Executive Committee Meeting of
the IEA Technology Collaborative Programme on Superconductivity
Round Table discussion

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Subjects for commercialization of SC cable system

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Subjects for commercialization of SC cable system

Yokohama Project (66kV/200MVA cable) in 2012

- **The HTS cable was successfully operated in the grid for over 1 year without any failures or interruptions.**
- **Stable operation for load fluctuations due to daily and season load variation and circuit switching.**

■ Remaining technical issues

To improve performance of refrigerator for reliability
higher efficiency, larger cooling capacity,
longer maintenance interval

To verify safety for circumference at accidents
like ground fault, short circuit fault, penetrating damage

Outline of NEDO's Project

Project : Verification tests and study on safety and reliability of HTS cable

Purpose:

- To verify the **safety and reliability of HTS cables at accidents** by conducting model tests with actual dimension cable for 22 kV, 66kV and 275 kV class.
- To develop **5 kW class Brayton refrigerator system** with higher performance and to confirm its stable operation in the grid at Asahi SS.

Period : **From July 2014 to March 2019**

Members :

NEDO (Project management), TEPCO (Utility , Project leader)
Sumitomo Electric, Furukawa Electric, Fujikura (Cable manufacturer)
Mayekawa Co. (Refrigerator manufacturer)

Residual subjects for commercialization

(1) Reliability

- Higher reliability for long term operation as Electric power infrastructure
  →Performance in the grid operation is not enough, so far.
  More cables and longer operation are necessary.
- Withstanding voltage test for whole length cable is necessary at shipping tests
  →Concerning some damage at cooling the cable in drum shape
  Study on substitutable test at room temperature. (ex in high pressure GN2)
- To secure higher reliability of cooling system
  →new Brayton cycle refrigerator are now under operation
  Monitoring system is also important to get early information of trouble

(2) Operability

- Easier maintenance and longer interval (especially cooling system)
- To secure the safety at accidents
  →under testing in NEDO projects
  Earlier recovering from accidents is necessary

Residual subjects for commercialization

(3) Economical merits

SC cable should have much merit compared to conventional system

■ Initial cost

Merit with smaller space for cable installation

→Civil work cost depends on installation method, place, environments, country, etc

To realize lower cost of SC cable and cooling system

→lower cost of SC wire according to mas production

→lower cost of cooling system according to higher capacity

■ Running cost

Lower heat invasion through cryostat

→under development in NEDO project

Higher efficiency of cooling system

→ under development in NEDO project

Selection higher load factor because of always cooling

Residual subjects for commercialization

(4) Applicable Low and standalization

In Japan, to revise Electric Utility Industry Law to aaply SC cable

In IEC TC 20, Standalization of testing method is now under discussion and deliberation

→Draft will be completed in this year.

(5) Market and possible application

In Japan, reducing the electric demand, distributed arrangement of electric power source

→Installation of new higher capacity line is not urgent issue

Other application (for railway or others) or application in other countries where the demand is growing should be developed, in parallel.