

earth's
energy

Investor Briefing Note

Geothermal Powered Data Centres

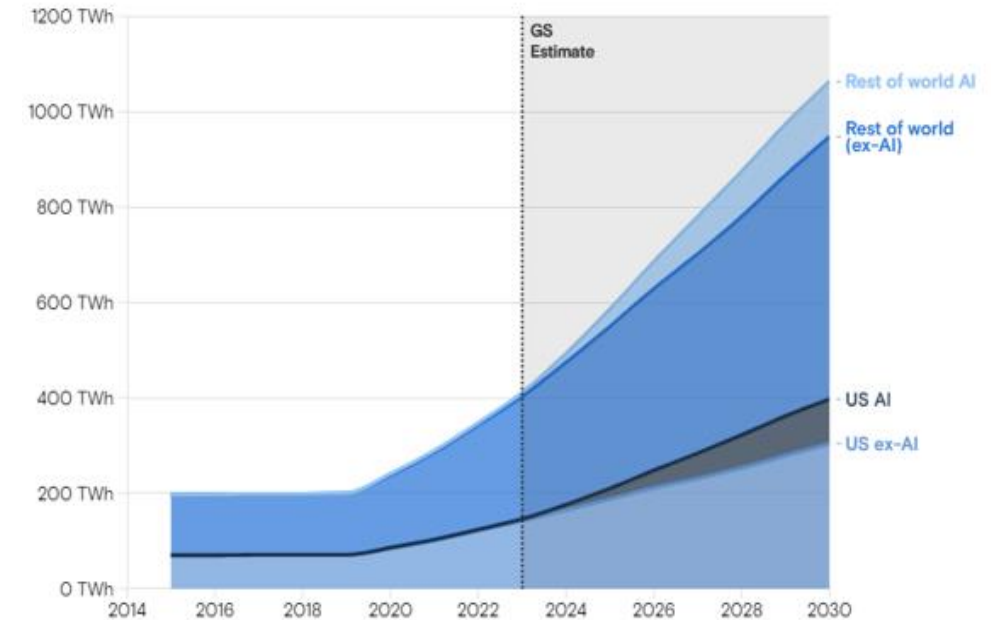
ASX: EE1 | October 2024



Investor Briefing Note: *Why is Geothermal Power in Demand for Data Centres?*

- **Global electricity demand is at all-time highs**
- **Data Centres require large amounts of baseload, uninterrupted electricity near cities and high population centres**
- **Power and data sovereignty are key strategic objectives of modern Data Centres – geothermal power delivers this by providing reliable off grid power directly on-site**
- **Geothermal energy offers to Data Centre operators:**
 - **Energy Independence:** minimises grid reliance
 - **24/7 Stable power:** off grid reliability without battery CAPEX
 - **Cooling Efficiencies:** direct use cooling can reduce OPEX
 - **Reduced OPEX:** on-site power behind the meter incurs no transmission fees and supplier / retailer margins
 - **Reduced Emissions:** geothermal energy is emission free
- **Data Centres are in significant demand due to the rise of Artificial Intelligence and the continued reliance on cloud connectivity**
- **Data Centre annual power demand is forecast by Goldman Sachs to grow from 400TWh to over 1,050TWh by 2030**

Data center power demand



Source: Masanet et al. (2020), Cisco, IEA, Goldman Sachs Research

“On average, a ChatGPT query needs nearly 10 times as much electricity to process as a Google search”



Investor Briefing Note: *Who is building Geothermally powered Data Centres?*



Figure 1: Technology companies already using or developing Geothermal powered Data Centres



Figure 2: Geothermal leaders already commercialising Geothermal Data Centres

- Google partnered with Fervo Energy (Houston) in 2023¹ to develop a first of its kind geothermal power project in Nevada which powers Google's Las Vegas Data Centres with carbon-free energy
- Microsoft and G42 recently (May 2024) announced² a US\$1 billion state of the art Data Centre to be built in Kenya which runs entirely from geothermal power
- Meta (Facebook) recently (August 2024) partnered with Sage Geosystems (Houston)³ to develop a 150MWe baseload power system incorporating Geopressured Geothermal Systems to provide green and cost-effective reserve and back up power solutions to their Data Centres
- Iron Mountain Data Centres⁴ operates geothermally cooled Data Centres in Pennsylvania and quote a 34% energy saving
- Pawsey⁵ is a geothermally cooled supercomputer facility in Perth, Western Australia, which has been operating for over 10 years

