Geothermal Energy Feasibility for Cornwall and Isles of Scilly Agrifood Sector

Report

GREAT CORNISH FOOD

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GOOD GROWTH CORNWALL & ISLES OF SCILLY SHARED PROSPERITY FUND

Executive Summary

This report explores the opportunity for deep and shallow geothermal energy to transform the agrifood sector in Cornwall and the Isles of Scilly, delivering decarbonised heat, cooling, and power. Building on the regional Agrifood Strategy, the study evaluates how agrifood businesses can leverage geothermal to reduce operational costs, improve resilience, and support long-term sustainability.

Cornwall's agrifood sector is a significant economic driver—accounting for 20% of local jobs and £2 billion in annual value—but faces mounting energy cost pressures, grid constraints, and urgent decarbonisation targets. Geothermal is uniquely positioned to address these needs, offering stable, local, renewable energy with proven technology and operational examples already established in the region.

Consultations with businesses, developers, public sector bodies, and stakeholders reveal strong demand for reliable, low-carbon heat and cooling, with key barriers being upfront capital costs, technical knowledge gaps, and planning uncertainty. Cluster and anchor-load models, where multiple users share infrastructure, are especially attractive for reducing individual risk and enabling broader adoption.

Key recommendations include early-stage feasibility assessments, collaborative business models, targeted funding and risk-sharing mechanisms, and strategic safeguarding of geothermal sites for agrifood clusters. Cornwall Council and sector partners are urged to streamline planning, expand demonstration projects, and provide practical guidance to accelerate uptake.

The report concludes that geothermal energy can underpin the next wave of growth and resilience in Cornwall's agrifood sector—unlocking new markets, securing supply chains, creating jobs, and achieving net zero goals—provided stakeholders act collectively to overcome early-stage barriers and build confidence through shared knowledge and pilot projects.

Purpose of the Report

Great Cornish Food aims to explore the potential for deep geothermal to provide opportunities, open new markets, and reduce costs for the agrifood sector through its Raising the Bar Programme, part funded by the UK Shared Prosperity Fund. The purpose of this report is to build upon the 2025 Cornwall and Isles of Scilly (CIoS) Agrifood Strategy in which geothermal energy was identified as an opportunity for agrifood businesses in Cornwall to decarbonise their process energy needs. This report identifies how collaboration between the agrifood and geothermal sectors can take place, promoting Good Growth directly within two core sectors and myriad positive impacts from enabling secure and renewable energy across Cornwall and the Isles of Scilly.

This report aims to identify existing knowledge, possibilities, and potential barriers to implementing deep geothermal to support agrifood businesses.

The Cornwall and Isles of Scilly Agrifood Strategy and Action Plan identifies the agrifood sector as critical: it is a significant employer and the beating heart of Cornish manufacturing, providing great products to Cornwall, the rest of the country, and beyond. There is a strong imperative to build resilience against shortages and shocks which threaten the sector, including a need for stable, renewable, and clean sources of energy.

Intended Audiences and Use Cases

This report is intended for a variety of different audiences.

For agrifood businesses, the report aims to be a decision-support resource to understand how geothermal energy could meet their heating, cooling, and power needs, what forms of geothermal may be relevant to different types of operations, and what delivery models could reduce cost and risk. It can inform internal discussions on decarbonisation strategies, future energy planning, and participation in shared or cluster-based energy projects.

For project developers and energy providers, there is demand-side evidence on where geothermal aligns with agrifood processes, helping to identify priority subsectors, anchor loads, and locations for potential projects. It can be used to shape early-stage feasibility studies, business cases, and engagement strategies with prospective customers.

For local authorities and public-sector bodies, the report offers an evidence base to support strategic planning, policy development, and investment decisions. It can inform the identification of geothermal opportunity areas, agrifood hubs, or heat network zones, and support bids for regional or national funding by demonstrating demand, economic benefit, and alignment with net zero objectives.

For funders and finance organisations, the report provides insight into market appetite, barriers to uptake, and the conditions required to make geothermal projects investable. It can help shape grant programmes, risk-sharing mechanisms, and blended finance models tailored to the agrifood sector.

Finally, for sector bodies and partnerships, the report can be used as a shared reference point to convene collaboration, communicate the role of geothermal in agrifood decarbonisation, and build momentum around cluster-based approaches that deliver both environmental and economic benefits.

Scope and Limitations

The scope of this project is to investigate the potential role of geothermal energy in helping to meet the heating, cooling, and power needs of the Cornwall and Isles of Scilly agrifood sector, while also assessing how geothermal deployment could support sector growth, improve competitiveness, and deliver wider economic benefits through investment, job creation, and increased local food resilience.

The stakeholder survey results illustrated in this report only reflect the businesses that participated in the stakeholder engagement process and consultations and are not a statistically representative picture of agrifood businesses in Cornwall; rather, they provide a snapshot intended to illustrate common energy demand patterns and inform further analysis. It is hoped that the Practical Guide that accompanies the report will give the sector some useful first steps and sources of information to start their journeys to developing geothermal projects themselves.

In recent years, great interest has been generated in the idea of geothermal brines producing commercial quantities of lithium, and this being a spur to create lithium extraction facilities alongside geothermal heat projects. The business models for this route to development are highly specialised and are not explored in this report.

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Report prepared for Great Cornish Food by Eden Geothermal Ltd., funded by the Shared Prosperity Fund.

Glossary

Term	Description
AGSHP (Augmented Ground Source Heat Pump)	A type of heat pump system that uses naturally warmer underground water, often from historic mines in Cornwall
Anchor Load	A large business or facility with steady heat demand that helps make a shared geothermal system financially viable.
Baseload Heat / Baseload Power	Energy that is available continuously, day and night, regardless of weather.
CHP (Combined Heat and Power)	A system that produces electricity and usable heat from the same geothermal source, improving overall efficiency.
Closed Loop GSHP	A heat-pump system where pipes are placed in the ground and a fluid circulates inside them, absorbing heat without interacting with groundwater.
Coefficient of Performance (COP)	A measure of how efficient a heat pump is. A COP of 'X' means 'X' units of heat are produced for each unit of electricity used.
Cascading Heat Use	Using geothermal heat at different temperatures for different tasks in succession. For example, high temperature heat for processing and lower temperature heat for space heating.
Direct Use Geothermal Heat	Using hot water from deep underground directly for heating buildings or industrial processes, without needing a heat pump.
EGS (Enhanced Geothermal System)	A geothermal system where artificial reservoirs in the rock are engineered so water can circulate and absorb heat, even if the rock has little natural permeability.

Exploration Well	A test well drilled to understand underground conditions sometimes used before committing to a full geothermal project.
GSHP (Ground Source Heat Pump)	A system that collects low temperature heat from the ground and uses a heat pump to raise it to a useful temperature.
Heat Exchanger	A device that transfers heat from geothermal water to a separate clean water circulation without mixing the two.
Heat Network	A system of insulated pipes that distributes heat from a central source, such as a geothermal well to multiple buildings or businesses.
Heat Pump	A device that upgrades low temperature heat from the ground or water to a higher temperature suitable for heating buildings or industrial processes.
Induced Seismicity	Very small ground movements caused by drilling or injecting water underground. These are usually too small to be felt.
Open Loop GSHP	A system that pumps groundwater from one well, extracts heat from it, and returns the cooled water to another well.
Organic Rankine Cycle (ORC)	The electricity generation technology used in UK geothermal systems. Can generate electricity from lower temperature resources (90°C +) than traditional steam turbines.
Permeability	A measure of how easily water can move through rock
Reinjection Well	A well used to return cooled water back underground after heat has been extracted, allowing the geothermal system to operate in a closed cycle.
Shared Ground Loop	A system where multiple buildings connect their individual heat pumps to a single set of underground pipes, rather than each building drilling its own boreholes.
SMEs	Small and Medium-sized Enterprises
Thermal Conductivity	A measure of how well the ground or rock transfers heat.
Thermal Storage	A method of storing heat so it can be used later when demand is higher.

1. The Role of Geothermal Energy in Addressing Agrifood Needs

1.1. Overview of the Agrifood Sector in Cornwall and the Isles of Scilly (CIoS)

Here we follow the Great Cornish Food definition of agrifood: food and drink, farming and fishing. The sector is made up of the businesses and enterprises, of all scales, involved with producing and supplying food and beverage products. Most companies in the sector are SMEs.

Agrifood is at the heart of Cornwall and the Isles of Scilly's culture, identity, history, and economy. Around 80% of Cornwall's land area is farmed, one quarter of Cornish businesses and 20% of Cornish jobs are agrifood-related, and the sector is worth a total of about £2 billion[i]. It is a foundation of the visitor economy in Cornwall, which itself is the largest economic sector in the county.

1.2. Why Geothermal Matters for the Agrifood Sector

Geothermal is a secure, clean source of energy which can provide baseload electricity, heat, and cooling at a low operating cost directly from the ground beneath our feet. The Cornish landscape, which has shaped the agrifood sector over hundreds of years, has major potential to supply geothermal energy. Recent research suggests that up to 31 GW of electricity could be developed[ii], and the Local Area Energy Plan is targeting 200 MW of geothermal energy production by 2045, to produce 25% of Cornwall's electricity needs[iii].

There are several types of geothermal technology, which can suit a variety of applications and demand profiles. Already, geothermal provides heat, cooling, and electricity to the agrifood sector in continental Europe, with multiple case studies proving the technology's ability to decarbonise as well as save on costs[iv]. Many policy guides have also been published to provide general support in decarbonising the sector, as well as specifically advising on creating value chains powered by geothermal heat[v,vi]. The geothermal industry is becoming established in the UK, particularly in Cornwall, offering development pathways and potential partnerships building on the relationships between industry members. The objective of this report is to synthesise the existing knowledge and evidence with the regional context of Cornwall and the Isles of Scilly, creating a collaboration between the agrifood and geothermal sectors.

1.2.1. Multiple Applications and Cascades

Geothermal can supply temperatures suitable for a range applications within or between agrifood businesses, from freezing and cold storage to process heat, distilling, drying and pasteurisation (Figure 1). Universal heat requirements, such as space heating and hot water for hand washing, can be provided from the same source.

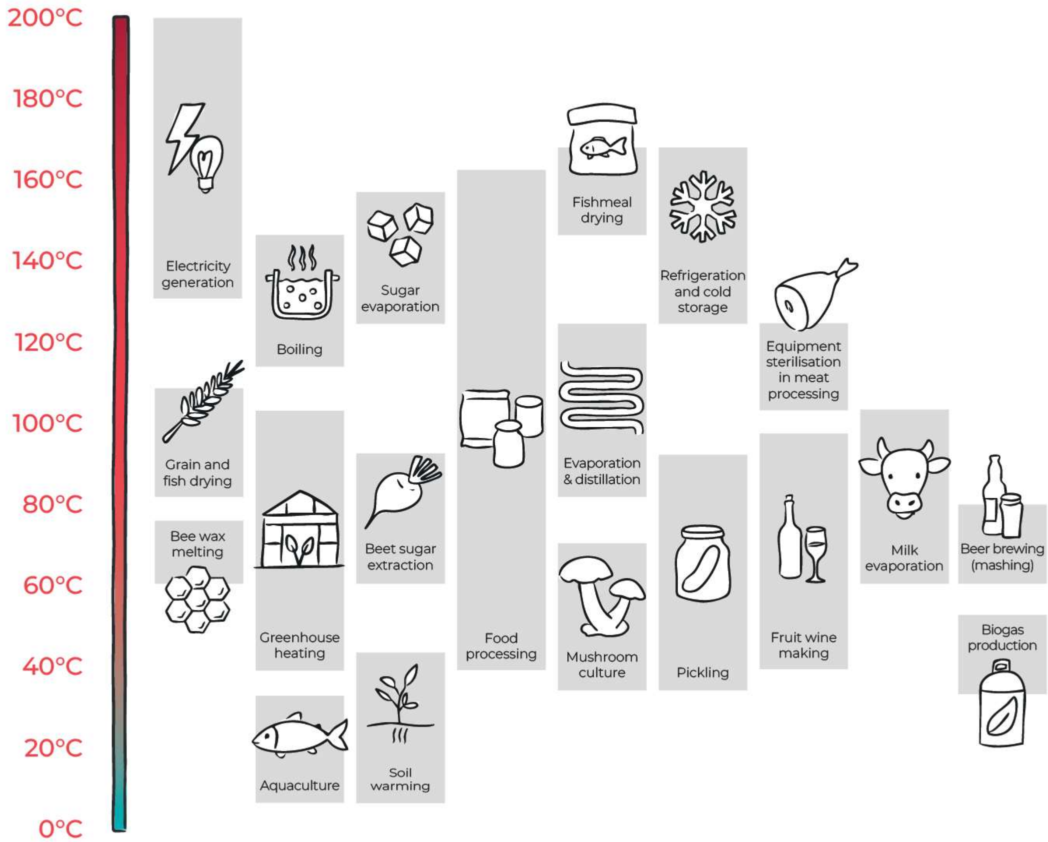

Figure 1: Applications of Geothermal Heat to the Agrifood Sector © Eden Geothermal 2026

This could encourage agrifood businesses to co-locate and benefit from a single geothermal development, increasing collaboration and sharing the economic load of the energy transition.

The 2024 CIoS agrifood sector insights report identified the opportunity in developing food processing capacity, adding value to a greater volume of CIoS quality produce within the county.[i] Examples from the USA show that co-development of geothermal electricity systems alongside crop processing facilities provide more jobs and better returns all round. In Reno, Nevada, a 2 MWe geothermal electricity plant with 3 employees, selling $1m of electricity per year had a payback rate of 6 years. Adding an onion dehydration plant with two lines, running for 10 months a year and producing 13,600 tonnes of onion and garlic powder supported 75 jobs and reduced payback to 2 years.[vii]

A major application proven in the Netherlands and elsewhere is protected growing, to extend production seasons into the lucrative early and late season markets. This would contribute to the CIoS Food Strategy target to increase the area of new protected growing environments, reducing risks and uncertainties associated with growing outside. Modern greenhouses are increasingly large: 10 hectares or more, and need around 1MW of heat per hectare. Greenhouses support more jobs than other kinds of agriculture: an average of 9/ha, which would also support workforce targets.[viii]

1.2.2. Energy Security

While significant diversity exists between businesses in the sector, a common vulnerability manifests in the cost and security of energy. Gas grid cover in Cornwall is low, with 53% of households, double the national average, with no access to natural gas[iii]. Consequently, many agrifood businesses are dependent on liquefied petroleum gas (LPG) or oil for heating. The sector faces disproportionately high financial impacts due to natural and geopolitical disasters, partly as a result of from grid or fuel import dependency[ix]. Building resilience against shortages and shocks caused by volatile energy markets, climate change, and geopolitical insecurity has been identified as crucial for the agrifood sector.

Geothermal can provide non-stop, uninterrupted electricity for both local energy demand and baseload power to the grid. Capacities are very high (often more than 90%), year-round, 24 hours a day, regardless of weather. It does not require the import of fuel or frequent maintenance, and system lifespans range between 20 and 40+ years.

Locating geothermal deployments near demand centres minimises the distance electricity must travel, reducing energy losses. Geothermal can be built close to energy demand, which can alleviate local congestion and improve delivery efficiency. Curtailment of renewable energy in the UK (due to grid constraints and transmission bottlenecks) amounted to 5.8 terawatt-hours of wind energy in 2020 through 2021—enough to power 800,000 homes annually.[x] Locally embedded geothermal generation can help avoid similar inefficiencies. Geothermal can reduce total system costs and ease congestion without requiring any changes to grid operations.[xi]

Shallow GSHPs to provide low temperature heat can be installed virtually anywhere, and geological potential for Mine Water Geothermal is particularly abundant in Cornwall.

Community and shared ownership of geothermal heat and power systems could create an energy system which brings greater direct benefits to the community in terms of skills and jobs.

1.2.3. Decarbonisation

Cornwall Council is working towards net zero in 2045, five years ahead of the targets enshrined in UK law.

In the UK, heat is ~46% of energy use and 37% of emissions[xii], but heat decarbonisation has lagged transport and electricity. Direct deep geothermal is one of the few technologies that can provide multi-megawatt scale, high temperature heat, up to around 210°C. Even higher temperatures are being achieved as drilling technologies continue to improve.

Direct geothermal heat use in granite has a carbon saving of ~93% when compared to natural gas[xiii]. A 2023 meta study of the emissions impact of electricity generation technologies showed deep geothermal electricity performs almost identically with photovoltaics, behind wind and hydro[xiv] (Table 1).

Table 1: Comparison of the emissions impact of electricity generation technologies per kWh (Source: Guidi et al., *2023)*

Technology	***Low gCO2eq/kWh***	***High gCO2eq/kWh***
Coal	753	899
Gas	379	678
Nuclear	3	45.5
Wind	9.4	18.1
Hydro	18.8	26
Photovoltaic	17	45.6
Concentrated Solar Power	20.5	33.2
Geothermal	13.7	47

Carbon savings for GSHP and mine-water systems are site specific, but all benefit from the decarbonisation of the electricity grid, and if they can be co-located with solar or wind and batteries, are almost zero-emissions in use. An average GSHP can save 77% on natural gas use[xv].

1.2.4. Land Use

The amount of land required for geothermal energy varies between technologies and scales of application, but it is very low compared to other renewable technologies.

Vertical boreholes for Ground Source Heat Pumps can be contained within a few square meters and buried (see Section 2.3.1), horizontal GSHP arrays require a large open area for trenching, but are covered over and all but invisible in operation. Further environmental and social considerations are summarised in Section 7.

For deep geothermal projects, ~1ha is required for the drilling rig for several months. In the case of heat projects, once the rig as left, the land required by pump houses and heat exchangers can be as little as two containers, as shown in these pictures of the Eden Project below.

Figure 2: The drilling rig on location at Eden Project, and the site in operation.

Deep geothermal electricity plants have the lowest land take of any renewable electricity technology. A comparison of installed power, capacity factor and annual energy yield per hectare emphasises this, with a 1 ha 5MWe geothermal electricity plant producing ~40 GWhe, compared to ~0.5 MWe solar photovoltaic (PV), which in the UK produces c.0.45 GWhe, over 80 times less power (Figure 3). Use of productive land is clearly a key interest of the agrifood sector, and geothermal may be particularly suited to places, such as the Isles of Scilly, where land is in short supply, and the landscape particularly sensitive.

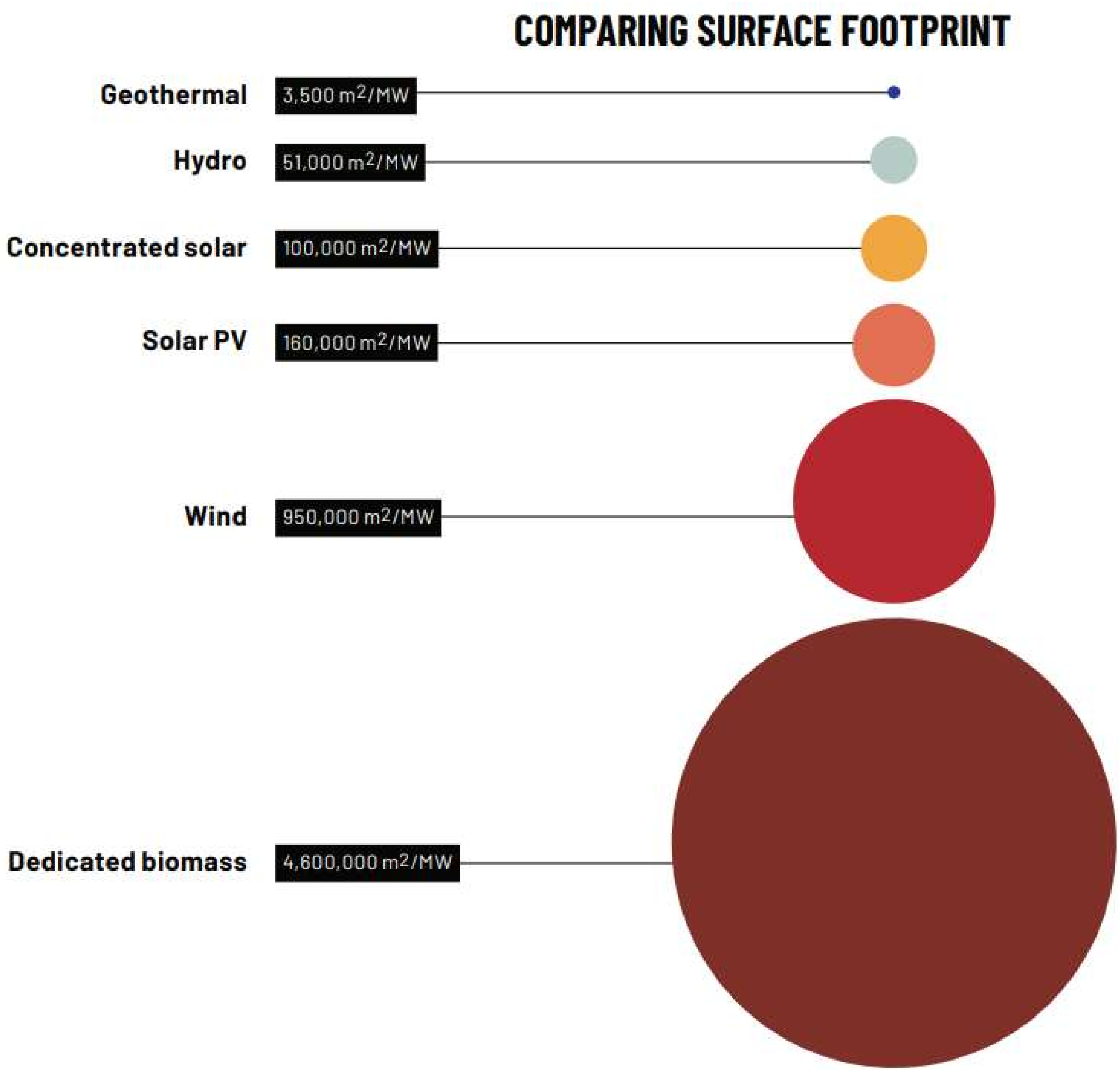

Figure 3: Electrical capacity by land area of several renewable technologies. Source: Project Innerspace (2025)[xvi]

1.3. Limits and Constraints of Geothermal Solutions

To state the obvious, any deep geothermal solution is tied to the geology beneath the site. Drilling often begins with a vertical section followed by drilling a tangent sub-horizontally. This gives some flexibility when targeting a specific reservoir, but projects are constrained by the local geology. For example, the Lizard does not have the elevated heat gradients seen elsewhere in the county due to its serpentine geology, and deep geothermal direct heat and electricity projects are not yet economically viable there.

In Cornwall, the granite batholith can be accessed from a wide variety of locations, as described in Section 4. A feasibility study is needed to capture the geological limitations of any site and compare the options. Site-specific considerations are discussed in Section 7.1. Other constraints include an understanding of the mineral rights landscape, which is detailed in Section 7.6.

High upfront costs and a lack of central government support are also issues, covered in Section 8.

We hope that this paper and the accompanying Practical Guide go some way to tackle unfamiliarity with the technology within the agrifood industry.

2. Geothermal Technologies

This section was written with the valuable contribution of Tamsin Lishman, CEO of Kensa.

2.1. Geothermal Energy Overview

Geothermal energy is the energy held in the ground beneath our feet. Everywhere the deeper you go, the hotter it gets, and the centre of the earth, at around 6000°C, is as hot as the surface of the sun.

In places that are volcanically or tectonically active like Iceland or California, hot springs and hydrothermal systems have been in use for centuries, and district heating systems and electricity developments are cheap and routine. Worldwide, lower temperature resources in warm aquifers provide district heating and heat for growers. Geothermal development is substantial and growing, with the Netherlands planning on 23% of their heat coming from geothermal sources by 2050, Germany 25%[xvii].

Elsewhere, in places like Cornwall, the heat produced from igneous rocks can be used for direct heating applications and electricity production. The heat energy is extracted by pumping fluid to depth, then bringing it back to the surface, passing it through a heat exchanger to extract the heat and then reinjecting it for recirculation. The key factors in geothermal energy production are temperature and fluid flow, with the amount of useful energy produced at the surface a product of the two.

Different technologies are used to extract thermal energy from different depths (Figure 4) – ground-source heat pumps (GSHPs) pump water in a closed loop between 100-500 m, mine water systems can go as deep as 800 m, while deep geothermal systems extract and reinject from reservoirs from around 1 km to as deep to 6.5 km (Table 2). Heat can be used for many processes, either using a heat pump, or directly in higher temperature wells. Electricity can be produced from c.150°C upward.

Geothermal energy can also be used for cooling, refrigeration, and freezing, either through reversal of Ground Source Heat Pump (GSHP) cycles, or absorption chilling from high temperature (120+°C) sources.

