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2023 United Kingdom Country Report

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1. Introduction

This report provides an update for the development of geothermal energy activities and projects in the United Kingdom in 2023.

Table 1 summarises the geothermal energy usage in the UK for the calendar year 2023. The installed capacity of 847 MW_{th} was obtained from an estimated 55,210 installed ground source heat pumps (including both commercial and domestic)[#]. In 2023 the Eden geothermal project in Cornwall, with an estimated installed capacity of 1.4 MW_{th}, became the first operational deep geothermal project in the UK since the Southampton scheme in 1986. The Gateshead mine water scheme (6 MW_{th}), the largest in the UK and one of the largest in Europe, started to supply heat to the municipal district heating network. The UK Geoenergy Observatory (UKGEOS) in Glasgow for research in mine water geothermal was fully operational in 2023.

Table 1 Geothermal energy usage for the calendar year 2023

Electricity		**Direct Use**	
Total Installed Capacity (MW_e)	0	Total Installed Capacity (MW_{th})	1.4
New Installed Capacity (MW_e)	0	New Installed Capacity (MW_{th})	1.4
Total Running Capacity (MW_e)	0	Total Heat Used (PJ/yr) [GWh/yr]	N/A
Contribution to National Capacity (%)	0	Total Installed Capacity Heat Pumps (MW_{th})	847[#]
Total Generation (GWh)	0	Total Net Heat Pump Use [GWh/yr]	1,430[#]
Contribution to National Generation (%)	0	Target (PJ/yr)	No target

(N/A = data not available).

[#]Heat pump data are calculated using information from GHSP sales (BSRIA, 2023). The BSRIA 2023 report figures include both water and ground source heat pumps. The figures are also only based upon small domestic (<6kW) to light commercial (up to 50kW) and don't include large industrial schemes, such as the mine water heat scheme at Gateshead. In calculating the net GSHP use it has been assumed that the hours per year heating equivalent full load is 1800 h/year for domestic systems and 1500 h/year for commercial systems (Le Feuvre & St John Cox, 2009).

2. Changes to Policy Supporting Geothermal Development

In 2023, there were several policy developments that occurred. The following chapter will list the relevant reports, funding mechanisms and changes in regulation in the UK. This is followed by noting specific policy developments for both Scotland and Northern Ireland.

In June 2023, a report titled 'Dig Deep: Opportunities to Level Up Through Deep Geothermal Heat & Energy on The Way to Net Zero' was published by MP Dr Kieran Mullan, which looks at the deep geothermal potential of the UK and identifies high-potential areas. The report was conducted with the cooperation of the Durham Energy Institute and the Coal Authority.

A report was commissioned by the North East Local Enterprise Partnership (NE LEP) and funded by the Department for Energy Security and Net Zero (DESNZ) and the North East and Yorkshire Net Zero Hub. The report titled 'The case for deep geothermal energy – unlocking investment at scale in the UK' was published in July 2023. It was written by the British Geological Society (BGS) and Arup and provided an evidence-based assessment of the opportunities and made recommendations for building the deep geothermal sector in the UK. Following this report, in November 2023, the BGS published a supplementary evidence report, funded by UK Research and Innovation (UKRI), which provides the original outputs from the North East LEP report as well as additional information. The supplementary evidence report can be found here: https://nora.nerc.ac.uk/535567/1/report_OR23032.pdf.

The Contracts for Difference (CfD) scheme is the UK Government's main mechanism for supporting low carbon electricity generation and provides power revenue guarantees and protection from market fluctuations for 15 years. Allocation Round 5 results were published in September 2023; it saw the first allocation of CfDs for geothermal. The CfDs were awarded to Geothermal Engineering Limited (GEL), together with its investors Kerogen Capital and Thrive Renewables, for three projects. See section 3.2 for further information on this project.

The Energy Act 2023 provided the powers for government to implement heat network zoning in England through regulation. A consultation opened in December 2023, which looked for views on proposals for heat network zoning in England, to attract investment and give local communities access to cheaper, greener heat sooner. Under zoning, central and local government will work with industry and local stakeholders to identify and designate zones where heat networks are the lowest-cost solution to decarbonising heat. Heat network zoning provides an opportunity for geothermal to be considered as a heat source for differing zones depending on the geothermal opportunities present in those areas.

