Iceland Liechtenstein Norway grants

Norway grants

Research & Development in MuoviTech Group

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R&D Manager

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User4GeoEnergy 25th May 2022

MuoviTech

Business Development

2002	MuoviTech founded by Ojala's family
2003	MuoviTech started exporting to Finland
2005	MuoviTech Oy was established
2006	MuoviTech started operation in Finland
2007	Products range was expanded
2008	TurboCollector was born
2009	Polish factory was established
2010	Manifold chambers were designed & produced
2011	MuoviTech UK Ltd started Manchester, and expanded the R&D
2012	MuoviTech started own factory in Holland
2015	MuoviTech USA started
2016	MuoviTech factory in Norway
2021	Second factory in The Nederland

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Overview

MuoviTech is the only European manufacturer of geothermal products with production sites in several countries.

Borås, Sweden

Turku, Finland

Noordwijkerhout & Tilburg, Holland

Krakow, Poland

Frogner, Norway

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Product Range

MuoviTech

MuoviTech

Collector Feeder

Collector Winder

MuoviTech

MuoviTech
MUOVITERM
25 kg

MUOVITECH
EN 124
D 400
BEST IN EARTH

MUOVITECH
D 400
ENERGY SYSTEM

EN 124
D400
VESIMENTOR

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Guidelines & Standards

- Annex 27

Guidelines in the field of design, environmental aspects, drilling, construction, completion, operation, monitoring, maintenance, installing of borehole heat exchangers for uses of geothermal energy.

https://iea-es.org/publications/final-report-annex-27/

- EN 17522

Design and construction of borehole heat exchangers

https://www.en-standard.eu/din-en-17522-planung-und-bau-von-erdwarmesonden-deutsche-und-englische-fassung-pren-17522-2020/

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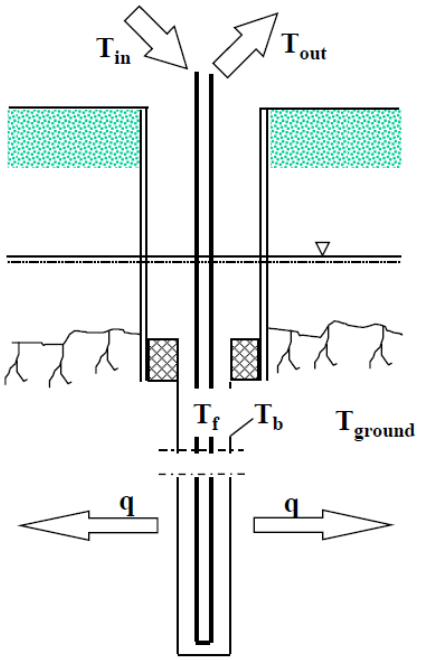
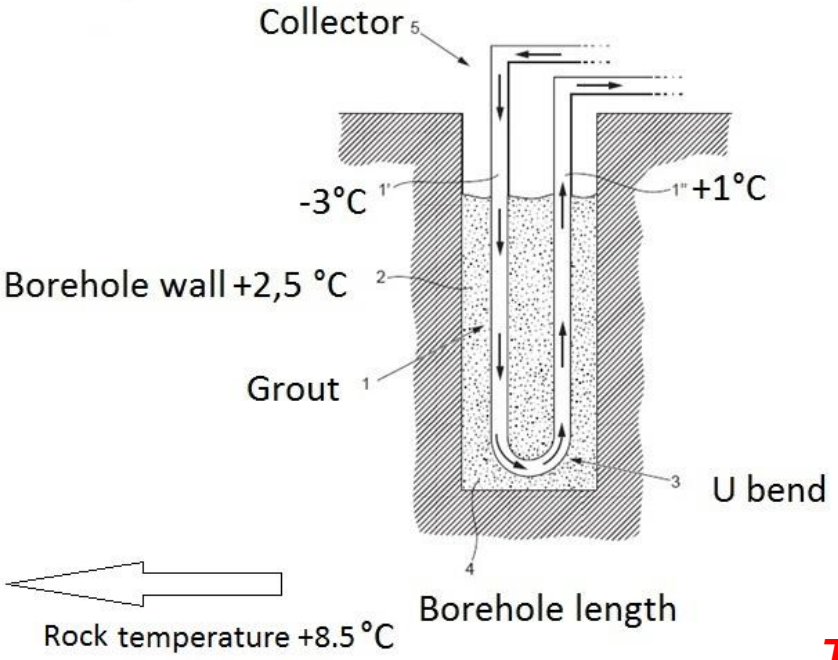
Borehole Thermal Resistance

$$q' = \frac{\rho \cdot \dot{V} \cdot C_p \cdot \Delta T}{L}$$





Tips:

