

Developing Geothermal Energy: Lessons & International Collaboration

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NEW ZEALAND
FOREIGN AFFAIRS & TRADE
MANATŪ AORERE



SUMMARY

1

Geothermal now meets some **20%** of New Zealand's electricity demand; more than **80%** of our generation is from renewable resources.

2

We continue to consider new geothermal resources; innovative solutions to enhance productivity and financial returns.

On a commercial and bilateral basis we are active globally.

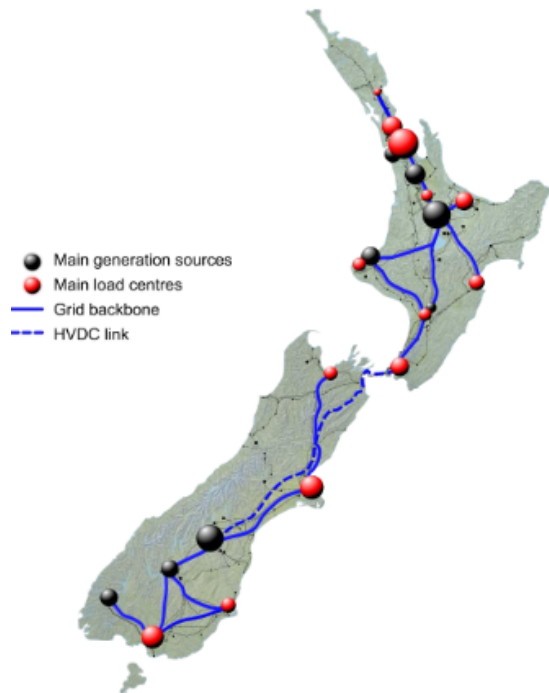
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What follows touches on:

- Our geothermal strategy
- Lessons we have learned
- International collaboration
- Key issues in capability development

