



BRIEFING  
NOTE  
No. 2

Geological Survey Ireland

# Geothermal Energy

Geological Survey Ireland provides geological advice and information to support the understanding of Ireland's geothermal resources, the development of Irish geothermal energy policy and the growth of the Irish geothermal industry. Geothermal energy is heat energy that is stored beneath the surface of the Earth. It is a secure, environmentally sustainable and economical source of renewable energy.

## Our Climate Commitments

Under the Climate Action Plan 2019<sup>1</sup>, Ireland aims to achieve net zero greenhouse gas emissions by 2050. This target is also a commitment under the European Green Deal.

A reliable supply of safe, local, low-carbon, renewable energy is essential to achieving these goals. Geothermal energy could be harnessed in Ireland by using the types of installations in Fig. 1.

### GEOTHERMAL FACT



In 2019 there was 5,500 GW of geothermal heating and cooling capacity installed in Europe, and 3,300 MW of geothermal electricity generated across 130 power

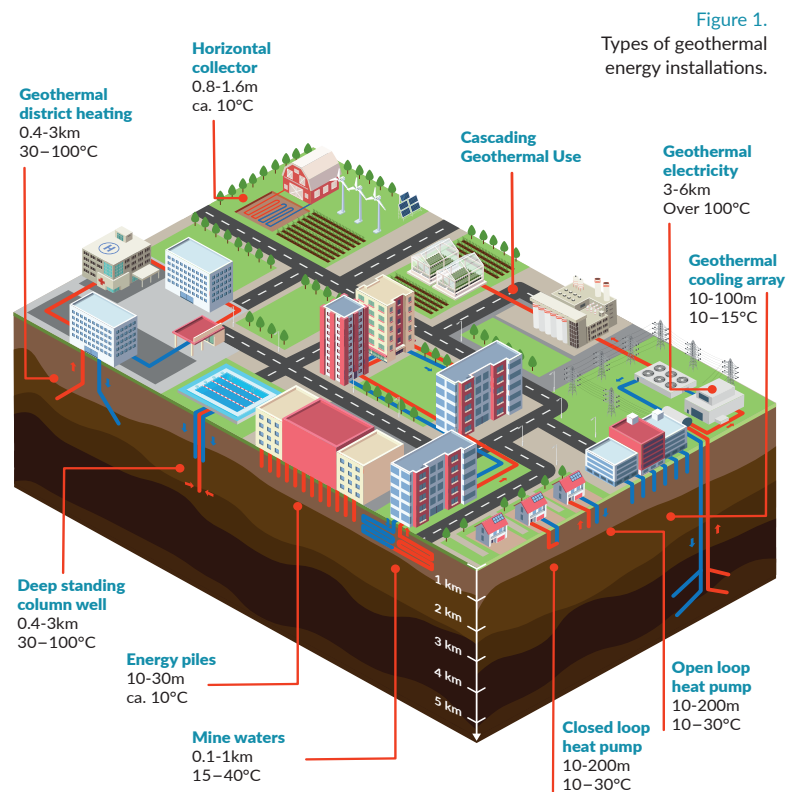


Figure 1.  
Types of geothermal energy installations.

## Geothermal energy in Ireland

New knowledge and developments in geoscience and technology provide the potential for Ireland to exploit its subsurface heat resources<sup>2,3</sup>. Recent temperature models of the Irish subsurface have indicated promising deep geothermal conditions (Fig. 2.).

Geothermal energy has great potential to decarbonise our heat sector. Heat represents one-third of Ireland's energy demand and currently 90% of our heat is generated by fossil fuels.

The best way to decarbonise our heat sector is through (i) district heating in areas where the heat demand or population density is high, and (ii) by individual heat pumps in other settings. Geothermal energy can provide heat in both of these scenarios.

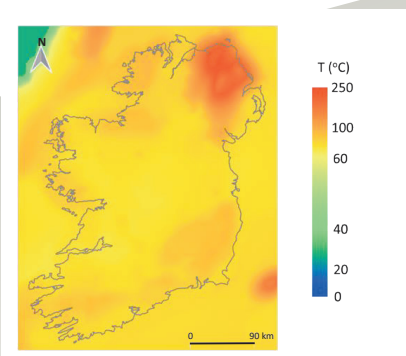


Figure 2.  
Map of temperatures 2.5 km beneath Ireland. Data from the Dublin Institute for Advanced Studies.

## Geothermal Energy in Ireland

Improved understanding of what lies beneath the surface of Ireland, and the development of new technologies to harness, now make it feasible to harvest this natural heat. Geothermal resources with temperatures as low as 10°C can be used as a baseload in heating and cooling applications for residential, municipal and industrial buildings. Higher temperature resources (usually above 100°C, likely to be found in Ireland at depths below 3km) can be used to generate electricity.

