National Institutes for
Quantum and Radiological Science and Technology

Fusion Energy Research and Development Directorate
Naka Fusion Institute
Rokkasho Fusion Institute

Our ultimate goal is to build a platform for the conduct of world class quantum science and technology research towards the improvement of human health and the overall well being of mankind through the creation of a harmonious diversity.

The National Institutes of Quantum and Radiological Science and Technology (QST) was newly-launched as a National Research and Development Agency on 1, April 2016. QST was created as a merger of the National Institute of Radiological Sciences, the Quantum Beam Directorate and the Nuclear Fusion Directorate of the Japan Atomic Energy Agency.

QST is bestowed with the mission of conducting high quality research and development in the following areas;

- cancer therapy with charged particles
- radiation effects on human bodies
- medical applications of radiation
- radiation protection and radiation emergency medicine
- material science with quantum beams
- development of life science with quantum beams
- quantum science with high power lasers
- nuclear fusion as the ultimate energy source for mankind

QST will play a leadership role in molding the future direction of Japan's radiological science field. It will also be Japan's representative for international collaborations such as the ITER Project and the Broader Approach (BA) Activities.

QST will combine the research and development abilities of five Japanese national institutes in the fields of radiology, quantum beams and nuclear fusion to form a world class institution in quantum science and technology research.QST will promote exploratory studies and translational research that integrate quantum science and technology with medicine and life sciences.

QST will also serve as a platform to foster collaboration between industry, government, and academia, through activities such as personnel exchanges and joint research. Such efforts will benefit Society in multiple ways including increased economic output, technological advancement, as well as education and training opportunities for the next generation of engineers and scientists. Finally, QST will actively promote the creation of a harmonious diversity for Society by fostering collaborations that spark intellectual creativity, understanding and respect for other cultures around the world. This kind of activity will contribute to the progress of a peaceful and spiritually rich human society.

We hope to benefit from your support.

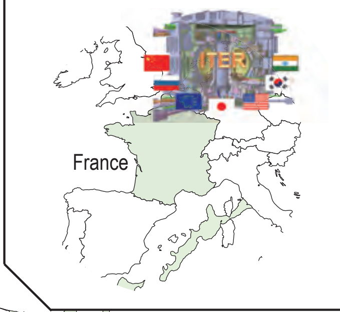
President Toshio Hirano

Organizations

- President
- Auditor — Auditor's Office
- Executive Director
  - [Headquaters]
    - Auditing and Compliance Office
    - Dept. of Management and Planning
    - Dept. of General Affairs
    - Personnel Department
    - Dept. of Safety Administration
    - Dept. of Information Technology
    - Innovation Center
  - QST Advanced Study Laboratory
  - National Institute of Radiological Sciences (Radiological Science Research and Development Directorate)
    - Research Planning and Promotion Office
    - Dept. of Administrative Services
    - Dept. of Engineering and Safety
    - Quality Assurance and Audit Office
    - Clinical Research Cluster
      - Hospital
      - Dept. of Charged Particle Therapy Research
      - Dept. of Molecular Imaging and Theranostics
      - Dept. of Functional Brain Imaging Research
    - Dept. of Accelerator and Medical Physics
    - Dept. of Radiopharmaceuticals Development
    - Dept. of Radiation Measurement and Dose Assessment
    - Dept. of Radiation Effects Research
    - Dept. of Basic Medical Sciences for Radiation Damages
    - Fukushima Project Headquarters
    - Human Resources Development Center
    - Radiation Emergency Medicine Center
    - Center for Radiation Protection Knowledge
  - Quantum Beam Science Research Directorate
    - Research Planning and Promotion Office
    - Takasaki Advanced Radiation Research Institute
      - Dept. of Administrative Services
      - Dept. of Advanced Radiation Technology
      - Dept. of Advanced Functional Materials Research
      - Dept. of Radiation-Applied Biology Research
      - Tokai Quantum Beam Science Center
    - Kansai Photon Science Institute
      - Dept. of Administrative Services
      - Dept. of Advanced Photon Research
      - Dept. of Quantum Beam Life Science
      - Synchrotron Radiation Research Center
  - Fusion Energy Research and Development Directorate
    - Research Planning and Promogion Office
    - Naka Fusion Institute
      - Dept. of Administrative Services
      - Dept. of ITER Project
      - Dept. of Tokamak System Technology
      - Dept. of Advanced Plasma Research
    - Rokkasho Fusion Institute
      - Dept. of Administrative Services
      - Dept. of Fusion Reactor Systems Research
      - Dept. of Fusion Reactor Materials Research
      - Dept. of Blanket Systems Research

Research Base

ITER-JADA On-site Support Team



Fusion Energy Research and Development Directorate

- Promotion of the ITER Project
- Research and development of advanced plasma and fusion science and technology, through Broader Approach (BA) Activities

[Base] Naka Fusion Institute
801-1 Mukoyama, Naka-shi, Ibaraki 311-0193 Japan
TEL. +81-(0)29-270-7213

[Base] Rokkasho Fusion Institute
2-166 Oaza-Obuchi-Aza-Omotedate,Rokkasho-mura,Kamikita-gun, Aomori 039-3212, Japan
TEL. +81-(0)175-71-6500

National Institute for Radiological Sciences

(Radiological Science Research and Development Directorate)

- Research and development into innovative medical uses of radiation
- Research into the impacts of radiation and radiation medicine

[Base] National Institute of Radiological Sciences
4-9-1, Anagawa, Inage-ku, Chiba 263-8555, Japan
TEL. +81-(0)43-206-3025

QST (Headquarters)

Quantum Beam Science Research Directorate

- R&D of advanced technologies for the generation, control, and use (processing and observation) of quantum beams
- Leading research into materials science, life science, and other fields, using quantum beams

[Base] Takasaki Advanced Radiation Research Institute
1233 Watanukimachi, Takasaki-shi, Gunma 370-1292, Japan
TEL. +81-(0)27-346-9232
2-4 Shirane,Shirakata,Tokai-mura,Naka-gun,Ibaraki 319-1195, Japan
TEL.+81-(0)70-3943-3400

[Base] Kansai Photon Science Institute
8-1-7 Umemidai, Kizugawa-shi, Kyoto, 619-0215, Japan
TEL. +81-(0)774-71-3000
1-1-1 Kouto, Sayo-cho, Sayo-gun, Hyogo, 679-5148, Japan
TEL. +81-(0)791-58-0922

The Promise of Fusion Energy

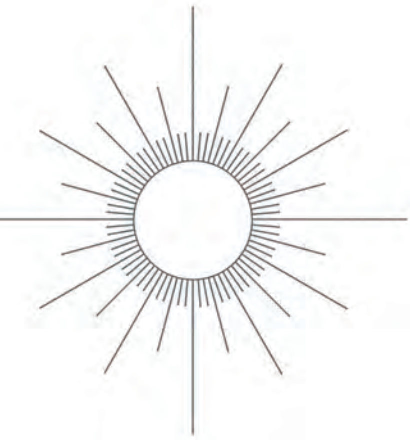
FUSION—Nuclear fusion is the energy source that powers the sun and stars in which light atomic nuclei fuse together by thermonuclear reactions, releasing a large amount of energy. Fusion power can be generated on earth using the isotopes of hydrogen, heavy hyderogen (D) and tritium (T) at ultra high temperature.
By harnessing this power, mankind can obtain an abundant and inexhaustible energy resource.

Plentiful Fuel Resource

Deuterium exists in sea water at a ratio of approximately 33 grams per cubic meter. Tritium can be produced by nuclear reaction with lithium in the fusion reactor. Since this lithium exists as mineral resources and is included in sea water at approximately 0.2 grams per cubic meter, fusion has practically inexhaustible fuel resources.

F U S

From sea water... Safely...



Energy favorable for environment and safety

Fusion produces helium gas as a byproduct ("ash") of fuel burning. Carbon dioxide, nitric oxide and other gases which cause global environmental pollution are not generated in the reaction. Furthermore, similar to a gas burner, the reaction can be easily stopped by closing the fuel supply valve.

