EUROPEAN UNION
European Regional Development Fund

United Downs Deep Geothermal Project

Summative Assessment Final Report

Geothermal Engineering Ltd

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1. Introduction

1.1. Project Overview

The United Downs Deep Geothermal Power (UDDGP) project is the UK's first geothermal electricity development. It has been developed, owned and operated by Geothermal Engineering Ltd (GEL) since the company was founded in 2009. The key objectives of the project were:

1. To demonstrate that Cornwall has the potential to generate electricity using the natural heat from the extensive, radiogenic Cornubian granite batholith.
2. To develop a project with high community acceptance, bringing benefits to the local community.
3. To understand the environmental impacts of the full project lifecycle, ensuring future geothermal power projects maximise their environmental benefits.
4. To provide a "living lab" for international research projects to ensure maximum impact on the development of future geothermal projects.
5. To complete the project with an exemplar health and safety record.

Cornwall was chosen for this project as its geology is unique within the UK and for decades it has been considered as a potential geothermal resource. The Cornubian granite batholith stretches from Land's End to Dartmoor and contains a high concentration of heat-producing isotopes such as thorium (Th), uranium (U) and potassium (K). This natural heat production means that the heat flow in southwest England is approximately double the UK average at 120mWm^{-2}, and Cornwall has the highest geothermal gradient in the UK at 33-35°C/km, almost 10°C/km hotter than large parts of the country. Temperature measurements from boreholes across Cornwall allow predictions that temperatures exceed 200°C at depths of 5km throughout the batholith.

To make a geothermal electricity project function, both high temperature and high water flow need to be found. Granite rock is not naturally permeable (water does not easily flow through it), so to find a productive reservoir at depth requires targeting permeable structures (faults and fractures) deep in the rock.

The UDDGP site was chosen as it lies just outside the surface outcrop of the Carnmenellis Granite, close to known hot springs in nearby mines and near enough to the Porthtowan Fault Zone (PTF) to drill into the target fault at a right angle. The PTF is a crosscourse that is believed to extend coast-to-coast from Porthtowan to Falmouth. Its significant length and linearity suggest that it is a near-vertical structure that persists at depth. This made it a good target for a geothermal project. The UDDGP concept was developed by GEL and involves drilling a deep production well and a shallow injection well into the fault zone (Figure 1).

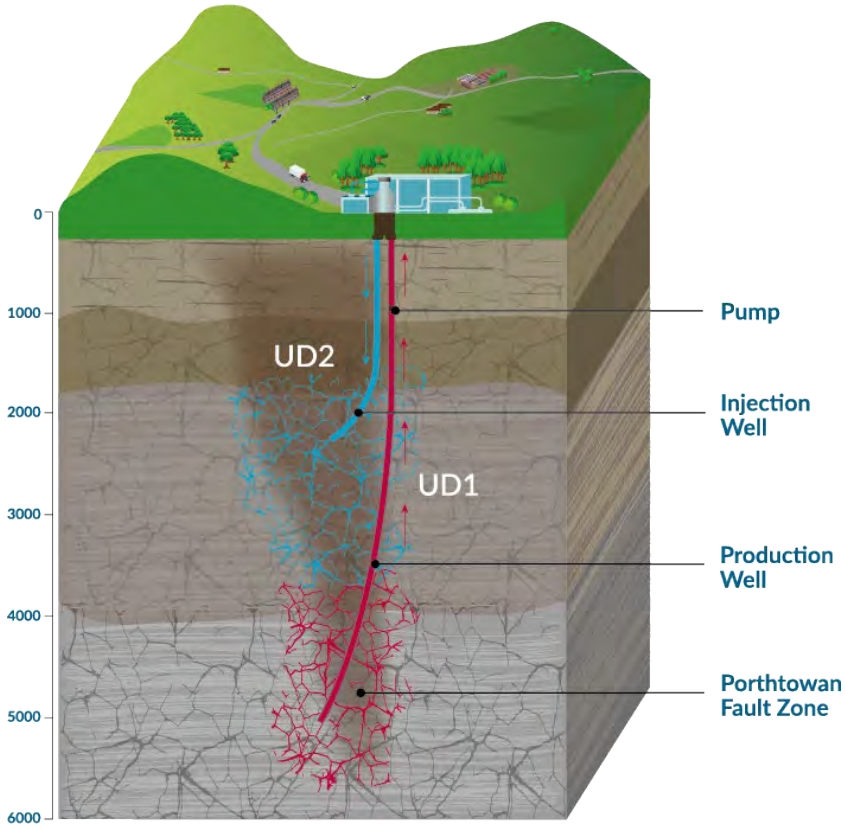

Figure 1. Schematic cross section of the directional wells drilled at United Downs. Both the deep production and shallower injection wells intersect the Porthtowan Fault Zone.

1.2. Project Timeline

An overview of the project timeline is provided in Figure 2.

The United Downs site was acquired by GEL in 2010 after a number of feasibility studies to find an appropriate site. It was selected both for its geological setting and its surface attributes with an existing grid connection, good proximity to access roads and a high likelihood of community acceptance due to its position on an industrial estate. Once all the relevant permits were secured, it then took five years to obtain the appropriate funding from a combination of sources, including the European Regional Development Fund, Cornwall Council and private investors. Final funding agreements were signed in 2017.

Procurement and drilling took place throughout 2018-2019. Contracts for drilling and site equipment were tendered and awarded following European guidelines. Drilling then started on 08 November 2018. In 2019, GEL completed the drilling of two wells. The production well, UD-1, reaches 5,275m MD and is the deepest onshore well in the UK, whilst the injection well, UD-2, reaches 2,393m MD.

Throughout 2020 and 2021, the wells underwent a significant testing and hydraulic stimulation programme whereby water was injected at varying volumes and flow rates into both wells to assess and develop the hydraulic properties of the deep reservoir. The project reached an important milestone at the beginning of July 2021, when an Electrical Submersible Pump (ESP) was lowered into UD-1 and coupled to injection pumps on UD-2 to simulate power plant operation and test the performance of the whole reservoir. The equipment was successfully installed, and the UK's first geothermal steam was produced.

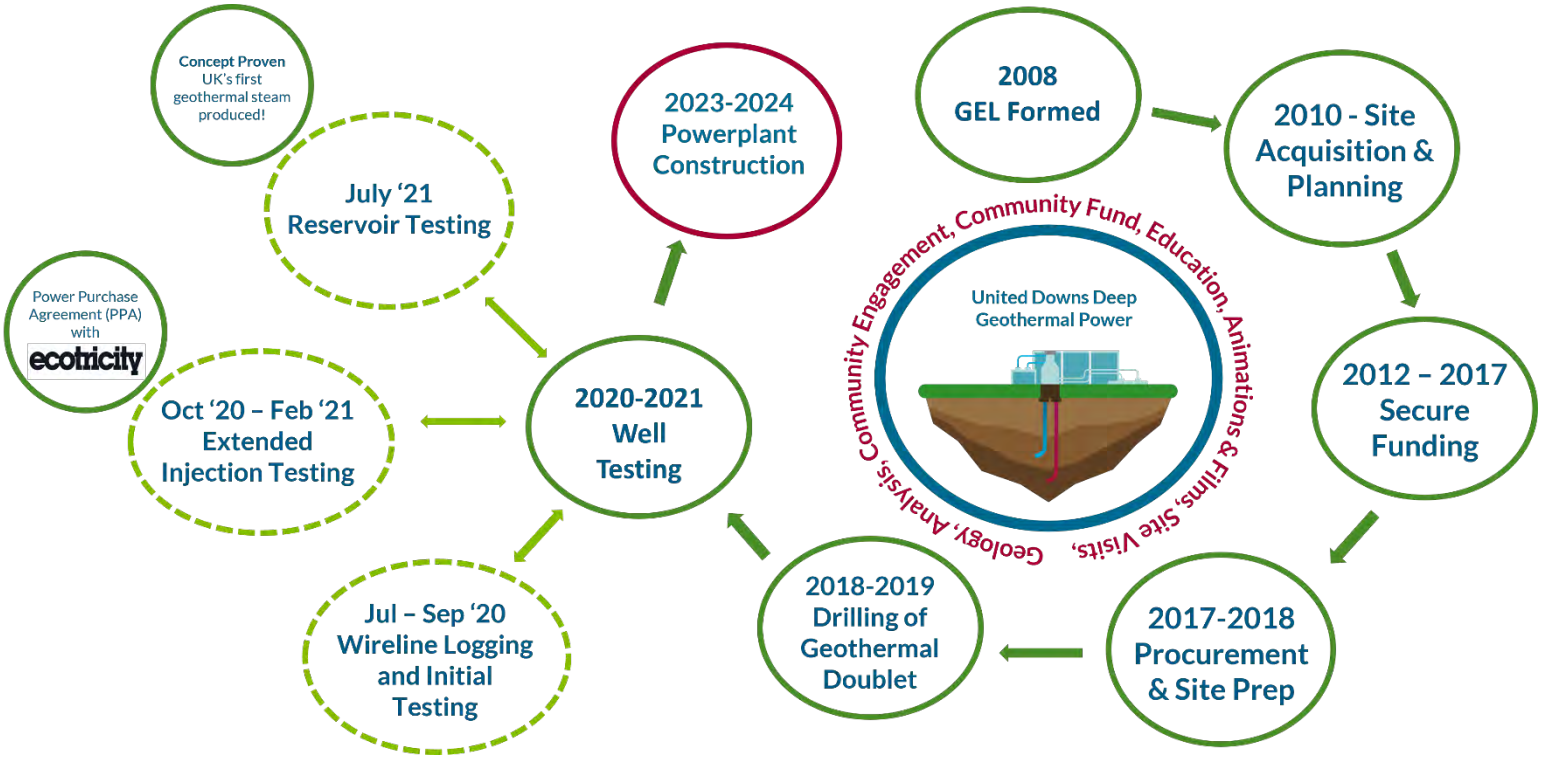

Figure 2. United Downs Deep Geothermal Power project timeline.

1.3. Project Partners

Project Lead

Geothermal Engineering Ltd (GEL)

GEL acts as both Developer and Operator of geothermal heat and power projects in Cornwall. GEL was founded in 2008 with a vision to use the geothermal resources beneath our feet, no matter where in the world, for zero carbon electricity, heating and cooling. It is a company built by a group of like-minded people who believe in sustainability and that geothermal should fill the gap for 24/7 renewable energy production, regardless of the weather.

GEL has been involved in several low-carbon projects across Cornwall, including:

- The United Downs Deep Geothermal Power (UDDGP) project. UDDGP is the first geothermal power project in the country and as such is a landmark project both for Cornwall and the UK.
- Jubilee Pool, Penzance, where GEL developed a low-carbon heat supply to a section of the lido to maintain a water temperature of 35oC year-round.
- Plans to trial a demonstration lithium extraction plant at the UDDGP site, where Direct Lithium Extraction (DLE) technology will be developed to recover lithium from the geothermal water.

As the developer and operator of the UK's first geothermal power plant, GEL is uniquely placed to ensure the success of future geothermal projects across the UK. The company is committed to using the knowledge gained through previous landmark projects to bring geothermal energy to new sites across the Duchy in the near future.

Delivery Partners

University of Plymouth

The University of Plymouth's Sustainable Earth Institute (SEI) connects the university's world leading research and expertise with the wider world. Bringing together researchers from natural and social sciences, engineering, arts, humanities, health and business, the SEI takes an interdisciplinary, systems-thinking approach to help tackle sustainability challenges. For the UDDGP project, SEI provided independent research into the perceptions and attitudes of stakeholders in the project. Their focuses included: (1) trying to understand how people picture the geological subsurface, and what emotions people feel about a geothermal power project; (2) investigating the impact of the media on communications about geothermal, and using state-of-the art software to assess how people access and interpret any new media information; and (3) looking at how to improve communications between companies interested in this new technology and the residents that will live near potential geothermal sites.

British Geological Survey (BGS)

A world-leading independent research organisation providing objective, expert geoscientific data, information and knowledge. Their research includes core geological survey and monitoring work and other innovative projects addressing today's geoscientific challenges driven by the changing needs of our stakeholders. The BGS also work between government, industry and stakeholders to ensure that legislation is fit for purpose to allow the use of geo-energy while simultaneously gaining societal support and ensuring safety and environmental protection.

GeoScience Ltd

GeoScience Ltd provide subsurface engineering, technical support, geomechanics and reservoir solutions for the oil, gas and geothermal industries. GeoScience staff have more than 40 years' experience in research, demonstration and commercial exploitation of geothermal resources of all types and aim to promote geothermal energy as a viable and attractive option for meeting low-carbon heat and power demand in the UK.

1.4. Project Monitoring

The five key objectives outlined in Section 1.1. have been adapted into the following research questions:

1. How can the geothermal resource within the Cornubian Batholith be optimised?
2. What methods of reservoir development are best suited to the fractured granite environment?
3. How can social acceptance be successfully maximised within local communities at every stage of a deep geothermal project?
4. Where do the major areas of environmental concern lie within a deep geothermal project and how can these concerns be mitigated to maximise a project's environmental benefit?
5. How can industry and academia successfully integrate to bring about positive change to support a growing geothermal industry?

To monitor the progress and impact of the project, a number of project milestones and deliverables can be mapped across the identified research questions:

Deliverables	Milestones
How can the geothermal resource within the Cornubian Batholith be optimised?	
D1: Drilling summary report D2: Geological summary report, including Formation Evaluation Log (FEL) for both wells.	M1: Preparation of the site for arrival of drilling equipment. M2: Spud first well. M3: Completion of geothermal doublet. M4: Design of geothermal power plant suitable for resource.
What methods of reservoir development are best suited to the fractured granite environment?	
D3: Injection Testing Reports. D4: Reservoir Testing Report.	M5: Injection testing of geothermal doublet complete. M6: Reservoir testing complete.
How can social acceptance be successfully maximised within local communities at every stage of a deep geothermal project?	
D5: Collation of Public Dissemination Quarterly Reports.	M7: Interact with 25 educational institutions. M8: Achieve over 100,000 social media interactions. M9: Host 50 visits for the local community at UDDGP. M10: Contribute £500,000 to the local economy. M11: Deliver £40,000 in funding to local community projects.
Where do the major areas of environmental concern lie within a deep geothermal project and how can these concerns be mitigated to maximise a project's environmental benefit?	
D6: Completion of Lifecycle Assessment	M12: Selection of suitable consortium to undertake lifecycle assessment of project.
How can industry and academia successfully integrate to bring about positive change to support a growing geothermal industry?	
D7: Completion of research project, including all internal reports and deliverables.	M13: Successful creation of international research consortium. M14: Attendance at five geothermal conferences or workshops.

Table 1. The anticipated deliverables and milestones of the UDDGP project.

2. Project Context

2.1. Cornwall and the Isles of Scilly (CIOS)

Cornwall and the Isle of Scilly (CIOS) is a struggling regional economy with the lowest levels of productivity of any LEP area in England, a reflection of the very low levels of research and development undertaken in the region [CIOS LEP ESIF Strategy p. 24].

One key resource is its natural energy. However, despite extensive, native renewable energy resources, CIOS still imports c. 95% of its energy requirements. In addition, of the c.560 MW of renewable energy generation in the region, only c.1% is owned by the local community, with most of the economic benefit of the generation leaving the region. The CIOS also produced greater CO_2 emissions per capita than the Intergovernmental Panel on Climate Change state is required to minimise the risks of dangerous climate change.

There is great potential for CIOS to (1) harness its natural energy resources to generate renewable energy; (2) develop innovative specialist technologies to capture certain natural energy flows (deep geothermal, wave); and (3) retain ownership of the generation to deliver maximum benefit to the region. Enabling this would deliver economic benefits for the region (business growth, job creation, retention of energy sector profits in the CIOS region, increase in disposable income / GVA); as well as environmental benefits in terms of reduced carbon emissions.

A number of barriers prevent transformation of the energy economy in CIOS. These include:

1) 'Lack of information' (information asymmetry) on how to cost effectively reduce emissions and the high 'transaction costs' involved in acquiring that information
2) 'Innovation deficit': A lack of local innovative activity (this is particularly true of low carbon product and service innovation as markets fail to offer sufficient incentives for the development of low-carbon technologies due to the systematic mispricing of carbon in the economy)
3) A lack of network infrastructure to support adoption of local carbon behaviours and low carbon technologies (the 'network effects' market failure) such as smart grids and electric vehicle charging points.
4) The leakage of energy value from the CIOS economy due to the lack of local investors/capital able develop energy projects

2.2. Geothermal Demand

As the UK moves towards net zero emissions by 2050, it is imperative that new, renewable sources of energy are identified and utilised across the country. Whilst solar and wind power have been an increasing part of the UK energy mix (*Figure 3*), they are an intermittent technology, reliant on weather and time of day.

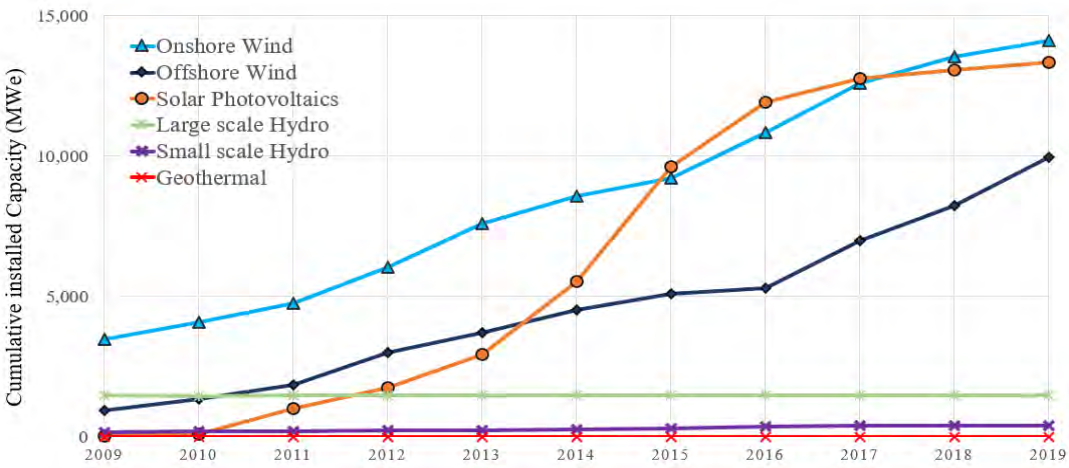

Figure 3. Comparison of renewable energy growth in the UK between 2009 and 2019.

The benefit of geothermal energy is that it provides baseload power with a smaller surface footprint than other renewable energy sources. It also produces renewable heat, which is a valuable by-product that can be used for heating and cooling anything from commercial greenhouses to industrial warehouses. Heating and hot water for UK buildings make up around 40% of energy consumption and nearly a third of greenhouse gas emissions. Delivery of renewable heat is therefore a critical component of UK climate and energy policy, and the UK needs a stable, reliable, resilient, and local source of baseload heat[1].

Fortunately, the UK is well suited to deep geothermal heating projects, with the United Downs site acting as a key demonstration of UK geothermal potential. Where the current hurdles related to geothermal exploration can be overcome, it is believed that it would be possible to deliver 3 to 4 projects per year over the next 30 years. This would result in around 100+ projects being delivered by 2050. At this rate of growth, the UK could be generating up to 2,800 GWh of heat and 300 GWh of electricity annually, resulting in carbon savings of up to 550,000 tons per year (*Figure 4*).

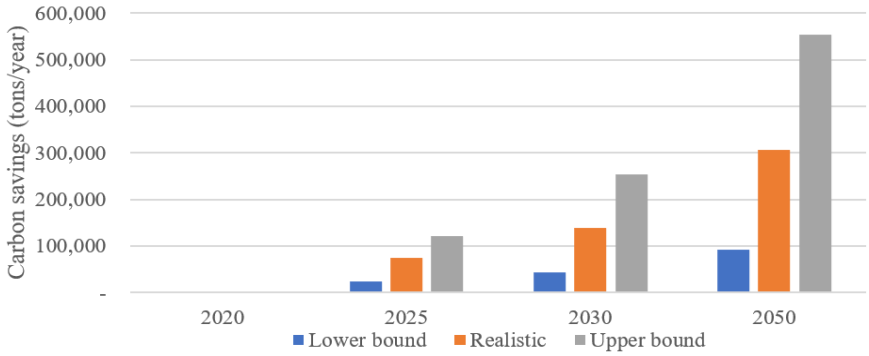

Figure 4. Potential carbon savings with increasing project delivery through time.

