



# THE HEAT IS ON

COULD A COMBINATION OF RISING ENERGY PRICES AND THE RENEWABLE HEAT INCENTIVE FINALLY MAKE GEOTHERMAL ENERGY A REALITY IN THE UK?

Words by **George Bull** Illustration by **Andrea Manzati**

When the UK's biggest deep geothermal power project, United Downs in Cornwall, was forced to give back a £6m government grant in April 2013, it was yet another blow to an industry that's still struggling to reassure investors. But while power-generation projects such as this have been grabbing headlines, perhaps the best prospects for the deep geothermal industry in the UK lie in providing heat to properties, rather than electricity to the grid.

Using deep geothermal energy to generate electricity involves pumping cold water down into the ground, where it's heated by hot granite rocks to create steam, which drives a turbine. For this to work, it's generally accepted that the temperature of the rocks needs to be at least 100°C – temperatures that don't exist close to

the surface in the UK – therefore, drilling is required to depths of 2–4km. Harnessing deep geothermal energy to generate heat, however, is a far more straightforward process. At depths of below 500m, hot water can be found at temperatures of 60°C or above, which can then be pumped to the surface and used to heat homes, and industrial and commercial properties, as part of district heating schemes. And with an increase in the Renewable Heat Incentive (RHI) for deep geothermal due to be announced later this year, those in the industry looking to capitalise on heat sales could finally have the incentive they need to get projects off the ground.

To date, the only existing deep heat-generating geothermal plant in the UK is in Southampton. Here, the city council has been bringing hot water to the surface via a 1,800m borehole in the Wessex Basin since

1986, and the system now serves a number of city-centre homes and businesses, saving an impressive 10,000 tonnes of CO<sub>2</sub> every year. However, the Department of Energy and Climate Change (DECC) has acknowledged that the current level of subsidy under the RHI is insufficient to bring similar plants forward before 2020, so an increase is crucial if developers are to follow Southampton's lead.

A spokesperson from the Renewable Energy Association (REA) says that the organisation is 'confident that an increase from 3.4p/kWh to 5p/kWh is a reasonable tariff to spur the development of deep geothermal heat projects'. Furthermore, the fact that there is already a successful deep geothermal heat-only scheme up and running in Southampton goes some way to reducing the perceived investment risk around deployment. According to REA,

heat-only projects are, therefore, in a much better position than the power-generation side of the industry, which is currently being held back by a lack of incentives under the Renewables Obligation.

But developing heat-only schemes could be the best place to start, believes professor Jon Gluyas, head of the department of earth sciences at Durham University and one of the leads on the Science Central project in Newcastle, a mixed-use urban development that will incorporate deep geothermal into the overall energy plan. 'In my opinion, the approach taken by companies in Cornwall, to try to generate power, is going for the most difficult option first,' he says, adding that rudimentary estimates suggest the geothermal hot water available in the UK's sedimentary basins – almost all of which lie near major population centres – is enough to heat the UK for 100 years. This is not a

Surveyor's view

## 'Developers need to look beyond gas'

SIMON CROWE MRICS PARTNER, RESOURCES AND ENERGY, STRUTT & PARKER

'We see geothermal as an emerging specialism for the profession. At Strutt & Parker, we've developed a specialist team that brings surveying and engineering skills together to create a business case for taking an energy project forward. As with any project, financial feasibility is key. At the moment, investors won't consider deep geothermal energy projects as the risk/return profile isn't competitive with other sorts of low-carbon energy generation, so it's going to be a long, hard road for those opportunities that exist to realise their potential. However, although it's still early days, we are seeing growing interest from local authorities in district heating schemes, rather than indigenous systems, for major town-centre developments. Where opportunities exist for geothermal-sourced district heating, it's a huge step to encourage developers to look beyond gas. At current pricing, geothermal is typically more expensive than gas-fuelled district energy schemes. But taking into account life-cycle operating costs, if gas prices continue to increase, then the financial case for geothermal will improve significantly. And once you've got district energy infrastructure in place, switching to geothermal in the future will be a real possibility.'

figure to be ignored when 45% of the UK's energy consumption is used for heating.

However, Ryan Law, managing director of Geothermal Engineering Ltd, the company behind United Downs in Cornwall, says that although there is a significant market for district heating schemes, the problem is securing a big customer demand all year round. On top of that, he says, there's no existing communal heating grid, as there is in Germany, for example: 'We can talk about a vast geothermal heat resource, but it's no good if we can't plug it in anywhere.' >>

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## ISSUES THAT LEAD TO THE REFUSAL OF PLANNING PERMISSION FOR RENEWABLE SCHEMES DON'T EXIST WITH GEOTHERMAL

As a result, Law explains that his company is looking to roll out lots of smaller commercial projects in the short term.

Of course, this could all change if the government keeps up its enthusiasm for district heating networks as part of its push for low-carbon heating. DECC has already established the City Deals Programme, where certain cities with a geothermal resource, such as Manchester and Newcastle, can apply for around £1m to develop plans for heat networks. One company looking to take advantage of this is GT Energy, whose proposal for a deep geothermal heat plant on Devonshire Street in Manchester was approved in October 2013. For this scheme, two wells will be drilled into the Cheshire Basin to depths of around 3,200m, which

could supply heat to an equivalent of around 6,000 homes via a district heating network, including commercial customers such as hospitals. The energy centre would be built underground to minimise visual impact, with only a head house visible above ground. This is typical of deep geothermal energy projects, which require a relatively small surface footprint: usually around 1.5 acres during drilling, and less than half an acre during operation.

Alan Mitchell, principal at SLR Consulting, which carried out the Environmental Impact Assessment work for the Devonshire Street scheme, says that geothermal is a good option for DECC in the long term. 'The issues that sometimes lead to the refusal of planning permission for renewable technologies — such as air quality concerns with energy from waste facilities or the visual impact of wind farms — don't exist with geothermal schemes,' he explains. Mitchell adds that providing the same permitted development rights as other utilities companies receive would also help to speed up deployment of geothermal heat schemes. 'Developers can apply for a Local Development Plan to acquire permitted development rights for the district heating element of a project, but it slows progress,' he says. 'It would give the industry a boost if they could roll out these networks without having to get planning permission.'

If the expected increase in subsidy for deep geothermal under the RHI is approved, it's likely that it will provide the impetus needed to see some heat-only schemes realise their potential. And, for Gluyas, this is a natural place for the industry to start: 'As we get a better understanding of how these systems work, then we can look at how we move to power generation.' ■

### Surveyor's view

#### 'Geothermal can help release a site'

DAVID SANDBROOK FRICS TECHNICAL DIRECTOR – PLANNING AND ESTATE MANAGEMENT, SLR CONSULTING

'There are potentially a lot of opportunities for surveyors within the deep geothermal industry. At the moment, we're working on a scheme with a major landowner who is looking for an angle to promote a site for residential and commercial development. By doing some GIS [geographic information system] work on the site's capabilities, we discovered that the development could potentially use geothermal power as a primary energy source. As a result, the energy source could provide a catalyst to release the site. We're also looking at new technologies such as data centres, which require year-round cooling, and where there are potential opportunities for us to bring them together with geothermal energy providers.'

'Generally, people are receptive to the idea of geothermal heating projects. There are a lot of energy schemes where people have seen development in their backyard, but not necessarily seen their energy bills go down. Any developer will want a return on investment, but with district heating projects, there are clearly opportunities to see a direct local benefit, and that can help with a project's overall accessibility.'



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