CRA Charles River Associates

Energy Transition

Green tech spotlight: How abandoned mines can power our future

In the campaign to reach **carbon neutrality by 2050**, engineers have proposed using **geothermal energy** sourced from **abandoned mines** for domestic heating in the UK. The need for greener heating derives from the fact that **77%** of UK heating currently comes from **fossil fuel** sources.[1] There are currently 23,000 abandoned mines in the UK (underlying a quarter of buildings)[1] that can be utilised for **community heat networks**, which are projected to account for 18% of UK heating needs by 2050.[2]

How it works

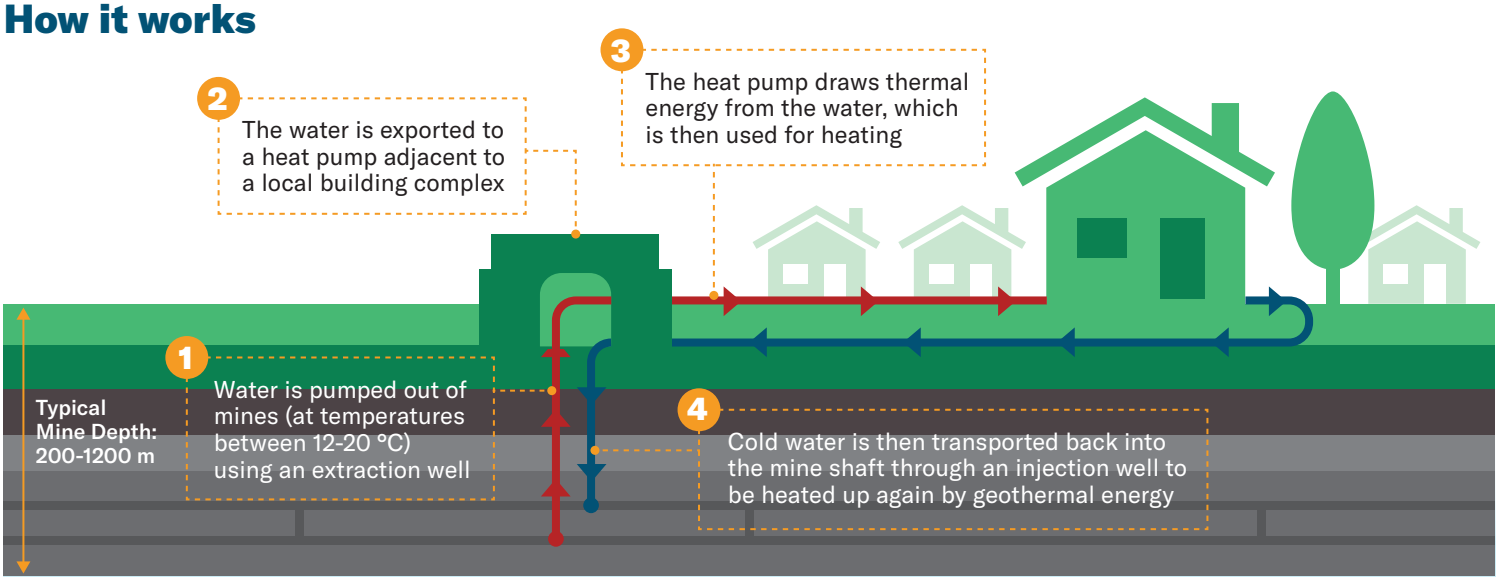

Diagram source: [1, 3, 4]

Benefits of mine water geothermal energy

Low-carbon footprint

Replacing a natural gas heating system to incorporate geothermal energy will help the average household cut down carbon emissions from heating by 45%*.[5,6]

CAPEX savings and reduced risk

Mine energy systems have lower CAPEX and risk than traditional geothermal energy structures. This is due to the reuse of existing infrastructure.

Social relief

Geothermal heat pumps are associated with lower heating costs than natural gas-powered boilers.[6] Therefore, mine energy can provide cost effective heating that can mitigate fuel poverty.[1,7]

*Calculated for a home using 11,000kWh of space heating and a heat pump with an average coefficient of performance of 4.

Investment

The Northeast Local Enterprise Partnership has identified mine energy as a pillar in their Energy for Growth strategy and has reported significant potential for investment.[7] Key market barriers include lack of research into the technical risks and lack of expertise, which can both be mitigated by subsidies and research grants. Overcoming challenges can help investors unlock the large economic potential of mine energy.

For more information, visit **www.crai.com/cop26**

Selected sources: [1] J.G. Gluyas, C.A. Adams, I.A.G. Wilson. (2020). The Theoretical Potential for Large-Scale Underground Thermal Energy Storage (UTES) within the UK. [2] Callanan (2021). The Case for Mine Energy – Unlocking Deployment at Scale in the UK. North East Local Enterprise Partnership. [3] Verhoeven, R., Willems, E., Harcouët-Menou, V., De Boever, E., Hiddes, L., Op't Veld, P., & Demollin, E. (2014). Minewater 2.0 project in Heerlen the Netherlands: Transformation of a Geothermal Mine Water Pilot Project into a Full Scale Hybrid Sustainable Energy Infrastructure for Heating and Cooling. Energy Procedia, 46, 58-67. [4] Coal Authority. N.d. 'Geothermal Energy from Abandoned Coal Mines'. https://www2.groundstability.com/geothermal-energy-from-abandoned-coal-mines/. [5] Renewable Energy Hub (2018). 'CO2 Carbon Savings of Heat Pump and Their Environmental Cost'. [6] Evergreen energy. N.d. 'Heat pump vs boiler comparison.' https://www.evergreenenergy.co.uk/heat-pumps/heat-pump-vs-boiler/. [7] Clark, A (2019). North East Energy for Growth. North East Local Enterprise Partnership.