rental display booths required for display increased.



The Plan for the Revision of Negotiated Contract was checked and reviewed in relation to contracts entered into in 2008. It was made public in April 2010.

Test for Procuring Services from the Market

In accordance with the Cabinet Decision on the "Principle for Public Service Reform, etc." (July 15, 2011), the Consortium for Facility Maintenance and Other Services at AIST Tsukuba was to provide eight services at AIST Tsukuba, including facility maintenance, for the 3 years from 2012 to 2014. Below are the main results of the services provided by the Consortium for the first 2 years of this period.

Reduction in greenhouse gas emissions

- Reduction in greenhouse gas emissions

By 40.8 t/year (in 2012)

By 169.2 t/year (in 2013)

The number of outdoor lights turned on was reduced, but safety at night was still ensured. Heating, ventilation, and air-conditioning systems were operated intermittently but a comfortable work environment was maintained.

Maintenance and improvement of the quality of services, and cost cuts

Improvement of service quality

- Clarification of instructions and orders centered on general management work
- Understanding each other's work (holding a work report meeting and providing periodic group training)

Cost cuts

- A reduction of 52,131,000 yen on average over 2 years of implementation (excluding additional work such as general management work)

Maintenance of service quality

- A comfortable facility environment was still maintained.

Average satisfaction rates in a questionnaire survey of facility users:

Operation and management of the Research Collaboration Center (Sakura Kan)
96% (recommended minimum approval rate 90%)

Operation and management of the Research Collaboration Center (Keyaki Kan)
98% (recommended minimum approval rate 85%)

Maintenance of Science Square Tsukuba
95% (recommended minimum approval rate 90%)

Operation and management of the Geological Museum
95% (recommended minimum approval rate 90%)

Community Involvement

Holding of Science Cafés at Various Locations

AIST has been active in outreach and has held science cafés at AIST Tsukuba and in regional research bases as part of these outreach activities.
In collaboration with academic societies and municipalities, the regional research bases have asked a variety of people and organizations to the science cafés. On Saturday, July 12, 2014, AIST Kansai held a science café for the first time jointly with the Japan Society of Applied Physics under the sponsorship of Senshu Ikeda Bank and the Ikeda Chamber of Commerce and Industry. Under the title "Near-future manufacturing involving cells," we were given presentations on the use of laser tweezers to grab a biological molecule and on the use of a laser to cut a nerve cell.
AIST Tsukuba changed the time of the science café from a weekday evening to a holiday afternoon. On Sunday, July 13, 2014, as a first attempt, AIST Tsukuba held the science café at a shopping center in the City of Tsukuba. Under the title "A decay investigator's crime file—An unfavorable relationship between food and microorganisms," we were treated to a mystery storytale presentation on the identity of the microorganisms that cause discoloration and rotting of food. The participants enjoyed the event, saying that the talk about bacteria was very interesting. They also said that the change in the time and location of the science café made it easier for them to come along.
On Friday, July 24, 2014, we held a science café at the Tosu Public Library in Tosu, City, Saga Prefecture, jointly with AIST Kyushu. Under the title "How close can robots be to humans? – The present and future of humanoid robotic research," we gave a presentation on the development of humanoids, the basics of bipedal locomotion control technology, and future advances in robotics. Many students from junior-high and high schools in the neighborhood participated. They said that they were able to touch real robots, and this deepened their interest in robotics.

Scene from the question and answer session (AIST Kansai)

Scene from the question and answer session (AIST Tsukuba)

Scene from a presentation (AIST Kyushu)

Publication of "From AIST to the Innovative World"

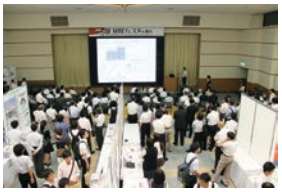
We published a booklet with a collection of new research products, titled "From AIST to the Innovative World," to tell more people about AIST. We gave this name to the booklet in the hope that more people would find out that the results of AIST's research and development are used widely in our daily lives. The booklet is laid out in an easy-to-view and -read format so that people will pick it up and read a few pages. The booklet was distributed at the AIST Open Lab 2013 and at the Fukushima Renewable Energy Institute and research bases, and it was favorably received. One company that was mentioned in an article contacted us saying that they wanted to use the article for external and internal public relations, and they did indeed use the article. The booklet is used as a presentation material for AIST's new employee training; it is also used as a tool for communications within and outside AIST.

Material Festa in Sendai: The Material World, Pride of Japan

AIST, Tohoku University, and the National Institute for Materials Science jointly held a “Material Festa in Sendai” at the Sendai International Center for 2 days (July 28 and 29, 2014) in cooperation with 55 companies. The event aimed to propagate excellent materials and material technologies of Japan to the young researchers and students who will take the future on themselves, as well as to the general public. Students from a total of 25 universities, technical colleges, and high schools made presentations at the exhibition, together with the people from 46 companies. From 35 topics of the student exhibition, 19 were awarded excellent poster prizes. At the event, lectures on “Success stories: materials changed the world” and a symposium by professionals on “the future materials” were also held. The event drew a total of 2640 participants, including 968 students, over 2 days, and ended in success.

Opening ceremony

Exhibition venue



Student exhibitions and student presentations

AIST President Chubachi listening to a student describe his poster

Geo-information for Society

Areas used for the purposes of research, education, and sustainable regional development while preserving natural heritage such as geological formations, strata, and rocks are designated as Global Geoparks supported by UNESCO. To increase the number of Geoparks, AIST serves as the administrative office of the Japan Geopark Committee, which recommends candidate applications for Global Geoparks and designates Japanese Geoparks, which are the domestic versions.

Currently, Japan has seven Global Geoparks and 29 Japanese Geoparks. In the Muroto Global Geopark, a guided nature tour of the walking trail along the beach is popular and draws more than 8000 people a year. The local guides talk about fossils as evidence that the ground level at Cape Muroto was raised by an earthquake, as well as about the strata formed by plate movement, plants at the beach, and living in the Muroto area. Their story fascinates many tourists. The guided tour gives schoolchildren the opportunity to learn about science and about disaster prevention.

Geo-information is used at Geoparks; as a result, geological formations and strata that previously have not attracted attention have now acquired new value as tourist drawcards and places of education. This offers the opportunity to revitalize local economies and to look at the relationship between the Earth and humans from a different perspective. AIST continues to support Geoparks, through which geo-information can be used within society.

Children enjoying outdoor education in Muroto Global Geopark

A tour guide at the Unzen Volcanic Area Global Geopark

Human Rights

Respect for Basic Human Rights

A wide variety of people work at AIST, including executives, permanent employees, contract employees, temporary employees, visiting researchers, technical trainees, contractors, visitors participating in industry–academia–government collaborative programs, and visitors participating in international collaborative programs. We work with the awareness that it is important to have an attitude of respect for each other, regardless of title or position.

From the "Compliance Guideline"

Paragraph 1: Respect for human rights

– We respect human rights. We do not say or act in any way that ignores human rights.

1. We respect basic human rights. We do not discriminate against people on the basis of race, nationality, age, sex, religion, belief, or social status.
2. We do not say or act in any way that ignores human rights, including by harassment.

Respect for Human Rights in Research Activities

Research involving human subjects and ergonomic experiments, such as measurement of human characteristics, is conducted at AIST.

Forty-five new research projects and 166 ongoing research projects were conducted in 2013.

An Ergonomic Experiment Committee, which includes 6 external members, has been set up to protect the human rights and dignity of subjects participating in experiments; ensure the safety of the experiments; review the scientific validity of the protocols; and approve the protocols. Experiments are thus conducted in an appropriate manner.

Harassment Prevention

Harassment hurts the dignity of the person being harassed and causes emotional distress and disadvantage. Conversely, if a person who conducted an act of harassment with no intention to do so is held responsible for that act, he/she may suffer from adverse health effects. The presence of harassment may lead to deterioration in the work environment, reduced motivation to work, and adverse effects on the results of research. 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 workplace harassment (excluding sexual harassment) and sexual harassment and has defined procedures for the prevention of harassment.
- AIST provides employees and managers, and counselors placed in the sites, with training on how to prevent harassment and provide counseling for harassment victims.

