Transfer in Focus: Is O&G drilling and well competence needed for geothermal resource extraction?

Introduction to New Thermal Energy Plant UiS and Living Lab

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Agenda

- Why and what?
- The Geothermal Heat Pump Project at UiS,
- Research Activities / Living Lab.

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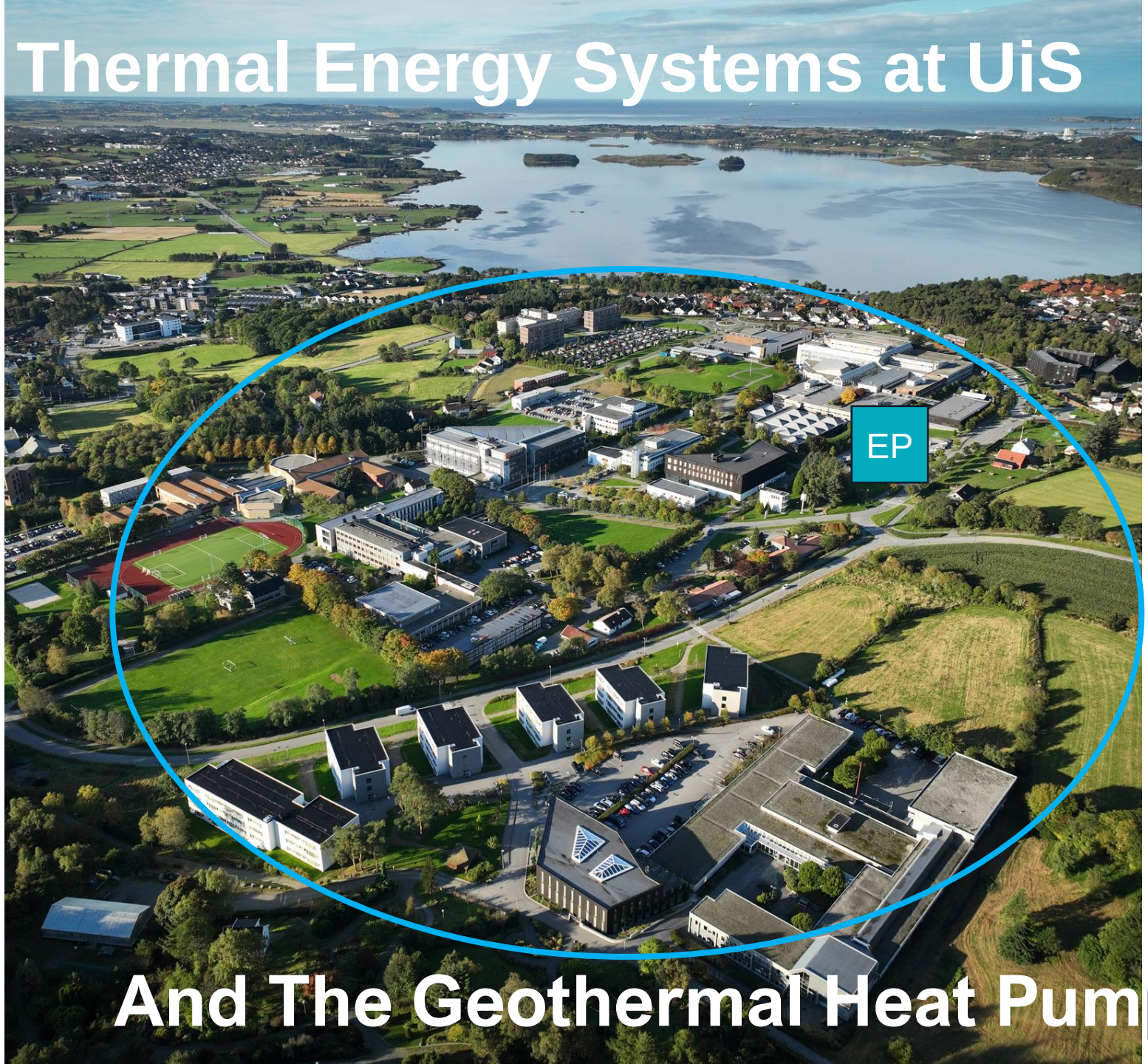
Why & What!

- Energy transition, sustainable energy solutions and green campus (the corner stone of UiS 2030 strategy)
- Increasing the share of renewable energy, and reducing CO_2 emissions: solar & geothermal installations
- Using the campus as living lab, providing education and research opportunities via existing installations
- The research part focuses on: deepening the knowledge about cost-benefit of parameters such as
  - well depth, borehole heat exchanger technologies, real-time operation optimization
- To realize this, we needed: wells with various depth, various BHE types, smart instrumentation for data gathering for digital twins (AI-based fast and accurate models for operation optimization)
- Providing realistic views of the potential of geothermal energy considering:
  - cost (well depth and BHE type),
  - flexibility (heating, cooling, energy storage),
  - optimized operation (continuous matching and resource use optimization),
  - education and training of specialized researchers and work force, who can support informed decision for selection of best options for realization of net zero.

The Thermal Energy Systems at UiS



Decentralized heat and cooling production,

- Heat recovery from cooling,
- Natural gas boilers,
- Electric boilers,

Heating and cooling grid at campus.

And The Geothermal Heat Pump Project

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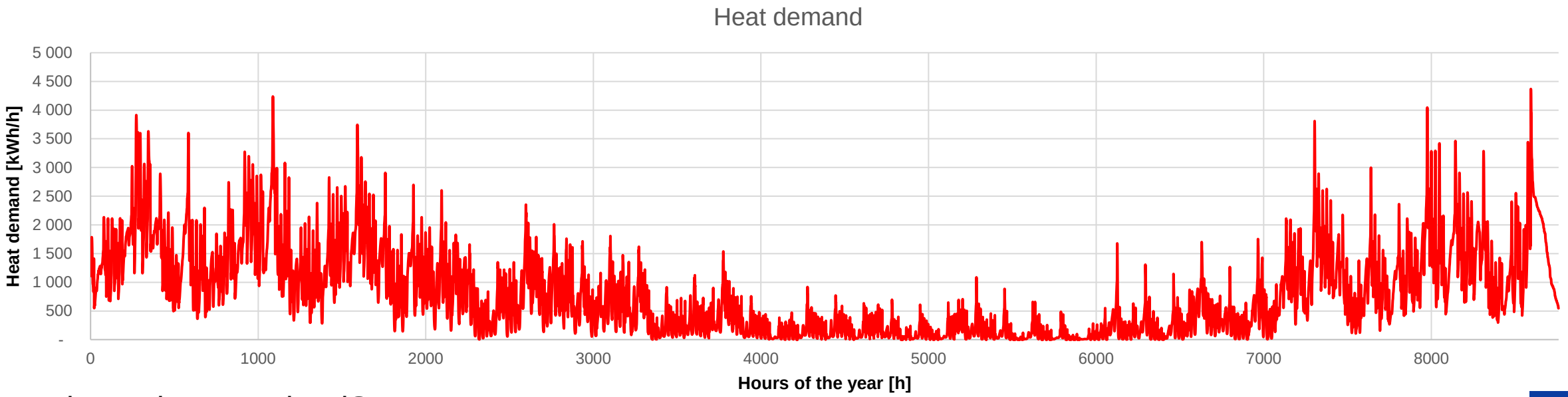
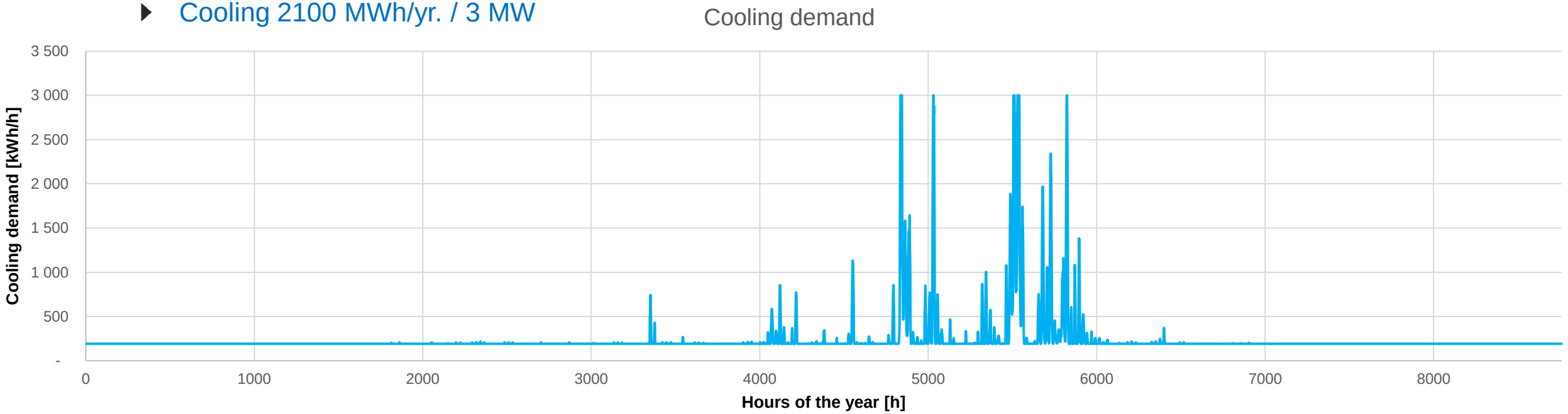


