

New solution:

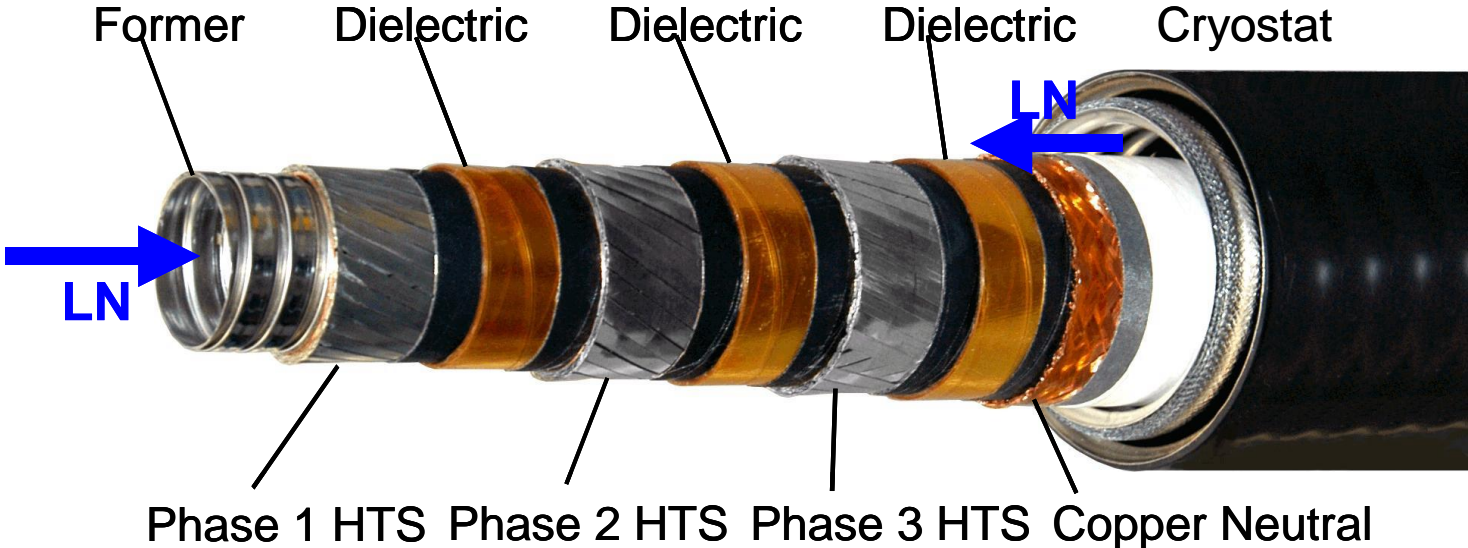


Long Superconducting Cable

Outline

- Introduction of HTSC technology
- Advantages of HTSC technology
- Dutch HTS cable project

Introduction (1)



Introduction (2)



Voltage [kV]	Traditional cables [MVA]	Super cables [MVA]
10	4 - 15	15 - 70
20	10 - 30	35 - 140
50	30 - 70	80 - 350
110	150 - 250	200 - 760
150	200 - 350	250 - 1000

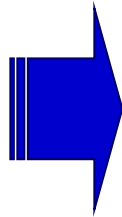
Advantages of HTSC technique (1)

➤ Environmental friendliness

- Low energy losses
- Very low EM-emissions
- No visual impact
- No harmful materials like oil or SF6

➤ Technical advantages

- High power transport
- Reduction of short circuit currents
- Reduction of voltage variations
- Low reactive power production
- No heat emission



➤ Reduction of environmental impact

- Efficient integration of power sources (e.o. sustainable)
- Efficient upgrading of existing grids


Advantages of HTSC technique (2)