Despite the immature market, the UK is well positioned to rapidly expand by harnessing the skills and talent pool of established related industries. Skills and knowledge developed in the oil and gas industry are directly transferable to deep geothermal projects, in particular deep drilling expertise. The growth of the UK geothermal industry would provide a significant boost to employment, both directly (*Figure 5*) and indirectly, with estimates from mature geothermal markets of geothermal heating projects producing up to 30 direct jobs, and power projects

[1] Renewable Energy Association (2021) Deep Geothermal Energy. Economic Decarbonisation Opportunities for the United Kingdom. Available here.

producing up to 100. Opportunities for the UK to manufacture essential drilling components would also provide a welcome economic boost, particularly in northern steel-manufacturing cities.

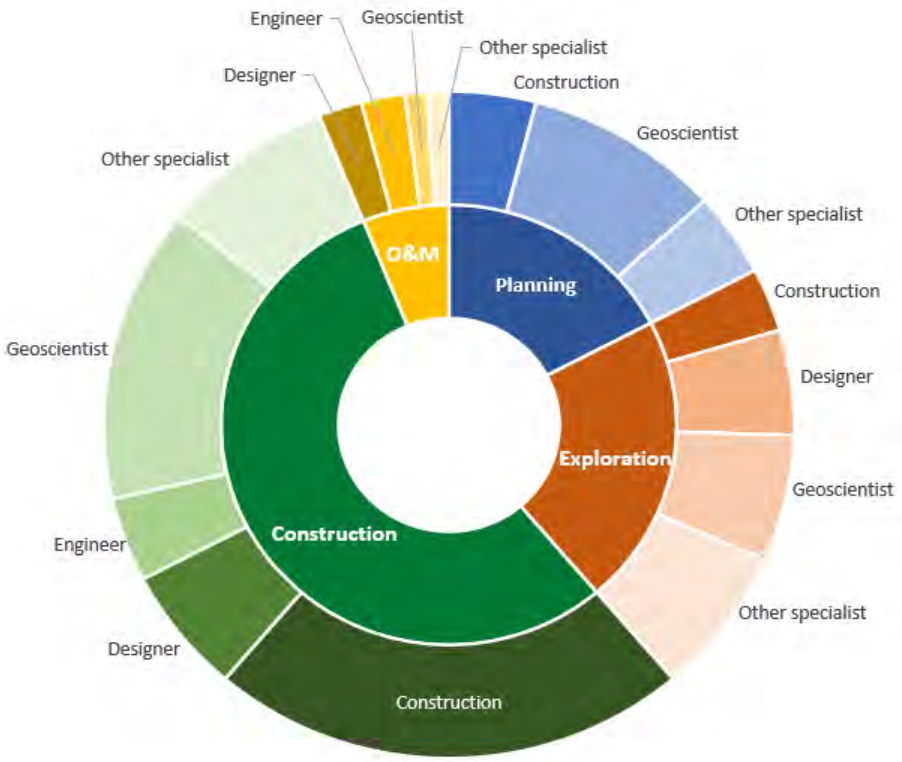

Figure 5. Example of direct job creation for a typical deep geothermal project[1].

2.3. Previous Work

The UDDGP project sought to prove that geothermal power production was possible in Cornwall by drilling, testing and developing two deep geothermal wells at the United Downs Industrial Estate near Truro. The project is the natural progression of the original Cornish Hot Dry Rocks (HDR) project undertaken in the 1980s at Rosemanowes quarry.

Rosemanowes was a pioneering research project associated with the Camborne School of Mines, designed to test and prove the theory of inducing a fracture network within the heat-producing granite to create a geothermal reservoir. It consisted of three phases:

1. Drilling 300m boreholes to demonstrate that water circulation could be established between boreholes following hydraulic stimulation of natural fractures.
2. Investigation of reservoir development at ~2km depth. Targets for a commercial system were set at 210°C, flow rate of ~100 l/s and maximum water loss of 10%.
3. Investigation of techniques for enhancing the deep reservoir to improve its performance.

Temperatures were significant but water losses of about 70% were observed during circulation. The analysis of microseismic event locations suggested that this high loss was associated with the downward growth of the reservoir to depths of around 3 to 3.5 km.

It was clear that permeability and circulation at depth in the granite was achievable, but before this could be tested at greater depth and taking into account the water loss data, funding was pulled, and the project effectively shelved.

In 2009, GEL picked up where Rosemanowes left off, identifying a more promising site on a significant permeability structure, and tweaking the well design to exploit this natural fracture network in a new way.

2.4. Economic & Policy Context

At the time the project was designed, the policy context was geared towards producing renewable baseload electricity. Renewable heat was not deemed to be as important. Since the project was started, policy has been shifting towards renewable heat supply and deployment. Further, the economic context has also changed after the war in Ukraine caused an increase in energy prices. Securing long term contracts for heat and power has now become more important for both the public and private sector.

The principal market failure was that no private investors would finance the drilling and testing phases of a deep geothermal project in Cornwall due to the perceived risk of such a project. This was because geothermal electricity production had never been proven in the UK and no entities had drilled to the depths required for electricity production in the region. To de-risk a project in a region with no previous successful projects would usually require detailed exploration via test drilling into the reservoir or geophysical surveys to image the reservoir. However, test drilling into fractured granite to the depths required to prove a viable resource would be almost as expensive as drilling full wells for power generation. Furthermore, geophysical exploration had proven ineffective to build confidence in a deep target within the granite due to the lack of contrast in the physical properties of the subsurface.

Figure 6 illustrates the problem. The generally accepted risk profile for a deep geothermal power project shows it to be high risk until the resource is “proven” via test drilling or exploration. For a project where these options are extremely expensive or unlikely to provide confidence, the majority of the cost of the project would need to be financed prior to any substantial risk reduction.

In order to reduce the risk of geothermal electricity production in the UK and leverage future private investment, deep wells needed to be drilled and the Cornish geothermal resource proven.

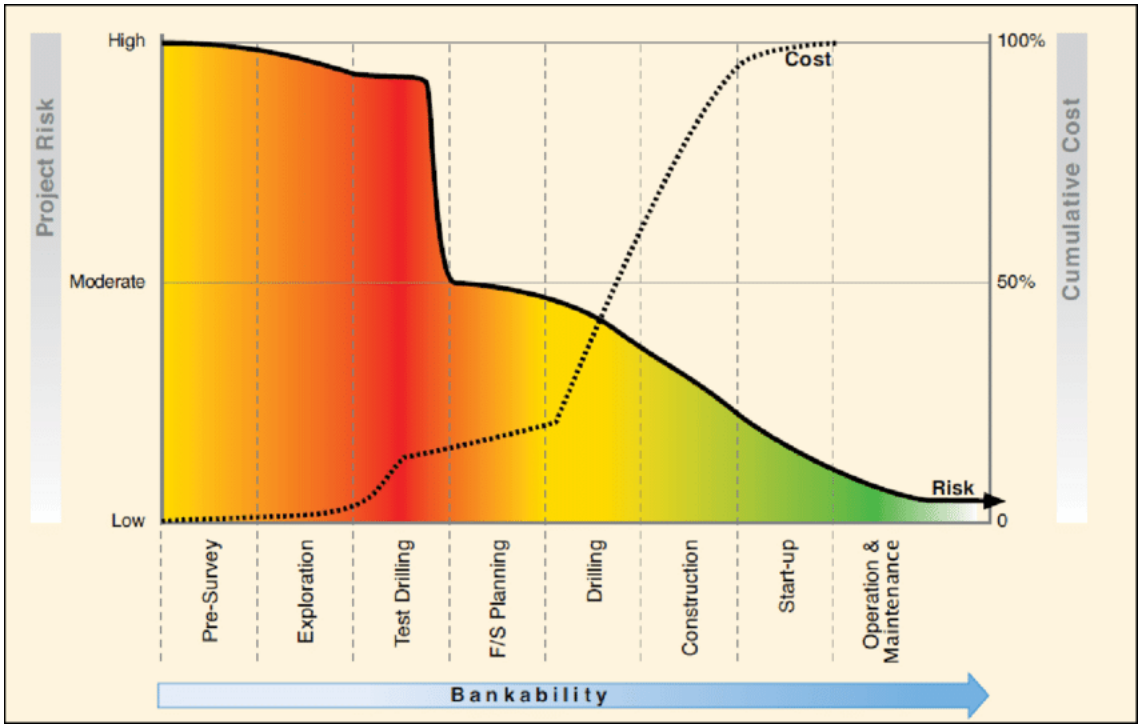

Figure 6. Geothermal project risk and cumulative investment cost.

2.5. Adapting to a Changing Backdrop

The project was designed to drill and test two deep geothermal wells. One deep well for production and one shallower one for injection. The testing and development of these wells was critical to meet the objectives of the project (namely to demonstrate that geothermal power was possible). The target of proving the geothermal resource was both realistic and achievable.

There were a number of changes during the project which exerted severe pressures on delivery. The four major changes were:

- Brexit impacted procurement for UDDGP and funding for associated research projects, adding uncertainty and significant administrative burden.
- Covid-19 affected the ability of the project to deliver on time, caused major delays in procurement and altered the available methods of community engagement for the project.
- Deep drilling into unknown geology led to delays and increases in the budget.
- The war in Ukraine led to supply chain problems and inflationary impacts on power plant machinery.

The project is still expected to perform against the aim of proving that geothermal electricity generation is possible in the UK. However, it has been difficult to deliver all anticipated deliverables within the original timeframe.

3. Project Progress

3.1. Project Summary

The United Downs site was acquired by GEL in 2010 after a number of feasibility studies to find an appropriate site. It was selected both for its geological setting and its surface attributes with existing grid connection, close proximity to access roads and limited anticipated impact on the local communities. Once all the relevant permits were secured, it then took five years to obtain the appropriate funding from a combination of the European Regional Development Fund, Cornwall Council and private investors, with the final funding agreements signed in 2017.

Contracts for drilling and site equipment were tendered and awarded in 2018 following European guidelines. Drilling then started on 08 November 2018 with UD-1, the production well, and drilling of the injection well started on 11 May 2019, reaching TD on 29th June 2019 (Figure 7).

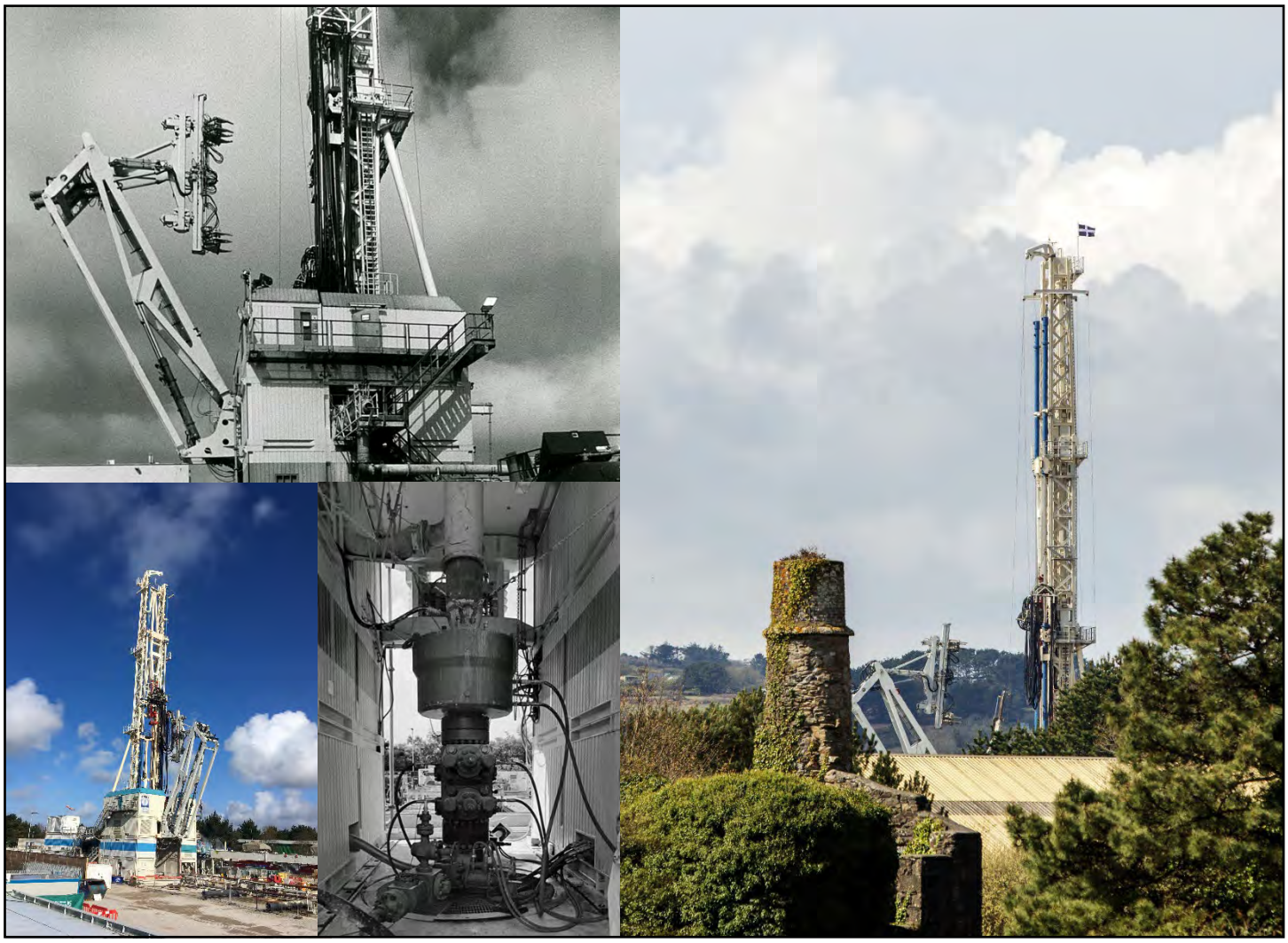

Figure 7. Photos of the main drilling rig (Innovarig) on site from November 2018 to June 2019

A summary of each well is provided in Table 2.

Item	UD-1	UD-2
Well Classification	Geothermal – Production Well	Geothermal – Injection Well
Target	Porthtowan Fault Zone	
Completion	8½" openhole	8½" openhole
Reservoir Rock Type	Fractured Granite	
Temperature	188°C at 5,275m MD	N/A
Well Depth	5,275 m MD (5,057.6 m TVD bGL)	2,393 m MD (2,214 m TVD bGL)
Casing Depths (MD bGL)	18⅝" casing to 244.8 m 13⅜" casing to 899 m 9⅝" to 3,985 m	13⅜" casing to 804 m 9⅝" to 1,820 m

Table 2. Key parameters for the wells at United Downs.

From August 2020 to July 2021, despite inevitable setbacks and delays caused by the Covid-19 pandemic, both wells have undergone a series of injection tests to analyse the hydraulic environment of the reservoir and stimulate the near and far field to ultimately improve productivity/ injectivity (Figure 8). The purpose of this period of testing was to:

- Define the injectivity of the fractures to gain a greater understanding of the character of the granite reservoir and the target fault.
- Improve the injectivity/ productivity of the reservoir using hydraulic stimulation to achieve sufficient flow rates to sustain the power plant.
- Monitor any injection-induced seismicity to map the growth of the reservoir during stimulation.
- Understand safe flow rate levels (pressure and volume) to inform any future well treatment
- 'Destress' the reservoir to prevent microseismic events occurring during long term operation

In addition, in July 2021, full reservoir testing (simultaneous production and injection) was undertaken for seven days (Figure 9). An Electrical Submersible Pump (ESP) was lowered to a depth of approximately 1 km into UD-1 and coupled to injection pumps on UD-2 to simulate power plant operation and test the performance of the whole reservoir. Successful testing enabled GEL to move forward with the purchase of a power plant, with plant construction during 2023-2024.

To date, all operations on site have occurred with zero accidents or incidents, maintaining a perfect health and safety record.

Figure 8. Photos of the initial well testing phase with additional workover rig on site.

Rig 50 on site and rigging up

Hartmann master valve on UD-1 prior to testing

Steam separator arrives on site for installation

View from GEL office of site set-up before testing

During testing, steam was visible from both the steam separator and outflow into the lagoon

Figure 9. Photos taken during final reservoir testing at UDDGP during summer 2021.

3.2. Engagement with Local Stakeholders

As part of the ongoing extensive public engagement exercise for the project, a locally based Community Engagement Manager (CEM) was recruited 5 months before drilling commenced. Bringing local knowledge and experience of working with communities in areas close to the drilling site reduced the amount of research needed to identify who the "community" were and where to find them.

The CEM has followed two main avenues of community engagement: inviting the community to the drilling site for talks and tours, and visiting existing community functions and events to interact with attendees. Information dissemination used an array of visual and written information available electronically and in paper format (Figure 10). The Covid-19 pandemic changed the way information could be distributed when all face-to-face contact had to be stopped. Social media became the medium for widespread information dissemination and project updates. As communities began to meet again, the CEM returned to pre-covid-19 practices in a staged approach.

Furthermore, engaging with education establishments gave an opportunity for a pyramid-style dissemination of information, where students take information home and share it with their families. Careers education has been fundamental and is now approximately 50% of all educational interaction, encouraging students to look at the diverse opportunities in geothermal power and heat projects and not just the obvious ones. Giving back to the community in the form of a grant programme has also brought cohesion to local groups that may not have otherwise been possible.

As a result of the community engagement programme, the United Downs project has been able to progress without demonstrations or mass complaints. This has highlighted that community engagement is an integral part of geothermal projects and the CEM will continue to develop best practice community engagement programmes for future GEL projects.

Figure 10. A selection of photographs from community engagement events hosted or attended by GEL staff.

For more information about community engagement throughout the project, the Public Dissemination Quarterly Reports from the past two full years (2021-2022) have been included at Appendix A.

3.3. Interactions with Academia

Throughout drilling and testing, a number of research projects have been associated with the United Downs geothermal project to help further the understanding of the resource and apply lessons learnt more generally to geothermal systems in fractured granite. These have included:

- Science for Clean Energy (S4CE) – EU Horizon 2020
- Multi-sites EGS Demonstration (MEET) – EU Horizon 2020
- Geothermal Power Generated from UK Granites (GWatt) – UK NERC
- Optimisation of Geothermal Drilling Operations with Machine Learning (OptiDrill) – Horizon 2020

More recently, interest has grown in the potential for critical raw material extraction from geothermal fluids and the use of geothermal energy to decarbonise district heating systems and facilitate underground thermal storage. In 2022-23, United Downs joined three new Horizon Europe projects investigating these areas of interest:

- Raw materials from geothermal fluids: Occurrence, Enrichment, Extraction (CRM-Geothermal) – Horizon Europe
- creation of a Single Access Point for information to increase uptake of geothermal district Heating and cooling networks across Europe (SAPHEA) – Horizon Europe
- Piloting Underground Seasonal Heat Storage In geothermal reservoirs (PUSH-IT) – Horizon Europe

3.4. Project Additionality

The UDDGP project has successfully reached numerous milestones over the past three years, with the drilling of the deepest onshore well in the UK, extended testing of the geothermal doublet, successful production of the country's first geothermal steam and the signing of the UK's first Power Purchase Agreement for the sale of geothermal electricity. It is truly a pioneering project, demonstrating the incredible potential that this renewable energy source offers and paving the way for the expansion of a new industry for Cornwall and the country.

Beyond it's intended impacts, the project also created substantial additionality:

1. Proof and testing of Direct Lithium Extraction technology from the deep geothermal water. Cornwall hosts one of only five large-scale, lithium-enriched granites in the world (USGS), making it an exceptional source of lithium for the growing battery industry. UDDGP has proven world-class lithium concentrations of more than 260ppm in the deep geothermal reservoir. The water from the United Downs was tested during 2021/22 and sent around the world to different DLE providers. A £3m grant was provided via the Getting Building Fund to trial technology on site (2022) and the results showed that 90% of the lithium could be extracted. There are now plans for a privately funded expansion of lithium extraction at the site, representing more than £30m of investment.
2. The Government announced (mid-May 2023) £22m of investment into the UK's first deep geothermal district heating network which will be supplied from the United Downs project. The heat main project is being led by Cornwall Council, and will provide heat to thousands of homes at Langarth Garden Village, as well as to a hospital and schools in the area. It therefore supports decarbonisation of a significant volume of heat demand (circa 10MWth) in central Cornwall.
3. The UDDGP has been, and continues to be, involved with a large number of research programmes. It has been associated with multiple Horizon 2020 research programmes worth a total of £30m.
4. GEL is going to expand its geothermal operations in Cornwall and has secured planning permission for two more sites during 2022/23. These will produce more power than United Downs, provide more heat and, potentially, extract more lithium. GEL is raising £120m of private funding to do this.

3.5. Media Profile

The project has had and continues to maintain a high media profile (Figure 11). It has acted as a strong advertisement for geothermal development in Cornwall and the ERDF.

Figure 11. A collection of the press coverage of UDDGP.

Part of this national engagement has also included a visit from HRH Princess Anne, who visited the site in 2019 for over an hour and met the entire team, local councillors, the ERDF management team, local MPs, UK Government Ministers, the Governor of Montserrat and hundreds of schoolchildren.

