

1.

1997 35.8GW 가 .
10 2010 62.2GW 가
, , 가
, , , GAS
가 .

2.

R. McFee
1980 , ,
가
가
2006 가 Brookhaven (BNL),
Gratz , (ETL)
가 Nb, NbTi,
“ (zero)” Nb3Sn
, , ,

가)

1987 , 1990 1

가 former, cryostat, , Termination .

가 2.1

1 ?

가 AC

DC , (WD, Warm (CD, Dielectric), (CD, Cold Dielectric)

765kV 345kV 154kV 22.9kV 가 2

cryostat

20% 가 가 (

1 |

			OF	CV
Former	Flexible Pipe or Spiral Tape	Flexible Pipe or Spiral Tape	Spiral Tape	
		NbTi, Nb ₃ Sn		
	Tape	Tape		
	77K (-196)	4.2K (-269)	90	90
			OF	()
			OF	XLPE
			PT	

1 | (,)



2 |



3 |

(single phase & three phase)



eddy current loss
(High-Tc Temperature, HTS) shield
cryostat eddy
current 가

3

HTS shield
shield 가 cryostat
eddy current
cryostat 3
cryostat

2.2

compact

AC Loss
가

1 Former,
(),

. Former

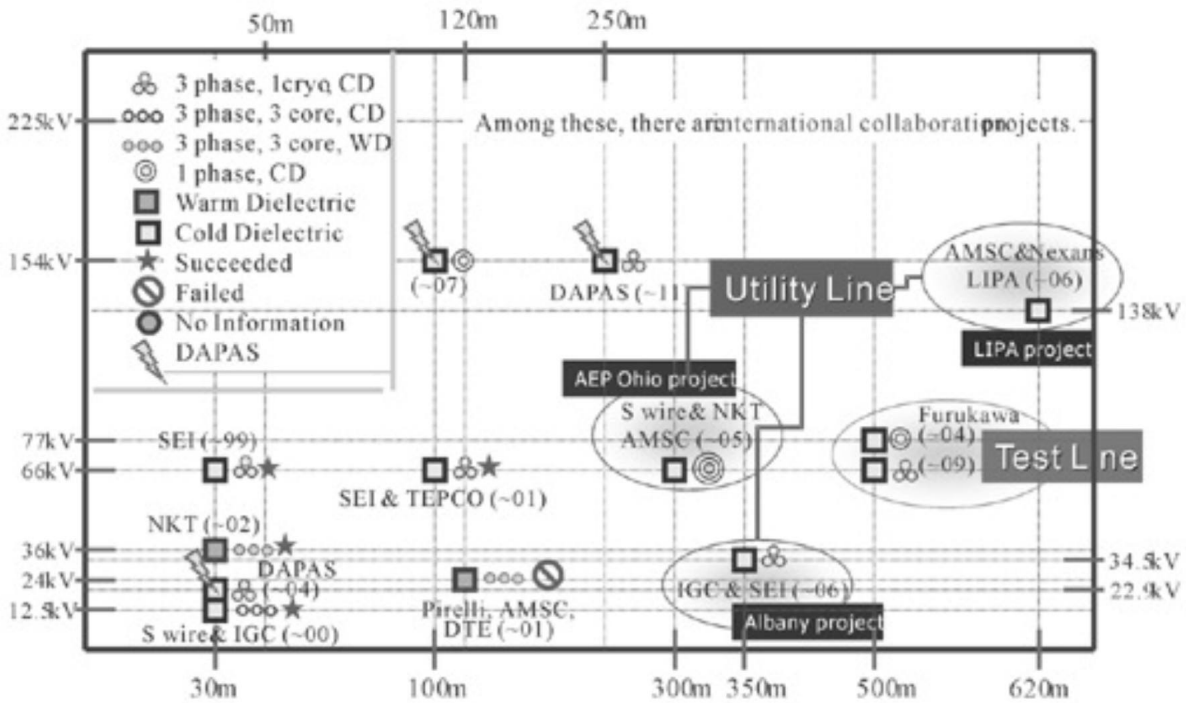
taping pitch

2.3

Ag shieth/Bi-2223 가 , cryostat
 transposition AC Loss MLI Super-insulation
 2 , 가
 Coated conductor , 가
 가 cryostat
 cryocooler,
 PE, XLPE , transfer line,
 Kraft Paper, PP
 Laminated paper

