



American Superconductor

REVOLUTIONIZING THE WAY THE WORLD USES ELECTRICITY™

American Superconductor Corporation

Founded 1987: MIT Spin-out

We are a world leader in developing and manufacturing superconductor and power electronic products for the power infrastructure



***Electric Motors
& Generators***



HTS Wire



***Power Electronic
Systems***



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AMSC's Integrated PowerModule Products

Power Electronic Systems

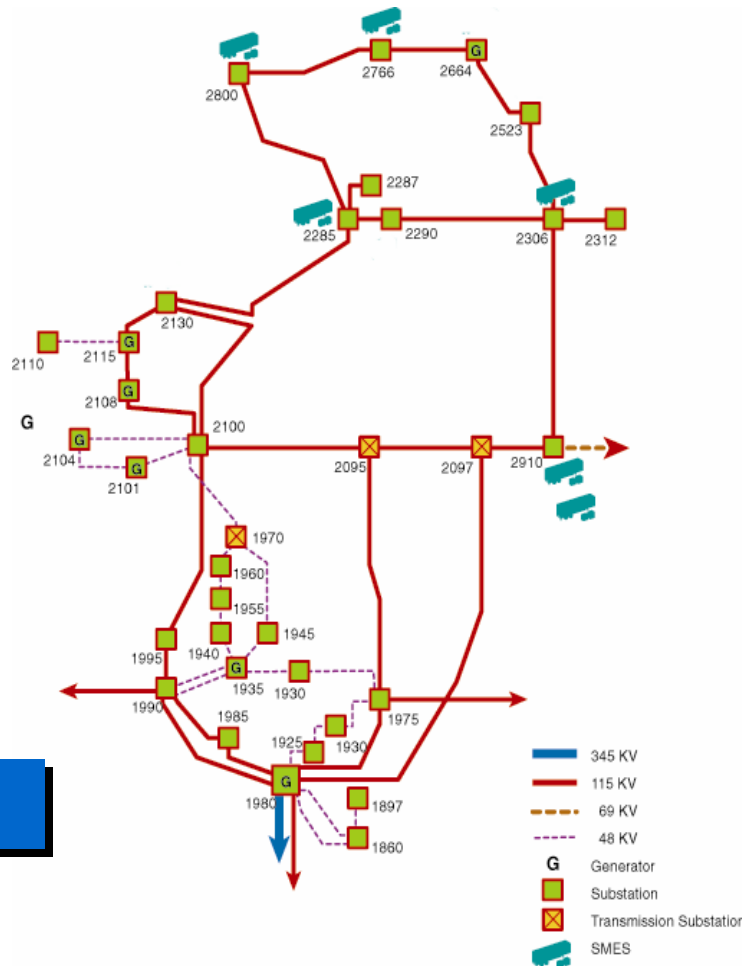
- **Distributed SMES (D-SMES)**
- **Dynamic VAR (D-VAR™)**
- **Power Quality SMES (PQ-SMES)**



Customized solutions for grid reliability and power quality

D-SMES: 1st Superconductors in Power Grid, July 2000

*Wisconsin
Public Service*



100 miles

200 MW Grid



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HTS Cables: Demonstration Phase Underway

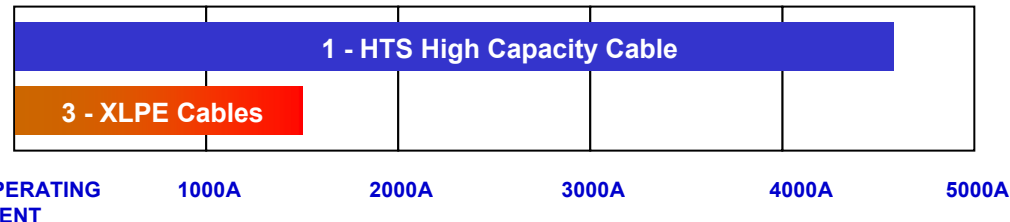
	1996 - 1999	2000 - 2005
Pirelli	50m/115kV/2kA "EPRI"	130m/24kV/2.5kA 3ph "Frisbie" 900m/66kV/0.7kA 3ph "LIPA"
		50m/225kV/2.6kA/3ph "EDF"
Southwire		30m/12.5kV/2.6kA/3ph 300m/15kV/3ph "AEP"
IGC		400m/35kV/3ph "Albany"
NKT		30m/60kV/3kA/3ph "Copenhagen"
SEI/TEPCO	30m/66kV/1kA "proto"	100m/66kV/1kA/3ph Japanese National Program?