Figure 12. A collection of photos from HRH Princess Anne's visit to UDDGP.

3.6. Measures of Project Success

The project has delivered in terms of spend (Table 3) and has proven that geothermal electricity generation is possible in Cornwall. The project will over deliver in terms of outputs as it will now produce geothermal electricity, plus renewable heat and low-carbon lithium via Direct Lithium Extraction (DLE) in 2024.

The key factors in consideration of this performance are:

- The deep drilling operations were spend intensive and the project overspent during those stages.

- The production of deep geothermal steam at over 160ºC at the site, coupled with successful simultaneous production and injection of this geothermal water, proved that electricity generation was possible. Electricity generation requires in the region of 125ºC to function.
- Cornwall Council has (February 2023) received a £22m grant from UK Central Gov't (DESNZ) for a 6 km heat main to connect the United Downs site with the Langarth Garden village and an existing hospital. This will deliver the heat network.
- The deep geothermal water has been extensively tested and found to contain very high concentrations of lithium. Work has been undertaken at site to extract the lithium using Direct Lithium Extraction technology. Over 90% of the lithium was successfully extracted and plans are now in place for a 1,000 tonnes per annum extraction facility. This will leverage £30m of private investment.

The addition of the heat network and the Direct Lithium Extraction facility will mean that the project will not draw to a close for another 2 years. It has, however, achieved much more than it originally set out to do. The project is set to run for at least 25 years. Permanent lithium production will start in late 2024. The heat network will deliver increasing amounts of heat from 2025/6 as more of the houses are built and connect to the network.

Indicator	Targets		Performance at Time of Evaluation		Projected Performance at Project Closure		Overall Assessment
	Original	Adjusted (if relevant)	No.	% of Target	No.	% of Target	
Capital Expenditure (£m)	£17,982,390.00	£28,642,185.00	£28,843,604.4	**101%**	£39,843,604.4	**139%**	
Revenue Expenditure (£m)	£0.00	£3,482,815.00	£3,665,317.66	**105%**	£3,665,317.66	**105%**	
C1: Number of Enterprises Receiving Support	3	3	3	**100%**	3	**100%**	
C2: Number of enterprising receiving non-financial support	1	1	1	**100%**	1	**100%**	

Table 3. Spend and Output Performance

4. Project Delivery & Management

The project was successfully delivered with no Health and Safety issues on site during the entirety of operations. This included during drilling of the UK's deepest well and testing of water on site at over 160°C at surface.

The project delivered to a high standard and excelled in community engagement and education. Further, the management team also successfully ran and completed a number of international research projects linked to the site during drilling operations with over 26 Universities from across Europe.

The project delivery could have been improved by having a larger team during operations (particularly on contract and grant management) but did not have sufficient Revenue budget to do so.

The project was very well received by the local community, local schools and universities, all of whom were fully engaged during the project. The local economy also benefitted as the project spent over £1.5m within a 10km radius of the site.

5. Project Outcomes & Impacts

A copy of the project logic model is provided at Appendix B – UDDGP Project Logic Model.

5.1. Completion of Major Objectives

The UDDGP project has successfully achieved its five major objectives:

- To demonstrate that Cornwall has the potential to generate electricity using the natural heat from the extensive, radiogenic Cornubian granite batholith.
- To develop a project with high community acceptance, bringing benefits to the local community.
- To understand the environmental impacts of the full project lifecycle, ensuring future geothermal power projects maximise their environmental benefits.
- To provide a "living lab" for international research projects to ensure maximum impact on the development of future geothermal projects.
- To complete the project with an exemplar health and safety record.

Furthermore, D1-7 and M1-14 have almost all been achieved or exceeded, as shown in Table 4 and Table 5.

Deliverables	Status
D1: Drilling summary report	Completed
D2: Geological summary report, including Formation Evaluation Log (FEL) for both wells.	Completed
D3: Injection Testing Reports.	Completed
D4: Reservoir Testing Report.	Completed
D5: Collation of Public Dissemination Quarterly Reports.	Completed
D6: Lifecycle Assessment	Completed
D7: Completion of research project, including all internal reports and deliverables.	2 completed, 5 in progress

Table 4. Status of project deliverables.

Milestones	Status
M1: Preparation of the site for arrival of drilling equipment.	Completed
M2: Spud first well.	Completed
M3: Completion of geothermal doublet.	Completed
M4: Construction and commissioning of power plant.	In progress

M5: Injection testing of geothermal doublet complete.	Completed
M6: Reservoir testing complete.	Completed
M7: Interact with 25 educational institutions.	>60 interactions. Exceeded
M8: Achieve over 100,000 social media interactions.	>500,000 interactions. Exceeded
M9: Host 50 visits for the local community at UDDGP.	>100 visits. Exceeded
M10: Contribute £500,000 to the local economy.	> £1.5m spent. Exceeded
M11: Deliver £40,000 in funding to local community projects.	Completed
M12: Selection of suitable consortium to undertake lifecycle assessment of project.	Completed
M13: Successful creation of international research consortium.	Completed
M14: Attendance at five geothermal conferences or workshops.	Completed

Table 5. Status of project milestones

The UDDGP project has had the following major outcomes:

- The project will also produce renewable heat for Langarth Garden Village and zero carbon lithium, neither of which were anticipated in the original model. This represents circa 10MWth of zero carbon heat.
- The success on social acceptance, education and community outreach was directly attributable to project activities. The outreach programme was much greater than originally planned and the public interest was much larger than expected with extensive media coverage and a Royal visit from HRH Princess Anne.
- The project spent over £1.5m within 10km of the project site. The outcomes (CO_2 savings) are far greater than originally set out due to the addition of a large heat network at the site.
- The local spend was tracked and can be quantified. The additional CO_2 savings from the heat network can also be quantified in a robust way.
- The project will add to the CO_2 reductions associated with the ERDF programme

The main source of strategic added value has been the creation of two new industries in Cornwall: the deep geothermal sector (the developer now has planning permission for two additional power generation sites and is raising £120m from private funding to develop them) and the zero-carbon lithium mining sector which is growing at pace in Cornwall.

5.2. Project Lifecycle Assessment

A comprehensive and detailed Life Cycle Assessment (LCA) study was undertaken by Paulillo et al. (2020) during the course of the S4CE research project. The study used site-specific data to quantify the potential environmental impacts of the UDDGP and of geothermal energy in the UK in general, in terms of a base case and nine alternative scenarios. The hot spot analysis revealed that the greatest portion of environmental impacts originates in the construction phase, from steel used for the wells casing and diesel consumed during drilling. Therefore, strategies to improve the environmental efficiency of deep geothermal should at first focus on extending the lifetime and reducing or replacing with more sustainable alternative diesel and steel. The results are consistent with the few available LCA results for enhanced geothermal plants across the world.

The scenarios developed to address uncertainties on geological conditions and final configuration of the power plant highlight that:

i) Both an increase in the installed capacity from 1 to 3 MW and cogeneration of heat and power can substantially increase the environmental performance;

ii) Whilst chemical stimulation yields negligible contributions to the environmental footprint, both hydraulic stimulation and construction of a two-legged well can each increase the environmental impacts by ~10-20%; and

iii) Different configurations of wells pumps significantly affect the environmental performance, suggesting that, when possible, pumps should be avoided.

The results allow a comparison of the environmental performance of the UDDGP project, and by extension of the UK geothermal energy, against other energy sources. The comparison highlighted clear trade-offs between environmental categories. Based on our results, geothermal energy should be the third most environmentally benign option after nuclear pressurised water reactors and offshore wind farms, if the ultimate objective is reducing carbon emissions. Future work should focus on evaluating in detail the merits of the strategies mentioned above to reduce the environmental impacts of geothermal energy.

5.3. Community Acceptance

Since its inception in 2017, GEL's community engagement programme has been extremely important for the successful continuation of the United Downs geothermal project. From an early stage it was established that time, effort and a personal approach were critical to finding the extent of the community and reaching a diverse range of its members.

Dissemination of information has taken various forms (via public visits to the GEL site, external presentations to interested groups, exhibitions at public events, and information en-masse via printed flyers, online resources and the wider media), and was largely governed by the type of audience or event. Meeting members of the local community at externally organised events has been very important in that it not only allowed up-to-date information to be distributed, but also allowed GEL's Community Engagement Manager to become a trusted part of the community. The launch of public drop-in sessions, with more informal visits tailored to a small group, also proved to be one of the best forms of community engagement. Through giving community members the opportunity to understand the project in a targeted and engaging manner, and discuss any aspect of the project with the relevant members of the team, GEL has become renowned for its friendly welcome and hospitality.

The education programme has been a multifaceted success, helping education establishments meet requirements to work with local businesses as well as enhancing the learning experience of students, who have been given an insight into Cornwall's new and growing geothermal power and heat industry. Careers events have also been a successful addition to the education programme, helping students to discover the plethora of job opportunities available in the renewable energy sector.

In addition to information communication and education aspect of community engagement, GEL has made sure to use services and resources as close to the project site as possible, and established a significant community fund, to ensure that as many benefits as possible are experienced within the local economy.

The Covid-19 pandemic has created new ways of engaging with the community, with increased use of virtual information dissemination methods crucial to maintaining ongoing connections with community members. As a result, GEL's resources are now available to a wider audience both within and beyond the local community. A blended approach of in-person and virtual engagement will continue to be a key part of GEL's strategy in the development of future sites in Cornwall.

6. Project Value for Money

The project has kick-started the deep geothermal and direct lithium extraction industry in Cornwall. The project not only proved the deep geothermal resource and high lithium contents but also had a very high media profile. It is seen across Europe as one of the leading deep geothermal projects and hence selected for multiple geothermal research projects (over £30m in linked Horizon 2020 projects).

More recently, it has helped to drive public and private investment into the sector in Cornwall to include:

- Getting Building Fund (£3m for lithium trials at the United Downs site)
- £15m private investment from Kerogen Capital and Thrive Renewables plc (February 2023)
- £120m private funding currently being raised for future geothermal project development
- £22m investment from DESNZ for a heat network (February 2023)
- £12m investment from the Automotive Transformation Fund for direct lithium expansion (in progress)

Overall, the UDDGP will have leveraged over 10 times the ERDF intervention in additional funding.

7. Conclusions & Lessons Learnt

The United Downs geothermal power project has successfully reached a number of milestones over the past three years, with the drilling of the deepest onshore well in the UK, extended testing of both geothermal wells, successful production of the country's first geothermal steam and the signing of the UK's first Power Purchase Agreement for the sale of geothermal electricity. It is a pioneering project, demonstrating the incredible potential that this renewable energy source offers and paving the way for the expansion of a new industry for Cornwall and the country. Beyond its initial scope, it has also brought the UK's lowest carbon heat network along with kick starting a spin off industry of zero carbon lithium extraction.

The strengths of the project have been:

- A continual high media profile, growing interest in the industry from the UK government, private investors and the global and local communities.
- Extensive education and community engagement programme, engaging with over 60 education establishments, 4000 members of the public, and gaining over half a million impressions on social media.
- Cooperating with seven international research projects (3 started in 2022-23),
- Higher CO_2 savings than originally planned due to the addition of the UK's lowest carbon heat network and Direct Lithium Extraction projects.

It was difficult to deliver the deep drilling and testing on time and on budget due to a number of factors, including:

- The nature of day rate deep drilling contracts (not fixed costs).
- The impact of external events such Brexit, Covid-19, and the war in Ukraine.
- Additional project strands which were not foreseen at the project outset.

Overall, although the project has been more successful than originally planned, it was very difficult to deliver during the drilling phases due to the rapidly changing nature of expenditure. This was challenging to fit into the structures of the ERDF and the associated time required to review project change requests. In hindsight, the ERDF process is probably better suited to more conventional projects that can be delivered under standardised EPC based contracts as opposed to higher risk, sub-surface day rate contracts.

Appendix A – Public Dissemination Quarterly Reports 2021-2022

European Union
European Regional Development Fund

GEL Geothermal Engineering Ltd

ITT: Public Dissemination Quarterly Report 1st January – 31st March 2021
Version: FINAL

United Downs Deep Geothermal Power Project

Public Dissemination Quarterly Report
1st January – 31st March 2021

UNITED DOWNS
DEEP GEOTHERMAL POWER

Project Name	**United Downs Deep Geothermal Power Project**
Project Reference Number	**CC563 UDDGP**
Date of Issue	**31st March 2021**
Version	**FINAL**

0

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1 Introduction

GEL is committed to informing the public about the United Downs Deep Geothermal Power project and endeavours to disseminate information fairly and transparently. Public events, site visits, conferences and school visits were arranged and attended regularly prior to the outbreak of the Covid-19 pandemic. However, during these extraordinary times, to reach both a local and wider audience social media platforms, Twitter, Facebook and YouTube have continued to be used along with direct email updates to the four local parish councils and community group leaders. In addition to this, webinars for strategic local people and service providers have been run specifically covering the geothermal testing phase. Virtual talks have also continued this quarter.

As it has not been possible to visit schools and career fairs, GEL continues to make the education animations available for families to use at home. New contacts are being made with primary and secondary school teachers so that the education programme can be updated and made relevant to the current curriculum.

In readiness for future site visits, all display information at the United Downs site is being redesigned and updated to reflect the fresh bright future of geothermal in the UK.

The following report contains a summary of all public dissemination between the 1st of January and the 31st March 2021.

2 Education

The spring term has generally been a popular time for schools to visit the site at United Downs, but due to the exceptional circumstance surrounding the Covid-19 pandemic school visits are still suspended.

Requests from education establishments have been received for virtual visits and talks. This is a totally new way for GEL to interact with schools, so new materials are being created with the help of primary and secondary school teachers to meet these requests.

2.1 Universities

Date:	1st February 2021
Staff:	Hazel Farndale
Attendees:	Approx. 30
Summary:	Hazel prepared a virtual talk, which she recorded and sent to the University of South Wales It was played to their third year Undergraduate Geology students. The students appreciated the presentation and insight into the project so far at the UDDGP site.

3 Conferences, Public Talks & Webinars

The GEL team has been involved with just virtual conferences this quarter due to the Covid-19 Pandemic. Webinars have been held to inform strategic local personnel about the testing phase at United Downs

3.1 Webinars: Testing Phase

Date: Every 2 weeks from January to Mid February

Staff: Ryan Law & Jane Charman

Attendees: Approx. 13 each session

Summary: The webinars are for 10 local parish councils, county council, academia, Devon and Cornwall police, resilience and emergency team and local property owners, giving them an opportunity to hear about the geothermal well testing that has taken place and is planned for the next two weeks at United Downs. Attendees are able to ask questions and air their concerns. These webinars have proved to be very successful in 2020 and continued during the first quarter of 2021 until the testing equipment was removed from site in the middle of February. Delegates agreed to suspend the webinars until GEL have a delivery date for the next round of testing equipment. It is anticipated that the next webinar will be towards the end of April.

3.2 Virtual Conferences

Date: 9th March 2021

Staff: Ryan Law

Attendees: Not known

Summary: The GEOENVI project has the objective to make sure that deep geothermal energy can play its role in Europe's future energy supply in an increasingly sustainable way and to create a robust strategy to answer environmental concerns. It will engage with all geothermal stakeholders to ensure the exchange of best practices, the test of harmonised methods in selected areas and then, to facilitate its replication across Europe. The project is funded by the European Union's Horizon 2020 research and innovation programme and coordinated by EGEC.

GEOENVI

4 Community Visits

There have been no community visits since the 4th March 2020. Project information has however been sent to Gwennap, Carharrack, St Day and Lanner Parish Councils as well as leaders of community groups. Project updates have been included in parish magazines and regular updates have been posted on social media. Webinars are being held to inform strategic local groups of the progress the testing phase is making and the attendees were encouraged to share this information.

5 Site Visits

There have been no site visits during this quarter. Even though the Covid-19 pandemic prevails a few enquiries have been made from local groups requesting visits. For safety reasons these visits have not been able to take place.

6 Media Coverage

Because there has been little physical activity at the UDDGP site there has not been any media coverage this quarter. The second half of this quarter has been taken up with planning the final round of geothermal well testing, which is scheduled to take place mid-second quarter, where we expect media coverage to take place.

7 Community Liaison Group

The Community Liaison Group held a virtual meeting during this quarter. Most attendees are part of the bi-monthly webinars, however, some local residents attended. After JC gave a project update the attendees were able to ask questions. It was agreed that the next CLG webinar would be close to the final round of testing and email updates would be sent at appropriate times to keep people up to date with progress.

8 Community Fund

The Community Fund panel met virtually for the last time in January. The remainder of the funds were allocated to local community projects. The fund has now closed, however, GEL will be sent updates regarding funded projects until all have been completed. It was agreed that previous fund allocations would be allowed longer than the statutory 12 months to complete their projects as most have been delayed due to the pandemic.

9 Social Media

GEL has been using Facebook, Twitter and YouTube to disseminate information to the public since the start of the UDDGP project. Since the review of Social media last year, the number of followers has grown and continues to attract new followers.

During this quarter, Social Media posts have been factual and informative regarding the geothermal well testing and when there is no testing being carried out educational information is posted along with reminders of what has happened so far with the project. This enables GEL to issue posts Monday to Friday to keep the momentum of interest in the project moving forward.

9.1 Facebook & Twitter

The United Downs geothermal Facebook and Twitter pages continues to grow. Facebook tends to be used by people in the local community.

Social Media Follow Statistics

Facebook			Twitter	YouTube
Month	**Page likes**	**Page Followers**	**Followers**	**Subscribers**
March '20	787	849	1209	49
June '20	810	883	1213	56
Sept '20	948	1045	1347	85
Dec'20	1012	1118	1414	109
Jan '21	1025	1141	1444	126
Feb '21	1029	1146	1464	139
March '21	1038	1159	1479	148
Increase since last Quarter	**+ 26**	**+ 41**	**+ 65**	**+ 39**
Increase since March 2020	**+ 251**	**+ 310**	**+ 270**	**+ 99**

9.2 YouTube

GELs YouTube channel continues to attract new subscribers. The GEL YouTube channel is being publicised via social media and the films are now linked to the new website.

9.3 Website

The new GEL website incorporating the UDDGP project has been a very useful tool to help people understand about deep geothermal energy. A new page "The Team" has been added to the main GEL website https://geothermalengineering.co.uk/the-team/ this allows people to put a face to a name and has been well received.

APPENDIX A: Community Updates

Update from United Downs Deep Geothermal Power Project for Gwennap Parish Council

February 2021

The bi-weekly Webinars continue, providing an opportunity for the parish council to hear firsthand from the managing director of Geothermal Engineering (GEL) Dr Ryan Law and Head of Community Engagement Jane Charman. Details of what has happened at the geothermal site over the past two weeks and the work that is planned to be carried out over the following two weeks are given. Attendees have the opportunity to questions or ask for explanations of technical aspects of the project.

Geothermal Well Testing

The Geothermal well testing has been ongoing since July last year, predominantly in the deep well. The test equipment was moved to the shallow well over the weekend of 5th / 6th February. Well testing commenced the following week. The shallow well (which will be injection well for the power plant) has not caused any induced seismicity during any of the tests to date . As always however, GEL will work within strict limits set out in the planning documents for project.

What's Next

An Electrical Submersible Pump (ESP) will be fitted to a depth of approximately 600m into the deep well. This will enable us to pump hot geothermal fluid to the surface. The longer we run the pump for, the hotter the fluid produced at the surface will be, eventually reaching close to 180°C. At the surface, steam will be produced and, as a result, the temperature of the fluid will drop to under 100°C. It will then be pumped into the storage lagoon before being reinjected back into the rock through the shallower injection well (2.2km). The fluid will then percolate through the granite and heat up. This process creates a continuous production and injection of geothermal fluid and will be the final piece of the geothermal jigsaw puzzle to prove the concept works. We hope this work can be carried out in late April this year.

For up to date project information follow us on social media

Twitter: @uniteddownsgeo or **Facebook:** uniteddownsgeothermal

Geothermal Engineering Ltd – United Downs Deep Geothermal Power Project Update

March 2021

The injection testing in both wells finished on 18th February, the results of these test are being analysed and will be a good reference point for future geothermal projects in Cornwall. The testing equipment has now been removed from the United Downs site. At the moment (2nd week in March) the site is clear of testing equipment and the water storage lagoon is virtually empty with just rain water accumulating in it. The bi-weekly Webinars have temporarily stopped until there is new information for GEL to share with attendees. Webinars will resume as soon as we have a confirmed date for the delivery of equipment, which at the moment is scheduled for the end of April/beginning or May.

