

GeoTermos – sesongvarmelagring i Norge

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Outline

- Film
- Where, and what is GeoTermos?
- History – planning and construction
- Award – Årets lokale klimaatiltak – Zero-konferansen 2020
- Test operation and the first experiences
- Temperature profile measurements done in cooperation with the RockStore research project



Where is Drammen?

Ca. 40 km southwest
of Oslo



Fjell school in Drammen

Building year: 2018-2019

Net floor area: 10 000 m²

GeoTermos was built in parallel with the school - for heating and cooling of the school.



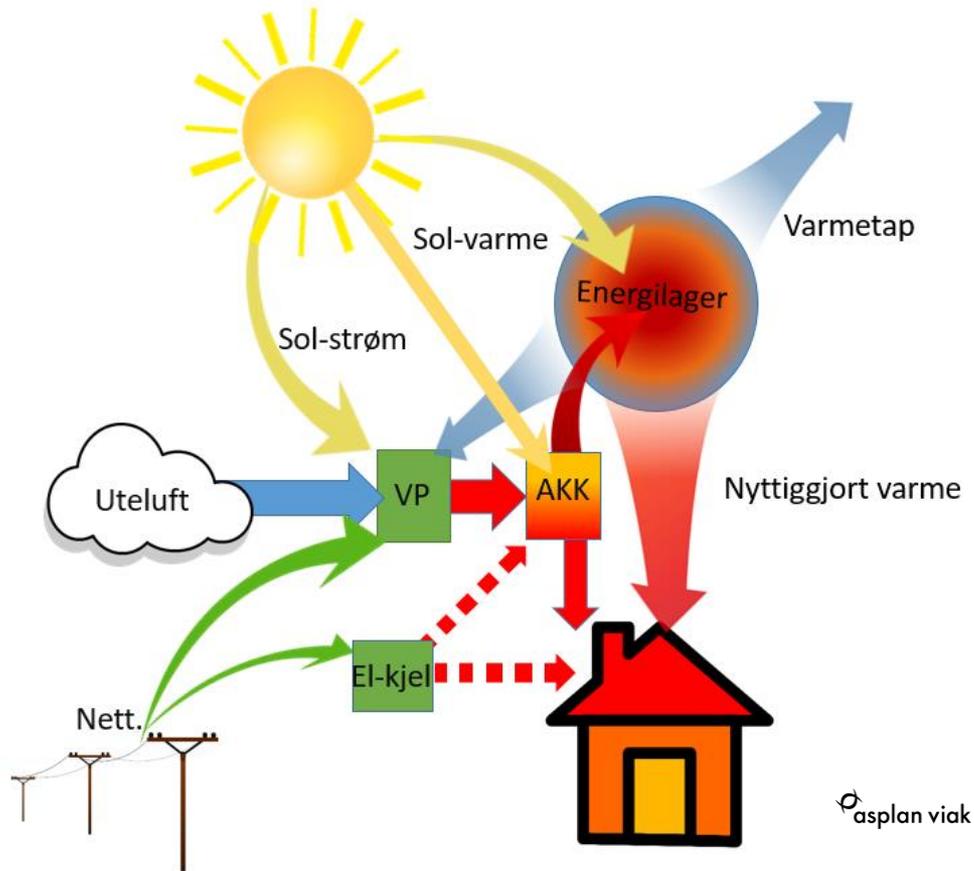
GeoTermos – what is it?

- main components

- Seasonal thermal storage in 100 boreholes to 50 m (filled with water).
- The boreholes are heated with by local heat. Center temperature will be up to ca. 50-55 °C.
 - Heat from the air. The air-temperature is increased by a CO₂-heat pump driven by electricity from solar cells.
 - Also heat from solar collectors.
- Low temperature heating system (25 °C) for direct heating without heat pump! (floor heating where the pipes are extra tight).

➔ A unique local «stand alone» energy system solution.

