

Renewable Energy Supply Potential

Brian Cox
East Harbour Management Services

Discussion starter presentation to workshop
Breaking Dependence on Fossil Fuels by 2020: Is this a Desirable and Realistic Goal for New Zealand?
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NZ Is Energy Rich

- Technically no shortage of renewable energy resources
- Take up of opportunities depends on
 - Cost of conversion of natural resource into usable energy
 - 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

Energy Resources

- Wind
 - Limited by proximity to infrastructure
 - Unlimited small wind
- Solar
 - Unlimited energy
 - High temperature constrained by cloud cover
 - Solar electric still expensive for grid use
 - Solar thermal use increasing 40-60% annually
- Hydro
 - Limited by potential effects
 - Limited to land access
 - Medium sized limited by access to infrastructure
 - Micro limited by proximity to embedded opportunities
 - Competition from alternative users of water

Energy Resources

- Woody biomass
 - Process residues limited by processor international competitiveness
 - Large forest residue quantities - limited principally by economics
 - Purpose grown limited by economics
- Agricultural
 - Agricultural residues limited by value as a feedstock for other uses
 - Purpose grown limited by economics
 - Driven by waste reduction
- Municipal waste
 - Limited by cost of removal of organic waste
 - Limited by guarantees for continuous supply

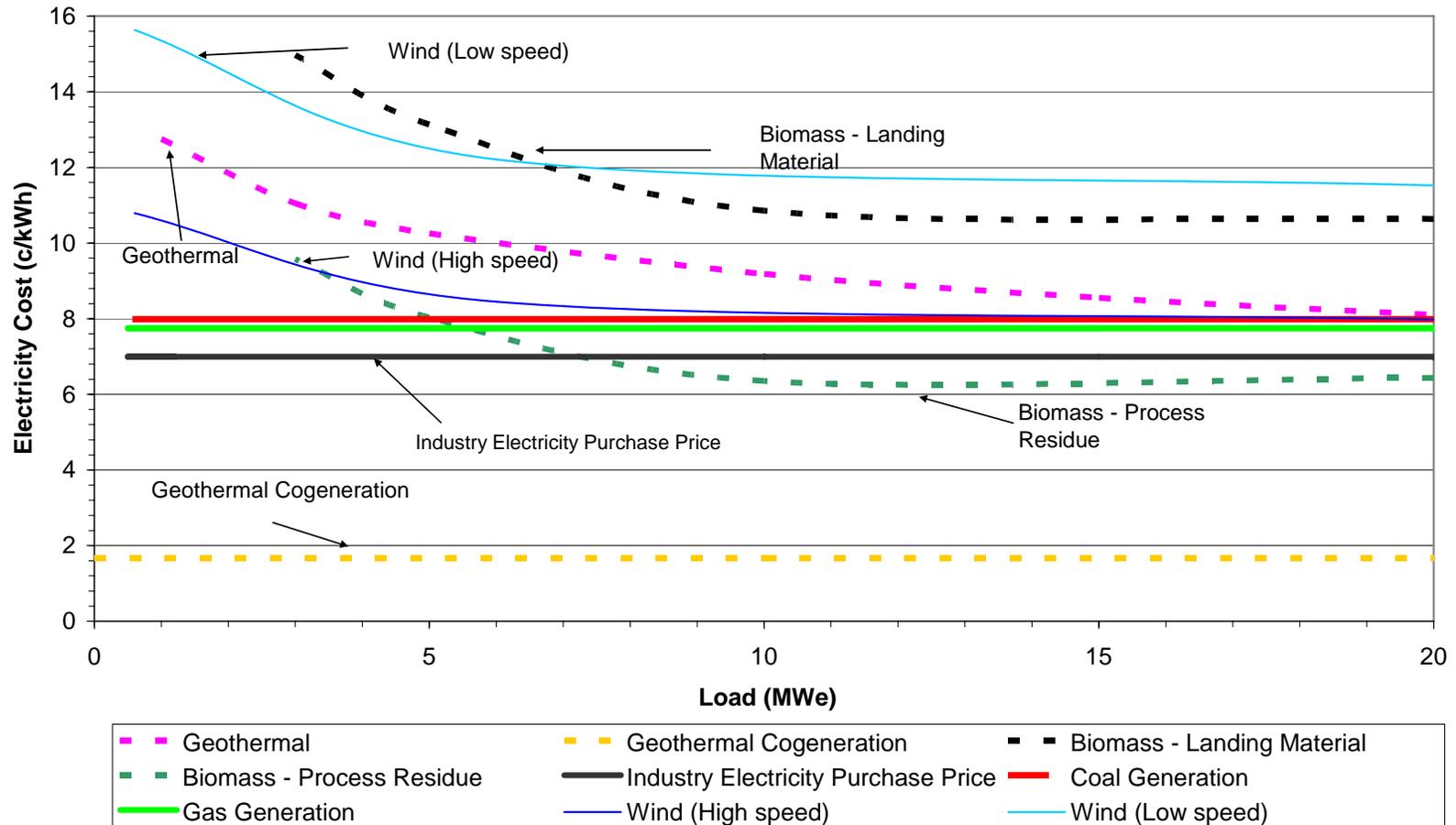
Energy Resources

- Marine
 - Unlimited quantity
 - Constrained by harsh environment
 - Technology still at R & D stage
- Geothermal
 - Limited surface level heat
 - Unlimited deep heat
 - Little focus on increasing direct use
 - Interaction with other uses

