



ESTONIAN
GEOTHERMAL
ASSOCIATION

**TAL
TECH**
DEPARTMENT OF
GEOLOGY

Geoenery possibilities in Estonia

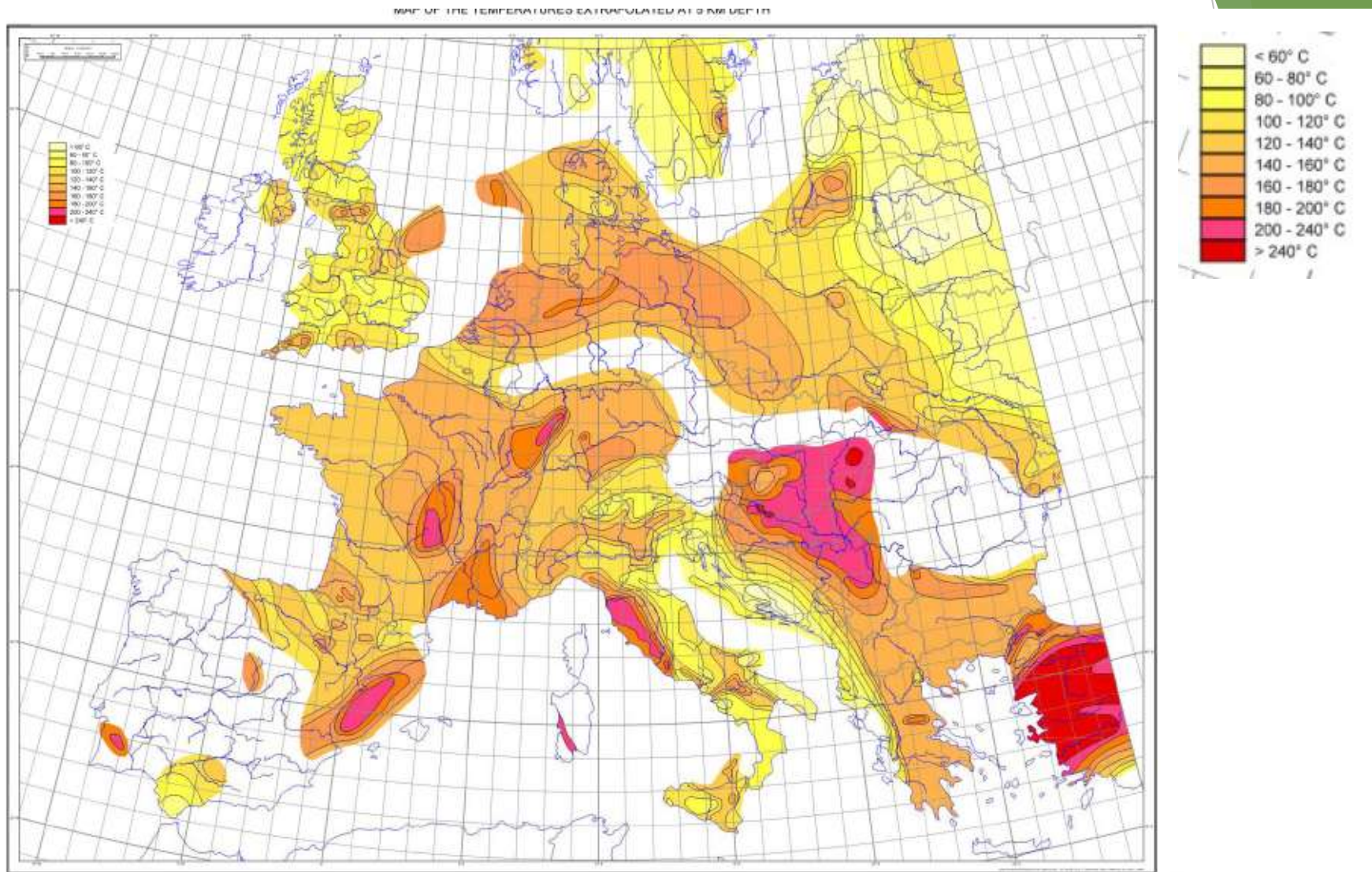
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Professor

TalTech, UT, EGT, Estonia

GEOLOGIC AND ECONOMIC POTENTIALS OF MINERAL RESOURCES ON BOTH SIDE OF THE GULF

21-22. April 2022 Tallinn



Map of temperatures extrapolated at 5km depth

... a part of history.....

