

Annual Report
Japan Atomic Energy Agency 2024
(Business Report FY2023)

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Japan Atomic Energy Agency

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National Research and Development Agency
Japan Atomic Energy Agency

Annual Report 2023

The Japan Atomic Energy Agency (JAEA), a National Research and Development Agency, submits an annual business report to the competent ministers together with financial statements in accordance with the Act on General Rules for Incorporated Administrative Agencies. This report presents an abstract of JAEA’s research and development (R&D) and various other activities. In the light of its corporate social responsibilities as a National Research and Development Agency, a comprehensive outline is also given of its environmental report publication, the operation of its information disclosure system, its participation in regional activities, and its technology transfer activities.





The main part of the report concerns JAEA’s operations and the state of its R&D for FY2023 (April 2023 – March 2024).

Through this report, we seek to promote your understanding and support of JAEA’s operations and R&D.

● Reporting period

The reporting period is basically FY2023 (April 2023 – March 2024).
However, the report also includes certain information from the period after FY2023.

● Reference Guidelines, etc.

- ◎ Guidelines on the Annual Report of Incorporated Administrative Institutions (Ministry of Internal Affairs and Communications)
: https://www.soumu.go.jp/main_content/000572212.pdf
- ◎ ISO 26000: 2010 Guidelines Concerning CSR : <https://webdesk.jsa.or.jp/books/W11M0070/index>
- ◎ Environmental Reporting Guidelines 2018 version (Ministry of the Environment) : <https://www.env.go.jp/content/900497076.pdf>
- ◎ GRI Standards : <https://www.globalreporting.org/standards/>

● Notation Method

Consumption taxes are accounted for using the tax-included method.
Figures are rounded in principle to the nearest whole number for the unit provided.
The total shown may therefore differ from the sum of the relevant individual items.

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Message from the President



Contributing to the welfare and prosperity of society through nuclear science and technology

President, the Japan Atomic Energy Agency
KOGUCHI Masanori

The JAEA is comprehensive nuclear research and development institute. Based on its own Medium-/Long-Term Objectives, JAEA conducts research on enhancing nuclear safety, carries out R&D on the nuclear-fuel cycle, engages in basic and fundamental research in the nuclear field, and has responded to the accident at the Fukushima Daiichi Nuclear Power Station of Tokyo Electric Power Company Holdings, Inc. (TEPCO)., and carries out R&D on radioactive-waste treatment and disposal technology.

Vision (Future Image)

Exploration of a New Future with the Synergy of Nuclear and Renewable Energy

Code of Conduct

To Act with a Goal-Oriented Approach

- Fostering a healthy organizational culture
- Preemptive safety and risk response
- Enhancing robust R&D capabilities in response to various societal needs
- Enhancing expertise and promoting self-awareness of responsibilities
- Accountability not explanation



Management Principles:
<https://www.jaea.go.jp/english/about/philosophy.html>

Review of FY2023

FY2023 saw great changes in terms of the promotion of the peaceful use of nuclear energy both domestically and internationally. In order to achieve carbon neutrality by 2050 as stated in its GX Policy, Japan presented a policy to maximize the use of nuclear energy while ensuring the highest level of nuclear safety. Internationally, at COP28, the Framework Convention on Climate Change, leading countries confirmed for the first time the policy direction to actively use nuclear energy to realize a decarbonized society.

Additionally, under the leadership of Director General Grossi, the IAEA launched an initiative aimed at utilizing nuclear energy not only as an energy source, but also in a wider range of fields, in order to solve various problems of modern society through nuclear science and technology. The nuclear research institutes in each country with which JAEA is in cooperation are steadily advancing similar initiatives.

Following these great changes, JAEA formulated a new vision to mark the start of FY2023 in April. The vision, which outlines the R&D direction for JAEA to pursue in the future, consists of the following three areas:

1. Synergy: R&D for synergy of nuclear and renewable energy;
2. Sustainability: R&D to make nuclear energy itself sustainable; and
3. Ubiquity: R&D for nuclear technology utilization not only in energy but in a wider range of fields.

FY2023 was the second fiscal year of the 4th Medium-/Long-Term Objective Period. All of the period's goals are included under the three areas above. This means that the steady implementation of this vision will lead directly to the achievement of the Medium-/Long-Term Objectives. Additionally, since we have incorporated the specific future direction to be pursued in R&D into the vision, we can expect it to have a positive impact on research outcomes by encouraging further collaboration among our various divisions and business operations.

In the area of Synergy, we made significant progress in the development of high-temperature gas-cooled reactors, including the success of a March 2024 safety demonstration test using a HTTR to simulate a severe accident during 100% output operation. We also

launched the development of a uranium redox flow battery to store renewable energy.

In the area of Sustainability, we posted significant achievements in our support activities for the decommissioning of the Fukushima Daiichi Nuclear Power Station. In addition to the fulfillment of our role as a third-party organization to ensure compliance with safety standards in the discharge of ALPS-treated water into the ocean, we began preparatory work to construct a facility for the analysis of fuel debris, which is planned in the near future. In the decommissioning of "FUGEN" and "MONJU", despite important setbacks such as delays with the spent fuel transportation at "FUGEN" and technical issues with equipment during the removal of the shielding body at "MONJU," we are committed to steady progress within the overall scheduled timeframe. Additionally, we began preparing to address new challenges, such as volume reduction and recycling of high-level radioactive waste.

In the area of Ubiquity, we concluded a cooperation agreement with the National Cancer Center in February 2024 for the discovery of cancer drugs using actinium-225, which is estimated to have promising potential. Since "JOYO" is to play an extremely important role as a core facility for this purpose, we are making all-out efforts to restart its operation.

On the management side, we worked on far-reaching reorganization, reform of various business processes, and human resource development in order to keep pace with the trend of major changes in the nuclear power industry by fully utilizing our limited management resources to achieve maximum effect and meet public expectations. We began implementing business process reform and human resource development in FY2023, and will sequentially implement reorganization from the beginning of FY2024 in coordination with local governments and other related organizations.

JAEA will continue to respond flexibly to changing circumstances, striving to fulfill its mission to "contribute to the welfare and prosperity of human society through nuclear science and technology" without slowing the pace. Your continued understanding and support are greatly appreciated.

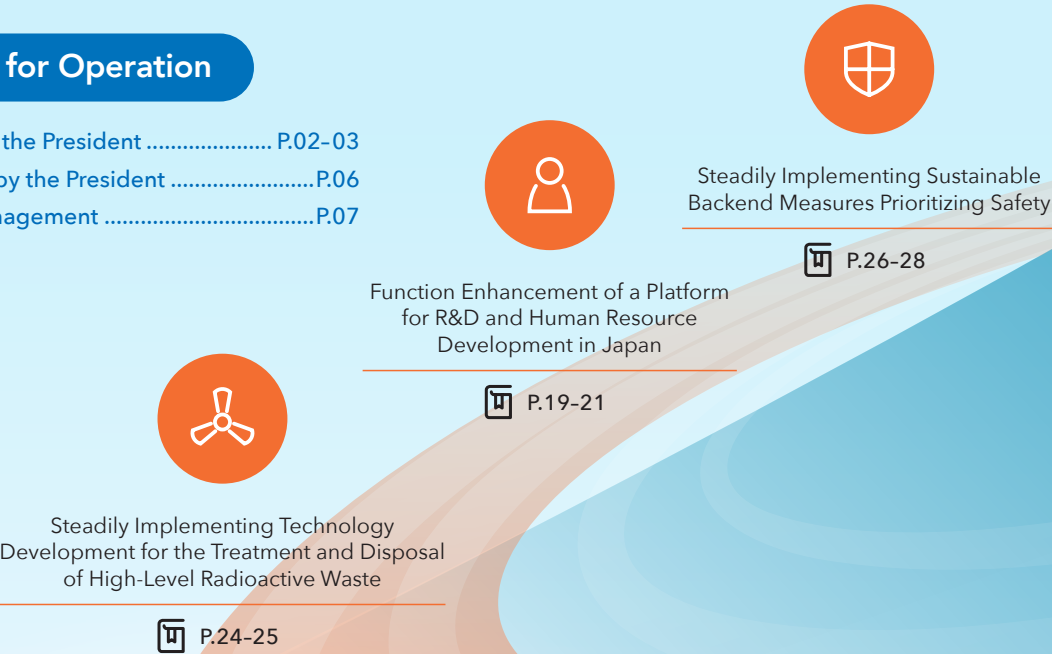
President's Philosophy, Operational Policies and Strategies

Contribution to Society by Achieving Medium- / Long-Term Objectives and Plan

JAEA will achieve the Medium-/Long-Term Objectives specified by the competent ministers and actively contribute to the development and use of nuclear energy throughout Japan, improvement of the safety of nuclear energy in Japan and overseas, and the creation of innovation.

Policies for Operation

- Message from the President P.02-03
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Synergy

Vision Future Image

Exploration of a New Future with the Synergy of Nuclear and Renewable Energy*

Sustainable Ubiquitous

Outcome of Operation

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* JAEA formulated new management principles on April 1, 2023, defining "Exploration of a New future with the Synergy of Nuclear and Renewable Energy" as the new vision. JAEA will make further efforts in R&D of nuclear science and technology, and contribute to realizing its vision by enhancing synergy, cooperation, and collaboration with all other fields, especially renewable-related technologies.



Management Principles:
<https://www.jaea.go.jp/english/about/philosophy.html>

Key SDGs to which JAEA's R&D contributes



Key SDGs to which the infrastructure of operations contributes



Decarbonized society by FY2050



Policies for Operation

Outcome of Operation

Foundation for Operation

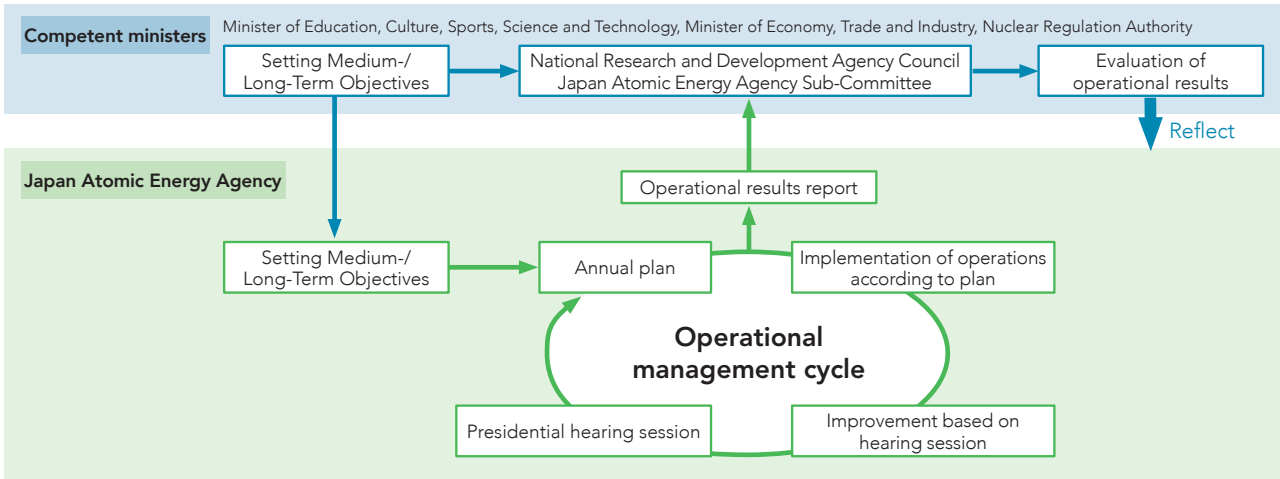
Basic Information

Management by the President

Under strong presidential leadership, JAEA efficiency by integrating with the business management cycle a range of operations that had been conducted separately (business planning, resource allocation, risk management, and performance evaluation). The presidential hearings clarify the issues facing each major business in terms of technology, society, and

resources, and also clarify the system of responsibility to improve management and achieve goals. In addition, we implement risk management activities (P.46) to deal with risks that may materialize, and carry out centralized business management in conjunction with the presidential hearings.

Management by the President



Presidential hearing session and Risk management activities

Presidential hearing session

Problem solving in setting goals

JAEA has integrated progress management and risk management activities in its main businesses and, having identified issues across the board in terms of technology, resources and society, is now considering countermeasures aimed at maximizing results.

- Layering and materialization measures to solve problems in order to achieve goals
 - Consideration of cross-organizational efforts and cooperation with external organizations such as manufacturers and universities
 - Consideration of the annual development of each issue
- Clarify the system for resolving each issue with executive staff as the person responsible for each extracted issue

Risk management activities

Prevention of risks
Countermeasures after risk occurrence

Extensive risk extractions for JAEA's main business by position hierarchy (management layer, managerial position, practitioners) and three factors (strategy, culture, process)

- Preparation of countermeasures for each risk from the perspective of minimizing the spread of damage when a risk occurs

Reform of Management

Promotion of management reform under the strong leadership of the President of the Board of Directors

Integration of business processes

JAEA has improved efficiency by designating major operations to be managed mainly by the president as core projects. In these core projects, operations previously conducted independently,

such as president's hearings and risk management activities, are integrated into the business management cycle, with intensive discussions held to maximize results.



* Core projects: Major projects, enhancement of research capacity, and operations related to strengthening headquarters functions

Review of organization

As part of management reforms to enable effective and efficient handling of JAEA's management issues, we are considering organizational reform to create value by enabling quick response to changes and needs in the wider society. This will consist of: establishing "business areas" responsible

for planning new business concepts; and strengthening the authority of individual business site directors to take executive action by clarifying "management" and "administration" and streamlining hierarchical structures. On this basis, we envisage starting organizational reform in FY2024.

Measures to be Taken to Attain Business Operation Targets Placing Top Priority on Safety

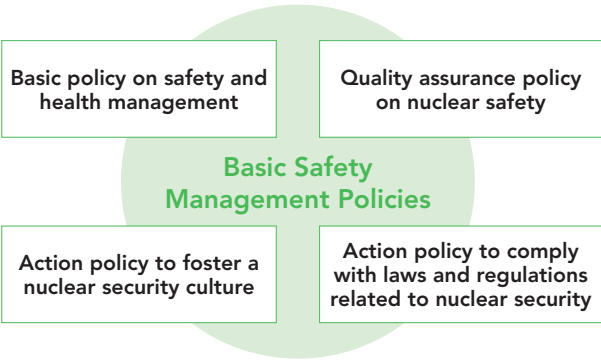
(Costs required for operations)
This item includes content realized by implementation of other matters, and the amounts recorded as administrative costs are as recorded for those other matters.

Basic Safety Management Policies

JAEA places the highest priority on ensuring safety in its basic policies for management and business operations. Based on these policies, JAEA is committed to ensuring the safety of its facilities and operations, the appropriate management of nuclear materials, and work tirelessly to develop and maintain a safety culture*1 and foster a nuclear security culture*1.



*1 Safety culture/nuclear security culture is the organizational climate and perception of safety as the top priority/nuclear security role and responsibility of the organization and its respective personnel.



Ensuring Safety Above All

JAEA handles radioactive materials and is therefore required to demonstrate exceptionally high levels of safety and reliability. To that end, JAEA has formulated basic policies on safety, quality, and nuclear security and conducts its operations placing safety above all. Each JAEA site undertakes activities in accordance with the basic policy on safety and health management and the quality assurance policy on nuclear safety. Each site also seeks continuous operational improvement by repeating the plan-do-check-act (PDCA) cycle.
To strengthen safety activities, the “chief safety manager,”

introduced in FY2021, visited each site to inspect the conditions of all sites from a single viewpoint, pointed out any problems, promoted their improvement, and checked their improvement plans. In addition, in FY2023, to “cover all sites with a safety blanket,” the manager of the Safety Administration Department at Headquarters drove safety management reform, including activities to direct greater efforts into the prevention of accidents and technical issues in cooperation with each site, to further improve safety awareness and to achieve excellence in safety management.

Activities to Develop and Maintain a Safety Culture

As part of activities to develop and maintain a safety culture, the Executive Directors undertook safety patrols and exchanged opinions with staff on-site to promote information sharing and mutual understanding between management and staff. In addition, JAEA held lecture meetings on the state of and measures against human error at JAEA, and each JAEA site held safety meetings with the participation

of operating partners, a safety and health patrol by the director general, sensory-based safety training to enhance staff sensitivity to risk, and other related activities as ongoing efforts to improve the safety consciousness of personnel involved in JAEA operations. We will continue these activities to develop and maintain a safety culture and thereby prevent accidents and technical issues.



Patrol inspection by a work safety specialist to check the state of safety and health (left); safety lecture meeting led by an in-house lecturer (middle); Virtual Reality (VR) sensory training to enhance sensitivity of field staff to safety and risks (right)

Activities to Prevent Recurrence of Similar Events (Agency-wide Sharing of Lessons Learned from Incidents)

Following an accident or technical issue, JAEA undertakes activities to share the lessons learned agency-wide. In FY2023, continuing from the previous fiscal year, in addition to its preexisting agency-wide sharing of information, JAEA worked

to promote understanding among staff by creating short educational videos with subtitles giving a visual demonstration of inappropriate responses to an accident or emergency and shared them on the JAEA intranet.

Efforts to Organize and Prioritize Aging Facilities for Utilization

As JAEA started its R&D activities in the 1960s, many of its facilities and equipment have aged. These older facilities and equipment pose a safety risk that needs to be prioritized. Our response plan is to group these facilities into those

we will continue to use and those we will no longer use for decommissioning. The necessary measures are implemented based on risk assessment.

Implementation of Training and Drills at Nuclear Facilities

To be prepared for crises such as nuclear facility accidents/failures and natural disasters, we periodically implement necessary training and drills. In comprehensive emergency preparedness drills held at the research institutes subject to the Act on Special Measures Concerning Nuclear Emergency Preparedness, we conducted exercises on sharing information via the Integrated Nuclear Emergency Preparedness Network that links JAEA and the Secretariat of the Nuclear Regulation Authority, with the aim of refining the system to share and send out information.

In FY2023, training was conducted five times on the sites covered by the Act on Special Measures Concerning Nuclear Emergency Preparedness. Specifically, assuming a large earthquake in Ibaraki Prefecture, a training exercise for simultaneous occurrence of disaster on two sites and a joint training exercise with other business operators were implemented to improve the accident response capacity for the event of multiple sites or business operators being affected by earthquake.

Actual achievements of comprehensive emergency training in FY2023

September 19, 2023 Ningyo-toge Environmental Engineering Center	October 17, 2023 Fugen Decommissioning Engineering Center	December 22, 2023 Prototype Fast Breeder Reactor Monju	January 19, 2024 Oarai Research and Development Institute Nuclear Science Research Institute Nippon Nuclear Fuel Development Co., Ltd.	February 13, 2024 Nuclear Fuel Cycle Engineering Laboratories The Japan Atomic Power Company (Tokai Nuclear Power Plant I, Tokai Nuclear Power Plant II)
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Maintenance of Equipment for Emergency Response

JAEA operates and maintain equipment for emergency response including a teleconferencing system to enable us to unflinchingly share information within JAEA and send out information to external parties. Focusing specifically on the Integrated Nuclear Emergency Preparedness Network, which is important in sharing information with the Japanese government, we conducted periodic connection testing to ensure the availability of services

in the case of a nuclear emergency.
In FY2023, to further improve the reliability of emergency response facilities, we initiated a study with the goal of optimizing and rationalizing the teleconference system, identified and categorized the requirements of a next-generation emergency response teleconference system, and designed the detailed specifications.

Occurrence of Accidents and Problems

In FY2023, JAEA reported a total of 29 accidents or technical issues where a notification was made to the fire department regarding fire, smoke, or injury. There were no accidents or technical issues that were subject to statutory reporting under the Nuclear Reactor Regulation Law. However, the number of incidents increased during the summer, and safety management reform was driven forward to reduce the number of incidents. As a result, the occurrence of accidents was curbed. This reform encompasses various initiatives to ensure that workers observe basic rules and operations, including enhanced site inspections by managers.

There was no recommendation from the nuclear regulation inspection, one correction recommendation from the Labor Standards Inspection Office regarding work safety, and one direction from the fire department. JAEA accepts these suggestions from external institutions in a serious spirit, investigates the causes, and works on improvement throughout JAEA. In addition, there was one accident accompanied by injury resulting in absence from work. JAEA is committed to investigating the cause and taking measures to prevent occurrence of similar events.

Activities Based on Quality Assurance Policy on Nuclear Safety

JAEA ensures proper operation and continuous improvement of safety-related activities under a quality assurance policy on nuclear safety set forth in accordance with the operational safety program for reactors and other facilities.

In FY2023, to maintain and improve the quality management

of nuclear facilities, JAEA published a message from the president, distributed the monthly quality poster, held lecture meetings, and checked actual work practices for any operational discrepancy from documents stipulated by the organization.

Agency-Wide Safety Review and Quality Assurance Committee

JAEA operates an Agency-wide Safety Review and Quality Assurance Committee to consider applications for licensing of nuclear facilities and matters related to quality management activities across JAEA. We took measures to improve the efficiency of the Committee's deliberations, including preparation of a summary sheet to check the completeness of the required items in technological standards and regulations, and of the entries in licensing application forms, which promoted appropriate licensing applications.

In FY2023, the committee held eight meetings to discuss five subjects in total including an application for amendment of a nuclear facility business license and an application for authorization of decommissioning plans. In addition, it performed causal analyses of the accidents/troubles occurred in 2023 (from January to December) and issued messages calling for prevention to prevent accidents/troubles on each of the sites.

Management Review by the President

To check if the safety activities of the nuclear facilities are effective, the president receives regular reports from each facility directly and reviews them to improve the operations pertaining to the quality management system and the safety activities.

In FY2023, the president management review was conducted twice with participants including senior advisors who are external experts. In response, the president instructed the director generals to demonstrate a strong sense of responsibility and leadership. The approach will be for the director generals and other executives to always show a strict attitude to "safety and security" in order to spread awareness

of safety first among employees and for the manager of the Safety Administration Department to cover all sites with a safety blanket, in a bid to achieve zero incidents.



Management Review by the President at the end of FY2023

Response to the Safety Regulations of Nuclear Facilities

To enhance agency-wide compliance with common safety regulations, JAEA periodically holds safety review and response liaison meetings to share information about the state of review by the Secretariat of the Nuclear Regulation Authority and recommendations. In addition, JAEA promoted resolution of issues by holding periodic meetings with the safety regulation managers of the Secretariat of the Nuclear Regulation Authority.

In inspections to verify compliance with the new regulatory

standards triggered by the accident at TEPCO's Fukushima Daiichi Nuclear Power Station, JAEA has focused on the inspection pertaining to the permission application for license amendment of the experimental fast reactor "Joyo". In an open inspection meeting, JAEA had discussions with the Nuclear Regulation Authority on its compliance with the regulatory standards, and the application was approved on July 26, 2023 after the necessary corrections. The future course of action will include R&D toward radioisotope production.

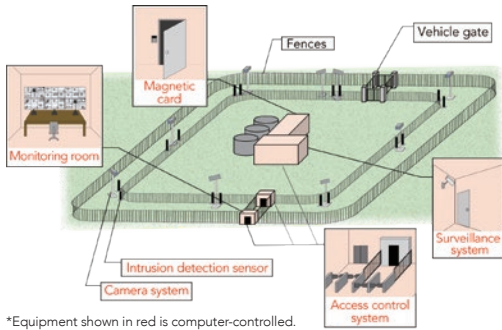
Initiatives for Ensuring Nuclear Security

JAEA steadily promotes "nuclear security (physical protection and specified radioisotope security)" to prevent terrorism. Lately, since the threat is growing due to changes in external conditions, JAEA is promoting risk mitigation against outsiders and insiders*2 by strengthening physical protection, inspections and monitoring, and effective operation of the trustworthiness determination program*3.

In addition, the Physical Protection Corrective Action Program (PPCAP) operation and assessments to relevant facilities were conducted to evaluate and improve voluntary nuclear security efforts.

Specifically, JAEA strives to maintain a high level of staff awareness of nuclear security through e-learning, message from the President, patrols and opinions exchanges by management, based on the "action policy to ensure

compliance with laws and regulations at nuclear facilities" and the "action policy to foster a nuclear security culture".