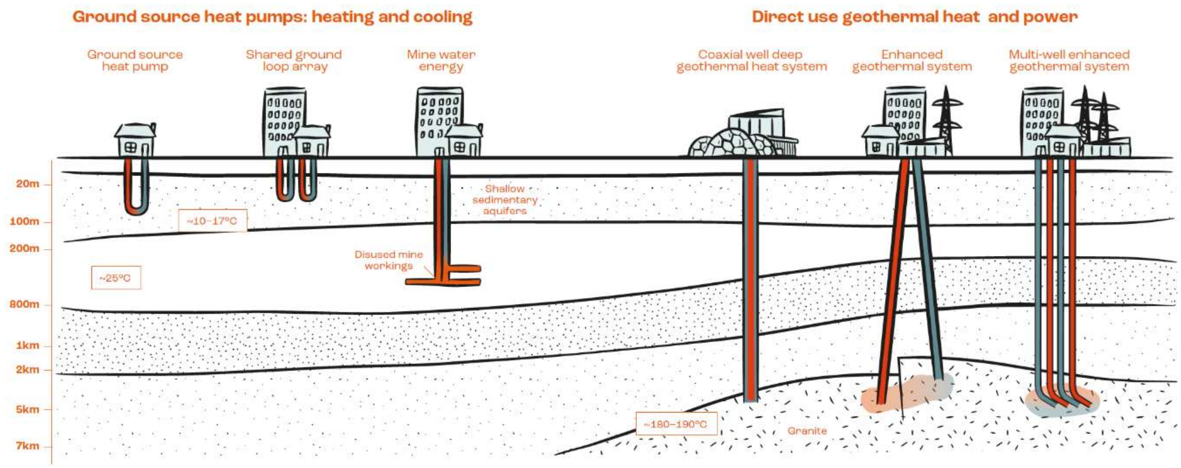

Figure 4: Types of Geothermal Technology. © Eden Geothermal 2026

Table 2: Geothermal Technology Summary Table

Geothermal Technology	Depth of Resource (approx.)	Technology Subtypes	Output temperature at well head	Case Studies in Cornwall
Ground-source Heat Pumps (Shallow Geothermal)	100 m - 800 m	Heat pumps, shared ground-loop arrays, mine water energy	5°C - 12°C (35°C–55°C with heat pump)	Over 14,043 domestic GSHPs in Cornwall[xviii]. Stithians shared network
Direct Use Geothermal Heat (Deep Geothermal)	800 m +	Hydrothermal systems, doublet heat systems, coaxial systems	45°C – 90°C or more depending on depth (can be boosted with industrial heat pumps)	Eden Project
Combined Heat and Power (CHP) (Deep Geothermal)	5 km +	Doublet systems, multi-well heat systems	150°C - 210°C	United Downs doublet system

2.2. Ground Source Heat Pumps

Several shallow geothermal technologies are available to meet heating loads: closed loop GSHP systems, and shared loop GSHPs which can be installed almost anywhere, and open loop systems and mine water systems which need specific ground conditions.

2.2.1. Closed loop Ground Source Heat Pump (GSHP)

Closed loop Ground Source Heat Pump (GSHP) systems are a well-developed technology that use low to moderate temperatures in the ground near the surface boosted by heat pumps. A closed-loop GSHP will usually consist of several vertical boreholes. The number of boreholes and their depth and arrangement is determined by the rock properties (thermal conductivity and specific heat capacity) underground. The boreholes (typically 120 – 200 m deep) have a plastic U-tube pipe inserted into them, which is then grouted in place.

A working fluid (usually glycol) is circulated through the pipes, extracting heat from underground. When the working fluid returns to the surface, its temperature is upgraded by a heat pump to the demand temperature, typically 35-60°C. Well-designed systems are incredibly efficient, operating with a Coefficient of Performance (COP) of between 3 and 4, meaning that they provide 3 to 4 kilowatts of heat for every kilowatt of electricity used.

Closed-loop boreholes have the lowest CAPEX of the geothermal ground source opportunities. Challenges can arise when difficult drilling conditions (e.g. drilling in areas of broken ground) result in poor borehole integrity or limited borehole depth.

These systems can be installed anywhere, provided there is space for the necessary trenches or boreholes, and they can supply heat loads from a few kilowatts to several megawatts. They can also be operated to provide cooling by removing heat from buildings and discharging it to the ground.

Closed loop systems can also be deployed in rivers, lakes, or the sea, eliminating the need to drill boreholes or dig trenches.

GSHPs can be installed with other on site renewables: solar or wind and batteries to create integrated systems. For example, Riviera Produce, alongside 1MW of solar has a ground source heat pump that also captures exhaust heat from chillers and uses it to heat staff accommodation and offices.[xix]

2.2.2. Augmented GSHP (AGSHP) and Mine Water Geothermal systems

Augmented GSHP (AGSHP) systems take advantage of favourable site conditions or the availability of warm water resources to supply water to heat pumps at a higher temperature; typically, up to about 25ºC. This improves the thermal efficiency and increases the COP to above 5, resulting in both greater carbon savings and reduced running costs.

An abundant warm water resource in Cornwall is flooded metal mines, which can extend up to 800 m deep. The South West Geothermal Alliance report showed that mines deeper than 200 m are suitable for Mine Water Geothermal extraction[xx]. There are 154 such mines in Cornwall, spatially concentrated in certain areas (see Section 3). Mine Water Geothermal provides an opportunity for stable heat at reduced drilling costs if pumped from an open shaft, though drilling boreholes into mine workings is possible. Water is then boosted with a heat pump and re-injected into the mine workings.

2.2.3. Shared Loop GSHP

Shared Ground Loops are systems wherein multiple buildings or installations connect their individual heat pumps to a single, communal ground loop. Instead of each property drilling its own boreholes, the network uses a central array of boreholes that circulates fluid to absorb low grade heat from the ground. Each home or building then has an individual heat pump to boost this to create hot water and heating. The shared loop typically delivers ground temperatures of 5–12°C, and each property's heat pump upgrades this to usable heating and hot water temperatures, between 33°C - 55°C. The same system can be run in reverse to provide cooling, using the same 5-12°C ground temperature.

2.3. Deep Geothermal Systems: Direct Heat and Combined Heat and Power (CHP)

Higher temperature heat, 60°C-210°C, suitable for many processes, and electricity generation can be produced from drilling deeper wells to access higher temperatures.

Deep geothermal developments involve drilling two (or more) wells extending to several kilometres in depth. Wells might be 2-6 km long or more, depending upon the temperature requirement. They may include horizontal sections at depth to maximise energy extraction. The drilling process takes several months. Drilling rigs operate continuously and are lit at night for safety, but careful lighting and noise mitigation measures can ensure minimal impact. Rigs and other equipment can be transported in multiple coordinated shipments in areas with poor road infrastructure.

There are two systems that can be employed to create a Deep Geothermal project: Reservoir Dependent and Reservoir Independent. The first makes use of natural fluid pathways within large geological faults, or within the natural permeability within the host rock. The latter doesn't require natural permeability within the host rock, and the reservoir is engineered after drilling is completed (otherwise known as Enhanced Geothermal Systems, or EGS).

After construction, the wellheads, heat exchangers and pumps for heat applications occupy an extremely small footprint, within a few shipping containers, or can be constructed so that cars can be parked overhead. Electricity developments using Organic Rankine Cycle (ORC) systems also have low visual impact, with no building higher than 10m, no chimneys, and no plumes of steam.

ORC electricity plants produce waste heat at around 90°C which can be used in a cascade of lower temperature applications. The more heat that can be used, the more efficient and economically viable the project becomes.

2.3.1. Geothermal Technology Improvements

Major improvements have been made in recent years in deep geothermal hard rock drilling, mostly through research in the US. Since 2021, the number of days to drill 4.2 km into granite has fallen from c.110 days to less than 20 days. Recent results from Fervo Energy in the United States demonstrate significant cost improvements. Between 2022 and 2024, the costs for developing a well dropped by nearly half[xxi]. The Levelised cost of geothermal electricity in the US will be $75/MWh in 2027,$45/MWh in 2035.[xxii] This means previously inaccessible geothermal resources have become available, and costs driven down. Drilling into hotter and harder rocks is becoming the norm within the geothermal sector, unlocking the potential for major expansions into granitic and other igneous geological settings such as Cornwall.

End-to-end improvements have been made; well heads can now be buried out of sight, further reducing the already small surface footprint. Incremental improvements and cost reduction in heat pump and low temperature electricity generation technologies mean that efficiencies are constantly improving.

Figure 5: Buried wellhead example. Source: NOV[xxiii]

For agrifood businesses, the resource is flexible. Shallow to medium-depth systems can provide direct heat for day-to-day operations, while deeper systems can support combined heat and power, providing both electricity and usable heat in a cascading model.

2.3.2. Cascaded Uses and Shared Infrastructure

One deep geothermal source can supply heat for multiple processes within a development at different temperatures, known as 'cascading use'. This can be within a single business or within a cluster of multiple heat users (Figure 6).

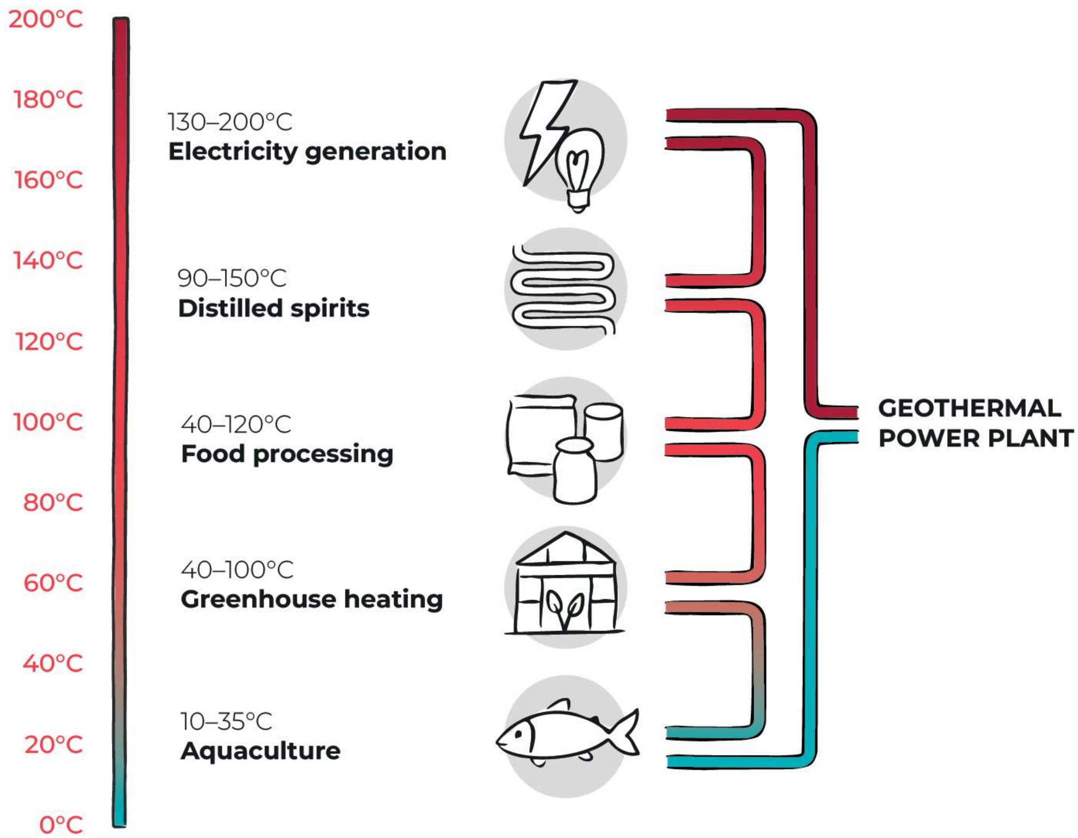

Figure 6: Cascading uses of geothermal heat and energy. © Eden Geothermal 2026

When businesses co-locate with other heat users, they gain shared access to electricity and high-temperature, low-carbon geothermal heat, allowing heat demand profiles to be balanced across multiple users. This can be structured as a cluster of businesses with dependable daily heat supply requirements, but typically only during specific operating windows, or around a large 'anchor user' from which heat is cascaded for heat applications at decreasing temperatures. This improves overall system efficiency and economics while avoiding the need for each business to invest directly in geothermal wells or generation infrastructure.

3. Delivery Models and Case Studies of Agrifood-Focused Geothermal Systems

Geothermal applications in the agrifood sector are well established in many developed countries. These include Japan; several European countries including Iceland, Italy, the Netherlands, and Türkiye; the United States; and Australia and New Zealand.

Geothermal agrifood uses are also found in developing countries across Africa, Asia, and the Americas, including countries such as China, Kenya, Mexico, and Chile. [vi].

The following case studies and delivery models illustrate how geothermal energy has been successfully applied within agrifood systems in several contexts. While the geological, regulatory, and market conditions vary, these examples highlight transferable lessons for businesses in Cornwall - particularly around direct heat use, collaboration models, risk reduction, and the role of long-term public investment. Together, they demonstrate how geothermal resources can support low-carbon production, reduce energy costs, and strengthen local value chains when projects are aligned with business needs and regional development objectives.

3.1. On-Site Single-User Systems

3.1.1. Shallow Geothermal for Medium Heat Demand (<40 °C)

Technology links: GSHP; AGSHP; Mine Water Geothermal systems; Shared Loop GSHPs

This scenario is designed for agrifood businesses that primarily require low- to medium-temperature heat, typically below 40 °C, across a range of operational uses.

Typical users include food packing and washing facilities, vegetable processors, and aquaculture operations. These businesses generally require heat for applications such as hot water production, cleaning and hygiene, moderate-temperature processing, space heating, and maintaining controlled environments, rather than for high-temperature industrial processes.

Shallow geothermal systems, delivered through GSHPs, are well suited to this demand profile. GSHPs extract low-grade heat from the ground, mine water, or shared ground loops and upgrade it to usable temperatures using electricity. When powered by low-carbon electricity, these systems can deliver substantial emissions reductions while providing reliable, year-round heat. For many agrifood businesses, GSHPs can directly replace oil or LPG boilers with minimal disruption to existing operations.

This option is particularly attractive for businesses seeking a low-risk and proven solution. GSHP technology is well established, with predictable performance, relatively short development timelines, and lower geological risk compared to deep geothermal systems. Installation can often be integrated into new developments or phased into existing sites, making it suitable for SMEs as well as larger facilities with dispersed heat loads.

In Cornwall, there are many thousands of legacy mines. Mine Water Geothermal systems use flooded mine workings as a stable heat source. Where multiple businesses are located close together, shared GSHP or shared ground loop systems can further improve economics by spreading capital costs, reducing land requirements, and enabling coordinated operation and maintenance.

Typical Temperature Ranges, Efficiency, and Costs

Typical temperature ranges

Shallow geothermal systems using GSHPs are well suited to agrifood applications requiring heat below 40°C. In practice:

- Ground or mine water source temperatures are typically **8–25 °C** in Cornwall
- GSHPs can reliably deliver:
    - **30–40 °C** for space heating, underfloor heating, and low-temperature radiators
    - **45–55 °C** for hot water, cleaning, hygiene, and moderate-temperature processing

This temperature range aligns well with food washing, packing, aquaculture temperature control, and cleaning-in-place processes.

System Efficiency

GSHP performance is typically measured using the Coefficient of Performance (COP), the ratio of heat output to electricity input.

- Typical seasonal COP for agrifood GSHP systems: 3.0–4.5
    - This means 1 unit of electricity produces 3–4.5 units of heat
- Mine water and shared ground loop systems often sit at the upper end of this range due to stable source temperatures
- Seasonal Performance Factors (SPF), which reflect real-world annual operation, commonly fall between 2.8 and 4.0 depending on system design and heat distribution temperatures.

Higher efficiencies are achieved where heat is used at lower temperatures and demand is steady.

Capital Costs (Indicative)

Costs vary depending on site conditions, system size, and whether boreholes, mine water access, or shared infrastructure are used. Typical indicative ranges for commercial agrifood sites are:

- **GSHP systems:** £800–£1,500 per kWth installed.
- **Borehole ground arrays:** £25–£50 per metre (depth dependent)
- **Mine water systems:** Often lower drilling costs but higher upfront feasibility, development, licensing and pumping costs
- **Shared GSHP systems:** Lower per-user capital costs due to shared ground loops and infrastructure

These costs are generally higher than conventional boilers but are offset by lower operating costs and long asset lifetimes (typically 20–25 years for heat pumps and 50+ years for ground loops).

Operating costs

- GSHP systems typically reduce heat-related energy costs by 30–60% compared to oil or LPG, depending on electricity prices and system efficiency
- Maintenance costs are low and predictable, as GSHPs have few moving parts and no on-site combustion.

Payback periods

- Typical simple payback for agrifood GSHP installations:
  - 6–10 years where oil or LPG is displaced
  - 8–12 years where electricity prices are higher or demand is more variable
- Payback periods can be shortened through:
  - Capital grants or low-interest finance
  - Shared systems that reduce upfront costs
  - Co-location with on-site renewable electricity to offset electricity OPEX cost (e.g. solar PV)

Strategic Implications for Cornwall's Agrifood Sector

For Cornwall's agrifood businesses, many of which are off the gas grid, GSHPs can be a financially attractive and low-risk pathway to decarbonising heat. The combination of high efficiency, predictable operating costs, and long system lifetimes improves business resilience while supporting regional net-zero targets. When deployed at scale through shared or mine water systems, GSHPs can also form a foundational layer of low-carbon heat infrastructure that complements deeper geothermal developments.

Case Studies

Riviera Produce[xxiv] Hayle.

Riviera Produce, a premier Cornish brassica grower managing 5,000 acres, has advanced its sustainability goals through a multi-layered approach to renewable energy. The firm's transition began with a strategic investment in solar power. In April 2015, Riviera commissioned an initial 250kW ground-mounted solar PV system designed to offset the high electricity demands of the facility's refrigerated storage areas. The project was forecast to deliver an annual financial benefit of 11.5% return on investment, it exceeded these projections by generating a 15% actual ROI. Encouraged by this success, the farm expanded its capacity by installing an additional 250kW of roof-mounted panels, eventually reaching a total solar output of 1MW across various field and roof sites. These installations currently provide enough power to make the packhouse approximately 55% self-sufficient, drastically lowering utility costs while securing long-term income through the government's feed-in tariff.

In tandem with its solar infrastructure, Riviera Produce integrated a sophisticated ground source heat pump (GSHP) system to decarbonise its heating requirements. This system is particularly innovative because it acts as a heat recovery unit, capturing the waste heat emitted by the facility's large industrial chillers. By repurposing this thermal energy that would otherwise be lost, the GSHP provides sustainable heating for the farm's staff accommodation and administrative offices. This integration reflects a broader commitment to a circular energy model, where the constant cooling needed for vegetable storage directly supports the comfort of the workforce, further reducing the operation's overall carbon footprint.

The farm's environmental strategy extends beyond stationary energy to include cutting-edge agricultural machinery trials. Riviera Produce was selected to field-test the New Holland T6 Methane Power tractor, which runs on biomethane processed from dairy farm slurry. Trials demonstrated that the methane-fuelled tractor delivers power and performance levels identical to conventional diesel models, though it requires refuelling approximately twice a day. Additionally, the business has successfully trialled Hydrotreated Vegetable Oil (HVO) as a drop-in replacement for diesel. Riviera Produce aims to surpass the industry's 2040 net-zero targets through these proactive investments in solar, heat recovery, and alternative fuels, target and establish a sustainable business model for future generations.

Riseholme Glasshouse R&D Centre

The University of Lincoln completed a new Glasshouse Research and Development Facility at its Riseholme Park campus in 2025, adding significant capacity for controlled-environment trials. The site uses geothermal ground-source heating to provide stable, low-carbon warmth for horticultural research throughout the year, demonstrating practical pathways to net-zero glasshouse production.

Designed for multiple projects to run in parallel, the glasshouse is divided into independently controlled compartments and will be available to eligible businesses alongside academic expertise from the Lincoln Institute for Agrifood Technology (LIAT). The facility also links into regional initiatives including the UK Food Valley and the Greater Lincolnshire LEP's proposed Agricultural Growth Zone, as well as the University's AgriTech Incubator with Barclays Eagle Labs.

Capital costs were around £2.2 million, comprising a £1.3 million grant from the Greater Lincolnshire Local Enterprise Partnership and £888,666 from the University of Lincoln.

The glasshouse strengthens an already nationally significant cluster. Greater Lincolnshire is responsible for around one-eighth of England's food and supports circa 75,000 food-sector jobs, with particularly strong specialisms in fresh produce, glasshouse production and food logistics. By proving out low-carbon heat at operational scale, the Riseholme facility is expected to accelerate innovation uptake across the region's growers and processors.

Lanchester Wines

Lanchester Wines Ltd owns two mine water heating schemes in Gateshead, northeast England. The schemes have been operational since 2018, delivering a combined 3.6 MW_{th} to neighbouring commercial warehouses at Abbotsford and Nest Road. As can be seen in Figure 7, both use boreholes to access vertically separate aquifers c. 130–280 metres below ground, yielding mine water temperatures of 14–19 °C and flow rates of 16–50 L/s.

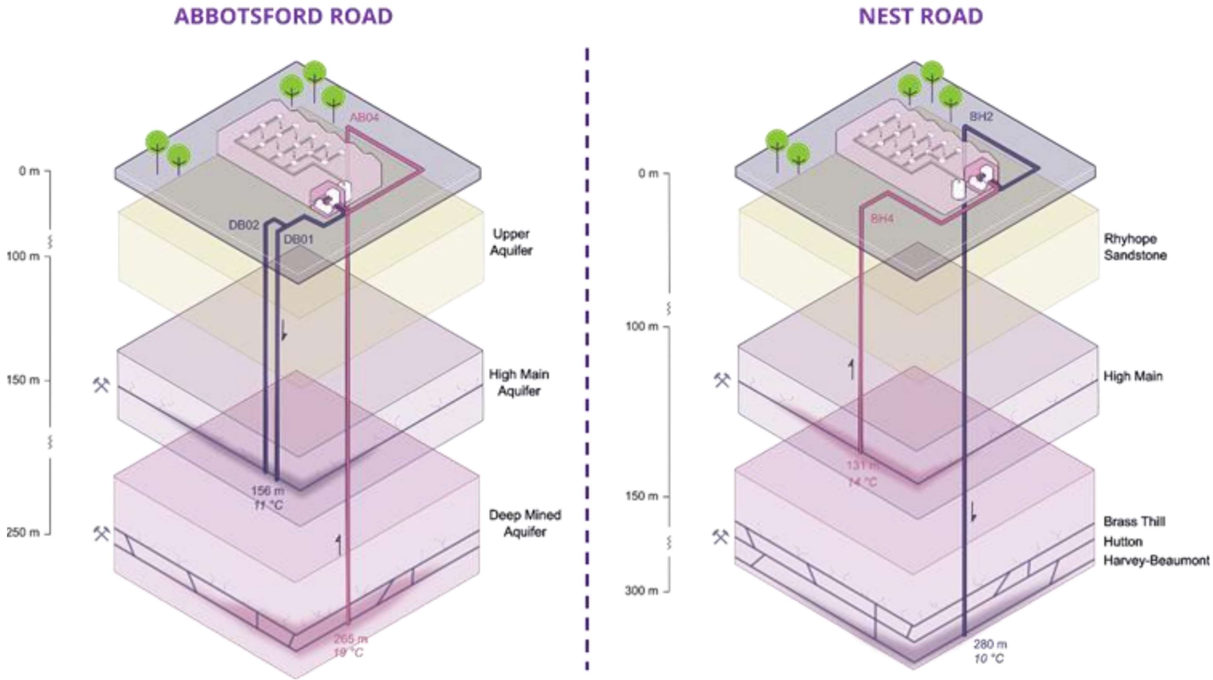

Figure 7: Schematic showing the two mine water systems owned by Lanchester Wines ©TownRock Energy Ltd

They are the first (and only to date) privately funded mine water projects in the UK and benefit from the Renewable Heat Incentive (RHI), a discontinued UK Government scheme which benefits generators of renewable heat.

Since 2021, TownRock Energy has been responsible for operations, maintenance, and improvement of both schemes. The scheme at Abbotsford Road came with significant legacy challenges, notably operational issues related to poorly designed plant and subsequent clogging of equipment, and an unclear regulatory regime.

Several efforts have since been made to overcome these challenges. In 2022, a new drilling programme was commissioned to reconfigure the system and mitigate challenges associated with the originally built design. An exploration borehole successfully made a suitable hydraulic connection with the Deep Mined Aquifer System (DMAS), resulting in completion as a new production hole that could abstract warmer water at c.19 °C. Due to a higher source temperature, the heat exchanger and heat pumps were subsequently optimised to use a greater temperature differential (ΔT), which meant the system could produce a higher thermal output and run more efficiently. Furthermore, the reducing chemical environment in the deeper aquifer kept iron in solution rather than precipitate out as ochre. As a result, clogging on surface plant was reduced and the thermal transfer across the plate heat exchanger increased.

In recent years, TownRock Energy and Lanchester Wines have worked with the relevant regulators – Mining Remediation Authority (MRA) and Environment Agency (EA) – to streamline the first fit-for-purpose commercial Heat Access Agreement (HAA). The agreement is the first of its kind to be privately funded, which sets the precedent for other commercial-scale mine water heat schemes to follow. Although a lot has been done, the regulatory landscape is still evolving for mine water heat in the UK, particularly around neighbouring schemes and the storage of heat in the subsurface. The schemes at Abbotsford and Nest Road have been early demonstrators of proximal long-term, commercial-scale mine water schemes, directly feeding into and shaping the new regulatory frameworks for mine water heat in the UK.

3.1.2. Direct-Use Geothermal for High, Continuous Heat Demand (40–80 °C)

Technology links: Deep Geothermal Systems

This scenario focuses on agrifood businesses with high, continuous demand for heat at medium to high temperatures, where heat is a critical input to daily operations and production cannot be easily interrupted. It is particularly relevant to energy-intensive food and drink manufacturing and controlled-environment agriculture, where reliable and cost-effective heat supply underpins productivity, product quality, and biosecurity.

Direct-use geothermal systems supply heat directly from underground resources, avoiding the need for fuel combustion or heat upgrade using heat pumps. When matched with continuous demand, these systems can operate at high use levels (~8400hrs/yr), delivering stable, low-carbon heat over long periods (30 years+) and significantly improving project economics. The ability to cascade heat across multiple processes further enhances efficiency, enabling a single geothermal system to meet a range of temperature requirements on site.

