

Short Rotation Crops For Bioenergy: New Zealand, 2003

The place for bioenergy in the New Zealand energy market

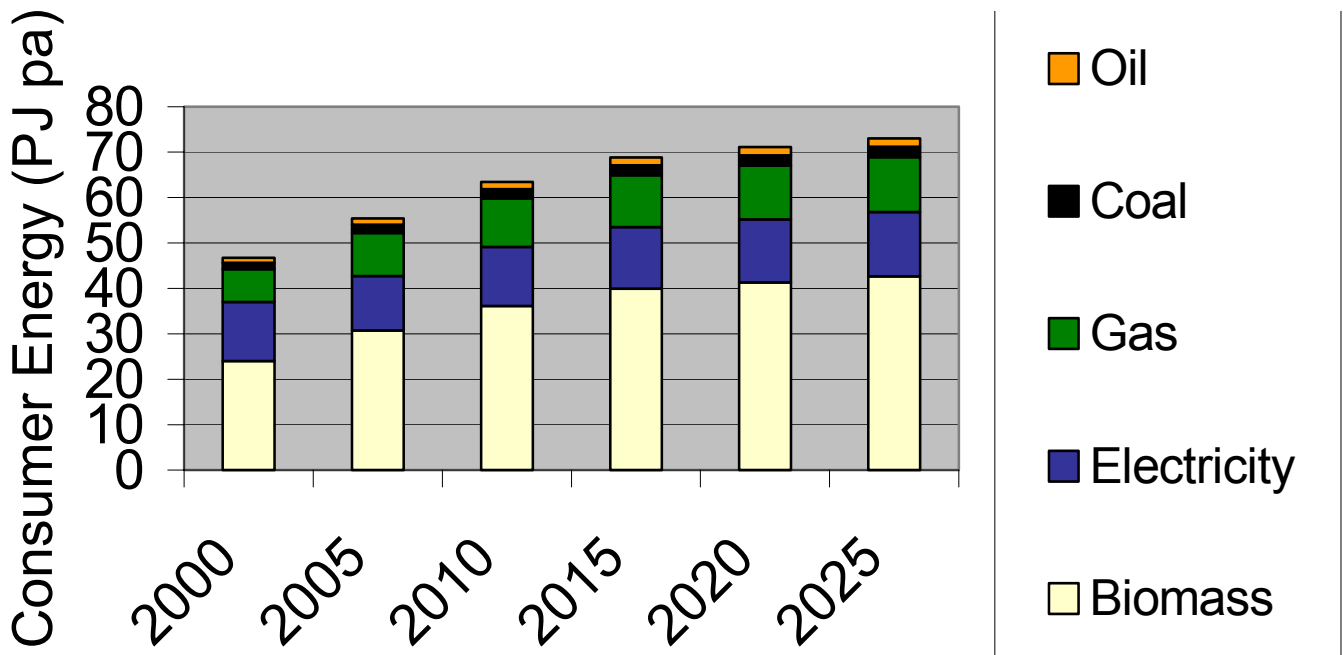
Brian Cox

East Harbour Management Services

1. MAJOR TRANSITION PERIOD

- **Era of cheap Maui energy has ended**
 - Maui was a large, plentiful and cheap gas field
 - Energy intensive industries were driven by Maui
- **New and replacement energy at a premium**
 - new gas, coal, geothermal, wind and hydro
 - new projects are more tightly constrained
 - many generation options in the longer term
- **Steep learning curve for energy market players**
 - new forms of contract
 - structural rigidities
 - customers incentivised to manage energy costs
 - opportunities for new players / activities