Conceptual study financed by Enova → Financial support for the investment

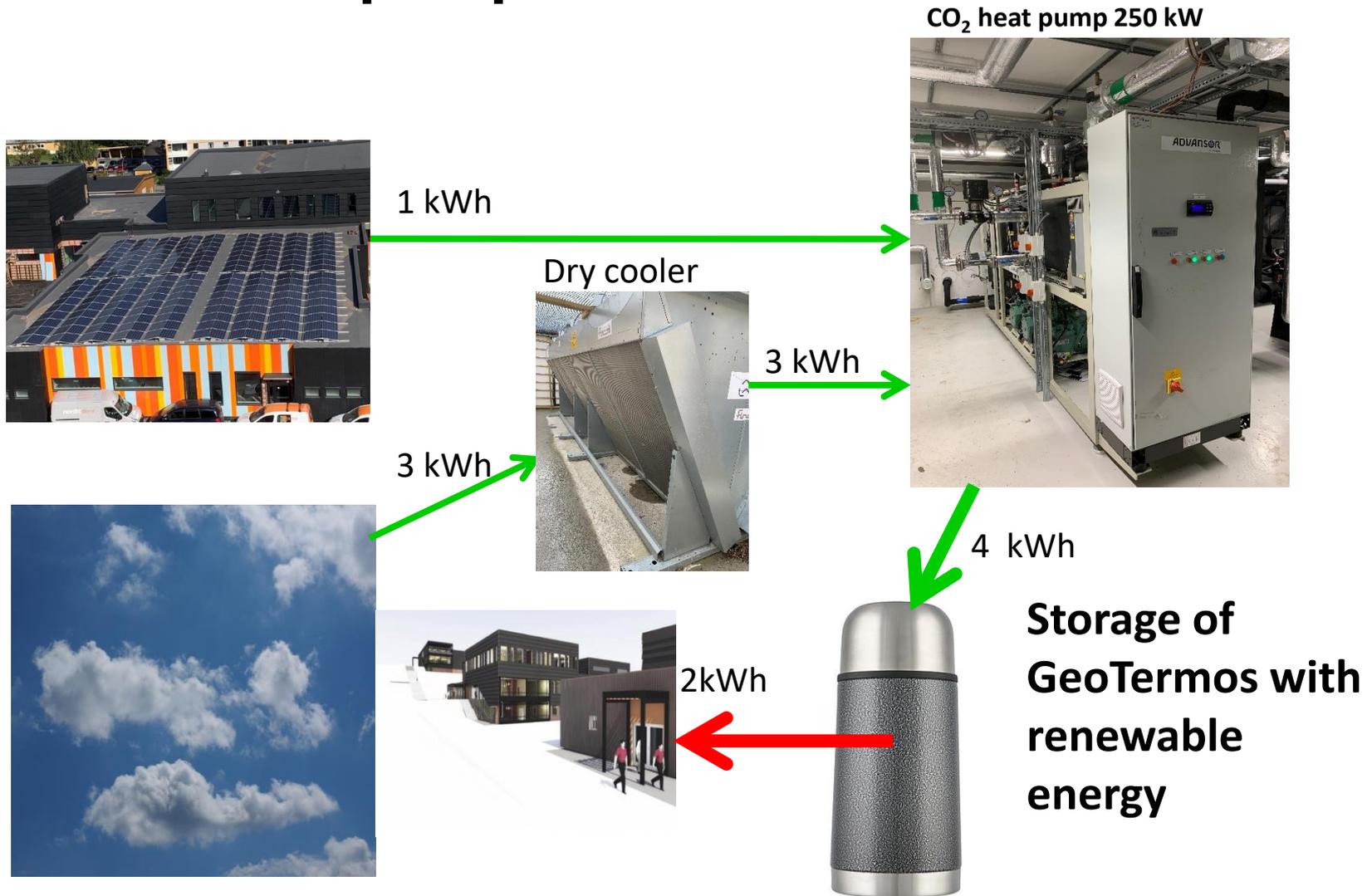


Report from conceptual study (early phase) to Enova – by Asplan Viak AS.

Project webpage at Enova: <https://www.enova.no/om-enova/om-organisasjonen/teknologiportefoljen/geotermos-fjell2020/>

asplan viak

Energy production summer / fall – advanced air/brine heat pump



The thermal battery – GeoTermos

Winner of «the local climate measure of the year 2020» at Zero-konferansen



[Miljøpris for GeoTermos | Drammen kommune](#)



