

Geothermal in the UK - What's next?

Geothermal heat & power is available for a leading role in energy security & decarbonisation

Results and actions from the conference 'Geothermal in the UK - What's next?' held on 12 June 2025

Headline message: Widespread political support would kick-start geothermal in the UK

In short, commercial geothermal heat and power in the UK is now available for a leading role in energy security and decarbonisation.

The conference called upon the Government, all political parties, and all councils to solidly support and advocate geothermal projects both for energy security, creation of a diverse energy mix, and as a 24/7/365 - always available - sustainable, renewable clean heat & power resource, ideal for decarbonisation.

Geothermal offers jobs, reduced emissions, near zero carbon heat and power, and energy security

By 2050, geothermal is estimated capable of supplying 10 GW of predicted heating demand, 1.5 GW of anticipated electricity demand, deliver a reduction of 10 Mt of CO₂ emissions, whilst adding 50,000 direct jobs and 125,000 indirect jobs. Geothermal reinforces the UK aspiration for decarbonised heat and power by contributing a reliable resource to a Net Zero energy system with greater resilience, and energy independence.

Increased national and local government support would advance geothermal as a clean energy option

As energy security and carbon reduction become critical priorities for governments and businesses alike, geothermal offers a scalable, reliable, and long-term solution. Geothermal energy is a significantly underutilized resource with substantial potential to contribute to both heat and power generation. Technology now allows it to be deployed anywhere as it is very scalable to both shallow, medium and deep projects, making it ideal for commercial buildings, industrial processes, and district energy systems seeking to lower emissions and reduce operating costs. It delivers clean, constant, carbon-free heat and power. Geothermal heat especially is local energy for local people. It can readily displace gas in domestic settings, leading to improved safety, improved air quality and thereby improving peoples' health.

More national and local government support is needed to scale-up geothermal projects, particularly in terms of policy, regulation, investment, and fostering closer collaboration between stakeholders. The geothermal sector is collective in its approach - what is missing is prominence. Government support is perceived as much less compared to other low-carbon sources, particularly wind, solar, hydro and nuclear. The lack of confidence in national policy direction and local government support is stymieing growth. As an emerging industry, we need to capture public imagination and become a government imperative.

Resources are available everywhere in the UK - we just need to use them!

Geothermal resources for heat & power are abundant throughout the UK. Due to the suitable subsurface conditions combined with multiple, now proven, technological innovations, geothermal resources can be developed anywhere in the UK.

Geothermal is sustainable by any human measure with 100+ years of resources. Unlike other energy resources and minerals, it is everywhere. UK geology in many areas is suitable for multiple technology solutions. It is proven to have negligible environmental impact. Surface facilities are typically small and unobtrusive, and water circulated to extract heat can be contained within a closed system. Simple messaging is needed to explain the resource opportunity – 'low carbon heat and power exists under all our feet; we just need to use it!'

Commercial projects already exist - the challenge is to scale up and unleash the technology

The UK has a small number of proven projects that produce low, medium and high-grade heat. These demonstrate commercial viability. Projects in the counties of Cornwall, Durham, Hampshire and Gloucester already show how geothermal can decarbonise heating. Very soon, Cornwall is expected to add the first UK geothermal power production at United Downs. The challenge countrywide is to scale up activities, at pace.

Technology innovation includes the repurposing of existing oil & gas wells, micro-Organic Rankin Cycle technology, the integration of deep & shallow geothermal resources with combinations of heat pumps, a new generation of smart heat networks, the use of water in abandoned coal mines as a heat source, and significant improvement in drilling technology delivering reduced capital expenditure.

Financing and funding will be critical - public financing can accelerate project delivery

Accelerating the growth of UK geothermal through Government financial incentives, together with fiscal collaboration and innovation can deliver thousands of new low-carbon heat and power projects. Previous geothermal projects have had to deal with high upfront drilling costs which can exceed 40% of total costs. Long lead times and geological risks have made financing difficult. Access to geological and seismic data is crucial for development design; data needs to be more readily available and accessible. With greater numbers of UK projects, drilling costs will decline through continuous improvement. Innovation in fast drilling technologies focussed on shallow to medium geothermal would assist in reducing costs of drilling.

Globally, early-stage public financial support has been critical to attract private capital; this often includes tax breaks that incentivise scale-up. A blended approach incorporating public finance to de-risk private investment would accelerate investment, including grants for exploration, concession loans and guarantees. Venture capital and project finance needs support of a heating offtake agreement, or power purchase agreement (PPA) ideally with a Contract for Difference (CfD) mechanism. Drilling and drilling costs are more likely to be held separate.

