Annual Report

Japan Atomic Energy Agency 2021
(Business Report FY2020)

To the Future/JAEA

未来へげんき

Annual Report Japan Atomic Energy Agency 2021 (Business Report FY2020)

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Japan Atomic Energy Agency

National Research and Development Agency
Japan Atomic Energy Agency

Annual Report 2020

The Japan Atomic Energy Agency, a National Research and Development Agency, undertakes a variety of activities with a strong commitment to fulfilling its corporate social responsibilities and pursues various initiatives, including the publishing of environmental reports and other social activities such as technology transfer.

This publication reports on the details of our operations and the state of our research and development for FY2020 (April 2020 – March 2021).

Through the report, we seek to promote an understanding among readers of JAEA's research and development and other activities and to foster mutual understanding and trust.

● Scope of Report

All sites

● Reporting Period

The reporting period is basically FY2020 (April 2020 – March 2021)
(The report includes certain information from after this period)

● Reference Guidelines, etc.

◎ Guidelines on the Annual Report of Independent Administrative Institutions
(Ministry of Internal Affairs and Communications, Sept. 2018)

◎ ISO 26000: 2010 Guidelines Concerning CSR

◎ Environmental Reporting Guidelines 2018 version (Ministry of the Environment)

◎ GRI Standards

● Notation Method

Fractions rounded in principle to the second decimal place

● Next Scheduled Issue Date

November 2022

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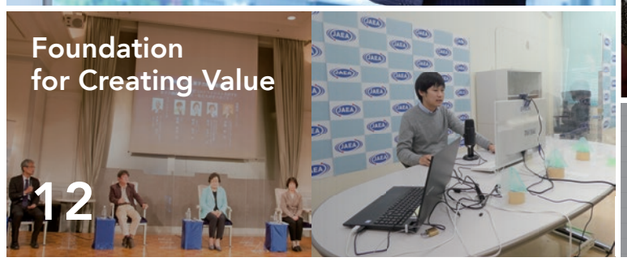


Message from the President

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

President, the Japan Atomic Energy Agency
KODAMA Toshio
児玉敏雄

The Japan Atomic Energy Agency (JAEA) is Japan's sole comprehensive nuclear research and development institute.

Based on Japan's national policy such as the Strategic Energy Plan, and in accordance with its own Medium-/Long-Term Plan, JAEA works on the response to the accident at the Fukushima Daiichi Nuclear Power Station of Tokyo Electric Power Company Holdings, Inc. (TEPCO), conducts research on the enhancement of nuclear safety, carries out R&D on the nuclear fuel cycle and on radioactive waste treatment and disposal technology, and engages in basic and fundamental research in the nuclear field.

[Management Principles]

- **Thoroughly ensure safety**
- **Focus on on-site activities**
- **Trust of society**
- **R&D filled with creativity**
- **Efficient work management**

[Conduct Standards]

JAEA has specified its management principles in a stratified and integrated manner. Based on the purpose of its establishment and its mission (roles), JAEA has laid down basic policies and conduct standards and set forth a management philosophy to serve as norms for the conduct of operations by its management and employees.

Japanese versions of the Management Principles and the Conduct Standards are available at: https://www.jaea.go.jp/about_JAEA/philosophy.html

Review of FY2020

In FY2020, JAEA conducted its operations with priority given to safety, including the security and safety control of facilities, while adopting new ways of working such as telecommuting due to the spread of COVID-19 and keeping in mind both "maximization of R&D achievements" and "appropriate, effective, and efficient operations."

As for the response to the accident at TEPCO's Fukushima Daiichi Nuclear Power Station (NPS), we took action in accordance with the Mid-and-Long-Term Roadmap towards the Decommissioning of TEPCO's Fukushima Daiichi NPS, including preparations for the analysis of fuel debris and the development of a method to promptly and accurately generate radiation maps from measurement data utilizing artificial intelligence (AI).

In addition, we advanced activities to improve safety through, for example, the development of analysis codes that enable evaluation of exposure doses from radioactive materials released into the environment in a nuclear emergency situation under various weather conditions.

Regarding advanced reactors, we furthered discussions with the United Kingdom and the United States toward implementation of newly established cooperation in the development of high-temperature gas-cooled reactors and fast reactors, respectively.

In the area of decommissioning, we completed unloading 146 fuel assemblies from the reactor vessel at Monju as planned, and made progress in the dismantling of the peripheral facilities of the reactor and the preparations for spent fuel retrieval at Fugen. We also proceeded with the plan for the decommissioning of the Tokai Reprocessing Plant, and developed a test method to investigate the impact of crustal movements and other geological events on the underground environment as research and development (R&D) related to geological disposal technology.

In the field of nuclear science research, we demonstrated the ability of thermoelectric elements, which are heat-to-electricity converters, to function in a high-radiation environment by applying electronic spins to them, and developed materials derived from waste pork bones to remove toxic metals.

For research reactors, activities toward resuming their operation are in steady progress. Capitalizing on the restart of the experimental reactor JRR-3 in February 2021, we will establish an open platform to facilitate use of large-scale facilities of the kind only available to JAEA as well as general equipment and promote industry-academia-government cooperation and collaboration toward innovation creation.

"Innovation Creation Strategy" Revised

In November 2020, we revised the "Innovation Creation Strategy" toward the realization of the "new-era nuclear science and technology (S&T)" set forth in the Future Vision "JAEA 2050 +." Taking into account the heightened importance of the achievement of carbon neutrality and innovation due to the COVID-19 pandemic, this revision clarified the following four policy initiatives: (1) reinforcement of open innovation initiatives, (2) enhancement of social implementation, (3) management of innovation activities, and (4) strengthening of R&D capability, based on the analysis and assessment of activities in the first edition of the "Innovation Creation Strategy," with the aim of creating an organization that steadily generates innovation. We plan to determine the details of the activities, implement them, and thereby make a broad contribution to the development of society through open innovation via fusion with a wide variety of fields.

I believe that the mission of JAEA as an R&D institute is to steadily produce results through R&D, with safety assurance as an absolute precondition. We would appreciate your continued understanding and support.

I hope that you will find this report useful in understanding the various activities of JAEA.

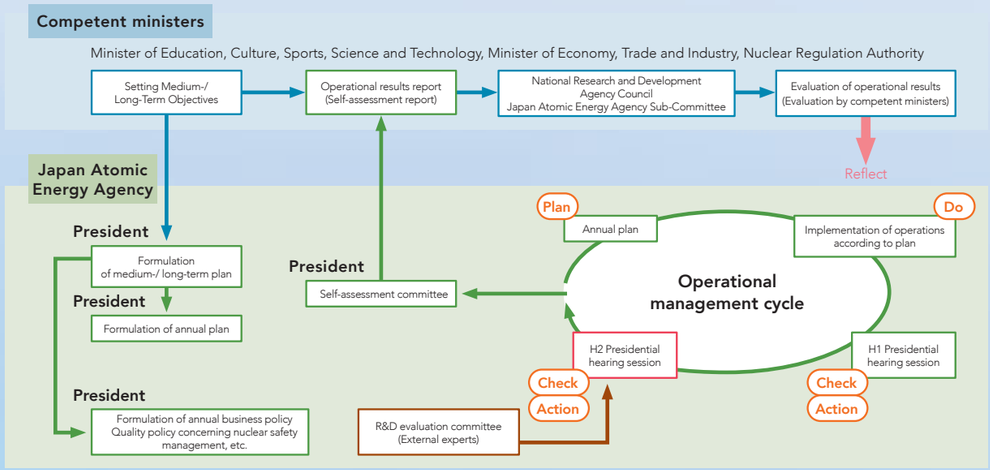
June 2021

[Management by the President]

JAEA runs its management cycle —a method to continuously make improvements by repeating the Plan, Do, Check, and Act (PDCA) cycle — through board meetings led by the President and presidential hearing sessions held twice a year.

Under the strong leadership of the President, adding the viewpoints of the corporation, JAEA clarifies its operations by introducing the concepts of Mission, Vision, and Strategy (MVS) and Balanced Score Card (BSC: a method to manage operations by specifying targets and performance indicators from the viewpoints of organization and operation processes, finance and facilities, human resource development, and the customer) for the entire JAEA. In addition, JAEA visualizes its operations by introducing individual MVS and BSC criteria for each business division and checking the progress using key performance indicators (KPI: quantitative indicator to measure the operational achievement level).

Management by the President



Mission, Vision, and Strategy (MSV) of JAEA

Mission	Contribute to the welfare and prosperity of human society through nuclear science and technology
Vision	To meet the expectations of Japanese citizens as Japan's sole comprehensive nuclear research and development institute (we shall aim for the following) • An organization that contributes to the development of nuclear science and technology, to the peaceful use of global nuclear energy and to regional development • An organization that promotes research into improving nuclear safety • An organization that creates innovation through interaction and collaboration with other fields of technology • An organization that contributes to the solution of global climate change, to ensuring energy stability and to the achievement of Society 5.0 To lead nuclear research and development with a high organizational IQ • An organization with high organizational IQ that always ensures safety first, always thinks independently and always continues to improve its efficiency • An organization that can best utilize limited resources (budget, assets, manpower)
Strategy	To share a sense of value and uplift the level of job quality e.g. formulation and implementation of "JAEA 2050 +" strategies and policies To enhance efforts toward establishment of public acceptance e.g. placing utmost priority on safety, R&D incorporating external needs To promote job prioritization, job streamlining, introduction of information technology and introduction of all cutting-edge technology e.g. redistribution of resources, gate control, Kaizen activities To enact management reform with the establishment of clear and straightforward plans e.g. targets, policies, KPIs, PDCA cycle, governance, safety management, internal control

Purpose of the Corporation

In accordance with the basic policy stipulated in Article 2 of the Atomic Energy Basic Act, JAEA's aims are to comprehensively, systemically 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)

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), of the Act on the National Institutes for Quantum and Radiological 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 2, 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)

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.

Social Issues
in JAEA's environment

- Climate change*, energy and resource problems
- Safe nuclear energy use
- Response to the Fukushima Daiichi Nuclear Power Station Accident
- Decommissioning of nuclear facilities and management of radioactive waste
- Ensuring nuclear nonproliferation and nuclear security

Activities to achieve targets

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Policies for Creating Value

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Foundation for Creating Value

Outcome of Value Creation

Cooperation

Cooperation and collaboration also with various stakeholders

Contribution to society

Achievement of Medium-/Long-Term Objectives and Plan

Realization of Future Vision "JAEA 2050 +"

- Contribution to solving climate change issues
- Contribution to ensuring stable energy supply
- Contribution to realization of ideal future society (Society 5.0)
- Contribution to achievement of Sustainable Development Goals (SDGs)

* Climate change has received much attention as a social agenda. The "Green Growth Strategy Through Achieving Carbon Neutrality in 2050" was formulated in December 2020 to reduce the emission of greenhouse effect gas to zero overall, that is, to realize Carbon Neutrality in 2050.

Efforts to realize the Future Vision “JAEA 2050 +”

-Toward an organization that continuously creates innovation-

In order to continue our social contribution into the future, JAEA has developed the Future Vision “JAEA 2050 +,” which outlines its ideal future profile in terms of “Goals to pursue” and “Actions to take.” As an approach to “New Era Nuclear Science and Technology,” it proposes a contribution to future society through development of a Nuclear Science and Technology system that addresses “S+3E,” and innovative creation through synergies with other areas of science and technology. In November 2020, we formulated and published a revised version of JAEA’s Strategy for Innovative Creation as a specific effort policy initiative to realize this goal.

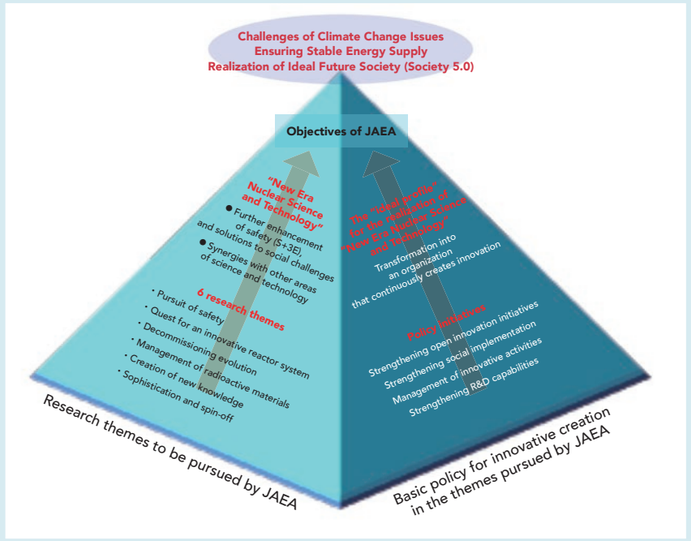
1 Concept of the revised version of JAEA’s Strategy for Innovative Creation

◆ **In order to transform JAEA into an organization that continuously creates innovation, we have set the following vision for the future (10 years from now).**

- As individuals and as an organization, we will nurture a strong awareness of innovation creation (innovation mindset) and build correspondingly excellent R&D capabilities.
- We will play a role in open innovation as a center for basic research and human resource development, the accumulation of knowledge, and data collection and analysis.
- We will operate support systems for strategic utilization of results, venture creation, and social implementation, and cultivate specialized human resources to support these activities.
- We will support innovative creation in the private sector by utilizing JAEA’s facilities, knowledge and technology base, and human resources.

◆ **In order to reach the ideal profile, we will present policy initiatives to strengthen the following areas:**

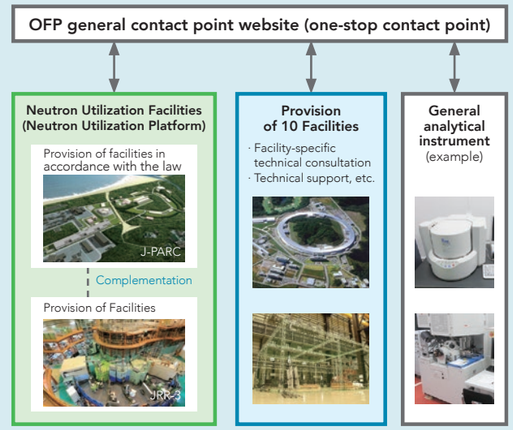
① Strengthening open innovation initiatives
② Strengthening social implementation
③ Management of innovative activities
④ Strengthening R&D capabilities



2 Policy Initiatives for Innovative Creation

① Strengthening open innovation initiatives

- With the resumption of the operation of our test and research reactors, we will promote the use of JAEA’s facilities, equipment, and devices, including general analytical instruments, to contribute to the creation of innovation in the whole of Japan.
- Through participation in government projects, JAEA will promote collaboration with industry by utilizing its technological infrastructure as a platform to secure diversity in the use of nuclear energy.
- JAEA and industry will bring together funds, people, and research themes to promote large-scale joint research on an organization-to-organization basis, with the aim of forming a collaborative center.



Build an open facility platform (OFP) as a “co-creation space” for open innovation.

② Strengthening social implementation

- In order to implement in society the results of JAEA’s R&D, we will review the role of coordinators and revitalize coordination activities.
- In line with the revision of the Law Concerning the Stimulation of Creation of Science, Technology and Innovation, we will strengthen our efforts to create venture businesses by reviewing the system for supporting venture businesses.
- We will work on intellectual property management that leverages the strengths of our own knowledge base, technology base, and intellectual property.

JAEA Technology Salon

Analysis Technology Exhibition

③ Management of innovative activities

- In order to strengthen innovative creation functions, we will strengthen organizations and structures, and implement seamless organizational management.

④ Strengthening R&D capabilities

- With a view to creating innovation, we will set research themes based on social needs and customer perspectives, and continuously generate R&D results.
- We will actively promote the digital transformation (DX) of JAEA’s research and development.

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

Contributing to Human Society and Peoples' Lives Through R&D on Nuclear Energy

R&D at JAEA is positioned within the policy framework below.
Aiming to secure the energy sources indispensable to the lives of citizens through nuclear energy based on the premise of safety assurance and to create scientific technologies and industries through nuclear energy, JAEA will carry out R&D, from basic and fundamental research to R&D for the application and commercialization of technology, disseminate the outcomes of this research, and thereby contribute to the welfare of human society and to raising the standard of living of Japan's citizens.

Policy framework for JAEA

[National Policy]

Article 7 of Atomic Energy Basic Act*1

"Activities such as basic research and applied research on nuclear energy, the development of fast breeder reactors and the necessary nuclear fuel materials for the purpose of establishing a nuclear fuel cycle, the development of technology for reprocessing, etc. of nuclear fuel materials, as well as the dissemination of the results of such research and development, shall be carried out by the Japan Atomic Energy Agency"

*1 Act No.186 of 1955

Fifth Science and Technology Basic Plan*2
Sixth Science, Technology, and Innovation Basic Plan*3
Basic Policy for Nuclear Energy*4
Basic Policy for Nuclear Research and Development*5
Strategic Energy Plan*6
Plan for Global Warming Countermeasures*7
Long-Term Strategy under the Paris Agreement*8
Green Growth Strategy Through Achieving Carbon Neutrality in 2050*9
etc.

*2 Cabinet Decision of January 2016. *3 Cabinet Decision of March 26, 2021.
*4 Japan Atomic Energy Commission, July 20, 2017.
*5 Decided by Japan Atomic Energy Commission on June 12, 2018.
*6 Cabinet Decision of July 2018. *7 Cabinet Decision of May 2016.
*8 Cabinet Decision of June 11, 2019.
*9 Sixth Committee on the Growth Strategy of December 25, 2020.

[Act on the Japan Atomic Energy Agency, National Research and Development Agency]

Purpose: To contribute to the promotion of research, development and use of nuclear energy to support the welfare of human society and the improvement of the standard of living of Japan's citizens

Operations:
- Basic and applied R&D on nuclear energy
- Operations necessary for technologically establishing the nuclear fuel cycle (development related to fast breeder reactors, reprocessing of nuclear fuel materials, processing and disposal of high-level radioactive waste and associated necessary research, etc.)
- Provision of the Agency's facilities and equipment to external users, development of researchers and technicians related to nuclear energy and improvement of their quality
- Dissemination and promotion of use of achievements, collection, arrangement, and provision of nuclear energy information

[Activities as a Corporation during the present Medium-/Long-Term Objectives Period]

1. Matters concerning business operations with placing top priority on safety
2. Matters concerning maximizing R&D outcomes and raising quality in other areas

(1) R&D pertaining to the response to the accident at TEPCO's Fukushima Daiichi Nuclear Power Station
(2) Technological support for nuclear safety regulation and safety research for this purpose
(3) R&D for improving nuclear safety and activities that contribute to nuclear non-proliferation and nuclear security
(4) Basic and fundamental research and human resources development in the nuclear field
(5) R&D on fast reactors and advanced reactors
(6) R&D related to the nuclear fuel cycle, such as reprocessing, fuel manufacturing and treatment and disposal of radioactive waste
(7) Activities for sector of Tsuruga decommissioning demonstration
(8) Activities to strengthen industry-academia-government collaboration and secure the trust of society

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

JAEA conducts operations 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.

Medium-/Long-Term Objectives

In accordance with Article 35-4 of the Act on General Rules for Incorporated Administrative Agencies, the competent ministers have set forth Medium-/Long-Term Objectives for the seven years from FY2015 to FY2021. FY2020 is the sixth year of that period. The Medium-/Long-Term Objectives are outlined below.

As a national research and development agency and as Japan's sole comprehensive research and development institute in the field of nuclear energy, JAEA is to respond to the accident at TEPCO's Fukushima Daiichi Nuclear Power Station, and work on the improvement of nuclear safety standards, promotion of basic and fundamental research and development of human resources in the nuclear field, R&D on fast reactors and advanced reactors, R&D related to the nuclear fuel cycle such as treatment and disposal of radioactive waste, and activities for nuclear facility decommissioning demonstration, in accordance with the basic policy stipulated in Article 2 of the Atomic Energy Basic Act, the foundation of Japan's nuclear energy policy.

In implementing these R&D activities, and placing utmost priority on safety, JAEA, as a national research and development agency, is to work not only on maximizing R&D outcomes but also on contributing to maximizing R&D achievements in the field of nuclear science and technology through active cooperation and collaboration with universities and industry.

On March 1, 2021, the Medium-/Long-Term Objectives were revised to reflect the investment operations that JAEA obtained the right to conduct from April 2021 following the revision of the Act on Activation of the Creation of Science and Technology Innovation (Act No.63 of 2008), and to reflect the uniform order from the Ministry of Internal Affairs and Communications to formulate a human resources recruitment and development policy in the Guidelines on Objectives Formulation of the Incorporated Administrative Agencies (partial amendment in 2019).

For details, please visit the website below.

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

Medium-/Long-Term Plan

Based on the Medium-/Long-Term Objectives as directed by the Government, and also in conformity with various national energy policies encompassing nuclear energy and science and technology policies such as the "Basic Policy for Nuclear Energy" (decided by the Atomic Energy Commission in July 2017), the "Strategic Energy Plan" (approved by the Cabinet in July 2018) and the "Fifth Science and Technology Basic Plan" (approved by the Cabinet in January 2016), the Medium-/Long-Term Plan of the JAEA describes its operations as follows.

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) R&D pertaining to the response to the accident at TEPCO's Fukushima Daiichi Nuclear Power Station
  2) Technological support for nuclear safety regulation and safety research for this purpose
  3) R&D for improving nuclear safety and activities that contribute to nuclear non-proliferation and nuclear security
  4) Basic and fundamental research and human resources development in the nuclear field
  5) R&D on fast reactors and advanced reactors
  6) R&D related to the nuclear fuel cycle, such as reprocessing, fuel manufacturing and treatment and disposal of radioactive waste
  7) Activities for sector of Tsuruga decommissioning demonstration
  8) Activities to strengthen industry-academia-government collaboration and secure the trust of society
III. Measures to be taken for attaining targets related to enhancing the efficiency of business operations
IV. Measures to be taken for attaining targets related to improving the state of finances
V. Important matters concerning other business operations

For details, please visit the website below.

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

Annual Plan

In accordance with Article 35-8 of the Act on General Rules for Incorporated Administrative Agencies, JAEA, prior to the start of the business year, formulates a plan (fiscal year plan) related to operations for that fiscal year based on the Medium-/Long-Term Plan.

For details, please visit the website below.

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

Board of Executive Directors

The Board of JAEA is composed of the President, the Vice President, six Executive Directors and two Auditors. The President represents JAEA in all aspects and is responsible for the overall management of JAEA, while the Vice President assists the President and acts on his/her behalf when deemed necessary or appropriate. The Executive Directors share the responsibilities of divisional management assigned to them with their strong and abundant experience and knowledge, and the Auditors audit the overall work of JAEA.

