

Renewables in NZ: stocktake and prospects

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Presentation to Victoria University School of Geography, Environment and Earth Sciences workshop
Carbon-neutral electricity in New Zealand?
21 February 2008



NZ Is Energy Rich In Renewable Energy

- Technically no shortage of renewable energy resources
- Take up of opportunities depends on
 - Cost of conversion of natural resource into usable energy to meet a demand
 - Relative economics between options
 - Acceptable external affects
 - Long term access to natural resources
 - Community attitudes
 - Investor confidence
- Investor confidence depends on
 - An appropriate financial return
 - Investment risk
- If any of these are missing opportunities will not proceed

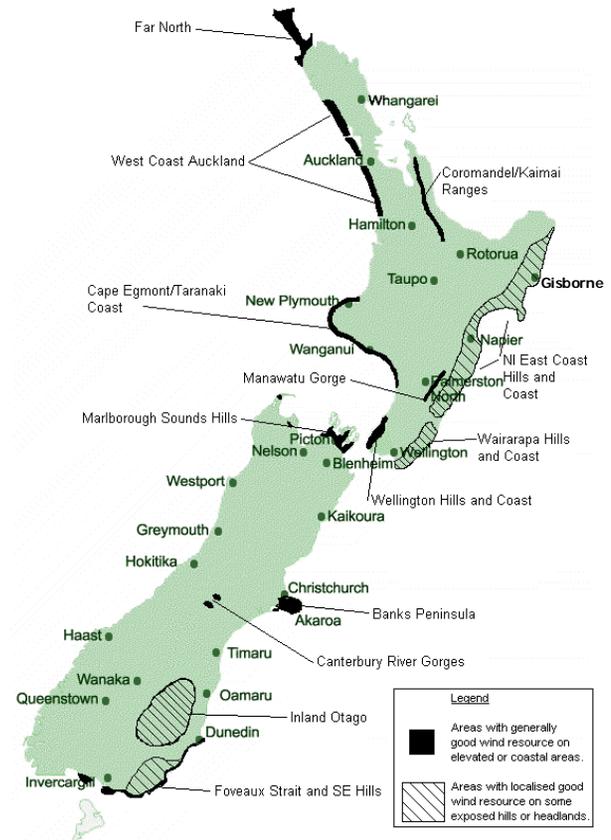
Immense Number of Opportunities

- Heat
 - Opportunities for fuel substitution
 - Large number of existing heat plant
 - Currently economic for residential, commercial and industrial
- Electricity
 - Cogeneration
 - Embedded generation
 - Stand alone plant
- Liquid Biofuels
 - Biodiesel
 - Ethanol



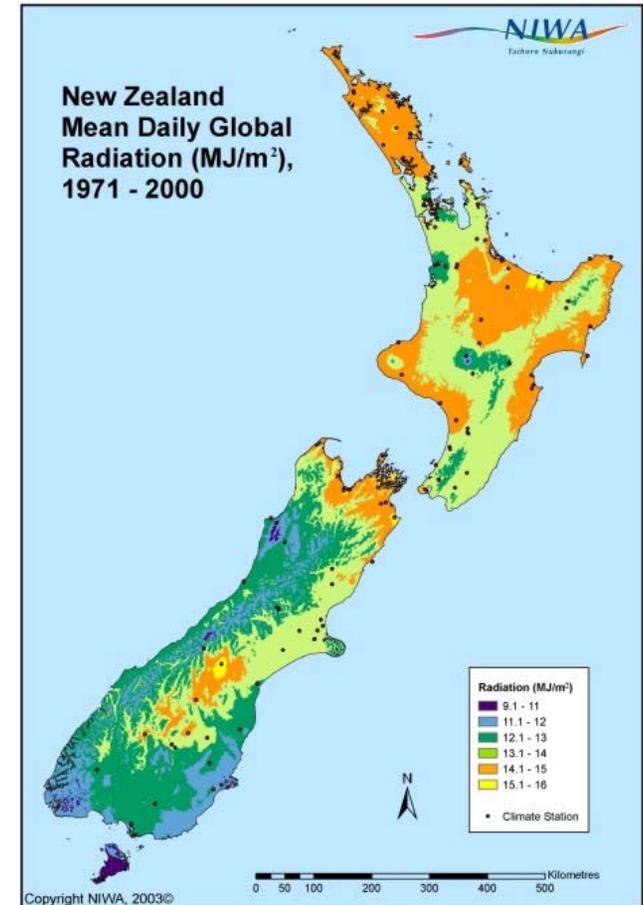
Wind

- Resource
 - Very site specific
 - Near unlimited small wind
- Opportunities
 - Wholesale
 - Embedded electricity
 - Direct pumping
- Constraints
 - Limited by proximity to infrastructure
 - Small turbines
 - Poor economics
 - High maintenance



