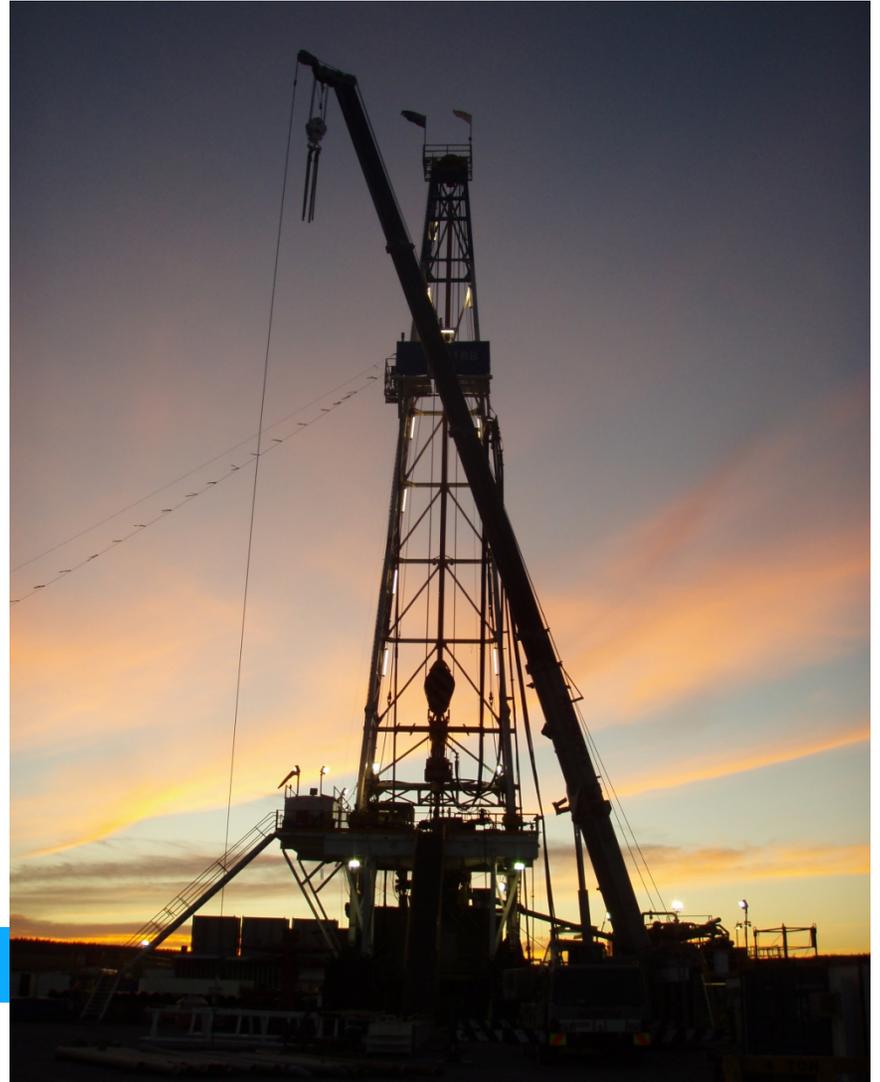


# From Resource to Market

Mighty River Power

9 November 2009

William Meek, Chief Financial Officer



# Geothermal Property Rights in NZ

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- The sole right to use geothermal energy on or under land was vested in the Crown by the Geothermal Energy Act 1953.
- This Act was repealed by Section 362 of the Resource Management Act 1991. Under the RMA, geothermal energy (water or steam) is included in the definition of water
- Requires a resource consent for use of heat or energy from water unless expressly allowed for in a regional plan.
- But land access also required to site bores and above ground infrastructure and land access only possible via bilateral agreement (royalties) with land owners (mostly Maori)
- Different to most international jurisdictions where geothermal use allocated via government concession, mining permit



# Old Style Geothermal – The Wild West

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- **Geothermal a mining operation:**
  - **drill a well**
  - **suck out the fluid**
  - **discharge to the environment (into the river!)**

↳ **Consequences:**

- **pollution**
- **pressure decline**
- **subsidence**
- **resource failures**



# Review of history

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- **Theoretically New Zealand has great geothermal potential (high temperature)**
- **Why hasn't it been developed earlier?**
- **Market had cheaper alternatives (Maui gas)**
- **Dilution of expertise due to geothermal development hiatus**
- **Significant exploration risk (except on big fields extensively explored by the Crown)**
- **Land ownership is fragmented**
- **Only one manufacturer (Ormat) focussed on New Zealand**
- ↳ **Focus on quick win “power plants” not a “value maximising sustainable business”**