Geothermal Well Testing

The next stage of the geothermal well testing is a reservoir flow test, this means pumping the very hot geothermal fluid to the surface from the production well then reinjecting it back underground through the injection well. This mimics the operation of the power plant. The geothermal fluid will be too hot to inject immediately, so it will be temporarily stored in the water storage lagoon. Because the geothermal fluid is under a great deal of pressure underground it is still a liquid at 180°C, but once it reaches atmospheric pressure some of the fluid will turn to steam, which will be visible just above the water storage lagoon. Special equipment will be used to minimize the amount of steam produced, but there will still be a lot of steam visible at certain times. This is in contrast to the actual operation of the power plant, when no steam will be visible at the surface. All of that energy will be converted to power.

What's Next

An Electrical Submersible Pump (ESP) will be fitted to a depth of approximately 600m into the deep well. This will enable us to pump hot geothermal fluid to the surface. The longer we run the pump for, the hotter the fluid produced at the surface will be, eventually reaching close to 180°C. A small workover rig plus other ancillary equipment will be delivered to the United Downs site around the end of April/beginning of May. GEL will keep all local parish councils up to date with information as well as the other businesses on the Industrial Estate.

If anyone has any questions or concerns, please contact Jane Charman – Head of Community Engagement by email: j.charman@geothermalengineering.co.uk or telephone: 01326 331920.

For up to date project information follow us on social media

Twitter: @uniteddownsgeo or **Facebook:** uniteddownsgeothermal

United Downs Deep Geothermal Power Project

Public Dissemination Quarterly Report 1st April – 30th June 2021

UNITED DOWNS
DEEP GEOTHERMAL POWER

Project Name	**United Downs Deep Geothermal Power Project**
Project Reference Number	**CC563 UDDGP**
Date of Issue	**30th June 2021**
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1 Introduction

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Although most schools are reluctant to have visitors, GEL has attended a careers event this quarter at a school.

G7 being in Cornwall in June created a lot of interest in the counties innovation and GEL was selected to be featured in films and printed literature for the delegates and international journalists.

The following report contains a summary of all public dissemination between the 1st of April and the 30th June 2021.

2 Education

The spring term has generally been a popular time for schools to invite businesses to visit them and for students to visit the site at United Downs, but due to the exceptional circumstance surrounding the Covid-19 pandemic most school visits are still suspended.

With the possibility of restrictions being lifted during this quarter one school organised a careers event for their year 9 students as well as inviting other local schools to attend, unfortunately, the event had to be confined to just the host school as Covid-19 restrictions were not lifted as scheduled.

2.1 Truro High – Careers Day

Date: 23rd June

Staff: Hazel Farndale & Jane Charman

Location: Truro High

Attendees: Approx. 60

Summary:	Truro High organised a careers event for year 9 students at their own school as well as some of the other local secondary schools. Unfortunately, because Covid-19 restrictions were not lifted as anticipated, the event could only accommodate students from Truro High. Each business was situated in their own classroom while groups of 9 students visited each business. GEL took a large TV, which showed a film about the different stages of the United Downs project interspersed with photos of the team and their respective jobs. The students were given a brief overview of the project before taking part in a fun career quiz to see which job would most suit them. All the students enjoyed learning about geothermal and the different jobs that are needed for a project.
Hazel Farndal	TRURO HIGH SCHOOL FOR GIRLS Jane Charman

3 Conferences, Public Talks & Webinars

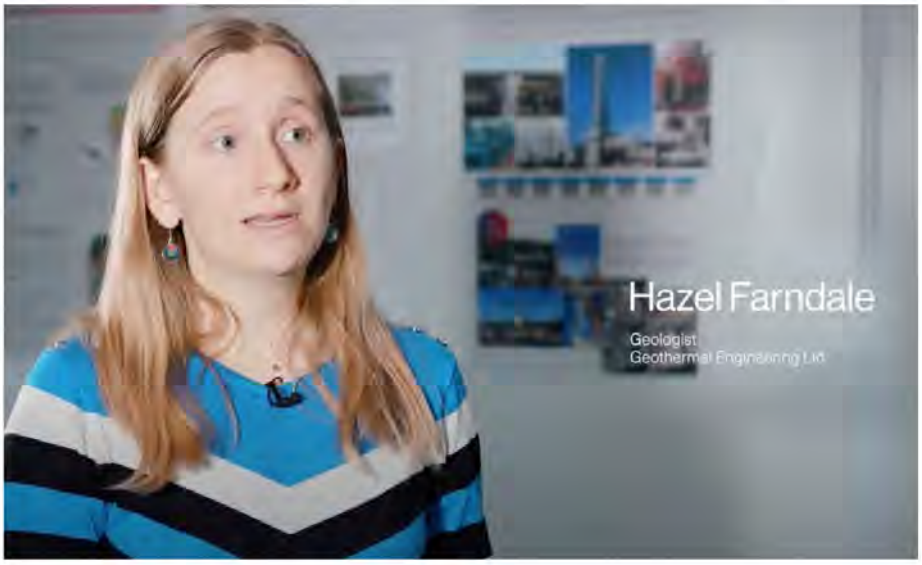
The GEL team has been involved with virtual conferences and talks this quarter due to the Covid-19 Pandemic not allowing large gatherings. Webinars have been held to inform strategic local personnel about the testing phase at United Downs

3.1 Webinars: Testing Phase

Date:	10th May, 7th & 30th June
Staff:	Ryan Law & Jane Charman
Attendees:	Approx. 13 each session
Summary:	The webinars are for 10 local parish councils, county council, academia, Devon and Cornwall police, resilience and emergency team and local property owners, giving them an opportunity to hear about the geothermal well testing that has taken place and is planned for the next two weeks at United Downs. Attendees are able to ask questions throughout the webinar. These webinars have proved to be very successful and have continued through to the end of well testing.

3.2 Clean Energy Resources Film

Date:	18th May
Staff:	Hazel Farndale
Attendees:	350 view
Summary:	The Cornwall and Isles of Scilly Local Enterprise Partnership (LEP) produced a short film on Clean Energy Resources that was released on YouTube in advance of the G7 meeting. It has had over 350 views and can viewed on YouTube https://www.youtube.com/watch?v=qNfQhZVydkU

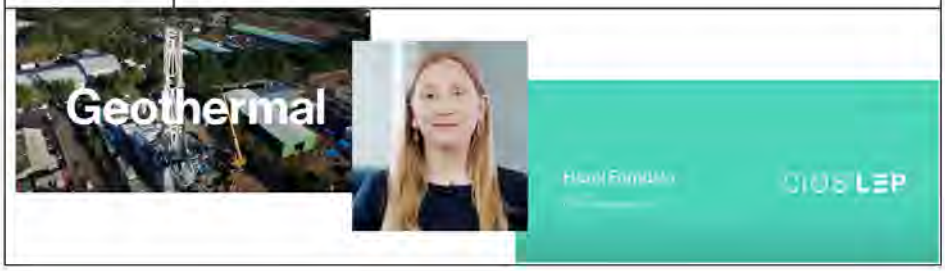


3.3 Institute of Mechanical Engineers Virtual Talk

Date:	18th May
Staff:	Hazel Farndale
Attendees:	Approx. 30
Summary:	The Institute of Mechanical Engineers organise talks for their members throughout the year. Hazel gave a virtual talk and presentation to the IMechE on Geothermal in the UK and an update on the United Downs project. The talk was recorded and had approximately 30 people in attendance on the evening. The talk was well received and was followed by a Q & A session.
	Institution of MECHANICAL ENGINEERS

3.4 Background briefing for G7 Journalists

Date:	27th May
Staff:	Hazel Farndale
Attendees:	27
Summary:	A background briefing on industry in Cornwall was produced by the LEP in advance of the G7 summit aimed at the international press contingent that were based in Falmouth during the G7 period. The film was launched on YouTube and it has had over 1,900 views.



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4 Media Coverage

4.1 BBC, ITV and Pirate FM News

Date:	April & May
Staff:	Hazel Farndale
Attendees:	N/A
Summary:	Media interest in the United Downs Project has been high during April and May even though there was no activity on site. Video interviews were given for both BBC TV News and ITV West Country News as well as a radio interview for local radio channel Pirate FM.

4.2 Business Cornwall Magazine

Date:	May Edition – G7 Special
Staff:	Hazel Farndale
Attendees:	N/A
Summary:	G7 put a spotlight on innovation in Cornwall and the United Downs Geothermal Power Project was chosen to be one of the businesses to be showcased. The G7 special addition featured GEL Geologist Hazel on the extended front cover as well as a whole page article on GELs geothermal projects. A copy of the magazine was given to each of the G7 delegates, which means this magazine has been distributed all over the world.

4.3 Guardian Newspaper

Date:	June 30th
Staff:	Ryan Law & Fin Thompson
Attendees:	N/A
Summary:	As part of the Electrical Submersible Pump (ESP) geothermal well flow test Ryan and Fin gave an interview to the Guardian Newspaper focusing on the benefits of geothermal power and heat as well as the job opportunities that have been offered to young people in Cornwall.
The Guardian	

4.4 BBC World Service

Date:	June 30th
Staff:	Ryan Law & Hazel Farndale
Attendees:	N/A
Summary:	The BBC World Service recorded an interview with Ryan and Hazel on the first day of the Electrical Submersible Pump (ESP) flow test.
BBC WORLD SERVICE	

5 Community Visits

There have been no community visits since the 4th March 2020. Project information has however been sent to Gwennap, Carharrack, St Day and Lanner Parish Councils as well as leaders of community groups. Project updates have been included in parish magazines and regular updates have been posted on social media. Webinars are being held to inform strategic local groups of the progress being made and the attendees are encouraged to share the information. Project information leaflets have been delivered to all of the businesses on the United Downs Industrial estate periodically throughout the project including the testing phase.

6 Site Visits

There have been no site visits during this quarter. Even though the Covid-19 pandemic prevails a few enquiries have been made from local groups requesting visits. For safety reasons these visits have not been able to take place.

7 Media Coverage

TV, radio and newspaper journalists visited the site during the final flow testing of the wells. This test was particularly interesting as steam was produced at surface as the geothermal fluid cooled before being reinjected underground and proved the concept at United Downs is viable.

8 Community Liaison Group

The Community Liaison Group has decided not to meet virtually at the moment as most attendees are attending the update webinars.

9 Community Fund

The Community Fund has now closed as all of the fund have now been allocated.

10 Social Media

GEL has been using Facebook, Twitter and YouTube to disseminate information to the public since the start of the UDDGP project. Project information is still being posted Monday to Friday every week, helping to disseminate project information including details of the final testing phase.

Posts on Facebook and Twitter cover details of the last stages of the final testing phase as well as general information about geothermal and the project.

Facebook & Twitter

The United Downs geothermal Facebook and Twitter pages continues to grow. Facebook tends to be used by people in the local community, so posts are being share with a number of local groups to maximise the number of people seeing the posts.

Social Media Follow Statistics

Facebook			Twitter	YouTube
Month	**Page likes**	**Page Followers**	**Followers**	**Subscribers**
2021			2021	2021
January	1025	1141	1444	126
February	1029	1146	1464	139
March	1038	1159	1479	148
April	1043	1166	1499	156
May	1049	1154	1521	161
June	1055	1180	1553	172
Increase since last Quarter	**+ 17**	**+21**	**+ 74**	**+ 24**

10.1 YouTube

GELs YouTube channel has now exceeded 170 subscribers. The GEL YouTube channel is being publicised via social media and the films are now linked to the United Downs website page.

10.2 Website

The GEL website incorporating the UDDGP project has been a very useful tool to help people understand about deep geothermal energy. The Meet the Team page has expanded to incorporate new members of staff.
https://geothermalengineering.co.uk/the-team/

APPENDIX A: Community Updates

Update from UDDGP Project

April 2021

Website: geothermalengineering.co.uk

Testing Phase – Reservoir Flow Test

The final round of geothermal well testing, currently planned for mid-June, will simulate the operation of the powerplant. Geothermal fluid will be pumped up the production well, steam produced at the surface, and the cooler geothermal fluid then pumped down the injection well. During this test, the geothermal fluid will not be used to generate electricity. Because the geothermal fluid is under pressure below ground, it will be around 180°c when it reaches the surface. At the surface, equipment will be used to diffuse the steam (a bit like a car exhaust muffler). There will be some steam visible from this 'steam separator' and some rising from the water storage lagoon. We are aiming to run this test for one week.

Electrical Submersible Pump (ESP)

Unlike countries that are close to tectonic plates that use the natural hot water from underground for geothermal, there is not enough pressure in the United Downs geothermal wells for the fluid to come to the surface on its own. We will therefore install an Electrical Submersible Pump (ESP) into the production well to a depth of approximately 1000m below ground.

Underground

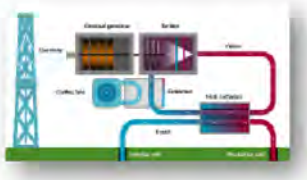
It is possible, though unlikely, that there will be some micro-seismic events during the final testing, and some may be felt or heard at the surface. None will be strong enough to cause any damage to buildings.

Website & YouTube

For more information about seismicity or about the United Downs project take a look at the project webpage:
https://geothermalengineering.co.uk/united-downs/

Powerplant

The powerplant that will be used at the United Downs site uses so called 'binary' technology. This means that the geothermal fluid brought up from deep underground will be kept in its own closed circuit and will not be used to drive the turbine or be exposed to the atmosphere. A secondary fluid will be used in the power plant. It will turn to vapour and drive the turbine to make electricity before condensing back into a fluid.



Schedule

Because the geothermal project at United Downs is an ERDF funded project, protocols must be adhered to; tenders have to be posted on the GEL website and promoted through other sources. Each bid that is submitted to GEL is evaluated before contracts are awarded, however, due to the ongoing Covid-19 restrictions, it has taken slightly longer than anticipated. Equipment is now expected to start arriving from late May/Early June and the reservoir flow test will commence around the middle of June 2021. At the end of this test the powerplant will be designed and build to GEL's specification. The powerplant will be installed and operational mid-2022.

Social Media

To get up-to-date information about the project follow us on:

Twitter @uniteddowsgeo
Facebook uniteddownsgeothermal

You can contact us by email:
contact@geothermalengineering.co.uk

United Downs Geothermal Power Project June 2021 Update

GEL has successfully recruited a Junior Drilling Assistant as part of the Build Back Better Kick Start scheme. Kieran will work with us for the next 6 months gaining valuable experience for his future career.

Equipment

Equipment will start to arrive at the United Downs site from Friday 18th June. A drilling rig will be delivered in sections over several days, before being built and tested.

The rig will not be used for drilling, it will be used to insert the Electrical Submersible Pump (ESP) into the Production (deeper) Well. This is a temporary pump that will only be used for the 7 days of testing.

When the powerplant is operational there will not be any steam visible as the geothermal fluid will be kept under pressure in a closed loop.

Steam

Because we will not be producing electricity during this test, the geothermal fluid needs to cool before being deposited back under ground. The circa 180°c water is under pressure, but when it gets to the surface, steam will be produced as the fluid cools to just below boiling point. Special equipment will be used to minimise the amount of steam produced.

June & July at the Geothermal Project

We have finally got to the last stage of the testing phase. We will be bringing the hot geothermal water to the surface, letting it cool and then pumping it back underground. Because the geothermal fluid will be deposited in the water storage pond, there will be steam visible as the water cools. This is a good sign and proves the concept we have been working towards

The testing will only last 7 days and will be continuous day and night. As with all the operations at the GEL site, noise levels must not exceed the regulated levels. The vehicle route to bring the equipment to site will be the same as before.

Flow Test

The flow test will allow GEL to record the amount of geothermal fluid that can be brought to the surface via the Production Well. This is due to start around 27th/28th June. The results of this test will be used to design the powerplant.

If you have any queries, contact us by phone on 01326 331920 or email contact@geothermalengineering.co.uk
Follow us on social media for daily updates.

United Downs Deep Geothermal Power Project

Public Dissemination Quarterly Report 1st July – 30th September 2021

UNITED DOWNS
DEEP GEOTHERMAL POWER

Project Name	**United Downs Deep Geothermal Power Project**
Project Reference Number	**CC563 UDDGP**
Date of Issue	**30th September 2021**
Version	**FINAL**

0

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1 Introduction

GEL is committed to informing the public about the United Downs Deep Geothermal Power project and endeavours to disseminate information fairly and transparently. Public events, site visits, conferences and school visits were arranged and attended regularly prior to the outbreak of the Covid-19 pandemic. However, during these extraordinary times to reach both a local and wider audience social media platforms, Twitter, Facebook and YouTube have continued to be used along with direct email updates to the four local parish councils and community group leaders. In addition to this, webinars for strategic local people and service providers have been run specifically covering the geothermal testing phase.

Schools are reluctant to have visitors still and this quarter has included the 6 week annual summer holiday.

The final week of geothermal testing to prove the concept attracted a lot of media attention locally as well as national and international publications.

The following report contains a summary of all public dissemination between the 1st of July and the 30th September 2021.

2 Education

The school summer holidays took up much of this quarter and the autumn term has generally been a quiet time regarding school visits. However, GEL has received multiple requests from universities from all over the country for site visits. Unfortunately, due to Cornwall having an extremely high number of Covid-19 cases, all academic visits have continued to be suspended.

2.1 University

Date: 23rd July 2021

Staff: Hazel Farndale

Attendees: International Postgraduate Students

Summary: A virtual presentation to a group associated with the University of Portsmouth, talking about geology of Cornwall and the UDDGP project.

This was a two-week funded geoscience virtual fieldtrip to Brazil and the UK, 19th – 31st July.
In conjunction with the British Council and UNESCO, the School of the Environment, Geography and Geosciences at the University of Portsmouth, UK are offering 30 funded places for geoscience postgraduate students on a two-week virtual fieldtrip of the UK and Brazil in partnership with the State University of Rio de Janeiro and the Federal University of Ouro Preto. This funding has been provided to help develop high-quality international opportunities for postgraduate students.

The two-week virtual trip appealed to all global postgraduate students on a geoscience-related programme such as PhD, MRes, MSc Engineering Geology, MSc Environmental Geology and MSc Contamination, Geological and Environmental Hazards.

The UK trip covered the geology of the southwest of England, its regional geology from basin development to orogenic deformation, metamorphism, magmatism and associated mineralization during the Variscan, the renaissance of mineral exploration and discussions on sustainable extraction of resources.

UNIVERSITY OF PORTSMOUTH

3 Conferences, Public Talks & Webinars

The GEL team has not been involved with virtual conferences and talks this quarter due to the Covid-19 Pandemic not allowing large gatherings. A webinar was held to inform strategic local personnel about the final week of the testing phase at United Downs

3.1 Webinars: Testing Phase

Date: 17th July 2021

Staff: Ryan Law & Jane Charman

Attendees: Approx. 13 each session

Summary: The webinars are for 10 local parish councils, Cornwall council, academia, Devon and Cornwall police, resilience and emergency team and local property owners, giving them an opportunity to hear about the geothermal well testing that has taken place at United Downs to prove the concept will be able to generate electricity. Attendees are able to ask questions throughout the webinar. These webinars have proved to be very successful and have continued through to the end of well testing. The next webinar will be held to update attendees on the procurement of the power plant.

4 Media Coverage

4.1 Final Week of Geothermal Well Testing

Date: 1st July 2021 for 1 week

Staff: Ryan Law, David Bridgland, Jane Charman, Hazel Farndale, Fin Thompson & Kieran Symons

Attendees: N/A

Summary: Media interest surrounding the final week of geothermal well testing was high. The BBC Spotlight Southwest team filmed and produced two separate news items, with many telephone interviews also taking place. See Appendix B Media Coverage

5 Community Visits

There have been no community visits since the 4th March 2020. Project information has however been sent to Gwennap, Carharrack, St Day and Lanner Parish Councils as well as leaders of community groups. Project updates have been included in parish magazines and regular updates have been posted on social media. Webinars are being held to inform strategic local groups of the progress being made and the attendees are encouraged to share the information. Project information leaflets have been delivered to all of the businesses on the United Downs Industrial estate periodically throughout the project including the testing phase.

6 Site Visits

6.1 Cornwall Council Cabinet

Site visits are still severely restricted; however, exceptions have been made to accommodate Cornwall Council and Parish Councils.

Date: 1st July 2021

Staff: Ryan Law, David Bridgland, Jane Charman, Hazel Farndale

Attendees: 8

Summary: To coincide with the final week of geothermal well testing the newly formed Cornwall Council Cabinet visited United Downs on the first day that steam was visible. Ryan gave a talk from the viewing platform giving details of the process that was taking place on that day. All attendees were very impressed with the success of the United Downs project and chatted with members of the GEL team.

6.2 Perranzabuloe Parish Council

Date: 27th August 2021

Staff: Jane Charman

Attendees: 6

Summary: Perranzabuloe Parish Council visited the United Downs site to learn about geothermal in general and the process of the whole project from groundworks to ordering the power plant so that they can be prepared to answer questions from their local community if a geothermal power project is started in their parish.