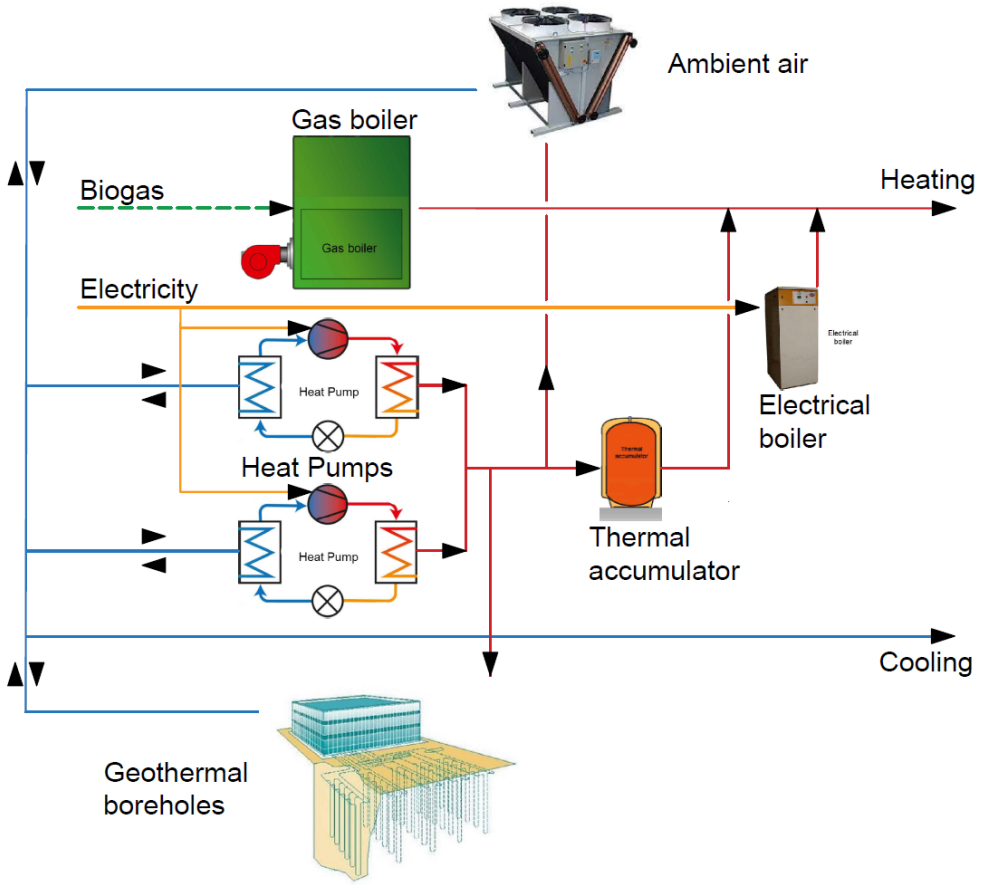
Thermal Demands UiS:

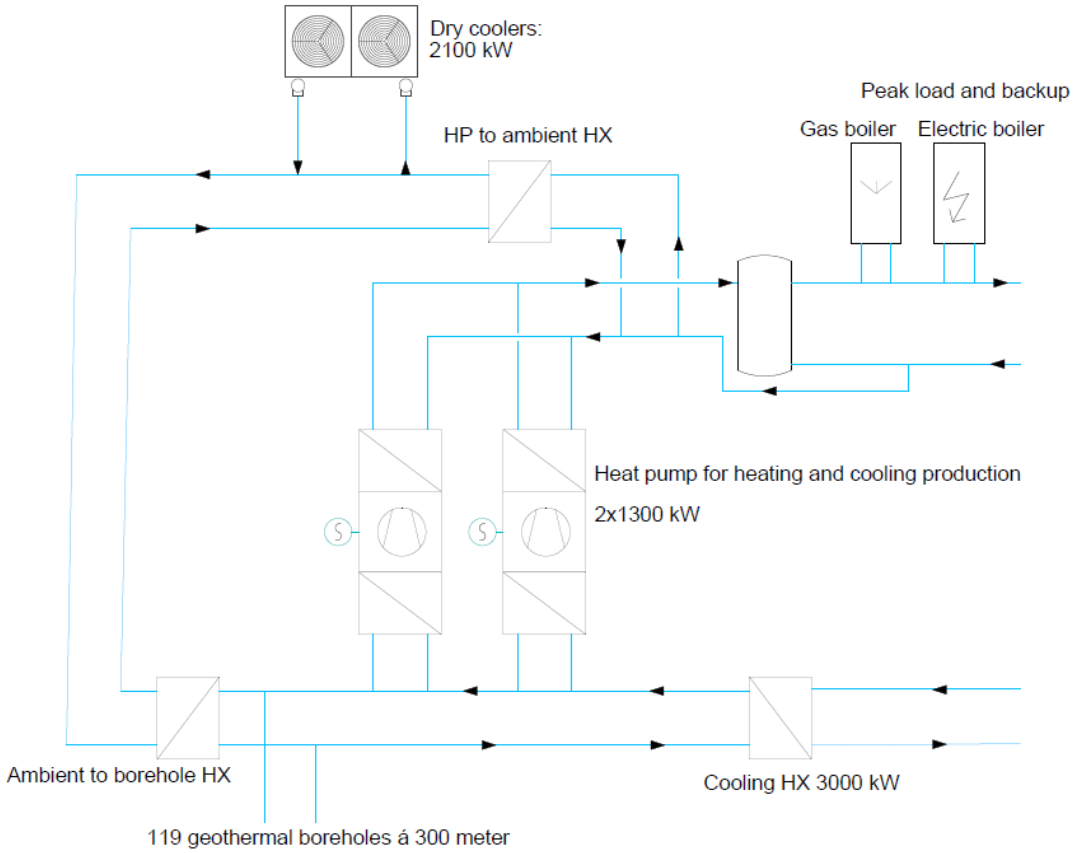
- **Heating 6900 MWh/yr. / 5MW**
- Cooling 2100 MWh/yr. / 3 MW

