TownRock Energy

“Geothermal heat with every beat”

The BODYHEAT project two years into operation

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Feb 2025

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Part 1

Background

A Client with a Strong Net Zero Vision

- SWG3 – a multi-disciplinary art space in Glasgow's West End.
- Client committed to hitting net-zero carbon emissions by 2025 or sooner.
  - Were looking for a more sustainable heating and cooling solution.
- TownRock Energy, with Harley Haddow, devised **BODYHEAT** – an innovative geothermal heating and cooling system.

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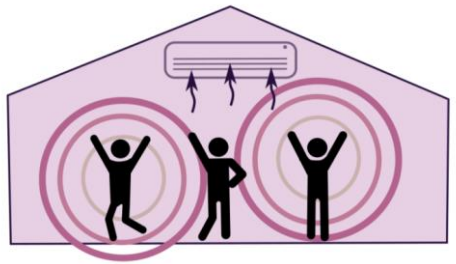
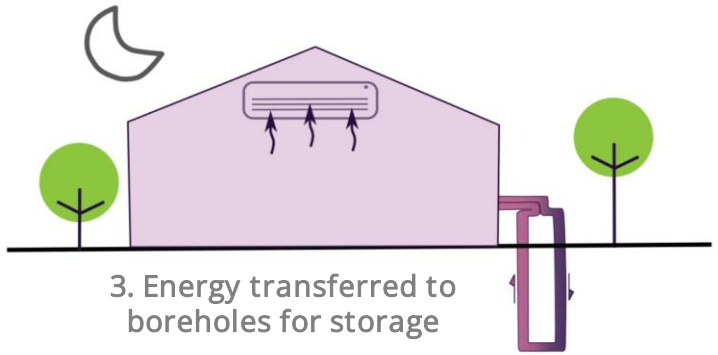
BODYHEAT System

- SWG3 previously used gas-fuelled heating and had limited capacity air conditioning.
- The BODYHEAT concept was to capture (not vent) the heat recovered during cooling.
- Heat stored in boreholes to provide heating day, weeks or months later.
- SWG3 has a very good potential for storing heat.

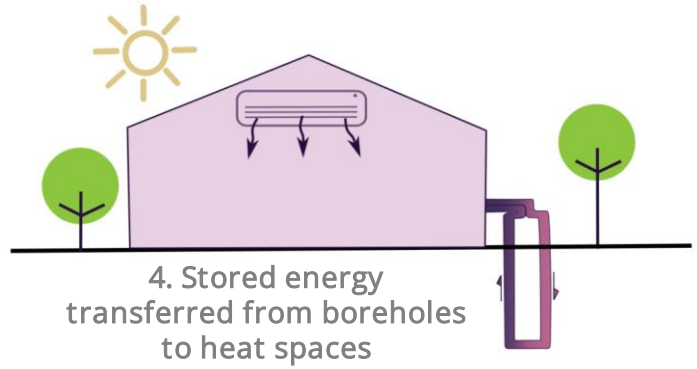


1. Dancing crowd releases energy

2. Energy captured



3. Energy transferred to boreholes for storage



4. Stored energy transferred from boreholes to heat spaces

BODYHEAT System

- Ground source system with 12 boreholes.

- Closed-loop borehole array drilled in an “Open-U” configuration, with 8 m spacing, in the SWG3 garden.

BODYHEAT System

- Heating and cooling provided by two ground source heat pumps and a plate heat exchanger.

- Heating and cooling provided to:
  - TV Studios
  - Galvanizers
  - Foyer
  - Yardworks

