

SPOTLIGHT ON...

Iceland

Perched over a geothermal hotspot Iceland is home to hundreds of hot springs



Taming turbulence

Iceland's unique geological past enables the country to power itself on almost 100 per cent renewable energy, creating economic opportunities for the island's inhabitants. It's also had a lasting impact upon Icelandic culture and lifestyles

by Chris Fitch



- **Geographic location:** Northern Europe
- **Population:** 340,000
- **Longitude/latitude** 63°55'08.4"N, 22°22'15.0"W
- **Land area:** 103,000 sq km
- **Urban population:** 94%
- **Life expectancy at birth:** 83 years
- **Coastline:** 4,970 km
- **Glaciers:** 11,922 sq km (including Vatnajökull, the largest in Europe)
- **Highest point:** Hvannadalshnjúkur (2,110m)

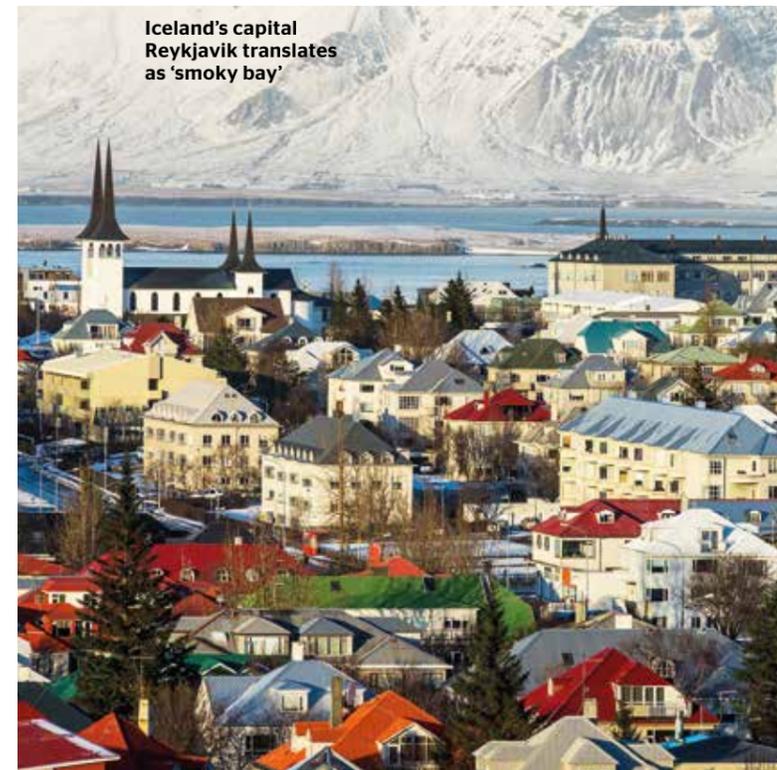
It's almost like the volcano is breathing,' says Bárður Örn Gunnarsson. Indeed, a series of wall monitors in the entrance hall of the Lava Centre (where Gunnarsson is managing director) reveal detailed information about the current status of some of Iceland's most active and/or potentially most explosive

volcanoes. A horizontal line beneath each one shows how its crater is fluctuating – perhaps by only a few millimetres – as the pressure of magma beneath the surface of each either builds or recedes.

In the centre of the hall, a digital installation shows a live feed from the Iceland Met Office and University of Iceland's Institute of Geology, displaying all tectonic activity from the past 48 hours. There has been a lot. A large sprinkling of orange dots can be seen all along the mighty Mid-Atlantic Ridge which streaks diagonally across the island, each one indicating a shudder or shake which the hundreds of beacons scattered across the country have picked up.

The Lava Centre itself is a recent addition to the landscape of south Iceland, opening in June last year. It sits in the middle of a ring of highly monitored volcanoes, a handful of the 200-odd scattered across one of the world's most northernmost inhabited regions. Out of one large glass window, the relatively active Hekla can be glimpsed. Gunnarsson refers to it as 'a tourist volcano' because, instead of destructive ash clouds, it tends to create only rivers of lava, akin to those seen on Hawaii. Nearby is Eyjafjallajökull – 'island mountain glacier', as it imaginatively translates – famous for causing chaos across Europe when it erupted in April 2010, with ash clouds blown southeast and closing airports across northern and central Europe ('We were okay though, the wind was blowing the right way for us,' chuckles Gunnarsson).