Solar

- Resource
 - Unlimited energy
 - Available throughout NZ
- Opportunities
 - Solar thermal
 - Solar electric (PV)
 - Solar thermal/electric
- Constraints
 - Limited trades skills
 - Solar electric still expensive for grid use
 - High temperature constrained by cloud cover



Hydro

- Resource
 - Small number of large sized
 - Reasonable number of medium sized
 - Lots of micro
- Opportunities
 - Energy storage
 - Peaking
 - Embedded (micro)
 - Alternative land use
- Constraints
 - Limited by potential effects
 - Requires agreement with multiple land owners
 - Limited by community attitudes
 - Significant effect on private property rights
 - Medium sized limited by access to infrastructure
 - Micro limited by proximity to embedded opportunities
 - Competition from alternative users of water



Bioenergy

- Resource
 - Forest residues
 - Process residues (wood & food processing)
 - Municipal waste (solid & liquid)
 - Purpose grown crops
- Opportunities
 - Heat
 - Electricity
 - Liquid Biofuels
 - Often driven by waste reduction
- Constraints
 - Lack of long term feedstock supply contracts
 - Need to focus on feedstock classification and quality
 - Process residues limited by processor international competitiveness
 - Large forest residue quantities - limited principally by economics
 - Purpose grown limited by economics of land use
 - Agricultural residues limited by value as a feedstock for other uses



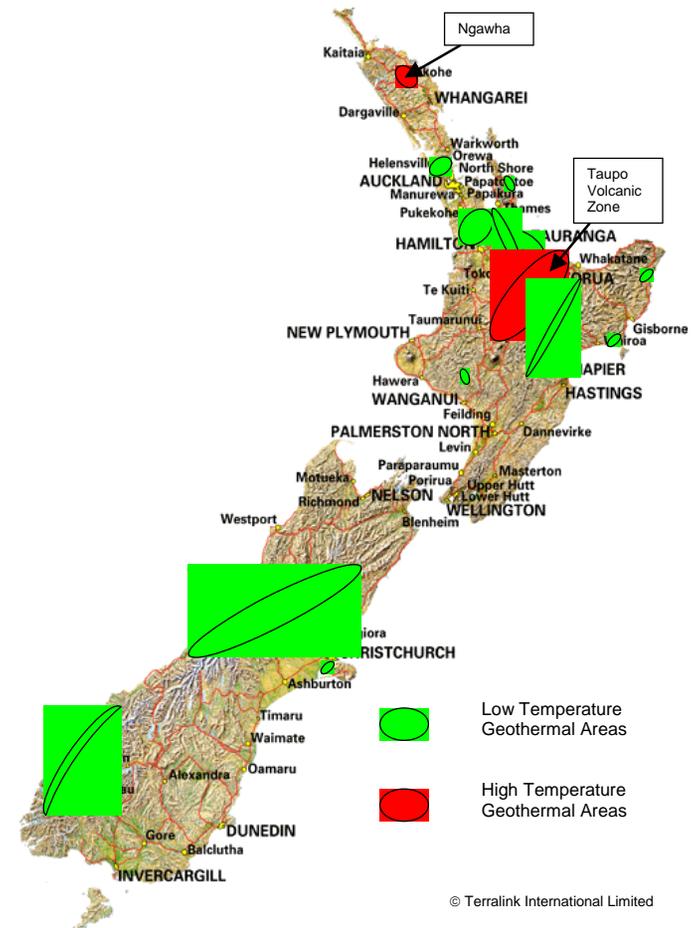
Marine

- Resource
 - Unlimited quantity
- Opportunities
 - Tidal
 - Wave
 - Impoundment
- Constraints
 - Interaction with other water users
 - Constrained by harsh environment
 - High maintenance costs
 - Technology still at R & D stage



Geothermal

- Resource
 - Limited surface level heat
 - Unlimited deep heat
- Opportunities
 - Electricity
 - Direct heat
 - Geothermal heat pumps
- Constraints
 - Little focus on increasing direct use
 - Interaction with other uses
 - Economics of deep heat