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Part 2

Challenges & Mitigations

Challenges

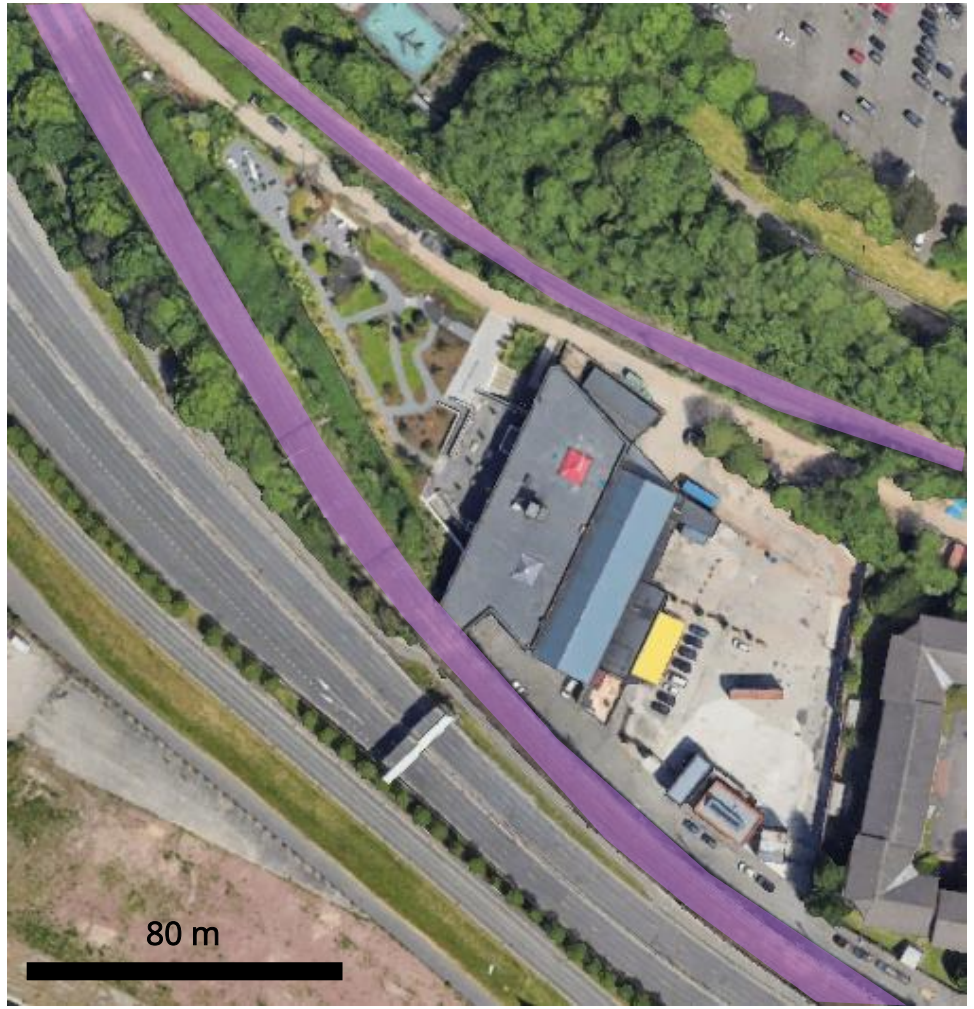
- Three key challenges during design and implementation stages:

1. **Uncertain future heating and cooling loads**

Challenges

- Three key challenges during design and implementation stages:

1. Uncertain future heating and cooling loads
2. **Confined space for borehole location**



Challenges

- Three key challenges during design and implementation stages:

1. Uncertain future heating and cooling loads
2. Confined space for borehole location
3. **Project cost/timeline growth and COVID difficulties.**

Mitigations & Replanning

1. Uncertain future heating and cooling loads

→ Increased heating load would help stabilise borehole temperatures.

2. Confined space for borehole location

→ Commissioned detailed geotechnical studies.

→ Worked closely with garden designer.

3. Project cost/timeline growth and COVID difficulties

→ Split project into phases, reduced BMS and project management budget.

→ Designed and installed low-cost data collection post completion.

Part 3

Project Execution

Borehole Installation

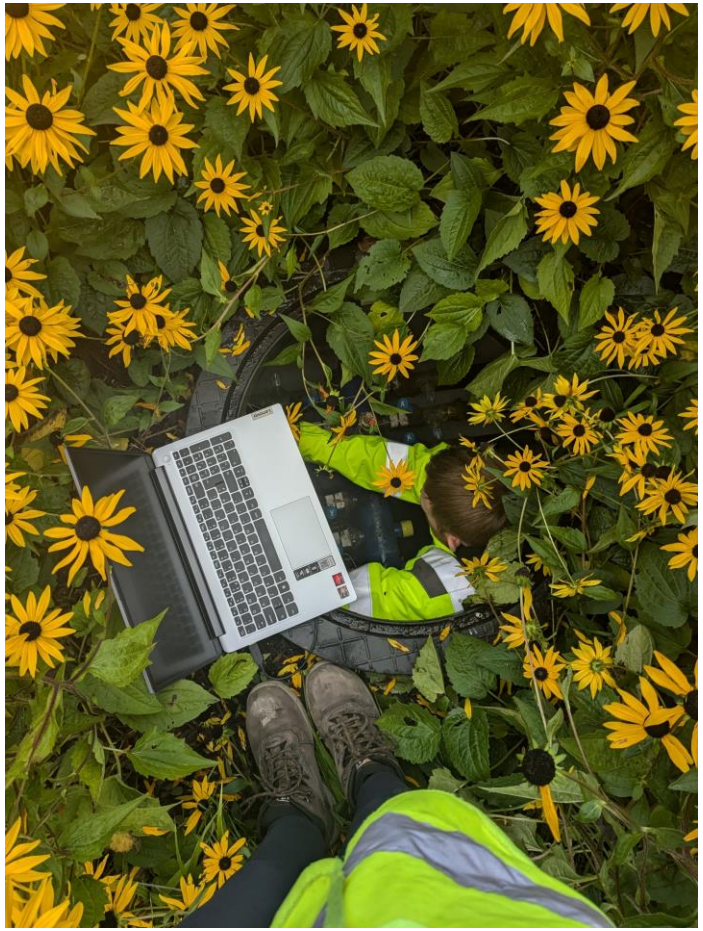
- Twelve 115 mm diameter boreholes to 200 m depth. Steel casing to 20 m depth.
- 40 mm SDR11 PE100 U-tubes, batch grouted.
- Fairly rapid compressed air drilling – one borehole per day.

