

Debate Pack

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Opportunities for geothermal energy extraction

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Summary

On Wednesday 14 September at 2.30pm Owen Thompson MP (SNP) will open a Westminster Hall debate on opportunities for geothermal energy extraction.

¹ Contributing author and reviewer: Dr Corinna Abesser (currently a fellow at the Parliamentary Office of Science and Technology).

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Background

Geothermal energy is the energy stored in the form of heat beneath the Earth's surface that can be used either for heating or to generate electricity, or both.

There are different ways in which geothermal energy can be exploited. This paper explores ground source heat pumps, deep geothermal plants, and extracting heat from mine water.

Use of geothermal resources is currently limited in the UK. However, several studies have investigated the potential for geothermal in the UK, some examples are listed below. The estimates vary due to the areas of the UK being considered, the depth of drilling considered, and the extent to which the resource is deemed technically and economically recoverable.

- In 2018, a study estimated that the available heat from deep geothermal resources (sedimentary basins, ancient warm granites) and flooded mines was equivalent to approximately 100 years heat supply for the entire UK.²
- In 2017, a study estimated that the UK had enough resource that was 'theoretically available' to easily surpass all UK energy demand (in 2015) but the amount that was 'technically available' was much smaller than the 'theoretical' resource and recovery would depend on depths drilled and areas targeted.³
- In 2013, a Government commissioned Deep Geothermal Review Study by the consultancy Atkins concluded geothermal for electricity generation could meet 4% of annual electricity requirements (in 2013 figures).⁴
- In May 2012, a paper by consultants SKM in association with the Renewable Energy Association (an industry trade body) argued that geothermal power could provide 20% of the UK's electricity and all of the UK's heat demand.⁵

Ground source heat pumps

In the UK, a key option for using geothermal resources at shallow depths is ground source heat pumps (GSHPs).⁶ GSHPs use buried pipes (closed-loop) or water from boreholes (open-loop) to extract heat from the shallow (100-200

² Gluyas et al., [Keeping warm: a review of deep geothermal potential of the UK](#). Proceedings of the Institution of Mechanical Engineers, Part A: Journal of Power and Energy 232, 2018

³ Jon Busby and Ricky Terrington, [Assessment of the resource base for engineered geothermal systems in Great Britain](#), *Geothermal Energy*, vol 5, 24 February 2017

⁴ Atkins, [Deep Geothermal Review Study](#), October 2013

⁵ SKM, [Geothermal energy potential Great Britain and Northern Ireland](#), May 2012

⁶ [Geothermal energy](#), British Geological Survey [accessed: 14 September 2021]

m) ground. The upper Earth is heated by solar radiation and by heat generated within the Earth and acts a heat store. This heat can then be used to heat radiators, underfloor or warm air heating systems and hot water in homes.⁷ GSHPs can provide heat to low-temperature heating networks (supplying a few tens of buildings or flats) or to form part of larger district heating networks.⁸ More information on heat networks is available from [POSTnote 632](#).

GSHP are one of three types of heat pumps which can extract heat from either the air, ground or water; respectively known as air source, ground source or water source heat pumps. Heat pumps are a low carbon heating technology that use some electricity to extract the heat. The Renewable Energy Hub (a consumer website for those looking to purchase renewable technologies) has a webpage on [A Complete Guide to Heat Pumps in 2020](#) which provides background information.

New homes

The Government is developing policy for new build homes to meet minimum standards for low carbon heating, but specific technologies are not prescribed and are the decision for the housebuilder. Background information is available in the Library briefing paper on [Housing and net zero](#). This outlines a Government consultation that ran between October 2019 and February 2020. The [Government responded](#) to this initial consultation on the Future Homes Standard on 19 January 2021. This proposes a two-stage approach to implementation with an uplift in the emissions levels allowed coming into effect in 2022. The second stage will be a further uplift in 2025 that is expected to be at a level where new homes will not be built with fossil fuel heating, such as a natural gas boiler. A [second consultation on the Future Homes Standard and Future Buildings Standard](#) ran from 18 January to 13 April 2021.

Government policy on heat pumps

The Government has a target for heat pump installation, set out in the [December 2020 energy white paper](#), of growing the installation of electric heat pumps, from 30,000 per year to 600,000 per year by 2028.

