

Answers provided by Michelle Bentham – Chief Scientist for Decarbonisation and Resource Management at the British Geological Survey.

The British Geological Survey contributes towards net zero and energy security by contributing to the development of technology that use the subsurface to decarbonise energy and industry and providing knowledge about the material required for the transition to net zero.

Overarching questions

2. What challenges and obstacles have you identified to decarbonisation?

BGS investigates the feasibility and development of a range of geological decarbonisation technologies at a national, local and site-scale including:

- Geothermal energy
- Carbon Capture Utilisation and Storage (CCUS)
- Energy storage (compressed air and hydrogen)
- Critical minerals for the energy transition
- Deep disposal of radioactive waste in geological formations.

The biggest challenge to the BGS contribution in this area is a lack of continuity in policy and funding. Deployment of carbonisation technologies has also suffered from this stop-start approach to support. For example, CCUS technology has been feasible for over a decade. Changes of approach and associated uncertainty has meant that the introduction of this important carbon mitigation technology has been much delayed. As a result, the UK is still without an active CCUS project. The stop-start nature of this approach has led to uncertainty, reduced confidence, inefficiencies and duplication in science work which underpins the technologies.

4. What more could government do to support businesses, consumers and other actors to decarbonise?

Because the UK market is immature and unproven, new decarbonisation technologies such as renewable geothermal energy are not attractive to large commercial organisations. Costs associated with novel geothermal technologies are often higher than traditional energy generation. In such cases, technology development is generally carried out by SMEs, academia and national organisations such as the BGS. These bodies often focus on investigating technical issues to increase the sustainability and commercial viability of geothermal. To stimulate the immature market, geothermal development should receive fiscal support such as feed-in tariffs. These should be comparable to those applied to other renewable technologies in the early stages of market development.

The UK energy transition to net zero will require a secure and sustainable supply of minerals and metals (such as lithium for battery production). BEIS support for the Critical Minerals Intelligence Centre hosted by BGS is part of this picture. Continued support to ensure a sustained contribution is essential.

6. How should we balance our priorities to maintaining energy security with our commitments to delivering net zero by 2050?

Delivery of net zero and energy security are not mutually-exclusive. We believe that by adopting a range of renewable technologies, the UK will be able to achieve both requirements. For example, in many areas of the UK renewable energy geothermal schemes could provide secure local, decarbonised domestic heating. In a limited number of settings geothermal schemes will be able to generate electricity.

Subsurface energy storage technologies (compressed air or hydrogen storage) will deliver on both objectives by improving our ability to balance intermittent renewable generation from wind and solar, helping to deliver steady and secure domestic decarbonised energy.

These renewable technologies are underpinned by CCUS, providing a route for industry to decarbonise. CCUS will also support the green production of 'blue hydrogen'.

Questions for academia and innovators

29. How can we ensure that we seize the benefits from future innovation and technologies?

Moving innovations and technologies to full deployment requires funding at all stages of the pathway, from the research phase to the commercial phase. There is a 'valley of death' in funding support between research and commercial deployment. This is particularly true for research organisations who may develop the innovation or technology, but then find that in later phases (higher technology readiness) funding is targeted at commercial organisations and SMEs. In part, this fails to recognise the contribution research organisations make to developing new innovations for decarbonisation.