2. WOOD PROCESSING CONSUMER ENERGY



Data source: Ministry of Economic Development, 2003

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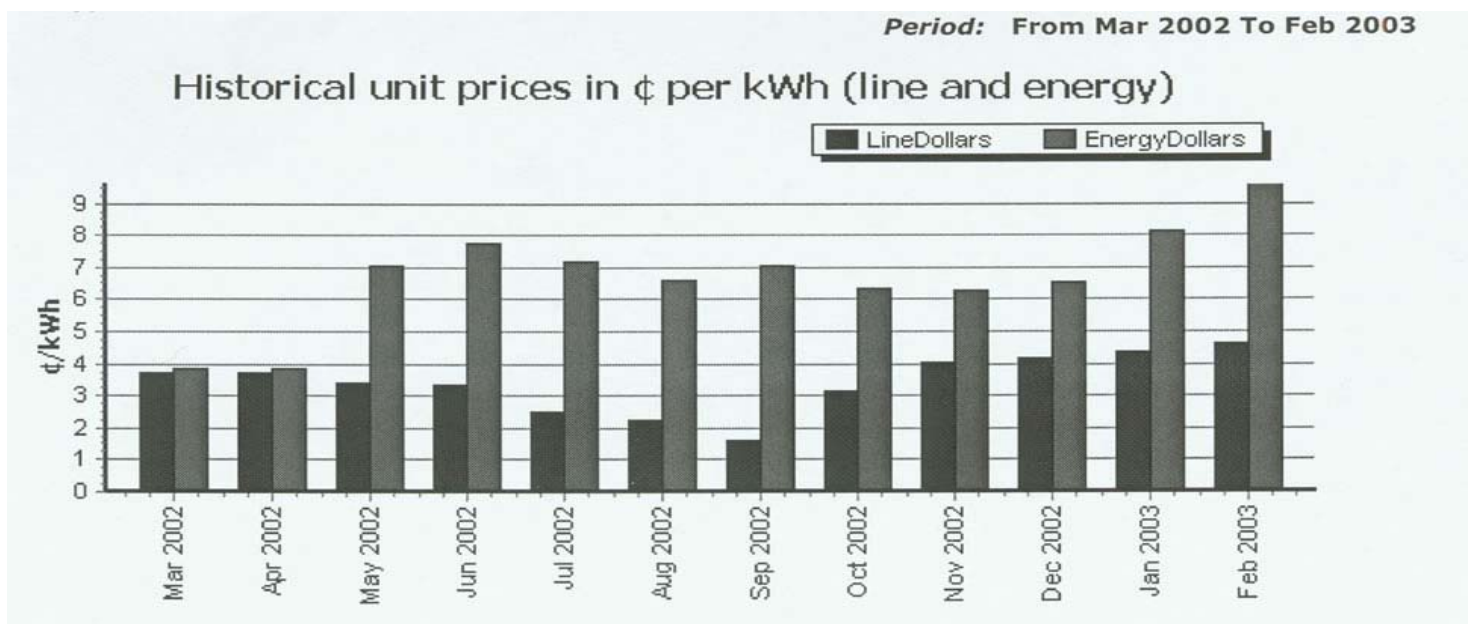
3. THE ELECTRICITY MARKET

- Disjointed and fragmented (generation and distribution)
- Supply driven (generators with retail hedge)
- Lack of liquidity in electricity contracts
- Lack of availability of firm price contracts
- Many contracts have a % based on spot price
- Minimal retail competition
- Generators focused on covering own contracted position
- Customers learning how to manage energy contracts
- Customers becoming cost conscious

4. ELECTRICITY PRICE DRIVERS

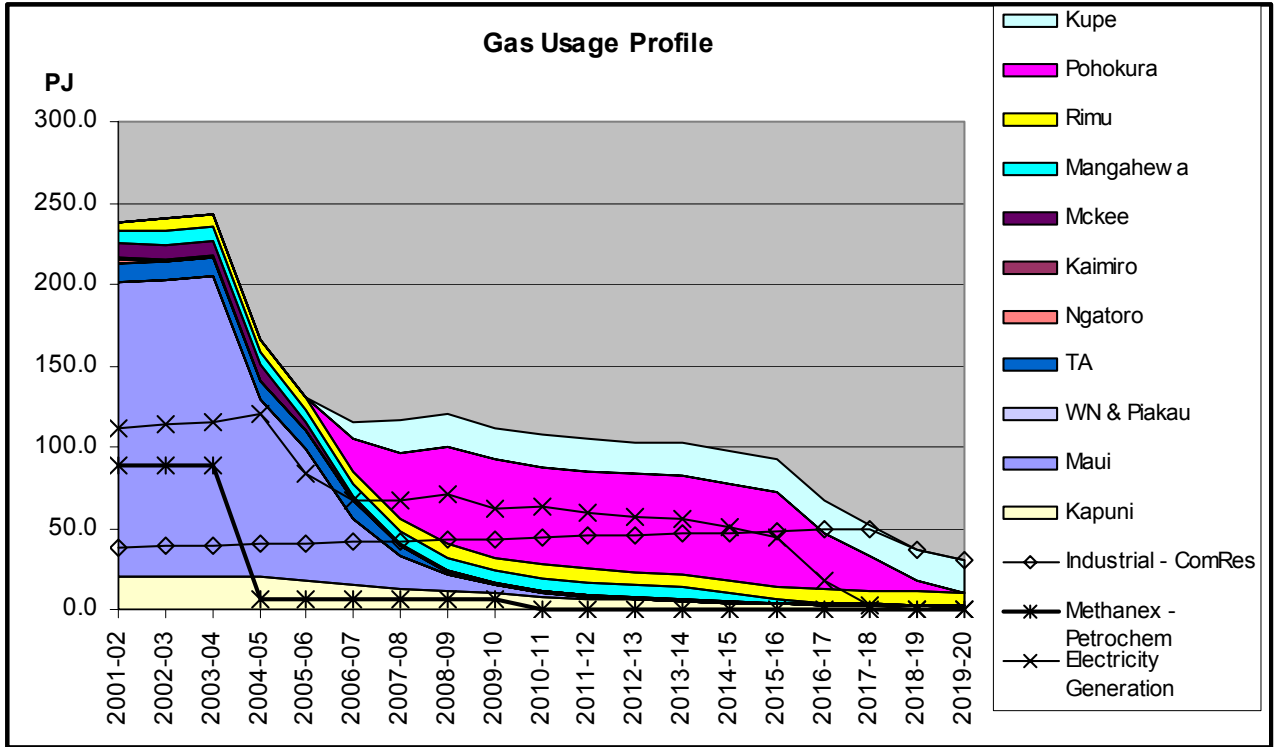
- Depletion of Maui gas field
- Generators covering only own contracted position
- Lack of balanced (fuel) portfolios of new generation
- No generation cap
- Large number of customers on spot price
- Inelastic market response to high prices
- Lack of depth in the energy market
 - few players
 - lack of competition
 - highly contracted positions