1 - <https://www.thinkgeoenergy.com/fervo-and-google-geothermal-power-facility-starts-grid-supply/>

2 - <https://www.thinkgeoenergy.com/microsoft-g42-to-invest-on-geothermal-powered-data-centre-in-kenya/>

3 - <https://about.fb.com/news/2024/08/new-geothermal-energy-project-to-support-our-data-centers/>

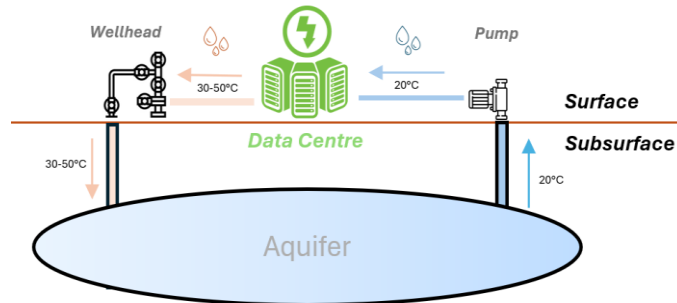
4 - <https://www.ironmountain.com/data-centers>

5 - <https://pawsey.org.au/>



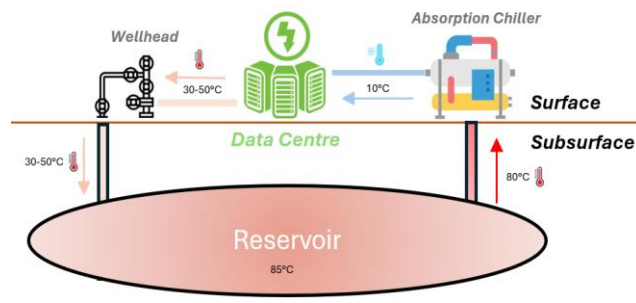
Investor Briefing Note: *How is Geothermal energy used in a Data Centre?*

Geothermal Cooling (Liquid Cooling)



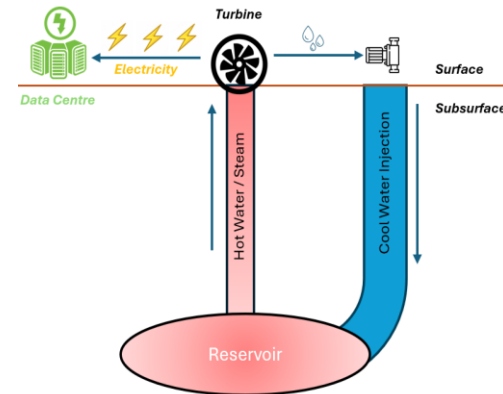
- Shallow aquifers provide passive cooling
- Pawsey supercomputer in Perth is an example of a conventional geothermal cooling system
- Reduces the need for energy-intensive mechanical cooling systems
- Lowers operational costs (OPEX) for cooling Data Centres
- Significantly reduces carbon emissions and environmental impact
- Provides consistent, reliable cooling year-round regardless of surface temperature

Geothermal Cooling (Absorption Chilling)



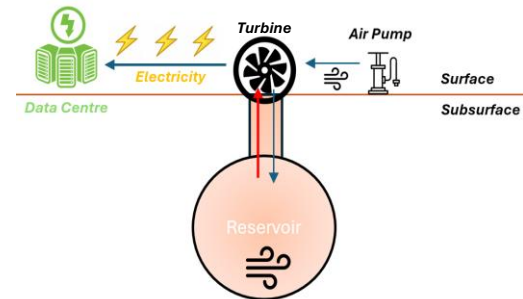
- Geothermal hot reservoirs that may have been sub-scale to produce commercial scale electricity can instead drive absorption chillers
- Absorption chillers use geothermal heat energy to drive various heat circuits (such as a CO₂ loop) to create cold air as chilled at 10°C
- This chilled air is used to cool CPUs and server rooms in the Data Centre at a reduced OPEX
- Reduces carbon footprint significantly

