Growth in the New Zealand Geothermal Industry

Brian White
Executive Officer, New Zealand Geothermal Association

Growth …

Do we believe it?

Are we ready?

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Overview

- Electricity generation market
- Direct heat use
- Heat pumps
- Comparison across technologies
- Geothermal tourism
- Some international issues
- Industry response

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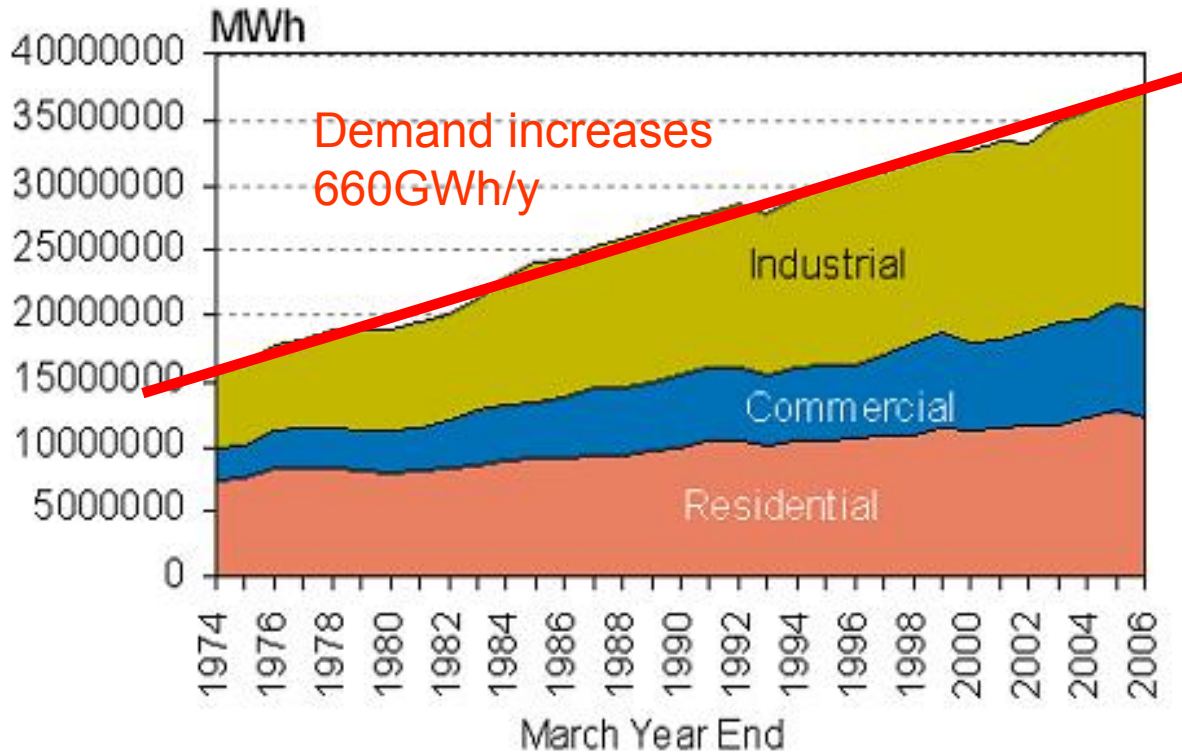
Geothermal Electricity Generation

Context

- In 2006 electricity demand = 38,740GWh
- Transmission /distribution losses – 7.5-12%



Requirement = 85MW/year geothermal equivalent

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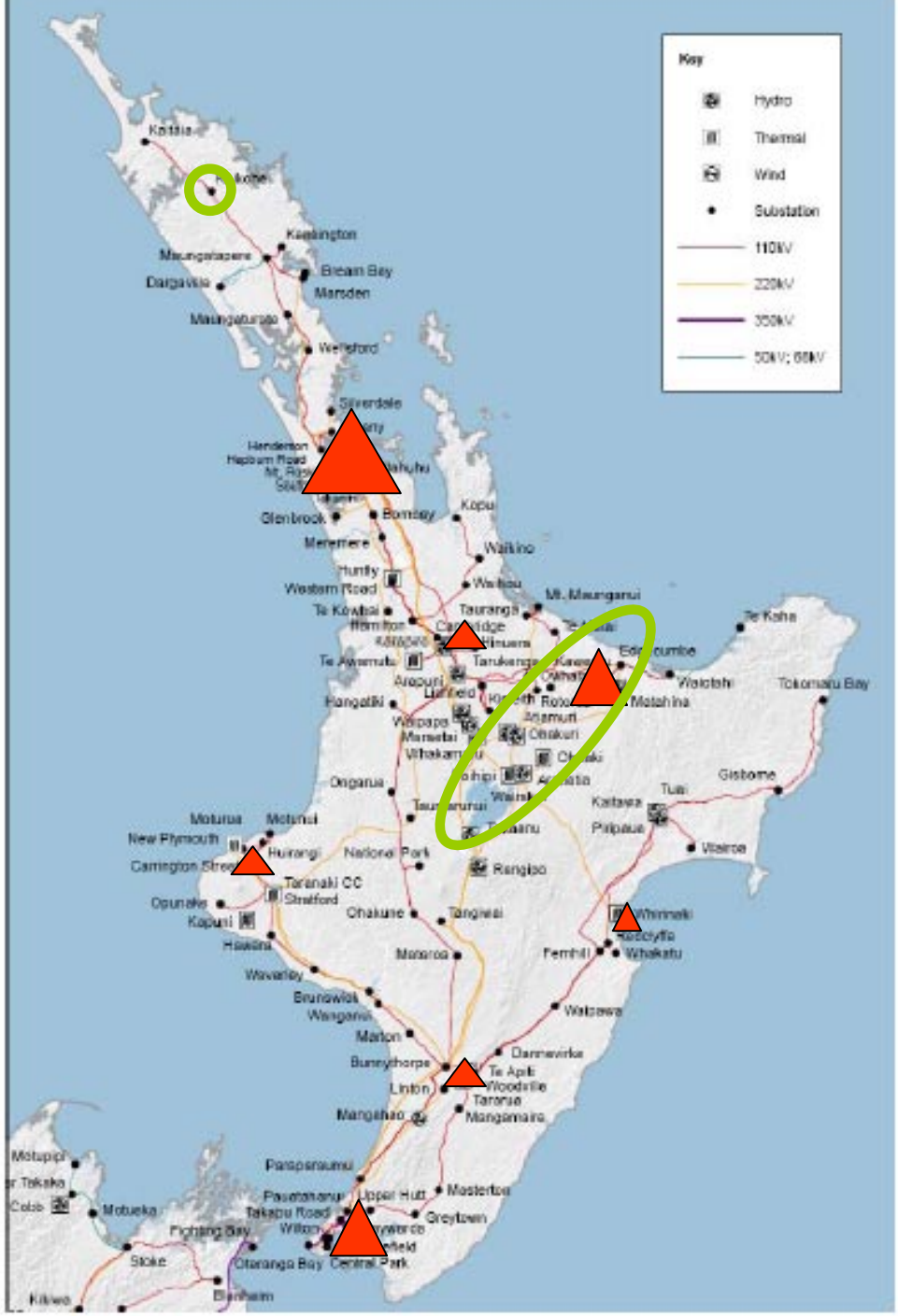