5. NETWORK AND ENERGY COSTS

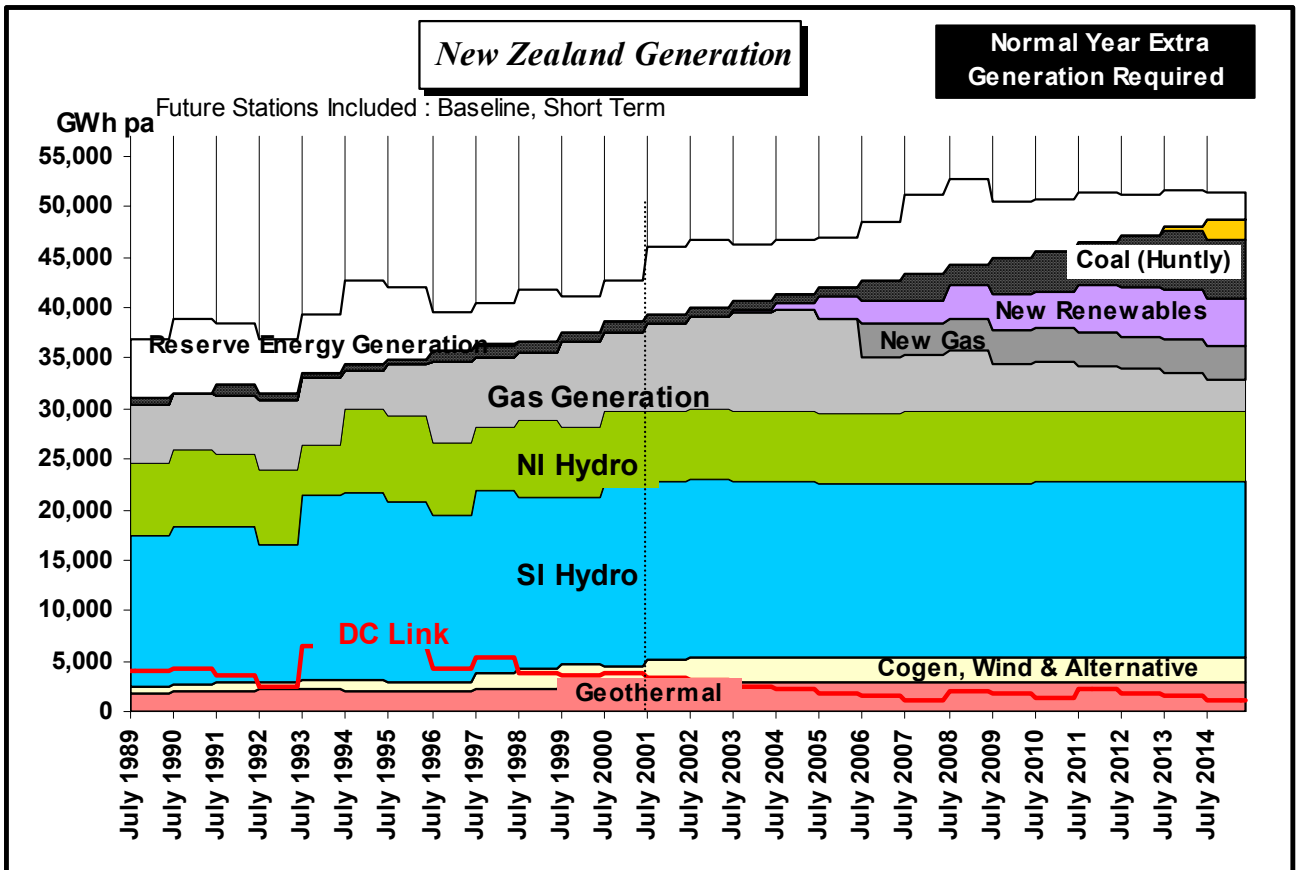


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6. GAS SOURCES

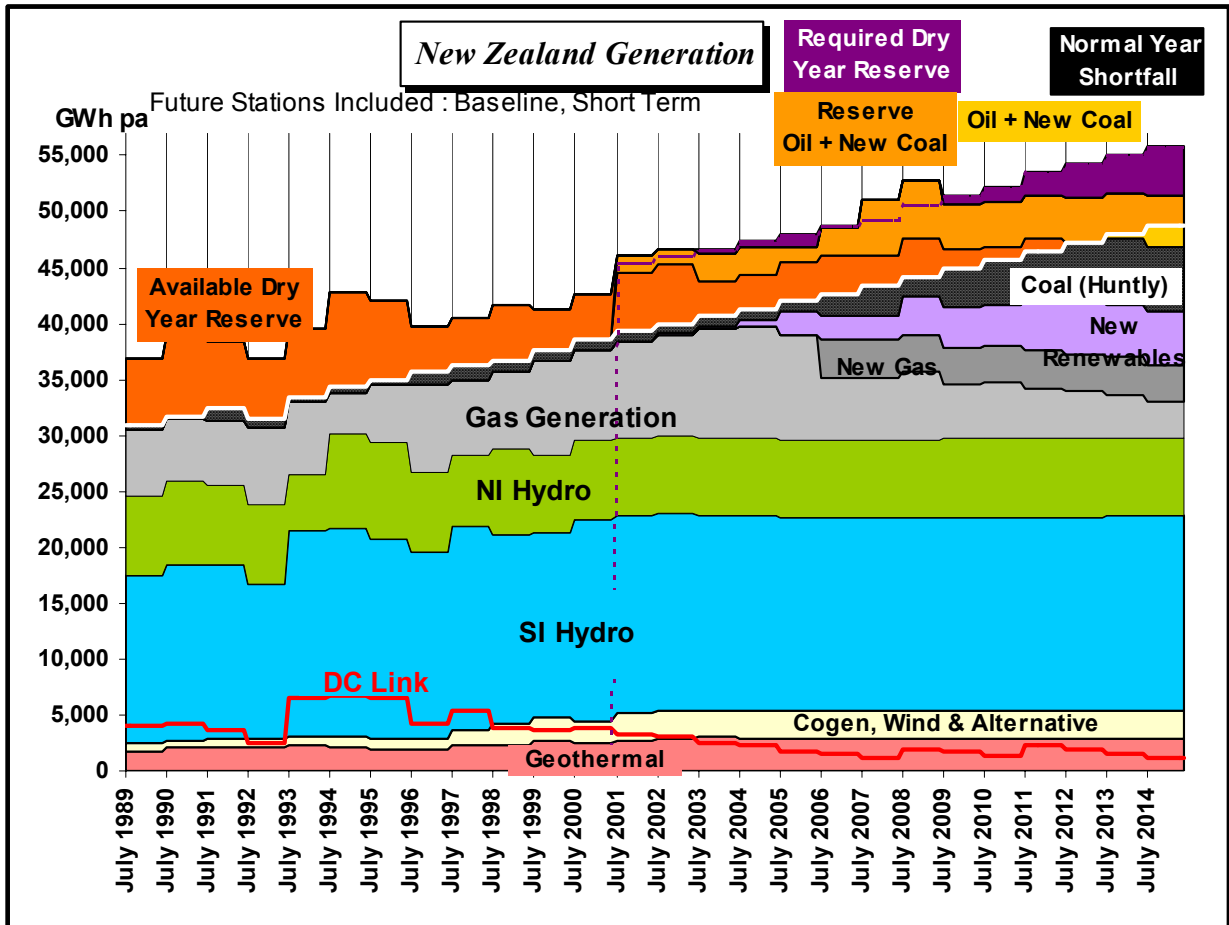


