Geothermal Energy

Geothermal energy is heat energy stored beneath the Earth's surface. As over 99% of our planet is hotter than 100˚C, geothermal energy represents huge resource of continuous, reliable, carbon-free energy. This internal heat comes from the steady decay of radioactive isotopes in the Earth's core as well as left over heat from the Earth's formation 4.5 billion years ago. Geothermal energy can be harnessed directly for heating and cooling purposes or it can be used to generate clean electricity using steam and turbines.Through geological engineering, surveying and data analysis geoscientists play essential roles in developing and implementing geothermal technologies across the globe.

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Shallow geothermal

1. Solar radiation heats up the ground to a depth of 10-15m. At this depth ground temperatures remain stable throughout the year (~9-13˚C in the UK), this is warmer than winter surface temperatures and cooler than summer temperatures.
2. Pumping water from a few metres below the surface and using a ground source heat pump can heat or cool buildings depending on the time of year.

cool water

warm water

Mine geothermal

Underground water can accumulate in old, disused mine shafts. The water is tepid (12-20˚C), heated from the high temperatures radiating from the Earth's core. Heat pumps can be used to harness this energy and provide low-carbon heating.

Deep geothermal

1. To harness the energy from heat sources deeper in the Earth, cooled water is pumped down into heated rocks where it is converted into steam.This hot steam rises and can be used directly to spin turbines and generate clean electricity.
2. Deep geothermal energy has traditionally been used in regions located near active plate boundaries such as Iceland, USA, Italy and Costa Rica. However new technologies are allowing deep geothermal energy to be harnessed from lower temperatures in non-volcanic regions e.g. from the granite rocks underlying Cornwall in the UK.

cooled water

hot steam

Heated rocks

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