Header Pipe Installation

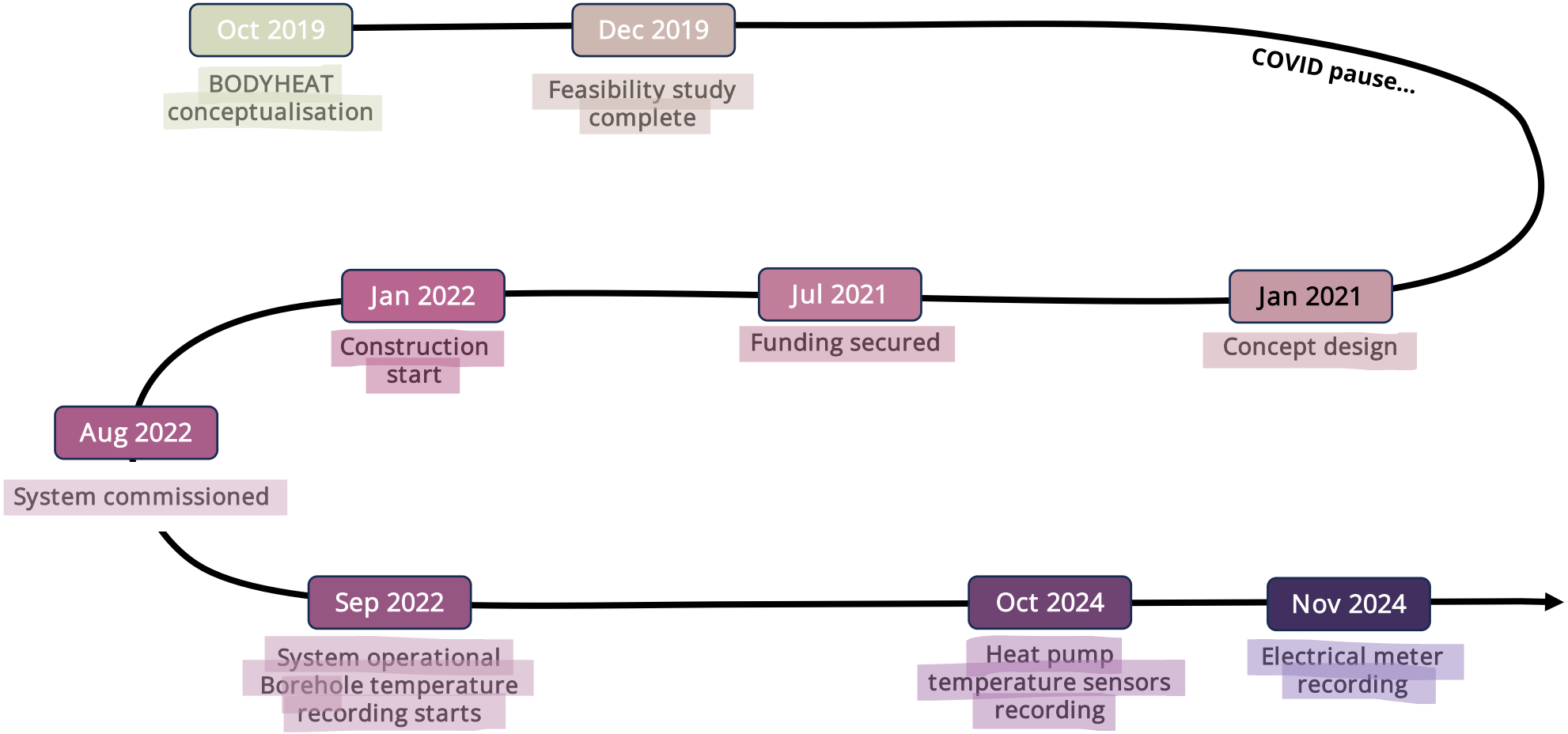
- 40 mm SDR11 PE100 pipes from each borehole to manifold.
- 1100 mm deep manifold with air vents, shut-off valves and balancing valves.