### Advantages...geothermal energy is

- used for direct heating/cooling for buildings and industrial processes
- independent of the weather or sunlight
- a stable, constant supply of renewable, baseload energy
- a local source not impacted by external supply chains or market fluctuations
- quiet and unobtrusive
- a near zero emission resource leading to improved air quality
- less impactful on ecology due to a small footprint compared to wind or solar energy

### Challenges...geothermal energy involves

- higher initial technical and financial risks than other renewables
- careful management of the heat and water resources to ensure sustainability and low environmental impact
- constant monitoring and management in areas prone to seismic activity (earthquakes)

#### GEOHERMAL FACT



Only airport campus near Paris is heated by a geothermal installation generating 10MW of heat and saving 8,200 tonnes of CO<sub>2</sub> per year compared to natural gas.

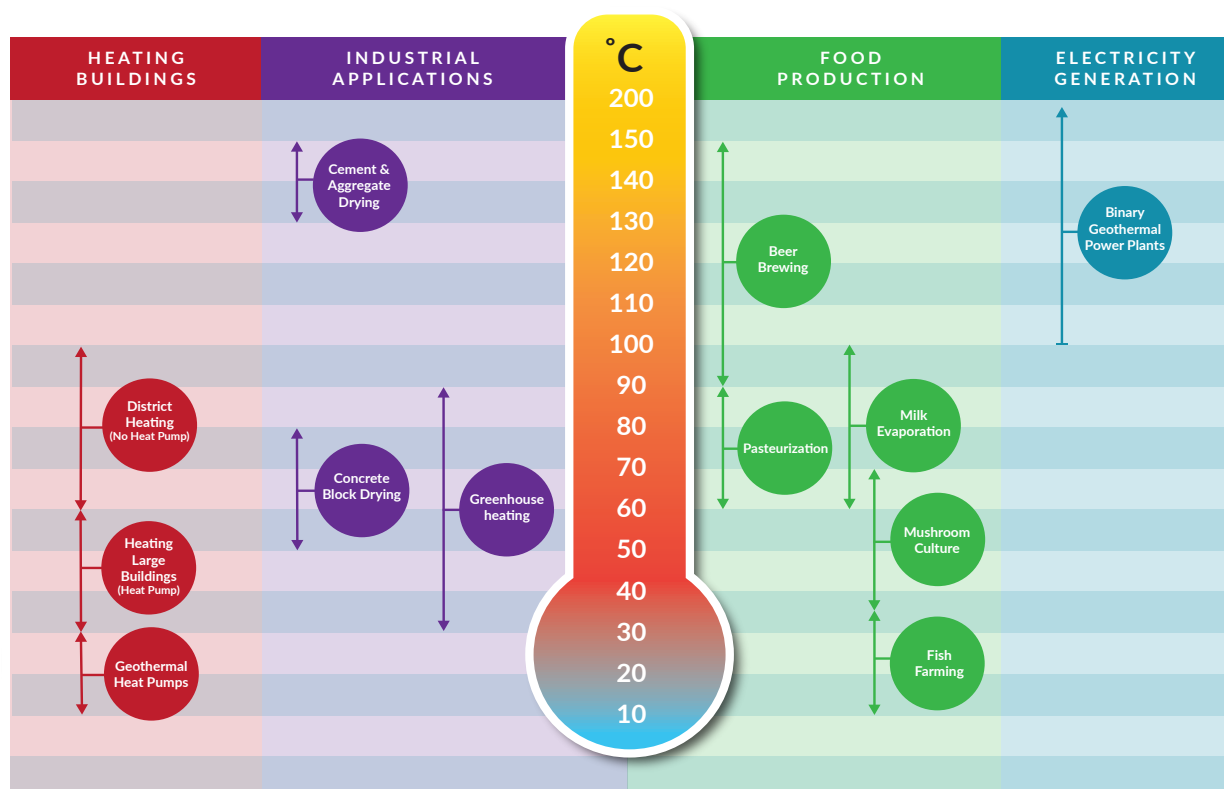


Figure 3. Range of potential applications for Irish geothermal energy. Subsurface temperatures increase with depth. In Ireland, we expect temperatures of about 50°C at a depth of 1.5 km and 100°C below 3km.



#### References

- <sup>1</sup> Government of Ireland (2019) Climate Action Plan 2019. <https://www.gov.ie/en/publication/cb2e0-the-climate-action-plan-2019/>
- <sup>2</sup> Government of Ireland (2020) Geothermal Energy in Ireland - A Roadmap for a Policy and Regulatory Framework. <https://www.gov.ie/en/publication/abe7a-geothermal-energy-in-ireland-a-roadmap-for-a-policy-and-regulatory-framework/>
- <sup>3</sup> Government of Ireland (2020) Assessment of Geothermal Resources for District Heating in Ireland. <https://www.gsi.ie/en-ie/publications/Pages/Geothermal-Energy-for-District-Heating-in-Ireland.aspx>

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