In December 2023, the All Party Parliamentary Group (AAPG) on Deep Geothermal chaired by Dr Kieran Mullan MP was registered. The APPG brought together parliamentarians to share information and ideas on geothermal energy, and to work collaboratively with stakeholders to develop a new British growth industry that is key to energy security and net zero.

The Heat Networks Delivery Unit (HNDU) provides support for local authorities by funding techno-economic feasibility studies and detailed project development in England and Wales. In December 2023, the last round (round 13) closed. In the financial year 2023/2024, approximately £4 million was awarded to 24 local authorities and 4 non local authorities.

The Green Heat Network Fund (GHNF) provides funding to help new and existing heat networks in England to adopt low-carbon technologies such as geothermal. In 2023, there were four rounds (Rounds 3-6), in which a total of over £9 million was awarded to four GSHP-led projects. No deep geothermal projects were awarded funding in 2023. However, in May 2023 it was announced that a GHNF award of £22 million had been made for the commercialisation and construction of the Langarth District Heat Network. This project aims to deliver deep geothermal heat generated from United Downs to a new 3,800-unit residential development and the Royal Cornwall Hospital, with potential for further connections in the future.

The Public Sector Decarbonisation Scheme (PSDS) provides grants for public sector bodies to fund heat decarbonisation and energy efficiency measures. There have been several phases to the PSDS. Phase 3 of the PSDS will provide over £1.8 billion of grant funding over the financial years 2022 to 2023 and 2025 to 2026, through multiple application windows. In Phase 3b of the PSDS, 26 Ground Source Heat Pumps (GHSP) were award funding in 2023, these are to be delivered over the financial years 2023/24 and 24/25.

In 2023, a report was published by the British Geological Survey (Arnhardt et al. 2023) which captures a qualitative analysis of the evidence gathered as part of the July 2022 UK Parliament's Environmental Audit Committee (EAC) inquiry on geothermal technologies. The report can be found here: https://nora.nerc.ac.uk/id/eprint/536828/1/OR23058.pdf. The report specifically investigates what opportunities, challenges and barriers are identified by the evidence submitted, as well as the support measures that are suggested for developing a geothermal industry in the UK.

Scotland

Heat networks have a big part to play in providing geothermal heat across Scotland. The Scottish Government continued to support the deployment of heat networks in Scotland through the Heat Networks (Scotland) Act 2021. Scotland's Heat Network Fund provided grant funding to support the development and rollout of zero emission heat networks across Scotland. The Heat Network Support Unit supported the growth of heat networks by working with the public sector to address key challenges and build capacity through advice, expertise and financial support.

Scottish Enterprise has supported various initiatives, including feasibility studies, pilot projects and research, to explore the viability of geothermal energy as a sustainable heating source. The agency has also funded a feasibility study through the CAN DO Innovation Green Heat Feasibility Challenge call, which was launched as part of the £17.6m Green Heat Innovation Support Programme, funded by the Scottish Government.

Northern Ireland

In Northern Ireland GeoEnergy NI, launched at the end of June 2023, a £3 million project designed to 'unearth the heat beneath our feet', aiming to support decarbonisation of the energy sector in pursuit of net zero carbon targets by 2050. The project is funded and delivered by the Department of Economy with scientific support from the Geological Survey of Northern Ireland and a specialist contractor team led by Tetra Tech Europe. The project will inform the development of a policy and regulatory framework that supports and promotes opportunities

to unearth Northern Ireland's geothermal potential and create a vibrant geothermal sector. More information is provided later in the report.

3. Geothermal Project Development

3.1 Projects Announced

Geothermal Engineering Ltd. announced plans of producing Lithium from projects in Cornwall. The focus for this project is exploring for shallow lithium-enriched geothermal waters. The company has projected that about 100 tonnes of Lithium Carbon Equivalent could be extracted per year. Testing at the United Downs geothermal wells revealed lithium concentrations of around 340 ppm in the geothermal fluid, one of the highest in Europe for commercial geothermal lithium projects. GEL to produce geothermal lithium from Cornwall, UK projects.

