



Paris, June 25, 2008

World first in electricity transmission: Air Liquide partner of the longest superconductor cable

press release

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Superconductivity and the transmission of electricity

Superconductor cables can be positioned at strategic points along an electricity grid to relieve traditional cables or power lines. They **relieve the networks** by offering the possibility of **significantly increasing the electric power** distributed in the underground networks by replacement of the existing traditional cables. This technology is thus particularly adapted in urban areas: its low civil engineering impact limits the costs of intervention as well as the inconvenience to the local residents.

The world's longest and most powerful superconductor power transmission cable has been connected to the commercial power grid in Holbrook, New York, United States, by the Long Island Power Authority (LIPA) and American Superconductor. The **600-meter** long cable is cryogenically cooled thanks to the advanced **technologies of Air Liquide, the world leader in cryogenics.**

This project **demonstrates the operation of a high voltage superconductor cable in an urban commercial power grid.** Capable of transporting up to 2,400 amps (574 MVA in a 138 kV system), the superconductor cable is the **first such high voltage electric cable in the world to be operating in a real transmission system.** This cable transports more energy than all of the previously demonstrated high temperature superconductor (HTS) cables together and is capable of powering 300,000 homes.

Air Liquide is providing its **innovative cryogenic technologies** and the **competencies of its teams** in operating and maintaining cryogenic systems. The Long Island project involved public and private partners, including the U.S. Department of Energy and Nexans, the worldwide leader in the cable industry.

Superconductor cables can **transport three to five times more energy than traditional cables.** Capable of transporting electricity without resistance at a certain low temperature (in this case at -200°C), the HTS cables avoid energy loss along the cable. In order to use the exceptional properties of superconductor materials, it is necessary to keep the cables below their critical temperature through an appropriate refrigeration system using liquid nitrogen. **Cryogenics is the key to superconductivity** and Air Liquide's fluid refrigeration and distribution system is the **technological innovation** that enables this **performance.**

François Darchis, Air Liquide Senior Vice-President in charge of R&D, Advanced Technologies and Engineering & Construction, said: ***"As the worldwide demand for energy continues to rise, and as the electricity grids become saturated in certain countries, Air Liquide is proud to contribute to the development of this particularly innovative technology which will not only produce significant energy savings in the transport of electricity, but will also lead to the construction of a new generation of energy distribution networks."***

Air Liquide is already involved in this project's next steps to build a **cable with second generation superconductor materials that are even more powerful.** In this second phase, Air Liquide will develop special very low temperature refrigeration technology.

Superconductivity and cryogenics

Superconductivity is used today to address technological challenges. **Tomorrow, it will be a key technology in the fields of energy and electronics. Cryogenic refrigeration** is an indispensable technology to enable the implementation and development of superconductivity. Air Liquide **is the world leader in cryogenics** and its expertise is unequalled in generating very low temperatures (for example, providing liquid helium at extremely low temperatures to the CERN particle accelerator and to the Korea Basic Science Institute, South Korea...). The Group is developing solutions that will enable the **industrial development** of superconductivity.

*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*