Successive Governments have supported the installation of low carbon heating, through various schemes. Most recently, support for heat pumps was available from the Renewable Heat Incentive (RHI – due to close in 2022), and the recently closed Green Homes Grant Voucher Scheme (GHGVS). For more information, see the Library briefing papers on the [RHI](#) (2017) and the [GHGVS](#) (2021). The [December 2020 Energy White Paper](#) set out the current Government position:

⁷ [Ground source heat pumps](#), Energy Saving Trust [accessed: 12 June 2018]

⁸ Department of Energy and Climate Change, [Heat Pumps in District Heating Case studies, 2016](#)

Heat pumps are a proven and commercially viable way to transform heat in buildings, which is also available now. Currently, however, fewer than 1% of homes in England use a heat pump.

[...]

We want to open the market of homes not on the gas grid to heat pumps or other clean energy alternatives, representing some 50,000 to 70,000 installations a year. We will therefore consult in early 2021 over new regulations to phase out fossil fuels in off-grid homes, businesses and public buildings, including a backstop date for the use of any remaining fossil fuel heating systems.

In setting a clear target for deploying the technology, there is an opportunity to expand the existing UK heat pump manufacturing base and exploit future export potential. The UK has a growing expertise in heat network design and is already home to several manufacturers of heat pumps. Annual global heat pump sales are expected to roughly double between 2019 and 2030 from 11.4 million to 20.8 million units. We need to take advantage of future export opportunities, particularly to markets in north-western Europe where high demand is expected.

But electrification is not just a solution for off-grid buildings. We believe that significantly increasing the deployment of heat pumps for on-gas grid homes through the 2020s, on a voluntary basis, will be beneficial, whatever the eventual mix of technologies for clean heat in 2050. We recognise that, to achieve this, we will have to increase business and public confidence in heat pump technology.

In April 2020, we launched our proposal for a Clean Heat Grant, due to launch in 2022, as a successor scheme to the domestic Renewable Heat Incentive. We will publish a government response in 2021. The Clean Heat Grant will be targeted at households and small, non-domestic buildings to support the installation of heat pumps and, in certain circumstances, biomass. The scheme will build upon the Green Homes Grant which provides support for heat pump deployment in the near-term.

Reducing emissions from buildings will require an annual market for heat pumps by 2028 at least 20 times the size of today's market, a scale which can help realise the economic benefits of a domestic supply chain. We will work with equipment manufacturers, wholesalers and installers to ramp up supply chain capacity and reduced technology and installation costs. In early 2021, we will consult on policy approaches to underpin the development of the UK heat pump market, including voluntary up-take by consumers in current on-gas-grid homes.

A new Heat and Buildings Strategy is expected to be published by the Government later this year. This is expected to set out further detail on actions the Government will take to reduce emissions from buildings.

Deep geothermal plants

In the deep subsurface of the Earth, ground temperatures are no longer affected by the sun but results from heat that is generated within the Earth's interior. As a result, ground temperatures increase with depth (around 2.7 °C per 100m depths in the UK). The feasibility of extracting this heat depends on several factors, including the availability of feasible geology, whether the target temperature can be reached at economically drillable depths, and whether the geothermal source is located near areas of heating demand such as cities. Extracting this heat requires drilling of deep boreholes: 1-3km for use in heating and up to 5km for electricity generation. Deep geothermal plants can provide heat directly to high-temperature district heating networks without need for a heat pump. Individual plants can provide heat for thousands to tens of thousands of households. A recent report on [Unlocking the potential of geothermal energy in the UK](#) published by the British Geological Survey (BGS) contains further information on deep geothermal opportunities in the UK.

The current use of deep geothermal energy in the UK is limited. There is a commercial plant in Southampton which, in 1986, began delivering heat from a deep borehole to a district heating network, and is now operated by the energy firm ENGIE.⁹ Several other geothermal projects are planned or under development. For example, [ThinkGeoEnergy](#) (a news and blogging website focusing on the Geothermal industry in the UK) sets out details of several projects planned in Cornwall.

Abandoned Coal Mines

The [Coal Authority](#) and the British Geological Survey have identified abandoned coal mines as a potential source of heat for UK homes and businesses. The Coal Authority states that 25% of UK residential properties sit on UK coalfields. When mines are abandoned, the pumps that kept them dry are turned off and the mines re-flood. Because of geothermal energy the water in the mine is naturally warmed and could be used as an energy source for heat networks. In December 2020, the Coal Authority and British Geological Survey [released a map](#) of where the mines are and the extent to which temperatures increase with depth. This is freely available to use by developers, planners and researchers to identify opportunities to investigate the use of mine water as a sustainable heat source.