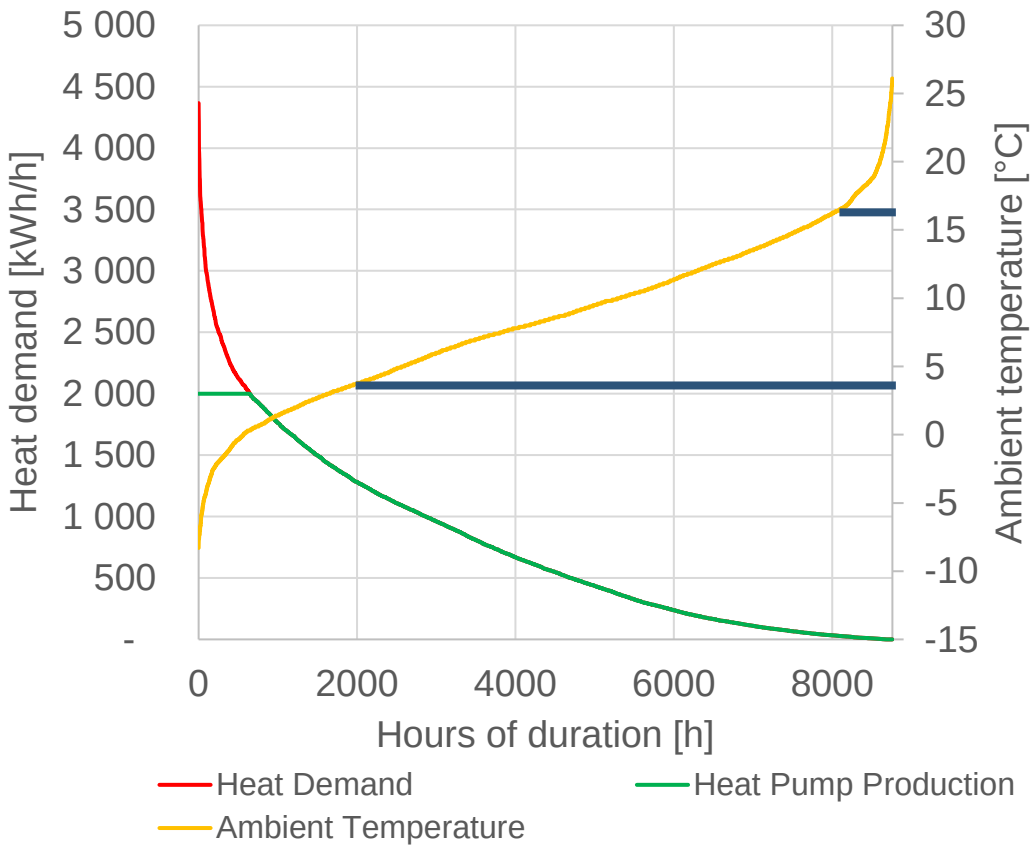


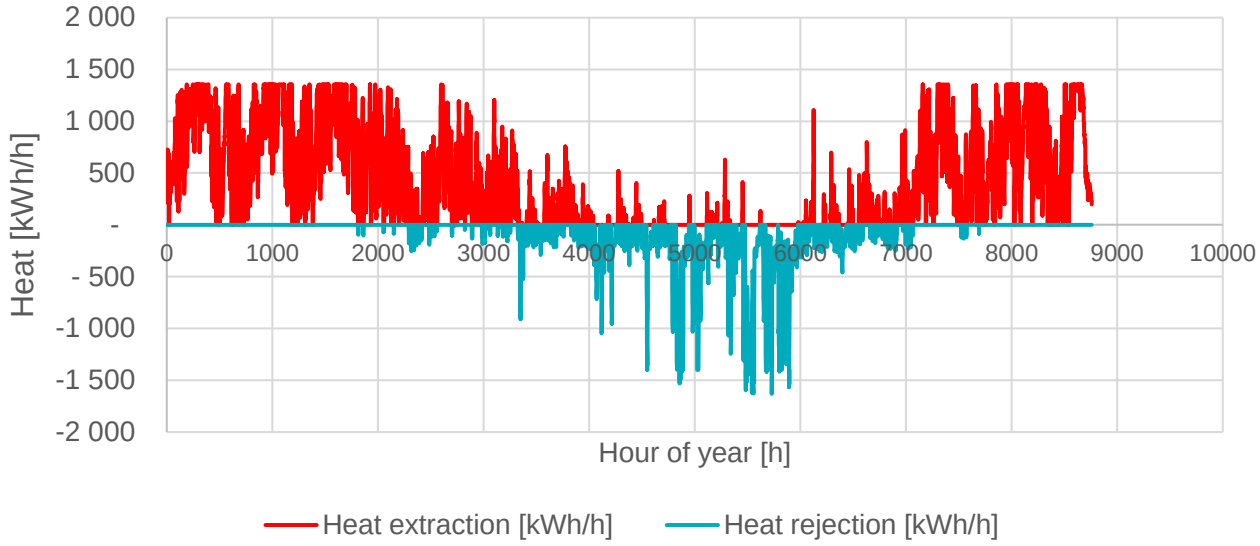
Heating	Cooling	Sum	
Geothermal Energy Plant	Energy production [MWh/yr.]	Efficiency / SCOP [-]	Input energy [MWh/yr.]
Geothermal heat pump	6 500	4.4	1 480
Bio gass boiler	300	0.9	350
Electric boiler	100	0.9	110
Heat production	6 900		1 940
Cooling from geothermal system	2 100	11.7	180
Sum Heat and Cooling	9 000	4.25	2 120

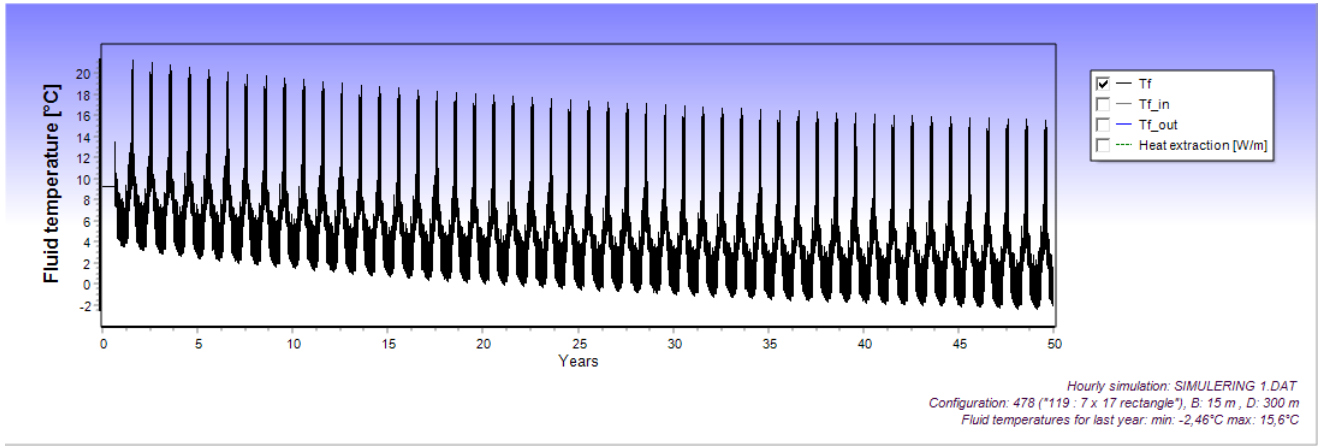
The Design and Targets of the Energy Plant Project