COP increases with higher temperature in the source or lower temperature in the demand

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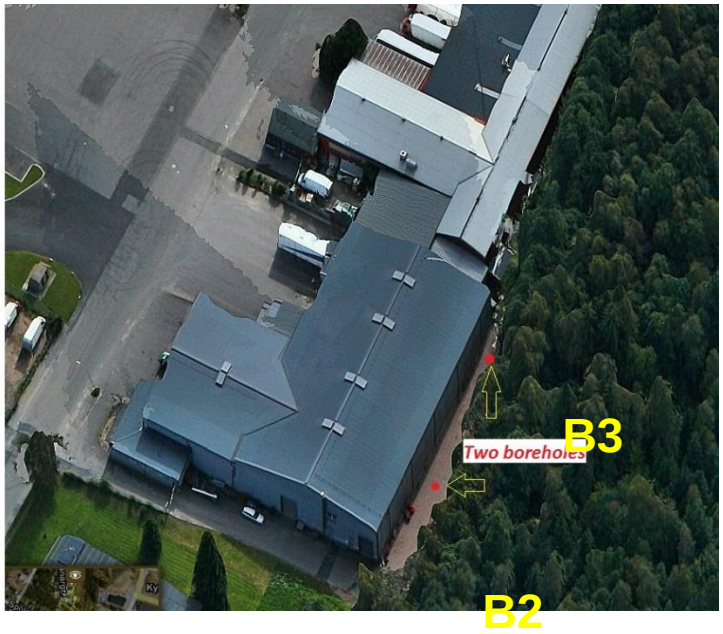
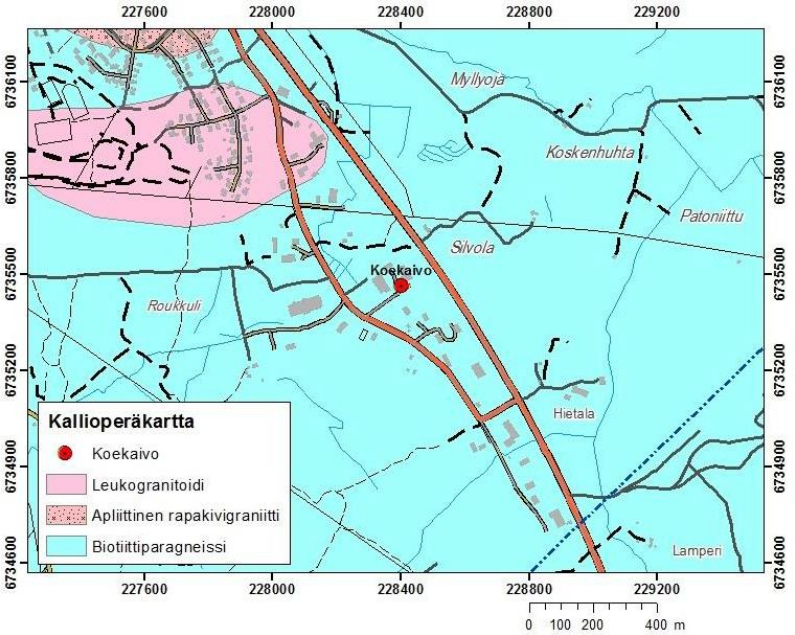
Ground Thermal Investigation





- Two boreholes in Borås
- Four boreholes in The Nederlands
- One semi deep borehole in Finland
- Deep borehole in Finland