A 2019 article on [Mining for heat](#) in the Journal *Geoscientist* provides more information on how the technology works (in a UK context):

Our mining legacy and the associated infrastructure could be repurposed and has potential as a future energy source. The mine shafts and galleries that are now flooded contain copious volumes of water at 12-20°C. Clearly you would not want to take a bath in water of this

⁹ ENGIE, [Southampton](#) [accessed September 2021]

temperature, but heat pumps can boost temperatures to provide hot water and space heating. Heat pumps require an energy input, but because each kW of electrical energy input could be expected to deliver a heat output of 3-4 kW, heat is provided in an energy-efficient way.

Mine water is accessed by drilling boreholes into flooded workings through which water is abstracted, heat is removed and the temperature boosted with a heat pump, before the water is returned to the subsurface. Using mine water as an energy source compared with individual closed-loop, ground-source heat pumps offers some advantages for domestic properties. Decreased garden size of newer housing stock leads to reduced space for horizontal ground loops, meaning that boreholes would be required, which are more capital intensive. Mine-water heat systems are generally operated open-loop, which offers better thermal efficiency than standard closed-loop ground-source heat systems. Finally, mine-water systems offer economies of scale, meaning that clusters of hundreds of properties could be served from a single mine and a few boreholes. To deliver this vision requires changes to planning and building control policies that support the future development of low-temperature energy systems.¹⁰

Some of the challenges of using geothermal heat from mines include the ownership of heat, identification of flooded workings, development of regulatory and licencing frameworks and high initial capital costs.¹¹

Projects in the UK

Several projects are underway in the UK to harness this resource as listed by [the Coal Authority](#):

- [Seaham Garden Village](#) – a development of 750 affordable homes, 750 private homes, a school, shops, and medical and innovation centres which will make use of water pumped from the mine at a temperature of 18-20 degrees at the Coal Authority's Dawdon mine water treatment scheme. The district heating scheme is unusual in not using metal heat distribution pipes because of the low water temperature, which increases the viability of the project.
- [Hebburn Minewater District Network](#) – water from the former Hebburn Colliery will be used to heat council-owned buildings in the town, including a residential tower block.
- [Gateshead District Heat Network](#) – funding from the government's Heat Networks Investment Project (HNIP) will help install boreholes and

¹⁰ Adams, C., Monaghan, A. & Gluyas, J., [Mining for heat](#). Geoscientist 29 (4), 2019

¹¹ Farr, G., Busby, J., Wyatt, L., Crooks, J., Schofield, D.I., and Holden, A., [The temperature of Britain's coalfields](#), Quarterly Journal of Engineering Geology and Hydrogeology, 54, 16 November 2020

pumps to extract warm water from the mine workings and help extend an existing heat network.

A recent article by the BBC provides an overview of the technology and related projects: BBC, [How flooded coal mines could heat homes](#), 7 July 2021.

Parliamentary comment

A PQ answer on geothermal energy in July 2021 confirmed the UK Government were working with the Coal Authority on energy from mine water and stated:

Heating and hot water make up around 40% of the UK's energy consumption and nearly a third of the UK greenhouse gas emissions. Around 25% of UK homes are situated in the former coalfields and since the water in the now flooded mines is geothermally heated Around 25% of UK homes are situated in the former coalfields, the Coal Authority estimates there is sufficient energy in the geothermal water found in former coal mines to heat all of the homes on the coalfields.

Depending on the depth from which the water is extracted, the temperature varies from 21 degrees Celsius to 40 degrees Celsius. Where mine water reaches the surface, the heat can be extracted through a heat pump and transmitted through heat networks to both industrial and domestic customers. Using naturally warmed water, rather than already chilled water, for these systems reduces the energy requirement involved in these systems.

The Seaham Gardens heat network in County Durham is a great example of the merits of this. Working with the Coal Authority and Durham County Council we have recently awarded £3.8m for commercialisation and construction of a mine-water heat network scheme through our Heat Network Investment Project. When finished the scheme will use 6MW of heat to supply 1,500 homes.¹²

Energy from mine water was also discussed in a December 2020 debate on the future of coal in the UK, where Owen Thompson made the case for developing the technology:

...Indeed, the old mines could still have a direct role to play in powering the economy, tackling fuel poverty and heating our homes, but in less conventional ways. For example, the HotScot project, developed by the University of Glasgow, is looking to tap into geothermal energy contained in disused flooded coal mines across the country. It is believed that heat trapped in the 600 cubic kilometres of disused mines throughout Scotland's central belt could meet up to 8% of our domestic heating demands, and extracting it could create almost 10,000 jobs while slashing household bills.