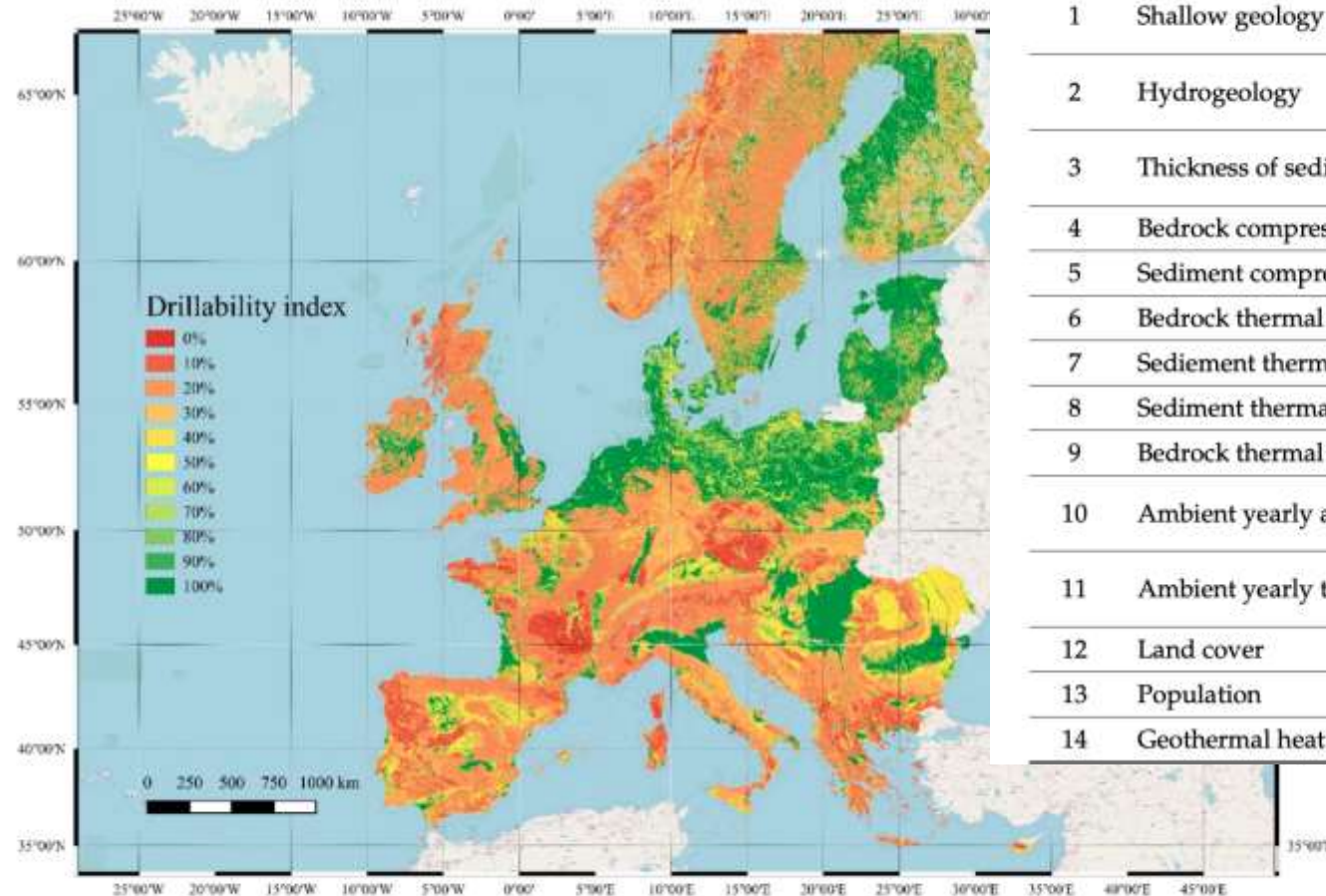


Figure 3. Percentage probability of suitable conditions for drilling in Europe.

No.	Parameter
1	Shallow geology
2	Hydrogeology
3	Thickness of sediments and bedrock depth
4	Bedrock compressive and shear strength
5	Sediment compressive and shear strength
6	Bedrock thermal diffusivity
7	Sediment thermal diffusivity
8	Sediment thermal conductivity
9	Bedrock thermal conductivity
10	Ambient yearly average temperature
11	Ambient yearly temperature amplitude
12	Land cover
13	Population
14	Geothermal heat flow

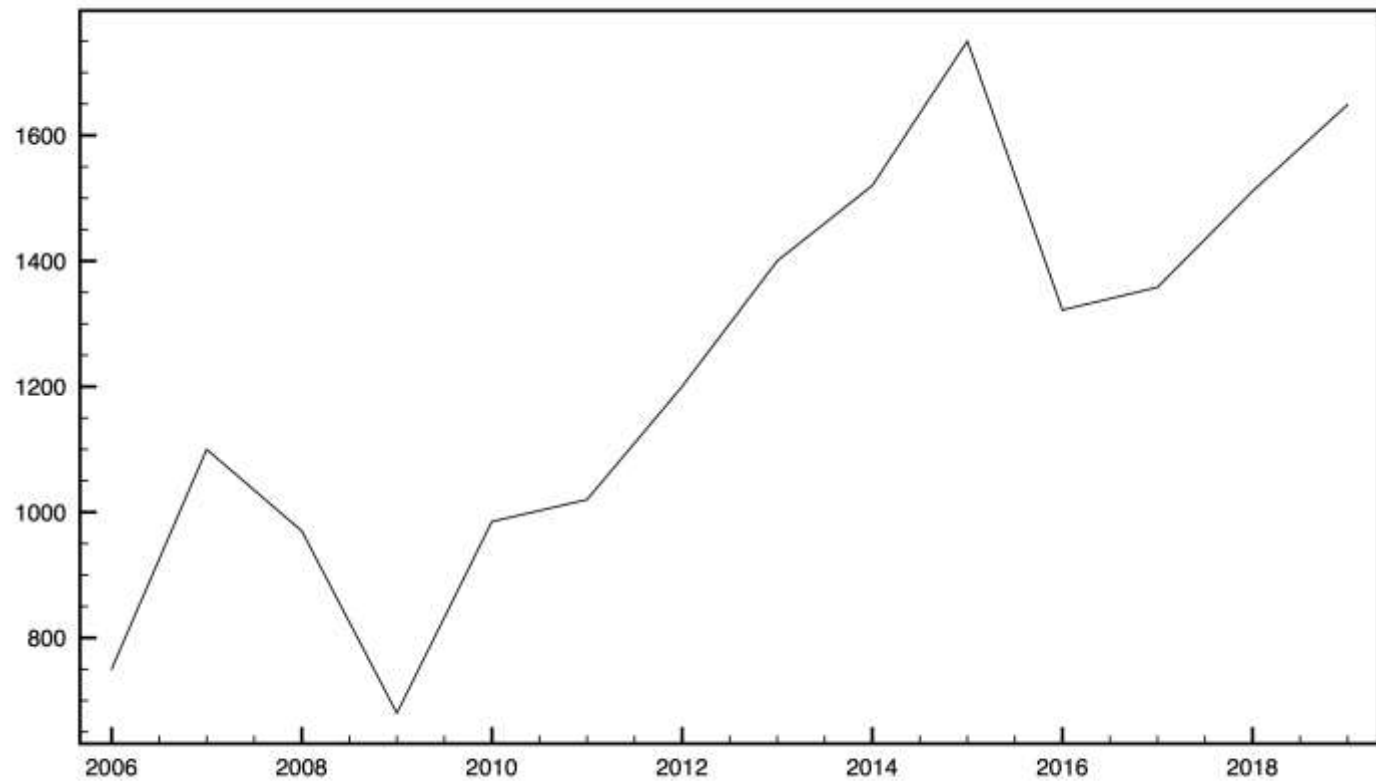
Green - suitability for shallow geothermal systems is high!

Suitability Evaluation of Specific Shallow Geothermal Technologies Using a GIS-Based Multi Criteria Decision Analysis Implementing the Analytic Hierarchic Process

Francesco Tinti , Sara Kasmaee, Mohamed Elkarmoty , Stefano Bondua  and Villiam Bortolotti

Ground source heat pump installations in Estonia, 2006 -- 2019

► Statistics is very poor.....