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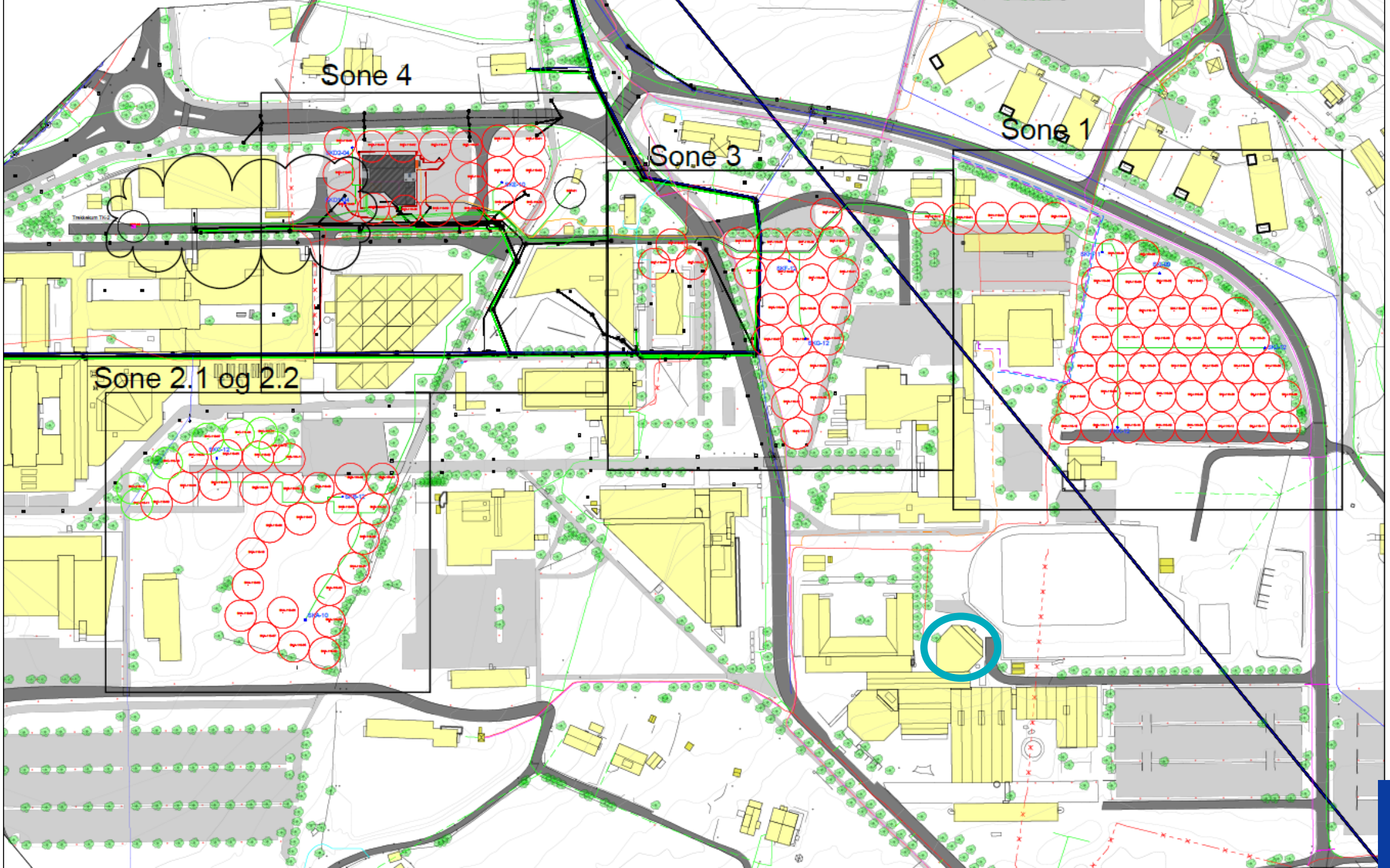
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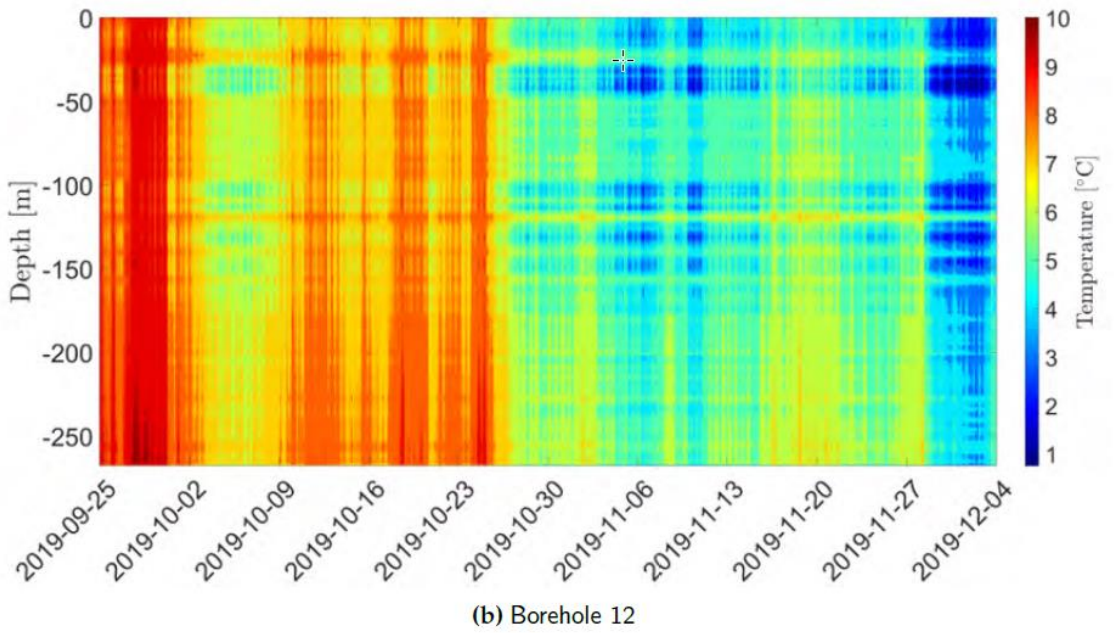
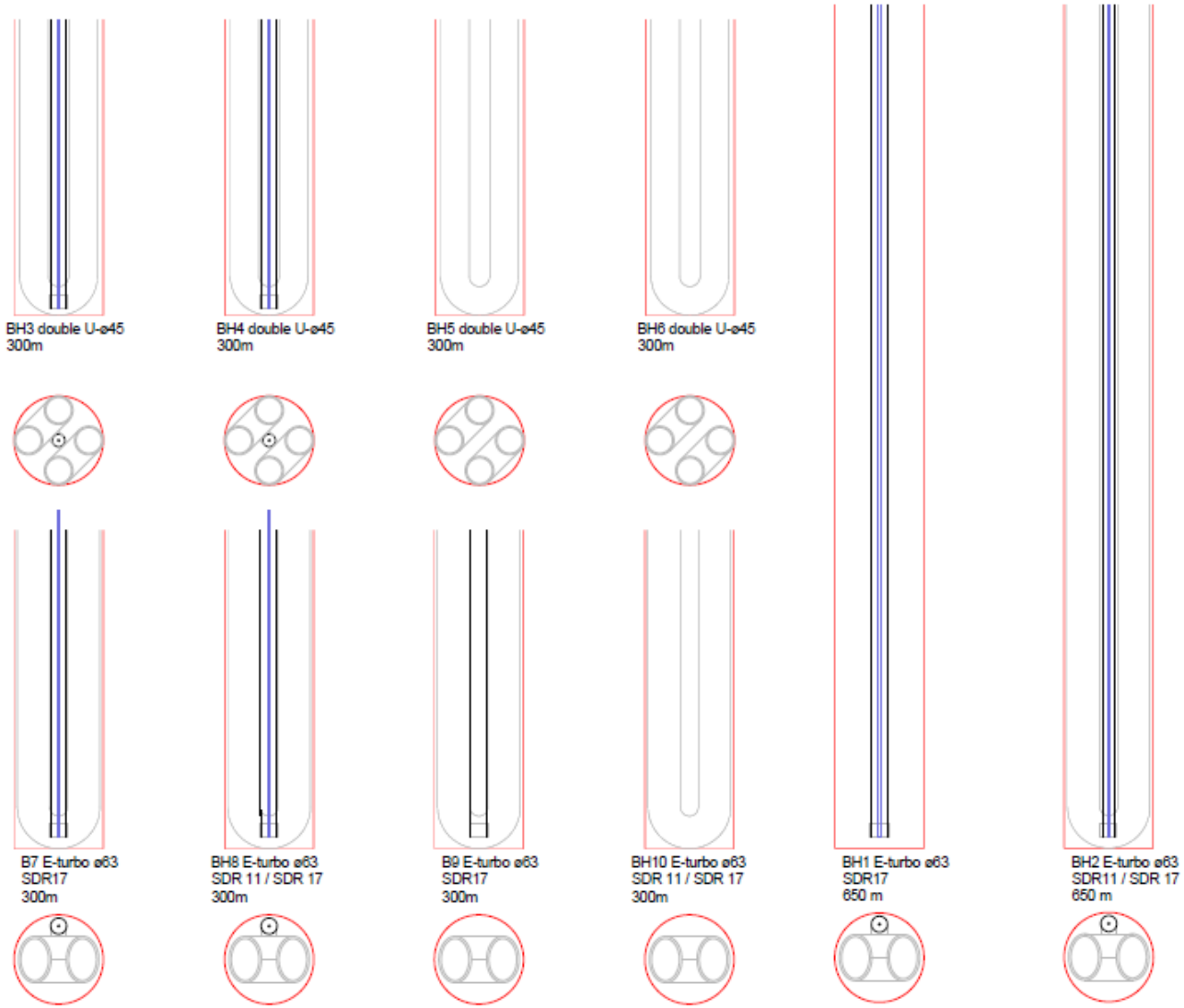
The Geothermal Heat Pump Project at UiS