Then there's the big one, Katla, which hasn't erupted for a century. Gunnarsson and his colleagues have a good reason for keeping an eye on Katla, when it last went off, in 1918, huge volumes of water created by melting glaciers created a flash flood (known locally as a jökulhlaup) that devastated the surrounding landscape. Massive lava flows extended the coastline for an additional eight miles out into the Atlantic. Karen Möller Sivertsen, a manager at Visit Iceland, reveals she has a jar of ash at home in the capital city of Reykjavik, over 100 miles away, that her grandmother



Iceland's capital Reykjavik translates as 'smoky bay'

scraped off the roof in the aftermath of the eruption. When it next blows – and it is somewhat overdue – it will likely result in mass evacuations and the closing of the iconic road that circumnavigates the island, cutting off numerous settlements around the rest of Iceland in the process. When such an eventuality occurs, the Lava Centre is fitted out with robust internet connections and even sleeping quarters so that journalists and camera crews can follow the unfolding story from a facility packed full of volcano experts.

▶ TIMELINE

- **870-930**
Settlement by Norse and Celtic explorers
- **930**
Founding of the first Althingi, the world's longest running parliament
- **1262-64**
Iceland swears allegiance to the King of Norway
- **1550**
Death of Bishop Jón Arason, marking the beginning of Danish rule
- **1830**
First allocation of Icelandic seats in Danish parliament
- **1918**
Becomes a sovereign state (under the Danish Crown)
- **1944**
Founding of modern Icelandic republic
- **1970**
Joins European Free Trade Association (EFTA)
- **2008**
Collapse of Iceland's banks crashes the country's economy

NATURAL FUEL
Iceland's raw geological past has profound implications for its current residents. Travelling the country can be hazardous, thanks to a range of threats including eruptions, earthquakes, landslides and avalanches, which can strike without warning as the ground tosses and turns like a hibernating polar bear. Information about active earthquakes and other tectonic activity is accessed at www.safetravel.is, an online tool that informs residents and tourists of any potential dangers.

SPOTLIGHT ON... ICELAND

But there are numerous upsides to Iceland's unique geographical location, simultaneously straddling the Mid-Atlantic Ridge and sitting above one of the Earth's many hotspots. A plentiful supply of geothermal energy is one, immense power available in the form of boiling hot water obtained from deep underground, providing Icelanders with a way of staying warm through the long, dark winters. Iceland's first geothermally heated building opened in the 1930s and this rich asset now heats all of Reykjavík, as well as more than 90 per cent of buildings across the entire country. By utilising both high and low pressure steam derived from a series of boreholes to activate turbines, this underground heat can be converted into electricity, and in doing so fulfil 25 per cent of the nation's energy needs. Much of the rest is catered for by hydropower supplied principally by the state-run company Landsvirkjun, generated from rivers fed by glacial meltwater. The final portion comes from a small number of wind turbines and is supplemented by imported oil, used to fuel cars, boats and other vehicles. If the proposed 'Icelink' project connecting the UK to Iceland's national grid were ever to become reality, then British consumers might too be able to sample Icelandic geothermal and hydropower.

Such a plentiful supply of relatively cheap energy (which can broadly be called renewable, with a caveat that boreholes are decommissioned and new ones drilled after a few decades of operation) has opened Iceland up to a wealth of economic opportunities that reach far beyond the Nordic nation's borders. These include many industries that demand vast quantities of energy. Probably the most prominent is aluminium smelting, where raw imported alumina (also known as aluminium oxide) is converted into the malleable metal. The government began trying to attract aluminium companies around the turn of

► DEMOGRAPHICS

■ Iceland is notable for having a uniquely small genetic pool, with around 94 per cent of the population descended from the first Norse and Celtic settlers who arrived more than a thousand years ago. For this reason, geneticists have focused on Iceland in numerous studies on various hereditary disorders. Iceland's population has fluctuated over the years with the changing fortunes of the country, from roughly 50,000 in 1700, down to 47,000 in 1800, and up to 80,000 by 1900. By the 1980s, this had escalated to 250,000, and today it stands at around 340,000 people.

The genetic isolation of Iceland has enabled the country to establish the world's foremost genealogical database, Íslendingabók, covering more than 1,200 years. The database aspires to trace all Icelandic family connections from settlement to the present era, covering every Icelandic citizen and legal resident, using information gained from national censuses, church records and various other public and historical documents.

In addition to the compilation of all this information online at www.islendingabok.is, a mobile app called ÍslendingaApp allows Icelandic singletons to ensure their family trees are sufficiently distant from each other before they consider starting a relationship.