Φ 115mm L: 200 m , 20 m distance groundwater- filled boreholes

Φ 114mm L: 350 m , groundwater-filled borehole

Φ 140 mm L: 850 m , groundwater-filled borehole

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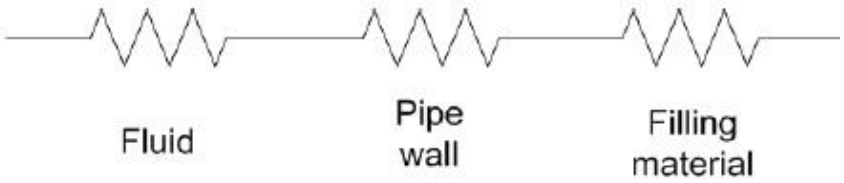
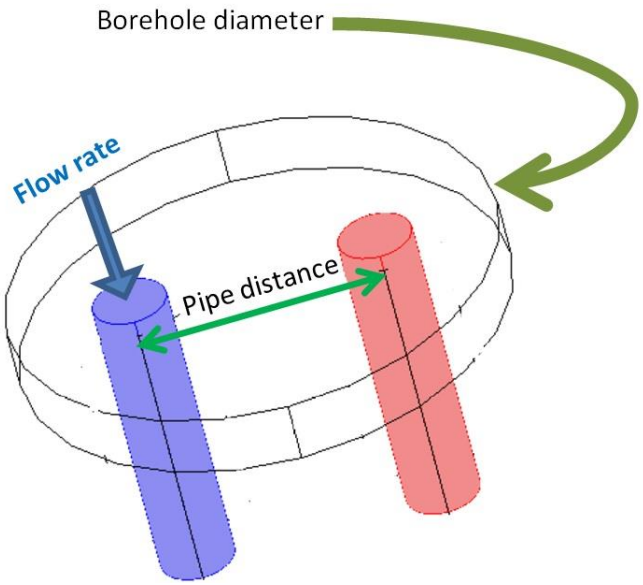
Key Factors For Borehole Resistance

- ⇧ Convective heat transfer
- ⇩ Thermal interaction **(Moment of inertia)**
- ⇧ Shank space
- ⇩ Borehole radius & depth
- ⇧ Thermal conductivity of backfilling materia
- ⇩ **Thermal resistance of fluid and pipe**
- ⇩ **Pipe resistance & pressure drop**

Minimizing borehole resistance





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Design Key Factors

Flow rate

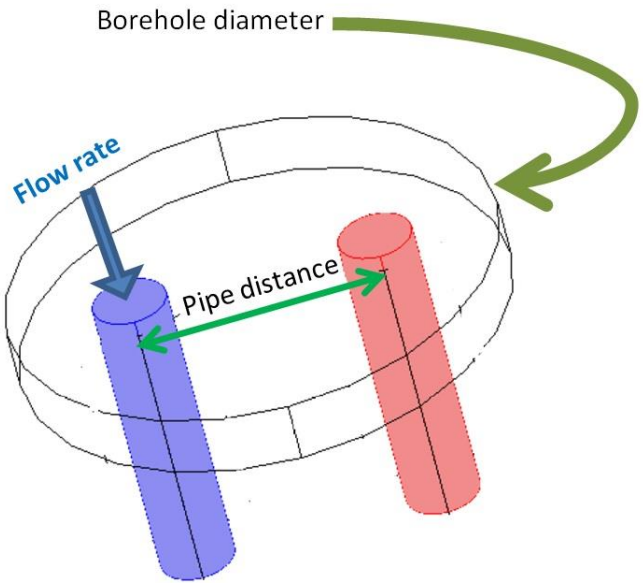
Pressure drop

Highest / lowest temperature

Borehole diameter & depth

Grouting

Stress analysis



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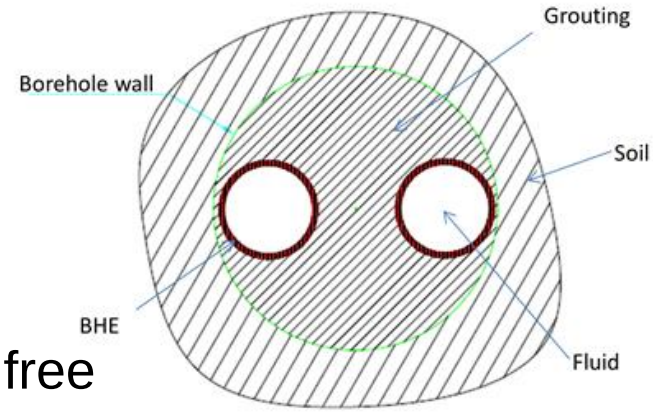
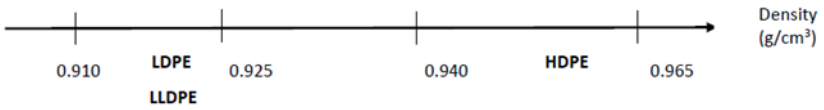
Polyethylene (PE)