*Equipment shown in red is computer-controlled.
Schematic illustration of physical protection (example)

*2 Outsiders and Insiders: A person who enters a nuclear facility from the outside and attempts to sabotage or steal nuclear materials is called an outsider. On the other hand, a person such as a staff member attempting to do this is called an insider. In the case of an insider they are difficult to detect because they have access rights.
*3 The trustworthiness determination program: As one of the measures against threats from staff and other insiders, this program investigates the identity, career, possible terrorist connections and other background details of individuals who have access to the designated inner areas of nuclear facilities and handle confidential information on physical protection so as to exclude the risk of sabotage.

Activities for SSAC*4 and Safeguards*5

From the viewpoint of peaceful use of nuclear materials, and to demonstrate the transparency of its use of nuclear materials, JAEA provides the Japanese government and the IAEA with information on the state of its nuclear material management and facilities in a timely and appropriate manner. For these activities, the Japanese government and IAEA conduct safeguards inspections to check that nuclear materials are properly managed. In addition, JAEA strives to further advance the nuclear material accountability and safeguards related knowledge of the staff involved through e-learning, safeguarding lectures, rank-based training, and patrols and opinions exchanges by management.

*4 Nuclear material accountability: This work involves measuring and recording the inventory and movement of nuclear materials and supplies, which is internationally regulated under the law, and reporting this information to the government on a regular basis.
*5 Safeguards: It is a system led by IAEA and the Japanese government that conducts inspections of nuclear facilities to verify that no diversion to nuclear weapons has taken place.



Safeguards: patrol by management

Contributing to Carbon Neutrality through the Development of Innovative Technologies such as Safety Improvements

(Costs required for operations)
The cost of this R&D was 35,539 million yen (operations expenses 20,002 million yen and entrusted expenses 15,494 million yen). The income recorded as funding for the R&D included income from government funding for operational grant (17,726 million yen) and income from research consigned from the government (14,799 million yen). The administrative cost, calculated by adding extraordinary loss (12,582 million yen) and other administrative costs (890 million yen) to this cost, was 49,016 million yen.

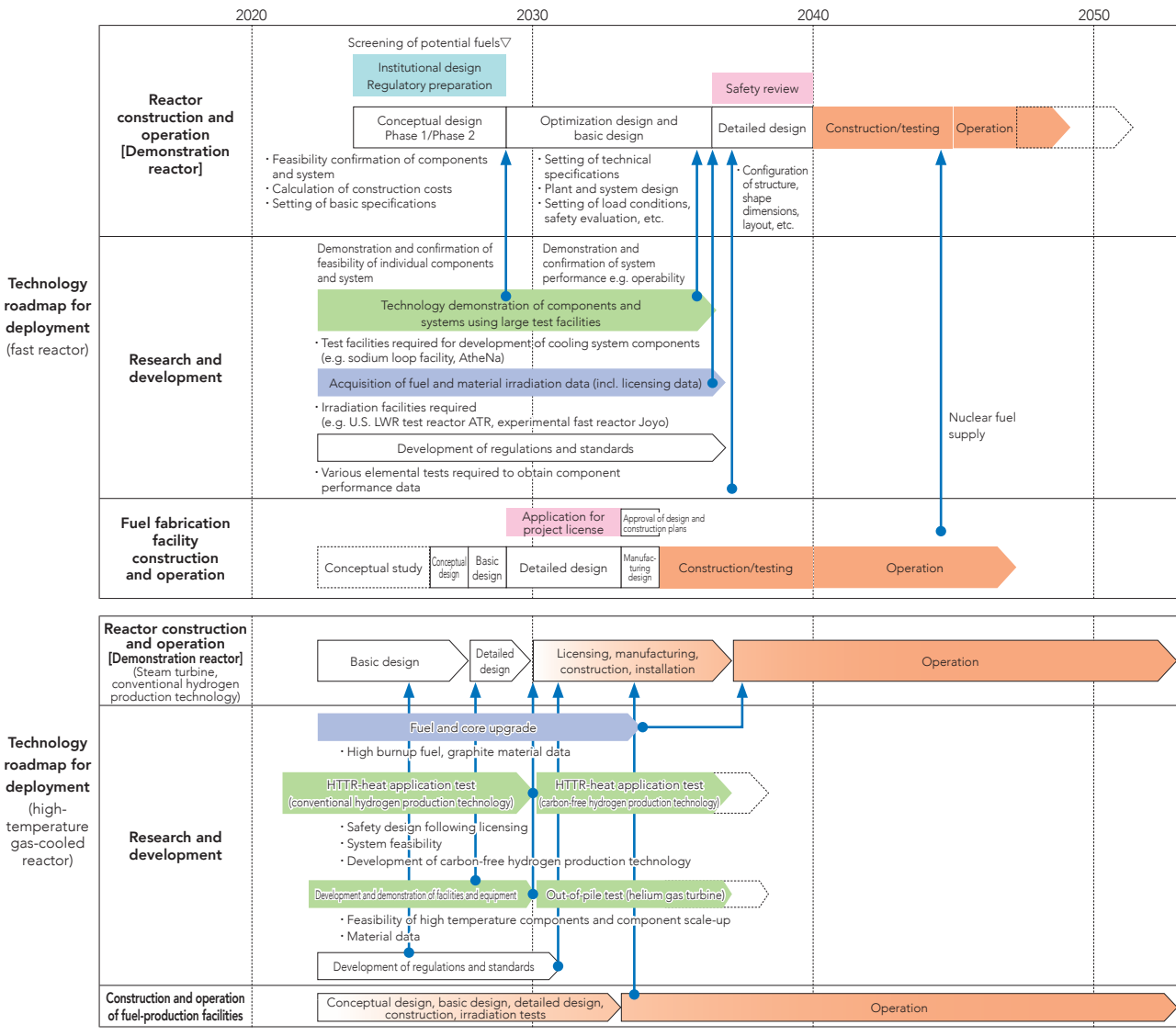
JAEA is actively engaged in research to improve the safety of nuclear energy systems, to support the safety improvement activities of related government agencies and nuclear power companies, and to implement its own nuclear energy systems. Specifically, JAEA has designated as core projects the safety demonstration tests of HTTR and the restart of operation and the production of radioisotopes at “Joyo”.

By advancing these projects, JAEA aims to meet social demands for nuclear energy systems, such as contributing to carbon

neutrality and improving economic efficiency. At the same time, we will proceed with other projects including fast-reactor development based partly on international collaboration, research on the innovative reactor technologies required for SMRs*¹ and related systems, and the establishment of elemental technologies for hydrogen production in HTGRs.

*1 Small Modular Reactors (SMRs) are small reactors with an electricity output of less than 300 MW per reactor compared to larger reactors with an electricity output of more than 1,000 MW, and are expected to offer higher safety, lower design, manufacturing and construction costs, and fewer siting constraints.

The chart below indicates the target timing for research and development implementation based on individual consultations with business operators.
(In the case of construction going ahead, the start of operations and other details will be determined based on the plan developed by the business operator, subject to the understanding of the local community in which the reactor is to be located.)



*2 Source: 33rd meeting of the Nuclear Energy Subcommittee of the Electricity and Gas Industry Committee under the Advisory Committee for Natural Resources and Energy, organized by Japan's Agency for Natural Resources and Energy (ANRE) https://www.meti.go.jp/shingikai/enecho/denryoku_gas/genshiryoku/033.html (in Japanese)

◆ Demonstration of superior safety features of HTGRs using HTTR

Aiming to start operation of the HTGR demonstration reactor in the late 2030s, JAEA started discussions at the Atomic Energy Society of Japan on how to demonstrate that the HTGR will not lead to a core meltdown in the event of an accident, and at the Japan Society of Mechanical Engineers on new material standards to be established. Basic design and safety evaluation were conducted in preparation for the next fiscal year's licensing application for hydrogen production using heat from the HTTR (High Temperature Engineering Test Reactor).

In the U.K., which aims to start operation of a HTGR demonstration reactor in the early 2030s, JAEA began work on the project following its selection for the demonstration reactor programme (Phase B) and fuel programme (Step 1) in collaboration with the UK National Nuclear Laboratory (NNL).

As part of the demonstration of the superior inherent safety features of HTGRs (no core meltdown in the event of an accident), a loss of core flow test (safety demonstration test) from 100% rated power (30 MW) was conducted using the HTTR. The test confirmed that the reactor power automatically decreased and maintained a stable state even when the helium circulators were forced to stop, the reactor lost forced cooling, and the control rods were not inserted.

Outcome
Testing using the HTTR will demonstrate to the general public the superior safety features of HTGRs and can be expected to contribute to the early introduction of HTGRs, whose location is planned close to areas of demand for energy (hydrogen, heat, electricity, etc.), as a step toward realizing carbon neutrality.



Safety demonstration test commemorative ceremony



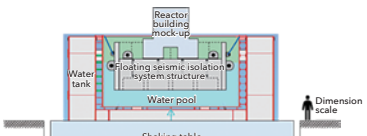
<https://www.jaea.go.jp/02/press2023/p24032801/>
(in Japanese)

◆ Demonstration test of floating seismic isolation system for nuclear power plants ◆ Permission for changes to Joyo reactor installation and start of safety upgrade work toward restart

We are developing a floating seismic isolation system (FSIS) to improve the safety of small modular reactor (SMR) plants. Built into the base mat of the nuclear reactor plant, the FSIS floats the nuclear plant on water to provide it with a 3-dimensional seismic isolation function. As part of a joint research project with the National Research Institute for Earth Science and Disaster Resilience (NIED), a 1/15 scale model of the FSIS was tested on the world's largest shaking table at E-Defense. The test confirmed its high seismic isolation effect and provided data necessary for SMR safety evaluation.

On July 26, 2023, JAEA obtained the permission of the Nuclear Regulation Authority (NRA) for changes to the Joyo reactor installation in conformity with the New Regulatory Requirements. On February 29, 2024, JAEA signed a cooperation agreement with the National Cancer Center for basic research on radioisotope-based cancer drugs. After the restart of Joyo, JAEA plans to utilize it for research and development of a demonstration reactor and for the demonstration of radioisotope production for medical use.

Outcome
Prospect of FSIS application for simplifying seismic structure and standardizing SMR design irrespective of site seismic intensity. Joyo is the only sodium-cooled fast reactor in Japan to have been confirmed as compliant with the new regulatory standards. Through the use of irradiation after its resumed operation, it is expected to make a steady contribution to the commercialization of fast reactors and thus to the realization of carbon neutrality.



Test model of the floating seismic isolation system (FSIS) for SMRs



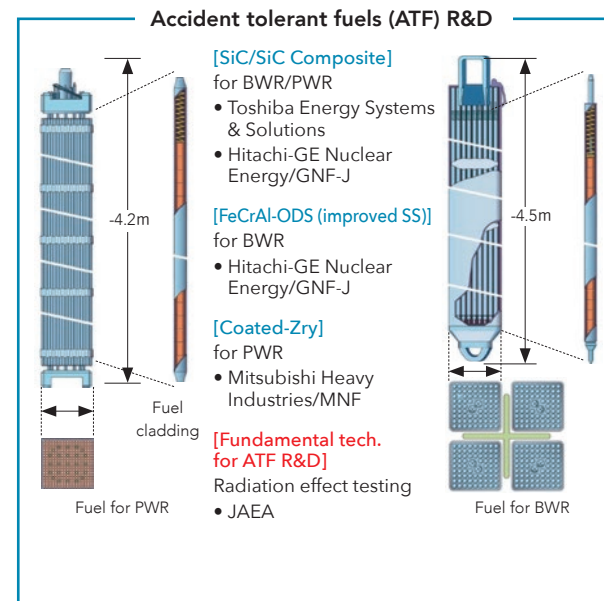
Joyo safety upgrade work to comply with the New Regulatory Requirements (Land reinforcement work at Joyo main cooling building)

◆Development of a new type of fuel (ATF) with improved accident resistance

The serious accident at the Fukushima Daiichi NPP was caused by progressive fuel melting. The development of a new “accident tolerant fuel (ATF)” that can mitigate accident progression has now become a global concern. In Japan, based on an “All-Japan” research team structure, we aim to achieve early practical use of domestically produced ATFs by working to develop ATFs that will realize an expected safety improvement by reducing heat generation and hydrogen generation during an accident. This technology development will make it possible to develop fuels and core materials with significantly improved resistance to loss of coolant in an accident.

Outcome

We have begun irradiation testing of a fuel rod at an overseas reactor (Idaho National Laboratory, US), the first such test of a fuel rod made of the candidate materials for the domestically produced ATF. In addition, the latest research results were presented and the future direction of development was discussed at an ATF workshop held on December 14, 2023. ATFs are expected to contribute to further improving the safety, reliability, and efficiency of light water reactors as a step toward the realization of carbon neutrality.



Accident tolerant fuels (ATF) R&D



ATF-WS:
https://nsec.jaea.go.jp/ATFWS/ATFWS_2023.html
(in Japanese)

INTERVIEW

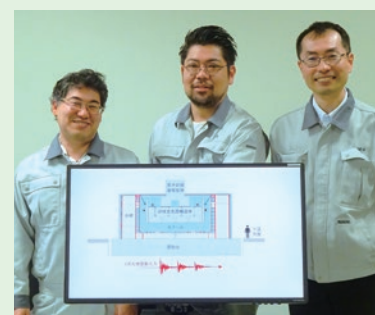
Toward Improving Seismic Performance of Small Modular Reactors

In order to demonstrate the new floating seismic isolation technology for the realization of safe and economical SMRs, our research team conducted a test at E-Defense. The data obtained from the test will help us to validate analysis tools, comply with safety evaluation and regulatory requirements, and standardize plant design, with the aim of enabling future deployment of SMRs.

Yamamoto: Although this was the largest-scale test ever conducted by our office, thanks to the close cooperation of the National Research Institute for Earth Science and Disaster Resilience (NIED) and nuclear vendors, we were able to obtain all necessary data efficiently and effectively and confirm the seismic isolation performance

Marufuji: Our challenge is to ensure that our safety technology meets regulatory requirements, and our current goal is to obtain regulatory approval in the US. We are studying ways to achieve higher safety performance from the floating system in terms of not only hardware but also software such as regulatory requirements.

Imai: This technology enables SMR construction regardless of the site seismic condition and allows standardization of plant design. Furthermore, it enables the modularization of the system, which is expected to help shorten the construction period and improve economic efficiency.



Nuclear Plant Innovation Promotion Office
Sector of Fast Reactor and Advanced
Reactor Research and Development
(from left)

YAMAMOTO Tomohiko,
MARUFUJI Takato,
IMAI Yoshiyuki

Creating Innovation through the Promotion of Diverse R&D on Nuclear Science and Technology

(Costs required for operations)

The cost of this R&D was 31,971 million yen (operations expenses 31,330 million yen and entrusted expenses 554 million yen). The income recorded as funding for the R&D included income from government funding for operational grant (15,466 million yen) and income from subsidies, etc. (8,675 million yen).

The administrative cost, calculated by adding extraordinary loss (105 million yen) and other administrative costs (1,204 million yen) to this cost, was 33,281 million yen.

At the Sector of Nuclear Science Research of JAEA, we aim to take the lead in science and technology related to the utilization of atomic energy and radiation, support the foundations of atomic energy development, and create and provide new value to society. One of the relevant core projects is the development of radioisotope production technology using the research reactor JRR-3. In recent years, we have also begun developing technologies to effectively utilize radioactive waste and other resources. In addition, we are working on the following four main areas: the Nuclear Science and Engineering Center (NSEC) is dedicated to making scientific contributions to various societal needs and

creating new uses for nuclear energy; the Advanced Science Research Center (ASRC) seeks to discover new principles and phenomena, create new materials, devise innovative technologies, and conduct world-leading nuclear science research with strong academic and technological impact; the Materials Science Research Center (MSRC) focuses on developing new materials and functional analysis tools for advanced structural and functional analysis; and the J-PARC Center, using a variety of secondary particles produced by the world's most intense pulsed proton beam, is engaged in world-leading research in a wide range of fields, from basic science to industrial applications.

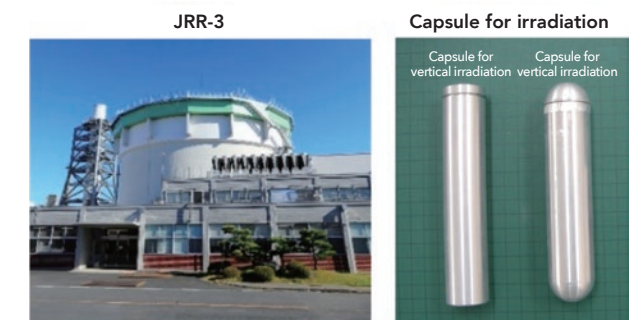
Major achievements 2023

◆Development of medical radioisotope production technology at JRR-3

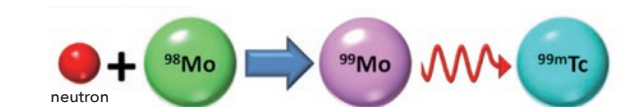
In May 2022, the Japan Atomic Energy Commission issued an action plan to promote the domestic production and use of medical radioisotopes. As one of the associated initiatives, we are currently developing production technology for Mo-99/Tc-99m using the research reactor JRR-3. Mo-99 is the raw material for Tc-99m, which is used in about 1 million nuclear medicine examinations and diagnoses annually, but is currently 100% dependent on imports. Under the national action plan, which aims to produce approximately 30% of domestic demand by FY2027 using test research reactors, etc., we are engaged in the development of irradiation and production technology using neutron activation methods. Additionally, toward social implementation, we are also working on initiatives aimed at building a supply chain through public-private cooperation. In FY2023, we continued to evaluate the amount of molybdenum produced under different irradiation conditions. We also succeeded in dissolving molybdenum pellets of practical size.

Outcome

Since 100% of the medical Mo-99/Tc-99m used in Japan is imported, our challenge is to ensure a stable supply that is not affected by the international situation. The establishment of manufacturing technology at JRR-3 and a supply chain will realize partial domestic production, contributing to the construction of a stable nuclear medicine diagnostic system.



Neutron activation method



Test of Mo-99/Tc-99m production using JRR-3



<https://jrr3.jaea.go.jp/3/34.htm> (in Japanese)

◆Launch of development project to change radioactive waste into useful resources

Regarding radioactive waste as a resource, we have begun developing technology to separate useful elements from the waste and to make effective use of the separated and extracted elements. The spent fuel from a nuclear reactor contains various elements produced by the nuclear fission of uranium, including not only radioactive nuclides but also a certain amount of rare elements that are essential for high-tech industries. In addition, some radioactive nuclides can be considered as energy sources, and, by utilizing them effectively, we can therefore not only reuse radioactive waste as a resource, but also reduce the burden on geological disposal sites. In this project, we are working on the following development themes:

- (1) Development of separation and extraction reagents and separation processes for useful elements
- (2) Development of semi-permanent and maintenance-free power sources using radioactive nuclides
- (3) Proof-of-principle test of a uranium redox flow (URF) battery using depleted uranium*

* This is not what is commonly called "radioactive waste" as it may potentially be used as a fertile material in fast reactors.

Outcome

Radioactive nuclides could potentially be used as an energy source in extreme environments that are inaccessible to humans. Furthermore, the large amounts of depleted uranium currently stored both in Japan and overseas could potentially create synergies between renewable energy and nuclear power as a material for large-scale storage batteries.

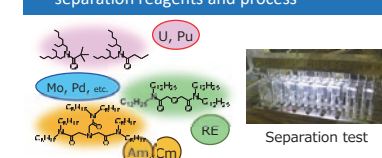
◆Elucidating the behavior of water inside an automobile fuel cell through observations using neutrons and synchrotron radiation

To improve the performance of fuel cells, it is necessary to properly understand where the generated water accumulates inside the fuel cell and how it is discharged. In this study, we have been working on the visualization of the water distribution inside a fuel cell by means of observation techniques using synchrotron X-rays and neutrons. These techniques were developed in collaboration between Toyota Central R&D Labs., Inc., the Comprehensive Research Organization for Science and Society (CROSS) and JAEA. The research revealed that the macroscopic water distribution formed over several tens of cm in the longitudinal direction of the fuel cell is influenced by the microscopic movement of water over several 100μm in the stacking direction inside the fuel cell.

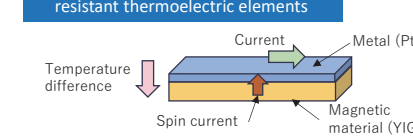
Outcome

It is expected that a correct understanding of the distribution and movement of water accumulated within a fuel cell will contribute greatly to the research and development of fuel cells, for example in establishing optimal control methods to maximize battery performance and in designing and verifying concepts for optimal materials and flow paths for water discharge.

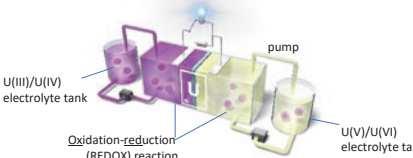
① Development and sophistication of separation reagents and process




② Development of highly radio-resistant thermoelectric elements



③ Conceptual diagram of URF storage battery



"Technological innovation transforming radioactive waste into resources" from 18th JAEA report meeting



<https://www.jaea.go.jp/jaea-houkoku18/> (in Japanese)

Major achievements 2023

◆Detailed design phase I of a new research reactor to be built at the Monju site has started

Government aims to use the Monju site to build a center of excellence for Japan's further nuclear research and development and human resource development. JAEA is the implementing body for the research reactor installation and is promoting the project through cooperation with Kyoto University and the University of Fukui. In May 2023, we concluded mutual cooperation agreements with each of the universities to strengthen the tripartite collaboration. In November 2023, we signed a basic contract with Mitsubishi Heavy Industries, Ltd. as the "prime contractor" to provide assistance in the design and installation of the research reactor. From FY2023, we began phase I of the detailed design for the reactor core, equipment, and layout, and conducted geological surveys of the candidate reactor sites and reported the results to a consortium meeting composed of stakeholders such as local governments, scientific bodies, and local industries.


Outcome

Contributions are expected to foundation building for both the research and development of new nuclear energy and human resource development in the nuclear power field.



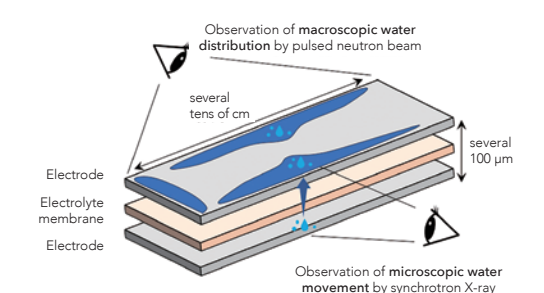
The heads of the three institutions shake hands after concluding the agreements: President Ueda (University of Fukui), President Minato (Kyoto University), and President Koguchi (JAEA)

<https://www.jaea.go.jp/04/nrr/jp/news/20230508/index.html> (in Japanese)
<https://www.jaea.go.jp/02/press2023/p23112901/> (in Japanese)




<https://www.jaea.go.jp/04/nrr/jp> (in Japanese)

Diagram of analysis method used in study



Method for observing water inside a fuel cell using neutrons and synchrotron radiation
From JAEA press release "Elucidating the behavior of water inside an automobile fuel cell - World's first successful observation using neutrons and synchrotron radiation -"

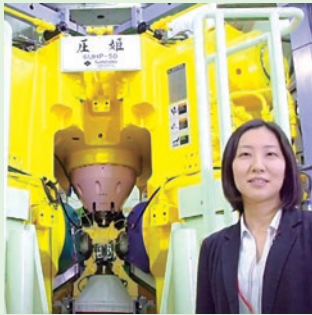


<https://www.jaea.go.jp/02/press2023/p23101101/> (in Japanese)

INTERVIEW

Contributing to the Advancement of Earth and Planetary Sciences with Neutrons

With 70% of its surface covered by ocean, the Earth is known as the "water planet", but water also exists deep underground. For example, in subduction zones such as Japan, where oceanic plates sink underground, water is stored in minerals and carried deep underground. The depths of the Earth are a world of extremely high temperatures and pressures, exceeding 3,600,000 atmospheric pressure and several thousand degrees Celsius at the center. In order to clarify the state of hydrogen in minerals and magma under such extreme conditions, a large hydraulic press was installed at the J-PARC Materials and Life Science Experimental Facility, which boasts the world's most powerful pulsed neutrons. This press makes it possible to reproduce in a laboratory the pressure at up to 600 km underground, and we have been conducting research to understand the role of hydrogen, which controls the macroscopic properties of materials, from their structures. In recognition of these technological developments and research content, I received the 5th Nishida Prize for Promotion of Geo- and Planetary Science from the Japan Geoscience Union. I would like to continue using neutrons to elucidate the behavior of materials in extreme environments.