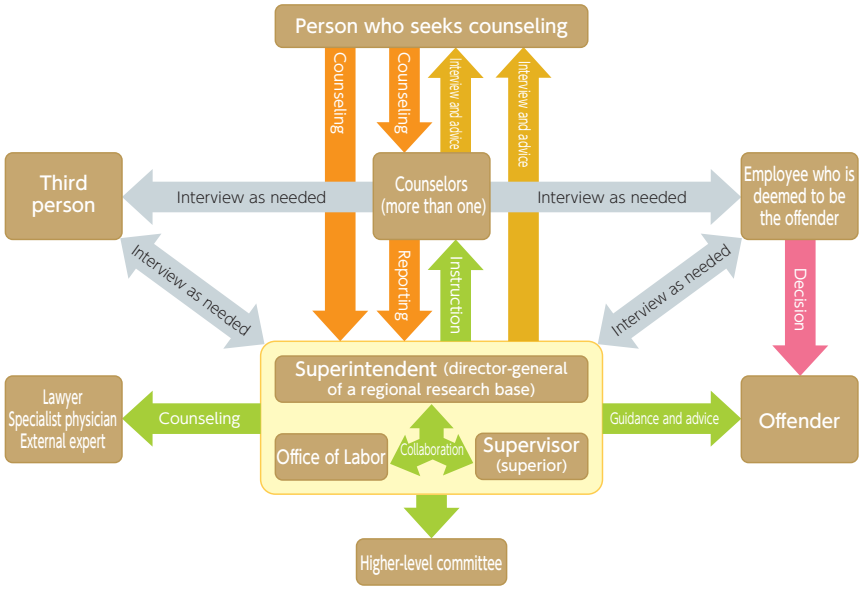
Counseling system

Each site has workplace harassment counselors and sexual harassment counselors; half of all the counselors are women. The counselors work to counsel, investigate, and mediate so that harassment victims are not distressed as a result of their experience. If the line of management or a counselor cannot address a harassment issue, a higher-level committee reviews the issue and recommends the appropriate actions, which are then taken.

In addition, we create an environment that helps harassment victims to seek counseling. As needed, we also ask industrial physicians or external organizations to provide counseling by email or telephone while protecting the privacy of the victim.

Training programs provided on harassment in FY2013

Training program	Trainees	Objectives	Number of trainees in FY2013
New Employee Training	New AIST employees	As part of training in the attitudes, basic knowledge, and skills required to perform their work, participants learn the basics of harassment issues and harassment prevention.	102
Contract Employee Basic Training	Contract employees who are newly employed and have not taken the training the previous fiscal year	As part of basic information on compliance with AIST' s mission and other matters, participants learn the basics of harassment issues and harassment prevention.	412
Basic Training for Foreign and Contract Employees	Foreign and contract employees who do not understand the Japanese language	Provision in English of training in the basics of harassment issues and harassment prevention.	34
Young Researchers' Training in Skills for Conducting Research	Young researchers in fixed-term employment who have been with AIST for 5 years, and young researchers who have passed an employment examination and have been with AIST for 8 years	As part of the training of young researchers transitioning to become mid-career researchers, participants learn skills in advanced research, along with the basics of harassment issues and harassment prevention. This deepens their understanding of how to interact with everyone at AIST.	16
Group Leader Training	Newly appointed group leaders (including group leaders who have not taken this training)	As part of their training in basic management knowledge and skills, newly appointed group leaders learn the basics of harassment issues and harassment prevention.	48
Mid-career Researcher Training	Permanent researchers who will reach the age of 45 in FY2013	As part of training aimed at career development consistent with the mission of the organization, mid-career researchers learn the basics of harassment issues and harassment prevention.	53
Harassment Counselor and Sexual Harassment Counselor Training	Harassment counselors and sexual harassment counselors	Participants learn the harassment prevention knowledge and skills required by counselors. These include face-to-face counseling techniques based on lectures and role-play sessions.	40



Flow of the counseling process

- Those who seek counseling can include people other than the employees involved (i.e. they can be the employee who is deemed to be the offender, the employee who is deemed to be the victim, or someone else, such as a colleague or supervisor).
- Counseling can be sought by means of a face-to-face meeting, telephone, email, writing (a letter), or fax.
- Seeking counseling causes no disadvantage.
- Adequate consideration is given to the protection of privacy, and any information acquired in the course of counseling is kept strictly confidential.

Diversity Promotion Education and Activities

Diversity is essential for creative research activities. Aiming to create a work environment that makes the most of the values and ideas associated with the diverse attributes of employees, such as gender, age, and nationality, AIST has set the following six action plans and has been taking various measures to implement them: 1. providing education to increase diversity awareness and disseminate that awareness; 2. proactively hiring female and foreign researchers and making the most of their abilities; 3. taking measures to ensure gender equality in career development support; 4. supporting work–life balance; 5. collaborating with the government, municipalities, and other research and educational institutions; and 6. promoting diversity in an integrated manner.

We organize seminars and training sessions for employees to disseminate diversity awareness. Among these, on July 2, 2013, AIST organized a symposium titled “Expanding Diversity and Innovation to Vitalize Japan,” jointly with the Vitalization Council for Industrial Technology of Japan, inviting an overseas expert on diversity.

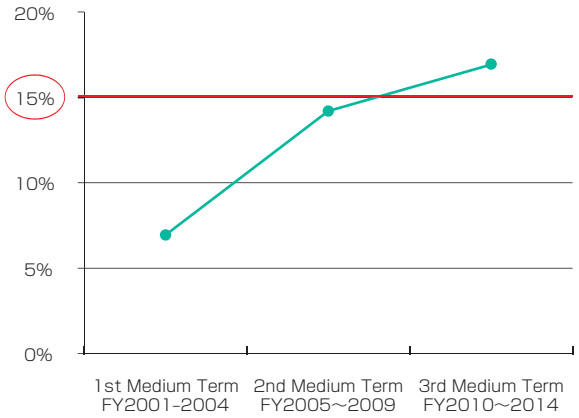
AIST also serves as one of the organizers of DSO (Diversity Support Office), which aims to expand collaboration among research and educational institutions in Japan, and has been organizing meetings and issuing newsletters for information-exchange. DSO now has 21 participating institutions which includes two newly joined institutes in FY2013.

AIST has set a goal of increasing the percentage of newly employed female researchers to be more than 15% in the 3rd medium-term period (FY2010 to FY2014). In order to attract female students with high potential, we are actively conducting recruiting activities through job fairs and job placement magazines, and as a result of these efforts, the percentage of female researchers hired between FY2010 and FY2014 had reached 16.8%, as of April 1, 2014.

Also as one of the activities to support female researchers, on July 21, 2013, AIST organized a symposium on “Encouraging Female Researchers and Engineers for World Wide Activities,” jointly with the Division of Women Engineers Support of the Japan Society for Science Policy and Research Management to support the career development of female researchers, where role models in the field of research management were presented. Discussions were also made on how to develop the leadership skills of female researchers and how to support female researchers.

At AIST, Dr. Shigeko Togashi, the first female Vice-President at AIST appointed in July, 2014, is in charge of diversity promotion.

Percentage of female researchers hired in each medium-term (as of April 1, 2014)



Symposium on “Expanding Diversity and Innovation to Vitalize Japan”

Supporting Foreign Researchers

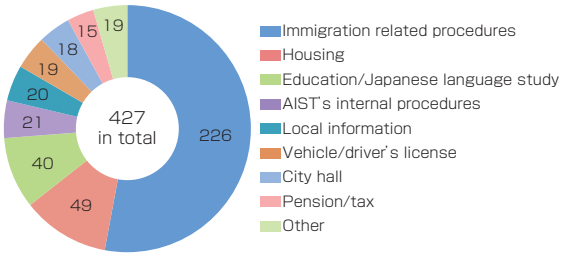
We have a “Manual for Handling Danger Abroad,” a “Safe Driving Workshop Brochure,” and a “Compliance Self-Check List” in English for foreign researchers working at AIST. We have produced a manual on AIST’s work procedures in both Japanese and English to meet the requirements of AIST and external parties employing foreign researchers. We also conducted an interview survey at all research bases across the country to identify the needs of foreign research staff. As a result of the survey, we have found that some foreign group leaders need language support in their organizational management, due to language difficulties. In order to meet their needs, a new program had been launched on a trial basis in FY2014, which provides language support by administrative staff.

AIST International Center (AIC)

The AIST International Center provides consultation to international researchers working or staying at AIST on immigration related matters as well as on everyday issues. Half of the consultations are related to applications at the Immigration Bureau. The application documents required by the Immigration Bureau depend on the type of resident status. Where possible, we discuss this with individual researchers and provide them with accurate information. At their request, we submit various types of application to the Mito Branch Office of the Tokyo Regional Immigration Bureau. (59 such applications were submitted in FY2013).
Twice a year we also offer an opportunity to study Japanese for international researchers at AIST Tsukuba. It has been well-received. Most participants say that the purpose of taking the class is to communicate with their coworkers and with other Japanese people. A total of 49 researchers took the class in FY2013.

Japanese language class completion ceremony

Breakdown of consultations in FY 2013



A word from one foreign researcher

Working abroad is hard. Leaving the family and friends behind, one has to face numerous problems, communicating in a foreign language and working in a new environment with a different culture of human relations. The daily survival routine helped with gestures includes sending children, who do not speak the local language, to kindergarten and school, and dealing with a bank operator, a barber or a doctor, who do not speak your language (“Do you feel *jiku-jiku* or *zuki-zuki* today?”). The population of foreigners is relatively large in Tsukuba, and some foreign languages are spoken at the city office and some private businesses, however, in addition to the daily life language problems, there is a language barrier at work, for instance, in performing various administrative procedures. To solve these problems, AIC at AIST is doing a very important job. It is very nice to have not only a support of daily life in Japan, and Japanese language courses, but also the chance to have a first-hand experience of Japanese culture, such as *ikebana* and tea ceremony. Beginning from this year, a new kind of support is enacted – individual assistance in administrative duties of foreign group leaders. The provision of free discussion space at AIC appears attractive to promote socializing between foreigners and Japanese. These kinds of support hopefully will increase the usefulness of AIC. I think it is crucial that AIST should provide support for foreigners in order to be a top class research institution in the world, strengthening its competitiveness.