# Geothermal in the 21<sup>st</sup> century

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- **Resource is king – energy transformation**
- **Integrated system – dynamic horizontal/vertical relationships (shallow/deep)**
- **Injection key factor in sustainability**
- **Production and injection developed in harmony and with regard to interconnectivity**
- **Field optimisation vital for sustainability and value**
- **Resource doesn't recognise land ownership boundaries**

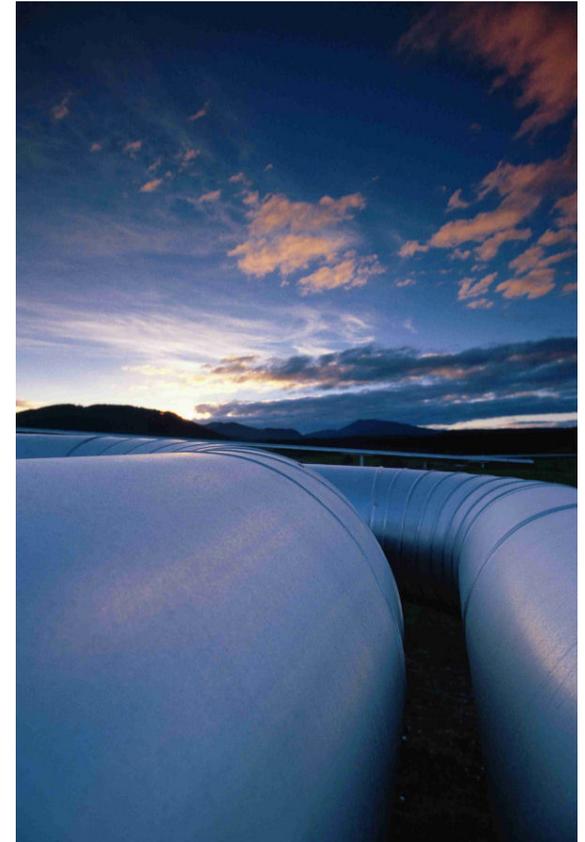