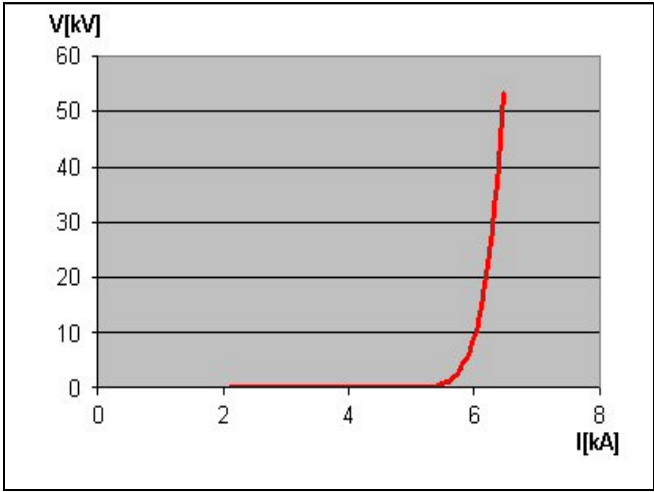
Solving the old dilemma

Improved non-linear voltage-current characteristic

Low impedance




Low energy losses
Stable voltage profile



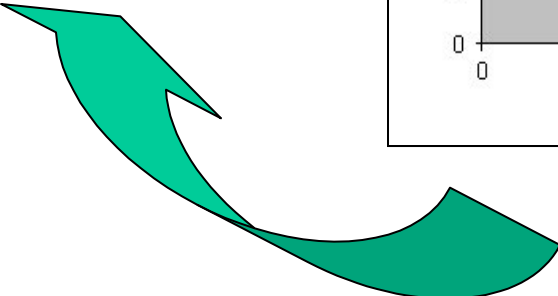
high Z



High impedance



Limiting of short circuit currents

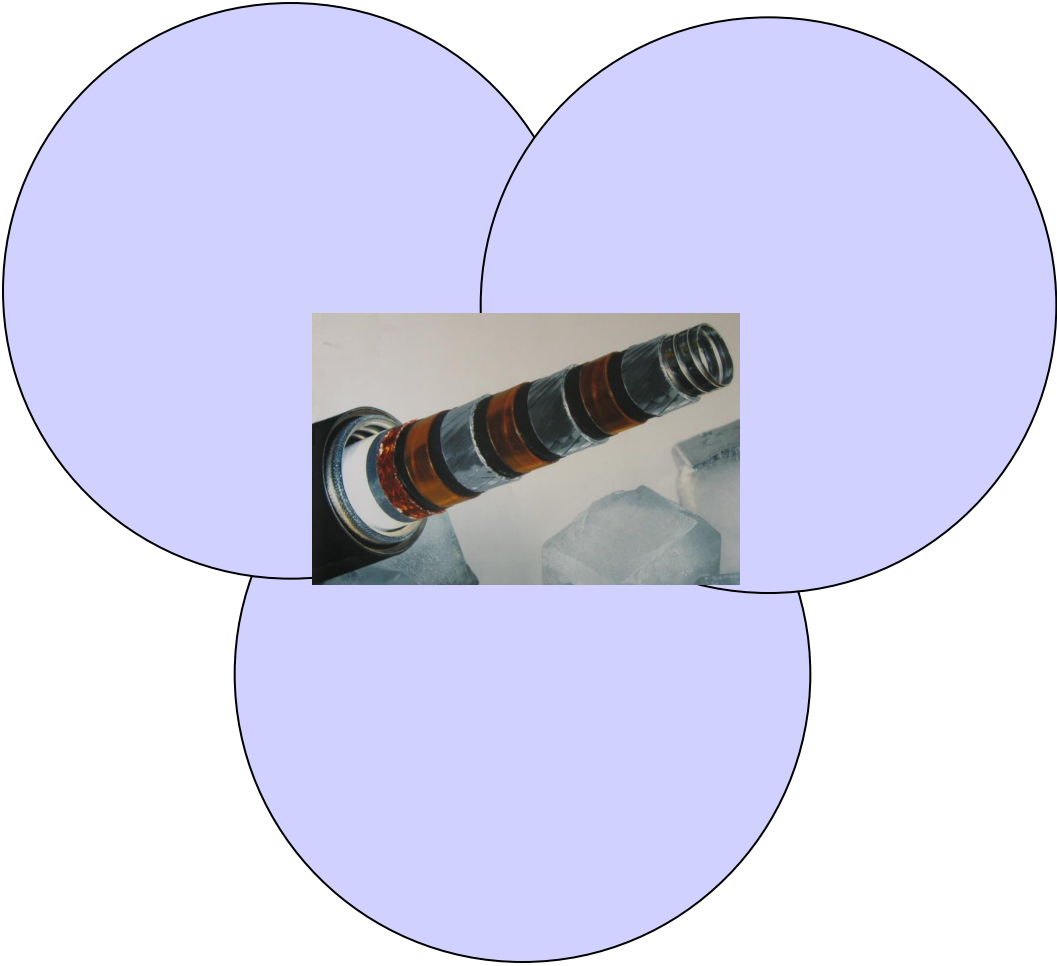


very low Z



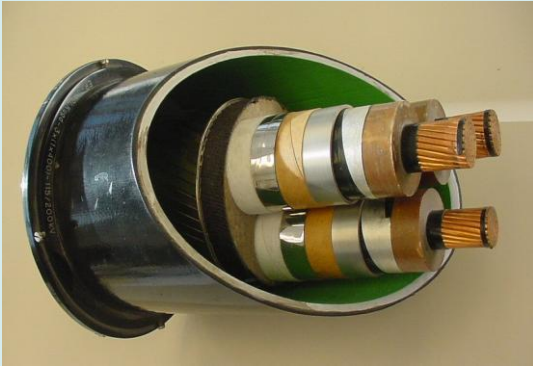
Dutch HTS cable project

Project consortium



Dutch Power: 6 km HTSC in the Netherlands

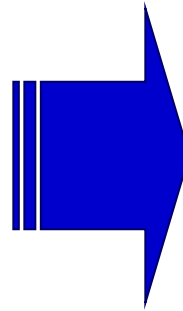
From:



Gas pressure cable

150 kV

100 MVA



To:



