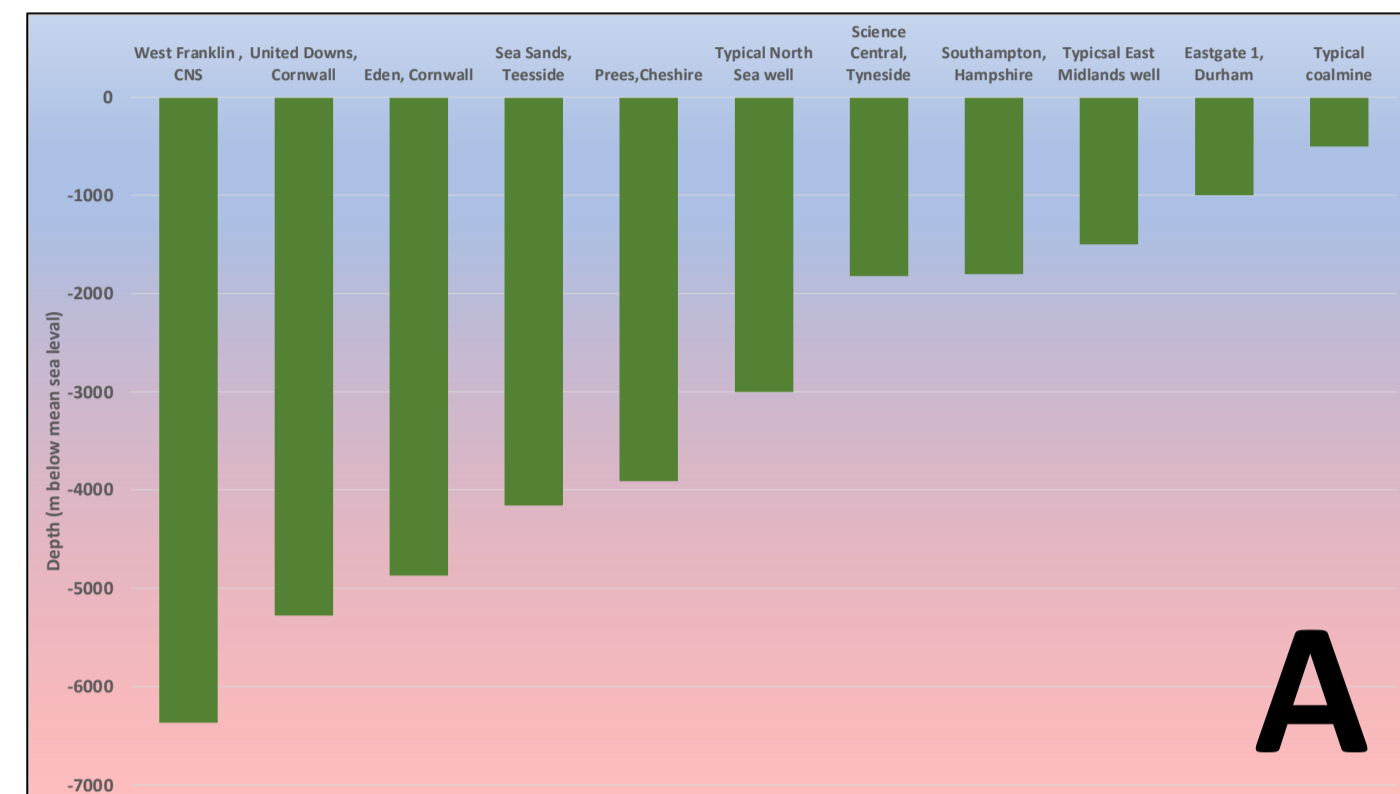
