

# New Zealand Geothermal, Future Outlook

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# Outline

- Overview on Geothermal installed capacity in NZ
- Expansion potential, technical and regulatory factors
- Energy logistics
- Growth and cost reduction of other renewables relative to Geothermal
- Summary

# Overview on Geothermal installed capacity in NZ

- Wairakei plant built in 1958
- 2<sup>nd</sup> largest geothermal plant in the world

Wairakei Geothermal Plant



[https://en.wikipedia.org/wiki/Geothermal\\_power\\_in\\_New\\_Zealand#/media/File:Wairakei\\_Geothermal\\_Power\\_Plant.jpg](https://en.wikipedia.org/wiki/Geothermal_power_in_New_Zealand#/media/File:Wairakei_Geothermal_Power_Plant.jpg)

# Overview on Geothermal installed capacity in NZ

- 854 MW, 13% of installed capacity
- From 2011 to 2016, 5 new plants completed, 450 MW
- Most reliable renewable resource
- Attractive, fuel prices increasing and hydro sites tapping
- Easily accessible reservoirs exploited



[https://en.wikipedia.org/wiki/Geothermal\\_power\\_in\\_New\\_Zealand#/media/File:Geothermal\\_drills\\_near\\_Taupo\\_1.jpg](https://en.wikipedia.org/wiki/Geothermal_power_in_New_Zealand#/media/File:Geothermal_drills_near_Taupo_1.jpg)

# Overview on Geothermal installed capacity in NZ

- At the end of 1980s, 129 reservoirs discovered
- Temperature range: 70° C to more than 220° C
- High temperature reservoirs concentrated in Taupo
- Steam/fluid is usually reinjected



[https://www.asiabiomass.jp/english/topics/1211\\_04.html](https://www.asiabiomass.jp/english/topics/1211_04.html)



## Expansion potential, technical and regulatory factors

### Regulatory:

- Geothermal Energy Act 1953
- Geothermal Energy Regulations 1961
- Rotorua City Geothermal Energy Empowering Act 1967
- Resource Management Act 1991

### Technical:

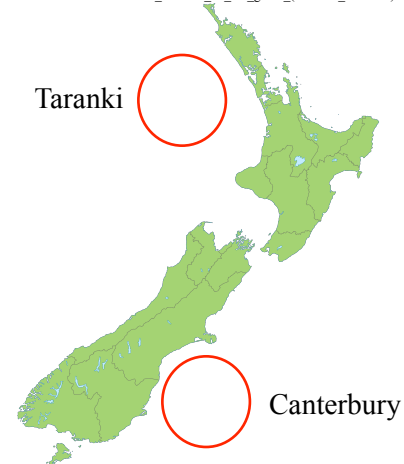
- New reservoirs are technically challenging
- Crown Research Institute
- GNS
- University of Auckland
- EDIN

# Energy logistics

- Oil deregulation in 1988
- Net importer, 15-20 tankers
- Shipping costs are moderate
- The Marsden Point Oil Refinery
- Gross oil prices affect geothermal future projects



