

SCOTTISH DEVELOPMENT INTERNATIONAL

# Geothermal Energy

“The Just Transition; Using Scotland’s oil and gas experience to develop a new supply chain of geothermal companies”

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Updated September 2023



## **NEW, BUT EXPERIENCED SUPPLY CHAIN OF COMPANIES**

Scottish offshore oil sector was characterised by innovation and engineering developments in harsh conditions

Skills are transferrable and valuable

*A Just Transition*, making sure the workers, the companies and the social and economic structures that were fundamental to the successful oil sector are not left behind



Target date for net zero emissions of all greenhouse gases by 2045

## Transitioning from the successful oil and gas sector to renewable energy

Delivering a just transition, by working with communities, business, industry and the people of Scotland to plan for our net zero future

Currently around 98% of power generated through renewable sources



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**THE STARTING POINT?**

# **Scottish Government Targets**

## **Optimat Geothermal Report January 2022\***

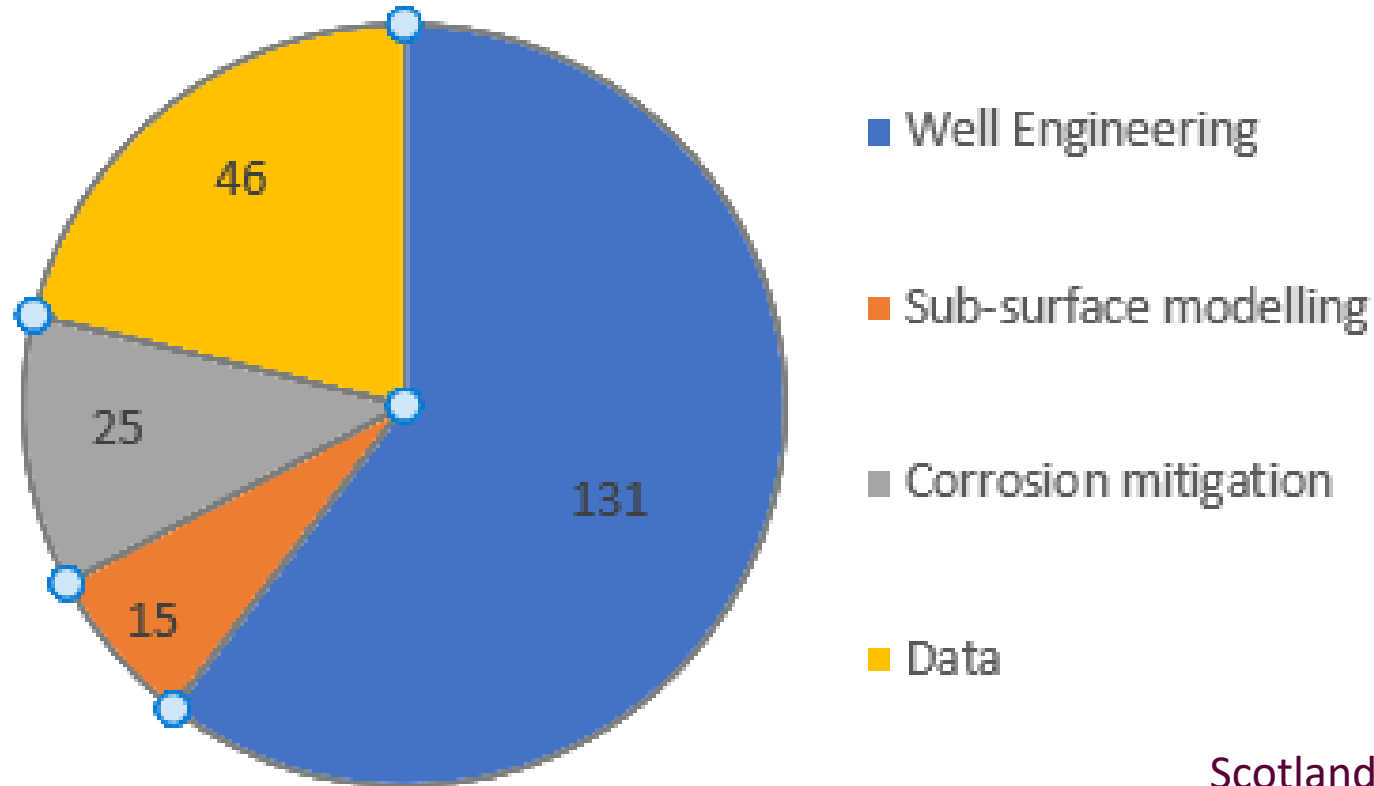
[\\*Scotland's Geothermal Supply Chain Analysis and Global Market Opportunities Study](#)

