FREQUENTLY ASKED QUESTIONS

In this section, we provide answers to the most frequently asked questions about the ITER Project.

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FUSION AND THE ITER PROJECT

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FUSION AS A SUSTAINABLE ENERGY SOURCE

- Why has fusion science developed much more slowly than fission science, which provided commercial reactors just a few years after its inception?
- Will commercial fusion be available early enough to contribute to the energy transition needed to fight climate change and to replace fossil fuels?
- If successful, when would fusion be able to add power to the grid? What steps would be required after ITER?
- How much power would a fusion reactor be able to deliver and at what cost? Would it be

If successful, when would fusion be able to add power to the grid? What steps would be required after ITER?

How much power would a fusion reactor be able to deliver and at what cost? Would it be competitive?

The power output of the kind of fusion power reactor that is envisaged for the second half of this century will be similar to that of a fission reactor, i.e., between 1 and 3 gigawatts. In theory, the larger the reactor, the more efficient it would be to operate and the more power it would produce, so it may be advantageous to go larger in the future. For the moment, it is envisaged that future fusion power plants would occupy buildings no bigger than those that presently house fission or coal-fired power stations.

The main goal of ITER and future fusion reactor-based power plants is to develop a new, sustainable and virtually unlimited energy source. The average cost per kilowatt of electricity is expected to be similar to that of current fission reactors ... slightly more expensive at the beginning, when the technology is new, and less expensive as economies of scale bring the costs down.

In order to have a rapid market penetration, fusion will have to demonstrate the potential for competitive cost of electricity. Although this is not a primary goal for DEMO, the perspective of competitively priced electricity production from fusion has to be set as a target. One way to do this is to minimize DEMO capital costs (and that of fusion power plants). The ITER Tokamak is a first-of-a-kind experimental machine, built with a vast array of diagnostic systems (over 40!) to learn as much as possible about what is happening in the plasma. A fusion power plant on the other hand would be conceived in quite a different way.

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Is there any assurance that there will be enough tritium available for commercial deployment of fusion? Are lithium resources sufficient to fuel future fusion reactors in competition with other lithium usages?

Is the concept of tritium breeding sufficiently robust to start the ITER Project?

I recently read that there was a shortage of helium in the world and this was unlikely to improve as stocks are used up. How will this affect plans for the fusion superconducting magnets?

What are the benefits of pursuing fusion as compared to next-generation nuclear fission reactors?

RELIABILITY OF MATERIALS