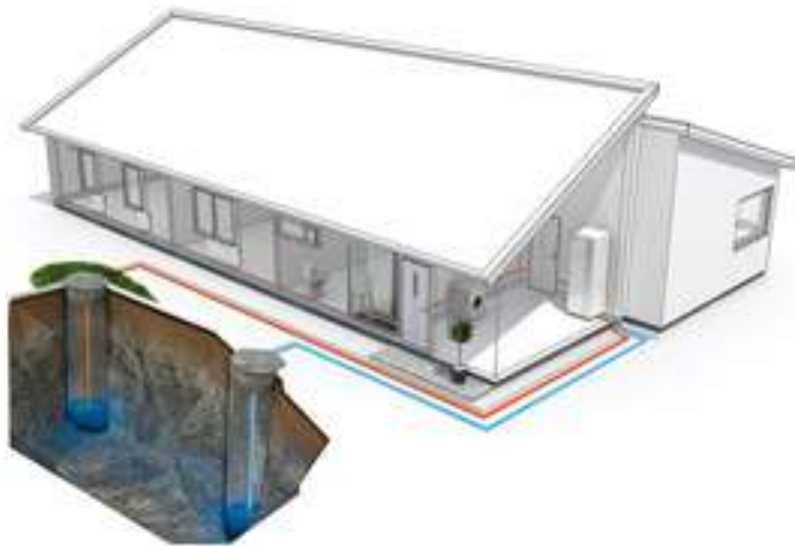


2022

Estonian reality....

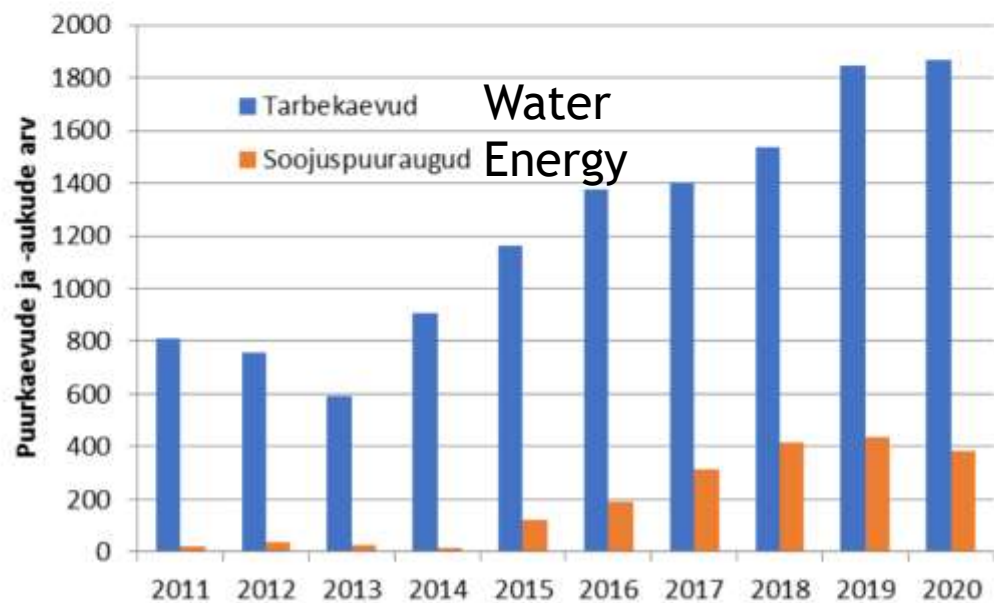
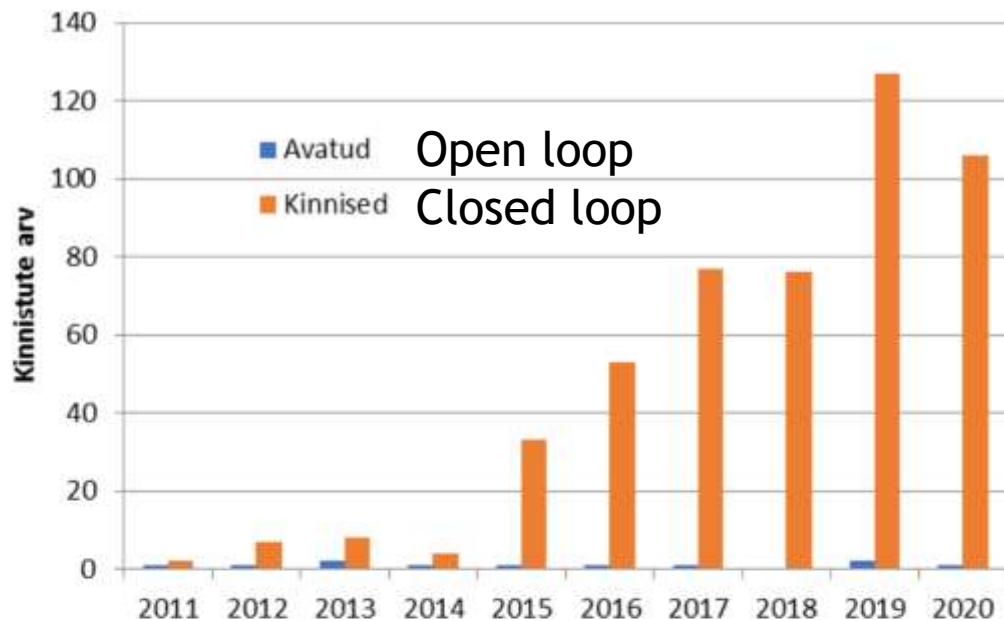


A few....



Increasing....