7. AVERAGE YEAR ELECTRICITY GENERATION

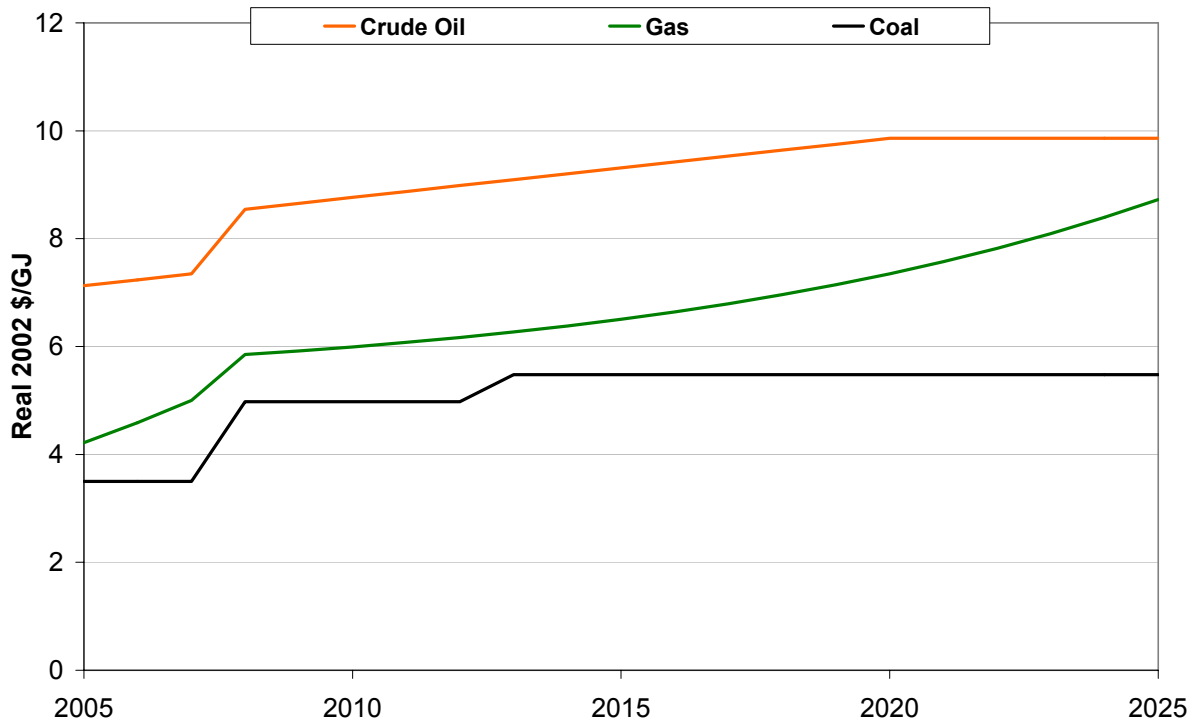


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8. DRY YEAR ELECTRICITY GENERATION

