



## Environmental Audit Committee

Rt Hon Jacob Rees-Mogg MP  
Secretary of State for Business, Energy and Industrial Strategy  
Department for Business, Energy and Industrial Strategy  
1 Victoria Street  
London SW1H 0ET

*Sent by e-mail only*

19<sup>th</sup> October 2022

Dear Secretary of State –

### **Technological Innovations and Climate Change: geothermal technologies**

I am writing to you following the Environmental Audit Committee's evidence session on Geothermal Technologies as part of its *Technological Innovations and Climate Change* inquiry. The Committee's call for evidence on this topic attracted 34 written submissions.<sup>1</sup> The Committee held an oral evidence session on 7<sup>th</sup> September 2022, hearing from the British Geological Survey, the Association for Renewable Energy and Clean Technologies, the Coal Authority, and Geothermal Engineering Ltd.<sup>2</sup> The Committee greatly appreciates the contributions of all who assisted it in this inquiry.

The evidence received by the Committee was clear and consistent: the UK has significant geothermal resources which can contribute to both the UK's energy security and its transition to net zero. The Committee is disappointed to find that the current policy, funding, and regulatory landscape does not appear to be conducive to optimising the potential contribution of geothermal to these policy goals.

The term "geothermal energy" refers to the energy stored beneath the surface of the Earth. Such energy from a variety of sources which can replenish heat abstracted to the surface.<sup>3</sup> In what follows, "deep geothermal resources," generally refers to geothermal energy at a depth greater than 500m from the surface: "shallow geothermal resources" refers to those at a depth less than 500m from the surface.

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<sup>1</sup> The [written evidence](https://committees.parliament.uk/work/6777/technological-innovations-and-climate-change-geothermal-technologies/publications/) taken by the Committee in the course of its inquiry is published at <https://committees.parliament.uk/work/6777/technological-innovations-and-climate-change-geothermal-technologies/publications/>. Individual evidence submissions are referenced below with the prefix GEO.

<sup>2</sup> The transcript of [oral evidence](https://committees.parliament.uk/oralevidence/10682/pdf/) taken by the Committee on 7th September 2022 is published at <https://committees.parliament.uk/oralevidence/10682/pdf/>.

<sup>3</sup> Abesser and Walker, "Geothermal Energy", [POST Brief 46](#), 2021



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### A. The scale of the resource and the Government's ambition

The Committee heard that, while there is uncertainty in the precise figure, the geothermal resources in the UK are considerable. The quantity of heat potentially accessible has been estimated between 100%<sup>4</sup> and 200%<sup>5</sup> of the UK's annual heating demand. The geothermal resources suitable for generating power are smaller, but still significant, representing 1.5 per cent of the UK's annual power consumption. When operating without venting gases, and from a decarbonised power supply, geothermal technologies are zero-emission technologies.

Different geologies lend themselves to different geothermal applications. For example, areas with radioactive granite deposits are suitable for geothermal power generation, as the radioactive decay heats the rock to suitable temperatures. Indeed, such granite deposits are the only geology in the UK suitable for such use. Areas of the UK with these granite deposits include Cornwall, Aberdeenshire, and the North of England.<sup>6</sup>

Other deep geological formations contain geothermal resources which can be exploited for use in district heating applications, as well as horticultural and agricultural applications. Typically, these formations are deep sedimentary aquifers—porous rocks saturated with groundwater—which can be found across England.<sup>7</sup>

The Committee has also received evidence on emerging deep closed loop technologies, where a heat carrier fluid is injected, heated, and abstracted without leaving the pipes.<sup>8</sup> Such technology may be able to bring new life to oil and gas wells at the end of exploration or production.<sup>9</sup>

Shallow geothermal resources are only suitable for the production of heat when combined with a heat pump. Closed-loop technologies can be deployed at a small scale anywhere in the UK, and open loop technologies can be installed exploiting groundwater in shallow aquifers.<sup>10</sup>

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<sup>4</sup> Gluyas et al., [Keeping Warm: a review of deep geothermal potential of the UK](#), 2021

<sup>5</sup> [Q6](#)

<sup>6</sup> British Geological Survey, [GEO0021](#)

<sup>7</sup> *Ibid.*

<sup>8</sup> Geothermal Energy Advancement Association, [GEO0009](#)

