



Climate Emergency Development Plan Document

**Topic Paper: Mine Water Energy & Deep
Geothermal**

February 2021



This is one in a series of topic papers produced to inform the preparation of the Council's climate emergency Development Plan Document (DPD)

Topic Paper
Renewable energy
Natural climate solutions
Town Centres
Mine water energy and deep geothermal
Energy and Sustainable Construction
Coastal Change and flood management
One Planet Development/Alternative living
Transport
Agriculture and Rural Sustainability

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Executive Summary

Mine water systems make use of previously mined areas where artificial void space allows underground water to flow; these waters can be extracted and used in district energy networks.

Deep geothermal energy comes from a combination of natural heat from the Earth's core and thermal conductivity of rocks which heats groundwater that can be extracted for use in district heating schemes or industrial uses. Parts of the UK have hotter rocks due to properties of granite bedrock; Cornwall is significantly hotter than the UK average and there is significant potential for engineered geothermal systems.

National planning policy and guidance supports the transition to a low carbon future. Recognising that plans can provide a positive strategy for low carbon energy and identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy systems. Locally, the adopted Local Plan sets the context for utilising renewable and low carbon energy recognising the opportunity for decentralised heat networks.

There is some evidence available on the potential use of both mine water energy and deep geothermal in the UK. Nationally the Government has considered the potential of the deep geothermal resource in the UK, concluding that further borehole drilling will be necessary to identify any viable resource. Projects, however are being developed both in Europe and the UK; examples include Heerlen mine water energy plants which heat the town; Glasgow City Council using abandoned mines for local communities; Bridgend, Wales developing a mine water plant; and locally United Downs Deep Geothermal Project and Eden Geothermal Project are both exploring the potential of the geothermal resource in Cornwall.

Opportunities exist in Cornwall to utilise both shallow mine water energy for local heating and energy provision in new development and develop deep geothermal energy. A positive policy approach is required to ensure the opportunities for use of mine water heating are established in large scale new development. It would be useful to consider the strategic allocations in the adopted Site Allocations DPD against areas with the potential to use mine water energy. Given the infancy of deep geothermal energy in Cornwall, it is probably not appropriate to seek to identify areas of resource for safeguarding but again a positive policy approach would assist the delivery of any such projects.

What is this topic paper about?

The Council is preparing a new Plan to set the framework for dealing with climate change. This will sit underneath the Local Plan and forms the strategic framework for planning decisions. This topic paper summarises the latest available evidence on mine water energy and deep geothermal. Reflecting the wide scope of this topic there are a number of overlaps between this paper and the other papers.

To view all the topic papers and the latest update on the Climate Emergency DPD, please visit www.cornwall.gov.uk/climatechangedpd

Can I comment on this topic paper?

The Climate Emergency DPD topic papers are factual in nature and set out the planning policy context and current issues in Cornwall, along with potential future approach to inform policy development. There will be opportunities to comment on the content of the Climate Emergency DPD at various stages of its development. As such we are currently seeking views on these topic papers, in particular any gaps in evidence.

If you wish to be kept informed of any forthcoming consultation, please email climateemergency.dpd@cornwall.gov.uk with your contact details.

Introduction

Mine water systems make use of the enhanced permeability in previously mined areas where rock and minerals were removed, creating artificial void space. Collapsed shafts, lodes and fractures provide storage and pathways for the flow of underground water. The heat contained within these waters can be extracted using ground source heat pumps and can be used in district heating schemes.

Deep geothermal energy comes from a combination of heat from the Earth's core and thermal conductivity of rocks which heats groundwater that can be extracted for use in district heating schemes or industrial uses. Parts of the UK have hotter rocks due to properties of granite bedrock, the geothermal gradient in Cornwall is significantly higher than the UK average and there is significant potential for engineered geothermal systems (where water is injected into fractures in the granite and the hot water used to generate energy).

Policy Context and Evidence

National Planning Policy

The **National Planning Policy Framework (NPPF)** recognises the role that planning can play in supporting the transition to a low carbon future. In particular the NPPF states that to help increase the use and supply of renewable and low carbon energy and heat, plans should:

- a) Provide a positive strategy for energy from these sources.....;
- b) Consider identifying suitable areas for renewable and low carbon energy sources and supporting infrastructure....; and
- c) Identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers.