In Cornwall, this scenario aligns with regional priorities to decarbonise industrial heat, reduce exposure to volatile fossil fuel prices, and support the growth of high-value agrifood activities. It is best suited to larger sites with long-term operational horizons and sufficient space for geothermal infrastructure, where direct-use geothermal can provide a resilient, future-proof heat solution that delivers both commercial and environmental benefits.

Typical Temperature Ranges

Direct-use geothermal systems are well suited to agrifood businesses with **continuous heat demand** in the **40–80 °C** range. In Cornish geothermal settings:

- Geothermal fluids can typically be delivered at:
  - 40–60 °C from shallow-to-medium depth systems
  - 60–80 °C (and above) from deeper)
- Heat can be supplied directly, without heat pumps, for:
  - Pasteurisation and brewing processes
  - Drying and sterilisation
  - Space heating and hot water
  - Temperature control in glasshouses and aquaculture
- Cascading use allows high-temperature heat to be prioritised for process needs, with lower-temperature heat reused for cleaning, hot water, and space heating before reinjection.

This makes direct-use geothermal particularly efficient for large sites with multiple, overlapping heat requirements.

System Efficiency

Because heat is delivered directly from the geothermal resource, conversion losses are minimal compared to electrically driven systems.

- Typical thermal efficiency (useful heat delivered / heat extracted):
    - 70–90%, depending on system design and heat integration
- Electricity use (for pumps and controls):
    - Typically 3–8% of delivered thermal energy .COP 12-30
- Overall system performance improves where:
    - Heat demand is continuous and predictable
    - Multiple uses allow cascading of heat
    - Reinjection temperatures are kept low

High utilisation rates are a key necessity of this scenario, significantly improving lifecycle economics.

Capital Costs (Indicative)

Capital costs are higher than shallow geothermal systems but are offset by long asset lifetimes and high annual energy output.

- Medium-depth geothermal (direct use):
  £1,500–£3,000 per kWth installed
- Deep geothermal / EGS (direct heat):
  £3,000–£7,000 per kWth installed
- Key cost components include:
    - Drilling and well completion
    - Heat exchangers and reinjection systems
    - On-site heat networks and thermal storage

Larger sites benefit from economies of scale and are better able to absorb upfront costs.

Operating Costs and Payback

Operating costs

- Operating costs are low and stable, dominated by pumping electricity and routine maintenance. The Eden Geothermal heat site requires 0.5 FTE to manage, maintain and operate the system.
- Heat costs are largely insulated from fuel price volatility
- Typical operating cost reductions:
    - 40–70% compared to oil or LPG
    - 20–40% compared to gas, depending on site and energy prices

Payback periods

- Typical simple payback periods for agrifood direct-use geothermal:
    - **8–15 years** for medium-depth systems
    - **12–20 years** for deep or EGS systems
- Payback improves where:
    - Heat demand is continuous and high
    - Multiple heat uses are integrated

- Anchor demand underwrites system sizing
- Public support or concessional finance is available

Given system lifetimes of **30–50+ years**, these assets deliver long-term cost certainty.

Strategic Implications for Cornwall's Agrifood Sector

Direct-use geothermal for continuous heat demand is highly aligned with Cornwall's strategic objectives for industrial decarbonisation, energy resilience, and value-added agrifood production. The model is particularly suited to large processors and growers with stable operations, long-term land tenure, and clustered heat needs.

By displacing fossil fuels in some of the most heat-intensive parts of the agrifood value chain, this scenario delivers substantial carbon reductions while improving competitiveness and protecting businesses from energy price volatility. When combined with cascading heat use and, where appropriate, shared infrastructure or EGS developments, direct-use geothermal could form a cornerstone of Cornwall's long-term low-carbon heat strategy.

Case Study: PlentyFlora, New Zealand

Connie and Harald Esendam from PlentyFlora use geothermal fluid to heat their 2,688 m^2 glasshouse used to produce *Gerbera* for the New Zealand cut-flower market. PlentyFlora's glasshouse is located on the Central Plateau, where the winter conditions can be very harsh, with an average of 20 to 30 frost days with -8°C as the lowest measured temperature. *Gerbera* is a subtropical plant originating from South Africa, and requires a minimum temperature of 14°C.

Supplementary heating for the PlentyFlora's greenhouse is provided by geothermal energy from two shallow (approximately 300 m depth) geothermal bores. The original bore produces about 70 m^3 per 24 h of 85-90°C liquid, while the second bore produces 30 m^3 per 24 h of 65°C liquid. The two bores are working as two individual heating systems. After passing the energy through a heat-exchange system the fluid is injected back into the shallow geothermal reservoir to complete the re-cycling. In 2013 PlentyFlora completed an upgrade to improve the output of the original bore with the installation of a compressor, which is used to inject air in the bore, enabling an increase in the volume of geothermal liquid produced from 70-130 m^3 (more than 80%) and so increasing the pipe temperature, inside the glasshouse, from 38°C to up to 60°C .The diesel peak-heating system on a fan coil unit, which forces hot air on the plants, is now used as a back-up system only. The new systems will save up to $40,000 in severe winters and will have less of an environmental impact.[xxv]

Case Study: Geothermal Horticulture Greenhouses in Netherlands

Figure 8: Geothermal Horticulture Greenhouses in the Netherlands

- ~20 greenhouses in the Netherlands now use direct-geothermal for heating from 42 wells
- Various high-value, heat-intensive crops are grown including vegetables, ornamental flowers, leafy greens and soft fruits
- IJsselmuiden well (2012, 1,950 m, 73–74 °C) cut natural gas use by 70–90%
- Produces low-carbon crops, attracting sustainable buyers like La Place
- Heat used decarbonised by 90% when compared to natural gas[xxvi]

Geothermal greenhouse projects in the Netherlands demonstrate how collaboration between agrifood businesses can unlock both public and private investment. Groups of growers formed consortia, pooling their own capital, secured bank finance, and leveraging government subsidies to jointly develop shared geothermal heat systems. This approach reduced individual risk, improved project bankability, and enabled long-term access to low-carbon, price-stable heat for year-round food production.

3.1.3. On-site geothermal for large, energy-intensive businesses

Technology links: Deep Geothermal Systems

This scenario is designed for large agrifood businesses with very high and continuous demand for both heat and electricity, long-term control of their sites, and limited flexibility to interrupt operations. It is particularly relevant where businesses face exposure to volatile energy prices or constraints on grid capacity and connection. On-site geothermal offers a long-term, strategic energy solution that can underpin core operations while improving resilience and cost certainty.

Typical users include large dairies and creameries, breweries and distilleries, major food processors, large glasshouse growers, animal feed manufacturers, and industrial bakeries. These businesses rely on dependable heat for critical processes such as pasteurisation, brewing, drying, sterilisation, and maintaining controlled growing environments. Where electricity demand is also high, integrated geothermal systems can be designed to optimise the balance between heat and power supply.

In Cornwall, this scenario is strengthened by the presence of deep geothermal resources and ongoing development of enhanced geothermal systems. On-site geothermal can reduce reliance on external energy markets, mitigate grid constraints, and in some cases provide on-site or locally supplied electricity alongside heat. Larger sites are more likely to have the land availability, planning certainty, and long operational horizons needed to justify the upfront investment and development timelines associated with deep geothermal systems.

Strategic Implications for Cornwall's Agrifood Sector

On-site geothermal systems provide Cornwall's largest agrifood businesses with a pathway to deep decarbonisation while strengthening energy resilience and competitiveness. By reducing dependence on constrained grid infrastructure and imported fuels, this scenario supports Cornwall's ambitions to develop secure, locally generated energy systems. It also positions leading agrifood businesses as anchor investors in Cornwall's geothermal economy, creating opportunities for future clustering and wider heat and power sharing.

3.2. Deep Geothermal Shared Infrastructure

3.2.1. Cluster Models

This scenario is designed for agrifood businesses that require high-temperature heat for multiple processes, but not on a continuous, 24-hour basis. It aligns with Cornwall's strategic objectives to decarbonise industrial heat, improve energy efficiency in food processing, and enable wider access to geothermal resources without placing capital burden on individual businesses, allowing for more businesses to take up the technology.

Typical users include dairies and creameries, breweries and distilleries, food manufacturers and processors, animal feed producers, and commercial bakeries. These businesses rely on dependable daily heat supply, often at higher temperatures, but typically only during specific operating windows. Key applications include pasteurisation, brewing, drying, sterilisation, and cleaning-in-place processes.

Businesses gain access to high-temperature, low-carbon geothermal heat by either co-locating with other heat users or by off-taking surplus or “waste” heat from a deeper geothermal electric/heat installation at defined times of the day. This approach allows heat demand profiles to be balanced across multiple users, improving overall system utilisation and economics while avoiding the need for each business to invest directly in geothermal wells or generation infrastructure. It could be incorporated into wider district heating schemes, or use other waste heat sources such as data centres.

This model is particularly relevant to Cornwall, where agrifood processing activities are often clustered and where deep geothermal resources are already being developed.

Areas in Cornwall already exist with clustered energy demand, typically on industrial estates that are home to a variety of different businesses from different sectors. With a cluster model, heat and electricity can be co-owned by all businesses within the local area.

The following figures (Figure 9 to Figure 12) show areas in Cornwall which may make suitable cluster locations between existing business locations. Due to logistics, planning, and infrastructure cost, businesses sharing direct heat from geothermal would most likely need to be located within approximately two kilometres of each other. Heat demand even within agrifood industries varies depending on the scale and diversity of operations, meaning that total heat demand could not be quantified within the clusters. However, the volume of businesses with close spatial proximity in Bodmin, Callington, Penryn and Falmouth, Penzance and Newlyn, St Austell, Newquay airport, Launceston and St Ives prove a promising opportunity to share geothermal energy resources at a variety of different temperature grades.

Many clusters are also located within proximity of granites that extend to 5 km or deeper below sea level, providing access to high direct-use deep geothermal or CHP temperatures.

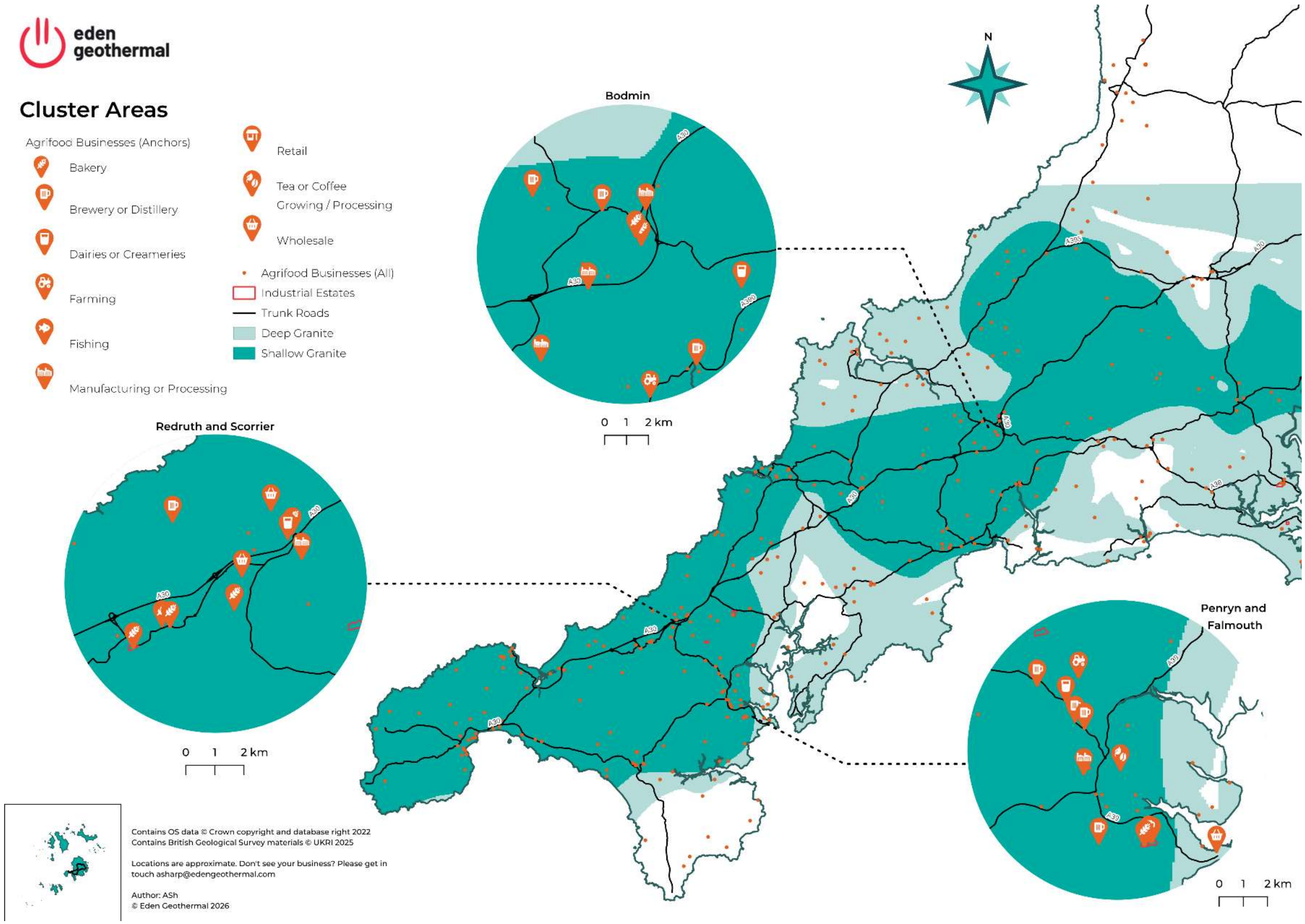

Figure 9: Cluster Areas Overview

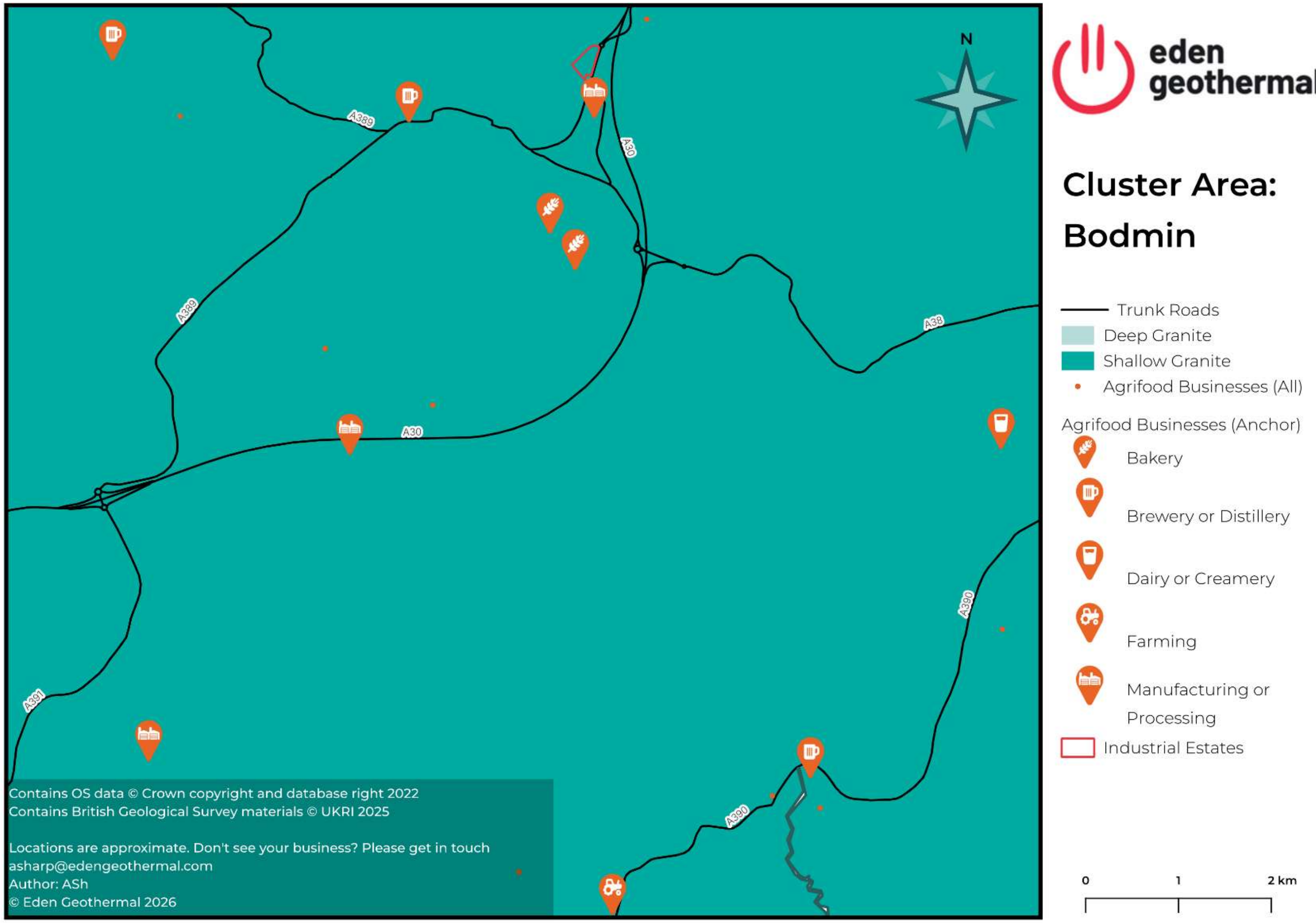

Figure 10: Cluster Area: Bodmin

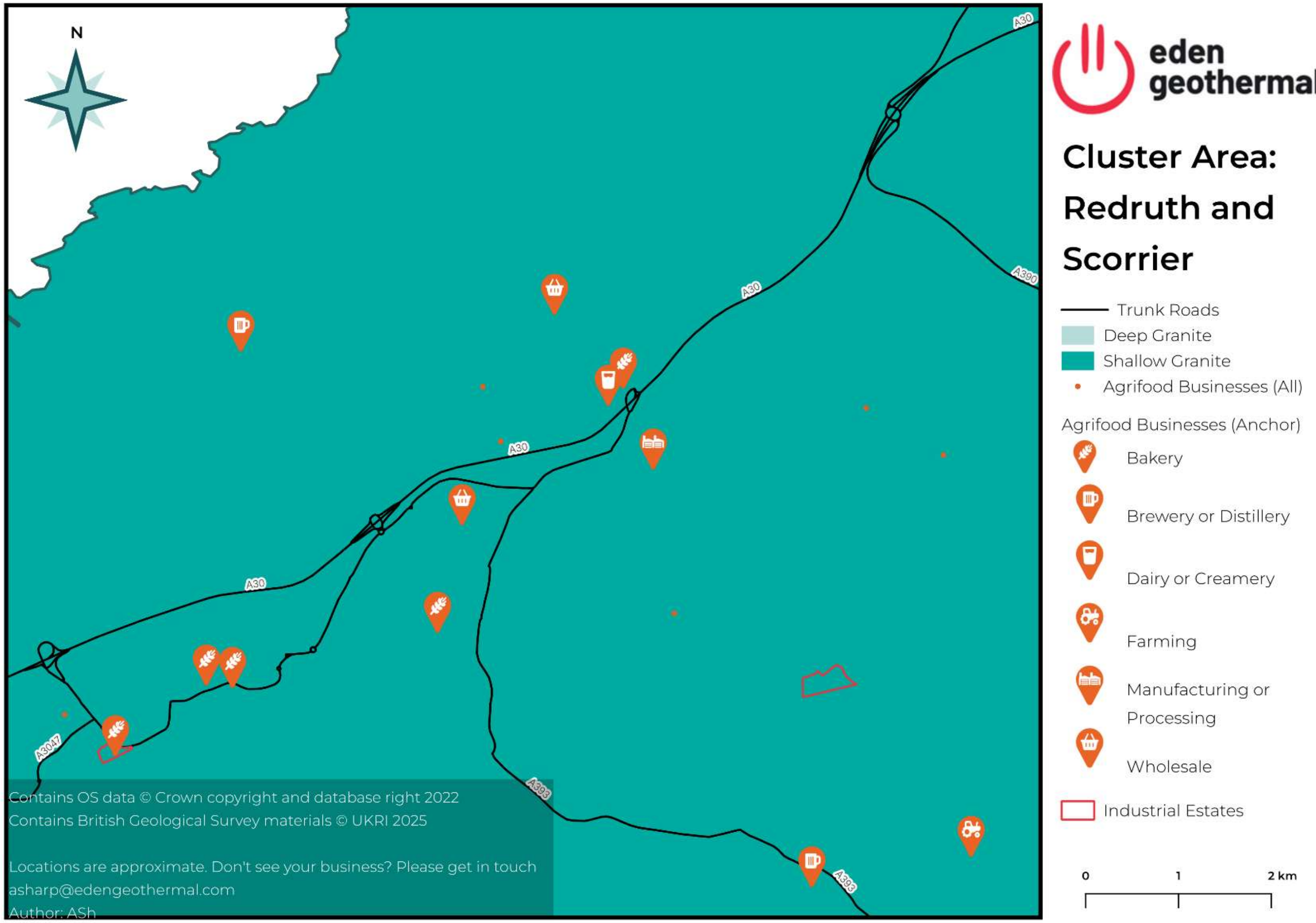

Figure 11: Cluster Area: Redruth and Scorrier

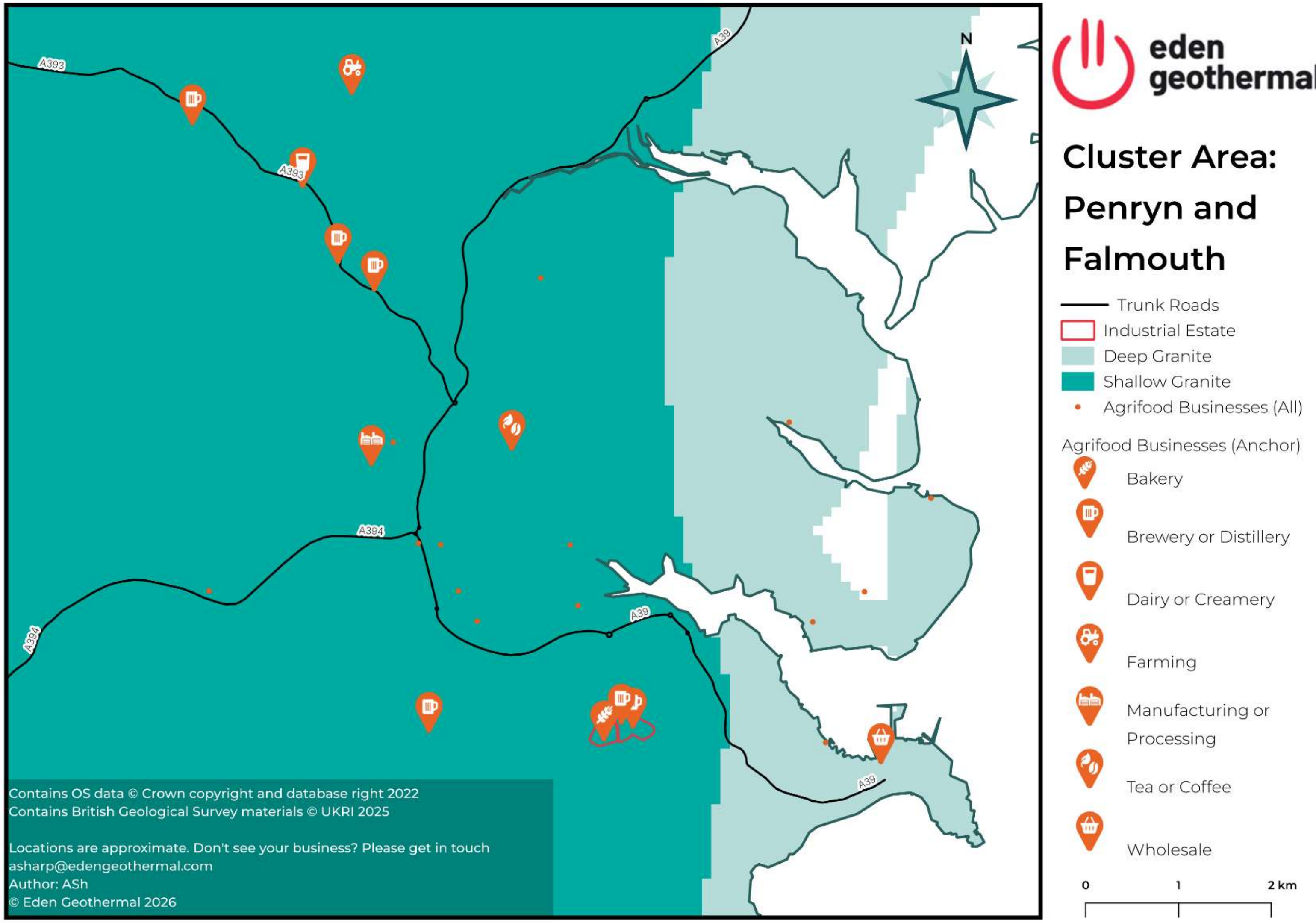

Figure 12: Cluster Area: Penryn and Falmouth

Brady Geothermal Power Plant and onion dehydration, Nevada USA

The integration of geothermal energy for both electricity generation and agricultural processing is a hallmark of Nevada's renewable energy landscape. A primary example is the Brady Hot Springs facility near Fernley, which features cascaded use of geothermal resources. The Brady Geothermal Power Plant, currently operated by Ormat Technologies, has been in operation since 1992. The site uses a double-flash system and a 5 MW binary unit to produce electricity from resources reaching temperatures of approximately 186°C. It features seven production wells at depths ranging from 400 metres to over 1.6 kilometres. The plant provides stable, base-load renewable power to the grid, but also serves as the primary heat source for nearby industrial operations via a dedicated pipeline.