Where?

= area of high temperature geothermal fields

= demand centre

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How much?

Field	Capacity (P50)(MW)	Cap-Env Limitations (MW)	Existing Gen or Use (MW)	Period of Past Use (years)	Calc. Available Addit. Cap (MW)
Atiamuri	6	0	0	0	0
Horohoro	5	5	0	0	5
Kawerau	450	225	30	40	155
Ketetahi	100	0	0	0	0
Mangakino	47	47	0	0	47
Mokai	140	140	94	5	32
Ngatamariki	120	120	0	0	120
Ngawha	75	38	10	8	25
Ohaaki	130	130	50	17	52
Orakei Korako	110	0	0	0	0
Reporoa	42	0	0	0	0

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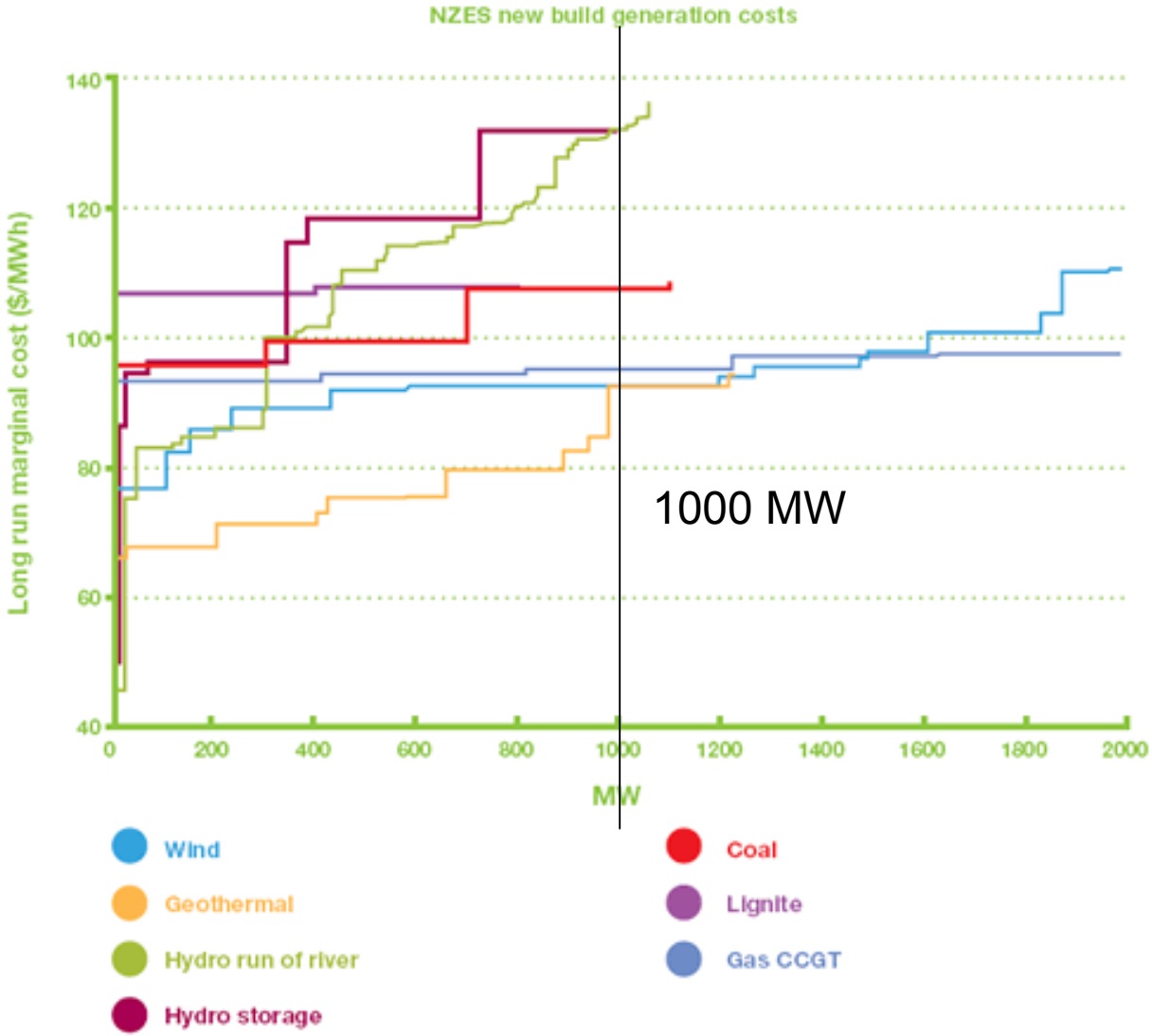
How much?

