

Geothermal Power Generated from UK Granites (GWatt)

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Deep geothermal systems have the potential to provide sustainable, reliable, carbon-free power for the UK. However, exploitation of the UK deep thermal resource is held back by knowledge gaps about permeability and fluid/heat flow within fractured hot rocks. The BGS-led GWatt project aims to fill these gaps via novel studies of rock stress, natural fracture networks, hot rock permeability, heat/fluid transport, and optimisation, in order to maximise reservoir utilisation whilst minimizing risks. The project aims to achieve a better understanding of fluid flow and heat transport in deep fracture-dominated systems that will enable the prediction of the economically-utilisable geothermal resource, the optimisation of reservoir development and the quantification of geological uncertainty and geological risks (such as induced seismicity).

GWatt aims to tackle the above challenges, by combining innovative and detailed scientific understanding gained from an in-depth study of the Variscan granites of south-west England and their adjacent host rocks, with data obtained from two new boreholes being developed at the UK's deepest onshore geothermal project at United Downs in Cornwall. Our project plan includes: identifying indicators of deep fracture flow from shallower measurements; developing new 3D fracture/structural/tectonic models of the SW England granites and their immediately adjacent host rocks that reflect the complete post-Variscan tectonic evolution; developing a quantitative understanding of the heat resource and sustainability of the reservoir; providing an assessment of seismic potential due to fluid flow through the Porthtowan Fault Zone; constructing robust geological risk assessments based on well-established oil & gas uncertainty quantification and optimisation methods, with a view to reducing perceived risks; and applying the integrated results of site-specific research at United Downs to new geothermal exploration models of the other granites of SW England. We will describe the scope for this new project, together with initial findings.