¹² [PQ 24273 29 June 2021](#)

Geothermal is a project that Midlothian has a long history of looking at, having commissioned a study into it in 2004, and the Scottish Government looked into it again in 2013. Unfortunately those projects were not viable at the time, although they were then exported to Spain and Holland, where they were adopted. I would encourage anyone who gets the chance to engage with a chap called Stevie Gillespie, who has an encyclopaedic knowledge of these things.

The transition from deep mining, a high carbon activity, was economically unjust for our coal communities, closing down not only the pits but the local economies, with enormous and long-lasting negative social impacts. The move to a low carbon economy could be a just one, if we choose to harness geothermal energy from the mine water that has flooded pits such as Bilston Glen and to tackle the industrial legacy that has left the surrounding communities behind. We can tackle the food and fuel poverty of our coal communities by tapping into this rich new source of energy, by installing district heating schemes in new and existing housing and by supporting local food production using heat to grow vegetables. Along the Forth estuary and the Clyde, we can capture and convert the heat to feed our people, producing food from the river banks instead of having people go to food banks. There are challenges to overcome, but exciting projects such as these could turn abandoned mines from liabilities into economic assets that could be an integral part of the green renaissance that we seek to build. We just need the commitment to make it happen.¹³

Government Policy

The Government view on geothermal energy for heat pumps and mine water heat is set out above. Geothermal energy in general was discussed on 4 June 2018, during an adjournment debate on [Geothermal Energy: Clackmannanshire](#). The then Minister for Clean Growth Claire Perry set out the Government's view on Geothermal energy:

That brings me to the role of geothermal energy, which is a critical part of the renewable energy resource. It can be used in several ways, for example heat networks. The UK Government have set aside over £300 million to invest in district heat networks over the next few years. They are a really important way of bringing it forward. Deep geothermal power is another opportunity to create heat and generate power [...]

This is not about finding new resource. The mining legacy has created a lot of holes in the ground beneath our feet, which have filled up with water. The water has become heated and is now available without drilling deep wells. This is relatively easy to set up. I am proud to be working with the Coal Authority and others to consider how we might manage this mining legacy. Across the UK, it has recently been assessed

¹³ [HC Deb 3 December 2020 c506](#)

that there are over 2 million GW hours of low carbon energy stored in mine workings across the UK. I feel strongly that we should be looking at how to extract it.

As I said, there are several ways to use this very valuable resource. We can use it as heat to supply homes and businesses. It can help to deliver the clean growth aspects of our industrial strategy, because it can be used to provide heat to certain business sectors. It can also provide opportunities for energy through regeneration and storage. There is a lot of work being done on storage capability. The problem with renewables is that they can be very intermittent. How do we store energy in a liquid state? Deep networks could be a way to help us to lead the world on this going forward. We are looking across the UK to see how we might exploit this great resource.¹⁴

The Scottish Government have information on their support for geothermal power on their webpage on [Geothermal Energy](#). Geothermal energy for the purposes of heat is a devolved matter; while geothermal energy for electricity generation is a reserved matter as the Scotland Act 1998 reserves the generation, transmission, distribution and supply of electricity.

Geothermal power is eligible for support under the Contracts for Difference subsidy scheme auctions, though no projects have yet been successful. More information is available in the Library briefing paper on [Support for low carbon power](#). Geothermal heating is currently only supported in domestic scale in the form of heat pumps under the RHI scheme which is due to close in 2022.

Heat networks

Geothermal energy can be connected to heat networks: a distribution system of insulated pipes that carry hot water to homes or businesses. These networks can also use heat from other sources such as industry and combined heat and power plants. The Government supports heat networks through the Heat Network Delivery Unit and Heat Network Investment Project. The former provides funding and guidance to local authorities developing heat network projects and the latter offers a total of £320 million of capital investment to support heat networks.¹⁵ More information on heat networks is available from [POSTnote 632](#).