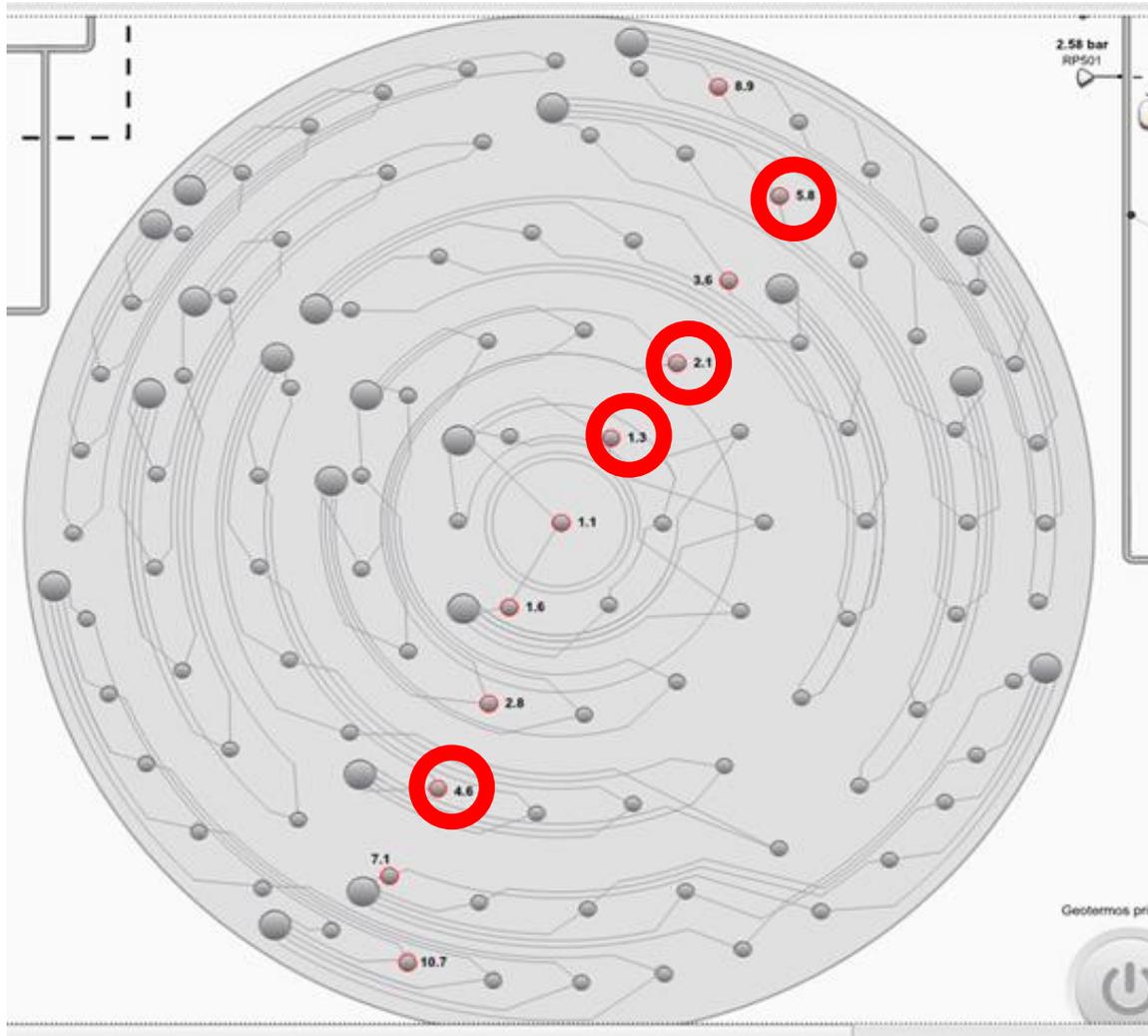
Test operation and the first experiences

- Promising first year – storing more heat than planned, good control of the operation
- Extensive monitoring, experienced and dedicated personnel (= success criteria!)
- Combination solar and the ground, area development and follow-up / tuning of the operation
- Nearly off grid energy system
- Usefulness of distributed temperature sensing (fiber)
- Important demonstration plant in the RockStore research project (2018-2022)
- Challenge: Design and coordination in parallel to an ordinary “construction project” (school)
- Three response tests where done to ensure «no groundwater flow» and «thermal leakage» with the groundwater
- Further work:
 - Tuning of the system
 - Hopefully several more GeoTermos’es to come!! 😊

