

International Opportunities Geothermal & Beyond



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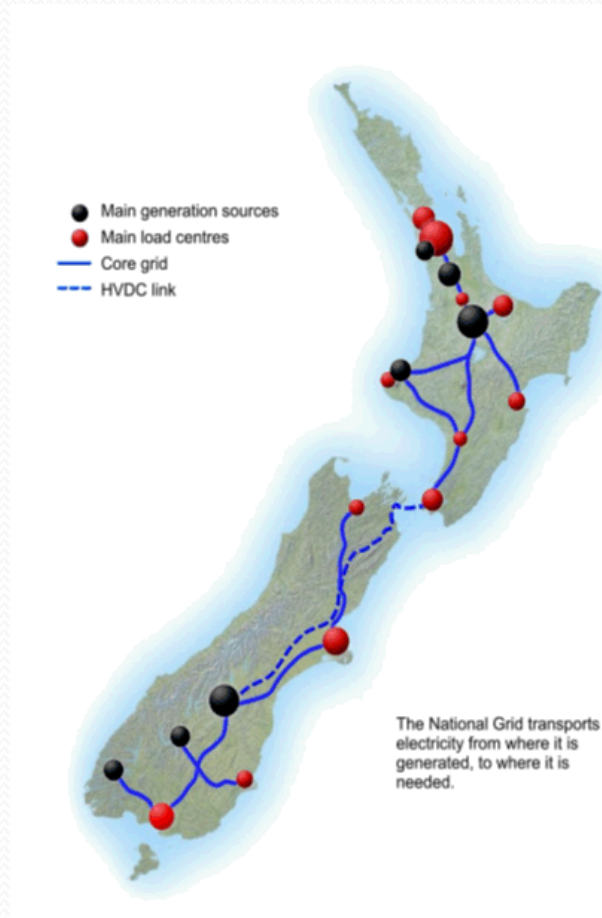
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Agenda

- New Zealand geothermal developments
- International geothermal contributions
- Approaching international wind opportunities
- IRENA
- Summary