High Energy Generating Rate

Fusion can generate energy equibalent to 8 tons of oil with 1gram of deuterium and tritium. The fusion fuel required for operating a 1,000MW electric power plant for 1 year is approximately 0.2 tons (at 70% duty factor).
(In order to obtain the same energy, approximately 1,400,000 tons of oil are required)

ION

Abundant power... And toward the future...

Contribution to Advanced Technologies

Fusion power plants need the integrated technologies of superconducting magnets, robots, heat resistant materials, ion beams, microwaves, etx. Realizing fusion energy will promote super advanced technological development towards the future and will widely serve society.

To Utilize Fusion Energy

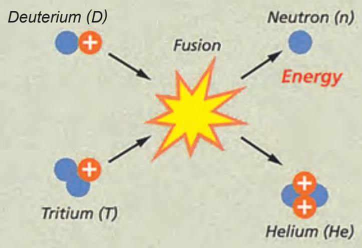
The comprehensive research and development for fusion energy are performed in three important areas; "ITER Project" that demonstrates the scientific and technical feasibility of fusion energy by international cooperation,
"Fusion Plasma Research" that pursuits controlled burning of fusion fuels and
"Fusion Science and Technology Research" that supports the realization of fusion plasmas.
Naka and Rokkasho institutes have succeeded in achieving remarkable results and world-leading progress in recent years.

plasma production

To utilize the fusion energy, it is necessary to heat fuels to a temperature of more than 100 million ℃ and keep them in a plasma state for the fusion reaction to continuously take place.

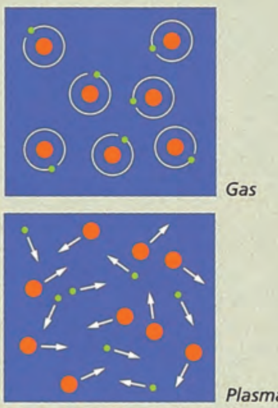
fusion reaction

Light nuclei collide with each other and form a heavier nucleus. At this moment, a huge amount of energy is released. The easiest fusion reaction to occur is the one between deuterium (D) and tritium (T).



plasma

Gas is a state where molecules or atoms move freely in space. When the temperature exceeds about ten thousand ℃, the state turns into another one in which the electrons and nuclei which form the atoms are separated and move freely. This state is called a plasma.

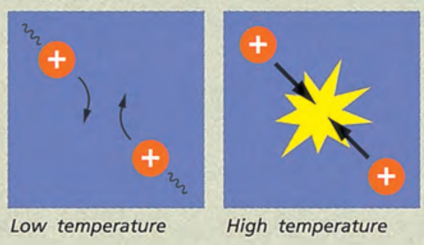


sustainment of high temperature plasmas

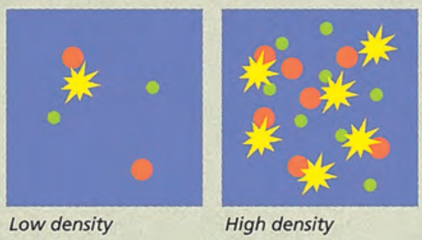
In order to produce and maintain the fusion reaction, the plasma has to be kept at a high temperature.

conditions for fusion reactions to occur

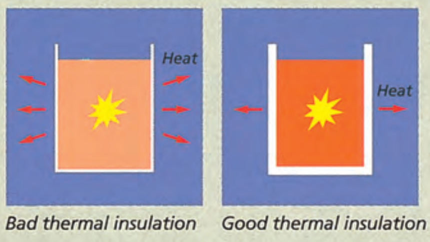
It is necessary to keep the plasma at a high temperature, in order to initiate and sustain the fusion reaction.



Keep the plasma density high enough to have effective fusion reactions.



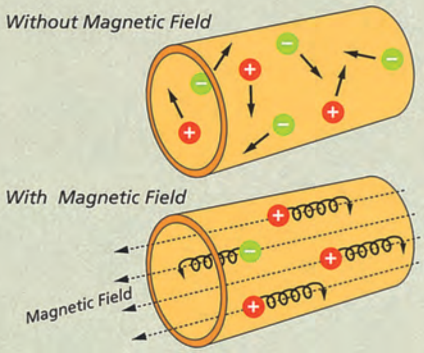
Make the plasma confinement (thermal insulation) good enough to maintain high temperature.



confine the plasma in a magnetic field

principle of magnetic confinement

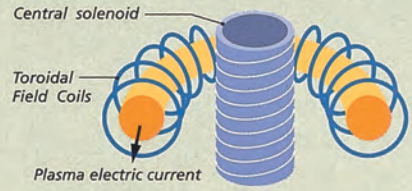
Both nuclei and electrons, which constitute the plasma, have electrical charge and move spirally along a magnetic field line by nature.



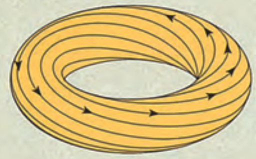
tokamak

The tokamak system, which is superior in producing and sustaining a high temperature plasma, is adopted for fusion energy research. In a tokamak system, a nest of magnetic field lines which are produced by external magnets located around the vacuum chamber and by a large current in the plasma confines the plasma in the vacuum chamber.

Tokamak plasma confinement device



Vessel of magnetic field lines



Introduction

QST: National Institutes for Quantum and Radiological Science and Technology

ITER Project

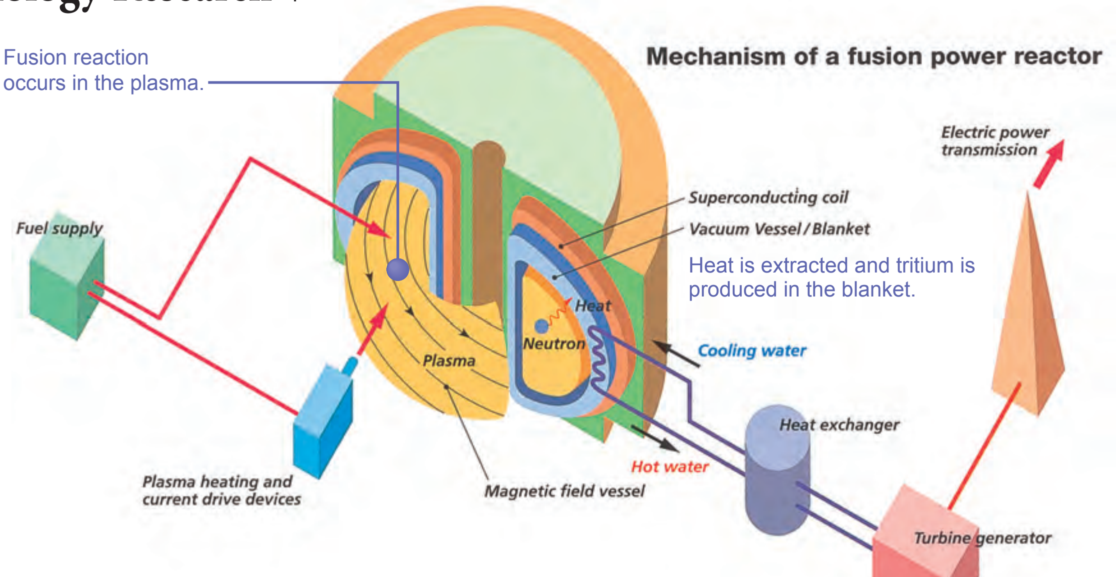
QST contributes to the ITER Project by way of international cooperation as the domestic agency of Japan.

Fusion Plasma Research

QST continues research and development in producing and sustaining high temperature plasmas to utilize fusion energy, based on the Broader Approach (BA) activities, which are the Japan-EU joint projects for establishment of technology bases toward a fusion DEMO reactor by supporting and complementing the ITER project.