Sector of Nuclear Science Research, J-PARC Center, Materials and Life Science Division, Neutron Science Section
SANO Asami

◆Initiatives for Industry-Academia-Government Collaboration

JAEA has been focusing on creating innovation and giving back its R&D results to society. In FY2023, 176 new joint research projects, 131 contract research projects with various bodies such as government, universities, and private companies, and 666 facility shared-use programs were conducted.

Since 2018, the “JAEA Technology Salon” has been held to accelerate R&D activities and application of its results via interdisciplinary and cross-industry collaboration. In FY2023, it was held in Tokyo (November 2023) and Nagoya (February 2024). Additionally, taking opportunities such as New Technology Presentation Meetings, we introduced our R&D results to the public. Through these efforts, we received technical consultations on social implementation and joint research from private companies with which we did not have previous connections.

Innovation coordinators are assigned to each site to support researchers, provide technical consultation, and work toward social implementation of JAEA’s technologies.


Additionally, we promote the industrial use not only of JAEA’s large research facilities, but also of our equipment and analytical instruments, and promote the external use of facilities and equipment. Furthermore, open innovation and science initiatives were also implemented through initiating and operating the research data management plan.

Through studies on research and utilization, our consultants will propose suitable facilities and instruments, as well as integrated research with researchers from different fields to introduce a “Co-Creation Space.”




JAEA’s Facilities and Analytical Instruments in Japan, which can be used industrially via a single point of contact by Open Facility Platform (OFP).

* The R&D results (about 120,000), such as academic papers and patents released by JAEA, can be accessed via the JAEA Originated Papers Searching System (JOPSS). For more details of industry-academia-government collaboration, please access the JAEA Innovation Hub’s website (as of June 2024: Research and Development Promotion Department’s website).



JOPSS:
<https://jopss.jaea.go.jp/search/servlet/interSearch?language=1>




JAEA Innovation Hub:
<https://tenkai.jaea.go.jp> (in Japanese)

TOPICS

JAEA technologies introduced at the JAEA Technology Salon in FY2023

- Acceleration of simulations using AI and machine-learning — A proposal for an automated learning method
- Application of Atmospheric dispersion model to environmental problems and disaster prevention — Atmospheric dispersion and dose assessment system considering building effect
- Lithium ion dynamics in all-solid-state batteries observed using neutrons
- Development of automated sample preparation system for organic elemental analysis — More effortless sample wrapping
- Methodology for quick, low-cost estimation of soft error rate



9th JAEA Technology Salon:
<https://tenkai.jaea.go.jp/salon/20231101/>

Function Enhancement of a Platform for R&D and Human Resource Development in Japan

(Costs required for operations)
The cost of this R&D was 3,556 million yen (operations expenses 3,282 million yen and entrusted expenses 268 million yen). The income recorded as funding for the R&D included income from government funding for operational grant (2,215 million yen) and income from subsidies, etc. (535 million yen). The administrative cost, calculated by adding extraordinary loss (6 million yen) and other administrative costs (22 million yen) to this cost, was 3,584 million yen.

To support the promotion of R&D and utilization of nuclear energy, JAEA is strengthening nuclear human resource development, nuclear nonproliferation and nuclear security, and promoting international cooperation and collaboration.

◆Nuclear Human Resource Development

The Nuclear Human Resource Development Center (NuHRDeC) of JAEA primarily provides various training and other programs to develop researchers and engineers in a wide range of nuclear energy fields. Since FY2022, NuHRDeC, the Nuclear Emergency Assistance and Training Center (NEAT) and the Integrated Support Center for Nuclear Nonproliferation and Nuclear Security (ISCN) have strengthened coordination in initiatives which had previously been implemented individually. We also continued with our Human Resource Development Concierge Activity as a contact point to promptly respond to inquiries and consultations from both within and outside of JAEA concerning human resource development. Through these activities, we aim to further enhance human resource development to support the 3Ss (nuclear safety, safeguards, and nuclear security).

In FY2023, NuHRDeC, NEAT, ISCN and the International Affairs department collaborated to hold a side event for the first time at the 67th General Conference of the International Atomic Energy Agency (IAEA) held in Vienna, Austria. The event, entitled The JAEA’s Contribution to Capacity Building to Ensure 3S for the Global Community in View of the Expected Expansion of Nuclear Energy Use, provided a valuable opportunity for the IAEA and its member states to share the challenges faced by emerging countries and express expectations for support, and further an opportunity to reaffirm the high level of trust and the deep appreciation enjoyed by JAEA’s overseas human resource development efforts, especially from Asian countries. Meanwhile, the Ambassador Extraordinary and Plenipotentiary of the Kingdom of Thailand to Japan and his delegation observed our international training program at Tokai-mura, contributing to friendly relations between Japan and Thailand.



Participants at the IAEA General Conference side event



Ambassador Extraordinary and Plenipotentiary of the Kingdom of Thailand to Japan (front row, third from right) and his delegation with the trainees

◆Strengthening Nuclear Non-proliferation and Nuclear Security

JAEA's Integrated Support Center for Nuclear Nonproliferation and Nuclear Security (ISCN) works proactively to further strengthen and improve nuclear non-proliferation, nuclear

security, and disarmament through utilization of JAEA technologies and knowledge.

◆Strengthening capacity-building support and advancing technology for nuclear non-proliferation and nuclear security, and promoting understanding through international cooperation

ISCN provides effective training courses on nuclear non-proliferation and nuclear security to domestic and international participants. The courses are highly evaluated by ASEAN member countries. ISCN also supported Ukraine by inviting a trainee to participate. In addition, the ISCN Exercise Field training facility has been upgraded, enabling the development of new training courses and significant training improvement.

In the development of technologies for detecting nuclear and radioactive materials at large-scale events, ISCN promoted the development of elemental technologies for wide-area radiation monitoring. These technologies, including nuclear and radioactive material detection, simultaneous localization and mapping (SLAM) and new communication technologies, were integrated and assembled into a prototype radiation detection robot. ISCN conducted preliminary tests with the robot at a real facility using a radiation source and demonstrated the ability to automatically detect and identify

radiation sources and their location. The International Forum on Peaceful Use of Nuclear Energy, Nuclear Non-Proliferation and Nuclear Security was held with domestic and international experts and other participants. The topics discussed included future visions for a sustainable society through the peaceful use of nuclear energy, strengthening of nuclear non-proliferation to realize a world without nuclear weapons, and future action by the international community and JAEA. Participants were able to develop a shared understanding of the future direction for these issues.



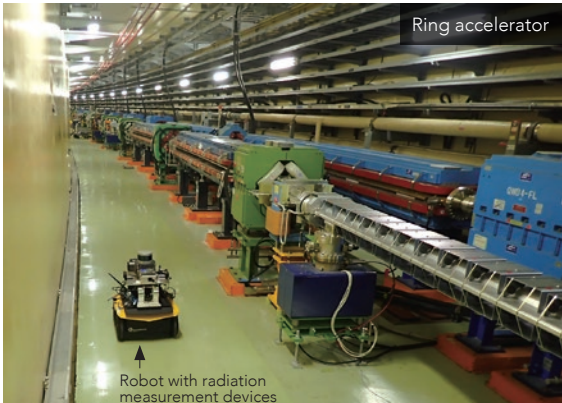
Integrated Support Center for Nuclear Nonproliferation and Nuclear Security (ISCN):
https://www.jaea.go.jp/04/iscn/index_en.html



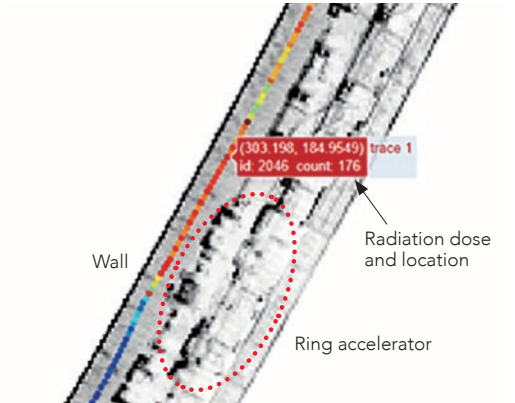
ISCN Exercise Field training facility



The International Forum 2023



Radiation measurement test with robot



Radiation measurement result

◆International collaboration

In promoting nuclear R&D focusing on the vision that JAEA has set forth since FY2023 ("Three Pillars of Research and Development"), collaborations with nuclear-related organizations overseas and international organizations are indispensable. These efforts include international joint research

programs conducive to maximizing R&D outcomes, expansion of human networks through international contributions such as support for human-resource development in emerging nuclear countries, and increasing JAEA's presence through worldwide dissemination of its R&D outcomes.

Fields of Collaboration with Foreign Countries and Major Progress in FY2023





International Atomic Energy Agency (IAEA)
Advanced Reactor, Nuclear Safety, Safeguards and Nuclear Security, Decommissioning and Radioactive Waste Management, etc.



Held side events at the 67th General Conference of IAEA and presented initiatives related to HTGR and human resource development in September 2023



Concluded the Practical Arrangements on Cooperation in the Area of Sampling and Analysis at the Fukushima Daiichi Nuclear Power Station in November 2023



Joined the first Nuclear Energy Summit, attended by heads of state and government, and presented as a panelist in March 2024



Organisation for Economic Co-operation and Development/ Nuclear Energy Agency (OECD/NEA)
Advanced Reactor, Nuclear Safety, Nuclear Science, Decommissioning, Radioactive Waste Management, and Human Resource Development
Carried out the evaluation of advanced reactor performance through the reactor forced cooling loss test at 100% reactor power operation in the LOFC project using HTTR in March 2024



The Generation IV International Forum (GIF)
Participated in R&D projects on Generation IV reactor systems



Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO)
Contributed to the international monitoring system to detect nuclear test explosions



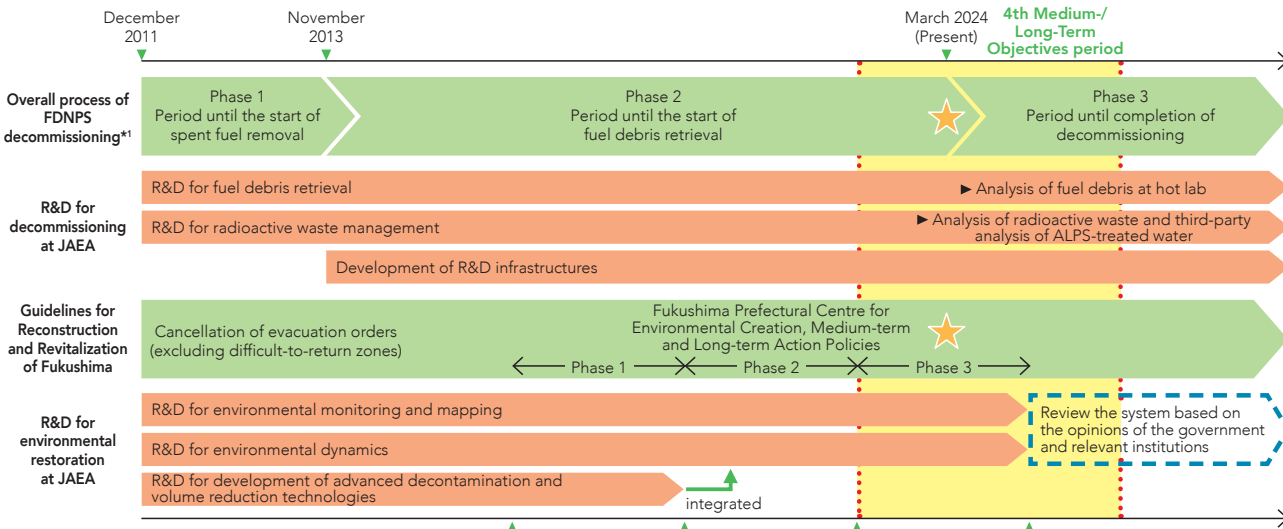
International Science and Technology Center (ISTC)
Participated in cooperative R&D projects

Promoting R&D Contributing to the Response to the Accident at TEPCO’s Fukushima Daiichi Nuclear Power Station

(Costs required for operations)
The cost of this R&D was 19,312 million yen (operations expenses 18,233 million yen and entrusted expenses 982 million yen). The income recorded as funding for the R&D included income from government funding for operational grant (10,170 million yen) and income from subsidies, etc. (5,987 million yen). The administrative cost, calculated by adding extraordinary loss (84 million yen) and other administrative costs (6,076 million yen) to this cost, was 25,481 million yen.

Objectives

With the Sector of Fukushima Research and Development at their center, we have established research bases in Fukushima and are conducting research and development related to the decommissioning of the Fukushima Daiichi Nuclear Power Station (FDNPS) operated by Tokyo Electric Power Company Holdings, Inc. and the environmental restoration of Fukushima in accordance with the Mid-and-Long-Term Roadmap towards Decommissioning and the Basic Guidelines for the Reconstruction and Revitalization of Fukushima. To maximize the comprehensive capabilities of JAEA, the relevant departments within the organization work together and cooperate to utilize the technology, knowledge, and experience they have accumulated. Furthermore, the data will be used for back-end measures at JAEA facilities and will be shared with the world, contributing to improving the safety of nuclear facilities in each country.



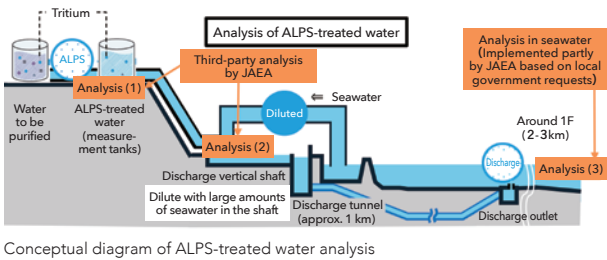
Major achievements 2023

◆Analysis of ALPS-treated water as third-party

As a third-party independent of TEPCO, we are conducting objective and transparent measurements (third-party analysis) of the radioactive materials contained in the ALPS-treated water.^{*2} The third-party analysis measures the tritium concentration of the ALPS-treated water before dilution and confirms that the concentrations of nuclides other than tritium are below the regulatory standard values, and, after dilution, below the release standard values.

To analyze tritium in treated water, we obtained laboratory accreditation under the international standard ISO/IEC17025 and strive to ensure the quality of our analysis values.

^{*2} ALPS-treated water is water that has been purified using the Advanced Light Processing System (ALPS) to remove radioactive materials other than tritium until it meets safety standards.



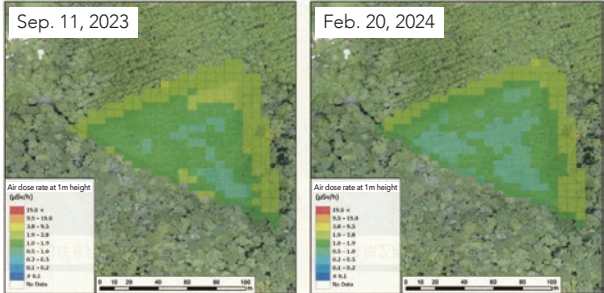
<https://fukushima.jaea.go.jp/okuma/alps/index.html> (in Japanese)

Outcome
We will ensure objectivity and transparency in the analysis of ALPS-treated water, and contribute to the smooth implementation of this important project, as well as to increased domestic and international understanding of the project.

◆Contributing to the lifting of evacuation orders in designated reconstruction and revitalization base areas

Using the various measurement and evaluation methods we have established to date, we have conducted, in response to requests from local governments and other organizations, assessments of the external exposure of agricultural workers, monitoring of Tsutsumi Park in Tomioka Town, measurement of concentrations in domestic wastewater, and detailed walking surveys of Tomioka Town’s specific reconstruction and revitalization centers. The results of these assessments are being used as evidence data in discussions by the decontamination verification committees of Tomioka Town and other local governments regarding the lifting of evacuation orders in specific reconstruction and revitalization center areas.

Outcome
The data will be used by local government decontamination verification committees and other organizations as evidence for lifting evacuation orders, and will contribute to lifting evacuation orders in designated reconstruction and revitalization bases.



Tomioka Town Specific Reconstruction and Regeneration Center Walking Survey

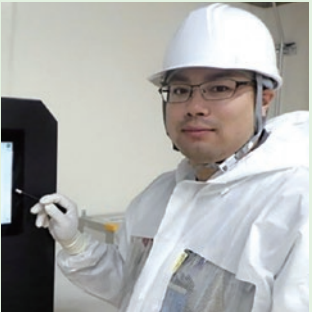
INTERVIEW

High reliability and transparency for your trust

As a third-party, the Okuma Analysis and Research Center conducts the analysis of ALPS-treated water to confirm that it has been purified to meet the regulatory limits set by the Japanese government for tritium concentration and other radioactive species before being discharged into the ocean.

In this analysis of ALPS-treated water, I am responsible for the analysis of tritium using a liquid scintillation counter. From the third-party standpoint, it is important to report reliable and objective measurement results to secure international credibility and transparency. Therefore, we studied the measurement conditions of liquid scintillation counters and established a quality assurance system to maintain and improve the analytical capabilities of our laboratory. In February 2024, we obtained laboratory accreditation under the international standard ISO/IEC17025.

As a third-party analytical laboratory for ALPS-treated water, we will continue to contribute to reassuring local residents, securing the trust of the international community, and contributing to the long-term decommissioning of 1F.



Sector of Fukushima Research and Development
Fukushima Research Institute
Okuma Analysis and Research Center
Analysis Section
Analytical Control Department
KOORIKAWA Masahiro

Steadily Implementing Technology Development for the Treatment and Disposal of High-Level Radioactive Waste

(Costs required for operations)
The cost of this R&D was 8,552 million yen (operations expenses 7,008 million yen and entrusted expenses 1,530 million yen). The income recorded as funding for the R&D included income from government funding for operational grant (4,602 million yen) and income from research consigned from the government (1,347 million yen). The administrative cost, calculated by adding extraordinary loss (21 million yen) and other administrative costs (26 million yen) to this cost, was 8,607 million yen.

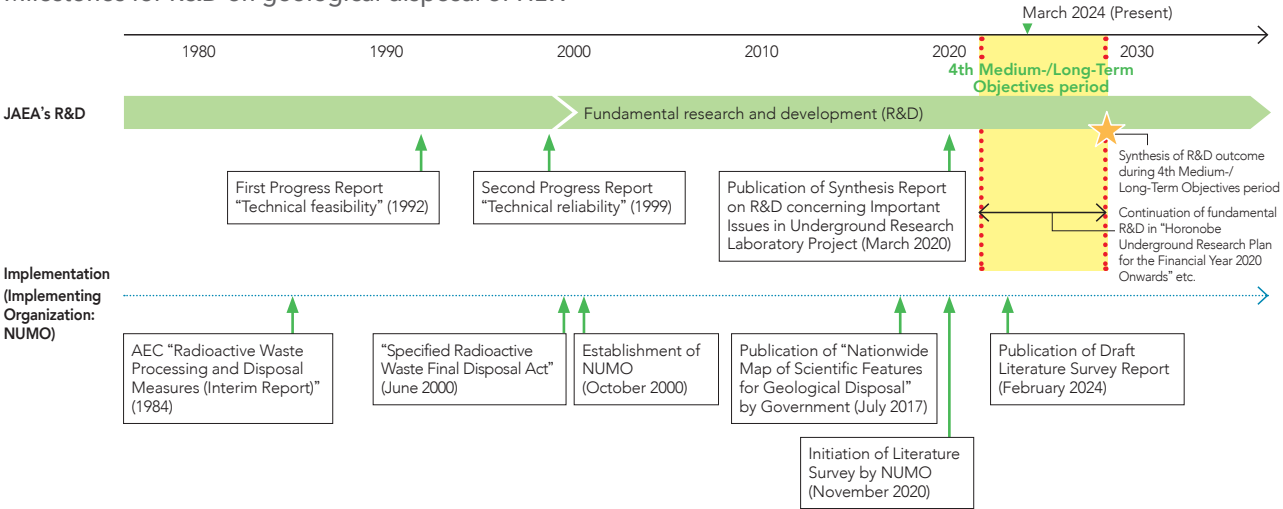
Based on the “Strategic Energy Plan” and the “Basic Policy Based on the Final Disposal Act,” JAEA is conducting research and development on the treatment (volume reduction and toxicity reduction) and disposal (geological disposal) of high-level radioactive waste.

Based on various nuclear utilization scenarios, we are conducting research and development for the partitioning and

recovery of minor actinides*1 and transmutation of them using an accelerator-driven system (ADS) to reduce the volume and hazard of high-level radioactive waste. Furthermore, JAEA is conducting basic research and development of geological disposal technology for high-level radioactive waste.

*1 Minor actinides are a group of radioactive isotopes such as americium and curium that are highly radiotoxic and have long half-lives.

Milestones for R&D on geological disposal of HLW



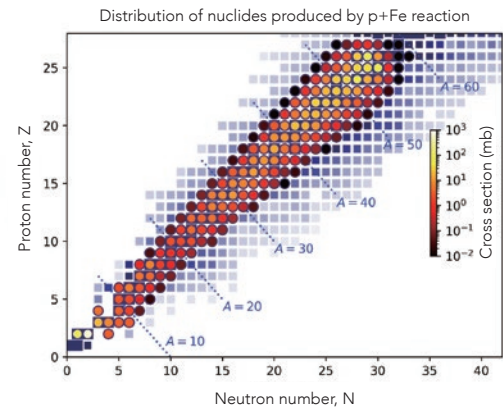
Major achievements 2023

◆Nuclear data measurements for nuclear transmutation and development of evaluation models using machine learning

It is necessary to take into account the effects of the nuclear reactions that occur inside to design a nuclear reactor or accelerator facility. The physical information on the nuclear reaction is called “nuclear data”.

At JAEA, nuclear data measurements for nuclear transmutation technology using accelerator-driven system (ADS) are being carried out at the Japan Proton Accelerator Research Complex (J-PARC). In FY2023, we obtained new nuclear data for seven elements related to the materials that compose ADS. We also developed a data science-based evaluation model that utilizes machine learning.

Outcome
By combining the experimental data accumulated at J-PARC with the nuclear data evaluation model we have developed, it will be possible to derive highly reliable nuclear data. It is expected that the results of this study will be utilized not only for ADS but also for the design of various accelerator facilities.



Example of evaluation results using the nuclear-data evaluation model developed in the study

https://j-parc.jp/c/uploads/2024/J-PARCMagazine2023_18.pdf#zoom=100 (in Japanese)

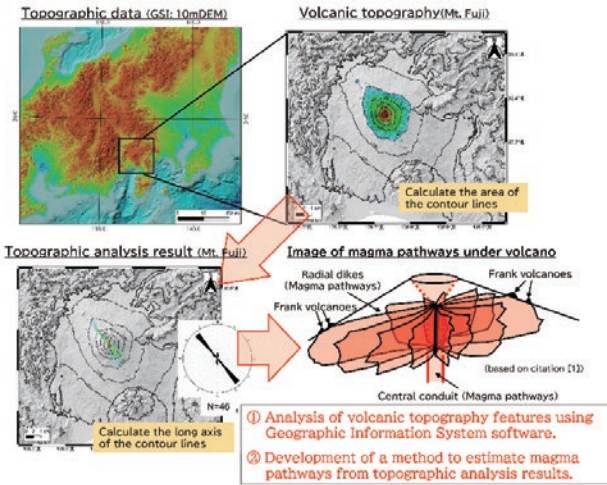
◆Development of a computer-based method to estimate magma pathways under volcanoes

Understanding where on a volcano eruptions are most likely to occur is an important factor in considering disaster prevention and mitigation measures for volcanoes and in safety assessments in selecting a geological disposal site for high-level radioactive waste. However, estimating subsurface magma requires a great deal of effort and time, including field surveys by experts.