(as of March 31, 2021)

President
KODAMA Toshio

Career Outline
April 2015: President, Japan Atomic Energy Agency (JAEA)
February 2015: Vice President, Director General of Technology Management, Mitsubishi Heavy Industries (MHI) (Resigned March 2015)
June 2013: Managing Executive Officer, Director General of Technology Management, MHI
April 2009: Executive Officer, Deputy Director General of Technology Headquarters, MHI
April 1976: Joined Takasago Research Center, Technology Headquarters, MHI

Executive Vice President
ITO Yoichi

Career Outline
April 2019: Executive Vice President, JAEA
July 2017: Senior Deputy Minister of Education, Culture, Sports, Science and Technology, Ministry of Education, Culture, Sports, Science and Technology (MEXT)
January 2016: Director-General, Science and Technology Policy Bureau, MEXT
August 2015: Assistant Minister for Policy Coordination, MEXT
January 2012: Executive Director, JAEA
July 2010: Deputy Director-General, Lifelong Learning Policy Bureau, MEXT
January 2001: Director, Private School Department, Higher Education Bureau, MEXT
April 1982: Joined Science and Technology Agency

Executive Director
AOTO Kazumi*

Career Outline
March 2021: Retired from JAEA
April 2015: Executive Director, JAEA
October 2014: Director General, Prototype Fast Breeder Reactor Monju, Sector of Fast Reactor Research and Development, JAEA
April 2014: Deputy Director General, Fast Breeder Reactor Research and Development Center, Tsuruga Head Office, JAEA
April 2013: Director General, Advanced Nuclear System Research and Development Directorate, JAEA
April 2010: Deputy Director General, Advanced Nuclear System Research and Development Directorate, JAEA

Executive Director
MIURA Yukitoshi*

Career Outline
March 2021: Retired from JAEA
April 2015: Executive Director, JAEA
October 2013: Director, Office of Monju Reorganization, Monju Reorganization Headquarters, JAEA
April 2010: Supreme Researcher/Director, Policy Planning and Administration Department, JAEA

Executive Director
YAMAMOTO Tokuhiro*

Career Outline
March 2021: Retired from JAEA
April 2017: Executive Director, JAEA
April 2015: Director General, Nuclear Fuel Cycle Engineering Laboratories, JAEA
April 2014: Deputy Director General, Nuclear Fuel Cycle Engineering Laboratories, JAEA
April 2010: Director, Technology Development Department, Tokai Reprocessing Technology Development Center, Nuclear Fuel Cycle Engineering Laboratories, Tokai Research and Development Center, JAEA

Executive Director
NODA Koichi*

Career Outline
March 2021: Retired from JAEA
April 2017: Executive Director, JAEA
April 2015: Vice President, National Institute of Technology and Evaluation
September 2013: Director, Decommissioning and Contaminated Water Management Office, Nuclear Emergency Response Headquarters, Cabinet Office
August 2012: Director, Nuclear Facilities Development and Nuclear Fuel Cycle Industry Division, Electricity and Gas Industry Department, Agency for Natural Resources and Energy
April 1986: Joined Ministry of International Trade and Industry

Executive Director
SUDO Kenji

Career Outline
April 2019: Executive Director, JAEA
January 2018: Director, National Space Policy Secretariat, Cabinet Office
April 2016: Director, Department of General Affairs, National Institutes for Quantum and Radiological Science and Technology
April 2014: Professor, Tokyo University of Agriculture and Technology
August 2012: Deputy Director General, Research Strategy Department, Japan Aerospace Exploration Agency
July 2009: Director for Resource Allocation, Bureau of Science, Technology and Innovation, Cabinet Office
April 1989: Joined Science and Technology Agency

Executive Director
YOSHIDA Kunihiro

Career Outline
July 2020: Executive Director, JAEA
June 2019: Senior Executive Officer, Deputy Executive General Manager, in charge of Tsuruga Head Office, Japan Atomic Power Company (JAPC)
June 2016: Senior Executive Officer, Deputy Executive General Manager, in charge of Tsuruga Head Office and General Manager of Community Relations & Co-operation Dep., JAPC
June 2015: Senior Executive Officer, Acting Executive General Manager, in charge of Tsuruga Head Office and General Manager of Community Relations & Co-operation Dep., JAPC
June 2014: Executive Officer, Deputy Executive General Manager, in charge of Tsuruga Head Office and Superintendent of Tsuruga Plant Construction Arrangements Office, JAPC
June 2012: Senior General Manager, Deputy Executive General Manager, in charge of Tsuruga Head Office and Superintendent of Tsuruga Plant Construction Arrangements Office, JAPC
July 2010: Acting General Manager, Decommissioning Project Department, JAPC
July 1997: Manager, Projects Development Department, JAPC
April 1980: Joined JAPC

Auditor
TANAKA Teruhiko

Career Outline
September 2019: Auditor, JAEA
July 2018: Representative, Tanaka Teruhiko Audit Firm
May 2002: Representative partner, Shinwa Audit Corporation
October 1979: Joined Shinwa Audit Corporation (currently KPMG AZSA LLC.)

Auditor (Part Time)
AMANO Reiko

Career Outline
September 2019: Auditor, JAEA
October 2014: Deputy Director-General, Innovation Center for Meteorological Disaster Mitigation and Research Center for Disaster Resilience, National Research Institute for Earth Science and Disaster Resilience
February 2014: Dedicated Officer, Intellectual Property and License Department, Kajima Corporation
April 2011: Manager, Intellectual Property and License Department, Kajima Corporation
April 2005: Manager, Civil Engineering Technology Department, Civil Engineering Management Division, Kajima Corporation
March 2004: Institute of Industrial Science, The University of Tokyo Visiting Professor
April 1980: Joined Kajima Corporation

Newly appointed Members of the Board of Executive Directors

(appointed April 1, 2021)

Executive Director
MIURA Nobuyuki

Career Outline
April 2021: Executive Director of 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
April 2014: Director of Technology Development Department, Tokai Reprocessing Technology Development Center, Nuclear Fuel Cycle Engineering Laboratories, Sector of Decommissioning and Radioactive Waste Management, JAEA
May 2011: Director of Vitrification Technology Development Department, Tokai Reprocessing Technology Development Center, Nuclear Fuel Cycle Engineering Laboratories, Tokai Research and Development Center, JAEA
July 2006: Senior Principal Engineer of Nuclear Fuel Cycle Technology Development Directorate

Executive Director
OHSHIMA Hiroyuki

Career Outline
April 2021: Executive Director of JAEA
April 2018: Deputy Director General of Oarai Research and Development Institute and Director General of Fast Reactor Cycle System Research and Development Center, Sector for Fast Reactor and Advanced Research and Development, JAEA
April 2014: Director of Fast Reactor Computational Engineering Department, Advanced Fast Reactor Cycle System Research and Development Center, Sector of Fast Reactor Research and Development, JAEA
July 2011: Deputy Director of JSFR Systems Development Planning Office, Advanced Nuclear System Research and Development Directorate, JAEA
July 2010: Senior Principal Researcher of Advanced Nuclear System Research and Development Directorate, JAEA

Executive Director
OIGAWA Hiroyuki

Career Outline
April 2021: Executive Director of 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
April 2014: Deputy Director of Office of Strategic Planning, JAEA
October 2010: Director of Research Co-ordination and Promotion Office, Nuclear Science and Engineering Directorate, JAEA
July 2010: Senior Principal Researcher of Nuclear Science and Engineering Directorate, JAEA

Executive Director
FUNAKI Kentaro

Career Outline
April 2021: Executive Director of 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

* The following four Executive Directors retired from JAEA on March 31, 2021.
1. AOTO Kazumi 2. MIURA Yukitoshi 3. YAMAMOTO Tokuhiro 4. NODA Koichi

Governance

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

Operations item in the Medium-/Long-Term Plan	Competent ministers: Minister of Education, Culture, Sports, Science and Technology	Competent ministers: Minister of Economy, Trade and Industry	Competent ministers: Nuclear Regulation Authority
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. R&D pertaining to the response to the accident at TEPCO's Fukushima Daiichi Nuclear Power Station	●	●	● *
2. Technological support for nuclear safety regulation and safety research for this purpose	●		● *
3. R&D for improving nuclear safety and activities that contribute to nuclear non-proliferation and nuclear security	●	●	● *
4. Basic and fundamental research and human resources development in the nuclear field	●		● *
5. R&D on fast reactors and advanced reactors	●	●	● *
6. R&D related to the nuclear fuel cycle, such as reprocessing, fuel manufacturing and treatment and disposal of radioactive waste	●	●	● *
7. Activities for sector of Tsuruga decommissioning demonstration	●	●	● *
8. Activities to strengthen industry-academia-government collaboration and secure the trust of society	●	●	
III. Measures to be taken for attaining targets related to enhancing the efficiency of business operations	●	●	
IV. Measures to be taken for attaining targets related to improving the state of finances	●	●	
V. Important matters concerning other business operations	●	●	

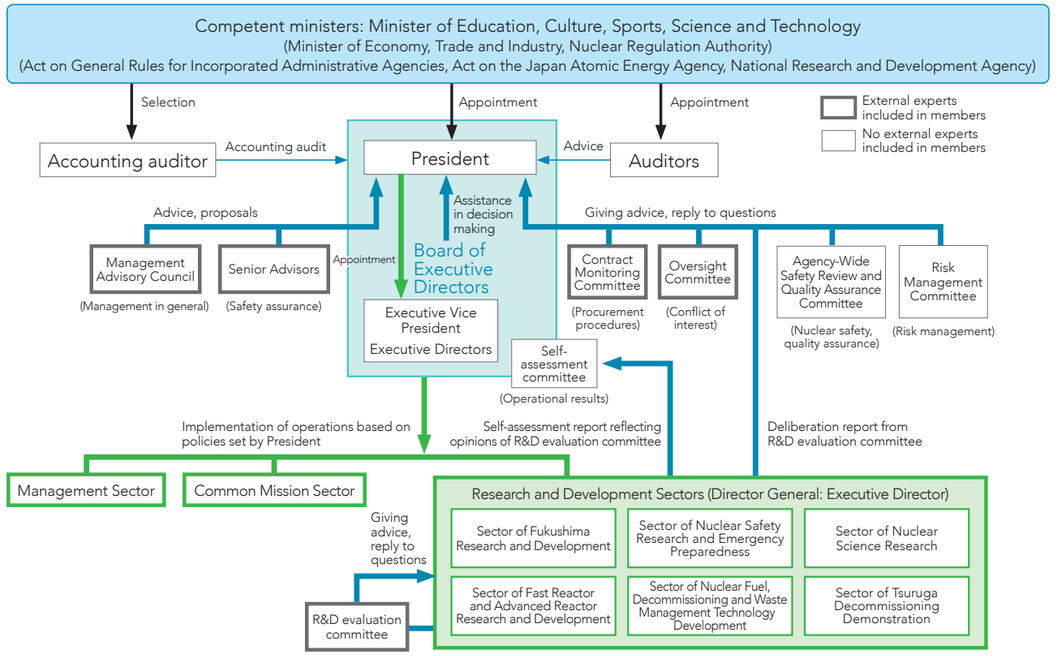
* (Safety assurance matter)

JAEA's Governance System

The figure below shows JAEA's governance system.
In accordance with the partial amendment of the Act on General Rules for Incorporated Administrative Agencies in 2014, we changed the format of our statement of operation procedures in 2015. Following the change, JAEA's statement of operation procedures now sets out the rules for decision making led by the President, the internal control promotion system, auditing by auditors, and other relevant systems as a framework to ensure the conformity of the execution of duties by the directors and employees of JAEA 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 the details of the changes to the internal control system, please read our statement of operation procedures.
(https://www.jaea.go.jp/about_JAEA/business_plan.html (in Japanese))

JAEA's Governance System



Net Assets, Sources of Revenue

Net Assets

(1) Capital Stock

(¥ million)

Items	Starting balance	Increase in the fiscal year	Decrease in the fiscal year	Ending balance
Government investment	802,232	0	727	801,505
Private investment	16,292	0	0	16,292
Total capital stock	818,524	0	727	817,797

The capital stock (government investment) at the end of FY2020 was 801,505 million yen, of which the general account accounted for 278,410 million yen and the power usage account for 523,094 million yen.

(2) Appropriated Retained Earnings, etc.

In the burial disposal business account, a gross profit of 2,496 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 over from the previous Medium-/Long-Term Objectives period is a reversal of 87 million yen, an amount equivalent to the cost incurred in FY2020 proportional to the accounting profit (general account of 3,442 million yen) that was recorded prior to the Second Medium-Term Objectives period and carried over to the Third Medium-/Long-Term Objectives period after obtaining approval from the Competent Ministers.

Sources of Revenue

(1) Breakdown of Sources of Revenue

JAEA's main income is funding from the national treasury, namely government funding for operational grant (132,103 million yen) and subsidies (18,178 million yen). In addition, as self-generated income, JAEA acquired competitive funds (364 million yen) through active applications and obtained external funds (11,542 million yen) from government-related organizations for contracted research and other research activities.

(2) Explanation of Self-Generated Income

JAEA worked to secure new self-generated income by identifying research needs at external organizations, including conclusion of income-generating joint research contracts and active application to competitive research funds.

JAEA's main self-generated income is:

- Contracted research (11,542 million yen)
- Competitive research funding (364 million yen)
- Joint research (154 million yen)
- External use of facilities (142 million yen)

JAEA's Budget Structure and its Evolution

○ JAEA has large-scale research facilities such as research reactors. These are operated and maintained with the highest priority on safety.

Currently, the Static Experiment Critical Facility (STACY), High Temperature Engineering Test Reactor (HTTR), Experimental Fast Reactor Joyo, and other facilities are being prepared for resumption of operation. We will aim to create the unique research results that only JAEA can produce in these facilities.

<Examples of operating and maintenance costs>
- Maintenance and inspection costs ・Utility costs
- Fuel production costs ・Operation to manage negative-pressure
- Installation and maintenance of nuclear material protection systems

○ We proceeded with decommissioning based on the Medium-/Long-Term Management Plan for JAEA Facilities formulated in 2017 (P.16).

The decommissioning of large-scale nuclear facilities such as Monju, Fugen and the Tokai Reprocessing Plant can reduce the total cost. But this decommissioning itself requires a large expenditure.

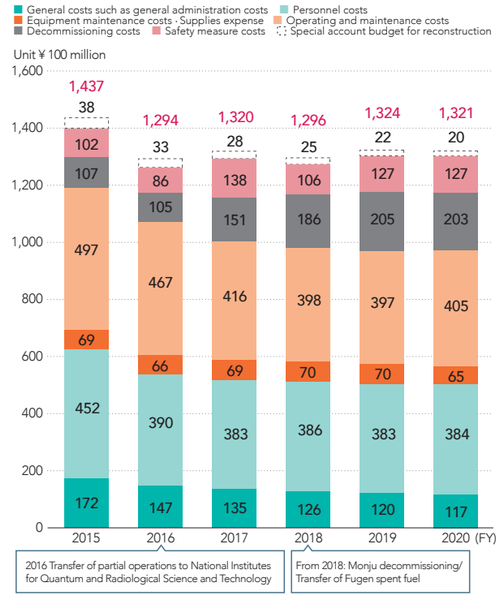
The decommissioning budget has increased under the 3rd Medium-/Long-Term Plan. Decommissioning is an urgent issue and one of JAEA's main operational tasks.

< Examples of decommissioning costs>
- Treatment costs of spent fuel
- Dismantling costs of reactor peripheral facilities
- Retained earnings for waste disposal costs

○ Many safety measures to meet the new standard have been introduced since the Great East Japan Earthquake of March 11, 2011. Measures to deal with aging facilities have also been pursued to prevent a nuclear disaster.

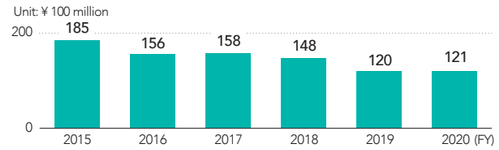
<Examples of safety measure costs>
- Construction costs for tsunami countermeasures
- Costs of seismic strengthening work, construction costs for tornado countermeasures
- Installation of water supply and power feeding system
- Updating of aged piping equipment

Government funding for operational grant
3rd Medium-/Long-Term Plan



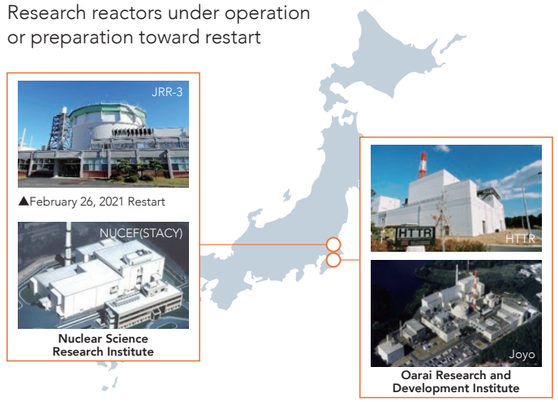
The change between 2015 and 2016 was caused by the establishment of the National Institutes for Quantum and Radiological Science and Technology.

Revenues from contract, etc.



○ Furthermore, we have been striving to secure external funds such as revenues from contract, etc. in addition to government funding for operational grants, which are the basic revenue source.

Research reactors under operation or preparation toward restart



Major decommissioning plans

Decommissioning process of Monju
March 2018 Approval of decommissioning plan
2018 - 2022 Fuel unloading


Monju

Decommissioning process of Fugen
2018 - 2026 Transfer of spent fuels
2033 Completion of decommissioning


Fugen


Dismantling of reactor peripheral facilities

Initiatives/Challenges for Sustainable Utilization of Nuclear Science and Technology

Approach to "Nuclear Legacy"

More than 60 years has passed since the Atomic Energy Basic Act of Japan came into effect in 1955, and various facilities have completed their mission and are moving to the decommissioning stage. Efforts to address back-end issues have therefore become important.

JAEA has various facilities which have supported R&D on nuclear science and technology and have completed their mission. We also have various types of radioactive waste generated through R&D. It is essential for us to steadily work on the nuclear legacy, radioactive waste management, and decommissioning evolution in order to gain the trust of society and make nuclear science and technology sustainable well into the future.

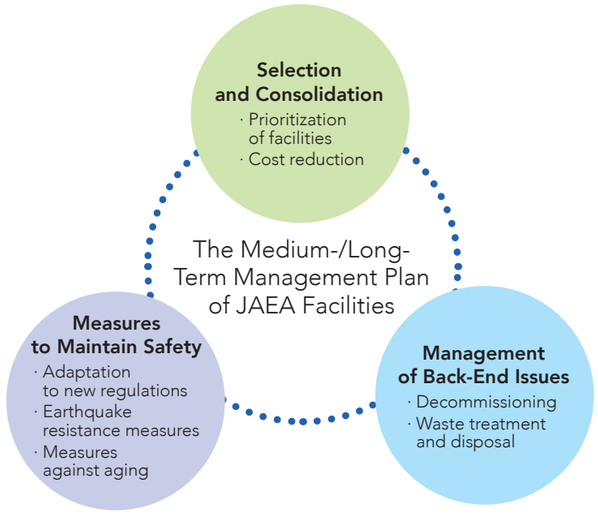
Management of radioactive materials: Aiming to promote more efficient means of radioactive waste treatment and disposal, we will conduct R&D on the reduction of the volume and radiotoxicity of radioactive waste through partitioning and transmutation technology.

Decommissioning evolution: We will optimize the entire process of decommissioning including technology development, and steadily advance with the safe, speedy, and efficient decommissioning of our various retired facilities using state-of-the-art technologies.

Medium-/Long-Term Management Plan for JAEA Facilities

JAEA issued the Medium-/Long-Term Management Plan for JAEA Facilities on April 1, 2017, in order to maximize the use of resources and maintain and develop R&D functions in the future. This comprehensive plan focuses on three objectives: selection and consolidation of JAEA's nuclear facilities; measures to maintain the safety of facilities; and management of back-end issues. The Medium-/Long-Term Management Plan for JAEA Facilities is updated every fiscal year based on progress. JAEA completed its response to the new regulatory standards for the JRR-3 research reactor in FY2020 and resumed its operation in February 2021 in order to promote neutron science research. In view of the suspension of the vitrification of high-level radioactive liquid waste, JAEA regards safety measures for high-level radioactive liquid waste storage facilities as a management issue to be urgently addressed, and began work on improving safety measures at the storage facility at the Tokai Reprocessing Facility in FY2019. In addition, measures for aging and back-end measures were implemented largely as planned.

* For details of the Medium-/Long-Term Management Plan for JAEA Facilities, please see https://www.jaea.go.jp/about_JAEA/facilities_plan/ (in Japanese)



Status of Environmental Impact Reduction Activities

Environmental Management

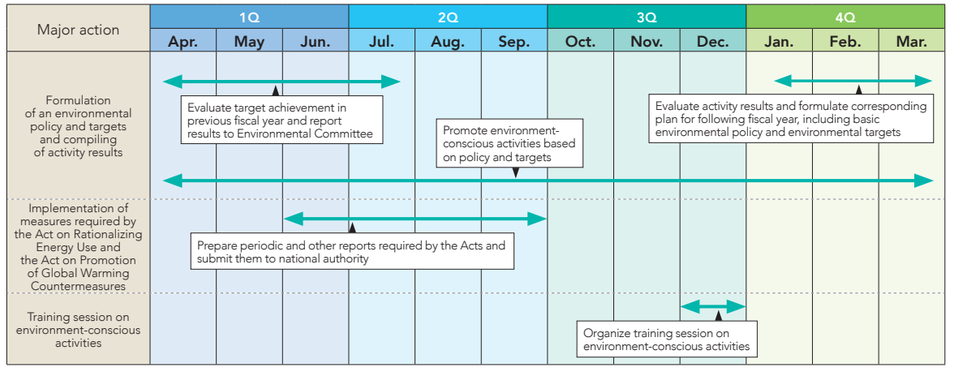
JAEA regards consideration for the environment as a high priority in its operations, and has formulated Rules on Environmental Management. In addition, under the basic environmental policy, we set environmental targets and proactively undertake environment-conscious activities.

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.

* For the basic environmental policy, please visit the JAEA website. https://www.jaea.go.jp/about_JAEA/safety/ (in Japanese) (Safety assurance activities page)

The chart below shows how we plan and implement our environment-conscious activities in each fiscal year. The activity results undergo review by the relevant committees, including the Environmental Committee, and are incorporated into the following year's basic environmental policy and environmental targets.

Results of FY2020 Environment-Conscious Activities



Training Session on Environment-Conscious Activities

Every year, JAEA invites an external lecturer to give training and hosts a meeting to encourage an exchange of views. These training sessions are expected to serve the purpose of promotion and active implementation of environment-conscious activities propelled by JAEA bases and other related organizations and improvement of the skills of relevant personnel.