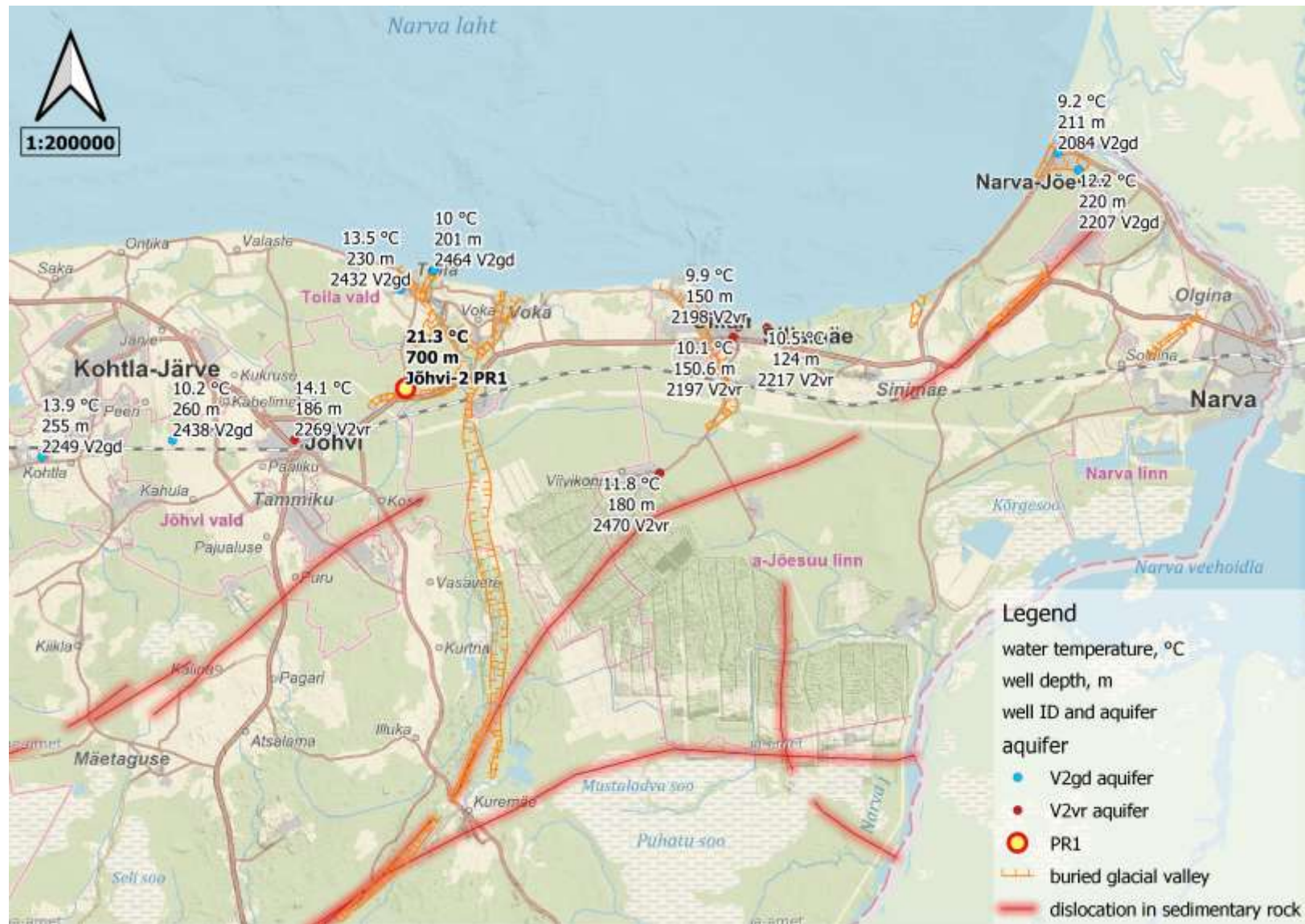
Exploitation Potential - **Small Footprint**

- ▶ THESIS: Geothermal power plants are compact (land per GWh):
- ▶ coal - 3642 m²
- ▶ wind - 1335 m²
- ▶ solar PV - 3237 m²
- ▶ Geothermal - 404 m²

Estonia - WHERE DO YOU GO NOW???

- ▶ Shallow ATES & BTES on the way, but little research
- ▶ Knowledge about the “deep source”, but not there
- ▶ Capabilities for building geothermal installations, yet low

