US ITER Project Office
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US ITER PROJECT

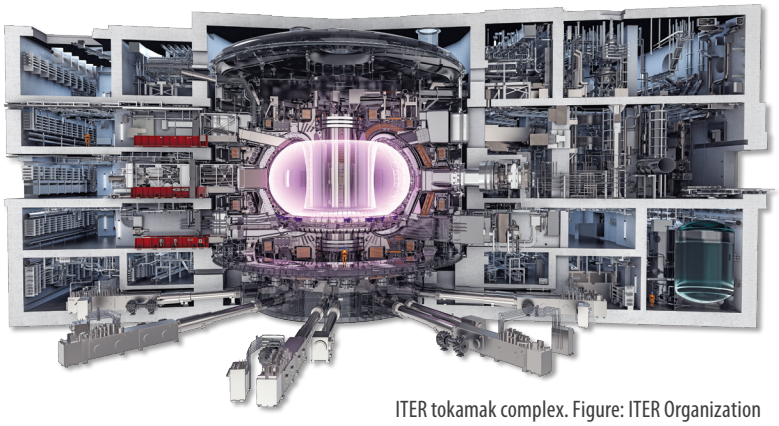
Central solenoid module stacking is visible at right inside the ITER assembly hall. Photo: ITER Organization

ITER Mission

The mission of the international ITER project is to demonstrate the scientific and technological feasibility of fusion energy, using strong magnetic fields to confine fusion fuels in a plasma state hotter than the sun. Fusion has the potential to yield carbon-free, abundant, safe energy that can be a major contributor to the U.S. energy portfolio in the future. ITER will allow scientists to study reactor-scale burning plasmas and explore technical challenges related to the development of a power-producing fusion reactor.

U.S. Participation in ITER

As an ITER member, the United States receives full access to all ITER-developed technology and scientific data, but bears less than 10% of the total construction cost. Most of US ITER funding for hardware contributions goes to U.S. industry, universities and national laboratories. The U.S. contribution consists of R&D, hardware design and manufacturing for 12 different ITER systems, plus assignment of personnel and funding for the U.S. share of common expenses. As of December 2023, >$1.4B has been awarded to U.S. industries and universities and obligated to DOE national laboratories in 46 states plus the District of Columbia.



ITER tokamak complex. Figure: ITER Organization

Scientific Foundations

Fusion reactions power the sun and the stars. To achieve fusion power on earth, a fusion reactor requires a burning plasma, where plasma energy is maintained primarily by self-heating due to internal fusion reactions. A 2002 U.S. fusion-community study assessed a range of approaches for creating a burning plasma. The Department of Energy initiated a National Research Council study and the President then decided to enter ITER negotiations. The scientific significance and readiness of ITER was documented in the 2004 National Research Council report *Burning Plasma:* "The next large-scale step in the effort to achieve fusion energy is to create a burning plasma… The ITER design is the most mature and is also sufficiently conservative to provide great confidence in achieving burning plasma conditions while being flexible enough to test critical advanced tokamak operating regimes in near-steady-state burning plasma conditions." A half-century of U.S. and international magnetic confinement fusion research is behind the science and engineering of ITER, and U.S. research continues to provide critical development for ensuring optimal exploitation of ITER. In addition, the 2020 Fusion Energy Sciences Advisory Committee long-range plan report, *Powering the Future*, and the 2021 National Academies report, *Bringing Fusion to the U.S. Grid*, emphasize the importance of ITER's burning plasma mission for the path to fusion energy.

Partners and Management

The seven ITER members, representing 35 nations, are the United States, European Union (host), Japan, Korea, India, China, and Russia. The ITER Agreement, signed November 21, 2006, and in force October 24, 2007, established a membership duration of 35 years for the participating partners. The members have divided the scope and are strongly mutually dependent, sharing the work and the benefits. U.S. participation in the ITER Agreement is essential to ITER's success.

The partners are jointly responsible for the construction, operation, and decommissioning of this experimental fusion facility. The European Union, as host for the ITER facility, is responsible for 45% of ITER's construction cost; the remaining partners contribute roughly 9% each. The facility is being assembled at St.-Paul-lez-Durance, France, using components fabricated in the United States and in other partner nations. The ITER Organization serves as the coordinating body of the project, and is led by an experienced international team. The ITER Council, which consists of high-level government officials from the member nations, governs the ITER Organization.

U.S. Project Status

The U.S. project has already completed contributions for two systems, the toroidal field conductor and the steady state electrical network, and is advancing design, fabrication, and deliveries for the remaining hardware. Four superconducting modules for the "heart of ITER," the central solenoid magnet, have already been delivered. In 2023, the project received approval for a new performance baseline for all remaining aspects of the project (hardware and construction cash contributions). From an international perspective, it is significant to note that the global partners continue to allocate substantial annual budgets to the ITER project. The European Union, the project host, has awarded over 750 contracts and 150 research grants related to ITER. Other partners are maintaining project funding consistent with achieving the international schedule.

ITER tokamak complex in 2023. Photo: ITER Organization

Commissioning of the cryoplant is underway. Photo: ITER Organization

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OAK RIDGE National Laboratory
PPPL PRINCETON PLASMA PHYSICS LABORATORY
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US ITER is managed by Oak Ridge National Laboratory in Tennessee, with partner labs Princeton Plasma Physics Laboratory in New Jersey and Savannah River National Laboratory in South Carolina.

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