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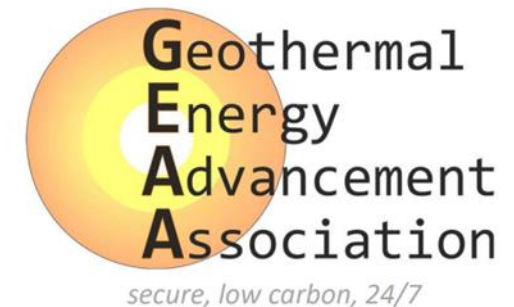


# SCOTTISH COMPANY BASE

Almost 220 oil and gas supply chain companies with capabilities that offer the potential for diversification into the geothermal supply chain were identified.



**37,000 direct jobs**  
**270,000 in supply chain**



# GEOHERMAL TECHNICAL CHALLENGES

Conventional Geothermal	Deep Geothermal	Engineered Geothermal Systems	Closed Loops Geothermal Systems	Abandoned Mines
Well structure failure	New drilling techniques	Directional Drilling	Complex and accurate directional drilling	Modelling to understand heat depletion
Corrosion and scaling	New tools	Real-time data and long-term monitoring		Use of advanced fluids
High flow rates	Improved modelling and simulation	Transfer of knowledge from shale gas fracking	Advanced turbines	
Failure of pumps				
Integrated design	Minimise maintenance			
	Improved sensors			

