

25 March 2024

**Opportunities for minewater
heat in County Durham**

**Report of Alan Patrickson, Corporate Director of Neighbourhoods
and Climate Change**

Electoral division(s) affected:

Countywide

Purpose of the Report

- 1 The purpose of the report is to provide members of the committee with further information on the opportunity with regards to taking heat from flooded, dis-used coal mines in County Durham.

Executive summary

- 2 Work is ongoing to identify if and where there are opportunities for heat recovery from disused coal mines in County Durham. By recovering this heat, we could use it to heat homes and businesses locally via a heat network. This work will assess heat sources, including minewater heat and other (such as heat from rivers, sewage, industry etc) and anticipate where heat network zones will be located.
- 3 This work is incredibly important as heat accounts for around half of the County's and Council's greenhouse gas emissions. This therefore needs to be tackled urgently if we are to achieve our net zero targets (Net zero by 2030 and 2045 for the council and county respectively.)
- 4 Whilst disused, flooded coal mines do provide us with an opportunity, there is no one size fits all solution, and it will not be appropriate everywhere. For example, other heat recovery from other sources such as sewage and rivers could be a more cost-effective alternative where minewater is not already pumped to the surface for treatment. The heat source should be assessed for individual heat networks on an

individual, case by case basis to ensure that the heat network is economically sustainable and therefore can pass on those savings to consumers.

Recommendations

- 5 That the Environment and Sustainable Communities Overview and Scrutiny Committee notes the potential for heat networks across the County

Background

- 6 County Durham's coal mining heritage has provided us with an opportunity; to recover heat from warm water that has flooded dis-used coal mines. The Coal Authority estimate that there are 23,000 abandoned deep coal mines around the UK, and each is likely filled with water which has been geothermally warmed to around 12-20 degrees Celsius, some of this heat can be extracted and used. The North East Local Enterprise Partnership (LEP) have developed two whitepapers in relation to heat networks, focussing on those with the following heat sources: minewater and geothermal more generally.
- 7 Heat can be recovered from the mine water by heat exchangers and used to heat fresh water which can then be distribute by a heat network for use. A heat network is defined as a series of pipes carrying warm water from a central source to offtakers/customers.
- 8 Heat networks are source agnostic, this means that different and even multiple sources of heat can be used. Sources can include, but are by no means limited to sewage, rivers, geothermal heat, natural gas, biogas, air, biomass boilers, energy from waste plants, and industrial waste heat. Of course, given the climate and ecological emergencies, we should only be exploring low carbon heat sources that do not use fossil fuels, excluding natural gas as a heat source.
- 9 The Coal Authority (hereby referred to as the Authority) is an executive non-departmental public body, sponsored by the Department for Energy Security and Net Zero. In County Durham, and indeed across the UK, the Authority has the responsibility of dealing with property and historical liability issues, for example environmental projects, mine water treatment schemes and surface hazards relating to past coal mining and providing access to coal mining information. As part of this remit, the Authority must treat minewater where there is a risk of it contaminating local drinking water supplies by first pumping said water to the surface.
- 10 Where minewater is not pumped to the surface for treatment, and a minewater heat scheme is of interest, there would be a need to drill

deep into the ground, in the hope that one would hit water. There would then be a requirement to pump that water to the surface.