Installation of optical fiber for temperature profile measurements

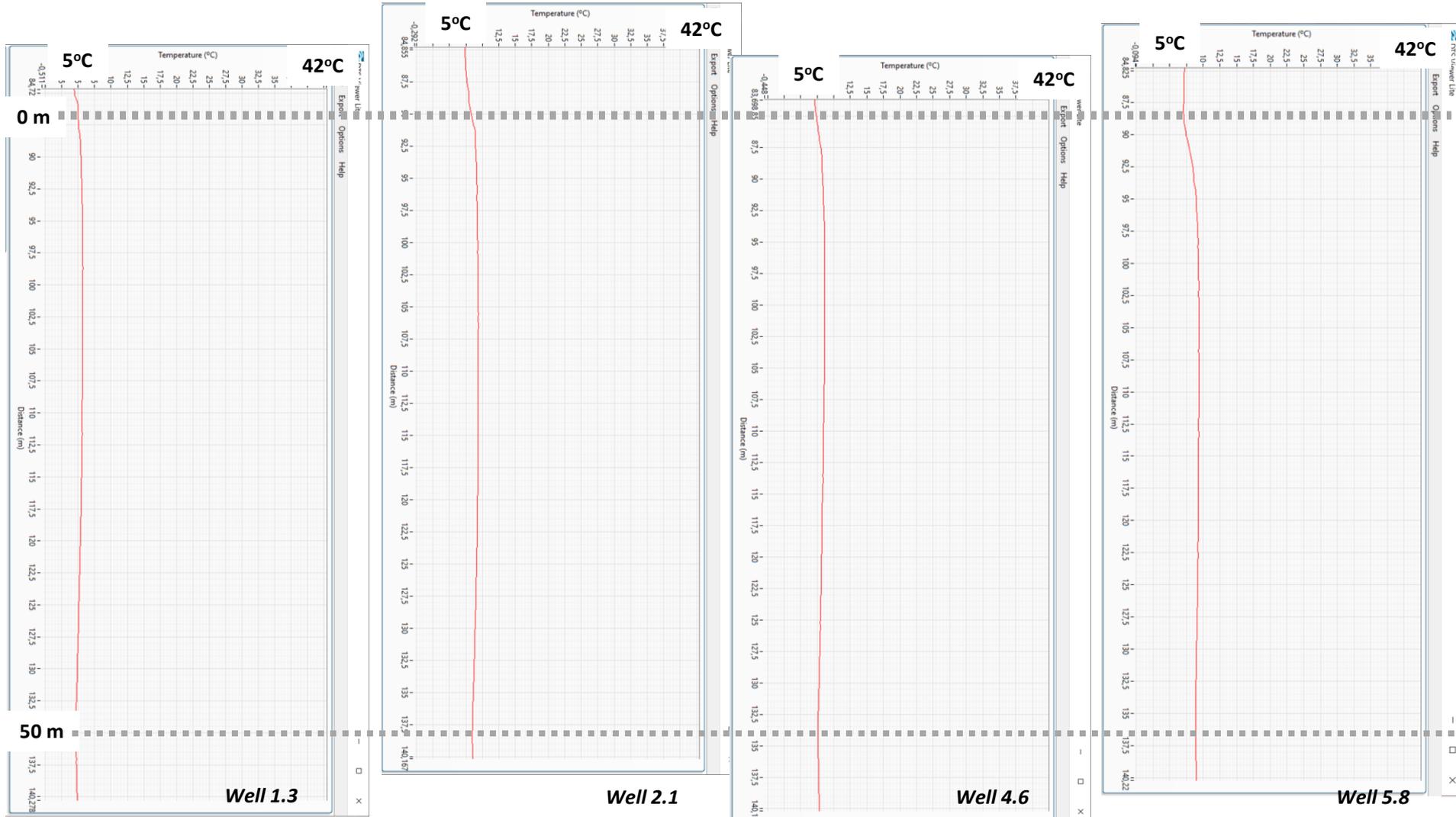


Temperature profile monitoring