Source: Sumitomo Electric Industries

High Capacity, Low Impedance HTS Cables



- High Temperature Superconductors Replace Copper as Cable Conductor
- AC Power Carrying Capabilities 3x to 9x of Copper Cables
- Low Impedance Shrinks Network Electrically
- Environmental Compatibility
 - No Electromagnetic Field
 - Thermally Independent of Environment
 - Nitrogen Cooling Fluid (Inert) – No Oil



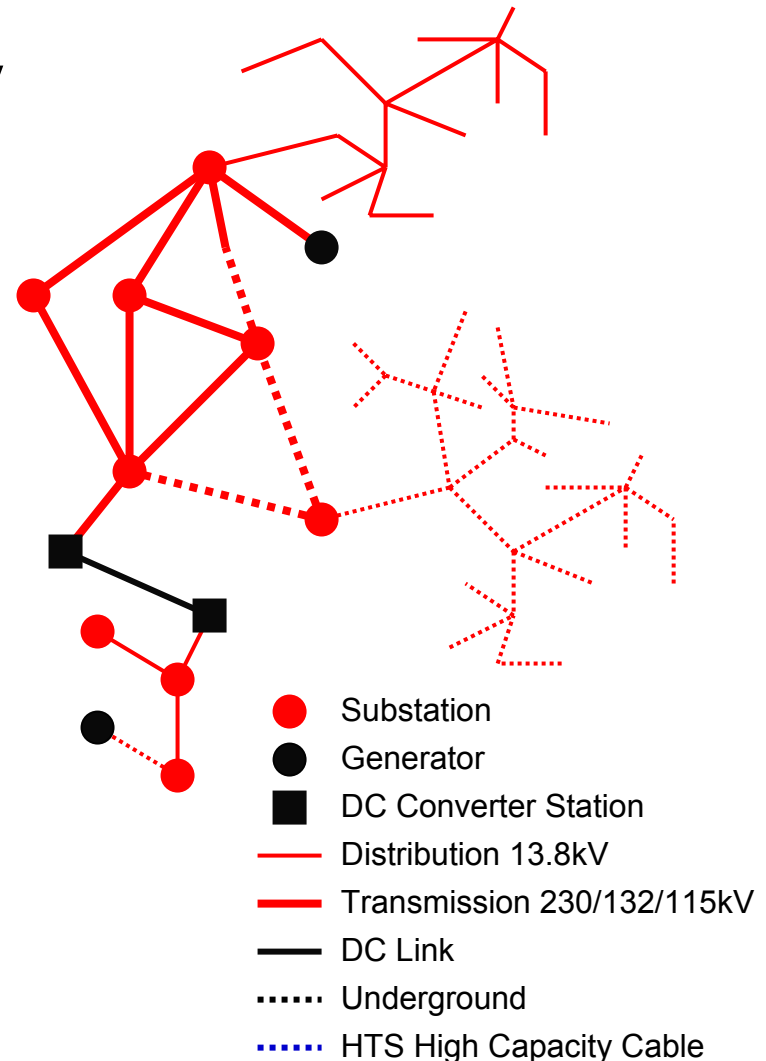
System Impacts of HTS Cables

- **Significantly Lower Impedance Characteristics of HTS Cables Allow Transmission Planners to Redistribute Power Flows within a meshed system**
- **Reduced reactive power losses provide more uniform voltage distribution within the transmission network**
- **Effective electrical distances are significantly shortened**
- **Operates at same or lowered voltages for reduced Reactive Power Requirements**
- **Total Efficiency higher than Al or Cu based systems**

A Comparison of Power Transmission Technologies			
Technology	Resistance (Ω /km)	Inductance (mh/km)	Capacitance (nf/km)
Cold Dielectric HTS	.0001	0.06	200
Conventional XLPE	.03	0.36	257
Overhead Line	.08	1.26	8.8

HTS Solutions For Load Growth

- Upgrades of System Capacity without Increasing System Voltage
- Upgrade of System Capacity with Minimal Civil Work
- Installation in Existing Infrastructure
- Use of Existing ROW's
- High Efficiency Operation
- Remove Constraints on Economic Dispatch





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