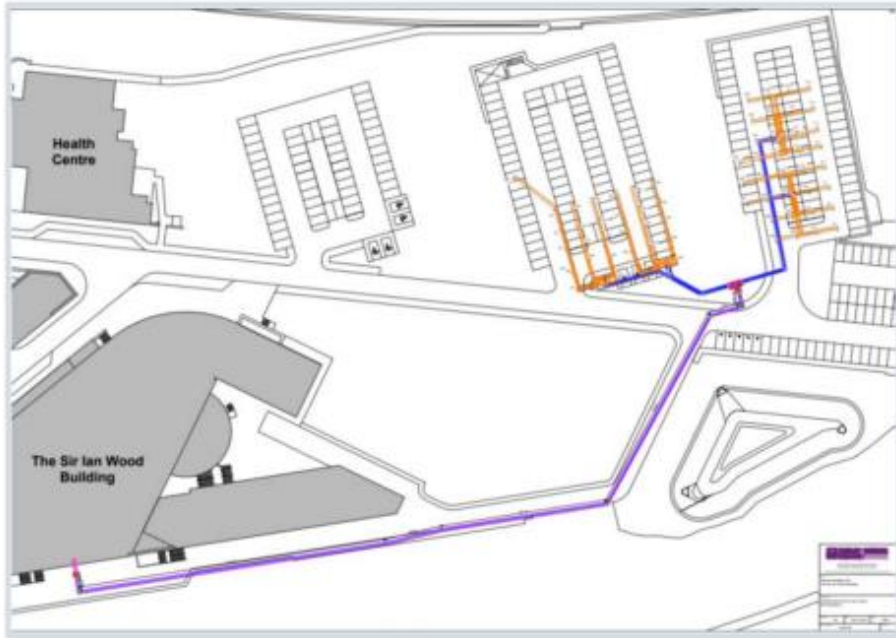


**ROBERT GORDON  
UNIVERSITY ABERDEEN**

## Unlocking the geothermal potential

- Re-purposing simulators for geothermal drilling
- Developing and expanding the simulator algorithms, specifically for geothermal drilling applications
- Discussing with the British Geological Survey the use of AI to uncover valuable insights from their borehole well reports, with the aim of identifying potential geothermal hotspots.
- Ambition to establish a geothermal rig and test site



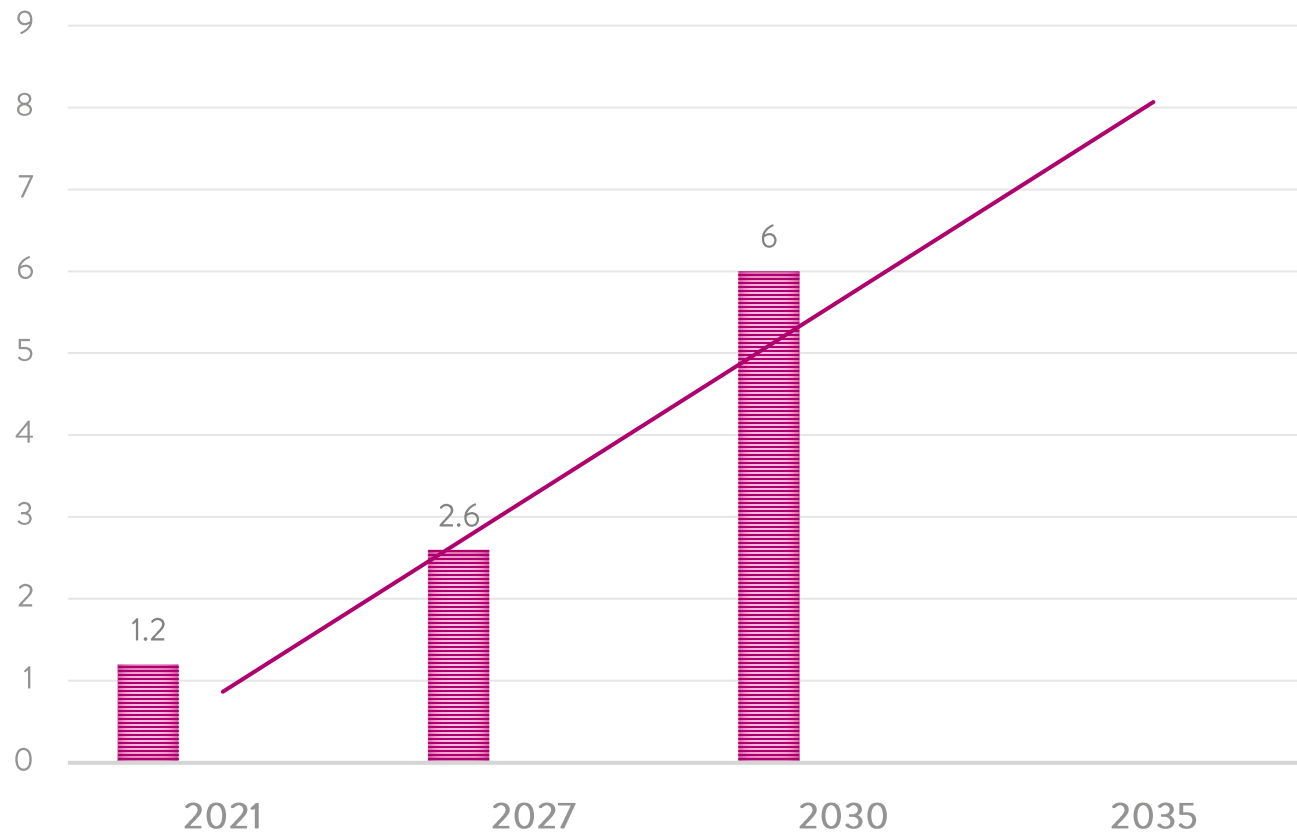


## RGU already has access to ground source heating

- RGU has 66 shallow 200 meter depth boreholes on campus
- Already using a ground source heat pump system
  - Operating at a higher temperature than predicted
- Aspiration is to deepen these wells to extract more geothermal energy to decarbonise the campus and provide wider community benefits

