NEW ZEALAND

GeoShot NZ

The power beneath our feet

Superhot geothermal
– the world's most powerful
renewable energy source

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

Kānoa
Regional Economic Development
& Investment Unit

Te Kāwanatanga o Aotearoa
New Zealand Government

"New Zealand is leading pioneering research to open a new global source of clean, green, sustainable energy that will help the world achieve its net-zero carbon goals."

Hon Tim Groser
Governance Group Chair, GeoShot NZ

GeoShot NZ is forging:

- **Research and development**
- **International collaboration**
- **Knowledge-sharing alliances**
- **Testbed, technology trials and intellectual property collaboration**

Contact:

GeoShot NZ
Email: kanoa@mbie.govt.nz

Cover image
Todd Energy's Big Ben Drilling Rig, Rotokawa
Photo: Mercury NZ

Sampling on Taupō Volcanic Zone
Photo: Earth Sciences NZ

An introduction

We're unlocking the potential of superhot geothermal energy.

Tēnā tatou katoa

It's my great pleasure to share with you our cutting-edge, exploratory project GeoShot NZ. This project has the potential to decarbonise industry and electricity generation – delivering massive climate, business, and investor benefits.

Globally, we're in an energy crisis. We need more clean, renewable energy to support the electrification of transport, industry, and data storage infrastructure.

Superhot – sometimes called 'supercritical' or 'superdeep' – geothermal offers untapped potential that would be a great step forward for clean, green, sustainable energy, helping the world achieve its net-zero carbon goals.

New Zealand has one of the most accessible geothermal sources on Earth, making us an ideal location for making superhot geothermal a reality now.

Our superhot geothermal exploration project is collaborating across disciplines and borders.

We have decades of geothermal expertise, political stability, a robust regulatory framework, and partnerships with our indigenous Māori landowners and communities for whom geothermal resources are deeply embedded in whakapapa (histories), wairuatanga (identity and spirituality), and tikanga (customs).

GeoShot NZ is employing New Zealand's geothermal experience and expertise to push the boundaries of geothermal science.

We're proud to be building a resilient, clean, and equitable energy future.

Hon Shane Jones
Minister for Resources
Minister for Regional Development
New Zealand Government

Superhot geothermal could be the world's most powerful new energy source

Superhot geothermal energy is sourced from water heated by magma deep under the Earth's crust.

Heated to over 374°C (705°F) and 220 bars of pressure, water enters a 'supercritical' state, neither liquid nor gas. In this state, it holds up to **three times more energy** than conventional geothermal fluids.

As global investment in next-generation and high-temperature geothermal surges, New Zealand is stepping forward as the place to test, trial, and prove what's possible, opening the field for others to follow.

Potential benefits of superhot geothermal:

- **A reliable, steady, and sustainable energy source**
- **Carbon-neutral**
- **A small footprint for extraction**
- **Resilient to climate extremes**

> *"Superhot geothermal could power the world 140 times over."*
>
> International Energy Agency (IEA)

A solution to the global energy crisis

Superhot geothermal offers a resilient, clean, and scalable solution in a world facing energy security risks from geopolitical instability and climate extremes.

Globally, energy demand is projected to rise faster than we experienced during the industrial revolution in the 1800s. According to the IEA, electricity use has grown at twice the pace of overall energy demand over the last decade and is projected to rise even faster.

In a world facing energy security risks from geopolitical instability and climate extremes, superhot geothermal offers a resilient, clean, and scalable solution. It could help countries reduce reliance on imported fossil fuels and stabilise energy prices while meeting climate goals.

Superhot geothermal is a game-changer as it:

- provides three times more energy than conventional geothermal
- is a flexible and high-efficiency energy source
- enables technologies essential to the clean energy transition and the burgeoning hydrogen economy
- supports industrial decarbonisation through direct heat.

Rotokawa Geothermal Station, Taupō
Photo: Mercury NZ

New Zealand offers the ideal testbed, experience and expertise

We have the science, the geology, and the relationships to succeed.