Adjacent to the power plant, Olam Spices operates what is considered the world's only onion dehydration facility powered entirely by direct geothermal energy. Geothermal water enters the dehydration units at nearly 149°C. After heating the air for drying, the water exits at roughly 71°C. Approximately 20% of the used geothermal water is cooled further to 43°C and reused as wash water for the onions and processing equipment. The facility reduces the moisture content of raw onions from 83% to just 4% over a 5–6 hour cycle. It produces roughly 60 tonnes of dried product per day.

Using geothermal heat instead of natural gas saves an estimated 11,500 metric tonnes of CO_2 annually. The facility is insulated from fossil fuel price volatility, sch as that seen caused by the geopolitics of 2026. This stability provides a significant competitive advantage over traditional dehydrators.

The dehydration plant is a vital economic engine for the local community, historically employing around 80 full-time workers to manage year-round operations and maintenance. During the peak processing season, which typically runs from May to December, the workforce expands significantly to include approximately 150 seasonal employees to handle the high volume of incoming produce. These positions provide stable industrial jobs in a rural area, showcasing how renewable energy integration can support local economic growth and provide consistent livelihoods for over 200 individuals in the Fernley region.

Mokai and Miraka, New Zealand

The Mokai Geothermal Field is approximately 30 km northwest of Taupō, New Zealand. The region is a poster child for the circular economy through the direct-use of geothermal energy, where a single resource simultaneously powers electricity generation, industrial dairy processing, and large-scale horticulture. The integration is overseen by the Tuaropaki Trust, a Māori land trust that owns the majority of the geothermal resource and maintains significant shareholdings in the commercial ventures on-site. This ownership structure ensures that the development remains aligned with the trust's mission of sustainable intergenerational asset management and environmental guardianship.

A central component is Miraka, a Māori-owned dairy company that operates the world's first geothermal-powered milk powder plant. By using geothermal steam for the energy-intensive spray-drying process instead of traditional coal or gas, Miraka achieves a carbon footprint approximately 92 to 94 % lower than conventional plants. Close by is Gourmet Mokai, a large 12-hectare glasshouse operation using the the geothermal resource to maintain precise climate control year-round, allowing for the consistent production of premium export-quality tomatoes and capsicums regardless of the weather.

The site is internationally renowned for its sophisticated cascade energy model, which maximises the utility of every drop of geothermal fluid. The process begins with high-temperature fluid, reaching up to 325°C, which is first harnessed by the Mokai Power Station to generate electricity for the national grid. Once the high-grade heat has been extracted for power, the remaining thermal energy is directed to Miraka for milk dehydration. Subsequently, the residual waste heat from these industrial processes is repurposed to heat the Gourmet Mokai glasshouses. Finally, to ensure the long-term viability of the field and protect the local ecosystem, the cooled fluid is reinjected back into the deep geothermal aquifer.

The efficiency of the cascade model provides a superior energy-return profile compared to standard parks. In a fossil-fuelled industrial park, energy is lost at every stage of combustion and transmission. At Mokai, the fluid is used at three distinct temperature tiers—325°C for power, roughly 150°C for dairy processing, and lower-grade heat for horticulture—ensuring that the maximum possible exergy is extracted before the fluid is reinjected. This systemic efficiency means the total carbon footprint per unit of economic output is a fraction of that found in traditional industrial hubs, making it one of the most carbon-efficient industrial clusters in the world.

The socio-economic impact of this integrated model is profound, particularly for the local Mokai and Mangakino communities. The Gourmet Mokai venture provides over 50 jobs, many of which have been filled by individuals who were previously unemployed, fostering regional economic resilience. The site employs a closed-loop waste management system where organic byproducts from the milk plant and glasshouses are supplied to an onsite worm farm. This farm produces nutrient-rich vermicast used to grow native plants for riparian restoration projects on Trust land, further demonstrating the project's commitment to ecological health alongside industrial success.

The Mokai geothermal cascade model offers a contrast to traditional industrial parks that rely on separate, fossil-fuelled energy sources. In a standard industrial setting, electricity is typically drawn from a national grid with a mix of generation sources, while high-intensity thermal processes like milk dehydration and glasshouse heating rely on dedicated coal or natural gas boilers. By integrating these needs into a single stream, the Mokai site drastically reduces the cumulative carbon intensity of its outputs.

3.2.2. Anchor Load and Hub-and-Spoke Approaches

Technology link: Deep Geothermal Systems

This scenario is a variation of the cluster model. It assumes a large energy user or 'anchor user' is located near other agrifood businesses with demand for reliable electricity and heat. Typical anchor users could be a data centre, hospital, university, large food processor, major growers, food parks, and agricultural estates with multiple tenants. Surplus electricity and heat can be supplied to neighbouring SMEs via local heat networks or private wire arrangements, enabling smaller agrifood businesses, leisure centres or new housing developments to benefit from geothermal energy without the cost or complexity of developing their own systems, while the anchor user can improve the economic performance of the project through heat sales. This stable demand base improves project viability and investment confidence, supporting Cornwall's ambition to scale low-carbon, locally generated energy.

This clustered approach builds directly on Cornwall's existing geothermal developments. Projects such as the United Downs Deep Geothermal Power Project demonstrate the technical feasibility of producing both renewable electricity and heat at scale, while the Eden Project geothermal scheme shows how geothermal heat can be successfully integrated into complex, multi-user environments. These projects provide a proven foundation on which clustered agrifood geothermal systems can be developed.

Shared infrastructure, including geothermal wells, heat distribution networks, substations, and control systems, reduces costs and operational risks for all users. Centralised operation and maintenance particularly benefit SMEs, which often lack in-house energy expertise. The model also supports phased development, allowing systems to start with an anchor user and expand as additional agrifood demand emerges, aligning capital investment with growth across local food hubs.

This scenario is suited to Cornwall's geography, where agrifood activities are frequently clustered and located close to potential geothermal resources. A single geothermal system can support multiple agrifood uses simultaneously through a cascading heat model. High-temperature heat is prioritised for energy-intensive activities such as food processing, with remaining lower-temperature heat reused for applications including drying, storage, space heating, and greenhouse production before reinjection underground. This maximises energy efficiency and supports Cornwall's circular economy objectives.

Strategically, clustered geothermal developments enhance energy security by providing a stable baseload supply that is not exposed to fuel price volatility. They also deliver significant carbon reductions, supporting Cornwall's net-zero commitments while strengthening the sustainability and market positioning of Cornish agrifood products. At a regional level, this model reinforces agrifood clusters, attracts investment, and positions Cornwall as a leader in integrated geothermal energy and food systems.

Case Studies: Turkiye, Italy, and a community owned approach in Japan

The Tuzla Geothermal Field in the Ayvacık district of Çanakkale, Turkiye[xxvii], is a significant renewable energy site featuring a dedicated Geothermal Source Greenhouse Agriculture-Based Specialized Organized Industrial Zone (TDIOSB). This zone is designed to leverage local geothermal resources for high-efficiency agricultural and industrial production.

The zone was established to create a production base for agricultural products, specifically high-quality "Çanakkale tomatoes," using geothermal energy for greenhouse heating. The zone covers approximately 3,000 ha and is employs around 2,600 people. The zone has been developed through a collaboration between the Çanakkale Governorship, the Special Provincial Administration, the Chamber of Commerce and Industry, and the Ayvacık Municipality.

Key Power Plant Operations

Tuzla Geothermal Power Plant (GPP): Operated by Tuzla Geothermal Energy Cothis facility has an installed capacity of 7.5 MWe, using a binary cycle system ORC where geothermal fluid (reservoir temperature ~174°C) transfers heat to an organic working fluid to drive turbines. It produces an average of 56,070 MWh annually, enough to power over 13,900 Turkish households. To maintain reservoir pressure and protect the environment, the spent geothermal fluids are re-injected back into the ground.

The geology has challenges: the geothermal brine is highly saline (dominated by NaCl), leading to significant silica-based scaling in downhole equipment and surface pipelines, which can reduce plant efficiency. This is unlikely in Cornwall, where the chemistry of brines, as reported at United Downs and by Cornish Lithium, is more benign.

Tuscany, Italy[xxviii]

The integrated geothermal model in Tuscany, Italy, centred around the historic Larderello-Travale and Mount Amiata areas, represents one of the most advanced examples of a circular energy economy in Europe. Italy was a global pioneer in this field, producing the world's first geothermal electricity in 1904 and building the first operational power plant in 1913 at Larderello. Today, the region hosts 34 power plants operated by Enel Green Power, which meet approximately 34% of Tuscany's total electricity needs while providing a stable heat source for a diverse range of agricultural and industrial applications.

A key feature of the Tuscan model is the Renewable Energy Food Community, which brings together local entrepreneurs who prioritize environmental sustainability in the agri-food sector. This community includes innovative businesses that utilize geothermal steam and waste heat to bypass fossil fuel reliance:

1. **Vapori di Birra**: Located in Sasso Pisano, this is the first craft brewery in Italy to use geothermal steam as its primary energy source for the entire brewing process.

2. **Parvus Flos**: An organic agricultural cooperative in Radicondoli that operates geothermal greenhouses to produce basil for pesto, as well as various aromatic and ornamental plants.

3. **Spirulina Cultivation**: A pilot facility in Chiusdino uses waste heat from the nearby power plant to maintain optimal temperatures for algae growth. This site also captures purified CO_2 from the plant's emissions to stabilize the growth fluid's pH and provide carbon for the microalgae.

The region also uses extensive district heating networks that provide sustainable warmth to over 10,000 residential users across 10 municipalities. In the town of Chiusdino, the integration of these systems has allowed the community to become completely carbon-free by eliminating all CO_2 and particulate emissions from traditional fossil-fuel boilers. This "cascaded" use of energy—from high-temperature power generation down to low-temperature residential heating and greenhouse climate control—serves as a primary European case study for combining industrial innovation with local development.

The "Waita Model": Community-Owned Geothermal

The Waita Onsen Hot Spring Village in Oguni Town, Kumamoto, serves as a global model for community-led geothermal development. Its "Waita Model" demonstrates how small-scale renewable energy can coexist with and even revitalize traditional hot spring (onsen) tourism while addressing local depopulation and economic decline.

Historically, geothermal power in Japan faced opposition from onsen owners who feared it would deplete hot spring water or lower its temperature. Waita Onsen overcame this through a unique organizational structure:

- **Waita-kai LLC**: Established in 2011, this company is owned by all 30 local households. This ensures that every resident is a stakeholder in energy decisions.
- **Profit Sharing**: Revenues from electricity sales are re-invested into the community to improve public spaces, such as community centres and tourist attractions.
- **Strategic Partnerships**: The community partners with specialized developers like Furusato Netsuden and Baseload Power Japan to provide technical expertise and global investment.

Key Technical Operations

The village uses OTC binary cycle power generation, which uses a secondary fluid with a lower boiling point than water. This allows electricity to be generated using existing hot spring steam without affecting the underground reservoir used for bathing.

- Waita No. 1 Power Plant: Operational since 2015 with a 2 MW capacity.
- Waita No. 2 Power Plant: Currently under construction, expected to add 5 MW and go online in early 2026.
- Sansui Geothermal Power Plant: A smaller facility generating roughly 700 MWh annually—enough for 200 households—by utilizing steam from a single existing ryokan (inn) well.

Multi-Use Geothermal Benefits (Cascade Use)

Beyond electricity, the village maximizes its "waste" heat through various daily and commercial applications:

Tourism & Gastronomy: Visitors can use *jigoku-mushi* (hell steaming) areas to cook vegetables, eggs, and buns in natural steam.

Industrial Use: Geothermal heat is used for drying local Oguni cedar, enhancing its quality and durability.

Residential and Agriculture: Steam and hot water are distributed for home heating, laundry drying, and greenhouse heating for specialized agricultural products.

The project has directly addressed rural depopulation—where the elderly make up 50% of the population—by creating new employment opportunities in plant operations and associated local businesses. It also provides a secondary income stream for residents through association salaries and profit dividends.

4. CIoS Deep Geothermal Resource Assessment

4.1. Geological Context

Cornwall sits on one of the UK's best deep geothermal resources. The region's geological foundation was shaped during a major mountain-building event approximately 290 million years ago, when ancient continents collided to create what would become the landscape we see today.

It is underpinned by a 250 km long body of granite, known as the Cornubian Batholith, extending from the Isles of Scilly through Cornwall to Dartmoor in Devon. This granite is enriched with naturally heat-producing elements – uranium, thorium and potassium – which continuously generate heat through radioactive decay over geological timescales. This natural heat production gives a heat gradient significantly above the UK average, (35-40°C vs 26°C per km of depth) making the higher temperatures closer to the surface and therefore cheaper and easier to access.

The region has significant fault structures along the peninsula, such as the Great Cross Course targeted during phase 1 of the Eden Geothermal project and the Porthtowan Fault Zone, targeted during the United Downs Deep Geothermal Power project. Where natural faults and fractures are well understood and accessible, they can be used as pathways for circulating water to extract the heat; these systems are known as Reservoir Dependent systems. Where fault structures are uncertain or create geological complexity, businesses may instead opt for Reservoir Independent systems, or Enhanced Geothermal Systems (EGS), which create engineered fracture networks in the granite; both are possible and applicable in Cornwall and each have their own advantages.

4.2. Resource Depth, Temperature and Accessibility

Cornwall's geothermal resource becomes hotter with depth, typically increasing by around 35-40°C for every kilometre drilled. Given an average surface temperature of 10°C, this means that by drilling to depths of 2–3 km, temperatures of ~80–130°C can be accessed, ideal for many agrifood heating needs such as pasteurisation, cleaning, drying, and greenhouse heating. At greater depths of 5 km+, temperatures are around 180–210°C, making electricity generation and high-temperature industrial processes viable. Currently, drilling beyond 6.5 km and 240°C is technically possible, but not yet economically viable.

Figure 13 shows the extent of the Cornubian Batholith. The spine of Cornwall is made up of granite, and in some places is exposed at the surface like at Bodmin Moor, St Austell, and the Isles of Scilly. Elsewhere the granite is buried at depth, often more than 3 km from the surface, but projects here can still access the elevated temperature gradient by drilling down to the resource. In some cases, deeply buried granites may be insulated by the covering country rock and be even hotter than that in exposed areas.

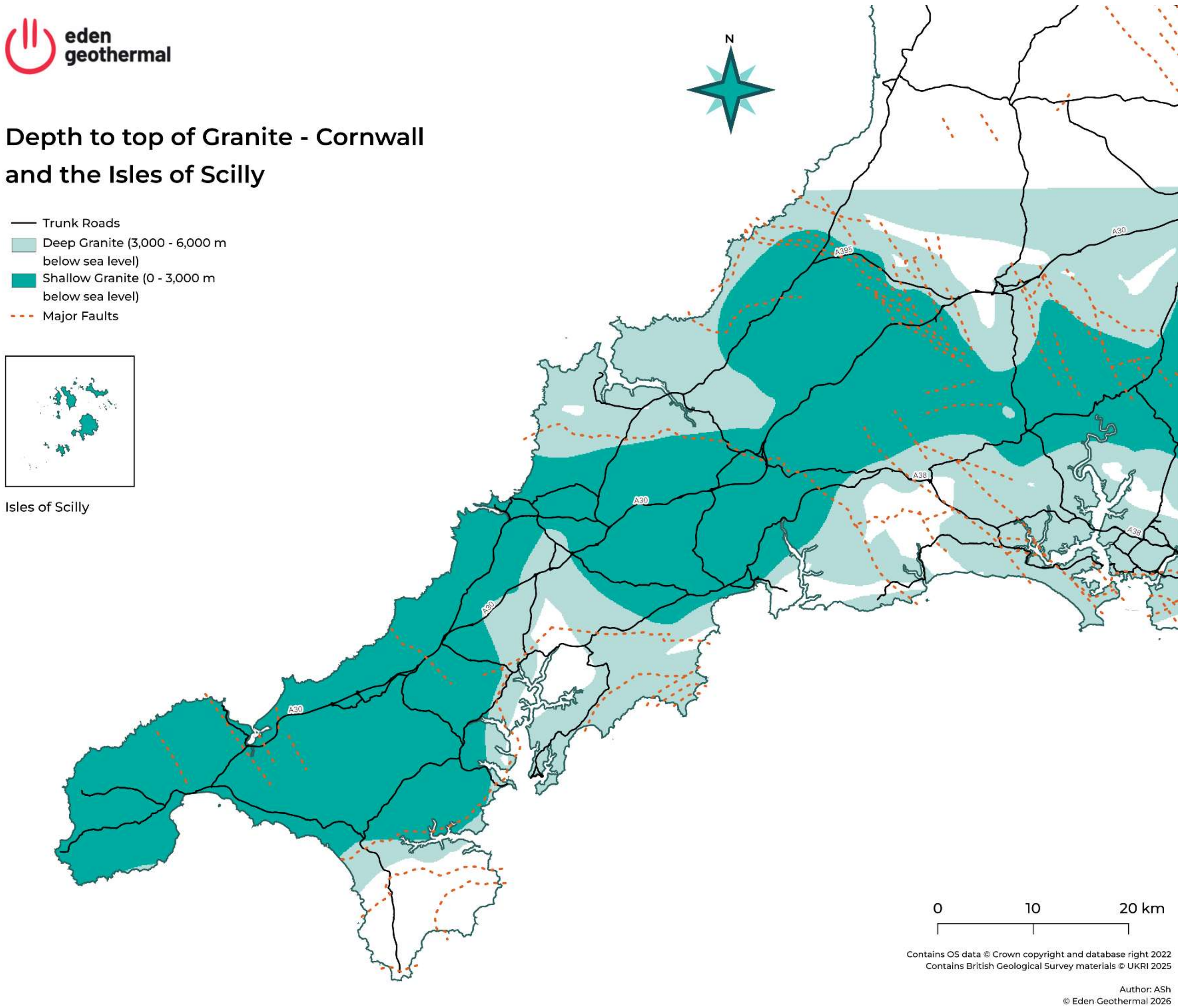

Figure 13: Depth to Granite - Cornwall and the Isles of Scilly

4.3. Resource Uncertainty and Risk Considerations

While Cornwall's geothermal resource is better understood than other regions in the UK, uncertainty remains, particularly around subsurface conditions at specific sites. Geological variability, the exact location and connectivity of faults, and the behaviour of rock formations under different temperatures and pressures can all influence project performance.

This means that choosing the right technological approach is important. Reservoir-dependent systems, which rely on naturally occurring fractures and faults, can offer high performance but may carry greater geological risk if those features are not well characterised. Reservoir-independent or EGS systems, on the other hand, engineer their own reservoirs and therefore reduce reliance on uncertain natural features, offering a de-risked pathway particularly suited to commercial and industrial users.

Early-stage feasibility studies, including desktop geological assessment and, where appropriate, exploratory drilling and targeted geophysical surveys such as Full Tensor Gravity Gradiometry (FTG) (among others), can significantly reduce uncertainty and improve confidence in project viability. For businesses considering geothermal, understanding the local resource and selecting the appropriate technology based on site-specific conditions is a critical part of building a robust and investable project. For more detail on risk considerations across the development cycle see Section 8.

5. Current and Emerging Geothermal Activity in CIoS

5.1. Existing Projects and Operational Experience

Existing geothermal projects in Cornwall show that geothermal is a proven, working option to deliver decarbonised heat and electricity (Figure 14).

They demonstrate that the local resource is usable, that planning and regulation can be managed, and that geothermal energy can be delivered reliably over the long term.

Example projects in Cornwall:

- Eden Project: (Eden Geothermal Ltd)
    - In operation since 2023
    - One well drilled to 5.2 km
    - Co-axial system
    - Providing heat for the Eden Project biomes, buildings and greenhouses
    - ~1 MW Heat
    - 72°C delivery temperature
    - 1.4 km heat main
- United Downs (Geothermal Engineering Ltd)
    - Operational 26 February 2026
    - Two wells, production well 5.2 km, injection well 2.3 km
    - Primarily electricity production
    - Lithium extraction
    - 180°C at base of the production well
    - 3 MW Electricity (predicted)
- Heat the Streets – Stithians (Kensa)
    - In operation
    - Networked GSHPs
    - 98 homes fitted with heat pumps, 22 for future connections
    - 102 boreholes drilled
    - Combined heating and cooling system
- Cornish Lithium – Chacewater (Cross Lanes Project)
    - Wells being drilled in summer 2026
    - Commercial lithium production facility
    - Heat as a by-product
    - 2 x 2km deep boreholes
    - Well temperature of 70°C

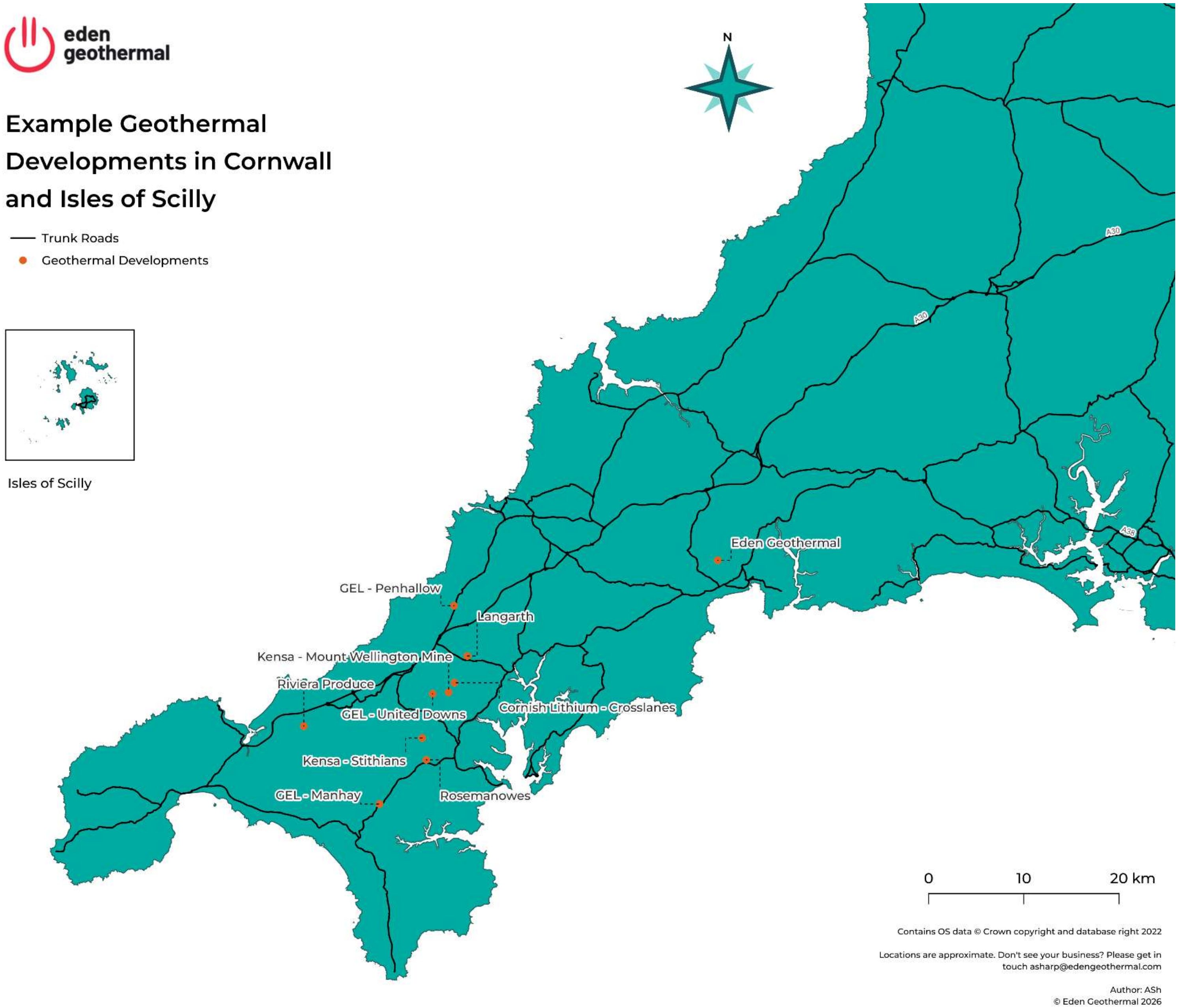

Figure 14: Example Geothermal Developments in Cornwall and the Isles of Scilly

6. Stakeholder Consultation

6.1. Overview of Consultation Process and Participants

Cornwall's agrifood sector is both economically significant and operationally complex, with energy playing a critical role in production, processing, storage, and distribution. As the sector faces rising energy costs, infrastructure constraints, and increasing pressure to decarbonise, there is growing interest in alternative energy solutions capable of delivering reliable, low-carbon supply. Geothermal energy represents one such opportunity; however, its suitability and potential impact cannot be assessed solely through technical or theoretical analysis.

For this reason, a programme of stakeholder and business engagement was undertaken, combining one-to-one consultations, an online survey, and an in-person workshop. This blended approach was designed to engage businesses of different sizes and maturity, operating across a range of locations and sub-sectors within the agrifood industry, including growers, processors, manufacturers, and retailers.

The consultation engaged 14 interview participants, comprising 7 agrifood businesses, 1 agrifood hub or infrastructure operator, 3 public sector officers, 2 sector and economic development organisations, and 1 technical specialist, supplemented by a workshop attended by a further 20 stakeholders, ensuring that insights reflected both operational energy demand realities and the strategic, regulatory, and commercial conditions shaping geothermal deployment in Cornwall.

The primary purpose of this engagement was to ensure that any assessment of geothermal energy is firmly grounded in the real-world operational, commercial, and strategic context of Cornwall's agrifood sector. Direct interaction with businesses and stakeholders enabled the study to move beyond generic assumptions and to develop a clearer understanding of how energy is actually used, where costs and constraints are most acute, and how investment decisions are shaped in practice. The workshop in particular enabled participants to contextualize their own energy challenges against live examples of geothermal deployment and to explore applicability across different scales and technologies.