Environmental Report

Environment-friendly Policy

AIST promotes environment-friendly activities with the Charter of Environmental Safety.

AIST has the Charter of Environmental Safety in place to incorporate environmental considerations, not only in the results of research and development but also in the process of research and development. Under the Charter of Environmental Safety, we have set an environment and safety policy to proactively work with a keen awareness of the importance of ensuring global and local environmental conservation and the health and safety of everyone working at AIST.

Charter of Environmental Safety

- We promote research that helps to conserve the global environment and human safety; we aim to realize a safe, secure, and high quality life and a society in harmony with the environment.
- We comply with laws and regulations on environmental safety, set our own guidelines and criteria, and seek to increase efforts in environmental conservation and promotion of health and safety on a daily basis.
- We actively disseminate information on environmental safety and seek to achieve harmony and integration with the local community. We take prompt and appropriate actions in the event of an accident or disaster and seek to pass on the lessons learned to society under the principle of disclosure.

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 on the environment and health and safety, set our own management criteria, and seek to further improve environmental conservation, and health and safety.
3. We seek to reduce the consumption of energy and resources and the production of waste, and thus aim to reduce loads on the environment.
4. We seek to prevent environmental 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 developing a management system for effectively and efficiently conducting activities to ensure environmental conservation and health and safety with the participation of all members of AIST; we seek continuous improvement.
6. We actively disclose environmental and health and safety information by publishing environmental reports and disclosing information to promote communication with society.

Energy Saving Measures of the Fukushima Renewable Energy Institute

The Fukushima Renewable Energy Institute, AIST (FREA) has two basic missions: to promote R&D on renewable energy, which is open to the world; and to contribute to the formation of new industrial clusters, thereby supporting reconstruction of the region. The new institute has introduced a variety of energy-saving measures.

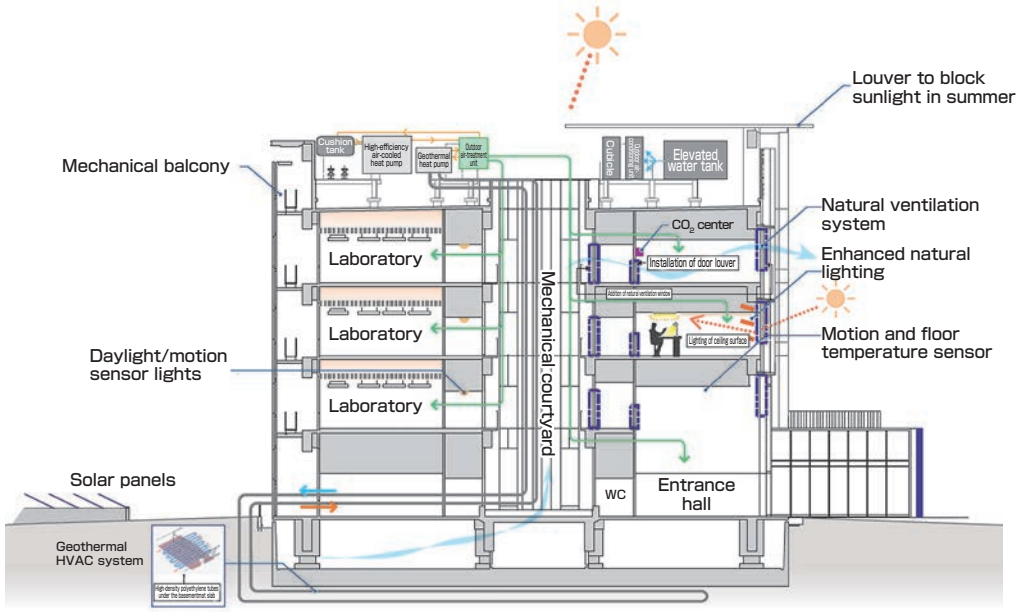
The HVAC (heating, ventilation, and air-conditioning) system is highly energy efficient. It uses geothermal heat, which is collected by sets of coil tubes (about 350 m long´ 6 lines) buried underneath the foundations of a building; a modular chiller allows for fine-tuning of operations to suit the air-conditioning loads of individual laboratories. Outdoor air pre-cooled/-heated in a seismically isolated cooling/heating pit is used to reduce the air-conditioning load.

A task-ambient lighting* system is used; It reduces the base brightness and lights only the necessary locations. An appropriate level of light is provided to reduce energy consumption without compromising the comfort of building users. Gradation blinds are used for effective room lighting.

A smart-grid system is installed and operated; it connects a solar array (500 kW), a wind turbines (300 kW), and lithium-ion battery storage (400 kWh) to the grid to effectively reduce electricity demand and control the supply of power.

Energy-saving effects are achieved by combining these energy-efficient systems.

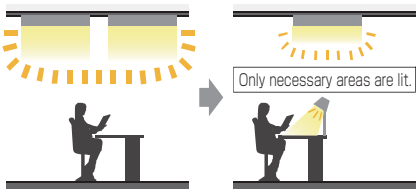
○ Some of the energy-efficiency measures used in the main research building



○ Tube to collect geothermal heat

＊ Task-ambient lighting

Energy consumption is reduced by using efficient lighting; the brightness provided by room lighting is halved, and lights are used to light only necessary task-related locations.



Targets and Results of Environment-friendly Activities

Targets are set for environment-friendly activities, the achievements are reviewed and evaluated, and the results are reflected in the activities for the next fiscal year.

Activity	FY2012 results	FY2013			FY2014 target	Reference page
		Target	Results	Self-evaluation		
Reduction of CO_2 emissions	7% reduction compared to FY2009	Average 4% reduction compared to FY2009 over 3 years from FY2012 to FY2014	Average 4% reduction compared to FY2009 over 2 years from FY2012 to FY2013	○	Average 4% reduction compared to FY2009 over 3 years from FY2012 to FY2014	P51
Asbestos removal	Removed 11,188 m^2	Complete removal of remaining asbestos by FY2013	Removed 12,898 m^2	○	Complete removal of remaining asbestos by FY2014	P54
Effective use of resources	Reused in 500 cases	Reuse of properties no longer in use: more than 600 cases (during Third Medium-Term Plan period)	Reused in 588 cases	△	Reuse of properties no longer in use: more than 600 cases (during Third Medium-Term Plan period)	P56
Promotion of green procurement	100% procurement rate for 231 out of 233 items	100% procurement rate for special procurement items	100% procurement rate for 231 out of 266 items	○	100% procurement rate for special procurement items	P49
Expansion of green contract	Signed contract for power supply with environmental threshold at AIST Tsukuba and AIST Kansai	Scheduled to introduce environmental threshold to power supply contract at AIST Tohoku and AIST Kyusyu	Signed contract for power supply with environmental threshold at AIST Hokkaido, AIST Tsukuba (Karima Site), AIST Chugoku, and AIST Shikoku	△	Signed contract for industrial waste disposal environmental threshold will be introduced in 2014 or later.	P50

Self-evaluation:
◎ Target exceeded
○ Target achieved
△ Target almost achieved
× Target not achieved

Overview of Environmental Load

It is important to evaluate the environmental loads generated by AIST so that we can conduct our activities with due consideration for the environment as a whole and for the need to reduce environmental loads. The table below shows the amounts of energy, chemical substances, water used and released through AIST's activities.