<sup>9</sup> Ceraphi Energy, [GEO0010](#)

<sup>10</sup> British Geological Survey, [GEO0021](#)



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A further, unconventional geothermal resource available in the UK is in flooded, disused mine workings.<sup>11</sup> Many towns and cities in the UK sit above former coal mines, and many of these settlements are on the Government's priority list for Levelling Up funding.<sup>12</sup> The Coal Authority is currently working with Gateshead Council to provide geothermal heat from mines below the town at a price cheaper than that currently charged for gas.<sup>13</sup>

The Committee has heard that geothermal projects can offer considerable economic benefits. For example, the Renewable Energy Association and Arup have estimated that the development of deep geothermal projects could bring around as many 10,000 direct and 25,000 indirect jobs by 2050.<sup>14</sup> The North East Local Enterprise Partnership estimates similar employment opportunities: 4500 direct and up to 11,000 indirect jobs if 42 mine water heat schemes are developed in conjunction with the Coal Authority.<sup>15</sup> It has also been noted that drilling skills and subsurface knowledge from the oil and gas industry are extremely well suited to the geothermal industry's needs. Geothermal therefore offers a potential green transition to the current oil and gas workforce.<sup>16</sup>

The geothermal resource in the UK is significant and multifaceted, and is co-located with heat, power, and investment demand. Exploiting this resource can support Britain's energy security and transition to a net-zero society, as well as create jobs and drive investment across the country.

The Committee therefore finds it disappointing that the exploitation of this resource has not been explicitly addressed either in the British Energy Security Strategy<sup>17</sup> or the Net Zero Strategy.<sup>18</sup> The lack of formal recognition of the potential for geothermal in Government energy and decarbonisation strategies, and the lack of explicit targets for generation of heat and power, clearly inhibits stakeholder and investor confidence: this in turn prevents the industry from growing.

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<sup>11</sup> The Coal Authority, [GEO0032](#)

<sup>12</sup> Department for Levelling Up, Housing and Communities, [Levelling Up fund round 2: list of local authorities by priority category](#), 2022

<sup>13</sup> Gateshead Council, [Zero Carbon Heat for Gateshead](#), 2021

<sup>14</sup> Energy Association and ARUP, [Deep Geothermal Energy: Economic Decarbonisation Opportunities for the United Kingdom](#), 2021

<sup>15</sup> North East Local Enterprise Partnership, [The Case for Mine Energy – Unlocking Deployment at Scale in the UK](#), 2021

<sup>16</sup> European Geothermal Energy Council, [GEO0024](#)

<sup>17</sup> Department for Business, Energy and Industrial Strategy, [British Energy Security Strategy](#), 2022

<sup>18</sup> Department for Business, Energy and Industrial Strategy, [Net Zero Strategy](#), 2021



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**Please set out what consideration was given to (a) including detailed geothermal heat and power in the British Energy Security Strategy and the Net Zero Strategy and (b) setting generation targets for these zero-emission technologies.**

### **B. Support for geothermal power generation under Contracts for Difference**

Geothermal power generation projects are eligible for the Contracts for Difference (CfD) scheme and can bid for funds from Pot 2. In Allocation Round 4, the administrative strike price (in 2012 prices) was £132/MWh.<sup>19</sup> There was no guaranteed minimum allocation to geothermal power projects. This appears to have led to at least one geothermal project losing out on funding despite bidding at a lower strike price than that agreed for successful tidal projects, which do have a guaranteed minimum allocation.<sup>20</sup>

The situation has led geothermal power project developers to conclude that the strike price under the scheme is “effectively meaningless”<sup>21</sup> because the likelihood of a bid being successful is so low. Difficulty in obtaining a CfD strike price harms investor confidence, which makes it difficult for developers to raise sufficient capital to meet the high expenditure during the exploration and commissioning phases of the project.

**Will your Department consider the creation of a ringfenced pot for geothermal power projects under the Contracts for Difference scheme?**

### **C. Licensing of heat from geothermal technologies**

Presently, heat is not classed as a natural resource in the UK.<sup>22</sup> As a result, there is no licensing regime for geothermal heat; no one ‘owns’ heat, and no one can secure exclusive rights to exploit the resource. For a company, this raises the issue that they could incur significant capital expenditure in proving the existence of a resource, only to have another company set up nearby and exploit the same resource.