Consultations were also critical in identifying non-technical barriers that are unlikely to emerge through desk-based analysis alone. These include planning and regulatory considerations, land and mineral rights, workforce and skills requirements, risk perception, insurance and finance constraints, and the level of confidence businesses have in emerging or unfamiliar technologies. The workshop discussions reinforced the importance of these issues, with participants raising practical questions around system reliability, cost competitiveness, development timelines, and enabling policy support.

In addition, the engagement process was structured to explore the wider strategic value of geothermal energy beyond individual sites. Discussions extended to the potential for shared infrastructure, sector collaboration, hub-based models, year-round production, local food security, and the creation of skilled employment in rural areas. By bringing together businesses, developers, skills providers, and public-sector stakeholders in both individual consultations and a collective workshop setting, the process provided insight into how geothermal energy could align with broader economic development, skills, and climate objectives in Cornwall.

Ultimately, the consultation programme, including the in-person workshop, provides the evidential foundation for this report. It ensures that conclusions and recommendations are informed by stakeholder priorities, highlights where further feasibility work is most likely to be viable, and helps identify where targeted intervention, whether technical, financial, or policy-led, could have the greatest impact in enabling geothermal uptake within Cornwall's agrifood sector.

6.2. Methodology Overview – Desk-based Analysis

Initial engagement was undertaken with representatives involved in the development of the regional Agrifood Strategy, providing an early strategic perspective on sector priorities, challenges, and opportunities. This initial phase helped to shape the focus of subsequent engagement and ensured alignment with wider agrifood policy objectives. Following this, consultation was expanded to a broader network of agrifood businesses and other strategic stakeholders across Cornwall.

Despite some challenges, as outlined in the Scope and Limitations section, a comprehensive programme of engagement was successfully undertaken through one-to-one consultations, an online survey and an in-person workshop.

Participants represented a broad cross-section of Cornwall's food, energy, skills, and development ecosystem (full list can be found in Appendix A), including agrifood producers and processors (dairy, brewing, soft drinks, and non-alcoholic beverages), sector bodies and food networks, energy and geothermal developers (including geothermal and lithium-linked organisations), land and property developers, skills and education providers, and place-based institutions and visitor attractions (such as Eden Project), providing a balanced mix of operational, technical, strategic, and enabling perspectives relevant to agrifood decarbonisation and geothermal deployment.

6.3. Heat, Cooling, and Power Demand Profiles

A consistent theme across business consultations was the central importance of thermal energy and cooling, rather than electricity alone. While electricity underpins many processes such as refrigeration, compressed air, packaging, and automation, it is heat and temperature control that most directly define operational viability. Businesses rely on heat for processes including pasteurisation, curing, cleaning, sterilisation, and hot water supply, often at moderate temperatures ranging from 50°C to 90°C. At the same time, stringent food safety requirements necessitate extensive chilling, blast freezing, and controlled ambient storage, frequently operating continuously and with pronounced seasonal peaks.

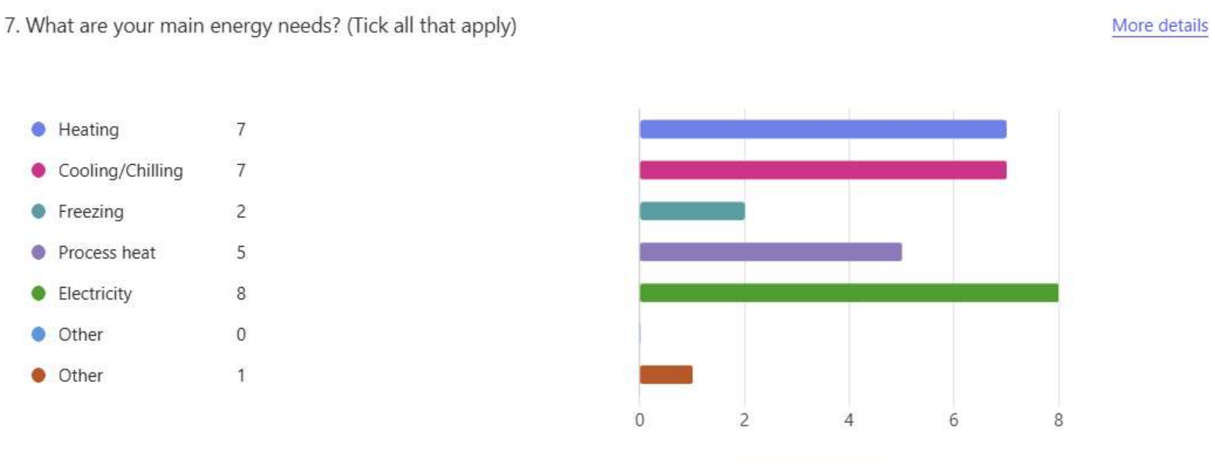

Figure 15: Businesses main energy needs. Survey Question 7.

The survey results in Figure 15 show a snapshot of the sector's energy demand. The result is dominated by electricity, heating, and cooling/chilling, with additional but smaller requirements for process heat and freezing, reflecting the energy-intensive nature of food production, processing, and storage across the sector.

Approximately 60% of survey respondents identified energy cost and price volatility as their primary energy challenge, underlining the financial pressure associated with this energy-intensive operating profile. Around 40% of respondents also reported constraints related to electricity grid capacity, highlighting that energy availability, as well as cost, is increasingly shaping operational decisions.

Key Energy Use Challenges in the Agrifood Sector:

- High energy demand is unavoidable, driven by food safety, hygiene, refrigeration, and processing requirements.
- Many businesses rely on continuous heating and cooling, resulting in limited flexibility to reduce consumption without impacting production.
- Seasonal variation is significant, with electricity demand peaking in summer due to increased chilling and refrigeration loads.
- Several businesses are operating close to the limits of their electricity grid capacity, restricting expansion and electrification options.
- Existing renewable technologies, such as solar PV, provide partial and seasonal coverage, offering limited support during winter months.
- Some businesses remain dependent on fossil fuels for medium- to high-temperature heat where electrification is challenging.
- Energy costs are an increasing and unpredictable financial pressure, particularly for energy-intensive processors.
- Integrating new energy systems into live production environments is seen as complex and potentially disruptive.
- Multi-tenant or shared sites face challenges in coordinating energy investment and cost allocation across different users.
- There is a limited understanding of geothermal heat and cooling solutions, reducing confidence in adoption.

Despite growing engagement with decarbonisation, a proportion of businesses remain reliant on fossil fuels for medium- to higher-temperature heat, where electrification is perceived as technically or commercially challenging. Survey results indicate that approximately 55% of respondents view high upfront capital costs as a significant barrier to alternative heat technologies, while around 45% are concerned about long payback periods.

6.3.1. Seasonal Demand, Cooling Peaks, Grid Pressure, and Continuous Operation

Energy demand within the sector is both intensive and highly variable, with summer periods typically associated with elevated electricity consumption due to increased cooling loads, while heat demand remains relatively constant throughout the year. Several Cornish businesses have sought to address this through on-site renewables, particularly solar PV, and in some cases through GSHPs. These investments demonstrate a willingness to engage with decarbonisation; however, they also reveal limitations. Solar generation is inherently seasonal, contributing little during winter months, while electrically driven heat systems can exacerbate pressure on already constrained grid connections, and can't compete with natural gas on price.

Approximately 65% of respondents indicated that their processes could operate fully or partially on a steady, continuous heat supply, suggesting strong technical alignment with geothermal energy.

For larger and expanding operations, electricity grid capacity has emerged as a critical constraint, directly limiting growth, diversification, and investment. In this context, geothermal energy is increasingly viewed not simply as a decarbonisation measure, but as a potential means of unlocking operational headroom and long-term resilience.

6.4. Energy Cost, Resilience and Security Concerns

6.4.1. Business Priorities and Decision Drivers

Across the consultations, businesses consistently emphasised that decisions relating to energy investment are shaped by a small number of priorities. Cost control was the dominant driver, with energy expenditure viewed as a critical and increasingly volatile input affecting margins, competitiveness, and long-term viability. Businesses prioritised solutions that offer clear and predictable operating costs over their lifetime, with a strong preference for technologies that can demonstrate cost competitiveness against existing fuels within realistic investment timeframes.

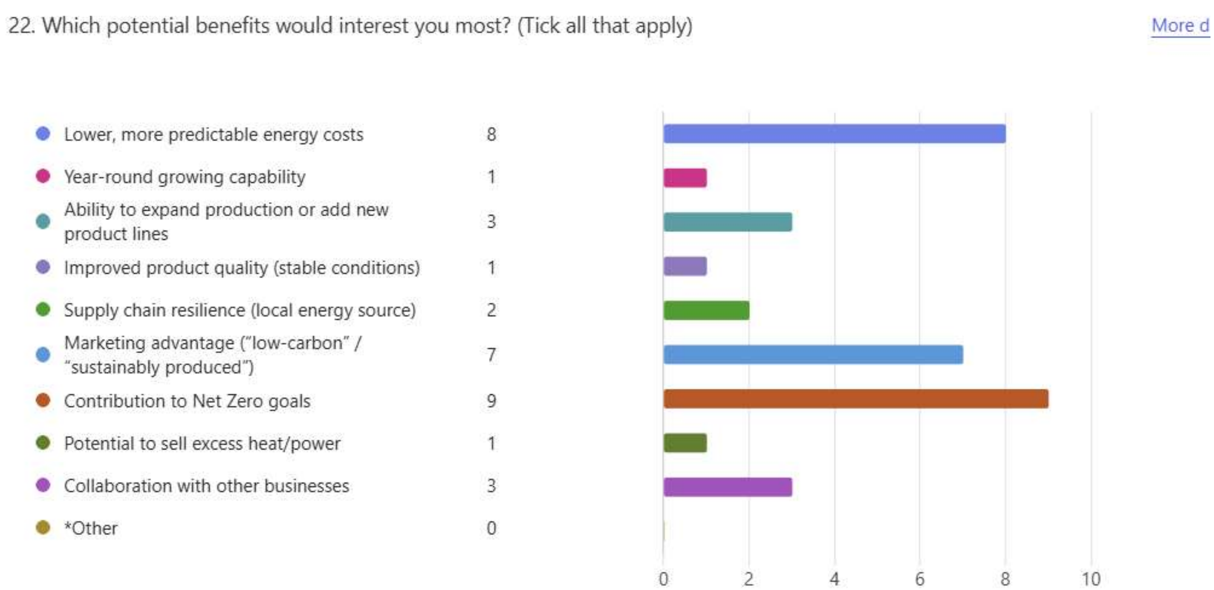

Figure 16: Businesses opinions on what they feel the potential benefits geothermal energy could give them. Survey Question 22.

Reliability and continuity of supply were equally important considerations. Given the sensitivity of food production, processing, and storage to energy interruptions, businesses have very low tolerance for outages or performance variability. Technologies perceived as unproven or complex were therefore approached with caution unless accompanied by robust backup arrangements, service guarantees, and clear accountability for system performance.

Operational fit also emerged as a key decision driver. Businesses favoured solutions that integrate with existing processes, require minimal changes to production schedules, and do not place additional management or technical burdens on already stretched teams. This reinforced interest in third-party ownership and service-based models, where energy infrastructure is delivered and operated externally and energy is purchased as a service rather than as a capital asset.

Finally, strategic considerations such as decarbonisation commitments, brand reputation, and alignment with customer and policy expectations played an important but secondary role. While most businesses recognised the importance of reducing carbon emissions, environmental benefits alone were rarely sufficient to justify investment without a strong commercial case. Overall, the consultations indicate that uptake of geothermal and other low-carbon energy solutions will depend on their ability to align with these core business priorities: affordability, reliability, simplicity of delivery, and long-term risk reduction.

Table 3: Common energy needs and opportunities identified during stakeholder engagement.

Energy Needs & Constraints	Operational Opportunities	Sustainability & Market Value	Interest in Geothermal Potential
High electricity demand for chilling, freezing, processing, and heating. Summer peaks driven by increased cold storage requirements. Grid capacity limitations restricting growth at several sites. Existing renewables (mostly solar) provide limited winter coverage.	Geothermal heat could support year-round production and processing. Cooling potential valuable for businesses with extensive refrigeration loads. Shared geothermal hubs appealing to multi-tenant or clustered sites. Reliable base-load energy critical for business resilience.	Low-carbon geothermal energy fits with sustainability goals. Potential to strengthen regional branding and market positioning. Supports customer expectations for sustainable food production.	Businesses open to exploring geothermal for heat, cooling, and potentially electricity. Potential to support diversification into higher-value or shoulder-season crops. Geothermal seen as a long-term investment aligned with growth ambitions.

6.4.2. Perceived Risks and Barriers

Perceptions of geothermal energy varied across consultees, reflecting differing levels of prior exposure and familiarity. Among businesses, geothermal is most commonly understood as a source of heat, with relatively limited awareness of its potential role in providing cooling, electricity or supporting integrated energy systems. Where geothermal had been previously encountered- through nearby projects or earlier consultations- it was generally regarded positively, particularly for its reliability and independence from weather conditions but a lack of technical understanding was evident.

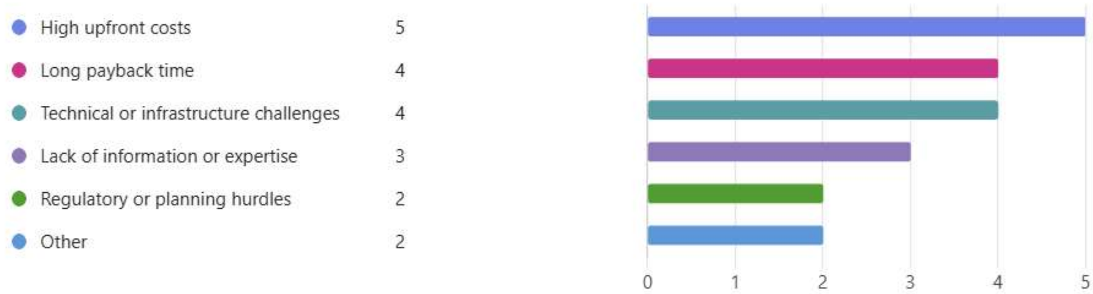

Figure 17: Barriers or concerns raised by businesses on the uptake of geothermal energy. Survey Question 24

Despite interest in geothermal, substantive challenges were identified. Foremost among these is commercial uncertainty, particularly around upfront capital costs, drilling risk, and long payback periods. Agrifood businesses often operate on tight margins and are cautious about committing to investments that could disrupt operations or divert capital from core activities. Without site-specific feasibility studies and clear financial models, geothermal is perceived as difficult to assess relative to more familiar technologies.

Planning and regulatory complexity also represents a barrier. Businesses expressed concern about navigating planning processes, particularly where geothermal projects intersect with issues such as land use, mineral rights, landscape and heritage designations, water management, and seismic risk. Uncertainty around whether geothermal developments are treated as renewable energy or mining activities adds an additional layer of complexity, increasing perceived risk and potential delays.

Knowledge gaps further compound these challenges. Limited UK deployment of geothermal in the agrifood sector means that businesses, financiers, and insurers lack reference points. This is particularly relevant in relation to insurance and risk transfer, where uncertainty around subsurface performance, long-term output, and liability can deter investment. Stakeholders with experience in other infrastructure sectors highlighted that without clear risk-sharing and governance mechanisms, geothermal projects may struggle to progress beyond early-stage interest.

Across the consultations and workshop discussions, businesses consistently highlighted funding and delivery barriers as critical factors shaping their appetite for geothermal and other low-carbon energy investments. While there was strong interest in the potential of geothermal to reduce long-term energy costs and improve resilience, most businesses indicated that high upfront capital costs represent a significant constraint, particularly for small and medium-sized enterprises with limited access to patient capital. Even where long-term savings were recognised, businesses expressed caution about committing to technologies with payback periods extending beyond typical investment horizons, especially in a sector characterised by tight margins and exposure to market volatility.

Participants also raised concerns about risk allocation and uncertainty, including subsurface risk, technology performance, and long development timescales. For many businesses, these risks were seen as difficult to absorb without some form of public-sector support, underwriting, or de-risking mechanism. Linked to this were challenges around insurance and finance, with uncertainty over how geothermal assets would be valued and insured, and whether lenders would be comfortable with unfamiliar technologies.

Table 4: Common risks and barriers identified by stakeholders.

Financial & Commercial Barriers	Technical Barriers	Planning & Infrastructure Barriers	Operational & Strategic Barriers
Uncertainty around capital cost of drilling, infrastructure, and connection.	Limited understanding of geothermal technology, especially cooling applications.	Perceived complexity of planning processes.	Some businesses are site-dependent, making relocating to geothermal hubs difficult.
Lack of clear commercial models, especially for shared/hub-based systems.	Concerns about reliability and compatibility with existing systems (heat pumps, refrigeration, heat mains).	Lack of clarity about whether projects are considered mining or renewable energy developments.	Fear of disruption during installation or integration with ongoing production.
Concerns about long project timelines before realising energy savings.	Uncertainty about geothermal resource availability in specific locations.	Concerns about the need for landowner agreements and multi-party coordination.	Seasonal operations question whether geothermal heat will be fully used year-round.
Difficulty assessing return on investment without site-specific feasibility studies.	Some operations use widely distributed sites, making heat distribution challenging.	Worries about grid constraints if electricity generation (not just heat) is involved.	A need for more case studies and local demonstrations to build confidence.
Uncertainty about future funding availability			

6.5. Attitudes Towards Electrification, Heat Networks and Geothermal

Across the consultations, businesses expressed a pragmatic and largely technology-agnostic approach to decarbonisation, with decisions driven primarily by cost, reliability, and operational fit rather than a preference for any single solution. Electrification was widely recognised as an important part of the transition, particularly for processes already dependent on electricity such as refrigeration, chilling, and pumping. However, participants highlighted significant concerns around grid capacity, connection costs, and exposure to volatile electricity prices, which in some cases were already constraining growth or forcing operational compromises.

Heat networks were generally viewed positively where they could offer reliable, competitively priced heat with minimal operational burden for end users. Businesses showed greater interest in shared or hub-based heat networks than in bespoke, single-site systems, particularly where these could aggregate demand, reduce individual capital exposure, and be managed by a third party. The presence of anchor loads and long-term heat supply agreements were seen as critical to making such models viable and bankable.

Geothermal energy was regarded as a potentially attractive option, particularly for heat-intensive operations with steady, year-round demand. Participants recognised its advantages in terms of baseload capability, price stability, and alignment with decarbonisation objectives.

Overall, businesses indicated that electrification, heat networks, and geothermal should be seen as complementary rather than competing approaches. There was strong support for flexible, hybrid solutions that combine electrification with low-carbon heat sources, particularly where these can be delivered through shared infrastructure, supported by clear policy frameworks, and underpinned by financial mechanisms that reduce risk and improve affordability for end users.

6.6. Appetite for Shared Infrastructure and Cluster Models

The consultations indicated a generally positive appetite for shared infrastructure and cluster-based models, particularly where these approaches could reduce individual capital exposure and simplify delivery for businesses. Many participants recognised that, on a standalone basis, geothermal and heat network solutions may be difficult to justify for individual sites, especially for small and medium-sized enterprises. Clustering demand across multiple users was therefore seen as a practical way to achieve sufficient scale, improve cost efficiency, and make low-carbon heat solutions more investable.

Businesses expressed interest in hub or cluster models where energy infrastructure, such as geothermal wells, heat networks, or centralised plant, is owned and operated by a third party rather than individual end users. This model was viewed as attractive where it limits operational responsibility, transfers technical and performance risk away from core food production activities, and provides predictable energy costs through long-term supply agreements. Co-location with existing or planned food hubs, industrial estates, or controlled-environment agriculture was seen as particularly promising, especially where a mix of heat and cooling demands could be balanced across users.

However, participants also emphasised that appetite for shared infrastructure is highly dependent on governance, transparency, and trust. Clear commercial structures, equitable cost allocation, and long-term certainty were identified as prerequisites for participation. Businesses also highlighted the importance of public-sector leadership in convening clusters, supporting early-stage development, and addressing planning, land, and coordination challenges. Overall, shared infrastructure and cluster models were seen as a potentially powerful enabler of geothermal deployment, provided that they are well-structured, professionally managed, and aligned with the operational realities of the agrifood sector.

6.7. Technology Suitability Against Consultation Findings

The consultation findings provide a clear framework for assessing the suitability of different low-carbon energy technologies against the operational realities of Cornwall's agrifood sector. Businesses consistently emphasised the need for solutions that deliver reliable, continuous energy, integrate with existing processes, and offer predictable long-term costs. These requirements shape which technologies are likely to be viable at scale.

Electrification is already central to agrifood operations and will continue to play an essential role, particularly for refrigeration, freezing, pumping, and automation. However, consultations highlighted that electrification alone is unlikely to meet the sector's full decarbonisation needs. Grid capacity constraints, rising electricity prices, and limited flexibility in energy-intensive processes restrict the scope for further electrification, particularly for heat. For larger or expanding businesses, reliance on electricity was seen as a potential risk rather than a long-term solution.

Heat pump technologies, including GSHPs, were generally viewed as suitable for low-temperature heat applications and for sites with sufficient land or ground conditions. They were seen as a proven and comparatively familiar option, particularly when combined with thermal storage. However, their dependence on electricity means that, in grid-constrained locations, they may exacerbate existing capacity issues unless paired with alternative heat sources or networked solutions.

Deep geothermal energy was identified as particularly well aligned with the sector's need for steady, baseload heat. Many agrifood processes operate year-round and require temperatures typically between 50°C and 90°C, which fall within the effective range of geothermal systems when integrated with heat networks or supplementary heat pumps. Consultations indicated that the ability for geothermal to provide long-term price stability and reduce exposure to electricity markets was a key advantage, especially for energy-intensive processors. However, geothermal was also recognised as capital-intensive and complex, with long development timescales that make it challenging for individual businesses to pursue independently.

Mine Water Geothermal and other shallow geothermal approaches were viewed as potentially attractive where local conditions allow, particularly in areas with existing mine infrastructure. These technologies were seen as offering a lower-risk, more modular pathway to geothermal heat, though with more site-specific limitations on scale and temperature.

Across all technologies, the consultations highlighted that no single solution is likely to be sufficient in isolation. Hybrid systems that combine electrification, solar PV, heat pumps, geothermal heat, and thermal storage were seen as the most realistic pathway to meeting diverse energy needs while managing cost and risk. Importantly, delivery model was seen as just as critical as technology choice. Technologies that can be deployed through shared infrastructure, cluster models, or third-party ownership arrangements were consistently viewed as more suitable than standalone, business-owned systems.

6.8. Strategic, Policy, and Enabling Stakeholder Perspectives on Geothermal Deployment

In addition to engagement with agrifood businesses, the study included consultations with a range of strategic, policy, planning, and environmental stakeholders. These stakeholders were selected to provide insight into the wider systems within which geothermal projects would need to operate, including land ownership, planning policy, economic development, skills, funding, and risk management. Their perspectives are critical in understanding not only the technical feasibility of geothermal energy, but also the institutional conditions required to enable deployment at scale.

The stakeholders consulted included representatives involved in agrifood economic strategy, management of public farmland assets, economic and skills policy, planning and renewable energy regulation, and environmental risk and insurance considerations. Collectively, these consultations provided a strategic lens on how geothermal energy could support Cornwall's wider objectives around net zero, rural employment, food security, and economic resilience.

Sector Structure and Coordination

A consistent message from strategic stakeholders was that Cornwall's agrifood sector has become increasingly fragmented in recent years. The withdrawal of European funding streams was seen as a key factor in the loss of coordinated programmes and shared platforms, leading many businesses to become more inward-looking and focused on individual resilience rather than collective action. While recent initiatives have begun to rebuild sector identity and collaboration, stakeholders noted that there remains a gap in coordinated infrastructure planning and long-term innovation support.

Within this context, geothermal energy was viewed not simply as an energy technology, but as a potential opportunity for renewed collaboration, particularly where it could underpin shared facilities, agrifood hubs, or cluster-based development models.

Strategic stakeholders tended to adopt a broad view, seeing geothermal not as a single-technology intervention but as part of a systems-based approach to regional energy and economic development. From this perspective, geothermal is valued for its capacity to underpin new models of production, support shared infrastructure, sustainability credentials, and as a catalyst for innovation within the agrifood sector. Across both groups, there was a strong appetite for clearer information, practical examples, and locally relevant case studies to build confidence and understanding.

Employment, Skills, and Social Value

Stakeholders responsible for land management and economic development emphasised that employment creation and retention are central priorities for Cornwall. Publicly owned farmland and rural assets are increasingly managed with explicit expectations around job creation, skills development, and community benefit. From this perspective, geothermal energy was seen as having particular value in enabling year-round agricultural and horticultural activity, reducing reliance on seasonal labour and supporting more stable rural communities.

There was also strong interest in the potential for geothermal-enabled production to support inclusive employment, including opportunities for lower-skilled roles and structured, routine work that could benefit individuals with additional needs. Stakeholders highlighted that these social value outcomes are increasingly important in justifying public-sector support for infrastructure investment.

Economic Resilience and Local Supply Chains

From an economic strategy perspective, geothermal energy was associated with opportunities to strengthen local food systems. By enabling year-round growing and processing, geothermal could support greater supply to local hospitality, retail, and public-sector procurement, reducing reliance on imports and retaining more economic value within Cornwall. This was seen as aligning with broader ambitions around food security, local sourcing, and green economic growth.

Stakeholders also highlighted the potential for geothermal to attract new investment into the region, particularly from businesses seeking locations with access to reliable, low-carbon energy infrastructure.