Field	Capacity (P50)(MW)	Cap-Env Limitations (MW)	Existing Gen or Use (MW)	Period of Past Use (years)	Calc. Available Addit. Cap (MW)
Rotokawa	300	300	35	8	256
Rotoma	35	10	0	0	10
Rotorua	35	18	6	45	2
Tauhara	320	160	2	1	158
Te Kopia	96	0	0	0	0
Tikitere-Taheke	240	240	0	0	240
Tokaanu	200	100	0	45	99
Waimangu	280	0	0	0	0
Waiotapu	340	0	0	0	0
Wairakei	510	510	230	30	47
Total					1248

NZES View – Quantity and Price



Recent Generation Gains

- Mokai 17MW extension - now over 110MW
- Ohaaki steam winning – generation increased from 25MW to >50MW since September
- Te Mihi steam winning – Poihipi will be fully loaded from next year

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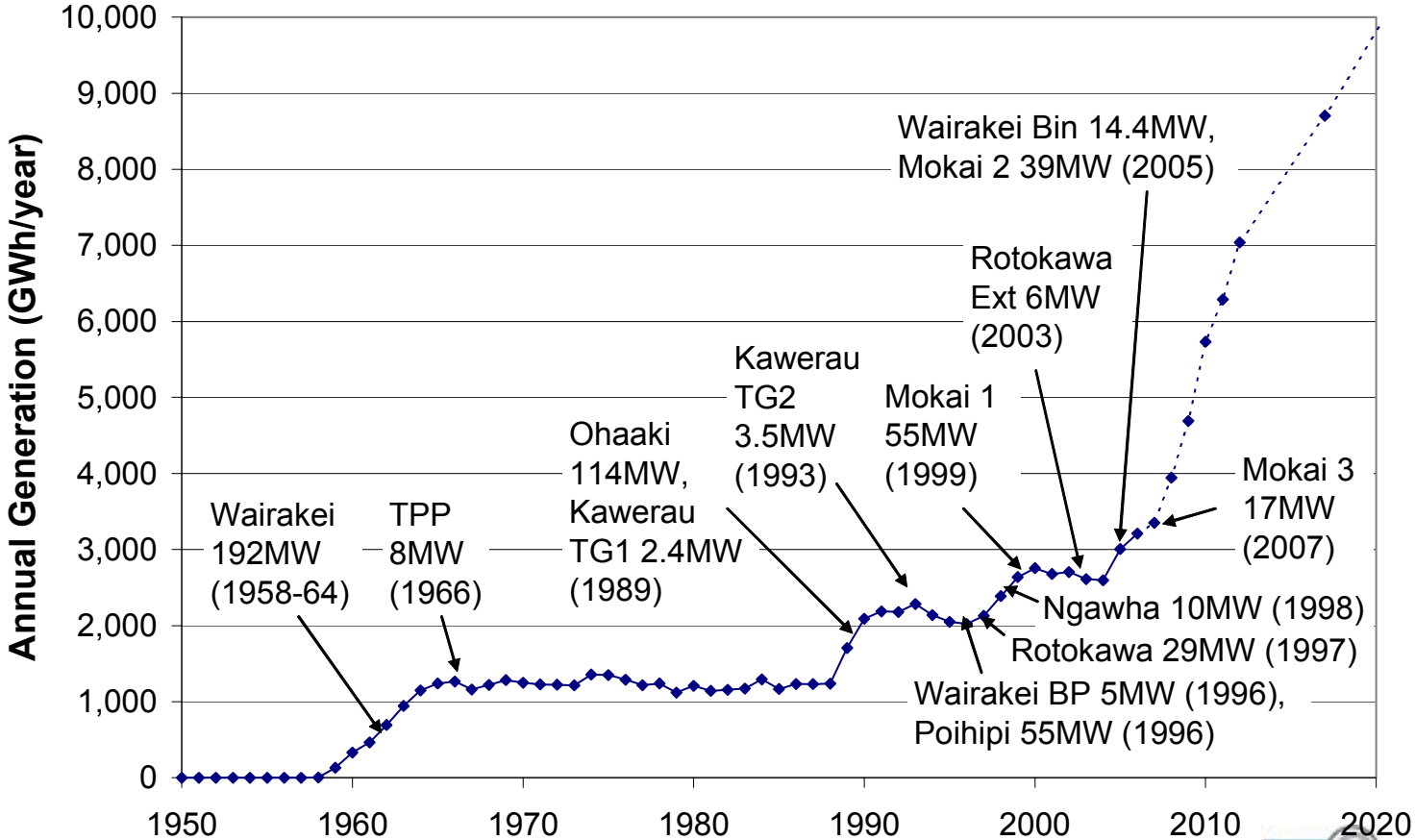
Opportunities - Generation

Table 1: Upcoming Geothermal Electricity Generation Projects

Station	Capacity (MW)	Operation	Developer	Comments
Kawerau	90	End 2008	MRP	Construction in progress
Ngawha	15	Mid 2009	Top Energy	Construction in progress (only showi average generation but some load-followi could be included in the design)
Rotokawa 2	110	End 2009	MRP	Consenting in progress
Te Mihi	220	End 2010	Contact	Consultation in progress (this replaces part the aging Wairakei plant – net benefit 67MW if generation is as good as expected)
Tauhara	<200 (50)	End 2011	Contact	Recent wells very encouraging. Slim ho exploration wells planned for 2007. Init concept floated to public (50MW used projections for Figure 1)
Mokai 4	40	End 2011	Contact	Contact has land rights under part of the fie and sits on the Mokai steamfield manageme committee. Concept floated to investors
Misc	200	By end 2016	MRP	Balance of 400MW in MRP's plan (Kawera Rotokawa, Ngatamariki, others?)
Misc	400	By 2025	Various	Balance of 1000MW of unspecified projects