Operation

- Commissioned August 2022.
- BODYHEAT now operational for over 2 years.
- Data from temperature sensors collected throughout this time
- Garden flowers now camouflage the manifold cover rather successfully!



Timeline



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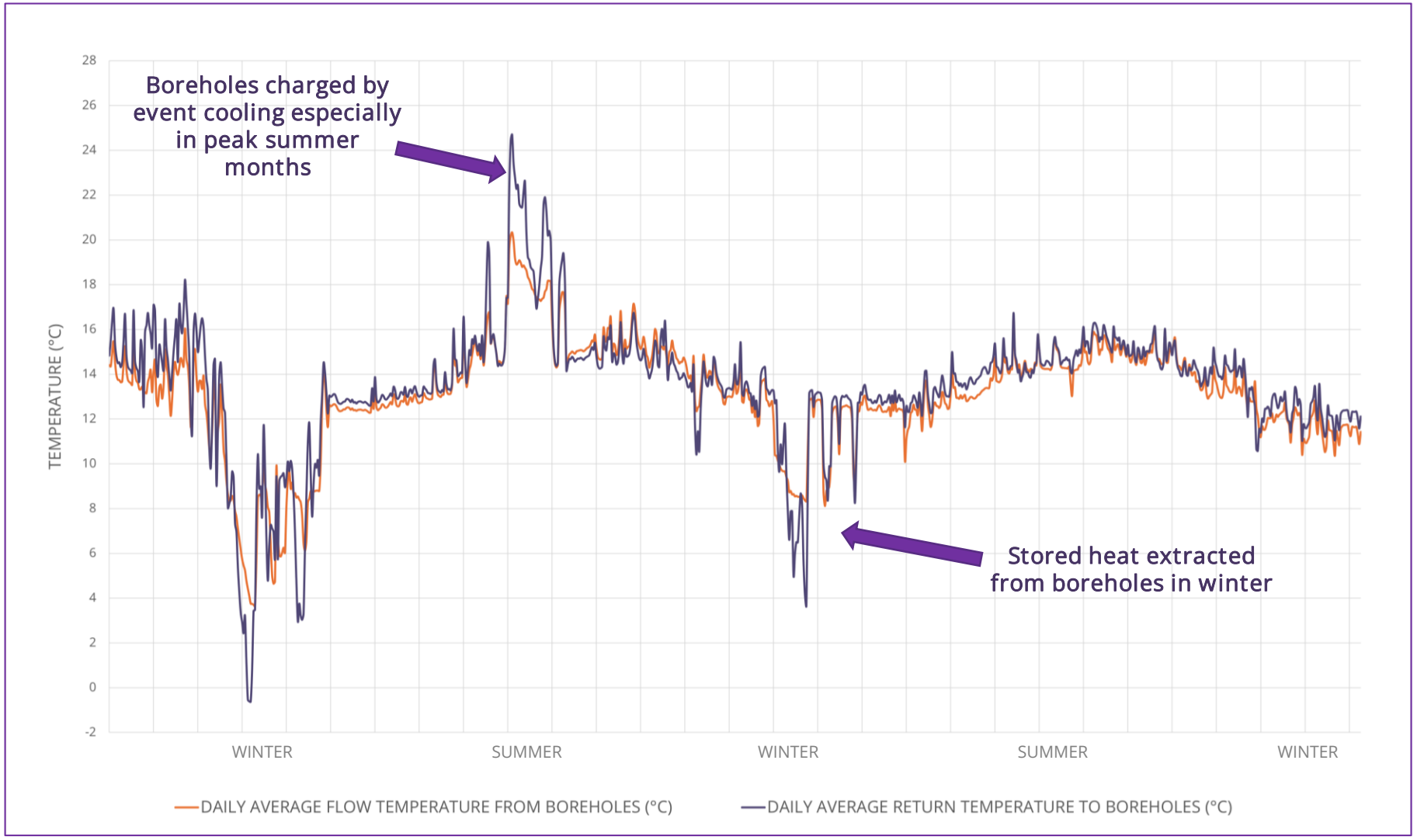
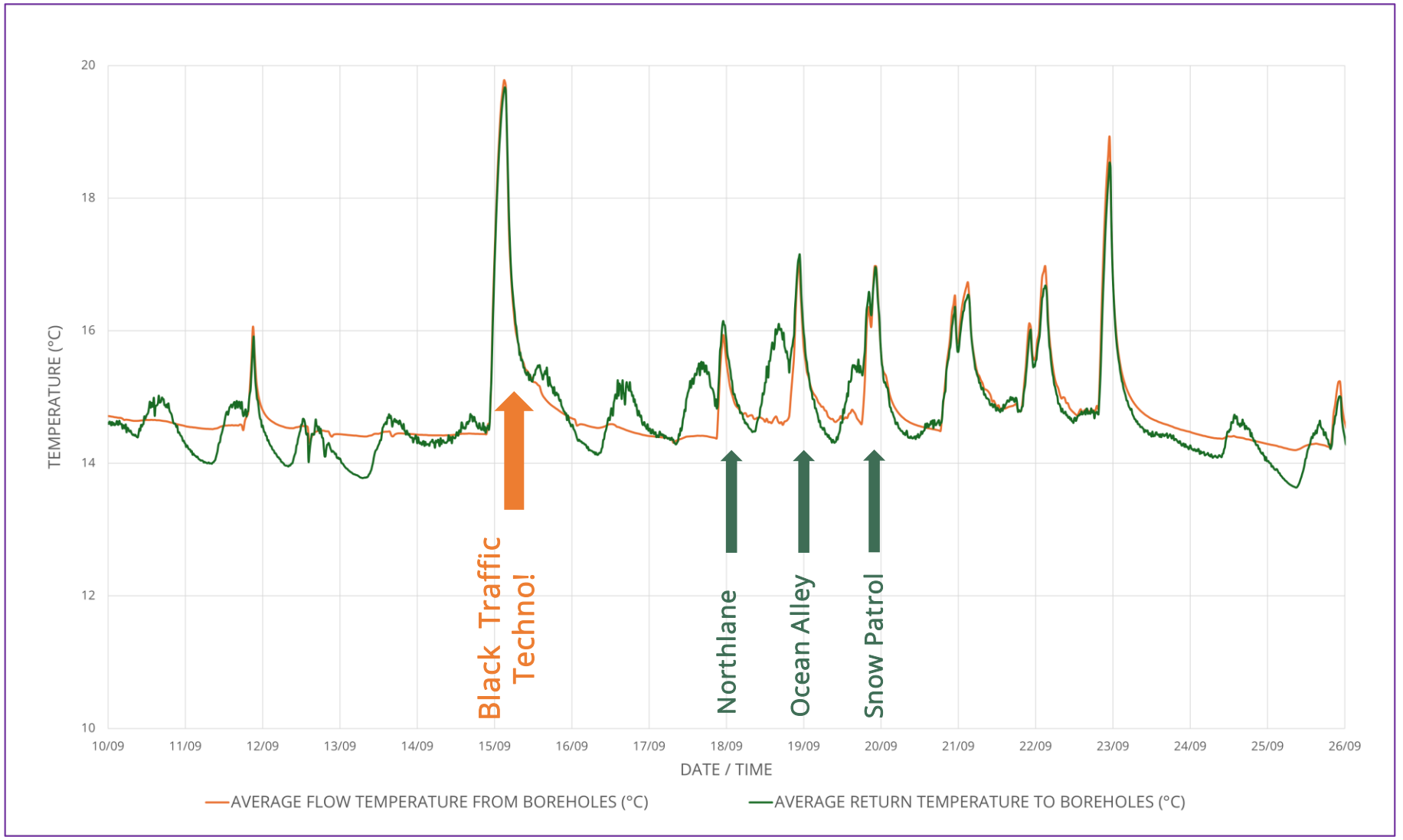
Part 4

