

POWER: VOLCANO

*Iceland has been harnessing its volcanic power in some shape or form for almost 1000 years. Now a new project could see the country sharing that power with the UK*

# FIRE AND ICE

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**G**eothermal energy. To some it sounds like a recently discovered and newfangled way of generating power, but really it's just a term for an innovation that in some parts of the world can be traced back a thousand years.

Geothermal energy is produced when water seeps into the Earth's crust where it is heated and forced to the surface. Steam is then captured and used to heat homes and generate electricity. Iceland is a world-leader in this clean and renewable form of energy, with references appearing in the country's written histories, the Sagas. One tale details how islander Snorri Sturluson tapped into the power lurking in the ground to warm a pool in his garden. That pool, located in the village of Reykholt, has been restored and is a tourist attraction today. It is, so the legend goes, as warm to the touch as when Snorri built it.

Snorri's modern-day descendants have done a good job at following his example. From the warm water that heats 99.9 per cent of the buildings in the capital city of Reykjavik to the warm baths at tourist hotspot, the Blue Lagoon, Icelanders are absolutely committed to harnessing the country's volcanic power. A power, which is so prolific that drive 10 minutes out of the capital and you can't fail to notice the steam rising out of the ground.

And if an exciting project between the National Power Company of Iceland (Landsvirkjun), the country's largest producer of electricity, and the UK's National Grid goes ahead, we could also be benefitting from Iceland's incredible supply of natural energy – not just its volcanic resources but also the electricity it generates from the falling water in its hydroelectric power stations, its geothermal plants and wind farms.

Known as IceLink, the project would connect Iceland and northern Scotland with 1000km of undersea cabling. This Atlantic super connector would be the largest of its kind in the world and would go a long way to help the UK satisfy its increasing demand for renewable energy, with no or very low emissions of greenhouse gases.

The reason for Iceland's abundant volcanicity is because of its unique location. Sitting on a crack in the Earth's crust where the North American and Eurasian tectonic plates meet or, more accurately, where these plates pull apart, causes huge amounts of geological activity, as well as vast

underground reservoirs of water. The island itself is actually relatively new, having been built by numerous volcanic eruptions over the last 16 million years.

And evidence of this activity is all around. Although pulling into the small lay-by marked 'Eyjafjallajökull' today, it's hard to associate the peaceful sight of a few snow-capped mountains with the ash cloud that poured from the volcano in 2010 and grounded much of the world's air traffic. However, the country's other worldly scenery – from the bubbling geysers to the black sand beaches – can only have been born out of ground-melting volcanism.

At Hellisheiði, one of the world's largest geothermal power plants, steam turbines (six high-pressure and one-low pressure) work around the clock processing the unfathomable amounts of water and steam that come from the geothermal area surrounding the plant, around 20 miles away from Reykjavik.

'Just inside the main engine room with its four turbines, we are generating about 180 megawatts of electricity,' says Sigurður Jón Björgvinsson, geologist and guide at the >>



Clockwise from top: a view over Iceland's capital, Reykjavik; a bore hole at Hellisheiði where the geothermal steam is harnessed; Icelandic ponies graze near the Eyjafjallajökull volcano; the heat exchanger at Hellisheiði; Seljalandsfoss waterfall





Top: Helga Barðadóttir outside the Hellisheiði power plant  
Right: the pipelines bringing geothermal steam and water into the power plant – these are angled to reduce pressure

## ‘Are we going to preserve areas for tourism or build a big power plant?’

HELGA BARÐADÓTTIR

plant. ‘If I can put that into context, we could use this room to power the whole of the Reykjavik area on Christmas night and we would still have leftovers – so it’s a lot of energy!’

As for hot water, Hellisheiði runs 16,000 tons of water through its system every hour – that’s the equivalent of 440 full oil tankers. ‘We use a heat exchanger, which is filled with geothermal hot water and a series of small pipelines,’ explains Sigurður. ‘We put cold groundwater – basically water you can drink – into these pipes and heat that water up to about 82C using the geothermal water, then that water heats people’s houses.’

Of course, oil tankers are not necessary as this geothermally heated groundwater simply flows through a 27km long pipeline into downtown Reykjavik, taking about six hours and losing just 2C of heat on the way.

It’s not just people in their homes that benefit from this never-ending source of natural power either – 99.9 per cent of the country is run on renewables, including the enormous aluminium smelting plants. ‘There are three

smelters and they are big, big energy consumers,’ explains Helga Barðadóttir, Senior Expert in Energy Affairs at the Ministry of Industries and Innovation. ‘The power intensive industry actually uses something like 78 per cent of the total amount of electricity produced in Iceland.’

With all this power being generated it’s no wonder that Iceland is a global leader in geothermal techniques, and the country’s experts are in demand all over the world, including East Africa, South America and Indonesia.

Iceland has been keen to share this knowledge too, largely because of the monetary incentives, which have played a part in helping the country get back on its feet after the financial crisis that hit in 2008.

But what do the Icelandic people feel about the possibility of sharing some of its natural power with the UK? ‘There are still a lot of questions to be answered about IceLink, because at the moment we don’t generate enough energy to share,’ says Helga. ‘So the big question is where should the energy come from?’

This view is echoed by the team at the National Grid, who are hoping that one day IceLink will bring Iceland’s cheap and – most importantly – reliable natural power to consumers in the UK.

‘We know that Icelanders are extremely proud of their environment and they may be reluctant to build a new fleet of power stations in order to facilitate the exporting of electricity,’ says Martin Moran, Project Development Manager at National Grid. ‘And we fully respect that it is a conversation for the Icelandic nation.’

It is a particular quandary for a country that is so stunningly unique and for its people, who generally feel a deep connection with the land they inhabit. Even today, the trolls and elves that feature alongside Snorri and his pool in the country’s legends still live large for some Icelanders. Ask around and you’ll soon hear the stories, such as the plans for a new road that had to be redrawn because elves live in the area.

‘There is always going to be a discussion around where to harness and where to preserve,’ says Helga. ‘Because most of the time when you are talking about geothermal, these areas are mostly very beautiful – it’s where you have hot springs and geysers – so are you going to preserve these areas for tourism and for our future, or are you going to build a big power station?’

What’s for sure is that this project is being taken very seriously by both sides. ‘Right now the Icelandic and UK governments are creating an energy task force to determine the viability and benefits for both countries,’ Martin explains. ‘Therefore it’s looking positive that they are keen to develop an interconnector.’

So perhaps in a few years when we turn on the lights in our homes or boil the kettle for a cup of tea, it will be thanks to Iceland’s ancient and abundant supply of volcanic power. All that will be missing is a geothermal pool in the back garden. ☺☺☺