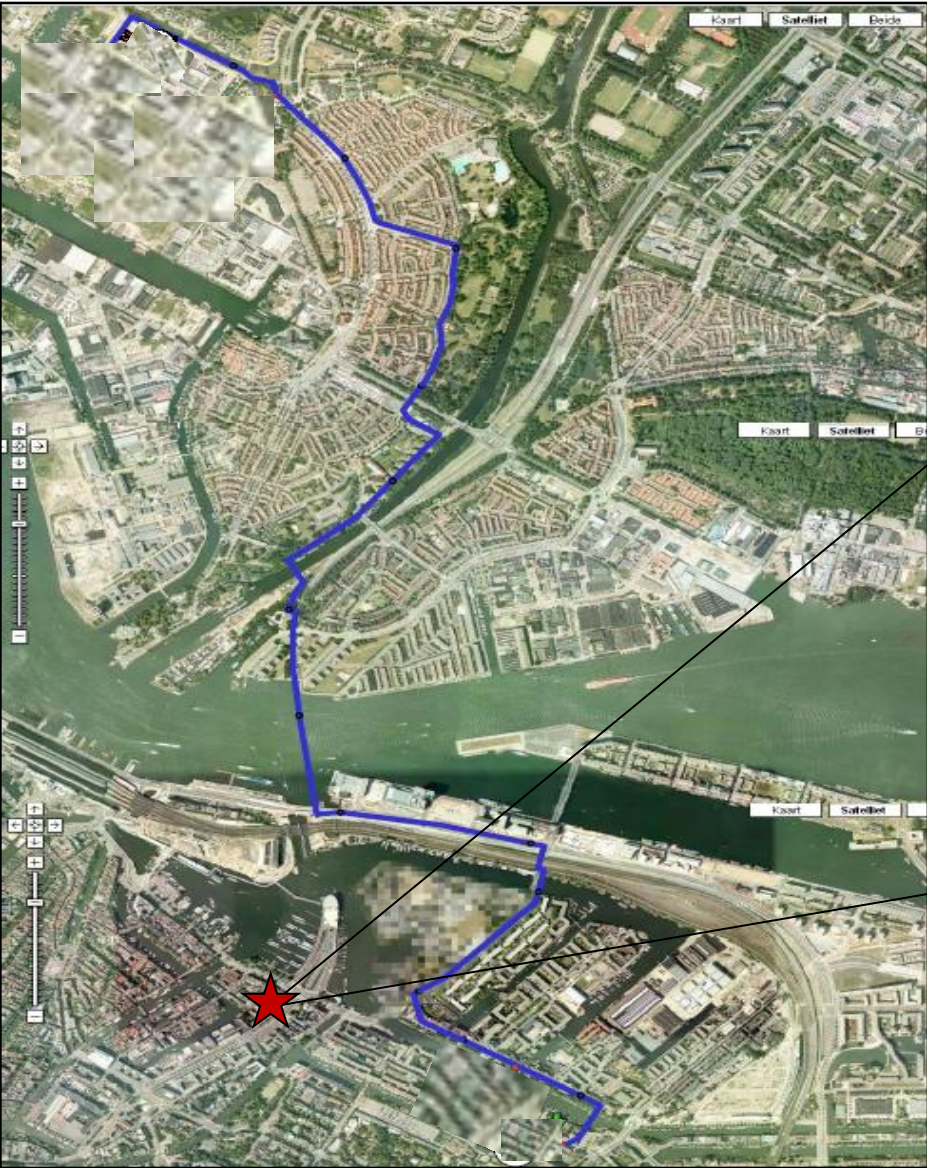
HTS Triax[®] cable

50 kV

250 MVA

7.5 times more Current

Long Length Cooling is necessary



150kV Grid

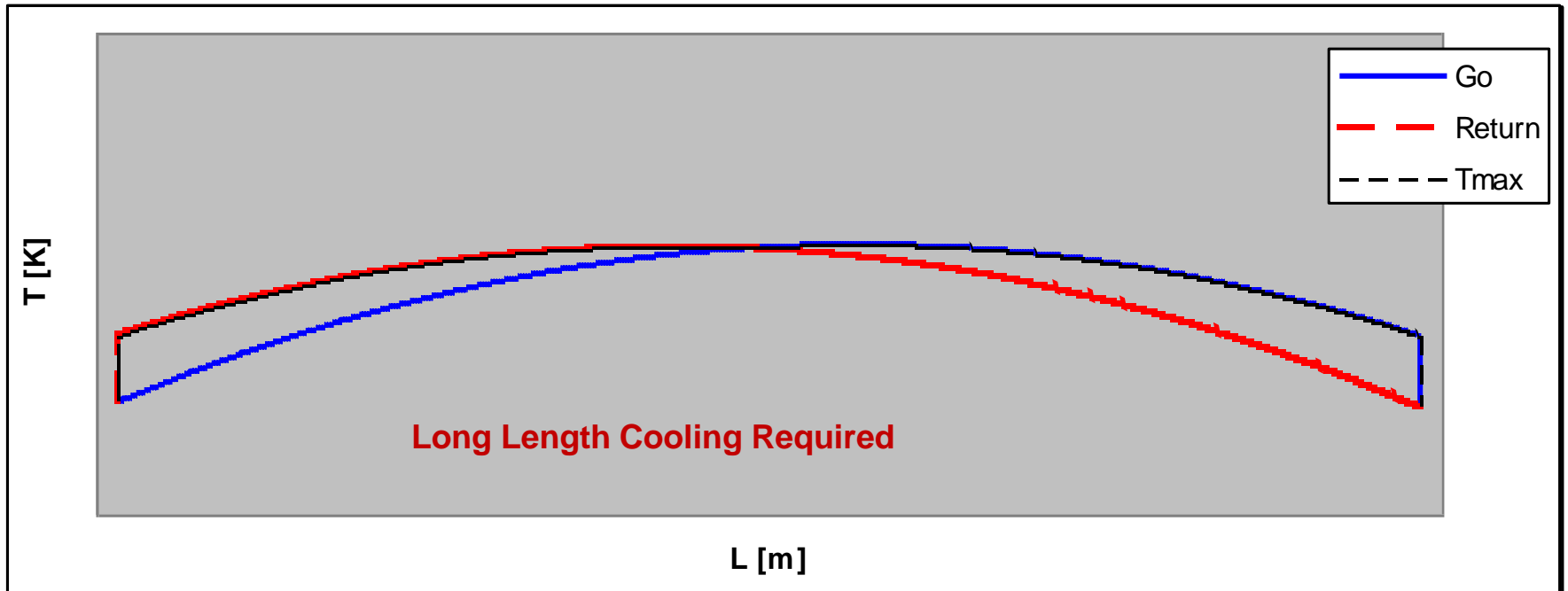
6km to cover

The warm heart of Amsterdam

A white rectangular box containing the text 'The warm heart of Amsterdam' in blue. Below the text are two icons: a blue smiley face on the left and a red lightbulb with a black outline on the right. A blue line from the '150kV Grid' text points down to the bottom of this box. A black line from the top-left corner of the box points to the red star on the map.

Centre of Amsterdam

Development: Improved Cooling Systems



System parameter	Present status	Project target
AC loss	1,4 W/m/phase	0,2 W/m/phase
Cryostat heat loss	1,5 – 2,0 W/m	0,5 W/m

Summary

- **The HTS cable technology demonstrates a great potential in solving of congestion issues and other weak spots in power grids**
- **Dutch pilot project will be an important step to an introduction of long HTS cables in real networks**

Thank you for your attention!