¹⁴ HC Deb, 4 June 2018, Vol 642, [c142](#)

¹⁵ Gov.uk, [Heat Networks](#), 14 July 2021

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PQs

[Heating](#)

Asked by: **Brown, Alan**

To ask the Secretary of State for Business, Energy and Industrial Strategy, what assessment he has made of the potential merits of making a heat pump sector deal; and will he make a statement.

Answering member: **Anne-Marie Trevelyan | Department: Department for Business, Energy and Industrial Strategy**

The UK Government is working closely with the heat pump industry to collaboratively address sector-specific issues and remove barriers to the deployment of heat pumps across the UK.

HC Deb 10 September 2021 | PQ 40992

[Heating](#)

Asked by: **Lord Truscott**

To ask Her Majesty's Government what assessment they have made of the appropriate heat source to replace redundant gas boilers with; and if such a heat source includes heat pumps, what plans they have to make these more (1) available, (2) practical, (3) efficient, and (4) cost-effective.

Answering member: **Lord Callanan | Department: Department for Business, Energy and Industrial Strategy**

Achieving net zero carbon emissions will require almost all UK homes to be supplied with low-carbon heating by 2050. Electrification through heat pumps and hydrogen both offer potential pathways to achieve heat decarbonisation, supported by other potential solutions including biogas and heat networks, and we expect 2050 to include a mix of these technologies. Currently, electrification of heat is the only pathway to net zero that has been proven to work at scale in buildings. That is why we have committed to grow the heat pump market to 600,000 installations a year by 2028.

This commitment provides a clear long-term signal to industry on the expected scale of heat pump deployment, providing certainty and enabling investment. The Government is also undertaking a comprehensive package of measures to support the transition, including targeted public investment, proposals for regulation to decarbonise buildings off the gas grid, and establishing a new market-based mechanism. The full package of measures will be set out in our forthcoming Heat and Buildings Strategy. Additionally, the Government is currently trialling solutions to help overcome barriers to heat pump deployment as part of the £14.6 million Electrification of Heat

Demonstration Project, which seeks to demonstrate the feasibility of a mass rollout of the technology by installing heat pumps in a representative sample of homes across the UK.

The above actions by industry and the Government will help to build supply chains and develop a more cost-effective heat pump offer for consumers.

HL Deb 02 September 2021 | PQ HL2398

[Heating: Innovation](#)

Asked by: **Menzies, Mark**

To ask the Secretary of State for Business, Energy and Industrial Strategy, what steps he is taking to ensure sufficient provision of skilled alternative heat source technologies engineers to help facilitate the move away from gas boilers to new technologies, such as ground or air source heat pumps.

Answering member: **Anne-Marie Trevelyan | Department: Department for Business, Energy and Industrial Strategy**

The Government is working closely with industry and the education sector to ensure that high-quality training is available for heat pump installers. This includes training for new heating engineers, and for existing heating engineers who do not yet have heat pump training.

As part of the Green Homes Grant Skills Competition, the Government awarded more than £6 million to support training for tradespeople delivering green home energy improvements, including heat pump installations.

We are also supporting the industry-led development of new heat pump upskilling courses for existing heating engineers. By the end of 2021, we expect industry to have the capacity to upskill thousands of heating installers per year to work on heat pumps.

Furthermore, BEIS together with the Department for Education is also working with the Institute for Apprenticeships and Technical Education (IfATE) to ensure that apprenticeships and T-Levels contain high quality heat pump training. Additionally, we are working with the Association of Colleges to ensure that further education providers are aware of future needs for heat pump installer skills, and to understand barriers to providing relevant training so that they can be better addressed.

HC Deb 16 July 2021 | PQ 29777

[Heating: Manufacturing Industries](#)

Asked by: **Whitehead, Dr Alan**

To ask the Secretary of State for Business, Energy and Industrial Strategy, what steps his Department is taking to ensure that the supply chain for the creation of air and ground source heat pumps is located in the UK, rather than abroad.

Answering member: **Anne-Marie Trevelyan | Department: Department for Business, Energy and Industrial Strategy**

Our plans to scale up heat pump deployment provide a huge opportunity to expand the UK heat pump manufacturing base and exploit future export potential. Published last year, our Heat Pump Manufacturing Supply Chain Research Project indicated that the heat pump market could be worth £5.5 billion to the UK economy by 2035.