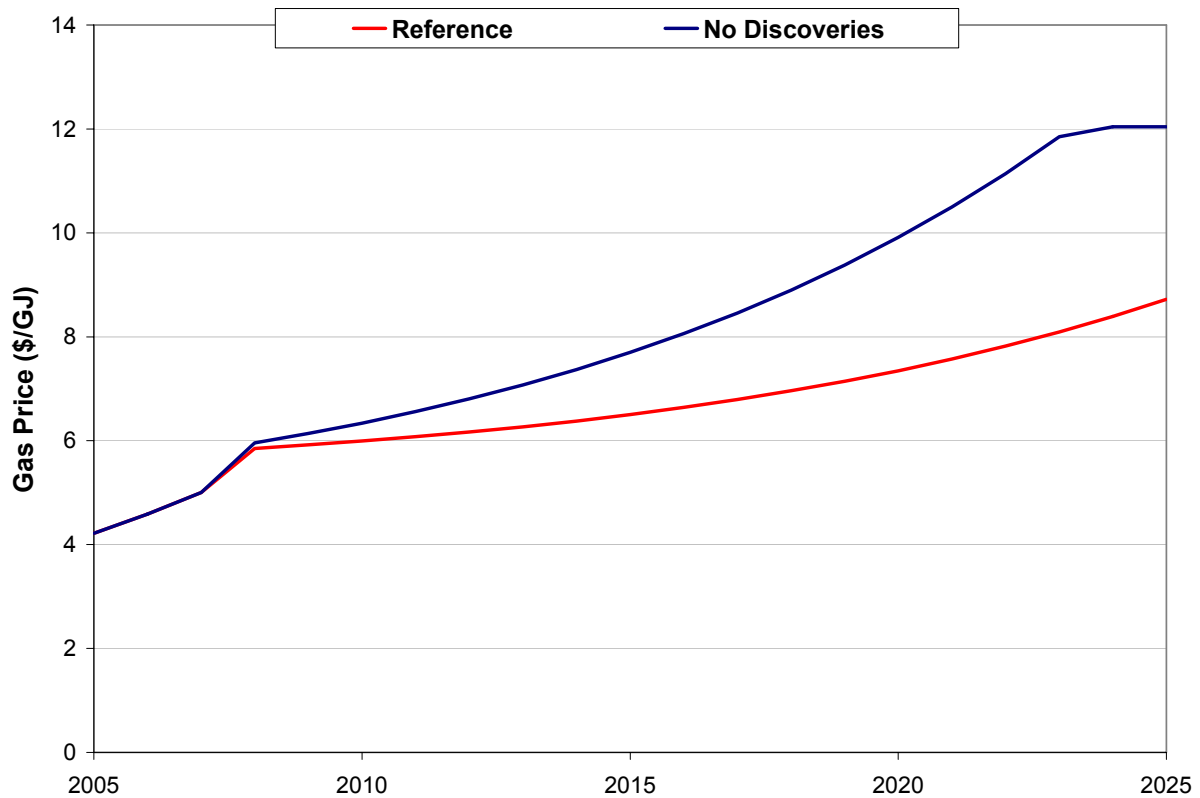


9. GAS/COAL PRICES

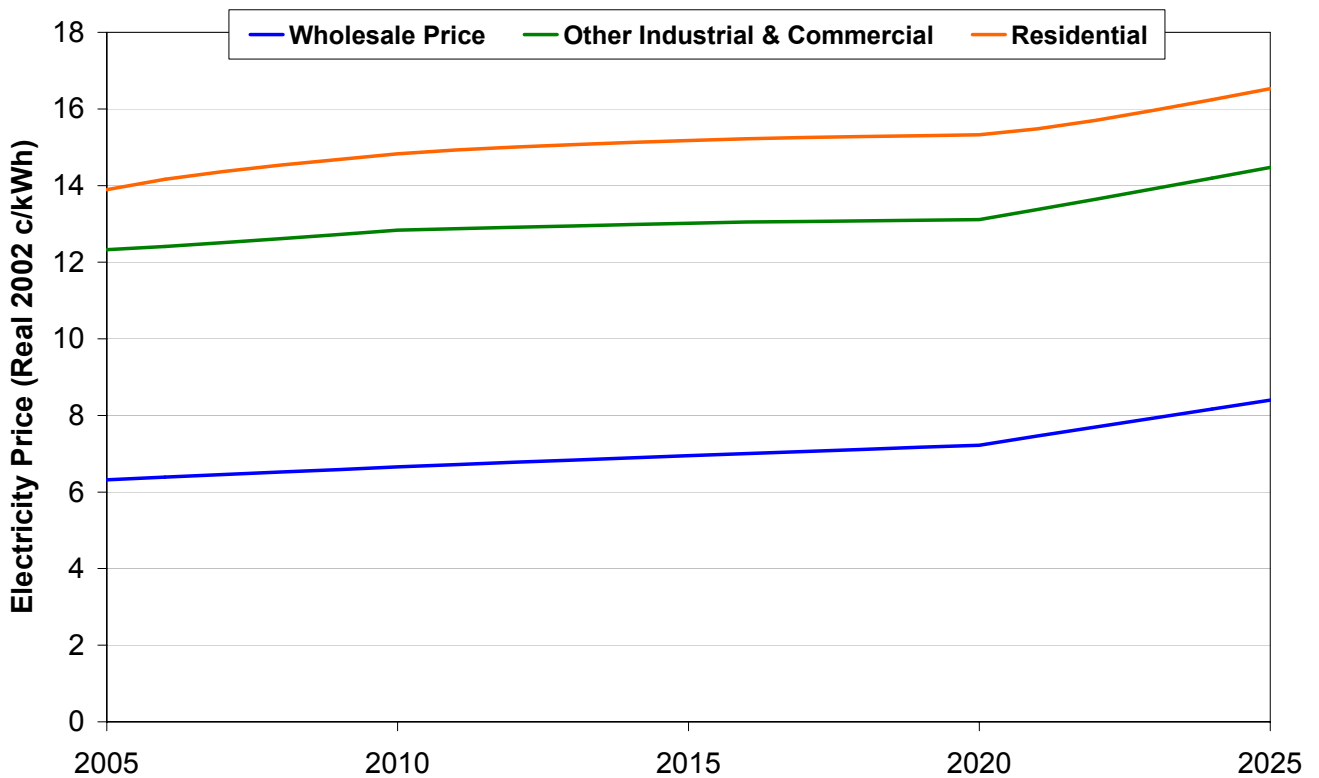


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10. GAS PRICE IF NO NEW DISCOVERIES