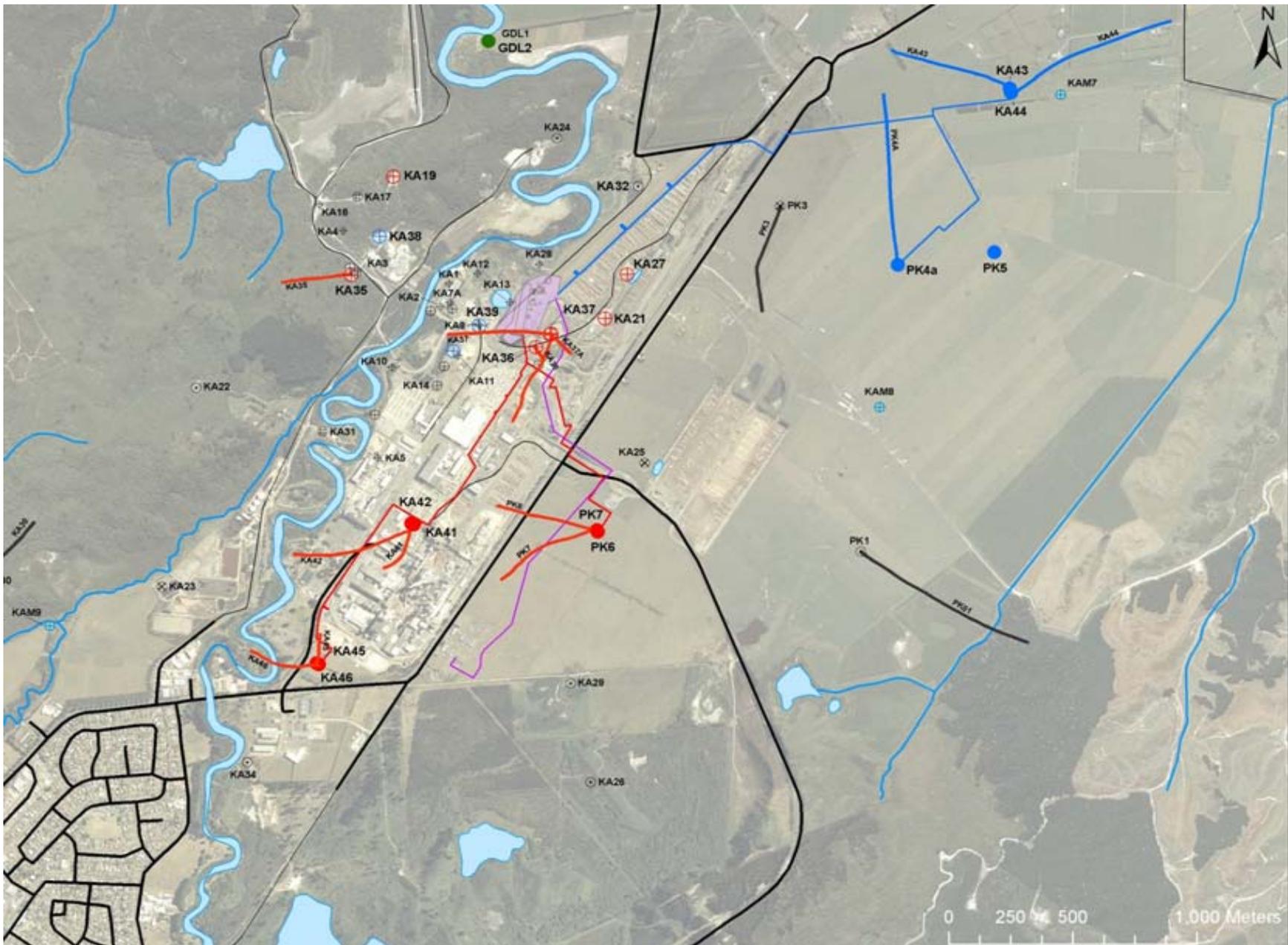
# Land Aggregation is Key

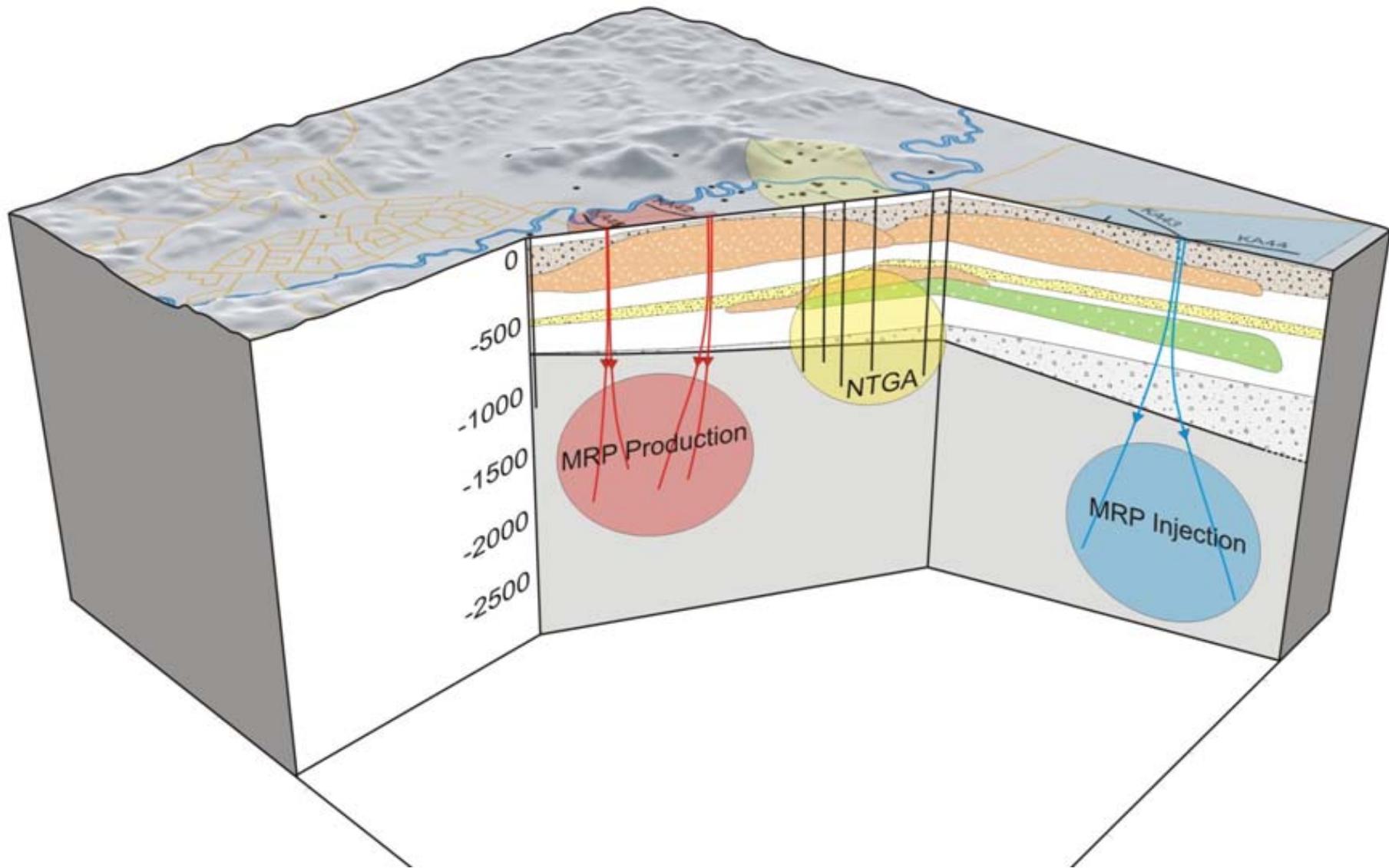
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- **Reservoir Sustainability**
  - Multi-tapper
  - Avoid tragedy of the commons
- **Creates flexibility in regard to location of production and injection wells**
- **Enables larger scale development**
  - Economies of scale
  - Absorb risk of drilling failure
  - Technology/Supplier choice
- **Drives stakeholder alignment**
  - Land owners, consent stakeholders