- 11 Drilling into coal mines is also a risk from a H&S and logistical perspective. Opening sealed coal mines can lead to harmful gases being released into the atmosphere that would have remained undisturbed and by nature, mine records are old and often inaccurate. Therefore, there is a risk that you will spend millions of pounds to drill into a mine that is in a different location than previously thought.
- 12 Durham County Council has two live minewater heat projects, both sites have a minewater pumping station, i.e., where mine water is pumped to the surface. These sites are Seaham Garden Village and Horden Minewater Project. A Techno-Economic Feasibility Study, completed in May 2023, suggested a minewater heat network could indeed be feasible under certain conditions, in Horden and the project has received further funding for the detailed project development stage to be completed by July 24. Seaham Garden Village, a development of 1,500 new homes is under construction.
- 13 In Gateshead, 350 homes, council and privately owned offices, a college and an arts centre have been supplied with heating by a minewater heat scheme. This is excellent example of mine water heat. In 2021 work began on an extension to the network, involving the construction of a 6MW heat pump energy centre, which uses water from abandoned coal mines 150 m below ground. Accompanying this is a 5km network extension to Gateshead Stadium. The scheme is owned and operated by Gateshead Council.
- 14 Although the two live heat network projects that DCC (and Gateshead's scheme) have are focussed on minewater heat, where other heat sources are available, they should all be assessed to ensure that the scheme is viable and sustainable from an environmental and financial perspective. Economically viable schemes can pass on savings to customers tackling fuel poverty, as well as tackling the climate emergency by tapping into low carbon heat sources.
- 15 An example of a relatively local scheme making use of alternative heat sources is the Viking Energy Network in Jarrow. This scheme uses river water as a heat source. Slightly further afield, the Leeds Pipes scheme uses waste heat from an Energy from Waste plant.
- 16 Heat networks are predicted to grow rapidly in the UK over the next two decades and the UK Government has predicted that nearly 20 % of UK heat demand will be provided by heat networks in 2050, up from 2 % currently. The ever-growing popularity of heat networks will be further accelerated through the incoming Heat Network Zoning Regulation. This regulation, expected to be introduced in 2025, was part of the

Energy Act 2023 and will identify where heat networks are the lowest cost solution to decarbonising heat in an area and can mandate that commercial buildings connect.

- 17 Alongside heat network zoning legislation, heat networks have growing in popularity as they can be low carbon, use currently wasted resources, provide price stability to offtakers, tackle fuel poverty, improve energy security and can create skilled jobs locally.
- 18 The council appointed the Centre for Sustainable Energy, who are also involved in the heat network zoning methodology development, to develop a series of maps with the intention of showing where in County Durham a heat network could be suitable. This work will consider vulnerability of customers, heritage, sensitivity of area, potential offtakers/customers, potential heat source(s) among other factors. This work will complete by April 2024. Once this has been completed, the proposals will be assessed, and appropriate grant funding will be sought.
- 19 Grant support is available in the UK for the development of heat networks, the Heat Networks Delivery Unit provides revenue funding for project development (up to 66 %) and the Green Heat Network Fund provides capital grants for commercialisation and construction (up to 50 %, in practise this is more like 33 %). BHIVE and other schemes can also help the public sector attract private investment.
- 20 To ensure the council has sufficient knowledge and expertise a council officer is partaking in the knowledge sharing workshops organised by DESNZ and the Danish Board of District Heat, as well as becoming a qualified Heat Networks Consultant through the Chartered Institute of Building Service Engineers and taking part in the Heat Exchanger Mentorship program.

Conclusion

- 21 The UK government has set targets for heat networks to provide 18 % of the UK's heat demand by 2050, up from around 2 % currently. Heat networks can be low carbon by tapping into centralised and non-fossil fuel heat sources; by using waste heat sources we can generate heat cheaper and pass on these savings to consumers and reduce emissions associated with heating, therefore tackling fuel poverty and climate change. Whilst minewater is a potential heat source, it likely only makes financial sense where it is already pumped to the surface for treatment as it can be a less cost-effective heat source than alternatives. Therefore, whilst heat networks should and are being prioritised in County Durham, the source(s) should be assessed on a case-by-case basis.

Background papers

- [Minewater Whitepaper](#)
- [Geothermal Whitepaper](#)
- [Kimble et al research paper on geothermal in Durham](#)
- [Heat Network Zoning](#)

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Appendix 1: Implications

Legal Implications

Not applicable

Finance

Not applicable

Consultation

Not applicable

Equality and Diversity / Public Sector Equality Duty

Not applicable

Human Rights

Not applicable

Climate Change

Heat networks are part of the solution to tackle emissions associated with heating homes and businesses across County Durham.

Crime and Disorder

Not applicable

Staffing

Not applicable

Accommodation

Not applicable

Risk

Not applicable

Procurement

Not applicable