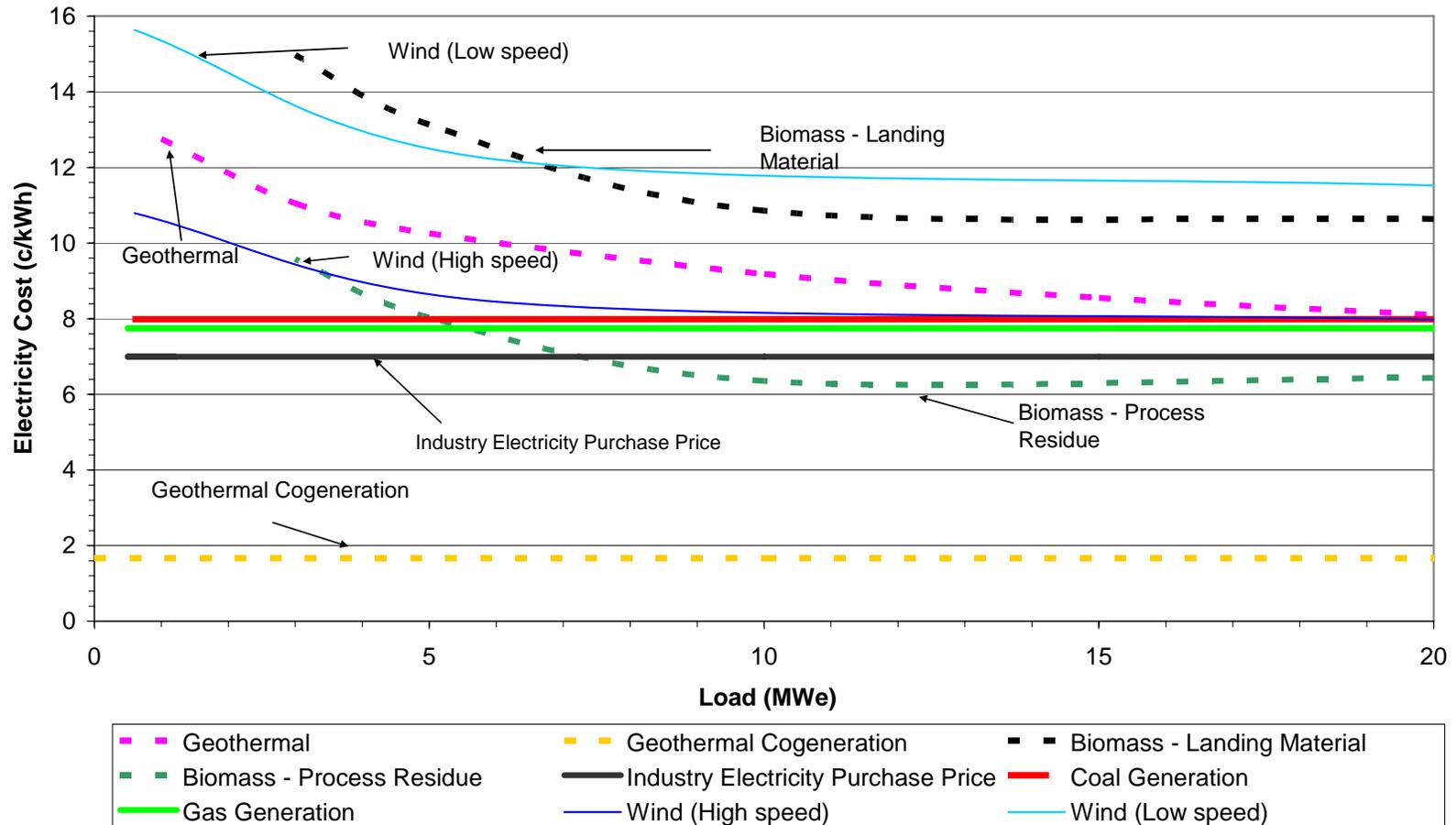


Price Relativities (No policy changes)

- Relative cost curves indicate an increased mixed portfolio of investments
 - Currently few economic unless economies of scale
 - Next 1-4 years gas, wind, small hydro, solar thermal, woody biomass (wood pellets, quality chip, process residue)
 - 5-10 years coal, wind, small hydro, geothermal heat, solar thermal, woody biomass (forest residue)
 - 10-15 years full portfolio of all options