- Corrosion and chemical resistance
- Long lifetime
- Mechanical fittings, fusion joints and leakage free
- Low-cost material
- Light in weight , flexible, can be coiled
- Maintenance free
- Low thermal conductivity (high thermal resistance)



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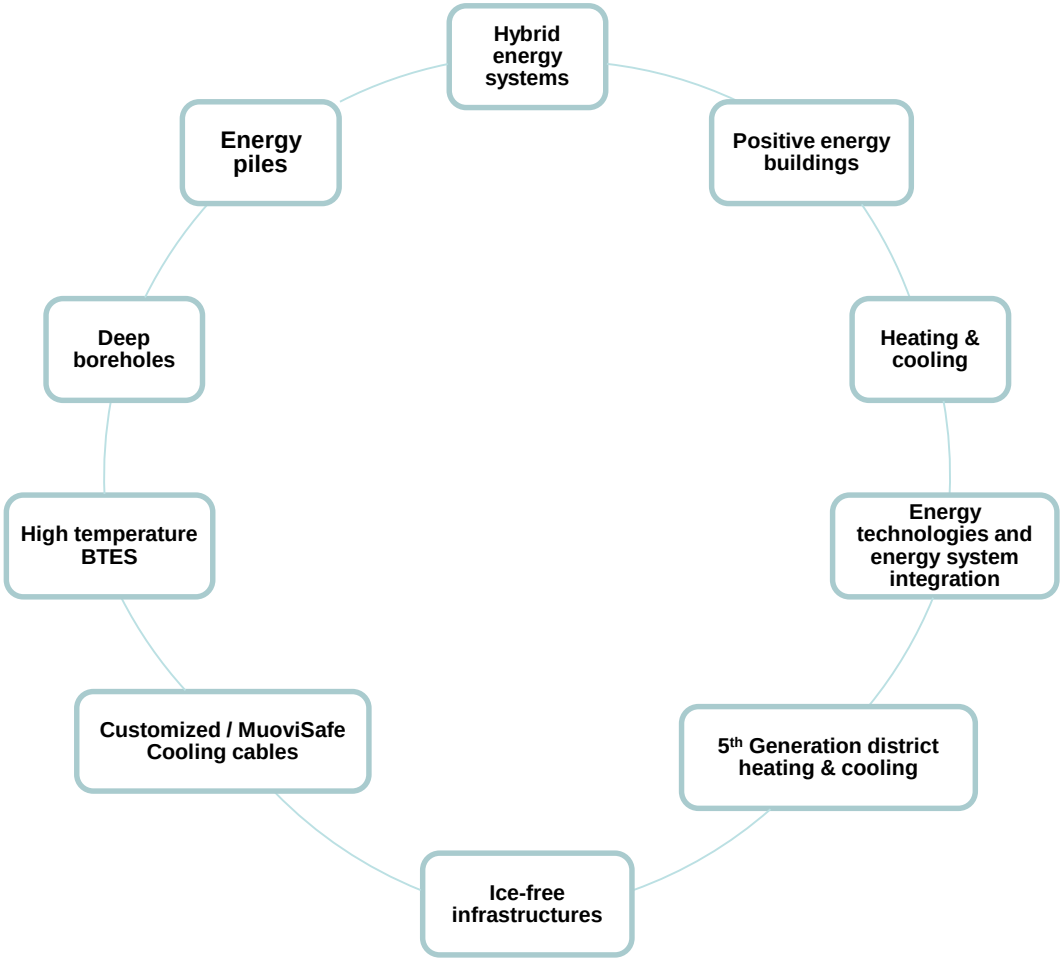
Development Area



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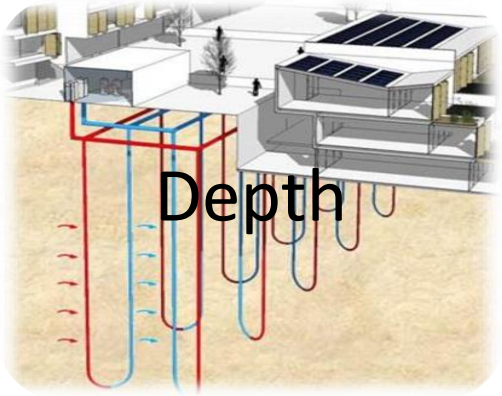
BHE Developments