New Zealand is well positioned for superhot geothermal exploration due to our location on a highly active tectonic plate boundary. This has created a unique geological structure with a thin crust and molten rock close to the surface, making superhot fluids accessible at relatively shallow depths.

We host more than 20 world-class geothermal systems. Combined with more than seven decades of operational experience, unmatched geological data and modelling expertise, and a collaborative research environment, New Zealand is ready to pioneer this next frontier.

New Zealand enjoys strong partnerships with our indigenous Māori communities who have long harnessed geothermal resources as part of their cultural practices. Māori continue to be at the forefront of geothermal technology and exploration.

Our approach is committed to environmental stewardship, cultural integrity, and technical excellence. GeoShot NZ is designed to be inclusive, resilient, and globally relevant.

We are in motion – the first well is being designed now.

The New Zealand Government has committed up to NZ$60 million for early-stage superhot geothermal exploration. We have:

- a technical design team mobilising across energy companies, scientists, and international experts
- an international review panel led by Stanford University Professor of Energy Science and Engineering, Roland N. Horne
- a drilling programme targeting the first of three deep wells
- identified a lead contractor for the drilling delivery.

Ngā Tamariki Power Station, Taupō
Photo: Mercury NZ

Rotokawa preferred for the first exploration well

Rotokawa geothermal field benefits from decades of operational data, advanced geophysical imaging, and robust infrastructure, making it the ideal launchpad for superhot geothermal exploration.

The Rotokawa geothermal field in the central North Island's active Taupō volcanic zone has been selected as the preferred field for the first superhot geothermal well.

Rotokawa is not only one of the hottest geothermal fields in New Zealand, with temperatures above 330°C measured at just 2.5 km depth, but it is also one of the most thoroughly studied and well understood, thanks to extensive scientific research and detailed data collected over many years by the Rotokawa Joint Venture – a partnership between Tauhara North No. 2 Trust and Mercury NZ.

The Rotokawa geothermal field is ideally placed physically, culturally, and technically to support this strategic, staged, and collaborative exploration based on:

- Design-first: world class engineering and risk modelling
- Partnership-driven: with Māori, industry, and global peers
- Transparent and adaptive: rigorous peer review and significant data
- Embedded Māori cultural and environmental values

"Superhot conditions are accessible at ~4-6 km depth in New Zealand, less than half the depth of most other countries (~13 km)"

Earth Sciences NZ

Rotokawa Geothermal Field Timeline

1985
Hydrothermal eruptions at Rotokawa documented

1997
First geothermal power station commissioned by Rotokawa Joint Venture (Mercury + Tauhara North No.2 Trust), with 34 MW installed capacity

2003
Second power station added, increasing installed capacity

2010
Ngā Awa Pūrua power station commissioned, adding 138 MW capacity

2015
Reservoir response to 172 MW of geothermal operation studied and published

2020
GNS Science (now Earth Sciences NZ) published revised geological stratigraphy model for Rotokawa

2021–2025
Advanced geophysical modelling, MT (magnetotelluric) inversion, and numerical simulations confirmed Rotokawa's suitability for superhot geothermal exploration

2025
Rotokawa selected as the preferred site for New Zealand's first superhot geothermal exploration well

New Zealand's geothermal history and credentials

Our project builds on a pioneering history of geothermal exploration and expertise.

Māori have long held geothermal waiwhatu (resources) as taonga (treasures) of cultural, spiritual, and practical significance, used for healing, cooking, and ceremony. Tradition links these practices to the ancestor Ngātoroirangi and a deep kaitiaki (guardianship) responsibility to protect their mauri (life force).

A Crown-led explorative drilling programme between 1949 and 1986 jumpstarted our understanding of our geothermal fields. This work established the potential for electricity generation using geothermal steam to power turbines.

In the late 1950s, geothermal wells were first drilled near Kawerau in the central North Island of New Zealand so the heat could be used in the timber and paper mills.