Status of Training Session on Environment-Conscious Activities

Initiatives to Promote Energy-Saving Activities

Japan Atomic Energy Agency (JAEA) promotes environment-conscious activities for energy conservation. JAEA's research institutes* at six locations are designated Energy Management Factories under the Act on the Rational Use of Energy (hereinafter "Energy Conservation Act"). Accordingly, these research institutes promote energy-saving activities in line with Medium-/Long-Term Plans drawn up based on the Energy Conservation Law. 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

Consideration for the Environment

In accordance with "the Act on Promotion of Contracts of National Governments and Other Entities Involving Due Care for Reduction of Greenhouse Gas Emission," JAEA works continuously for environment-conscious agreements and procurement and on other activities relating to the input materials required for its operations. Additionally, JAEA sites proactively implement initiatives to improve and beautify the environment inside and outside their compounds, such as planting trees and flowers, weeding, and cleaning up.

JAEA implements its operations in an environment-conscious manner with a strong awareness of its corporate social responsibility.

* For detailed information on environment-conscious activities, please visit the JAEA website (Environmental Information). https://www.jaea.go.jp/about_JAEA/environment/ (in Japanese)

Status of Risk Management

JAEA implements risk management activities to reduce and prevent potential risks, including compliance risk and incidents at nuclear power facilities.

Risk Management Activities

Following the FY2019 case of theft by a service contract worker in the Nuclear Fuel Cycle Engineering Laboratories, in FY2020 JAEA steadily implemented risk management activities prioritizing security, further strengthening governance of contractors and reducing risks by identifying, analyzing and assessing them and taking measures based on the assessment.

Compliance training
(Fukushima Head Office)

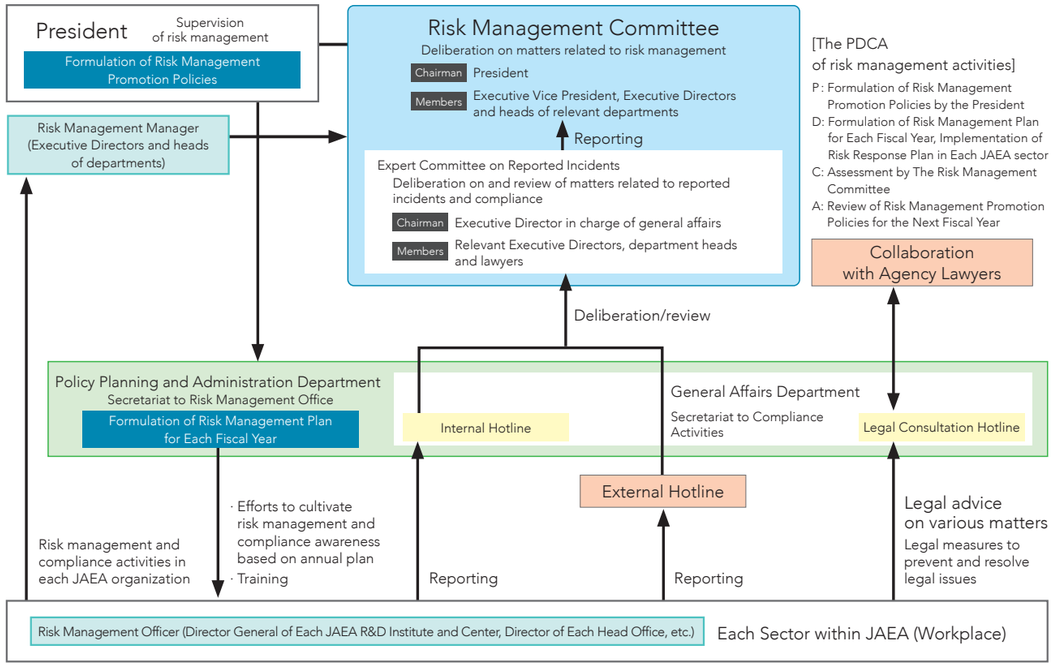
Compliance Activities

In FY2020, JAEA utilized effectively a Compliance Guidebook based on internal incidents and the instructional materials of other agencies produced in FY2019. Compliance training was provided for new recruits and employees newly promoted to managerial level (3 courses with 232 participants in total) and interdepartmental training sessions were held (545 participants in total) as part of activities to confirm and consolidate compliance awareness.

We also worked to raise compliance awareness through other activities, such as participating in the National Research and Development Agency Council's compliance expert committee and the compliance promotion month organized by the committee.

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

Organizational Chart of JAEA Risk Management Activity



Appropriate Contracting Practice (Ensuring Fairness, Transparency and Efficiency)

JAEA formulates a Procurement Rationalization Plan*1 for each fiscal year. According to this plan, we implement the plan-do-check-act (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

Check

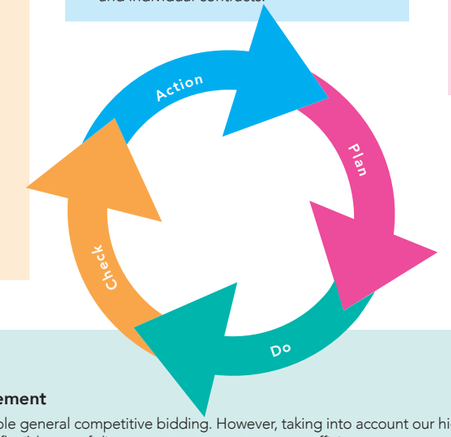
Rigorous Review and Monitoring Systems

- To promote competitive contracts and select appropriate companies to invite bids from, potential contracts undergo prior review by the Contract Review Committee, whose members include external experts. This review checks the reasons for using single tendering and whether competitive bidding is indeed unfeasible.
- The Contract Monitoring Committee, which comprises the Auditors of JAEA and external experts, checks the implementation progress of the Procurement Rationalization Plan and carries out follow-up inspections of individual contracts.

Action

Incorporation of Inspection Results into Following Year's Plan

- To ensure fair contracts, we incorporate the results of follow-up checks and inspections into the following year's plan and individual contracts.



Plan

Procurement Rationalization Plan

- We formulated the FY2020 Procurement Rationalization Plan in June 2020 through review and approval by the Contract Monitoring Committee*4.

Do

Implementation of Efficient Procurement

- Our main tool for procurement is in principle general competitive bidding. However, taking into account our highly specialized R&D operations that require a high level of expertise, we make flexible use of diverse contract types to ensure efficient procurement that is also fair and transparent.

Efforts to Ensure Competitive Opportunities in Contracting Process

- When conducting bidding, we strive to provide competitive opportunities to participants by not imposing unnecessarily strict entry conditions, creating easy-to-understand specifications, providing a sufficient public notice period and posting our annual procurement plan on our website.
- We also make efforts to increase the number of bid participants. As part of these efforts, we conduct questionnaire surveys to ask companies that did not participate in the bidding about their reasons for not taking part. We post on our website "JAEA bid participation guide" that explains the procedure for participating. For contracts involving a large amount of money, we hold a bidding briefing session in advance to promote understanding of our specifications.

Efforts to Prevent Embezzlement

- An e-learning-based education and awareness campaign for all employees was conducted as a measure to prevent collusive rigging involving government agencies.

*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)

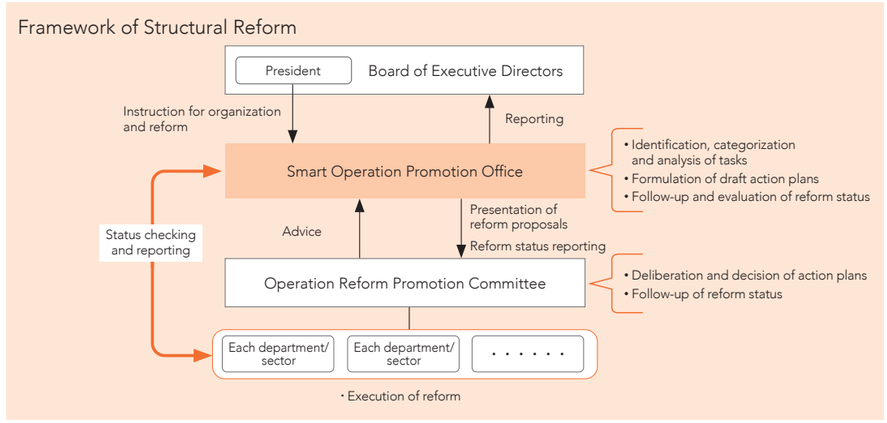
Measures against New Coronavirus Infection

In February 2020, JAEA established the JAEA Novel Coronavirus Response Headquarters led by the President, which decides on action to be taken based on the policy of the national government and requests from local governments. Under this system, JAEA continues its operations while taking all necessary infection prevention and control measures and adapting to the new lifestyle, including new ways of working such as working from home, staggered commuting hours, and online meetings. Specifically, JAEA sites that have a nuclear facility have established a business continuity plan to ensure the safety of the facilities in emergencies and implemented site-specific measures including restriction of entry to the central control room and dividing up the interior of commuting buses and common-use areas (e.g. canteens).

Operation Reform

Promotion of Structural Reform under Strong Leadership of President

In order to steadily resolve its urgent management challenges, JAEA has been working on structural reform under the President's firm determination and leadership toward JAEA reform, with the core role played by the Smart Operation Promotion Office established in April 2019 as a control tower to promote specific activities.



Necessity of Structural Reform

JAEA's environment is full of operational challenges, including aging facilities and equipment, increasing workload in waste management and decommissioning, and a decreasing trend in the R&D budget and staff numbers. To overcome these issues, it is imperative for JAEA to continue with reform by promoting elimination of inefficient or wasteful activities, operational efficiency improvement and operational consolidation, introduction of IT, and other initiatives.

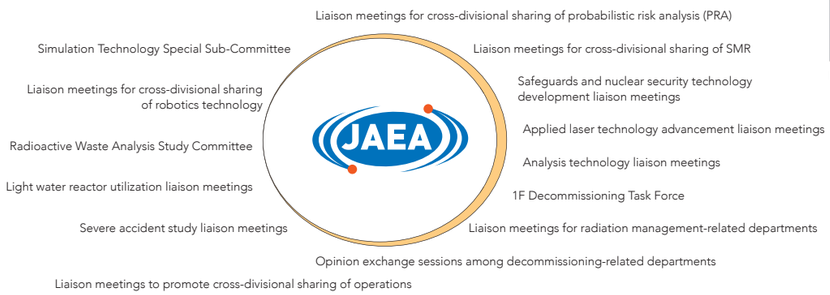
Execution and Reform Action Plans

Based on the outcome of activities pursued in FY2019, we summarized the reform challenges to be tackled in FY2020, adding newly raised issues and tasks identified in employee opinion exchange sessions and other opportunities.

Regarding challenges, we set priorities, formulate action plans clarifying "who" does "what" and "by when," and work as one on reform activities through cooperation with relevant departments.

In promoting JAEA reform we quantify the outcome of activities where possible and adjust Action Plans as appropriate based on progress checking by the Operation Reform Promotion Committee and opinions gathered from staff.

Motivation-raising campaign poster



Evaluation of Activities in FY2020 and Future Activities

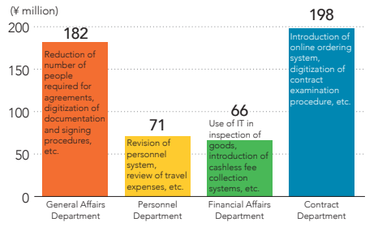
FY2020 saw much progress and achievement in activities, as shown in the table below, which fostered the spread of reform. In particular, "Reform of employee awareness" and "Downsizing of operations and cost reduction" yielded major results in consequence of efforts focused on priority items.

Meanwhile, some tasks are still in need of continuous effort. In FY2021, we will boost our activities to attain even further quantifiable achievements.

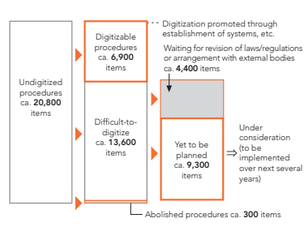
List of Status and Achievement of Major Reform Tasks in FY2020

Category of task	Main activity item	Main achievement
Reform of employee awareness	• Motivation raising • Business operations focused on customers and cost economy	• Motivation Raising Campaign implemented. Employee motivation was raised through facility tour and opinion exchange sessions (36 facilities, 230 participants), inter-organization opinion exchange sessions (118 organizations participated), etc. • JAEA staff made posters "What is a customer?" and "Personnel cost" to raise awareness.
Removal of vertical divisions	• Promotion of cross-divisional sharing of operations	• Liaison meetings to promote cross-divisional sharing of technology and operations were held for a total of 13 items. (Liaison meetings were held for 4 additional items.)
Downsizing of operations	• Job streamlining and introduction of information technology • Review of documentation procedures • Introduction and spreading of RPA	• Administrative departments (General Affairs, Personnel, Financial Affairs, and Contract Departments) formulated and are currently implementing a plan for job streamlining, introduction of information technology, etc. A total cost reduction of 520 million yen per year* is expected. • Regarding documentation, which uses over 20,000 written forms, transition to electronic forms is in progress with the aim of full conversion to electronic format. • Robotic Process Automation (RPA) was implemented for 15 items, which is expected to save approximately 1,600 hours of labor per year.
Omnidirectional cost reduction	• Cost reduction through hearings • Rationalization of administrative expenses	• Guidance on cost reduction, etc. was given in contract hearings at all JAEA bases, which led to a total cost reduction of approximately 220 million yen across 20 items. • A total cost reduction of approximately 14 million yen per year was realized through review of the lease lot area of liaison offices, reduction of the number of company-owned cars, reduction of the number of photocopiers and fax machines, and other measures.
Streamlining of human resources-related operations	• Appropriate personnel procurement • Fluidization of same-type workforce	• The employment method for new graduate engineering positions was changed to an agency-wide engineer and developer recruitment system (centralized recruitment process) to secure a wider variety of human resources. • In the fields of safety and radiation management, nuclear material management, construction and engineering works, and waste management and decommissioning, initiatives to encourage exchanges among same-type human resources and personnel pooling are being implemented.
Exit strategy	• External dissemination of technology seeds	• New technology information sessions and JAEA technology salons are being held to promote external dissemination of technology seeds.
Management reform	• Acceleration of decision making	• Regarding organizational downsizing, JAEA decided to discontinue 57 small organizations with less than 10 members each (of which 49 were dissolved at the end of FY2020) to secure managerial grade human resources.

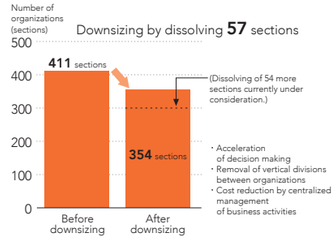
* Includes reduction in personnel expenses (including indirect expenses) calculated at a rate of 8,000 yen per hour.



Cost reduction through job streamlining, etc.



Digitization of documentation procedures



Organizational downsizing

Public Consultation, Public Relations and Information Disclosure

JAEA ensures the transparency of its operations by proactively communicating facility safety and other information in addition to disseminating the outcomes of its R&D activities. At the same time, JAEA works to foster mutual understanding with local communities and society as part of its efforts to earn their trust through dialog activities, such as participation in exhibition events. JAEA has also promoted many online activities during the COVID-19 pandemic.

Prompt and Proactive Provision and Disclosure of Information and Transparency

JAEA actively provides and discloses information. In doing so, we try to make information easy and clear to understand by converting it to knowledge and incorporating risk communication techniques. When disseminating R&D results and information at exhibition events, we use both paper media such as public relations magazines and electronic media such as social networking services (SNS) and utilize video clips and effective photographs where possible to help people understand the content of research that may otherwise appear distant from daily life. Meanwhile, in the event of an accident or a problem, JAEA distributes information prioritizing promptness and accuracy.

Twitter to introduce PR magazines

https://twitter.com/JAEA_en

Twitter to introduce R&D results by video clips

Science Cafés and Open Facility Days

JAEA promotes direct dialog with all interested parties through exhibitions to disseminate its research outcomes and participation in educational events such as science experiment classes and science cafés. JAEA also conducts facility tours through online video clips to provide the public with the opportunity to directly observe and learn about its operations, together with the opportunity to talk directly with researchers.

Web-Based Exhibition "Science AGORA"

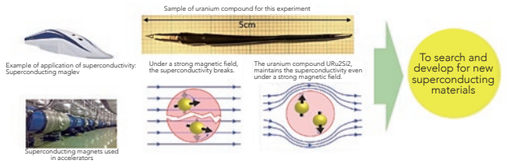
Technology Exhibition Event

Information Disclosure

JAEA responds promptly and appropriately to disclosure requests as provided for in the Act on Access to Information. JAEA also works to confirm the objectivity and transparency of its operations, including through the operation of a Public Information Committee composed of external experts to verify the proper operation of its information disclosure system. (https://www.jaea.go.jp/about_JAEA/information_disclosure/ (in Japanese))

Timely and Appropriate Press Releases and Accurate and Easy-to-Understand Information Dissemination

JAEA periodically holds lecture sessions on how to write press release documents for its staff and encourages creative expression to convey the writer's intent, aiming to improve the rate of documentation. We have also opened a page on the JAEA website and on social networking sites containing an abstract version of press releases written in an easy-to-understand manner. (https://www.jaea.go.jp/study_results/representative/ (in Japanese))



Introducing JAEA's R&D outcome in an easy-to-understand manner.

Briefings on Activity Results

At the FY2020 session of the JAEA annual symposium, held under the conditions of the COVID-19 pandemic, JAEA provided a real-time online streaming service and had many more listeners than in previous years. Around the main theme "Shaping Innovation – Aiming for A New Revolution," JAEA's efforts towards innovation and nuclear utilization in the SDGs were presented. During the "Talk Session," issues relating to nuclear energy R&D under COVID-19 conditions and the expectations from JAEA innovation were raised by well-informed members of the public.

JAEA annual symposium

Initiatives for Industry-Academia-Government Collaboration

As well as giving back R&D results to society, JAEA launches initiatives that generate innovation. These include R&D projects based on industry-academia-government collaboration, transfer of patents and other intellectual property, shared use of facilities, and dissemination of information on research results such as academic papers.

In FY2020, we carried out 226 new joint research projects and 117 contract research projects with various bodies such as the government, universities and private companies. In addition, 116 shared-use programs were conducted at JAEA-owned facilities. Since 2018, we have hosted the JAEA Technology Salon, where researchers give presentations on advanced technologies and discuss with external experts issues in their practical application and the possibility of commercialization. By inviting private companies from outside the nuclear field to attend, we aim to promote interdisciplinary research and the use of R&D results. Indicative of the event's success is that we have been contacted for technical consultation on joint research by private companies with which we had never had contact before. In FY2020, the JAEA Technology Salon was scheduled to be held twice, in Tokyo and Osaka, but to prevent the spread of COVID-19, both events were held online.

At various other exhibitions sponsored by organizations other than JAEA, we introduced JAEA's intellectual property and technologies and actively promoted their transfer to private companies. We also put in place a system to promote joint research with private companies for the practical application of intellectual property owned by JAEA.

In addition to the above, in FY2020, we actively promoted open innovation, and open science initiatives, continuing the program for shared use by industry of large-scale research facilities, and researching a framework for the management and sharing of research data based on the JAEA Data Policy.

The JAEA's R&D results (approximately 110,000 items in total), including academic papers and patents released by JAEA, can be viewed on the JAEA Originated Papers Searching System (JOPSS).

* For details of industry-academia-government collaboration and the dissemination of R&D results, please see the JAEA website: https://tenkai.jaea.go.jp (in Japanese)

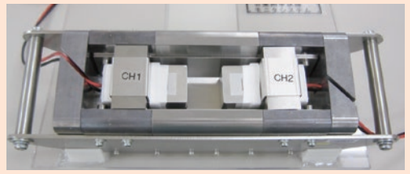
Shared-use program for 11 major research facilities

JAEA Technology Salon (online)

TOPICS

Some of the technologies introduced at the JAEA Technology Salon 2020

- Corrosion-resistant pump for stable supply of solutions that easily produce precipitates
- Environmental cleanup by "Super Nano Bone," an adsorbent made from food waste bones
- Metallic element adsorbent able to select particle size and pore diameter
- Seismic risk assessment technology for large-scale facilities
- Small and easy-to-handle radiation monitor for iodine thyroid dose
- Material analysis technology using synchrotron radiation
- Consolidating knowledge and expertise for the decommissioning of Fukushima Daiichi Nuclear Power Station
- JAEA's decommissioning-related technology needs



Small iodine thyroid dose monitoring system

In particular, "Super Nano Bone*," with its unexpected combination of the topics "pig bones" and "nuclear," achieved more than 60,000 views in 4 days after being posted on social media and was featured in terrestrial news programs.

* This hazardous metal adsorbent, made from food waste such as beef and pork bones, was developed with a focus on strontium's tendency to accumulate in bone. It has significantly higher adsorption performance than the natural zeolite adsorbent currently in use.

Redefining the Organizational Concept and Securing/Training Human Resources

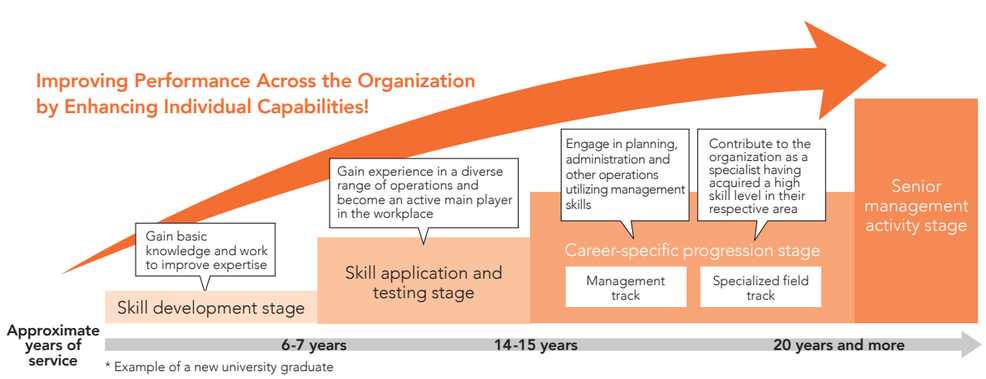
With a view to maximizing R&D outcomes and carrying out efficient operations, JAEA has formulated a Human Resources Policy which sets out the ideal employee profile and includes related career path policies. By increasing employee motivation and improving their qualifications and capabilities in this way, JAEA is promoting human resource development in a systematic and organized manner.