The **Planning Practice Guide (PPG)** also sets out guidance on planning for climate change and states that when preparing local plans and taking planning decisions, pay particular attention to integrating adaptation and mitigation approaches.... for example:

- Through district heating networks that include tri-generation (combined cooling, heat and power)

Local Planning Policy

The adopted **Local Plan** policy 2 sets the context by stating that proposals should deliver renewable and low carbon energies, increase energy efficiency and minimising resource consumption through a range of renewable and low carbon technologies. The Plan states that policies are designed to promote renewable and low carbon energy resource development while ensuring that adverse impacts are addressed. The Plan contains two policies specifically relating to renewable energy; policy 14 aims to increase the use and production of renewable and low carbon energy generation

through proposals which maximise the use of the available resource by deploying installations with the greatest energy output practicable. Support will also be given to renewable and low carbon energy generations developments that are led by, or meet the needs of local communities, create opportunities for co-location of energy producers with energy users and facilitate renewable and low carbon energy innovation. Policy 15 of the Local Plan aims to safeguard renewable energy installations from other new development which might harm the operations.

Minerals Safeguarding DPD safeguards mineral resources and infrastructure. Some of the shafts which may be suitable for mine water heat extraction will be safeguarded for their access to the mineral resource and as a result will be indirectly safeguarded for mine water extraction.

Evidence

There is some evidence available on the potential use of both mine water energy and deep geothermal in the UK.

Department for Energy and Climate Change in association with Atkins produced research on deep geothermal resource potential in the UK. It concluded that there is currently uncertainty whether there is a viable resource which will not be overcome until deep boreholes are drilled into potential host rocks to demonstrate reserve extent and exploitability <https://www.gov.uk/government/publications/deep-geothermal-review-study>.

The British Geological Survey (BGS) has been working with Glasgow City Council to research the potential for mine water to provide heating to local communities in the city. The initial study was to establish the level of heat within the abandoned mines under Glasgow.

<https://www.bgs.ac.uk/research/energy/geothermal/heatEnergyGlasgow.html>.

Glasgow City Council's Local Development Plan encourages use of mine-water heating and applicants should have regard to the BGS dataset.

In Wales, Bridgend County Council is developing the first mine water energy plan, early feasibility study shows water temperatures of around 20.5oC at a depth of 230m

<https://www.bridgend.gov.uk/news/65m-awarded-for-uk-s-first-large-scale-mine-water-energy-project-1/>

In the Greater Manchester Plan, particular opportunities for the use of decentralised heating and cooling networks in strategic development locations are encouraged.

In Europe, a project in the Netherlands has developed a mine water energy plant which now heats the town of Heerlen <https://www.mijnwater.com/?lang=en>

A local consultancy has been working on behalf of TEVI (EU funded project supporting small and medium businesses in Cornwall) as part of the EU REMIX project to look at

the potential to utilise mine water from old mine shafts. The dataset produced considers the depth of the shaft, location, condition and whether its inclined or vertical. The data is spatial.

In terms of deep geothermal locally, the United Downs Deep Geothermal Project has completed drilling and the data show promising results; the fault was intersected as predicted and the temperatures are around 190oC. Well testing is currently being carried out. <https://www.uniteddownsgeothermal>

The Eden Geothermal project has secured funding. Site construction works are now well underway, in preparation for drilling to commence in early Spring 2021
<https://www.edengeothermal.com/>

Cornwall Council produced a heat demand map and some work has been carried out for Launceston.

Deep geothermal energy is still in its infancy in Cornwall, whilst funding has been secured for both the United Downs and Eden schemes and initial test are promising these have yet to come to fruition to deliver any energy.

Also need to consider mineral rights issues, although not directly relating to the extraction of the water there could be complications where the mineral rights owner is unknown.

Future Approach

Opportunities exist in Cornwall to utilise both shallow mine water energy for local heating and energy provision in new development and develop deep geothermal energy. A positive policy approach is required to ensure the opportunities for use of mine water heating are established in large scale new development. It would be useful to consider the strategic allocations in the adopted Site Allocations DPD against areas with the potential to use mine water energy. Given the infancy of deep geothermal energy in Cornwall, it is probably not appropriate to seek to identify areas of resource for safeguarding but again a positive policy approach would assist the delivery of any such projects.