POLICY BRIEFING

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THE UK'S UNTAPPED GEOTHERMAL ENERGY POTENTIAL

C Abesser, E Dunnet and A Bloodworth, British Geological Survey.
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The research team

The British Geological Survey (BGS) is a public sector organisation responsible for advising the UK Government on all aspects of geoscience, as well as providing impartial geological advice to industry, academia and the public. It is the UK's premier provider of objective and authoritative geoscientific data, information and knowledge for the sustainable use of natural resources, reducing risk and living with the impacts of environmental change. BGS undertakes interdisciplinary research to advance the understanding of the structure, properties and processes of the solid-Earth system, as well as of the available resources and their utilisation for the benefit of society.

Executive summary

Geothermal energy is the energy that is stored beneath the surface of the Earth in the form of heat. Regarded favourably by the pubic (Climate Assembly UK, 2020), geothermal energy is available across the UK and has a number of distinct advantages over other energy technologies:

- it is low carbon, unlike coal and gas
- it is always available irrespective of the weather, unlike wind and solar
- it is scalable, so it can provide heat to a small cluster of homes (via ambient heat networks) or to thousands of homes (via district heating)

Installation of 12 geothermal heating plants per year over the next 30 years could provide heating for more than two million homes and deliver carbon savings of around three million tons annually (ARUP, 2021), thereby making a significant contribution to meeting the UK's net zero target.

Researchers at BGS study different geothermal systems and technologies in the UK, including the energy stored in rocks and aquifers in the deep subsurface (1–5 km depth), in the shallow ground (less than 500 m depth) and in water within abandoned mines. Our research addresses critical questions such as investigating the size of the geothermal resource beneath our feet, understanding how it can best be managed and how any environmental risks can be mitigated. BGS also informs the policy and regulatory changes that are necessary to enable wider exploration of this resource.

We conclude that wider recognition of the UK geothermal potential as well as technology-specific targets, legislation and regulation of geothermal energy are now required for this resource to fulfil its potential in the UK's decarbonisation efforts as a functioning part of our energy system.

Context

Decarbonising heating is key to achieving the UK's net zero goals. While good progress has been made in decarbonising electricity, heating remains the UK's biggest source of carbon emissions: 85 per cent (or about 24.5 million) of homes are still heated by natural gas today (Energy Systems Catapult, 2020). No single technology can meet this challenge (Policy Connect, 2019). Instead, a combination of clean, secure and affordable technologies is needed that can support the energy transition on a place-to-place basis using the available low-carbon heat (re)source.

Geothermal energy is one such low-carbon heat source that is available in all parts of the UK. It is widely used in countries like Germany and the Netherlands, where it has contributed extensively to carbon emission savings, economic stimulus and job creation (Abesser et al., 2020). Geothermal energy has been the subject of Parliamentary questions[1] and debates[2] that acknowledged its various roles in decarbonising heating, creating jobs and addressing fuel poverty. Resources are enough to deliver heating for more than 15 million homes for more than 300 years (Gluyas et al., 2018) and, in some areas, can also deliver low-carbon electricity.

[1] Written communication from BEIS to K Mullen MP, February 2021; written communication from BEIS to J Gullis MP, September 2020.

[2] Parliamentary debates:

- 2021: Opportunities for geothermal energy extraction. (*Hansard* 700.)
- 2020: Future of coal in the UK. (*Hansard* 685.)
- 2018: Geothermal energy. (*Hansard* 643.)
- 2018: Geothermal energy: Clackmannanshire. (*Hansard* 642.)

Geothermal energy is extracted by a range of different technologies and is scalable from domestic, single-unit installations to local heat networks and district heating applications. Several critical questions need answering to enable the wider adoption of geothermal energy in the UK: for example, geothermal energy in the UK is not regarded as a recoverable, natural resource such as oil, gas, coal or water. This causes some difficulties when it comes to assigning legal ownership to or licencing and regulation of it.

There are currently no tailored regulations for geothermal energy and policy support to produce geothermal heat is limited to small-scale, domestic installations. Without Government-set targets, regulatory framework and policy support, it is difficult for a market to be established and, as a result, there is a high risk that this low-carbon, renewable heat resource, which is available 24/7, 365 days a year, will be overlooked in the UK, despite its great potential.

Key messages

- Geothermal energy is a low-carbon resource that is available across the UK and at all times.
- Realisation of its potential in the UK requires broader technology awareness, legal acceptance and policy support from key stakeholders, policymakers and Government.
- Geothermal energy could make a considerable contribution to the UK decarbonisation efforts if properly supported, regulated and licenced.

Our proposals to policymakers

- Support the recognition of geothermal energy as a natural resource through developing bespoke policies and regulation and provision of wider technology deployment in the UK.
- Define clear targets for geothermal developments in the UK. According to ARUP, a short-term target of 10–12 geothermal heat projects in the next five years could provide heat to up to 500 000 homes and achieve carbon savings of 80–100 kiloton per year (ARUP, 2021).
- Develop a geothermal road map that defines long-term strategy and financial commitments from the Government for supporting geothermal energy schemes in the UK.

Evidence Week policy briefing video

- https://senseaboutscience.org/evidence-week/institution/british-geological-survey/

References

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