New Zealand's first, and the world's second, geothermal power station was Wairākei, just outside Taupō, first generating electricity in 1958. It is still operating and is now one of 17 geothermal power plants across eight geothermal fields – delivering a combined generation capacity of 1,200 MW.

Unlike other renewable sources like wind and solar, geothermal energy is consistently available. In February 2026, it accounted for 26.3% of New Zealand's total electricity generation.

Partnering with Māori is an integral component of geothermal development. It brings a rich blend of values to the fore. This collaboration enables Māori, as kaitiaki (guardians of the environment and people), to actively lead the future and catalyse innovation across the industry.

Advances in reinjection technology are enhancing the sustainability profile of geothermal energy. In addition to being reliable and renewable, geothermal can now offer low-emissions electricity generation, as most of the naturally occurring greenhouse gases can be reinjected into the geothermal reservoirs rather than released to the atmosphere.

The GeoShot NZ exploration project will take us to the next level.

Wai-o-Tapu, Rotorua
Photo: RotoruaNZ

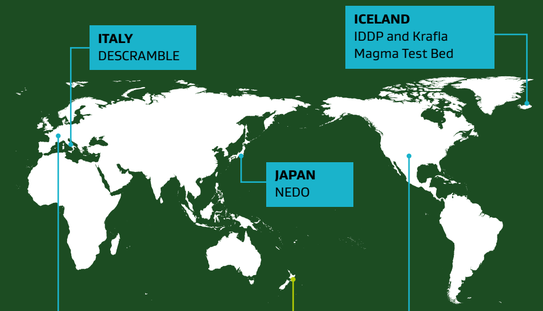
Global innovation in superhot geothermal energy

GeoShot NZ complements and accelerates international efforts in superhot geothermal research.

GeoShot NZ is exploratory and innovative, but we're not starting from scratch.

New Zealand is part of a global superhot geothermal movement together with Iceland, Japan, Italy, and the United States.

We're working with international experts, sharing knowledge, and building on global efforts that will benefit all, such as:



Our investment

Superhot geothermal research is high-risk, high-reward and globally relevant.

This is the next frontier of clean, resilient energy through funding, co-development, and field trials.