Also in Cornwall, Cornish Lithium drilled an exploration borehole to assess the potential for geothermal lithium production near the village of Blackwater. The borehole reached a depth of circa 1,800 m and found lithium in the geothermal waters at a temperature of 80 °C. Blackwater | Cornish Lithium Plc.

In the Northeast of England, Weardale Lithium announced that the company extracted lithium carbonate from geothermal brine from the existing boreholes at Eastgate in County Durham. Lithium carbonate was extracted using a low-impact, low-carbon, and low-water method by Watercycle Technologies. Their solution, also used in Italy's Lazio region, requires 95% less land than conventional methods. Lithium Carbonate produced County Durham for the first time – Weardale Lithium

Geothermal Energy Ltd was awarded £50k from the Scottish Enterprise's CAN DO Innovation Fund to conduct a 3-month feasibility desk study on the economic and technical viability of developing a geothermal demonstrator at the Hill of Fare District Heat Network in Banchory (Aberdeenshire). Geothermal Energy Ltd has been working with Arup on the findings from this feasibility study.

3.2 Projects Commissioned

The projects listed below were initiated in 2023, including those in the pre-development or construction phase of deployment.

In 2023, Geothermal Engineering Ltd. (GEL) awarded to Exergy the supply contract for the 3 MW power plant in United Downs. It is expected that United Downs will start to supply power and heat in January 2025. GEL also received approval for the Manhay geothermal power project. Manhay is expected to produce 5 MW electricity and 20 MW of thermal energy.

GT Energy (a Star Energy Group Company) was selected to develop a geothermal heat plant for the Salisbury District Hospital NHS Trust. It is expected that, if successful, heat from deep wells can be supplied to the hospital by the end of 2026. The plant is proposed to fulfil the full heat requirements of the hospital, which is currently >20 GWh_{th}. Salisbury NHS Foundation Trust - Star Energy (starenergygroupplc.com) GT Energy has also been awarded

preferred contractor from Manchester University NHS Foundation Trust and the Carbon Energy Fund to assess the resource potential and develop a geothermal plant to supply heat to the Wythenshawe Hospital. If successful supply could start in 2027.

In NE England, the South Tyneside Council is developing the Holborn Renewable Energy Network. The 5 km renewable Heat Network will use a combination of multiple low carbon heat sources including mine water, river water and waste heat from wood gasification. It was expected that mine water would provide 2.5MW heat, but this is being reviewed as part of an application for new funding for phase 2 of the project. The project is aiming to be operational in 2028.

Sunderland City Council supported by WSP and funding from Green Heat Network Fund Transition Scheme, secured planning permission for exploratory drilling in the flooded Wearmouth colliery. The ambition is to realise the UK's largest geothermal mine water source district heat network.

The Queens Medical Centre, a hospital in Nottingham, is working with E.ON on installing air and ground source heat pumps, with 64 boreholes up to 250 metres deep. In the first phase of the energy centre development, a 4MW combined heat pump solution with a 2.88MW cooling capacity will be installed to support the Queens Medical Centre existing gas turbine and standby boilers. In phase two, the combined heat pump solution will be expanded to provide 8MW of heating capacity along with an additional 5.8MW of new cooling capacity.

£1.7 million funding from the Public Sector Decarbonisation Scheme was awarded to the Natural Environment Research Council for a ground source heat pump project and living lab at the British Geological Survey's Keyworth site (Living laboratory' will help meet net zero targets | Salix Finance). This will include 28 closed loop boreholes drilled up to 225 m deep to replace gas boilers and heat two buildings. The planned thermal capacity is 300 kW (5 x 60 kW heat pumps) supplying 55°C heat to two buildings. Drilling is planned to start in 2024.

The University of Leeds Net Zero delivery plan includes drilling of eight, 150-250 m deep geothermal boreholes. Drilling is planned to start in January 2024. Two boreholes will be utilised as a fully reversable open loop ground source doublet to supply geothermal heat to buildings. The remaining boreholes will be used for monitoring the impact extracting heat from the ground has on the surrounding area (Living Lab Exploring Geothermal Energy on Campus - Sustainability).