In order to help accelerate investment in UK heat pump manufacturing capability and capacity, we are setting clear long-term policy through our forthcoming Heat and Buildings Strategy. The Government is also providing cross-sector fiscal support, including expanded export finance facilities, funding to support training in low-carbon technologies and manufacturing through the National Skills Fund, and a 130 per cent super-deduction capital allowance on qualifying plant and machinery investments. In addition, officials in BEIS, together with colleagues from the Department for International Trade, are working closely with heating appliance manufacturers to provide business investment support.

UK-based heat pump manufacturers – like Mitsubishi Electric, Kensa, Clade Engineering Systems, Star Renewable Energy, Global Energy Systems, Big Magic International – are investing to meet growing demand in the UK and internationally, and Vaillant recently announced plans to expand their UK boiler manufacturing facility in Belper, Derbyshire, to produce heat pumps from 2022. This demonstrates that the UK is an attractive place to invest and to do business.

HC Deb 15 July 2021 | PQ 31278

[Heating: Costs](#)

Asked by: **Whitehead, Dr Alan**

To ask the Secretary of State for Business, Energy and Industrial Strategy, what steps his Department is taking to help ensure that the cost of heat pumps is reduced in the short and medium term.

Answering member: **Anne-Marie Trevelyan | Department: Department for Business, Energy and Industrial Strategy**

We expect the upfront costs of heat pump installations to reduce significantly as the scale of the UK market grows in line with the Government's ambition for 600,000 heat pump installations per year from 2028.

We are taking a range of steps both to support the heat pump market to develop and to support consumers with the costs of installing a heat pump in the near term while the market builds. These include, for instance, the planned Clean Heat Grant and the Future Homes Standard, which will ensure that new homes are future-proofed with low-carbon heating from 2025.

We will set out further plans for developing the heat pump market in the Heat and Buildings Strategy.

HC Deb 15 July 2021 | PQ 31276

Geothermal Energy: Net Zero Target

Asked by: **Steve Double**

What recent assessment the Climate Action Implementation Cabinet Committee has made of the role of geothermal energy in the UK reaching net zero.

Answered by: **The COP26 President (Alok Sharma)**

The Committee that I chair has been working with Departments across Whitehall to develop our plans to deliver on our carbon budgets and, indeed, our net zero commitments. The Government consider geothermal energy a low-carbon technology that is within the scope of our new £270 million green heat network fund, which supports the commercialisation of low-carbon heat network projects and opened for applications earlier this month.

Steve Double

The COP President will know from his recent visit that Cornwall is leading the way in the development of geothermal energy in the UK with two wells being drilled and many more planned. However, the people developing this new technology need the Government to back it to ensure that we can realise its potential, and they need certainty to make their plans in the near future. Will he ensure that the Government come forward with a renewable heat incentive for geothermal as soon as possible?

Alok Sharma

May I say that I very much enjoyed my visit to Eden Geothermal with my hon. Friend? It was particularly pleasing to note that some of those working in the project had made the transition from the oil and gas sector owing to their transferable engineering skills. As I set out, the fund has been launched, and I know that my right hon. Friend the Minister for Business, Energy and Clean Growth will be delighted to meet my hon. Friend to discuss the issue further.

HC Deb 14 July 2021 | Vol 699 c355

Geothermal Power: Mines

Asked by: **Thompson, Owen**

To ask the Secretary of State for Business, Energy and Industrial Strategy, whether he has had discussions with representatives of the Coal Authority on the (a) feasibility and (b) potential merits of extracting geothermal energy from mine water in abandoned mines.

Answering member: **Anne-Marie Trevelyan | Department: Department for Business, Energy and Industrial Strategy**

I can confirm that we are in close contact with the Coal Authority and that we see working with them to develop energy from mine water as essential to decarbonising the UK's heating systems.

Heating and hot water make up around 40% of the UK's energy consumption and nearly a third of the UK greenhouse gas emissions. Around 25% of UK homes are situated in the former coalfields and since the water in the now flooded mines is geothermally heated Around 25% of UK homes are situated in the former coalfields, the Coal Authority estimates there is sufficient energy in the geothermal water found in former coal mines to heat all of the homes on the coalfields.

Depending on the depth from which the water is extracted, the temperature varies from 21 degrees Celsius to 40 degrees Celsius. Where mine water reaches the surface, the heat can be extracted through a heat pump and transmitted through heat networks to both industrial and domestic customers. Using naturally warmed water, rather than already chilled water, for these systems reduces the energy requirement involved in these systems.