Overall picture of environmental load

Energy	Unit	FY2011	FY2012	FY2013
	TJ	2,172	2,422	2,372
Electricity purchased	1,000 kWh	195,868	217,356	217,914
Utility gas	1,000 m³	5,611	5,657	5,823
Propane gas	kg	5,091	4,091	3,703
Liquid fuel	kL	639	803	370
Purchased energy	TJ	18	21	21
Solar power	1,000 kWh	1,220	1,319	1,257

Substance	Unit	FY2011	FY2012	FY2013
Chemical substance (PRTR substance)	t	104	123	109
Equipment and materials for research and development (laboratory equipment, paper, etc.)	-	-	-	-

Water	Unit	FY2011	FY2012	FY2013
	1,000 m³	2,249	2,535	2,267
Water received	1,000 m³	1,094	1,116	1,042
•Potable water	1,000 m³	1,059	1,082	1,004
•Groundwater	1,000 m³	33	34	38
•Industrial water	1,000 m³	2	0	0
Recycled water	1,000 m³	1,155	1,419	1,225

input → AIST → output

Atmospheric emission	Unit	FY2011	FY2012	FY2013
Greenhouse gas emissions	1,000 tCO_2	92	115	127
•Purchased electricity	1,000 tCO_2	77	99	112
•Fossil fuels	1,000 tCO_2	14	15	14
•Purchased energy	1,000 tCO_2	1	1	1
NOx emissions	kg	5,283	11,495	3,302
SOx emissions	kg	1,318	1,853	2,244
Soot dust emissions	kg	346	371	299

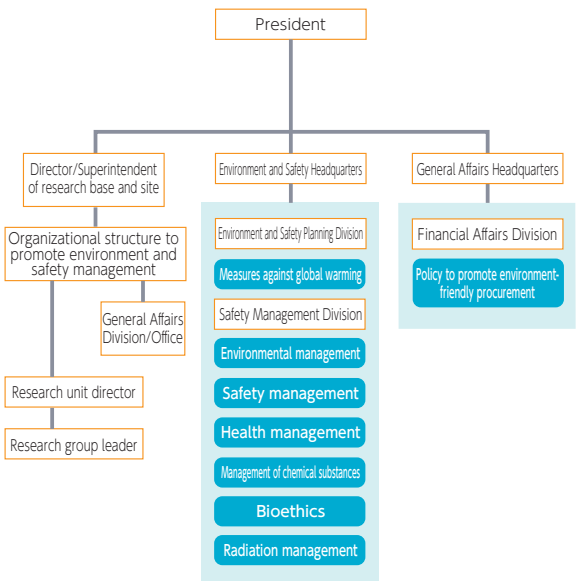
Waste	Unit	FY2011	FY2012	FY2013
Waste generated	t	2,320	2,453	2,741
•General waste	t	567	611	585
•Industrial waste	t	1,753	1,842	2,155
Landfill waste	t	180	300	258
Recycling of used paper	t	250	202	230

Effluent	Unit	FY2011	FY2012	FY2013
Amounts of water discharged	1,000 m³	981	1,171	908
•To sewer	1,000 m³	979	1,169	879
•To public waters	1,000 m³	2	2	29
Amounts of pollutants discharged	kg	1,114	1,426	928
•BOD	kg	470	590	353
•Nitrogen	kg	118	154	56
•Phosphorus	kg	10	11	8
•Suspended solids	kg	516	671	511

Organizational Structure

We have a structure in place to ensure that our actions are based on environmental policies.
In the efforts of AIST as a whole to incorporate environmental considerations, our headquarters organizations (Environment and Safety Headquarters, General Affairs Headquarters) promote environmental measures in close collaboration with our research organizations (regional research bases and sites).
The Environment and Safety Headquarters determines policy for the reduction of greenhouse gas emissions, which is an ongoing issue, and the General Affairs Headquarters develops and monitors AIST's policy for procuring eco-friendly goods and services.
On the basis of these policies, individual regional research bases and sites develop and implement specific procurement plans under the leadership of the directors-general and the superintendents.

Organization for environment and safety

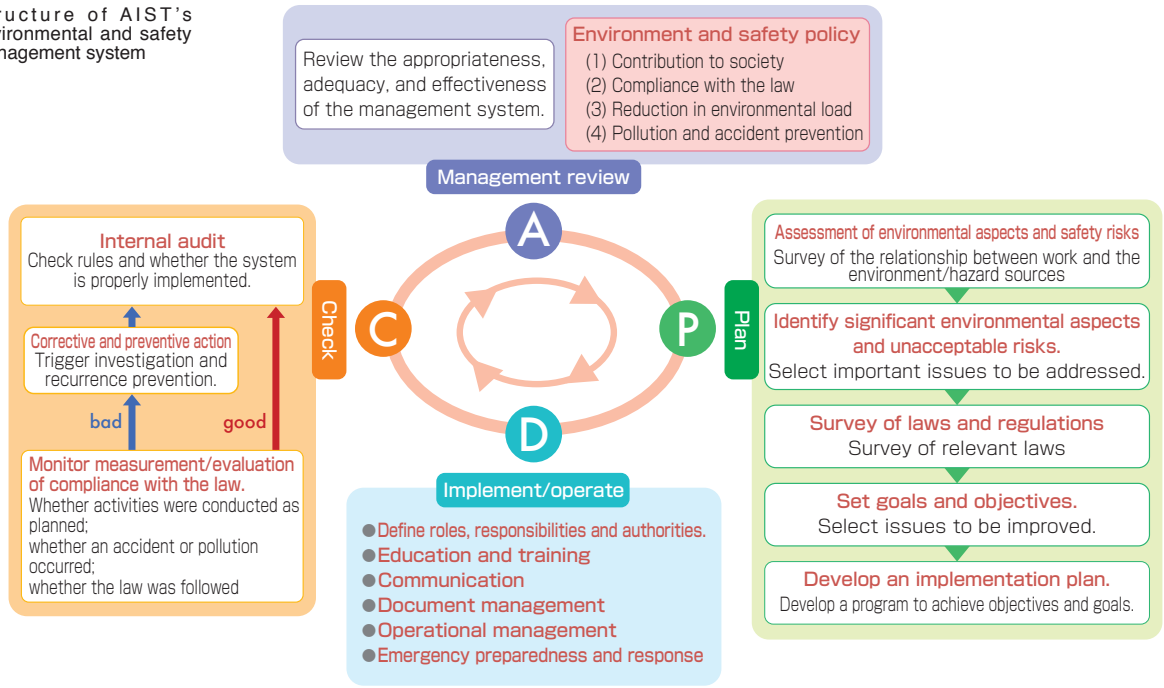


Environmental and Safety Management System

AIST has its own environmental and safety management system (ESMS) in place. It combines two systems: an environmental management system to reduce the environment impacts of research and preserve the natural environment, and an occupational health and safety management system to reduce potential risks in the workplace and improve health and safety.

In 2013, we conducted an internal environmental and safety audit of each research base, checked the implementation status of the management program, and reviewed the program to make improvements. With the aim of improving the skills of health and safety managers and the relevant personnel who serve as administrators of the ESMS at the regional research bases and sites, we held a meeting of national health and safety managers. These managers were given a presentation on ESMS activities and exchanged views on improvements and good practice.

Structure of AIST's environmental and safety management system



Environmental Education

AIST provides environmental education to new employees and those who have joined AIST under the industry–academia–government exchange program, the international exchange program, or dispatch programs on issues with significant environmental impacts, such as how to treat liquid waste and vent gas from research and how to sort and remove waste.

Green Purchasing and Green Contract

Green purchasing activities[*1]

When purchasing products, parts, or materials that are necessary for conducting R&D and when subcontracting external services for processing and prototype building, AIST considers the environment as well as quality and price, and engages in green procurement that gives priority to products and services with little environmental load.

To promote green procurement, every year AIST publicizes the procurement policy that sets the procurement goal for environment-friendly goods, based on the "Law Concerning the Promotion of Procurement of Eco-friendly Goods and Services by the State and Other Entities (Green Purchasing Law)" and the "Basic Policy for the Promotion of Procurement of Eco-friendly Goods and Services."

Status of procurement of environment-friendly goods

In FY2013, AIST purchased 232 items in 18 categories among the 266 items in 19 categories specified in the Green Purchasing Law (types of environment-friendly goods and services to be preferentially purchased by the government and other organizations). Excluding one item (media case) that failed to fulfill the standard due to the required function and performance, the 100% procurement rate for the FY goal was achieved for the specified procurement goods (those that meet the criteria for goods that reduce environmental load specified by the government). The environmental load is also considered in purchasing environment-friendly products (such as trash bags) that are not specified procurement goods.

Number of hybrid vehicles owned by AIST

As April 2014, of a total of 84 AIST-owned vehicles used for work (including those used for research), 8 are hybrid vehicles, 1 is a plug-in hybrid vehicle, and 2 are electric vehicles. In updating the automobile that will be used for operations, preference will be given to hybrid and low-emission vehicles.

＊1 For details on green procurement, please refer to the following page:

http://www.aist.go.jp/aist_j/procure/kouhoyou/green/

Green contract activities

AIST promotes the green contract that takes into consideration the reduction of greenhouse gases when signing contracts with the subcontractors, based on the “Law concerning the Promotion of Contracts Considering Reduction of Emissions of Greenhouse Gases and Others by the State and Other Entities (Green Contract Law).” In FY2013, there were six green contracts including the contract to change the power supply method.

Number of green contracts

Type of green contract	Number
Automobile purchase	2 Cases
Contract for power supply	4 Cases

For automobiles, 4 automobiles were purchased and 2 were leased. These were determined by general competitive bidding, in which the price and environmental performance (fuel efficiency) were comprehensively evaluated and the contract was made with the company that provided the most highly evaluated vehicles.

For the power supply contract, the environmental threshold system[*2] was employed at AIST Hokkaido, AIST Tsukuba (Karima Site), AIST Chugoku, and AIST Shikoku.

Next year, we will enter into a contract for the disposal of industrial waste.

＊2 Environmental threshold system
This is a system where the bidders are reviewed based on the score points for carbon dioxide emission coefficient, use of unused energy, use of new energy sources, and planned amount of green power certificate to be transferred to the purchaser, The bidder that has a total score that surpasses the standard and presents the lowest price is selected.

