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 clean, abundant, safe energy that can be a major contributor to the US 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. ITER will be the largest tokamak ever constructed and is designed to deliver 10 times more fusion power than the plasma heating power. As a research facility, ITER is expected to have a 20 year operational lifespan and will provide supporting R&D for the development of a demonstration fusion power plant (DEMO).

Investment and Return
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. Over 80% of US ITER funding for hardware contributions goes to US industry, universities and national laboratories.

The US contribution consists of R&D, hardware design and manufacturing for 12 different ITER systems, plus assignment of personnel and funding for the US share of common expenses. As of June 2017, over $942M has been awarded to US industries and universities and obligated to DOE national laboratories in 44 states plus the District of Columbia. To complete its contributions to ITER, the project plans to award and manage an estimated $800M in future contracts to US industry.

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 US fusion–community study assessed a range of approaches for creating a burning plasma. Following a 2003 letter report, the Fusion Energy Sciences Advisory Committee noted ITER’s advanced stage and comprehensive science and technology program, and recommended that the US seek to join ITER. 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 US and international magnetic confinement fusion research is behind the science and engineering of ITER. Experimental research at DIII-D (General Atomics), C-Mod (MIT) and NSTX (Princeton Plasma Physics Laboratory) has contributed to important findings in the prediction and management of plasma behavior at a range of experimental scales. Additional US research continues to provide critical solutions for ensuring ITER’s success.
Partners and Management

The ITER project is being designed and built by seven partners: China, the European Union, India, Japan, South Korea, the Russian Federation, and the United States. 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. US 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 will be 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.

US Project Status

The US project is now completing R&D and design and is fabricating and delivering. Major hardware procurements have begun, requiring an increase in annual funding in order to assure that the project remains on schedule. With industry involvement, US ITER has identified a number of value engineering opportunities and cost savings strategies. A May 2016 report from the US Department of Energy notes that “ITER remains the best candidate today to demonstrate sustained burning plasma, which is a necessary precursor to demonstrating fusion energy power.”

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 first plasma schedule.