Electricity

202020 Vision



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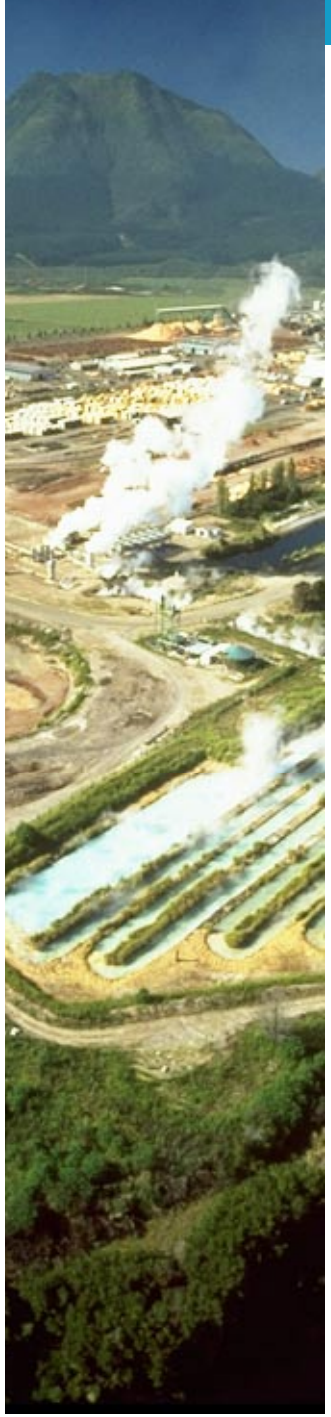

Direct Heat Use

- More efficient
- Can use lower temperature fluids
- May use “waste” fluid from power plant

Is there a place for district heating?

Consumer Energy (TJ/year)

Council Regions	Space Heating	Space Cooling	Water Heating	Greenhouse Heating	Fish and Animal Farming	Agricultural Drying	Industrial Process heat	Bathing and Swimming	Other Uses	**Total**
Northland								6		**6**
Auckland								65		**65**
Waikato	13		3	334	271		797	1,321	846	**3,585**
Bay of Plenty	19				2		5,730	1,196		**6,947**
Gisborne								0.1		**0**
Hawke's Bay								3		**3**
Taranaki								0.2		**0**
Marlborough	0									**0**
Canterbury								30		**30**
West Coast								14		**14**
Total	**32**	**0**	**3**	**334**	**273**	**0**	**6,527**	**2,638**	**846**	**10,653**

- Roughly a 50% conversion factor
- Many resources are unused

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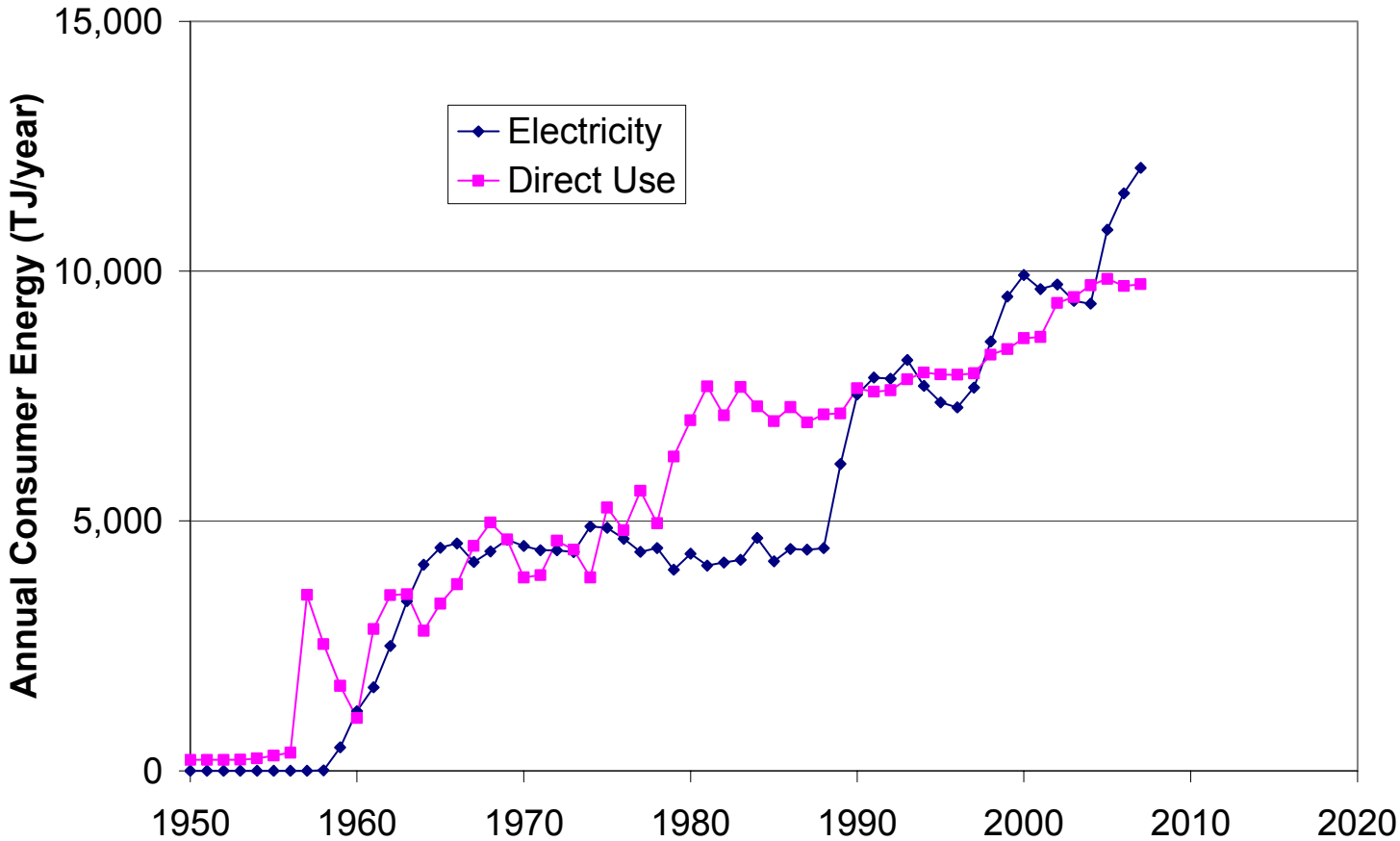
Comparison – Electricity and Heat