Fusion Science and Technology Research

QST conducts the research and development required for establishment of technology bases for a fusion DEMO reactor, mainly by BA activities



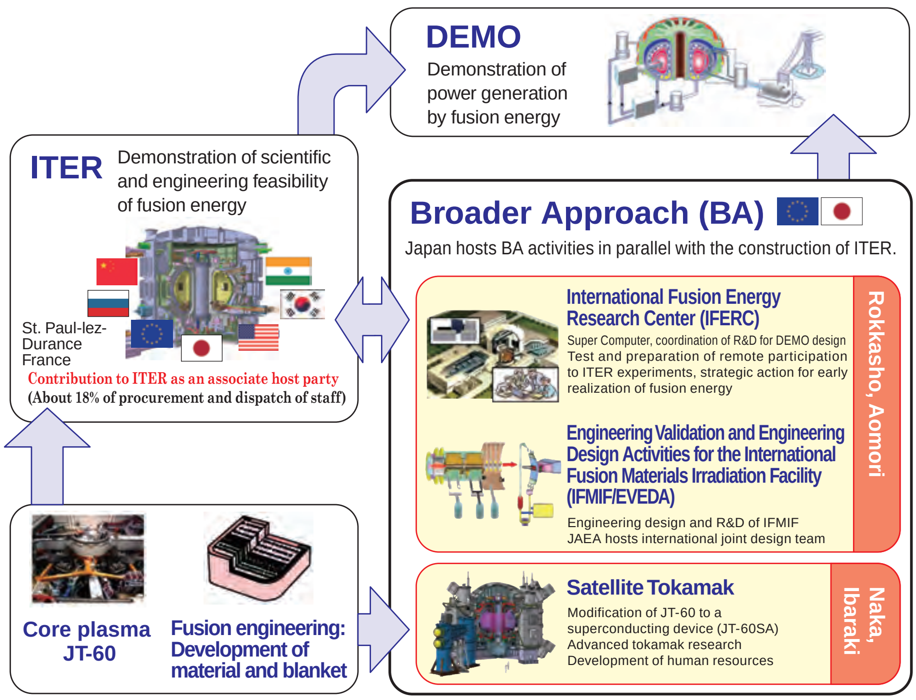
ITER and BA activities

ITER project

ITER is an international project implemented by the agreement signed by the 7 participating parties (China, the EU, India, Japan, Korea, Russia and the US). It demonstrates the scientific and engineering feasibility of fusion energy by producing burning plasma with 500MW of fusion power for 300-500 seconds.

Broader Approach (BA) Activity

As a joint project between Japan and the EU, advanced fusion research, such as fusion engineering and plasma physics research are being conducted in parallel with ITER project to support and compliment it toward DEMO.



The ITER Project

The use of fusion energy is one of the most attractive options for a long term energy source in the future, meeting the common demand of mankind.
The ITER project is an international R&D project aiming to utilize fusion energy.

ITER Main Parameters

Fusion power	500MW
Plasma radius	6.2m
Plasma current	15MA
Toroidal field	5.3T (center)
Toroidal field	11.8T (max)

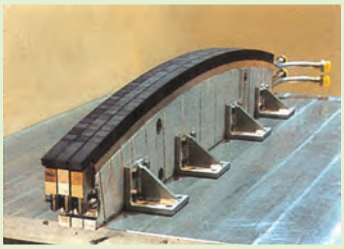
Tritium Fuel Cycle and Tritium Handling Technologies

Tritium is a hydrogen isotope which emits β rays. Its energy is low, and it can be stopped by a sheet of paper, but radiation control must be intensively studied to insure safety. QST is proceeding in research and development of fusion fuel technology and tritium safety technology and also in establishing stringent radiation control systems for personnel safety.

A tritium handling system with glove box

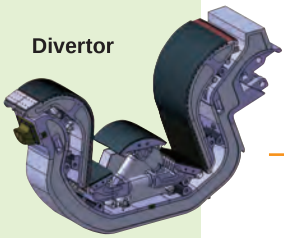
Development of High Heat Flux Components

QST develops advanced materials and high perfomance cooling structures to protect in-vessel components against the high heat load from the plasma. The heat load from the plasma is more than 50 times higher than that of a conventional power plant.



Full size test component of thermal resistant tile

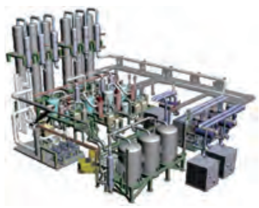
Divertor

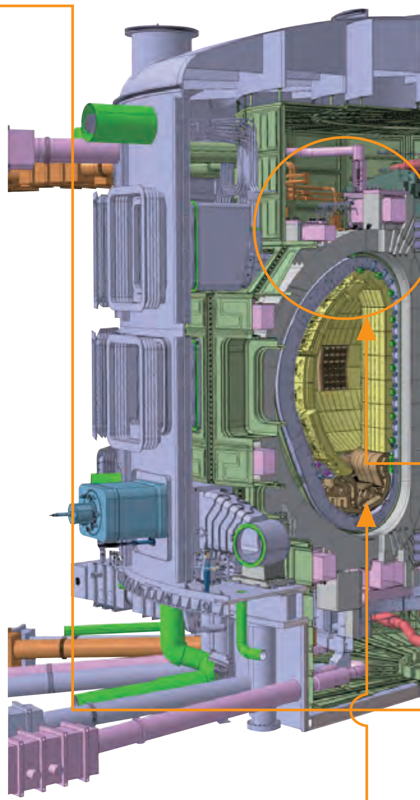


Conceptual View of ITER

30m

Testing for the tritium plant





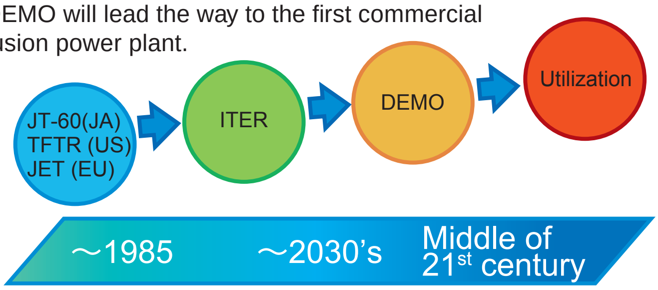
Technical Targets of ITER

① Demonstration of a Burning Plasma: a continuous fusion reaction of DT for 400 seconds. It will generate ten times more power than it consumes.
② Demonstration of Fusion Reactor Technologies
: Superconducting Magnets, Vacuum Vessel, Plasma Facing Components, Current Drive & Plasma Heating, Remote Maintenance, Fusion Fuel System, Diagnostics, etc.
③ Blanket Module Tests: Tritium breeding modules will be tested for use in DEMO.

Location of the ITER Site

The Way Toward Fusion Energy

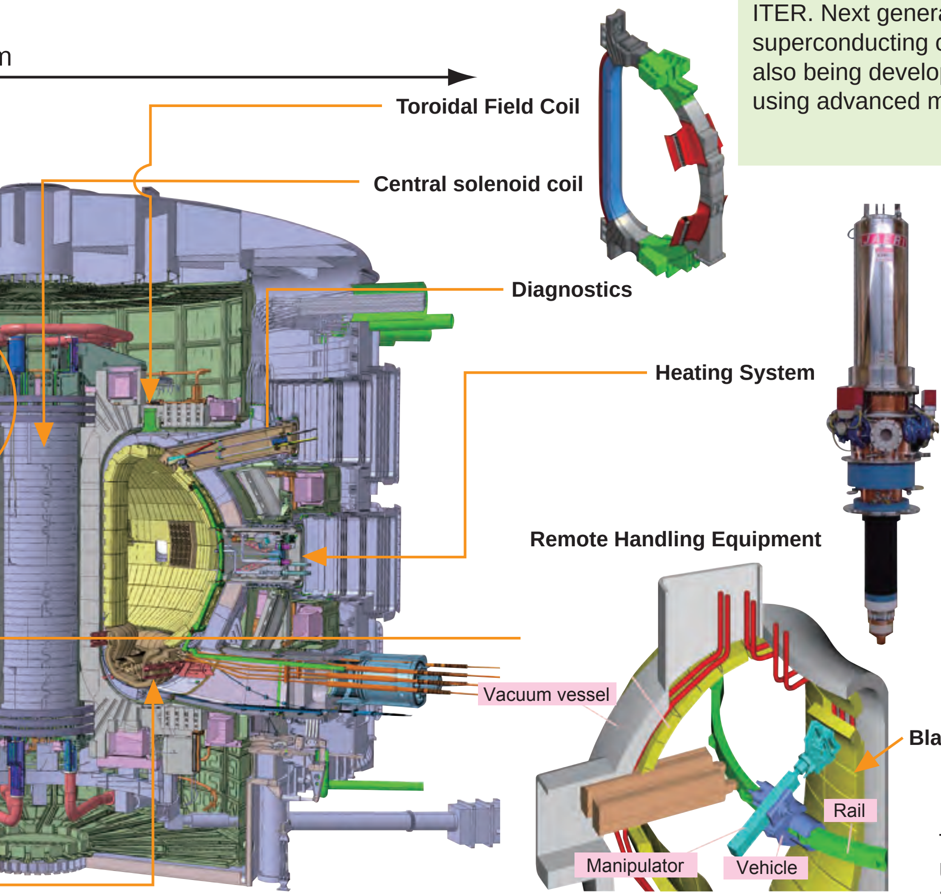
Fusion energy as a future energy source is one of the most attractive options for human society. The ITER project is a collaborative research venture using international resources and expertise toward the realization of fusion energy.
ITER is not an end in itself: it is bridge toward demonstrating the feasibility of a large-scale reactor for electrical power production, called DEMO.
DEMO will lead the way to the first commercial fusion power plant.