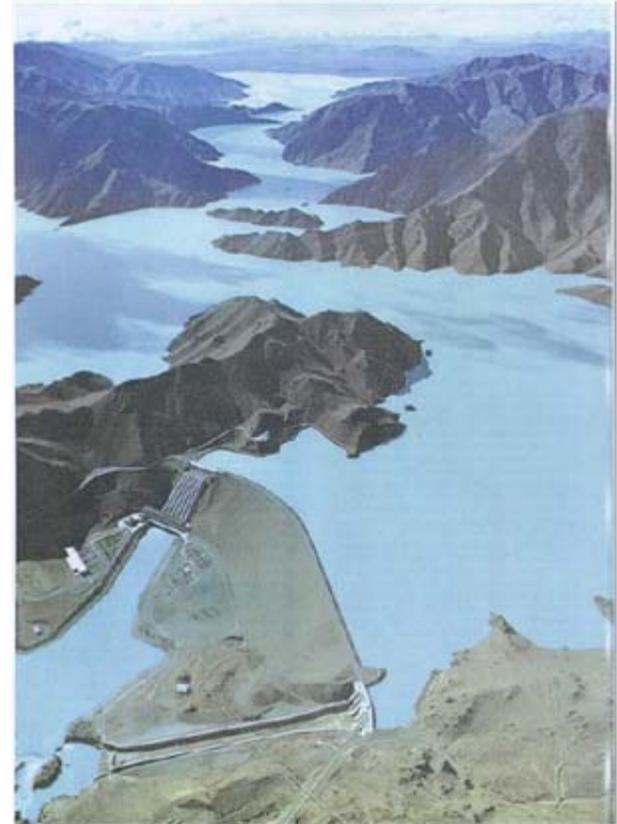
Electricity Cost Curves



Current Situation

- Perceptions

- Not controversial
 - Solar
 - Wood pellets
- Often controversial projects
 - Wind
 - Hydro
 - Geothermal
- Less likely to be controversial
 - Bioenergy
- Expected to be controversial
 - Marine



- Micro constraints

- Eg forest residue – inability to obtain long term contracts for supply of feedstock

Infrastructure

- Distribution lines capacity constraints
 - First in, first served?
 - Payment for upgrades
 - Capacity rights
- Capacity for handling intermittent supply
- Limitations on lines companies to directly invest in renewable energy
 - Fear of competition in retail market
 - Constraints of CPI-X on investment in demand options

Constraints on Technology Improvements

- Need economies of scale eg Large wind economies of scale
- Renewable energy facilities have high upfront costs with little certainty of outcome
 - High cost of investigations before decisions can be made
 - High risk if likely to not get resource consent
- No support for small wind, hydro and direct use of geothermal
- Inadequate transfer of international knowledge and experience
 - No applied research since NZERDC and LFTB
 - No support for consultants & decision makers to visit overseas
- Information barriers
 - Widen the investor base
 - Cost of resource data collection eg small wind & hydro

The Profile of an Investor in Renewable Energy

- Must have deep pockets
- Must be determined
- Must think long term
- Must be thick skinned
- Must be able to manage risks



Why?

Renewable energy projects potentially affect communities and land owners

Barriers to Renewable Energy Use - environmentally responsible

- National vs local interests
 - Requires presentation of national interest
 - Trade off of private property rights vs rights of the community
 - Collective community responsibility
 - Adjudication of competing interests
 - Capture by minority vocal community interests
 - Role of Government
 - Competing national interests
 - Community has to decide cost and security vs community aspirations
 - How to balance property rights of current communities vs future generations vs short term investor interests
- Fossil fuels not accepted as a valid transition energy source
 - Inappropriate barriers will extend transition period

Barriers to Renewable Energy Use

- reliable and resilient

- Share market driven investment
 - energy facilities have high capital cost but long term (30-100year) use
- Uptake is limited by lack of publicly available information
 - eg farm digesters, solar water pumping
- Technology can meet agreed environmental standards
 - community needs to agree these
- Fluctuating /Intermittent Supply
 - Limits to penetration
 - Depends on location
 - Depends on backup eg Eastland diesels
 - Need for storage
 - Shift time of availability
 - Increase value of investment

A Common Dilemma

- Continual focus on electricity not energy
- Everyone supports
 - Renewable energy
 - Assisting future generations
 - Sustainable energy policies
- Everyone wants them built elsewhere
 - Spoil my view
 - Change surrounding land use
 - My rights
- Conflict between private and community property rights
- Generally not economic with high upfront costs and need Government incentives / policies to overcome barriers and speed up uptake