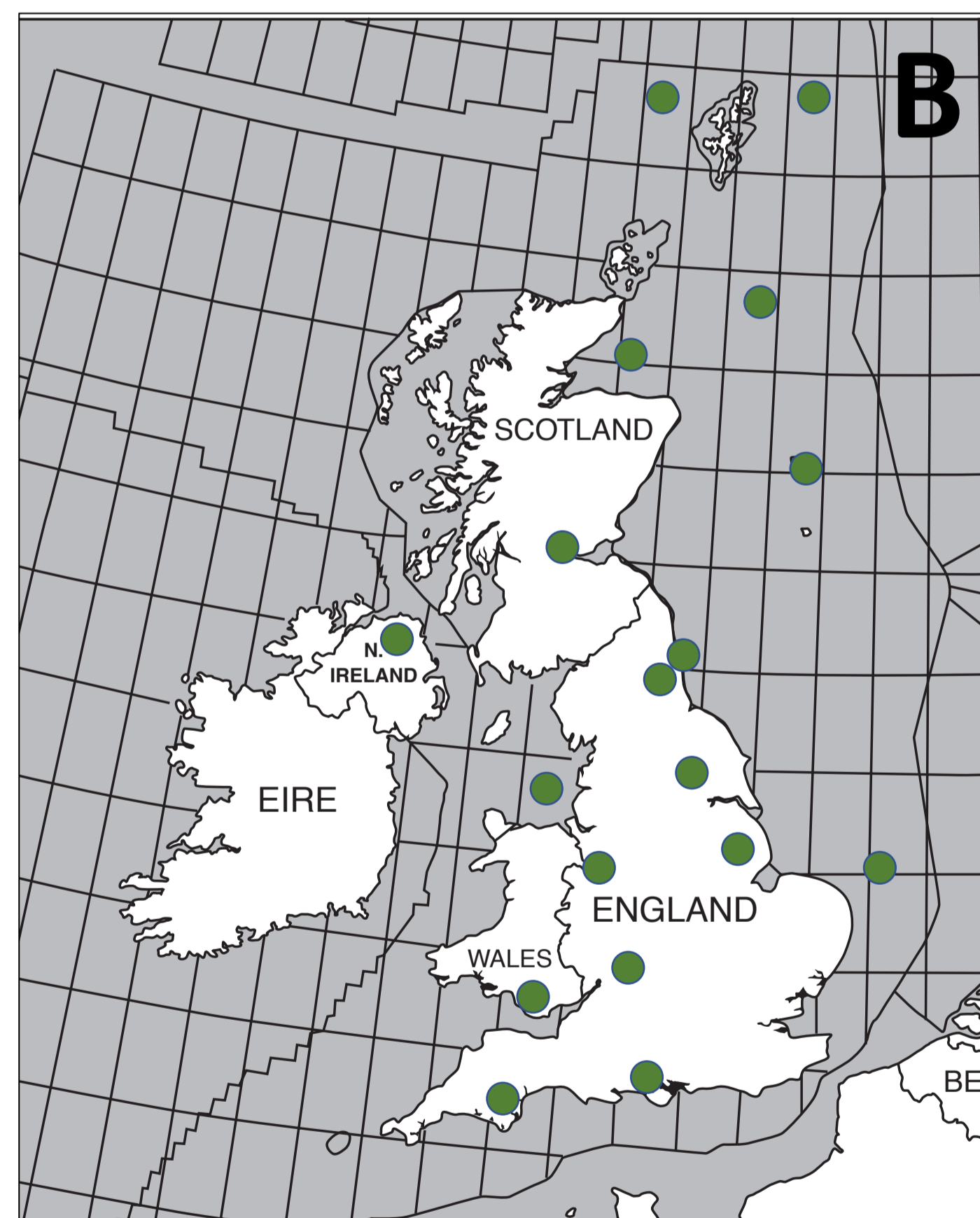