Research activities

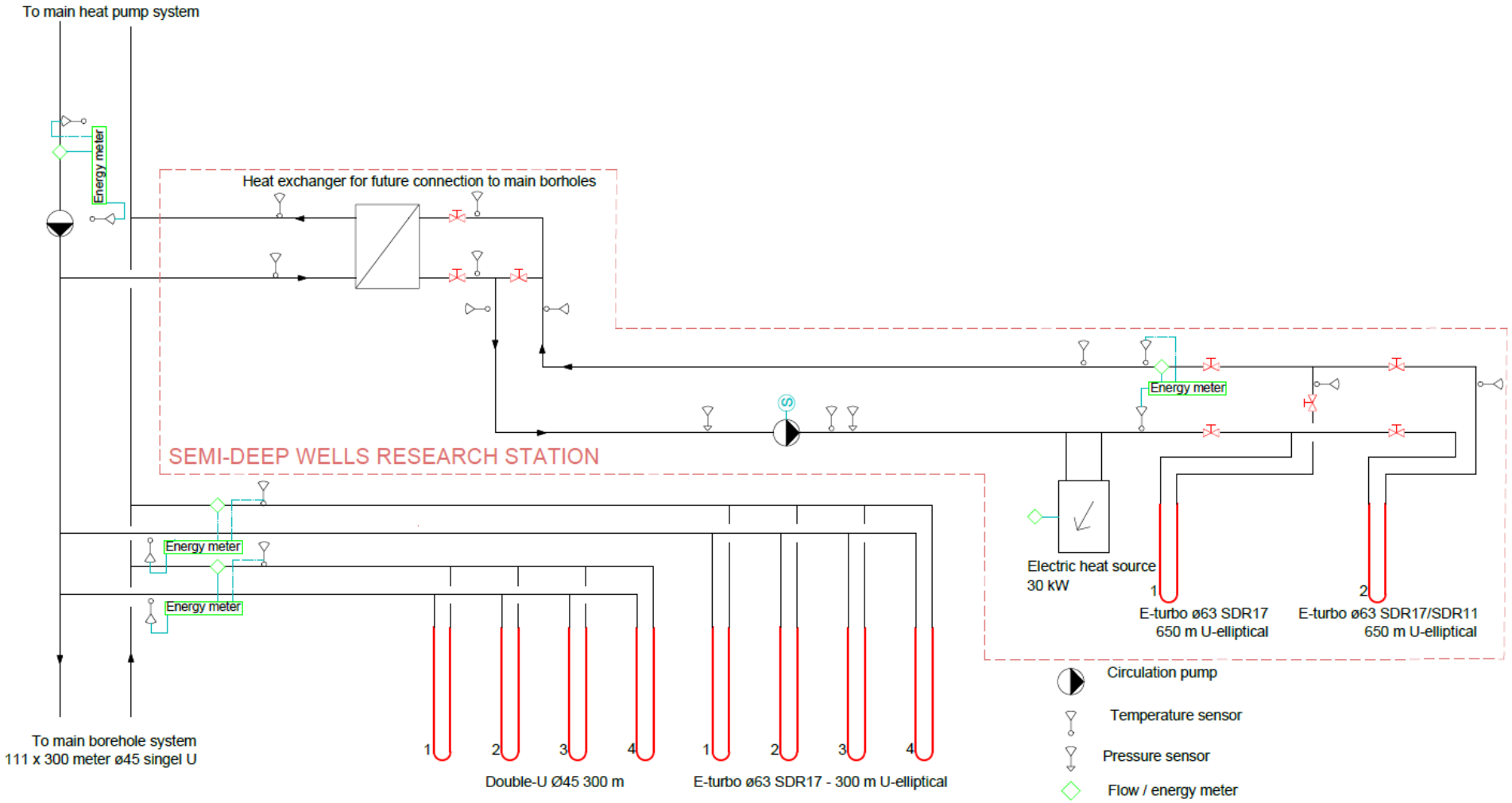
1. Semi-deep boreholes (650 meters),
2. Alternative borehole collectors,
3. Distributed temperature sensing,



