New Zealand's Thermal Generation Options

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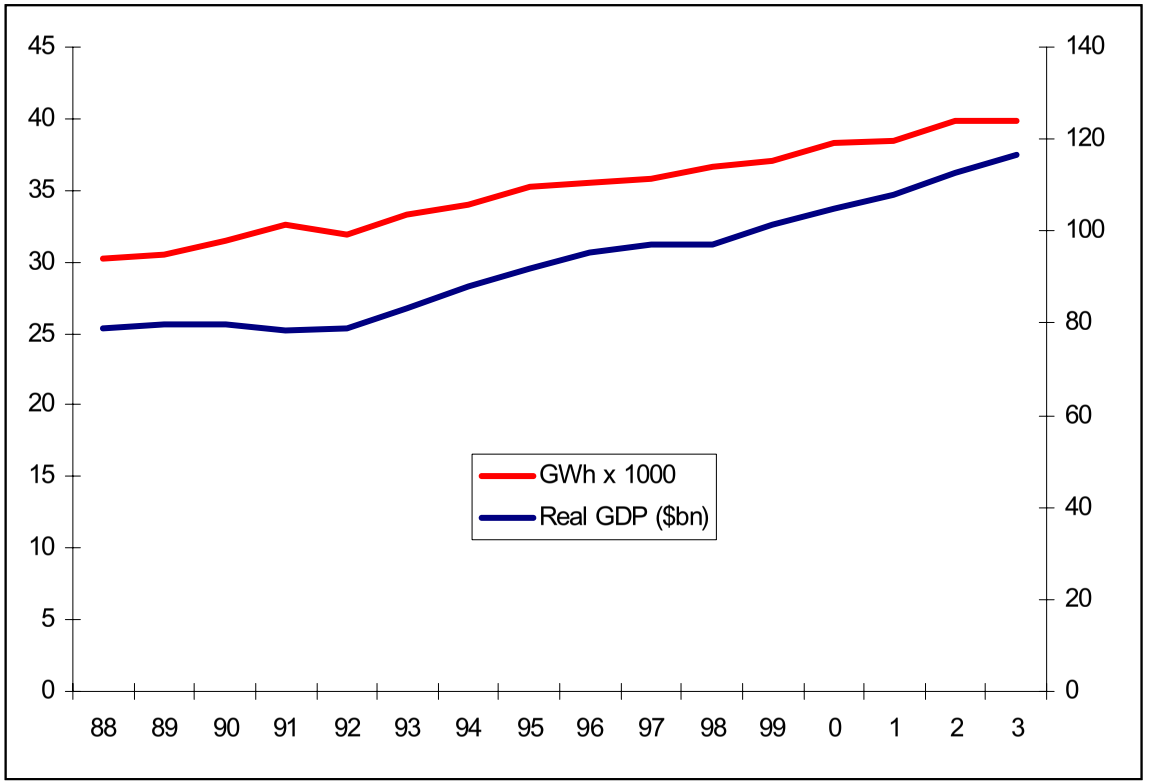
Outline

- Electricity demand growth
- Supply options
- Thermal generation
  - Its role of thermal generation in NZ system
  - Outlook for the existing mix of thermal plant
  - Implications of the gas gap
  - Fuel options

Electricity demand

- Steadily growing in line with GDP
- Some apparent decline in electrical intensity recently
- Could be due to distributed generation not included, &/or efficiency gains, both of which could continue & accelerate
- However, we should still expect to require more supply