Data on the purchase of major specified items

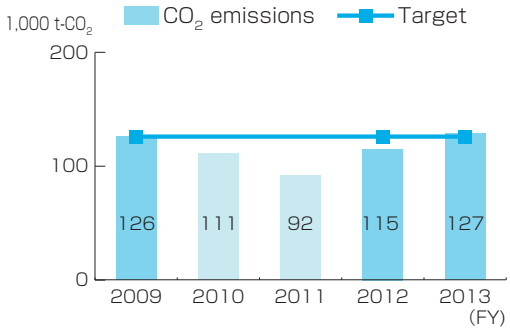
Area	Item		Target	Total quantity purchased	Purchase of specified purchase items	Target attainment
Paper	Photocopier paper		100%	102,664.073kg	102,664.073kg	100%
	Forms		100%	298.4kg	298.4kg	100%
	Coated paper for inkjet color printers		100%	890.02kg	890.02kg	100%
	Toilet rolls		100%	2,135.4kg	2,135.4kg	100%
	Tissue paper		100%	13,941.96kg	13,941.96kg	100%
Stationery	Mechanical pencils		100%	792	792	100%
	Mechanical pencil leads		100%	500	500	100%
	Ballpoint pens		100%	11,184	11,184	100%
	Marker pens		100%	12,495	12,495	100%
	Pencils		100%	1,393	1,393	100%
	Media case		100%	2,803	2,244	80%
	Glue (solid)		100%	2,064	2,064	100%
	Files		100%	40,491	40,491	100%
Office furniture, etc.	Chairs		100%	1,342	1,342	100%
	Desks		100%	482	482	100%
OA equipment	Photocopiers, etc.[*3]	Purchased	100%	27	27	100%
		Leased/rented (new)		55	55	
		Leased/rented (extension)		190	180	
	Scanners	Purchased	100%	195	195	100%
		Leased/rented (new)		0	0	
		Leased/rented (extension)		0	0	
	Paper shredders	Purchased	100%	58	58	100%
		Leased/rented (new)		0	0	
		Leased/rented (extension)		0	0	
	Recording media		100%	10,378	10,378	100%
	Toner cartridges		100%	6,280	6,280	100%
	Ink cartridge		100%	3,469	3469	100%
Vehicles, etc.	Non-general official vehicles	Purchased	100%	5	5	100%
		Leased/rented (new)		1	1	
		Leased/rented (extension)		0	0	
Fire extinguishers	Fire extinguishers		100%	272	272	100%
Services	Passenger transportation		100%	2,849	2,849	100%

＊3 Photocopiers, combination units, digital photocopiers with expandable functions

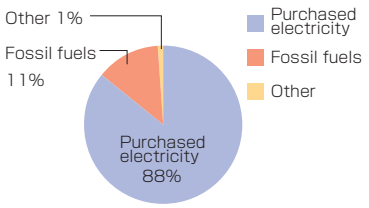
Measures against Global Warming

AIST created plans for reducing greenhouse gas emissions in April 2012, as part of the effort to reduce the environmental load materials that are produced by the operations at AIST. In three years from FY2012 to 2014, AIST plans to reduce the greenhouse emissions by an average of 4% compared to FY2009.
Following activities in FY2012, in FY2013, research activities were restarted, as aggregation and space savings were promoted to achieve more efficient research facilities and organizations.
As a result, in the 2 years from FY2012 to FY2013, greenhouse gas emissions increased compared with those in FY2012 but decreased by an average of 4% compared with the baseline FY2009 level.
While greenhouse gas emissions are expected to increase due to the operation boosts including the construction of new research bases and the promotion of open innovations, AIST will continue its efforts to reduce the greenhouse gas emissions to meet the demands of society and the government.

Changes in CO_2 emissions



Breakdown of sources of CO_2 emissions



Introduction of New Energy Sources

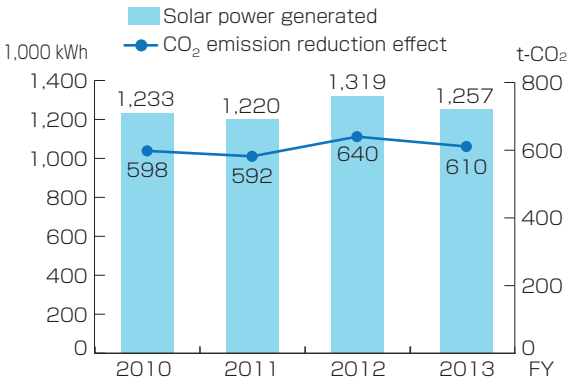
We have introduced new energy to reduce the CO_2 emissions

AIST introduced solar power generation facilities to AIST Tsukuba, as well as to its research bases such as AIST Tohoku, AIST Tokyo Waterfront, AIST Chubu, AIST Kansai, AIST Chugoku, AIST Shikoku, and AIST Kyushu.

Mega solar town “Taiyo No Oka (Hill of the Sun)” at AIST Tsukuba

The amount of solar power generated in FY2013 was 1,257,000kWh. This is equivalent to the annual power use of 349 households, and this helped reduce the CO_2 emissions by 610 ton/year.

Changes in electricity output generated by solar power and CO_2 emission reduction



Power Saving Measures during Summer

AIST conducted the following energy saving measures as requested by the government, taking into account the impacts on research activities.

(1)Large facilities and equipment (clean rooms, constant temperature/humidity room, large-scale computers, HVAC systems, etc.) were operated in turn to balance the operating load.

(2)Infrastructures that consume large amounts of power such as wastewater treatment facility and helium liquefaction facilities were operated in turn, and were also shifted to holidays and nights.

(3)Use of electrical power was monitored by introducing the total power monitoring system.

(4)Employees at AIST Tsukuba and regional research bases took holidays in turn and in groups.

(5)AIST requested the cooperation of technology research associations in cutting peak electricity consumption in summer.

These measures helped to reduce peak power consumption by 10% at AIST Tsukuba and by 4% to 13% in the regional research bases, compared with FY2010 levels.

Appropriate Management of Chemical Substances

AIST seeks to reduce environmental risks and ensure safety through appropriate management of chemical substances.

AIST's research covers a wide variety of areas and involves the use of a wide variety of chemicals. Chemicals are used and stored properly to prevent accidents and leaks and are disposed of properly.

[Treatment of liquid waste and vent gas after the use of a chemical]
Liquid waste: At AIST Tsukuba, inorganic liquid waste is rendered harmless in the treatment facility on the premises and is then discharged into the public sewerage system. AIST Tsukuba decided to outsource the disposal of all organic liquid waste to an industrial waste-treatment service provider, starting in 2013. Regional research bases outsource the disposal of their organic and inorganic liquid wastes to industrial waste-disposal service providers.
Effluent gas: Toxic vapor–producing chemicals are used in fume hoods, and the toxic vapors are discharged through effluent gas detoxification systems. By using the integrated chemical management system described below, AIST provides each researcher with information on the chemicals that may be used only in a fume hood and must be discharged only after being rendered harmless.

Chemical Substances Integrated Management System

A wide variety of chemicals used in research are registered in the Chemical Substances Integrated Management System at the time of delivery. Via AIST's intranet, the Chemical Substances Integrated Management System allows all researchers to view, at a glance, information on the laws and regulations applicable to the chemicals being used and on the properties and handling of the chemicals. Also, the system gives a quick view of the amounts of hazardous materials (under the Fire Defense Law) and high-pressure gases that may be stored in each room. The system is used to collect information on chemicals that are subject to the PRTR Law and should be reported to government agencies.

Collecting Information on Released Chemical Substances

AIST reports on the releases and transfers of chemicals subject to the PRTR Law* and applicable municipal ordinances. At AIST, the following chemicals are used in large quantities: organic solvents to dissolve or extract various organic compounds; hydrogen fluoride to clean semiconductors; and ferric chloride to treat hydrogen fluoride liquid waste. The use of these chemicals must be reported every year. In FY2013, the organic liquid waste spray incinerator was removed. As a result, there is now no facility subject to the reporting of dioxin emissions.

Amounts of chemicals reported under the Chemical Control Program
Releases and transfers of chemicals subject to the PRTR Law (chemicals used in quantities of more than 1 ton)

Research site	Substance	Amount used	Amount released	Amount transferred	
			Air	Sewer	Waste
AIST Tsukuba Central 5	Chloroform (kg)	1,080	540		550
	Methylene chloride (kg)	1,350	190		1,200
AIST Tsukuba West	Hydrogen fluoride and its water-soluble salt (kg)	6,980		240	670
	Ferric chloride (kg)	91,650		-	-

After use, all of the ferric chloride changes to insoluble ferric fluoride and ferric hydroxide. There are no releases and transfers.