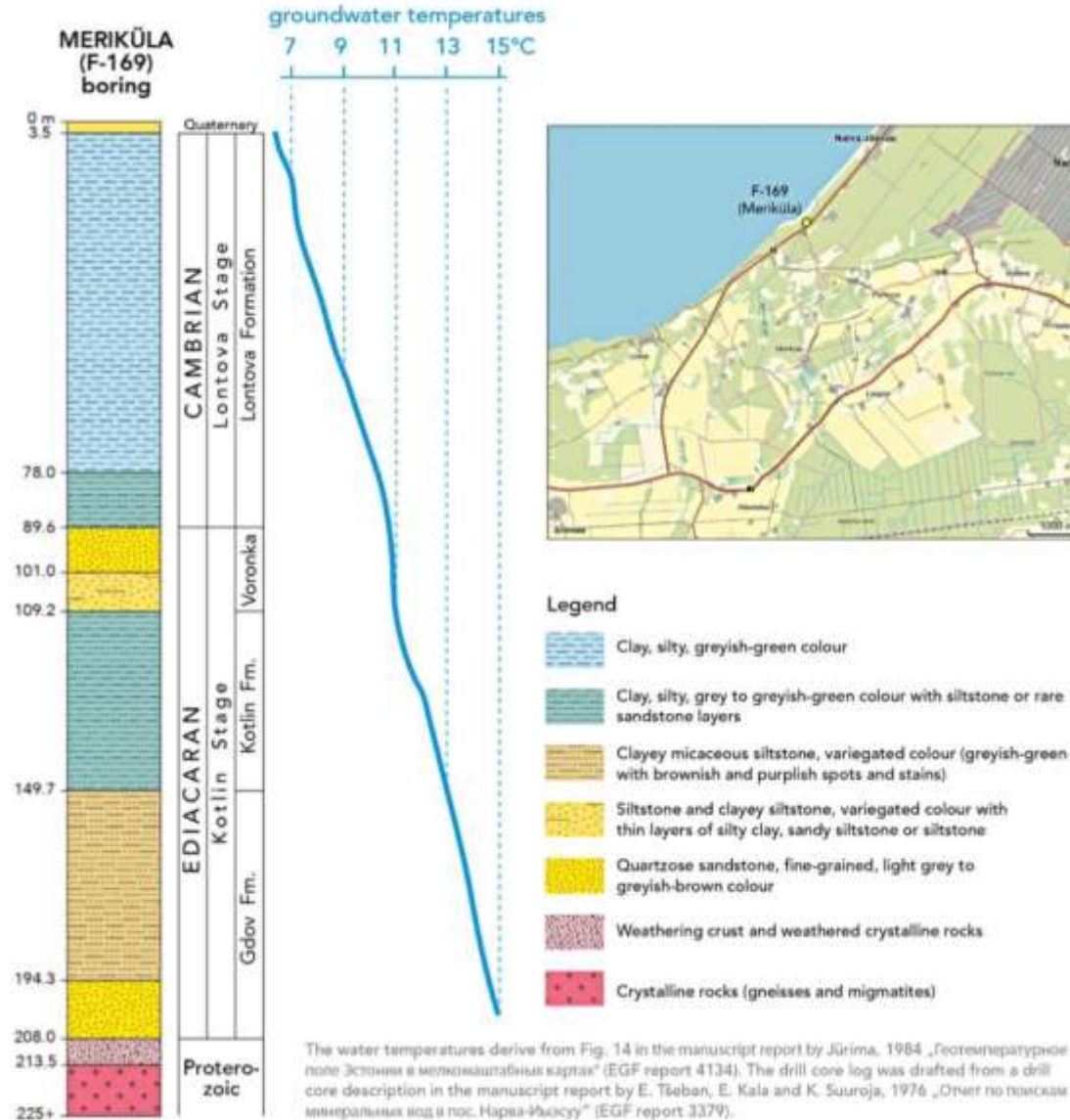
NE Estonia - a warmer place than others



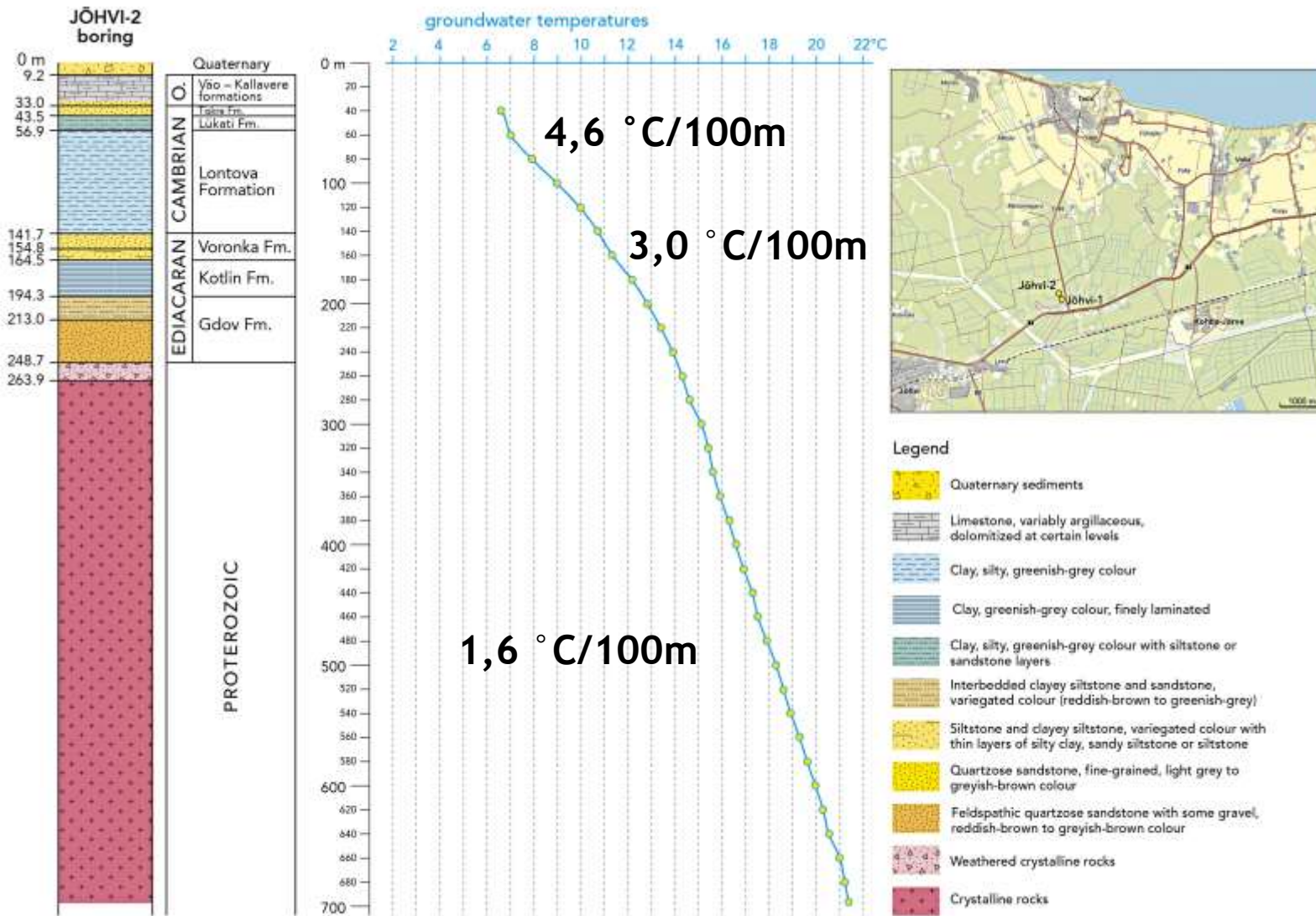
Open Loop System (ATES)