Ideal JAEA Employee Profile

(1) Persons who understand JAEA's management philosophy and can implement it in a reliable and self-motivated 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 role within the organizational structure and demonstrate a high level of expertise while collaborating with others

Career Path Policies

JAEA formulates organizational training plans that reflect the actual circumstances of individual organizations. Based on the organizational training plans, JAEA formulates a personal training plan for each staff member and holds annual training interviews to provide follow-up and career path adjustment as necessary. In this way, JAEA endeavors to assist employees in developing a unique career that fits individual skills and aptitude and works to improve the capabilities of each employee and translate the outcomes into improved performance for the entire organization.



Research positions

Conduct original and innovative R&D to carve out the future of nuclear energy

Example activities: Support for acquisition of doctoral degree; basic training for research positions; seminars on methodology for drafting research papers; support for presentations at academic conferences; dispatch to overseas research and other organizations and overseas nuclear study programs; utilization of cross-appointment system.

Administrative positions

Contribute to smooth execution of JAEA operations and serve as bridge between specialists and society

Example activities: Experience of different administrative operations through job rotation system; transfer to international organizations or overseas offices and temporary assignment to central government ministries and agencies; improvement of expertise through participation in external seminars.

Engineering positions

Play active role as engineer, engaging in latest technology development and operating cutting-edge facilities

Example activities: On-the-job training by senior colleagues at nuclear facilities; encouragement of acquisition of government-sanctioned qualifications and nurturing of legally required chief engineers; dispatch to overseas research and other organizations and overseas nuclear study programs.

Various training programs

Activities to develop capabilities as a group of specialists trusted by society

Example activities: Training for new employees; training for mid-career employees; training for employees promoted to managerial positions; basic and applied courses in nuclear energy; practical business language training.

Framework of Employee Development

Our efforts to promote human resource development in a well-planned and systematic manner comprise on-the-job training, which provides guidance in each workplace on carrying out duties, and off-the-job training to complement on-the-job training.

Operations Respecting Individual Employees

Promotion of Work-Life Balance

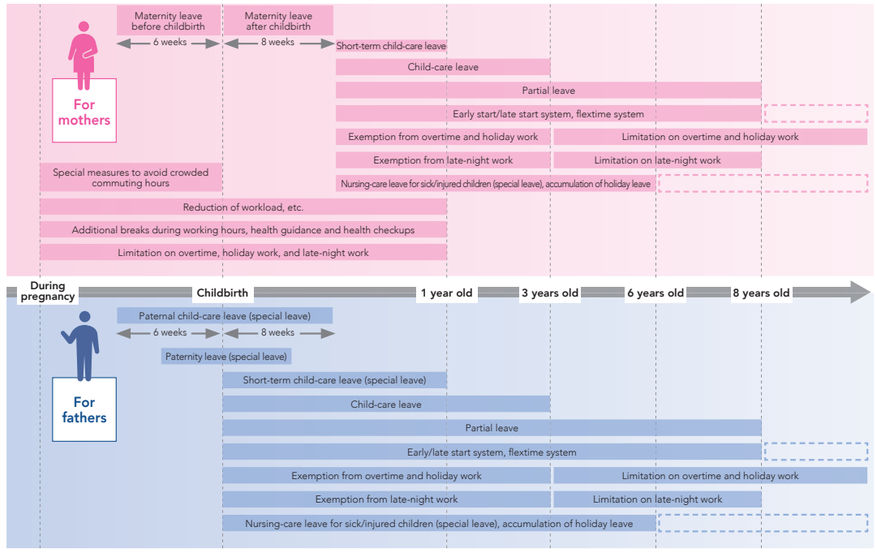
JAEA engages in a variety of activities to facilitate all its employees to fully develop their abilities by creating an environment where employees can balance work and personal life.

In addition to a hotline established to answer questions about child care and nursing care-related systems, in FY2020, JAEA commenced organization-wide trial operation of telecommuting to further develop the telecommuting system that was started in FY2019 for employees engaged in child care and nursing care.

Further, we implemented initiatives to support child rearing, such as financial aid for childminding fees using the system offered by the national government.

"Genki! Ikukatsu Menu" for Balancing Work and Child Care

JAEA has in place a wide range of short-/long-term leave systems collectively called "Genki! Ikukatsu Menu" for both female and male employees to balance work and child care.



List of Leave Systems for Balancing Work and Family Care

JAEA offers the following extensive working, holiday, and leave systems to help balance work and family care: flextime system; nursing-care leave; short-term nursing-care leave; partial leave; exemption from and limitation on working extra hours; early/late start system; accumulation of holiday leave.

Promotion of Gender Equality and Diversity

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

- Ratio of female employees newly employed in FY2020 ..... 20.1%
- Ratio of female employees to all employees (as of April 1, 2021) 11.3%

(1) Increased female recruitment: We engage in proactive public relations activities in our recruitment process, using female recruiters to appeal to female students.
(2) Career development of female employees: Through mentoring and other systems, we aim to utilize female employees to serve as role models.
(3) Improvement of work environment: We are raising the awareness of both the employees who use the support systems and superiors and providing information in a more effective manner through public relations magazines and other means.
(4) Facilitating understanding of gender equality: We hold exchanges and other meetings to increase employee understanding of our activities and aim to raise their awareness through means such as rank-based training.

International Cooperation and International Contribution

Implementation of the Strategy for International Cooperation

For JAEA to execute its mission, various forms of cooperation and partnership with the relevant nuclear organizations in other countries and international organizations are essential. These include, among others, undertaking international joint research to maximize R&D outcomes, expanding human networks through international contribution via such means as support for human resource development efforts in other countries, and increasing the visibility of JAEA in the global nuclear community through dissemination and international outreach of JAEA R&D outcomes.

European Commission (EC)
Nuclear Non-Proliferation/Nuclear Security

Finland
Nuclear Safety

Poland
HTGR, and Material Testing Reactor

Russia
Minor Actinoid (MA) Transmutation

United Kingdom
Decommissioning, Radioactive Waste Management, and High Temperature Gas-Cooled Reactor (HTGR)
- An amendment to add cooperation in the field of HTGR to the existing arrangement with the National Nuclear Laboratory (NNL) was signed in October 2020.
- An arrangement with the Office for Nuclear Regulation (ONR) in the field of HTGR safety was signed in November 2020.

Sweden
Disposal of High Level Radioactive Waste

Switzerland
Disposal of High Level Radioactive Waste

China
Nuclear Non-Proliferation/Nuclear Security, and Nuclear Spallation, etc.

South Korea
Nuclear R&D, Nuclear Non-Proliferation/Nuclear Security, and Radioactive Waste Management

United States
Next Generation Reactor, Nuclear Fuel Cycle and Radioactive Waste Management, Nuclear Non-Proliferation/Nuclear Security, and Nuclear Science

Kazakhstan
Fast Reactor Safety, HTGR, and Nuclear Non-Proliferation/Nuclear Security

Emerging Nuclear Countries in Asia and the Middle East
(Personnel Training Support for Nuclear Safety and Security)

France

Fast Reactor, Nuclear Safety and Radiation Protection, Nuclear Science, Decommissioning, and Issues related to the Fukushima Daiichi NPS Accident, etc.
- An extension to the framework agreement for cooperation in the field of nuclear R&D with the French Alternative Energies and Atomic Energy Commission (CEA) was signed in December 2020.

Australia
Research Reactor Utilization, and Neutron Science

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

Organisation for Economic Co-operation and Development/Nuclear Energy Agency (OECD/NEA)
Advanced Reactor, Nuclear Safety, Nuclear Science, Decommissioning, Radioactive Waste Management, and Personnel Training
- An agreement on the OECD/NEA Framework for Irradiation Experiments (FIDES) was signed in March 2021.

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

International Science and Technology Center (ISTC)
Participation in cooperative research projects

The Generation IV International Forum (GIF)
Participation in R&D project on Generation IV reactor systems

Events Organized by JAEA Overseas Offices (New initiatives using online platforms)

With attendance of key persons from the nuclear community of the US and Europe

Co-organized with EC/Joint Research Centre (JRC) as a side event of the 64th IAEA General Conference "Achievement and Future Direction – 30th Anniversary of Cooperation between EC/JRC and JAEA in Nuclear Nonproliferation and Security" in September 2020

Showcased the outcome of 30 years of cooperation with EC/JRC in this field and presented prospects for future cooperation


The Fourth Symposium on US-Japan Nuclear Energy Research Cooperation (October 2020)

Confirmed the Japan-U.S. partnership on nuclear R&D, including advanced reactor technologies in the demonstration phase

Other initiatives

Cooperation with the online course "Radiation and Earth's Journey" organized by the Japanese School in Paris (May 2020)

Contribution to outreach on the significance of nuclear energy and radiation to the younger generation, who will play important roles in the future

* Please visit our website for details of the Strategy for International Cooperation (in Japanese). https://www.jaea.go.jp/about_JAEA/international_strategy/

Contribution to Regional Development

JAEA's Research Institutions contribute actively to regional development throughout Japan with provision of supporting science classes at junior high schools, technological support of local companies and so on. JAEA also opens its facilities to the public and holds various events to deepen mutual understanding with local residents.

* The activities shown below are implemented while taking all necessary measures against new coronavirus infection.

Examples of Regional Contribution in FY2020


[Horonobe] Site tour for elementary school students


[Aomori] Science class at junior high school


[Tsuruga] Consultation for technical support from local companies (technological challenge resolution promotion project)


[Fukushima] Staffing of a booth at a local event at "Emiful Town Naraha"


[Tokai] Scientific experiment class for elementary school students


[Ningyo-toge] Summer vacation crafting class for elementary school students

[Tono] Participation in the online event "A Day to Learn Science in TOKI"


[Oarai] Science class at junior high school


[Tokai] Participation in the cleaning event "Autumn Cleanup Campaign"

Activities for a New Test and Research Reactor at the Monju Site

Aiming to Create a New Center for Nuclear Research and Human Resource Development

In November 2020, JAEA, Kyoto University, and the University of Fukui were adopted by MEXT as the core institutions of a commissioned project (FY2020-2022) to create a conceptual design for a new test and research reactor at the Monju site and to make proposals for its operation.

In FY2020, in addition to the abovementioned conceptual design and operation proposals, a borehole investigation was launched at the candidate site. In addition to the core institutions, a consortium consisting of academia, industry, and related local organizations was established and the first meeting of the consortium committee was held in March 2021 to collect and summarize a wide range of opinions from within the consortium. In parallel with the borehole investigation, work on the conceptual design and the operational proposals will proceed with reference to the opinions of the consortium committee.

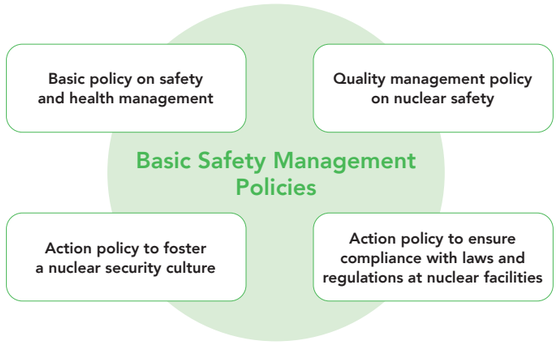
Measures to Be Taken for Attaining Targets Concerning Business Operations with Placing Top Priority on Safety

[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

In its Basic Policy, JAEA specifies ensuring safety as the utmost priority for its management and operations. In addition, based on the Basic Safety Management Policies, JAEA thoroughly ensures the safety of its facilities and operations and the proper control of its nuclear materials, and ceaselessly works on the development and maintenance of a safety culture and a nuclear security culture.

* For the Basic Safety Management Policies, please visit the JAEA website.
https://www.jaea.go.jp/about_JAEA/safety/
(in Japanese) (Safety assurance activities page)



Ensuring Safety Above All Else

As Japan's only comprehensive R&D institute in the field of nuclear energy handling radioactive materials, JAEA is required to demonstrate extremely high levels of safety and reliability. To that end, JAEA has formulated basic policies on safety, quality, and nuclear security, and conducts its business placing safety above all else.

Each JAEA site undertakes activities in accordance with the basic policy on safety and health management and the quality management policy on nuclear safety. Each site also seeks continuous operational improvement by repeating the plan-do-check-act (PDCA) process. In addition, by instilling recognition of the importance of pre-determined routine actions at each individual workplace, we promote pre-work activities such as risk assessments and hazard prediction activities.

In conducting R&D, JAEA specifies safety assurance as the basis of its management and operations. These initiatives contribute to fostering a sense of safety and security in national and local communities.

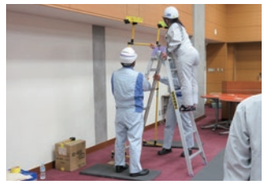
Activities to Develop and Maintain a Safety Culture

JAEA officials undertook safety patrols and exchanged opinions with staff at JAEA sites to promote information sharing and mutual understanding between management and staff. Each JAEA site held a safety gathering with participation of operating partners, a safety and health patrol by the director general, sensory-based safety training to enhance the risk awareness of workers, and other related activities as ongoing efforts to improve the safety consciousness of persons involved in JAEA operations.

Additionally, in FY2020, with account taken of the state of accidents and problems that had occurred, we ran a Special Safety Activity Campaign for the primary purpose of instilling the importance of following pre-determined rules and routine actions in the framework of agency-wide efforts to prevent occurrence of accidents and problems. Specifically, we provided sensory-based training using virtual reality (VR), displayed safety information newsletters, implemented workplace patrols, checked hold points, and confirmed the practice of pointing and calling, reporting, communicating, consulting, and performing work using a check sheet. We will continue these activities to prevent occurrence of accidents and problems.

Sensory-based training to enhance risk awareness


Clothing check, pointing and calling


Stepladder safety training


Heavy object safety training

Agency-Wide Sharing of Lessons Learned from Accidents and Acting on Such Lessons

Following an accident or a problem, JAEA undertakes activities to prevent occurrence of similar events (agency-wide sharing of lessons learned). In FY2020, in addition to the existing agency-wide sharing of information, JAEA created educational video clips with subtitles giving a visual demonstration of wrong practice in the response to an accident or emergency to facilitate staff understanding, and shared the clips on the intranet.

In April 2019, JAEA received instructions from the Minister of Education, Culture, Sports, Science and Technology titled "Future measures to prevent accident or problem recurrence following the contamination accident in the controlled area of the Nuclear Fuel Cycle Engineering Laboratories." In accordance with the instructions, in FY2020, JAEA started operation of relevant measures it had formulated.

Efforts to Organize and Prioritize Aging Facilities for Utilization

As JAEA started its R&D operations in the 1960s, many of its facilities and equipment items have aged. These older facilities and equipment items pose safety risks and need to be categorized; in other words, these facilities must be grouped into those we will continue to use and those we will no longer use and have to decommission. After assessing the risk, we systematically implement the necessary measures.

We conducted risk assessments again in FY2020, and implemented relevant activities for these facilities by incorporating plans to address aging into the Medium-/Long-Term Management Plan for JAEA Facilities, thus reducing risk.

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 the necessary training and drills.

In FY2020, we conducted a total of 14 drills in which a JAEA facility was assumed to be the source of an emergency. 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 Emergency Preparedness Network that links JAEA and the Secretariat of the Nuclear Regulation Authority, with the aim of refining the system for sharing and sending out information. In addition, during the comprehensive emergency preparedness drills at the Prototype Fast Breeder Reactor Monju and the Nuclear Science Research Institute, we conducted drills that incorporated support from other JAEA sites and confirmed the support system of the entire organization.

Comprehensive Emergency Preparedness Drills in FY2020
(Participant figures do not include participants of evacuation drills only or drill evaluators)

September 8, 2020	October 13, 2020	February 9, 2021
Nuclear Fuel Cycle Engineering Laboratories	Fugen Decommissioning Engineering Center	Prototype Fast Breeder Reactor Monju
ca. 260	ca. 150	ca. 160
September 29, 2020	**November 10, 2020**	**March 26, 2021**
Ningyo-toge Environmental Engineering Center	Oarai Research and Development Institute	Nuclear Science Research Institute
ca. 240	ca. 310	ca. 210

Maintenance of Emergency Response Systems

We operate and maintain emergency response systems (e.g. teleconferencing and broadcast fax systems) to enable us to unfailingly share information within JAEA and send out information to external parties.

With specific regard to the Integrated Nuclear Emergency Preparedness Network, which is important in sharing information with the Japanese government, we conducted periodic connection testing to ensure availability of services in the event of a nuclear emergency. In addition, in FY2020, for the purpose of bypassing any communication failure and ensuring information sharing during emergency response, we established a teleconferencing system using a dedicated network at the research institutes subject to the Act on Special Measures Concerning Nuclear Emergency Preparedness and related Head Offices, etc. (three locations). Through these activities, JAEA endeavored to maintain and improve the crisis management and response capabilities for the entire organization.

Occurrence of Accidents and Problems

The number of accidents and problems JAEA reported in FY2020 was 29 and on a decreasing trend (29 in FY2019 and 40 in FY2018). Although none of them required reporting pursuant to the Act on Regulations of Nuclear Source Material, Nuclear Fuel Material and Reactors, four cases of fire occurred as shown on the right. Regarding the fire at the Sodium Analysis Laboratory (controlled area) of the Oarai Research and Development Institute and the fire at the Fire Hydrant Pump Room of the Fusion Neutron Source Building (FNS Building) of the Nuclear Science Research Institute, we received instructions from the Fire Fighting Headquarters of Oarai Town and the head of the Fire Fighting Headquarters of the Hitachinaka-Tokai Regional Union Office, respectively, and submitted reports summarizing recurrence prevention measures.

JAEA was found by nuclear regulatory inspections to have no violation of safety regulations and received no corrective recommendation from the Labor Standards Inspection Office. There were eight injury incidents requiring lost workdays (including four incidents during commuting).

- Sector of Fukushima Research and Development
  Okuma Analysis and Research Center
  Radioactive Material Analysis and Research Facilities
  Laboratory-1 Construction Site Floor 1
  North Ventilation Facility Room (non-controlled area) (April 30)
- Oarai Research and Development Institute
  Sodium Analysis Laboratory
  Radioactive Material Handling Room B (controlled area)
  (September 10)
- Nuclear Science Research Institute
  Fusion Neutron Source Building (FNS Building)
  Fire Hydrant Pump Room (non-controlled area) (October 7)
- Ningyo-toge Environmental Engineering Center
  General Management Building Floor 1
  Control Room (non-controlled area) (November 9)

For detailed information on accidents and problems released to the press, please visit the JAEA website.

○ **Accidents and problems**
https://www.jaea.go.jp/news/incident/
(in Japanese)

Activities Based on Quality Management Policy on Nuclear Safety

JAEA has a quality management policy on nuclear safety in accordance with the operational safety program of reactors and other facilities and ensures proper operation and continuous improvement of safety-related activities under this quality management system.

In FY2020, in response to changes to quality management system requirements associated with the revision of relevant laws and regulations in April 2020, JAEA revised its quality management plan and relevant procedures and implemented initiatives pertaining to the development and maintenance of a safety culture. In addition, JAEA launched activities to contribute to further improving the safety of nuclear facilities, including independent inspections such as periodic nuclear operator inspections, free access to workplaces for nuclear regulatory inspectors, and operation of improvement activities under a corrective action program (CAP). Nuclear regulatory inspections in FY2020 found no violation of safety regulations or recommendations, indicating proper operation of the quality management system in compliance with the changed requirements.

Regarding the challenges and issues identified during the operation of the new quality management system, we have been making continuous improvements through discussions among relevant parties within JAEA, including review of the JAEA standard guidelines and their incorporation into procedures at JAEA sites to maintain and improve quality control pertaining to nuclear facilities.

Periodic nuclear operator inspection

Agency-Wide Safety Review and Quality Assurance Committee

We operate an Agency-wide Safety Review and Quality Assurance Committee to deliberate on the safety reviews required for licensing of nuclear facilities and basic matters related to quality management activities throughout JAEA. In FY2020, we improved the efficiency of the committee's deliberations and ensured appropriate licensing procedures by preparing a summary sheet to check the completeness of required items such as technological standards and regulations and entries in licensing application forms.

The committee met 11 times in FY2020 to discuss a total of nine matters, including applications to change the operating license of nuclear facilities and applications for approval of decommissioning plans. In addition, we shared information from an analysis of trends in the cause of the accidents and problems that occurred in FY2020, and proceeded with initiatives to ensure safety through close collaboration between the Safety and Nuclear Security Administration Department and each JAEA site.

Compliance with Regulatory Standards and Response to Changes in Inspection Program

Regarding certification of compliance with the new regulatory standards triggered by the accident at TEPCO's Fukushima Daiichi Nuclear Power Station, the JAEA Japan Research Reactor (JRR-3) passed the pre-use inspection and periodic nuclear operator inspection in FY2020, and resumed operation in February 2021.

For the High Temperature Engineering Test Reactor (HTTR), Static Experiment Critical Facility (STACY), and Experimental Fast Reactor JOYO, we continued reviewing the process for application to change the operating license, and HTTR and STACY obtained permission to change the reactor installation license in June 2020 and August 2020, respectively. As for JOYO, a review team was formulated in the Secretariat of the Nuclear Regulation Authority, and started hearings in August 2020.

To enhance the agency-wide functions pertaining to licensing applications throughout JAEA, we periodically held safety review and response liaison meetings and shared information about the state of review by the Secretariat of the Nuclear Regulation Authority and recommendations.

We promoted resolution of issues through discussions and arrangements with the Secretariat of the Nuclear Regulation Authority, by holding periodic meetings with the safety regulation managers of the Division of Licensing for Research Reactors, Use of Nuclear Material, Secretariat of the Nuclear Regulation Authority.

Regarding the New Inspection Program that started in April 2020, we made applications for licensing based on revised regulations and for changes in the operational safety programs and decommissioning plans, and obtained approval for all operational safety programs.

Management Review by the President

The President himself periodically receives and reviews activity reports from each facility to ensure the effectiveness of safety-related activities at our nuclear facilities and to improve our quality management system and security operations. In FY2020, two management reviews were held with participation of senior advisors (external specialists), at which the challenges and evaluation results of quality assurance activities were reported to the President. As regards improvement instructions from the President, decisions were made on improvements necessary for the inspection program reviewed in FY2020 to take root, taking into account comments from Senior Advisors, and improvement activities were rolled out at each site.

Through these continuous improvement activities (PDCA cycles), JAEA endeavored to achieve, maintain, and improve the safety of nuclear facilities.

Management Review by the President at the end of FY2020

Activities based on Action Policy to Foster a Nuclear Security Culture and Action Policy to Ensure Compliance with Laws and Regulations at Nuclear Facilities - Initiatives for Nuclear Security and Safeguards to Ensure Peaceful Use of Nuclear Energy

JAEA steadily promotes "nuclear security," which is designed to prevent the theft of nuclear fuel materials or radioactive materials and the sabotage of nuclear facilities by terrorism or other antisocial activities, in accordance with relevant laws, regulations, and standards. To that end, we steadily enhance our safeguards including effective operation of the "trustworthiness determination program*" to reduce relevant risks. Also, to guard against the cyber-terrorism activity that has drawn attention lately, JAEA has been taking appropriate measures following government guidelines, etc.