New Zealand Power System

78% Renewables

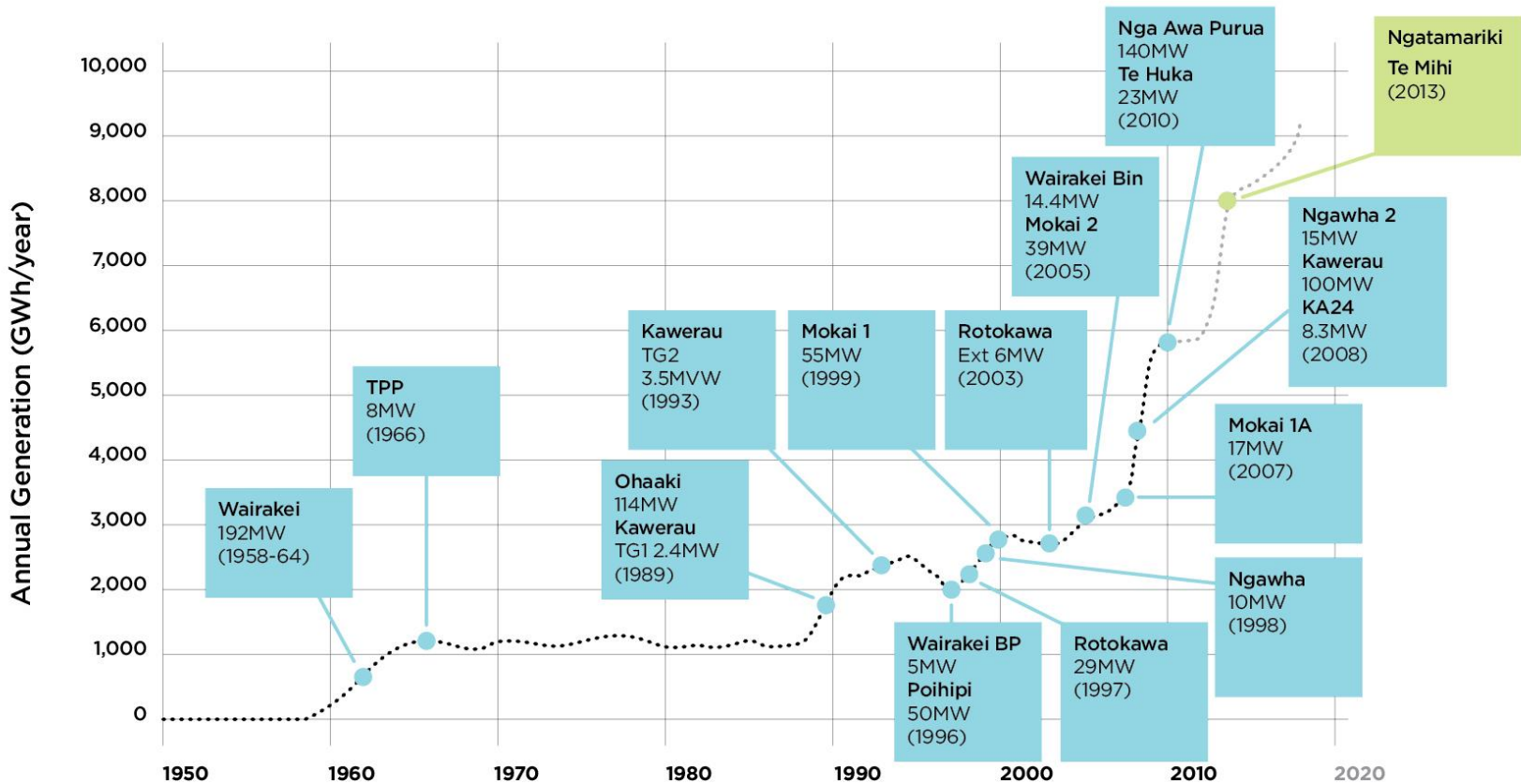


43 GWh gross generation

53% hydro
17% geothermal
8% wind

A 60 year story...

Geothermal Installations in New Zealand



Nga Awa Purua (2010) – 140 MW



Triple flash, single steam turbine

Ngatamariki (2013) 82MW



Total reinjection of all fluids – heat exchange to secondary cycle

Kawerau – 50 years industrial use



more than 50 years of operations

Clean, Base load, Compact...



Looking overseas for business

It may seem a long trek into uncertain lands but there is a lot of experience available



In Indonesia for over 40 years



- Kamojang first plant 30 MW
- New Zealand funded; led by GENZL; team effort
- 30 years of operation
- 200MW and expanding

- Kiwi's involved in first 1,000 MW
- Indonesia looking to 4,000 MW+
- 30,000 MW potential?



1982 Inauguration of Unit

Philippines a key early focus



- 1976 – bilateral government agreement
- Early exploration at Leyte and Palimpinon
- New Zealand supplied rig
- Undertook early drilling
- Extensive involvement through KRTA
- 2nd largest geothermal production globally 1800 MW
- Plants privatised
- Modest future potential

Kenya then and now..



- GENZL took up UNDP 45 MW Olkaria project in 1978
- Involved in field extensions - 200 MW
- Now adding some 1,000 MW
- Possible 5,000 MW
- New fields
- NZ consultancies and contractors playing key roles



New challenges, different models



- Mighty River Power invests in USA plant – 2011 commissioning of 49.9 MW John *Featherston* – Imperial Valley, California

- Mighty River Power undertakes greenfield development in Tolquaca, Chile



New Zealand Geothermal Institute



- One of our proudest achievements
- Trained over 1,300 scientists and engineers



THE UNIVERSITY OF AUCKLAND
NEW ZEALAND

“Geothermal New Zealand”

Over 40 companies involved domestically and internationally

- *R&D*
- *Education & Training*
- *Earth Scientists*
- *Drilling specialist*
- *Engineering Consultants*
- *Process Designers*
- *Fabricators*
- *Manufacturers*
- *Suppliers*
- *Installers*
- *Constructors*
- *Project Developers*



www.geothermalnewzealand.com

Collaboration is key

- Sharing market information with others in NZ
- International marketing is expensive
- Draw on relationships with international partners – GEONZ EPC opportunities with Japanese, European trading houses, manufacturers and IPPs
- The experience we offer and existing working relationships from NZ are an invaluable mix
- MFAT (IDG) as new market access points
- NZTE market entry support

Wind opportunities



Market potential

- Geothermal only 12,000 MW globally
- Wind already at some 250,000 MW globally
- Wind competitively priced
- Wind development cycle relatively short (cf Geothermal)
- Small scale opportunities can provide entry point?

Market entry

- What can we offer?
- What differentiates your offer from others?
- Never under estimate our experience
- Competition on price is key
- Kiwi approach and values widely recognised
- Use existing partnerships to “go international”
- MFAT and NZTE support – they need wins!

Wind – benefits not understood

Reactive power

Frequency keeping and voltage support

Fault ride through

Spinning reserve



International Renewable Energy Agency - IRENA

- Abu Dhabi based – Middle East location key
- US\$29 million annual budget; US\$350 million ADFD fund backing
- New Zealand on Council, VP of Assembly in 2015
- Valuable entry point; opportunity to influence and guide
- New Zealand pragmatism well regarded
- Joint efforts with NZ and other major donors through Pacific Energy Summit (2013) and SIDS (September 2014)

NZ and IRENA

- Co managing \$50 million investment in Pacific
- Active support to geothermal promotion, training
- Collaboration on Africa Clean Energy Corridor – linking Cairo to Cape Town – NZ network and market experience
- Support on costing coalition – real cost data
- Support on global RE atlas
- Where could we influence wind opportunities?

International opportunities..

- *They are there* – but you have to be on the ground
- Many companies now have strong international linkages / ownership they can exploit
- *There is strength in numbers* – sharing market information is mutually rewarding, rarely detrimental
- *Be pragmatic* about what you chase
- International operations must have local support – *partnerships are key*
- Think beyond consultancy; where is the real money?



Thanks – Happy Hunting!

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