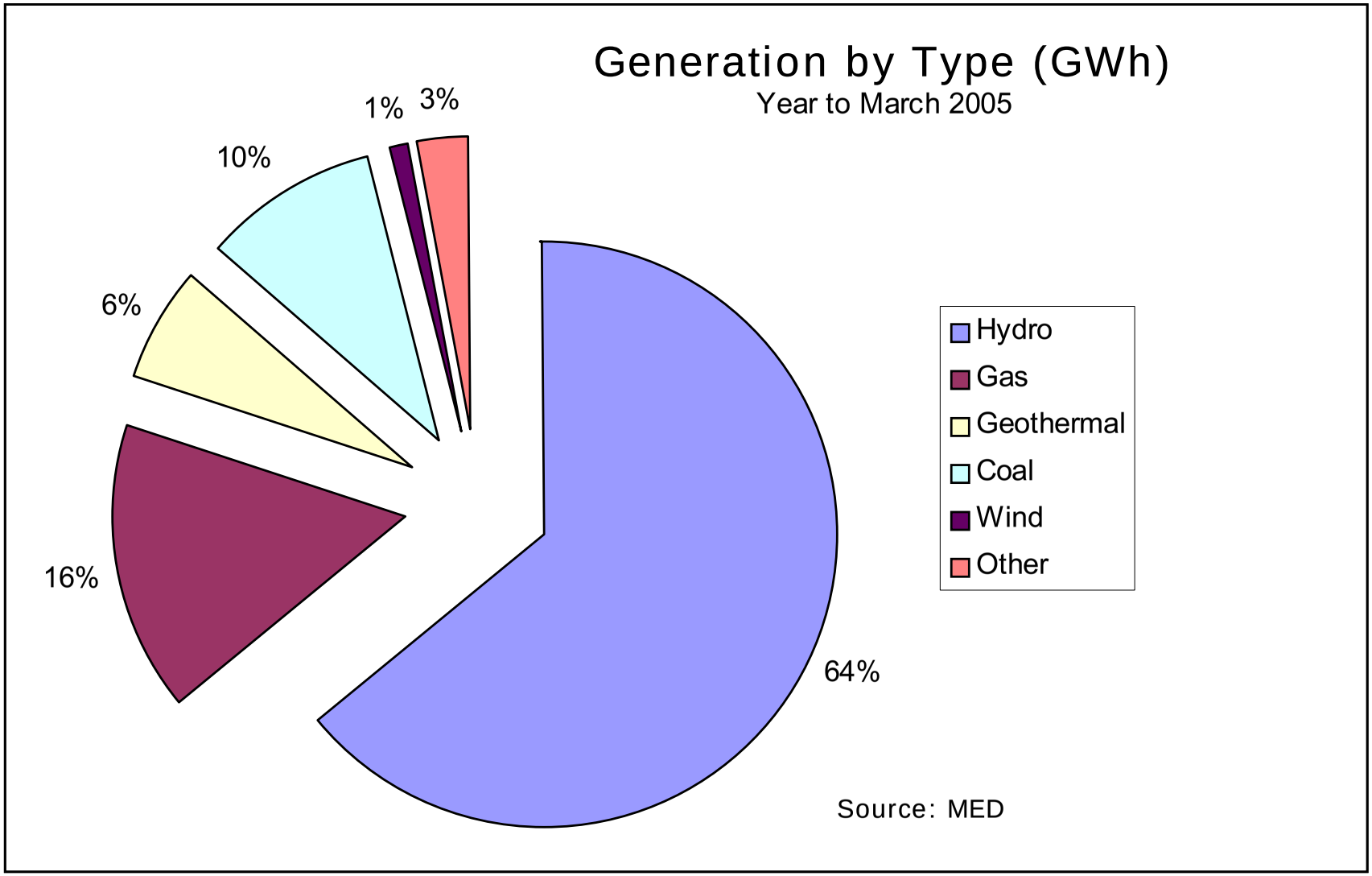


Sources: MED & Statistics NZ

How much more?