The councillors were impressed with the overall project at United Downs especially the noise and seismicity monitoring.

6.3 St Agnes Parish Council

Date: 14th September 2021

Staff: Jane Charman

Attendees: 10

Summary: St Agnes Parish Council visited the United Downs site to learn about geothermal in general and the process of the whole project from groundworks to ordering the power plant so that they can be prepared to answer questions from members of the public if a geothermal power project is started in their parish.

The councillors were impressed with the overall project at United Downs especially the community engagement and community fund.

6.4 Ecotricity

Date: 21st September 2021

Staff: Jane Charman & Hazel Farndale

Attendees: 3

Summary: Ecotricity, who have signed a Power Purchase Agreement (PPA) with GEL for the electricity when it is generated at United Downs sent along 3 senior members of their team to learn about geothermal in general and to have a tour around the site at United Downs. Jane gave a presentation and Ecotricity made an informative film while they were at the site, which Hazel narrated.

6.5 Wendron Parish Council

Date: 27th September 2021

Staff: Jane Charman

Attendees: 7

Summary: Wendron Parish Council visited the United Downs site to learn about geothermal in general and the process of the whole project from groundworks to ordering the power plant so that they can be prepared to answer questions if a geothermal power project is started in their parish.

The councillors were impressed with the overall project at United Downs, they were given a tour of the site so that they could see how small the site is.

7 Community Liaison Group

The Community Liaison Group has decided not to meet virtually at the moment as most attendees are attending the update webinars.

8 Community Fund

The Community Fund has now closed due to the fund being fully allocated to 14 projects. Projects that were due to finish during the last 18 months have been give extra time to complete their projects.

9 Social Media

GEL has been using Facebook, Twitter and YouTube to disseminate information to the public since the start of the UDDGP project, during this quarter the dedicated United Downs social media accounts were replaced with "Geothermal Projects" to allow a wider variety of posts.

Facebook & Twitter

The United Downs geothermal Facebook and Twitter pages continued to grow while they were in use. Facebook tends to be used by people in the local community while Twitter is used more by academics and business, which means GEL has a good all round following.

Social Media Follow Statistics

Facebook			Twitter	YouTube
Month	**Page likes**	**Page Followers**	**Followers**	**Subscribers**
2021			2021	2021
January	1025	1141	1444	126
February	1029	1146	1464	139
March	1038	1159	1479	148
April	1043	1166	1499	156
May	1049	1154	1521	161
June	1055	1180	1553	172

9.1 YouTube

GELs YouTube channel has now exceeded 190 subscribers. The GEL YouTube channel is being publicised via social media and some of the films are now linked to the United Downs website page.

9.2 Website

The GEL website incorporating the UDDGP project has been a very useful tool to help people understand about deep geothermal energy. The Meet the Team page has expanded to incorporate new members of staff.
https://geothermalengineering.co.uk/the-team/

Appendix A: Community

GEL Geothermal Engineering Ltd

United Downs Geothermal Power Project
July 2021 Update

~ Cornwall has a new Renewable Energy Industry ~
Geothermal Power & Heat Projects to be rolled out at multiple locations in Cornwall

Testing Completed

On the 1st July 2021, Geothermal Engineering made history by being the **FIRST** developer to successfully bring the naturally hot geothermal fluid to the surface and reinject it underground, proving that the novel concept at United Downs works and a powerplant can now be installed.

Future Sites

GEL is working with Cornwall Council to identify suitable locations across Cornwall for larger geothermal sites to produce electricity and heat. These sites will be privately funded.

When the powerplant is operational, there will not be any steam visible as the geothermal fluid will be kept under pressure in a closed loop.

Steam

Steam was visible from the early hours of 1st July, predominantly from the steam separator, but also from the water storage pond.

The naturally hot geothermal fluid was deposited into the water storage pond to allow it to cool before being reinjected underground.

GEL is the FIRST!

- Drilled with safest, quietest rig
- Using the novel concept of deep production well, shallow injection well
- Deepest on shore well in the UK
- Successfully produced and injected geothermal fluid
- Powerplant installed 2022

If you have any queries, contact us by phone on 01326 331920 or email contact@geothermalengineering.co.uk
Follow us on social media for daily updates.

European Union
European Regional Development Fund

@uniteddownsgeo uniteddownsgeothermal YouTube Geothermal Engineering Ltd

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APPENDIX B: Media Coverage

Announcing the expansion of geothermal energy across Cornwall

Geothermal energy production to significantly expand in Cornwall as four new deep geothermal power projects announced

- *Geothermal Engineering Ltd to deliver a total of 20 MW of baseload electricity and 100 MW of heat energy from deep geothermal by 2026*
- *UK's first geothermal steam and highest water flow rate delivered from deepest UK well at the United Downs site in Cornwall, developed with funding from Thrive Renewables*

A total of **116 pieces of coverage to date**

- 11 pieces of national coverage including, **The Guardian, 2x articles in The Daily Telegraph, BBC News Online, ITV News online, The Daily Mail, Mail on Sunday, Daily Express, CNBC, NBC**
- 4 TV channels covered the story including **BBC National** and **BBC Spotlight** news as well as **ITV** and **Euro News** broadcast the piece to 11m European citizens
- 6 Radio interviews on **BBC World Service, BBC Business Daily, Pirate FM, ABC Radio, SBS Radio,** and **Money FM.** These were repeated throughout the launch day.
- 20 pieces of trade and regional coverage including **New Power, World Energy, Power Engineering International, ThinkGeoEnergy, Geodrilling International, Current News, Ground Engineering, Renewables Now,** and **Energy Live News.**
- Local coverage in **The Falmouth Packet, Cornish Stuff** and across **all local TV and radio stations**

National and Broadcast Coverage

Trade and regional coverage

United Downs Deep Geothermal Power Project

Public Dissemination Quarterly Report 1st October – 31st December 2021

Project Name	**United Downs Deep Geothermal Power Project**
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1 Introduction

GEL is committed to informing the public about the United Downs Deep Geothermal Power project and endeavours to disseminate information fairly and transparently. Public events, site visits, conferences and school visits were arranged and attended regularly prior to the outbreak of the Covid-19 pandemic. However, during these extraordinary times to reach both a local and wider audience social media platforms, Twitter, Facebook and YouTube have continued to be used along with direct email updates to the four local parish councils and community group leaders.

During this quarter it has been possible to invite small groups to the visitor centre at United Downs as well as team members going out to visit schools and to give talks.

The following report contains a summary of all public dissemination between the 1st of October and the 31st of December 2021.

2 Education

The autumn term has generally been a quiet time regarding school visits. However, GEL has received a few requests from primary and secondary schools asking for a member of the GEL team to visit them, although some visits were subsequently cancelled by the schools due to a covid outbreaks. GEL decided that it would be safe for members of staff to visit schools who would take all necessary precautions to stay safe.

2.1 Primary School

2.1.1 St Frances Primary School

Date: 7th December 2021

Staff: Jane Charman & Fin Thompson

Attendees: 60 Pupils & 4 Adults

Summary: GEL were invited to visit year 4 at St Frances C of E school in Falmouth as they are currently studying electricity from its discovery through to current times.

Jane and Fin gave an overview of geothermal electricity production in the school hall, then the pupils wated the GEL primary school animation, a Q & A session followed. The pupils then went back to their classrooms to do a fun geothermal electricity quiz and word search; Jane helped the pupils in one classroom, while Fin helped in the other. The session concluded with a short recap about geothermal and checking the answers the pupils had entered on their quiz paper.

This was a very successful visit, and the pupils learnt a lot about the production of geothermal electricity to add to their work.

2.2 Secondary Schools

2.2.1 Mounts Bay School

Date: 19th November 2021

Staff: Jane Charman & Fin Thompson

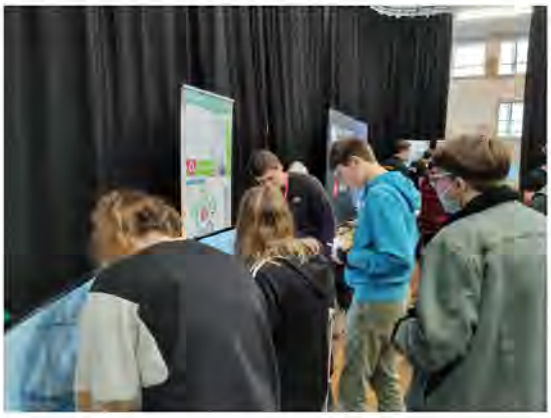
Attendees: Years 9, 10 & 11

Summary: Mounts Bay School hold an annual careers fair, unfortunately it had to be cancelled last year, which is why year 11 students attended this year.

A stand was set up with pull up banners, TVs showing UDDGP project films and the GEL career quiz. Most students knew about geothermal and had heard about the project at United Downs. All students who visited the stand took the career quiz and all were pleased with the job they would be best suited to. Many of the students didn't realise that there are such a variety of jobs available in the renewables sector. Students were given a postcard to remind them of the job they are best suited to as well as project information leaflets and GEL stickers.

A lot of students were eager to talk to Fin about his work maintaining the GEL website and social media pages and thought his job was something they would like to do.

It was a great day meeting a huge range of students who left with a renewed excitement about their futures.



2.2.2 Penryn College

Date: 23rd November 2021

Staff: Jane Charman & Fin Thompson

Attendees: Years 9 & 10 Students and Parents

Summary: This was an evening careers event where parents accompanied the students.

Fin talked to students about the importance of social media and allowed some students to create a post about the importance of "Youth Voice" regarding climate change and renewable energy.

Jane engaged with students and parents encouraging all to do the GEL career quiz. Both Jane and Fin explained what geothermal is and how it can be used to generate renewable electricity. Both students and parents thought the career quiz was a really good idea and all the students were pleased with the outcome. Students were given a postcard to remind them about the job that would best suit them if they worked for GEL along with UDDGP project information leaflets.

This was a good evening engaging with students and their parents.

2.2.3 Penair School

Date: 10th December 2021

Staff: Jane Charman

Attendees: Year 8 Approx. 230 Students and 8 Adults

Summary: The year 8 students have been learning about geothermal in their geography lessons this term. Jane was invited along to talk about site selection for geothermal projects and the importance of community engagement from the very early planning stages. Jane talked about the UDDGP project and how it will be the first geothermal power plant in the UK.

UDDGP information leaflets were left with the head of Geography to distribute to members of staff after the talk.

PENAIR SCHOOL

3 Conferences, Public Talks & Webinars

GEL MD Dr Ryan Law has given a virtual and an in person talk this quarter.

3.1 Future of Geothermal in Northern Ireland

Date: 1st October 2021

Staff: Ryan Law

Attendees: 67

Summary: A series of webinars have been organised to explore the future of geothermal in Northern Ireland. This session saw Ryan give a talk about the UDDGP project from finding the site through to ordering the power plant, including the importance of community engagement from the pre-planning stages. The talk was well received and the 30-minute Q&A session ran out of time before all questions could be answered.

3.2 8th UK Geothermal Symposium

Date: 17th November 2021

Staff: Ryan Law

Attendees: 40 - 50

Summary: Ryan was invited to deliver the Keynote Speech at the 8th UK Geothermal Symposium, organised by the Geological Society and held at Burlington House in London.

Ryan provided an update to the UK geothermal community on the progress that has been made at the UDDGP project. Ryan then spoke about the challenges faced by future geothermal development in Cornwall and where GEL see the future of geothermal heading in the UK.

3.3 Kick Start Presentation

Date: 24th November 2021

Staff: Kieran Symons supported by the GEL Team

Attendees: 10

Summary: GEL has been taking part in the Governments Build Back Better – Kick Start scheme to get as many young people as possible off of universal credit and into long term employment.

Kieran started working with GEL at United Downs in June 2021 for a 6-month placement assisting Jan the GEL Drilling & Well Testing Supervisor. As part of the Kick Start scheme young people need to demonstrate that they have increased their employability skills in various ways, so it was decided that Kieran would give his very first public presentation to local councillors and education representatives about his 6 months with GEL.

Kieran's presentation was well received, which was followed by a Q & A session. At the end of Kieran's presentation, he announced that GEL has offered him a fulltime position and that he had accepted.

3.4 Green Ambassadors Presentation

Date: 24th November 2021

Staff: Ryan Law, Jane Charman, Hazel Farndale, Jan Laszczak-Moodie, Kieran Symons, Fin Thompson & Tony Wilson

Attendees: 15

Summary: Before drilling started at the UDDGP project, a group of people known as Green Ambassadors have been invited to presentations on and off the site at United Downs, through various stages of the project.

The group were invited to United Downs to hear about the progress being made at the site. Ryan gave a virtual talk to the group, then answered many questions from the audience.

It is important to keep these people up to date with the progress being made by the UDDGP project, so that they can share the information that they find out. Attendees were given UDDGP information leaflets to take away.

4 Community Visits

There have been no community visits since the 4th March 2020. Project information has however been sent to Gwennap, Carharrack, St Day and Lanner Parish Councils as well as leaders of community groups. Project updates have been included in parish magazines and regular updates have been posted on social media. Webinars have been held to inform strategic local groups of the progress being made and the attendees are encouraged to share the information. Project information leaflets have been delivered to all of the businesses on the United Downs Industrial estate periodically throughout the project including the testing phase. It is hoped that Community visits will be able to resume early in 2022.

5 Site Visits

Site visits are still severely restricted; however, exceptions have been made to accommodate Cornwall Council and Parish Councils.

5.1 Illogan Parish Council

Date: 6th October 2021

Staff: Jane Charman & Jan Laszczak-Moodie

Attendees: 8

Summary: Illogan Parish Council were invited to visit the UDDGP project site to have a look around and hear about the project from start to the current day.

This parish has potential for a future geothermal power site, so they found the presentation about the UDDGP project very interesting and had many questions for Jan.

5.2 Cornwall & Isles of Scilly LEP

Date: 6th October 2021

Staff: Hazel Farndale & Jane Charman

Attendees: 3

Summary: The CIOS LEP keep in close contact with GEL and enjoy regular updates about the project.

Three representatives visit the UDDGP site where Hazel gave a short presentation about the progress that has been made at the

United Downs site over the summer and the tendering process for the power plant with estimated time scales. The LEP representatives had a few questions, and they took away information leaflets about the project.

5.3 Royal College of Defence Studies

Date: 9th December 2021

Staff: Hazel Farndale & Jane Charman

Attendees: 20

Summary: The Royal Collage of Defence Studies (RCDS) is an organisation that encourages top international military personnel to gather together in various countries to learn about a multitude of initiatives that are taking place.

This December, RCDS met in the UK and spent a couple of days touring Cornwall learning about the initiatives taking place in the Duchy. The group visited the UDDGP project to learn about geothermal in general and the project at United Downs, the presentation was followed by a Q & A session. It was unfortunate that the group had a tight schedule and had to leave promptly before all the questions were answered.

This was a fantastic opportunity to showcase the UDDGP project to an international audience. Each attendee was given leaflets about the UDDGP project with details of the GEL social media pages and website.

5.4 George Eustice MP

Date: 10th December 2021

Staff: Hazel Farndale & Tony Wilson

Attendees: 3

Summary: George Eustice MP was accompanied by two of his support personnel when he visited the UDDGP project site. GEL has kept Mr Eustice up to date with the geothermal projects progress since the beginning of the project. He was eager to find out what progress had been made this year and to find out more general information about site selection, planning applications and regulations for geothermal projects in Cornwall.

Following the visit a variety of information was sent in both electronic and paper format for his future use.

6 Community Liaison Group

The Community Liaison Group has decided not to meet virtually at the moment as most attendees are attending the update webinars.

7 Community Fund

The Community Fund has now closed due to the fund being fully allocated to 14 projects. Projects that were due to finish during 2020/2021 have been given extra time to complete their projects due to the covid pandemic.

8 Social Media

GEL has been using Facebook, Twitter and YouTube to disseminate information to the public since the start of the UDDGP project. The dedicated United Downs social media accounts were replaced with "Geothermal Projects" to allow a wider variety of posts.

8.1 YouTube

GELs YouTube channel subscribers continue to increase. The GEL YouTube channel is being publicised via social media and some of the films are now linked to the United Downs website page.

8.2 Website

The GEL website incorporating the UDDGP project has been a very useful tool to help people understand about deep geothermal energy. The Meet the Team page has expanded to incorporate new members of staff. The website is continually being updated with a wide range of information.

Appendix A: Community Update

GEL Geothermal Engineering Ltd

Geothermal Projects Update October 2021

Is Anything Happening?

If you drive by the GEL site at United Downs, you will be forgiven for thinking nothing is happening. We assure you that a lot is happening, just not visible from the outside. After the huge success of the final stage of the testing phase where we had a week of steam proving we could bring the hot geothermal fluid to the surface and once it had cooled a little it was deposited back underground, a tender was then published for the geothermal binary power plant. The closing date for bids was extended as many businesses wishing to submit a tender were closed during August, so the closing date is now the end of October.

Back to School!

GEL are excited to be going back into schools again. Jane and Fin will be attending a careers fair at Mounts Bay Academy in November to talk to their students about all the different jobs that are incorporated into a geothermal power and heat project.

MOUNTS BAY

GEL is growing

We are please to announce that GEL has recruited a Power Plant Construction Project Manager. Tony lives in a hamlet just outside of Truro with his family. Tony will join the team at United Downs on 1st November and he will be doing exactly what his job description says, managing the whole power plant phase of the project. Keep an eye out for his biography on the Team page on the website.

Back in June GEL recruited Fin through the government's Kick Start scheme as our office, website and social media administrator as well as Kieran on a 6 month contract working with Jan the Drilling Supervisor. By the end of October GEL will be recruiting another young person through the Kick Start scheme to work with Jane, assisting with Community Engagement. This vacancy is open to anyone between the ages of 18 – 24 who is claiming Universal Credit, if you know anyone who might be interested, they need to talk to their Job Coach for more information.

Geothermal is a new Cornish Industry

During October GEL submitted planning applications for 4 new prospective sites, they are in or close to Penhallow, Mawla, Manhay and Tolvaddon Energy Park. At the beginning of September GEL hosted four separate pre-planning public consultations in each of the four areas. Over the four days more than 200 people attended. The GEL team were very proud to talk about the project at United Downs from preparing the site through to proving the concept. It is anticipated that all 4 applications will be reviewed at a planning meeting in December with the outcome being given just before Christmas.

Social Media

A few weeks ago, GEL stopped using the United Downs Geothermal Facebook and Twitter accounts and switching to Geothermal Projects instead, so that all GEL projects can be incorporated. If you haven't started following the new social media account, please switch today, so that you don't miss news and updates about existing and new projects.

Geothermal: Helping to combat climate change-Increase biodiversity-Fund community projects

GEL Geothermal Engineering Ltd

Geothermal Projects Update December 2021

Looking Back on 2021

The major milestones for GEL have been:

- Increased the number of employees by 100%
- Proved the novel concept of having a deep production well with an injection well above it.
- Planning Applications for 4 prospective Geothermal Power Sites were submitted to Cornwall Council.

GEL Website

The GEL website has a new section call "Learn" with lots of interesting information. Details of prospective futures sites can be found under the Projects tab and if you want to know who's who and what we do, take a look at the Team page.

Kick Start Scheme

Kieran came to work with GEL in June as part of the Governments Build Back Better scheme – Kick Start. At the end of November Kieran gave a presentation to local councilors and education professionals about his time working at United Downs. Kieran has completed his 6 months on the Kick Start scheme and we are please to announce he has become a full time GEL employee.

If you know a young person who is on Universal Credit that is interested in PR and Marketing, GEL has a vacancy for a Community Engagement Assistant, applications can be made through Job Coaches.

Looking Ahead to 2022

Early in 2022 GEL will be issuing the power plant contract for United Downs. Activity at the site will start slowly with ground preparation, building up to the components of the power plant being delivered and constructed.

Cornwall Council will make a decision regarding the planning applications for the next 4 geothermal power projects.

A new education programme will be created to meet the current primary and secondary school curriculum.

GEL will continue looking for more geothermal power sites and working with MPs, councils & communities.

When it is safe, the GEL team will be out in the community supporting local events.

Careers Fairs and School Talks

It has been great to be back out visiting schools again. Jane and Fin have attended 2 Careers Fairs, telling students all about the different career possibilities there are in the renewable energy sector. They both spent a morning at a local primary school talking about geothermal electricity production and Jane gave an assembly to year 8 at a secondary school in Truro, talking about geothermal site selection and community engagement. The students are currently studying geothermal power production in Geography.

GEL is excited to be one of the exhibitors at this event.
Put the dates in your diary now!