- Up to 450m
- 450-650 m
- 600-1000 m
- 1000-2000 m

Temperature

- Up to 40 °C
- From 40°≈ 70 °C
- Above 70 °C

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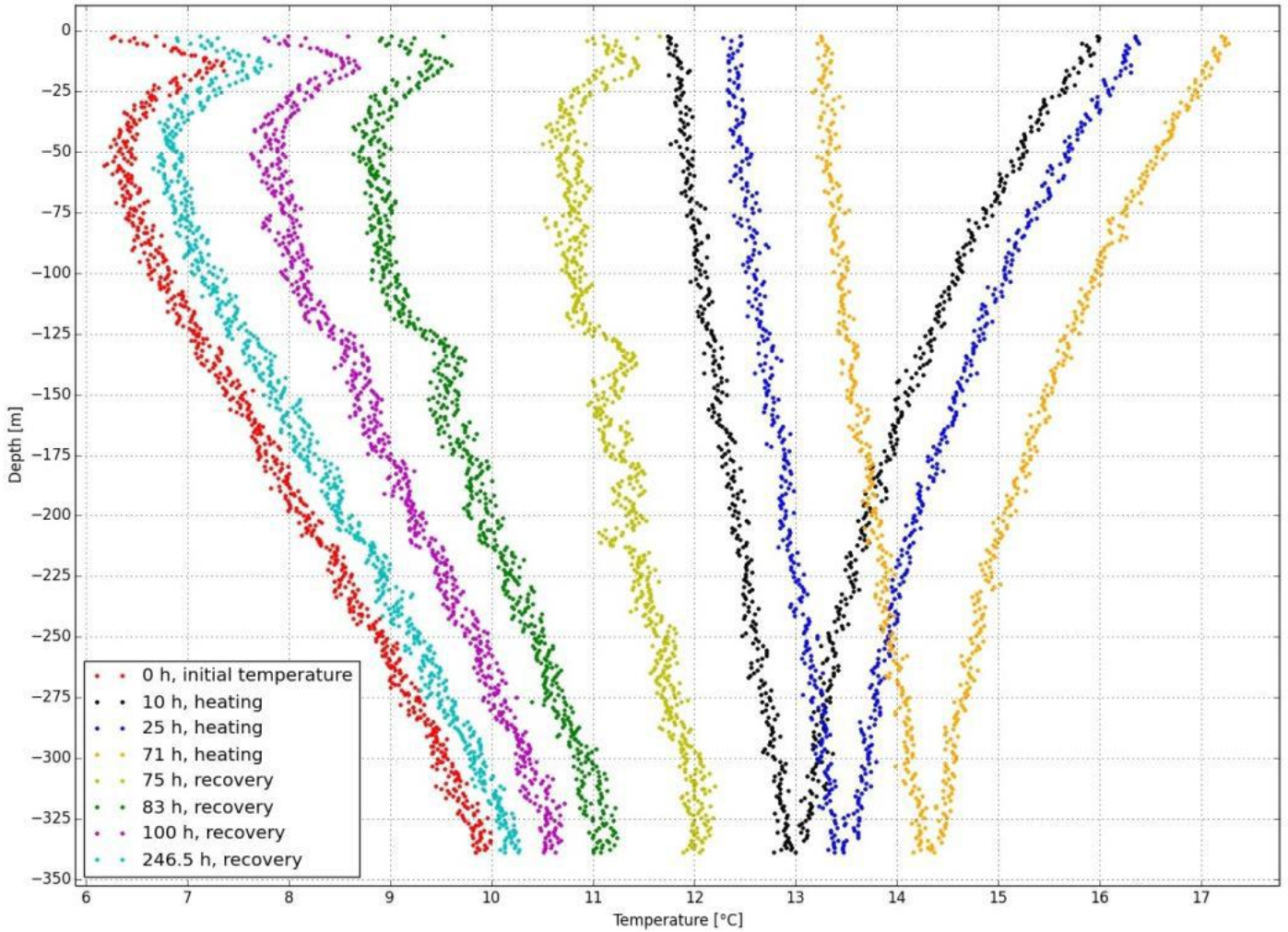
TRT For 45 mm Turbo