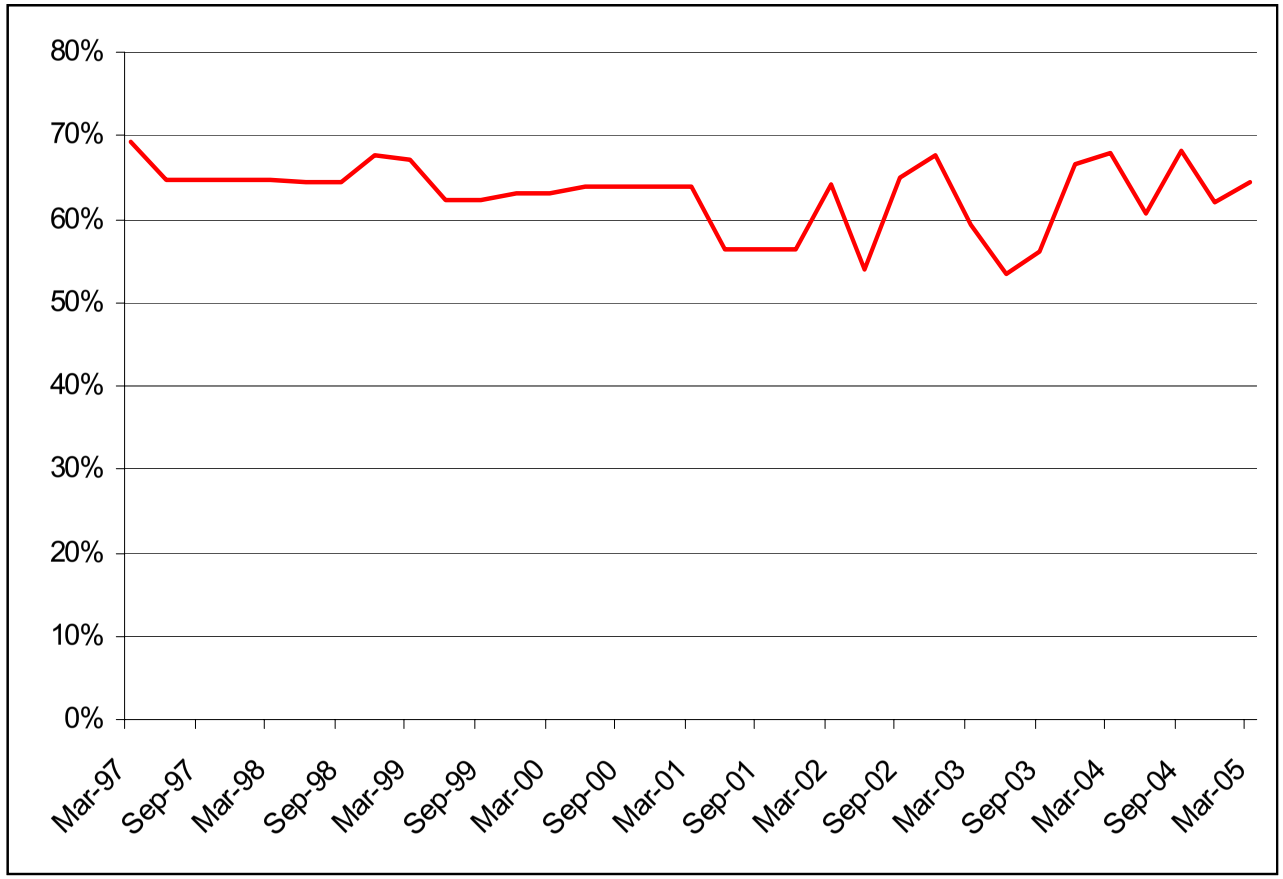
- 690GWh p.a. = average growth since 1988
- Compare with Genesis new E3P station
  - This will have 365MW capacity
  - Which implies 2100 – 2800 GWh, depending on utilisation rate (65% - 87%)
  - So we need the equivalent of one new E3P every 3 to 4 years

The current generation mix



Hydro production share

- Hydro Share has become more volatile in recent years
- The six-monthly variation (trough to peak) has been up to 5PJ, which is twice the annual average growth
- Implies an increased need for substantial seasonal swing capacity