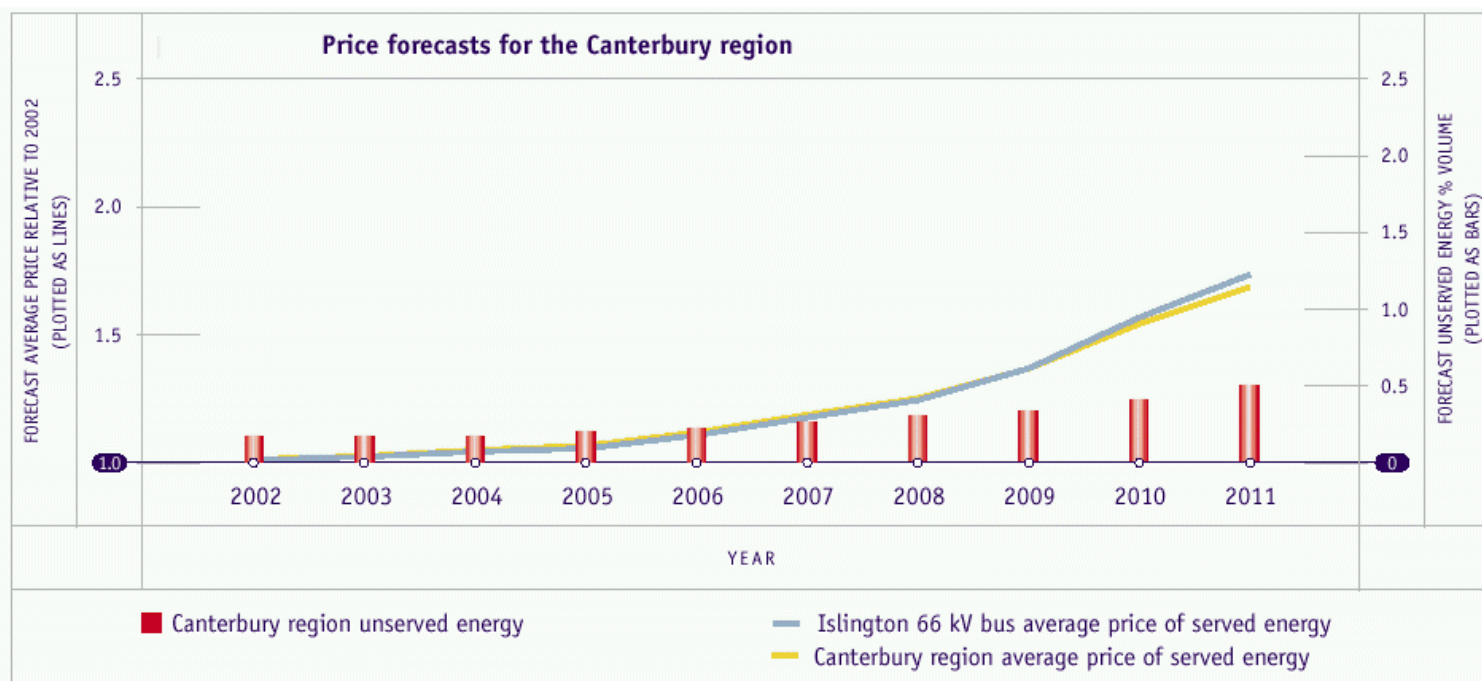


11. DELIVERED ELECTRICITY PRICES



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12. PRICE FORECAST CANTERBURY