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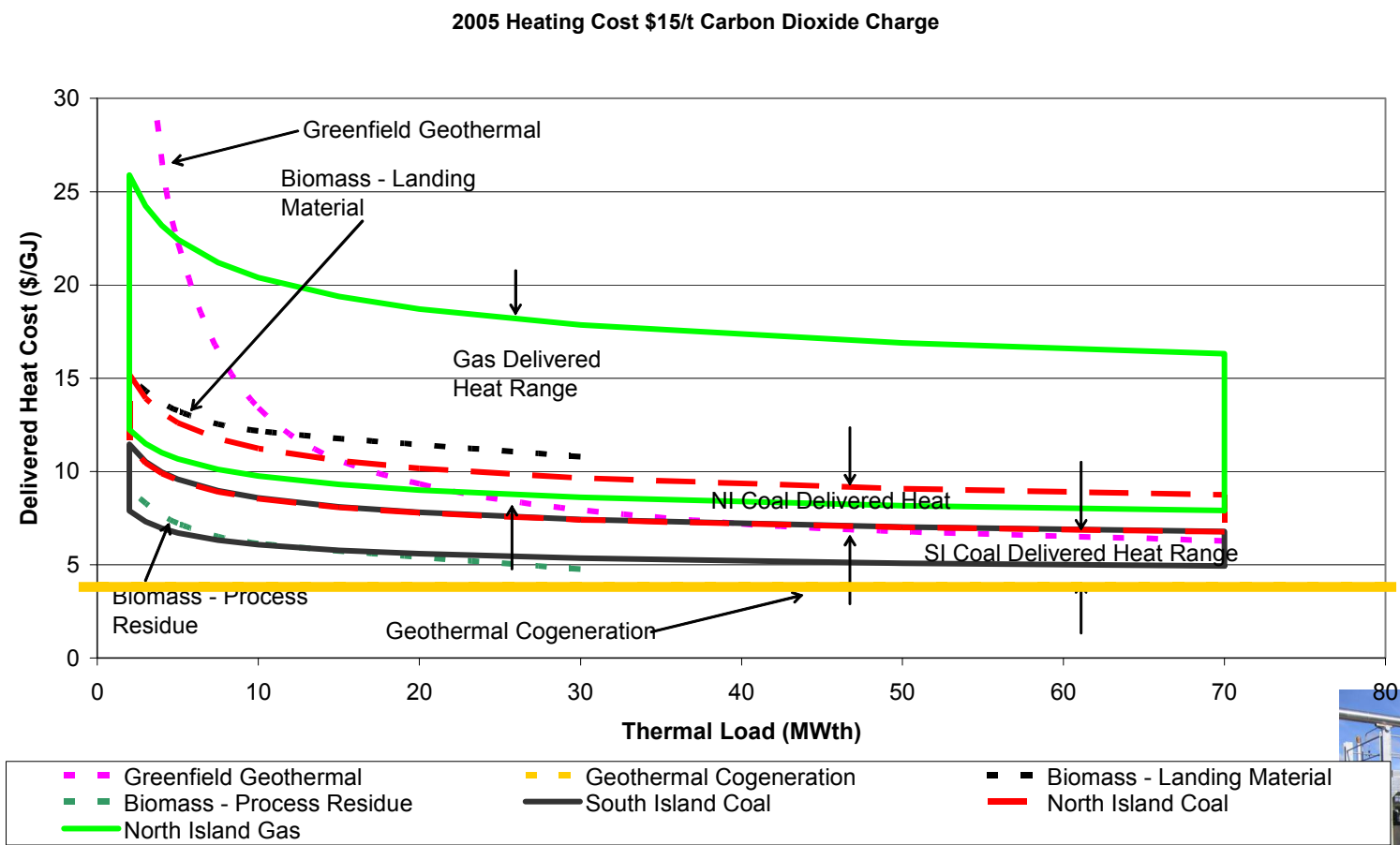
Direct heat- industrial scale



Tenon Taup
2006 suppl

Future direct use developments

- More domestic and commercial use at Taupo, Tauranga (and Rotorua?)
- Contact and Tuaropaki actively (openly) looking for projects
- Meridian (including with NZCEC) – heat only interest
- Commercial development of glasshouses, kilns etc on major field developments for heat or electricity
- Use of some lower temperature resources?

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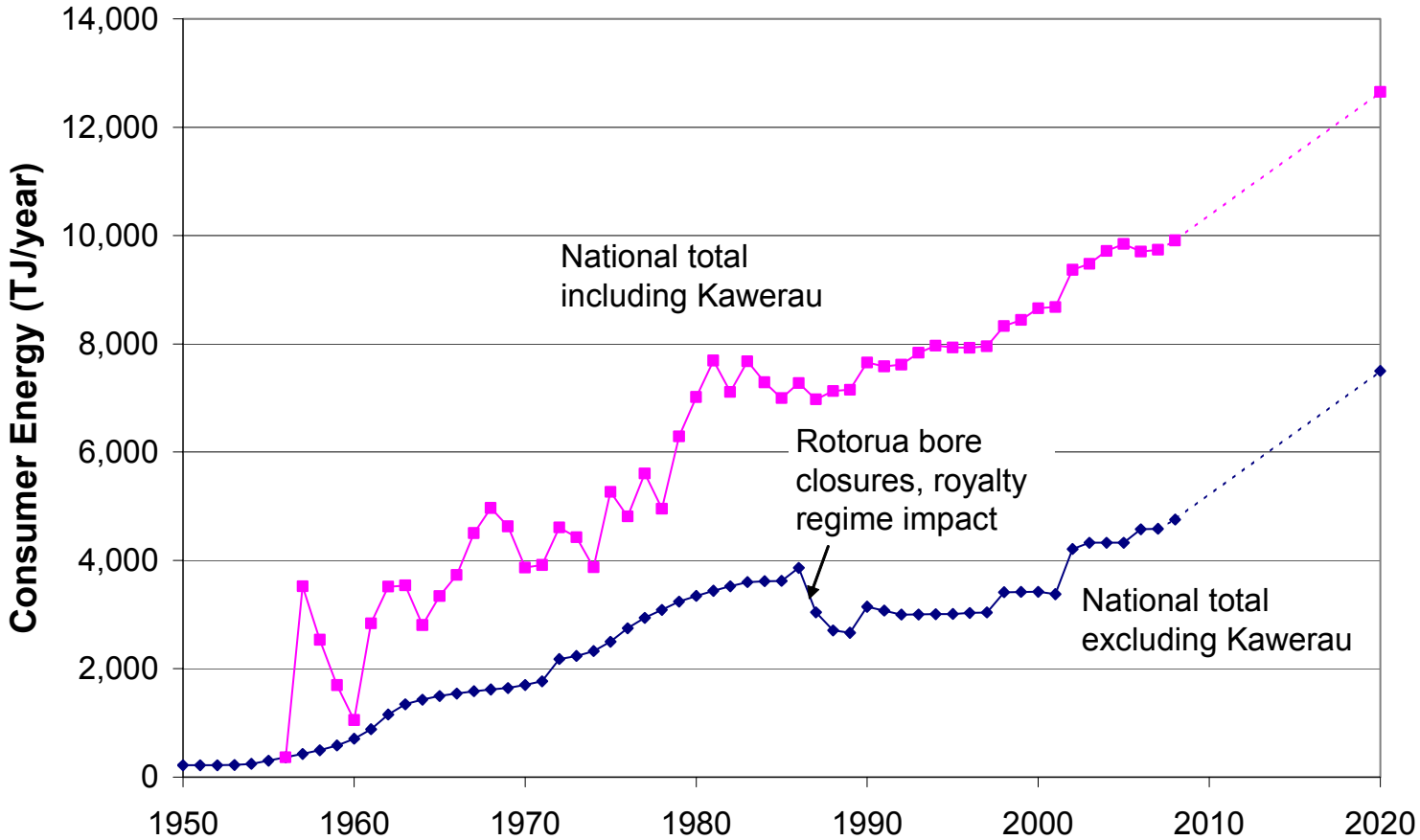
Direct Heat Use