The Blue Lagoon – one of Iceland's most popular destinations

the millennium, rapidly growing the sector to the extent that in 2008 the export of aluminium exceeded that of fish for the first time. Other energy-intensive products now made in Iceland for international export include ferrosilicon (an alloy used in steel production), diatomite (a fine rock-powder with multiple industrial purposes), silicon-based computer chips and ammonia for fertilisers.

Not everyone is a fan of turning the island into a massive industrial workshop in this way. Occasional environmental protests against further expansion of the industry have taken place over the past decade, backed by singer and Icelandic folk hero Björk. Furthermore, these large-scale, energy-intensive industrial projects – coupled with a very small population – mean that, even with such low-carbon resources available, Iceland's energy use per capita is still among the highest in the world.

SKIN-HEALING WATERS

'The story of the Blue Lagoon is quite incredible,' says Ásgeir Eiríksson, mayor of the local town of Vogar, as we drive through the lava fields of Reykjanes towards Iceland's most popular tourist attraction. A large burgundy-red pipeline sending hot water down to the fishing village of Grindavík runs alongside the road, a common feature in this region.

Initially, in 1976, the Blue Lagoon was simply a lava field that became the chosen site for a geothermal power plant, one capable of using huge volumes of steam and immense heat to generate both electricity and hot water. 'The original plan when they were building the power plant was that to utilise the plant's excess water, it would have to seep down into the lava,' explains Eiríksson. Instead, the water, packed full of algae and minerals, simply pooled on the surface.

'One of the workers had a skin disease – psoriasis,' he continues. 'He started to experiment at the end of the day by taking a daily bath in this nice temperature water. After three weeks, his symptoms had vanished.' So the Blue Lagoon's legend was born.

Catering for the estimated 1.5 million visitors now coming to the site annually (its location near the international airport enables trans-Atlantic travellers to visit during a stopover) means there are hundreds of local people working at the lagoon, up to ten times more than are now employed at the local power plant. 'The Blue Lagoon is by far the largest provider of jobs [in the local area],' says Eiríksson.

The Lagoon's reputation for skincare persists in the form of an in-house lab that harvests and analyses algae while on the hunt for new, premium skin products. Furthermore, Iceland's geothermal bathing extends far beyond just the Blue Lagoon. The presence of hundreds if not thousands of established (although far

► GEOPOLITICS

■ Although it was one of the founders of NATO in 1949, Iceland is the only member of the organisation with no standing military (although there is always the Icelandic Coast Guard). Nevertheless, the rest of NATO has pledged to protect the island's sovereignty in the event of any sort of attack.

Iceland is one of the four EFTA members, and while rhetoric has often leaned towards further European integration, it has never gone as far as becoming a full EU member, or adopting the Euro as currency. The country has been involved in a few minor diplomatic incidents with neighbours in recent years, including

less famous) hot water springs across the country has made them the Icelandic equivalent of a pub – places to socialise and relax after a long day at work.

ARTIFICIAL ILLUMINATION

Knútur Rafn Ármann and his wife Helena Hermundardóttir used to live in Reykjavík. Around 20 years ago they opted to leave the city for a life of 'tomatoes and horses.' Specifically, breeding native Icelandic horses for shows (Icelandic horses have extreme genetic purity, since importing horses has been illegal for over 1,000 years – if one is ever taken abroad, it can never return) and growing tomatoes in a massive greenhouse named 'Friðheimar'.

Inside the 5,000 sq metre allotment, row upon row of plants reach high up towards the ceiling, each one decorated with tomatoes in every shade of red, yellow and green. The plants grow around 25cm per week, and must be changed twice a year, by which time they'll be as long as nine metres. Some of the greenhouse's most industrious employees – more than 600 bumblebees imported from the Netherlands – buzz around overhead, each one pollinating more than 2,000 flowers per day. Friðheimar produces more than 300 tons of tomatoes every year – plum, cocktail, green and many other varieties – which Ármann and his team turn into everything from salsas and sauces to tomato ice cream and tomato beer. Even during the dark winters, as many as 40 people remain working in the greenhouses, producing significant quantities of tomatoes, cucumbers, strawberries, peppers and cauliflowers.