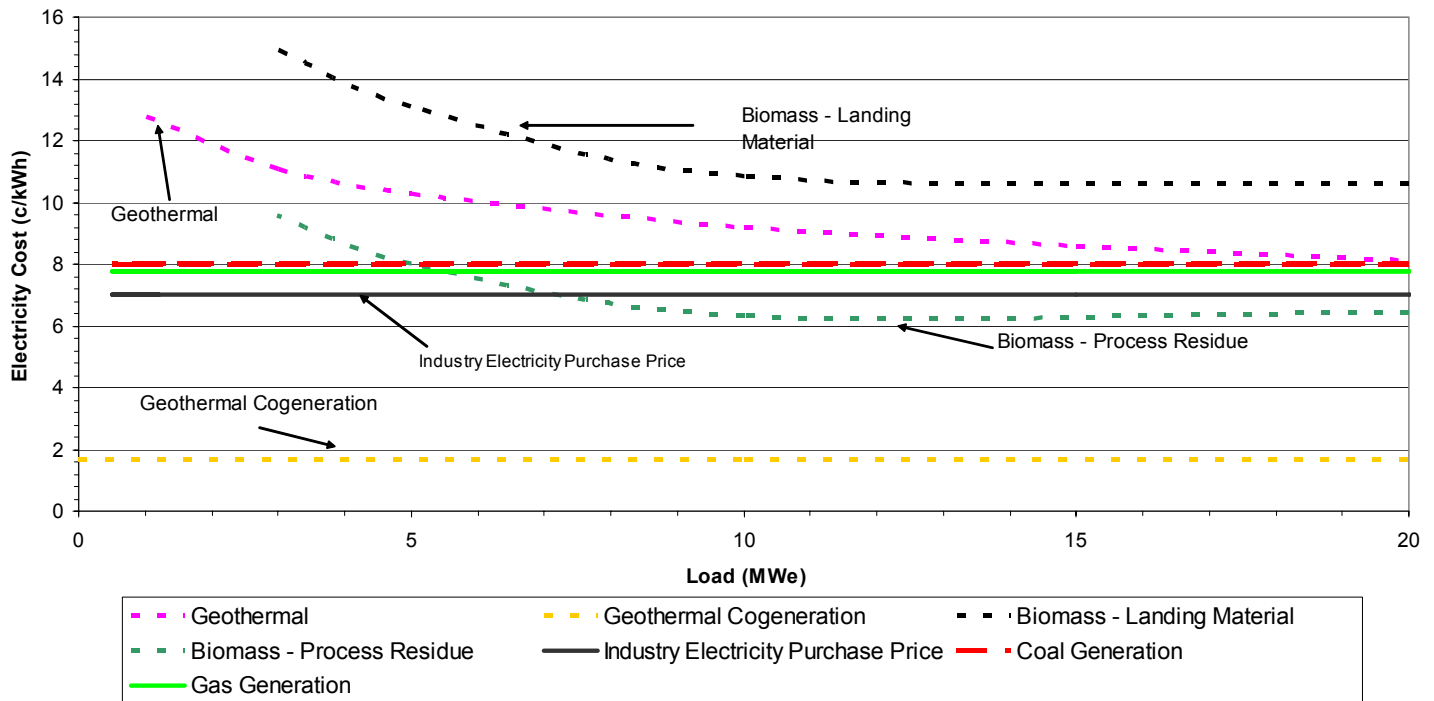


13. ELECTRICITY GENERATION OPTIONS

		C/kW	MW	GW/yr
Gas (C	2005 -	6.5 -	800	5,000
Wind	2005-	6.2 - 8.5	680 600	2,340 1,800
Geotherm	2005-	4.0 -	630	5,000
Project	2008-	4.5	570	3,200
(ex				
Other	2005-	4.5 -	500	2,350
Cogeneratio		4.6	350	1,700
LNG&Ccharge		9.3-	no	no
CoalC	South	7.6-	very	very
	North	9.8-	very	very

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14. COST OF ELECTRICITY FROM BIOMASS



15. ENERGY EFFICIENCY OPTIONS

- Making better use of existing energy
- Efficiency may reduce cost of energy and increase demand
- Cost effective when installing new plant or replacing plant
- May also involve changing work practices
- May also produce improved product quality
- Capital expenditure can be a barrier → operating cost
- Demand management

