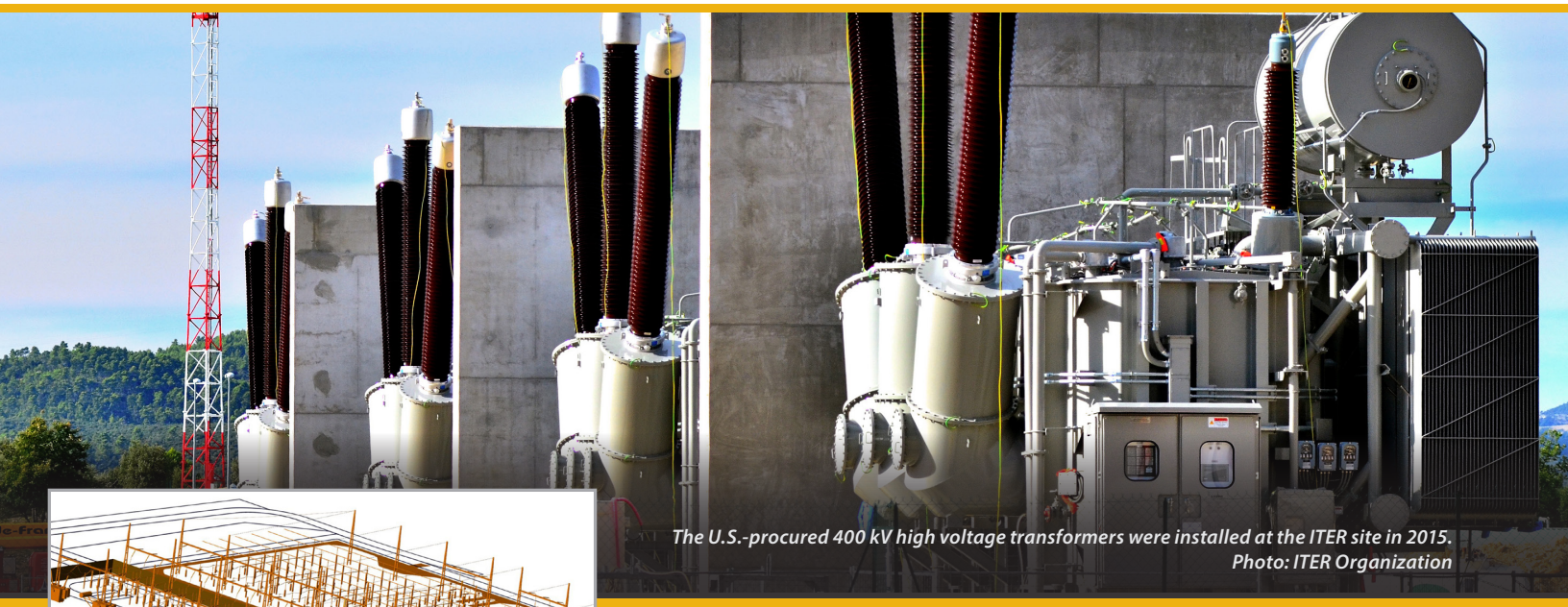
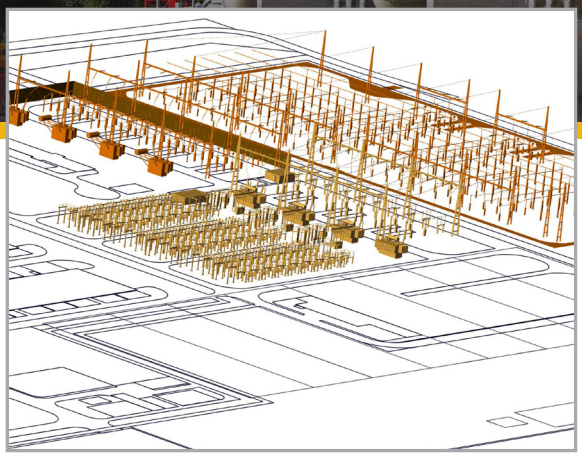
Steady State Electrical Network



The U.S.-procured 400 kV high voltage transformers were installed at the ITER site in 2015. Photo: ITER Organization



Switchyard design. Image: US ITER

US Contribution

The United States contributed 75% of the equipment required for ITER's steady state electrical network (SSEN), excluding cables and emergency power. The European Union contributed the remaining equipment and was responsible for the design and installation of the system.

Overview

The steady state electrical network is an alternating current (AC) power substation and distribution system that supplies electrical power to all ITER conventional systems and facilities. A separate system delivers power to the pulsed systems, including the magnet and heating power supplies.

The SSEN is rated at 120 megawatts (MW) and is similar to the auxiliary power distribution system in a nuclear fission power plant, except that it is about twice the size. The equipment contributed by US ITER is typical of a large AC power distribution system, consisting of transformers and switchgear at a high voltage of 400 kilovolts (kV) and a medium voltage of 200 kV.

A wide view of the installed high-voltage transformers and the electrical gantry train. Photo: ITER Organization

Status

The United States completed delivery of all components in 2017.

Steady State Electric Network

High-voltage switchgear during factory acceptance testing. Photo: US ITER

Earthing resistors during factory acceptance testing. Photo: US ITER

Installation of bushings for high-voltage transformers. Photo: ITER Organization

Technical Description

Standards: International Electrotechnical Commission standards for 50 Hz operation

Power feeds

2 feeds: 400 kV substation transformer, 22 kV distribution to load centers, 6.6 kV distribution

2 feeds: 400 kV substation transformer, 22 kV distribution to load centers, 22 kV distribution

Equipment

High voltage (HV) disconnect switches

HV circuit breakers

HV current transformers

HV potential transformers

HV surge arresters

HV substation transformers

HV substation hardware

HV control & protection

Earthing resistors

22 kV switchgear

6.6 kV switchgear

Reactive power compensators

Power transformers

Uninterruptible power supply

Low voltage distribution & subdistribution panels

Direct current distribution

Contributors include

ABB (Raleigh, NC)

Eaton (Cleveland, OH)

Hyundai (Houston, TX)

Schneider (Palatine, IL)

Siemens (Raleigh, NC)

Alstom (Saint-Ouen, France)