

# Renewable Energy Supply Potential

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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

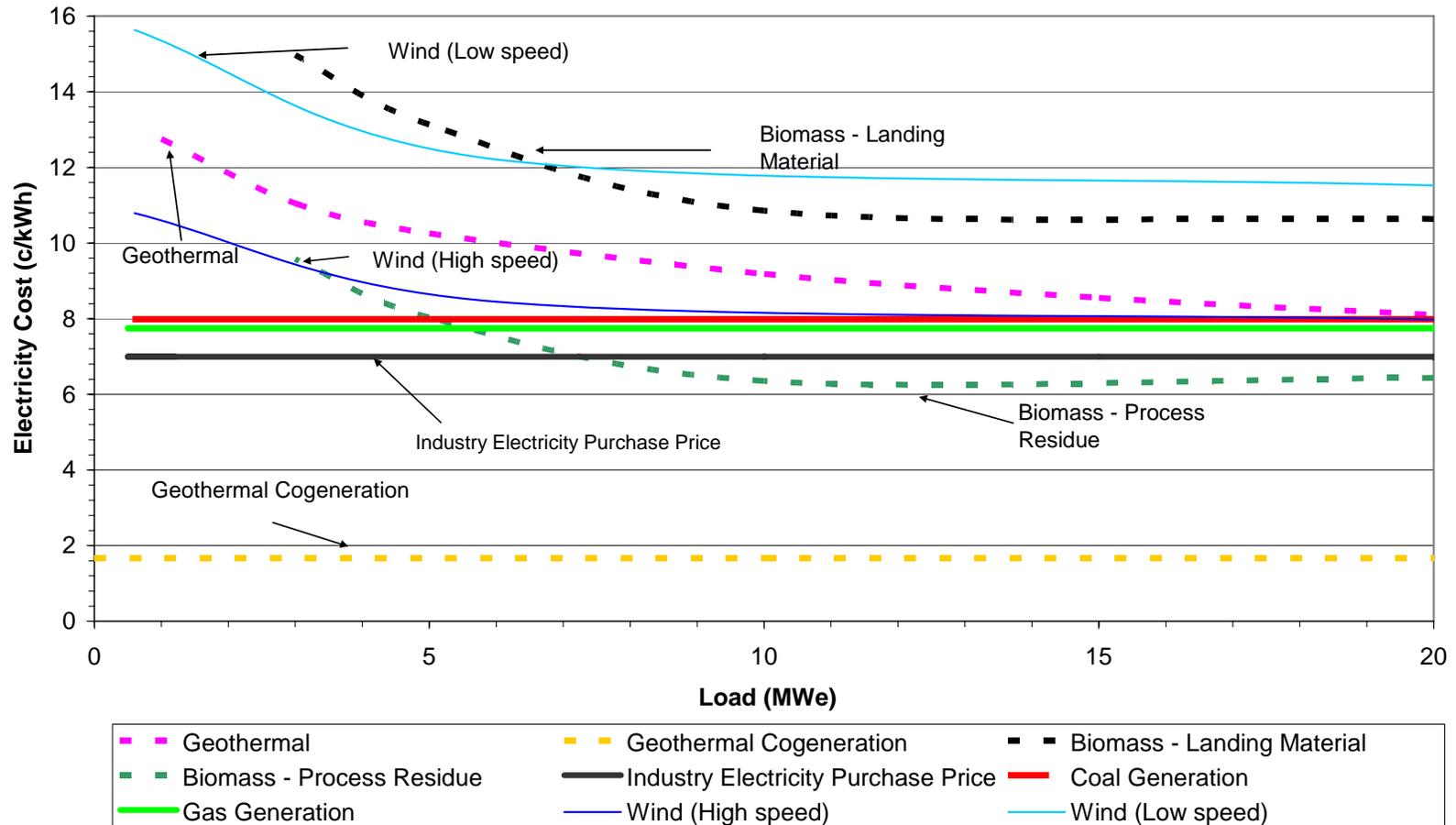
