

**Scottish Renewables written evidence to the House of Commons
Environmental Audit Committee inquiry into Technological Innovations
and Climate Change: Geothermal Technologies**

About Scottish Renewables

Scottish Renewables is the voice of Scotland's renewable energy industry, working to grow the sector and sustain its position at the forefront of the global clean energy transition. We represent around 300 organisations across the full range of renewable energy technologies in Scotland and around the world, ranging from energy suppliers, operators and manufacturers to small developers, installers, and community groups, as well as companies throughout the supply chain.

Executive Summary

Scottish Renewables welcomes the opportunity to provide written evidence to the House of Commons Environmental Audit Committee inquiry into Geothermal Technologies. Our submission focuses on geothermal in Scotland, with particular reference to the scaling up of district heat networks.

It is our position that the disused, abandoned mines in the Central Belt of Scotland are a potential heat source for heat networks and would aid both the UK Government and The Scottish Government to meet climate change and fuel poverty targets. It is our view that there needs to be a regulatory system and clear strategy for geothermal technologies in the UK to maximise the economic benefits and secure a just transition away from fossil fuels.

Written Evidence

What role can geothermal technologies take in the transition to net zero in the UK?

1. Geothermal technologies are vastly unexplored as a potential heat source for heat networks. Both UK and Scottish Government have committed to the rapid deployment of heat networks to help decarbonise heat and meet climate change targets.
2. Geothermal technologies are not dependent on weather conditions, can provide good seasonal thermal storage and a dependable energy source to balance the variability of renewable energy sources, like wind or solar, therefore contributing to energy security.
3. Geothermal could utilise the flooded mines under our large cities and be a potential heat source for heat networks. Leading to city scale heat networks providing low-carbon, renewable and affordable heat which could help to alleviate fuel poverty. Old disused and abandoned mine workings can be reused, contributing to a circular economy.
4. Utilising geothermal technologies can help to support a just transition away from oil and gas industries; specialist skillsets relating to drilling for oil and gas can be transposed to geothermal.

What barriers (technological, regulatory, or otherwise) are there to deploying operational geothermal technologies in the UK?

5. There are currently barriers which prevent the deployment of operational geothermal technologies, these are:

The lack of exemplar projects to showcase 'learning by doing'. There are only two small mine water schemes in Scotland: Shettleston in Glasgow and Lumphinnans in Fife, which are no longer operational.

There is not a clear funding picture across the UK. For example, The Scottish Government's Scotland's Heat Networks Fund cannot support projects that are at the research and development stage or to develop technologies not yet commercially viable The UK Government's Green Heat

Networks Fund does support the accessing of heat sources, including geothermal. Companies operating across the UK may find the uncertainty of the funding landscape to be a barrier to their development of heat networks.

Additionally, the cost of drilling is a major barrier for these projects moving forward.

This technology is not considered in the UK 6th Carbon Budget, therefore there is a lack of awareness about its potential and what it could contribute to the diverse energy mix we need to address climate change.

There is no specific regulatory system for geothermal energy; instead, there is a repurposing of various regulatory systems used for petroleum exploration or water use and protection, for example, via the Scottish Environment Protection Agency. Therefore, a specific geothermal regulatory system and regulator would be desirable.

There is not yet a route to market for the geothermal sector. It could become operational if treated similarly to other renewable technologies. For example, offshore wind is developing quickly as it has government support, ambitious targets and a finance stabilisation mechanism.

Therefore, geothermal technologies in the UK could be greatly helped by the addition of targets, and inclusion in future Carbon Budgets, with a clear strategy as to how these targets would be achieved. This will help to maximise the economic benefits of geothermal and secure a just transition away from fossil fuels.

What is the scale of the potential market for geothermal energy sources and which geographic or other geological types are most suitable for exploitation of this natural resource?