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Recent New Zealand Heat Pump Installation

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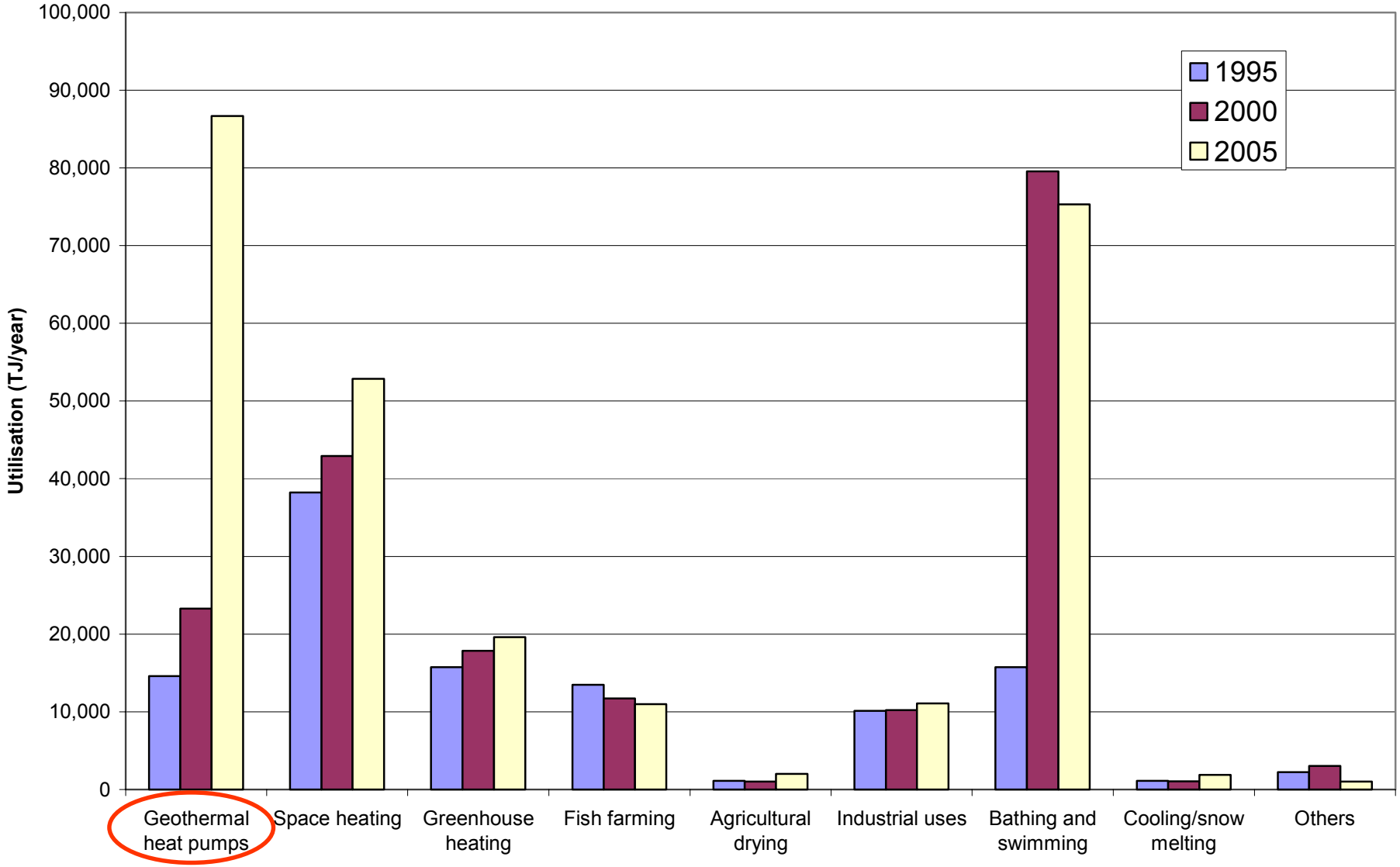
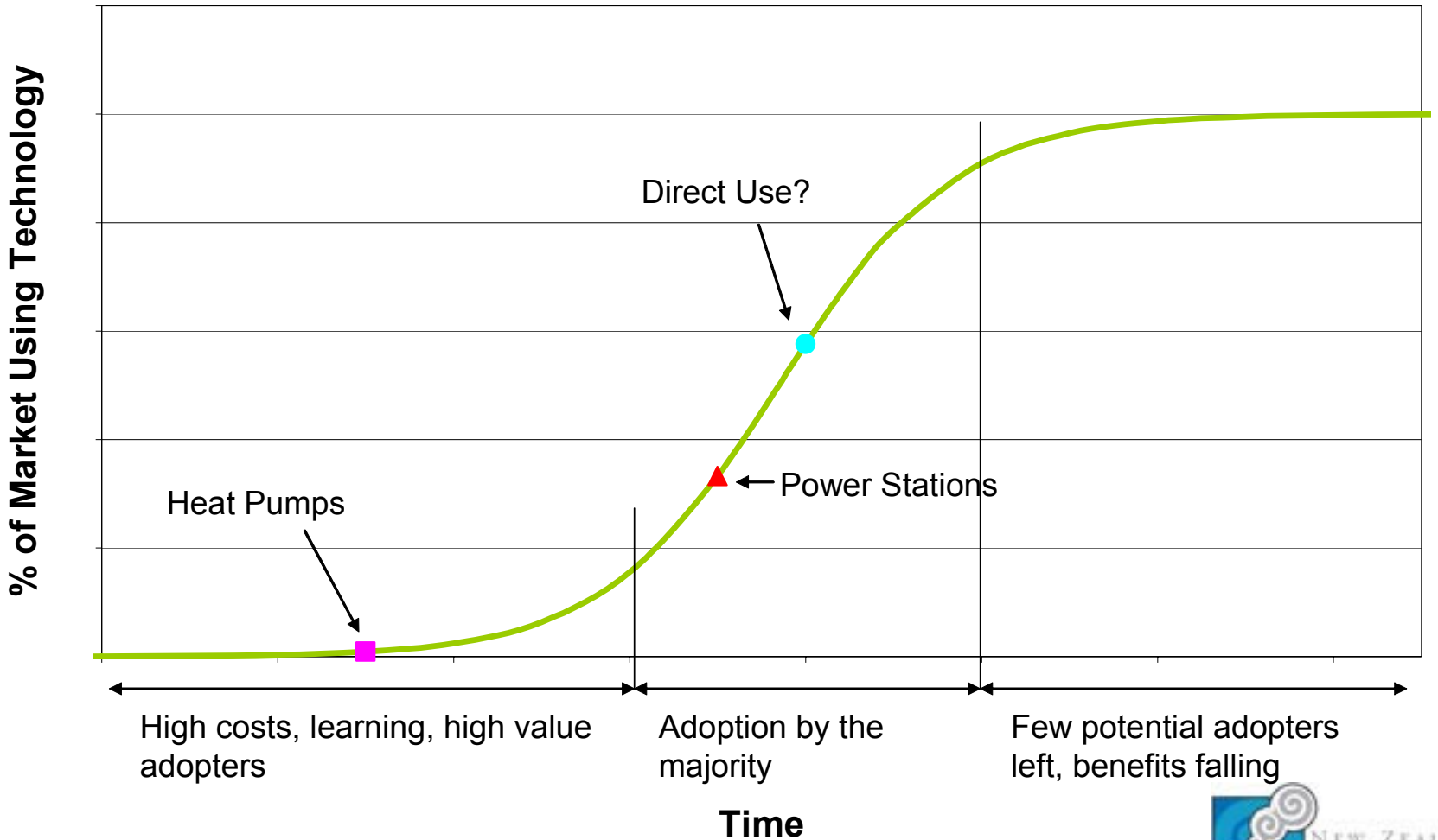
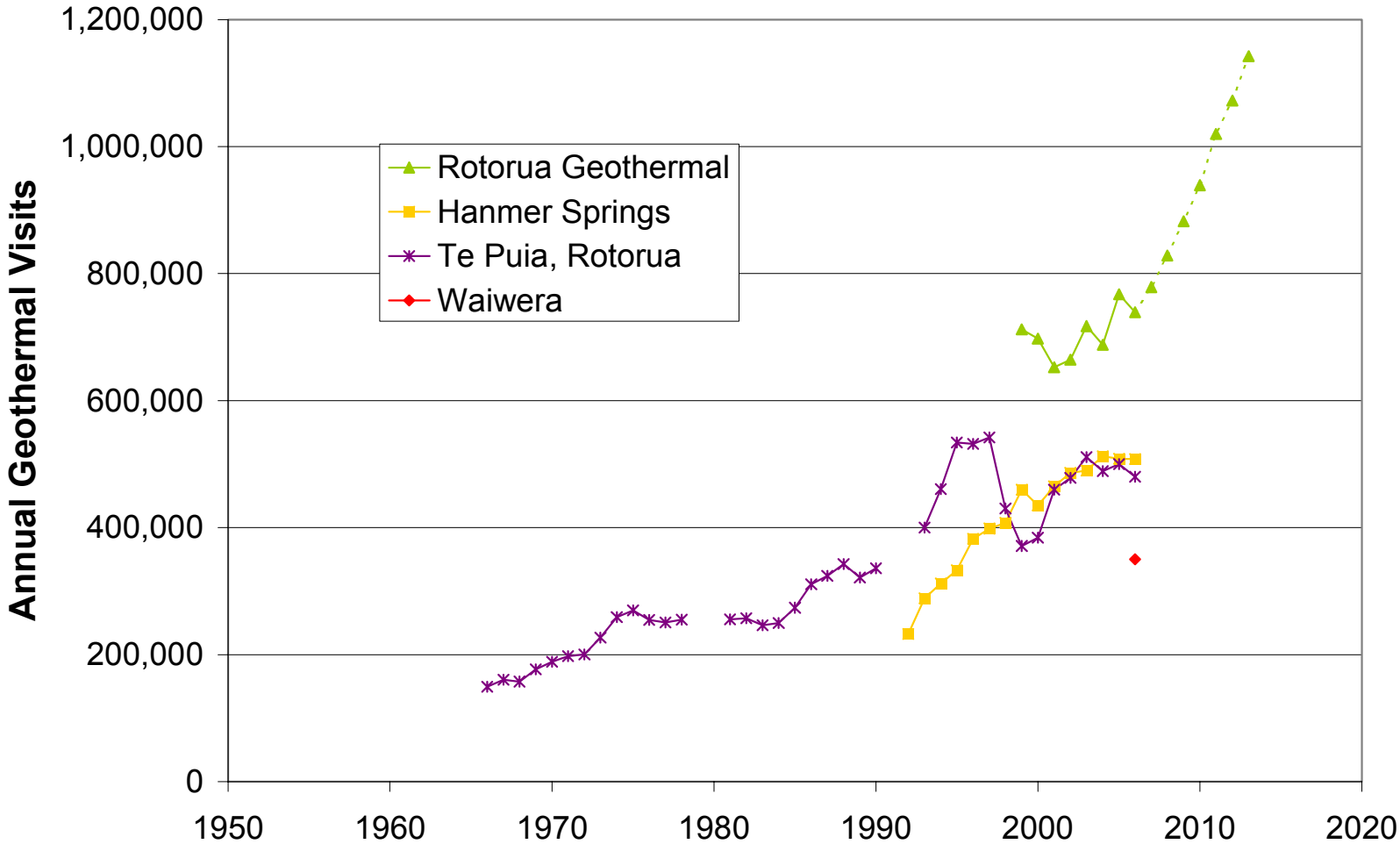
International trends – note heat pumps