16. THE HEAT MARKET

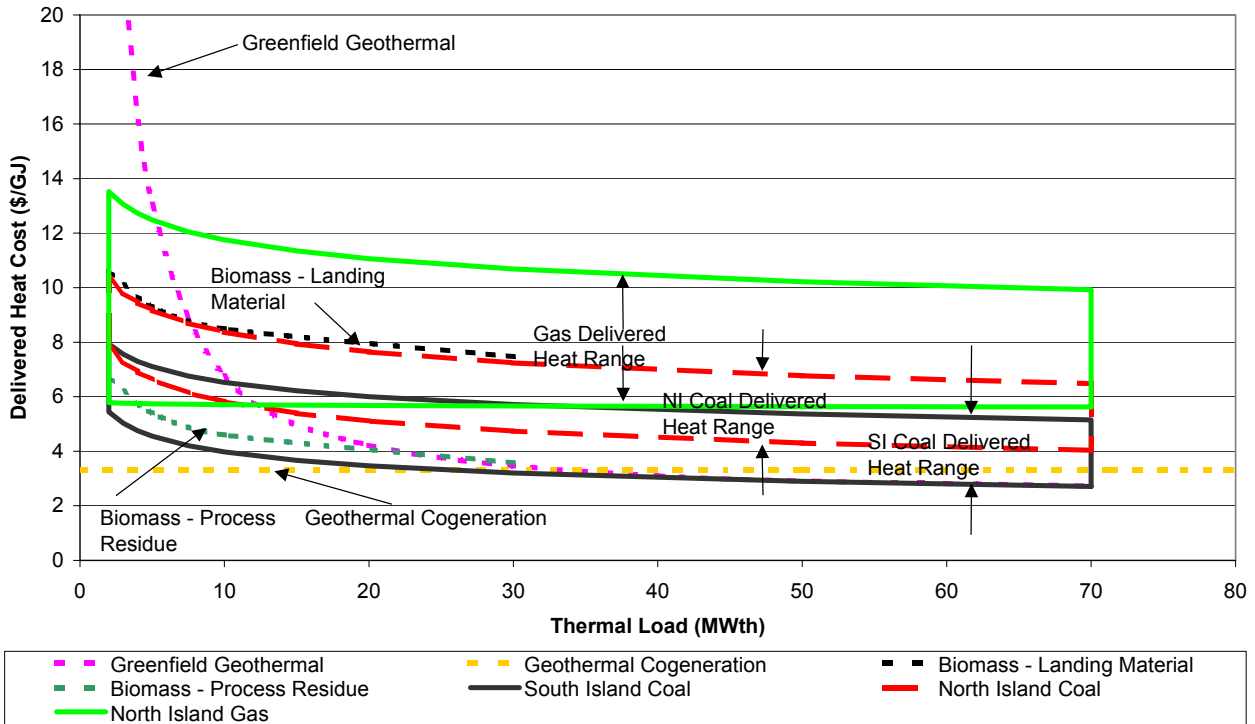
Constrained by industry's continual focus on electricity

17. BIOENERGY

- Fuel most within control of wood processors
- Uses waste materials
 - Forest residue
 - Process waste
- May require backup from coal, gas, forest residue or imported fuel
- Need to focus on fuel handling and processing
- Economics improved when biomass processed to be homogenous fuel

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18. RENEWABLE TECHNOLOGIES



19. COST OF BIOMASS HEAT

Resource	Electricity	Heat	Uses	Electricity c/kWh
Biomass (Process Waste)	Yes	Yes	Combined heat and electricity	9 - 11
Biomass (Forest Residue)	Yes	Yes		16 - 25
Biomass (Liquid Waste)	Yes	Yes		7-17
Wind	Yes	No	Water pumping	7 - 22
Solar Thermal	Yes	Yes	Hot water, kiln drying	7 - 10
Solar Photovoltaic (PV)	Yes	No	Niche off-grid electricity	> 31
Hydro	Yes	No	Irrigation	8 - 15
Geothermal	Yes	Yes	Minerals	7-12

20. BIOENERGY TRENDS

- 6% (30 PJ) of total consumer energy (546 PJ) is provided by bioenergy (2003)
- Process heat = 34% of NZ energy demand (Excl. Comalco Aluminium smelter)
- Bioenergy growth projected at 1.9% p.a. over next 20 years (= 1 * 15 MWth boiler p.a.)
- Consumer energy expected from bioenergy;
 - 36PJ by 2012,
 - 41PJ by 2020
- Forest residue as fuel currently adds 5c/kWh to cost of electricity generation
- Use of biomass waste for energy is;
 - economic today for heat
 - close to economic for electricity generation

21. THE POSITION OF SRC

- Perceived as being uneconomic
- No up-to-date cost data
- No effective advocacy
- Not even on the radar screen of expensive photovoltaics
- Uptake will follow uptake of vast quantities of forest residue
- Little knowledge on forest residue – even less on SRC

22. DISTRIBUTED GENERATION (DG)

- Distributed generation is local generation to meet capacity, reliability, and security requirements
- DG has national and local benefits but driven by local needs
 - Embedded has less complexity
 - Difficulty of finding a purchaser for energy

Distributed generation allows paradigm shifts in thinking about solutions for meeting consumer energy capacity and reliability requirements

23. MARKET CHANGES

- Government appointed Electricity Commission
 - Central coordination
 - Limited to electricity
 - Reserve generation to cap prices at 20 c/kWh
- Network companies
 - under price control
 - can invest in generation

- Renewed interest in distributed generation
- Strong Govt support for renewable energy
 - Additional funding and EECA strengthened
 - NEECS
- Government climate change policies will affect decision making
- Carbon tax post 2007 will increase the cost of fossil fuels

24. TRANSITION INVESTMENT RESPONSES

- Energy management
 - Getting better value out of what we have today so as to prepare for tomorrow
 - Reduce energy demand
- Investment in heat plant
 - Based on current on-site waste
 - Transition through forest residue
- On-site cogeneration
 - Distributed generation
 - Bioenergy based on process wood waste
 - Embedded
- Prepare for future electricity generation
 - Focus on reducing fuel cost
 - Evaluate forest residue