



## A first for KSTAR, South Korea: plasmas generated thanks to Group's technologies

*press release*

### **Contacts:**

#### **Corporate Communication**

Corinne Estrade-Bordry  
+33 (0)1 40 62 51 31

#### **Investor Relations**

Virginia Jeanson  
+33 (0)1 40 62 57 37  
Aude Rodriguez  
+33 (0)1 40 62 57 18

#### **Air Liquide Advanced Technologies**

Dominique Lecocq  
+33 (0)4 76 43 64 97

### **Air Liquide and nuclear fusion**

For over 20 years, Air Liquide has been involved in the world's leading nuclear fusion projects (Tore Supra, JET, SST-1, KSTAR). The Group has developed specialized expertise in the provision of tailor-made solutions in the field of cryogenics in order to meet the demands of these fusion projects. This will enable Air Liquide to bring its expertise in this area to the ITER project. ITER is a prototype of the nuclear fusion reactor which is under construction at Cadarache (France), intended to demonstrate the scientific and technical feasibility of nuclear fusion.

**Mastering nuclear fusion** offers the potential to produce electrical energy differently, contributing thus to the challenge of satisfying increasing worldwide energy requirements.

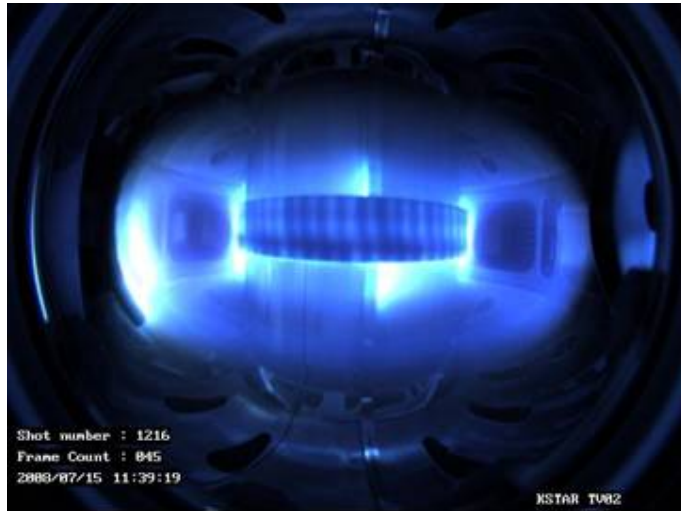
**Scientists at KSTAR (Korean Superconducting Tokamak Advanced Research) in South Korea have just successfully generated the first plasmas in the core of their new Tokamak.**

The success concludes the installation and start-up phase of this unique technical apparatus. Doing so **marks a significant milestone in the development of the project** which, combined with other international programmes, **contributes to improving the knowledge and mastery of fusion reactions, designed to generate electrical energy.**

The NFRI (National Fusion Research Institute) in South Korea has developed a **Tokamak**, an ultra-sophisticated physics-based instrument whose purpose is to generate plasmas that make possible the conditions required for controlled nuclear fusion of atoms. This type of reaction, which also occurs in the sun, releases a large amount of energy that can be converted into electrical energy. **In order to obtain the very powerful electromagnetic fields** necessary for the confinement of this physical reaction, **superconducting magnets** must be used, which only function at **extremely low temperatures**. It is **liquid helium** which enables such temperatures to be maintained within the Tokamak.

**Air Liquide, a partner in the KSTAR project since 2005, designed and built the Tokamak's system of helium liquefaction and distribution, in operation since the beginning of this year.** This incorporates a **refrigerator**, designed to **cool the superconducting magnets of the experimental reactor** to a temperature of minus 269°C, that is, close to absolute zero. **Air Liquide's unique expertise in mastering ultra low temperatures**, and its teams' expertise in developing **innovative technologies**, enable the Group to cooperate in numerous scientific projects relating to particle physics and the applications of supraconductivity (such as its remarkable collaboration with CERN on the Large Hadron Collider-LHC, which began operating on September 10), and which call for a **total mastery of cryogenics at ultra low temperatures.**

*“We are delighted about KSTAR’s first successes, in which we are proud to be involved. They represent an important step towards the ITER international experimental reactor, to which our teams will be able to contribute their expertise. This success shows the capacity of the Air Liquide Group to respond to major technological challenges and to contribute towards developing future energy solutions”,* declared François Darchis, a member of the Executive Committee of the Air Liquide Group, in charge of Advanced Technologies.



Photograph of the first plasma generated by the KSTAR Tokamak, thanks to Air Liquide’s technologies (South Korea – July 2008).

*With more than **40,000 employees** in **75 countries**, Air Liquide is the **world leader** in industrial and medical gases and related services. The Group offers **innovative solutions** based on constantly enhanced **technologies** and produces **air gases (oxygen, nitrogen, argon, rare gases...)** and **many other gases including hydrogen**. The Group contributes to the manufacturing of **many everyday products**: bubbles in sparkling beverages, protective atmosphere for packed foods, oxygen for hospitals and homecare patients, ultra-pure gases for the semiconductor industry, hydrogen to desulfurize fuels...*

*Air Liquide is committed to **sustainable development** and helps to **protect life**. Founded in 1902, Air Liquide has successfully developed a long-term relationship with its shareholders built on **trust** and **transparency** and guided by the principles of **corporate governance**. Since the publication of its first consolidated financial statements in 1971, Air Liquide has posted **strong and steady earnings growth**. Sales in 2007 totaled **11,801 million euros**, with sales outside France accounting for almost 80%. Air Liquide is listed on the Paris stock exchange and is a component of the CAC 40 and Eurostoxx 50 indices (ISIN code FR 0000120073).*