Comparison of Technologies



Tourism



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International Issues

- Pricing of carbon
- Fuel price driving up electricity price
- Regional growth leading to competing demands on consultants
- Massive geothermal growth driving up prices
- Oil and gas development – competes for people, rigs, casing and drilling materials
- General increase in commodity prices including steel
- Takeovers, mergers and asset sales

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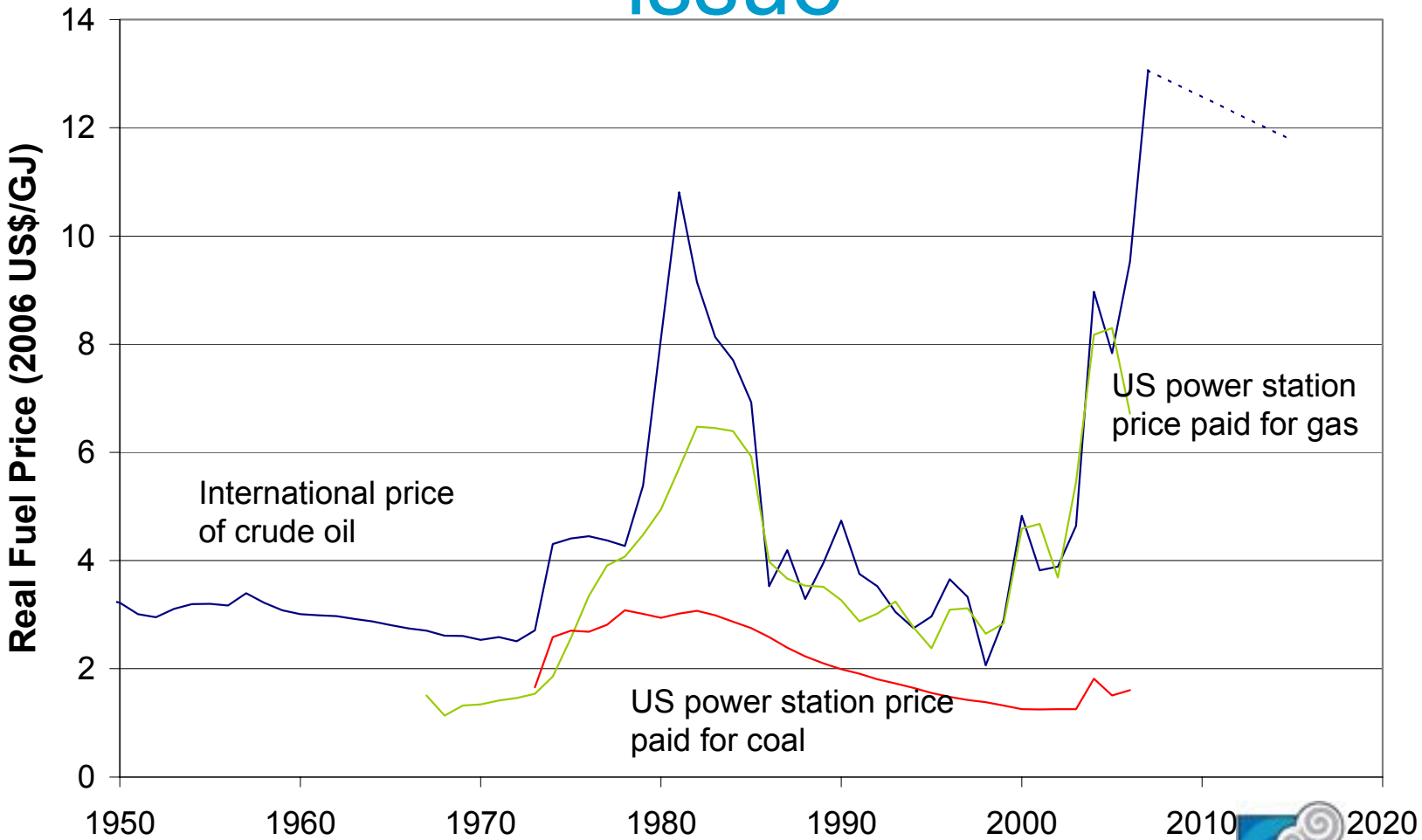
Rising fuel price is an international issue



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International Growth

- Lawless 2007 – 1000MW geothermal generation in Western Pacific region in next 5 years
- US-1000MW in next 5-10 years – US consultants will focus on home market
- Philippines – several hundred MW in near term
- Indonesia – 6,000MW by 2020
- Australia – 100s or 1000s of MW from hot rock – 27-30 active geothermal investment companies in Australia now
- All these countries have had relatively little geothermal development in the last 10 years

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Industry Response to Growth

- A few companies say they are expanding – most say they have finished expanding
- Most companies do in-house training – but there is some interest in GI Certificate course
- Most companies have noticed an increased geothermal workload nationally and internationally
- Expectation for increase in domestic work indefinitely (though some just see this for 3-5 years)

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Personal View

- Growth is real, significant, has already started across all sectors and should be long term
- There needs to be a focus on succession planning – bringing people into the industry and training them - long term view
- There will be some personnel areas of critical shortage
- The staged growth apparently envisaged by major NZ developers (rather than boom and bust) could provide a way forward

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