# HEAT NETWORKS (SCOTLAND) ACT 2021

Sets ambitious targets for the amount of heat to be supplied by heat networks



£300m Heat Network Fund – 50% capital funding available to public and private sector bodies.

# GEOTHERMAL HEAT & DISTRICT HEATING

- Growth of geothermal heat market will be linked to growth of heat networks market.
- Heat networks are technology agnostic -growth of heat networks provide opportunity for geothermal wells to supply heat.
- Geothermal heat provides lowest carbon heat of all alternative technologies - attractive to heat network owners / operators.

Geothermal heat is a supply technology for district heating and therefore buyers of district heating networks are also buyers of deep geothermal wells.

**Overall process driven by Scottish Government,  
Scottish Enterprise, SDI and others**

**Identify opportunities and set up  
encouragement structure**

**Set up support infrastructure – NZTC,  
Energy Transition Zone, Global  
Underwater Hub, SE Scotwind Team**



**Net Zero  
Technology  
Centre**

**Technology Driving Transition**

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**Net Zero  
Technology  
Centre**

Over £20 million awarded to net zero technologies as part of NZTC's 2022 open innovation programme, £8 million from NZTC and over £12 million co-funded by industry

The 20 winning technologies fall into seven focus areas to accelerate clean energy production and close the gap in net zero technologies



 **Net Zero  
Technology  
Centre**  
Technology Driving Transition

**Geothermal  
Innovation Centre**

# Purpose

To become the “go-to” centre for solving geothermal technology challenges and world leading in supporting government legislation and best practice.

01. TECHNOLOGY DEVELOPMENT



02. KNOWLEDGE HUB

03. ACCELERATOR PROGRAM

# Roadmap



Theme	Priority Areas
Legislation, Policy & Regulation	Resource Ownership and Licensing
	Environmental Regulation & Planning Policy
Technology	Risk Mitigation
	Geothermal energy targets, grants and subsidies.
	Demonstrators & Technology Transfer
	Geothermal co-production
	Closed loop systems
	Open Loop Systems
	Drilling & Recovery optimisation
Simulation & Modelling	
Infrastructure	Sensors & Instrumentation
	Complimentary & Transferable Technologies
	Offshore Asset Decarbonisation
Research & Data	Local and National Energy Networks
	Onshore Well Repurposing
	Power Stations
	National Geothermal Database
Global Analysis	
Technical Standards and Best Practice	
Exploration and Potential	

# Impact by 2030

shift  
GEOTHERMAL

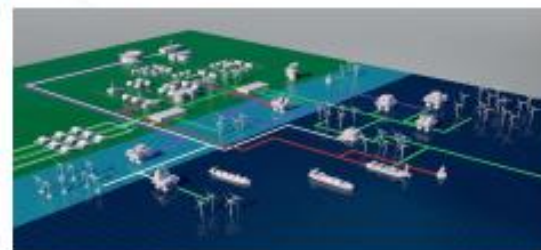
Durham  
University  
Durham Energy Institute



The Centre has contributed with a **3% CO2 reduction** in the UK's emissions.



The Centre has delivered **5** strategic projects for demonstrating geothermal in the UK.



Geothermal energy accounts for **5%** of the UK Energy Mix and is on route to hit **20%** of the mix by 2050.

The Centre has supported **10** focussed research projects with global collaboration.