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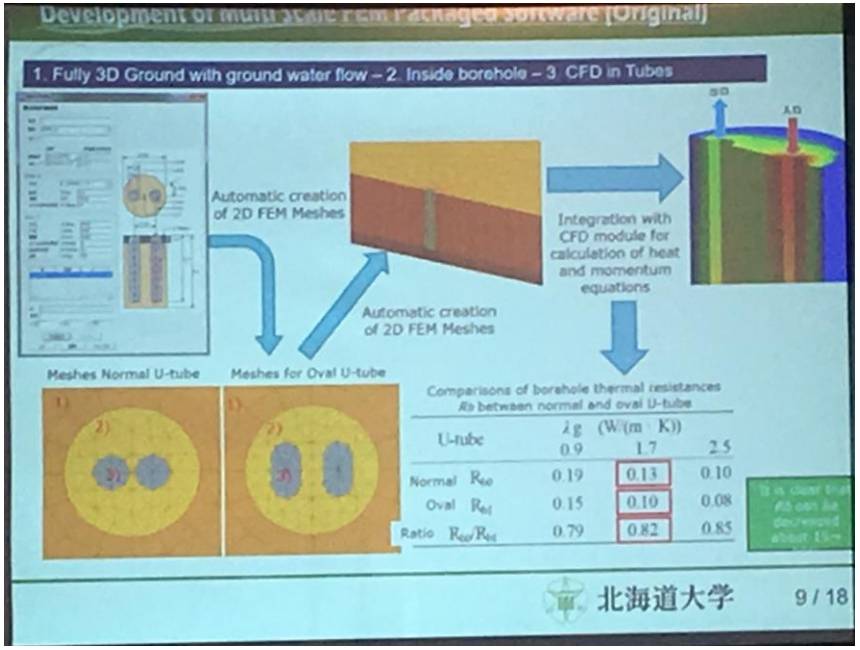
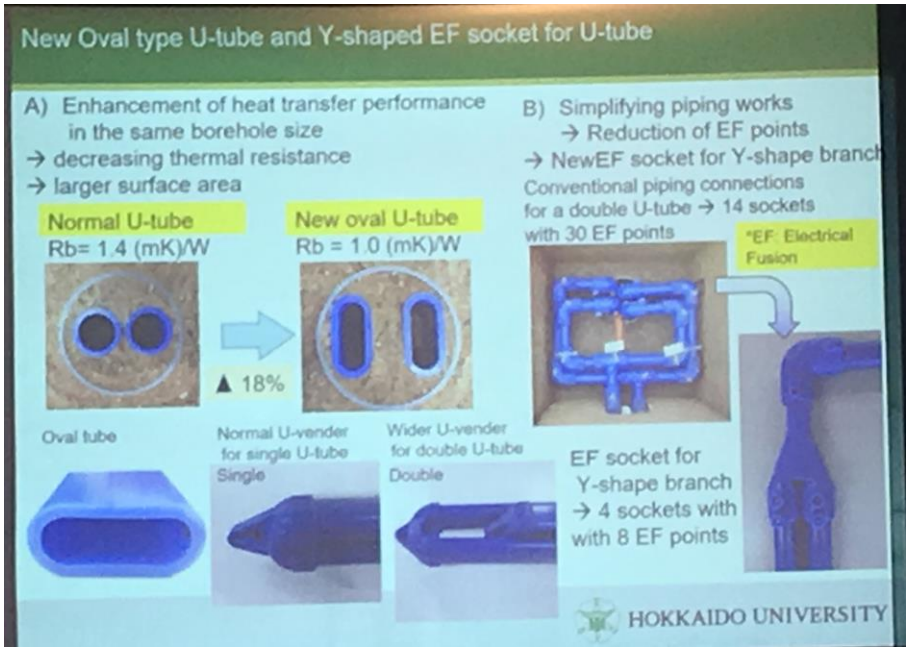
New Research From Japan





Ref: Prof. Katsunori Nagano from Hokkaido University presented in the Annex 27 Vancouver Sep 2018

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Semi-Deep BHE

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Deep BHE

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Thank you for attention!

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