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HVDC Cables User Experience

Gridable Final Webinar 14.6.2021

HVDC cables as a part of the power transmission system

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Fingrid Oyj

Transmission System Operator (TSO)

14300 km of overhead lines

99,9999% Transmission reliability

76 % of all electricity in Finland (2019)

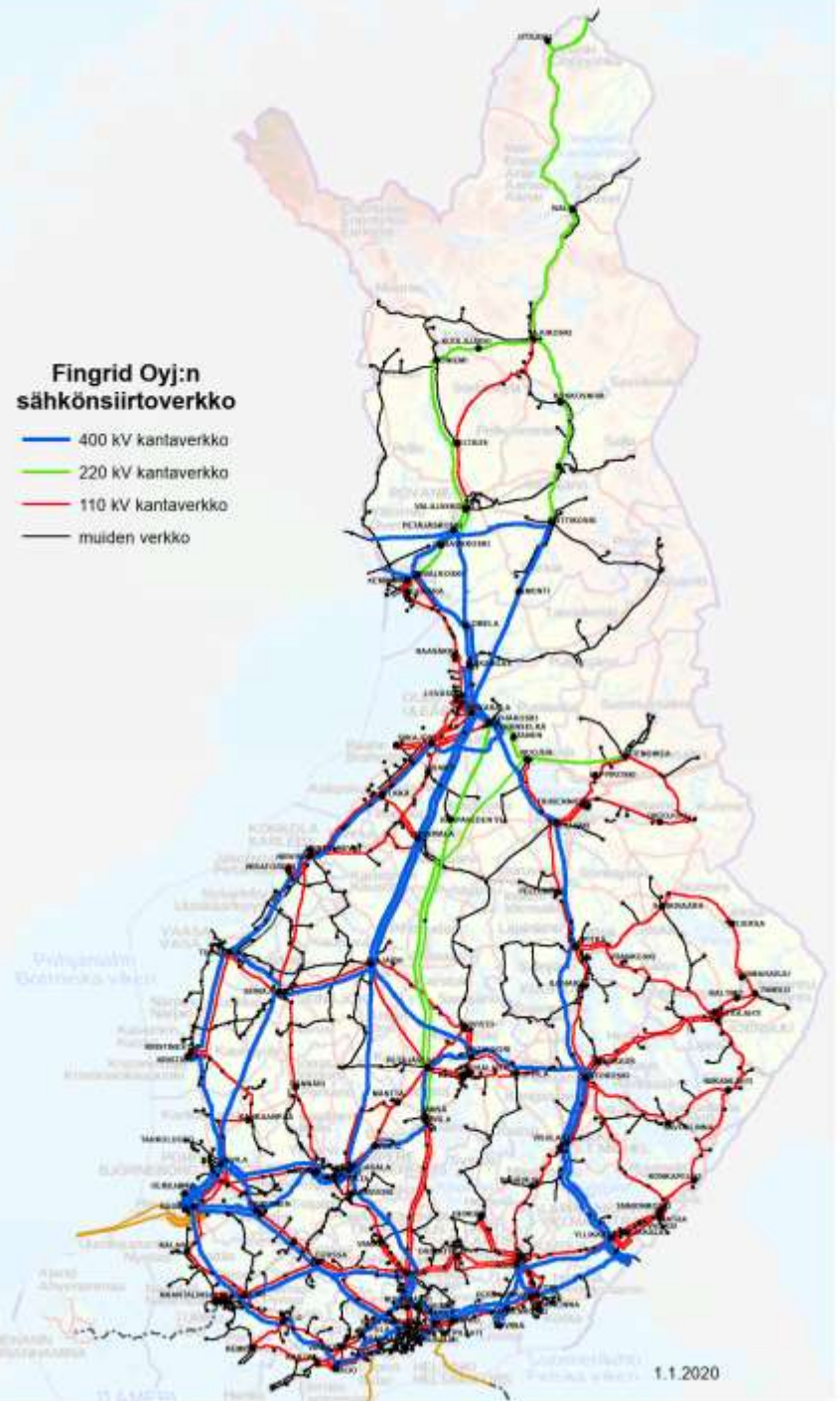
68,7 TWh (2019)

320 km of HVDC cables (owned, operated 640 km)