ITER Project

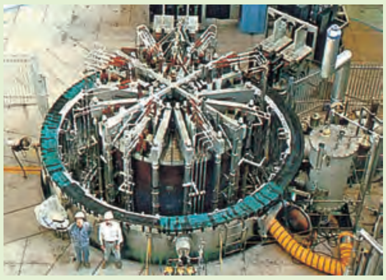
In-kind Procurement for Japan

Japan contributes to the construction of ITER by producing major components in collaboration with the ITER Organization and Participating Parties.



Development of Superconducting Coil

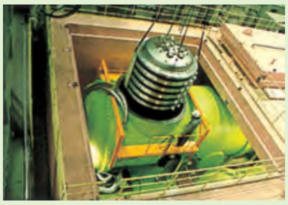
The superconducting coil which generates a high magnetic field to confine the plasma is one of the most advanced technologies. The ITER model coil has been developed and it successfully demonstrated 13 tesla in magnetic field strength, which is maximum required for ITER. Next generation superconducting coil is also being developed using advanced materials.



Superconducting central solenoid model coil for ITER

Development of Plasma Heating and Current Drive Devices

QST is developing the devices which heat plasmas up to 100 million℃



Neutral beam injection (NBI) heating device: MeV class ion source device which generates high energy negative hydrogen ion beam

Radiofrequency heating device(RF): Oscillating tube of high power millimeter waves called Gyrotron

Development of Reactor Structure and Remote Handling Technologies

The development of remote maintenance technology and reactor structures compatible with remote handling is essential for ITER. QST is proceeding with R&D of various remote handling equipment such as the in-vessel manipulator, which can move a heavy component weighing several tons with millimeter accuracy.

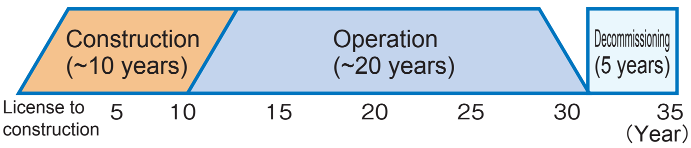
ITER In-vessel Remote Maintenance Device for blanket

ITER Domestic Agency Activities

The ITER Agreement was signed by Japan, European Union (EU), Russia, USA, China, Korea, and India in November 2006, and the activities to begin ITER construction in full scale are being performed by the ITER Organization, which was established at the ITER site in St. Paul-lez-Durance, France. QST was designated as the Japan domestic agency under the ITER Project, and procures the equipment and devices allotted to Japan, such as the superconducting coils, as well as plays a role as the contact point for personnel contribution from Japan to the ITER Project.

Schedule of ITER

ITER project is a long-term project with a duration of 35 years (about 10 years for construction, about 20 years for operation, and 5 years for decomissioning of the ITER facilities.)



History

1985
Joint statement of fusion research and development promotion at the USA and USSR summit conference

1988-1990
ITER Conceptual Design Activities (CDA)

1992-2001
ITER Engineering Design Activities (EDA)

2001-2002
ITER Coordinated Technical Activities (CTA)

2003-2006
ITER Transitional Arrangements (ITA)

2006.11
ITER Agreement was signed

2007.10
ITER Agreement entered into force

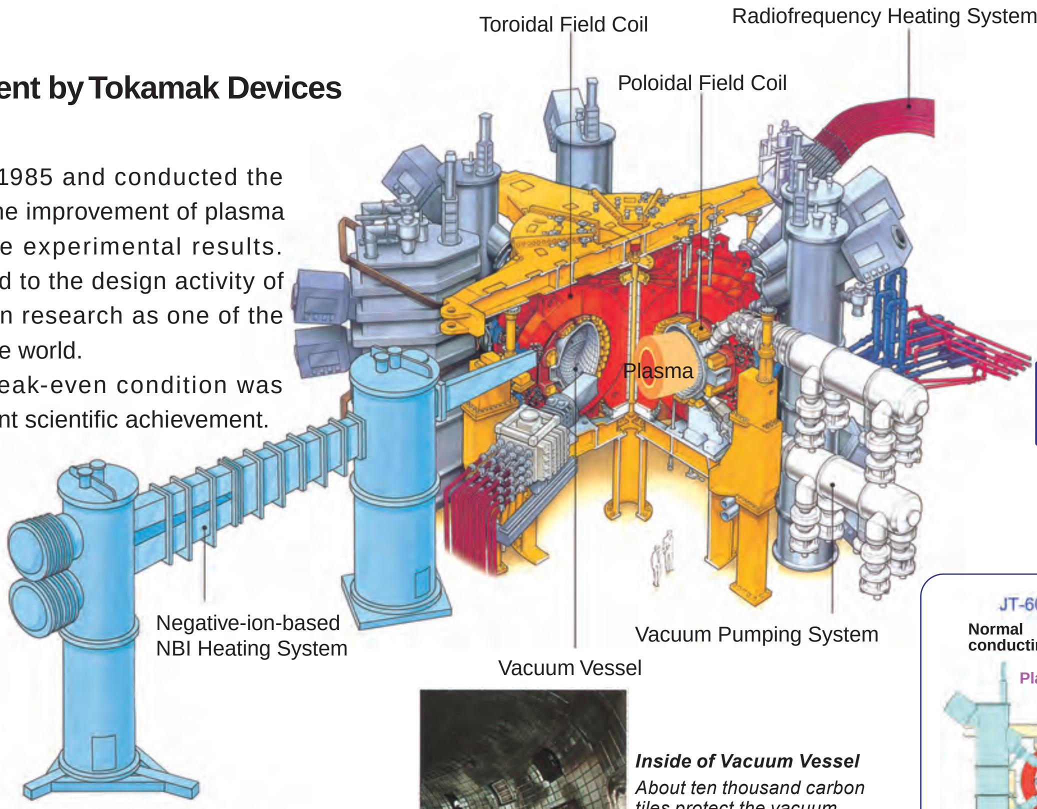
Research and Development of Fusion Plasmas

In fusion plasma research, plasma control techniques for achieving a self-ignition condition, in which the plasma is kept burning only by self-generated fusion power, is under development. This study is conducted by utilizing a large tokamak device, JT-60. Fusion research for scientific feasibility is progressing steadily under the leadership of JT-60.

Research and Development by Tokamak Devices

JT-60

JT-60 started its operation in 1985 and conducted the modification of its devices and the improvement of plasma control schemes based on the experimental results. Consequently, JT-60 contributed to the design activity of ITER and the progress of fusion research as one of the three large tokamak devices in the world.
In the autumn of 1996, the break-even condition was demonstrated, making a significant scientific achievement.



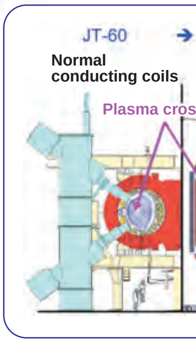
International and Domestic Collaboration

Researchers from countries all over the world, such as the US, EU, Russia, Australia, China, Korea and others are involved in the research activities for JT-60. Remote participation in JT-60 experiments using a new computer network was also performed. Collaborative research is being promoted with universities under the functional cooperation of JT-60.