JAEA works for appropriate management of nuclear materials in line with relevant laws, regulations and international agreements. In addition, to demonstrate the transparency of its use of nuclear materials, JAEA provides the Japanese government and the International Atomic Energy Agency (IAEA) with information on the state of its nuclear material management and facilities. For these activities, the Japanese government and IAEA conduct nuclear verifications (safeguard inspections) to check that nuclear materials are properly managed. JAEA openly accepts and cooperates in the verification activities.

Nuclear security and safeguards are also extremely important in decommissioning, since the condition of facilities under decommissioning changes by the second. JAEA will ensure steady implementation of the necessary action through prior consultations with the Japanese government and IAEA. Through these activities, JAEA continuously strives to maintain and improve its nuclear security ability and the transparency of its nuclear material management.

* Trustworthiness determination program: As one of the measures against threats from employees 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.

R&D Pertaining to the Response to the Accident at TEPCO's Fukushima Daiichi Nuclear Power Station

The cost of this R&D was 16,907 million yen (operations expenses 15,824 million yen and contracted expenses 1,046 million yen). The revenues recorded as funding for the R&D included revenues from government funding for operational grant (10,581 million yen) and revenues from subsidies, etc. (2,971 million yen). The administrative cost, calculated by adding extraordinary loss (115 million yen) and other administrative costs (1,001 million yen) to this cost, was 18,030 million yen.

The Sector of Fukushima Research and Development conducts R&D to promote the decommissioning of TEPCO's Fukushima Daiichi Nuclear Power Station (FDNPS), as well as environmental restoration after the FDNPS accident.

Collaborative Laboratories for Advanced Decommissioning Science (CLADS)

Towards the decommissioning of the FDNPS, R&D has been carried out on fuel debris removal, accident progression analysis technology for evaluation of post-accident reactor conditions, waste management, remote sensing systems, environmental science, and environmental monitoring. An "R&D map for basic and fundamental research" has been developed to obtain an overview of future research tasks at the FDNPS. The map is progressing as a collaborative project with domestic and international institutes for innovative research contributing to FDNPS decommissioning.
In addition, CLADS is soliciting applications for the "Nuclear Energy Science & Technology and Human Resource Development Project" to promote research that contributes to resolving nuclear issues and human resource development through industry-academia collaboration. With the CLADS Main Building in Tomioka Town as the core site of the project, we are systematically promoting the concentration of expertise and the development of human resources through collaboration with domestic and overseas research institutes, universities, and industry. In the field of research related to the environmental remediation of Fukushima, CLADS is collaborating with Fukushima Prefecture and the National Institute for Environmental Studies at the Fukushima Prefectural Centre for Environmental Creation (Miharu Town and Minamisoma City).
Fukushima Environment Database and Knowledge Base (FaCE!S): https://fukushima.jaea.go.jp/ceis/en/index.html


Simulated fuel melting test

Naraha Center for Remote Control Technology Development (NARREC)

For the decommissioning of FDNPS, as operations are expected to require robots and other remote-controlled technology due to the high radiation dose rate, various test facilities for the development and demonstration of remote-controlled equipment have been installed and user activity about remote-controlled technology development is in progress at NARREC in Naraha Town, Fukushima Prefecture.

As a technical demonstration for FDNPS, the International Research Institute for Nuclear Decommissioning (IRID; a user of NARREC) has started preparations for a full-scale mock-up test of fuel debris removal. In addition, a virtual reality system is being developed and FDNPS data is being sorted and made available for lending to support information sharing on the decommissioning work and the researching and drafting of operational plans. NARREC is also developing a robot simulator and has made part of the results available to the public.

In addition, the number of visitors to NARREC reached 20,000 in December 2020, and the robot operation training program launched in 2019 is used by high schools in Fukushima Prefecture, universities, and companies. NARREC is contributing to the promotion of understanding of the decommissioning of FDNPS and the development of human resources who will lead the next generation.

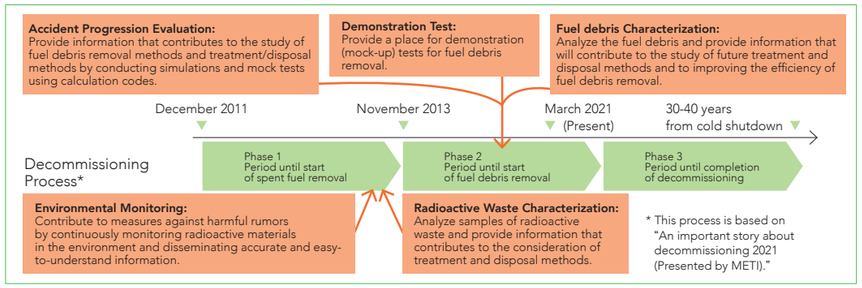

Virtual reality system

Okuma Analysis and Research Center

On a site adjacent to FDNPS, the Radioactive Material Analysis and Research Facilities are now under construction, where radioactive waste and fuel debris from FDNPS will be analyzed and researched to assist in the facility's decommissioning. The Administrative Building has been in operation since March 2018 and is in use as a base for the designing of Laboratories 1 and 2, and for activities to prepare for the start of operations, such as training of analytical technicians.
Construction of Laboratory 1, where radioactive waste will be analyzed, is progressing steadily. Laboratory 2, where fuel debris and so on will be analyzed, is in the process of official authorization.

Rendering of Okuma Analysis and Research Center

Involvement of JAEA's technology development in the overall decommissioning process



○ Establishing an analysis system for radioactive waste and fuel debris that integrates JAEA and other organizations.

Planning/Outcome Construct facilities for analysis and research of radioactive waste and fuel debris.

➡ The Okuma Analysis and Research Center started operation before the evacuation zone of Okuma Town was lifted in March 2018. The center, based in the Administrative Building, is currently working to construct facilities and train engineers for deployment after the start of operations. The center is steadily constructing the facilities in cooperation with related organizations, and is collaborating with one other sector (Ibaraki area) and Tokyo Electric Power Company Holdings (TEPCO HD) on the engineer training.


Practical training in Ibaraki area (Nuclear Science Research Institute, Nuclear Fuel Cycle Engineering Laboratories, and Oarai Research and Development Institute)

Outcome The results of the analysis at the Okuma Analysis and Research Center will be used to development such as studies of radioactive waste treatment and disposal methods and fuel debris removal methods.

○ Developing remote technologies necessary for decommissioning; contributing to regional revitalization and human resource development.

Planning/Outcome Create a mock-up test facility for remote technology related to FDNPS decommissioning.

➡ With the lifting of the evacuation zone in Naraha Town in September 2015, NARREC started operation as the first facility in the decommissioning field of the Fukushima Innovation Coast Initiative. NARREC has seen active testing and facility utilization, mainly by companies and academic research institutes related to FDNPS decommissioning, including mock-ups of fuel debris removal tests conducted by the International Research Institute for Nuclear Decommissioning (IRID), with approximately 60 utilizations per year. In the future, we will also focus on reducing radiation exposure at the FDNPS decommissioning site and on research and development for locating radiation sources.


Robot operation training program for local students

Outcome By conducting mock-up tests and developing technologies, NARREC will contribute to the promotion of FDNPS decommissioning and the improvement of worker safety and work efficiency.

○ Integrating results to reveal the entire extent of the linkage between the causative factors and the actual situation of land contamination in Fukushima.

Planning/Outcome Consolidate and analyze knowledge on environmental dynamics and monitoring from immediately after the FDNPS accident up to the present.

➡ Since the FDNPS accident, many studies on the behavior and effects of radioactive materials discharged into the environment have been conducted and their results have been reported, but each of these studies presents only one part of the results for one period of time. In order to get a complete picture of the environmental recovery, CLADS collaborated with Tsukuba University and others to undertake a comprehensive compilation of more than 210 research papers on terrestrial environmental monitoring in Fukushima, analyzing and evaluating particularly the mechanism of terrestrial contamination by radioactive cesium-137.

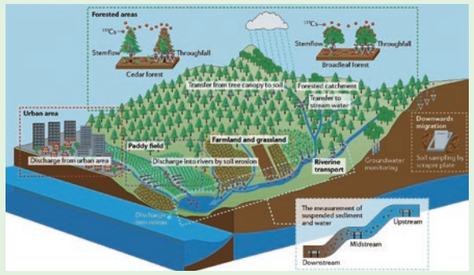


Diagram of Cs transfer on land

Outcome Scientists around the world will be able to understand the contamination mechanism from the early stages of the FDNPS accident and use this information to predict future accident situations.

Outcome of Operations and Resources Required

Technological Support for Nuclear Safety Regulation and Safety Research for This Purpose

The cost of this R&D was 6,970 million yen (operations expenses 3,653 million yen and contracted expenses 3,309 million yen). The revenues recorded as funding for the R&D included revenues from government funding for operational grant (3,152 million yen) and revenues from research contracted from the government (3,304 million yen). The administrative cost, calculated by adding extraordinary loss (22 million yen) and other administrative costs (208 million yen) to this cost, was 7,200 million yen.

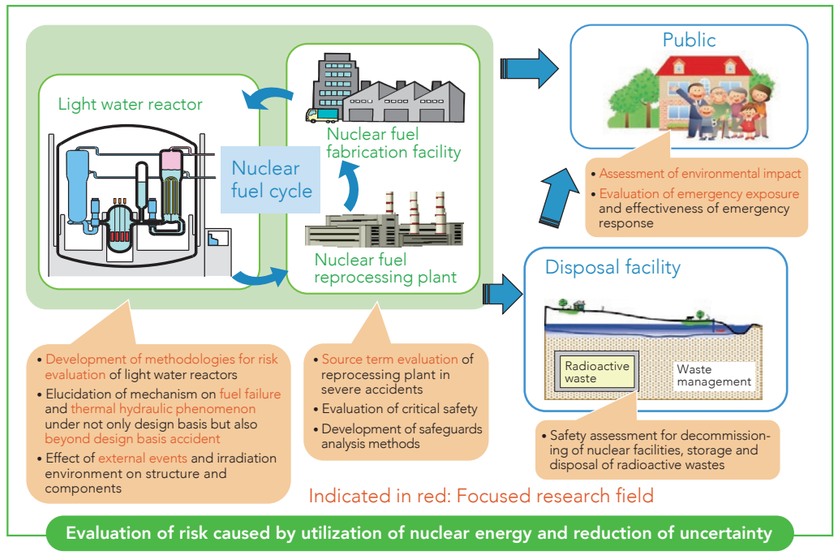
Contribution to the Continuous Improvement of Nuclear Safety and Nuclear Emergency Preparedness

The Sector of Nuclear Safety Research and Emergency Preparedness pursues the enhanced safety of nuclear facilities by conducting multifaceted and comprehensive research, and contributes to strengthening of nuclear emergency preparedness by providing technical support to the national government, local governments, police and fire departments, etc.

Nuclear Safety Research for Contributing Nuclear Safety Regulations

To provide the technical basis for the Nuclear Regulation Authority, the Nuclear Safety Research Center conducts multifaceted and comprehensive research on nuclear facilities such as light water reactors and nuclear fuel reprocessing plants. It is currently recognized that risk-informed decision making (RIDM) is an effective measure to enhance the safety of nuclear facilities, and we have therefore launched a practical and comprehensive study to utilize risk information on nuclear facilities based on the probabilistic risk assessment (PRA) methodologies that we have been developing in each field. To uphold our principles of transparency and technological neutrality as a technical support organization of the nuclear regulation authority, our research activities are monitored by a council of advisers.

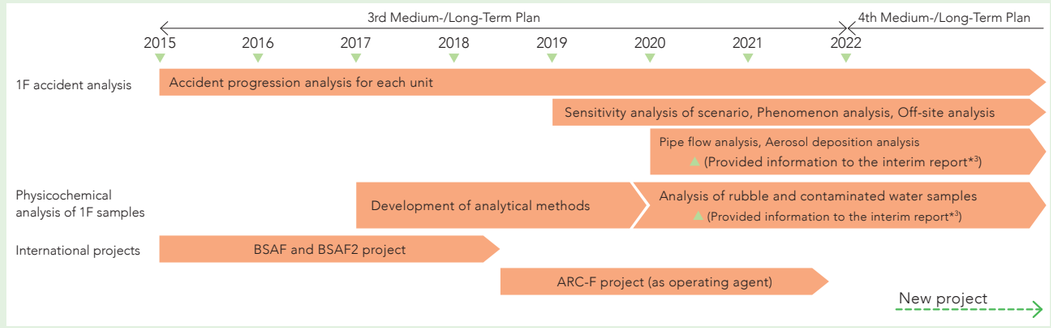
Research Areas Covered by Nuclear Safety Research Center



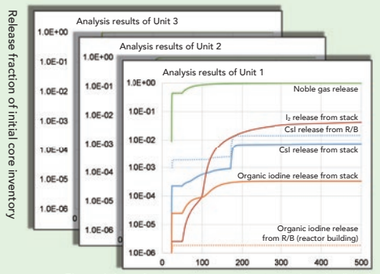
Technical Support for Nuclear Emergency Preparedness and Response

JAEA provides technical support to national and local government Nuclear Emergency Response HQs in nuclear emergencies. As the basis for this activity, NEAT supports nuclear emergency drills performed by national and local governments and trains personnel preparing for nuclear emergencies during normal times. NEAT also performs R&D to improve the efficiency of protective measures against nuclear emergencies and promotes national and international structures of emergency preparedness and response.

○ Gain of new findings from analysis of the accident at the Tokyo Electric Power Company Holdings Fukushima Daiichi Nuclear Power Station (1F)



Planning/Outcome It is expected that a range of beneficial knowledge will be obtained to ensure and continuously improve the safety of light water reactors by estimating accident scenarios through simulation of the 1F accident and by analyzing the causes of occurrence of each scenario. At the Nuclear Safety Research Center, an integral severe accident simulation code, THALES2/KICHE, has been developed and applied to the analysis of the progression of the 1F accident and of the types, amount and timing of release to the environment of radioactive materials (source terms). The results of the simulation were shared in the OECD/NEA Benchmark Study of the Accident at the Fukushima Daiichi Nuclear Power Station (BSAF) project. Several articles summarizing the outputs of the simulations by the partners of the BSAF project were issued jointly with the project partner experts. Additionally, at the request of the Committee of Accident Analysis of Fukushima Daiichi Nuclear Power Station at the Nuclear Regulation Authority of Japan, a series of analyses at the facilities of the Nuclear Science Research Institute of JAEA were carried out to study concrete rubble samples from the reactor building containing radioactive material deposits and water samples taken from a pool in the migration pathway of the radioactive materials. Based on the analysis, insights into the composition of the radioactive materials released from the containment vessels and other data were presented in the Interim Report on Investigation and Analysis of the TEPCO Fukushima Daiichi Nuclear Power Station Accidents* prepared by the Committee. This content was also shared in the OECD/NEA Analysis of Information from Reactor Buildings and Containment Vessels of Fukushima Daiichi Nuclear Power Station (ARC-F) project operated by JAEA. We intend to continue the foregoing simulation and analysis to obtain new findings relevant to ensuring and continuously improving safety, and to steadily progress with the development of younger human resources and the transfer of techniques and skills.



Results of analysis for source terms at 1F accident with THALES2/KCHE code

* https://www.nsr.go.jp/data/000345595.pdf (in Japanese)

Outcome It is anticipated that these outputs could be contributory in areas such as regulatory decision making for reactor safety assessment and in-depth investigation of 1F accident scenarios.

○ Enhancing national emergency preparedness and organizational response capacities by promoting training and drills with flexible COVID-19 countermeasures

Planning/Outcome We utilized teleconferencing and e-learning systems and also conducted workshops with thorough COVID-19 countermeasures to achieve significant development of capability, under the conditions of the epidemic, in emergency responders including firefighters, police, and national and local government officers. We also supported the planning, implementation and review of the nuclear emergency drills performed by local governments and by emergency monitoring centers to enhance emergency preparedness and organizational response capacities.

Drill at emergency monitoring center

Workshop for emergency responders

Outcome Contribution to enhancing national emergency preparedness and human resource development.

R&D for Improving Nuclear Safety and Activities that Contribute to Nuclear Non-Proliferation and Nuclear Security

The cost of this R&D was 2,035 million yen (operations expenses 1,862 million yen and contracted expenses 168 million yen). The revenues recorded as funding for the R&D included revenues from government funding for operational grant (1,278 million yen) and revenues from subsidies, etc. (301 million yen). The administrative cost, calculated by adding extraordinary loss (9 million yen) and other administrative costs (54 million yen) to this cost, was 2,098 million yen.

The Nuclear Science and Engineering Research Center is engaged in the basic research necessary to improve the safety of reactors such as light water reactors, and the development of safe decommissioning technology.

The Integrated Support Center for Nuclear Nonproliferation and Nuclear Security (ISCN) aims to strengthen nuclear non-proliferation and nuclear security, and to support denuclearization, through JAEA's technologies and experience.

Nuclear Science and Engineering Center

To contribute to the improvement of the safety and reliability of nuclear facilities such as light water reactors, the Nuclear Science and Engineering Center conducts research and development aimed at "accident prevention," "prevention of accident escalation," and "appropriate implementation of decommissioning" in line with external needs.

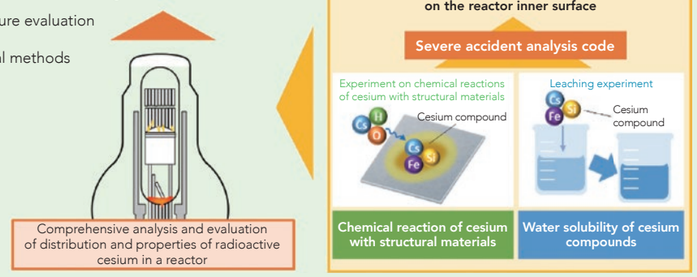
○ The properties of Cs retained on the inner surface of the reactor during a severe accident (SA) in a light water reactor (LWR) were predicted

Planning/Outcome The chemical behaviors and water solubilities of cesium (Cs) were investigated and the properties of Cs retained on the inner surface of a reactor during a severe accident (SA) in a light water reactor (LWR) were predicted.

➡ The chemical reactions of Cs with structural materials in a high-temperature steam environment and the water solubility of its reaction products were investigated. The obtained information was compiled as a database named ECUME. Moreover, ECUME was implemented into the SA analysis code SAMPSON, which can be applied to estimate the chemical behaviors of Cs under various SA conditions. Validation of SAMPSON with ECUME is ongoing. In the coming few years, SAMPSON will become one of the most powerful tools for accurate estimation of residual Cs distribution inside the nuclear reactors at 1F and for improvement of source term estimations in SAs.

The research will support improved accuracy of source term evaluation during SAs and the formulation of safety measures for 1F decommissioning work

- Radiation exposure evaluation
- Investigation of waste disposal methods



Outcome

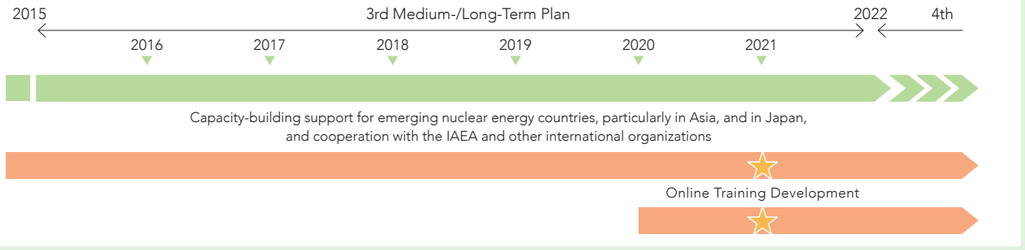
- Reliability will be enhanced in the estimation of residual Cs distribution retained on the inner surface of the primary containment vessel at 1F.
- The improved SA analysis code will increase the accuracy of source term estimations in SA.

Integrated Support Center for Nuclear Nonproliferation and Nuclear Security

ISCN develops nuclear material detection and measurement technologies, nuclear forensics technologies to determine the origins and the transport paths of nuclear materials seized by law-enforcement authorities, and approaches to mitigate the threat from nuclear material. It also engages in associated policy research and policymaking support, and supports human resources development activities in emerging nuclear countries, particularly in Asia. Moreover, ISCN contributes to the CTBT (Comprehensive Nuclear-Test-Ban Treaty) International Verification Regime and promotes understanding by distributing the ISCN Newsletter, which reports current trends in nuclear nonproliferation and nuclear security, and by holding international forums.

Development and implementation of online training during the COVID-19 pandemic.

○ Promoting understanding of the importance of nuclear nonproliferation and nuclear security, and supporting the skill development of practitioners

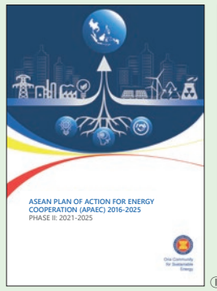


Initial plan and results of training provided in FY2020

Course	Initial Plan and target	Target regions	Results (online): Number of participants
Nuclear security	Number of courses: 22 High satisfaction in course participant evaluation	Asian region / Domestic	7 (4): 178 participants
Safeguards/ SSAC *		Asian Region	3 (3): 107 participants
* State System of Accounting for and Control of Nuclear Material		Average satisfaction rate in course evaluation: 97%	Total:10 courses / 285 participants

- Early decision in favor of online transfer, development, and implementation of training courses based on anticipated prolonged impact of COVID-19 pandemic
  ➡ Continuous capacity-building support through world-first development and implementation of online training courses in this field
- Cooperation with various countries/institutions, utilizing the advantages of online operation (IAEA, U.S. Department of Energy, EURATOM, Korean Institute of Nuclear Nonproliferation and Control, etc.)
- Collaboration with ISCN/JAEA was specified in the ASEAN Plan of Action for Energy Corporation (APAEC) 2021-2025.
  ➡ Deepening of international cooperation, increase of JAEA presence
- Potential new training formats such as a combination of online and in-person training post-COVID-19 pandemic

Outcome Contribution to strengthening nuclear nonproliferation and nuclear security



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① Collaboration in capacity-building support has been included in the ASEAN Plan of Action for Energy Cooperation (APAEC) 2021-2025, and future cooperation is expected.
② An online workshop was held to share the findings of the ISCN's online training development and implementation with the U.S. Department of Energy and other stakeholders.
③ Implementation of the first SSAC training contributed to the IAEA going online.

Basic and Fundamental Research and Human Resources Development in the Nuclear Field

The cost of this R&D was 30,240 million yen (operations expenses 29,838 million yen and contracted expenses 359 million yen). The revenues recorded as funding for the R&D included revenues from government funding for operational grant (14,488 million yen) and revenues from subsidies, etc. (7,507 million yen). The administrative cost, calculated by adding extraordinary loss (7,274 million yen) and other administrative costs (2,738 million yen) to this cost, was 40,254 million yen.