Location: Narva-Jõesuu

Gradient @ 0 - 200m:
4,5 °C/100m

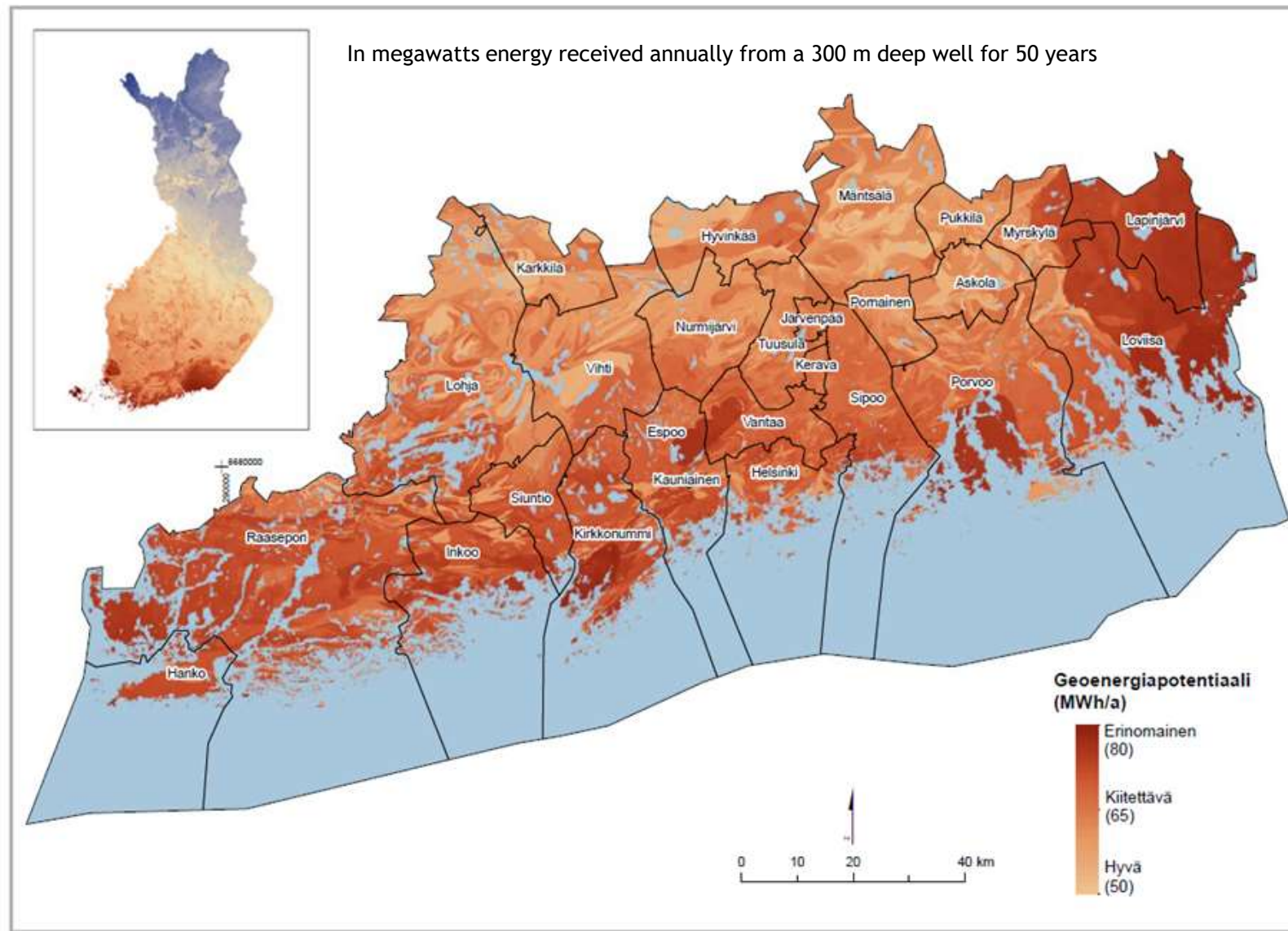


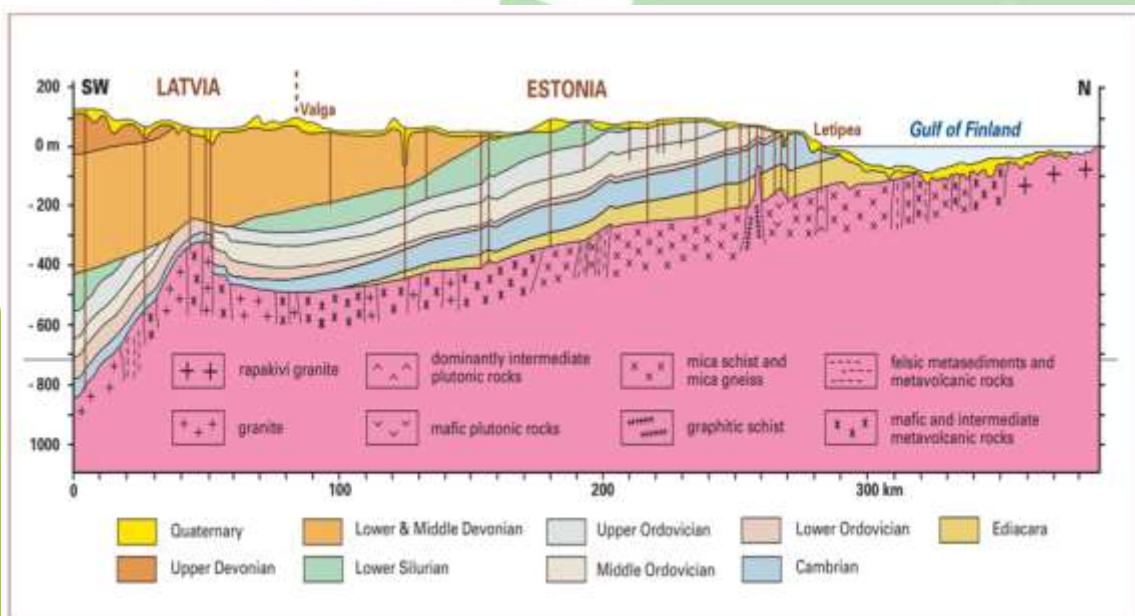
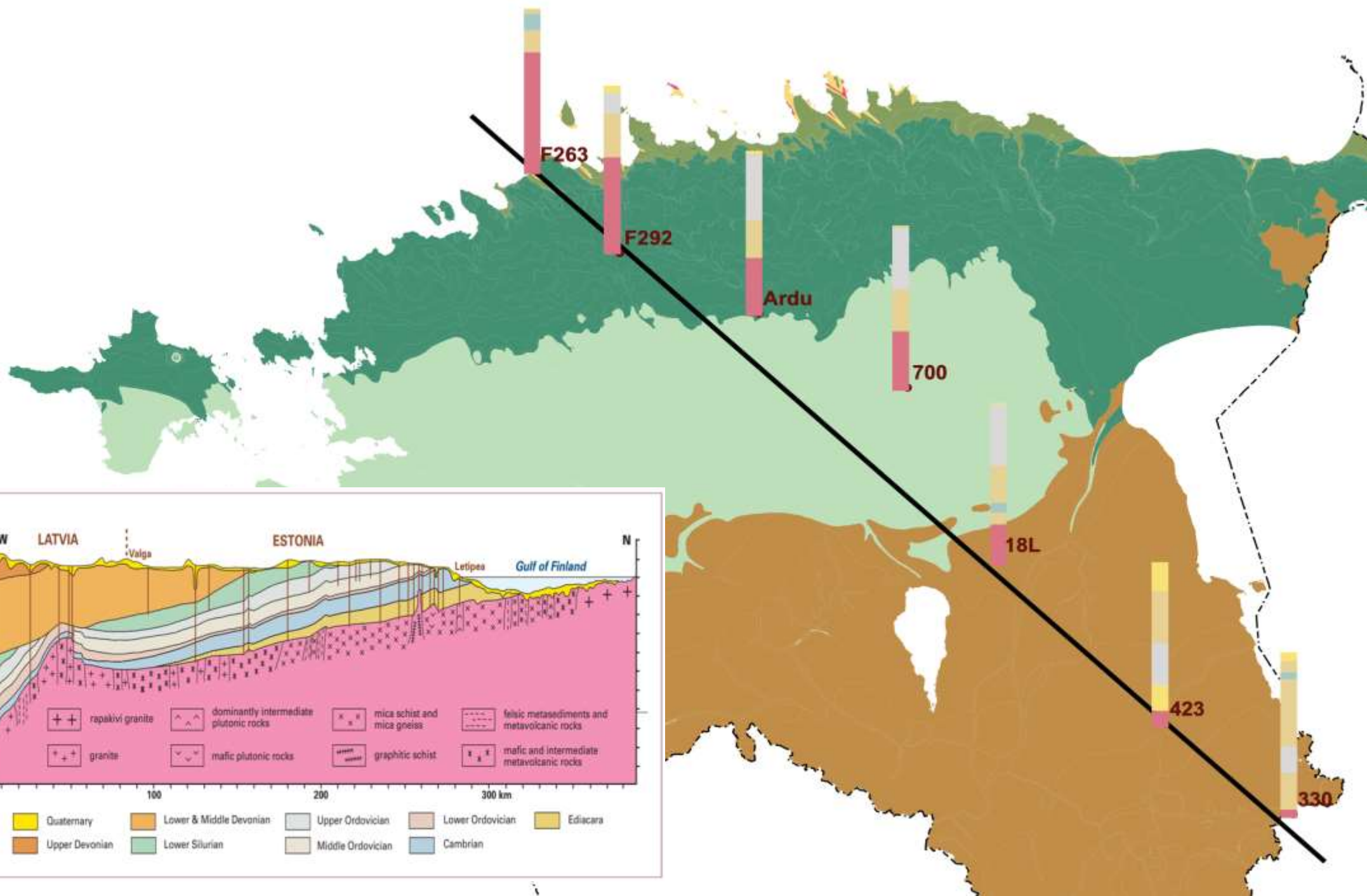
Geothermal gradient differs: an example of a basement hole at Jõhvi

