




أديبك  
ADIPEC

4-7 November 2024  
Abu Dhabi, UAE

ENERGY IN CONTEXT SERIES



# DECARBONISING TODAY'S ENERGY SYSTEMS

CASE STUDY

Capitalising on the strengths  
of hydrocarbons to produce  
carbon-free energy

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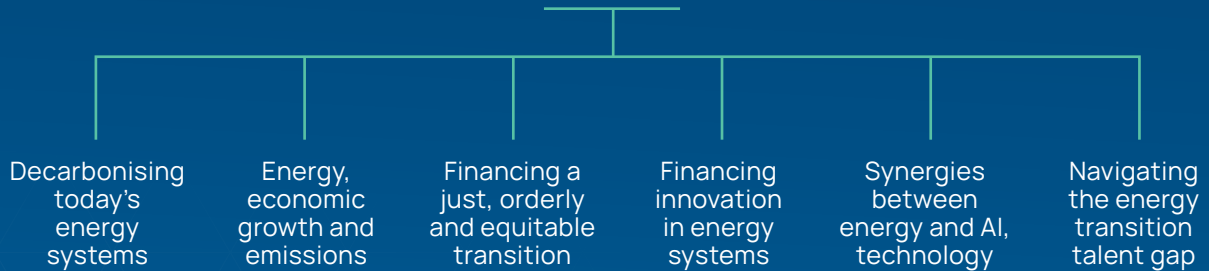
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# Capitalising on the strengths of hydrocarbons to produce carbon-free energy

## CONTEXT

Geothermal energy, which harnesses heat from the Earth's crust, is being widely discussed among top energy leaders for its potential to deliver vast amounts of renewable power around the clock, unlike solar and wind energy. 'Superhot rock energy,' a next-generation form of geothermal energy, involves injecting water deep into the Earth's crust, heating it, and returning it to the surface as steam. This method has the potential to unlock thousands of terawatts of zero-carbon power.

Fervo Energy in the US has successfully demonstrated that fracking techniques – a drilling method used to extract hard-to-reach oil and natural gas from deep rock formations – can be adapted for geothermal energy. The energy startup's partnership with Google to build a geothermal plant that powers the tech giant's data centres while also supplying energy to the local grid shows that this model can be replicated globally.

## TECHNOLOGY ALREADY EXISTS, THE WORLD NOW NEEDS TO SCALE IT

In the pursuit of low-carbon growth without compromising on affordability and sustainability of energy, the expertise of oil and gas companies is being leveraged to harness abundant energy sources beneath our feet.

In 2021, Google announced its partnership with Fervo Energy to develop a next-generation geothermal power plant. Fast forward two years, and

### 3%

Percentage of global energy consumed by data centres <sup>3</sup>

### 0.5%

Percentage share of geothermal energy in the global renewable electricity market in 2022 <sup>4</sup>

### 6.15-9.17Gt

Expected amount of reduction in GHG emissions by 2050 <sup>5</sup>

### 3.5%

Percentage of annual global electricity generation through geothermal plants by 2050 <sup>5</sup>