Source: MED

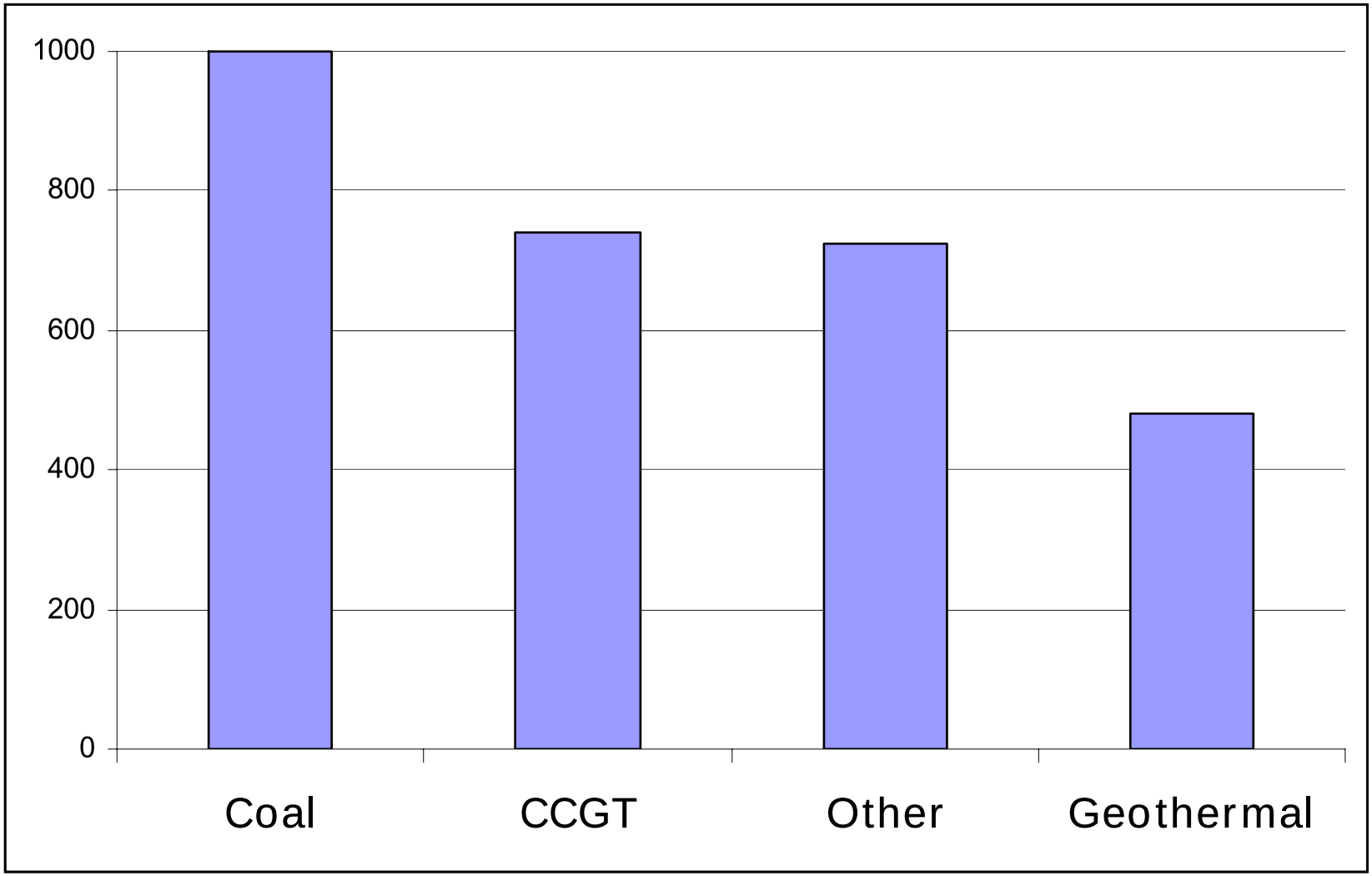
Role of thermals

Thermal plant has a dual role

1. To provide bulk supply additions required to keep pace with demand growth
   - There is about 200MW of wind plant in progress currently, however, and more could be accommodated, especially with grid enhancements

2. To provide seasonal reserve to back our hydro capacity
   - This seems particularly important – our vulnerability to dry years will not diminish unless/until there is more redundancy in the system

Existing thermals (MW)