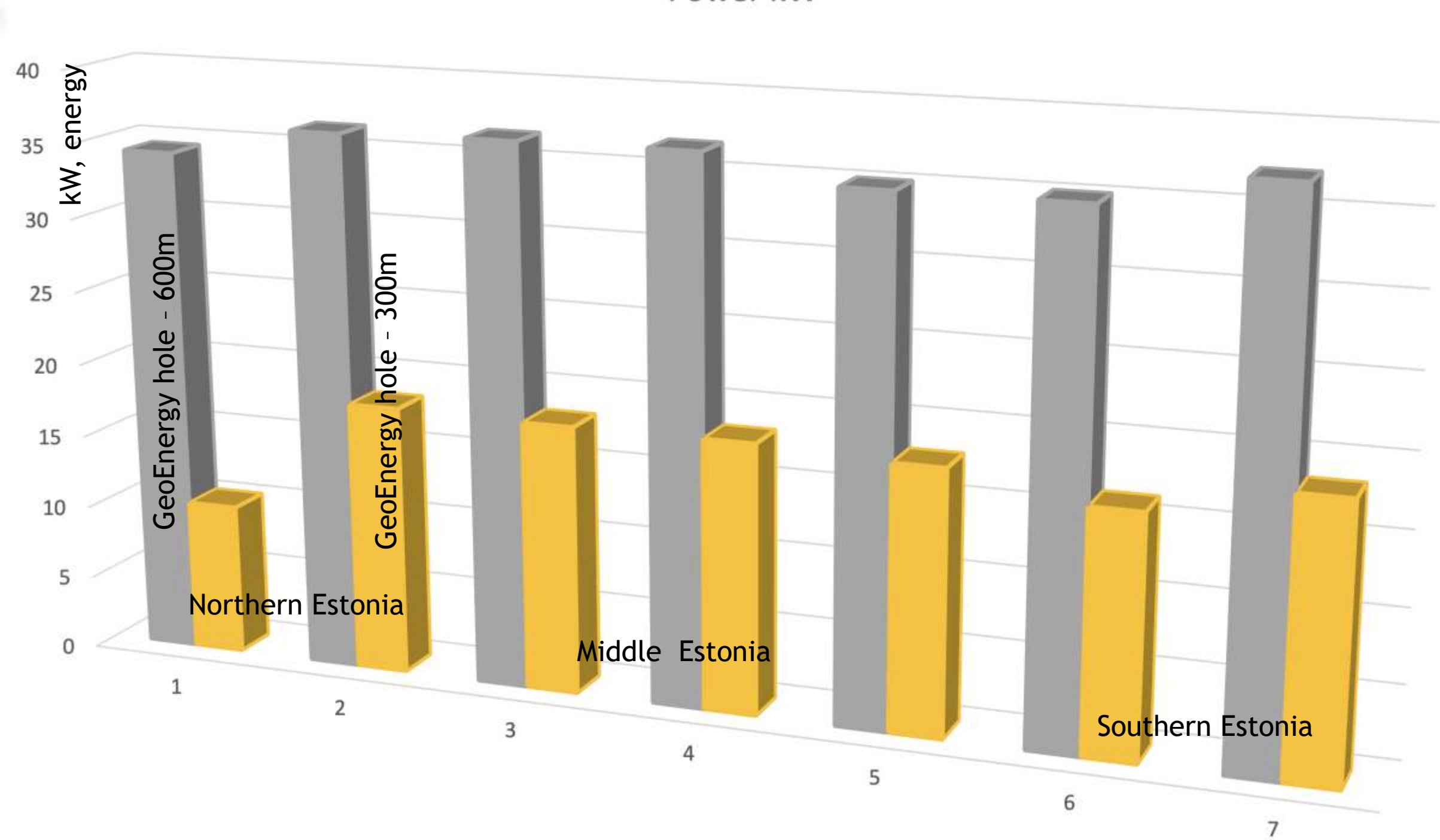


The water temperatures in the Jõhvi-2 drill hole were measured by S. Tamos on November 25th, 2020. The measured depths of the inclined (65°) Jõhvi-2 drill hole were recalculated to the vertical depths. The Ediacaran-Ordovician sequence of the Jõhvi-2 drill hole was drilled without the core retrieval. Therefore the Jõhvi-2 log is based on rock description from the Jõhvi-1 drill core which was drilled 80 m apart from the Jõhvi-2 drill hole. The Jõhvi-1 drill core description was provided by K. Suuroja.

Hopefully, we will get there for Estonia in coming years.... or century?







Main directions in Estonia: a summary

ATES

BTES

Energy-producing
constructions
(thermal pile etc)

Seawater

Mine water??
Deep holes??

