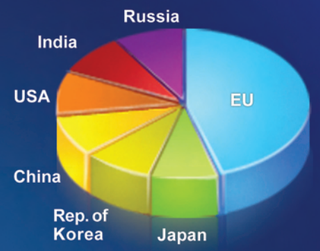
Europe at the forefront of fusion energy development

Fusion for Energy (F4E) is the European Union's organisation established to enhance Europe's global role in the development of fusion energy. The organisation – formally known as the European Joint Undertaking for ITER and the Development of Fusion Energy – primarily manages the EU's contribution to ITER, the international fusion energy project.
F4E was established in April 2007 for a period of 35 years. It has more than 250 members of staff and its offices are located in Barcelona, Spain.

One of its main tasks is to work together with European industry and research organisations to develop and provide a wide range of high technology components for the ITER project. F4E was created by a decision of the Council of the European Union as an independent legal entity: it is a joint venture that brings together Euratom (the Treaty establishing the European Atomic Energy Community), the EU Member States and other European countries that have cooperation agreements with Euratom.

In order to respond rapidly and deliver in an efficient manner, F4E combines a culture of project management and an industry-driven approach to meet the needs of the ITER project. F4E strives to be a centre of excellence by grouping all the knowledge and expertise needed for the construction of demonstration fusion power plants so that Europe can fully benefit from fusion energy in the future.



Distribution of ITER parties contribution

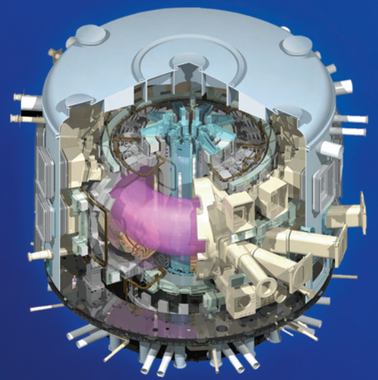
ITER – fusion energy on a global scale

ITER, meaning "the way" in Latin, is an unprecedented global project for the development of fusion as a virtually limitless source of energy that is safe and environmentally friendly. Building upon the success of around 50 years of scientific research into fusion, ITER aims to operate under conditions similar to those expected within a fusion electricity-generating power plant.

With Europe, China, India, Japan, the Republic of Korea, Russia and the United States all participating in the project as parties, ITER, is one of the largest international scientific projects ever conceived: it brings together countries representing over half of the world's population! ITER is being constructed in Cadarache, in the South of France.

ITER is built in a unique way – each of the seven parties have agreed to work together with their own industries and research organisations to develop and construct the various component parts of ITER.

Europe, as the party hosting ITER, is required to contribute with around half of all the components – a very challenging task that will be the responsibility of F4E.



A cut-away view of the ITER tokamak, revealing the doughnut-shaped plasma inside of the vacuum vessel (image courtesy of ITER)

What is fusion?

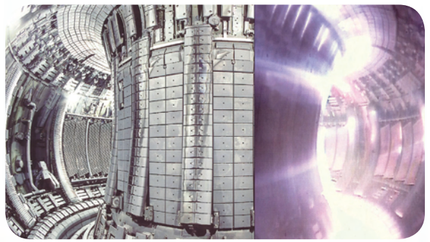
Fusion is the process which powers the sun and the stars. When light atomic nuclei fuse together to form heavier ones, a large amount of energy is released. This is a very difficult process to recreate on earth – gases need to be heated to extremely high temperatures (about 150 million degrees C) to produce a plasma which then needs to be contained for a sufficiently long period for fusion to occur. Harnessing fusion would provide an environmentally sustainable and almost limitless source of energy.

What is ITER?

ITER is a major international experiment with the aim of demonstrating the scientific and technical feasibility of fusion power and capable of generating some 500 million watts (MW) of fusion power continuously for up to 10 minutes. It will be 30 times more powerful than the Joint European Torus (JET), which is currently the largest comparable experiment operating in the world. ITER will allow scientists and engineers to develop the knowledge and technologies needed for the future demonstration electricity producing fusion power stations.

What is Euratom?

Fusion research in Europe is organised though a coordinated programme which makes effective use of all the knowledge and resources. This programme is managed by the European Commission under the auspices of the Euratom Treaty – one of the founding Treaties of the European Communities signed in 1957. This joint approach has allowed the development of the largest and most successful fusion experiment in the world – JET which has formed the basis for the design of ITER and started out as a Joint Undertaking similar to F4E.



