

**2010 Advanced Cables and Conductors Peer Review
Project Summary**

Project Title:	LIPA 2 Cable Project
Organization:	American Superconductor, Nexans, Air Liquide, LIPA
Presenters:	James Maguire, Frank Schmidt, Shawn Bratt, Thomas Welsh
FY 2009 Funding:	\$4.2 M

Overall Project Purpose and Objectives:

The purpose of this project is to operate and monitor the transmission voltage high temperature superconducting cable on the LIPA grid built under the LIPA 1 contract and to expand on the development and demonstration by addressing the remaining outstanding items for the commercial integration into the grid. These items include the demonstration of a field splice, the replacement of one phase conductor with one manufactured from AMSC's second generation wire, the laboratory evaluation of fault current limiting properties in the cable design, the installation of a field repairable cryostat, the development of a modular 20KW refrigeration system designed specifically for the cooling of HTS cables as well as the production and testing of key components for this refrigeration system.

The project objectives build on the LIPA 1 project utilizing the same location and installed conduits for the cable as well as existing refrigeration system and other infrastructure. It also is addressing and demonstrating the key elements identified by our utility partner during the first phase as necessary elements to a full commercial installation including the preliminary design and testing of key components for a refrigeration system optimized for use on a high temperature superconductor cable system.

Specific objectives of the program are:

- Operate and gather data from the LIPA 1 installation
- Demonstrate 600 meter, 1 phase, 138kV cable in the LIPA grid at the LIPA I site
- Evaluate a 138kV fault current limiting transmission voltage design in a laboratory
- Develop the key components required to commercially deploy 2G HTS cables
 - Field repairable cryostat
 - Standardized cable joint
 - Thermal contraction compensation
 - Modular refrigeration

The project is a milestone-driven effort divided into two principal phases. Phase 1 encompasses laboratory demonstrations of the key cable technologies and design of refrigeration components. Phase 2 is the actual build and install of the new 2G phase conductor as well as the manufacture of key refrigeration components

2010 Approach and Results:

We are currently executing the second phase of this effort. The cable design and qualification of the superconducting wire into the LIPA cable design is complete and test cables have been fabricated, tested and evaluated identifying no issues for the manufacture of the 600 meter single phase cable. Testing to establish the design parameters for the thermal shrinkage has been ongoing for the past year and a suitable design is now complete. The refrigeration system development is also underway and the main operating characteristics of the refrigerator system have been established. Component fabrication for the key elements of the refrigeration system are beginning.

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2011 Plans and Expectations:

In GFY 2011 we will manufacture and test a 30 meter test section of the cable and perform qualification testing for integration into the LIPA grid. We will also fabricate the cable core for the 600 meter cable section . Air Liquide will continue on the design of key components for the refrigeration system

Technology Transfer, Collaboration, Partnerships:

None