But how do tomatoes – notoriously demanding of sunlight – survive in a cold environment where in the winter there can be as little as two or three hours a day of sunlight? It all comes down to energy. Ármann points to the beaming bright lights above our heads, special artificial illumination that is able to simulate sunshine. Around 30 per cent of Friðheimar's expenditure goes on the immense quantities of energy required to power these greenhouses. In most countries, this might be prohibitively expensive, rendering the whole operation impossible. But in Iceland, with plentiful clean, cheap, geothermal energy and boiling hot water readily obtainable from a borehole just 200 metres away, it is entirely possible.

'That makes Iceland the perfect country for growing vegetables all year round,' says Ármann. 'We are using

being sued by the British and Dutch governments after refusing to pay back creditors in the wake of the country's 2008 to 2011 financial collapse. There has also been disagreement with Denmark over the extent of the Faroe Islands' continental shelf.

Perhaps Iceland's most pivotal geopolitical moment was the hosting of the October 1986 Reykjavík Summit between US president Ronald Reagan and his Soviet counterpart, Mikhail Gorbachev. While the talks themselves were ultimately unsuccessful in achieving complete nuclear disarmament, the meeting is often seen as the beginning of the end of the Cold War.

► **CULTURE**

■ **Music**

There's a lot more to Icelandic music than just Bjork, though many performers tend to embrace the same pop-friendly soaring melodies and haunting vocals. If bands such as Of Monsters and Men or Kaleo don't take your fancy, try Sigur Rós. The band's 2005 *Hoppípolla* features lyrics that are a mix of Icelandic and 'Hopelandic' (*Vonlenska* in Icelandic), the bizarre made-up language created by lead singer Jónsi.

■ **Films**

Iceland doesn't feature in the original 1939 short story *The Secret Life Of Walter Mitty*. But in the 2013 Ben Stiller film, Mitty's epic journey takes him from Greenland to Iceland and on to the Himalayas - the stunning scenery used for all three locations was filmed in Iceland. Few will forget his thrilling ride down Eyjafjallajökull on a longboard, moments before an eruption. In 1992, Fridrik Thór Fridriksson's *Börn Náttúrunnar* (*Children of Nature*) became the only Icelandic film to receive an Oscar nomination for best foreign language film.

■ **Books**

There can be no better way to grasp Icelandic history and traditional culture than by reading the epic Sagas. These 40 stories from around the turn of the first millennium describe the founding of Iceland, as well as the violent escapades which saw rival factions fight over rulership. The tales were highly influential in inspiring Tolkien's *The Lord of the Rings*. They also detail expeditions by Norse explorer Leif Eriksson who stumbled upon *Vinland* (modern Newfoundland) around a millennium ago, making him the first European settler in North America - nearly 500 years before Columbus.

Of Monsters and Men's Nanna Bryndís Hilmarsdóttir performs on the John Peel Stage at Glastonbury in 2016



our natural environment to create food for ourselves.' The land even provides a regular supply of carbon dioxide for the growing plants - to the tune of over 100 tons annually - from the nearby geothermal source at Hæðarendi at Grimsnes. Since the first such greenhouse was opened in 1924, these facilities have been producing food for both domestic and international consumption, all enabled by the unique geology beneath their feet.

PLATE TECTONICS

At Reykjanes UNESCO Global Geopark, the landscape has an apocalyptic feel, with plumes of steam bellowing from craters all around. Waves of intoxicating sulphur scents hit with each change of the winds. 'You are now standing on the border between the Eurasian plate and North American plate,' says Eggert Sólberg Jónsson, manager of the geopark, gesticulating towards the respective areas.

Reykjanes - which literally translates as 'smoky peninsula' (Reykjavik, in a similar theme, means 'smoky bay') - is a special region of the country, being the only place in Iceland where the Mid-Atlantic Ridge rises above the sea level. Although

the symbolic 'bridge between continents' may in reality be more of a tourist photo opportunity than something with any particular geological interest, it is possible to walk across the divide; the ridge itself extends for around 5km across - and often far further - between the two plates.

There are very few places in the world even remotely like Iceland, a country whose landscape and contemporary culture are intertwined and visually shaped by geography. Powerful forces underway deep beneath the surface create both hazard and opportunity in equal measure, from volcanic eruptions and earthquakes, to renewable energy and locally produced food. Icelanders have always invented new ways of managing this relationship, and will continue to incorporate their geological circumstances into the national character, even as wider debates about how best to benefit from them - just like the tectonic activity that powers it all - rumble on. ●

► **LINK**

■ **Icelandic Tourism - inspiredbyiceland.com**