Planning, Policy, and Regulatory Considerations

Planning and policy stakeholders emphasised that geothermal projects must be carefully aligned with existing regulatory frameworks as there are currently no direct policies relating to geothermal energy alone. Key considerations include water management, seismicity, land use, heritage constraints, and early clarity on project classification. Uncertainty around whether geothermal developments are treated as renewable energy or mineral projects was identified as a potential source of risk and delay, reinforcing the importance of early engagement with planning authorities.

There was also discussion around the potential to safeguard specific sites for geothermal development, particularly where heat generation could serve industrial, agrifood, or community clusters. Such an approach was seen as a way to protect strategic resources and provide greater certainty for long-term investment.

Funding, Risk, and Insurance

Strategic stakeholders highlighted that while geothermal aligns well with policy ambitions, its deployment is constrained by perceptions of risk, particularly around subsurface uncertainty and long project timelines. From an investment and insurance perspective, transparency around geological risk, performance expectations, and governance arrangements was seen as essential.

There was interest in learning from European experience, where tailored insurance products and risk-sharing mechanisms have been used to support geothermal development. Stakeholders noted that clearer guidance for insurers and financiers, alongside public-sector involvement in early-stage risk reduction, could play a significant role in unlocking private investment.

6.9. Stakeholder Workshop at the Eden Geothermal Site

In addition to on-to-one consultations, an in-person stakeholder workshop was held on 24 November 2025 at the Eden Geothermal project site in Cornwall. The purpose of the session was to provide businesses and other interested stakeholders with an overview of geothermal energy and its potential role in decarbonising Cornwall's agrifood and wider economy, while creating space for informed discussion and questions. The workshop covered not only deep geothermal systems but also a wider range of related technologies, including GSHPs, mine water heat systems, and dual-production models that combine heat or power generation with the extraction of minerals from geothermal fluids. Examples of geothermal and heat network projects operating or in development across Cornwall were presented to illustrate the diversity of technological approaches and delivery models.

The workshop was attended by 19 participants representing a broad cross-section of Cornwall's food, energy, skills, and development ecosystem. Attendees included agrifood producers and processors spanning dairy, brewing, soft drinks, and non-alcoholic beverages, alongside sector bodies and food networks, geothermal and energy developers, land and property developers, skills and education providers, and place-based institutions and visitor attractions. This mix ensured that discussion reflected both operational energy needs and the strategic, technical, and enabling considerations relevant to geothermal deployment.

Figure 18: A photograph from a tour of the Eden Project greenhouses given during the workshop. © Eden Geothermal 2026

As part of the workshop, participants visited geothermally heated greenhouses to see the Eden system in operation and to speak to staff responsible for food production. This site visit provided practical insight into how geothermal heat can deliver stable, year-round growing conditions, support local food production, and reduce reliance on fossil fuel-based heating systems.

Discussion during the workshop focused on practical and commercial considerations associated with geothermal deployment. Participants raised questions about system longevity and subsurface risk, including whether thermal "short-circuiting" between wells could compromise long-term performance in deep geothermal schemes. There was also interest in the environmental performance of GSHPs, particularly the global warming potential of refrigerants. Skills and workforce requirements were discussed, with questions on the types of technical and operational skills likely to be needed and how these could be supported through further education provision. From a commercial perspective, participants sought clarity on how different geothermal technologies compare with other renewable options in terms of payback periods, typical heat or electricity costs, and competitiveness within a five-year investment horizon. Enabling factors were also explored, including the sourcing of drilling rigs, the extent to which local authorities are supporting geothermal strategy areas or hubs, and the role of land use and mineral rights permissions as potential barriers to development.

Overall, the workshop successfully brought together businesses and stakeholders to build understanding of geothermal technologies, demonstrate their real-world application, and surface the key technical, commercial, and regulatory questions that will need to be addressed to support wider adoption across the county.

6.9.1. Stakeholder Engagement Conclusions

Engagement levels were constructive across both one-to-one consultations and the in-person workshop, indicating clear interest from businesses and stakeholders in geothermal and wider low-carbon energy solutions. Participants were open and constructive in sharing operational data, challenges, and commercial considerations, enabling discussions to move beyond high-level concepts into practical, site-specific realities. The diversity of participants, spanning agrifood producers, developers, skills providers, and public-sector bodies, supported well-rounded discussion and helped surface connections between energy, land use, skills, and economic development. The workshop format, particularly the opportunity to see a live geothermal system in operation, was effective in building understanding and confidence, allowing participants to engage with the technology in a tangible way and ask informed, practical questions. Overall, the process fostered productive dialogue, improved awareness of geothermal options, and established a strong foundation for further feasibility work and collaboration.

7. Planning, Regulation and Policy Context

Developing geothermal energy systems in Cornwall requires navigating a range of planning, regulatory, and policy considerations that can significantly influence project viability and timelines. For agrifood businesses considering geothermal investment, understanding these requirements early is essential to managing risk, budgeting appropriately, and building confidence in the development process. This section provides an overview of the key planning and regulatory considerations, drawn from recent geothermal project experience in Cornwall.

7.1. Site Selection and Considerations

Selection of a site for geothermal drilling must consider several factors:

- **Space constraints:** A deep geothermal drilling operation to several kilometres requires a ~1 Ha, relatively flat site. The site needs to be able to accommodate the well pad (~30 x 30m), auxiliary services, welfare facilities, storage for casing (although an extra holding area may be required) and a water storage facility for testing (lagoon/bladders). The well pad requires foundations to support the rig, and the site will need a base suitable for heavy transport movements for the duration of the drilling period.
- **Exploration Well:** Depending on the project concept, an exploration well to confirm permeability and the presence of valuable minerals may be necessary. If minerals exploration is part of the purpose, permitted development is an option. And exploration well will add 9 months - 1 year for project development. For deep projects, using the Reservoir Independent model negates the requirement for an exploration well.
- **Road infrastructure:** For GSHP projects, the impacts should be low. For deep geothermal projects, the site must have suitable local infrastructure to support the transport of large machinery and equipment. Traffic, especially during the mobilisation and demobilisation of the drill rig, must be carefully managed. Rigs are delivered in containers, with several extra heavy or wide loads. At Eden Project, the rig was delivered in 108 loads over several days. During drilling, the dominant movements are staff transport at the beginning and ends of shifts, and waste removal lorries, which may occur once or twice a week. In operation, traffic is minimal.
- **Grid Infrastructure:** A key issue for projects intending to import or export electricity. It is crucial to engage with NGED/NESO at the earliest possible opportunity.
- **Ecology:** A Preliminary Ecological Assessment should be undertaken at the drill site by an ecological consultant. This will clarify whether extended ecological surveys are needed, and baselines of biodiversity at the site.
- **Land Ownership:** Land solely owned by the client is ideal for geothermal development, as it simplifies development, operation and maintenance over the well's lifetime.
- **Historic mine-workings:** Mine-workings may represent an opportunity for a shallow mine water heat project, but they are also a risk to boreholes for GSHPs and to deep drilling. If they are nearby or are suspected to underlie the site, early engagement with a specialist is crucial.

7.2. Planning Permission

Shallow systems using GSHPs may come under permitted development for planning purposes, depending on their scale. For shallow geothermal systems, the planning process is typically straightforward, particularly where infrastructure is located on land already owned by the business and where visual impact is minimal.

Deeper wells targeting higher temperatures will require planning permission from the local planning authority. The process varies depending on the scale and type of system proposed, but all geothermal projects benefit from early engagement with Cornwall Council to clarify requirements and establish what will be acceptable at a given location.

For deeper geothermal developments, particularly those involving drilling to depths of 2–5 km or more, the planning process is more rigorous. The first step is to apply to Cornwall Council for a pre-application screening opinion to determine whether an Environmental Impact Assessment (EIA) is necessary.

To date, geothermal developments in Cornwall have not required an EIA, but proximity to water bodies, sensitive locations such as UNESCO World Heritage Sites, or historic buildings may trigger additional scrutiny. For businesses located near such designations, or considering geothermal as part of shared infrastructure serving multiple users, early clarification of EIA requirements is strongly recommended.

Key planning considerations for geothermal projects include noise and lighting during drilling operations, transport and site access, water use and drainage, ecology and biodiversity, landscape and visual impact, and historical or heritage sensitivities. Drilling operations are typically conducted 24/7 over several weeks or months to manage costs effectively, which means that noise management plans and community engagement are critical components of the planning application. While drilling is temporary, businesses should expect to provide detailed mitigation measures, including acoustically lined equipment, directional lighting, and traffic management plans.

Once drilling and testing are complete, operational geothermal systems have minimal ongoing impact. Heat exchange equipment, pumps, and Organic Rankine Cycle (ORC) power generation infrastructure occupy a small footprint and produce little noise, making geothermal the least intrusive renewable energy technology once operational. Buildings are no more than 10m high, and as ORCs are air-cooled, no chimneys are needed or plumes of steam produced. Planning timelines for deep geothermal projects can range from 12 to 18 months, and businesses should factor this into their development schedules and investment planning.

7.2.1. Community Engagement

Early stakeholder engagement is vital for securing long-lasting support and ensuring the project is delivered on time, with minimal impact. Effective and transparent engagement is perhaps even more important in geothermal than in other projects since it is unfamiliar to most people and communities in the vicinity of developments are likely to have many questions and concerns.

This communication should comprise two-way conversations where any uncertainties can be aired, but also any justified issues can be communicated with the operator and planning team. A useful vehicle for this is stakeholder workshops that should be carried out before any planning documents are submitted. Having this early contact approach makes sure that a planning submission is no surprise to local interest groups.

It is recommended in the Infrastructure Act 2015 that arrangements are made for £20k per well to be allocated and managed for distribution as a local Community Fund. Both the Eden Geothermal and United Downs projects followed this recommendation as good practice.

7.2.2. Seismic Monitoring

As part of the conditions to planning permission, it is likely that Cornwall Council will require a seismic hazard assessment and seismic monitoring plan, as have been required at Eden Geothermal and United Downs.

Induced seismicity is the very small movements in the rock caused by activities such as drilling, fluid injection or extraction, mining, quarrying and blasting. In geothermal projects, these are typically classed as micro seismic events, far below the level that can cause structural damage and usually too small to be felt at surface without sensitive instruments. Nevertheless, all activities which involve altering the subsurface in any way have a duty of care to monitor, record and discuss any events which may occur.

Induced seismicity is recognised as a low but manageable risk for deep geothermal development, but standards and proven protocols are already used in other geothermal projects in Cornwall, following guidance under the Mines and Quarries Act. The combination of strict vibration limits, independent real-time monitoring, and clear communication with neighbours means that in the situation that a felt event does occur, operations can be paused and adjusted immediately to stay within agreed safety margins.

7.3. Environmental and Regulatory Considerations

In addition to requiring planning permission from the local planning authority geothermal developments are regulated using a combination of mining and quarrying regulations, and engagement with the relevant statutory consultees and regulators covering relevant issues such as water abstraction (Environment Agency), landscape quality (Natural England) and archaeological interests (Historic England) is recommended.

7.3.1. Environment Agency (EA)

The Environment Agency (EA) has the requirement to protect water resources and the environment with relation to drinking water and potential groundwater connection to surface water or ecological receptor. At depth, depending on the nature of the aquifer, groundwater loses its value as a resource that can be either exploited for human activities or support surface flows and ecosystems. The UK Technical Advisory Group on the Water Framework Directive defines the extent of groundwater bodies, and states that the maximum depth of groundwater bodies is 400 m below ground level[xxix].

GSHP projects are likely to have closed circulations, and deep geothermal projects extend much deeper than 400m. For these types of projects, the potential risk to any aquifer is therefore likely to be very low, but this should be confirmed in discussions with the EA and there will be a requirement to demonstrate that there is no hydraulic connection with shallower aquifers or environmental receptors. The Environment Agency should be approached for a Pre-Application Meeting to clarify the requirements that need to be met. A desk study and conceptual model of the system may be adequate, as the abstraction is unlikely to cause environmental harm. If not, the requirements are likely to be as below.

For mine-water projects in particular the situation is likely to be more complex, and the requirements could include (i) Consent to Investigate a Groundwater Source; (ii) Abstraction Licence; and (iii) Groundwater Activity Permit. If so, the lead time for the permits can be up to 18 months, so it is recommended that the EA is engaged at the earliest opportunity as an early step in the project's progress.

An application for an environmental waste permit (as defined within the Mining Waste Directive, 2006/21/EC) will need to be submitted to the Environment Agency. This will follow a staged process of application over an estimated period of 12-16 weeks, including an initial meeting, and will be carried out during the site preparation stage.

It may be necessary to confirm with the EA that effective operational and environmental management systems are in place and that a method for monitoring induced seismicity has been established if significant fluid injection is planned as part of the well testing programme.

7.4. Alignment with Local and National Policy

Geothermal energy development in Cornwall benefits from strong alignment with local and national policy objectives. At the national level, geothermal is recognised as a renewable energy technology capable of delivering reliable, baseload heat and power, contributing to the UK's legally binding net zero targets. Cornwall Council has embedded geothermal energy within its strategic planning frameworks, including the Local Area Energy Plan and the Carbon Neutral Cornwall programme, signalling institutional support for low-carbon infrastructure that can underpin economic resilience and decarbonisation.

This policy alignment creates a more favourable environment for project development. Geothermal projects that can demonstrate alignment with local economic development objectives, job creation, food security, and supply chain resilience are more likely to attract public-sector support, whether through planning facilitation, co-investment, or enabling infrastructure. Cornwall Council has also shown willingness to safeguard specific sites for geothermal development where heat generation could serve industrial, agrifood, or community clusters, providing greater long-term certainty for investment.

There is currently no dedicated geothermal policy framework in UK planning legislation, meaning that geothermal developments are assessed under general renewable energy and mineral extraction policies. This can create some ambiguity, particularly around whether geothermal projects are treated as renewable energy developments or as mining activities. This makes early engagement with planning authorities essential to clarify how a proposed geothermal system will be classified and what regulatory pathway will apply.

Looking ahead, there is growing recognition within Cornwall Council and national government that geothermal energy can play a strategic role in enabling industrial decarbonisation, particularly in sectors where heat demand is high and continuous. By positioning geothermal investments as part of a broader agrifood resilience and decarbonisation strategy, businesses can strengthen the policy case for their projects and align with public-sector priorities around green economic growth and local supply chains.

7.5. Planning Risk from a Business Perspective

Planning and regulatory processes represent both a necessary step and a source of risk with long timelines, complex requirements, and uncertainty around outcomes deterring initial investment. However, early engagement with planners and regulators can help clarify expectations, de-risk key decisions, and give confidence to investors and lenders that a project has been properly scrutinised. With realistic timelines and the right support, small and medium-sized enterprises can navigate these processes successfully.

Another planning risk relates to uncertainty around project classification and regulatory pathway. For this reason, obtaining pre-application planning advice is strongly recommended. This allows businesses to understand the local planning authority's expectations, identify potential sensitivities early, and build these into project design and budgeting.

Planning and regulatory processes present real challenges, but they are not insurmountable. Cornwall's existing geothermal projects have established valuable precedents, and there is growing institutional familiarity with geothermal development within local planning and environmental agencies.

7.6. Mineral Rights

One of the most significant planning risks identified in Cornwall is the question of mineral rights. Here, centuries of mining activity have created a complex system of land and mineral ownership, where surface landowners may not own the rights to minerals beneath their property. While the Infrastructure Act 2015 establishes the right to exploit geothermal resources from deep-level land greater than 300 metres below the surface, it does not provide automatic rights to access that land through overlying mineral estates. This means that businesses will need to engage with mineral rights holders to notify them of planned activities and perhaps secure wayleaves or agreements, particularly in areas where historic mining activity has occurred or where active mineral exploration is underway.

The mineral rights landscape of Cornwall dates back hundreds of years to historic ownership of parcels of land by major mining families. Due to this any one parcel of land can have multiple or partial owners, for various different commodities. This means that any one potential geothermal site can be divided between multiple partial owners.

In recent years there has been great interest in the possibility of geothermal brines yielding commercial quantities of lithium. This is beyond the scope of this project, and it is recommended that specialist advice is sought from lithium companies if a joint geothermal heat/electricity and geothermal mineral operation is envisaged.

8. Economics, Finance and Risk Management

8.1.1. Capital and Operating Cost Considerations

In general, development (DEVEX) and capital costs (CAPEX)for geothermal projects are high, while OPEX costs, because there is no fuel involved, are low, and decommissioning costs are also low. There is a long project lifetime (30+ years). Geothermal's cost structure is more akin to large infrastructure or mining projects than to rapid-deployment renewables like solar PV, with drilling costs often accounting for 30–50% of total project investment. With improvements in technology, these costs are falling fast.

With CAPEX costs high, it is important for project design to use as much of the heat at surface as possible for the best returns.

To demonstrate this, we have created three deep geothermal model cases based on drilling in granite in Cornwall:

1. A 2.5km 2-well heat- only project, with the resource arriving at 90° C at the surface, reinjected at 50°C.
2. A 5MW electricity project with two 6.5km wells. Heat post electricity production released at 90°C, reinjected at 50°C.
3. A 15MW project with five 6.5km wells, heat post electricity production released at 90°C, reinjected at 50°C.

Table 5: Project CAPEX Considerations

Case	**Heat only**		**5MW electric**		**15MW electric**	
CAPEX £ m	18		37		71	
Heat capacity @90°C	11MWth		12MWth		36MWth	
Contract for Difference	n/a		Yes		Yes	
Sales heat %	50	70	5	20	2	30
Internal Rate of Return (IRR) %	9	18	14	21	28	40

1. Geothermal Project Costs. DEVEX (Development/Exploration): Includes geological surveys, and in some cases, exploratory drilling. This is traditionally the highest-risk phase, where significant sums can be spent without the certainty of finding a viable resource. This risk is now mitigated by the new technology of Reservoir Independent systems, where the permeability is engineered to create the desired production rates.

- **CAPEX (Capital Expenditures):** Ranging between £4–7.5 million per MWe, with costs for deep, high-temperature, Reservoir Independent systems being at the higher end.
    - **Well Drilling:** 30% to 50% of total project costs.
    - **Plant Equipment:** ORC plants are generally more expensive than conventional electricity generation plants fuelled by coal or gas.

- **OPEX (Operating Expenditures):** Low, ranging from 1-5% of CAPEX. These include maintenance of wells, turbine operation, pump replacements every 3-7 years.

3. Key Cost Drivers and Trends

- **Drilling Costs:** The primary driver of geothermal CAPEX. Because rigs are hired by the day from the oil and gas industry, drilling costs are directly proportional to drilling time. In general, for electricity projects, larger capacity projects 10-20MW have lower costs per MW. This is because of on-site learning curves: the best place to drill a geothermal well is next to a geothermal well you've just drilled, as the geology is understood, and as soon as possible afterwards, to maximise crew learning curves and keep rig mobilisation and demobilisation costs low.
- **ORC Costs:** These also favour larger projects, to go from a 5MW to 15MW, the power output increases by a factor of 3, but ORC capital costs only double.
- **Risk Mitigation:** Due to exploration risk, many projects use public funding or grants for early stages.
- **Geothermal vs. Others:** While wind and solar have seen massive cost reductions (85%+ for solar), geothermal's complexity has kept costs more stable until recently, Reservoir Independent techniques are aiming for similar cost reductions, where recent results from Fervo Energy in the United States demonstrate significant cost improvements. Between 2022 and 2024, the costs for developing a well fell by nearly half.[xxx]
- **Heat vs. Power:** Geothermal heat-only projects (direct use heat for growing or processing, district heating) have CAPEX roughly half that of power-generation projects.
- **2024–2025 Trend:** A significant increase in investment (nearly $8bn in 2023, high activity in 2024-2025) has been driven by improved technology and high-power demand. Much of this activity has been driven the US by the need to provide clean, firm power for data centres. Geothermal is one of the few renewable energy sources supported by the Trump administration in the US. They have just announced a further $171m in Federal funding for Reservoir Independent and superhot projects[xxxi].

The market for funding direct geothermal projects in the UK is still emerging but the financial resources and mechanisms for delivering renewables projects for other technologies is mature. The development and delivery of deep geothermal resources require a combination of direct corporate funding, project finance, and public funding.

8.2. Community Ownership Models

Direct geothermal energy projects lend themselves to models of shared ownership, including community energy participation, because they generate both potential economic and social advantages that can be maximised by governance arrangements. Community Energy England (2025) summarises some of the advantages:

"Taking a shared ownership stake in a renewable energy project allows community groups to play a proactive role in the UK energy system and generate a valuable ongoing source of income to reinvest in the people and places in their community. For private developers, having a community group onboard as a financial partner can lead to a faster development process by improving the perception of the project, leading to less opposition and fewer legal objections, appeals and delays. Ownership of community energy assets has also repeatedly been shown to positively affect energy awareness and lead to decarbonisation behaviours in these communities."

Key questions arise in the planning process of any potential geothermal energy project that is seeking to include some form of shared community energy project; which potential community energy benefits, commercial, or social, does the project want to prioritise? And which commercial governance structures are most suited to meeting and maximising the identified community objectives for the duration of the lifetime of the resource?

Designing and agreeing how the asset will be managed for the long term will help ensure the system is appropriately designed and documented during development for future operation.

Community energy projects have two mechanisms for rewarding local markets: through benefits in kind and direct savings models.

Table 6: Reward mechanisms explored by Community Energy Projects

Community Objective	**Shared Ownership**	**Benefits in Kind**
Financial Return	Direct	Indirect
Risk Exposure	Higher	Lower
Community Control/ Long term responsible development	High	Subject to governance model
Inclusivity	Subject to governance model	Subject to governance model
Long-Term Sustainability in Operations and Maintenance	Strong	Variable

By aligning the commercial planning of the energy system with wider community benefits of cluster development, such as heating a leisure centre, or district heating for new housing developments, possibilities may emerge to maximise the benefits to both industry and community. These could be long term, stable utilities (heat and electricity) pricing, or designing system outputs to support shorter term economic development objectives. In either scenario appropriate decision-making processes and community participation or governance models could make or break a project.

UK community benefit structures that may be considered include those in Table 7 below. These structures offer, subject to governance objectives, means of direct community ownership of projects.

Table 7: UK Community Benefit Structures which may be considered in an energy-related project.

Structure	**Purpose**	**Typical Features**
Community Benefit Society	Benefit the wider community	Democratic governance, can raise capital via community shares, Profits reinvested locally
Co-operative Society	Mutual benefit of members	Member-focused, Profits can be distributed among members, Strong community engagement
Community Interest Company (CIC)	Social enterprise	Manage assets for community benefit, can receive grants and donations, adaptable governance
Joint Venture (JV)	Shared ownership with commercial partner	Shared risk and reward, Access to developer expertise and capital, Flexible structure
Special Purpose Vehicle (SPV)	Subsidiary energy asset	Isolates financial risk, Clear project boundaries, can be co-owned by community and developer

An emerging opportunity for community funding is the use technology platforms that aim to simplify transparency and governance arrangements. Tokenisation platforms may simplify community ownership and project finance when aligned to an appropriate community ownership model. The identification of options for community ownership and participation in project finance requires stakeholder engagement and investment in time and money for full feasibility studies.

8.2.1. UK Geothermal Funding and Policy Landscape

The development of a UK geothermal industry is far behind the US, France, The Netherlands and Germany; the UK does not yet have a formally adopted policy toward geothermal development. This absence is important because of the regulatory risk for prospective investors and developers of geothermal projects. However, the progress in international technological development and in the UK pipeline of projects, combined with new Ministerial level sponsorship, suggests that a change in status of geothermal, from an emerging domestic industry, to one that the Government signals its support for, is realistic in the next 12 – 24 months. Geothermal enables national strategic objectives and investment in the energy transition, economic growth, the creation of high-quality jobs, and long-term energy security.

Geothermal is eligible for grant funding at the commercialisation stage of energy decarbonisation schemes such as the Green Heat Network Fund. This may provide an avenue for future feasibility and exploration work. Geothermal is also eligible for Contract for Difference support for electricity projects. In 2023, Geothermal Engineering’s projects at United Downs, Manhay and Penhallow were successful in gaining support.

The UK’s public investment institutions deliver and support investment. The institutions are to target specific market failures and weaknesses, and aspire to support business, projects and assets of all sizes. Public financial institutions now have £137 Billion in funds and reforms now specify that they can go further to support key government missions such as growth and clean energy. As such, the prospects for integrated geothermal cluster developments are in scope.