Geothermal Primary Power Source



- Conventional or Next-Generation geothermal power production used to power primary (CPUs) and secondary systems (cooling)
- Moderately higher upfront CAPEX and complexity for total power security and sovereignty for up to 30 years
- Greatly reduces long term OPEX and makes the Data Centre carbon neutral from power consumption

Geothermal Stored Energy Back Up Power



- Geopressured caverns or reservoirs can be used for highly efficient power storage – where the air pressure is relieved on command to drive a turbine and generate immediate electricity
- Potential to replace expensive back up power hardware (such as lithium batteries and flywheels)
- Current trials indicate potential for 70-75% power efficiency at an additional LCOE of just \$10 per MW



Investor Briefing Note: *Earth's Energy's Queensland Data Centre Project*

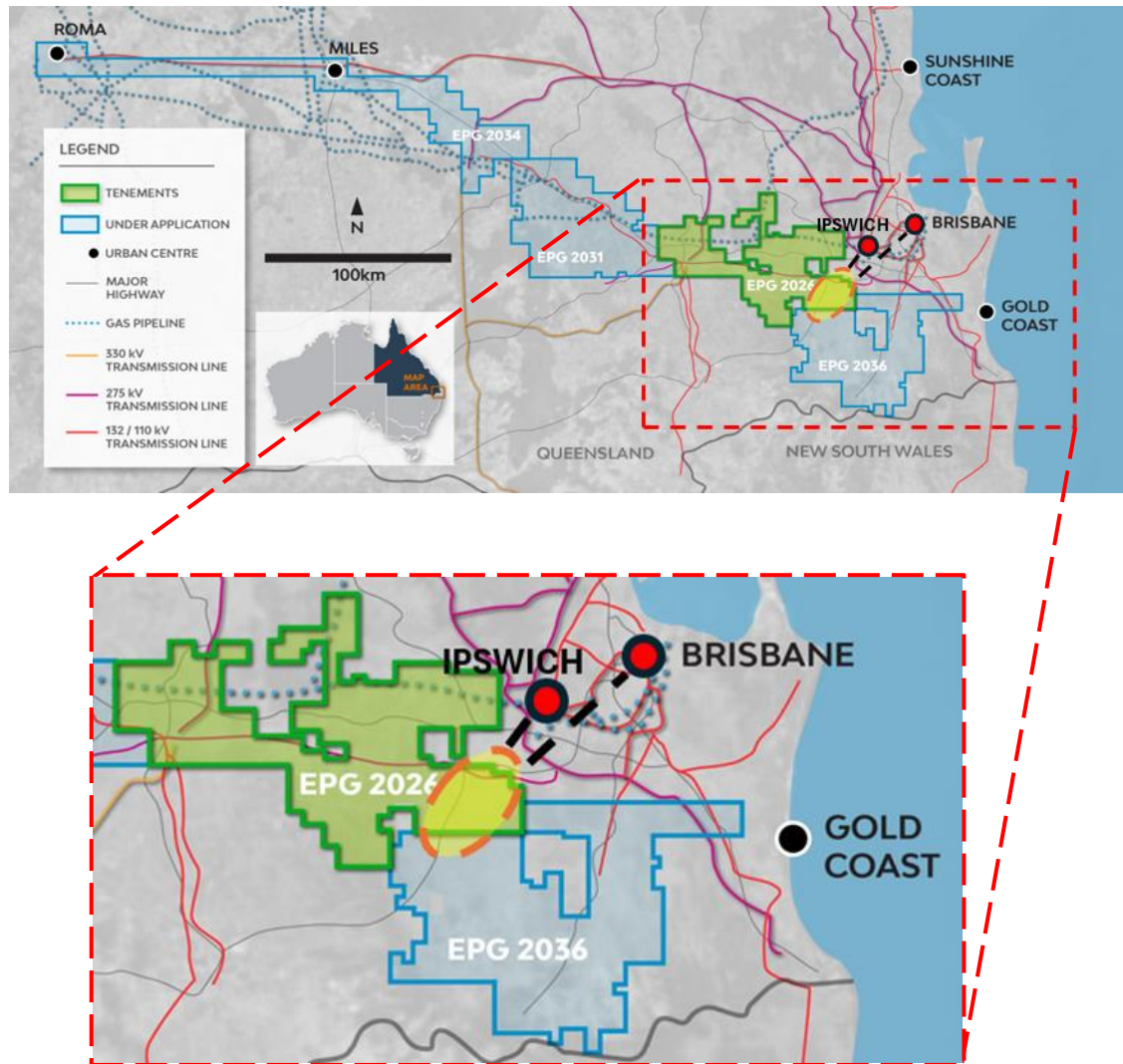


Figure 3: Earth's Energy has identified ground for geothermal data centre development in Queensland

- EE1 holds EPG 2026 in Queensland which is fully granted for geothermal exploration and development
- EPG 2026 host an area of approximately 260km² (highlighted in yellow) that has been identified with the following characteristics:
 - Power production potential of 40MWe to 60MWe
 - Direct use suitability for:
 - air chilling
 - liquid cooling