The Sector of Nuclear Science Research (SNSR) has the following mission: "Advancing the latest science and technology to support the use of radiation and atomic energy and continuing the fundamental support of atomic energy development." The activities of the SNSR are spread over a broad range of R&D such as basic and fundamental nuclear research, advanced nuclear science research, materials science research using neutrons and synchrotron radiation, R&D to improve nuclear safety, and R&D on accelerator-based techniques to reduce the volume and toxicity of radioactive waste. Its activities also include human resources development related to this R&D program.

Nuclear Science Research Institute

The Nuclear Science Research Institute has various research facilities for nuclear science and technology and functions as an R&D base. The research reactor JRR-3 resumed operation after completion of seismic reinforcement work and the conformity review for the New Regulatory Requirements of the Nuclear Regulation Authority. From 2021, JRR-3 will resume in-service operation as a space for innovation that gives users access to neutron beam experiments and radioisotope manufacturing. The Nuclear Safety Research Reactor (NSRR) continued to conduct experiments to understand the behavior of nuclear fuel in the event of a nuclear reactor reaction accident and improve the safety of the reactor, and obtained important data for future regulatory standards.

Research Reactor JRR-3

Nuclear Science and Engineering Center

The Nuclear Science and Engineering Center conducts basic and fundamental R&D on nuclear data and reactor engineering, fuels and materials engineering, nuclear chemistry, and environment and radiation science. The R&D meets a variety of social demands, contributes to the creation of innovative nuclear technology, and provides a foundation for atomic energy use.

Advanced Science Research Center

The Advanced Science Research Center promotes leading-edge nuclear science research on advanced actinide science and advanced nuclear materials science, which have great academic and technological impact, with the aim of discovering novel principles and phenomena, creating new materials, and generating innovative technologies.

Materials Sciences Research Center

The Materials Sciences Research Center promotes materials science research of high scientific and social significance that contributes to nuclear science and the utilization of nuclear energy. Its R&D is performed with full use of the neutron and synchrotron radiation instruments installed at JRR-3, J-PARC MLF, and SPring-8 as advanced analysis tools for the structure and function of materials. Specifically, we have begun developing analytical systems for the fuel debris and related materials derived from the Fukushima Daiichi Nuclear Power Station.

J-PARC Center

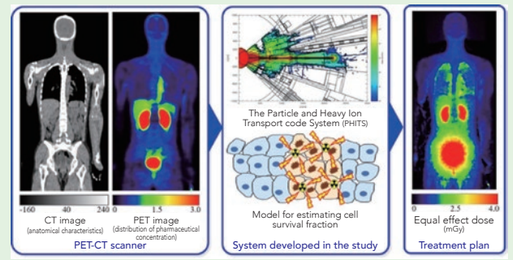
J-PARC Center has successively carried out R&D to improve the efficiency of the facility and conducts cutting-edge research with many research institutions and companies in a variety of fields ranging from fundamental science to industrial applications using various secondary particles produced by the world's highest-intensity pulsed proton beams. In FY2020, it achieved stable user operation for 144 days with a power of 600 kW at the Materials and Life science experimental facility (MLF). Furthermore, it demonstrated stable user operation for 36 hours with a beam power equivalent to 1 MW, the rated power of the facility, a significant increase from the 10 hours achieved in FY2019.

Japan Proton Accelerator Research Complex, J-PARC

○ Contribution of the PHITS code to radiation dose estimation

Planning/Outcome Technique/system for estimating radiation dose were improved using the PHITS code.

➡ A system has been developed for estimating the therapeutic/side-effects of target radionuclide therapy by calculating absorbed radiation doses precisely using the PHITS code from patients' PET-CT images. The system will achieve tailor-made treatment planning such as determination of appropriate fraction/doses of radiopharmaceuticals by taking the individual patient characteristics into account. The system is planned for used in dose estimation for lung-cancer patients at Osaka University Hospital.

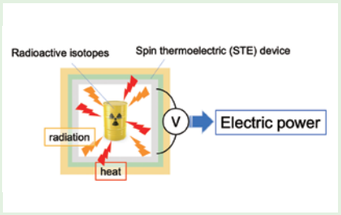


Outcome Safer and more efficient nuclear therapy using α-rays will be achieved.

○ Tolerance of spin-Seebeck thermoelectricity against irradiation by swift heavy ions

Planning/Outcome Study on interaction between mechanical rotation and nuclear spin for development of energy-transformation devices

➡ A research team at the Advanced Science Research Center has demonstrated from experiments with the JAEA Tokai tandem accelerator that "spin thermoelectric (STE) devices," which generate electricity from heat, have a very high radiation tolerance, and that their performance would not deteriorate for several hundred years even if spent nuclear fuel were used as a heat source. STE devices relying on electron spins have been developed in recent years and are expected to outperform existing technologies in terms of flexibility of design, low environmental impact, and economic efficiency. In particular, this achievement opens up future prospects for the development of new technologies in radiation environments, including radioisotope power generation.

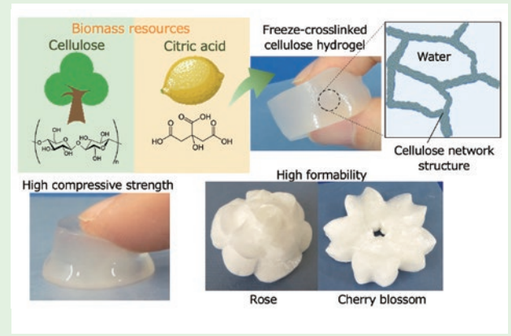


Outcome It will lead to new technological development for the safe and effective utilization of waste heat from spent nuclear fuels.

○ Eco-friendly cellulose nanofiber hydrogels prepared via freeze-crosslinking

Planning/Outcome Neutron scattering and synchrotron radiation are important tools for scientific discovery.

➡ We use these resources to study the hierarchical structure of materials to create new technologies that will address challenges in areas of environmental and material science. Utilizing the findings of structural research into hydrated polymers using neutron scattering and synchrotron radiation, we developed an environment-friendly freeze-crosslinked hydrogel composed of cellulose nanofiber obtained from wood, citric acid obtained from lemon, and water. The freeze-crosslinked cellulose hydrogel material obtained through this technique exhibited sufficient strength to withstand a compression load of 2 tons. In addition, the material has the potential to be used as an adsorbent to remove hazardous substances.

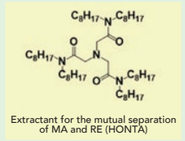


Outcome This new type of hydrogel with high compressive strength is expected to be applied in environmental purification materials and in plastic substitute materials with the environment-friendly feature of using only naturally derived materials, and in regenerative medicine materials that decompose in the body after a certain period of time.

○ Successful recovery of minor-actinide (MA) from high-level liquid waste in a hot cell

Planning/Outcome Fundamental data with regard to the radiolysis of extractants and effective separation system was accumulated by experiments with highly radioactive liquid waste.

➡ We have advanced the development of a hydrometallurgical process called SELECT (Solvent Extraction from Liquid-waste using Extractants of CHON-type for Transmutation) to recover nuclear material and separate MA. In FY2019-2020, experiments for the mutual separation of MA and rare-earth (RE) elements were carried out using an extractant of HONTA in a hot-cell at NUCEF, and approximately 0.3 g of MA was successfully recovered without using complexing agents. The results demonstrated the validity of the novel MA separation process using a stable and practical extractant.



Extractant for the mutual separation of MA and RE (HONTA)


Experimental apparatus installed in a hot cell
Two mixer-settler extractors consisting of 20 stages were used.

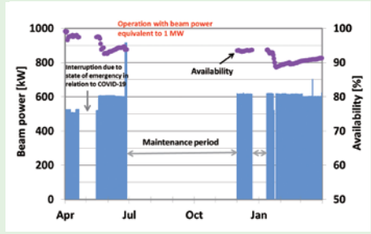
Outcome A practical solvent extraction process for MA separation was successfully demonstrated, and is expected to support the establishment of a fuel-cycle technology based on partitioning and transmutation.

○ Stably providing users with the world's highest-intensity pulsed neutron beams

Planning/Outcome We aimed to achieve annual operation with availability of over 90% while ensuring safe facility operation at J-PARC. Furthermore, with priority to stable beam supply to users, we aimed to increase beam power and check facility performance under operation at beam power equivalent to 1 MW, and continuously improve related devices.

➡ We stably provided users with the world's highest-intensity pulsed neutron beams generated by proton beams with a power of 600 kW for 144 days (6.5 cycles) of the original plan of 159 days (7.2 cycles). The resultant availability was 92% during the period of operation, exceeding our target of 90%. The instrument scientists conducted 116 experiments on behalf of users who could not come to J-PARC due to the COVID-19 pandemic, leading to the achievement that the number of experiments conducted in the fiscal year exceeded the target number of 263 to reach 362. It is noted that the number of experiments for industrial applications contributing to society accounts for more than 20%.

We also checked the facilities' performance under operation at beam power equivalent to 1 MW over 36 hours with high availability of 94%. Moreover, improvement of the neutron production target vessel was carried out continuously.



Operational history of neutron source in FY2020

Outcome We provided users with a stable supply of the world's highest-intensity pulsed neutron beams for 6.5 cycles, resulting in the above-target total of 362 experiments being completed. As an example, the effect of hydrophilic carbon on water distribution in Nafion thin films was investigated. The findings may provide a guideline for the material design of a fuel cell composed of Nafion thin films, which would greatly contribute to society.

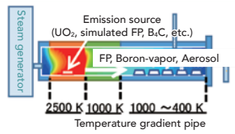
○ Foundation of the "SA Platform" through cooperation between the Sector of Nuclear Science Research, the Sector of Nuclear Safety Research & Emergency Preparedness, and the Sector of Fukushima Research & Development

Planning/Outcome A comprehensive technical document about SA and practice programs related to SA were prepared through the SA Platform activity.

➡ The "SA Platform" was derived from a research and liaison meeting about SA (Severe Accident) attended by FEPC, JEMA, nuclear reactor manufacturers, CRIEPI, and JAEA. Through the SA Platform activity, state-of-the-art knowledge and information about nuclear reactor behavior and related important phenomena during SA and accident management, etc. were gathered and compiled as a comprehensive technical document about SA and practice programs related to SA. Disclosure of the document and practice programs are ongoing, and they are expected to serve as a knowledge base for the development of human resources, such as operators who can prevent or react appropriately to SAs.

Compilation of a comprehensive technical document about SA


Preparation of practice programs



Temperature gradient pipe

Outcome The document and practice programs will be Japan's first fundamental SA knowledge base for R&D, and will support the improvement of analysis codes and evaluation tools. Moreover, human resource development against SAs will be promoted by the cross-functional knowledge base within the nuclear industry.

Human Resources Development in the Field of Nuclear Energy

The Nuclear Human Resource Development Center (NuHRDeC) promotes the human resource development which builds the foundation of the nuclear field through its activities in *Domestic Training Courses, Collaboration with Universities, the Japan Nuclear Human Resource Development Network and International Training Courses*. In FY2020, following the issue of an Emergency Declaration due to the spread of COVID-19 infection, training was conducted by postponing schedules, utilizing online lectures, thoroughly avoiding the three Cs, including by reducing training capacity, preventing the spread of droplets with masks and face shields, and keeping the environment clean by ventilation and frequent alcohol disinfection.

Domestic Human Resource Development Activities

Domestic Training Courses

NuHRDeC provides training for the purposes of advancing the education of RI/radiation and nuclear energy engineers, and of supporting national certification candidates.

- Regular training courses ... conducted **19** courses (**274** participants)
- Special training courses (held in response to local government requests) ... conducted **2** courses


Participants in a practical exercise (domestic training course)

Collaboration with Universities

Using a distance education system, the Japan Nuclear Education Network conducts a Nuclear Engineering Basic Course in collaboration with seven Japanese universities. In addition, educational guidance and practical training are delivered to students under various systems.

- Nuclear Engineering Basic Course ... enrollment of **189** students
- Cooperation under agreement of the Collaborative Graduate School System ... **1** student accepted, **51** lecturers dispatched
- Cooperation with the Nuclear Professional School of the University of Tokyo ... **15** students accepted, **148** lecturers/instructors dispatched
- Student Acceptance System (**38** special research students, **37** student trainees, **172** summer intern trainees)

Japan Nuclear Human Resource Development Network

NuHRDeC is the secretariat of the Japan Nuclear Human Resources Development Network, which has 83 industry-academia-government organizations as members and promotes the establishment of an integrated nuclear human resources development system in Japan. The Japan-IAEA Nuclear Energy Management School, which has been held annually in cooperation with the IAEA, was postponed to the year 2021. On the other hand, the Capacity Building Course for Young Nuclear Professionals, a course which aims to develop international human resources with a focus on improving English skills, was held successfully with nine participants. Participants commented that it had been good to be able to speak English intensively, and that they would recommend their younger colleagues to participate.

○ Fostering human resources who can play an active role internationally

The Japan Nuclear Human Resources Development Network, with cooperation from METI and MOFA*, started activities from FY2020 to foster human resources who can play an active role at IAEA and other international organizations. Employing online tools, whose use has spread rapidly with the advent of COVID-19 infection, four webinars were held with 197 participants. Experts with a background in international organizations shared their career experience, and gave lectures on the necessary qualities to work in an international organization. Participants commented that it was very useful to hear directly from people who are active overseas.

* Ministry of Economy, Trade and Industry and the Ministry of Foreign Affairs

Human Resource Development Activities Overseas (International Training Courses)

The training for participants from Asian countries which is normally held face-to-face at NuHRDeC every year took place online in FY2020. Local training courses were also cancelled in three of the nine Asian countries. In the other six countries, the local training courses were held including lectures and technical guidance presented online by 31 JAEA experts. The fact that the training was conducted even under conditions where the trainees were unable to enter Japan led to JAEA's activities being still more highly evaluated in Asian countries.

- Online training course for engineers/researchers in Asian countries ... conducted **4** courses (**219** participants from **10** countries)

https://nutec.jaea.go.jp/english/


Photo of online exercise (international training course)

R&D on Fast Reactors and Advanced Reactors

The cost of this R&D was 15,653 million yen (operations expenses 11,569 million yen and contracted expenses 4,082 million yen). The revenues recorded as funding for the R&D included revenues from government funding for operational grant (10,238 million yen) and revenues from research contracted from the government (4,025 million yen). The administrative cost, calculated by adding extraordinary loss (15 million yen) and other administrative costs (517 million yen) to this cost, was 16,189 million yen.

In the "Sector of Fast Reactor and Advanced Reactor Research and Development (SeFARD)," we conduct R&D on advanced reactor technologies such as fast reactors, high-temperature gas-cooled reactors (HTGRs), and related fuel cycle technologies in order to further enhance future energy sustainability, safety, reliability, economic competitiveness, and flexible load-following ability.
We also carry out R&D on decommissioning and radioactive waste management.

Reactor Systems Design Department and Fuel Cycle Design Office

Toward the commercialization of advanced reactors (Fast Reactor and HTGR), the Reactor Systems Design Department conducts fast reactor design studies utilizing international collaboration, and promotes international harmonization activities for safety standards and development of reactor systems and components, aiming at further enhancement of safety and economic efficiency. The design evaluation results of the HTGR system for steam supply will be utilized for international collaboration with the Polish HTGR project and others.

The Fuel Cycle Design Office carries out R&D on reprocessing technology and fuel technology for oxide fuel including minor actinide (MA)-bearing fuel in order to contribute to the establishment of the fast reactor fuel cycle and the reduction of the volume and toxicity of radioactive waste. In these developments, MA separation technology, MA-bearing fuel manufacturing technology, physical property research, and long-life core materials such as oxide dispersion strengthened steel are key issues for focus.

Oarai Research and Development Institute

Fast Reactor Cycle System Research and Development Center

To establish fast reactor cycle technology that contributes to energy security and environmental sustainability, we perform a variety of research tasks such as design, safety assessment, and safety standard development for fast reactor systems. Specifically, we are developing an advanced evaluation approach called ARKADIA, which will optimize fast reactor design, and also working on the modification of JOYO to meet Japan's new regulatory requirements.

Experimental Fast Reactor JOYO and Post-Irradiation Examination Facilities

HTGR Research and Development Center

The High Temperature Gas-cooled Reactor (HTGR) is an attractive nuclear reactor since it has inherent safety and can reach high helium gas temperatures of around 950 degrees C. We carry out R&D on HTGR technology and multipurpose heat utilization technologies effective as global warming countermeasures, such as technology for hydrogen production through high-temperature water-splitting and technology for power generation through helium gas turbine. Of our facilities, HTTR acquired permission to change the reactor installation license in June 2020 and plans to restart operation in July 2021.

High Temperature Engineering Test Reactor (HTTR)

Waste Management and Decommissioning Technology Development Center

The Japan Materials Testing Reactor (JMTR), which was widely used, most notably for irradiation tests of light water reactor fuels and materials, is currently under decommissioning in accordance with the decommissioning plan of the JMTR authorized by the Nuclear Regulation Authority in March 2021. The center is also engaged in related technology development. It additionally treats radioactive waste generated by the operation of nuclear facilities and technology development at the Oarai Research and Development Institute. At the Oarai Waste Reduction Treatment Facility (OWTF), trial operation of facilities for waste volume reduction is in progress.

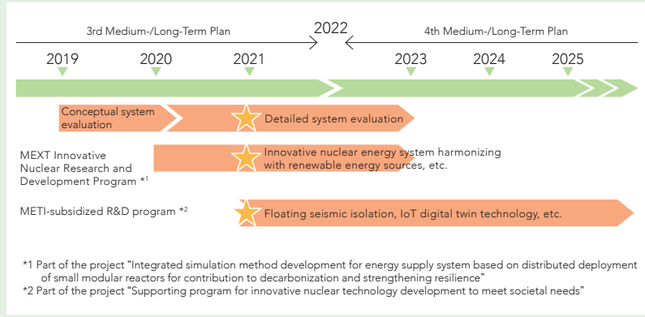
Oarai Waste Reduction Treatment Facility (OWTF)

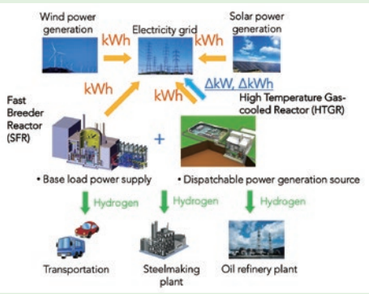
Tsuruga Comprehensive Research and Development Center

The center is engaged in knowledge preservation related to the Prototype Fast Breeder Reactor Monju, technology development on the inspection and maintenance of sodium-cooled fast reactors, and research and development on applied laser technology for nuclear facilities.
The center also takes part in industry-academia-government joint studies, accepts guest student researchers, and provides engineer training. Through these activities, the center contributes to the maintenance of fundamental technology and the development of human resources for fast reactors.

Sodium Engineering Research Facility (SERF)

○ Establishing an innovative nuclear energy system concept to meet future societal needs





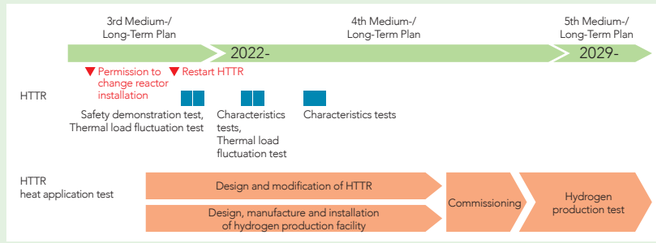
Harmonious energy supply system using renewable energy sources, FBR, and HTGR

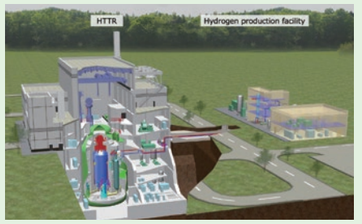
Planning/Outcome Contribution to the development of innovative nuclear technology through R&D in response to the needs of private companies developing fast reactor technologies.

➡ An innovative nuclear power system concept has been proposed to meet societal needs such as zero emissions. The concept combines the role of the high temperature gas-cooled reactor (HTGR) for variable load following with the role of the fast breeder reactor (SFR) for base load power generation and for nuclear fuel supply to the HTGR. The development issues required to realize the concept have been identified and the development plans made. A floating seismic isolation technology, whose patent application has been submitted, is among the development plans.

Outcome The potential of innovative nuclear energy technology as an answer to future societal needs around sustainability, such as zero emissions, will be demonstrated. By addressing these development issues, which also reflect the needs of the private sector, JAEA will contribute to promoting private-sector development.

○ JAEA obtained permission to change the reactor installation of the High Temperature Engineering Test Reactor (HTTR) in conformity with the New Regulatory Requirements. The safety review of HTTR by the Nuclear Regulation Authority (NRA) confirmed that no fuel damage would occur even in the event of a Beyond Design Basis Accident (BDBA).





Concept of HTTR-based nuclear hydrogen production system

Planning/Outcome Toward an early restart, the refurbishment of the HTTR, as mandated in the permission to change the reactor installation, will be steadily carried out, including installation of countermeasure systems against internal and external fires and installation of diverse radiation monitoring systems.

➡ On June 3, 2020, JAEA obtained permission from the NRA to change the reactor installation of the HTTR in conformity with the New Regulatory Requirements. NRA confirmed through safety review based on the New Regulatory Requirements that no fuel damage would occur even in the event of a BDBA. Furthermore, even if the cooling functions of the reactor were to be lost, it was recognized that measures such as indoor evacuations were unnecessary. JAEA will by 2030 establish the safety design and technologies required for HTGR heat applications through HTTR heat application tests using the HTTR hydrogen production system with the aim of domestic and overseas deployment by 2050.

Outcome

- The inherent safety of HTGR is recognized and it is expected to contribute to international standardization of safety design criteria.
- The HTTR-based carbon-free hydrogen production technology outlined in the Green Growth Strategy will be demonstrated and contribution will be made to the deployment of a pilot reactor.

R&D Related to the Nuclear Fuel Cycle, Such as Reprocessing, Fuel Manufacturing and Treatment and Disposal of Radioactive Waste

The cost of this R&D was 53,747 million yen (operations expenses 51,738 million yen and contracted expenses 1,931 million yen). The revenues recorded as funding for the R&D included revenues from government funding for operational grant (36,633 million yen) and revenues from contribution for treatment and disposal of waste (5,606 million yen). The administrative cost, calculated by adding extraordinary loss (901 million yen) and other administrative costs (2,308 million yen) to this cost, was 56,971 million yen.