The Big Heat: what role for geothermal energy in UK net zero 2050?

Some Like It Hot



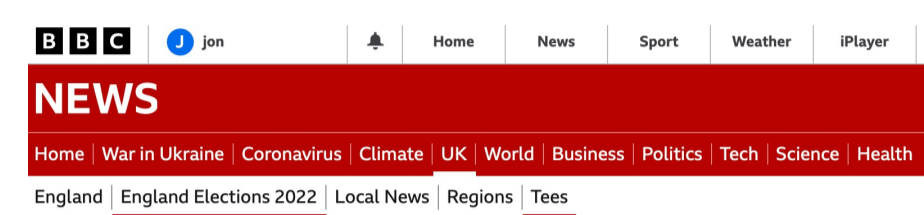
A



B

A & B – the UK contains:
 23,000 abandoned flooded mines
 >2,000 onshore petroleum wells
 >10,000 offshore petroleum wells
 UK geothermal gradient 25-35 °C/km
 A heat resource for all

Power Play



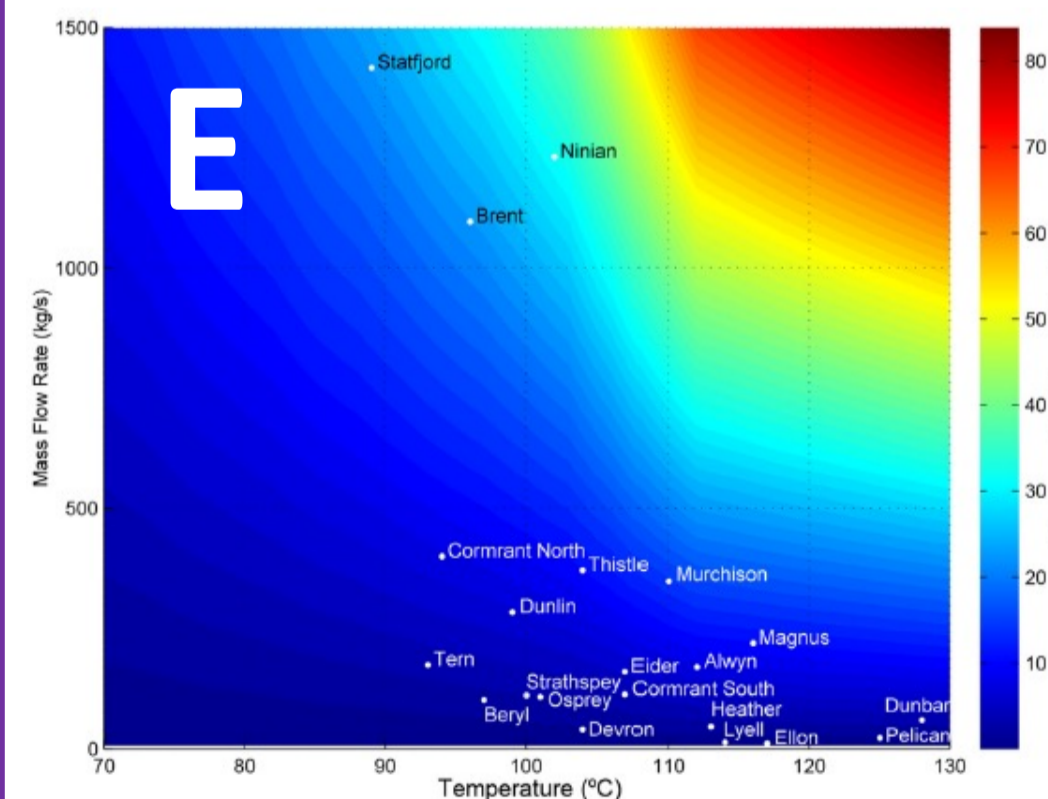
Auckland Castle launches £3.5m geothermal heat investigation

© 18 September 2014



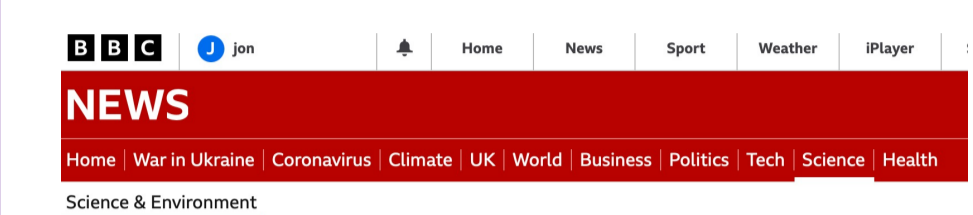
First steam produced at Cornish geothermal plant

© 1 July 2021



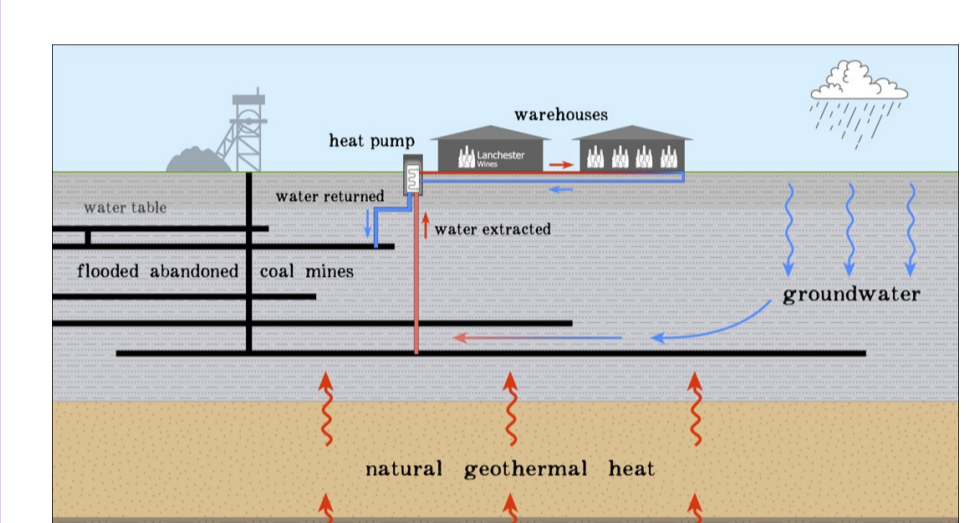
C & D – Deep geothermal heat and power sites in development at United Downs & Eden in Cornwall and planned for bishop Auckland in Durham.
 E – power potential of co-produced North Sea brines.

