Papua New Guinea / PNG

- Geothermal Policy still awaiting ratification from government
- Review of the main legislation (Mining Act) has to be completed before geothermal policy can be looked at
- Stalled development

Travertine sinter, Papua New Guinea Highlands. Credit: Nathan Mosusu, Mineral Resources Authority,
Australia / Straya

Australian Geothermal Association (AGA)

- Incorporated in September 2016
- Central point for information about geothermal energy in Australia, a forum for stakeholders and promotion of geothermal energy
- 73 current members and growing

www.australiangeothermal.org.au
AGA Census

- Build a comprehensive database of geothermal installations and projects
- Communicate contribution of geothermal energy to Australia
- Update work by Geoscience Australia (2016)
- Support local ‘Levelised Cost of Energy’ calculations to compare geothermal with other energy sources
Preliminary results – GSHP & Direct Use

![Bar charts showing capacity (MWt) for GSHP heating, cooling, and direct use heating and cooling, along with other uses such as bathing, cooking, and aquaculture for the years 2015 to 2020.](WWW.AUSTRALIANGEOTHERMAL.ORG.AU)
Power Generation - Winton

Funding

<table>
<thead>
<tr>
<th>Total project cost</th>
<th>$3,086,500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funding (BoR)</td>
<td>$500,000</td>
</tr>
<tr>
<td>Funding (Council)</td>
<td>$2,586,500</td>
</tr>
</tbody>
</table>

Jobs*

- 9.3

Construction

- Current stage: Construction underway
- Construction start: July 2017
- Expected completion: November 2018

Green Thermal Energy Technology
Aotearoa / New Zealand
Whenua / Land

Almost all of New Zealand is in the deforming plate boundary zone

www.gns.cri.nz
Geothermal Electricity

- TARGET: 90% Renewables by 2025
- ~1000 MW installed capacity
- Free Market
- 12th April NZ government announced no new exploration permits for offshore oil and gas fields
Ngawha

• Doubling capacity to 53MW (with an additional 28MW extension proposed by 2026)
• Resource consent granted for 35 years (July 2017)
• All 3 production wells tested, showing encouraging results
• Production wells drilled between 1600m – 1750m
• 2 reinjection wells planned for completion December 2018
• Ormat binary technology power plant, site works start mid 2019
• Generation commencing late 2020
• Separate monitoring programme for Waiariki pools
• Kaitiaki Advisor from Parahirahi Ngawha Waiariki Ahuwhenua Trust
• Total cost ~NZ$160M

www.ngawhageneration.co.nz/geothermal-power-station-expansion-2-2/, 2018
Ngawha Hot Springs
Te Ahi o Maui (TAOM)

- Commissioning of the 25MW Ormat plant began 28\textsuperscript{th} September
- Estimated total cost of NZ$137M (NZ$5.48m/MW)
- Project owned by Eastland Group (94\%) and the landowner A8D Maori Trust (6\%)
- Consent granted for use of up to 15,000t/day of fluid

Direct Use Geothermal

GeoHeat Strategy target by 2030:

• 7.5 PJ/year additional geothermal direct use

• 500 new jobs in geothermal related businesses

nzgeoheat.org.nz
Co-location of Resources

Comparative energy costs in NZ

<table>
<thead>
<tr>
<th>Energy Source</th>
<th>Total Energy Costs (NZ$/GJ effective)</th>
<th>Carbon Costs (at NZ$30/t CO2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geothermal - direct</td>
<td>$5.01</td>
<td></td>
</tr>
<tr>
<td>Biomass</td>
<td>$7.81</td>
<td></td>
</tr>
<tr>
<td>Coal</td>
<td>$7.97</td>
<td></td>
</tr>
<tr>
<td>Gas</td>
<td>$9.90</td>
<td></td>
</tr>
<tr>
<td>Wood pellets</td>
<td>$10.59</td>
<td></td>
</tr>
</tbody>
</table>

Source: Contact Energy
West Coast Geothermal

"The discovery could transform the economy and resilience of Westland, and provide a significant and sustainable clean energy resource. The location of the geothermal activity could provide real benefit to the dairy and tourism sectors," Westland Mayor Bruce Smith

- In 2014 scientists drilled a borehole nearly 900 metres deep along the Alpine Fault near Whataroa, on the West Coast, and found water temperatures of 120 degrees Celsius
- GNS Science undertaking a study on the resource capacity and ability to support direct use geothermal projects
- The possibility of small-scale electricity generation would also be considered

NZ Aid - Indonesia

The purpose is to accelerate geothermal development in Indonesia

Two programs of work:

• Capacity development and technical assistance (5 years) includes Support to Badan Geologi (Geological Agency), EBTKE (Regulator), PT SMI (SOE). Managed by Jacobs

• Technician training (3 years). Managed by WINTEC

• Additional cross-industry workshops/events eg, Use of slimholes and the International Women’s Day Event

Anna Prestage (Jacobs) helping Badan Geologi with geochemical sampling

First Women in Geothermal Workshop, 8th March 2018, Jakarta Indonesia
Establishment of 5 year (NZ$10m) New Zealand-Africa Geothermal Facility (NZ-AGF) in partnership with the Africa Union Commission (AUC), to support geothermal developments throughout East Africa

- Markos Melaku – Facility Manager (markosm@africa-union.org)
- Hosted by & located with the Regional Geothermal Coordination Unit of the AUC in Addis Ababa, Ethiopia

Objective of facility:
- To provide responsive, flexible and timely geothermal technical assistance and capacity building for East African countries
- The NZ-AGF will prioritise assistance for overcoming barriers, that are currently stalling projects, to bring them closer to generation and distribution

Activities include: Technical studies and reports, advisory services, peer review, quality assurance services, training and capacity building.
We went to Kenya. We delivered. We left knowing that Ngati Tahu & Contact Energy will become part of the Olkaria Maasai history.” Aroha Campbell
Summary

PNG: On hold awaiting parliamentary decision on geothermal law

Australia: Small generation project (300kw), focus on hot spring development, AGA focussed on communicating the benefits of geothermal energy

New Zealand: Ngawha expansion, Te Ahi o Maui development, direct use investment focus, offshore Aid work in Indo and East Africa
Acknowledgements

- Tom Zink, Top Energy, NZ
- Graeme Beardsmore, Australian Geothermal Association, Aus
- Mike Allen, Geothermal NZ
- Jane Bydder, Jacobs, NZ
- Maxine Lahan, Mineral Resources Authority, PNG
GRC Sessions - NZ

Tuesday
• Sharing Best Practices in Community Engagement for Geothermal Development – Kenya/NZ Partnership, 1:50pm, Napels 7
• The Relationship Between Geothermal Fluid Flow and Geologic Context: A Global Review, 2:10pm, Capri 4

Wednesday
• Integrated Geothermal Resource Assessment using multi-variate 3D models, 8:20am, Capri 3
• Early 3D model Construction for well planning; A Case Study from Barrier Volcanic Complex Kenya, 9:00am, Capri 3
• Uncertainty Analysis of Forecasting with the Ohaaki Reservoir Model using PEST, 10:30am, Naples 7
• Kawerau Industrial Complex – The Worlds Largest Geothermal Direct Use Operation, 2pm, Capri 1
KIA ORA

andy.blair@upflow.nz