A clear, simple regulatory framework in the UK would improve investor confidence

The current regulatory framework is inadequate for geothermal, lacking specific licensing and management systems. The UK requires simple, clear regulation for the use and commercialisation of geothermal opportunities. At the current time, there is no consistent countrywide legislation. Light-touch pragmatic regulation, combined with bankable heat and power purchase agreements would be a massive boost for investor confidence, and the insurance sector.

Having an additional income stream from geothermal projects will only help the bankability. Lithium in geothermal fluids is perhaps best known but there are sometimes also base metals and rare earth elements. Here again, actions on simple regulations and policy are now needed.

The UK services sector and supply chains are ready to meet a surge in geothermal projects

The UK supply chain currently serves projects in the UK and is scaled to meet the next few years of demand. Many UK-based suppliers are active in Europe while waiting for UK geothermal to take off. UK demand is much lower compared to Germany, Netherlands, Denmark, Croatia and France. The difference is not due to different subsurface resources - the geology is often very similar, whilst risks are proven acceptable in Europe.

Europe's approach is underpinned by strong EU government support and legislation. Legislation includes the Renewable Energy Directive, Energy Efficiency Directive, Net-Zero Industry Act, and Critical Raw Materials Act. These introduce rules that can benefit the entire geothermal sector. The EU funds research projects through the Horizon 2020 programme, focussing on cost reductions and improved performance. Several countries have national roadmaps and ambitious targets to make investment in geothermal projects more attractive.

A rapid build-up in geothermal can offset the loss of jobs from a fast-downsizing oil & gas industry. Geothermal could create a pathway for >30,000 oil and gas professionals as it relies on similar skills to drill wells and manage fluids. If UK geothermal develops quickly, this can ensure highly skilled and trained drilling and engineering staff are not lost forever.

Heat networks fed by geothermal resources are an enormous opportunity

Heating and cooling accounts for 35-40% of total UK carbon emissions with the burning of fossil fuels accounting for most of these emissions. Heat networks offer low-hanging fruit to decarbonise. UK heat networks are proven - with companies designing, building, financing and operating district heating, hot water and cooling schemes - there are currently ~500,000 heat network customers. However, these cover only 2-3% of total heat demand, which is very low compared to several European countries e.g. Denmark 60-65% of households and Sweden 50-55%. Only a tiny fraction - less than 0.5% - of the UK's total annual heat demand is met by geothermal. Adding geothermal to heat networks can offer space savings, long term cost savings, and a route to decarbonisation.

Geothermal is poised to assist large data centers and the AI-driven surge in energy demand - the UK can be a big beneficiary if it acts now. Recent PPA deals involve Google in the USA, whilst Meta, Microsoft, and Amazon are each well advanced. Their search for a clean energy mix for energy hungry operations has identified geothermal as ideal for heating, cooling and baseload power for data centres, whilst meeting energy procurement targets.

Academic support and involvement are growing - increased funding is desirable

20 UK universities are now researching or using geothermal on their estates. Opportunities abound to decarbonise large buildings such as NHS hospitals, universities & schools, new data centres, airports, prisons, warehousing and large-scale greenhouse horticulture. Increased funding is desirable both for research and to develop much-needed undergraduate level courses. Funding is critical to invest in skilling, and re-skilling, young and existing workers for the future. Increased support of the UK funding councils is desirable.

Academia can do much to bring the geothermal opportunity to all - young-old, rural-urban, south-north, rich-poor. Raising public awareness and engaging local communities is essential for successful geothermal projects. Social understanding of geothermal energy opportunities is extremely low, often non-existent. Education about geothermal is essential at all levels; for example, by a small investment in developing Minecraft and other video gaming technologies, this could be used reach millions of younger students and children.



Who attended the 'Geothermal in the UK - What's next?' conference? The full day event held at the Geological Society of London premises had over 100 attendees, with some online. Attendees included geothermal companies, universities, research students, many CEOs and executives, geoscientists, financiers, insurers, engineers, institutions and services sector.

June 12 was proposed by the NGC to become 'UK Geothermal Day' - this was seconded by GEAA. It is another indicator that geothermal is advancing in the UK. An inaugural award for outstanding contribution to geothermal in the UK was given to Peter Ledingham for a lifetime of making geothermal a reality, particularly in SW England.

About the GeoEnergy Exploration Society of Great Britain: GESGB is a registered charity, and a community committed to advancing for public benefit, education in the scientific and technical aspects of subsurface energy and related technologies. It informs and champions the importance of geoscience in the Energy Transition.

About the Geothermal Energy Advancement Association: GEAA advocates increased investment in geothermal and increased awareness of this sustainable source for near zero-carbon heat, and hot water, cooling, power & critical minerals. It offers leadership, dialogue, and information. GEAA is a not-for-profit registered in the UK.

