

Staying Ahead: Innovation in Geothermal Energy

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Tauhara Power Station

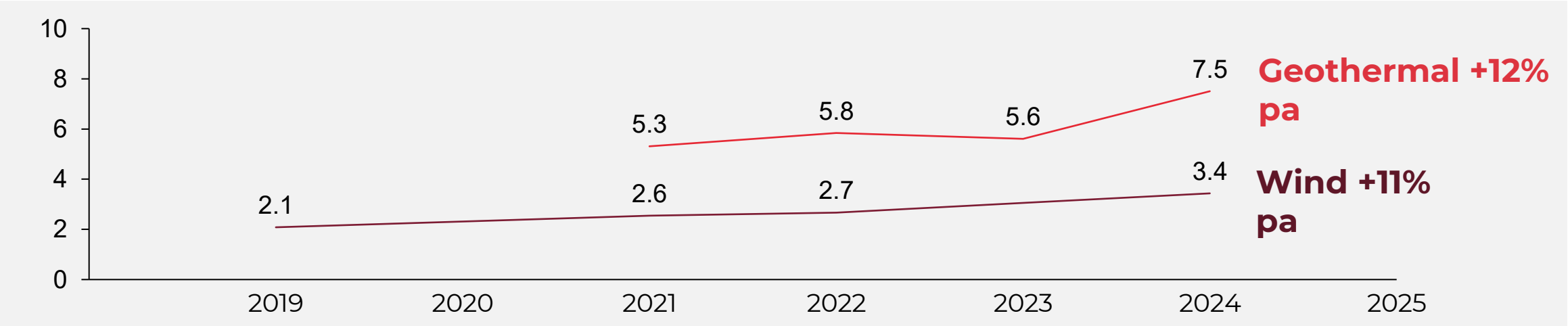
Geothermal remains competitive

Even though by global standards the research and development into geothermal is relatively small

2021-2024 Global committed capital by technology USD Bn¹



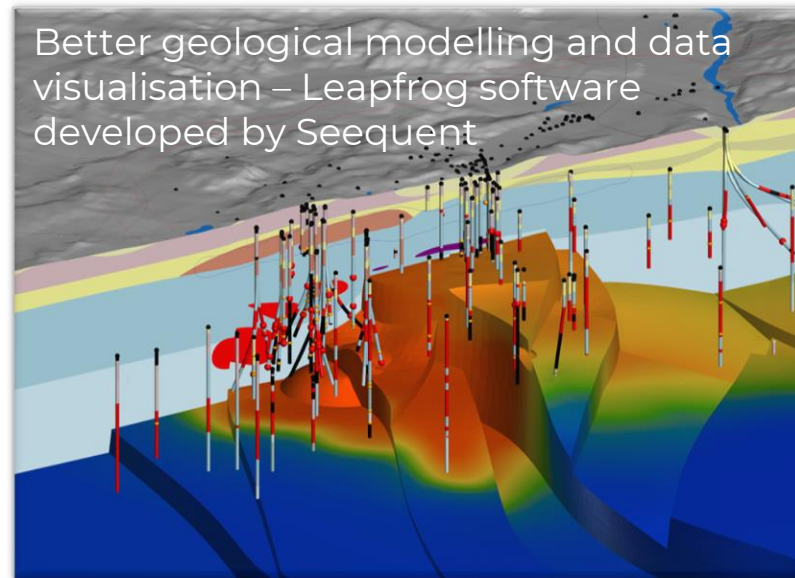
Wind and Geothermal Projects recently announced in New Zealand Capex NZDm/MW & CAGR



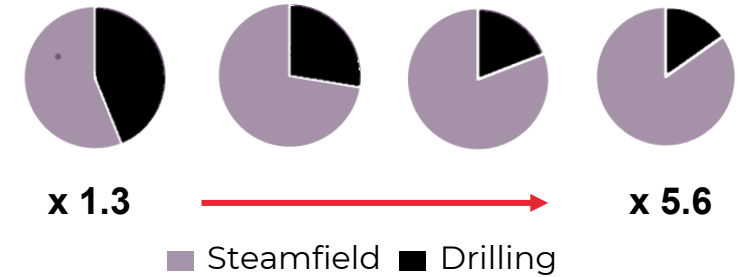
Projects are presented at the date of their Final Investment Decision (FID). Information is taken from publicly available sources and represent costs as announced and may not include all relevant project costs such as land costs, sunk costs, capitalised interest etc. In addition, actual project costs may have been higher or lower on completion.