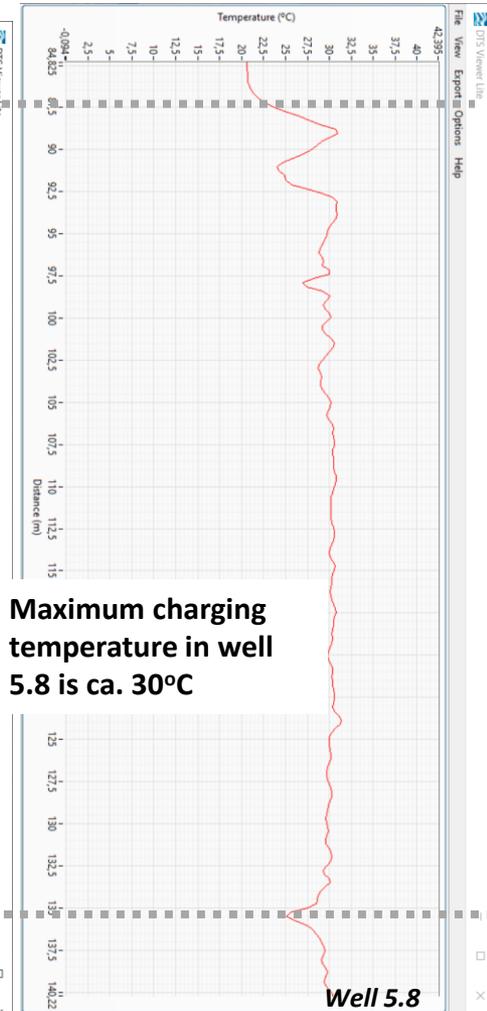
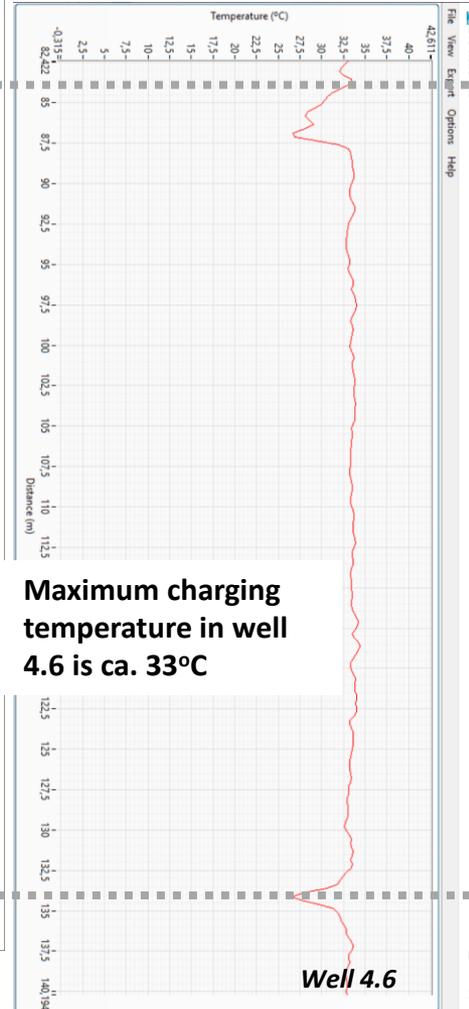
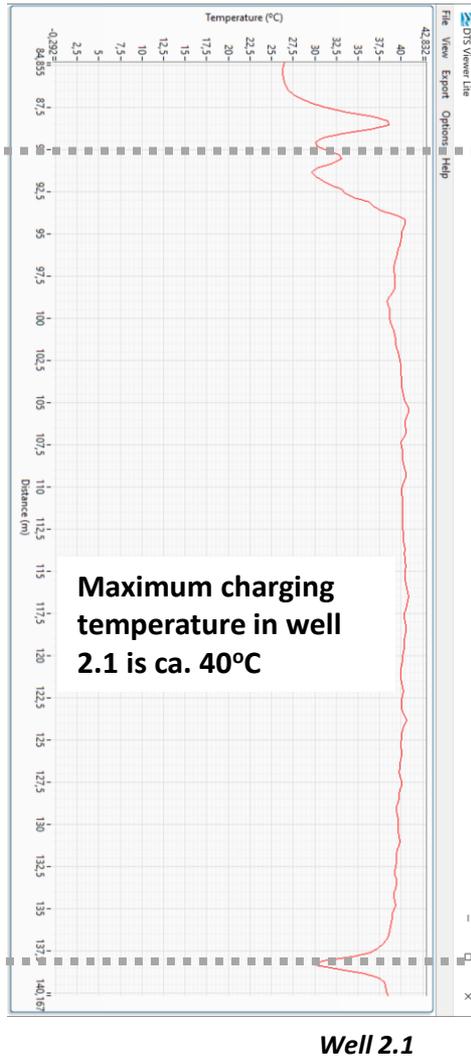
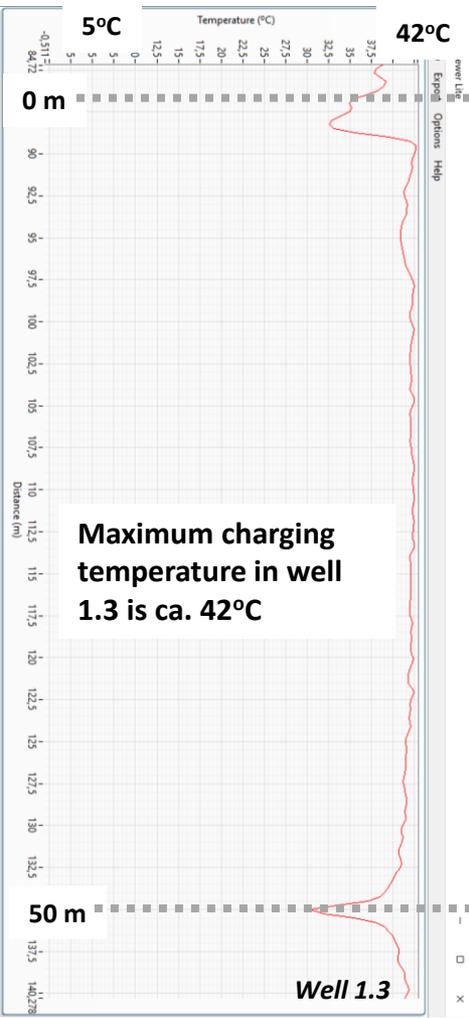