In the "Sector of Fast Reactor and Advanced Reactor Research and Development (SeFARD)," we are implementing R&D on advanced reactor technologies such as fast reactors, high-temperature gas-cooled reactors (HTGRs), and related fuel cycle technologies in order to further enhance future energy sustainability, safety, economic competitiveness, and flexible load-in line with ability. R&D is also conducted in the fields of decommissioning and radioactive waste management.

Research and Development Sites for Geological Disposal Technology

The Horonobe Underground Research Center for sedimentary rock carries out research and development including demonstration of Engineered Barrier Systems (EBS) in the geological environment using underground facilities. At the Tono Geoscience Center, the Toki Research Institute of Isotope Geology and Geochronology is engaged in a study of the long-term stability of the geological environment, while the Mizunami Underground Research Laboratory project for crystalline rock is continuing work on the backfilling of underground facilities.
The Nuclear Fuel Cycle Engineering Laboratories in Tokai are involved in the development of technologies for the design and safety assessment of geological disposal systems.

Horonobe Underground Research Center

Nuclear Fuel Cycle Engineering Laboratories

The Nuclear Fuel Cycle Engineering Laboratories (NCL) are advancing with R&D on subjects including plutonium-uranium mixed oxide (MOX) fuel, separation techniques for minor actinide (MA) to reduce the volume and toxicity of radioactive waste, and countermeasures for the accident at the Fukushima Daiichi Nuclear Power Station. NCL continues to contribute to innovation in the use of nuclear energy and the resolution of problems related to energy resources. The Tokai Reprocessing Plant (TRP) is a large-scale nuclear fuel facility and its decommissioning is a major long-term project. As one of Japan's leading institutions in the field, TRP is proceeding with this decommissioning, including related R&D.

Development of new glass melter

Ningyo-toge Environmental Engineering Center

The Ningyo-toge Environmental Engineering Center is proceeding with the decommissioning of Japan's first large-scale uranium enrichment facility based on the Uranium and Environmental Research Platform Concept. In 2020, we received approval for the Decommissioning Plan for the Processing Business. In the future, we will proceed with the dismantling of the equipment of the Uranium Enrichment Demonstration Plant with the highest priority on safety. In addition, we are progressing with research and development relating to centrifuge treatment processes.

Gas centrifuge at uranium enrichment demonstration plant DOP-2, opened in 1989

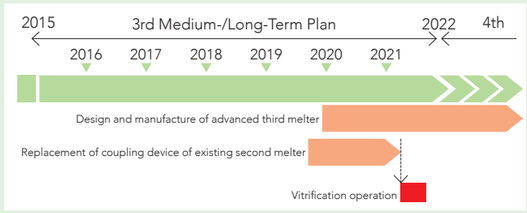
Aomori Research and Development Center

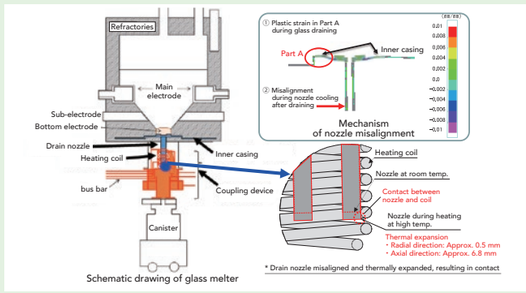
At Aomori Research and Development Center, based in Mutsu City, Aomori Prefecture, ultra-trace radionuclides in the global environment are measured using an accelerator mass spectrometer (AMS) with the world's highest level of accuracy. The data contributes to research on the migration behavior of radioactive materials in the marine environment.

Accelerator mass spectrometer

○ Efforts for early resumption of vitrification of high-level radioactive liquid waste (HLLW)

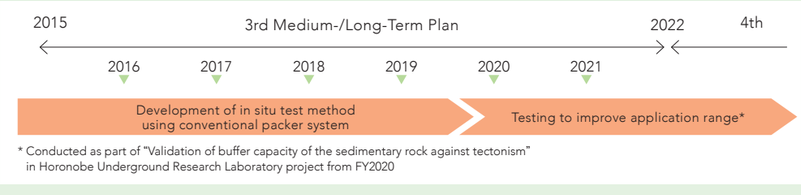
Planning/Outcome With a view to restarting HLLW vitrification in 2021, the Nuclear Fuel Cycle Engineering Laboratories have developed a new improved coupling device for the drain nozzle of the glass melter following the failure of the glass pouring operation at the existing second melter in FY2019. The manufacturing schedule was subject to strengthened management, including an online meeting system, and the new coupling device was delivered at the end of FY2020, and will be attached to the bottom of the melter and inspected.
An advanced third glass melter has been developed based on operational experience with the second, including the abovementioned failure of the glass pouring operation.
Safety assessment toward approval by the Nuclear Regulation Authority (NRA) and preparation of the constituent materials of the melter such as refractories and electrode materials are in progress.



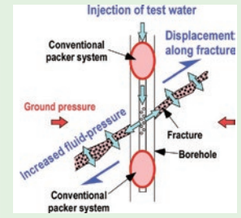


Outcome The lessons learned from operational experience of the JAEA glass melter are expected to contribute to the stable operation of the commercial vitrification plant of Japan Nuclear Fuel Limited (K-facility).

○ Development of a new method to displace fractures in deep underground using a conventional packer system



* Conducted as part of "Validation of buffer capacity of the sedimentary rock against tectonism" in Horonobe Underground Research Laboratory project from FY2020



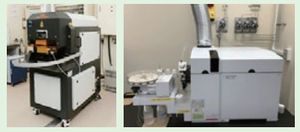
Test concept using conventional packer system

Planning/Outcome In geological disposal of high-level radioactive waste, account must be taken of possible tectonic displacement of underground fractures, which would increase the permeability of such fractures and affect the geological containment capability. Horonobe Underground Research Center developed a new in situ test method to experimentally displace actual underground fractures using a conventional packer system rather than specifically developed equipment. This method enabled observation of displacements of several centimeters, substantially larger than those that can be observed with special equipment, and significant reduction of the cost per test.

Outcome This method is useful for efficient selection of geological disposal sites based on assessment of the permeability increase caused by tectonically induced fracture displacement and is also applicable to problem solving in civil engineering and other fields involving underground applications.

○ Development of a new analytical method for investigation and evaluation of the cooling and uplift processes of plutonic rock

Planning/Outcome In collaboration with researchers at Yamagata University and other institutions, we developed an analytical technique for simultaneous determination of zircon U-Pb age and titanium concentration at individual spots. Zircon U-Pb age and titanium concentration reflect the crystallization age and temperature. This method makes it possible to estimate with greater accuracy the time-temperature (t-T) history of granitic magma before its solidification.



Laser ablation inductively coupled plasma mass spectrometer at Tono Geoscience Center

Outcome The result of this research will contribute to the reduction of uncertainty in the evaluation of uplift and erosion rates, which are important indicators for selection of HLW disposal sites. It can also be expected to find applications in other fields of underground utilization such as natural gas and oil storage.

Activities for Sector of Tsuruga Decommissioning Demonstration

The cost of this R&D was 27,793 million yen (operations expenses 27,791 million yen), and the revenues recorded as funding for the R&D included revenues from government funding for operational grant (26,170 million yen). The administrative cost, calculated by adding extraordinary loss (190 million yen) and other administrative costs (1,192 million yen) to this cost, was 29,180 million yen.

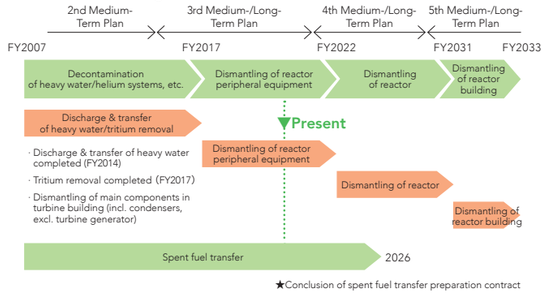
With utmost priority given to safety assurance, the Sector of Tsuruga Decommissioning Demonstration worked on the decommissioning of "Fugen" and "Monju." Full-scale dismantling of the reactor peripheral equipment started at Fugen while the fuel unloading operation was successfully carried out on schedule at Monju. Both projects are moving steadily toward the completion of decommissioning.

Toward the Completion of Decommissioning of "Fugen"

At Fugen, dismantling operations inside the reactor building started in FY2018. In FY2020, an opening was bored through the walls of the reactor building and the turbine building for efficient transfer of the dismantling waste. Of the two loops of the reactor cooling system, the dismantling of the A loop piping and other equipment is already complete and work on the B loop has started. Safe and efficient dismantling procedures have been pursued through measures including collection of samples from inside the reactor for analysis and assessment in order to evaluate accurately the radioactivity in the reactor structural materials.

For the very low-radioactivity metal generated by the dismantling and removal of the turbine building, radioactivity has been steadily measured and evaluated using a "clearance system." By FY2020, approximately 175 tons had been determined to be below the "clearance level" and we are now moving forward with reuse and disposal of this material by the same route as for general industrial waste. In February 2020, we applied to the Nuclear Regulation Authority for approval of a design for the spent fuel transport casks and are currently making arrangements for manufacture toward the completion of spent fuel transfer in FY2026.

Decommissioning Schedule



Toward the Completion of Decommissioning of "Monju"

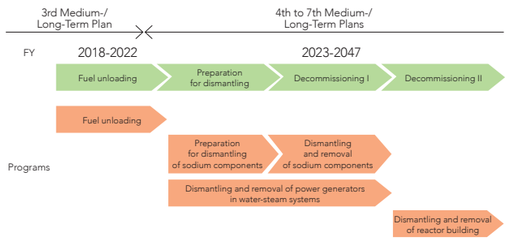
Monju is the first fast breeder reactor in Japan to be decommissioned; in August 2018, JAEA initiated the first stage of its decommissioning process, the "fuel unloading operation."

From FY2019 to FY2020, 174 fuel assemblies were subjected to fuel treatment operation, a number exceeding the initial plan. This was achieved by applying improvements based on lessons learned from previous treatment procedures. In FY2020, 146 fuel assemblies were removed from the reactor vessel. Of the total of 530 fuel assemblies, 260 have been treated, and 246 of the remaining 370 have been unloaded. The fuel unloading operation has progressed steadily toward completion.

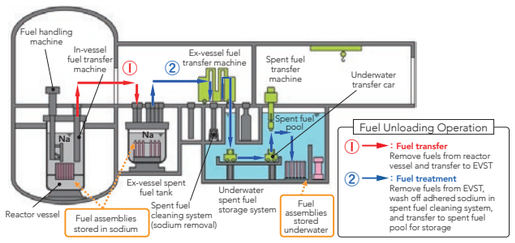
A modification of the decommissioning plan relating to the "partial loading" of the reactor was approved. "Partial loading" means loading the reactor only "partially" with dummy fuel assemblies, which would otherwise replace all the removed assemblies. This will reduce the number of dummy fuel assemblies to be loaded by 124, leading to reductions in waste and cost and greater efficiency in the decommissioning operation.

Toward the launch of the second stage of decommissioning, JAEA has made efforts to realize a safe and highly efficient operation by studying treatment and disposal methods for sodium and planning for the dismantling of sodium components.

Decommissioning Schedule

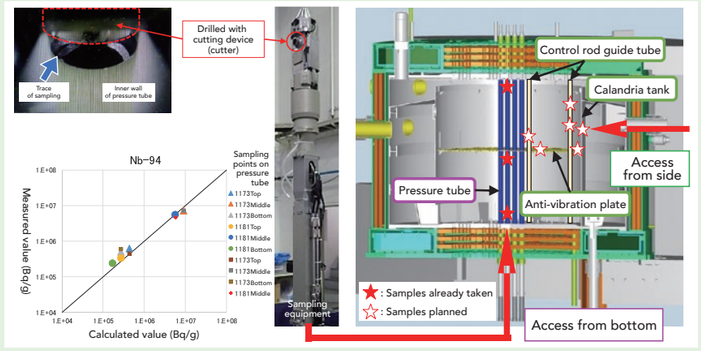


Fuel unloading operation



○ Accurate evaluation of radiation distribution in reactor through verification of sampling technology for reactor structural materials

Planning/Outcome In dismantling the Fugen reactor, it is important to take the following points into consideration: reduction of radiation exposure during dismantling work, optimization of the implementation schedule, and efficient waste packaging, etc. Developing sampling methods is thus required in order to accurately evaluate the radioactivity remaining in the reactor structural materials.



Comparison of calculated and measured radioactivity levels in samples in reactor: Pressure tube

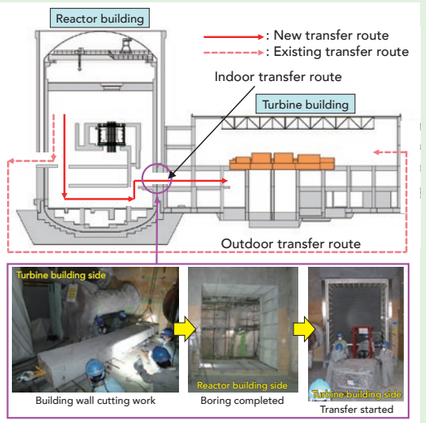
Sampling equipment and sampling points

➡ From FY2018 to FY2019, using sampling equipment that we had developed, we verified remote sampling methods by accessing components of high radioactivity level such as the pressure tube from the reactor bottom and collecting sample materials. In FY2020, it was confirmed that the results of radionuclide analysis of the collected samples were generally in accordance with those of prior activation calculation and analysis, proving the validity of the activation evaluation of the reactor structural materials. We plan to collect samples by accessing targets from the side of the reactor to verify techniques for sample collection from the side and to further confirm the validity of the radioactivity evaluation of reactor structural materials. Through these efforts, we will improve the accuracy of the evaluation of the remaining radioactivity to proceed with the aim of safe and efficient dismantling and radioactive waste treatment and disposal.

Outcome The reactor sampling system and the system for laser cutting in air/water which we developed are expected to contribute to the development of sampling and decommissioning technology for light water reactors under spatially restricted and high-radiation conditions, such as those of the fuel debris removal work at TEPCO's Fukushima Daiichi Nuclear Power Station (1F).

○ Improvement of safety and efficiency of dismantling work inside Fugen reactor building

Planning/Outcome In preparation for the dismantling of the reactor, full-scale dismantling of the reactor peripheral equipment and piping started in FY2019. The total dismantling waste to be generated is estimated at up to 2,000 t. To ensure safe and efficient treatment of the waste, including sorting, decontamination, and radioactivity analysis using the "clearance system," an efficient route to transfer the waste to the turbine building needs to be prepared.



➡ An opening (approx. 4 m high, 3 m wide, and 4 m thick) was bored through the sturdy concrete wall to create a safe and efficient route for transferring the dismantled material directly from the reactor building to the turbine building. This route allows the amount of dismantled material carried out to be more than doubled. Since the material can be transferred to the turbine hall with less spatial restriction and does not need to be cut into pieces, this route also speeds up the dismantling work. In this way, we have worked for safe and efficient decommissioning, devising ways to meet challenging issues through trial and error. We hope our experience will help in the decommissioning of other nuclear facilities.

Outcome

- Greatly improved efficiency in the dismantling work and dismantling waste transfer will contribute significantly to the completion of decommissioning.
- The experience gained through the demolition and removal work has been summarized in public reports and will be shared at domestic and international academic conferences.
- Information exchange meetings are regularly held with power companies to share the experience; we hope this will be helpful to other ongoing light water reactor decommissioning projects.

Results of Self-Assessment and Administrative Cost by Segment in FY2020
Results of Ministerial Evaluation for Past Years

(1) Self-Assessment and Administrative Cost in FY2020

Keeping in mind that the primary 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 FY2020*.

For details, please read JAEA's FY2020 Operational Results Report.
(https://www.jaea.go.jp/about_JAEA/business_plan.html (in Japanese))

* Ratings were specified 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)

1.	Safety assurance and nuclear security	A	— 1)
2.	R&D pertaining to the response to the accident at TEPCO's Fukushima Daiichi Nuclear Power Station	S	18,030 million yen
3.	Technological support for nuclear safety regulation and safety research for this purpose	A	7,200 million yen
4.	R&D for improving nuclear safety and activities that contribute to nuclear non-proliferation and nuclear security	A	2,098 million yen
5.	Basic and fundamental research and human resources development in the nuclear field	S	40,254 million yen
6.	R&D on fast reactors and advanced reactors	A	16,189 million yen
7.	R&D related to the nuclear fuel cycle, such as reprocessing, fuel manufacturing and treatment and disposal of radioactive waste	A	56,971 million yen
8.	Activities for sector of Tsuruga decommissioning demonstration	A	29,180 million yen
9.	Activities to strengthen industry-academia-government collaboration and secure the trust of society	A	4,158 million yen
10.	Promotion of rationalization and efficiency of operations	A	— 2)
11.	Budget (including estimate of personnel expenses), revenues and expenditure plan, financing plan	A	— 2)
12.	Establishment of effective and efficient management system	A	— 2)
		Total	177,992 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 (3,913 million yen).

(2) Overall Ratings of Past Fiscal Years by Competent Ministers within the present Medium-/Long-Term Objectives Periods

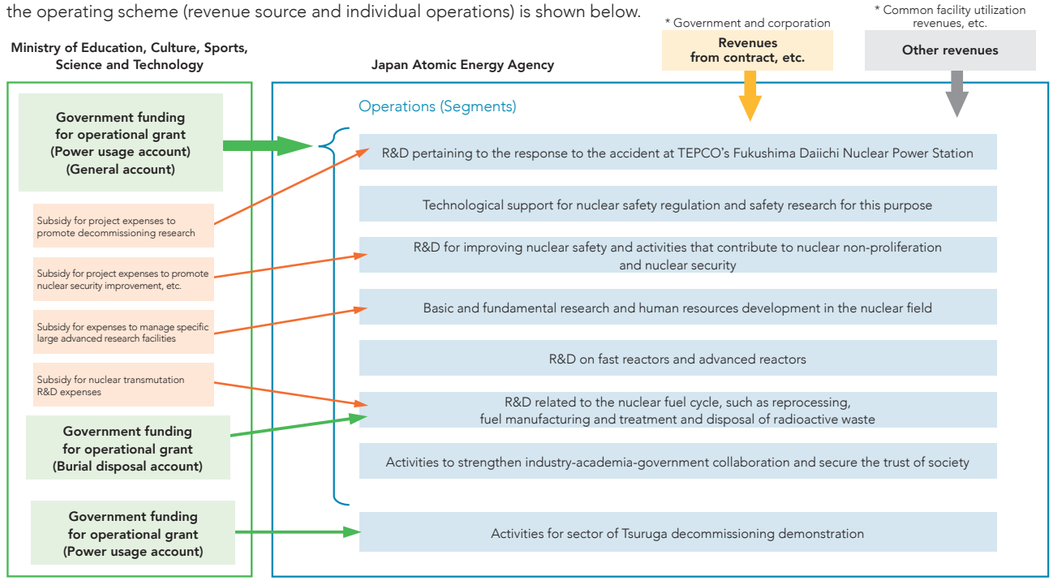
Fiscal year	2015	2016	2017	2018	2019	2020	2021
Rating	B	B	B	B	A		
Reasons for rating	As shown in the evaluation of the entire corporation, the results and initiatives arising from the corporation's activities were comprehensively considered in light of the objectives and operations of the Japanese National Research and Development Agencies, the Medium-/Long-Term Objectives, etc. As a result, JAEA was recognized as having attained marked achievements and the expectation of future results in its efforts for maximization of research and development outcomes under adequate, effective and efficient management*.						

* Extract from the Evaluation of FY2019 Operating Results of Japan Atomic Energy Agency (September 2020, Minister of Education, Culture, Sports, Science and Technology, Minister of Economy, Trade and Industry, Nuclear Regulation Authority)

Premise Information for Proper Assessment of Operations
Information on Operation of Internal Control

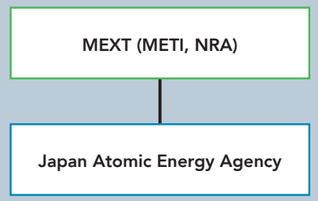
Premise Information for Proper Assessment of Operations

To assist the understanding and evaluation of JAEA's operations in FY2020, the operating scheme (revenue source and individual operations) is shown below.



Relationship between JAEA and government

The operating scheme above shows only the Ministry of Education, Culture, Sports, Science and Technology (MEXT), which is responsible for government funding for operational grant. In practice, however, the system also involves the Ministry of Economy, Trade and Industry (METI) and the Nuclear Regulation Authority (NRA). MEXT, METI and NRA are respectively responsible for the overall operation of JAEA, the technological operations for establishing the nuclear fuel cycle, and safety assurance matters (for details, please see P.13 of this report).



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)**

Internal audit was conducted to check the implementation of competitive funding, etc., as specified by regulations, and of personal information protection, management of cash and goods, etc., and preventive measures for work safety.

○ **Bidding and Contract (Article 34 of the statement of operation procedures)**

The Contracting Monitoring Committee consisted of four external experts and the auditors. In June and October 2020, the committee checked the appropriateness of non-competitive negotiated contracts, contracts with a single bidder for two consecutive years, contracts with a bid acceptance ratio of 100%, and contracts with related organizations.

○ **Appropriate budget allocation (Article 35 of the statement of operation procedures)**

The 2020 budget guideline of the implementation plan and its 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.