[Tokyo Metropolitan Government]
Releases and transfers of chemicals subject to the Ordinance on an Environment to Ensure the Health and Safety of the Residents of Tokyo (chemicals used in quantities of more than 100 kg)

Research site	Substance	Amount used	Amount released	Amount transferred	
			Air	Sewer	Waste
AIST Tokyo Waterfront	Acetone (kg)	120	60		58
	Chloroform (kg)	210	15		200
	Methanol (kg)	820	370		450

[Osaka Prefectural Government]
Ordinance on the Preservation of the Living Environment of Osaka Prefecture (chemicals used in quantities of more than 1 ton)

Research site	Substance	Amount used	Amount released	Amount transferred	
			Air	Sewer	Waste
AIST Kansai	VOCs (kg)	2,600	510		2,100

* The official name of the PRTR Law is The Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof. Facilities that use any of the 462 designated Type 1 chemicals in quantities of more than 1 ton/year (more than 0.5 tons in the case of some chemicals) must report the amount released to the environment and the amount transferred to other facilities (the amount sold and the amount disposed of by waste-disposal service providers).

Asbestos Removal

Removal of spray materials containing asbestos

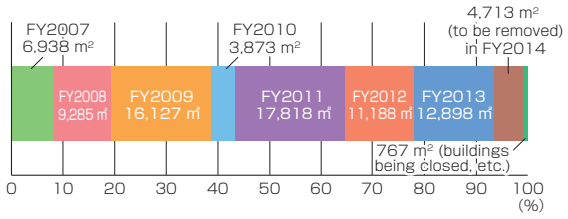
The spray materials containing asbestos are systematically removed.

Since FY2007, AIST has been inspecting sprayed asbestos coatings for deterioration; we have taken environmental measurements and intend to remove a total of 83,607 m^2 of sprayed asbestos coatings in a planned manner.

In FY2013, we removed 12,898 m^2 of sprayed asbestos coatings. We have now removed a total of 78,127 m2 of sprayed asbestos coatings.

We will finish asbestos removal in FY2014, with the exception of asbestos to be removed from buildings that will be closed.

Changes of the surface area of spray materials containing asbestos



Storage of PCB Waste Materials

AIST stores and monitors PCB waste on an ongoing basis.

Each research base stores PCB-containing transformers and capacitors.

PCB waste is stored as specially controlled industrial waste in designated individual storage areas at each research bases and sites. The Specially Controlled Industrial Waste Manager inspects the stored PCB waste once a month to ensure that it is properly stored.

In FY2013, we had the Hokkaido Facility of the Japan Environmental Safety Corporation (JESCO) dispose of 386 ballasts that were stored at AIST Hokkaido. We also had JESCO's Toyota Facility dispose of two high-voltage capacitors stored at AIST Chubu.

Storage of PCB waste

Waste type	Quantity
Capacitors	558
Transformers	45
Ballasts	4,902

PCB-contaminated wastes packed in barrels for registration

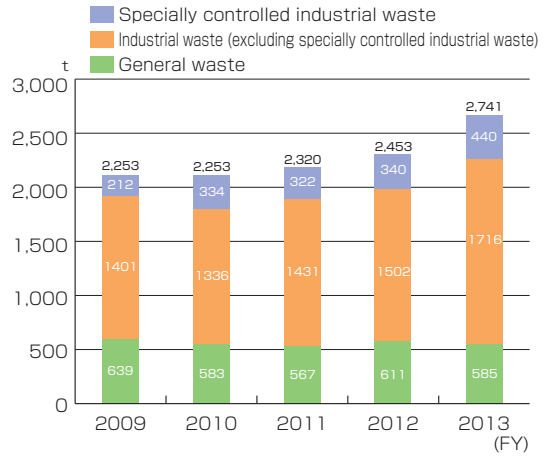
Reduction in Waste Generation

AIST seeks to reduce waste and thus to reduce environmental loads.

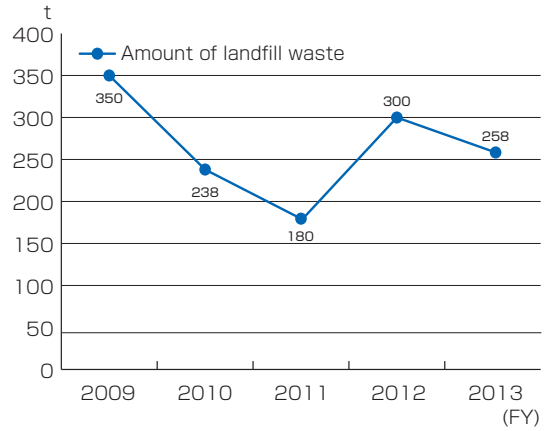
AIST seeks to reduce waste by applying 3R (Reduce, Reuse, and Recycle) principles and thus to reduce environmental loads. We are focusing particularly on the reuse of research equipment, because this reuse can contribute to cost savings (see “Effective Use of Resources” below).

As part of our responsibility as a waste generator, every year we conduct on-site inspections of waste treatment facilities on a voluntary basis. In FY2013, we conducted on-site inspections of 23 intermediate waste treatment and landfill facilities to ensure that the waste was being correctly treated and disposed of.

Changes in the amount of disposed waste



Changes in amounts of landfill waste



Breakdown of waste generated (FY2013)

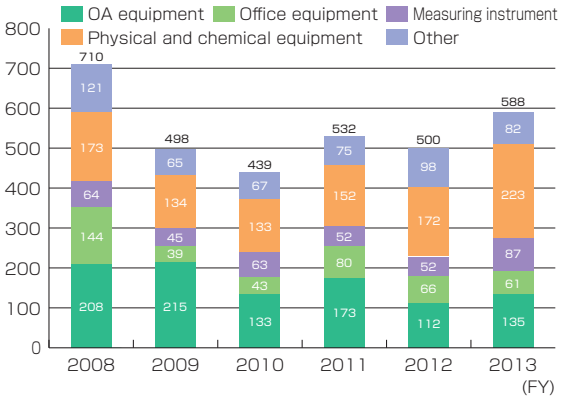
Waste type	Amount disposed (t)	Amount landfilled (t)	Percentage of waste landfilled (%)
General waste	585	106	18
Industrial waste	1,716	128	7
Plastic waste	406	32	8
Metal scrap	836	1	0
Sludge	170	71	42
Wood waste	71	9	13
Glass, concrete/ceramic waste	38	2	6
Mixtures	11	2	20
Mixtures of controlled waste	9	2	20
Composite materials	0	0	0
Slag	22	0	0
Other	154	9	6
Specially controlled industrial waste	440	24	5
Flammable waste oil	62	4	7
Strong acids	237	3	1
Infectious waste	13	10	73
Waste oil (hazardous)	8	0	1
Sludge (hazardous)	17	6	34
Acid waste (hazardous)	42	0	0
Other	61	1	2
Total	2,741	258	9

Effective Use of Resources

AIST promotes the reuse of equipment that is no longer used.

Since 2005, an intranet-based Article Recycling System has been in place to exchange information on necessary and unnecessary items, including research equipment, OA equipment, furniture, and consumables, and to promote recycling within AIST. We give away items no longer used at AIST to external organizations. In this way we facilitate the reduction and reuse of waste.

Number of exchanges of items for recycling

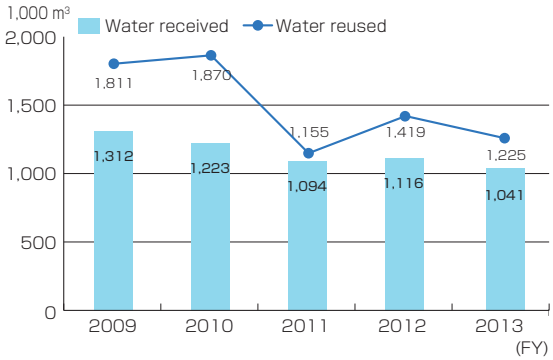


Conservation of Water Resources

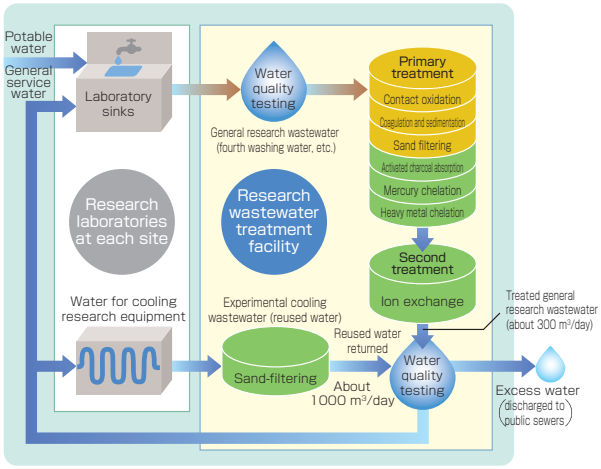
AIST seeks to effectively use water resources through reuse.

At AIST Tsukuba and AIST Chubu, research wastewater is neutralized, reduced, and reused to effectively use water resources.
In FY2013, the amount of water received decreased by 7% compared with that in the previous year and the amount reused decreased by 14%. We are continuing to seek to effectively use water resources.