Source: MED data

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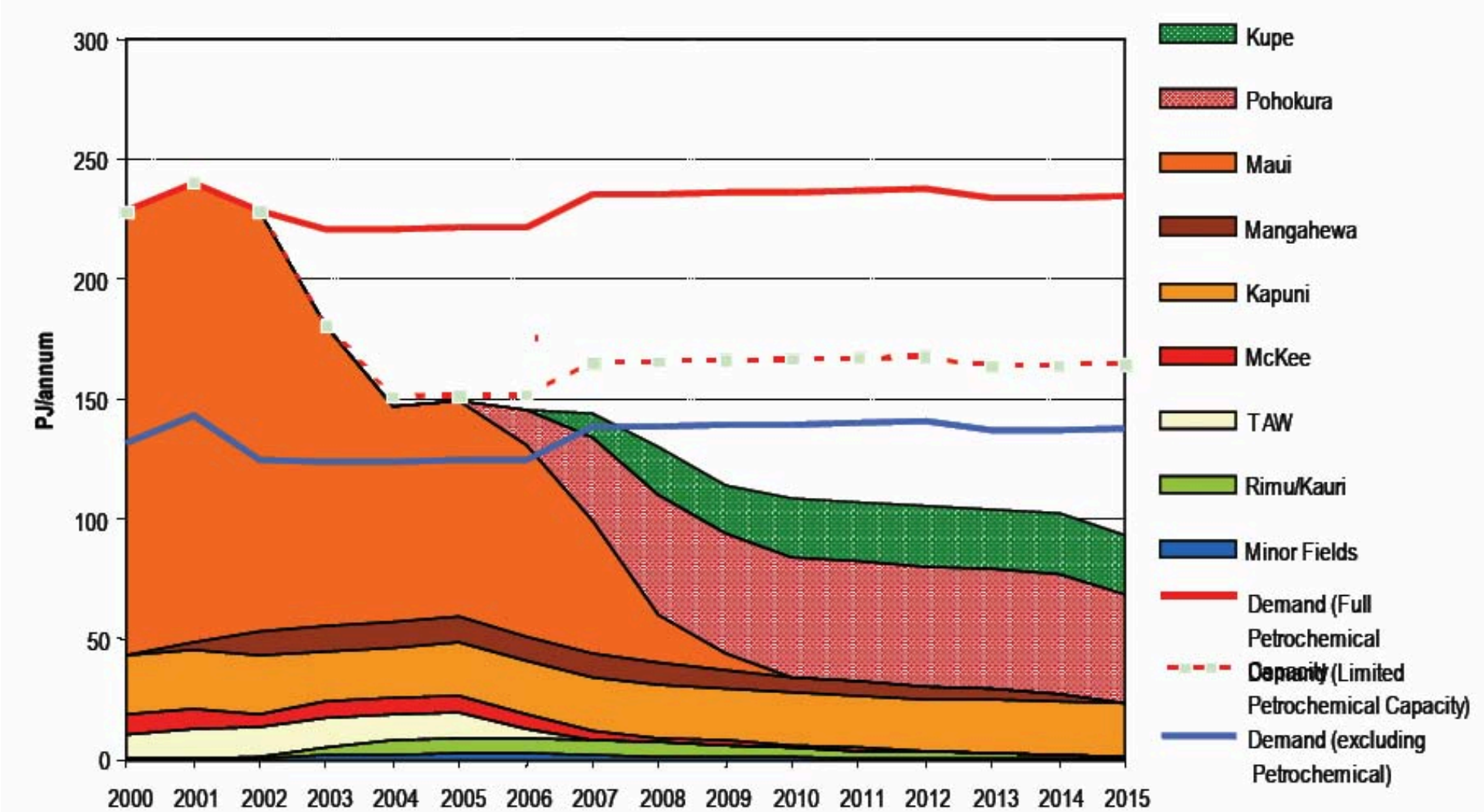
The "gas gap"



Source: Contact Energy

Gas gap interpretation

- Exact timing uncertain
  - Date estimates vary across analysts
  - And its only a forecast; it may never happen
- New discoveries may fill the gap
- But the gap is still a problem
  - Particularly for CCGT owners, Contact & Genesis
  - Risk of stranding these assets is affecting their behavior already
  - They need a “plan B” in case new gas is not discovered.

Plan B for the CCGTs?

- Import LNG?
  - Would need a long-term gas contract to support re-gas infrastructure
  - Commercial risk: potential competition from new finds of local gas
- Import CNG?
  - Still costly, but may be able to buy smaller quantities, so less commercial risk
  - Emerging technology, so some availability risk
- Use for jet-fueled hydro reserve?
  - No perceived demand for that much hydro reserve, though previous "hydro share" slide may suggest otherwise
  - Very costly to hold these assets for that purpose
  - Still need gas for other plant such as co-gen

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What about new plant?