A split image inside the JET experiment showing the high temperature plasma on the right (image courtesy of EFDA-JET)

More information

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FUSION FOR ENERGY

Bringing the **power** of the **sun** to earth

The mission of Fusion for Energy

The primary mission of Fusion for Energy (F4E) is to manage the European contribution to the ITER project. The organisation also provides Europe's contribution to a number of so-called Broader Approach fusion energy projects with Japan and, in the longer term, supports a programme of research and development activities to prepare for the construction of demonstration fusion reactors (DEMO).

Managing the European contribution to ITER

F4E works to meet Euratom's international wide-ranging obligations towards ITER.

First and foremost, it works together with European industry and research organisations to develop and manufacture the components that Europe will provide to ITER via around 220 contracts. It also provides the EU's financial contribution to the project, which mostly comes from the European Community budget.

Among its other tasks, F4E oversees the preparation of the site where ITER will be constructed and arranges for European staff to be available to the ITER International Organization. It also supports research and development for ITER construction. F4E plays an important role in preparing for Europe's participation in the operation of ITER.

Contributing to the Broader Approach to Fusion Energy

F4E plays a key role in the so-called Broader Approach, an international agreement with Japan designed to accelerate the development of fusion energy by cooperating on a number of projects of mutual interest. These projects, including preparations for a new materials testing facility, are designed to run alongside and complement ITER by filling possible knowledge gaps. The EU has agreed to provide components, equipment, materials and other resources for the Broader Approach, prepare and coordinate the European participation in the initiative, and make European staff and funding available.

Preparing for demonstration fusion reactors

F4E has progressively started to implement a programme of activities to prepare for the first demonstration fusion reactors beyond ITER which could generate significant amounts of electricity. Other related projects include the International Fusion Materials Irradiation Facility (IFMIF) designed to develop materials that can withstand the conditions expected in a fusion reactor. By capitalising on the activities carried out for ITER and the Broader Approach, Europe is in an excellent position to carry fusion forward as a clean and sustainable energy source for the 21st century.

Pooling knowledge and resources at European level

Scientific Programme Boards

To ensure that the organisation has the best possible scientific and technical advice at its disposal, the statutes of F4E make provisions for Scientific Programme Boards. These are intended to provide up-to-date impartial scientific and technical advice to the Director and the Governing Board, especially with regard to the organisation's work programme and technical activities.

Pooling resources at European level

One of the objectives of F4E is to pool resources at a European level. To this end, F4E receives financial contributions from Euratom, from its members and from France (the country hosting the ITER project). The organisation has its own set of financial rules adapted to its special tasks, particularly for the procurement of high technology components from European industry.

Transparency and accountability

F4E is supervised, which ensures that taxpayers' money is spent and managed in a sound and responsible way. Among a range of measures, the organisation has its own internal audit unit. The annual accounts are scrutinised by the European Court of Auditors and the European Anti-Fraud Office (OLAF) has full access.

A staff of dedicated experts

The success of F4E depends on the expertise and dedication of its staff. In particular, the organisation's scientists, engineers, administrators, lawyers and procurement officers work in partnership with industry and fusion laboratories to ensure that Europe delivers on its international commitments to ITER and the Broader Approach. In the longer term, this know-how will be decisive in ensuring that Europe is first off the starting blocks in the race to develop a demonstration fusion reactor.

An efficient organisation

Lean management

F4E has a lean managerial structure that is defined in the statutes of the organisation.
The rationale has been to create an organisation which can deliver on its commitments and is accountable and transparent while making sure that its activities fit with and complement the other parts of the European fusion programme – this is especially crucial given that most long-term fusion research work will continue to be carried out in national fusion laboratories under the umbrella of the integrated Euratom fusion programme.

Governing Board

To ensure the overall supervision of F4E's activities, the members of F4E – i.e. Euratom, the EU Member States and other European countries that have cooperation agreements with Euratom – sit on a Governing Board. The Governing Board has a wide range of responsibilities including appointing the Director, adopting the financial regulation, adopting rules on intellectual property rights, adopting work programmes etc.

Executive Committee

The Executive Committee is required to approve the awarding of contracts for the procurement of components for ITER. The thirteen members of the Executive Committee are appointed collectively by the Governing Board to represent it.

Role of the Director

The Director of F4E is in charge of the day-to-day management of the organisation. His responsibilities include the signature of contracts, the appointment and supervision of staff, the preparation of work programmes, the allocation of resources, budget and the approval of annual activity reports. Furthermore, the Director guarantees the application of the necessary internal controls and ensures sound financial management.

Working together with Europe's industry and SMEs to deliver ITER and pave the way towards commercial fusion.