In this study, we developed a method to estimate the traces (pathways) of past magma movement under volcanoes on a computer basis using a geographic information system (GIS).

By processing a large amount of data at once using a model that uniquely combines existing GIS software tools, and by applying topographic analysis to a large number of volcanoes, this study was able to provide a clear indicator of the relationship between volcanic topography and magma pathways.

Outcome
Through the topographic analysis proposed in this study, we were able to reproduce the characteristics of the magma pathways of volcanoes with well-known activity histories. With this method, it is possible to estimate the degree of change in magma pathways even for volcanoes with unknown activity histories, and it is expected to provide important information for prevention and mitigation of volcano disasters and for safety assessment in geological disposal.



Conceptual diagram of the method for estimating magma pathways by topographic analysis
Nakamura, Volcanoes as Possible Indicators of Stress Orientation – Principle and Proposal. Journal of Volcanology and Geothermal Research, 1977. 2: pp.1-16.

<https://www.jaea.go.jp/02/press2023/p23100401/> (in Japanese)

INTERVIEW

Estimating complex natural phenomena with a variety of tools

Since natural phenomena are complex and depend on various intertwined factors, a multifaceted approach is important to understand them, and methodological advancement is required in various areas. I am particularly working on methodological advancement based on topography and geology.

The study of the method for estimating magma pathways is part of this effort. The output of objective topographic data, where previously no clear topographic features were available, has created a tool that can be used regardless of field, and is an achievement that responds to the needs of geological disposal projects.

In addition to its numerous dating techniques, the Tono Geoscience Center possesses topographic, geological, and geophysical techniques, and its geographical location allows it to seamlessly conduct research in collaboration with research institutes and universities with a wide range of expertise. Taking advantage of this favorable environment that allows us to be involved in diverse fields, we aim to foster researchers who can respond to societal needs by making full use of a variety of methods.



Tono Geoscience Center
Geoscientific Research Department
Neotectonics Research Group
NISHIYAMA Nariaki

Steadily Implementing Sustainable Backend Measures Prioritizing Safety

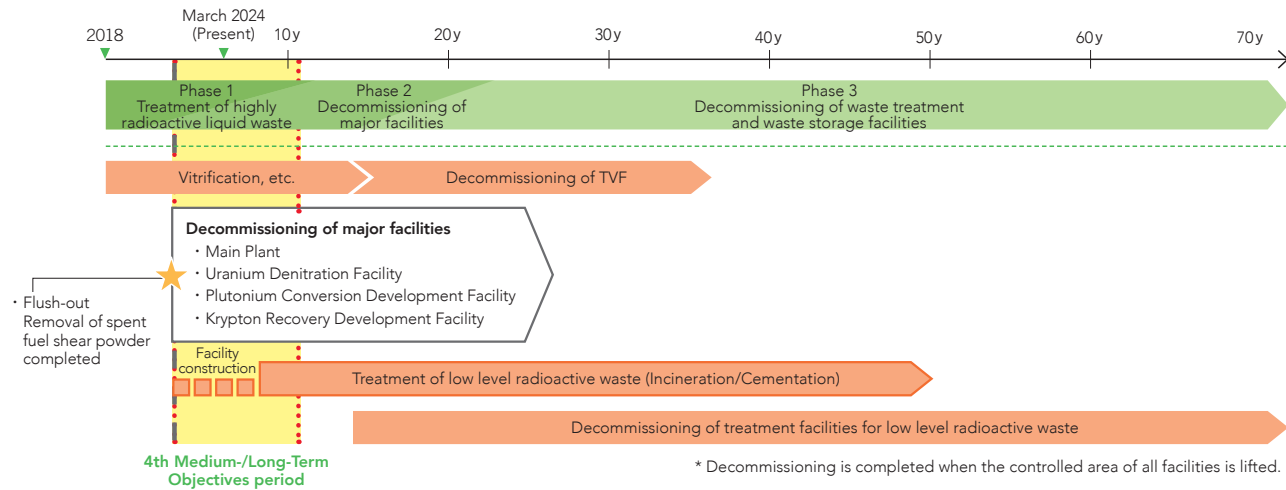
(Costs required for operations)
The cost of this R&D was 83,263 million yen (operations expenses 82,392 million yen and entrusted expenses 493 million yen). The income recorded as funding for the R&D included income from government funding for operational grant (45,267 million yen) and income from contributions for treatment and disposal of waste (7,380 million yen). The administrative cost, calculated by adding extraordinary loss (10,298 million yen) and other administrative costs (2,414 million yen) to this cost, was 95,986 million yen.

With utmost priority given to safety assurance, JAEA is working on the decommissioning of the Tokai Reprocessing Plant, Fugen and Monju, etc., based on the decommissioning plan.

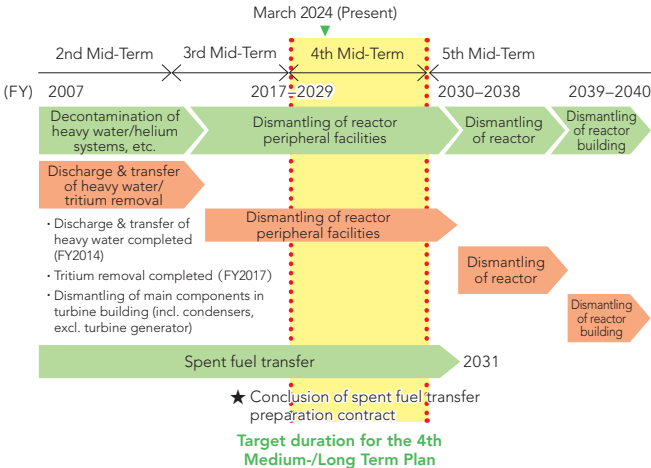
At the Tokai Reprocessing Plant, activity to replace the glass melter is underway to enable early completion of vitrification and thereby reduce the risk from high-level radioactive liquid waste. In addition, we are steadily proceeding with decommissioning after taking measures against earthquake and tsunami to improve the safety of the

Tokai Vitrification Facility and the high-level radioactive liquid waste storage facility. We are now steadily moving forward with the decommissioning; installation of the equipment for dismantling the reactor peripheral facilities and preparation for spent fuel transfer are in progress at Fugen, while the Monju plant advanced in FY2023 to the second phase of decommissioning, the period of preparation for dismantling, and is carrying out works such as unloading neutron shields ahead of the dismantling of sodium components.

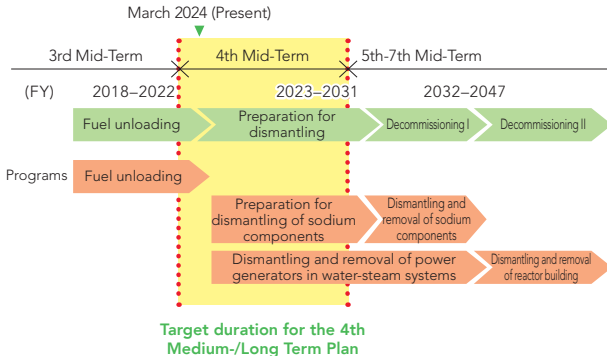
Future Development of Tokai Reprocessing Plant Based on Decommissioning Plan



Decommissioning Schedule of Fugen



Decommissioning Schedule of Monju

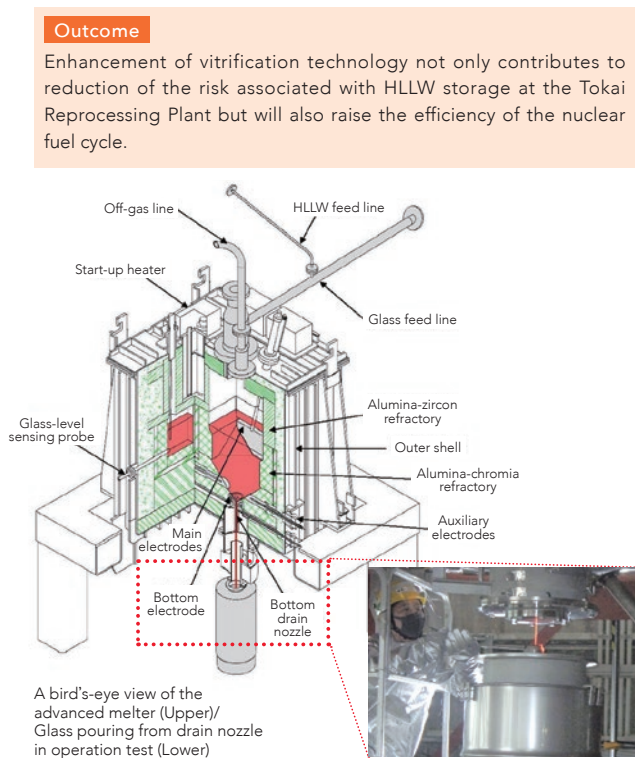


Major achievements 2023

Development of advanced melter for vitrification of high-level radioactive liquid waste (HLLW)

At the Tokai Reprocessing Plant, in order to ensure steady and stable progress with HLLW vitrification going forward, the planned completion date for vitrification has been changed to FY2038 in consideration of past progress with vitrification and the envisaged risk of future delay. In line with the plan, the replacement of the glass melter at the Tokai Vitrification Facility (TVF) is underway with a view to restarting vitrification operations in FY2026. In order to enhance performance in the discharge of platinum-group elements, the shape of the melter bed has been changed from a quadrangular pyramid shape in the existing melter to a cone shape in the new advanced melter.

Operational testing of the advanced melter using non-radioactive HLLW simulant was conducted in a mock-up test facility at the Nuclear Fuel Cycle Engineering Laboratories and was successfully completed in January 2024 with an observation of the melter interior. The testing confirmed that the advanced melter enables stable operation and full discharge of platinum-group elements and provided operational data necessary for stable and safe operation.

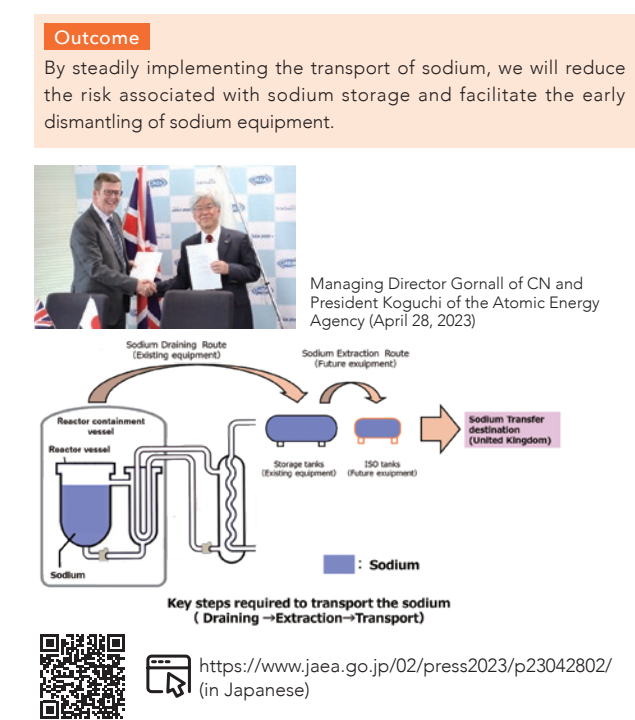


Commencement of Phase II of Monju decommissioning plan

The Monju plant advanced to the sodium equipment dismantling preparation period (Phase II of the decommissioning plan) in FY2023. Currently, we are engaged in unloading the neutron shields and other installations still remaining within the reactor vessel and dismantling and removing the water and steam system components used for power generation. Although the works to unload the neutron shields, etc., were temporarily suspended due to equipment issues in October 2023, repairs are scheduled to be completed by April 2024 and the works to be resumed in October 2024.

Furthermore, the sodium from Monju is to be processed in the UK and utilized as sodium hydroxide. It will be transported out of Monju between FY2028 and FY2031. To facilitate this operation, a framework agreement was signed in April 2023 to set out the roles of JAEA and Cavendish Nuclear (CN) and work has begun on the design of the sodium processing facility in the UK.

We will continue to proceed safely and steadily with the Phase II decommissioning activities, at the same time ensuring a safe and steady approach to the sodium transport operations.



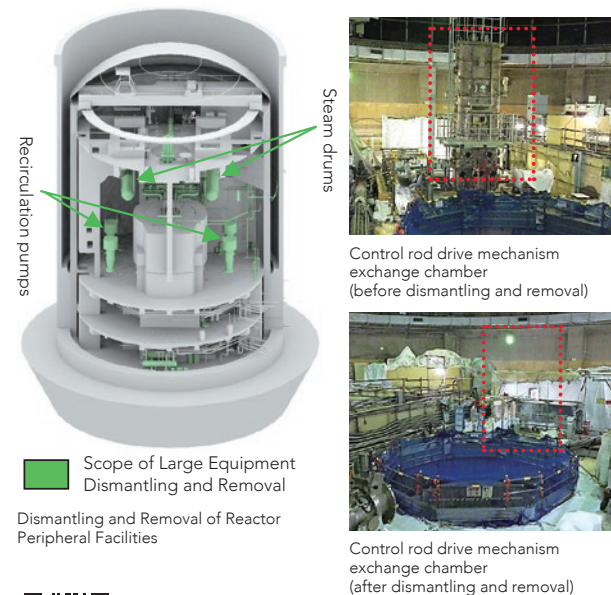
◆Toward dismantling the reactor of Fugen

We started the dismantling and removal of large equipment at Fugen in FY2022 in preparation for the dismantling of the reactor core. As part of this process, the dismantling and removal of the control rod drive exchange chamber located above the reactor core was completed in December 2023.

In addition, in preparation for the remote underwater dismantling of the reactor core by laser cutting, we are proceeding with the development of a remote laser-based dismantling system and remote automatic welding and inspection equipment. This includes conducting element tests for the installation of a dismantling pool in the high radiation area above the reactor, such as remote welding tests for joint gaps.

Regarding the transport of spent fuel, due to the need for design changes in some of the transport casks being manufactured in France (Orano Recyclage), the plan was changed in December 2023 so that the transport to France will now begin from FY2027.

We will proceed safely and steadily with the dismantling and removal of large equipment around the reactor and continue with the installation of remote dismantling equipment for the reactor core and related technology development.



<https://www.jaea.go.jp/04/fugen/haishi/activity/>
(in Japanese)

Outcome

The experience gained in the dismantling of the facility and the successful development of remote automatic welding and inspection equipment can be expected to support the development of decommissioning and maintenance technology for light water reactors.

INTERVIEW

Towards the Removal of Sodium from Monju

To mitigate the risk of leakage, all sodium held within the Monju plant, except for the sodium required for neutron shield removal (from the reactor vessel and the ex-vessel storage tank), has already been transferred to tanks within the facility and solidified for storage.

Moving forward, we plan to transfer the sodium from the facility tanks to transport tanks to be newly manufactured and transport it to the UK for processing. Currently, collaborative efforts with UK operators are underway to design the necessary facilities and equipment for sodium processing within the UK.

This endeavor will not only facilitate the planned decommissioning of Monju but will also contribute to the accumulation of technical knowledge related to the decommissioning of sodium-cooled fast reactors. With a unified approach across the Sector of Tsuruga ("One Heart") and collaboration between JAEA and UK stakeholders ("One Team"), we will continue with diligent efforts to advance the decommissioning process.



Decommissioning Project Management Office
Head Office of Tsuruga Decommissioning
Demonstration
Sector of Tsuruga Decommissioning
Demonstration

YAMAMOTO Kohei

Technical Support for Nuclear Safety Regulation and Emergency Preparedness through Safety Research

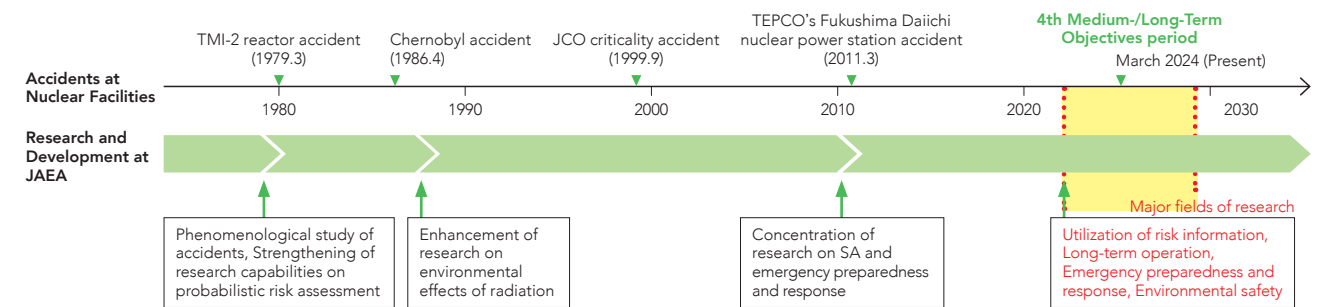
(Costs required for operations)

The cost of this R&D was 7,714 million yen (operations expenses 3,858 million yen and entrusted expenses 3,839 million yen). The income recorded as funding for the R&D included income from government funding for operational grant (3,320 million yen) and income from research consigned from the government (3,797 million yen). The administrative cost, calculated by adding extraordinary loss (6 million yen) and other administrative costs (133 million yen) to this cost, was 7,853 million yen.

JAEA's Sector of Nuclear Safety Research and Emergency Preparedness conducts research covering the safety of nuclear facilities, not only light water reactors but also reprocessing and radioactive-waste management facilities, the effects of severe accidents*1 (SA) on the public and the environment, and emergency preparedness and responses. The results obtained

are utilized in developing scientific, effective regulation and guidance, to investigate causes of accidents and failures, and to assess the safety of nuclear facilities.

*1 Severe accident: A beyond-design-basis accident at a nuclear facility that results in a severe condition such as damage to a reactor core.



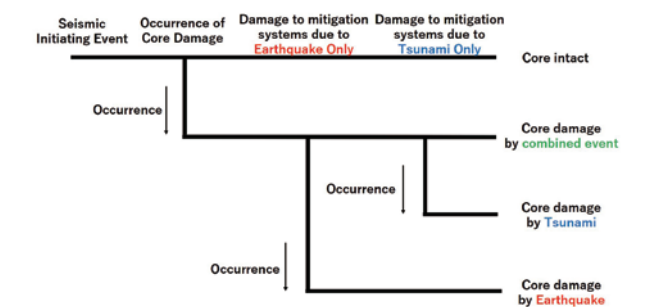
Major achievements 2023

◆Development of Probabilistic Risk Assessment (PRA) method considering multi-hazards such as earthquakes and tsunamis*1

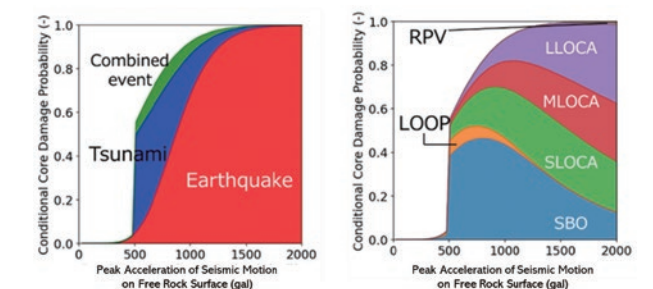
Recent earthquakes, such as the 2011 off the Pacific coast of Tohoku Earthquake and the 2016 Kumamoto Earthquake, have demonstrated that multi-hazards can occur at relatively short intervals, such as tsunamis following an earthquake and aftershocks larger than the main shock, causing unprecedented damage. For nuclear facilities, it is important to be able to properly assess the impact of such multi-hazards. In this study we developed a method using an event tree to classify earthquake-related events in terms of the conditions leading to core damage. Specifically, we constructed an event tree that classifies conditions into three categories (1) earthquake, (2) tsunami and (3) multi-events (earthquake, tsunami and internal events), and improved the SECOM2-DQFM code for accident sequence evaluation developed by JAEA to allow it to handle the effects of a tsunami associated with an earthquake and thereby enable us to evaluate the contribution of each hazard and initiating event to the conditional core damage probability (CCDP). This has provided the prospect of a method for considering a variety of multi-hazards in PRA.

Outcome

This study enables the evaluation of each hazard's contribution to the core damage probability, which results from various combinations of initiating and associated events, and is expected to contribute to the establishment of more scientific and rational regulations.



Event Tree for Classification of Core Damage States



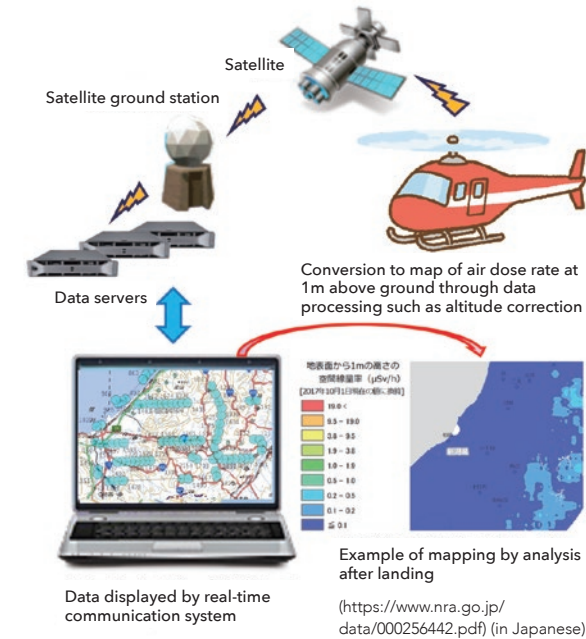
Contribution of Hazards (left) and Initiating Events (right) to Conditional Core Damage Probability (CCDP)

*1 This study was performed as part of the contract research for FY2022 commissioned by the Secretariat of Nuclear Regulation Authority of Japan, "Research on Level 1 PRA for Nuclear Regulatory Inspection".

◆Environmental radiation monitoring using manned helicopter in a nuclear disaster*2

In a nuclear disaster, it is important to measure the radiation dose around the site. Aerial radiation monitoring using a manned helicopter is a useful tool for carrying out radiation measurements quickly over a wide area. In order to maintain the operational basis and effectiveness of aerial monitoring technology in an emergency, monitoring using manned helicopters has been conducted in cooperation with the Nuclear Regulation Authority and the Ministry of Defense as part of comprehensive nuclear disaster prevention drills and other events. Up to now, because the Regulation for Enforcement of the Civil Aeronautics Act required the aircraft to pass a test for resistance to radio waves, monitoring data could not be provided in real-time and were instead analyzed after landing.

This time, we enabled data satellite communication by conducting electromagnetic interference tests to verify that measuring equipment including data communications would not affect aircraft operation. It was thus possible for the first time to transmit data to ground in real time during the comprehensive nuclear disaster prevention drill. We will continue working to contribute to improving the effectiveness of Japan's nuclear disaster prevention system.



*2 This study was conducted as part of the contract research for FY2023 commissioned by the Nuclear Regulation Authority (NRA), Japan.

Outcome

It has now become possible to rapidly provide important data to decision makers in the unlikely event of a nuclear disaster.

INTERVIEW

Preparedness for a fire accident in a nuclear fuel cycle facility

A nuclear fuel reprocessing plant and a MOX fuel fabrication plant are being built in Japan in accordance with its nuclear fuel cycle policy. If a fire accident breaks out in such a facility, for example in a reprocessing plant, which uses large amounts of organic solvent, the fire may spread and threaten the safety functions of the facility. It is therefore necessary to understand well the behavior of a fire outbreak, which is an extended design base accident, and to prepare for such an event.

I am conducting experiments assuming a fire affecting organic solvent or the panel of a glove box. Several kilograms of such materials are burned in the experiments, and I observe the progress of combustion (decrease of material), heat release, and produced soot. Based on the observations, I also investigate the thermal effect on other equipment and the effect on filters in a ventilation system that contains radioactive materials. I envisage that the research findings will contribute not only to nuclear safety regulation but also to facility design and safety evaluation.