Geothermal: - Clean Energy for a Healthy Planet

@Geo_Projects Geothermal Projects Geothermal Engineering Ltd

www.geothermalengineering.co.uk

United Downs Deep Geothermal Power Project

Public Dissemination Quarterly Report 1st January – 31st March 2022

UNITED DOWNS
DEEP GEOTHERMAL POWER

Project Name	**United Downs Deep Geothermal Power Project**
Project Reference Number	**CC563 UDDGP**
Date of Issue	**31st March 2022**
Version	**FINAL**

0

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1 Introduction

GEL is committed to informing the public about the United Downs Deep Geothermal Power project and endeavours to disseminate information fairly and transparently. Public events, site visits, conferences and school visits were arranged and attended regularly prior to the outbreak of the Covid-19 pandemic. However, during these extraordinary times to reach both a local and wider audience social media platforms, Twitter, Facebook and YouTube have continued to be used along with direct email updates to the four local parish councils and community group leaders.

During this quarter it has been possible to invite small groups to the visitor centre at United Downs as well as team members going out to visit schools and to give talks.

The following report contains a summary of all public dissemination between the 1st of January and the 31st of March 2022.

2 Education

The spring term has in the past been a time for non-exam years to visit the United Downs site or invite a GEL representative into schools to give talks. With the Covid-19 pandemic remaining unpredictable, most schools are reluctant to book businesses for talks, most of the bookings GEL did receive for this term have subsequently been cancelled due to high numbers of students and staff being absent due to illness. GEL did attend a college careers fair, which was very successful.

GEL has used this term to reconnect with primary and secondary schools and start conversations about the education programme that GEL currently has and how it can be improved to better meet the needs of the schools.

2.1 Primary School

2.1.1 Connor Downs Primary School

Date:	17th March 2022
Staff:	Jane Charman
Attendees:	1
Summary:	Jane met with a representative from Connor Downs Primary School at the United Downs site office, which included a tour of the site. A good discussion was had regarding the curricular and extracurricular needs of the school. This school runs an extensive selection of outdoor and natural resources lessons, so GEL will be able to support and enhance these. The school will be contacting GEL again soon to book some talks and interactive sessions for their pupils.

2.2 Secondary Schools

2.2.1 Truro High School for Girls

Date: 19th January 2022

Staff: Hazel Farndale

Attendees: 10

Summary: Truro High School has held many career events in the past which GEL always supported. GEL is pleased to be able to deliver talks and work once again with Truro High. This talk was part of the Aspiring Engineers sessions. Hazel gave an overview of the potential geothermal power and heat resources in the UK, especially focusing on the United Downs project. The talk was well received by the students from years 10 and 11.

2.2.2 Hayle Academy

Date: 1st March 2022

Staff: Jane Charman

Attendees: 1

Summary: GEL has attended career events at Hayle Academy in the past and the school has a Raspberry Shake that has been donated by GEL. Jane visited Hayle Academy to talk to the head of the geography department regarding the year 8 geothermal topic and Year 10 GCSE students who require more in-depth knowledge of geothermal. The planning meeting for future education went well and the school has booked two sessions at the United Downs site in May.

Hayle Academy

2.3 Colleges

2.3.1 Truro College Careers Fair

Date: 10th March 2022

Staff: Jane Charman & Finlay Thompson

Attendees: 85

Summary: This was the first careers fair at the college for two years, so it was well attended by 1st and 2nd year students as well as mature students on degree courses.

Jane and Fin spoke to individual students as well as groups. All students were invited to take the GEL careers quiz to see which job they would be best suited to if they worked on a renewable energy project. Student were pleasantly surprised at how accurate the results were and took away a postcard to remind them of the job sector they are suited to.

3 Universities

3.1 Leeds University

Date: 17th March 2022

Staff: Jan Laszczak-Moodie

Attendees: 20

Summary: This talk was delivered virtually to third year and MSC students. Jan gave an overview of the geothermal project at United Downs with more in-depth details regarding the drilling and well testing phases of the project. The talk was well received with many students taking part in the Q & A session that followed the talk.

UNIVERSITY OF LEEDS

4 Conferences, Public Talks & Webinars

4.1 United Downs Update Webinar

Date: 7th February 2021

Staff: Tony Wilson & Jane Charman

Attendees: 15

Summary: United Downs update webinars have not been held since the end of well testing. This webinar was held to introduce Tony Wilson to the attendees so he could explain the power plant tendering and supplier selection process. Further webinars will be held when there is more news to disseminate regarding the United Downs power plant

4.2 Women in Geothermal – Wednesday Talks

Date: 30th March 2022

Staff: Women in Geothermal (WinG)

Attendees: 20

Summary: WinG have regular virtual talks about all aspects of geothermal development. Hazel gave a presentation on the subject of "A perspective on the future of geothermal development across Cornwall" The United Downs project was highlighted as being the first UK deep geothermal power project and used the timeline for this project as a measure of future geothermal power projects in Cornwall. A Q & A session was held after the talk with many questions being asked.

WING
Women in Geothermal

5 Community Visits & Events

After a two-year hiatus due to the Covid-19 Pandemic community events are slowly beginning to resume. The community close to the United Downs project are enjoying a return to face-to-face updates and asking about the work that has been carried out since March 2020.

5.1 Lanner Market

Date: 9th February 2022

Staff: Jane Charman

Attendees: 22

Summary: This community event held every Wednesday at the village hall in Lanner, which Jane regularly attended pre pandemic has now resumed. The break has reinvigorated this event with more stall holders attending and more attendees. GEL has booked a stall once a month on the 2nd Wednesday. The regular attendees were please to see GEL back out in the community with new information banners and leaflets. Most people took leaflets some of which will be passed on to friends and relatives. People were pleased that the project at United Downs is still progressing and several requests for site visits were received.

5.2 Gwennap Community Coffee Morning

Date: 1st March 2022

Staff: Jane Charman

Attendees: 17

Summary: This community coffee morning has resumed every Tuesday morning. The regular attendees were please that Jane has returned to give an update on the United Downs geothermal project, all were eager to hear how the project had progressed over the last two years. There were some new attendees, who knew very little about geothermal, so Jane gave them an overview of the project so far and the process of geothermal in general.

5.3 Lanner Market

Date: 9th March 2022

Staff: Jane Charman & Kieran Symons

Attendees: 25

Summary: There were many new attendees at this community event who were interested in what a geothermal power project is and how it is being utilised in Cornwall. Jane & Kieran explained how electricity will be produced at the United Downs site and gave out project leaflets. The organiser said how they appreciate GEL supporting their local events.

5.4 Truro Big Green Day

Date: 19th March 2022

Staff: Jane Charman & Hazel Farndale

Attendees: 38

Summary: Truro Cathedral was the venue for the Big Green Day. The event was supported by several green and ecological projects and groups. The stalls were set out on both sides of the cathedral's central seating area. Although the event did not attract a vast number of visitors, Jane and Hazel spoke to a steady stream of visitors including representatives from Cornwall Council, Lord Teverson, members of the local community and holiday makers. All were very supportive of the United Downs project and eager to hear how the project is progressing everyone took information leaflets and wished the team every success for the power plant installation.

5.5 Carharrack Saturday Fundraiser

Date: 26th March 2022

Staff: Jane Charman

Attendees: 37

Summary: This is a new addition to the regular monthly coffee morning held on a Thursday at Carharrack Methodist Hall. The morning combined a bring and buy cake sale and general knowledge quiz. Jane set up a table and pull up banners so people could browse the information. United Downs project leaflets were put on tables, with many being taken home, some will be sent overseas to Cornish relatives. Jane talked to attendees throughout the morning as well as joining a team for the quiz. It is important for GEL to support local activities which is appreciated by the event organisers.

5.6 Frogpool Community Coffee Morning & Fund Raiser

Date: 31st March 2022

Staff: Jane Charman

Attendees: 52

Summary: The Frogpool community coffee morning has resumed being held on the last Thursday of every month. This month's coffee morning including a cake bring and buy sale to raise funds for a humanitarian charity helping Ukrainian refugees. This event was very well attended by people from many of the surrounding villages. The organiser of the event was very please that GEL supported their fund raising. A selection of cakes was purchased by Jane to take back to the team based at the United Downs office. A table was set up with information leaflets for people to take away, while Jane chatted to attendees about the geothermal power project.

6 Site Visits

Site visits are still severely restricted; however, exceptions have been made for small groups and individuals.

6.1 Governor Designate of Montserrat

Date:	18th March 2022
Staff:	Tony Wilson, Hazel Farndale, Jan Laszczak-Moodie, Jane Charman, Kieran Symons & Finlay Thompson
Attendees:	2
Summary:	GEL was contacted by the Governor Designate of Montserrat Sarah Tucker prior to her departure from the UK to take up her new post. Montserrat already has two completed geothermal wells and one partially drilled well. Sarah and her husband visited the United Downs site to gain greater knowledge about geothermal, to see how the well heads had been configured and to discuss how the island of Montserrat can progress their geothermal power and heat project. Drilling Supervisor Jan talked extensively about the drilling and well testing process at United Downs and showed Sarah pictures of the well heads in Montserrat, giving maintenance recommendations. Sarah was very appreciative and took away information leaflets as well as asking for electronic copies of the presentation and wall panels, which were subsequently sent to her. Jane spoke to Sarah about linking up Hayle Academy with a School on the Island, Sarah was excited about the idea and asked if a message could be sent to the Head of Geography asking her to contact Sarah. The visit concluded with assurances that Sarah would keep in touch once she arrives in Montserrat.

6.2 BGS Ireland and Dublin University

Date:	22nd March 2022
Staff:	Hazel Farndale & Jane Charman
Attendees:	5
Summary:	Three representatives from BGS Ireland along with 2 representatives from Dublin University visit the United Downs project site to find out about all aspects of the project plus geothermal regulations. Hazel and Jane gave a presentation detailing the individual phases that the United Downs project has gone through. Jane talked predominantly about the drilling and testing phases along with the importance of a comprehensive community engagement programme which has included working with local schools and colleges. Hazel talked about gaining planning permission for geothermal projects and the power plant phase with in-depth detail about the Cornish granite. The presentation was well received, and a great deal of questions were asked. The visit concluded with a walk around the operational area to see the well heads and water storage pond.

7 Community Liaison Group

The Community Liaison Group has decided not to meet virtually at the moment as most attendees are attending the update webinars.

8 Community Fund

The Community Fund has now closed due to the fund being fully allocated to 14 projects. Projects that were due to finish during 2020/2021 have been given extra time to complete their projects due to the covid pandemic.

9 Social Media

GEL has been using Facebook, Twitter and YouTube to disseminate information to the public since the start of the UDDGP project. The dedicated United Downs social media accounts were replaced with "Geothermal Projects" to allow a wider variety of posts.

9.1 YouTube

GELs YouTube channel subscribers continue to increase. The GEL YouTube channel is being publicised via social media and some of the films are now linked to the United Downs website page.

9.2 Website

The GEL website incorporating the UDDGP project has been a very useful tool to help people understand about deep geothermal energy. The Meet the Team page has expanded to incorporate new members of staff. The website is continually being updated with a wide range of information.

Appendix A: Community Update

GEL Geothermal Engineering Ltd

Geothermal Projects Update
January 2022

Future Geothermal Development in Cornwall

GEL had hoped to have prospective future site planning applications reviewed and a decision made at the strategic planning committee meeting during the first week of January. Unfortunately, due to some delays, the planning applications have been deferred to a future meeting, most likely in April 2022. This gives GEL and the Cornwall Council planning team more time to finalise and assess the required documents.

As always, GEL will be happy to answer any questions you might have about future sites or go over plans for clarity.

Big Announcement

On 21st December it was announced that GEL will be working with a consortium called Geothermal NI (geothermalni.com), to work as part of a wider team on developing deep geothermal power and heat projects in Northern Ireland. This is an exciting project for GEL to be involved with and we look forward to sharing the knowledge we have all gained working in Cornwall.

Kick Start Scheme

If you know a young person who is on Universal Credit that is interested in PR and Marketing, GEL still has a vacancy for a Community Engagement Assistant, applications can be made through Job Coaches. This opportunity will be closing soon.

Dates for your diary

GEL has been invited to have a stand at this year's Mining Villages Expo. The launch will be on Friday 1st April at Cornwall College followed by Camborne Community Centre on Tuesday 5th, Redruth Community Centre on 6th, Stithians Centre on 7th and the last day will be at Chacewater Village Hall on the 8th. We hope you will be able to visit us on one of the days.

You will also find GEL at the Chacewater Community Energy Group – Ideas Day on Thursday 28th April from 10am. For more information contact organic@carleys.co.uk

United Downs Geothermal Power Project

At the GEL United Downs project, Tony, our Project Manager is in the final stages of agreeing a contract with a power plant provider, it is hoped that the final contract will be ready to sign by the end of January. It is expected that the first phase, which will be the site preparation will begin late spring/early summer.

It looks like 2022 is going to be a busy and exciting year for GEL and with that comes the opportunity to recruit more team members.

Geothermal: - Clean Energy for a Healthy Planet

@Geo_Projects Geothermal Projects Geothermal Engineering Ltd

www.geothermalengineering.co.uk

United Downs Deep Geothermal Power Project

Public Dissemination Quarterly Report 1st April – 30th June 2022

UNITED DOWNS
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1 Introduction

GEL is committed to informing the public about the United Downs Deep Geothermal Power project and endeavours to disseminate information fairly and transparently. Public events, site visits, conferences and school visits were arranged and attended regularly prior to the outbreak of the Covid-19 pandemic. However, during these extraordinary times to reach both a local and wider audience social media platforms, Twitter, Facebook and YouTube have continued to be used along with direct email updates to the four local parish councils and community group leaders.

After evaluating the safety of staff and visitors, the GEL team has once again been able to invite schools to visit us at the United Downs site as well as visiting schools and colleges for talks and careers fairs

A lot of community events are now back to meeting in person, which has allowed the Community Engagement Manager to once again go out to personally give an update on progress at the United Downs Deep Geothermal Power Project, as well as supporting events such as the Gwennap Climate Change Group.

The following report contains a summary of all public dissemination between the 1st of April and the 30th of June 2022.

2 Education

The spring term has in the past been a time for non-exam years to visit the United Downs site or invite a GEL representative into schools to give talks. During this quarter it has been great to be back working with schools and colleges, meeting students, teachers and tutors to talk about Geothermal in general and give an update on the United Downs project.

GEL has taken the opportunity this quarter to create new education resources, which have all be well received.

2.1 Primary School

2.1.1 Perran-ar-worthal Primary School

Date: 17th May 2022

Staff: Jane Charman & Fin Thompson

Attendees: 24 students & 5 Teachers/Parent Helpers

Summary: The year 5 pupils from Perran-ar-worthal primary school have been learning about renewable energy, so a visit to United Downs to find out about geothermal and how it fits into the mix of renewables for Cornwall was a valuable learning experience.

The students watch the bespoke primary school animation, which was followed by a question-and-answer session. The students with the help of the adults completed a fun quiz to test their geothermal knowledge, this was then followed by a game of marching pairs to help them remember geothermal power project terminology.

The student left with a copy of the Miss Molecules Mission comic, United Downs project leaflets, a GEL pencil and sticker.

All attendees had a great time and the adult helpers said they had learnt a lot as well.

2.2 Secondary Schools

2.2.1 Mounts Bay School

Date: 3rd May 2022

Staff: Jane Charman

Attendees: 25 year 7 students & 1 teacher

Summary: Jane gave a group of year 7 students an "I love my job" talk. So that the student understood why community engagement is so important, the students watched the bespoke animation for secondary schools, with a short question and answer session. Jane then gave a presentation about her role as Community Engagement Manager, why her job is so important and why she loves it so much.

The students had to make notes throughout the session so that they could give a presentation to the rest of their year about the speaker and the job they do.

Students were given United Downs project leaflets, GEL pencils and stickers as a reminder of the morning.

MOUNTS BAY ACADEMY

2.2.2 Hayle Academy (year 8)

Date: 9th May 2022

Staff: Jane Charman & Fin Thompson

Attendees: 15 year 8 students & 2 teacher

Summary: The year 8 students have been learning about geothermal in their geography lessons. 15 were given the opportunity to visit the geothermal site at United Downs to learn more about geothermal in the UK and how it varies from volcanic regions of the world.

The group watched the bespoke secondary school animation followed by a question-and-answer session. The students then had to find the answers to over 20 questions by reading the information panels on the visitor centre walls. The students and teachers had a great time and were quite competitive to be first to find all the answers. Jane and Fin went through the answers to make sure everyone had the correct information.

Everyone took United Downs project leaflets, a GEL pencil and sticker as well as their completed question sheet.

HAYLE ACADEMY

2.2.3 Hayle Academy (Year 10)

Date: 10th May 2022

Staff: Jane Charman & Fin Thompson

Attendees: 15 year 10 GCSE Geography students & 2 teacher

Summary: To enhance the students understanding of geothermal, the social science aspect of a project and the value to good information, some of the Year 10 GCSE students visited United Downs Deep Geothermal Power Project to hear directly from the project team.

The students started their visit by watching the secondary school bespoke animation, which was followed by a question-and-answer session. The students were then split into two groups for a fun session to create posters. One group were geothermal supporters, the other were protesters. The groups were given copies of the FAQ sheets from the GEL website as

well as being able to use the visitor centre wall panels for inspiration. The protesters then had to shout about why they didn't want a geothermal project, while the supporters had to reason with them and correct the miss information they had used. The students really enjoyed this session as it gave them a different perspective of a geothermal power project.

The students and teachers were given United Downs information leaflets, GEL pencils and stickers to remind them of their visit.

2.2.4 Truro High & Surrounding Schools

Date: 24th June 2022

Staff: Jane Charman & Fin Thompson

Attendees: 70 students

Summary: Truro High School hosted a careers day for their own year 8 students as well as female students from neighbouring schools to mark Women into Engineering Day. The girls were split into groups of 5 – 6 students, each group then visited each employer for 20 minutes to find out about their industry and to take part in an industry related activity. Jane and Fin gave each groups a short talk about the United Downs Deep Geothermal Power Project. Each group then took part in a fun careers quiz based on personality and hobbies, to see which one of the varied roles at a geothermal power project they would be best suited to. Each student was given a postcard to remind them of the career choice from the quiz results. If there was time before the 20-minute session expired the students watched project films from the United Downs drilling and testing phases.

New postcards have been created for the career quiz which now give more information about subject that can be studied if the student want to pursue the career as predicted by the quiz, along with industry websites to browse for more information.

The students were able to take United Downs Geothermal information leaflets away with them.

2.2.5 Redruth School

Date: 30th June 2022

Staff: Jane Charman & Fin Thompson

Attendees: 18 Students & 1 Teacher

Summary: GEL were invited to run an after-school club for year 9 and 10 students. GEL decided to run a multi-media workshop based on the GEL website, social media and Information Flyers.

The students started by watching the bespoke secondary school animation, so they understood the fundamentals of geothermal and the project at United Downs. A short question and answer session followed. Jane and Fin then talked about the merits of having multi-media as an aid when talking to local communities about geothermal power projects and what makes a good website, social media post and information flyer. The students then split up into groups of two to work on their chosen media type.

At the end of the session one of the social media posts was posted onto the GEL Projects Twitter and Facebook pages. GEL took away some new ideas for enhancing the website.

The students and teacher were all give United Downs information flyers, GEL pencils and stickers to take home. The session was well received by all.

2.3 Colleges

2.3.1 Penwith College Careers Fair

Date: 29th June 2022

Staff: Jane Charman

Attendees: Approx 75 students and tutors

Summary: Penwith Collage held a careers fair for their year 1 and 2 students so that they could find out about local businesses and jobs that may be available to them.

Three pull up banners were displayed giving details about Cornwalls potential for geothermal along with a TV showing films from the United Downs Deep Geothermal Power project drilling and well testing phases.

Students were able to take the GEL career quiz to see which one of the roles at the United Downs site they were most suited to do. Students were given a postcard to remind them of the quiz results along with United Downs project leaflets and GEL pencils and stickers.

PENWITH COLLEGE

3 Universities

No Universities have visited GEL this quarter

4 Conferences, Public Talks & Webinars

4.1 Chacewater Renewable Energy Ideas Day

Date: 28th April 2022

Staff: Jane Charman & Tony Wilson

Attendees: Approx 80

Summary: Chacewater is a village close to the United Downs Deep Geothermal Power Project site. As part of the village's climate change initiative they organised an Energy Ideas Day, with inspirational speakers from service providers to local renewable energy initiatives. Tony gave a talk about the United Downs project and the prospect of using the surplus hot water after electricity has been produced to supply heating to local residents or businesses.

A small stand was set up with pull up banners for attendees to browse during breaks with United Downs information leaflets to take away.

4.2 Manx Radio Interview

Date: 19th May 2022

Staff: Hazel Farndale

Attendees: Unknown

Summary: Manx Radio covered a short news story about renewable energy a few months earlier, a listener contacted the radio station and recommended that they invite a representative from GEL to talk about deep geothermal and the project at United Downs. Hazel gave a short talk about the potential to use geothermal energy on the Isle of Man using United Downs as a successful case study. The slot was well received with some listeners calling in to ask questions.