This is a fundamental issue faced by the geothermal industry, but not one faced by others: the fossil fuel and mining industries are able to secure the right to explore and

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<sup>19</sup> Department for Business, Energy and Industrial Strategy, [Contracts for Difference, Allocation Round 4: Budget Notice](#), 2021

<sup>20</sup> Eden Geothermal Ltd, [GEO0020](#)

<sup>21</sup> Geothermal Engineering Ltd, [GEO0018](#)

<sup>22</sup> Abesser and Walker, “Geothermal Energy”, [POST Brief 46](#), 2021



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exploit their respective resources.<sup>23</sup> Indeed, the lack of a licensing regime in the UK makes it an outlier when compared to other neighbouring economies. Denmark, Germany, France and the Netherlands all regulate heat as a natural resource.<sup>24</sup> In Switzerland and Belgium, these regulations are set by some regional administrations in the absence of national legislation.<sup>25</sup>

The Coal Authority is the only body in the UK to issue licenses specific to geothermal heat. They issue licenses to abstract heat from 'blocks' of interconnected mines.<sup>26</sup> This was introduced partly to address the issue of thermal interference, where the operation of several geothermal installations can reduce the temperature of the reservoir enough to affect the efficiency of the installations.

### **Will your Department undertake to investigate and to implement an appropriate licensing regime for geothermal projects in the UK?**

#### **D. Support for accessing geothermal heat**

In the written and oral evidence received by the Committee it was made clear that the closure of the Non-Domestic Renewable Heat Incentive (RHI) has posed a significant problem to the geothermal industry. The RHI offered a feed-in tariff for heat paid over 20 years.<sup>27</sup> It has been replaced by the Green Heat Network Fund.<sup>28</sup> While this scheme is generally useful, the short-term nature of the support it provides does not appear conducive to growth in the UK's geothermal industry.

The Renewable Energies Association has called for existing support to be supplemented by tailored long-term support for geothermal projects.<sup>29</sup> According to the REA, there are at least a dozen projects waiting for funding that are otherwise ready to begin development.

### **Will your Department give consideration to longer-term support for geothermal heat, and other forms of renewable heat?**

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<sup>23</sup> North Sea Transition Authority, [Types of Licence](#), 2022

<sup>24</sup> British Geological Survey briefing paper, August 2022

<sup>25</sup> *Ibid.*

<sup>26</sup> Ceraphi Energy, [GEO0010](#)

<sup>27</sup> Ofgem, [Non-domestic Renewable Heat Incentive](#), 2021

<sup>28</sup> Department for Business, Energy and Industrial Strategy, [Green Heat Network Fund](#), 2022

<sup>29</sup> [Q18](#)



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The risk profile of geothermal projects a considerable barrier to the industry. In an immature industry, there is great uncertainty in accessing the resource; projects tend to undertake an exploration phase of drilling test wells to achieve the necessary flow rates and fluid temperatures.<sup>30</sup> This means that projects have a high capital expenditure and high risk in these early stages.

In less mature markets in continental Europe, this risk is typically shared with the public through risk-sharing schemes. These schemes tend to be public insurance schemes, loans, or grants. As the industry matures, and knowledge of the resource improves, the risk declines. As a result, private insurance tends to emerge, rendering public risk-sharing no longer necessary.<sup>31</sup>

**Please set out what plans your Department has to ensure that appropriate risk-sharing mechanisms are in place for the geothermal industry, and what models, if any, are under consideration.**

On the basis of the evidence before it, the Committee considers that geothermal technologies present exciting opportunities which, if supported and developed, can assist in addressing significant current policy challenges. The Committee looks forward to receiving your considered response to the questions and observations above.

I am copying this letter to the Chairs of the Business, Energy and Industrial Strategy Committee and of the Science and Technology Committee. The letter will also be published on the Committee's website.

Yours sincerely,

**Rt Hon Philip Dunne MP**  
**Chairman of the Environmental Audit Committee**

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<sup>30</sup> British Geological Survey, [Unlocking the potential of geothermal technology in the UK](#), 2021

<sup>31</sup> GEORISK, [Report reviewing existing insurance schemes for geothermal](#), 2020