In Northern Ireland, GeoEnergy NI (https://geoenergyni.org/), a project from the Department for the Economy (DfE) with support from the Geological Survey of Northern Ireland (GSNI) and a specialist contractor team led by Tetra Tech Europe, aims to explore the potential for geothermal energy in the region. The project comprises two feasibility studies. At the College of Agriculture, Food and Rural Enterprise (CAFRE) Greenmount Campus near Antrim (up to 2 km deep) a series of geophysical surveys have been undertaken to understand the potential for deep geothermal energy in the area. At the Stormont Estate in Belfast, a drilling and testing programme is carried out to assess the potential for shallow geothermal energy and inform the design of a system to decarbonise several buildings on the Estate. The project was officially launched in June 2023, and in July, the deep geothermal feasibility's geophysical surveys (including gravity, magnetotelluric and seismic) around CAFRE's Greenmount Campus in Antrim were completed. The data acquired from these surveys is being processed and will be publicly available once complete, alongside

the results of the shallow feasibility study on the Stormont Estate. The project has undertaken significant communications and engagement activity, and in October 2023, launched the *GeoEnergy Discovery Centre*, a mobile visitor unit that aims to boost public awareness and understanding of the potential for geothermal energy in Northern Ireland.

3.3 Projects Operational

3.3.1 Deep geothermal

The Eden geothermal project, in Cornwall (Eden Geothermal Energy Project | Eden Project), started operation in June 2023. It has become the first deep geothermal project operational in the UK since the Southampton project in 1986. The heat is extracted from the longest geothermal well in the UK (5277 m; TVD of 4871 m) via a coaxial well uncased at its final ~1.4 km. It is used to provide heat for the biomes, nursery and offices of the Eden Project. It is estimated that the use of geothermal energy can save up to 500 tonnes of carbon dioxide per year.

3.3.2 Mine Water Geothermal

The Gateshead mine water heating scheme (Mine water energy scheme at Gateshead - Coal Authority), located in Northeast England, started operations in March 2023. The project took about 3 years to deliver and was funded by the Heat Network Investment Project (HNIP) and Gateshead Council. The Gateshead Energy Company heat network supplies heat to a range of users, including offices, municipal buildings and council owned homes. The water is extracted from flooded mine workings about 150 m below the ground surface and is, with 6 MW_{th} installed capacity, one of the largest mine water heat schemes in Europe.

The mine water schemes at Lanchester Wines were drilled in 2015 and licensed in 2017. The mine water schemes with boreholes drilled at two locations provides heat to two beverage warehouses near Gateshead, UK. The scheme has encountered some operational challenges, including iron ochre scaling, corrosion of the downhole water loggers and limits in the reinjection capacity due to suboptimal connectivity of the mine workings (Banks et al., 2022, TownRock Energy, 2023).

3.3.3 Shallow Geothermal

An increasing number of ground source heating and cooling or shallow geothermal projects are becoming operational in the UK. A selection are summarised here.

The Citigen project in London, managed by E.ON, was upgraded in 2022 with a solution designed by Ramboll that consisted of the addition of a heat pump and the drilling of three 200 m deep boreholes with capacity of around 4 MW heating and 2.8 MW cooling (https://www.cibsejournal.com/technical/greening-the-city/). The ground source heat pumps are integrated with a heat network, CHP and a thermal store.

The Kensa 'Heat the Streets' project (Heat the Streets - Kensa Utilities) was completed in 2023. Over its two-year duration, the project installed ground source heat pump technology in 98 new and existing homes across Cornwall. It connected the ground source heating

systems to Shared Ground Loop Arrays, a communal network of underground pipework that extracts renewable heat via closed-loop boreholes.

The Colchester Northern Gateway in north Essex gained funding from the UK Government Heat Network Investment Project to install an 800 kW capacity open loop ground source heat pump system for a district heat grid to supply 300 new build houses and healthcare facilities. The scheme is using 5 boreholes sunk into the Chalk Group aquifer (Sezer et al. 2024).

