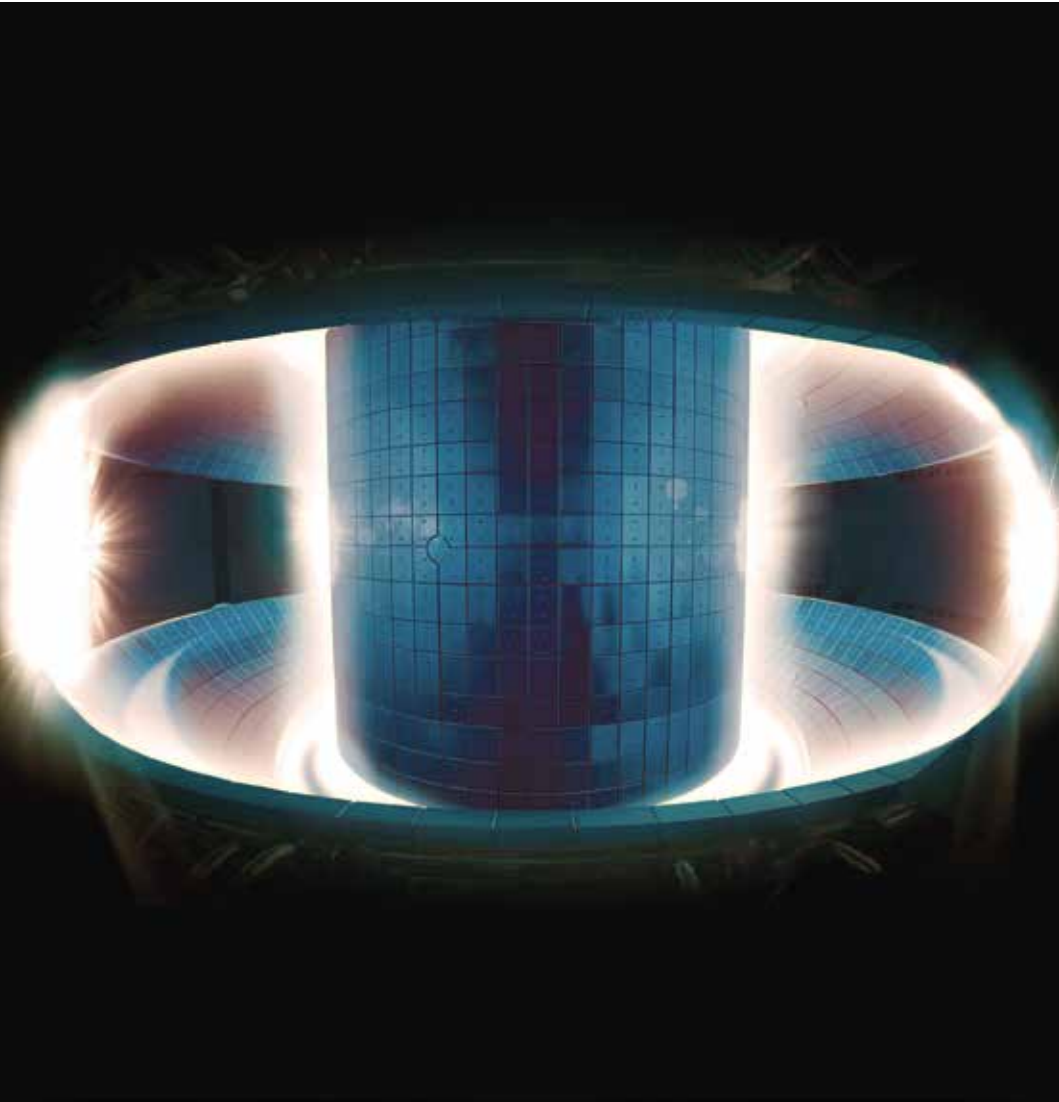


# Cryogenics for fusion energy

Cryogenic systems for fusion plants



**A**ir Liquide is the world leader in gases, technologies and services for Industry and Health and supplies customized solutions dedicated to fusion energy.

Air Liquide designs and manufactures systems for cold production and distribution of cryogenic fluids necessary to cool down the devices of the fusion plants.



## Air Liquide expertise

Air Liquide has unique expertise in the field of low temperatures and recognised know-how in the design, production, and installation of high-capacity gas liquefaction and refrigeration systems and cryolines. Air Liquide has supplied highly reliable cryogenic equipment and cryolines for the biggest fusion projects of the last 25 years: WEST, JET, SST-1, KSTAR, JT-60SA, ITER.

Air Liquide has also designed and built cryogenic equipment for the CERN's LHC in Switzerland and the largest helium production unit in the world in Qatar.

*Liquefier cold box*



**A**ir Liquide teams support you in all the stages of the project, using a global approach that combines design, commissioning, operations and maintenance.



## Air Liquide products and services

- Helium and nitrogen refrigerators
- Valve boxes
- Cryogenic transfer lines
- Cold circulators
- Isotope separation system
- Liquid helium and nitrogen storage tanks
- Gas supply: helium, hydrogen, nitrogen...
- Preliminary analysis
- Risk management
- Training
- Maintenance and operation services

*Turbo-expanders and cold circulators*



*Helium liquefier – HELIAL*





## Ou references in major fusion projects

### WEST (France)

- Cryoplant of the Tokamak

### JET (United Kingdom)

- Cryopumps

### SST-1 (India)

- Cryoplant of the Tokamak
- Cryoplant of the NBI

### KSTAR (South Korea)

- Tokamak Thermal Shields engineering study
- Cryoplant

### JT-60SA (Japan)

- Cryoplant engineering study and construction

### ITER (France)

- Prototype cryopump and its test facility at FZK
- Helium cryoplant engineering study and construction
- Cryolines

### MITICA (Italy)

- Cryoplant

### IFMIF (Japan)

- Cryoplant

*For more information:*



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A world leader in gases, technologies and services for Industry and Health, Air Liquide is present in 80 countries with approximately 66,000 employees and serves more than 3.6 million customers and patients.