## Organisations involved


- Fervo Energy
- Google
- Liberty Energy
- Helmerich & Payne
- Devon Energy

## Industry

Energy

## Location

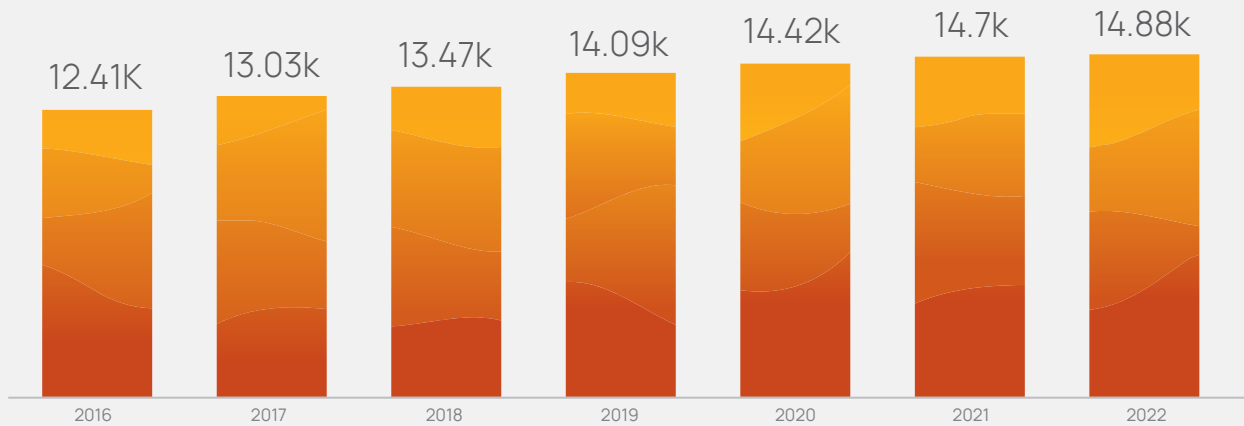
Nevada, US

Visit **Helmerich & Payne** in at **Stand #7340** in Hall 7 during ADIPEC 2024, taking place in Abu Dhabi from 4-7 November. 

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## Geothermal could power a swifter energy transition for the world

Leveraging geothermal energy for data centres offers a low-carbon power source that can support technological growth while minimising environmental impact. The following graph shows the growth of this energy source.



Note: Geothermal energy capacity in MW globally

Source: IRENA

the Texas-based startup celebrated the successful testing of its commercial-scale power plant, consistently producing 3.5MW of energy for months.

This innovative plant utilises shale oil drilling technologies to generate zero-emission geothermal energy. By November 2023, Google reported that Fervo Energy had begun supplying electricity to the local grid, which powers data centres in Nevada. By June 2024, Google announced increasing the supply of geothermal power to its data centres operations from 3.5MW to 115MW in about six years.

Unlike solar and wind energy, which depend on specific weather conditions, geothermal plants provide a steady stream of power, crucial for grid stability. Yet, the sector hasn't attracted funding and interest at the scale seen for other renewables.

In the US, geothermal energy currently contributes only about 0.4% to total electricity generation<sup>6</sup>.

Fervo's successful pilot project could make geothermal power plants economically feasible in many more locations, potentially transforming geothermal energy into a significant player in decarbonising the US grid and beyond. Michael Terrell, Senior Director for Energy and Climate at Google, said: "We're really hoping that this could be a springboard to much, much more advanced geothermal power available to us and others around the world."

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The company attributes its success largely to its workforce, 60% of whom hail from the oil and gas industry, adept at adapting fracking techniques to their advantage<sup>1</sup>.

Even though geothermal startups are crucial for integrating oil and gas technologies into the market, it is the veterans from the oil and gas industry who appear to be ideally positioned to rapidly scale up new and more efficient forms of geothermal energy.

"Principally, there's virtually an unlimited amount of geothermal energy. The world is really big, and the world is really hot. We've got billions of years of energy under our feet. It's all a question about how much you can access economically. We think with existing technology, drilling down to about 4,000 metres is probably cost effective," Fervo Energy founder and CEO Tim Lattimer told TIME magazine in 2023.

Geothermal technology requires drilling engineers to produce a carbon-free energy source, a resource that is available in abundance in the oil and gas industry. Oil and gas firms, and tech companies can make a significant impact on this industry with their expertise and investments. When deployed at a scale, geothermal technology can reduce carbon emissions and enhance grid reliability.

Fervo Energy and Google are both expanding beyond their initial Nevada project. Fervo recently

commenced exploration drilling for a 400MW geothermal energy project at Cape Station, Utah, with expected operations starting by 2028. The company aims to tap into the vast geothermal potential identified by the US' National Renewable Energy Lab, and supply 20% of US electricity by 2050, with global replication thereafter.

The US Department of Energy estimates that geothermal energy could provide up to 120GW of reliable generation capacity by 2050, meeting over 16% of anticipated US electricity needs<sup>2</sup>. However, these projections will only be realised with timely investments in the sector. Currently, oil companies are among the few with the skills and equipment needed to scale up geothermal energy. Some companies are already contributing: Chevron, for instance, invested US\$25 million in Swedish geothermal developer Baseload Power in 2021.

Fervo's funding sources include oil players Liberty Energy, Helmerich & Payne, and Devon Energy. Drilling contractor Nabors has invested US\$10 million in geothermal startup Sage, while oil and gas companies OMV and BP have invested millions in Canadian geothermal startup Eavor Technologies.

Yet, such investments only represent a fraction of what is needed to develop geothermal energy at a pace needed for a swifter green transition. The industry needs the expertise of the oil and gas industry and co-investments from technology companies to develop at the necessary pace. More collaborations could be a key to moving forward.



“  
We're really hoping that this could be a springboard to much, much more advanced geothermal power available to us and others around the world.”

**Michael Terrell**  
Senior Director for Energy and Climate at Google

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