



Geothermal Lower Carboniferous fracture system play onshore UK: viable economics, and prospective examples

Our structure interpretation work identifying natural-fracture zones as effective hot water reservoirs, taken together with latest-generation binary turbines and modern pulse-drilling methods, points to a large number of potentially-commercial geothermal plays onshore UK. Having run generalised AI models for the economics, we consider that twin-well, binary-turbine supported, natural-fracture based system plays can produce revenues viable for investment in geothermal drilling in UK. In these notes we outline around 20 technically-attractive geothermal targets for well pairs in Lancashire, East Midlands, and Northumberland, at locations where Lower Carboniferous platforms abut marine shale basins and the platform margins are heavily faulted.

It is our view that numerous significant, major opportunities exist. Confirming and maturing them for drilling needs the licensing of presently available seismic, re-mapping the acreage, forming private venture funding groups; then define work programmes and acquire the rights to proceed, drill and own the assets. There is a pressing need for a framework regulating and licensing geothermal acreage, to accelerate the development of geothermal investment.

To improve the odds for success in proving commercial results, the technique of pulse drilling should be used. That is, vary pressures whilst drilling so as to create an annular network of new fractures interconnecting with presently-open water-bearing systems. It doesn't matter what the rock types are: the main reserve of heated ground water is in the open, interconnected fractures. These can deliver fluids at high rates. Flow rates in our modelling match heat extraction, typically 50-200 kg/sec for two cases: fluid temperatures of 85 and 100 degrees Centigrade. Thermal power input-to-turbine ranges from 8.4 to 21 MW. Electrical power output is 0.7 to 2.5 MW. Between 2-3 wells are drilled. Based on a 2.5 MW plant, setting our lower-range costs for exploration and drilling at £6.5 million and plant at £6.25 million respectively, we calculate typical capex input at production onset is around £15 million. A power purchase agreement range of £50-90 per MWh gives annual revenue between £0.98- £1.8 million. The heat resource doesn't run out, and the plant and wells will last for 25 years.

This result is encouraging and we are working on additional areas in UK Carboniferous basins. These figures are higher than estimates published by other observers. Geothermal can become important for UK electricity generation.

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