Storing heat by a
number of ways

NOTE FOR ADMINISTRATORS: WHATEVER YOU DO, 5TH GENERATION OF DHC HELPS

S. Boesten et al.: 5th generation district heating and cooling systems

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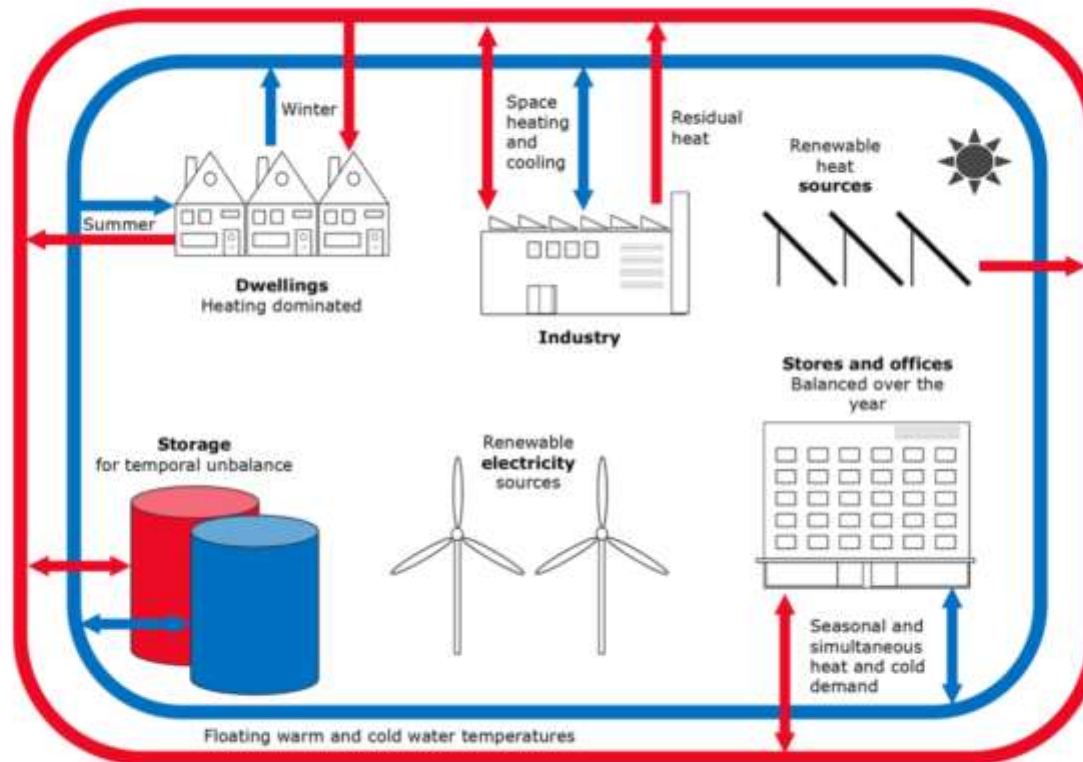


Figure 1. A circular representation of a 5GDHC system. The network is balanced over the year, with warm return flows from cooling supply and cold return flows from heating supply covering as much of the demand as possible. Any residual heat or cold demand is supplied using renewable sources.

THANK YOU FOR YOUR ATTENTION!

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Geothermal is also everything below +100 C!

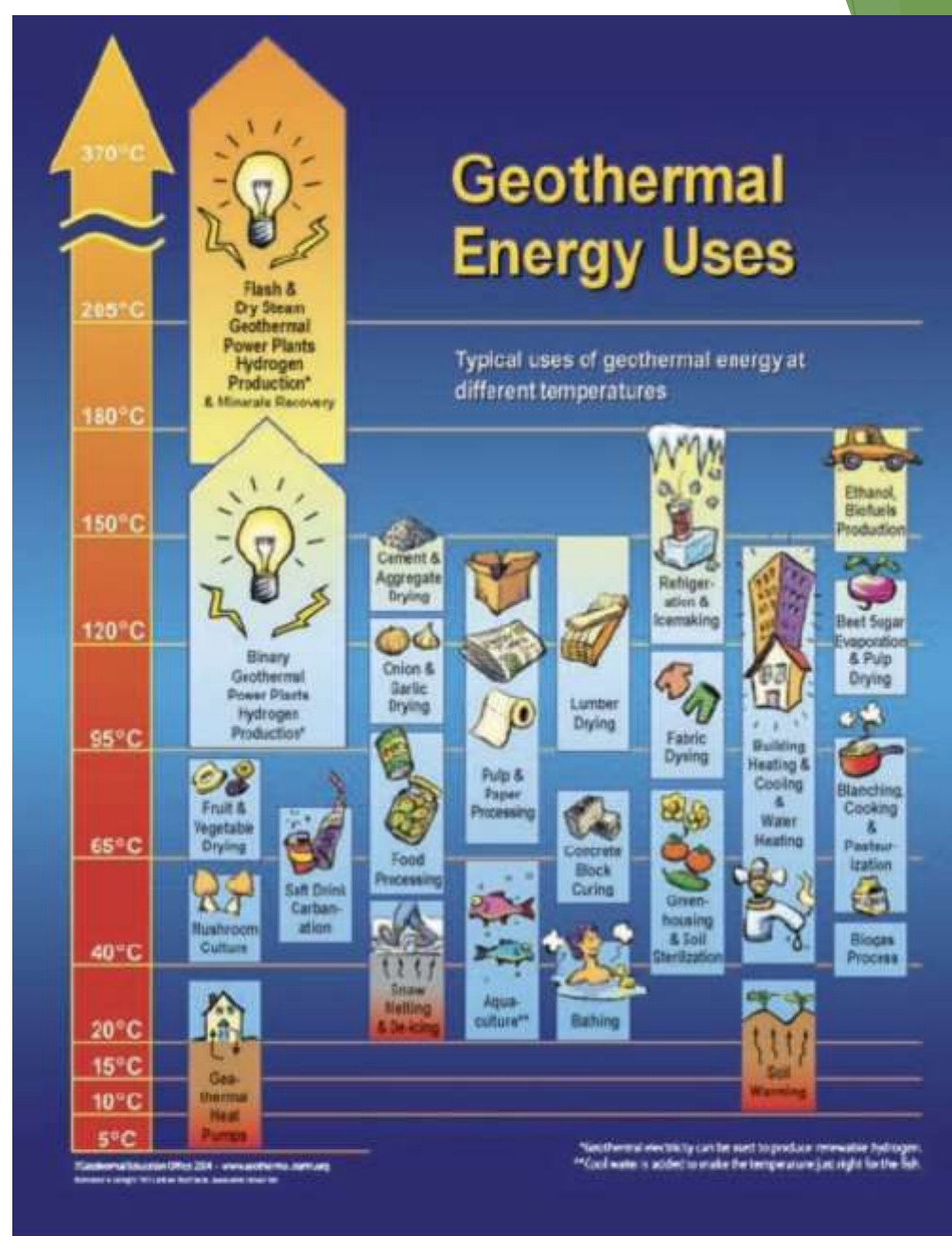


Figure 3 Examples of direct-use applications (Courtesy of Geothermal Education Office).