Changes in the amounts of water received and reused



Recycling of reused water at AIST Tsukuba



Compliance with the Convention on Biological Diversity and the Cartagena Law

In 1992, the cooperation of many countries, including Japan, led to the adoption of the Convention on Biological Diversity to allow comprehensive conservation of biodiversity and sustainable use of biological resources. The Cartagena Protocol was created to protect biodiversity by the safe transport, handling, and use of living modified organisms that may have adverse effects on the conservation and sustainable use of biodiversity. In Japan, the Act on the Conservation and Sustainable Use of Biological Diversity through Regulations on the Use of Living Modified Organisms (the Cartagena Law) came into effect in 2004.

To comply with the Cartagena Law, AIST holds committee meetings attended by external experts to conduct preliminary reviews of experiments involving living modified organisms and the handling of living modified organisms. AIST requires researchers and research assistants who conduct experiments involving living modified organisms to undergo education and training on a regular basis. We conduct on-site inspections of laboratories that use living modified organisms to ensure that the organisms are labeled as specified in the Law, that they are stored correctly, and that containment measures are taken to prevent dispersal of the organisms. We have a system in place in each research site to provide support and guidance in this regard and thus seek to conserve biodiversity.

Composting and Cutting and Removal of Dead Pine Trees

AIST Tsukuba weeds the grounds twice a year. The grass clippings generated at are not disposed of outside the research base. They are fermented for about a year and composted in a designated area on the premises without imposing any environmental loads. The compost is returned to the earth as a natural fertilizer for green areas and existing forests at the research base. About 150 m^3 of compost is produced each year.

There is a Japanese red pine wood in the area where AIST Tsukuba is located. Every year, many pine trees die from pine wilt disease caused by a pinewood nematode transmitted by Japanese pine sawyer beetles.

To maintain a good research environment and prevent secondary infection of trees and spread of the disease from tree to tree, AIST Tsukuba cuts down dead pine trees. The number of trees felled depends on the weather and the environment. In November every year, we inspect the dead pine trees and determine the number to be cut down. In FY2013, we felled about 800 pine trees. The felled trees are treated as general waste and turned into compost at an external recycling center.

In the existing forest, where a wide variety of trees grow, we scatter grass compost, and every other year we remove the underbrush. In these ways we seek to maintain the health of the existing wood environment.

We aim to promote AIST's compliance with laws and regulations, social norms, our code of conduct for researchers, and our rules, and to turn AIST's Charter "Full Research in Society, for Society" into a reality.

We take the following environmental protection actions to help conserve the global environment and create a sustainable society.

1.We comply with international environmental regulations and the environmental laws and regulations of the government and municipalities, and we work to prevent pollution and conserve the natural environment.

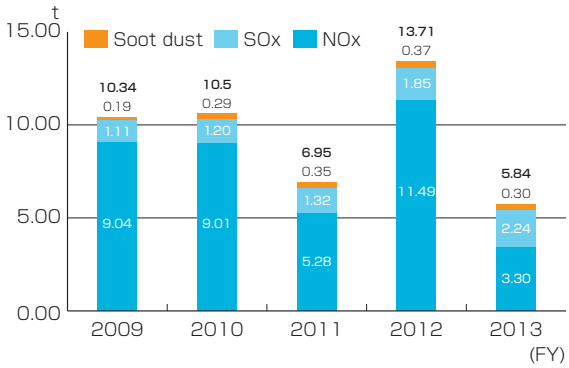
2.We promote research that helps to conserve the global environment and human safety, and we proactively work to improve energy efficiency, save natural resources, and promote recycling.

Prevention of Air Pollution

The major sources of air pollutants in AIST are the boilers for cold heat source in air conditioning. To reduce SOx emissions we use mainly city gas and kerosene as fuel for the boilers.

In FY2013, as a result of a review of air-conditioning and liquid-waste treatment operations, both the Energy Center and the incinerator at the North Waste Treatment Facility at AIST Tsukuba were eliminated, and NOx emissions were substantially reduced.

Changes in air environmental loads



Prevention of Water Pollution

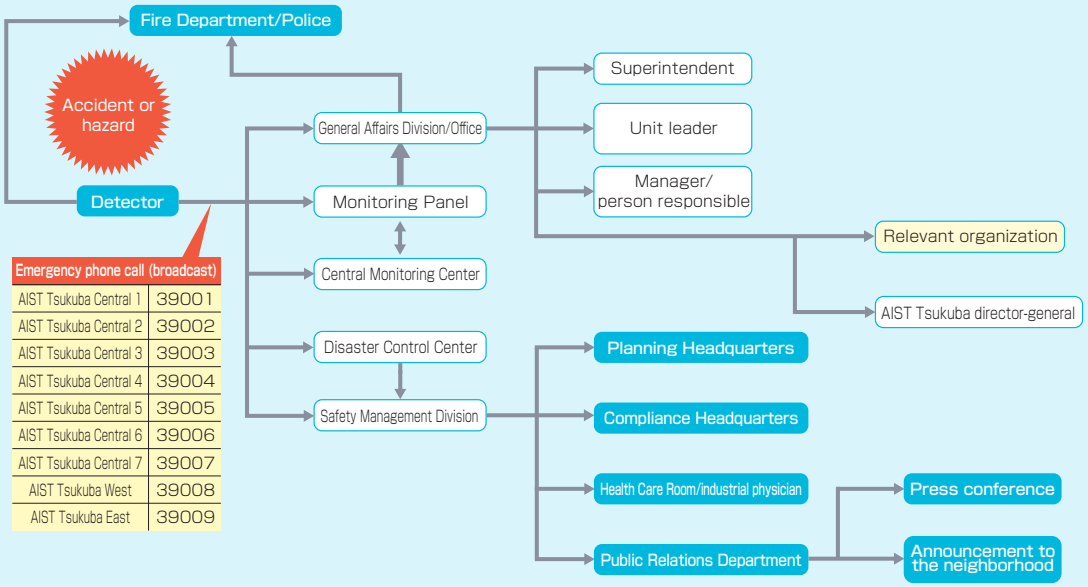
Research wastewater discharged from AIST undergoes processes such as pH adjustment, coagulation and sedimentation, filtration, and activated charcoal absorption at the wastewater treatment facility at each research base to meet municipal effluent standards. It is then discharged into the public sewerage system.

In FY2013, specified facilities and underground pipes were inspected in accordance with the Water Pollution Control Law. Damage was found in underground pipes at AIST Tsukuba and AIST Kansai. Wastewater leakage was reported to the municipalities. The quality of the leaked wastewater was analyzed and soil analyses conducted. In this way, measures were taken to prevent impacts on the surrounding environment.

Accidents Affecting the Environment

To ensure compliance with environmental laws and regulations, AIST has an ESMS (Environmental and Safety Management System) in place and implements the PDCA (plan–do–check–act) cycle. Also, we have a system to minimize damage in the event of an accident.

AIST Tsukuba Emergency Contact System



Emergency phone call (broadcast)	
AIST Tsukuba Central 1	39001
AIST Tsukuba Central 2	39002
AIST Tsukuba Central 3	39003
AIST Tsukuba Central 4	39004
AIST Tsukuba Central 5	39005
AIST Tsukuba Central 6	39006
AIST Tsukuba Central 7	39007
AIST Tsukuba West	39008
AIST Tsukuba East	39009

Drills to prepare for environmental accidents

AIST conducts contact, communication, and emergency action drills to minimize damage in the event of environmental accidents such as oil and chemical leaks.

In FY2013, drills were conducted at AIST Tsukuba and in the regional research bases to prepare for the leakage of hazardous substances from exhaust gas scrubbers located on rooftops and on the ground. The hazardous substances can flow into public waters via gutters and downspouts (in the case of leakage on rooftops) or through local catch basins (in the case of leakage on the ground). We checked rainwater drainage lines and methods of stopping water flow in the catch basins. We also checked on whom to contact and report to in an emergency.

We conduct similar drills on a regular basis and revise the procedures as needed.

A leak-prevention drill in action

Reporting of accidents and incidents that occurred in FY2013

Failure to submit a Notification of Change in Manufacturing for a high-pressure gas production facility (a refrigerator) at AIST Tsukuba Central 2

On January 29, 2014 at AIST Tsukuba Central 2, refrigerant gas leaked from a helium refrigerator that was undergoing a test run. The incident was reported immediately to Ibaraki Prefecture.

Later, it was found that a Notification of Change of Facilities for Production required under the High Pressure Gas Safety Act was not submitted for the refrigerator. Following this incident, we checked all AIST research bases and sites to see whether the required procedures, such as legally required notifications, for facilities and equipment had been completed. We found a failure to complete the required procedures for equipment using high-frequency waves, and we completed the procedures promptly. To prevent the recurrence of similar incidents, we called for all employees' attention to the issue and took measures to enhance the checking system.