Operation & Performance

Borehole Temperatures



Cool(ing) Events



Comparison with modelled data

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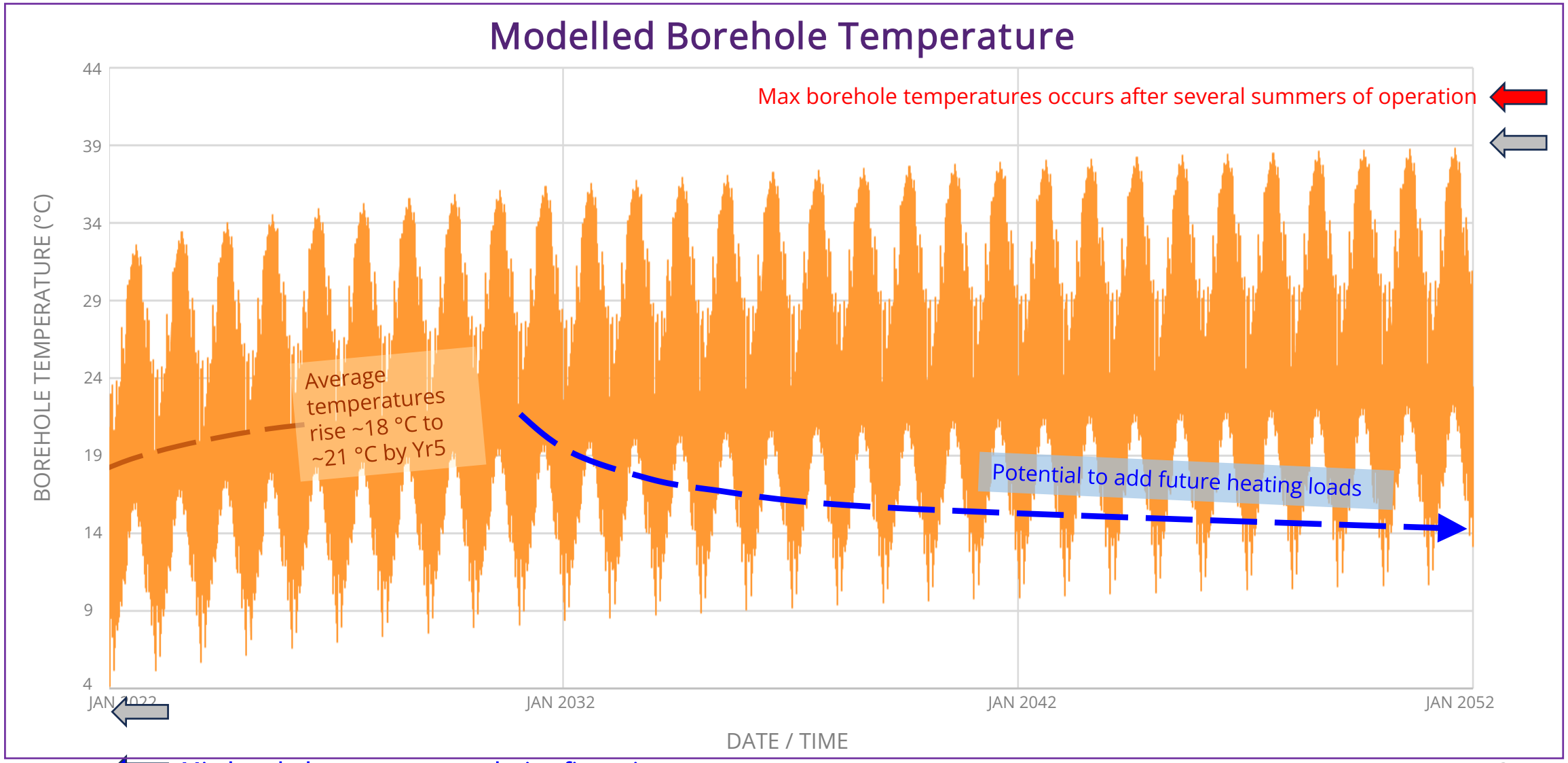
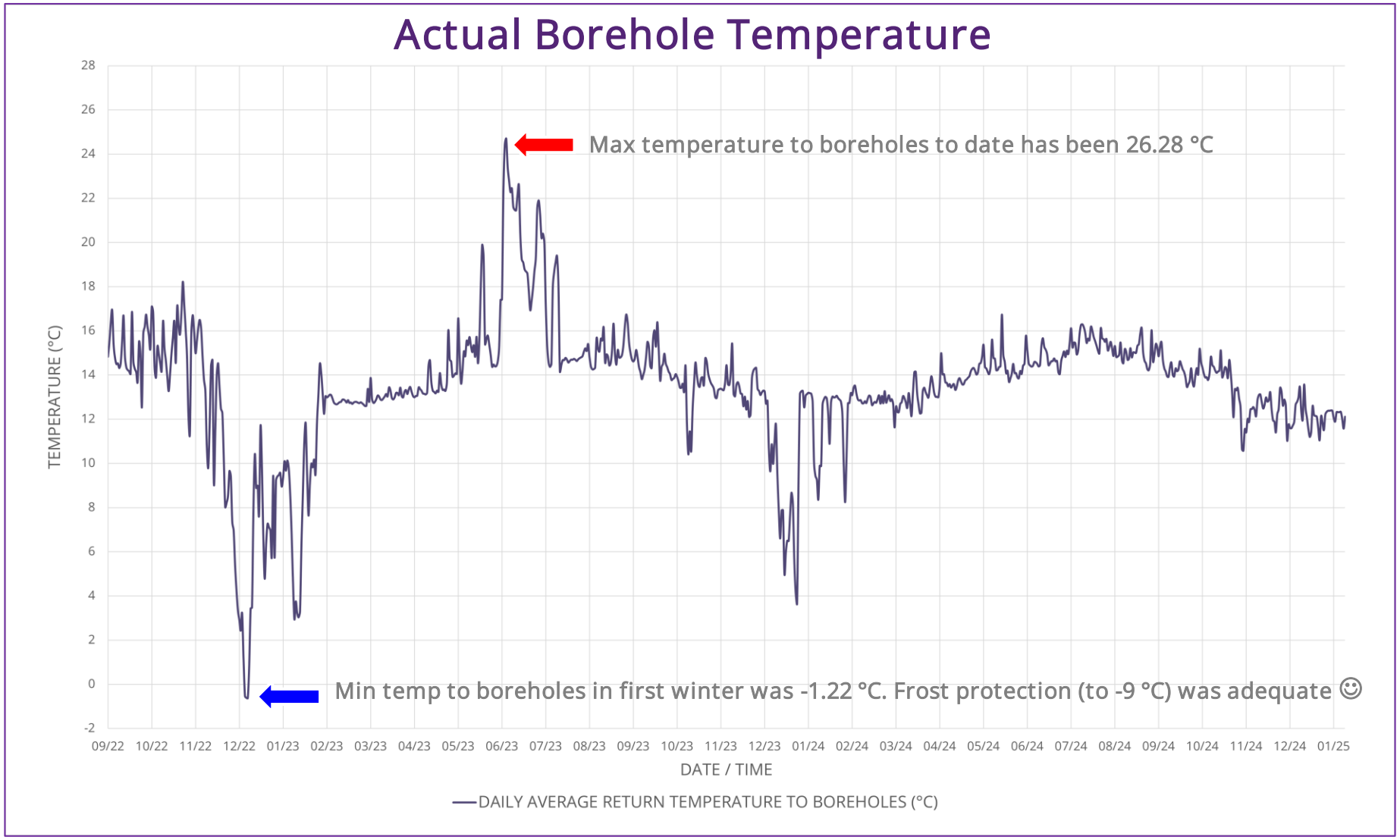