NEW ZEALAND ELECTRICITY SYSTEM

New Zealand's electricity system

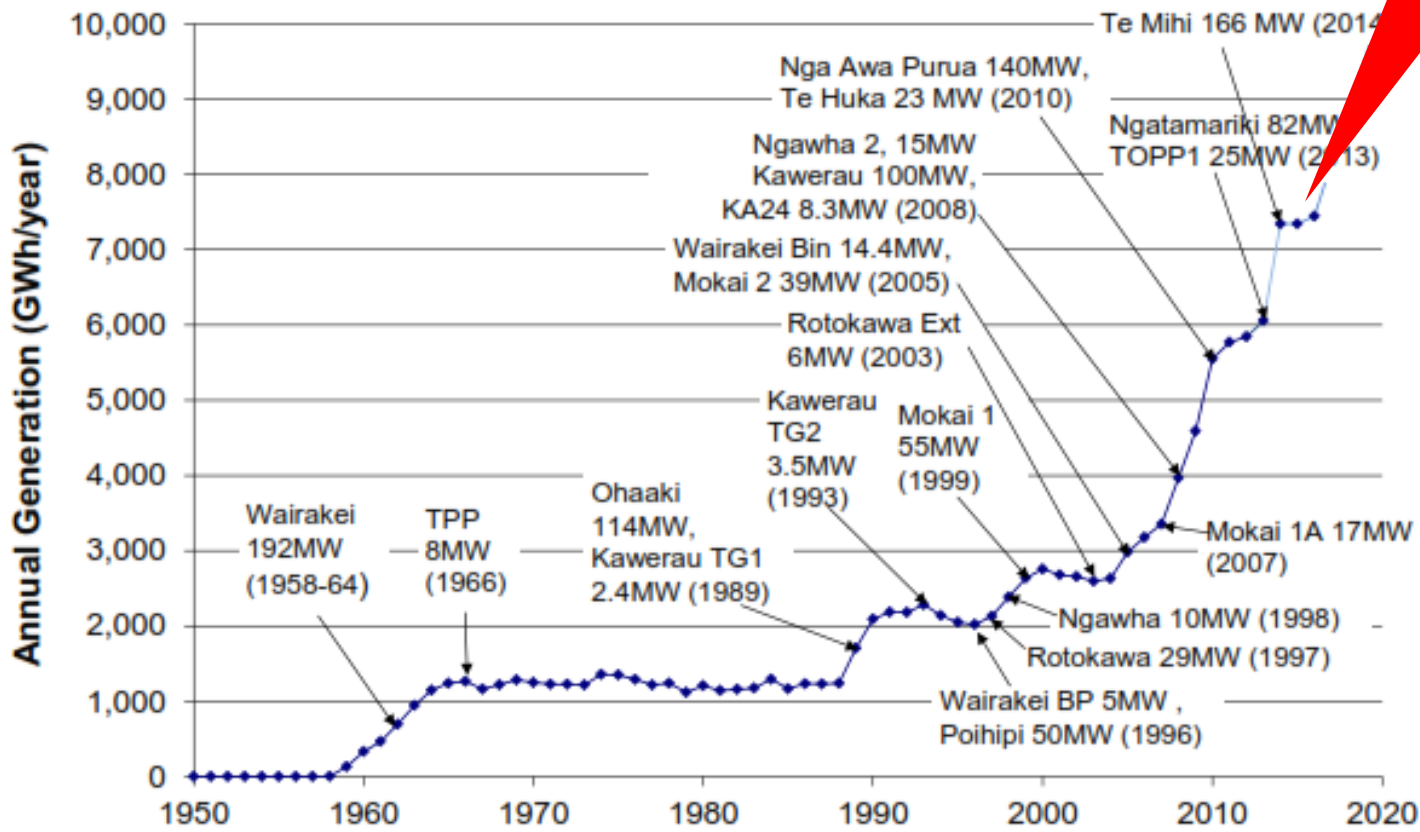


- Installed generation 9,800 MW
- Peak demand 6,750 MW
- Total energy supply 43,000 GWh/yr
- Connected by 700 MW HVDC link
- Power mainly transferred northwards from southern hydro systems
- Large thermal plant in north island aids peak demand and dry years

A LONG TERM GEOTHERMAL STRATEGY

Over sixty years of development

980 MW &
7,500 GWhr



RECENT PLANT ADDITIONS > \$2B INVESTED



Nga Awa Puru 140MW



Ngatamariki 82MW



Te Mihi 166MW

INTEGRATED USE OF GEOTHERMAL RESOURCES



Miraka Dairy
Factory

Glasshouses
5.5 Ha

100 MW
Binary Plant

"We will act as a beacon of hope and prosperity for our people"
Tuaropaki Trust, owners and developers of the Mokai resource

SUMMARY

- New Zealand is fortunate to have a good level of accessible renewable energy sources
- We have considerable additional geothermal and wind sources yet to be tapped
- The electricity market is deregulated and production costs and retail prices support a healthy market operation
- Development of renewables is determined by land owners
- Maori iwi, under whose land many of our geothermal resources are found, are active commercial partners in the newer developments
- Geothermal is a key primary energy source for industrial and agricultural processing and these integrated uses are being encouraged
- We welcome the ongoing opportunities that we have to share this experience with others as they build their geothermal and wider renewables markets.
- We are all continuing to learn!

INTERNATIONAL ACTIVITIES



INDONESIA – FOR MORE THAN 40 YEARS

- *Providing full support from surface exploration through to construction and commissioning – early parallel programme in Philippines also continues*
- Involved since 1970's with bilateral support to Kamojang - commissioned in 1982
- Providing advice at Ministry level on improving quality of field data collection, storage and dissemination
- Assisting in development of concession tendering and evaluation
- Training at all levels within technical institutes, universities, state companies and IPPs
- Running drilling engineering workshops in country; project management courses in NZ.



CARIBBEAN

- Full surface exploration on Grenada and St Lucia
- Working with Dominica to develop first small generation facility
- Assisting CDB with GEOSmart financing facility
- Providing peer review and technical input to St Kitts/Nevis, and St Vincent
- Offers considerable potential for island nations totally dependent on diesel generation



EAST AFRICA REGIONAL ACTIVITIES

- Full surface exploration on Comoros with GRMF support.
- Working with Govt of Comoros to secure exploration drilling funding
- Establishing New Zealand-Africa Geothermal Facility in partnership with the African Union Commission. This is a 5 year programme with a total \$10m commitment.
- Already provided New Zealand Drilling Code of Practice as basis for drilling operations in East Africa.



THE GEOTHERMAL INSTITUTE IN AUCKLAND



- One of our proudest achievements – ongoing scholarships
- Trained over 1,500 scientists and engineers
- A real opportunities to share international experiences

BUILDING CAPACITY INTERNATIONALLY

Recognise critical areas of capabilities;

- No substitute for the highest quality surface exploration and resource estimates
- Public offers of concessions must be based on best quality, reliable data
 - Public sector playing renewed role in confirming resources – accepting early stage risk
- Reservoir modelling and engineering critical from exploration, through development and on into long term operations and field management
- Drilling is expensive – design and implementation must be appropriate and competently managed
- Power plant design and engineering relatively well established – EPC driven by funders
- Effective operations and management of reservoirs critical to ensure returns and longevity of resources
- National educational support at technical college, undergraduate and graduate levels to meet growing demand for qualified staff.

THE GEOTHERMAL GLOBAL ALLIANCE

- New Zealand is supportive of the GGA initiative
- It is imperative that the GGA reflects and helps address the critical issues that face the geothermal industry
- Geothermal is increasingly being challenged by other renewable technologies as costs and risks fall dramatically, with solar PV in particular
- Leadership in sharing experiences will be a key attribute for the GGA – an “open source” model to disseminate information, lessons learnt at all stages of resource identification, exploration, development and reservoir and plant management, could differentiate GGA from other initiatives
- Geothermal has a reputation (and often record) as an expensive and time consuming undertaking – the industry has to work together to demonstrate that it is willing and capable of addressing these issues
- The geothermal industry understands the key hurdles that projects face; GGA’s success will be measured by the solutions that we can deliver



THANK YOU