- 150 – 500 kV, up to 800 MW per cable

Fingrid Oyj:n sähkönsiirtoverkko

- 400 kV kantaverkko
- 220 kV kantaverkko
- 110 kV kantaverkko
- muiden verkko



Why HVDC Cables

Losses



Connectability

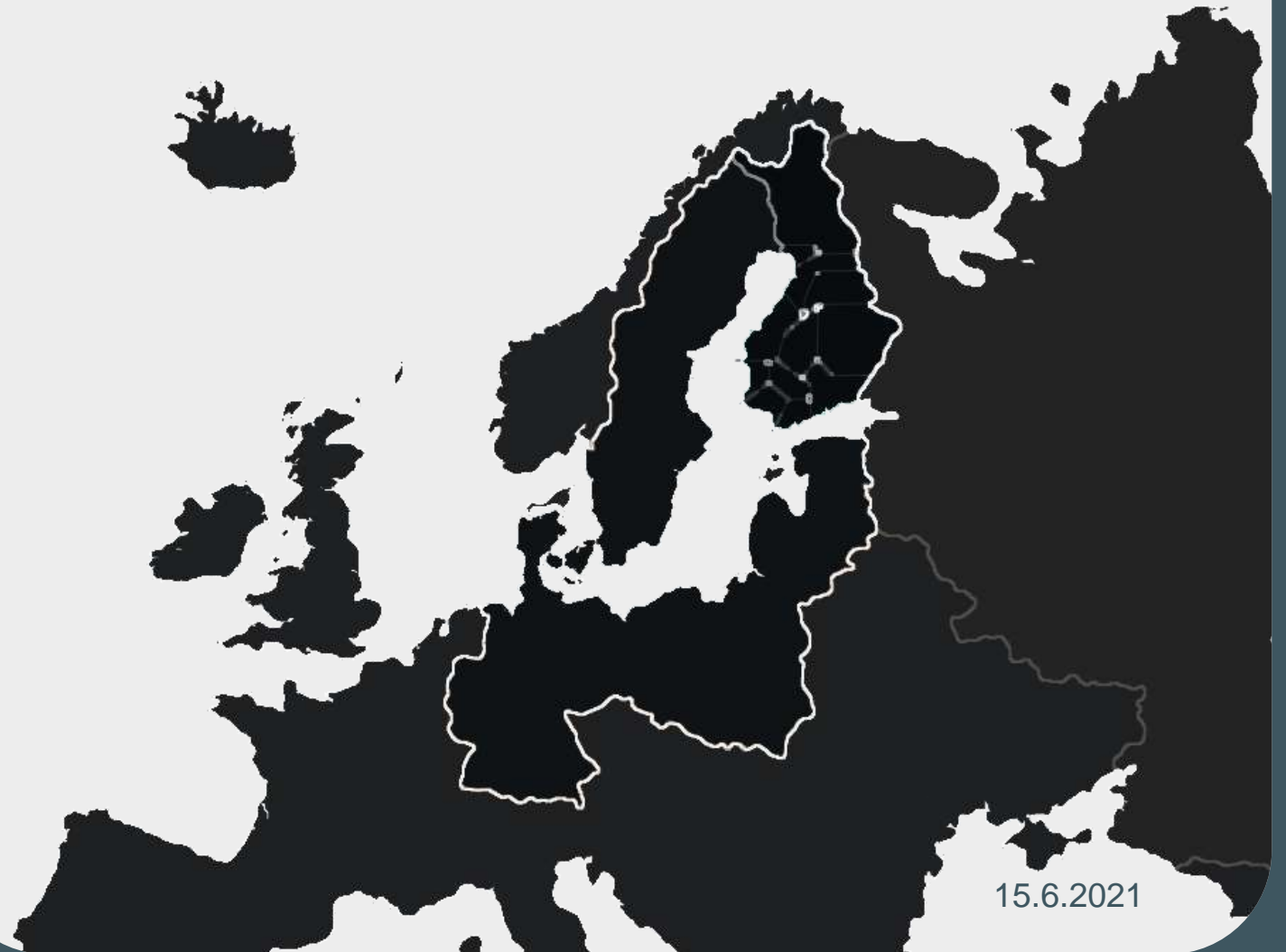
- Synchronization

Adjustability



- stability (POD, f , U)

Cables



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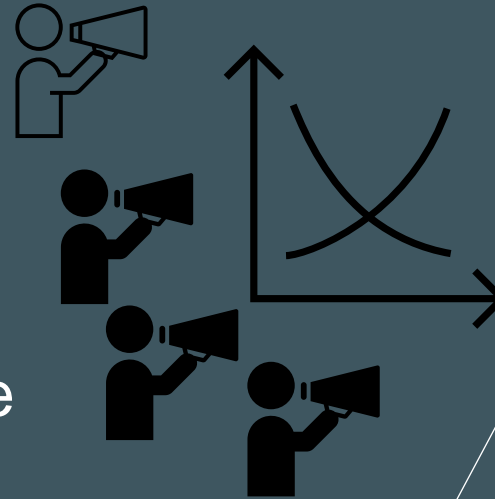
How we use HVDC cables

Market based operation

- 1h → 15 minutes
- More frequent ramping in the future

Stabilisation

- frequency & voltage control, incl. oscillation damping



Improvements

- Condition monitoring - long cables have unknown condition
- Installation and repair cost – lighter design and equipment
- Intercompatibility of spares (manufacturer bound)
- Lead (environment and health) (SVHC)
- Better fault location ? – always low resistance SC ?
- Temperature gradient?



Influence
of
insulation
design?

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Summary



- HVDC cables are needed and dynamically operated
- Easiness and cost in installation, repair, monitoring
- Future is leadless?

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Thanks for your attention!

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