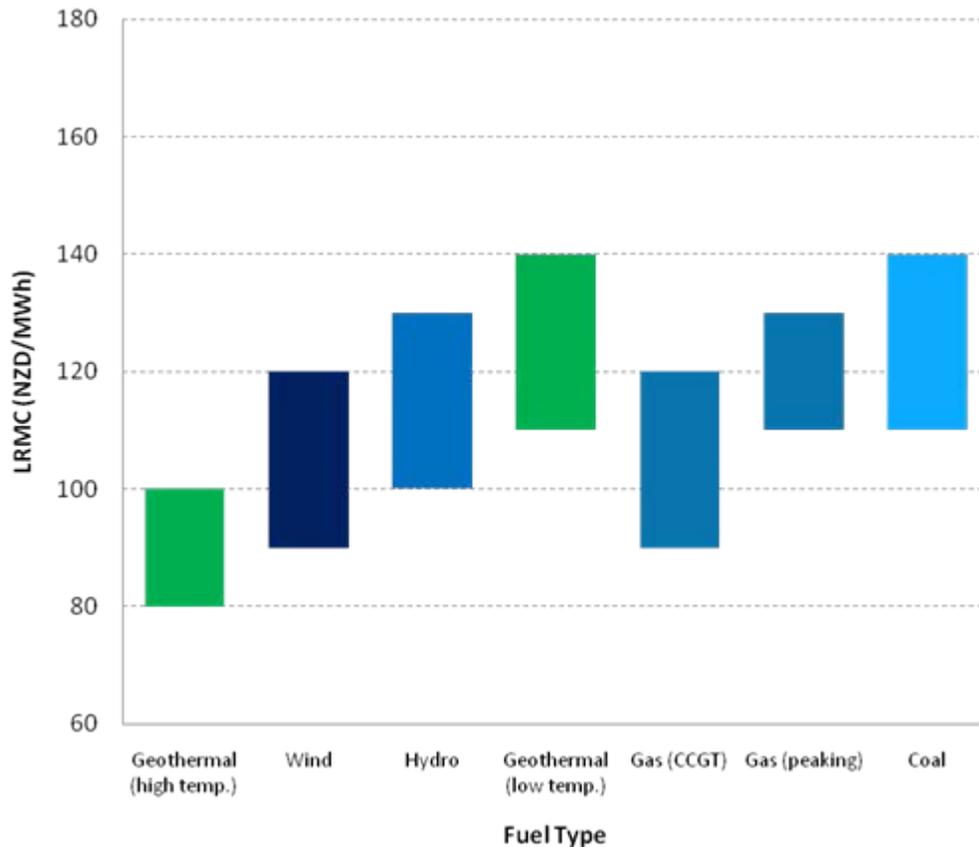
 **Project success**







# Technology Cost



- Large scale geothermal has edge on competing technologies, baseload (have achieved 98% load factor)
- Gas potentially competitive but no long term reserves and exposure to carbon pricing

# Leveraging Geothermal

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- **Mighty River Power has built up a world leading geothermal team**
  - **Multi-discipline: drilling, reservoir engineers, procurement, construction, O&M**
  - **Collaboration with Crown Research Institutes and NZ Universities**
  - **Now in top ten largest geothermal companies in the world**
- **Currently undertaking a significant geothermal development programme**
  - **Domestic: >500MW geothermal operating by 2013**
  - **International: Geo Global, Chile, USA, Germany**
- **Local relationships are important, particularly with landowners, regulatory authorities,**



**KAWERAU – 100MW**





**STEAM BLOW ROTOKAWA**





## CONSTRUCTION NGA AWA PURUA – 140MW





**The cows don't seem too concerned with the addition**



TOLGUACA, CHILE



# Questions?

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