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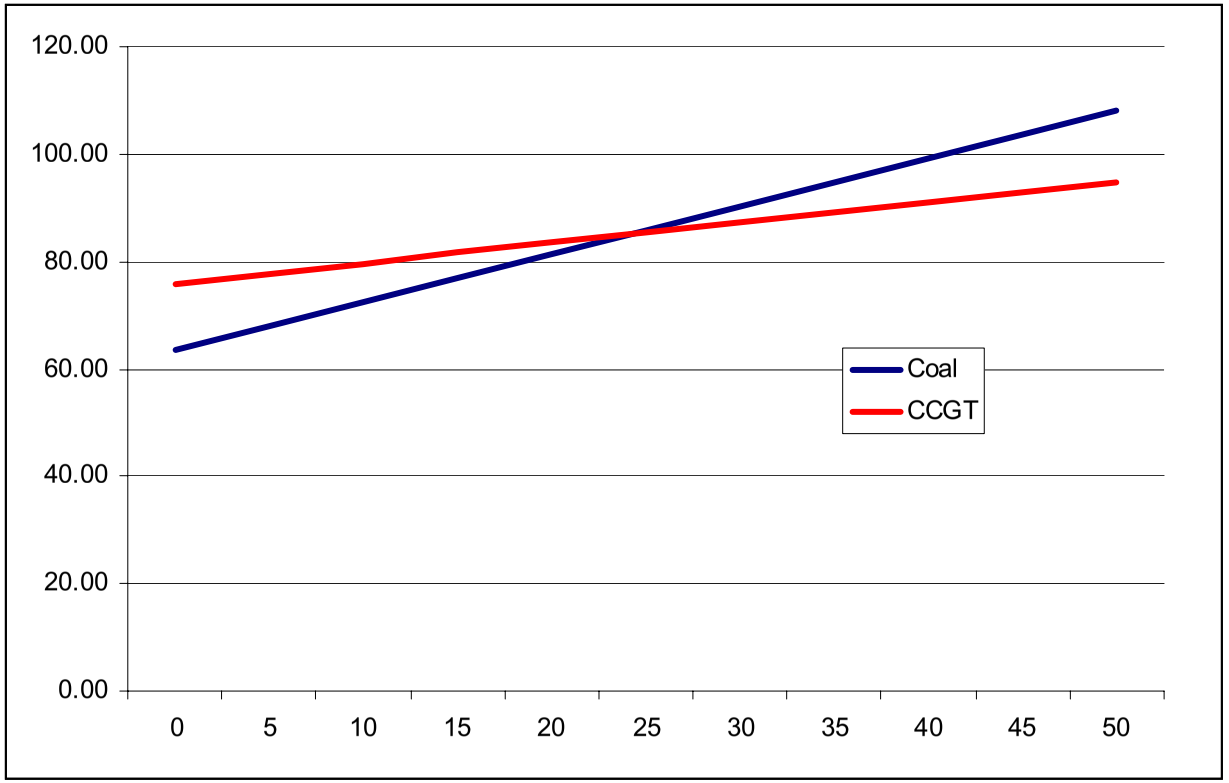
- Geothermal has further potential, but…
  - electricity a very inefficient use for geothermal energy; much better to use it directly
- Gas investment is constrained…
  - By the fairly unattractive plan Bs already cited
- Coal is the other main thermal option

Coal options

- Marsden Point
  - restarting Marsden B is a possibility
  - existing RMA conditions make it unlikely
    - And may indicate problems for any new coal plant
- Huntly
  - An obvious location, with existing infrastructure and expertise
- West Coast
  - Because it is close to good (bituminous) coal
- Southland
  - Because it is close to lots of coal (lignite)

Carbon charge impacts

- Can conventional coal compete with a CCGT?
- Graph shows $/MWh against $/ton CO2
- At low carbon charges coal can compete
- Other (coal/CCGT) assumptions are: efficiency (40%/55%) and capital cost in $/kW (2170/1230)



Coal summary

- Some advantages
  - Available local resource
    - Holds prospect of paying less than “world price”
    - Though this requires exploiting the lignite
  - Might defer/eliminate need to import gas
    - So, could be a case for using it as a stop-gap fuel

- Disadvantages
  - Emissions
    - Unless/until better technologies become feasible
      - Higher efficiencies &/or CO2 capture/sequestration
  - Location
    - Southland is a long way from major load centres
      - So may either need more grid, or to import coal

Other options

- Alternatives to thermal all have some drawbacks
  - Wind
    - Need lots of land per MW
    - NIMBY effects except offshore, which is expensive
  - Hydro
    - Running out of rivers, so perceived cost is increasing
  - CHP
    - Limited by heat demand from our relatively small industrial base