(b) Borehole 12



The Research Station



2024-01-23 – From Semi-Deep Drilling

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2024-02-08 – Status Semi-Deep Drilling

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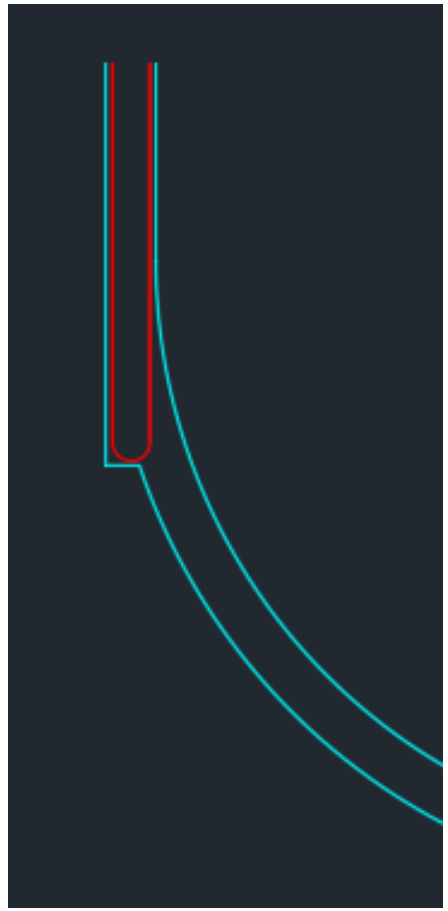

2024-03-01 – Status Semi-Deep Drilling

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2024-03-12 – Status Energy Plant Building

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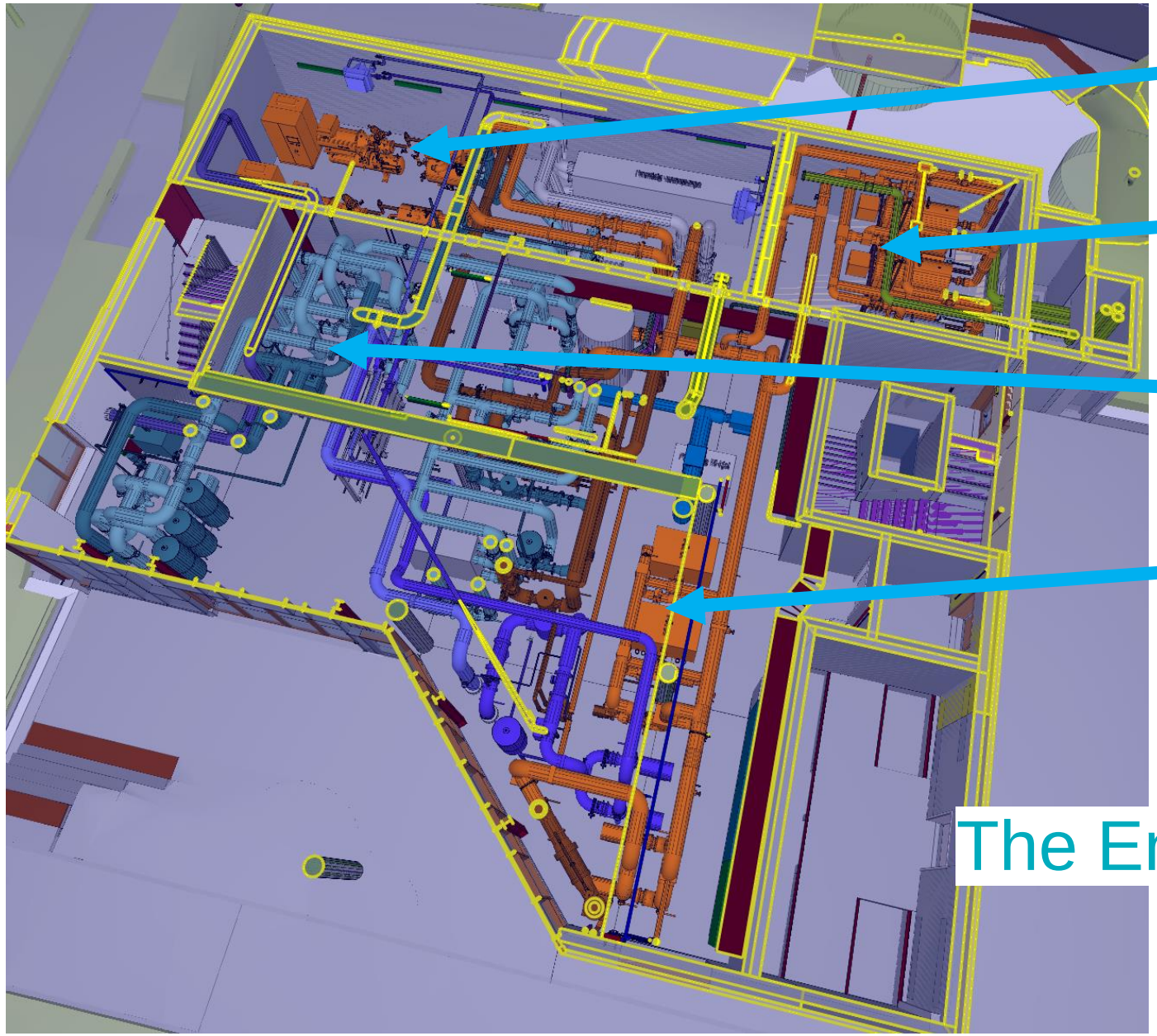

Heat Pump Room

Gas Boiler Room

Evaporator Side System And Cooling distribution

Electric Boilers and Heat distribution

The Energy Plant

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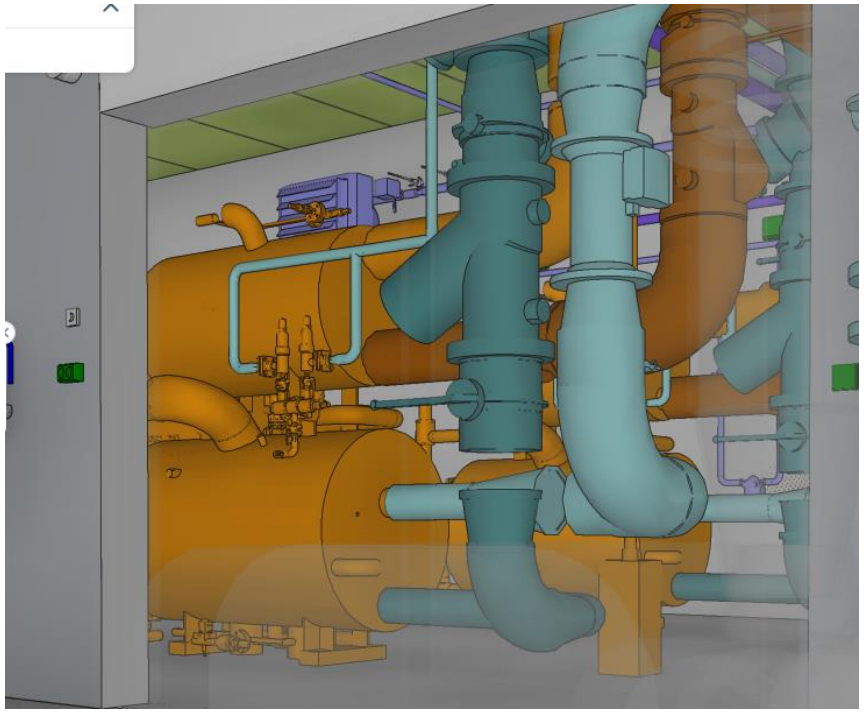