JT-60 Main Parameters

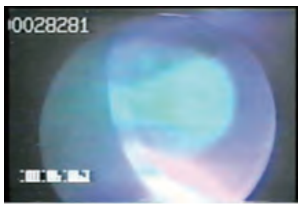
Diameter	15m
Plasma current	6MA
Toroidal field	4.4T
Plasma radius	3.2m

Inside of Vacuum Vessel
About ten thousand carbon tiles protect the vacuum vessel from the high temperature plasma. In 1997, the divertor geometry at the bottom of the vacuum vessel was modified, in order to improve the heat and particle flux controllabilities.



Achievement of Breakeven

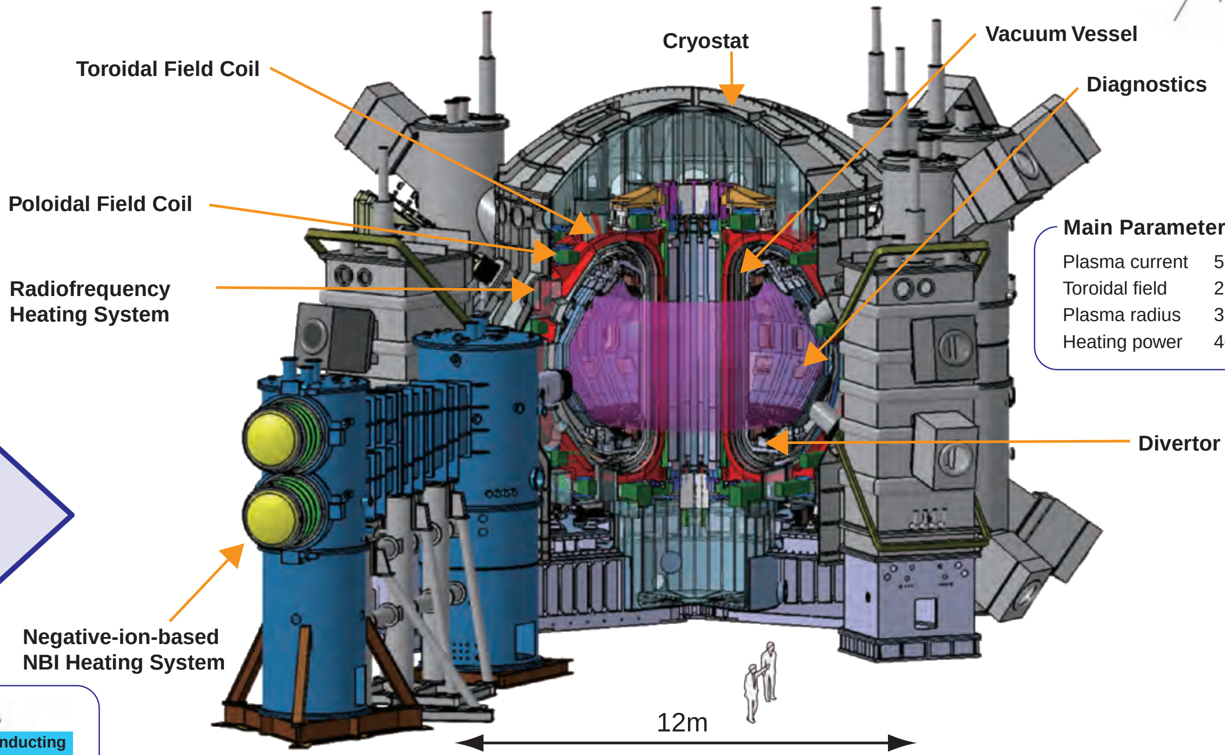
On the 31st of October 1996, a deuterium plasma with an energy confinement time of 1 second, temperature of 190 million degrees and ion density of 49 trillion/cm^3 was produced. This is equivalent to the breakeven condition, where the ratio of the input power to produce the high temperature plasma to the output power generated by the DT fusion reactions (energy multiplication factor) is unity, in a DT plasma where deuterium and tritium are equally mixed.
This achievement was established by an innovative technique to form a thermal insulation layer in the plasma to prevent heat loss from the plasma core. The technique was discovered as a standard operational regime of a steady state fusion reactor in the future.
Impurities in the plasma were decreased by a newly installed divertor, which resulted in further improvement of plasma performance. On June 10th, 1998, a deuterium plasma with an energy multiplication factor of 1.25, the world's highest record, was successfully produced.



Picture of a high temperature plasma with thermal insulation layer.

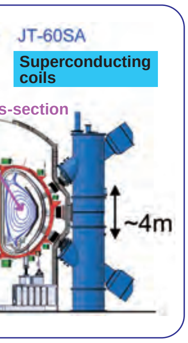
JT-60 to JT-60SA (JT-60 Super Advanced)

For further advanced research, JT-60 is being modified into the superconducting tokamak JT-60SA.



Main Parameters of JT-60SA

Plasma current	5.5MA
Toroidal field	2.25T
Plasma radius	3m
Heating power	40MW x 100 seconds

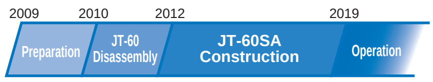


Two international research activities are conducted for the early realization of fusion energy: ITER supportive research for efficient and effective development in ITER, and ITER complementary research toward DEMO.

・ITER supportive research: Support for development of plasma operation scenario and solving physics issues for ITER
Initial test before modification of ITER
Human resource development of scientists and engineers for ITER project

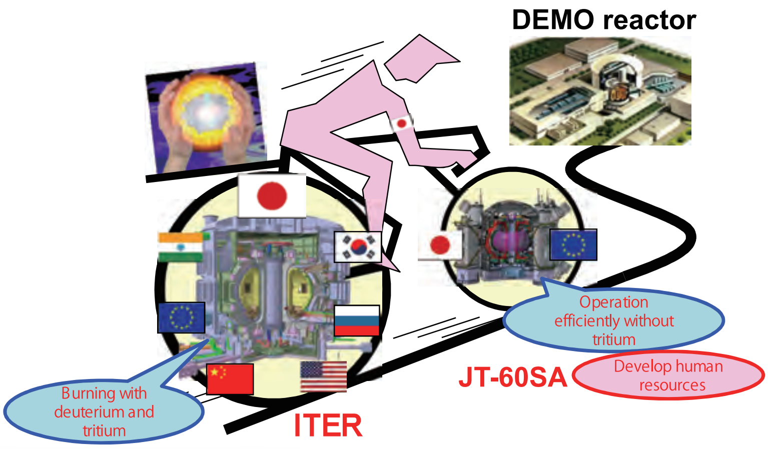
・ITER complementary research: Development of steady-state operation, high beta operation and control methods for heat and particle handling

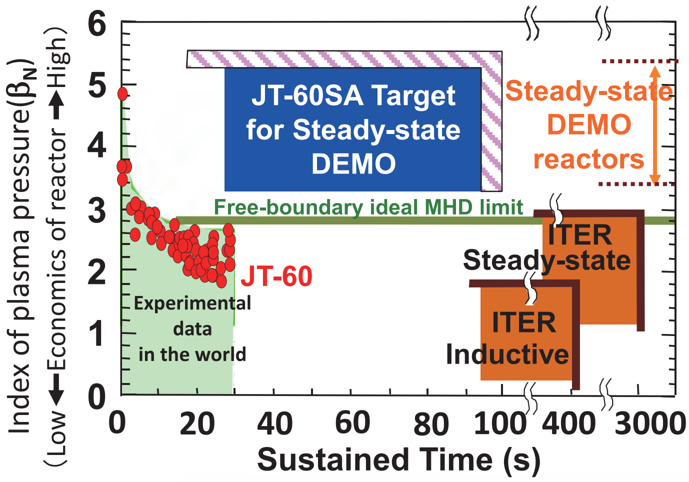
Expected start of operations in 2019



JT-60SA is the front wheel leading ITER toward DEMO

JT-60SA finds the best route to reaching a DEMO reactor based on studies to support and supplement the ITER project, by optimizing the facility with a sufficient size for contributing to ITER and DEMO reactor and with mobility and expandability. JT-60SA also develops human resources as the only large tokamak in Japan.