Using funding from the Public Sector Decarbonisation Scheme, a ground source heat pump system has been fitted in St. Mary's Hospital in London to give both heating and cooling to its critical care unit (https://www.build-review.com/the-nhs-is-going-green-with-commercial-heat-pumps-for-their-buildings-leading-the-way-in-decarbonisation/). The hospital has reduced its carbon emissions by over 40% and expects to save around £1 million per year in energy costs.

3.3.4 Thermal Energy Storage

Aquifer Thermal Energy Storage (ATES) developments are very limited and slow in the UK, with only 11 installations (9 of them in London, 1 in Manchester and 1 in Brighton) (Jackson et al., 2024). The first ATES system deployed was in 2006, averaging at around one new system installed per year (Jackson et al., 2024). Most current installations are small (<1 MW_{th}) via a single well doublet and supplying part of the heating/cooling demand (Jackson et al., 2024). ATES systems are an attractive technology to provide seasonal, low-carbon heating and cooling, however a combination of factors such as lack of technology awareness and understanding, and subsurface complexity (10 of the 11 installations target the fractured Chalk aquifer) have restricted their uptake in the UK.

4. Research Highlights

4.1 Research Infrastructure

The **UK Geoenergy Observatory in Glasgow** (https://www.ukgeos.ac.uk/glasgow-observatory) for research and innovation in mine water geothermal and thermal energy storage became fully operational in 2023 (Monaghan and Spence, 2023). The Observatory includes boreholes drilled and screened in two levels of mine workings equipped with pumps for abstraction and re-injection at flow rates between 3 and 12 L/s, as well as a heat centre with a 200 kW heat pump/chiller and three different heat exchangers. The monitoring infrastructure includes fibre optic and electrical resistivity cables installed in the mine water boreholes and downhole hydrogeological loggers in the mine water and environmental boreholes to measure pressure, temperature and electrical conductivity. Additional pressure and temperature sensors in the geothermal surface infrastructure allow for monitoring of changes during geothermal investigations.

The **UK Geoenergy Observatory in Cheshire** (https://www.ukgeos.ac.uk/cheshire-observatory) finalised the drilling stage in 2023 and started to install the surface infrastructure, ahead of becoming operational in 2024. It is a research and innovation infrastructure for shallow geothermal energy and thermal energy storage in a sandstone aquifer. The facilities include borehole heat exchangers for heating and cooling of the subsurface (closed loop), boreholes for open loop investigations, advanced sensors (electrical

resistivity and fibre optics) for 3D imaging of subsurface processes in real time and a network of boreholes for multilevel groundwater monitoring and hydraulic control.

The Coal Authority started the construction of a **Mine Water Heat Living Lab** in Gateshead in 2023, with the drilling of the first boreholes and the installation of monitoring infrastructure. The scheme is located between the Gateshead Energy Company Network and the Lanchester Wines mine water energy schemes. The new data will help in the understanding of thermal and hydraulic interactions between adjacent mine water heat schemes and support the Coal Authority licensing, environmental regulators, and other stakeholders in the development of new schemes.

CeraPhi Energy converted the legacy Kirby Misperton KM8 well of Third Energy (North Yorkshire, UK) to a geothermal well, demonstrating repurposing of wells using the coaxial closed-loop technology. The temperature at the bottom of the 3 km deep well is about 110°C. The demonstrator project has provided data for future system improvements and commercialisation of the technology. The company has estimated that using their closed-loop technology it would be possible to get up to 90°C at the surface, enough to supply heat to 400 homes for about 40 years.

4.2 Research Projects

The EU Horizon funded **PUSH-IT** (https://www.push-it-thermalstorage.eu/) ("Piloting Underground Storage of Heat In geoThermal reservoirs") started in January 2023 led by TU Delft (Netherlands). The project aims to demonstrate and develop large scale, seasonal high temperature thermal energy storage in aquifers, boreholes and flooded mines. The British Geological Survey, the University of Exeter, Anglia Ruskin University and Geothermal Engineering Ltd. are UK partners in the project. One of the MTES (mine water thermal energy storage) sites to be assessed in the project is located in Cornwall.