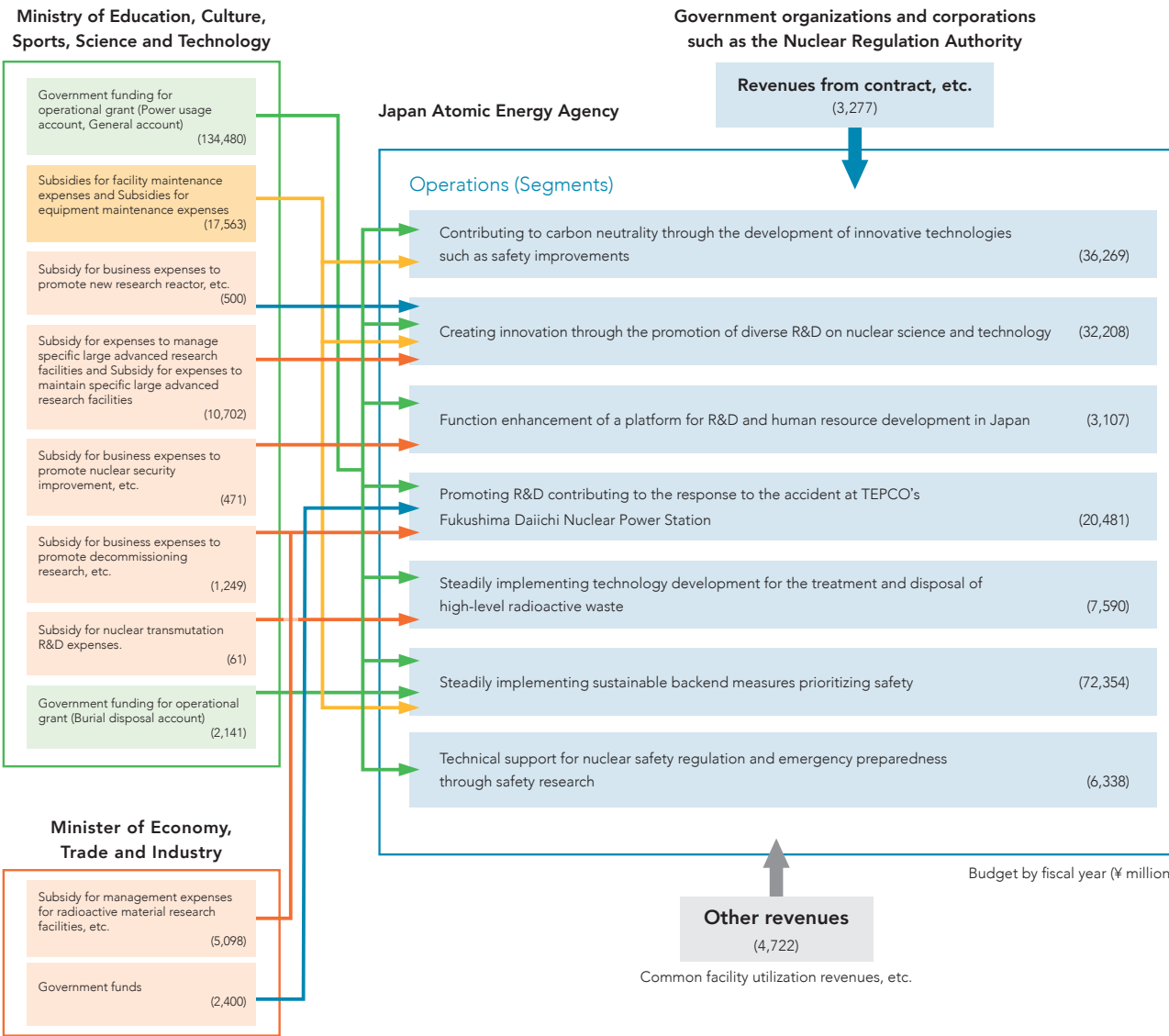
Fire may have significant impact as an initiating event that threatens safety functions in nuclear reactors and other nuclear facilities. As well as nuclear fuel cycle facilities, I also plan to research cable fires in nuclear reactors.



Sector of Nuclear Safety Research and Emergency Preparedness
Nuclear Safety Research Center
Fuel Cycle Safety Research Division
Cycle Safety Research Group
OHNO Takuya

Premise Information for Proper Assessment of Operations

To assist with understanding and evaluation of JAEA's operations in FY2023, the operating scheme (revenue source and individual operations) is shown below.



Results of Self-Assessment and Administrative Cost by Segment in FY2023

Results of Ministerial Evaluation for Past Years

(1) Self-Assessment and Administrative Cost in FY2023

Keeping in mind that the objective of national research and development agencies is achievement of both “maximization of R&D results” and “appropriate, effective, and efficient operating,” JAEA conducted self-assessment of its performance

in FY2023. This rating was based on the Guidelines for Evaluation of Incorporated Administrative Agencies (decided by the Minister of Internal Affairs and Communications on September 2, 2014, last revised on March 12, 2019).



Operational Results Report:
https://www.jaea.go.jp/about_JAEA/business_plan.html (in Japanese)

I. Measures to be taken to attain targets related to business operations with safety as top priority	B	— ¹⁾
1. Contributing to carbon neutrality through the development of innovative technologies such as safety improvements	S	49,016 million yen
2. Creating innovation through the promotion of diverse R&D on nuclear science and technology	B	33,281 million yen
3. Function enhancement of a platform for R&D and human resource development in Japan	B	3,584 million yen
4. Promoting R&D contributing to the response to the accident at TEPCO's Fukushima Daiichi Nuclear Power Station	A	25,481 million yen
5. Steadily promoting technology development for the treatment and disposal of high-level radioactive waste	B	8,607 million yen
6. Steadily implementing sustainable backend measures prioritizing safety	B	95,986 million yen
7. Technical support for nuclear safety regulation and emergency preparedness through safety research	A	7,853 million yen
III. Measures to be taken to attain targets related to improving and enhancing the efficiency of business operations	B	— ²⁾
IV. Measures to be taken to attain targets related to improving the state of finances	B	— ²⁾
V. Important matters related to other business operations	B	— ²⁾
	Total	228,597 million yen

1) This item includes content realized by implementation of other items and amounts recorded as administrative costs are as recorded for those other items.
2) The administrative costs recorded for this item consist of costs for other items and costs common to the corporation (4,789 million yen).

(2) Overall Ratings of Past Fiscal Years by Competent Ministers within the Present Medium-/Long-term Objectives Period

Fiscal year	2022	2023	2024	2025	2026	2027	2028
Rating	A						
Reasons for rating	As the ratings show, it was recognized that the JAEA's business operations are appropriate, effective, and efficient, that it has achieved marked progress toward the goal of “maximizing research and development results,” and that the results achieved can be expected to continue to be produced in the future after taking into account of comprehensive and various aspects including its aim and businesses of medium and long term goal and its effort and outcome of activities of National Research and Development Agency.						

Condition of Net Assets and Financial Resources

Condition of Net Assets

(1) Capital Stock

(¥ million)				
Items	Starting balance	Increase in the fiscal year	Decrease in the fiscal year	Ending balance
Government investment	803,672	2,400	—	806,072
Private investment	16,284	—	—	16,284
Total capital stock	819,956	2,400	0	822,356

The capital stock (government investment) at the end of FY2023 was 806,072 million yen, of which the general account accounted for 283,036 million yen and the power usage account for 523,036 million yen.

(2) Appropriated Retained Earnings, etc.

In the burial disposal business account, a gross profit of 1,966 million yen was generated for the fiscal year. In accordance with Article 21, paragraph (4), of the Japan Atomic Energy Agency Act, this must be appropriated as a fund for burial disposal and related operations in the next and subsequent fiscal years and need not be reported as appropriated retained earnings.

The reversal of reserves carried forward from the previous Medium-/Long-term Objective period represents the reversal of 1,457 million yen in the General account and 60 million yen in the Power Supply Utilization account, which correspond to the accounting profits recorded prior to the 3rd Medium-/Long-term Objective period and which were carried over to the 4th Medium-/Long-term Objective period in the amount of 9,596 million yen in the General account and 12,174 million yen in the Power Supply Utilization account after obtaining approval from the Competent Minister.

Condition of Financial Resources

(1) Breakdown of Sources of Revenue

JAEA's main income source is funding from the national treasury, namely, government funding for operational grant of 136,621 million yen and subsidies of 30,810 million yen. In addition, as self-generated income, JAEA acquired competitive funds of 369 million yen by making proactive applications and obtained external funds of 21,945 million yen from government-related organizations for entrusted research and other research activities.

(2) Explanation of Self-Generated Income

JAEA worked to secure self-generated income by identifying research needs at external organizations, then concluding income-generating joint research contracts and making proactive applications to competitive research funds.

JAEA's main self-generated income is:

- Income from entrusted research (21,945 million yen)
- Competitive research funding (369 million yen)
- Income from joint research (246 million yen)
- Income from external use of facilities (281 million yen)

Summary of Budget and Financial Results

Comparison of Budget and Settlement

(¥ million)

Item	Budget amount	Settlement amount
Incomings		
Government funding for operational grant	136,621	136,621
Government subsidies	35,644	30,810
Government investment	2,400	2,400
Other subsidies	–	3,100
Income from entrustment, etc.	3,277	22,561
Other income	4,722	6,108
Amount carried over from previous fiscal year	134,889	134,889
Total	317,552	336,488
Outgoings		
General and administrative expenses	4,316	4,406
Business expenses	155,335	141,537
Expenses related to government subsidies	35,644	30,381
Expenses related to other subsidies	–	3,119
Expenses related to entrustment, etc.	3,274	17,357
Amount carried over to next fiscal year	118,984	127,275
Total	317,552	324,074

For details, please see JAEA’s financial statements.

 https://www.jaea.go.jp/about_JAEA/financial/ (in Japanese)

Summary of Financial Statements

Balance Sheet

Balance sheet:
https://www.jaea.go.jp/about_JAEA/financial/ (in Japanese)

(¥ million)

Item	FY2023	FY2022	Item	FY2023	FY2022
Current assets	222,701	227,060	Current liabilities	83,095	75,999
Cash and deposits ^(*)	66,536	98,535	Debt from government funding for operational grant	16,133	7,817
Securities	93,547	68,588	Reserves	17,626	16,776
Nuclear material	5,879	5,899	Others	49,335	51,405
Others	56,739	54,039	Fixed liabilities	381,961	349,862
Fixed assets	634,607	606,182	Assets offsetting liabilities	148,158	137,494
Tangible fixed assets	457,756	455,035	Reserves	206,716	180,391
Buildings	98,306	100,272	Others	27,087	31,977
Machines and equipment	36,876	37,446	Total liabilities	465,055	425,860
Land	56,610	57,000	Capital stock	822,356	819,956
Construction in progress	187,399	177,978	Government investment	806,072	803,672
Others	78,565	82,338	Private investment	16,284	16,284
Intangible fixed assets	2,672	2,967	Capital surplus	– 474,507	– 469,078
Patent rights	88	71	Capital surplus	113,923	108,241
Others	2,584	2,896	Cumulative total of other administrative costs	– 588,429	– 577,319
Investments and other assets	174,179	148,180	Retained earnings	44,403	56,503
Total assets	857,308	833,242	Total net assets ^(*)	392,253	407,382
			Total liabilities and net assets	857,308	833,242

Administrative Cost Statement

Administrative Cost Statement:
https://www.jaea.go.jp/about_JAEA/financial/ (in Japanese)

(¥ million)

	FY2023	FY2022
Expenses on the profit and loss statement	217,487	188,238
Ordinary expenses ^(*)	194,334	159,730
Extraordinary loss ^(*)	23,102	28,456
Income taxes	50	53
Other administrative costs	11,111	10,586
Administrative cost total	228,597	198,824

To show the flow of information within the system of financial statements, items that are linked across statements are indicated by an asterisk (*), and the same number is assigned for the linked items.

Profit and Loss Statement

Profit and Loss Statement:
https://www.jaea.go.jp/about_JAEA/financial/ (in Japanese)

(¥ million)

Item	FY2023	FY2022
Ordinary expenses (A) ^(*)	194,334	159,730
Operating expenses	166,102	145,079
Entrusted expenses	23,159	9,635
General and administrative expenses	4,428	4,013
Financial expenses	603	968
Others	42	35
Ordinary revenues (B)	194,510	159,200
Revenues from government funding for operational grant	102,676	103,957
Income from entrusted research	23,086	9,606
Revenues from facilities expenses	532	1,002
Revenues from subsidies	15,412	14,897
Reversal of asset-offsetting liabilities	11,543	12,484
Others	41,260	17,255
Extraordinary loss (C) ^(*)	23,102	28,456
Extraordinary income (D)	10,877	27,333
Income taxes (E)	50	53
Reversal of reserves carried over from previous Medium-/Long-Term Objectives period (F)	1,517	2,203
Gross profit for fiscal year (B-A-C+D-E+F)	– 10,583	498

Statement of Changes in Net Assets

 **Statement of Changes in Net Assets:**
https://www.jaea.go.jp/about_JAEA/financial/ (in Japanese) (¥ million)

	FY2023	FY2022
Starting balance of fiscal year	407,382	417,187
I. Change of capital stock in fiscal year	2,400	- 2
Receipt of investments	2,400	-
Reduction due to payment to national treasury pertaining to unnecessary assets, etc.	-	- 2
II. Change of capital surplus in fiscal year	- 5,429	- 8,054
Acquisition of fixed assets	5,682	2,531
Disposition/sale of fixed assets	- 285	92
Depreciation	- 8,835	- 8,564
Impairment of fixed assets	- 477	- 2,068
Others	- 1,513	- 45
III. Change of retained earnings in fiscal year	- 12,100	- 1,750
Change in fiscal year	- 15,129	- 9,805
Ending balance of fiscal year ^(*)2)	392,253	407,382

Cash Flow Statement

 **Cash Flow Statement:**
https://www.jaea.go.jp/about_JAEA/financial/ (in Japanese) (¥ million)

Items	FY2023	FY2022
I. Cash flow from business activities (A)	11,650	9,492
Personnel expenses	- 41,055	- 41,335
Proceeds from subsidies	19,428	19,301
Other proceeds	156,206	149,830
Other payments	- 122,929	- 118,304
II. Cash flow from investment activities (B)	- 44,351	- 49,217
III. Cash flow from financial activities (C)	702	- 985
IV. Fund increase (or decrease) (D = A + B + C)	- 31,999	- 40,711
V. Starting balance of fund (E)	98,535	139,246
VI. Ending balance of fund (F = E + D) ^(*)5)	66,536	98,535

(Reference) Relation between Ending Balance of Fund and Cash and Deposits

(¥ million)

	FY2023	FY2022
Ending balance of fund ^(*)5)	66,536	98,535
Time deposits	-	-
Cash and deposits ^(*)1)	66,536	98,535

Explanations on Financial Situation and Operation Status

(1) Balance Sheet

Cash and deposits	: Cash and deposits
Securities	: Trading securities, government bonds that mature within one year, government-guaranteed bonds Nuclear materials Nuclear source materials and nuclear fuel materials stipulated by relevant laws and regulations
Buildings	: Buildings and ancillary equipment
Machinery and equipment	: Machinery and equipment
Land	: Land
Construction in progress	: Amount expended and materials appropriated for construction or production in progress
Intangible fixed assets	: Patent rights, trademark rights, software, etc.
Investments and other assets	: Investment securities, long-term prepaid expenses, security deposits, security money, etc.
Debt from government funding for operational grant	: Account that shows the liability generated when receiving government funding for operational grants
Others (current liabilities)	: Accounts payable, accrued expenses, deposits received, etc.
Reserves	: Specific future expenses or losses accrued as expenses or losses for the fiscal year, including reserve for bonus, reserve for retirement benefits, reserve for radioactive waste, reserve for environmental measures, and reserve for overseas refining
Asset-offsetting liabilities	: Liabilities appropriated when depreciable assets are obtained in accordance with the purpose of use predetermined by the Agency and within the scope envisaged by the Medium-/Long-Term Plan by means of government funding for operational grant or subsidies, etc. from national or local government
Others (fixed assets)	: Long-term donations deposited, asset retirement obligations, etc.
Capital stock	: Paid-in capital sourced from investment in the Agency
Capital surplus	: Capital other than capital stock and retained earnings (in the case of appropriation of fixed assets, those appropriated assets eemed to constitute part of the Agency's financial basis in consideration of the nature of the acquired asset)
Cumulative total of other administrative costs	: Cumulative total showing the practical reduction in the financial basis of the Incorporated Administrative Agency corresponding to the reduction in the assets acquired using government investment, facilities expenses granted by the government, etc. as the source of funds
Retained earnings	: Cumulative total of surplus generated in connection with the Agency's operations

(2) Administrative Cost Statement

Expenses on profit and loss statement	: Ordinary expenses, extraordinary loss, and income taxes on the profit and loss statement
Other administrative costs	: Account showing the level of the practical reduction in the financial basis of the Incorporated Administrative Agency corresponding to the reduction in the assets acquired using government investment, facilities expenses granted by the government, etc. as the source of funds
Administrative cost	: Account showing the character of the full cost used for generating the output of the Incorporated Administrative Agency and the character of an indicator showing the basis for calculating costs related to the operations of the Incorporated Administrative Agency attributable to the nation

(3) Profit and Loss Statement

Operations expenses	: Expenses required for R&D operations of the Agency
Entrusted expenses	: Expenses required for entrusted operations of the Agency
General and administrative expenses	: Expenses required for the headquarters management sectors of the Agency
Financial expenses	: Expenses for financing and leasing, such as interest payments
Others (ordinary expenses)	: Miscellaneous losses, etc.
Revenues from government funding for operational grant	: Revenues originating from government funding for operational grant, which is recognized as revenues for the financial year
Income from entrusted research	: Income arising from entrusted research
Revenues from facilities expenses	: Revenues originating from facility expenses from the government, which is recognized as revenues for the financial year
Revenues from subsidies	: Revenues originating from subsidies, etc. from national and local government, which is recognized as revenues for the financial year
Reversal of asset-offsetting liabilities	: Asset-offsetting liabilities converted to revenues in response to depreciation, etc.
Others (ordinary revenues)	: Miscellaneous income, etc.
Extraordinary loss	: Loss on retirement or sale of fixed assets, casualty loss, etc.
Extraordinary income	: Income corresponding to the cost of retirement of fixed assets, etc.
Income taxes	: Paid amount of corporate, resident, and enterprise taxes
Reversal of reserves carried over from previous Medium-/Long-Term Objectives period	: Reversal arising from cost generated for the fiscal year for the retained earnings carried over from the previous Medium-/Long-Term Objectives period in accordance with Article 21, paragraph (1), of the Act on the Japan Atomic Energy Agency

(4) Statement of Changes in Net Assets

Ending balance of fiscal year	: Balance shown in the net assets section of the balance sheet
-------------------------------	--

(5) Cash Flow Statement

Cash flow from business activities	: Cash flow originating from activities other than investment or financial activities, such as income from provision of services and payments for purchase of raw materials, commodities, or services (shows the state of funds for the execution of the Agency's normal operations)
Cash flow from investment activities	: Cash flow originating from acquisition, sale, etc. of fixed assets (shows the state of funds for investment activities to secure the business base for the future)
Cash flow from financial activities	: Cash flow originating from procurement and repayment of funds, such as incomings and outgoings of funds, and incomings and outgoings due to issuance and redemption of bonds, and borrowings and repayments

Description of Financial Condition and Management Situation

(1) Balance Sheet

(Assets)

The total of assets as of the end of FY2023 was 857,308 million yen, an increase of 24,066 million yen (3%) compared with the end of the previous fiscal year. The main causes of this were an increase in new acquisitions necessary for business operation and a decrease in depreciation due to the elapse of time.

(Liabilities)

The total of liabilities as of the end of FY2023 was 465,055 million yen, an increase of 39,195 million yen (9%) compared with the end of the previous fiscal year. The main causes of this, as in the case of assets, were an increase in new acquisitions necessary for business operation and a decrease in depreciation due to the elapse of time.

(2) Administrative Cost Statement

Administrative cost in FY2023 was 228,597 million yen, an increase of 29,773 million yen (15%) compared with the previous fiscal year. The main cause of this was an increase of 21,023 million yen in operating expenses.

(3) Profit and Loss Statement

(Ordinary expenses)

Ordinary expenses in FY2023 were 194,334 million yen, an increase of 34,604 million yen (22%) compared with the previous fiscal year. The main cause of this was an increase in the provision of reserves for radioactive waste.

(Ordinary revenues)

Ordinary revenues in FY2023 were 194,510 million yen, an increase of 35,309 million yen (22%) compared with the previous fiscal year. The main cause of this, as in the case of ordinary expenses, was an increase in revenues related to radioactive waste associated with the increase in the provision of reserves for radioactive waste.

(Gross loss for the fiscal year)

The gross loss for FY2023 of 10,583 million yen was mainly due to the state of ordinary expenses and revenues as set out above and the appropriation of an accumulated impairment loss of 12,560 million yen as extraordinary loss.

(4) Statement of Changes in Net Assets

The total amount of assets as of the end of FY2023 was 392,253 million yen, a decrease of 15,129 million yen (4%) compared with the end of the previous fiscal year. The main cause of this was a decrease of 12,100 million yen in retained earnings.

(5) Cash Flow Statement

(Cash flow from business activities)

The cash flow from business activities in FY2023 was 11,650 million yen, an increase of 2,158 million yen (23%) compared with the previous fiscal year. The main cause of this was an increase of 4,326 million yen in entrusted income.

(Cash flow from investment activities)

The cash flow from investment activities in FY2023 was a deficit figure of 44,351 million yen, an increase of 4,866 million yen (10%) compared with the previous fiscal year. The main cause of this was a decrease of 8,655 million yen in expenses for the acquisition of securities.

(Cash flow from financial activities)

The cash flow from financial activities in FY2023 was 702 million yen, an increase of 1,688 million yen compared with the previous fiscal year. The main cause of this was an increase of 2,400 million yen in income from receipt of monetary investments.

(6) Financial Data Year-on-Year Comparison and Budget, Revenues and Expenditure Plan, and Financing Plan for Next Fiscal Year

1. Year-on-Year Comparison of Primary Financial Data

(¥ million)

Items	4th Medium-/Long-Term Objectives period						
	FY2022	FY2023	FY2024	FY2025	FY2026	FY2027	FY2028
Assets	833,242	857,308					
Liabilities	425,860	465,055					
Net assets	407,382	392,253					
Administrative cost	198,824	228,597					
Ordinary revenues	159,200	194,510					
Ordinary expenses	159,730	194,334					
Gross profit [or loss (indicated by negative sign)] for fiscal year	498	- 10,583					
Cash flow from business activities	9,492	11,650					
Cash flow from investment activities	- 49,217	- 44,351					
Cash flow from financial activities	- 985	702					
Ending balance of fund	98,535	66,536					

2. Budget, Revenues and Expenditure Plan, and Financing Plan for Next Fiscal Year

① Budget

(¥ million)

Category	Total
Incomings	
Government funding for operating expenses	131,836
Subsidy for facility maintenance expenses	0
Subsidy for expenses to manage specific large advanced research facilities	10,183
Subsidy for business expenses to promote nuclear security improvement, etc.	496
Subsidy for nuclear transmutation R&D expenses	61
Subsidy for business expenses to promote decommissioning research, etc.	1,248
Subsidy for business expenses to promote new research reactor, etc.	600
Revenues from contract, etc.	3,489
Other revenues	2,594
Amount carried over from previous fiscal year (carried-over waste treatment business expenses, etc.)	127,569
Total	278,076
Outgoings	
General and administrative expenses	5,237
Business expenses	143,695
Expenses related to subsidy for facility maintenance expenses	0
Expenses related to subsidy for expenses to manage specific large advanced research facilities	10,183
Expenses related to subsidy for business expenses to promote nuclear security improvement, etc.	496
Expenses related to subsidy for nuclear transmutation R&D expenses	61
Expenses related to subsidy for business expenses to promote decommissioning research, etc.	1,248
Expenses related to subsidy for business expenses to promote new Research Reactor, etc.	600
Expenses related to contract, etc.	3,486
Amount carried over to next fiscal year	113,071
Total	278,076

② Revenues and Expenditure Plan

(¥ million)

Category	Total
Expenses	
Ordinary expenses	145,554
Business expenses	125,982
General and administrative expenses	4,741
Expenses related to contract, etc.	3,486
Depreciation expenses	11,346
Revenues	
Revenues from government funding for operational grant.	108,863
Revenues from subsidies	12,588
Income from waste disposal for research facilities, etc.	3
Income from contract, etc.	3,486
Revenues from contribution for treatment and disposal of waste	2,740
Other income	2,597
Reversal of asset-offsetting liabilities	11,346
Revenues from reserve offsets	5,849
Net profit	1,917
Gross profit	1,917

③ Financing Plan

(¥ million)

Category	Total
Outgoing funds	
Expenditure for business activities	141,802
Expenditure for investment activities	23,204
Amount carried over to next fiscal year	113,071
Incoming funds	
Revenues from business activities	150,507
Revenues from government funding for operational grant	131,836
Revenues from subsidies	12,588
Revenues from waste disposal for research facilities, etc.	3
Revenues from contract, etc.	3,486
Other income	2,594
Amount carried over from previous fiscal year	127,569

For details, please see the Annual Plan.