The relevant institutions are:

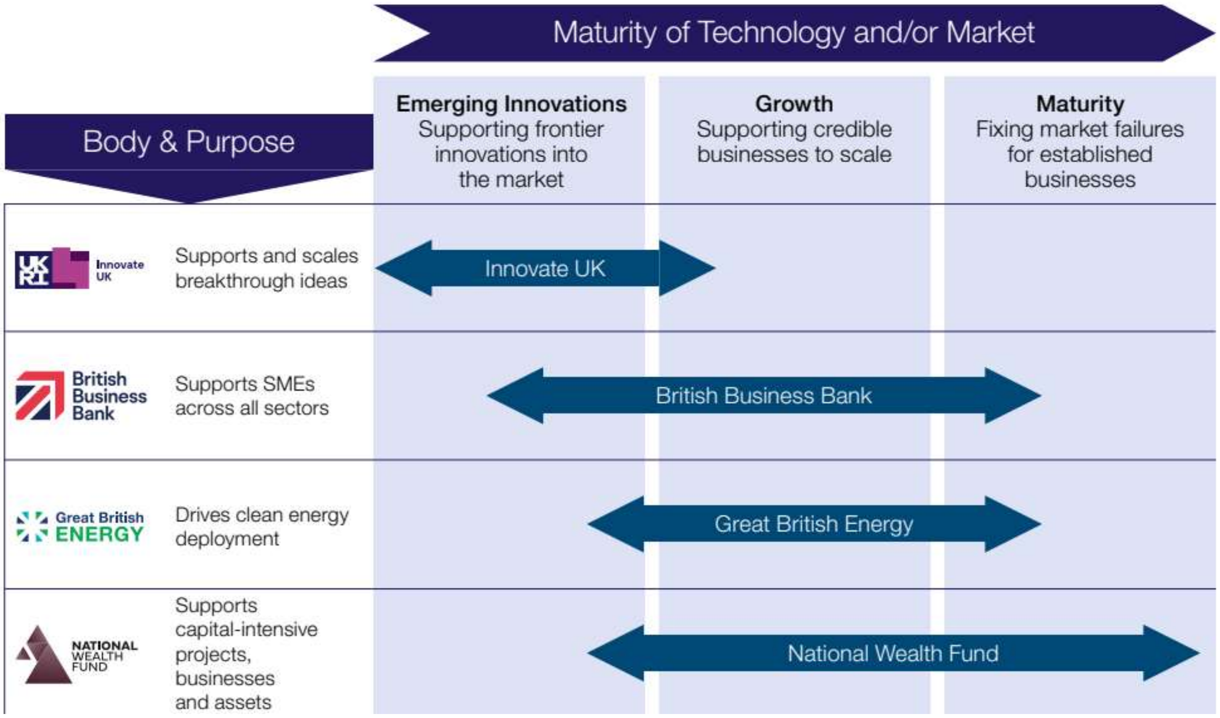

Figure 19: Excerpt of the map of the public investment landscape

Innovate UK has supported geothermal projects of various kinds in the county. To date (February 2026), National Wealth Fund has supported critical minerals projects in Cornwall and as the geothermal market matures the prospects of support strengthens. The Industrial Energy Transformation Fund, which ran in several rounds until 2026, was extremely helpful in part-funding the early feasibility studies and FEED studies that are needed to encourage innovation in new industries for the UK. No similar fund has yet been announced, but given that food manufacturing is the biggest manufacturing sector in the UK, larger than aerospace and automotive combined, a national food chain innovation fund, as suggested by Great South West, would seem to be great idea.[xxxii]

The government has recently announced that community energy groups will be able to access a share of £5m from GB Energy through the SW Net Zero Hub. This route has already provided funding for at least two feasibility studies in CIoS.

In 2026, the Kernow Fund, administered by Cornwall Council will be supporting four strategic industries, of which renewable energy is one.

8.3. Risk and Geothermal Projects

This section is summary of a longer paper kindly written by Alistair Donohew BSc (Hons) MSc PCE PgCE CEnv FISEP FGS Principal Environmental Director UK & Ireland of Crawford Environmental. The full paper is available on request**.**

8.3.1. Energy Projects and Risk

Energy projects can attract investment and development partners if they can demonstrate a credible pathway from conceptual stages where there is much uncertainty through to a desirable long-term performance. Several factors affect how clear and visible that pathway is and includes: i) the maturity of the technology in question; ii) the certainty of revenue; and iii) the effectiveness that risk is shared. The diagram below (Figure 20) shows a visual representation of the first point - mature and emerging markets:

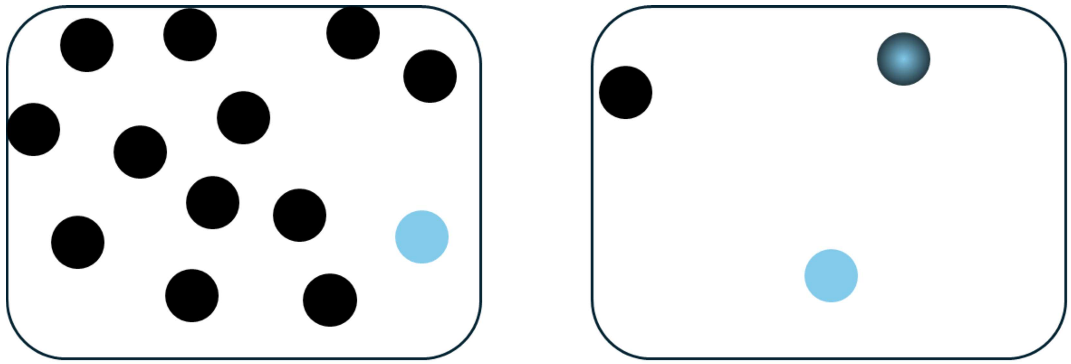

Figure 20: Mature and emerging markets[xxxiii]

For established technologies in mature markets, this pathway is already well defined through accumulated development and operational experience: risks are well understood, performance is supported by extensive data, and residual uncertainties can be priced, insured, or contractually transferred, resulting in low failure rates and high confidence in outcome probabilities.

By contrast, newer or less-deployed technologies often face 'front-loaded risks' that are difficult to price or transfer at the outset. Within this framing, geothermal technologies – particularly deep, high-temperature systems – are perceived to exhibit strongly front-loaded risk profiles, where feasibility assessment and drilling dominate overall exposure. However, once a viable resource is proven, operational risk can be relatively stable and predictable compared to other renewables. By contrast, low-temperature heat networks and ground-source systems shift risk away from site-based factors such as subsurface uncertainty toward system design, integration, governance, and user behaviour – these are risks that are often underestimated in early business cases despite being more amenable to management through planning and contractual structures.

Wind and solar technologies, meanwhile, largely present "known unknowns" that is their risks are predominantly commercial, consenting, or supply-chain related rather than technical, which makes them easier to standardise, insure, and finance at scale. From an insurance and finance perspective, these distinctions are significant: deep geothermal most closely resembles an exploration risk issue, low temperature heat and GSHP systems align with infrastructure systems risk, and wind and solar are best understood as asset performance risks, reflecting different positions along the technology and market maturity spectrum.

As more geothermal projects are delivered, market maturity will increase and risk-management priorities will evolve; advances in drilling and reservoir engineering that reduce reliance on highly site-specific geological conditions are already widening the pool of viable locations, supporting a shift over time from exploration-driven uncertainty toward more standardised, manageable infrastructure risks.

8.4. Risk in Geothermal Projects

Risk in geothermal projects can be understood as 'phase-dependent': early project stages are dominated by the management of subsurface uncertainty, while successful projects resemble conventional energy and infrastructure assets as they progress. This section therefore examines how risk evolves across the project lifecycle, considering each stage in turn, to support a clearer understanding of project viability and the actions required to manage risk effectively.

8.4.1. Risk Holders (Risk Allocation)

As projects progress, primary responsibility for risk typically shifts from funders and developers in the early stages, to contractors during construction, and ultimately to operators and off-takers once the system is operational. Before examining individual risk categories and project stages in more detail, it is useful to consider how risk is commonly allocated between parties. The table below illustrates typical patterns of risk allocation in geothermal projects, identifying a *primary risk holder* for each risk category. This reflects which party is best placed to control or influence the risk, rather than absolute or exclusive liability.

The table also provides indicative examples of mitigation measures and risk transfer mechanisms, including contractual arrangements and insurance. These examples are not exhaustive, nor are they universally applicable; in practice, the availability and effectiveness of risk transfer depend on project structure, regulatory context, and market conditions. Even where risk is transferred, a residual exposure usually remains with one or more parties closest to the activity or outcome.

The allocation shown below illustrates how subsurface and delivery risks dominate early project stages, while contractual, operational and demand-related risks become more prominent once the system is operational.

Table 8: Indicative risk allocation and risk transfer mechanisms in agrifood–geothermal projects

Risk category	Primary risk holder (typical)	Indicative mitigation measures	Indicative risk transfer	Residual risk typically retained by
Subsurface and resource risk	Developer / SPV (early phase)	e.g. Geological surveys, phased drilling, probabilistic resource modelling	Exploration risk cover (where available), public risk-sharing	Developer / equity investors
Drilling and well failure	Developer / EPC contractor	e.g. Performance standards, contingency wells, staged drilling	Construction insurance, delay cover (DSU)	Developer (outside insured events)
Induced seismicity	Project owner / SPV	e.g. Seismic assessment, monitoring, traffic-light controls	Third-party liability cover (often limited)	Project owner / public sector (beyond cover)
Construction delay / cost overrun	Developer / EPC contractor	e.g. Fixed-price or target-cost contracts, contingencies	Construction and delay insurance	Developer
Heat demand / offtake risk	Offtaker(s) / SPV	e.g. Long-term heat contracts, minimum-take provisions	Parametric insurance	Offtakers / SPV
Operational performance	SPV / Operator	e.g. Preventive maintenance, redundancy, monitoring	Property damage and interruption cover	SPV / operator
Environmental liability	SPV	e.g. Environmental management systems, monitoring	Environmental liability insurance	SPV
Governance and counterparty risk	SPV / investors	e.g. Governance controls, step-in rights, credit checks	Limited applicability	Investors / SPV

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The inclusion of insurance in the table reflects potential mechanisms for financial risk transfer; it does not imply universal availability or suitability for all projects. Beyond the project's internal development and operational cycle, geothermal–agritech systems are exposed to a range of risks outside control, including interest rates and inflation, evolving policy and regulatory frameworks, energy market prices, and heat or product demand fluctuations. These can materially affect project returns and operational viability.

8.4.2. Exploration and Drilling Risk ("Resource Risk")

The exploration and drilling phase carries the highest inherent uncertainty in geothermal projects. Key risks include uncertainty in subsurface temperature (both at depth and deliverable at surface), sustainable flow rate, fluid chemistry, and long-term reservoir performance. These uncertainties cannot be fully resolved until drilling and testing have taken place.

A wide range of technical information can be used to assess and progressively reduce resource risk, including existing site data (e.g. legacy wells, seismic surveys, thermal gradients, and flow tests), probabilistic resource estimates (such as P50 and P90 scenarios), drilling success metrics, well design assumptions and contingency planning. These risks are also being mitigated using Reservoir Independent models of development, where rather than looking for natural permeability, the reservoir is designed and engineered from the beginning of the project. Despite these tools, there is always some remaining risk at the exploration stage.

Who carries the risk if drilling does not deliver?

In most geothermal projects, drilling and exploration risk is not borne by a single party, but managed through a combination of financial capacity, public-interest intervention and structured governance.

In practice, drilling risk is typically allocated through:

- Developer and early-stage equity risk, where capital is exposed to loss if the geothermal resource does not meet expectations;
- Public-sector participation, including grants, guarantees or risk-sharing mechanisms (often national or regional), reflecting the wider climate, energy security and economic benefits of geothermal infrastructure;
- Staged investment and decision gates, whereby further capital is committed only once defined technical thresholds (e.g. minimum temperature, flow rate or chemistry) are confirmed.

Exploration risk insurance or well-failure insurance is available in some markets, such as Germany, where there are many geothermal projects, but insurer appetite depends heavily on the quality of geological data, drilling design, monitoring arrangements and governance structure. Such products typically transfer only a portion of the financial risk and do not remove the need for equity or public-sector risk participation.

Crucially, agrifood heat off takers are rarely expected to carry exploration risk directly. For agrifood businesses, this risk would be typically managed by:

- entering projects only after resource confirmation;
- structuring heat supply agreements with conditions precedent;
- or placing drilling risk within a dedicated project entity rather than passing it through to end-users.

This allocation is reflected in the risk allocation table, which identifies a *primary risk holder* for each category based on who has control over outcomes, while recognising that contractual and insurance mechanisms typically transfer only part of the risk, leaving residual exposure with those closest to the activity.

Role of partnerships, public funding and governance

The ability to manage drilling risk is strongly influenced by who participates in the project and how responsibilities are allocated. Many geothermal projects are therefore delivered through special purpose vehicles (SPVs) that combine private developers and investors with public-sector partners. Public partners may contribute through:

- direct equity investment;
- innovation or capital grants (often regional – such as Shared Prosperity Cornwall Good Growth Fund, national – such as Green Heat Network Fund or EU-funded low-carbon programmes such as European Regional Development Fund - ERDF);
- national or regional geothermal guarantee schemes;
- or acceptance of higher risk or lower financial return in recognition of wider public and social benefits.

This approach reflects the reality that geothermal infrastructure often delivers value beyond private heat revenues, including decarbonisation, energy resilience, local economic development and food system security. Public participation can therefore help "prime" early infrastructure that would otherwise struggle to attract private capital alone.

Governance as a determinant of drilling risk outcomes

Unclear allocation of responsibility can deter both private capital and public bodies from accepting drilling risk. Robust projects therefore explicitly define:

- the SPV structure and ownership;
- allocation of technical, operational, legal and financial responsibilities;
- decision triggers for remediation, re-drilling or project pause;
- escalation mechanisms and exit options for partners.

From an investor and insurer perspective, clear governance materially reduces political, counterparty and execution risk — factors that often determine whether drilling risk can be financed or insured at all.

Induced seismicity and liability risk

Induced seismicity is a recognised but typically a (very) low-probability risk, particularly for deep geothermal systems. The likelihood of seismic effects are highly site-specific and dependent on geology, drilling practices and operational controls. Insurance for seismic risk is generally available in the form of third-party liability cover, rather than insurance against seismic events themselves. Effective management of seismic risk relies operational controls, transparent monitoring and stakeholder communication, rather than insurance alone.

Operational and performance risk

Once operational, geothermal systems face risks like other forms of energy infrastructure. These include equipment failure, corrosion or scaling, pump failure and control system faults. These risks are commonly addressed through a range of measures:

- property damage and machinery breakdown insurance;
- business interruption cover;
- preventive maintenance regimes;
- performance guarantees and redundancy[xxxiv].

For agrifood businesses, contractual service levels, clarity on outage management and backup arrangements are often as important as insurance coverage in ensuring operational continuity. In some cases, parametric insurance products can help mitigate specific exposures, for example by providing payments tied to measured shortfalls in heat delivery for co-located agrifood businesses, thereby reducing financial uncertainty even when the underlying external drivers are uncontrollable.

Once a geothermal system is successfully commissioned, risk reduces significantly and becomes more comparable to long-life infrastructure assets.

Operational risks in relation to shared and hub-based geothermal systems

Shared or hub-based geothermal systems, supplying multiple agrifood or other heat users, introduce additional complexity around responsibility and claims management. These risks can be managed through clear allocation of ownership and operational responsibility along with defined interfaces between system operator and end-users as well as potentially pooled insurance arrangements. In many cases, insurers may focus more on clarity of responsibility than on the number of connected users.

Environmental, social and economic risks

Geothermal risks – in the context of project viability and risks to investors and developers - are 'front-loaded'. There are also typically some risks that are localised and potentially 'visible' and this can mean the perception of risks of a project *on the environment* in the mind of a decision maker can be disproportionate to reality - geothermal projects are among the most thoroughly studied, monitored and regulated risks in the energy sector.

This can develop to the extent that the perceived risks can overshadow the long-term environmental and social benefits. The reality is that actual residual risks (after design, permitting, monitoring, assurance and controls) are comparable to or even lower than other accepted types of energy projects and technologies. The following table aims to provide some information in relation to such risks for different types of geothermal project to help better illustrate that – despite perceptions - such risks can be managed.

Table 9: Perceived environmental, social and economic risks of geothermal technologies

Risk category	Deep high-temperature geothermal	Lower-temperature geothermal	Low-temperature networks / GSHP	Typical mitigation and 'reality'
Induced seismicity	●● Moderate–high (perceived) ● Low–moderate (actual)	● Low	● Negligible	Careful site selection, baseline seismic monitoring, traffic-light systems, pressure management. Events are typically micro-seismic and below felt thresholds.
Groundwater contamination	● Moderate (perceived)	● Moderate (perceived)	● Low	Multi-casing bore design, cementing, separation of aquifers, permitting under groundwater protection regimes, routine monitoring. Actual incidents are rare.
Surface water impacts	● Low–moderate	● Low	● Low	Closed-loop systems, discharge controls, construction-phase management. Primarily a temporary construction issue.
Land take and visual impact	● Low–moderate	● Low	● Low–moderate (during install)	Small surface footprint; wellheads often compact and can be screened. GSHP disruption is temporary and reversible.
Noise and vibration	● Moderate (short-term)	● Low–moderate (short-term)	● Low (short-term)	Time-limited drilling noise managed through working hours, acoustic screening, planning conditions. Minimal during operation.
Air quality and emissions	● Low	● Low	● Very low	Closed systems; minimal non-condensable gases in most European contexts; negligible compared to fossil alternatives.
Resource sustainability / thermal depletion	● Moderate	● Low–moderate	● Low–moderate long term)	Reservoir modelling, reinjection, thermal balance monitoring, adaptive management. Well understood and manageable with correct design.
Construction disruption	● Moderate (temporary)	● Moderate (temporary)	● Moderate (temporary)	Traffic management, phased works, stakeholder engagement. Comparable to other infrastructure projects.
Community acceptance / perception	●● Moderate–high (perceived)	● Moderate	● Moderate	Early engagement, transparency on seismic and groundwater risks, clear communication of benefits. Concerns often reduce once evidence is shared.
Health and safety	● Moderate	● Low–Moderate	● Low	Standard oil & gas / civil engineering H&S regimes; risks concentrated in drilling phase and well regulated.
Financial risk (cost overrun / uncertainty)	●● Moderate–high	● Moderate	● Low–moderate	Staged development, risk-sharing mechanisms, modular rollout, anchor heat offtake. Risk decreases sharply post-resource confirmation.
Carbon and climate performance	● Very low risk (high benefit)	● Very low risk	● Very low risk	Very low lifecycle emissions; strong alignment with climate targets and heat decarbonisation.
Social and local economic benefit	● Low risk (high upside)	● Low risk (high upside)	● Low risk (high upside)	Local jobs, stable energy prices, energy security, long-term community assets. Benefits often underweighted in planning decisions.

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Effective project design, permitting, monitoring and assurance reduce impact risks while simultaneously protecting investor value, illustrating how environmental and social risk management is directly linked to financial outcomes.

Assurance and technical due diligence

As projects progress from an investment idea, independent technical assurance and due diligence play a critical role in supporting investment and funding, insurance and partnership decisions. This can be a relatively simple exercise if sufficient risk management, monitoring and validation has been put into place.

Table 10 below provides an indicative scope of topics typically considered by technology type.

Table 10: Indicative scope of technical assurance and due diligence by technology

Topic Area	Deep / High-Temperature Geothermal	Lower-Temperature Geothermal	GSHP / DH Networks
Geological and reservoir model	High detail, probabilistic	Moderate detail	Low–moderate
Drilling design and risk	Critical	Important	Limited
Seismic risk assessment	Required	Site-specific	Generally minimal
Surface plant and network design	Important	Important	Critical
Operational and maintenance strategy	Important	Important	Important
Governance and risk allocation	Critical	Critical	Important
Insurance and risk transfer review	Important	Important	Moderate
ESG and regulatory compliance	Important	Important	Important

Source: Crawford

These reviews are typically undertaken by specialist independent consultancies and are used by developers, investors, insurers, lenders, and public bodies to understand project-specific risks, test technical and operational assumptions, confirm readiness to proceed with investment or construction, and provide a structured, professional assessment of uncertainty. Independent technical reports provide professional indemnity-backed advice and opinions, meaning that the consultant's expertise and liability coverage become part of the risk management framework – acting as risk intermediaries. By commissioning these reviews, stakeholders which include agrifood organisations can rely on an expert assessment rather than internal judgement alone, document mitigation measures and assumptions, and use the findings to support insurance, contractual obligations, or financing decisions.

9. Chapter 9: Strategic Opportunities and Priority Interventions

9.1. Near-Term Opportunities (0–3 Years)

In the near term, the strongest opportunities arise from technologies and delivery models that are already commercially proven and can be deployed with minimal disruption. Many agrifood businesses in Cornwall face immediate pressures linked to rising energy costs, grid constraints, and tightening decarbonisation requirements. These conditions make shallow geothermal, mine-water systems, and shared ground-loop networks especially viable.

Shallow geothermal systems, including ground source heat pumps and mine-water heating schemes, can often be fitted within existing facilities or industrial estates. They provide stable, year-round low-temperature heat and cooling, and reduce dependence on oil, LPG, or grid-supplied electricity. Because they rely on familiar technologies with predictable performance, they offer agrifood businesses a practical route to lower operating costs and increased energy reliability. Shared-loop systems also create early opportunities for collaboration, particularly in business parks with multiple agrifood tenants whose combined energy demand can enhance project viability.

In parallel, the formation of early agrifood energy clusters can support coordinated planning and shared investment. Mapping undertaken for this study identifies several areas in Cornwall—such as Bodmin, Redruth and Scorrier, Penryn and Falmouth, Penzance and Newlyn, and St Austell—where agrifood businesses are already co-located. These locations lend themselves naturally to shared heat infrastructure and collective engagement with developers. Early-stage collaboration can help SMEs articulate their energy demand, simplify communication with planning authorities, and strengthen the case for feasibility studies or shared heat networks.

A further near-term priority is improving clarity around planning, permitting, and mineral rights. Stakeholders expressed a consistent need for clearer guidance, especially concerning how geothermal projects are classified, what environmental assessments are required, and how to navigate Cornwall's complex mineral rights landscape. Providing technical guidance, standard documentation, and planning officer training can significantly reduce uncertainty and enable quicker assessment of early-stage projects.

Finally, near-term opportunities include creating demonstrator projects that build confidence in geothermal solutions. Local case studies—such as Eden Geothermal, United Down, mine-water systems, and shared-loop heat pump networks such as Kensa's 'Heat the Streets' —provide valuable practical examples. Expanding this portfolio with targeted pilot projects for agrifood applications would support knowledge transfer, build trust, and accelerate adoption across the sector.

Cornwall Council is a large landowner in the county. A strategic review of its landholdings in industrial estates, and county farms is indicated.

9.2. Mid-Term Opportunities (3–7 Years)

In the medium term, opportunities expand into deeper geothermal developments, shared heat networks, and hybrid energy systems combining geothermal with solar, thermal storage, or local microgrids. These projects are more capital-intensive and require longer development times, but they offer substantial benefits for agrifood businesses with continuous or high-temperature heat requirements.

Direct-use deep geothermal heat systems, capable of delivering temperatures between 50°C and 150°C, align particularly well with energy-intensive agrifood processes such as pasteurisation, hot-water generation, brewing, drying, and temperature-controlled horticulture. Businesses with round-the-clock operations—such as dairies and large processors—are especially well positioned to benefit, since steady demand improves both economic and technical viability. For such users, geothermal heat offers a stable, low-carbon alternative to fossil fuels, reducing exposure to volatile global energy markets and strengthening long-term operational resilience.

Heat-network development represents a major mid-term opportunity, especially where an anchor load—such as a large dairy, food manufacturer, or agri-industrial site—can underpin investment. Anchor-led networks allow smaller agrifood businesses, community facilities, and even housing developments to connect without needing to bear the cost or risk of developing geothermal infrastructure themselves. This model mirrors successful European and international examples where geothermal heat is cascaded across multiple users at different temperatures, maximising efficiency and reducing overall system costs.

Another mid-term possibility lies in hybrid and integrated energy systems. Many agrifood businesses already use or are exploring solar PV, and combining geothermal baseload heat with solar electricity and thermal storage can reduce pressure on constrained grid connections while delivering low-emission, seasonally balanced energy solutions. Such integrated systems are particularly attractive for operations with significant cooling loads, which can be supported through heat-pump-driven chilling or geothermal absorption cooling.

In addition, the mid-term period provides an ideal window to expand Cornwall's geothermal supply chain. As deployment grows, the region will need additional drilling expertise, heat-network engineers, geothermal maintenance specialists, and controlled-environment agriculture technicians. Building skills pathways in collaboration with further education providers and existing geothermal developers will strengthen local capacity, create new jobs, and support long-term sector growth.

As the technology is in a head long development phase with drilling costs falling swiftly, deep geothermal combined heat and power (CHP) also offers the potential to generate firm, renewable electricity for areas constrained by grid capacity. As drilling technologies advance and costs fall, deep geothermal electricity could complement existing renewable sources and support local microgrids, energy parks, and electrified agricultural equipment.

9.3. Long-Term Opportunities (7–15+ Years)

Looking further ahead, geothermal energy presents transformative long-term opportunities for the agrifood sector. As infrastructure develops, deeper wells, industrial heat networks, and integrated agrifood energy parks could underpin entirely new production models and strengthen the region's broader economic resilience.

One of the most significant long-term opportunities is the development of geothermal-powered agrifood hubs. Drawing on international case studies from Tuscany, New Zealand, and Nevada, Cornwall could establish integrated clusters where geothermal electricity and heat support food processing, greenhouses, vertical farming systems, aquaculture, cold storage, distribution facilities, and product innovation centres. Such hubs enable cascading heat use, minimise waste, and create substantial employment while anchoring high-value supply chains within the region.

Year-round controlled-environment agriculture is another major long-term opportunity. Large-scale geothermal-heated glasshouses could significantly expand local production volumes, capture early- and late-season markets, and reduce dependence on imported produce. Given the proven employment intensity of protected horticulture, geothermal energy could also support stable, year-round agricultural employment that strengthens rural communities.

Finally, while outside the scope of this report, there may be future long-term opportunities to integrate geothermal heat production with mineral co-production, such as lithium extraction from geothermal brines. Such hybrid projects could improve economic returns and contribute to national supply-chain resilience, though they would require specialist regulation and partnership arrangements.

10. Recommendations and Action Plan

10.1. Recommendations for Agrifood Businesses

To realise the benefits of geothermal energy in Cornwall and the Isles of Scilly's agrifood sector, a coordinated approach is required across businesses, public bodies, and sector partners.