CRM-Geothermal project (https://crm-geothermal.eu/), also funded by Horizon Europe, started at the end of 2022. The project is developing innovative solutions to combine extraction of raw materials and energy from geothermal fluids. UK partners include the British Geological Survey, Levin Sources, Geothermal Engineering Ltd. and Cornish Lithium. In Summer 2023, the project conducted a series of tests in Cornwall to gather hydrogeological and geochemical data.

A collaborative project between the Universities of Manchester and Bristol and the British Geological Survey is studying the genesis of **hypogene karst** in the Lower Carboniferous Limestone of the UK and the implications for the low-enthalpy deep geothermal resource.

The **GEMS** ("Geothermal Energy from Mines and Solar Geothermal Heat") (https://gems.ac.uk/) project led by Durham University and with the British Geological Survey, is studying how water from flooded mines could be used as a low-carbon energy source. As part of the project, geothermal experiments were performed in the UK Geoenergy Observatory in Glasgow in 2023.

The project "GigaWattHour Subsurface Thermal Energy storAge: Engineered structures and legacy Mine shafts (**STEAM**)" led by the University of Strathclyde and funded by the Engineering and Physical Science Research Council (EPSRC), is investigating the feasibility of

using flooded mine shafts as thermal stores. Research involves an inventory of shafts in the UK, modelling and an at-scale test in a legacy mineshaft, in planning.

In 2023 the project "Smart assessment, management and optimisation of urban geothermal resources (**SmartRes**)" (https://www.imperial.ac.uk/earth-science/research/research-projects/smartres/) led by Imperial College London was launched. The project is funded by the Natural Environmental Research Council (NERC) Highlight Topics. Partners in the project are the University of Manchester, Leeds University and the British Geological Survey. Imperial College also leads the project **ATESHAC** ("Aquifer thermal energy storage for decarbonisation of heating and cooling: Overcoming technical, economic and societal barriers to UK deployment") (https://www.imperial.ac.uk/earth-science/research/research-groups/ateshac/).

"Galleries2Calories (**G2C**)" (https://www.ed.ac.uk/geosciences/research/galleries-to-calories), is a collaborative £2.6 million EU funded project between academic, industry and national research partners from Scotland, USA and Ireland led by Edinburgh University and TownRock Energy that seeks to understand the feasibility of capturing waste heat and storing the heat in flooded disused mine workings -up to a maximum temperature of 40°C – with the potential to heat at least 5,000 households in Scotland's capital.

The project "Unlocking the economic potential of mine water geothermal in Scotland: a study of stakeholder awareness" (Deeming et al., 2024), led by the University of Strathclyde, was completed in 2023. The project looked at the level of awareness among Scottish industry stakeholders of using abandoned mine workings as a source of energy for district heating and thermal storage. The results show that the landscape of mine water thermal is very complex with many interlocking elements.

The project "Net Zero Geothermal Research for District Infrastructure Engineering (**NetZero GeoRDIE**)" is examining the potential to repurpose the Newcastle Science Central Deep Geothermal Borehole as a coaxial deep closed-loop system (Brown et al., 2023). The borehole was drilled to 1821 m between 2011 and 2014 and found very low hydraulic conductivities preventing its development as a conventional geothermal resource.

NHS England with the Energy Systems Catapult and the British Geological Survey led a Knowledge Asset Fund grant from Innovate UK for the development of a tool that supports shallow closed loop pre-feasibility screening for hospital sites, to be delivered in 2024.

5. Other National Activities

5.1 Geothermal Centres and Groups

The IEA Geothermal Mine Water Energy Expert Group (IEA Geothermal | Mine Water Geothermal Energy Group - International Energy Agency geothermal), coordinated by the British Geological Survey, was active, publishing a number of case studies and a UK regulatory summary. The group aims to use UK and international expertise in mine water thermal energy to help developing the technology through global collaboration and knowledge exchange (Monaghan et al., 2023). The group initiated in 2022 with support from the IEA Geothermal Technology Collaboration Programme and is open to all interested in mine water thermal energy.

A collaboration between Durham University, the Net Zero Technology Centre and SHIFT Geothermal, with support from the Reece Foundation, announced the creation of the National Geothermal Centre, expected to be launched in 2024. The aim of the Centre is to drive collaboration between academia, industry and government to promote and support the integration of geothermal technologies in the energy mix.