# Energy Resources

- 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

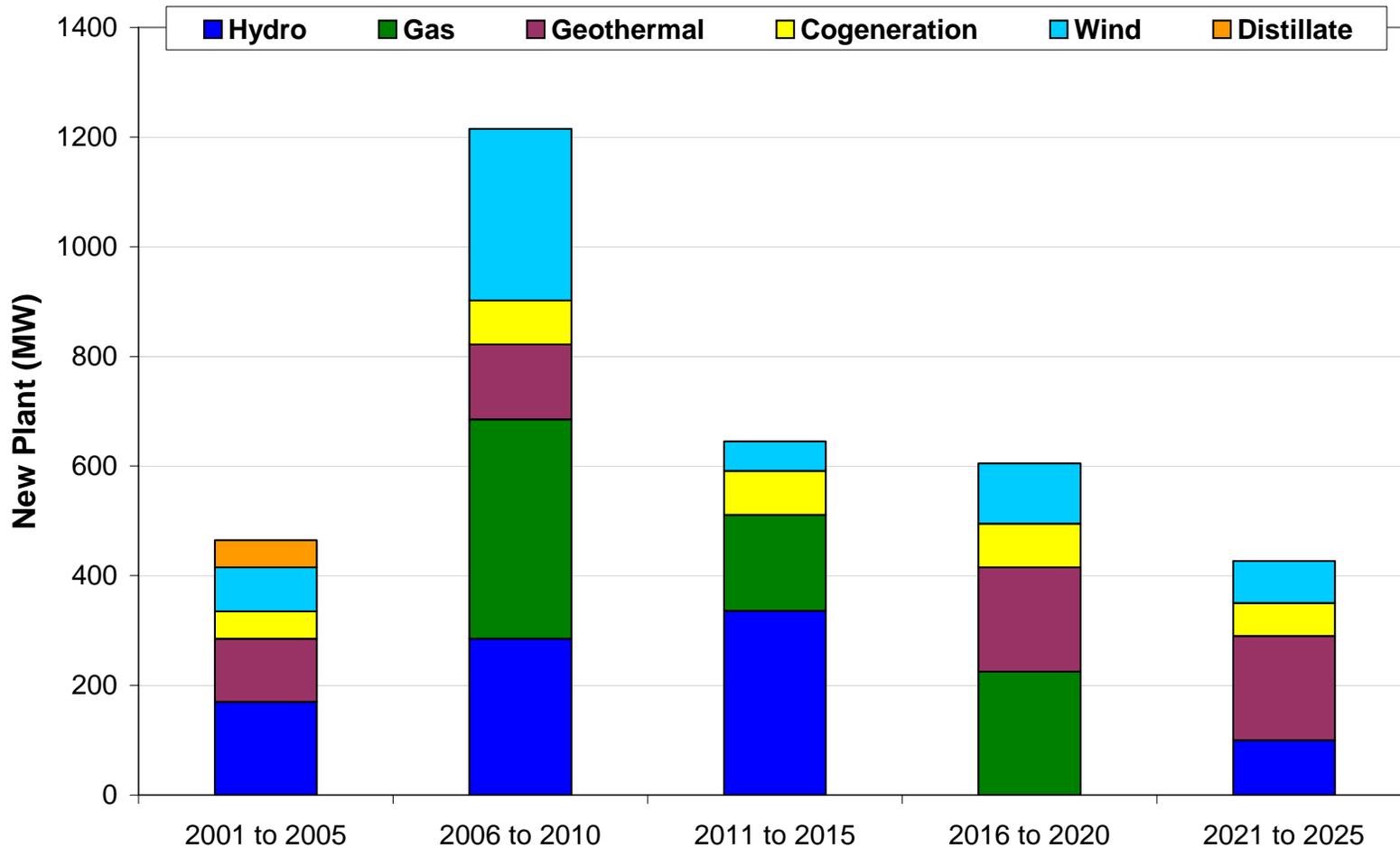
# Price Relativities

- 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