6. Many actors recognise the huge potential of harnessing geothermal energy to generate electricity or heat. There are potentially substantial geothermal reserves and these would have minimum impact on the environment¹ A clear roadmap is needed to capture the benefits and set out the considerable potential of this technology.
7. Research carried out by the British Geological Survey in 2013 examined Scotland's Midland Valley (Central Belt) which has a network of abandoned mines. These mines, many of which are flooded, could play an important role in providing access to thermal reservoirs which could help to heat homes and buildings. The heat trapped in 600km³ of deserted mine-workings in the Central Belt of Scotland is expected to address up to 8% of Scotland's domestic heating demand.
8. In 2004, the Scottish National Mine Water Potential Study assessed the 62 largest coal mines in Scotland. This study considered the potential for mine water heating at Shawfair near Edinburgh. Shawfair is a new town being built on the former site of Monktonhall Colliery.² The study calculated that mine waters could contribute up to 1,708 gigawatt hours (GWh) per annum of heat if grants were provided. Many feasibility studies have been carried out on this site over the last ten years but only recently has progress been made.
9. The HotScot project, developed by the University of Strathclyde and others, projected that the geothermal energy potential in disused mines would address up to 8% of heat demand in Scotland. This is crucial as one challenge we all face is how to decarbonise heat with the goal of reaching net-zero by 2045 in Scotland and 2050 for the rest of the UK.

¹ Gillespie, M R, Crane, E J and Barron, HF. Deep geothermal energy potential in Scotland. 2013

² Scottish Government. Potential for deep geothermal energy in Scotland: study volume 2. 2013

10. The British Geological Survey estimates around 25 per cent of UK homes and businesses are located above abandoned coal mines³.

Are current government support schemes sufficient to grow geothermal energy deployment in the U.K.?

11. Current government support schemes, such as the UK Green Heat Networks Fund, do support geothermal. However, they need to be scaled up to enhance the development of geothermal as a heat source for heat networks and contribute to achieving net-zero. For ground source heat pumps or shallow geothermal, the scale of the support to individual homeowners is quite limited. For example, the UK Government's Boiler Upgrade Scheme (which replaces the Domestic Renewable Heat Incentive) awards £6,000 towards the cost and installation of a ground source heat pump. This is not likely to cover the full cost of the drilling of boreholes as well as the installation of the heat pump itself. The benefits of ground source heat pumps, such as the stability of the temperature of the ground all year round, should be recognised and supported by UK government support schemes.

12. If geothermal technologies were properly incentivised as detailed above, this would help de-risk investment in them.

What environmental concerns are associated with geothermal technologies, and are they appropriately accounted for in regulations?

13. There is a lack of regulations in the geothermal sector, therefore any environmental concerns cannot be considered properly.

14. The UK Government notes⁴ that the development and exploration of geothermal energy systems can have minor environmental impacts on subsurface temperatures and groundwater quality. These impacts are being explored through a UKGeos test facility at Cuningar Loop in Glasgow.

What risks are there to investors, operators, and consumers of geothermal energy? How can these be mitigated?

15. Research is needed to de-risk geothermal projects, address perceived and actual barriers to mine-water geothermal and investigate thermal energy storage as a technology. The UK Government should develop a clear goal and national strategy for the advancement of geothermal technologies which would help to de-risk them.

What economic impact could the deployment of mine water geothermal systems have on the areas in which they are deployed?

16. The HotScot consortium, which is led by the University of Strathclyde, and received initial research funding⁵ from the UK Government, planned to develop at least three new mine-water geothermal heating/cooling or thermal energy storage sites in the Central Belt of Scotland. The project is expected to boost economic growth equivalent to £303m and create approximately 9,800 jobs. This project is awaiting funding to progress to the next stage.

17. The development of mine water geothermal systems would create employment within the areas that they are developed in and would also create export opportunities over the long term for Scottish skills and sustainable economic growth.

18. The deployment of mine water geothermal would help with the scaling up of district heat networks. Both The Scottish and UK Governments want to develop heat networks as a way of decarbonising

³ British Geological Survey <https://www.ukgeos.ac.uk/glasgow/mine-water-thermal-energy#widespread>

⁴ ABESSER, C, WALKER, A. Geothermal energy, POSTbrief 46. June 2022

⁵ <https://www.gov.uk/government/news/uk-government-invests-150000-in-scottish-research-projects-to-boost-jobs-and-create-skills>

heat, therefore having a consistent source of heat to help power those networks would be extremely useful.

19. Other European countries, for example France, provide a good case study demonstrating environmental, economic and technical advantages of using geothermal compared to other renewable and non-renewable heating sources. The city of Paris, for example, has been using geothermal for heating since 1969, via 50 heating networks and supplying geothermal heat to 250,000 households⁶.

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⁶ BOISAVY, C et al. Geothermal Energy Use, Country Update for France. 2019