



# Summary of Previous EPRI Superconductivity Workshops

by

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# EPRI Mission

- As part of EPRI's commitment to improving the future power grid it supports development of advanced technologies and sponsors workshops and reports in a variety of disciplines
- EPRI has supported superconducting power technologies since it was established in 1973 and over the last decade has sponsored annual meetings that bring technologists and utility staff together.
- As superconducting power applications mature, EPRI decided to initiate a series of workshops that address issues critical to future implementation.

# Workshops

- EPRI's initial workshop addressed cryogenic issues associated with superconducting power applications. \*
- Nashville, TN, August 2004
- EPRI Report available
- EPRI's second workshop was jointly sponsored by DOE and addressed issues of testing, specifying and qualifying superconducting power equipment. \* \*
- Hauppauge, NY September 2007
- EPRI and DOE Reports available

\* 18 Attendees   \* \* 34 Attendees

- **Observation: larger attendance and parallel sessions introduces overhead → one day too short.**

# Workshop II Goals

- Provide Information on existing test procedures and specifications for SC materials & equipment
- Provide information on standards organizations & existing standards that apply to SC materials & equipment
- Address needs for development and coordination of tests
- Explore which tests are actually utilized for SC prototypes
- Obtain feedback from participants about needed tests, test procedures, & specifications
- Outline priorities & procedures for an ongoing dialog amongst the stakeholders

# Workshop II Goals

## Provide guidance to EPRI & DOE on their potential roles

- In the process of specifying and standardizing tests for SC power equipment
- In supporting future development of equipment & procedures for tests that are used today, or may be needed in the future

# Workshop II Structure

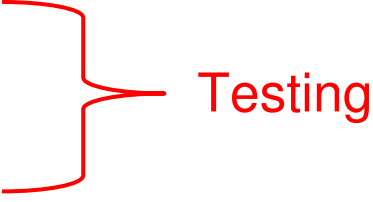
## The workshop consisted of two major segments

- **Informational**
  - An informative segment of the workshop that provided participants with basic information about various issues to do with standards, standards organizations, and
- **Breakouts**
  - Participants were organized into breakout groups to discuss questions regarding testing and specifications
- ❖ **Similar structure for Cryogenic Workshop**

# Workshop II Conclusions

**Testing protocols need to be adopted & categorized with utility needs in mind**

TYPE  
Factory  
Field



Testing

Need for adequate test facilities (high power + cryogenic)

**Development of guidelines for testing and specifying SC cables and FCLs within the next year is needed for the establishment of standards within the next 5 years**

**Communication is an issue. Stakeholders need to provide general education to:**

Managers  
CEOs  
Public

# Workshop II Conclusions

Communication between stakeholders is necessary for the development of equipment for practical use and feasible reliability

There is lack of data from testing and demonstrations on reliability and long-term performance

A survey of utility needs is needed to determine the next steps for making SC power equipment feasible

Stakeholders should start to gain institutional support for education, tutorials, workshops, & working group participation

**EPRI, DOE, & KERI have roles here**

## Workshop II Recommendations

### Recommendations from the break out groups include but are not limited to the following:

- Begin the development of standards via modification of existing ones
- Develop test categories that include testing from design to operation
- Develop educational tools to train engineers, administrators, system planners, & the general public
- Form or support working groups within various organizations
- Quantify utility needs & expectations
- Facilitate more frequent workshops to promote stakeholder interaction
- Develop a manual for cryogenic safety that specifically addresses utility needs
- Support R&D efforts in thermal insulation materials and cryogenic dielectrics

**Choose a target technology for initial standards and specification development**

**Establish test facilities for superconducting power equipment.**

# Workshop II Output

- **Recommendations for future EPRI activities in SC**  
Determine how EPRI's supporting utilities can participate in the implementation of the recommendations?
- **CD of presentations (All participants)**
- **Short meeting report (EPRI funders)**  
Discussion Summary  
Conclusions and recommendations
- **DOE Meeting Report**

## Workshop I Goals

Provide attendees information on existing utility O & M procedures.

Address possible modes for cryogenics and cryogenic O&M on utility based superconducting systems.

Itemize the cryogenic requirements of several SC applications.

Address reliability (availability) requirements for SC systems and for refrigeration systems as a subcomponent.

Address special needs for specifications/guidelines/standards for refrigeration systems associated with SC devices at electric utility sites.

Discuss/clarify/classify the differences between buying cold and buying a refrigerator or a combined superconducting device with its refrigerator.

Outline priorities and procedures for an ongoing dialogue among the stakeholders regarding the above goals.

What are the next steps and who are the participants?

Provide EPRI guidance on potential roles in this process.

# Workshop I Topics

What O&M practices are relevant to SC applications today?

What are the requirements/characteristics of different cryogenic systems for SC devices?

How well do the existing cold supply business models fit existing utility practice?

What are the reliability/availability) requirements for SC systems and for the subcomponent refrigeration systems?

What issues are associated with the procurement of O&M for SC equipment in the substation?

What should be the nature of ongoing interactions among the stakeholders?

What is the appropriate future role for EPRI in terms of utility wide coordination efforts in this area?

# Workshop I Conclusions

Both utility based and contracted O&M for cryogenics can be effective.

The implementation of one or the other will depend on the specific needs and capabilities of the host utility and the combination of technologies in use.

Utility personnel need exposure to the art and science of SC and of the enabling cryogenic technology. Without proper exposure, the utilities will be ill positioned to make the best decisions regarding the new systems.

Ideally this process will occur before a large number of superconducting systems become operational.

Both the SC manufacturers and suppliers of cold must become familiar with utility's standard practices.

# Workshop I Recommendations

- Increase communication between electric utilities and organizations such as NASA and the DOE labs that already use SC systems.
- Prepare a “Primer” that explains some of the cryogenic concepts in a way that can be read and understood by non scientists.
- Such a document was produced and distributed in early 2006
- Looking further into the future, it would be appropriate for EPRI to address a set of standards and recommended practices for the cryogenics O&M.

# Workshop I Output

- **Recommendations to EPRI and the utilities that are supporting this effort.**

How to proceed to the use of commercial cryogenic systems with reliable operation and maintenance

- **CD of presentations (All participants)**

- **Short meeting report (EPRI funders)**

Discussion Summary  
Conclusions and recommendations

# EPRI Publications

To download Reports

Go to [EPRI.COM](http://EPRI.COM) input report number in search box

- Workshop II - 1016928
- FCL utility needs survey - 1008694
- Survey of FCL technologies - 1010760
- HTS Cables 2006 tech watch - 1012430
- Cryogenics Primer - 1010897 \*
- Workshop I proceedings - 1008699\*

\* will be available soon