4.3 Cornwall Climate Focus Webinar

Date: 19th May 2022

Staff: Hazel Farndale

Attendees: Approx 30

Summary: Derek Thomas, MP for West Cornwall hosted a Climate Focus webinar titled "Modern-day mining opportunities in Cornwall" Hazel gave a general introduction to geothermal and United Downs, and the potential for power and heat that geothermal offers to Cornwall as well as the economic benefits to the local community and helping Cornwall meet it's 2030 carbon neutral targets.

5 Community Visits & Events

After a two-year hiatus due to the Covid-19 Pandemic community events are slowly beginning to resume. The community close to the United Downs project are enjoying a return to face-to-face updates from the GEL Community Engagement Manager and asking about the work that has been carried out since March 2020. Larger community events are also being organised, which gives GEL a great opportunity to meet the wider community.

5.1 Mining Villages Regeneration Expo

Date: 1st, 5th, 6th, 7th & 8th April 2022

Staff: Jane Charman, Hazel Farndale, Jan Laszczak-Moodie, Kieran Symons

Attendees: Approx 400

Summary: The mining villages are made up of Camborne, Redruth, Illogan and many of the smaller villages surrounding the United Downs Deep Geothermal Power Project site. The Mining Villages Regeneration Expo, was a 5 day event organised to showcase all the innovative and forward thinking projects that are taking place in the area.

GEL had a large stand with a TV showing project films from the drilling and well testing phases of the United Downs Deep Geothermal Power project. Information flyers were available for people to take and GEL team members manned to stand to talk to people about the United Downs project and geothermal in general.

This was a fantastic opportunity for GEL to show the local community the benefits of geothermal projects in relation to climate change mitigation and the economic benefits to businesses and communities.

5.2 Carharrack Community Coffee Morning & Quiz

Date: 14th April, 28th May & 25th June 2022

Staff: Jane Charman

Attendees: 20 – 35 local residents

Summary: This is a new community event that was started earlier in 2022.

Jane attends this event to support it as being part of the local community as well as sharing information about the United Downs Deep Geothermal Power project. It is important for GEL to support local activities even when there is no activity at the geothermal site.

5.3 Frogpool Community Courtyard Opening

Date: 21st April 2022

Staff: Jane Charman & Fin Thompson

Attendees: 32

Summary: Frogpool Methodist Church Hall has a courtyard that was rarely used. Following a successful application for funds from the GEL community fund, the courtyard has been transformed into a beautiful outdoor community space with handmade ceramic decorations on a deep blue painted wall. Bespoke benches and flower planter have also been installed. All of the work has been carried out by the local community and local artisans.

Jane handed over a UDDGP plaque which will be displayed in the courtyard for all to see.

5.4 Trevithick Day

Date: 30th April 2022

Staff: Jane Charman, Hazel Farndale & Jan Laszczak-Moodie

Attendees: Approx 300

Summary: Trevithick Day is a celebration of the Cornish Engineer Richard Trevithick, it is an all day festival of steam engines and local businesses.

GEL had a stand just off the main street. Many interesting conversations were had with local people and holidaymakers about Cornwall's deep geothermal power potential. Visitors to the stand were able to take away children's Miss Molecules Mission comics, United Downs information leaflets and GEL pencils and stickers.

5.5 Lanner Village Market

Date: 18th May & 8th June 2022

Staff: Jane Charman

Attendees: 20 -35

Summary: This is an event that has resumed after not being able to run during the Covid-19 Pandemic. It is a weekly event, however, GEL has a stand just once a month. Many local traders support this event, which is attended by the local community and provides a valuable resource for those that do not have cars.

GEL will display two of the five pull up banners in rotation to keep the information fresh. Jane is on hand to chat to the attendees and give updates on the United Downs Deep Geothermal Power project. It is important that the local communities around United Downs see GEL supporting their initiatives.

5.6 Gwennap Climate Change Group

Date:	11th June 2022
Staff:	Jane Charman
Attendees:	6
Summary:	United Downs Industrial Estate in the parish of Gwennap, so when a few of the local community and parish council decided to start a climate change group, Jane joined as a local business as well as being able to give details of the Deep Geothermal Power project. This was only the second time that the group has met, but they are attracting a variety of speakers.

5.7 Frogpool Community Coffee Morning

Date:	23rd June 2022
Staff:	Jane Charman
Attendees:	25 - 30
Summary:	This coffee morning has been a longstanding event that returned to its once-a-month slot earlier in 2022. Jane attends the event whenever possible to share updates from the United Downs Deep Geothermal Power project, find out what is worrying or concerning people in the community from other activities in the area to stay aware of any issues that may impact the support for the geothermal project.

6 Site Visits

Site visits are still severely restricted; however, exceptions have been made for small groups and individuals.

6.1 Society of Economic Geology

Date:	22nd April 2022
Staff:	Jane Charman Hazel Farndale & Jan Laszczak-Moodie
Attendees:	9
Summary:	The Society of Economic Geology is a group of students from multiple universities, predominantly from the UK, with some overseas students. A small group visited the United Downs Deep Geothermal Power project whilst on a tour of Cornwall. A presentation was given by Hazel and Jane about the geothermal potential in Cornwall and the social science side of a geothermal power project. A tour of the site then took place and a talk about the geothermal well heads from Jan. The group asked many questions throughout the visit, and all took away United Downs information leaflets.

6.2 DWP – Cornwall

Date: 27th April 2022

Staff: Jane Charman, Jan Laszczak-Moodie, Fin Thompson & Kieran Symons

Attendees: 3

Summary: Following the success of the governments Kick Start scheme to get young people off of long-term Universal Credit, representatives from the local DWP came to find out how our Kick Start recruits were getting along and to find out about the United Downs Deep Geothermal Power project.

The team gave a presentation about the work that has been carried out at United Downs, followed by Fin and Kieran talking about their transition from unemployment to working for the first geothermal power project in the UK.

6.3 Cornwall Council – Adult Education

Date: 9th May 2022

Staff: Jane Charman & Fin Thompson

Attendees: 6

Summary: Cornwall Council's Health Works for Cornwall Employment Broker, Cornwall Council Together for Families & Education Services brought 4 adults who are receiving Universal Credit and are exploring options to train for a new career. GEL agreed to run a multi-media workshop to give the delegates a taste of how businesses use websites, social media and information leaflets to engage with the local community and wider public.

The delegates were shown the secondary school animation to help them understand what geothermal is and the work that has been happening at the United Downs site. A question-and-answer session followed.

Fin gave a talk about the merits of good multi-media and how people use different methods to find out information. All attendees were given information leaflets about the United Downs project to take a way.

6.3.1 Cornell University

Date: 15th June 2022

Staff: Jane Charman & Hazel Farndale

Attendees: 1

Summary: Catherine Lambert a researcher from Cornell University, which is currently undertaking a geothermal heating project of their own came to the UK to research how community engagement is being carried out and to find out more about the United Downs Deep Geothermal Power (UDDGP) project. Jane and Hazel gave an overview of the UDDGP project and Jane gave a short talk about community engagement and how it has evolved throughout the project. Catherine had some preprepared questions, which Hazel and Jane answered.

Catherine was given a tour of the geothermal site before leaving with information leaflets about the project.

7 Community Liaison Group

The Community Liaison Group is not currently meeting. The group will resume just before ground works begin for the power plant construction.

8 Community Fund

The Community Fund has now closed due to the fund being fully allocated to 14 projects. Projects that were due to finish during 2020/2021 have been given extra time to complete their projects due to the covid pandemic.

See Community Visits for information about the Frogpool Methodist Church community courtyard.

9 Social Media

GEL has been using Facebook, Twitter and YouTube to disseminate information to the public since the start of the UDDGP project. The dedicated United Downs social media accounts were replaced with "Geothermal Projects" to allow a wider variety of posts.

9.1 YouTube

GELs YouTube channel subscribers continue to increase. The GEL YouTube channel is being publicised via social media and some of the films are now linked to the United Downs website page.

9.2 Website

The GEL website incorporating the UDDGP project has been a very useful tool to help people understand about deep geothermal energy. The Meet the Team page has expanded to incorporate new members of staff. The website is continually being updated with a wide range of information.

https://geothermalengineering.co.uk/the-team/

Appendix A: Community Update

GEL Geothermal Engineering Ltd

Geothermal Projects Update - April 2022

A warm welcome to.....

GEL is slowly but steadily expanding. Over the last few weeks Ana and Steve have joined the United Downs team. Ana is our new project geologist and Steve is managing all the research projects that GEL is currently involved with as well as revieing new opportunities that are always being made available. It is great to have both working with us.

Future Geothermal Development in Cornwall

GEL has listened to comments that have been made regarding future sites and the new and improved plans, which incorporate the most up to date technology will soon be ready for consideration.

As always, GEL will be happy to answer any questions you might have about future sites or go over plans for clarity.

Community Engagement

Over the last few weeks GEL has been supporting community events around the United Downs area. It is great to be out and about again, catching up with everyone.

If you organise or attend a community event that GEL could attend, please let us know by emailing details to:
contact@geothermalengineering.co.uk

Expo

GEL had a great time at the mining villages regeneration expo early in April, talking about all things geothermal. Some attendees have been following the United Downs project from the beginning while it was all new to others. It was a fabulous community event that was very well attended and received.

Dates for your diary

GEL will be attending the Chacewater Community Energy Group – Ideas Day on Thursday 28th April from 10am. For more information contact organic@carleys.co.uk

Looking Ahead....

GEL will have a stand at the following Shows:

- Wendron Motor Show on Sunday 19th June.
- Pendeen Renewable Energy Fair on Saturday 9th July
- Stithians Show on Monday 11th July
- Chacewater Energy Fair on Saturday 16th July

All Change!

Hazel Farndale has now been promoted to Business Development Manager. Hazel has put many hours into locating new prospective geothermal sites as well as working closely with our Planning Consultants. Jane Charman has also slightly changed her role and now manages the office as well as Community Engagement. Jane is currently recruiting a Community Engagement Coordinator to help with the ever-expanding role and to improve the GEL education Programme.

Geothermal: - Clean Energy for a Healthy Planet

@Geo_Projects Geothermal Projects Geothermal Engineering Ltd

www.geothermalengineering.co.uk

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United Downs Deep Geothermal Power Project

Public Dissemination Quarterly Report 1st July – 30th September 2022

Project Name	**United Downs Deep Geothermal Power Project**
Project Reference Number	**CC563 UDDGP**
Date of Issue	**30th Sptember 2022**
Version	**FINAL**

0

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1 Introduction

GEL is committed to informing the public about the United Downs Deep Geothermal Power project and endeavours to disseminate information fairly and transparently. Public events, site visits, conferences and school visits were arranged and attended regularly prior to the outbreak of the Covid-19 pandemic. However, during these extraordinary times to reach both a local and wider audience social media platforms, Twitter, Facebook and YouTube have continued to be used along with direct email updates to the four local parish councils and community group leaders.

After evaluating the safety of staff and visitors, the GEL team has once again been able to invite schools to visit us at the United Downs site as well as visiting schools and colleges for talks and careers fairs

A lot of community events are now back to meeting in person, which has allowed the Community Engagement Manager to go out once again to personally give an update on progress at the United Downs Deep Geothermal Power Project, as well as supporting local events.

The following report contains a summary of all public dissemination between the 1st of July and the 30th of September 2022.

2 Education

The summer is generally a quiet time as it encompasses the summer holidays. There were no visits to primary schools, colleges, or universities, however, there were two secondary school careers fairs.

2.1 Primary School

There were no visits this quarter from or to Primary schools

2.2 Secondary Schools

2.2.1 Sir James Smith Academy - Camelford

Date: 19th July 2022

Staff: Jane Charman

Attendees: 85 – Students, Staff & Parents

Summary: This was the first time that GEL has attended a careers fair at this school. There was a diverse mix of businesses with GEL being the only renewable energy company there. The GEL stand was very popular even though the school is a long way from United Downs. Older students had studied geothermal in geography lessons, so they were eager to find out about geothermal in Cornwall and the different types of jobs that are available. Students were invited to take part in the GEL career quiz, which students found fun and were pleased to take away a postcard with information about their career outcome.
The school was pleased with the number of students who visited the GEL stand and will invite us back for the next careers fair in 2023.

2.2.2 Humphry Davy School – Careers Fair

Date: 28th September 2022

Staff: Jane Charman

Attendees: 135

Summary: GEL has attended careers fairs at Humphry Davy School in the past. The fair was very busy with a large number of students from years 7 – 11 visiting the GEL stand. Later in the afternoon parents also visited the careers fair. All of the students that visited the GEL stand knew about geothermal as they live in Penzance where Jubilee Pool is located. The students all took part in the GEL career quiz and were all happy with the result they received. Each student took away a postcard, which gave details of subjects to study at college and university and some useful websites that they could look at for more inspiration.

Humphry Davy School

2.3 Colleges

There were no visits to or from colleges this quarter.

3 Universities

There were no university visits this quarter

4 Conferences, Public Talks & Webinars

There were no conferences, public talks or webinars this quarter.

5 Community Visits & Events

After a two-year hiatus due to the Covid-19 Pandemic community events are slowly beginning to resume. Larger community events are also being organised once again, which gives GEL a great opportunity to meet the wider community.

5.1 Pendeen

Date: 9th July 2022

Staff: Jane Charman

Attendees: 40

Summary: This was the first time Pendeen has held a Renew-Reuse-Recycle event. Unfortunately, due to the covid-19 pandemic several of the businesses and local groups who had been booked were unable to attend due to their representatives having the virus.

The day was a great success and many good conversations were held about geothermal power and heat and how it fits into the renewable energy mix for Cornwall. The local MP Derek Thomas attended with his family and although he knows a lot about geothermal projects in Cornwall he stopped by for a chat.

5.2 Stithians Show

Date: 11th July 2022

Staff: Jane Charman, Hazel Farndale, Jan Laszczak-Moodie, Fin Thompson, Kieran Symons, Tony Wilson

Attendees: 80

Summary: The Stithians Show returned after a two-year absence due to the Covid-19 pandemic. The show was well attended, and the GEL team had many interesting conversations. Information sheets regarding the GEL education programme were given out to interested parents and school governors, who were willing to take the information back to their respective schools. Information leaflets about the progress at United Downs were given out along with a leaflet detailing the eco-credential of geothermal power and heat projects.

5.3 Perran-ar-worthal WI

Date: 12th July 2022

Staff: Jane Charman

Attendees: 27

Summary: This evening meeting was well attended by local ladies. They regularly have a speaker at their monthly meetings. Most of the attendees knew about the United Downs geothermal power project as they all live quite close to the site. They were all very interested in the process from groundworks through to well testing. After the presentation many questions were asked. Everyone took a leaflet about the UDDGP project.

5.4 Falmouth & Penryn Churches Together

Date: 13th July 2022

Staff: Jane Charman

Attendees: 12

Summary: The chair of Falmouth and Penryn Churches Together is a UDDGP Green Ambassador, who has visited the United Downs site on several occasions, so requested a presentation for the groups quarterly meeting.

A presentation was given with a Q & A session. There were many questions, and all attendees took UDDGP information leaflets along with one outlining the eco-credentials of geothermal and a pencil with the GEL logo on.

Falmouth
Penryn
Churches
Together

5.5 Carharrack Community Coffee Morning & Auction

Date: 30th July 2022

Staff: Jane Charman

Attendees: 23

Summary: This Coffee Morning is a regular monthly event, with either a quiz or an auction. The morning was good fun and although there were no updates from the UDDGP project, the organisers were very please that GEL supports their events.

5.6 Gwennap Parish Flower Festival

Date: 9th – 11th September 2022

Staff: Jane Charman

Attendees: 64

Summary: GEL has supported events in the Gwennap Parish since the beginning of the UDDGP project. This year the Community Engagement Manager was asked if GEL could take part in the annual flower festival, which is held in the parish church. Although this is not something that has been done before, Jane agreed. Each display was associated with a saint, GEL chose St Kateri Tekakwitha – patron saint of ecology and environment. All the flowers and foliage were gathered from the UDDGP site and arranged along a windowsill with a bird box and a bug hotel as props. This three-day event was very popular and raised over £1k for local good causes.

5.7 St Peter's Church Chacewater – Harvest Festival & Save the Earth Celebration

Date: 25th September 2022

Staff: Jane Charman

Attendees: 36

Summary: GEL has supported many of the community events that are held in Chacewater, a village not far from the UDDGP site. St Peter's Church asked GEL to be part of an exhibition they were holding before and after their morning service which was dedicated to celebrating harvest festival and saving the earth. There were three other displays which people could browse. Most people knew about the UDDGP project, but all had questions about the drilling and well testing. Leaflets, children's comics, and GEL logo pencils were available for people to take away.

6 Site Visits

Site visits are still severely restricted; however, GEL has been accommodating visits as much as possible this quarter.

6.1 Cornwall College – Plumbing & Heating Lecturers

Date:	6th July 2022
Staff:	Jane Charman & Jan Laszczak-Moodie
Attendees:	6
Summary:	All college lecturers are encouraged to explore local businesses which could benefit their students by either a visit to the company for a presentation or inviting a representative from the company in to college to give a talk. The Plumbing and Heating lecturers were very interested in Geothermal power and heat. Jane and Jan gave a presentation before taking the attendees up to the viewing platform to look at the well heads. The visit was well received and hopefully the college will be contacting GEL in 2023 to arrange for students to visit.

CORNWALL COLLEGE

6.2 Renewable Energy Ambassadors

Date: 14th July 2022

Staff: Jane Charman

Attendees: 2

Summary: A couple who have been following the progress and sharing information about the UDDGP project since the site was prepared at United Downs came to visit, as they had not been able to attend any of the public drop-in session. They enjoyed looking at the wall panels, a geology display, and an education display. An informal presentation was given with a Q & A session. They took away information about the UDDGP project so that they can carry on spreading the news of Cornish geothermal.

6.3 Constantine History Society

Date: 19th August 2022

Staff: Jane Charman

Attendees: 20

Summary: Constantine is a small village south of United Downs. The historical society either invite speakers to their meetings or they visit an interesting location. The group chose the UDDGP project as it is history in the making.

A presentation was given with a Q & A session at the end. The group were taken outside to look at the drill bits and to view the well heads from the viewing platform. All attendees took home information leaflets.

6.4 Menheniot Parish Council

Date: 30th August 2022

Staff: Jane Charman & Hazel Farndale

Attendees: 4

Summary: Menheniot Parish is near Liskeard, several miles north of United Downs. The parish council were looking at ways to make the parish more eco friendly and to cut their carbon footprint. They came across the UDDGP project and wanted to know more and if a similar project could be undertaken in their parish. Hazel and

Jane gave a presentation about geothermal and why Cornwall is a good place for power and heat projects, the presentation also included a timeline of the UDDGP project. A Q & A session followed the presentation. Hazel the GEL Business Development Manager and trained geologist talked about the possibility of their parish exploring the possibility of geothermal. The attendees all took information leaflets and Jane's contact details were taken to pass on to their local primary school.

6.5 Public Drop-In

Date: 31st August 2022

Staff: Jane Charman, Hazel Farndale, Jan Laszczak-Moodie, Tony Wilson, Ana Ierofeieva

Attendees: 96

Summary: The last public drop-in session for the UDDGP project was at the end of 2019. This was the first time the site has been open to the public in 2 ½ years. Due to the risk on Covid-19, free tickets were available through Eventbrite, so that GEL could manage the number of people. Due to restricting numbers there were three session, which enabled nearly 100 attendees to visit over the day. A presentation was given before everyone visited the viewing platform where Jan the drilling supervisor gave a talk about the drilling rig and well testing rigs using the new railing posters to. Attendees were able to browse the wall panels in the visitor room and ask members of the team questions. Information leaflets were available for people to take home.

6.6 Cornwall Councillors

Date: 13th September 2022

Staff: Jane Charman & Hazel Farndale

Attendees: 2

Summary: Due to GEL submitting planning applications for future geothermal projects a lot of conversations have been held amongst Cornwall Councillors. So that they could get up to date and factual information about the UDDGP project, two councillors visit the United Downs site. Jane & Hazel gave an informal presentation about the UDDGP project answering questions as they went along. The councillor enjoyed their visit and said they would recommend to other councillor that they should visit to see for themselves. Both took away information leaflets.

7 Community Liaison Group

The Community Liaison Group is not currently meeting. The group will resume just before ground works begin for the power plant construction.

8 Community Fund

The Community Fund has now closed due to the fund being fully allocated to 14 projects. Projects that were due to finish during 2020/2021 have been given extra time to complete their projects due to the covid pandemic.