- 11 energy wells with fiber (marked with red)
- Storage of around 1 GWh since 14th of April 2020.
- 4 energy wells monitored April – November 2020

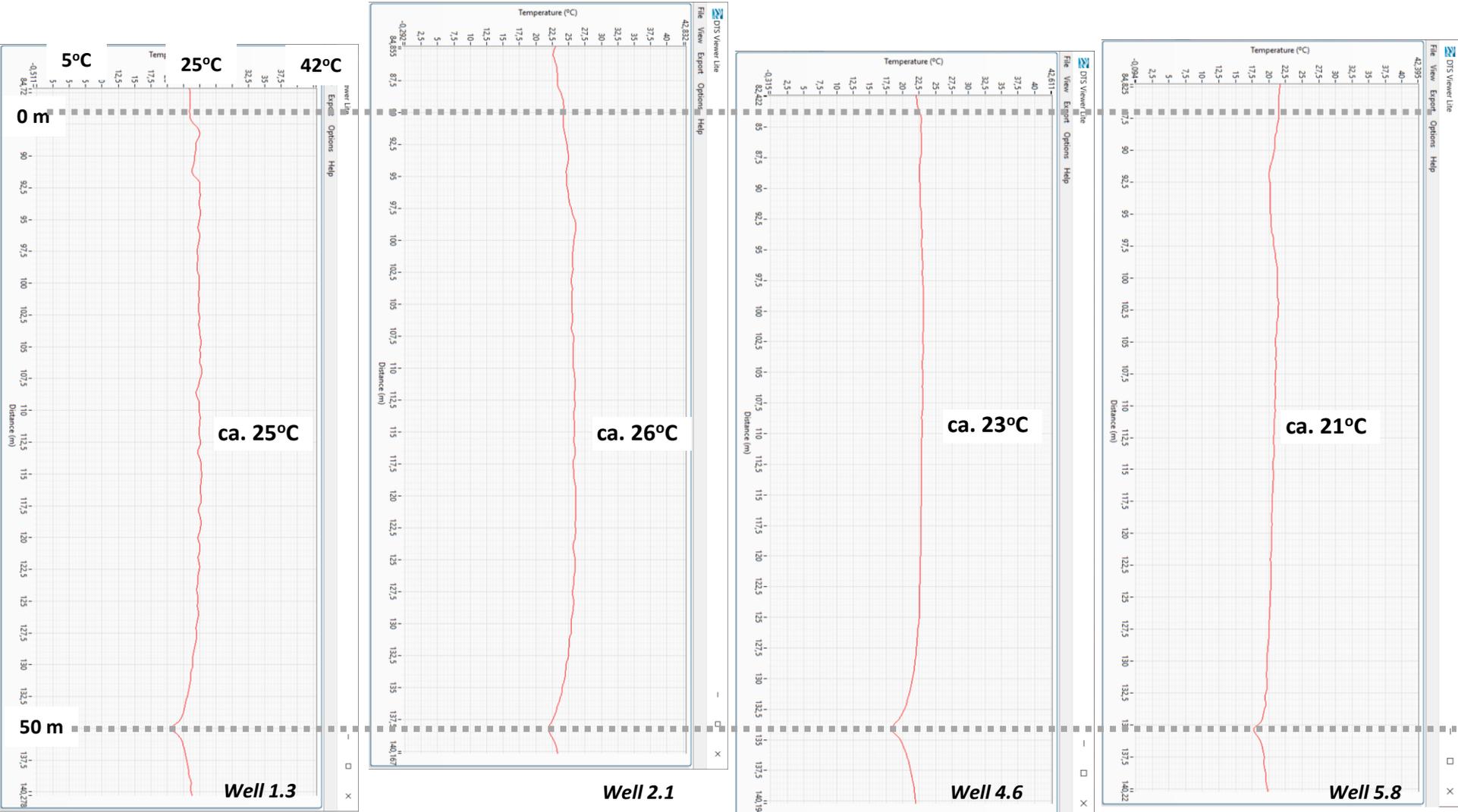
14th of April – undisturbed temperature



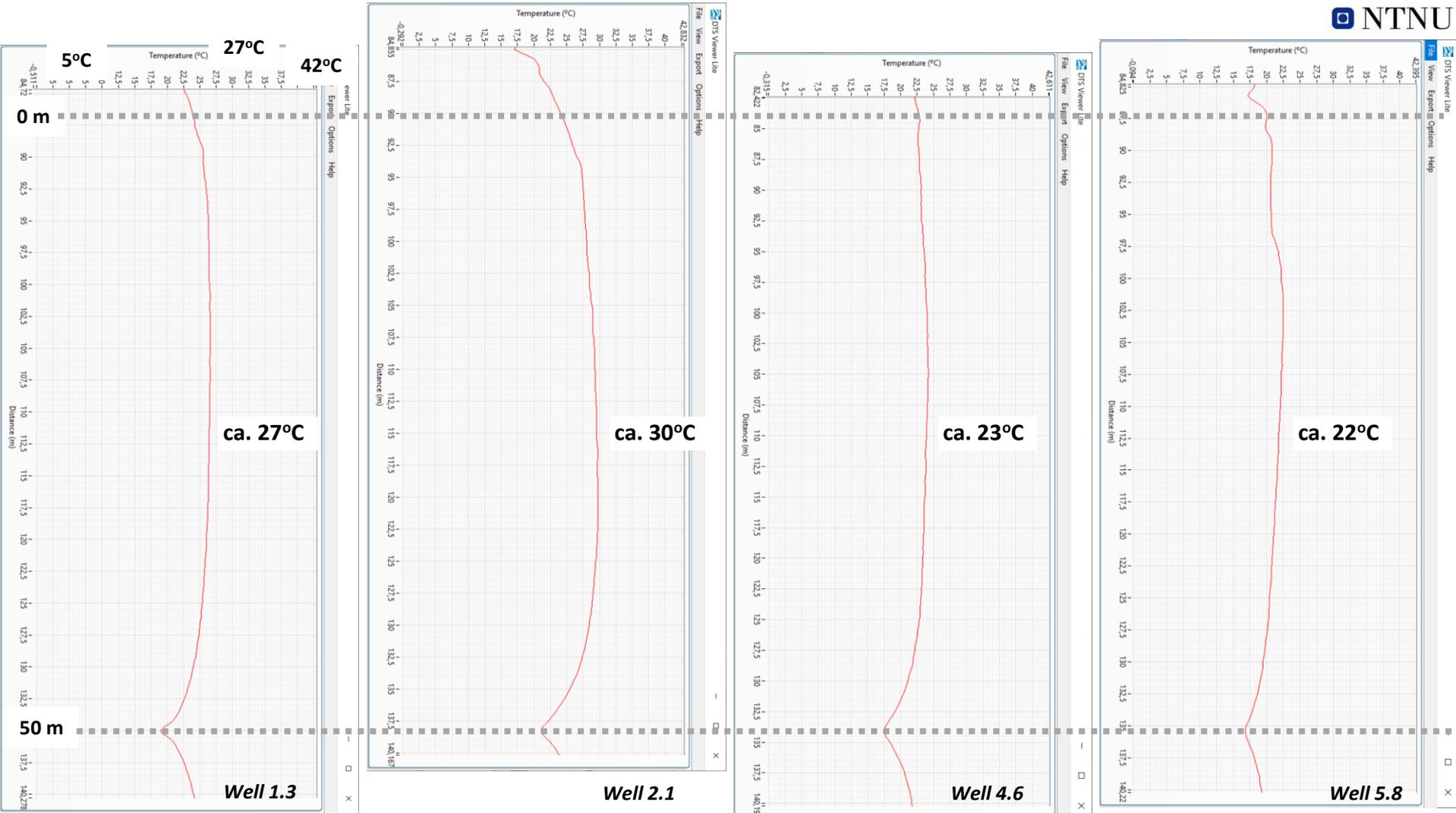
16th of August – high charging temperature



