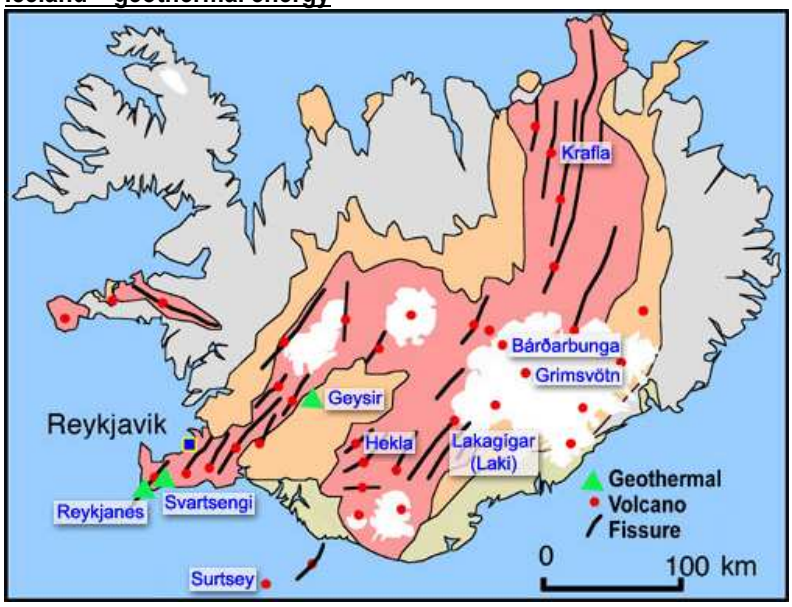
Iceland – geothermal energy



Bjarnarflag Geothermal Station – located near Lake Myvatn in northwest Iceland, Bjarnarflag Geothermal Station is the smallest owned by Landsvirkjun and Iceland's first geothermal power plant. Electricity, produced by steam from the steam supply system in Bjarnarflag is distributed to nearby households.

Hellisheiði Power Station – located in Hengill, southwest Iceland, it is the second largest geothermal power station in the world. It is aimed to meet the ever increasing demand for electricity & hot water in Iceland e.g. for hot springs. As a result it underwent further expansion in 2007 – 2008, with a few more turbines added.

Krafla Geothermal Station – in northern Iceland; its location near Lake Myvatn makes it an ideal place for travellers in Iceland. Sightseeing is very popular in the region with lava fields and explosion crater Viti.

How geothermal energy is produced & developed by governments

Temperatures in the Earth's core are very high, >5000°C. Deep underground, rocks & water absorb heat from the magma. Water is pumped down an "injection well", filters through cracks in the rocks in the hot region & comes up "recovery well" under pressure. It turns into steam upon reaching the surface, which may be used to drive generators to produce electricity, or passed through a heat exchanger to heat water to warm houses.

In 1940s, the National Energy Authority was started by the government in order to increase the knowledge of geothermal resources and the utilization of geothermal power in Iceland. This agency has been very successful and has made it economically viable to use geothermal energy as a source for heating in many different areas throughout the country. The government no longer has to lead research in this field as geothermal power has been so successful & has been taken over by the geothermal industries.

Iceland government also thinks there are more untapped sources of geothermal energy; after tapping them to their full extent, it is estimated that Iceland would get another 50 TWh of energy per year – all renewable.

Location factors considered

- **Economy of the area** – Blue Lagoon, a tourist bathing resort/ geothermal spa which is one of the most visited attractions in Iceland. Money earned from tourism thus makes the area richer & more economically sustainable than it previously was.
- **Needs of people** – Nesjavellir Geothermal power station was built to satisfy the hot water demands of people in settlements nearby. All geothermal power stations were built to help
- **Near a heat source from the Earth** – can be near volcanoes/ reservoir, where injection wells built can first inject cool water into hot basement rock near magma, and the water is heated up and then extracted out again by doublet wells.

Benefits

- Low operational & maintenance costs, thus the power plant company can make more profits from providing electricity from geothermal power.
- Renewable source of energy, can replace coal, oil and natural gas which are running out fast. Geothermal energy is environmentally friendly compared to fossil fuel plants, as they only produce a small amount of carbon monoxide.
- Can be a tourist attraction, e.g. Bjarnarflag Geothermal Station has many tourist services nearby. Svartsengi Power Station supports Blue Lagoon, a geothermal hot spring. This could bring in more money for the region, making it more economically sustainable as tourists also go mountain climbing & skiing nearby.

Costs

- Require high investments in machinery. Hellisheidi Power Station decided last October that a number of turbines will be added, along with 90MW – these amounts to $197 million. Construction of a plant & well drilling costs ~ €2-5 million per generated MW of electricity.
- If not done with adequate care enhanced geothermal systems can trigger earthquakes, thus severely affecting land stability & putting nearby areas at risk – potential threat to settlements.
- Before access to potentially huge amounts of energy, the success rate for discovering geothermal resources in new untapped areas is ~20%. In areas near wells already producing, it is 80%.