1. Sourced from Bloomberg New Energy Finance

Innovation in action



Problem: Ratio of steamfield to drilling capex last 4 Contact Energy projects



Formation cleaning – improved well injectivity or productivity

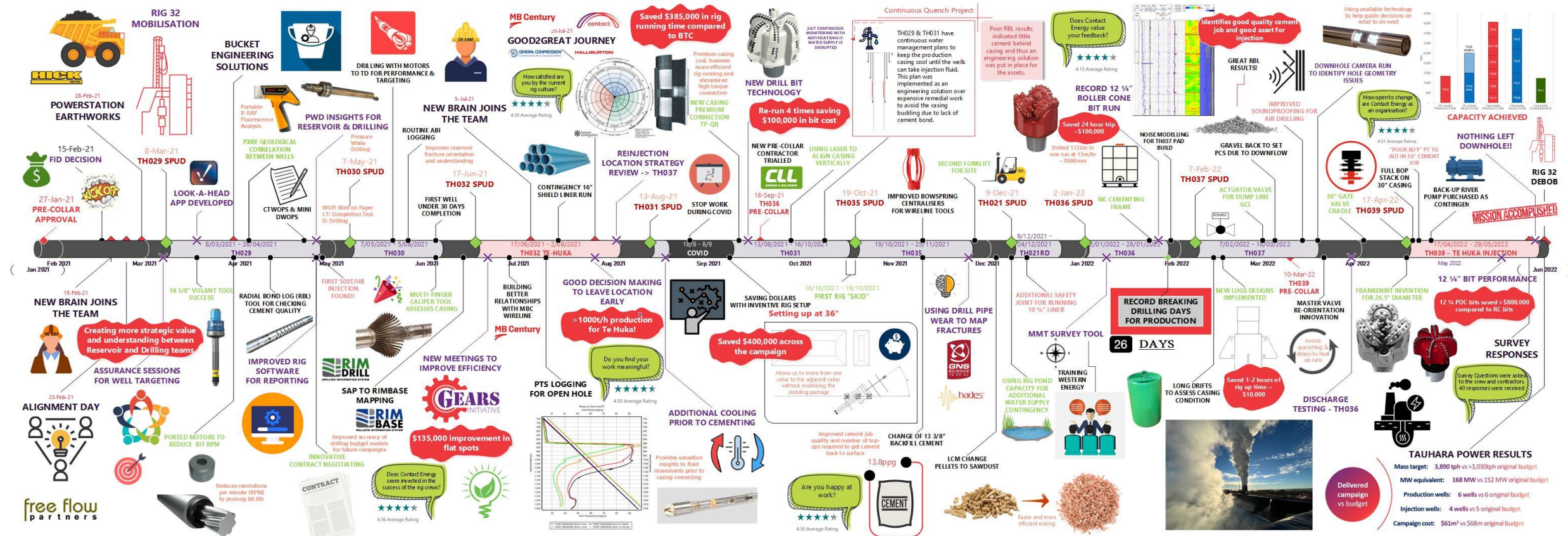


CO2 capture and reinjection/ food grade CO2



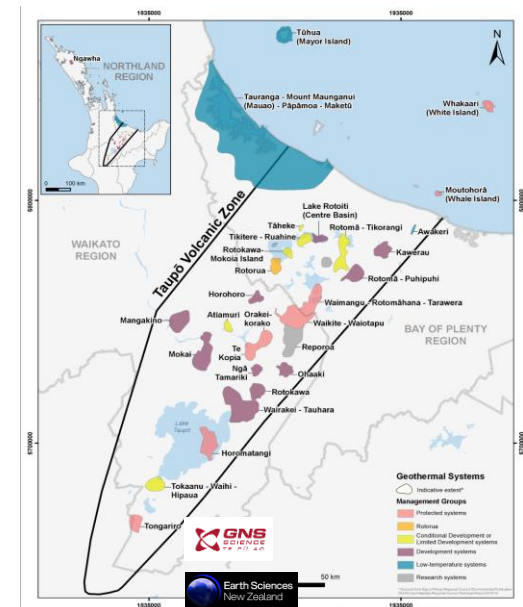
Continuous improvement in geothermal drilling

A timeline poster from Tauhara



Where are the next opportunities for geothermal?

1. Expand generation on existing fields
2. Developing new, lower temperature fields
3. Geothermal generation that flexes up in winter and down in summer
4. Super critical geothermal
5. Enhanced geothermal systems (EGS)



Further innovation is required to make the most of our opportunities

- Reducing steamfield development cost and increasing productivity is a key target
 - Many cost increases have been driven by regulations and changes in seismic code – these need testing and challenging to ensure they are appropriate to the risks and fit for purpose
 - New approaches may assist eg different foundations and supports or buried piping
- Applying new techniques from EGS including high deviation directional drilling and permeability enhancement to increase well productivity
- Modulating geothermal flows to suit market movements, seasonally, weekly or even daily
- Plus, many more...

The geothermal world has always looked to New Zealand for end to end geothermal experience driven by innovation

The next steps need to come from us