Annual Plan :

https://www.jaea.go.jp/about_JAEA/business_plan.html
(in Japanese)

President	Career Outline
KOGUCHI Masanori	<p>April 2022 President, Japan Atomic Energy Agency</p> <p>June 2020 Counselor, Mitsubishi Heavy Industries, Ltd. (MHI)</p> <p>June 2018 Board Member, Executive Vice President, CFO (MHI)</p> <p>April 2018 Board Member, Executive Vice President, CFO, Director of the Office of Strategic Planning and Promotion (MHI)</p> <p>June 2015 Board Member, Managing Director, CFO, Director of the Office of Strategic Planning and Promotion (MHI)</p> <p>April 2014 Board Member, Operating Officer of the Office of Strategic Planning and Promotion (MHI)</p> <p>April 2013 Director of the General Accounting Division (MHI)</p> <p>April 2008 Director of The Funding Division (MHI)</p> <p>April 1978 Joined General Affairs Dept. of MHI</p> <p>March 1978 Graduated from the School of Law, Hokkaido University</p>


B Executive Vice President

ITAKURA Yasuhiro

Career Outline

- April 2022 Executive Vice President, Japan Atomic Energy Agency (JAEA)
- July 2021 Executive Officer (JAEA)
- July 2020 Director-General of the Science and Technology Policy Bureau, Ministry of Education, Culture, Sports, Science and Technology (MEXT)
- April 2018 Executive Director of the National Institutes for Quantum Science and Technology (QST)
- June 2016 Deputy Director-General, Research Promotion Bureau (MEXT)
- January 2014 Director of the Promotion Policy Division, Research Promotion Bureau (MEXT)
- January 2012 Director of the Life Science Division, Research Promotion Bureau (MEXT)
- April 2010 Director of the Atomic Energy Division, Research and Development Bureau (MEXT)
- April 2007 Director of the Atomic Energy Research and Development Division, Research and Development Bureau (MEXT)
- January 2003 Director of the Office of Facilities Planning, National Facilities Division, Department of Facilities Planning, Minister's Secretariat (MEXT)
- April 1987 Joined Science and Technology Agency
- March 1987 Graduated from Faculty of Science, Kyoto University

Executive Director	Career Outline
FUNAKI Kentaro	April 2021 Executive Director of the Japan Atomic Energy Agency (JAEA)
	July 2019 Chief Nuclear Officer for International and Technology Affairs, Agency for Natural Resources and Energy, Ministry of Economy, Trade and Industry
	July 2016 Senior Nuclear Safety Specialist, OECD Nuclear Energy Agency
	August 2014 Managing Director, Nuclear Damage Compensation and Decommissioning Facilitation Corporation
	August 2013 Director of R&D Strategy Planning Department, International Research Institute for Nuclear Decommissioning
	August 2012 Director of Nuclear Accident Response Office, Agency for Natural Resources and Energy, Ministry of Economy, Trade and Industry
	July 2010 Director for Nuclear Energy Policy, Agency for Natural Resources and Energy, Ministry of Economy, Trade and Industry
	April 1991 Joined Ministry of International Trade and Industry
	March 1991 Graduated from Department of Nuclear Engineering, School of Engineering, The University of Tokyo

 Executive Director MONMA Toshiyuki	Career Outline	
	April 2024	Executive Director, Japan Atomic Energy Agency (JAEA)
	April 2021	Director of Policy Planning and Administration Department, JAEA
	January 2018	Director of Radioactive Waste Management Department, JAEA
	July 2016	Deputy Director of Office of Strategic Planning, JAEA
	April 2014	Senior Principal Engineer of Office of Strategic Planning, JAEA
	July 2013	Senior Principal Engineer of Department of Partnership Operations for Plant Restoration, Headquarters of Fukushima Partnership Operations, JAEA
	March 1990	Graduated from Department of Nuclear Engineering, School of Engineering, Hokkaido University
	March 1988	Graduated from Department of Nuclear Engineering, Faculty of Engineering, Hokkaido University

Executive Director


KONTOH Masaaki

Career Outline

- April 2014 Executive Director, Japan Atomic Energy Agency (JAEA)
- July 2021 General manager in charge of nuclear safety enhancement, Corporate Planning Office, Kansai Electric Power Company, Inc. (KEPCO)
- July 2017 Chief Manager of Quality Assurance Group, Nuclear Power Generation Department, Nuclear Power Division, KEPCO
- December 2015 Manager of Nuclear Fuel Cycle Business Group, Nuclear Fuel Cycle Office, KEPCO
- December 2012 Seconded to Washington Policy & Analysis, United States of America
- June 2010 Manager of Nuclear Power Planning Group, Nuclear Power Planning Department, Nuclear Power Division, KEPCO
- June 2008 Manager of Safety & Emergency Preparedness Group, Nuclear Power Generation Department, Nuclear Power Division, KEPCO
- July 2005 Manager of Takahama Power Station Quality Assurance Office, KEPCO
- June 2002 Leader of Power Generation Group, KEPCO
- April 1992 Joined KEPCO
- March 1992 Graduated from Department of Metallurgy, School of Engineering Kyoto University
- March 1990 Graduated from Faculty of Engineering, Kyoto University

 HAYASHI Takahiro	Executive Director	Career Outline
	April 2024	Executive Director, Japan Atomic Energy Agency (JAEA)
	April 2022	Deputy Director-General, Research and Development Bureau, Ministry of Education, Culture, Sports, Science and Technology (MEXT)
	July 2021	Director, Policy Division of the Minister's Secretariat, MEXT
	August 2020	Director, Yokohama Branch, RIKEN
	January 2019	Director, Research and Development Policy Division, MEXT
	July 2017	Director for Atomic Energy Bureau of Science, Technology, Innovation and Policy Cabinet Office
	January 2016	Director, Ocean and Earth Division, MEXT
	March 1992	Graduated from School of Science and Engineering, Tokyo Institute of Technology
	March 1990	Graduated from Department of Applied Physics, Tokyo Institute of Technology

1 Auditor	Career Outline
KUMAGAE Masashi	<p>September 2022 Auditor of the Japan Atomic Energy Agency (JAEA)</p> <p>June 2020 Managing Executive Officer, Development Bank of Japan Inc. (DBJ)</p> <p>June 2017 General Manager, Corporate Finance Dept. Division 4, DBJ</p> <p>April 2015 General Manager, Corporate Finance Dept. Division 3, DBJ</p> <p>June 2013 Special Assistant to the President and CEO, Secretariat Office, DBJ</p> <p>November 2012 Deputy General Manager, Secretariat Office, DBJ</p> <p>May 2011 Deputy General Manager, Risk Management Dept., DBJ</p> <p>October 2009 Deputy General Manager, Kansai Branch, DBJ</p> <p>April 1989 Dept. for Regional Development, The Japan Development Bank</p> <p>March 1989 Graduated from Faculty of Law, The University of Tokyo</p>

Executive Director	Career Outline
 <p>MIURA Nobuyuki*</p>	April 2021 Executive Director of the Japan Atomic Energy Agency (JAEA)
	May 2019 Deputy Senior Director General of Decommissioning and Radioactive Waste Management Head Office, JAEA
	April 2018 Deputy Director General of Sector of Nuclear Fuel, Decommissioning and Waste Management Technology Development, JAEA
	April 2017 Director General of Nuclear Fuel Cycle Engineering Laboratories, Sector of Decommissioning and Radioactive Waste Management, JAEA
	April 2015 Director of Tokai Reprocessing Technology Development Center, Nuclear Fuel Cycle Engineering Laboratories, JAEA
	March 1983 Graduated from Faculty of Engineering, Hokkaido University
	March 1981 Graduated from School of Engineering, Hokkaido University

Executive Director OIGAWA Hiroyuki*	Career Outline
	April 2012 Executive Director of the Japan Atomic Energy Agency (JAEA)
	April 2019 Deputy Director General of Sector of Nuclear Science Research and Director General of Nuclear Science Research Institute, JAEA
	April 2016 Director of R&D Program Management Department, JAEA
	April 2015 Senior Principal Researcher and Director of R&D Program Management Department, JAEA
	May 2001 Obtained Ph. D. in Engineering
	March 1987 Completed master's course in Graduate School of Engineering
March 1985 Graduated from Faculty of Engineering, Kyoto University	
	Professional history

<div>Executive Director</div> <div>HORIUCHI Yoshinori*</div>	Career Outline
	April 2022 Executive Director of the Japan Atomic Energy Agency (JAEA)
	August 2020 Deputy Director-General, Research and Development Bureau, Ministry of Education, Culture, Sports, Science and Technology (MEXT)
	July 2019 Deputy Director-General for Science, Technology, and Innovation, and Okinawa Institute of Science and Technology Graduate University Project Office, Cabinet Office
	July 2018 Director for Science and Technology Policy, Cabinet Office
	April 1990 Joined Science and Technology Agency
	March 1990 Completed Tokyo Institute of Technology Graduate School, Division of Science and Engineering
	March 1988 Graduated from Faculty of Engineering, Tokyo Institute of Technology

Annual Report Japan Atomic Energy Agency 2024 (Business Report FY2023)

Governance


Competent ministers (according to Article 28 of Act on the Japan Atomic Energy Agency, National Research and Development Agency)


Operation items in the Medium-/Long-Term Plan	Competent ministers		
	Minister of Education, Culture, Sports, Science and Technology	Minister of Economy, Trade and Industry	Nuclear Regulation Authority
I. Measures to be taken to attain targets related to business operation with safety as top priority	●	●	●*
II. Measures to be taken to attain targets related to maximizing R&D outcomes and raising quality in other areas			
1. Contributing to carbon neutrality through the development of innovative technologies such as safety improvements	●	●	●*
2. Creating innovation through the promotion of diverse R&D on nuclear science and technology	●		●*
3. Function enhancement of a platform for R&D and human resource development in Japan	●	●	
4. Promoting R&D contributing to the response to the accident at TEPCO's Fukushima Daiichi Nuclear Power Station	●	●	●*
5. Steadily implementing technology development for the treatment and disposal of high-level radioactive waste	●	●	●*
6. Steadily implementing sustainable backend measures prioritizing safety	●	●	●*
7. Technical support for nuclear safety regulation and emergency preparedness through safety research	●		●*
III. Measures to be taken to attain targets related to improving and enhancing the efficiency of business operations	●	●	
IV. Measures to be taken for to attain targets related to improving the state of finances	●	●	
V. Important matters related to other business operations	●	●	

*(Safety assurance matter)

JAEA's Governance System


The figure below shows JAEA's governance system. JAEA's statement of operation procedures sets out the rules for decision making led by the President, the internal control promotion system, auditing, and other relevant systems as a framework to ensure the execution of duties by the directors and employees of JAEA in conformity with relevant laws and regulations such as the Act on General Rules for Incorporated Administrative Agencies and to ensure the appropriateness of JAEA's operations. For details of the internal control system, please read our statement of operation procedures.



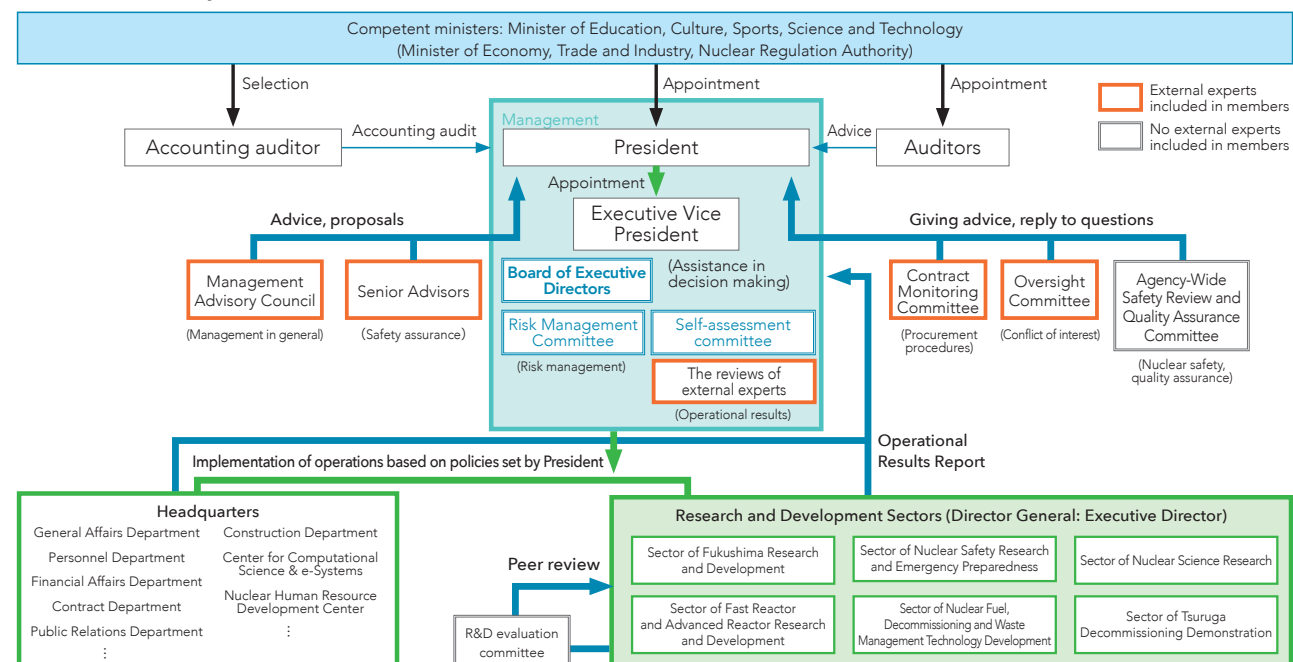


Statement of operation procedures
https://www.jaea.go.jp/about_JAEA/



 **Statement of operation procedures:**
[https://www.jaea.go.jp/about_JAEA/
business_plan.html](https://www.jaea.go.jp/about_JAEA/business_plan.html) (in Japanese)

JAEA's Governance System



Information on Operation of Internal Control

JAEA has formulated a statement of operation procedures which sets out the system for ensuring that the performance of duties by corporate officers (excluding auditors) conforms with the Act on General Rules for Incorporated Administrative Agencies and the Act on the Japan Atomic Energy Agency, National Research and Development Agency, etc. The main items relating to the operation of internal control and their implementation status are shown below.

Internal audit (Article 32 of the statement of operation procedures) ■

For the sake of improving internal control, we have introduced a self-auditing system whereby directors check their own organization and work operations. In addition to the existing audit subjects (such as the implementation status of personal information protection), we have audited the efficacy and

effectiveness of task management and have been engaged in the establishment of a system for centralized internal auditing of all JAEA activities in coordination with the regulation audits conducted by other departments.

Bidding and Contracting (Article 34 of the statement of operating procedures) ■

In June 2023, September 2023, and February 2024, the Contract Monitoring Committee inspected contracts with a high bid-to-asking-price ratio, such as multi-bidder contracts with a ratio of over 99.5%, contracts with a single bidder for

consecutive years, contracts for which a low bid-price survey was conducted, and contracts with affiliated corporations, and investigated the appropriateness of the reasons for choosing no-bid contracts (negotiated contracts).

Appropriate Budget allocation (Article 35 of the statement of operation procedures) ■

The 2023 implementation plan budget guideline and implementation plan were decided at a board meeting.

We strived to allocate the budget appropriately based on an analysis of budget use during the period.

Initiatives to Maintain and Develop R&D Functions

In order to maintain and add to the strength and the foundation of the organization

JAEA issued a Medium- and Long-Term Management Plan (formulated in April 2017) to promote the efficient utilization of its nuclear facilities, which are important resources for the maximization of R&D outcomes, and is taking initiatives to maintain and develop them for the future.



* The Medium-/Long-Term Management Plan for JAEA Facilities:
https://www.jaea.go.jp/about_JAEA/facilities_plan/
(in Japanese)

Main initiatives in FY2023

- Towards the resumption of operations at Joyo, JAEA obtained permission from the Nuclear Regulatory Commission for the modification of a reactor installation after the completion in July 2023 of construction work in compliance with the new regulatory standards, including ground reinforcement of the main cooler building.
- In order to upgrade facilities at JRR-3, JAEA started work on design modification of the cold neutral resource unit moderator vessel.
- At Monju, JAEA began removing the remaining neutron shielding bodies in the reactor in June 2023, and began dismantling the power generation equipment, including the water and steam system, in July 2023.
- In preparation for the dismantlement of the main reactor at Fugen, JAEA started work on the dismantlement and removal of large equipment in December 2022, as part of which it completed the dismantling and removal of the control rod drive unit replacement chamber located above the reactor in December 2023.
- In order to reduce risks associated with high-level radioactive liquid waste storage, etc., the Tokai Reprocessing Facility completed ground improvement work around the High-Level Radioactive Waste Storage (HAW) and installation of tsunami debris protection fences (for incoming waves) as earthquake and tsunami countermeasures for HAW and the Tokai Vitrification Facility (TVF), etc., as safety improvement measures based on the new regulatory requirements. In addition, we have completed the flush-out of remaining nuclear fuel materials from some equipment in the Main Plant (MP), etc.
- Decommissioning of other facilities was progressed in line with priorities, and measures related to the treatment and disposal of radioactive waste were carried out in a planned manner.
- Measures related to aging nuclear facilities were conducted with strategic flexibility.

Status of Environmental Impact Reduction Activities

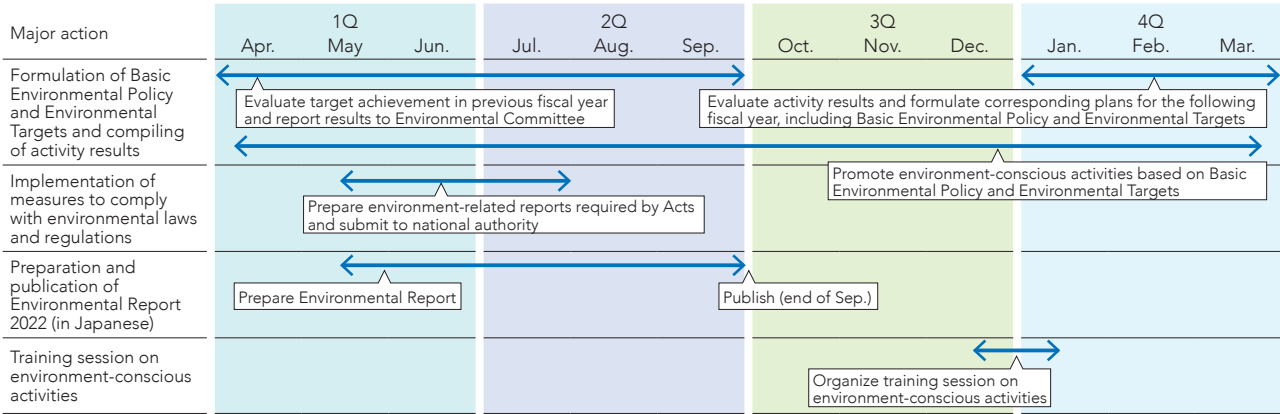
Environmental Management

JAEA regards consideration for the environment as a high priority in its operations, and has formulated Rules on Environmental Management. In addition, under the Basic Environmental Policy, we set Environmental Targets and proactively undertake environment-conscious activities.

Moreover, to systematically promote environment-conscious activities, we have set up an environmental management framework, which includes an Environmental Committee and a Meeting of Section Heads in Charge of Environmentally Conscious Activities.

The chart below shows how we plan and implement our environment-conscious activities in each fiscal year. The activity results undergo review by the Environmental Committee, and are incorporated into the following year's Basic Environmental Policy and Environmental Targets.

Results of FY2023 Environment-Conscious Activities



Every year, JAEA invites an external lecturer to provide training and hosts a meeting to encourage the exchange of views. These training sessions are expected to serve the purpose of promotion and active implementation of environment-conscious activities at its R&D sites and improvement of the skills of relevant personnel.

Initiatives to Promote Energy-Saving Activities

JAEA promotes environment-conscious activities for energy conservation. JAEA's seven R&D sites* are designated Energy Management Factories under the Act on Rationalization of Energy Use and Shift to Non-fossil Energy (hereinafter "Energy Conservation Act"). Accordingly, these R&D sites promote energy conservation activities in line with Medium-/Long-Term

Plans drawn up based on the Energy Conservation Act. Other sites also engage in energy conservation efforts.

* Nuclear Science Research Institute (including J-PARC), Nuclear Fuel Cycle Engineering Laboratories, Oarai Research and Development Institute, Fugen Decommissioning Engineering Center, Prototype Fast Breeder Reactor Monju, Ningyo-toge Environmental Engineering Center, Fukushima R&D Site Okuma Analysis and Research Center.

Consideration for the Environment

JAEA promotes environmentally aware businesses to fulfill its social responsibility. With regard to the materials required for business promotion, we continue various efforts to make environmentally aware contracts and procurements based on the "Act on Promotion of Contracts of the State and Other Entities, Which Show Consideration for Reduction of Emissions of Greenhouse Gases, etc." In addition, we are making efforts to perform arrangements and beautification activities of the environment, such as planting, weeding,

tree planting, and picking up garbage, inside and outside of the premises of each site. Please refer to the Environmental report for more information about the environmental friendliness activities of JAEA.



Prepare Environmental Report:
https://www.jaea.go.jp/about_JAEA/environment/
(in Japanese)

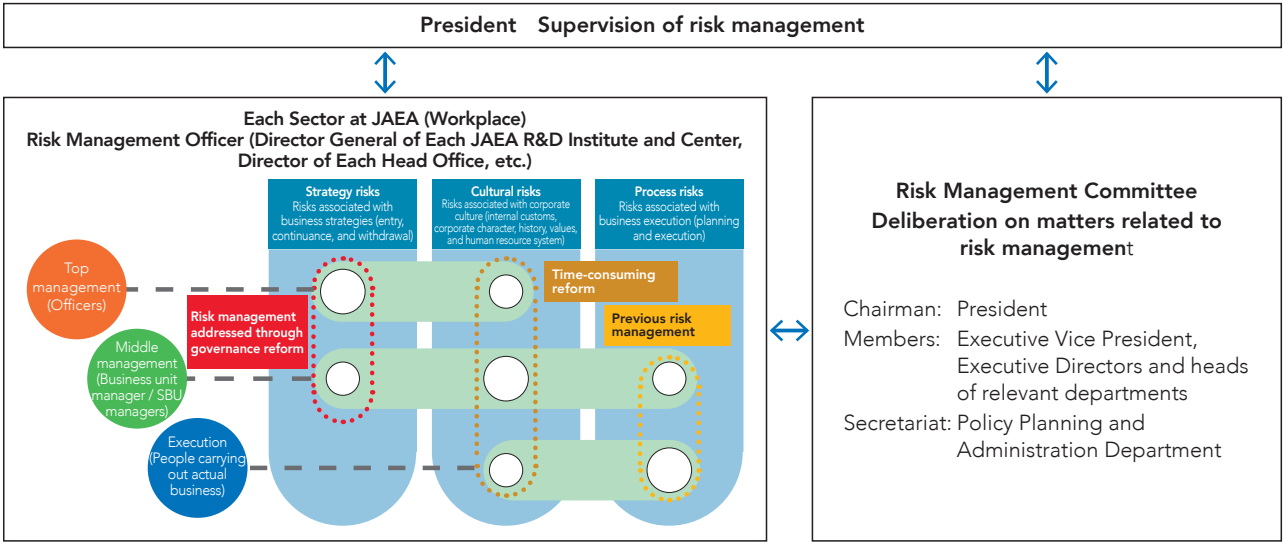
Status of Risk Management

Under the leadership of the president, JAEA implements risk management activities to minimize risk impact and to respond quickly to issues related to business promotion such as safe operation and maintenance of nuclear facilities, and compliance activities to foster awareness among individual employees and organizations of the need to act appropriately and not deviate from social norms such as laws and ethics.