가가

4



3. LIPA Long Island
620m 2006
가 (HTS wire)
AMSC (American Superconductor) 가
Nexans 가
5
4 , 6 Top view
가
138kV
3.1.
3 가
DOE SPI 3.1.2. AEP Ohio project
(Superconductivity Partnership with
Industries) AEP Ohio project 1 3
LIPA project, AEP Ohio project, . 2005 300m
Albany project . 3 Ohio
2 , ULTERA 가
. ULTERA
3.1.1. LIPA (Long Island Power Authority) project Southwire 30m
NKT
2 | DOE SPI 3

Install	Long Island Power Authority	Bixby Substation, Ohio	Albany, New York
Period	2002 - 2006	2003 - 2005	2003 - 2006
Nation	France&USA	Denmark&USA	Japan&USA
Length	620m	300m	350m
Volt/Cur	138kV/2.5kA	13.2kV/2.5kA	34.5kV/2.5kA
FUND	Gov.	15M\$	4.33M\$
	Ind.	15M\$	4.32M\$
	Total	30M\$	8.65M\$

5 | LIPA project
(Cold Dielectric)



7 | AEP Ohio project Triax Cable Design



6 | LIPA



DOE
13M\$, 가
가
350m
, 30m 2
(Coated Conductors)
8 350m

9 Hudson

Top view

7 3 former

800A

5m

34.5kV

Fabrication

CRIEPI

Sumitomo

13.2kV

3kA

3 phases-in-1 cryostat

2006 Cold Dielectric

5

3.1.3. Albany project

8 | Albany project 350m

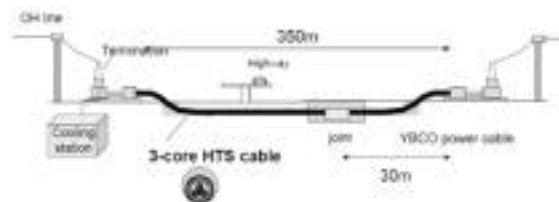
Albany project 2

가

IGC - SuperPower

100m

(SEI)



9 | Hudson 350m



3.2 Super-ACE

100m

Albany project
Super-ACE project
500m

CRIEPI

Super-ACE

AC loss

2009

1W/m

2004

sample cable

500m system

77kV

Polypropylene paper

1 wire

500m

가

가

5kA

3kA 1W/m

1kA 1W/m

1kA

Laminated

Bi-2223

10

2004 4

11

CRIEPI

50km,

10km

11 (c)

가 12

2003 11

2004 1

가

가

13 CRIEPI

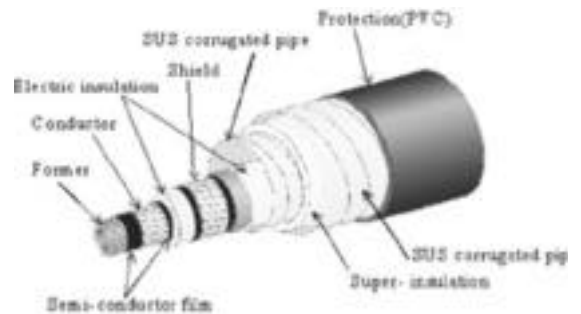
500m

10

1kA

500m

77kV,



11

CRIEPI

500m



12 | CRIEPI | 2003 11 | 500m



13 | Furukawa | CRIEPI



13 | Furukawa | CRIEPI



3.3.

30

, IEE CAS

InnoPower

, InnoPower

InnoPower Bi-2223 wire

InnoST

2004 6 30m

35kV , 2kA

Cold

Dielectric

Warm Dielectric

8 GM

3.4

2001 21C

LS (),

, 16

14 | (, ,) | 30m



15

30m



22.9kV, 50MVA

30m

22.9kV, 50MVA, 3 30m

cold Dielectric

1 cryostat

3

2005 7

가 22.9kV

154kV

CAST()

DAPAS Program

DOE가

SPI

NEDO가

Super - ACE

가

863

가

SPI

Nexans ,

NKT ,

4.

16

(LS

)



가

가