First, agrifood businesses should begin by carefully mapping their energy needs—including heating, cooling, and power requirements—while considering both the scale and seasonality of their demand. By understanding which processes rely most heavily on fossil fuels and which could be replaced by geothermal sources, companies can make informed decisions about where geothermal would have the most impact. Businesses are encouraged to commission initial feasibility studies that examine local geological suitability, technical options, and financial modelling. Early engagement with geothermal developers and technical experts is critical to clarify practical options, likely costs, and delivery models, whether these be on-site solutions, shared infrastructure, or anchor-load scenarios for larger operations. Exploring available funding sources, such as government grants or blended finance models, is essential to overcoming the challenge of high upfront investment. Ultimately, agrifood businesses should prepare robust business cases that integrate capital and operational costs, savings, risk management strategies, and opportunities to supply heat or cooling to nearby businesses.

Small and medium enterprises (SMEs), often constrained by resources and technical capacity, are advised to collaborate actively with others in their area. By joining local heat user groups, SMEs can aggregate their demand, making their case more attractive to developers, investors, and public funders. Supporting proposals for heat networks—especially those led by larger anchor businesses—will also increase the likelihood that SMEs can benefit from geothermal energy as a service, without bearing the full responsibility or risk of ownership. Building knowledge through workshops, case studies, and technical advice will bridge existing information gaps and boost confidence.

LARGE Energy Users:

1. **Identify your heat, cooling and power needs:** Develop a clear picture of how much energy you use, what temperatures are required, and whether demand is continuous or variable. Anchor projects work best where energy use is high and steady throughout the year.
2. **Assess where geothermal could replace fossil fuels:** Look at which processes rely on gas, oil or electricity and where geothermal heat or cooling could be a direct substitute or support multiple uses through heat cascading.
3. **Check geothermal resource availability near your site:** Commission an initial desktop assessment to understand whether shallow or deep geothermal is feasible at your location. In Cornwall, this step is well supported by existing data and expertise.

4. **Engage early with geothermal developers and technical experts:** Early conversations help shape realistic options, costs and timescales. Developers can also advise on whether your site could act as an anchor for a wider heat network.
5. **Explore funding and finance options:** Investigate grants, heat network funding and blended finance. Anchor projects often unlock public funding that would not be accessible to smaller standalone schemes.
6. **Commission a full feasibility study:** A detailed feasibility study will confirm technical design, costs, risks, planning requirements and commercial structure. This is the key decision point before major investment.
7. **Consider your role as an anchor for nearby businesses:** Assess whether surplus heat could be supplied to neighbouring SMEs, estates or food hubs. Exporting heat can improve project economics and strengthen local supply chains.
8. **Develop a robust business case and delivery plan:** Bring together capital costs, operating savings, funding, risk management and potential heat sales. Treat geothermal as a long-term infrastructure investment that supports resilience and growth.

SMEs:

1. **Make your heat/energy demand visible**: Clearly articulate your energy usage, when you need it, what temperature you need and your site longevity (or whether you are willing to relocate).
2. **Form or join a local heat user group**: By collating the above information with other businesses you form a more compelling case for developers, local authorities and funders to invest and support projects.
3. **Express your interest**: Engage with developers, local authorities, energy groups. Respond to consultations on heat networks, energy plans and decarbonisation initiatives.
4. **Support larger businesses or Heat Network Proposals**: There may be a large business local to you willing to act as an anchor load, support them by explaining what your energy offtake would be and make it clear you would connect if it was available.
5. **Be open to buying heat as a service**: For SMEs geothermal works best as a service, not an asset. Be open to long-term heat contracts and shared infrastructure.
6. **Solve real business problems:** Geothermal interest should be framed around reducing exposure to energy prices, improving efficiencies, lowering operational risk and securing long-term affordable energy prices.
7. **Geothermal is happening now:** Operational geothermal projects in Cornwall already exist, use the wealth of expertise and knowledge on your doorstep.

10.2. Public Sector and Sector Intermediaries

Cornwall Council has already taken substantive steps that directly respond to needs identified by stakeholders, and these actions align closely with the objectives of the Great Cornish Food programme. Through its climate, energy, and economic strategies, the Council has established a policy environment in which low-carbon infrastructure is treated as a foundation for wider economic transformation, rather than as an isolated technical intervention. This mirrors Great Cornish Food's emphasis on building a resilient, place-based food economy that is rooted in Cornwall's environmental assets, cultural identity, and local supply chains. By embedding geothermal energy within strategic frameworks such as the Local Area Energy Plan and the Carbon Neutral Cornwall programme, the Council has already begun to normalise the idea that energy infrastructure can actively support food production, processing, and distribution, particularly where year-round heat availability can unlock new forms of agrifood activity.

The Council's role in funding and supporting flagship geothermal demonstrator projects has also been critical in addressing the confidence gap identified by agrifood stakeholders. High-profile initiatives such as the Eden Geothermal project and the United Downs deep geothermal power project have provided tangible, Cornwall-specific evidence that geothermal resources can be accessed safely and productively.

These projects perform an important signalling function. Great Cornish Food consistently highlights the importance of provenance, sustainability, and innovation in strengthening Cornwall's food brand. Council-backed geothermal demonstrations, such as at the Eden Project, contribute to this narrative by showing how locally derived, low-carbon heat can underpin food production systems that are both environmentally credible and pioneering. In doing so, they help create the conditions for agrifood businesses to experiment with new growing, processing, and storage models that align with Great Cornish Food's ambition to grow more value locally and reduce exposure to volatile global supply chains.

Cornwall Council's stewardship of economic development funding further reinforces this alignment. Through programmes such as Good Growth, the Council has already invested in renewable energy, clean growth, and innovation-led infrastructure, including projects that combine geothermal heat with other strategic assets such as mineral extraction and industrial development. This approach resonates strongly with Great Cornish Food's focus on collaboration, shared infrastructure, and cluster-based development. Rather than supporting individual businesses in isolation, the Council's vision creates opportunities for shared facilities, hubs, and anchor projects that can serve multiple producers. For the agrifood sector, this opens up the possibility of geothermal-enabled packhouses, controlled-environment growing, food processing units, or storage facilities that are collectively accessed and that strengthen the overall resilience of Cornwall's food system.

The Council has also demonstrated leadership in aligning land use, economic development, and social value objectives in ways that directly support agrifood priorities. Publicly owned land and rural assets are increasingly managed with explicit expectations around employment, skills, and community benefit. This reflects Great Cornish Food's emphasis on people as well as produce: sustaining rural livelihoods, creating accessible employment, and maintaining vibrant farming and food-producing communities. By recognising the role that geothermal heat can play in enabling year-round production and more stable employment patterns, it has already laid the groundwork for agrifood models that reduce seasonal volatility and support inclusive employment. These outcomes strengthen the social licence for public investment while reinforcing the values that underpin the Great Cornish Food brand.

Cornwall Council's engagement with planning, regulation, and risk management addresses one of the key structural barriers facing both geothermal and agrifood innovation: uncertainty. By working to integrate renewable energy into planning policy, monitoring renewable deployment, and engaging early with regulators, the Council reduces friction for projects that sit at the intersection of food, energy, and land use. This is particularly important for the ambition to encourage innovation across the sector, as smaller businesses are often least able to absorb regulatory complexity or long development timelines. Council leadership in clarifying policy pathways, supporting early-stage feasibility work, and learning from European best practice therefore directly supports the enabling conditions required for geothermal-supported agrifood development to move from concept to delivery.

Looking ahead, Cornwall Council can strengthen this approach by identifying and/or establishing safeguarded areas with geothermal potential that align with existing or emerging agrifood clusters. By identifying and protecting sites where geothermal heat could support concentrations of food production, processing, storage, or distribution, the Council could provide greater long-term certainty for investment and infrastructure planning. This would support the development of shared, geothermal-enabled agrifood hubs that reflect the collaborative, place-based ambitions of Great Cornish Food, while ensuring that strategically important subsurface resources are not constrained by incompatible development. Such an approach would move geothermal from an opportunistic intervention to a planned component of Cornwall's agrifood and energy systems, reinforcing resilience, productivity, and sustainability across the sector.

Unlocking targeted funding for feasibility studies, exploration, and demonstrator projects—including the use of council-owned land—will catalyse broader uptake. Streamlining the planning and regulatory environment, developing clear local guidance, and providing dedicated training for planning officers will help reduce complexity and uncertainty, a major barrier cited by stakeholders. Acting as convenors, public bodies should bring businesses together, foster transparent governance and shared ownership models, and drive data improvements by maintaining up-to-date mapping of agrifood energy demand.

Sector partnerships and funding organisations are encouraged to de-risk early-stage investment in geothermal projects. This may involve supporting insurance products, guarantees, or public underwriting to address drilling and capital risk. Prioritising cluster and anchor projects—where cross-business benefits, resilience, and economic impact are strongest—will ensure resources are allocated effectively. Sharing best practices and lessons learned from operational geothermal projects, both locally and internationally, will help demonstrate viability and encourage wider adoption.

Across all stakeholders, increasing practical knowledge and confidence in geothermal solutions is vital. Plain-English communication of costs, benefits, risks, and proven deployments should be a priority, supported by ongoing monitoring and transparent reporting of pilot projects and feasibility studies. Open feedback channels will allow strategies and approaches to be adjusted in response to real-world outcomes. We hope that the Practical Guide, which accompanies this report will be a step along the way in this work.

Cornwall and the Isles of Scilly can unlock the transformative potential of geothermal energy, strengthening the agrifood sector's resilience, competitiveness, and contribution to regional sustainability.

Let's wake the sleeping giant.

11. Appendices

A. Consultation Results and Participants
B. Stakeholder Mapping Methodology
C. References

11.1. Appendix A: Consultation Results & Participants

The survey consisted of a range of questions to determine businesses energy usage, primary energy consumption and barriers, existing knowledge of geothermal energy and perceptions, perceived barriers to take up and future business plans.

Nine surveys were completed with a range of different businesses; five of these were in addition to the one-to-one consultations.

Business names and locations have been omitted from the table below to anonymise the data.

Form responses: Geothermal energy potential for the agrifood sector in Cornwall – Results

Survey: Geothermal energy potential for the agrifood sector in Cornwall – Fill in form

Eventbrite link for the workshop: Geothermal Energy & Agrifood Workshop Tickets, Mon, 24 Nov 2025 at 14:00 | Eventbrite

	Company size	Do you share your location with any other businesses?	If yes, how many others?	What is your primary product/produce:	What are your main energy needs? (Tick all that apply)	How would you describe your current energy costs?	When do you use the most energy?	*Please explain	Which processes in your business use the most energy? (Tick all that apply)
1	SME	No		Fish and shellfish	Cooling / Freezing; Electricity; Heating;	Increasing concern	Mainly summer	All our production areas as chilled. Freezers, and icemakers work harder in summer and offices need cooling	Refrigeration / cold storage; Blast freezing / rapid cooling;
2	Medium	Yes	2	Brassicas and Courgettes	Heating; Cooling / Chilling; Electricity;	Increasing concern	All year round		Refrigeration / cold storage; Chilling / Storage;
3	SME	No		Dairy processing of milk into clotted cream, butter and bottled milk	Cooling / Chilling; Freezing; Process heat; Heating; Electricity;	Increasing concern	All year round	We have relatively flat milk profile of milk intake so our production energy is consistent. We also have a good strong demand for energy overnight.	Refrigeration / cold storage; Cooking / baking; Washing / cleaning; Chilling / Storage; Blast freezing / rapid cooling;
4	Large	No	NA	Gammon	Heating; Cooling / Chilling; Process heat; Electricity;	Increasing concern	All year round	during the summer Months the refrigeration has to work harder but the volume goes up during the colder months	Refrigeration / cold storage; Blast freezing / rapid cooling; Cooking / baking; Washing / cleaning; Chilling/Storage;
6	SME	Yes	100	Meat and processing	Cooling / Chilling; Freezing; Electricity	Major challenge	Mainly summer	While we do use it all the year round we obviously suck enormous amounts in the warmer months.	Refrigeration / cold storage; Blast freezing / rapid cooling; Cooking / baking; Washing / cleaning; Chilling / Storage

7	Large	No		Dairy Products	Heating; Cooling / Chilling; Process heat; Electricity	Manageable	All year round		Pasteurisation; Refrigeration / cold storage; Blast freezing / rapid cooling; Cooking / baking; Washing / cleaning
8	Micro	No		-	Heating; Cooling / Chilling; Process heat; Electricity	Increasing concern	All year round		Brewing / fermentation; Refrigeration / cold storage
9	Micro	Yes	1 -Gorse Bakery	Botanical Sparkling Beverages	Heating; Cooling / Chilling; Process heat	Manageable	*Specific times	Production days	Pasteurisation; Brewing / fermentation; Refrigeration / cold storage
10	Micro	No		Nut and Seed Spreads	Electricity	Manageable	All year round	Gas used for nut roasting	Other

	What temperature ranges do you typically need? (for processing)	**Are you planning to expand operations or increase energy consumption?**	**Comments**	**Are you interested in, or already use technologies like smart meters, energy storage, or microgrids?**	***If yes, please explain:**	**Would or do you participate in energy efficiency programs or incentives?**	***If yes, which one/s?**	**How familiar are you with geothermal energy?**	**How open would your business be to exploring geothermal energy?**	**Have you considered using geothermal energy in your business before?**
1	Chilled (0–10°C)	No		Maybe		Yes		Somewhat familiar	Somewhat open	No, never considered
2	Chilled (0–10°C)	Yes, within 2–5 years	Not enough capacity on the National Grid so restricted at the moment	*Yes	already some in place	*Yes	depending what was on offer	Heard of it but not sure how it works	Somewhat open	Yes, briefly considered
3	High (>80°C)	Yes, within 2–5 years	We are investing in additional new products which will take more energy	Maybe	We are interested in all new tech as we want to be oof grid for all our energy.	*Yes	We are constantly looking at reducing energy usage and would love to be involved with any other initiatives.	Very familiar	Very open	Yes, seriously considered
4	Chilled (0–10°C)	No		No		*Yes	Carbon desktop/ESOS	Heard of it but not sure how it works	Not sure yet	No, never considered
6	Chilled (0–10°C)	Yes, within 2–5 years		*Yes	Roof panels, heat extraction from motors for hot water.	Maybe		Somewhat familiar	Very open	Yes, briefly considered
7	Medium (40–80°C)	Yes, within 1 year	Approx +50% energy demand in the next 1-3 years	Maybe		*Yes	-	Somewhat familiar	Somewhat open	No, never considered
8	High (>80°C)	Yes, within 1 year		Maybe		*Yes		Somewhat familiar	Very open	Yes, briefly considered
9	Medium (40–80°C)	Yes, within 1 year		*Yes		*Yes		Somewhat familiar	Very open	No, never considered

10	Medium (40–80°C)	No		*Yes		*Yes		Very familiar	Somewhat open	Yes, briefly considered

Which potential benefits would interest you most? (Tick all that apply)	*Please explain1	What barriers or concerns would stop you from using geothermal energy? (Tick all that apply)	Could your processes run on a steady heat supply?	*Please explain2	Would you consider using thermal energy storage (e.g., hot water tanks)?	How important is collaboration with other businesses/energy producers?	What support would make you more likely to adopt geothermal energy? (Tick all that apply)	What is the biggest energy challenge your business faces right now?	Would you like to stay informed about geothermal projects?
Lower, more predictable energy costs; Marketing advantage ("low-carbon" / "sustainably produced"); Contribution to Net Zero goals;		Long payback time	*Partly	Dependent on conversion to chilling		Somewhat important	Grants / incentives; Technical advice; Shared infrastructure options;	Cost	Yes
Lower, more predictable energy costs; Ability to expand production or add new product lines; Marketing advantage ("low-carbon" / "sustainably produced"); Contribution to Net Zero goals;		High upfront costs; Long payback time; Technical or infrastructure challenges; Regulatory or planning hurdles;	Yes	convert to chilling	Yes	Not important	Grants / incentives; Technical advice; Case studies / demonstrations;	lack of electricity on the grid	Yes
Contribution to Net Zero goals; Ability to expand production or add new product lines; Lower, more predictable energy costs; Collaboration with other businesses;	We have land that is suitable for Geothermal and want to unties the electricity and also the thermal load in the water/steam	High upfront costs; Lack of information or expertise;	Yes	Yes, we constantly use energy for heating and cooling. If required we would invest and change our cooling system and move to systems that are	Yes	Somewhat important	Grants / incentives; Technical advice; Shared infrastructure options;	Sustainability I key for any business, and we want a proper solution not a headline grabbing quick fix.	Yes

				able to store the energy.					
Lower, more predictable energy costs; Marketing advantage (“low-carbon” / “sustainably produced”); Contribution to Net Zero goals;		Other;	*Partly	I'm not sure if I'm honest	Maybe	Neutral	Grants / incentives; Low-interest loans; Technical advice; Case studies / demonstrations;	high cost + sustainability goals	Yes
Lower, more predictable energy costs; Contribution to Net Zero goals		Lack of information or expertise	*Partly	Cooling use more than heating	Yes	Somewhat important	Technical advice	Unknown costs and lack of electric supply on our industrial estate for car chargers that we asked for .	Yes
Lower, more predictable energy costs; Marketing advantage (“low-carbon” / “sustainably produced”); Contribution to Net Zero goals	Not just -, but ability to decarbonise to meet targets set by government and customers	High upfront costs; Long payback time; Technical or infrastructure challenges	Yes	-	Yes	Not important	Grants / incentives; Technical advice; Case studies / demonstrations; Other	short term - cost! long term - availability from the grid, decarbonising heat	Yes
Lower, more predictable energy costs; Supply chain resilience (local energy source); Marketing advantage (“low-carbon” / “sustainably produced”); Contribution to Net Zero goals; Potential to sell excess heat/power;		High upfront costs; Long payback time; Technical or infrastructure challenges; Regulatory or planning hurdles; Other	*Partly	Cooling can, heating can't	Yes	Somewhat important	Grants / incentives; Shared infrastructure options	cost, waste	Yes

Collaboration with other businesses									
Collaboration with other businesses; Contribution to Net Zero goals; Marketing advantage (“low-carbon” / “sustainably produced”); Supply chain resilience (local energy source); Improved product quality (stable conditions); Ability to expand production or add new product lines; Lower, more predictable energy costs; Year-round growing capability		High upfront costs; Technical or infrastructure challenges	*Partly		Yes	Very important	Grants / incentives; Technical advice	energy costs	Yes
Marketing advantage (“low-carbon” / “sustainably produced”); Contribution to Net Zero goals		Lack of information or expertise	No	we need brief spells of roasting temp 140 degrees	Maybe	Somewhat important	Low-interest loans; Case studies / demonstrations	Need to find non fossil gas to run our roasters (talk to Bennemann!)	Yes

Any other comments
It would be great to understand more about the opportunity so we can build this into our 3 Year Plan
At this point I'm just looking to understand what is involved and how this may help us.
More needs to be done for getting plain English explanations to business owners who usually are not scientific but, understand outcomes .

Engaged Businesses

Thank you to the businesses and other stakeholders for engaging with us to inform this report.

Atlantic Brewery

Atlantic Energy

Carleys Organics

Cornwall & Isles of Scilly Food Board

Cornwall & Isles of Scilly Economic Forum

Cornwall Council

Cornwall Gateway

Cornish Lithium

Crawford & Company

Crawford & Company

Danish Crown

Eden Project

Geothermal Engineering Ltd

Great Cornish Food

Invertigro

Kensa Heat Pumps

Lynher Dairy

Nonal Drinks

Norton Barton Food Village

Riviera Produce

Roddas Creamery

Treveth Holdings

Trewithian Dairy

Truro and Penwith College

Wing of St Mawes

11.2. Appendix B: Stakeholder Mapping Methodology

No full list of businesses by sector in Cornwall was available commercially at the time of assembling this report. Identification of agrifood businesses therefore required a synthesis of multiple data sources. Companies House data provided an index of businesses with "Cornwall" in their registered office address and their nature of business (SIC codes) including one or more of the following:

Table 11: Agrifood-related SIC codes and descriptions (derived from Companies House, 2025)[xxxv]

SIC	Description	SIC	Description
01110	Growing of cereals (except rice), leguminous crops and oil seeds	10120	Processing and preserving of poultry meat
01120	Growing of rice	10130	Production of meat and poultry meat products
01130	Growing of vegetables and melons, roots and tubers	10200	Processing and preserving of fish, crustaceans and molluscs
01140	Growing of sugar cane	10310	Processing and preserving of potatoes
01150	Growing of tobacco	10320	Manufacture of fruit and vegetable juice
01160	Growing of fibre crops	10390	Other processing and preserving of fruit and vegetables
01190	Growing of other non-perennial crops	10410	Manufacture of oils and fats
01210	Growing of grapes	10420	Manufacture of margarine and similar edible fats
01220	Growing of tropical and subtropical fruits	10511	Liquid milk and cream production
01230	Growing of citrus fruits	10512	Butter and cheese production
01240	Growing of pome fruits and stone fruits	10519	Manufacture of other milk products
01250	Growing of other tree and bush fruits and nuts	10520	Manufacture of ice cream
01260	Growing of oleaginous fruits	10611	Grain milling
01270	Growing of beverage crops	10612	Manufacture of breakfast cereals and cereals-based food
01280	Growing of spices, aromatic, drug and pharmaceutical crops	10620	Manufacture of starches and starch products
01290	Growing of other perennial crops	10710	Manufacture of bread; manufacture of fresh pastry goods and cakes
01300	Plant propagation	10720	Manufacture of rusks and biscuits; manufacture of preserved pastry goods and cakes
01410	Raising of dairy cattle	10730	Manufacture of macaroni, noodles, couscous and similar farinaceous products
01420	Raising of other cattle and buffaloes	10810	Manufacture of sugar
01430	Raising of horses and other equines	10821	Manufacture of cocoa and chocolate confectionery
01450	Raising of sheep and goats	10822	Manufacture of sugar confectionery
01460	Raising of swine/pigs	10831	Tea processing
01470	Raising of poultry	10832	Production of coffee and coffee substitutes
01490	Raising of other animals	10840	Manufacture of condiments and seasonings
01500	Mixed farming	10850	Manufacture of prepared meals and dishes

01610	Support activities for crop production	10860	Manufacture of homogenized food preparations and dietetic food
01621	Farm animal boarding and care	10890	Manufacture of other food products n.e.c.
01630	Post-harvest crop activities	10910	Manufacture of prepared feeds for farm animals
01640	Seed processing for propagation	10920	Manufacture of prepared pet foods
02300	Gathering of wild growing non-wood products	11010	Distilling, rectifying and blending of spirits
03110	Marine fishing	11020	Manufacture of wine from grape
03120	Freshwater fishing	11030	Manufacture of cider and other fruit wines
03210	Marine aquaculture	11040	Manufacture of other non-distilled fermented beverages
03220	Freshwater aquaculture	11050	Manufacture of beer
10110	Processing and preserving of meat	11060	Manufacture of malt
46310	Wholesale of fruit and vegetables	11070	Manufacture of soft drinks; production of mineral waters and other bottled waters
46320	Wholesale of meat and meat products	46350	Wholesale of tobacco products
46330	Wholesale of dairy products, eggs and edible oils and fats	46360	Wholesale of sugar and chocolate and sugar confectionery
46341	Wholesale of fruit and vegetable juices, mineral water and soft drinks	46370	Wholesale of coffee, tea, cocoa and spices
46342	Wholesale of wine, beer, spirits and other alcoholic beverages	46380	Wholesale of other food, including fish, crustaceans and molluscs

These were compiled from multiple searches into a single database for further processing. Businesses with Cornwall in the registered address, but were not located within the county, were removed by filtering postcodes. Businesses linked to SIC codes 01430, 01610, and 01621 were manually checked for relevance to Agrifood and businesses whose operations would likely not require significant heat and/or power, e.g. equipment leasing and storage, were removed from the database.

A significant number of discrepancies were found during manual checking between registered addresses and likely operational centres for businesses in the database. It was key that the latter was mapped as this would be the location of heat demand. Discrepancies were identified by checking duplicate addresses and corrected using web searches, then checked manually where operating sites could be located. Some inaccuracies may remain as a result of operating locations not being disclosed by businesses on official communications. Businesses with no evident online presence were removed from the mapping as the operating location could not be verified. It is therefore crucial that communication channels remain open so that location data can be updated where needed. Each map output features a short disclaimer regarding accuracy and getting in touch to correct if necessary.

“Large” or “Anchor” businesses were identified according to the client’s suggestion, based on knowledge of the agrifood network.

To better understand and represent business heat and power demands, SIC codes are also aggregated within the dataset according to the following table:

Table 12: Aggregated nature of business description

SIC	Description
01110 01120 01130 01140 01150 01160 01190 01210 01220 01230 01240 01250 01260 01280 01290 01300 01410 01420 01430 01450 01460 01470 01490 01500 01610 01621 01630 01640 02300 01270	"Farming" Note: when 01270 accompanied by 10831 and/or 10832, categorised instead as "Tea and Coffee"
03110 03120 03210 03220	"Fishing"
10831 10832	"Tea_Coffee"
10110 10120 10130 10200 10310 10320 10390 10410 10420 10611 10612 10620 10730 10810 10821 10822 10840 10850 10860 10890 10910 10920 11070	"Manufacturing_Processing"
10511 10512 10519 10520	"Dairy"
10710 10720	"Bakery"
46310 46350 46360 46370 46380	"Wholesale"
11010 11020 11030 11040 11050 11060	"Brewery_Distillery"

Coordinates (BNG) were determined by isolating and converting postcodes to eastings and northings. While most agrifood organisations are allocated a unique large user postcode due to delivery volume, some sites may share postcodes. Where this was possible to be identified, e.g. due to shared industrial estate addresses, coordinates were manually corrected by cross-referencing with online mapping. However, for the scope of this project, accuracy within the same postcode area is sufficient. Investigation into individual settlements would necessitate location refinement.

Coordinates and other metadata were then exported into QGIS ver. 3.44.2 "Solothurn" to create visual outputs.

11.3. Appendix C: References

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