See Community Visits for information about the Frogpool Methodist Church community courtyard.

9 Social Media

GEL has been using Facebook, Twitter and YouTube to disseminate information to the public since the start of the UDDGP project. The dedicated United Downs social media accounts were replaced with "Geothermal Projects" to allow a wider variety of posts.

9.1 YouTube

GELs YouTube channel subscribers continue to increase. The GEL YouTube channel is being publicised via social media and some of the films are now linked to the United Downs website page.

9.2 Website

The GEL website incorporating the UDDGP project has been a very useful tool to help people understand about deep geothermal energy. The website is continually being updated with a wide range of information.

https://geothermalengineering.co.uk/

United Downs Deep Geothermal Power Project

Public Dissemination Quarterly Report 1st October – 31st December 2022

UNITED DOWNS
DEEP GEOTHERMAL POWER

Project Name	**United Downs Deep Geothermal Power Project**
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1 Introduction

GEL is committed to informing the public about the United Downs Deep Geothermal Power (UDDGP) project and endeavours to disseminate information fairly and transparently. Public events, site visits, conferences and school visits were arranged and attended regularly prior to the outbreak of the Covid-19 pandemic. However, during these extraordinary times to reach both a local and wider audience social media platforms, Twitter, Facebook and YouTube have continued to be used along with direct email updates to the four local parish councils and community group leaders. Conferences, community events, United Downs site visits and school visits have all resumed in person again.

During this quarter GEL has recruited a Community Engagement & Education Coordinator to work alongside the existing Community Engagement & Education Manager enabling more local events to be attended for greater information dissemination.

The following report contains a summary of all UDDGP public dissemination between the 1st of October and the 31st of December 2022.

2 Education

The Autumn term has seen a steady flow of event requests for GEL, some to attend this quarter and others scheduled for early 2023 at primary and secondary schools, however, there were no visits to colleges, or universities this quarter.

2.1 Primary School

2.1.1 Cusgarne Primary School

Date: 9th December 2022

Staff: Paul Phillips

Attendees: ~60 students and siblings

~ 50 Parents & members of staff

Summary: Cusgarne Primary School invited GEL along to their Christmas Fair, so that students, school staff and parents could get up to date information about the UDDGP project.

Some great conversations were had with parents and teacher about the UDDGP project, and the progress made during the pandemic. Many information leaflets and Miss Molecule comics were given away.

The year 6 teacher would like to discuss a classroom session in the new year and the Head Teacher is eager to organise some assembly talks, GEL will follow up these requests in early 2023.

A very productive school visit with lots of community engagement.

2.2 Secondary Schools

2.2.1 Mounts Bay Academy

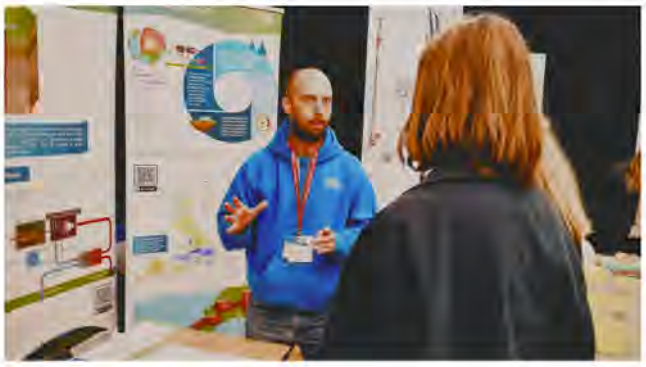
Date: 18th November 2022

Staff: Jane Charman & Paul Phillips

Attendees: ~180

Summary: GEL were invited to attend a careers fair at Mounts Bay Academy. GEL has visited the school several times before for careers fairs and to network with teachers.

Students from years 9, 10 and 11 visited the fair throughout the day, where they could talk to local businesses to find out what kind of jobs may be on offer when they are looking for employment. GEL chatted to students continuously, explaining about geothermal in Cornwall, then the students completed the GEL bespoke jobs personality quiz. Students were given a postcard to remind them of the job sector that could best suit them with information about subjects to study and websites to look at for further inspiration including the GEL website.



2.2.2 Penair School – Year 8 Assembly

Date: 25th November 2022

Staff: Jane Charman & Paul Phillips

Attendees: 230

Summary: The year 8 students are currently learning about geothermal power projects around the world including the UDDGP project.

A presentation was given about the various phases of the UDDGP project and why community engagement and education are so important. A short Q & A session followed. Information sheets about the GEL education programme were given to teachers, encouraging them to work with GEL in the future to enhance geography and science lessons.

PENAIR SCHOOL

2.2.3 Penair School – Hidden Science Careers Fair

Date: 2nd December 2022

Staff: Jane Charman & Paul Phillips

Attendees: 240

Summary: The year 9 students will be choosing their GCSE options soon, so the school wanted the students to find out about industries and jobs that have a hidden science element.

The format of this event was slightly different to the usual careers fairs as the students stayed in a classroom and the visiting businesses moved from class to class. Jane and Paul gave 8 presentations about the UDDGP project and why Cornwall is the best place in the UK for deep geothermal projects, they also talked about the job progression of some of the team. The students then took part in a shortened version of the GEL job personality quiz. After the quiz, Jane and Paul then explained where the hidden and sometimes not so hidden science is for each of the sectors. There was then a short amount of time for students and teachers to ask questions.

2.3 Colleges

There were no visits to or from colleges this quarter.

2.4 Universities

There were no university visits this quarter

3 Conferences, Public Talks & Webinars

3.1 9th British Geology Society – London Symposium

Date: 14th – 15th November 2022

Staff: Hazel Farndale

Attendees: ~100 in person & ~50 online

Summary: **Talk Title**: A Perspective on the Future of Deep Geothermal Energy in Cornwall

A presentation was given regarding the general progress at the UDDGP project and how this has led to future sites achieving planning permission, as well as the ongoing challenges faced by the geothermal industry, both nationally and locally.

GEL Managing Director Dr Ryan Law was presented with an award for his contribution to the UK geothermal industry.

3.2 OptiDrill Project Webinar

Date: 9th December 2022

Staff: Hazel Farndale

Attendees: 80 online

Summary: **Talk Title**: Sharing the Vision: Advancing wells with sensor technology and machine learning

A general overview of the OptiDrill project, was given Geolorn. A presentation was then given by Hazel Farndale on the use of the OptiDrill research project for GEL, based on lessons learnt from drilling at the UDDGP project. Women in Geothermal (WinG) UK was also championed for it's work in promoting the industry across the country and bringing together industry and academic partners for discussion and data sharing.

4 Community Visits & Events

Community events have been steadily getting back to pre-pandemic levels, which gives GEL a great opportunity to meet the wider community to disseminate up to date UDDGP project information and to support the local community.

4.1 Carharrack Community Coffee Morning

Date: 10th November 2022

Staff: Jane Charman & Paul Phillips

Attendees: 17

Summary: This was a well-attended community event, where the attendees know about the UDDGP project and are always eager for an update. Jane & Paul chatted with the attendees talking about the planned time scale for the power plant installation and hearing about how GEL is growing and employing more staff. Jane & Paul listened to attendees talk about their recent activities and were both invited to attend other community event later in the month.

4.2 Gwennap Coffee Stop

Date: 15th November 2022

Staff: Jane Charman & Paul Phillips

Attendees: 12

Summary: This is a community coffee morning which is the closest to the UDDGP site. The attendees have always been interested in the geothermal power project and enjoy hearing about progress. This was Pauls first visit to this event; he was given a warm welcome.

The attendees are planning a fund-raising event for Ukraine, however, they are short of volunteers, so Jane & Paul offered to run the refreshment stall.

Everyone left talking about the forthcoming fundraiser and how pleased they were that GEL will be there to help.

4.3 Frogpool Community Coffee Morning

Date: 24th November 2022

Staff: Jane Charman & Paul Phillips

Attendees: 21

Summary: This is another community event that has returned to its regular once a month time slot. This event is well attended by both local community members and those from surrounding towns and villages.

Paul was demonstrating how virtual reality can be used to help people understand geothermal projects. Several people took leaflets about the UDDGP project.

4.4 Carharrack Community Coffee Morning & Sale

Date: 26th December 2022

Staff: Jane Charman & Paul Phillips

Attendees: 15

Summary: This Saturday event is usually well attended, however, due to inclement weather and a clash with another event, attendance was down. Jane and Paul chatted with attendees about the UDDGP project and geothermal developments around the world. The organiser of this event was very grateful for the support from GEL.

4.5 Gwennap Parish Ukraine Fundraiser

Date: 29th November 2022

Staff: Jane Charman & Paul Phillips

Attendees: 35

Summary: This fundraiser was organised and run by the regular coffee morning attendees and advertised around the parish and surrounding villages. Jane & Paul volunteered to make and serve the teas and coffees to the attendees. It is important for GEL to be part of the community by being inclusive and helping where needed. The event raised over £600 for Médecins sans Frontières' work in Ukraine.

4.6 Frogpool Community Christmas Coffee Morning

Date: 15th December 2022

Staff: Jane Charman & Paul Phillips

Attendees: 29

Summary: The community in Frogpool are very sociable and enjoy hosting events for people from the surrounding villages and towns. This was the last community coffee morning before Christmas, which is always a special occasion with attendees traveling from several miles away. It is important that GEL are seen out and about in the local area even when there is little happening at the UDDGP site, so people can ask questions if they wish. Paul had an in-depth conversation with a few people about the power plant, how the binary system works and why GEL will be using this type of power plant

5 Site Visits

Site visits are still severely restricted; however, GEL has been accommodating visits as much as possible this quarter.

5.1 Local Landowner & Green Energy Supporters

Date:	10th October 2022
Staff:	Jane Charman & Hazel Farndale
Attendees:	12
Summary:	This group of local landowners and green energy supporters visited the geothermal site at United Downs to learn more about the technology and where in Cornwall future developments could take place. Jane gave a presentation to the group, which was followed by a Q & A session. Hazel and Jane answered all questions before going outside to look at the drill bits and view the well heads. The visit was well received. Thank you email: "Thanks so much to you both for giving the Burncoose party such a comprehensive tour of all that GEL have achieved to date-a series of key steps in bringing forward the power of mother nature to provide an abundance of economic electricity to Cornwall and beyond. We were all particularly taken by the care taken to assist the local community. Despite the current economic disruption, look forward to keeping in touch and wish you every success in getting the power plant assembled and production underway. Best wishes and much appreciated, David W"

5.2 Wardell Armstrong

Date: 13th October 2022

Staff: Jane Charman & Hazel Farndale

Attendees: 12

Summary: Wardell Armstrong are the consultancy company that assisted with the UDDGP planning application, they help in the development of green energies and critical infrastructure necessary to sustain social, environmental and economic improvement for all and facilitate a progressive diversification away from "carbon intensive" activities. GEL hosted a visit so they could view the site and hear how the development has progressed through each stage of the project and for new members of staff to hear about the United Downs project and how Wardell Armstrong has played their part.

5.3 Cornwall Labour Party

Date: 14th October 2022

Staff: Jane Charman, Hazel Farndale & Tony Wilson

Attendees: 15

Summary: A local Labour parliamentary candidate organised a visit to the UDDGP project site for some of the local Labour councillors and party members to find out about geothermal and why it is being developed in Cornwall. When attendees arrived, they browsed the wall panels and watch project films whilst enjoying refreshments, a presentation was then given about the United Downs project followed by a Q & A session. The group visited the viewing platform to take a look at the site and ask some final questions. The visit was enjoyed by everyone.

5.4 Royal College of Defence Studies

Date: 18th October 2022

Staff: Jane Charman & Hazel Farndale

Attendees: 20

Summary: The Defence Academy delivers world class professional defence and security education to the military bodies from all over the world. In the summer, visiting military personnel can choose which area of the UK they would like to visit to learn more about non-military ecological and economic businesses.

Following the successful visit in 2021, GEL hosted a visit for the 2022 delegation. Visitors browsed the wall panels upon arrival, a presentation was then given followed by a Q & A session. Due to the visit time constraints, there was only enough time for a short visit to the viewing platform before they moved on to their next location. The attendees all said they found the UDDGP project very interesting.

6 Community Liaison Group

The Community Liaison Group is not currently meeting. The group will resume just before ground works begin for the power plant construction.

7 Community Fund

The Community Fund has now closed due to the fund being fully allocated to 14 projects. Projects that were due to finish during 2020/2021 have been given extra time to complete their projects due to the covid pandemic.

8 Social Media

GEL has been using Facebook, Twitter and YouTube to disseminate information to the public since the start of the UDDGP project. The dedicated United Downs social media accounts were replaced with "Geothermal Projects" to allow a wider variety of posts.

8.1 YouTube

GELs YouTube channel subscribers continue to increase. The GEL YouTube channel is being publicised via social media and some of the films are now linked to the United Downs website page.

8.2 Website

The GEL website incorporating the UDDGP project has been a very useful tool to help people understand about deep geothermal energy. The website is continually being updated with a wide range of information.

https://geothermalengineering.co.uk/

9 Appendix A – Community Newsletter

GEL Geothermal Engineering Ltd *Clean Energy for a Healthy Planet*

Geothermal Projects Update - December 2022

Behind the Scenes

Although there has not been any activity at the United Downs site for a while as we await the arrival of our power plant, the team have been very busy behind the scenes preparing and enhancing planning applications for more geothermal power projects in Cornwall. In September, planning permission was granted for a project at Penhallow just south of Goonhavern. We hope to have another planning application decision during the first quarter of 2023, followed shortly after with at least two new planning applications being submitted to Cornwall Council.

Research Projects GEL has joined

Earlier this year, GEL joined a research project called Critical Raw Materials - Geothermal (CRM-G), as an associated partner. This is a 4-year, EU-funded project looking at the extraction of critical minerals from geothermal water. Please take a look at the project website for more information: https://crm-geothermal.eu/.

Furthermore, in 2021, heating and hot water was found to make up around 40% of the UK's energy consumption and generate nearly a third of UK carbon emissions. This shows a need to transition the heating sector onto green, renewable energy sources. With this in mind, GEL is excited to have joined SAPHEA, a European consortium looking at developing a toolbox to increase the market uptake of geothermal energy in heating and cooling networks across Europe. GEL is providing industry insight to both projects, sharing experience of the relevant policies and challenges for geothermal projects, offering Cornwall as a case study due to our region having huge potential.

School Visits

Over the last few months GEL has taken part in several careers fairs at local schools. These events are aimed at encouraging students to study appropriate subjects for their preferred career choice. Some events are specifically designed to encourage students to study Science, Technology, Engineering & Maths. GEL are always happy to discuss education needs with local schools.

GEL is still Growing

With another geothermal project waiting to start and the prospect of more being granted planning permission in 2023, GEL has been busy recruiting new members of staff. Amy has joined the team as a geothermal geoscientist and Paul will be working with Jane looking after Community Engagement and Education. We are also in the interview stage for a Power Plant Project Engineer, Office Manager and Finance & Payroll Manager. Soon we will have enough people to form a football team! More vacancies will be announced in 2023 via the GEL website and on social media, so keep an eye out if you would like to be part of our steadily growing team.

https://geothermalengineering.co.uk/jobs/

Links to our social media pages are below.

Social Media & Community Events

GEL stopped using the old UDDGP social media accounts over a year ago and switched to Geothermal Projects on Facebook, if you haven't already started following the new page, please do, so you can keep up to date with all our projects, not just the one at United Downs.

We are visiting community events again, so if you don't use social media, hopefully you will bump into one of us at a coffee morning for an update. If you attend a community event and would like Jane & Paul to visit, you can contact us by email:
contact@geothermalengineering.co.uk

We wish you all a very merry Christmas and happy and healthy 2023

@Geo_Projects Geothermal Projects Geothermal Engineering Ltd

16

Appendix B – UDDGP Project Logic Model

Project

United Downs Deep Geothermal Project

Click on the arrows to navigate around the model. Tables can be edited directly in the model. To edit free text, click Edit under each title

Context

Edit

Cornwall and the Isle of Scilly (CIOS) is a struggling regional economy with the lowest levels of productivity of any LEP area in England (a reflection of the very low levels of research and development undertaken in the region [CIOS LEP ESIF Strategy p. 24]).

One key resource is its natural energy. However, despite extensive, native renewable energy resources, CIOS still imports c. 95% of its energy requirements. In addition, of the c.550 MW of renewable energy generation in the region, only c.1% is owned by the local community, with most of the economic benefit of the generation leaving the region. The CIOS also produced greater CO2 emissions per capita than the Intergovernmental Panel on Climate Change state is required to minimise the risks of dangerous climate change.

There is great potential for CIOS to (1) harness its natural energy resources to generate renewable energy; (2) develop innovative specialist technologies to capture certain natural energy flows (deep geothermal, wave); and (3) retain ownership of the generation to deliver maximum benefit to the region. Enabling this would deliver (1) economic benefits for the region (business growth, job creation, retention of energy sector profits in the CIOS region, increase in disposable income / GVA); and (2) environmental benefits in terms of reduced carbon emissions.

Market Failure Assessment

Edit

A number of barriers prevent transformation of the energy economy in CIOS. These include:

1) 'Lack of information' (information asymmetry) on how to cost effectively reduce emissions and the high 'transaction costs' involved in acquiring that information

2) 'Innovation deficit': A lack of local innovative activity (this is particularly true of low carbon product and service innovation as markets fail to offer sufficient incentives for the development of low-carbon technologies due to the systematic mispricing of carbon in the economy)

3) A lack of network infrastructure to support adoption of local carbon behaviours and low carbon technologies (the 'network effects' market failure) such as smart grids and electric vehicle charging points.

4) The leakage of energy value from the CIOS economy due to the lack of local investors/capital able develop energy projects

Project Objectives

Edit

The United Downs Deep Geothermal Power (UDDGP) project is the first geothermal electricity development in the UK. The key objectives of the project are:

1) To demonstrate that Cornwall has the potential to generate electricity using the natural heat from the extensive, radiogenic Cornubian granite batholith.

2) To develop a project with high community acceptance, bringing benefits to the local community.

3) To understand the environmental impacts of the full project lifecycle, ensuring future geothermal power projects maximise their environmental benefits.

4) To provide a "living lab" for international research projects to ensure maximum impact on the development of future geothermal projects.

5) To complete the project with an exemplar health and safety record.

Rationale

Edit

At the time the project was designed, the policy context was geared towards producing renewable baseload electricity. Renewable heat was not deemed to be as important. Since the project was started, National policy has been shifting towards renewable heat supply and deployment. Further, the economic context has also changed after the war in Ukraine caused an increase in energy prices. Securing long term contracts for heat and power has now become more important for both the public and private sector.

The principal market failure was that no private investors would finance the drilling and testing phases of a deep geothermal project in Cornwall due to the perceived risk of such a project. This was because geothermal electricity production had never been proven in the UK and no entities had drilled to the depths required for electricity production in the region. To de-risk a project in a region with no previous successful projects would usually require detailed exploration via test drilling into the reservoir or geophysical surveys to image the reservoir. However, test drilling into fractured granite to the depths required to prove a viable resource would be almost as expensive as drilling full wells for power generation. Furthermore, geophysical exploration had proven ineffective to build confidence in a deep target within the granite due to the lack of contrast in the physical properties of the subsurface.

The generally accepted risk profile for a deep geothermal power project shows it to be high risk until the resource is "proven" via test drilling or exploration. For a project where these options are extremely expensive or unlikely to provide confidence, the majority of the cost of the project would need to be financed prior to any substantial risk reduction.

In order to reduce the risk of geothermal electricity production in the UK and leverage future private investment, deep wells needed to be drilled and the Cornish geothermal resource proven via extensive testing.

Inputs

What	Value
Funding from ERDF	16.884m
Private Match Funding from the project Delivery Partners	£12.841m
Public Match Funding from Cornwall Council	£2.400m

Activities

What
Drill production well to 5.2km
Drill injection well to 2.4km
Develop reservoir to improve flow pathways
Confirm temperatures and flow rates

Outputs

What	Value
Max temperature at 5.2km	180°C
Flow rates from production well	20-40 l/s

Outcomes

ID	Intended Outcome	How is it Measured?	Level	Baseline	Actual
1	Inc. energy generation and efficiency; adoption of LCEGS	Desktop calculated potential kWh generated, kWh savings; Annual energy cost reductions	Business	Original energy use at facility	
2	Growth in CIOS-based LCEGS innovations being	Increase in TRLs, LCEGS commercialised	Business	Original TRL	
3					
4					
5					

Intended Impacts

What
Increase in (1) confidence in geothermal energy efficiency; (2) amount of renewable energy generated; and (3) carbon intensity of CIOS SME sector
Reduction in spending on 'imported energy' in CIOS; increased retention of profits from the energy-sector in the CIOS economy
Reduction in GHG emissions from CIOS