



Fusion Energy Research on the Joint European Torus

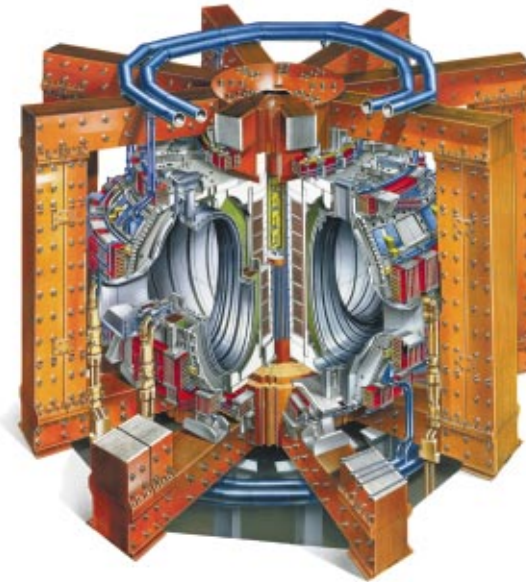
Preparing the Future

- ⇒ JET is a key facility in the present world fusion energy research and has brought an invaluable contribution with the **first controlled DT fusion energy production on earth** and the present **world record of fusion energy production**.
- ⇒ The JET programme is strongly focussed toward the **preparation of a necessary "Next Step"** in fusion research, aiming at demonstrating the scientific feasibility of fusion as a future energy source, the **ITER** project.
- ⇒ The organisational structure of EU Fusion Research and in particular of JET under the European Fusion Development Agreement is well prepared for the future, being already **prototypical of the "European Research Area"**

JET: The Largest Controlled Fusion Research Facility Worldwide

JET can provide a unique contribution to the preparation of the Next Step (ITER):

- JET plasmas are nearest to reactor conditions, so it is ideally placed to carry out key R & D for ITER, both for Standard and Advanced Scenarios
- JET has a unique DT capability, essential for the study of alpha-particle physics
- JET includes several technologies needed for ITER: eg Tritium & Remote Handling

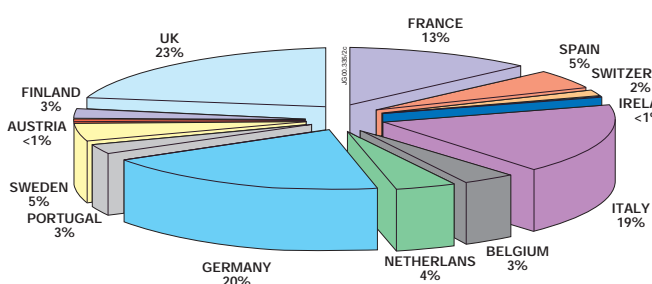


An Anticipation of the European Research Area (ERA)

JET under EFDA

The European Fusion Development Agreement has provided since 1 January 2000 a new framework for using the JET facilities:

- JET programme integrated with other EU fusion activities (in particular ITER preparation)
- Scientific programme elaborated with input from all the EU laboratories
- Experimental campaigns executed by staff from the EU laboratories on mission at JET (more than 250 physicists in 2000)
- Operation of the facilities by the local fusion laboratory (UKAEA)
- ⇒ Reinforced co-operative spirit in line with EU guidelines (subsidiarity and complementarity)
- ⇒ Open scientific programme but strongly focussed toward the future (ITER)



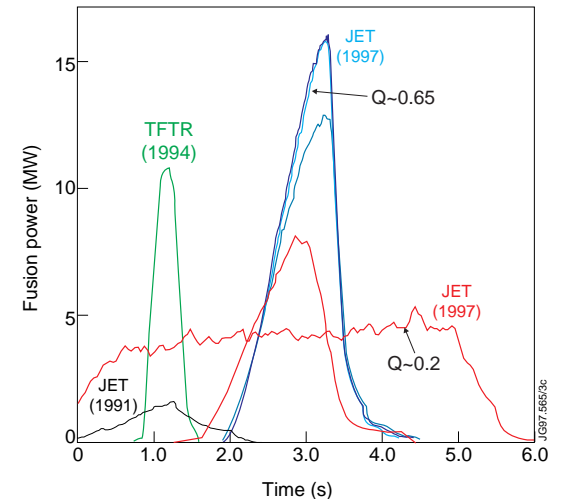
Conclusion

"Scientific, technical and organisational preparation of ITER" (5th Framework Programme Objective)

- ⇒ JET should remain the most performant fusion facility worldwide until ITER starts
- ⇒ The JET Scientific Programme is strongly focussed towards ITER
- ⇒ The EFDA framework provides for a strong integration of JET with the other EU fusion activities
- ⇒ The programme is led in a fully co-operative manner and the European Character is further reinforced with EFDA

<http://www.jet.efda.org> EFDA-JET, Culham Science Centre, Abingdon, Oxon, OX14 3DB. UK

Scientific Results



Fusion Energy Deuterium-Tritium Experiments

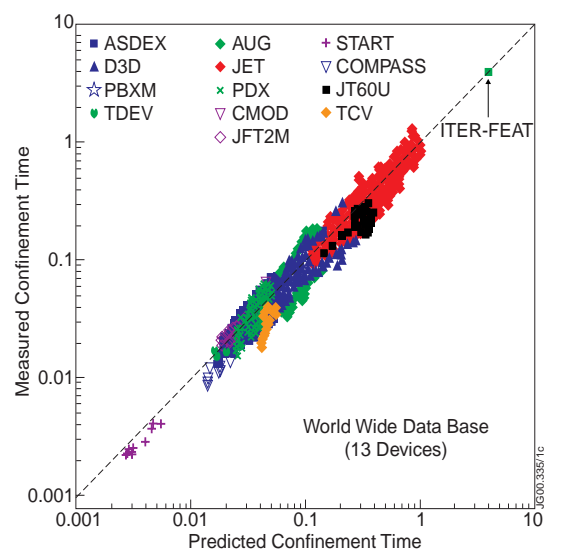
- JET 1991 (EU): 1.7 MW**
First Controlled DT Fusion Experiments on Earth
- TFTR 1994 (US): 11.5 MW**
- JET 1997 (EU): 16 MW**
(Fusion Power ~ 0.8 external plasma heating power)
- ITER ~ 2020: 500 MW**
scientific demonstration of reactor grade thermonuclear plasmas (fusion power ~ 10 external heating power).
- Demonstration reactor ~ 2030–2040: ~ 2000 MW**
electricity production demonstration

The ERA is a project proposed by the EU Commission in January 2000 and endorsed at the European Council (Lisbon, 23-24 March 2000) by the Heads of State and Government. It aims at strengthening the coherence of research activities and policies conducted in Europe.

Fusion activities in Europe represent a successful working example of what is aimed under ERA. In particular, the use of JET facilities under EFDA complies with several of the ERA criteria:

- in line with EU priorities (energy research)
- joint EU efforts allowing critical mass to assemble and to combine complementary expertise in the different countries
- strong link with national activities
- centre of excellence recognised worldwide
- co-ordinated implementation of the programme
- International collaborations (USA, Japan, Russian Federation,.....)
- Inducing researchers mobility

Distribution of European Scientists involved in the JET Work Programme 2000



Complete Exchange of the Divertor by Remote Handling

