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DC High Temperature Superconducting (HTS) Cables

Study Committee B1 – PS2-Q4

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ELECTRIFY THE FUTURE

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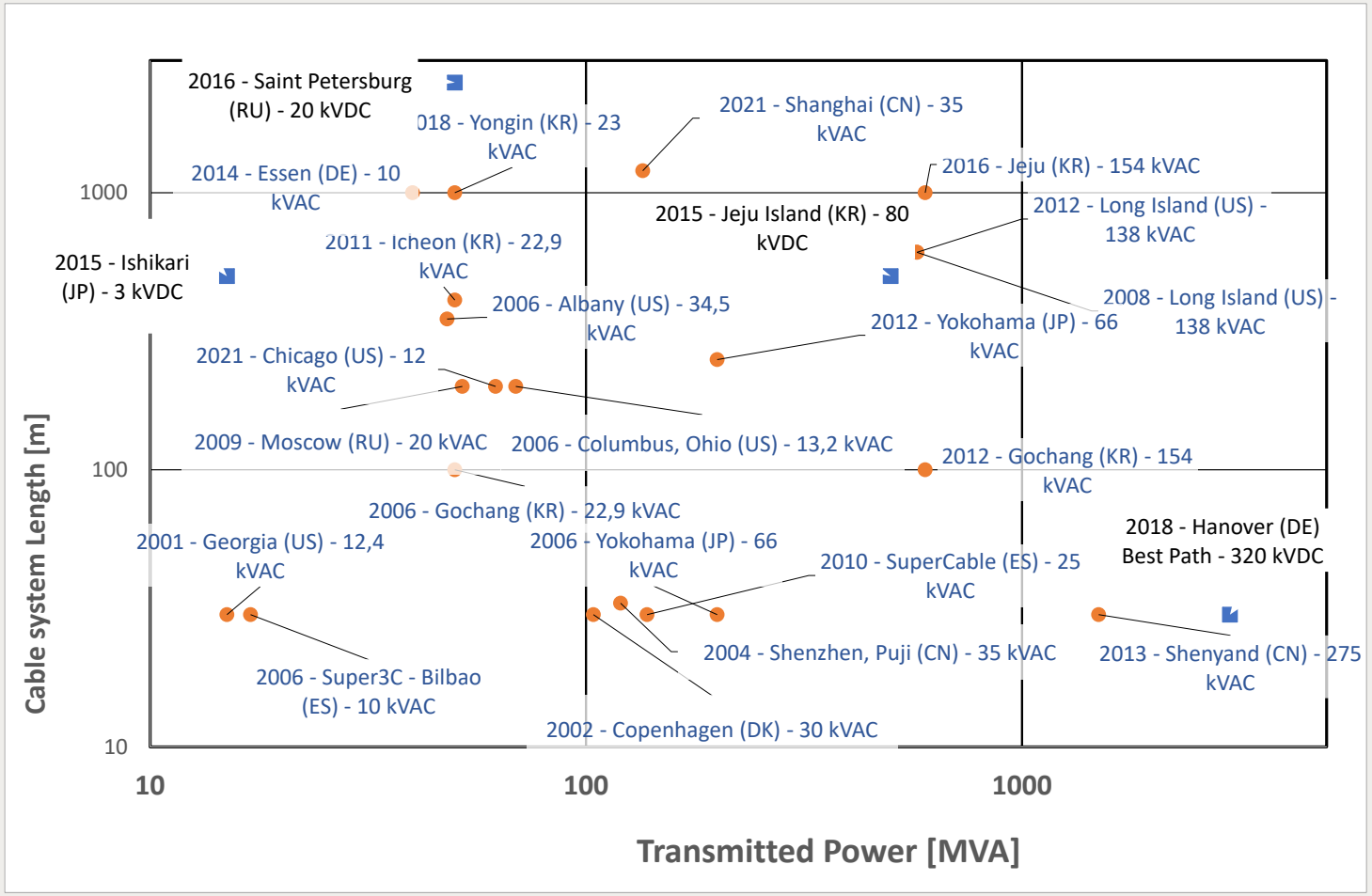
High Temperature Superconducting (HTS) cables today

- More than 24 projects of HTS cables have been carried out since 20 years (20 AC ● and 4 DC ■) with the contributions of at least 6 cable companies or cable developer around the world.
- The technology is industrial and mature. All projects started in the last 2 years are or will be soon in exploitation in the grid : COMED (US), SuperLink (DE), Shanghai (CN), SuperRail (FR).



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DC HTS cable

1. DC HTS cable presents very reduced environmental impacts that could contribute to reach the reduction of CO_2 emission
    - Reduced raw material needs
    - Very reduced losses
    - No EMF and no thermal impact

2. HTS cables need a very limited civil works or space foot print that makes such technology desirable to energize urban areas or for very long transcontinental links

2. HTS DC transmission can be applied as the optimal solution to high capacity bulk transmission of renewable energy sources within the urgent timelines required for the decarbonisation

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Technical Brochures on HTS cable systems

- The TB 229 and TB 538 brochures published in 2003 and 2013 have been necessary to pave the way for the deployment of AC HTS cable. they have been followed by the IEC standard 63075 released in 2019 that is used today.
- General interest of grid operators for DC system has increased during the last years and a special attention was carried out on HTS DC systems due to significant savings of the transmission system CAPEX and OPEX (contribution 1181 of CIGRE Symposium in Ljubljana in 2021).
- Recently, TBs on DC cable systems have brought the community to a higher level of maturity, the combination of experience acquired on DC resistive cables and HTS cables will reduce the effort to finalize a TB for DC HTS cable systems.
- A CIGRE working group is a pre-requirement to agree upon the qualification tests for DC HTS cable systems to prepare in an acceptable time frame the standards, at the initiative of the TC90 and TC20, that will give grid operators confidence of this solution.

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