Research and Development of Fusion Science and Technologies

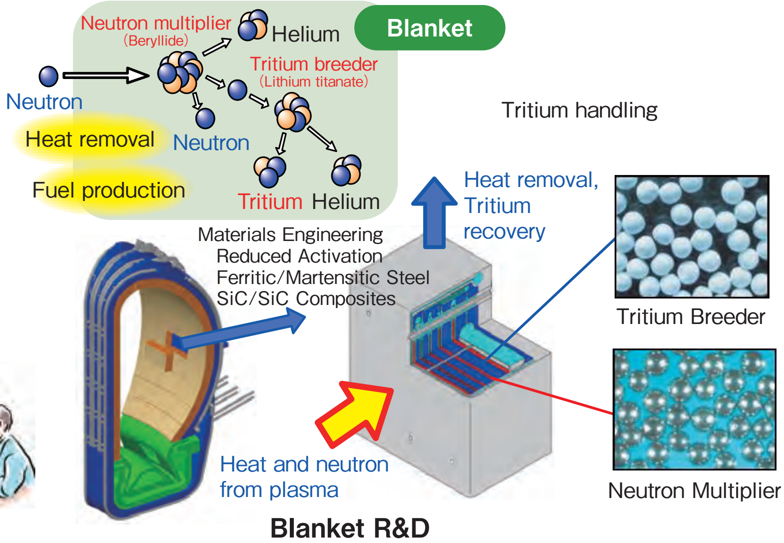
Research and development (R&D) of various advanced technologies has been extensively conducted aiming at the realization of fusion energy mainly by BA activities.

International Fusion Energy Research Center (IFERC)

DEMO Design and R&D

Pre-conceptual DEMO design activities and R&D of materials and technologies necessary for generation of electrical energy are conducted. R&D of the manufacturing and handling technologies for the blanket, which extracts heat and produces tritium, is intensively conducted.

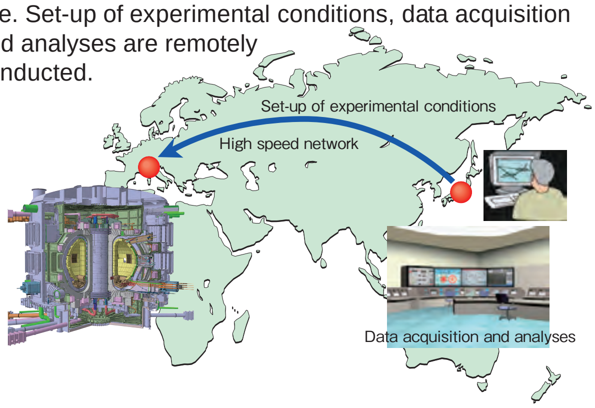
DEMO design activities



Blanket R&D

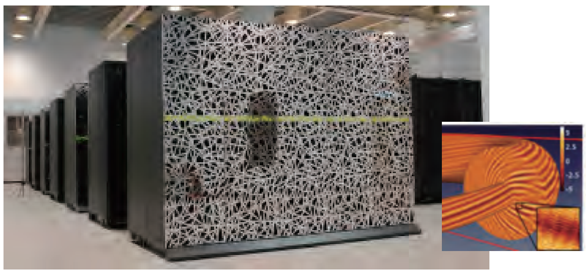
ITER Remote Experimentation

A high speed network is established with the ITER site. Set-up of experimental conditions, data acquisition and analyses are remotely conducted.



Computer Simulation

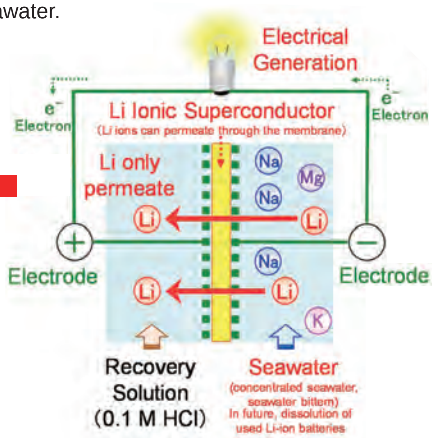
Fusion plasma simulation studies are conducted using the high performance supercomputer (1.2 Pflops) for understanding physical characteristics of fusion plasma. Simulation studies related to DEMO design and material R&D are also conducted.



Lithium Recovery Technology from Seawater by World-First Dialysis with Li ionic superconductor

Li_2CO_3 Powder

Li is necessary for fuel (tritium) production in a fusion reactor and exists plentifully in seawater.

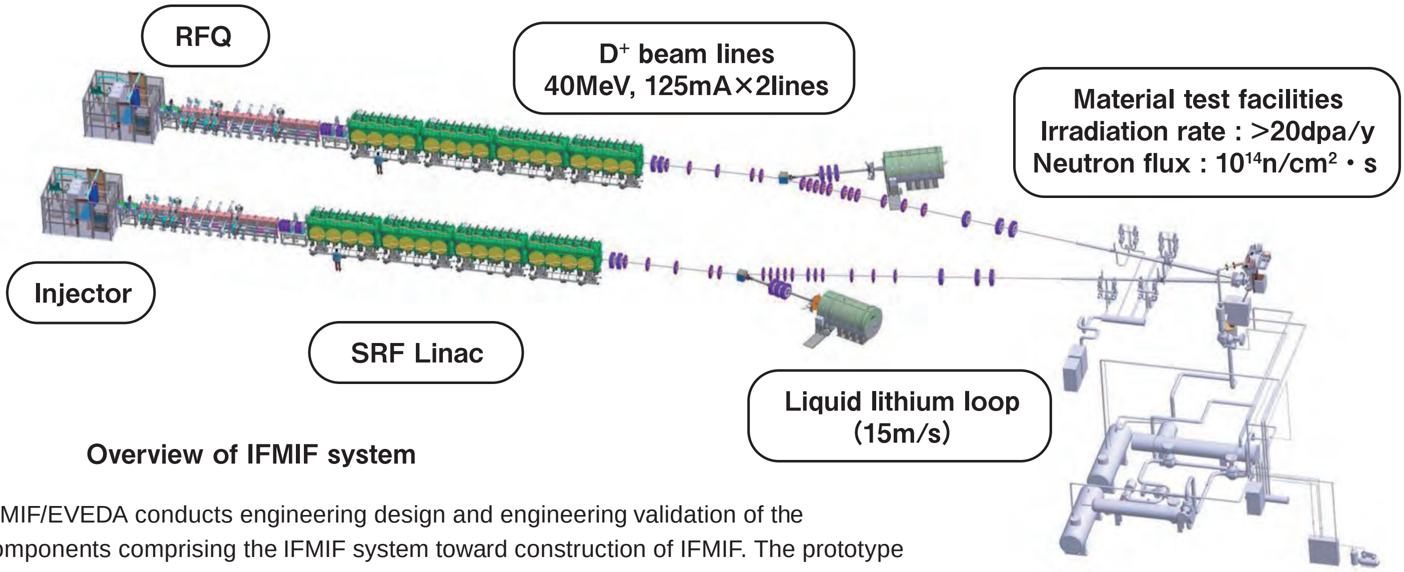


This new method is also suitable for recycling Li-ion batteries

Realization of Li recycling-based society

Engineering Validation and Engineering Design Activities for the International Fusion materials Irradiation Facility (IFMIF/EVEDA)

