

Thème 2 – Enjeux planétaires contemporains

2-A – Géothermie et propriétés thermiques de la Terre.

Geothermal energy in the United Kingdom

From the example of the UK, demonstrate that in the Earth's areas where the geothermic flow is low, geothermal resources can be used for space heating and even for electricity production.

Excerpt from an article written by Dr Jonathan Busby, British Geological Survey

<http://www.bgs.ac.uk/research/energy/geothermal/home.html>

[...] Although the UK is not actively volcanic, there is still a substantial resource of geothermal energy at shallow depths [...]. The upper 10-15 m of the ground is heated by solar radiation and acts a heat store. This heat can be utilised by ground source heat pumps that can substantially reduce heating bills and reduce the associated carbon footprint [...]

- 5 Hence the ground at this depth (about 15m) is cooler than the air in summer and warmer than the air in winter. This temperature difference is exploited by ground source heat pumps that are used for heating and / or cooling of homes and office buildings.

- 10 [...] With increasing depth, the ground temperatures are also affected by the heat conducted upwards from the Earth's core and mantle, known as the geothermal heat flow.[...] The UK's geothermal gradient, the rate at which the Earth's temperature increases with depth, has an average value of 26°C per km. Some rocks contain free flowing water and so at depth this water will be warm and can be extracted for use in district heating schemes or for industrial uses such as heating greenhouses.

- 15 There are also regions in the UK where the rocks at depth are hotter than expected.[...] some granites generate internal heat through the radioactive decay of the naturally occurring elements [...] It is possible to engineer the fracture system so that water can be made to flow from one borehole to another through the granite. The extracted hot water is at a sufficient temperature to drive an electricity generating turbine.
- 20 [...]

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In the UK, in the 1980s, an experiment was carried out at Rosemanowes (Carmenellis granite; 2.6 km, 100 °C). Today 2 projects are planned in Cornwall; Geothermal Engineering Ltd, 4-5 km depth 10 MWe; EGS Energy, 3-4 km depth, 3 MWe.

<http://www.groundwateruk.org/downloads/4%20Busby.pdf>