16th of October – direct heating (without heatpump) of the school (low temperature floor heating)



17th of November – start of «resting period»

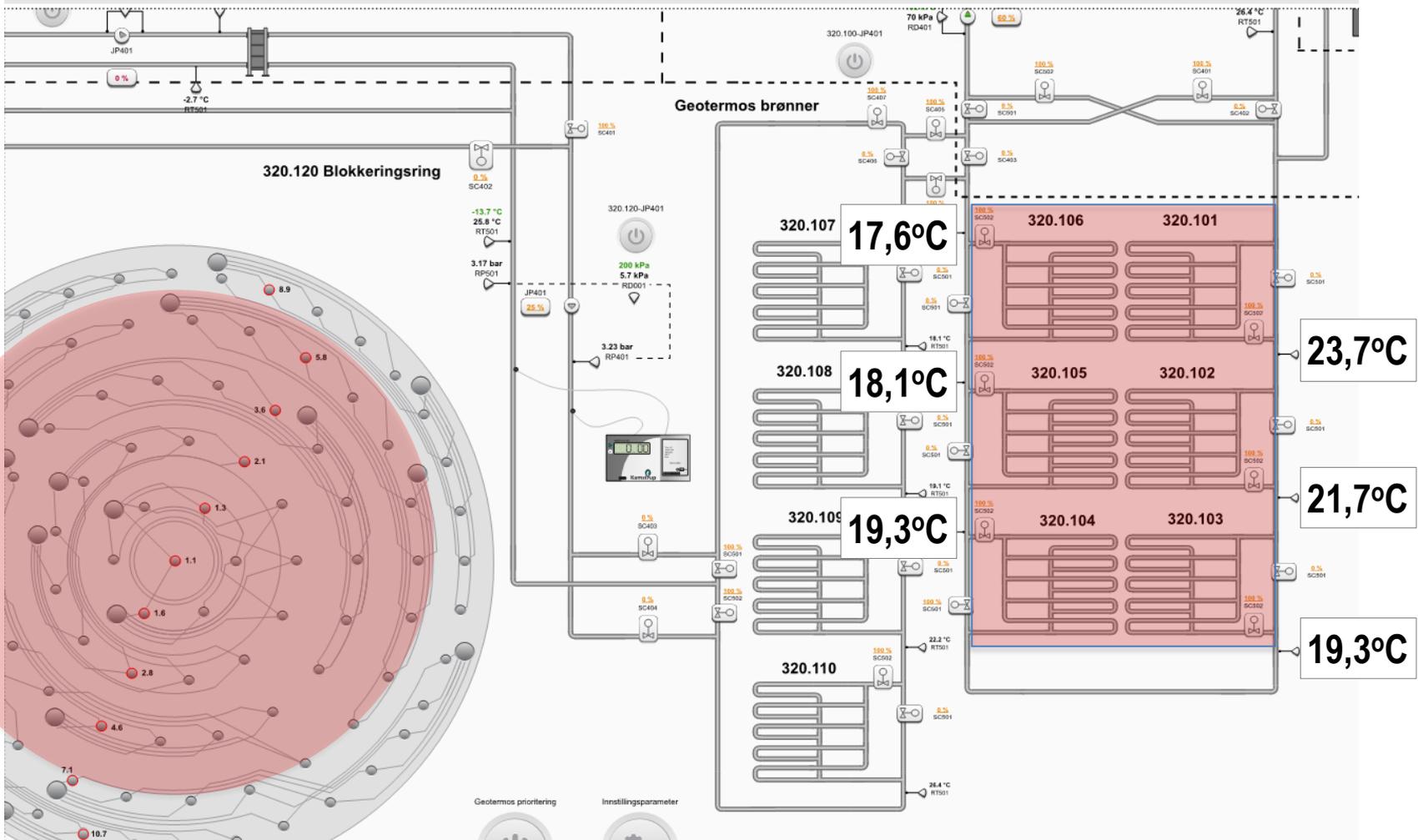


Temperatures 12th of January 2021

Soneoversikt x +D4S3 x

+D4S3 Fjell Skole

- Oversikt
- Sanitæranlegg 310
- Varmeanlegg 320**
- Luftbehandling 360
- Komfortkjøling 370
- Elvarme 450
- Lokal kraftproduksjon 470
- Alarm- og signalsystem 540
- Utendørs elkraft 740
- Energi



Thank you!

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