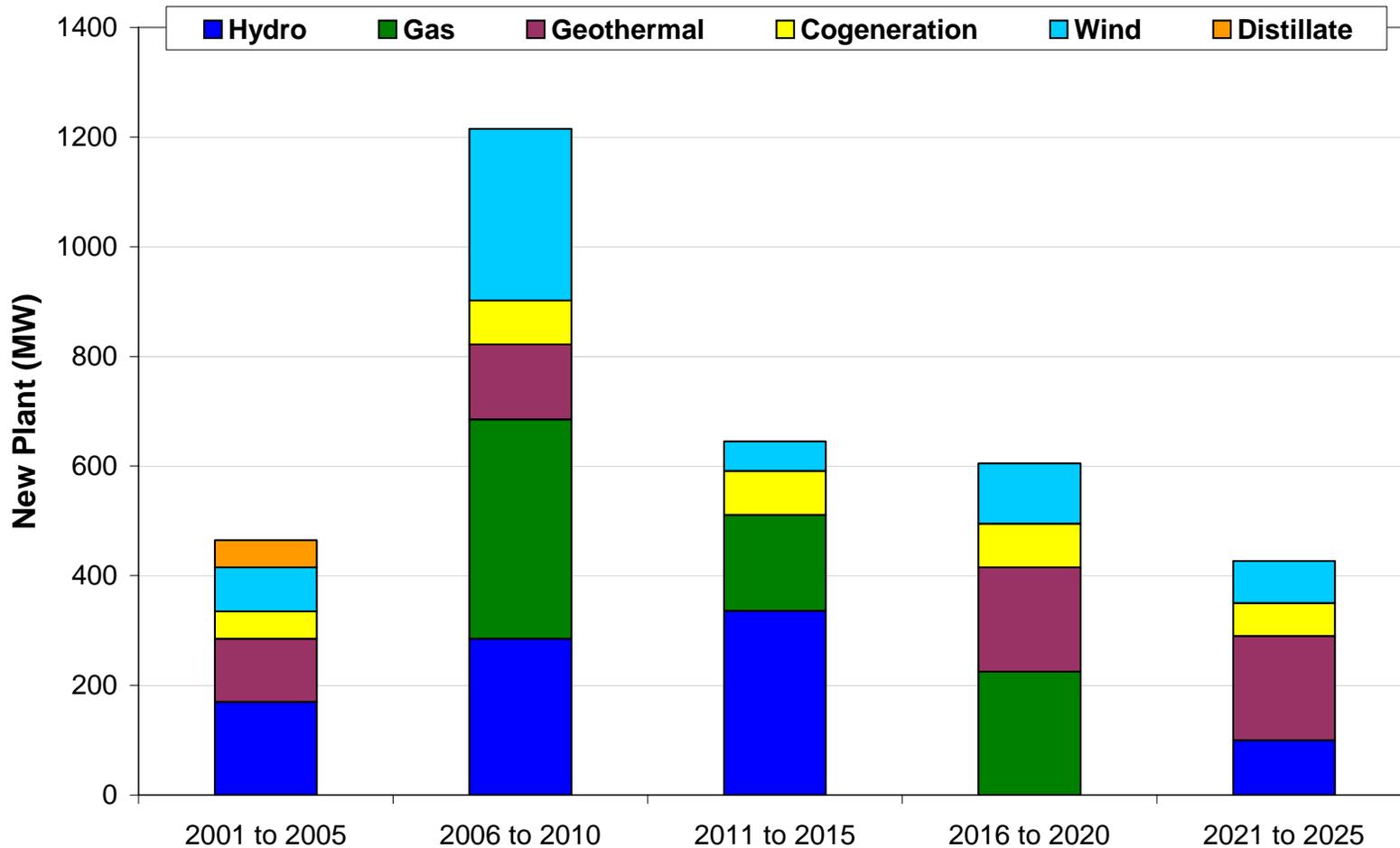
Price Relativities

- Relative cost curves indicate an increased mixed portfolio of investments
 - Next 1-4 years gas, wind, small hydro, solar thermal, woody biomass (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



New Electricity Generation



Source: MED Energy Outlook

Sustainable Supply Issues

- Projects can be secure, affordable and environmentally responsible
- Thinking smarter about what we already know
- Using fossil fuels as a transition to long term sustainable supply
- Need to manage the resource eg geothermal, hydro
- Sustainable with regard to what?
- Climate change policies can change relative costs of options
- Continual focus on electricity not energy eg Energy Outlook (policies need to include heat and electricity)

Complex Regulatory Framework

- Govt policies
 - Electricity governance
 - Sustainability framework
 - Growth and innovation framework
 - Climate change policies
 - National Energy Efficiency & Conservation Strategy
- Environmental
 - Resource management legislation
 - National environmental standards
- Commerce & Electricity Commissions
 - Information disclosure
 - Price regulation
 - Investment decision making
 - Integrating demand, supply, and transmission options

Access to Resources

- National interest
 - Requires presentation of national interest
 - Collective community responsibility
 - Rights of the individual
- Adjudication of competing interests
 - RMA
 - Licensing?
- Information barriers
 - Widen the investor base
 - Cost of resource data collection eg small wind & hydro
- Cost of investigations
 - High cost of investigations before decisions can be made
 - High risk if likely to not get resource consent

Infrastructure

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

Constraints on Technology Improvements

- Need economies of scale eg Large wind economies of scale now occurring
- Renewable energy facilities have high upfront costs with little certainty of outcome
- 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
 - No applied R & D programme

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
- Requires R & D
 - Too costly for market participants

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 achieving Sustainability - fairly and efficiently priced

- Lack of retail competition breeds community distrust
- Lack of support for electricity gentailers- profit only driven
- Lines companies inability to sell on open market
- Little attention to achievement of NEECS activities
- Difficulties of sale of surplus on-site electricity

Barriers to Achieving Sustainability - environmentally responsible

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

Barriers to Achieving Sustainability - reliable and resilient

- Share market driven investment
 - energy facilities have high capital cost but long term (30-100year) operation
- Uptake of options 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