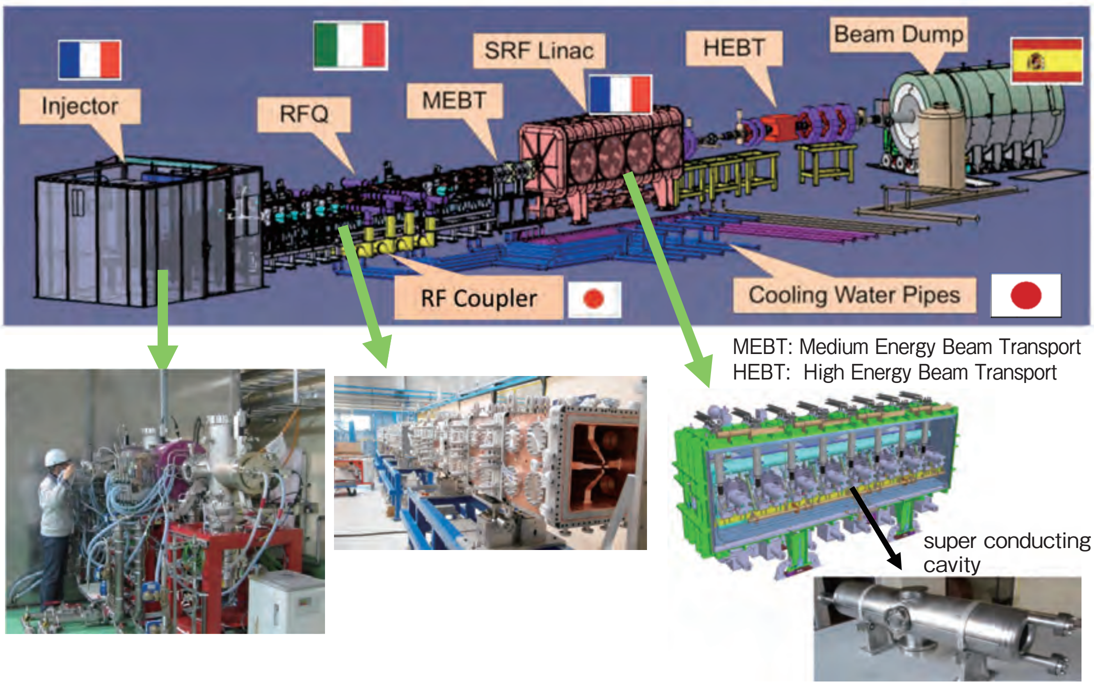
For material R&D toward DEMO reactor, studies on irradiation effects of high energy neutrons produced during fusion reactions are necessary. International Fusion Materials Irradiation Facility (IFMIF) provides a fusion-relevant irradiation environment, where high energy and high density neutrons are produced by bombarding liquid lithium with accelerated intense deuterium ion beams.



Overview of IFMIF system

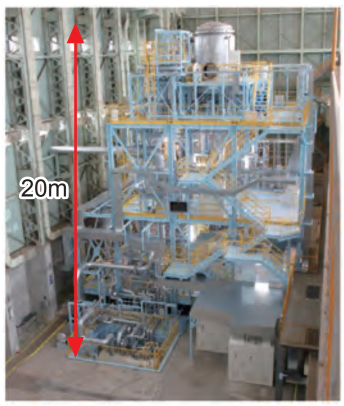
IFMIF/EVEDA conducts engineering design and engineering validation of the components comprising the IFMIF system toward construction of IFMIF. The prototype accelerator demonstrates steady-state operation with the first stage of SRF Linac (9MeV, 125mA). The prototype lithium loop was constructed and demonstrated stable flowing liquid lithium necessary for injection of a high current beam. R&D of the irradiation module and the material test method are also conducted for validation of the target facility.

Overview of the Linear IFMIF Prototype Accelerator (LIPAc)



Flowing liquid lithium

Lithium test loop



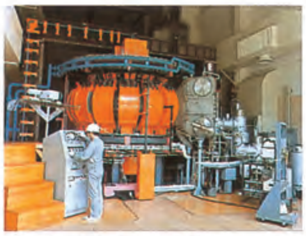
Progress of Fusion Research and Development

Since 1961, the scale of devices in the field of fusion research has progressively increased starting from JFT-2, JFT-2a, JFT-2M, to JT-60, each incorporating the latest achievements in experiments and discoveries in theory.
QST also supports the ITER Project on an international cooperation basis, and proceeds to further advance research aiming at the realization of a fusion reactor which is environmentally safe and acts as an inexhaustible energy resource.

1956
Formation of the Japan Atomic Energy Research Institute

1961
Start of fusion research at JAERI

1972
Start of JFT-2 operation



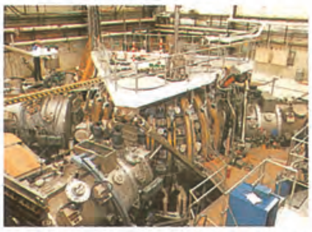
March 1973 Success of long time confinement of plasma (electron temperature: 7 million℃ and confinement time: 0.02s) in the medium-β torus system (JFT-2) (Tokai Research Establishment)

1974
Start of JFT-2a (The first divertorTokamak) operation

August 1974 Completion of high stabilized magnetic device equipped with world's first divertor (JFT-2a)

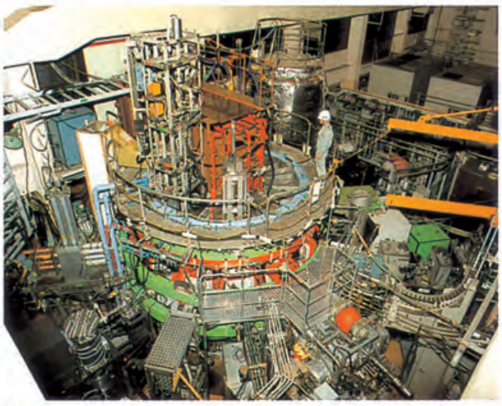
1975
Start of JT-60 design

1979
Start of joint experiment with Doublet Ⅲ (USA)



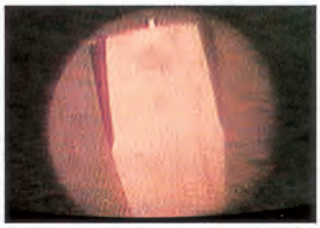
DoubletⅢ:A medium Tokamak device constructed at GA company in USA by Japan-USA cooperation program

1983
Start of JFT-2M operation



JFT-2M:Medium Tokamak device which achieves pioneering research by using it's mobility

1985
Inauguration of the Naka Fusion Research Establishment
Start of JT-60 experiments



JT-60:Success of first plasma ignition

JT-60:Large tokamak device

Progress

FUSION

1988
Start of ITER Conceptual Design Activities (CDA)

1991
Start of upgraded JT-60 operation

1992
Start of ITER Engineering Design Activities (EDA)

1993
Success of world record 3.6 million A of non-inductive current drive by JT-60 Radiofrequency

1996
Achievement of 520 million ℃, world's highest ion temperature in JT-60.
Achievement of break-even plasma conditions in JT-60

1998
Achievement of 1.25, world's highest energy multiplication factor in JT-60

2005
Japan Atomic Energy Agency Naka Fusion Institute

2007
ITER Construction Beginning
Start of BA
Inauguration of Rokkasho Site

2008
Completion of JT-60 experiments

2016
National Institutes for Quantum and Radiological Science and Technology

2019
First plasma in JT-60SA (scheduled date)

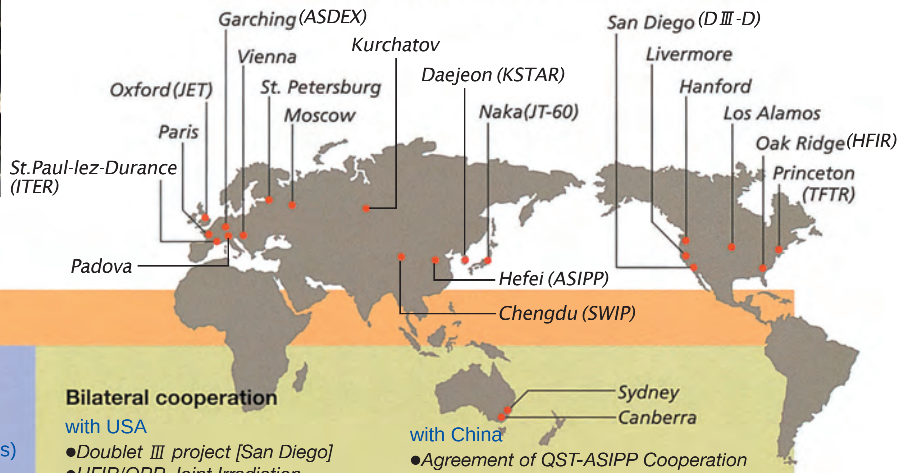
~2025
First plasma in ITER (scheduled date)