The Seaham Gardens heat network in County Durham is a great example of the merits of this. Working with the Coal Authority and Durham County Council we have recently awarded £3.8m for commercialisation and construction of a mine-water heat network scheme through our Heat Network Investment Project. When finished the scheme will use 6MW of heat to supply 1,500 homes.

HC Deb 06 July 2021 | PQ 24273

Geothermal Power: Finance

Asked by: **Thompson, Owen**

To ask the Secretary of State for Business, Energy and Industrial Strategy, what steps the Government is taking to incentivise (a) investment in and (b) development of deep geothermal energy projects.

Answering member: **Anne-Marie Trevelyan | Department: Department for Business, Energy and Industrial Strategy**

The Government believes that geothermal energy has an important role in the United Kingdom's transition towards net-zero, particularly in the decarbonisation of heat. The most promising use of geothermal energy in the UK is in district heating schemes, also known as heat networks.

The Government has been supporting the deployment of heat networks powered by geothermal energy. Geothermal projects can seek capital funding from the Heat Networks Investment Project (HNIP) (2018-2022) and as part of the project we have funded a £3.5m to an innovative Colchester shallow geothermal network. In terms of future support, we are currently considering geothermal energy as a low carbon technology to be within scope of our new £270m Green Heat Network Fund (2022-2025). The eligibility criteria for the fund were the subject of our consultation which closed on 29th January this year, and the response will be published in due course.

Finally, to encourage investment and drive costs down, the Government has funded £31m to the UK Geoenergy Observatories which will provide world-class infrastructure for a wide range of geoenergy related research. This research facility aims to attract leading geothermal scientists and engineers from all over the world, and the knowledge, expertise and technology generated from this research will propel the UK to becoming a leader in this field.

HC Deb 06 July 2021 | PQ 24272

Heating: Costs

Asked by: **Double, Steve**

To ask the Secretary of State for Business, Energy and Industrial Strategy, what assessment his Department has made of the average cost of fitting a new heating system to a typical UK property to make it compatible with a heat pump.

Answering member: **Anne-Marie Trevelyan | Department: Department for Business, Energy and Industrial Strategy**

Earlier this year, the Department published a report on heat distribution systems. This report concluded that the typical cost of retrofitting an entire house with larger radiators for a low temperature heating system, like a low temperature heat pump, would be approximately £1,700 for a one- to two-bedroom house, £2,200 for a three-bedroom house and £2,900 for a five-bedroom house. However, not all homes will require a radiator retrofit to become suitable for a heat pump, meaning the costs would be lower. In addition, the use of high temperature heat pumps is likely to significantly reduce the need to alter existing heat distribution systems.

HC Deb 02 July 2021 | PQ 21263

Geothermal Power

Asked by: **Mullan, Dr Kieran**

To ask the Secretary of State for Business, Energy and Industrial Strategy, what assessment his Department has made of the potential of geothermal energy to contribute to the UK's net zero target.

Answering member: **Anne-Marie Trevelyan | Department: Department for Business, Energy and Industrial Strategy**

The most promising use of geothermal energy in the UK is for low temperature applications such as district heating schemes. We have been providing support to the deployment of district heat networks from geothermal through the Heat Networks Delivery Unit (HNDU) and the Heat Networks Investment Project (HNIP).

The £270m Green Network Heat fund is still at an early stage of scheme development, and we will be issuing a consultation response in due course.

The Government has also funded the £31m UK Geoenergy Observatories which will provide a world class infrastructure for a wide range of geoenergy related research including geothermal.

HC Deb 05 February 2021 | PQ 147099

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News items

Business Green

13 September 2021

[Pump it up: Campaigners warn UK must accelerate heat pump installations or risk lagging behind European neighbours](#)

Power Engineering International

8 September 2021

[Geothermal potential – Why hot rocks are cool](#)

Guardian

14 August 2021

[Warmth from the earth and air: could heat pumps replace our gas boilers?](#)

Herald

28 July 2021

[Scientists bid to transform disused mines into renewable energy sources](#)

Power Engineering International

2 July 2021

[Four deep geothermal plants announced for UK](#)

Aberdeen Press & Journal

5 April 2021

[Could North Sea oil platforms be repurposed for geothermal energy?](#)

The i

11 March 2021

[Drilling for Eden Project's 'hot rocks' geothermal project to start in May after months of delays](#)

Scotsman

2 December 2020

[Green energy village plan in north-east Scotland could harness power from rocks](#)

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