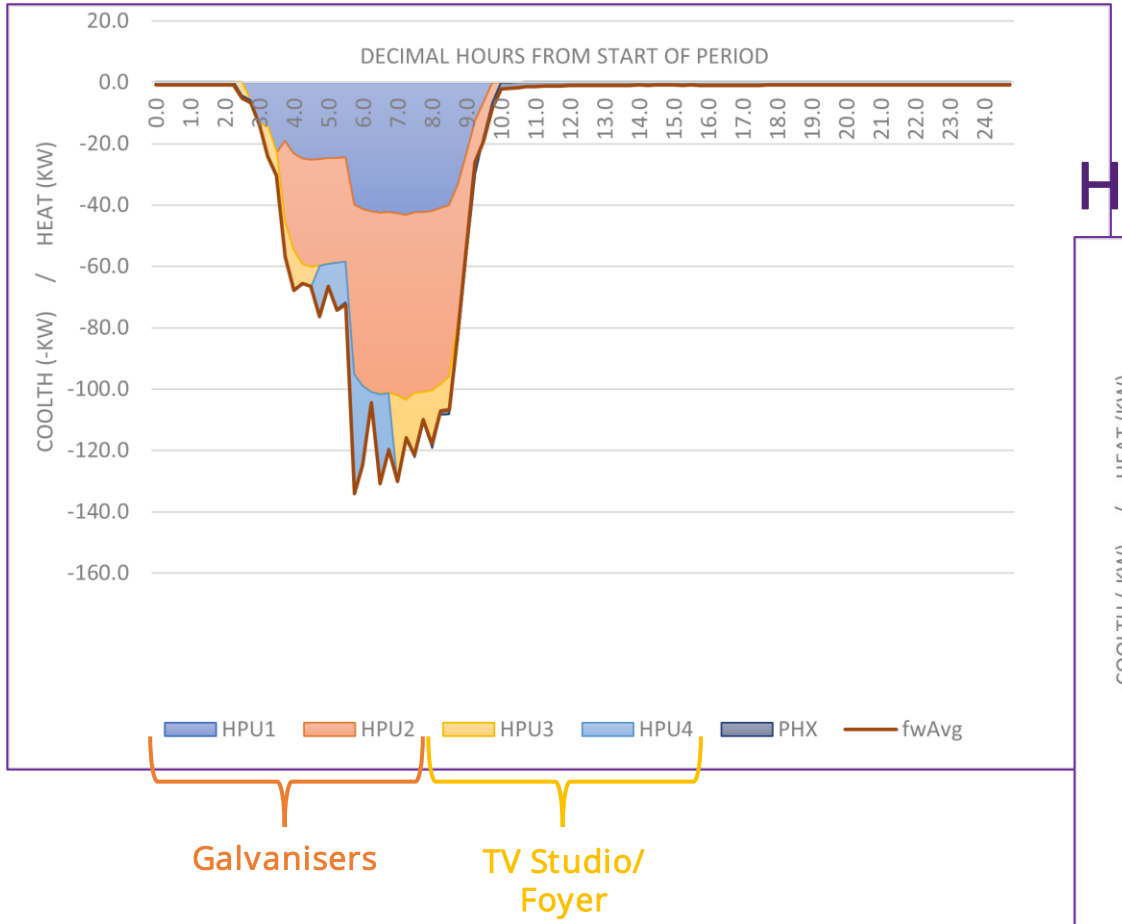
Comparison with modelled data



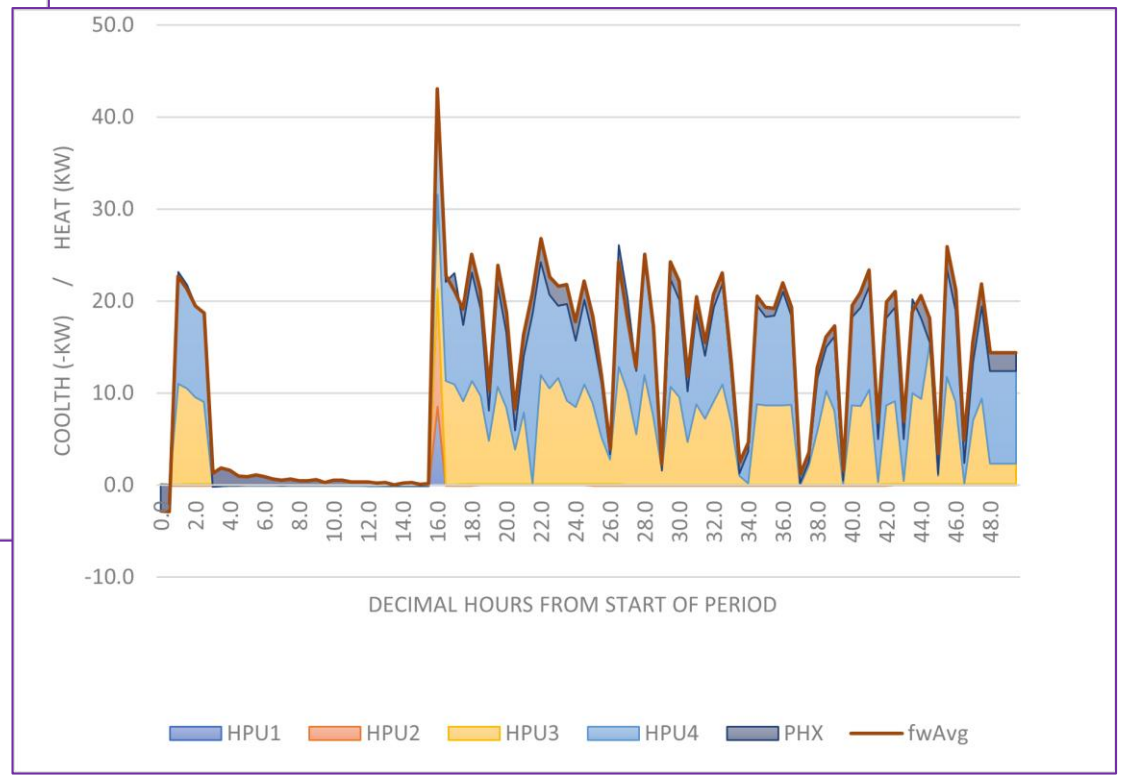
Actual average borehole temperature unchanged from Feb 2023 to Feb 2025. Inconclusive without load data.

Heating/Cooling data

Cooling period: 2nd November 2024



Heating period: 19th November 2024



Conclusions

Key takeaways:

- Detailed planning at design stage crucial.
- Relatively comprehensive analysis can be done with low-cost instrumentation.
- This does have its limits – longer term aim to install a comprehensive BMS.
- Initial conclusions:
  - Boreholes are performing well.
  - **BODYHEAT is keeping eventgoers cool!**

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Thank you for listening

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Date:
Feb 2025