Risk Management Activities

In FY2023, our risk management activities were carried out as an integral part of business management by extracting the assumed risks and linking them with the business operations target to achieve the goals related to business operations such as R&D in the 4th Medium-/Long-Term Objectives period. All officers and employees also worked together to implement risk management by centrally managing risks

and countermeasures at each level (officers, managers, employees) with an emphasis on responses to risks in addition to prevention.
We also implemented activities to improve risk management through communication between employees of different seniority grades based on the understanding that the risk perspective differs at each level.



Compliance Activities

In FY2023, with the aim of fostering an organizational culture that prevents the occurrence of misconduct, we worked on building an open and disciplined workplace environment by revitalizing intradepartmental communication through Workplace Environment Promoters.

We also implemented a number of initiatives, including compliance training by external lecturers for all employees (six sessions, total 4,854 participants) and training for new recruits, delivery of the President's Message during compliance promotion month and regular compliance newsletters to raise compliance awareness among employees.

In addition, to ensure research integrity, we offered a seminar on risks such as conflict of interest and obligation and leakage of information in international research activities.



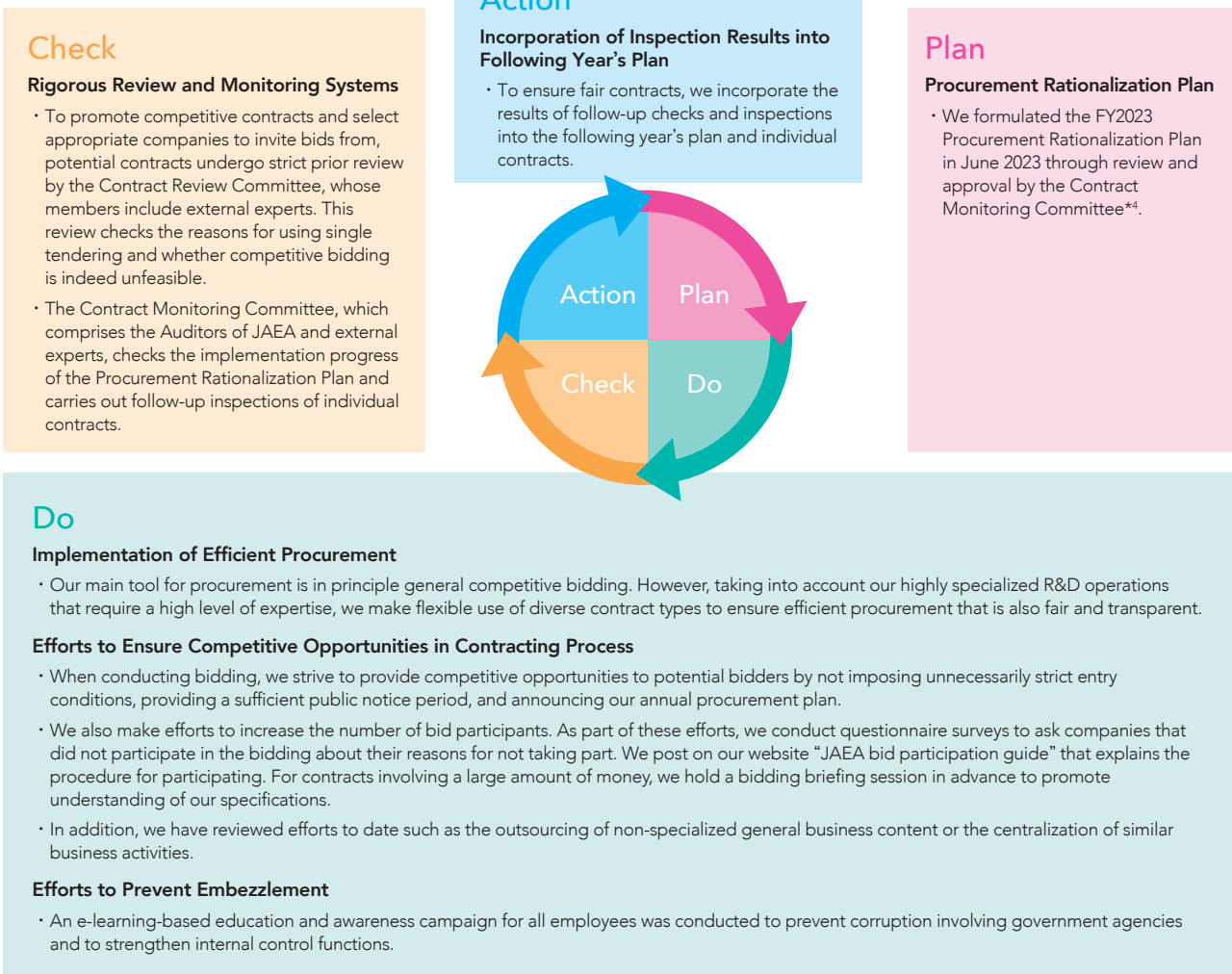
*1 Compliance awareness poster (Coordinated activity by National Research and Development Agency Council)

Efforts to ensure fair, transparent and efficient procurement

JAEA formulates a Procurement Rationalization Plan*1 for each fiscal year. According to this plan, we implement the PDCA cycle to promote autonomous and continuous rationalization of procurement and related activities, while ensuring fairness and transparency. We promote procurement

of eco-friendly products*2, such as those designated under the Act on Promoting Green Procurement, in the interest of environmental preservation. We also purchase products preferentially from organizations supporting persons with disabilities*3.

PDCA Cycle in JAEA's Contracting Process



(Go To Top of Section *1-4)

*1 For details of the Procurement Rationalization Plan, please see the JAEA website.
https://www.jaea.go.jp/for_company/supply/contract/ (in Japanese)
*2 For performance in the procurement of eco-friendly products, please see the JAEA website.
https://www.jaea.go.jp/for_company/supply/green/ (in Japanese)
*3 For performance in the procurement of products from organizations supporting persons with disabilities, please see the JAEA website.
https://www.jaea.go.jp/for_company/supply/handicapped/ (in Japanese)
*4 For information on the Contract Monitoring Committee, please see the JAEA website.
https://www.jaea.go.jp/for_company/supply/contract/committee.html (in Japanese)

Securing/Training Human Resources and Redefining the Organizational Concept

While placing itself at the frontline of action to achieve maximum utilization of nuclear technology toward the realization of a decarbonized society, JAEA systematically and organically works on the development of human resources and organizations through its daily operations, including accumulation of new technological innovations and knowledge, improvement of work efficiency, and securing talented staff members who challenge themselves in various fields of study.

Ideal JAEA Employee Profile

- (1) Persons who understand management philosophy and can implement it in a steadfast and voluntary manner
- (2) Persons who play an active role in the international community while demonstrating originality and an innovative mindset in their respective areas of specialty
- (3) Persons who understand their respective roles within their organizational structure and demonstrate a high level of expertise while collaborating with others

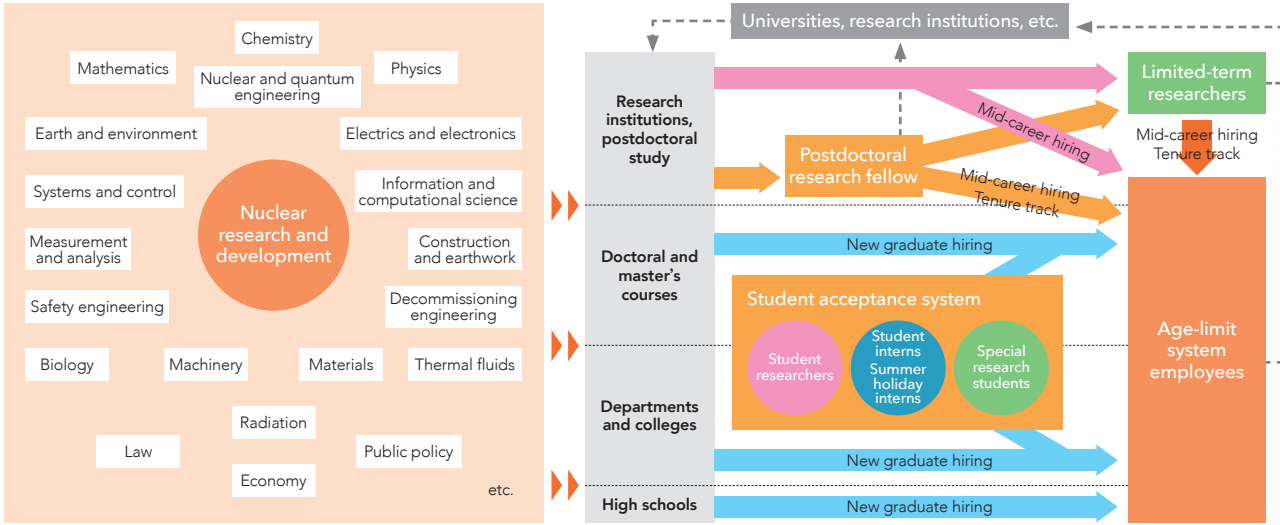


Securing Human Resources

JAEA promotes diversity by securing mid-career personnel who can make an immediate contribution through extensive recruiting activities ranging beyond the nuclear field. Specifically, JAEA advertised positions for female researchers and engineers to increase the ratio of new female employees in research and engineering, and adopted a tenure track (internal

promotion) and referral systems for some employees such as excellent young researchers under the “Leading Initiative for Excellent Young Researchers” program of the Ministry of Education, Culture, Sports, Science and Technology. In addition, JAEA opened a “matching support” desk to promote mid-career hiring to fully utilize personnel expertise.

JAEA is involved in various fields where people can exercise their expertise.



Enhancement of Employee Development Framework

JAEA endeavors to systematically and organically develop human resources in order to realize its management philosophy and meet community expectations from nuclear technology. In June 2023, to develop the leaders who will take on its management in the future, JAEA launched a new managerial personnel development program hosted by the president. Under this program, JAEA held monthly lecture sessions inviting prominent individuals from a broad range of fields, including not only nuclear science but also telecommunications, local government, culture and art, to plant the seeds of self-awareness and sense of responsibility in future leaders and to develop self-directed human resources who take the initiative in adding to their own value.

For young and mid-career employees, we revised our promotion criteria, alleviated educational discrimination and implemented exceptional promotions to drive early promotion of excellent personnel to managerial positions regardless of their sex. As for senior employees, our basic approach is to encourage them to take specialized roles to support the organization by making use of their experience, knowledge and expertise, including in the development of young personnel, as frontline leaders of the organization. Through the development of its employees in a multitude of career paths according to their skills and aptitude, JAEA strives to improve the ability of each one of its employees and to raise the bar on its overall organizational performance.

Promoting Diverse and Highly Productive Ways of Working Tailored to Each Employee

Promotion of Work-Life Balance

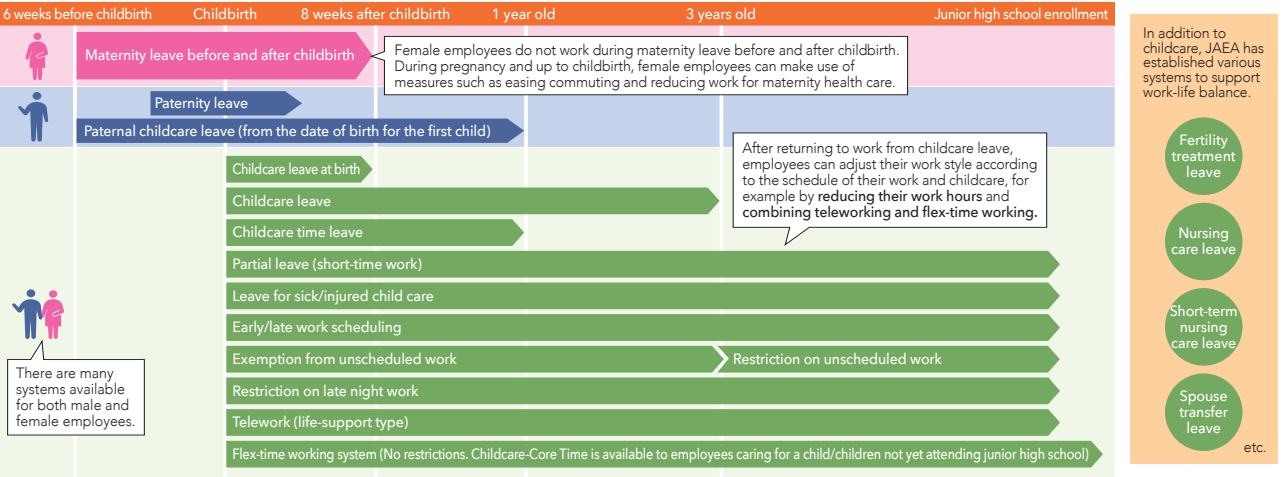
We introduced a telecommuting system to encourage employees to continue working during challenging life stages such as child rearing and providing nursing care. To officially implement the system, we formulated and are testing a teleworking optimization program. In FY2023, we launched a system to allow employees to continue working through teleworking or other means if they move home when their spouse has a job transfer (spouse transfer work system), and conducted an unconscious bias survey to develop a workplace culture that recognizes and respects diversity.



“Genki! Ikukatsu Menu” for Balancing Work and Child Care

For both male and female employees to balance work and child care, in FY2022, we introduced “childcare leave at birth” and other child rearing support systems. As a result, the number of male employees who took childcare leave or childcare leave at birth increased from 24 (FY2022) to 34 (FY2023). In FY2023, we expanded the eligibility for childcare core time as part of the flex-time working system and introduced the use of communication tools to ease the return to work for employees on childcare leave.

Development of Systems for Balancing Work and Nursing Care



Promotion of Gender Equality

JAEA engages in a variety of activities to promote gender equality from the viewpoint of securing and utilizing a wide spectrum of human resources (diversity).

- Ratio of new female employees in FY2023 **23.4%**
- Ratio of female employees to all employees (as of April 1, 2024) **13.2%**

In addition, JAEA is proceeding with the initiatives below to enhance its promotion activities in and out of house.

[Increasing female recruitment]

- Through positive action including university visits by female employees (recruiters), the ratio of new female employees in research and engineering improved to **20.0%** in FY2023 (target 20% or higher)

[Improving systems, environment, etc.]

- Discontinuation of childcare-related regional working systems with reduced salary, new establishment of spouse transfer work system
- Allowing employees on childcare leave to use communication tools (use of JAEA email address, electronic application, etc.)
- Holding periodic briefing sessions on systems to support balancing work with childbirth, childcare, or nursing care

[Supporting career development of female employees]

- Operation of a mentoring system, holding opinion exchange sessions for female management staff

Public Consultation, Public Relations and Information Disclosure

JAEA is making efforts to promote mutual understanding through various communication activities and to win the confidence of local communities. We swiftly and actively transmit and disclose information about R&D achievements, business activities, etc.

Swift and Active Information Provision and Disclosure for Ensuring Transparency

JAEA swiftly and actively provides and discloses information about its activities to ensure transparency of its operations. For this purpose, we try to provide a wide range of people with easy-to-understand information using various media such as SNS in addition to our website and public-relations magazine while leveraging dialogue taking risk communication into account based on awareness of the needs of the reader. With regard to the issues of especially high social concern, we actively implement public relations activities that are integrated and use specific stories through symposiums, various events, our public relations magazine, etc. In addition, we offer information emphasizing swiftness and accuracy in the case of an accident or other difficulties.



日本原子力研究開発機構 (JAEA)
@JAEA_Japan

「コンパクト」のサイズを1000分の1に！超小型化できる新原理を研究
コンパクトの小型化で、あらゆる電子機器に高度な情報処理機能を内蔵す
ることが可能に。
ネットワークを介して電子機器を活用する「IoT社会」の進展に貢献しま
す。
[jaea.go.jp/02/press2023/p...](https://www.jaea.go.jp/02/press2023/p...)

従来型インダクター (コイル)
約 10 mm

超小型インダクター (コイル)
約 0.0001 mm

約 1000 分の 1 に小型化

「超小型インダクター」
(本研究所で開発)

Offers information about R&D achievements using SNS



Official X account:
https://x.com/jaea_en

Public hearing and public relations/outreach activities


Aiming at disseminating JAEA's R&D achievements, we hold a wide variety of symposiums and presentation meetings, and implement public hearings and public relations activities such as exhibitions at events.

In FY2023, we held symposiums and events with a focus on next-generation innovative reactors and hydrogen energy, which are gaining increasing public attention from the viewpoint of realizing a decarbonized society and energy security, and disseminated information on our vision: Exploration of a New Future through the Synergy of Nuclear and Renewable Energy.

During the JAEA Symposium in November 2023, we reported our efforts toward the realization of a hydrogen society around the theme "Toward the Realization of a Hydrogen Society – a Clean and Sustainable Future Created by Hydrogen." The invited external experts explained the roles that JAEA should fulfill and their expectations.

We have implemented these activities to inform society of the value brought by JAEA's R&D achievements.



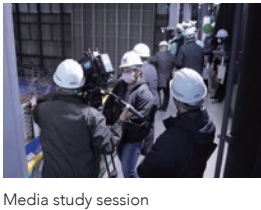



JAEA Symposium:
https://www.jaea.go.jp/english/annual_symposium/18/

Timely and intelligent press response, accurate and easy-to-understand information dissemination

We actively publish the achievements obtained from JAEA's R&D activities and the current situation of our operations on our website and in press releases. In addition, with regard to those topics gaining a lot of social attention, we open facilities to the media and hold study sessions.

To effectively disseminate such information, we provide our staff with easy-to-understand information, writing technique learning sessions and experience-based presentation training sessions for the purpose of improving their communication capabilities.






Provide easy-to-understand introduction of R&D results:
https://www.jaea.go.jp/study_results/representative/
(in Japanese)

Information Disclosure

With regard to information disclosure requests, we respond swiftly and appropriately under the provisions of the Act on Access to Governmental Information, and hold a "Public Information Committee" composed of external experts to inspect the fair application of the information disclosure system to ensure objectivity and transparency.



Information Disclosure:
https://www.jaea.go.jp/about_JAEA/information_disclosure/ (in Japanese)

Contribution to Regional Development

JAEA has made proactive efforts to participate in activities that contribute to the development of local communities, including participation in science classes in junior high schools and in industrial and technical events near JAEA sites across the country. In this way, we engage in various activities to promote mutual understanding with people in local communities.

Examples of Regional Contribution in FY2023



[Aomori] Science classes in junior high schools

[Aomori] Memorial event for the opening of the Mutsu Science Museum

[Horonobe] Participation in local industrial and technical events

[Tsuruga] Training workshop for local companies

[Tsuruga] Participation in local industrial and technical events

[Fukushima] Participation in local industrial and technical events

[Oarai] Participation in local industrial and technical events

[Oarai] Science classes in junior high schools

[Tokai] Participation in local industrial and technical events

[Tono] Participation in local industrial and technical events

[Ningyo-toge] Crafts class for elementary school students

[Ningyo-toge] Participation in local industrial and technical events

JAEA's Position and Role in Japan's National Policy

Purpose of the Corporation

In accordance with the basic policy stipulated in Article 2 of the Atomic Energy Basic Act, JAEA was established to comprehensively, systematically, and efficiently conduct basic and applied research on nuclear energy, the development of fast breeder reactors to establish the nuclear fuel cycle and the associated necessary nuclear fuel materials, and the

development of technologies related to nuclear fuel material reprocessing and high-level radioactive waste disposal; to disseminate the outcomes of the research; and thereby to contribute to the welfare of human society and to raising the standard of living of Japan's citizens.



Article 4 of Act on the Japan Atomic Energy Agency, National Research and Development Agency:
<https://elaws.e-gov.go.jp/document?lawid=416AC0000000155>
(in Japanese)

Operations

In order to achieve its purpose as set out in Article 4 of the Act on the Japan Atomic Energy Agency, National Research and Development Agency, JAEA conducts the operations below

(excluding those that fall under operations listed in Article 16, item (i) and (ii), of the Act on the National Institutes for Quantum Science and Technology).

- (i) Basic research on nuclear energy
- (ii) Applied research on nuclear energy
- (iii) The following operations required to technologically establish the nuclear fuel cycle:
 - a. Development of fast breeder reactors (excluding where the building of a demonstration reactor is involved) and the associated necessary research
 - b. Development of the nuclear fuel materials necessary for the operations shown in a. above and the associated necessary research
 - c. Development of technology related to nuclear fuel material reprocessing and the associated necessary research
 - d. Development of technology related to the processing and disposal of the high-level radioactive waste generated in association with the operations shown in c. above and the associated necessary research
- (iv) Dissemination and promotion of the use of the results of the operations shown in (i) to (iii) above
- (v) The following operations related to radioactive waste disposal (excluding those that fall under operations of the Nuclear Waste Management Organization of Japan):
 - a. Final disposal, by means of burying, of the radioactive waste generated in association with the operations of JAEA and radioactive waste entrusted to JAEA for disposal by external organizations (excluding waste generated by commercial nuclear power reactors, etc.)
 - b. Construction, improvement, maintenance and other management of facilities for burial disposal, closure of disposal facilities after completion of burial disposal, and management of disposal facility sites after closure
- (vi) Provision of JAEA's facilities and equipment for R&D related to science and technology and for activities related to the development and use of nuclear energy
- (vii) Development of researchers and technicians related to nuclear energy and improvement of their quality
- (viii) Collection, arrangement, and provision of information related to nuclear energy
- (ix) In addition to activities carried out as part of the operations shown in (i) to (iii) above, nuclear energy-related testing, research, investigation, analysis, or assessment where deemed necessary and entrusted to JAEA by the head of a related administrative organization or local public organization
- (x) Operations relating to investment and physical and technological support as stipulated in Article 34-6, Paragraph 1, of the Act on Activation of the Creation of Science and Technology Innovation (Act No.63 of 2008) and that are additionally specified by Cabinet Order
- (xi) Operations incidental to the operations from (i) to (x)
- (xii) Operations stipulated in Article 5, Paragraph 3, of the Act on the Promotion of Public Utilization of the Specific Advanced Large Research Facilities (Act No.78 of 1994)
- (xiii) In addition to the operations from (i) to (xii), within the range that does not interfere with the performance of these tasks, operations to store and/or dispose of nuclear source materials (referring to nuclear source materials as stipulated in Article 3, item (iii), of the Atomic Energy Basic Act), nuclear fuel materials, or nuclear waste entrusted to JAEA by national government, local public organizations or other persons specified by Cabinet Order.



Article 17 of Act on the Japan Atomic Energy Agency, National Research and Development Agency:
<https://elaws.e-gov.go.jp/document?lawid=416AC0000000155>
(in Japanese)

Policy framework for JAEA

[National Policy]

Atomic Energy Basic Act (Sets the framework for Japan's nuclear research and utilization including JAEA)



Atomic Energy Basic Act:
<https://elaws.e-gov.go.jp/document?lawid=330AC1000000186>
(in Japanese)

Sixth Science, Technology, and Innovation Basic Plan
Basic Policy for Nuclear Energy
Basic Policy for Nuclear Research and Development
Strategic Energy Plan

Plan for Global Warming Countermeasures
Long-Term Strategy under the Paris Agreement
Green Growth Strategy Through Achieving Carbon Neutrality in 2050, etc.