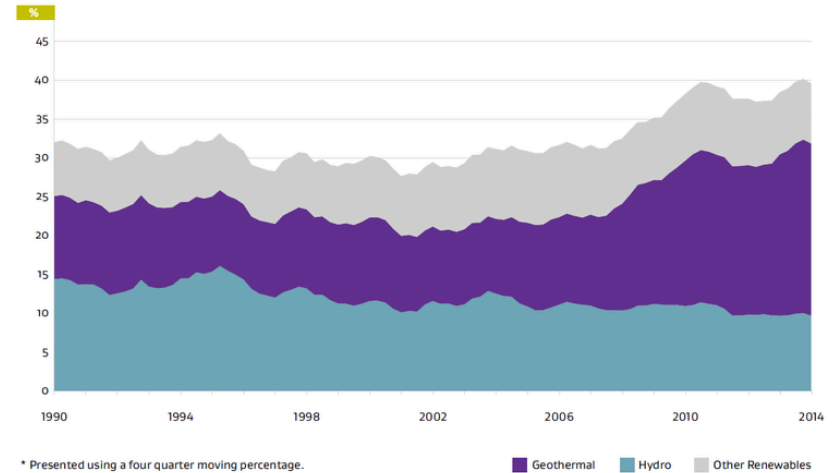
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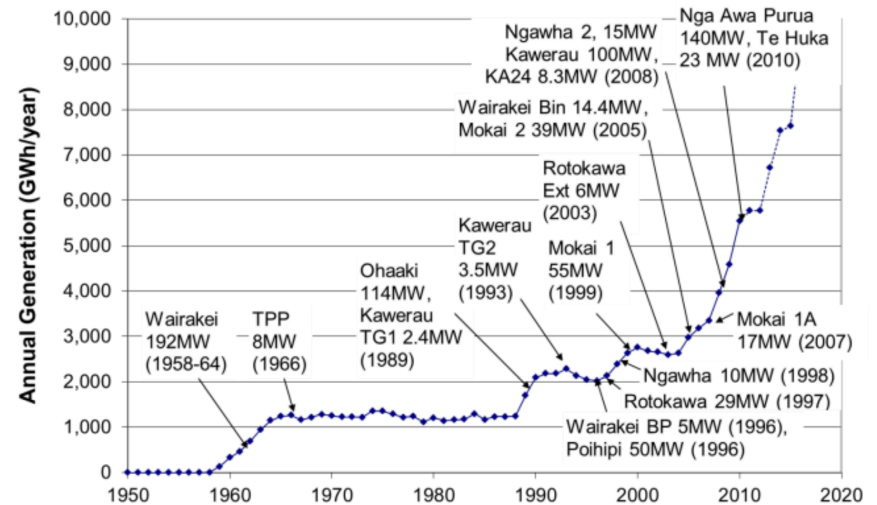
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# Growth and cost reduction of other renewables relative to Geothermal

- In 2006, Geothermal became the first renewable resource
- Growth is expected to continue because other resources are shrinking
- Demand reduction is growing (370 MW in 2015)
- Increasing cost is mitigated by diversification and innovation



<http://www.mbie.govt.nz/info-services/sectors-industries/energy/energy-data-modelling/statistics/renewables>

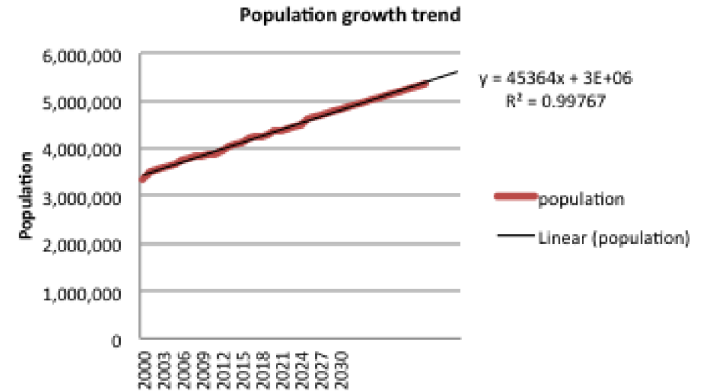


<https://www.geothermal-energy.org/pdf/IGStandard/ARGeo/2012/Harvey.pdf>

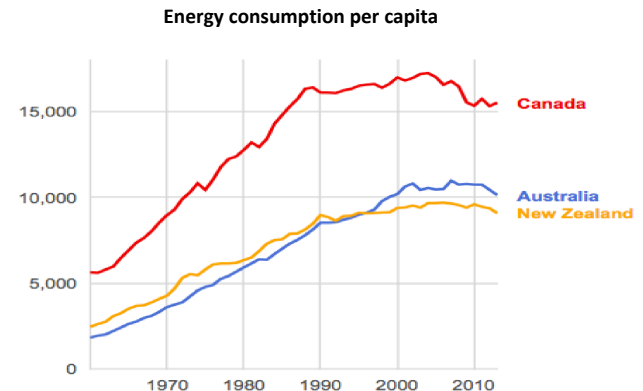


# Growth and cost reduction of other renewables relative to Geothermal

- Population is increasing linearly
- Consumption reduction policies are effective
- Efficiency of power consumption is greatly optimized



<https://www.greens.org.nz/sites/default/files/Toward%20100%25.pdf>



<https://www.greens.org.nz/sites/default/files/Toward%20100%25.pdf>

# Summary

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- Technical and regulatory factors
- Energy logistics
- Growth and cost reduction of other renewables relative to Geothermal

Thank you..