



Asia Pacific Clean Energy Summit

Challenges and Opportunities
in Geothermal Development in New
Zealand and Indonesia

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World Market for Geothermal Energy (WGC)

<i>Country</i>	<i>Installed 2010 (MW)</i>	<i>Forecast by 2015 (MW)</i>	<i>Increase to 2015 (MW)</i>
Indonesia	1179	3500	2300
USA	3087	5400	2300
New Zealand	628	1240	610
Philippines	1904	2500	600
Kenya	167	530	360
Iceland	575	800	225
Mexico	958	1140	180
Chile	0	150	150
Nicaragua	88	240	150
Turkey	82	200	120
Russia	82	190	110
El Salvador	204	290	90
Italy	843	920	80
Ethiopia	7.3	45	40
Costa Rica	166	200	30
Papua New Guinea	56	75	20
Japan	536	535	0

AECOM working in
the Countries
marked in Red

Geothermal Energy



- Geothermal power generation is based on established technology
- Average generation cost of geothermal is significantly lower than most other clean energy sources
- Geothermal generation costs are mostly effected by:
 - The quality of the resource
 - Financing terms
 - The knowledge and experience of the development team.
- The cost of generation is comparable to gas combined cycle plants
- Geothermal has a capacity factor of over 90% (Wind is 30-40%) making it ideal for base load power generation.
- It is renewable and relatively benign environmentally.

