



OVERVIEW OF THE ITER PROJECT

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ABSTRACT

ITER is a unique scientific, technological, and industrial project being built in the south of France through a partnership involving the European Union, China, India, Japan, Korea, Russia, and the United States. Its primary objective is to demonstrate the scientific and technological feasibility of controlled magnetic fusion, producing significant fusion power amplification (10 times the power input to the plasma) with an output of up to 500 MW for 300 – 500 s. This paper will give an introduction to the concept of nuclear fusion in general and the “tokamak” approach to magnetic confinement in particular. The tokamak magnetic configuration has been chosen for ITER as it has the most mature experimental and theoretical basis of all magnetic confinement concepts. It relies on the capture of a gas with temperatures in excess of 100 million degrees in a vacuum chamber using ultra-high magnetic fields. In ITER, these are generated by some of the world’s largest superconducting magnets. This paper will give an overview of the ITER design and highlight some of its unique technical challenges and their solutions.

As of 2013, construction is well underway and has been rapidly evolving since the start in 2007. The 40 hectare ITER site near St. Paul-lez-Durance, France was prepared in 2009/10 and the first buildings have been completed, among them the large poloidal field coil winding building and the main office building. The preparation of the tokamak pit has been completed and the seismic foundations have been erected. ITER is built using an in-kind procurement model, under which the components are constructed by the ITER partners and delivered to the ITER site. A total of 84 procurement arrangements (PAs) have been signed with the relevant domestic agencies for 82 % of the procurement value of ITER construction. Construction of a number of key components is underway (e.g. vacuum vessel construction is underway in Korea and Europe and industrial production of the toroidal field superconductor has started in most of the ITER members). This paper will also provide an overview of the present state of construction progress.

Keywords: nuclear fusion, ITER, tokamak, magnetic confinement