Cool Runnings



Homes to be heated by warm water from flooded mines

By Roger Harrabin
 BBC environment analyst
 © 9 June 2020



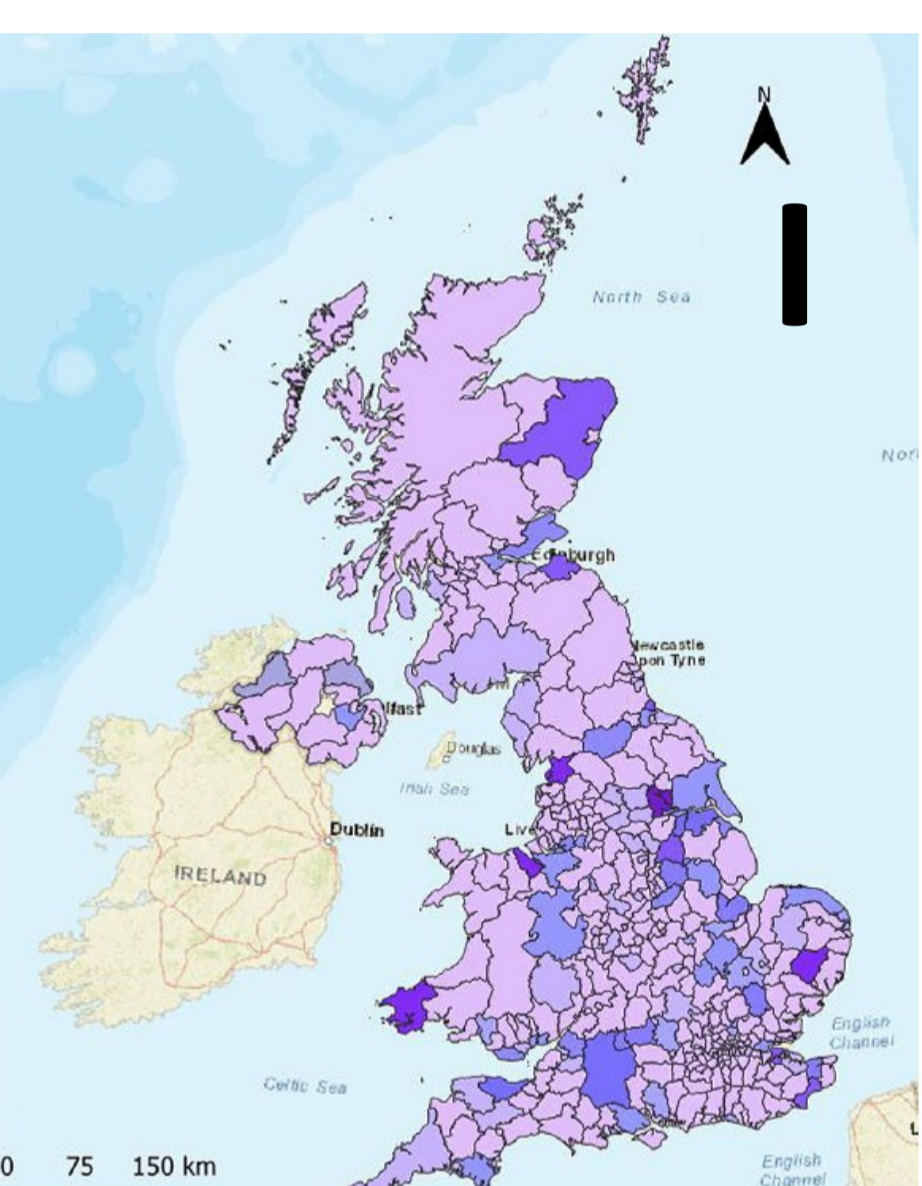
G



H

F & G - Flooded mines offer low risk delivery of low-grade heat for space heating.
 H – projects in development include: Gateshead, South Shields x2, Durham and more.

Waste Land



Waste heat (GWt) 1125 - 2747 7613 - 10312
 2747 - 4234 10312 - 12595
 4234 - 5436 12595 - 23716
 277 - 1125 5436 - 7613 23716 - 26882



J

I – waste heat from industry and solar thermal can be stored in the subsurface (J blue areas) in summer and reclaimed in winter, creating an 'Earth battery'.

Towards Zero

The UK uses about 1.5 billion tonnes of oil equivalent energy every year. That equals around 6×10^{18} joules (6 EJ). About 50% of all energy used is for heating (3 EJ). The heat contained in water sedimentary basins, hot granites and flooded mines is estimated to be 300 EJ. That is 100 years supply at a minimum and does not account for heat flow from the Earth's interior. Managed properly the heat supply is sustainable (the Earth has only used 15% of its fuel to produce heat, in the past 4.5 billion years).

Currently, 77% of all heat in the UK is generated by burning fossil fuels (mostly gas), liberating 30% of our greenhouse gas emissions. Any location in the UK could switch to using its own local geothermal heat. Where needed, heat upgrading with heat pumps powered by electricity would require only about 25% of the power conventionally used for direct electric heating systems.

Besides being sustainable, heat is also secure, no imports, no exports are needed.

Using geothermal and waste heat together would allow us to make the next carbon budget and would help free the UK from reliance on imported fossil fuels.