Demonstration Reactor (DEMO)

Practical plant

JT-60 control room
(Completion of JT-60 experiments on 29th August 2008)

International Cooperation of Fusion



International Collaborations

Multilateral cooperation

OECD/IEA (Organization of Economic Cooperation and Development/International Energy Agency, Headquarters: Paris)
- *Cooperation on the Large TOKAMAK Facilities*
- *Research and Development Radiation Damage in Fusion Materials*
- *Environmental, Safety and Economic Aspects of Fusion Power*
- *Nuclear Technology of Fusion Reactors*

IAEA (International Atomic Energy Agency, Headquarters: Vienna)
- *Fusion Energy Conference*
- *Energy Technology Data Exchange Program*
- *Other Expert Meetings*

ITER Agreement (ITER Organization, Headquarters: St. Paul-lez-Durance)

Bilateral cooperation

with USA
- *Doublet Ⅲ project [San Diego]*
- *HFIR/ORR Joint Irradiation Experiment Program [Oak Ridge]*

with Europe
- *Agreement of Broader Approach Activities*
- *Agreement of QST–IPP/ASDEX Cooperation [Garching]*
- *Agreement of QST-RFX [Padova]*

with Australia
- *Japan–Australia Joint Committee*

with China
- *Agreement of QST-ASIPP Cooperation [Hefei]*
- *Agreement of QST-SWIP Cooperation [Chengdu]*

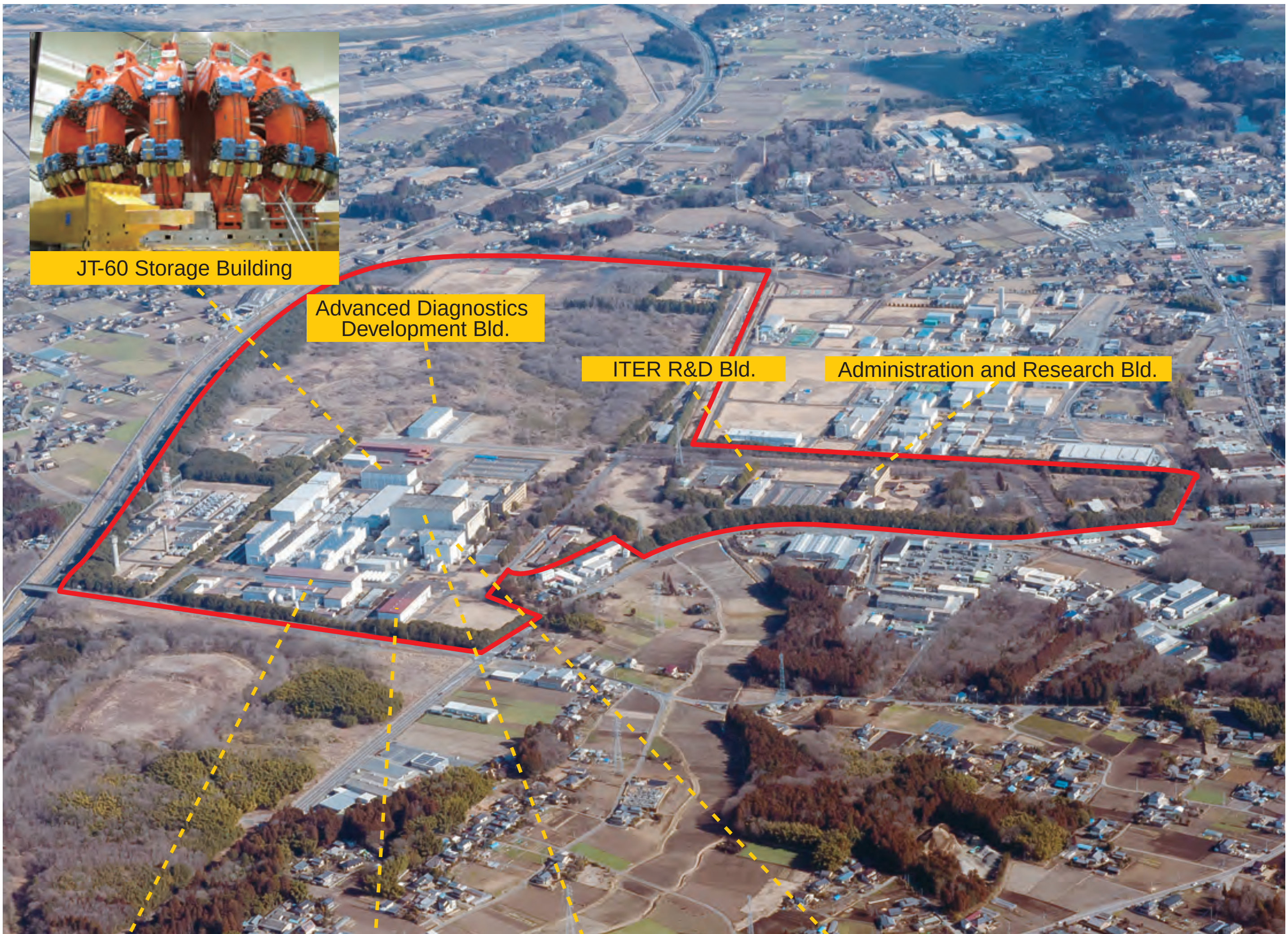
with Korea
- *Agreement of QST-NFRI Cooperation [Daejeon]*

with Russia
- *Agreement Japan-Russia Scientific and Technological Cooperation [Moscow, St.Petersburg]*

with Kazakhstan
- *Agreement QST-NNC [Kurchatov]*

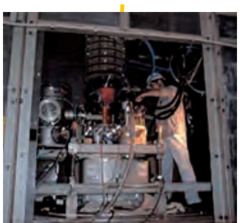
Naka Fusion Institute

The Naka site was established in 1985, research and development have been conducted using the large tokamak device JT-60 and various fusion testing and research facilities.
Research and development for ITER project and JT-60SA construction are being progressed.



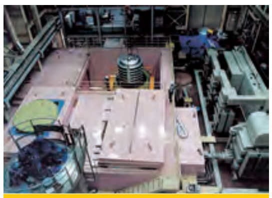
February 2016

Supercondecting Coil Test Facility



Gyrotron Test Facility

Large Tokamak Device (JT-60) under modification to JT-60SA



MeV Test Facility

Facilities

Naka

Rokkasho Fusion Institute

The Rokkasho site was started in 2007 to conduct international research and development based on BA activities. Advanced fusion research and development toward a DEMO reactor are being carried out.

July 2016

DEMO R&D Bld.

Multi-purpose RI Laboratory

IFMIF/EVEDA Accelerator Bld.

Injector of Linear IFMIF Prototype Accelerator

Computer & Remote Experimentation Bld.

Supercomputer for fusion research

Ibaraki-ken


Prefecture's flower **Rose**


Prefecture's bird **Skylark**


Prefecture's tree **Japanese apricot**

Naka-shi

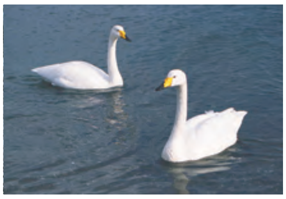

City's flower **Sunflower**


City's bird **Swan**


City's tree **Yaezakura**

Aomori-ken


Prefecture's flower **Apple blossom**


Prefecture's bird **Whooper swan**


Prefecture's tree **Hiba**

Rokkasho-mura


Village's flower **Day lily**


Village's bird **White-tailed sea eagle**


Village's tree **Kuromatsu**

National Institutes for
Quantum and Radiological Science and Technology

Fusion Energy Research and Development Directorate

http://www.fusion.qst.go.jp

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801-1 Mukoyama, Naka-shi, Ibaraki-ken
311-0193
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Rokkasho Fusion Institute

2-166 Omotedate, Obuchi, Rokkasho-mura, Kamikita-gun,
Aomori-ken 039-3212
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