The North East Local Enterprise Agency (NELEP) continued to run a geothermal taskforce.

5.2 Geothermal Education

There are no specific Geothermal Degrees or Masters in the UK, but multiple universities have geothermal modules as part of Earth Science and Energy programmes.

A number of PhD projects in various geothermal related topics were completed in 2023. A selection is shown below:

- Regnier, G (2023). Characterisation of Aquifer Thermal Energy Storage with Applications in the UK. Imperial College London.
- Todd, F (2023). Modelling the thermal, hydraulic and mechanical controlling processes on the stability of shallow mine water heat systems. University of Edinburgh.
- Turner, J.L. (2023). Using system data to understand the performance of multi-occupancy and commercial ground source heat pumps in the UK. University of Leeds.
- Walls, D. (2023). How can optimal sites for mine water geothermal energy systems be identified and where are they in Scotland? University of Strathclyde.

5.3 Conferences and Events

In February 2023 the second online SPE Aberdeen Geothermal Seminar 2023 was run: https://www.spe-aberdeen.org/uploads/SPE-Geothermal-Programme-Flyer_0.6.pdf.

The 2023 Mine Water Geothermal Energy Symposium organised by the BGS, Coal Authority and IEA Geothermal took place the 19-20 April 2023 (virtual): https://iea-gia.org/workshop-presentations/2023-mine-water-geothermal-energy-symposium/.

The 2023 All-Energy Conference and Exhibition took place in Glasgow from the 10-11 May, this conference is the biggest renewable energy conference in the UK. For the first time in several years there was an entire panel dedicated to geothermal energy: https://www.scottishrenewables.com/events/197-all-energy23.

The Energy Geoscience Conference 2023 took place in Aberdeen running from 16th to 18th May 2023. The theme for the conference was 'Powering the energy transition through subsurface collaboration': https://www.energygeoscienceconf.org/.

The 10th Geological Society of London Geothermal Symposium 2023, ran over three days, from the 20th to 22nd November 2023: https://www.geolsoc.org.uk/expired/011-EG-Geothermal-symposium-2023.

Scottish Enterprise hosted a webinar which focused on the economic development of Scotland's geothermal opportunities: https://attendee.gotowebinar.com/recording/5098966916084893103.

5.4 Publications

"Dig Deep: opportunities to Level Up Through Deep Geothermal Heat & Energy On The Way To Net Zero" by Dr Kieran Mullan, published June 2023..

The White Paper entitled "The case for deep geothermal energy – unlocking investment at scale in the UK" by British Geological Society and Arup was published in June 2023. An evidence report supporting the White Paper (Abesser et al., 2023b) was also published: https://nora.nerc.ac.uk/535567/1/report_OR23032.pdf.

Scottish Enterprise's Global Data article offered insights into innovative geothermal projects including the potential of using mine water geothermal for energy storage and the support available.

A selected list of scientific publications of interest is included below:

- Abesser, C., Gonzalez Quiros, A., Curtis, R., Raine, R. & Claridge, H. (2023c). Geothermal Energy Use, Country Update for the United Kingdom. Proceedings World Geothermal Congress 2023. Beijing, China, 2023.
- Abesser, C., Schincariol, R. A., Raymond, J., et al. (2023). Case studies of geothermal system response to perturbations in groundwater flow and thermal regimes. Groundwater, 61(2), 255-273.
- Brown, C. S. (2023). Revisiting the deep geothermal potential of the Cheshire Basin, UK. Energies, 16(3), 1410.
- Brown, C. S., & Howell, L. (2023). Unlocking deep geothermal energy in the UK using borehole heat exchangers. Geology Today, 39(2), 67-71.
- Brown, C.S., Kolo, I., Falcone, G. and Banks, D., 2023b. Repurposing a deep geothermal exploration well for borehole thermal energy storage: Implications from statistical modelling and sensitivity analysis. Applied Thermal Engineering, 220, p.119701.
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Banks, D., Steven, J., Black, A. & Naismith, J. (2022). Conceptual modelling of two large-scale mine water geothermal energy schemes: Felling, Gateshead, UK. International Journal of Environmental Research and Public Health, 19(3), p.1643.

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