Third Party Views

An Outsider's View of the AIST Report 2014 Social and Environmental Report

Director, Workers Club for Eco-harmonic Renewable Society (NPO) Tamio Yamaguchi

The two most important tasks of the AIST Report in its role as a social responsibility report are to convey (1) how the motto "in society, for society" is being put into practice and (2) what contributions are being made to the creation of a sustainable society, which is the point of social responsibility. It is also vital that these points are discussed in a way that is easy for readers to understand.

Considering these two points, collaboration between many sectors in work on solutions to various problems in society is described in the President's message and in the sections "About AIST" and "Open Innovation." In regard to the creation of a sustainable society, the two missions described in 2013, "green technology for a prosperous and environmentally friendly society" and "life technology that enables healthy and safe living," are becoming more of a reality. AIST is also continuing to work hard on ease of understanding. The Technology Report still causes many problems for the ordinary reader, with the frequent use of specialist terms and assumptions of prior technical knowledge. However, the lead-off articles and research reports in this Social and Environmental Report are comprehensible to the ordinary reader and make the technology seem familiar. In particular, the special report that describes the three major problems hindering the growth of renewable energy and the technological developments offering solutions to these problems is persuasively written.

In addition to the two important tasks mentioned above, the Social and Environmental Report also has the task of responding to trends in society and the expectations of society. For example, considering working practices, there is growing interest in society in the work–life balance, the active involvement of women, and mental health. This report gives new descriptions of results of the use of various leave management systems, results of the use of temporary childcare, and trends in female researcher employment rates over medium-term monitoring periods, demonstrating the beginnings of an active engagement with these matters. The reporting on mental health describes current activities, including action against harassment, but it is not clear whether the situation of sufferers is improving or not. Results from surveys into mental health in Japan indicate that 42.3% of employees on leave resign while using a leave of absence system or after returning to the workplace, and that there are more applications for workers' compensation insurance for mental health problems than ever before, which is a worrying situation. If it is acknowledged that the fact staff are taking leave because of mental health problems is an indicator of the psychological health of all the employees in an organization, we can look forward to reporting of the situation that is easy to understand.

For public research institutes, since the extensive reporting of problems with the paper on STAP cells and the manipulation of clinical research data into medicines, the greatest concern from society this year has been about the governance and ethics of research organizations. Dishonest research leads to doubts about honest research, which is a matter of the utmost seriousness for research institutes. This report acknowledges the point with "It is clear that when dishonest actions that violate research ethics, known as scientific misconduct, occur, public trust is lost and subsequent research and development struggles for credibility." The report also describes training on standards in research activities and an internal survey. These are evidence of a response to society's concern, but it seems likely that what society demands is more profound. There is clearly a proper focus on training, such as in the description "ten sessions concentrated in a two-month period in April and May ... lectures for all participants were completed by the end of June." However, it is unclear how the awareness of participants changed as a result and what specific anti-misconduct measures there are now, such as monitoring to prevent misconduct, administration of funds, storage of data and so forth. Moreover, in the event that scientific misconduct were to occur, the basic policies on, for example, a prompt public explanation, the establishment of an independent committee, and verification of the misconduct are unclear.

Finally, in these times in which the position of public institutes that receive funds from government and industry is being questioned, I think the occurrence of the first audit has great significance. America has an administrative body that oversees research activities receiving funds from the government, but this body does not exist in Japan. Therefore, each research institute must demonstrate its own ability to keep its house in order by internal audits and the like. Considered from this perspective, AIST must demonstrate frankness by asking whether the introduction of the system for internal audits is enough in itself. I look forward to fuller reports from next year.

Workers Club for Eco-harmonic Renewable Society (Junkan Workers Club): A citizens group that investigates, with a global perspective, the form of a society in harmony with the natural ecosystems that will be passed on to the next generation. The goal of the club is to study, support and put into practice measures leading to a sustainable mode of society for regional citizens, businesses and governments. At CSR workshops in its study groups, the group studies and proposes appropriate forms of CSR. URL：http://junkanken.com/

Afterword

On the publication of the AIST Report 2014

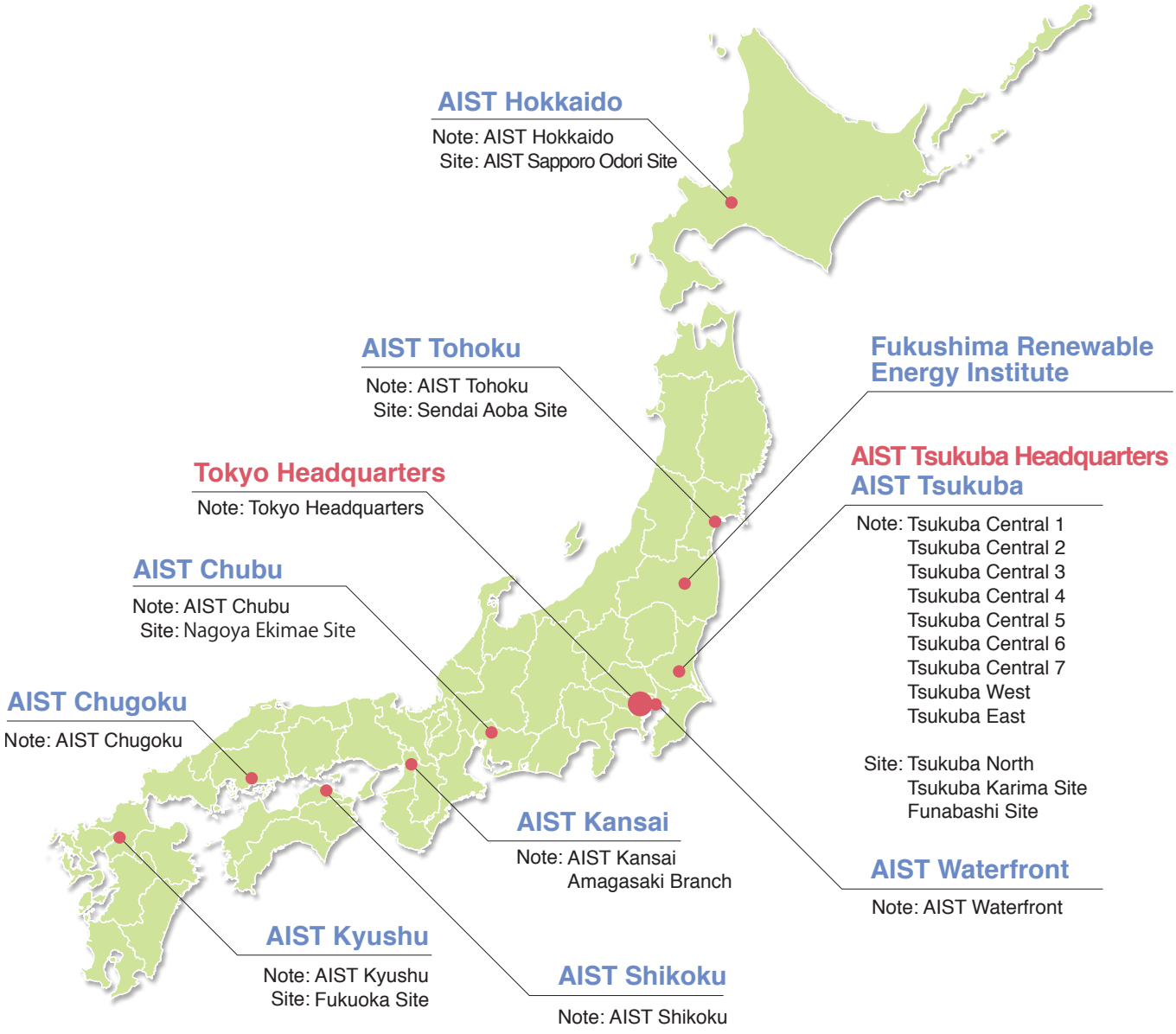
Masahiro Seto,
AIST Vice-President and Director-General,
Public Relations Department

AIST has been publishing environmental reports since 2004. Since 2010, reports on environmental initiatives and workplace health and safety initiatives have been published, covering research bases across the country as well as AIST Tsukuba, and recently the AIST Report: Social and Environmental Report has been compiled and published in accordance with ISO 26000, adding reports on the organization's activities from the corporate social responsibility (CSR) perspective.

This report takes as its main theme the challenges of renewable energy, pursued by AIST in the hope of improving Japan's industrial competitiveness. In the lead-off reports, we describe research activities at the Fukushima Renewable Energy Institute that we opened in April 2014. In the research reports, we introduce studies of international contribution, international standardization, and standards & certification, including research into a malaria diagnosis device, micro-hardness, and robot certification. There are also new reports on improving the open innovation hub function working toward the realization of a sustainable society, the implementation and administration of the system of shared use facilities at TIA, and the organization and activities of research associations that serve as technological bases.

For AIST, with the motto "in society, for society," it is our duty and our mission to present AIST's activities to the many stakeholders who want to hear about them in a form that is easy to understand. In this report, we are striving to make connections to build relationships of deeper trust with society.

Research Bases



http://www.aist.go.jp/index_en.html

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