Balance Sheet

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

Item	FY2020	FY2019	Item	FY2020	FY2019
Current assets	229,067	189,324	Current liabilities	68,458	67,909
Cash and deposits (*1)	178,101	125,447	Debt from government funding for operational grant	16,321	17,810
Securities	–	13,329	Reserves	9,852	8,819
Nuclear materials	5,947	8,353	Others	42,285	41,280
Others	45,019	42,196			
			Fixed liabilities	303,613	308,015
Fixed assets	552,839	597,812	Asset-offsetting liabilities	125,797	130,102
Tangible fixed assets	441,756	440,676	Reserves	143,101	147,817
Buildings	85,506	85,421	Others	34,715	30,097
Machinery and equipment	30,640	33,140	Total liabilities	372,070	375,924
Land	57,216	57,268	Capital stock	817,797	818,524
Construction in progress	186,310	184,444	Government investment	801,505	802,232
Others	82,085	80,401	Private investment	16,292	16,292
Intangible fixed assets	2,652	2,576			
Patent rights	59	62	Capital surplus	– 456,870	– 454,145
Others	2,593	2,514	Capital surplus	104,554	99,144
Investments and other assets	108,432	154,560	Cumulative total of other administrative costs	– 561,424	– 553,289
			Retained earnings	48,910	46,833
			Total net assets (*2)	409,836	411,212
Total assets	781,906	787,137	Total liabilities and net assets	781,906	787,137

Administrative Cost Statement

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

	FY2020	FY2019
Expenses on profit and loss statement	169,857	336,142
Ordinary expenses (*3)	161,251	155,000
Extraordinary loss (*4)	8,558	181,090
Income taxes	48	52
Other administrative costs	8,135	35,183
Administrative cost total	177,992	371,325

Profit and Loss Statement

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

Item	FY2020	FY2019
Ordinary expenses (A) (*3)	161,251	155,000
Operations expenses	145,591	138,043
Contracted expenses	11,263	12,071
General and administrative expenses	4,217	4,820
Financial expenses	145	41
Others	34	26
Ordinary revenues (B)	161,541	156,358
Revenues from government funding for operational grant	109,649	107,488
Revenues from contracted research	11,215	12,052
Revenues from facilities expenses	269	1,508
Revenues from subsidies	10,907	10,325
Reversal of asset-offsetting liabilities	11,763	11,972
Others	17,738	13,013
Extraordinary loss (C) (*4)	8,558	181,090
Extraordinary income (D)	10,392	201,319
Income taxes (E)	48	52
Reversal of reserves carried over from previous Medium-/Long-Term Objectives period (F)	87	190
Gross profit for fiscal year (B – A – C + D – E + F)	2,163	21,725

Statement of Changes in Net Assets

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

	FY2020	FY2019
Starting balance of fiscal year	411,212	423,941
Ⅰ. Change of capital stock in fiscal year	– 727	– 1,767
Reduction due to payment to national treasury pertaining to unnecessary assets, etc.	– 727	– 1,767
Ⅱ. Change of capital surplus in fiscal year	– 2,725	– 32,497
Acquisition of fixed assets	4,847	1,160
Disposition/sale of fixed assets	– 972	– 55
Depreciation	– 6,630	– 7,604
Impairment of fixed assets	– 229	– 7,708
Others	259	– 18,290
Ⅲ. Change of retained earnings in fiscal year	2,076	21,536
Change in fiscal year	– 1,376	– 12,729
Ending balance of fiscal year (*2)	409,836	411,212

Cash Flow Statement

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

Items	FY2020	FY2019
Ⅰ. Cash flow from business activities (A)	16,572	13,028
Personnel expenses	– 42,115	– 42,661
Proceeds from subsidies	16,038	13,952
Other Proceeds	156,820	159,422
Other payments	– 114,172	– 117,686
Ⅱ. Cash flow from investment activities (B)	36,979	– 9,571
Ⅲ. Cash flow from financial activities (C)	– 896	– 1,523
Ⅳ. Fund increase (or decrease) (D = A + B + C)	52,654	1,934
Ⅴ. Starting balance of fund (E)	125,447	123,513
Ⅵ. Ending balance of fund (F = E + D) (*5)	178,101	125,447

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

(¥ million)

	FY2020	FY2019
Ending balance of fund (*5)	178,101	125,447
Time deposits	–	–
Cash and deposits (*1)	178,101	125,447

(Reference) Impact on FY2019 Financial Statements of Revision of Accounting Standards for Incorporated Administrative Agencies

The FY2019 Financial Statements include amounts generated prior to FY2018 due to accounting processes associated with the revision of the Accounting Standards for Incorporated Administrative Agencies (September 3, 2018).

○ **Accounting Process for Reserves**

As reserves with measures on source of revenue from government funding for operational grant and other funds were stipulated to be included in liabilities and the same amount to be included in assets as a reserve offset, the transferred amount of these reserves prior to FY2018 (163,879 million yen) is included in extraordinary loss, and the earnings pertaining to reserve offsets prior to FY2018 (123,722 million yen) is included in extraordinary income.

○ **Accounting Process for Amount Equivalent to Expenses Related to Specific Assets**

Since the new accounting standards stipulate that, of the succeeded assets, an amount equivalent to the expenses related to specific assets is to be deducted from the capital surplus instead of being included in expenses, extraordinary income was increased as a result of the inclusion in earnings of 19,639 million yen that had been included in expenses prior to FY2018, and the same amount appears in "FY2019 Other Administrative Cost."

For details on financial statements, please see JAEA website.
https://www.jaea.go.jp/about_JAEA/financial/(in Japanese).
Figures are rounded to the nearest integer for the unit provided. The total shown may differ from the sum of relevant individual items.

Explanations of Items in Summary of Financial Statements

(1) Balance Sheet

Cash and deposits	: Cash and deposits
Securities	: Trading securities, government bonds that mature within 1 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 grant
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, and reserve for environmental measures
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 deemed 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 that shows 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 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 that shows 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 that has 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 that are attributable to the nation

(3) Profit and Loss Statement

Operations expenses	: Expenses required for R&D operations of the Agency
Contracted expenses	: Expenses required for contracted 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
Revenues from contracted research	: Revenues arising from contracted 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 revenues 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

Comparison of Budget and Settlement

(¥ million)

Items	Budget amount	Settlement amount
Incomings		
Government funding for operating expenses	132,103	132,103
Government subsidies	16,237	18,178
Other subsidies	0	1,105
Revenues from contract, etc.	3,054	12,060
Other income	1,643	4,383
Contribution for treatment and disposal of waste	9,400	10,105
Amount carried over from previous fiscal year	146,094	148,050
Total	308,532	325,984
Outgoings		
General and administrative expenses	4,353	4,515
Business expenses	141,943	146,490
Expenses related to government subsidies	16,346	18,057
Expenses related to other subsidies	0	1,105
Expenses related to contract, etc.	3,050	11,533
Amount carried over to next fiscal year	142,839	146,039
Total	308,532	327,740

For details, please see JAEA's financial statements.

(1) Balance Sheet

(Assets)
The total of assets as of the end of FY2020 was 781,906 million yen, a decrease of 5,230 million yen (1%) 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 FY2020 was 372,070 million yen, a decrease of 3,854 million yen (1%) compared with the end of the previous fiscal year. The main causes of this were, as in the case of assets, 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 FY2020 was 177,992 million yen, a decrease of 193,333 million yen (52%) compared with the previous fiscal year. The main cause of this was a decrease in the 163,879 million yen of extraordinary loss that was included in FY2019 following the revision of the Accounting Standards for Incorporated Administrative Agencies and other related regulations.

(3) Profit and Loss Statement

(Ordinary expenses)
Ordinary expenses in FY2020 were 161,251 million yen, an increase of 6,251 million yen (4%) compared with the previous fiscal year. The main cause of this was the new inclusion of 6,478 million yen of transferred reserve for radioactive waste.
(Ordinary revenues)
Ordinary revenues in FY2020 were 161,541 million yen, an increase of 5,183 million yen (3%) compared with the previous fiscal year. The main cause of this was, as in the case of ordinary expenses, an increase in revenues pertaining to the offsetting of the reserve for radioactive waste following the new inclusion of the said reserve.
(Gross profit for the fiscal year)
The gross profit for FY2020 was 2,163 million yen, a decrease of 19,562 million yen (90%) compared with the previous fiscal year. The main cause of this was a decrease in the 19,639 million yen of profit associated with the specification of succeeded assets that was included in FY2019 following the revision of the Accounting Standards for Incorporated Administrative Agencies and other related regulations.

(4) Statement of Changes in Net Assets

The total amount of assets as of the end of FY2020 was 409,836 million yen, a decrease of 1,376 million yen (0.33%) compared with 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.

(5) Cash Flow Statement

(Cash flow from business activities)
The cash flow from business activities in FY2020 was 16,572 million yen, an increase of 3,543 million yen (27%) compared with the previous fiscal year. The main cause of this was a decrease of 4,093 million yen (4%) in expenditure associated with R&D activities.
(Cash flow from investment activities)
The cash flow from investment activities in FY2020 was 36,979 million yen, an increase of 46,550 million yen (486%) compared with the previous fiscal year. The main cause of this was an increase of 43,568 million yen in income from sale of securities.
(Cash flow from financial activities)
The cash flow from financial activities in FY2020 was a deficit figure of 896 million yen, a deficit reduction of 626 million yen (41%) compared with the previous fiscal year. The main cause of this was a decrease of 549 million yen in expenditure arising from the repayment of lease obligations.

(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	Third Medium-/Long-Term Objectives Period					
	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020
Assets	948,147	753,495	696,898	695,391	787,137	781,906
Liabilities	394,226	266,329	265,770	271,451	375,924	372,070
Net assets	553,921	487,166	431,128	423,941	411,212	409,836
Administrative cost	–	–	–	–	371,325	177,992
Ordinary revenues	182,875	160,309	161,542	175,020	156,358	161,541
Ordinary expenses	182,277	158,696	158,920	173,063	155,000	161,251
Gross profit [or loss (indicated by negative sign)] for fiscal year	961	427	− 2,182	2,002	21,725	2,163
Cash flow from business activities	32,460	15,897	25,380	18,114	13,028	16,572
Cash flow from investment activities	− 38,737	9,874	− 24,718	− 9,006	− 9,571	36,979
Cash flow from financial activities	− 2,397	− 3,181	− 2,478	− 2,570	− 1,523	− 896
Ending balance of fund	99,242	118,791	116,975	123,513	125,447	178,101

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

(1) Budget (¥ million)

Category	Total
Incomings	
Government funding for operating expenses	134,094
Subsidy for facility maintenance expenses	100
Subsidy for expenses to manage specific large advanced research facilities	10,183
Subsidy for business expenses to promote nuclear security improvement, etc.	508
Subsidy for nuclear transmutation R&D expenses	103
Subsidy for business expenses to promote decommissioning research, etc.	1,318
Revenues from contract, etc.	3,115
Other revenues	3,867
Contribution for treatment and disposal of waste	9,400
Amount carried over from previous fiscal year (carried-over waste treatment business expenses)	138,199
Total	300,887
Outgoings	
General and administrative expenses	5,820
Business expenses	196,225
Expenses related to subsidy for facility maintenance expenses	100
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.	508
Expenses related to subsidy for nuclear transmutation R&D expenses	103
Expenses related to subsidy for business expenses to promote decommissioning research, etc.	1,318
Expenses related to contract, etc.	3,112
Amount carried over to next fiscal year	83,518
Total	300,887

(2) Revenues and Expenditure Plan (¥ million)

Category	Total
Expenses	154,550
Ordinary expenses	154,550
Business expenses	133,684
General and administrative expenses	5,104
Expenses related to contract, etc.	3,112
Depreciation expenses	12,650
Revenues	154,189
Revenues from government funding for operational grant	111,024
Revenues from subsidies	12,111
Income from waste disposal for research facilities, etc.	3
Income from contract, etc.	3,112
Revenues from contribution for treatment and disposal of waste	6,166
Other income	4,063
Reversal of asset-offsetting liabilities	12,650
Revenues from reserve offsets	5,059
Net loss	361
Reversal of reserves pursuant to Article 21, paragraph 4, of the Act on the Japan Atomic Energy Agency	361
Gross loss	0

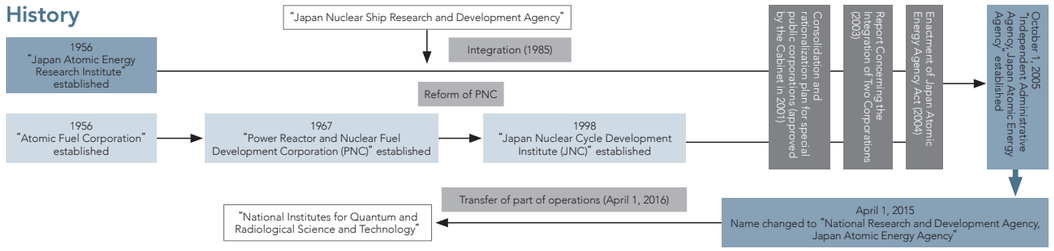
(3) Financing Plan (¥ million)

Category	Total
Outgoing funds	300,887
Expenditure for business activities	150,041
Expenditure for investment activities	67,327
Amount carried over to next fiscal year	83,518
Incoming funds	300,887
Revenues from business activities	162,587
Revenues from government funding for operational grant	131,903
Reception from other accounts	2,191
Revenues from subsidies	12,111
Revenues from waste disposal for research facilities, etc.	3
Revenues from contract, etc.	3,112
Revenues from contribution for treatment and disposal of waste	9,400
Other income	3,867
Revenues from investment activities	100
Revenues from facility maintenance expenses	100
Amount carried over from previous fiscal year	138,199

For details, please see the Annual Plan.

Profile of Organization

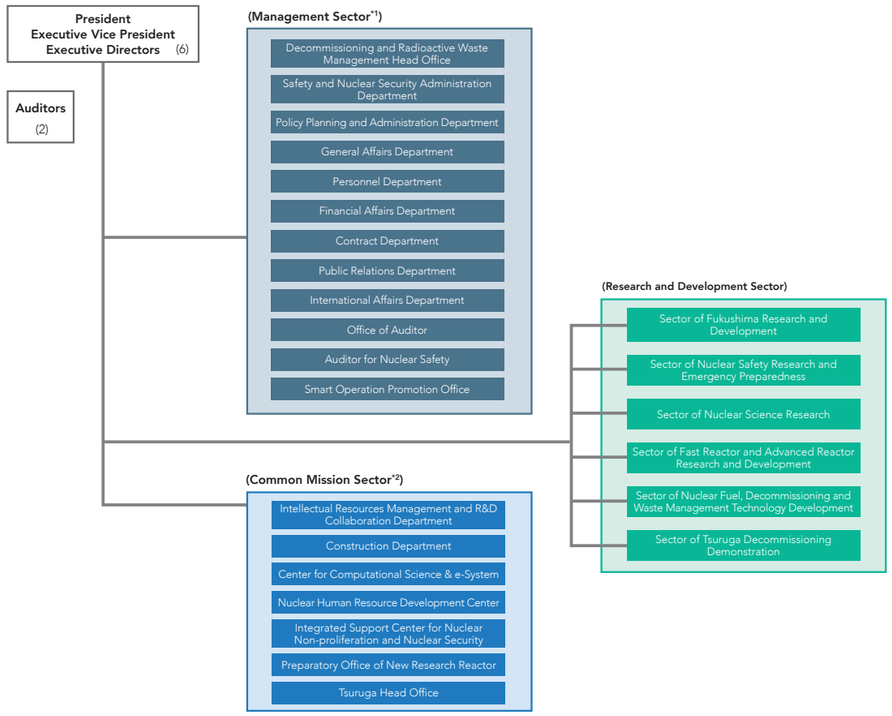
History



Law Underlying Establishment of JAEA

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

Organization (as of June 2021)



*1 JAEA's organization was restructured on April 1, 2021. The former R&D Program Management Department and Office of Strategy and International Affairs changed to the Policy Planning and Administration Department and International Affairs Department, respectively, through transfer and integration of their operations. The operation of the nuclear safety audit was transferred from the former Legal and Audit Department to the Auditor for Nuclear Safety and the former Legal and Audit Department became the Office of Auditor.

*2 The Preparatory Office of New Research Reactor, established on April 1, 2021, reports directly to the President.

Employees

The number of full-time employees under the age-limit system as of the end of FY2020 was 3,116 (an increase of 26 compared with the end of the previous fiscal year), and the average age was 42.8 years (43.2 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 Wednesday, March 31, 2021, was 102.

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

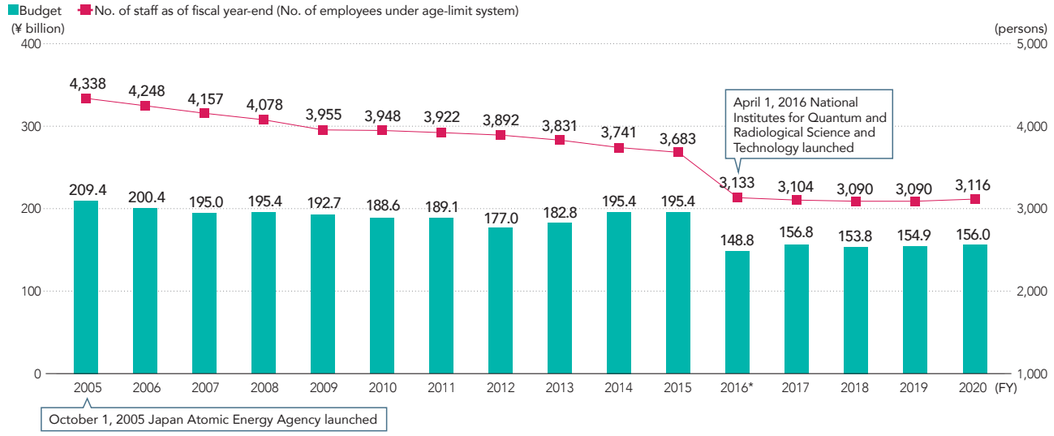
Corporation	Outline of operations	Relation to JAEA
Mutual Aid Association for Japan Atomic Energy Agency	Promotes the benefit and welfare of executive directors, staff and other employees of Japan Atomic Energy Agency and its full-time officers and employees and conducts activities to contribute to and achieve the advancement of the Agency'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 activities for radiation application and conducts activities to contribute to 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 promotes 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 the development of academia and science and technology.	Related public interest corporation
Radwaste and Decommissioning Center (RANDEC)	Endeavors to contribute to the preservation of the global environment, smooth advancement of the development of nuclear energy, and the formation of a safe society in which the Japanese people can feel secure through conduct of back-end activities relating to nuclear energy use and dissemination of the outcomes thereof, including the decommissioning of nuclear facilities and processing and disposal of radioactive waste generated through the development and use of nuclear energy, and conducts activities to contribute to the promotion of science and technology.	Related public interest corporation

For details, please see the detailed statements attached to JAEA's financial statements. (https://www.jaea.go.jp/about_JAEA/financial/ (in Japanese))

Accounting Auditor

KPMG AZSA LLC

Transition in Number of Staff and Budget



* Decrease in staff and budget with launch of National Institutes for Quantum and Radiological Science and Technology

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 at 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
- Sale of Arayadai site (land) (Tokai Base) (acquisition cost 31 million yen)
- Sale of Ichirizuka housing site (land) (Tokai Base) (acquisition cost 99 million yen)
- Disposition of shafts and drifts of Mizunami Underground Research Laboratory (Tono Base) (acquisition cost 7,392 million yen; accumulated depreciation 873 million yen)

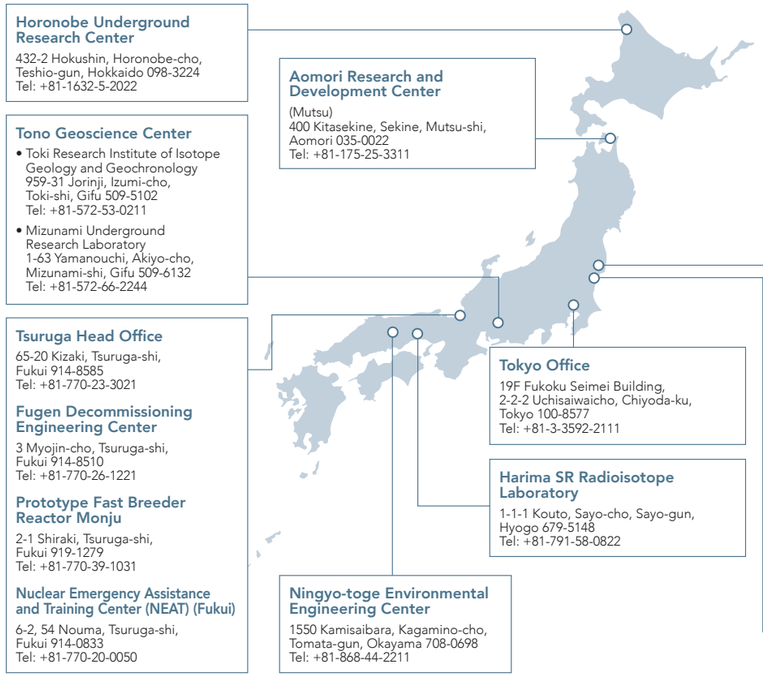
Principal Themes in R&D and Location of R&D Sites

Principal Themes

JAEA prioritizes the following themes: establishment of technologies towards the revitalization and reconstruction of Fukushima; continuous improvement of nuclear safety, basic and fundamental research to support nuclear energy; establishment of decommissioning and waste management technologies; establishment of fast reactor cycle technologies; and implementing the decommissioning of "Fugen" and "Monju." These are based on energy policies encompassing nuclear energy and the science and technology policies shown in the Strategic Energy Plan (Cabinet Decision of July 2018), the Fifth Science and Technology Basic Plan (Cabinet Decision of January 2016) and the basic policy of the decommissioning plan for "Monju" (Cabinet Decision of June 2017).

- Establishment of Technologies toward the Revitalization and Reconstruction of Fukushima
- Establishment of Decommissioning and Waste Management Technologies
- Continuous Improvement of Nuclear Safety
- Establishment of Fast Reactor Cycle Technologies
- Basic and Fundamental Research to Support Nuclear Energy
- Implementing the Decommissioning of "Fugen" and "Monju"

R&D Sites, etc. (as of June 2021)



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  Tel: +81-572-53-0211
- Mizunami Underground Research Laboratory
  1-63 Yamanouchi, Akiyo-cho, Mizunami-shi, Gifu 509-6132
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Other Information for Publication

◆ JAEA publicizes its activities through various media.

JAEA Homepage

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

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

Social Network Services (Twitter official account @JAEA_en)

JAEA Channel

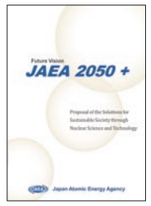
https://www.jaea.go.jp/english/jaea_channel/

Introducing JAEA activities through video streaming services.

— Publicity Brochures —

JAEA Pamphlets

"Genki" Future Vision



"JAEA 2050+"

— Dissemination of Scientific Achievements —

Research Achievements

Technical Seeds Collection

Research and Development Reports

Inquiries

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

Quantitative Analysis of the JAEA Achievements

Dissemination of R&D Achievements

Number of Papers Published 1,183

Oral Presentations 994

Peer-Reviewed 890

Others 293

Number of JAEA Reports Published 153

Indicators of R&D Activities

Number of Joint Research Projects 226

Number of Facility Sharing Contracts 116

New Patents (Domestic Only) 27

Number of Entrusted Research Contracts 117

External Research Funds (Entrusted Research, etc.) 13,585 million yen

Awards

Awards from Various Foundations 3

Awards from Various Academic Associations 50

Awards from the MEXT Minister 3

Performance Information

Cooperation/Collaboration with Other Organizations

Cooperation Arrangements with Other Organizations

International 124

Domestic 40

International Training Courses

219 participants from 10 countries

Domestic Training Courses

182 participants

Number of Cross-Appointment Researchers 13

Public Hearings and Public Relations Activities

Public Hearings and Public Relations Activities

Outreach Activities 496 times (Total approx.) 21,000 participants

Open Campus/Hosting of Individual Visitors 309 times (Total approx.) 7,400 participants