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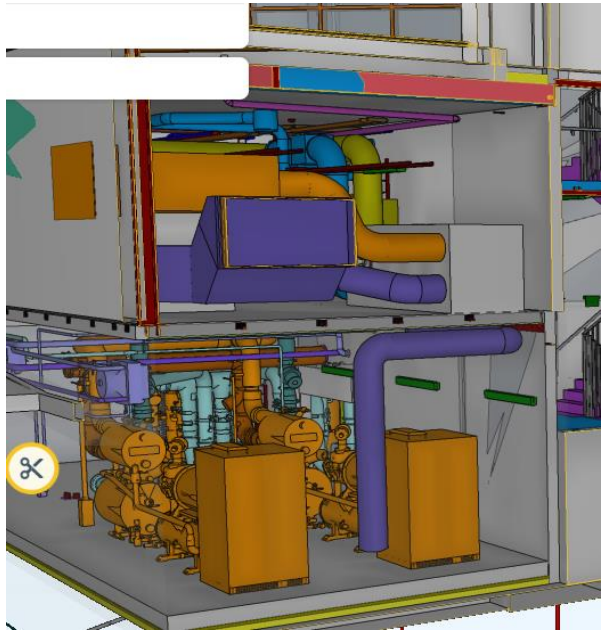
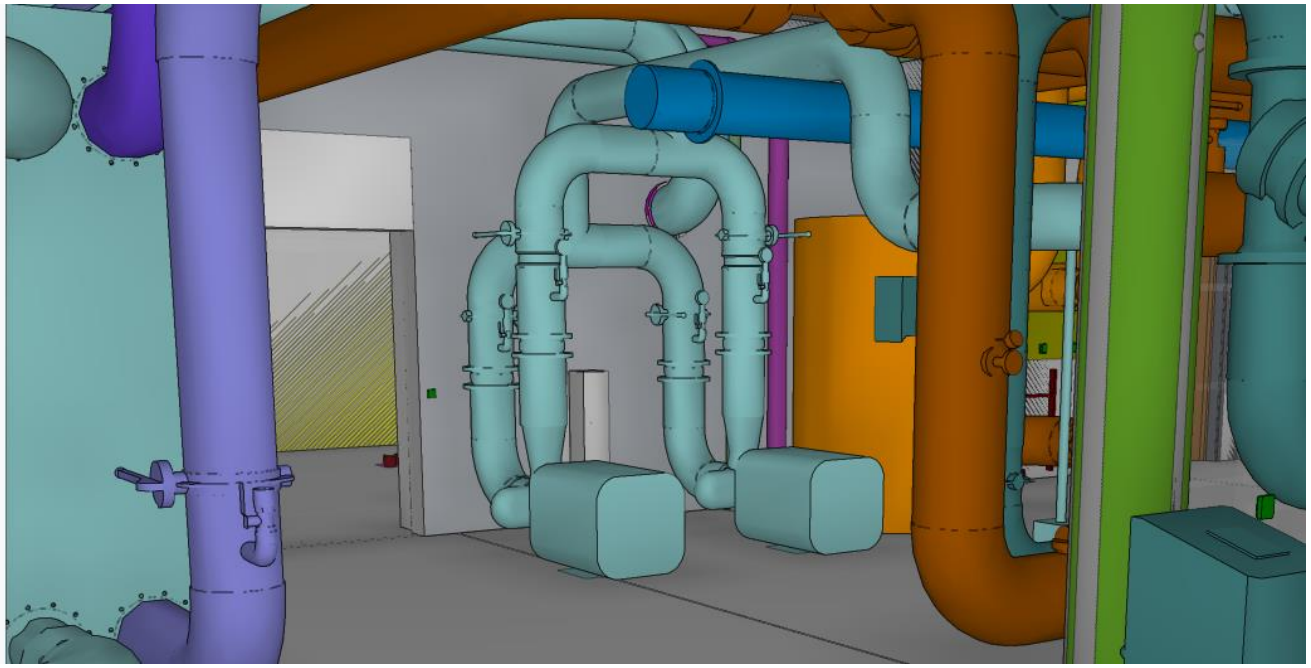
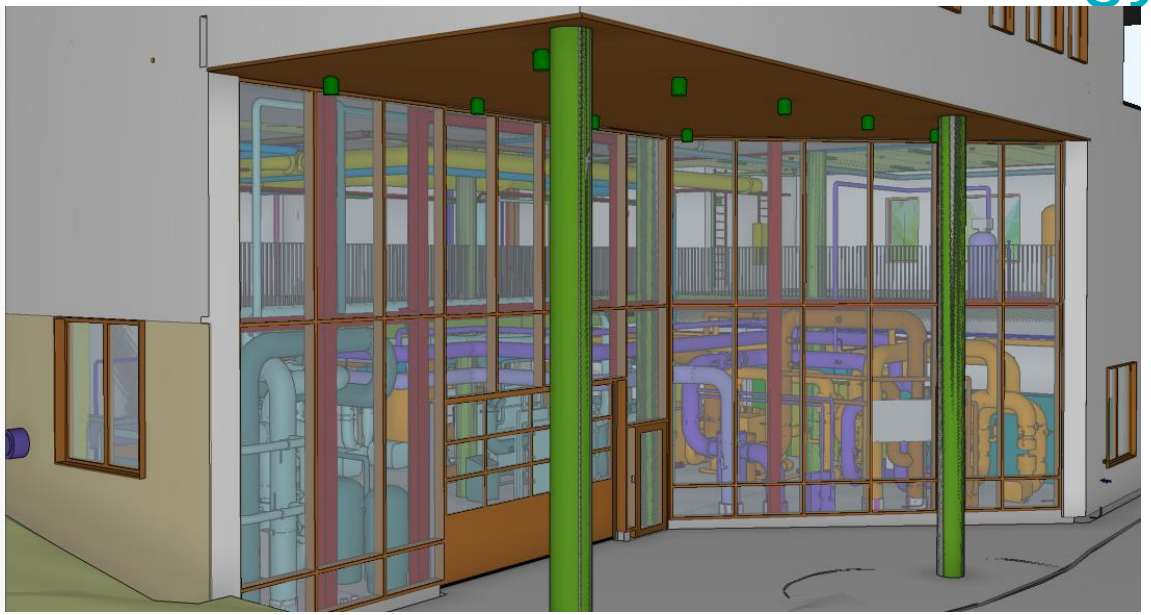


The Heat Pump(s)