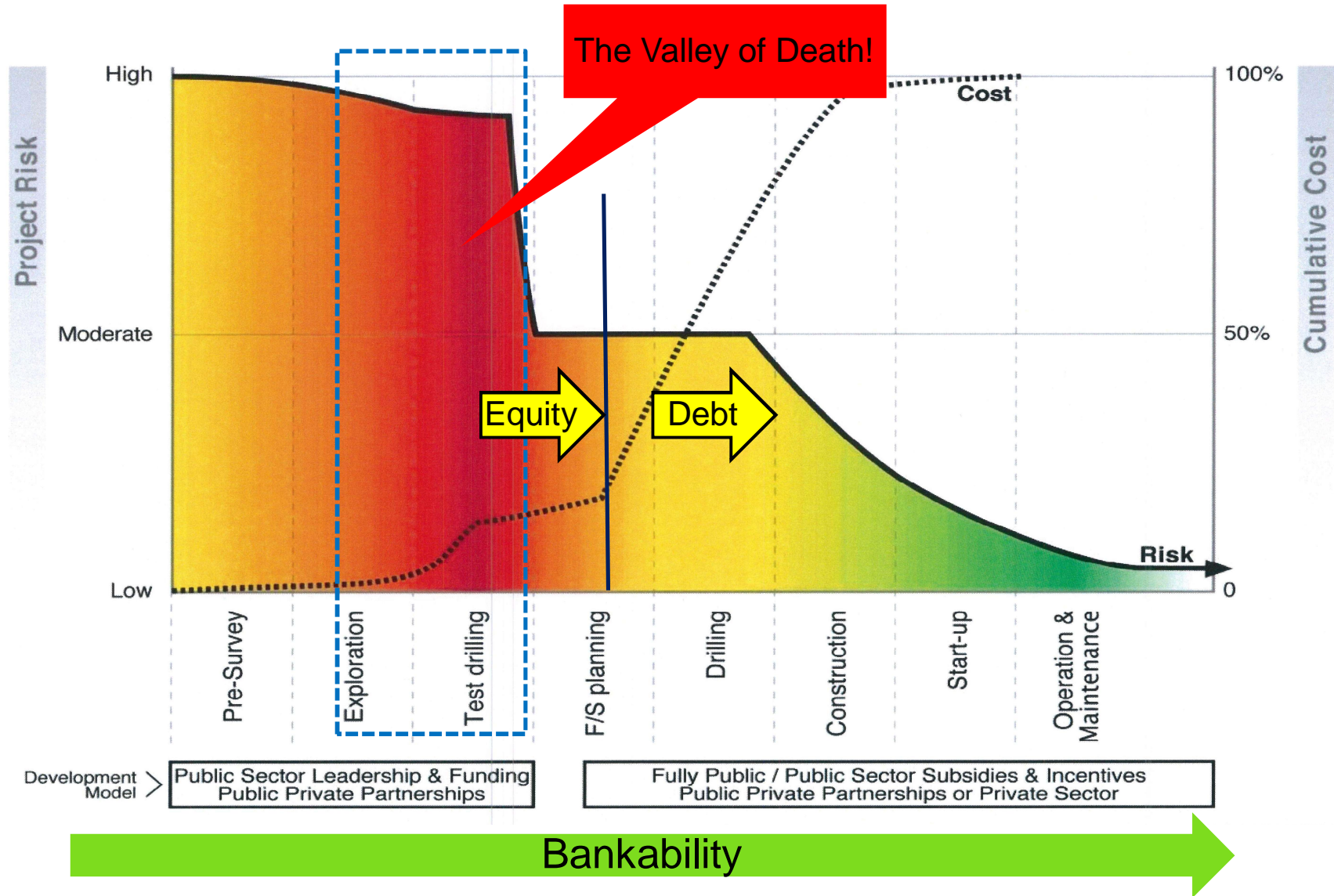
Project Risks



- Geothermal Risk
 - Resource risk
 - Reinjection risk
- Resource ownership and access risk
- Environmental and H&S risks
- Construction risk – Contracting methodology (EPC Delivery)
- Financial risk – Financing structure
- Market risk – Security of Power Purchase Agreement (PPA)
- Country and political risk – Insurance available.
- Project management and technical development risk - Knowledge and experience.

The Project Cycle – Risk and Reward

Ex World Bank Presentation



The New Zealand Geothermal Market



- New Zealand power market – no incentives for geothermal
- A long history of Geothermal investment in exploration and test wells.
- Most developments have been associated with “brown-field” sites. Resource knowledge reduces development risk.
- New Zealand Govt. Has fully funded geothermal projects (Ohaaki and Wairakei).
- Indigenous Maori have invested in many smaller developments.
- Large scale developments:
 - MRP (SOE) in “JV” with Maori
 - Contact Energy – Private sector corporate.

New Zealand – Planning and Permitting



- Resource Management Act – based on the principle of Sustainable Development
- Resource consent application
- Environmental Impact Assessment
- Public consultation
- Public Notification & submissions
- Council hearings
- Appeal process – lodged with the Environment Court
- Time frame:
 - Application preparation 2 years
 - Council hearings 1 year
 - Another 1-2 years if appeal to Environment Court

Tauhara North No. 2 Trust Geothermal Development



- Tauhara North No.2 Trust established to manage the Tauhara land block on behalf of the indigenous Maori owners.
- Trust vision: Hold fast to your land; make use of your land; for future generations.
- 34.5 MW Rotokawa GPP (Operating)
- In 1999, established a JV with MRP (Major power utility) & purchased the rights to Ngatamariki
- 140 MW, Nga Awa GPP (Online 2010)
- 82 MW Ngatamariki GPP. (Online 2013)
- 80-110 MW Rotakawa GPP extension planned.
- 2012 the Trust increased equity in Nga Awa from 10% to 35%.

Indonesia Geothermal Market



- Approximately 80 million people in Indonesia have no access to electricity
- Generation is predominantly coal and gas and electricity is subsidised.
- Indonesia has a geothermal resource potential of 27,500MW (T > 250 C). 44 Projects in development.
- Exploration, test wells and 1st Plant funded through NZ AID.
- Development issues:
 - State Electricity Co. is the single buyer – favour coal.
 - Sovereign risk.
 - Land ownership and access.
 - Concessionaires have difficulty raising equity exploration.

Indonesia - Planning and Permitting



- Structured environmental reporting:
 - EIA
 - Environmental Base Line Report
 - Environmental Management Plan
 - Environmental Monitoring Plan
- Decision making by central Government (Ministry of Mines and Energy).
- Limited third party input into decision making
- Use of Environmental Standards
- Emphasis on environmental management and monitoring.
- Ability to vary permits

Indonesia - Development Progress



Indonesia Government Sector

- Exploration by earlier donor support
- Pertamina Geothermal Energy (PGE) State Oil Co. funded exploration
- World Bank, Asian Development Bank, KfW, JBIC, assisted in funding projects

Indonesia IPPs

- Chevron with PGE
- Supreme Energy – JV with GDF Suez and Sunitomo (JBIC)
- Star Energy – Funding off balance sheet.
- Origin / Tata JV. Funding off balance sheet.