[Act on the Japan Atomic Energy Agency, National Research and Development Agency] (Sets out the purpose and operational scope of JAEA)

[JAEA's Activities in the 4th Medium-/Long-Term Objectives (Plan)]

- I. Measures to be taken for attaining targets concerning business operations with placing top priority on safety
- II. Measures to be taken for attaining targets concerning maximizing R&D outcomes and raising quality in other areas
 - 1. Contributing to carbon neutrality through the development of innovative technologies such as safety improvements
 - 2. Creating innovation through the promotion of diverse R&D on nuclear science and technology
 - 3. Function enhancement of a platform for R&D and human resource development in Japan
 - 4. Promoting R&D contributing to the response to the accident at TEPCO's Fukushima Daiichi Nuclear Power Station
 - 5. Steadily implementing technology development for the treatment and disposal of high-level radioactive waste
 - 6. Steadily implementing sustainable backend measures prioritizing safety
 - 7. Technical support for nuclear safety regulation and emergency preparedness through safety research
- III. Measures to be taken to attain targets related to enhancing the efficiency of business operations
- IV. Measures to be taken to attain targets related to improving the state of finances
- V. Important matters related to other business operations

Overview of Medium-/Long-Term Objectives, Medium-/Long-Term Plan, and Annual Plan

Following the Act on General Rules for Incorporated Administrative Agencies, JAEA's operations are conducted in accordance with the Medium-/Long-Term Plan formulated based on the Medium-/Long-Term Objectives specified by the competent ministers and an annual plan laid down every fiscal year for achieving the Medium-/Long-Term Plan.

The ministers set the 4th Medium-/Long-Term Objectives in FY2021 of the final year of the period among the 3rd Medium-/Long-Term Objectives. JAEA formulated the 4th Medium-/Long-Term Objectives of the seven years from FY2022 to FY2027, and the basic policy of the 4th Medium-/Long-Term Objectives is follows.

[The basic policy of the 4th Medium-/Long-Term Objectives]

- (1) Importance of nuclear research for national security of energy, the science, technology, and development of the industry

(2) Expectation of the policy to contribute to carbon neutrality

(3) Function enhancement of a platform for R&D and human resource development in Japan

(4) Balancing R&D activities with back-end measures placing top priority on safety
- (5) Development of advanced reactors, which are further improvements on safety for light water reactors, and the creation of innovation through digital transformation (DX)

(6) Contribution to the maintenance and strengthening of national research, development, and human resource development infrastructure

(7) Promotion of the creation and utilization of comprehensive knowledge for generating new value

(8) Promoting the dissemination of easy-to-understand information and interactive communication activities

In the 4th Medium-/Long-Term Plan and the annual plan for FY2022, which were formulated based on the Medium-/Long-Term Objectives, the following research and development activities will be carried out, taking into account national policies such as the "Green Growth Strategy Through Achieving Carbon Neutrality in 2050", various social issues surrounding JAEA, in addition, the following research and development activities will be carried out based on the future vision "JAEA2050+", which was compiled in FY2020.

1. Contributing to carbon neutrality through the development of innovative technologies such as safety improvements

2. Creating innovation through the promotion of diverse R&D on nuclear science and technology

3. Function enhancement of a platform for R&D and human resource development in Japan

4. Promoting R&D contributing to the response to the accident at TEPCO's Fukushima Daiichi Nuclear Power Station

5. Steadily implementing technology development for the treatment and disposal of high-level radioactive waste

6. Steadily implementing sustainable backend measures prioritizing safety

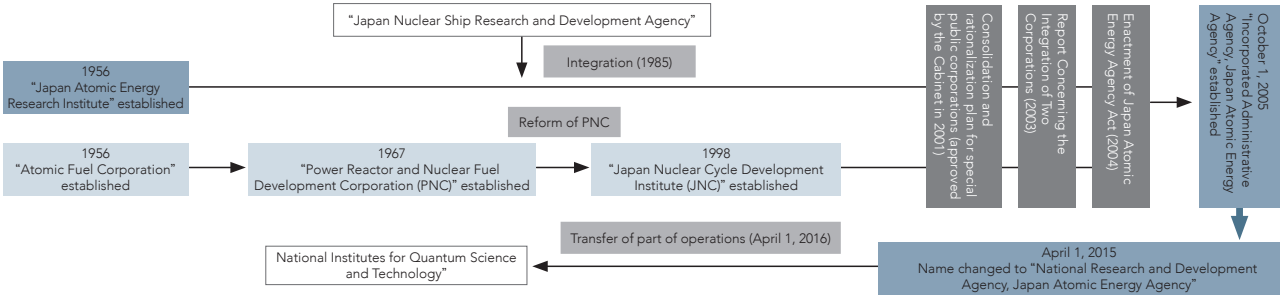
7. Technical support for nuclear safety regulation and emergency preparedness through safety research



Overview of Medium-/Long-Term Objectives, Medium-/Long-Term Plan, and Annual Plan:
https://www.jaea.go.jp/about_JAEA/business_plan.html
(in Japanese)

Profile of Organization

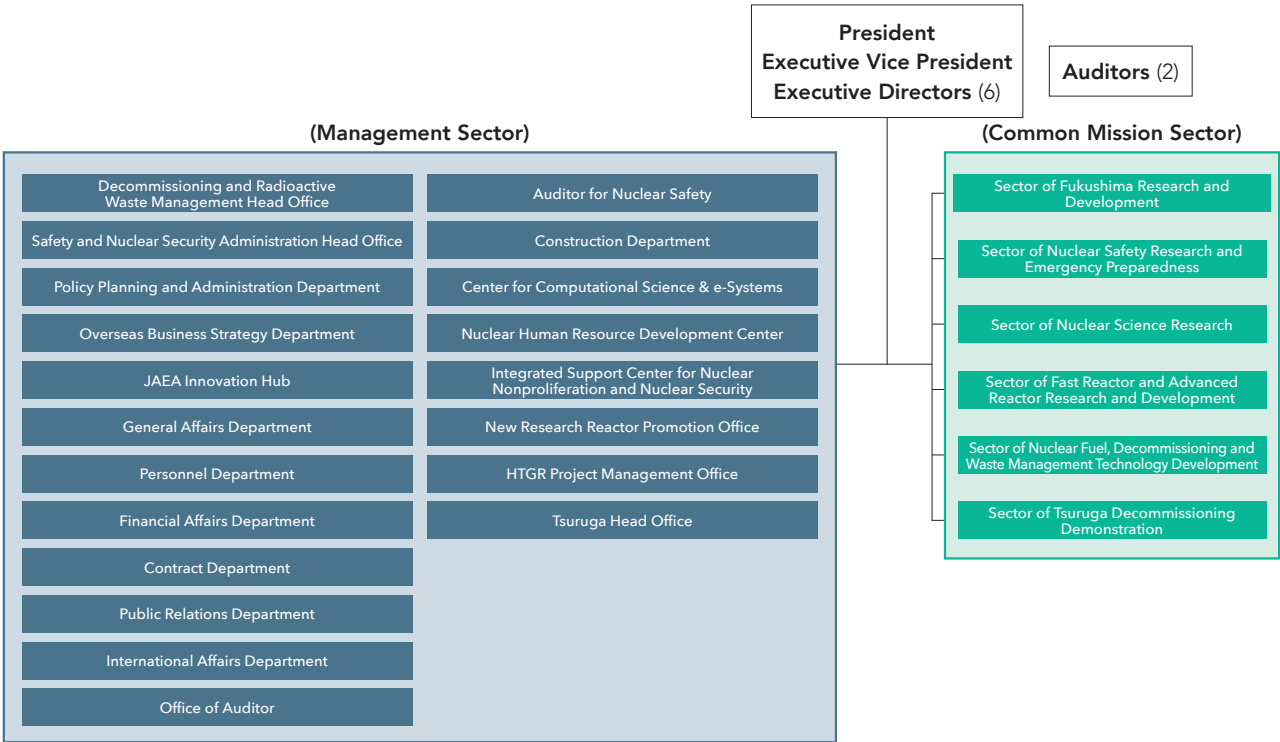
History



Law Underlying Establishment of JAEA

Act on the Japan Atomic Energy Agency, National Research and Development Agency (Act No.155 of 2004)

Organization



* With effect from April 1, 2024, JAEA was reorganized from a divisional system to a center system (with some divisions retained) in order to enable more flexible response to various management issues. As part of the new system, new domains were established to consider new business concepts and a Chief Science and Technology Officer was appointed to advise the president on R&D strategies.

Employees

The number of full-time employees under the age-limit system as of the end of FY2023 was 3,090 (a decrease of 12 compared with the end of the previous fiscal year) and the average age was 42.3 years (42.4 years as of the end of the previous fiscal year). The number of full-time employees under the age-limit

system does not include persons seconded from the national government or private companies. The number of employees retiring on March 31, 2024, was 0 (due to the extension of retirement age).

Major Specified Affiliated Companies, Affiliated Companies and Related Public Interest Corporations

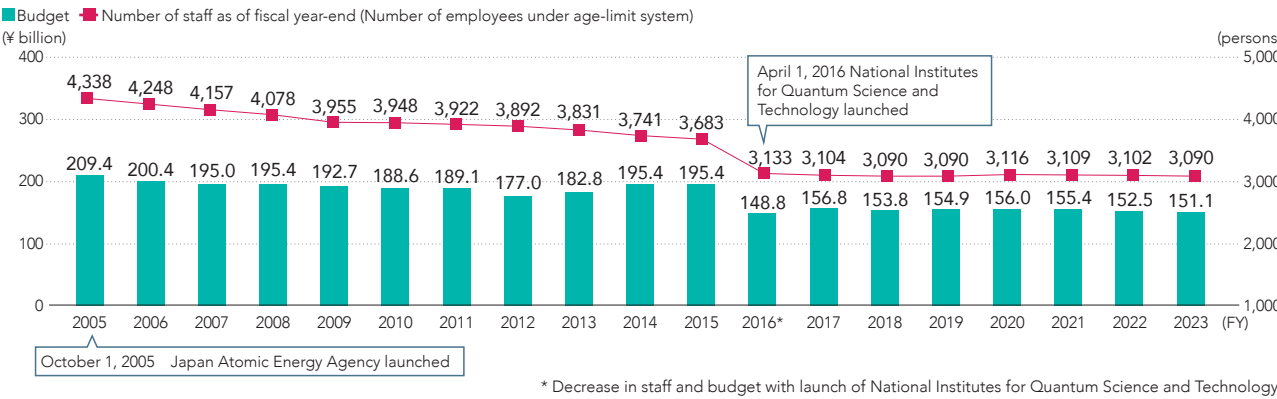
Corporation	Outline of operations	Relation to JAEA
Mutual Aid Association for Japan Atomic Energy Agency	Promotes the benefit and welfare of executive directors, staff and other employees of the Japan Atomic Energy Agency (JAEA) and its full-time officers and employees and conducts activities to contribute to and achieve the advancement of JAEA's operations.	Related public interest corporation
Institute of Radiation Measurements	Conducts activities necessary to improve the reliability of radiation measurement and uses the results of these activities, and training and education on radiation measurement to contribute to and achieve the healthy advancement of the development and use of nuclear energy and radiation, and the realization of a safe and secure society.	Related public interest corporation
Japan Chemical Analysis Center	Conducts activities such as analysis and measurement of radioactive materials contained in environmental materials, analysis and measurement of various other substances, related investigation and research to contribute to the improvement of the health and safety of the Japanese people, and activities to contribute to the promotion of academia, and science and technology.	Related public interest corporation
Radiation Application Development Association	Promotes the application of radiation and conducts activities to contribute to and achieve the improvement of the lives of the Japanese people and the establishment of a sustainable society by promoting dissemination of knowledge and technology related to the use of nuclear energy.	Related public interest corporation
Research Organization for Information Science and Technology (RIST)	Comprehensively propels investigation and collection of information on studies and technology development pertaining to information science and technology, and information in the science and technology field, and activities to contribute to and achieve the development of academia, and science and technology.	Related public interest corporation

Detailed statements supplementary to JAEA's financial statements:
https://www.jaea.go.jp/about_JAEA/financial/ (in Japanese)

Name of accounting auditor and remuneration paid

The accounting auditor is KPMG AZSA LLC. The amounts of remuneration paid to personnel of the accounting auditor and its network in the fiscal year under review were 32 million yen and 11 million yen for audit and assurance services and for non-audit services, respectively.

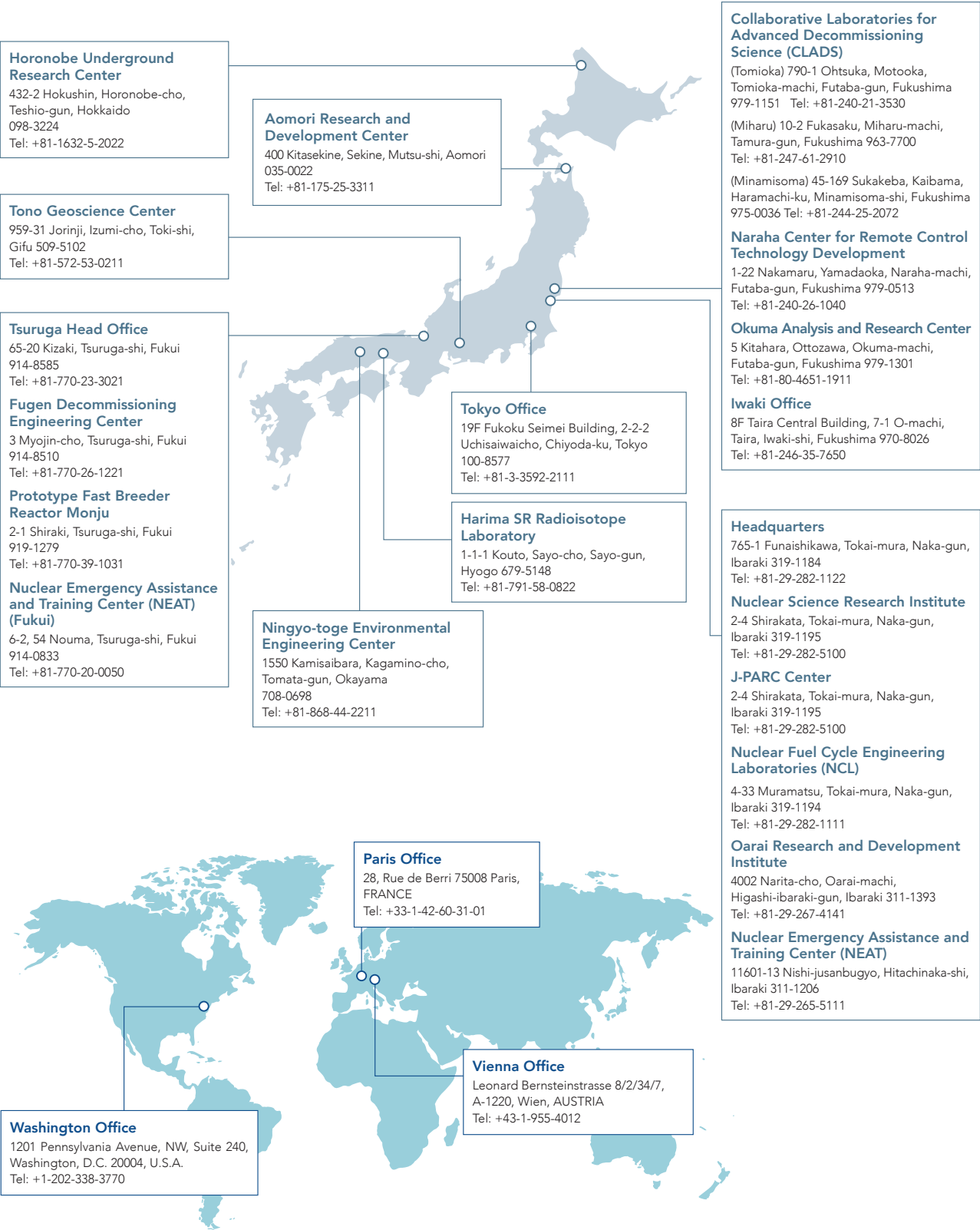
Transition in Number of Staff and Budget



State of Establishment of Important Facilities

- (1) Major facilities, etc. completed this fiscal year
 - None
- (2) New construction or expansion of major facilities, etc. in progress this fiscal year
 - Safety measures for nuclear facilities, etc.
 - Establishment of research-base facilities toward decommissioning of TEPCO's Fukushima Daiichi Nuclear Power Station
- (3) Major facilities, etc. disposed of this fiscal year
 - Sold Hyakuzukahara-danchi (land) (home) (acquisition price: 26 million yen, accumulated impairment loss: 23 million yen)

Location of R&D Sites (as of June 2024)




Other Information for Publication

Reference sources of 2023 annual report

The relationship between the items contained in this report and the JAEA website are as indicated in the following.


[Introduction of JAEA]

- Information Disclosure P50
- Efforts for Safety P08
- Financial Information P35-36, 39
- Environmental Information P45

 https://www.jaea.go.jp/about_JAEA/


[JAEA abstract]

- Management Principles and Conduct Standards P02
- Medium-/Long-Term Objectives, Operational Plan, Operational Results, Evaluation P32, 39, 54
- Medium-/Long-Term Management Plan for JAEA Facilities P44
- International Strategy P21
- Legislation, etc. P53


 https://www.jaea.go.jp/about_JAEA/outline.html


[Procurement/Bidding Information]

- Act on Promoting Green Procurement P47
- Procurement Rationalization Plan P47
- Procurement/Contracting of products from organizations supporting persons with disabilities P47
- Contract Monitoring Committee P47








 https://www.jaea.go.jp/for_company/supply/contract/







JAEA Website

 <https://www.jaea.go.jp/>
(in Japanese)



R&D results


- The range of efforts to secure safety P08
 https://www.jaea.go.jp/about_JAEA/safety/
- Demonstration of superior safety features of HTGRs using HTTR P13
 <https://www.jaea.go.jp/02/press2023/p24032801/>
- Acquisition of permit for changes to JOYO reactor installation with a view to restart P13
 <https://www.jaea.go.jp/02/press2023/p23072601/>
- Development of medical radioisotope production technology at JRR-3 P15
 <https://jrr3.jaea.go.jp/3/34.htm>
- Launch of development project to convert radioactive waste into useful resources P16
 <https://www.jaea.go.jp/jaea-houkoku18/>
- Elucidating the behavior of water inside an automobile fuel cell through observation using neutrons and synchrotron radiation P16
 <https://www.jaea.go.jp/02/press2023/p23101101/>
- Conclusion of collaborative agreement between relevant institutions on installation of new research reactor P17
 <https://www.jaea.go.jp/04/nrr/jp/news/20230508/index.html>

- Strengthening capacity building support for nuclear non-proliferation and nuclear security P20
 <https://www.jaea.go.jp/04/iscn/>
- Conclusion of the memorandum of co-operation with the UK's NNL in the field of high temperature gas-cooled reactor technologies P21
 <https://www.jaea.go.jp/02/press2023/p23090701/>
- Third-party analysis of ALPS-treated water P22
 <https://fukushima.jaea.go.jp/okuma/alps/index.html>
- Nuclear data measurements for nuclear transmutation and development of evaluation models using machine learning P24
 https://j-parc.jp/c/uploads/2024/J-PARCMagazine2023_18.pdf#zoom=100
- Development of a computer-based method to estimate magma pathways under volcanoes P25
 <https://www.jaea.go.jp/02/press2023/p23100401/>
- Conclusion of framework agreement between JAEA and Cavendish Nuclear (CN) for MONJU sodium processing in the United Kingdom (UK) P27
 <https://www.jaea.go.jp/02/press2023/p23042802/>


Other Information for Publication

JAEA publicizes its activities through various media.

JAEA Website


 <https://www.jaea.go.jp/english/>

Information on the activities of JAEA such as R&D status.




Social Network Services
JAEA Channel
X official account @JAEA_en


JAEA Channel

 https://www.jaea.go.jp/english/jaea_channel/


Introducing JAEA activities through video streaming services.



- Publicity Brochures -




JAEA Pamphlets




"Genki" Future Vision


- Dissemination of Scientific Achievements -



Research Achievements




Technical Seeds Collections





Research and Development Reports

Inquiries

An Inquiry Page is available on our website.  <https://www.jaea.go.jp/english/query/>

If you cannot find the inquiry page, please use the following Inquiry Form:

 <https://www.jaea.go.jp/query/form.html> (in Japanese)



JAEA at a Glance

Establishment of safe and effective decommissioning technology for nuclear facilities
(Tsuruga area / Tokai area)

(1) Decommissioning of Prototype Fast Breeder Reactor, Monju

(2) Decommissioning of Fugen Decommissioning Engineering Center

(3) Decommissioning of Tokai Reprocessing Plant

Monju

Fugen

TRP

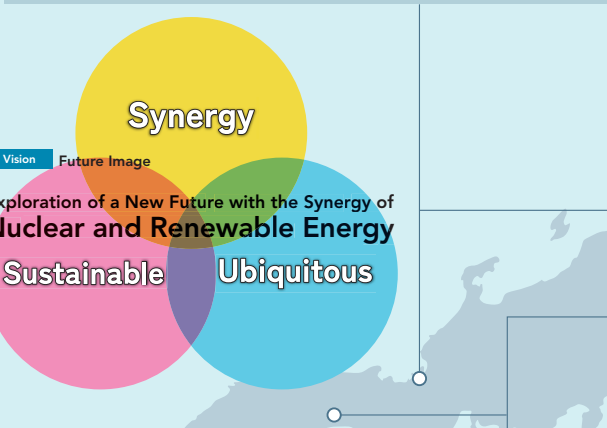
Contributing to safety and security of Fukushima through science and technology
(Fukushima area)

(1) Research for decommissioning of Fukushima Daiichi Nuclear Power Station

(2) Research for environmental restoration

Decommissioning studies

Environmental research



Creating new value in nuclear science and technology
(Tokai area / Harima area)

(1) Development of uranium battery

(2) Development of partitioning technology for rare metals

(3) Development of thermal and radiation power generation technology

(4) Research with neutron and synchrotron radiation

URF storage battery

Partitioning test

JRR-3

J-PARC

SPRING-8

[Cited from RIKEN]

Research & development for domestic production of medical radioisotopes
(Tokai area / Oarai area)

Research and development on high-level radioactive waste disposal technologies
(Horonobe area / Tono area)

Research and development on reprocessing, fuel fabrication, and treatment and disposal of radioactive waste for the nuclear fuel cycle
(Tokai area)

Decommissioning of uranium enrichment facility
(Ningyo area)

Storage of the reactors of the nuclear ship Mutsu
(Aomori area)

Contributing to decarbonisation through high-temperature gas-cooled reactor and fast reactor technology
(Oarai area)

[HTGRs]

(1) Demonstration of excellent safety

(2) Establishment of various heat utilization technologies

[FBR]

(1) Establishment of FBR cycle

(2) Technologies for reducing hazardousness of radioactive substances

HTTR

Joyo



Quantitative Analysis of JAEA Achievements and Performance Data

Number of Employees Engaged in R&D



Research Positions **667** Engineering Positions **1,909**

Dissemination of R&D Achievements

Number of Papers Published **1,115** Oral Presentations **1,639**
Peer-Reviewed **901** Others **214** Number of JAEA Reports Published **117**

Indicators of R&D Activities



Number of Joint Research Projects **176**



Number of Facility Sharing Contracts **666**



Number of Entrusted Research Contracts **131**



New Patents (Domestic Only) **15**



External Research Funds (Entrusted Research, etc.) **51,646 million yen**

Awards



Awards from Academic Organizations **107**

Awards from the MEXT Minister **1**

Cooperation/Collaboration with Other Organizations



Collaborations with Overseas Institutions **106**



Collaborations with Domestic Institutions **40**

International Training Courses **82** participants from **10** countries
Domestic Training Courses **233** participants

Number of Cross-Appointment Researchers **9**

Public Hearings and Public Relations Activities

Public Hearings and Public Relations Activities
Outreach Activities **1,059** times (Total) **45,683** participants
Open Campus/Hosting of Individual Visitors **770** times (Total) **7,956** participants