

1,000m underground central heating system planned

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(PhysOrg.com) -- A pioneering scheme to build a giant central heating system that will harness heat from deep underground is being developed by university scientists.

For the first time in the UK, a team of scientists and engineers, led by Newcastle University, plan to complete a twin [borehole](#) system that will allow warm groundwater to be continually cycled through rocks as deep as 1,000m.

Water at a temperature of around 30C will be brought up to the surface where it will pass through a heat exchanger before being sent back underground to be re-heated.

The project will provide renewable, [clean energy](#) for homes and businesses in the planned Eastgate eco-village in Weardale, County Durham, complementing four other forms of renewable energy which are to be harnessed there.

Some of the natural hot water will also be used in a spa - the first such development in the UK since the Romans tapped the hot springs at Bath.

Project lead Professor Paul Younger, of Newcastle University, says that using a twin set of boreholes solves problems which have hindered other attempts to use deep-seated hot water.

“Water from such depths is twice as salty as [seawater](#), so unless you

happen to be on the coast, you can't let the spent [water flow](#) away at surface," he explained.

"By re-injecting water using a second borehole we are able to maintain the natural water pressures in the rocks and allow pumping to continue for many decades to come."

Funding of £461,000 from the Department of Energy and [Climate Change](#) will be used to drill a reinjection borehole to complement the 995m deep exploration borehole which was originally drilled three years ago. There are also plans to prepare the existing borehole for long-term pumping service.

Used water will be reintroduced to the granite at about 420m depth, and will heat up again as it flows through a complicated maze of fractures on its way back to the pumping borehole.

"By recycling the hot water through what is essentially a huge central heating system deep underground, we can produce an almost carbon-neutral source of energy," added Professor Younger.

Newcastle University's Professor David Manning said the plan was to build a geothermal prototype that could be used at other 'hotspots' across the UK.

He explained: "Water deep underground gets heated by the naturally-occurring low-level radiation that is found in all rocks.

"Some rocks are far better at producing heat than others - especially granite of the kind we drilled into at Eastgate. This makes it one of the country's 'hotspots' - where water starts warming up quite close to the surface."

The new twin borehole system is to be analysed by a team of experts which also includes Professor Jon Gluyas from Durham University, and the world-leading engineering consultancy Parsons Brinckerhoff.

“There is every reason to suppose that if we drill even deeper here in future we will find water at boiling point, which is hot enough to generate electricity,” says Professor Younger. “Once the twin set of boreholes is complete in March this year, we will be in a position to explore this possibility.”

Provided by Newcastle University

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