The Centre has supported **40** technology projects, with **4** commercialised.



The Centre has supported **5 cohorts** to accelerate entrepreneurs.

# COMPANY PROFILE

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Geothermal Scale &  
Corrosion Specialists

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## Summary background

- Roemex provide **integrity management solutions** to the global Energy sector.
- Independent, privately-owned SME with a 38-year track record in **oilfield corrosion, scale & water management**.
- Roemex has a global footprint headquartered in Aberdeen, Scotland with regional offices UAE and the Netherlands.
- Network of agents, and alliance partners & 3<sup>rd</sup> party chemical blending: providing local content and expertise.

## Geothermal offering

Roemex supply a full suite of products & services for the integrity and flow assurance of Geothermal Plants.

- Corrosion Mitigation
- Scale Control
- Microbiology
- Flow assurance
- Deposit & Fouling
- Optimisation
- Laboratory testing
- Fast track R&D

## Further Information

- Scales can form on the production well casing & can lead to galvanic corrosion
- Scales and form in surface equipment such as heat exchangers
- Scaling can form in the injection well, leading to a reduction in injectivity.
- Scaling can be radioactive (NORM) and expensive to dispose of.
- Microbial activity / bacteria can generate bio-film & Iron Sulphide, leading to a reduction in injectivity



[renewables@roemex.com](mailto:renewables@roemex.com)

## Track Record Q3 2023

18 Projects

Service &  
Technical  
Support

5 x Downhole  
Dissolver  
Projects

Bespoke  
Chemistry

- Roemex supply inhibitor to **7 doublets in Delft Sandstone** formation AND **5 doublets in the Slochteren** Formation
- supply technical service for **chemical management, optimisation & monitoring**:
  - Corrosion & Scaling prediction modelling
  - Coupon analysis and reporting
  - Brine Chemistry
  - Residual corrosion inhibitor detection
  - Microbiological testing
  - Field Chemists & Engineers
  - Technical Support - corrosion and flow assurance (injectivity)
- Roemex have **performed 5 downhole cleaning projects** which have successfully cleaned and dissolved blockages in the injection well. Resulting in higher flow rate, lower injection pressure and reduced power consumption.
- Roemex have developed **combined scale and corrosion inhibitor** for Upper Rhine Valley & a WGK1 compliant scale inhibitor for Molasse Basin (Bavaria)



## **Use Atomic Dielectric Resonance**

**Green Technology to help calculate subsurface geothermal zones and temperatures before drilling**

**European Patent No 2862003 "Methods for Determining Material and/or Subsurface Composition"**

**Adrok have applied their sub-surface heat detection methods in the Weardale Granite, NE England, as well as the Wairakei Geothermal Field, New Zealand.**

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# EXAMPLE PROJECTS



## Evaluating geothermal opportunities at Balmoral Estate in Aberdeenshire, Scotland

Phase 1 pre-feasibility complete

Co Funded by the Balmoral Estate and



In collaboration with the University of Aberdeen and support from Ross DK.

It provides conceptual heat potential and uses while scoping preliminary well designs along with drilling and surface scenarios



## Deep Geothermal Exploration in the Grampians using Satellite Data

To address the barriers of a lack of subsurface data to progress geothermal systems into operational phase.

Assessed the deep geothermal potential of geothermal critical faults which intersect radiothermal granites in the northeast Grampian

The research was conducted in partnership with Astrosat who used SAR and optical satellite data to automatically select potential fault lineaments which intersect geothermal critical granites.

# **PROGRESS OCTOBER 2023**

**Working with Scottish Public and Private interests to help transition from oil and gas**

**Geothermal potential recognized and the sheer scale of the potential supply chain and jobs stirred interest**

**Around 20 companies have expressed interest in attending the Geotherm Expo & Congress in Offenburg Feb 2024**

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# LET'S KEEP IN TOUCH

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