 - geopressed energy storage
 - Shallow target zones of 600-800m
- Proximity to significant population density:
 - ~7.5km to Ipswich
 - ~40km to Brisbane CBD

Key summary points

Data Centres are a Growing Industry

Data Centres are in significant demand due to the rise of Artificial Intelligence and the continued reliance on cloud connectivity and storage by individuals and businesses.

Power consumption to grow from 400TWh p.a. to over 1,050TWh p.a. by 2030.

Big-Tech is Moving into Geothermal

Google, Microsoft and Meta are investing billions of dollars in developing geothermally powered Data Centres and they're partnering with geothermal industry leaders like Fervo Energy and Sage Geosystems.

Geothermal Data Centres Make Sense

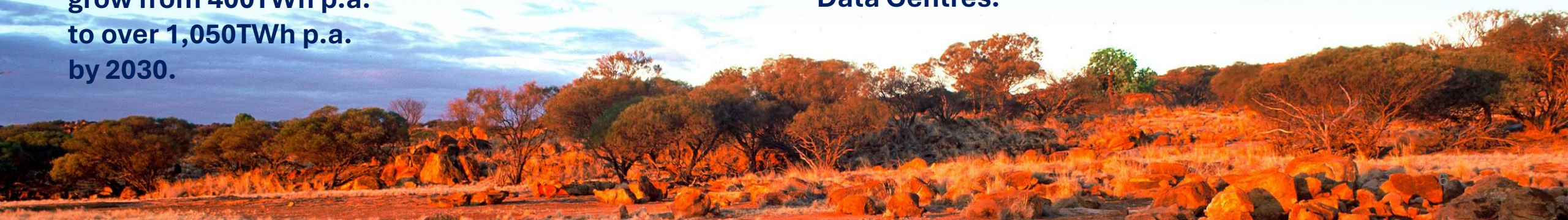
Geothermal baseload power delivers power sovereignty to a Data Centre by being independent of an electricity grid.

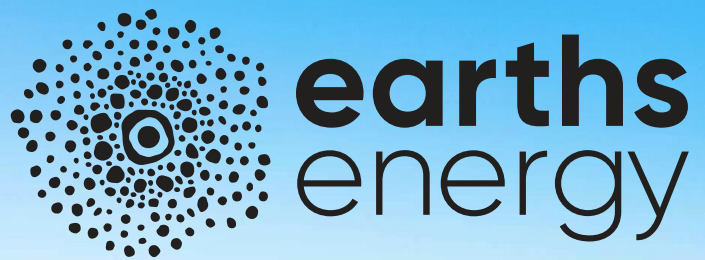
Geothermal Data Centres are greener and more profitable than conventional Data Centres.

EE1 Has Perfect Data Centre Ground

EE1 has identified a 260km² area which is approx. 7km from Ipswich and 40km from Brisbane's CBD.

Ground in this location is well suited to be developed as a geothermally powered Data Centre.





Australian Geothermal (ASX: EE1)

Commercial green on grid baseload power

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