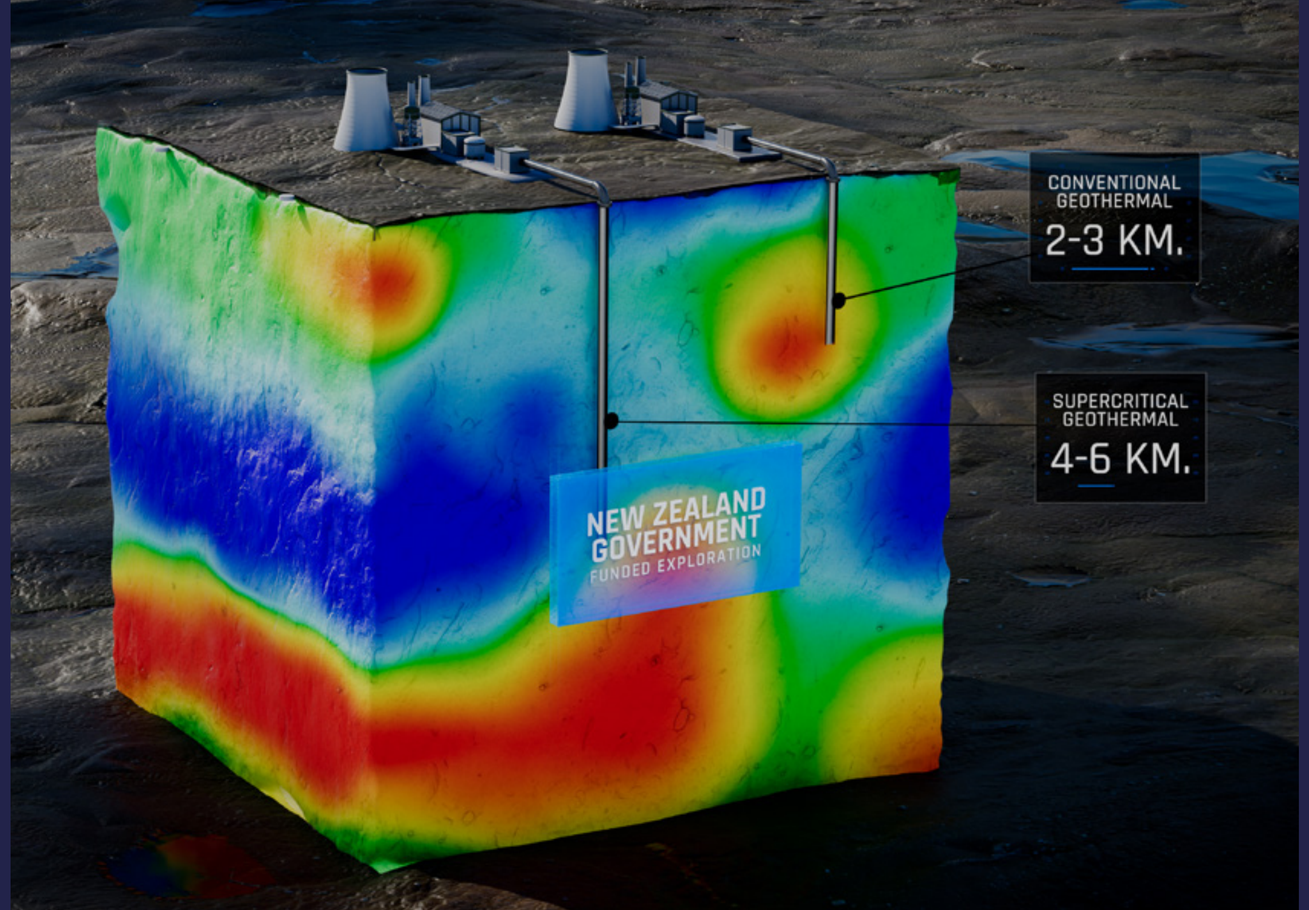
New Zealand's commitment so far:

- NZ$10.2 million already invested via the government's Endeavour Fund (Project Geothermal: The Next Generation)
- NZ$10.6 million committed to further scientific research from the Endeavour Fund (Project DeepHeat)
- NZ$60 million approved from the government's Regional Infrastructure Fund (Project GeoShot NZ)
- Decades of industry research and capability.

GeoShot NZ is all about:

- advancing global energy security through cutting-edge research
- developing a testbed for high-performance tools, materials, or systems in real-world superhot well conditions
- creating commercialisation potential, enabling early movers to shape the future of geothermal innovation.

Illustration: Earth Sciences NZ



We're a pioneering team!

GeoShot NZ is a true testbed for the next generation of geothermal.

We are collaborating with world-leaders in:

- drilling technologies
- well completion and casing systems
- safety systems
- reservoir engineering and production
- monitoring and control systems
- materials science
- data analytics and modelling
- geoscience

Contact us

GeoShot NZ
Email: kanoa@mbie.govt.nz

Find out more

www.growregions.govt.nz
www.geothermalnextgeneration.com

Meet our partners

earthsciences.nz
mercury.co.nz
tauharano2.co.nz
contact.co.nz
toddenergy.co.nz
spdgroupltd.com

Contact us

GeoShot NZ
Email: kanoa@mbie.govt.nz

Kānoa
Regional Economic Development & Investment Unit

TAUHARA NORTH No.2 TRUST

Mercury

Earth Sciences New Zealand

contact

GEODE WELL ENGINEERING

Upflow

Superior Performance Design

TODD ENERGY

Supported by:

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

Te Kāwanatanga o Aotearoa
New Zealand Government

KNO 12201