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Programme "Electricity"

IEA Implementing Agreement

for a cooperative programme for assessing the impacts of High-Temperature Superconductivity on the electric power sector

worked out by

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on behalf of the

Swiss Federal Office of Energy

March 2001 **Final Report**

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Diese Arbeit ist im Auftrag des Bundesamtes für Energie entstanden. Für den Inhalt und die Schlussfolgerungen ist ausschliesslich der Autor dieses Berichts verantwortlich.

1. Contracts

In the frame of the International Energy Agency Switzerland among others signed June 90 an "Implementing Agreement for a Cooperative Programme for Assessing the Impact of High-Temperature Superconductivity on the Electric Power Sector" with one Annex of the same title.

The Agreement was prolonged in 95 and 00 based on a review of the Enery End-User Working Party. Two revisions of the Annex I were introduced at the same dates.

Means defined by the Annex:

a) Preparing essays on outstanding issues and fostering debate and appropriate action through workshops, seminars, etc.

b) Encouraging discussion (e.g. holding workshops) among those who might plan to integrate future devices into present systems and facilitate discussion among groups engaged in R&D and potential users of the results of the R&D.

c) Evaluating and synthesizing the results of on-going work on high temperature superconductivity as related to the electric power sector, and providing a repository facility for assessment material furnished by the Participants.

d) Establishing a current register of names, addresses of institutions and published documentation in the field of activity;

e) Promoting international cooperation and planning that may lay the basis for future joint projects, including hardware projects.

1. Participants

The Contracting Parties which are Participants in Annex I are the following:

Hydro-Québec	(Canada)
Ontario Hydro (until 2000)	(Canada)
The Elkraft Power Company Limited*	(Denmark)
Technology Development Centre (TEKES)	(Finland)
The Forschungszentrum Karlsruhe	(Germany)
Research Authority, The Tel Aviv University	(Israel)
Centro Elettrotecnico Sperimentale Italiano (CESI)	(Italy)
The New Energy and Industrial Technology Development Organization (NEDO)	(Japan)
Korea Electric Power Research Institute	(Korea)
The Netherlands Agency for Energy and the Environment (NOVEM) (until 2000)	(Netherlands)
The Research Council of Norway*	(Norway)
The Swedish National Energy Administration Development (NUTEK)	(Sweden)
The Office Fédéral de l'Education et de la Science	(Switzerland)
The Turkish Scientific and Technical Research Council	(Turkey)
The Department of Trade and Industry (DTI)	(United Kingdom)
The United States Department of Energy (DOE) *(Operating Agent through ANL)*	(USA)

2. Achievements

- Directory on key players in all participating IEA-countries;

  first edition December 1991;

  second edition December 1993

  third edition July 1995

  special edition November 1997

- Survey and comments on published assessments bearing on the future use of ceramic superconductors by the electric power sector;

  first edition September 1992

  second edition November 1996

- 16 essays (each peer reviewed) on specific topics, each aimed at technical managers

- 4 International Workshops on specific topics (SMES/Germany, FCL/Israel, Cables/Italy, Reliability/USA)

3. Essays on specific topics

- Status of progress toward HTS high amperage conductors;

  first edition January 1992

  second edition October 1993

  third edition January 1996

  fourth edition March 1997

- Status of progress toward HTS bulk high amperage conductors January 1996

- Fault Current Limiters;

  first edition November 1991

  second edition March 1995

- Superconducting transmission cables, February 1993

- Superconducting magnetic energy storage (SMES),

  first edition January 1994

  second edition September 1998

- Refrigeration for HTS, October 1994
- Rotating machinery, October 1994
- Transformers, November 1996
- Use of patent search to assess market status of cables, October 1997
- Impacts on environment, safety and health, December 1999
- AC losses in HTS, May 2000

4. Workshops

- **Superconducting Magnetic Energy Storage (SMES), at FZK/Karlsruhe, October 1994**
- **Superconducting Fault Current Limiters (FCL), at Jerusalem, April 1995**
- **Power Transmission Cables, at CISE/Milan, April 1997**
- **Future Impact of Superconductivity on System and customer Reliability, at Santa Fe/LANL; October 1999**

5. Information

All above mentioned directories, surveys, topical reports and invitations to the workshops were distributed to the interested parties in Switzerland as listed below:

Herrn
Dipl. El.-Ing. R. Brüniger
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