From The Energy Plant



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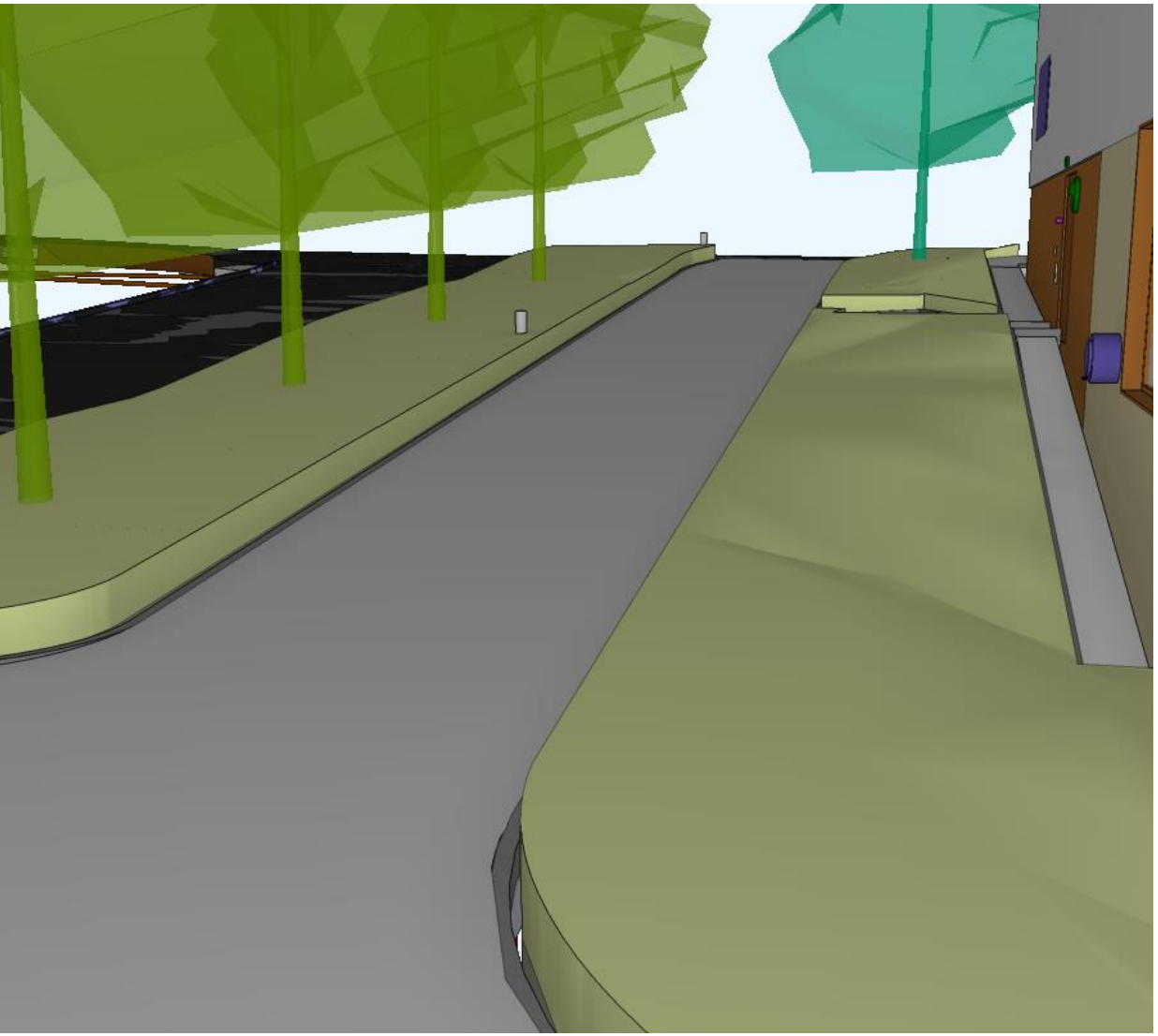
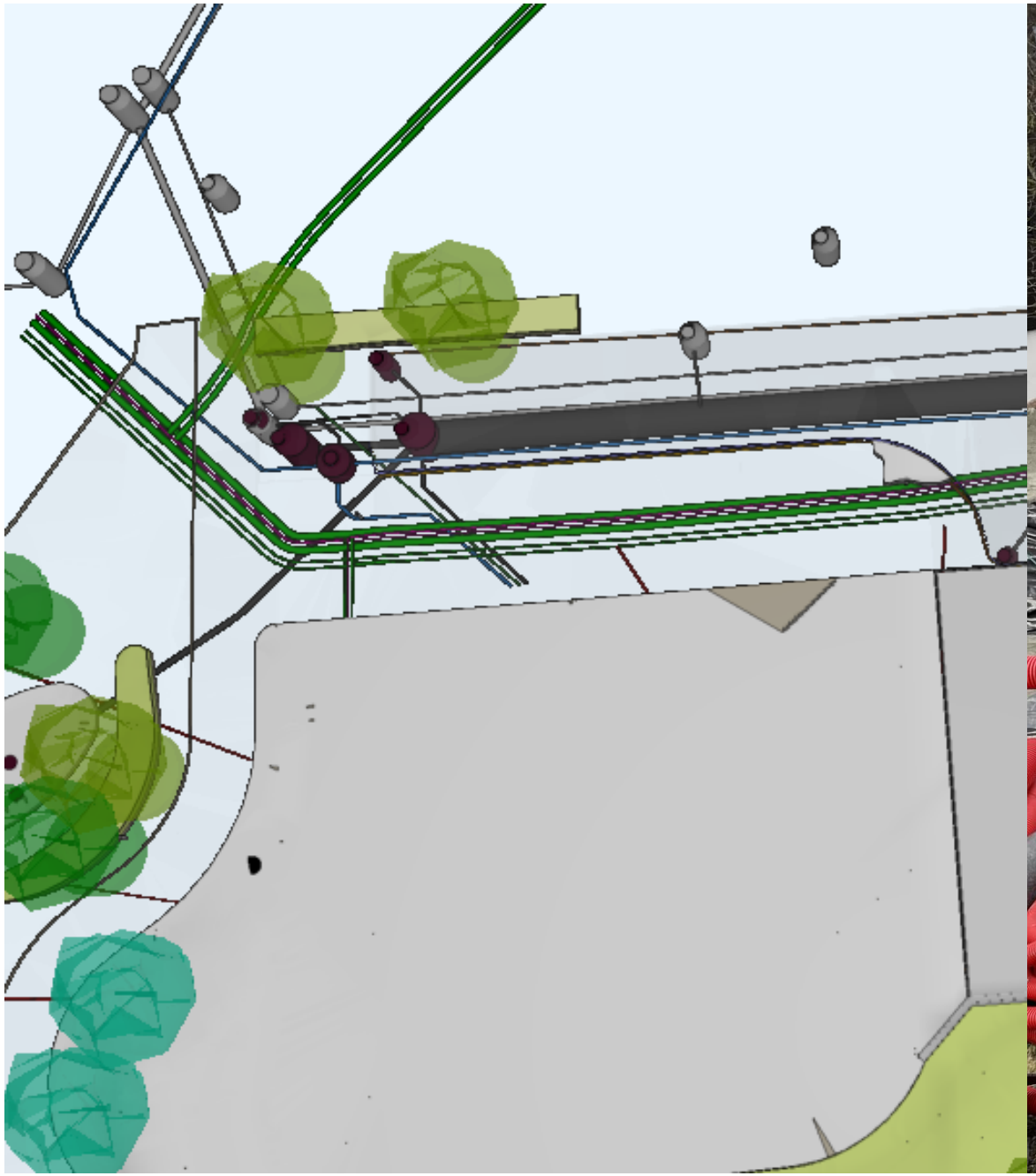


Piping in the Ground



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Thank you for your attention!