Competition, Reliability and Hedge Market Developments in NZ

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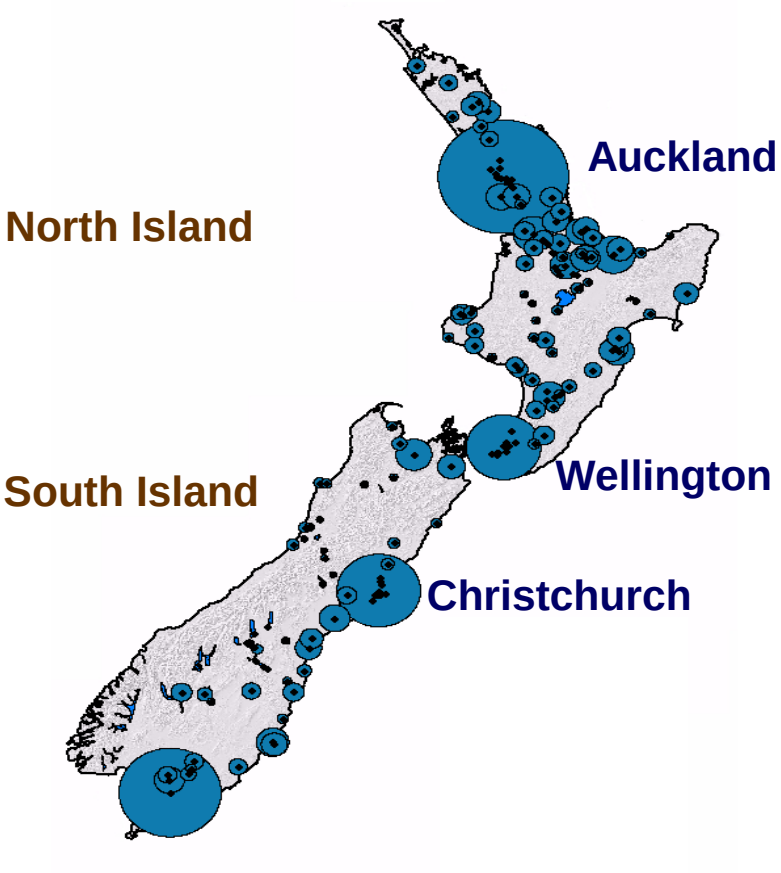
Outline

- Overview of the NZ electricity system and markets
- The EA's policy framework
  - Role and overall objective of the EA
  - How the hedge market affects the physical market
  - How the physical market affects the hedge market
- Recent hedge market initiatives (2010 – now)
- Appendix
  - Origins of the NZ hedge market and market developments (1994 – 2010)
  - Initial policy focus on transparency and liquidity (2003 – 2009)

Overview of the NZ electricity system and markets



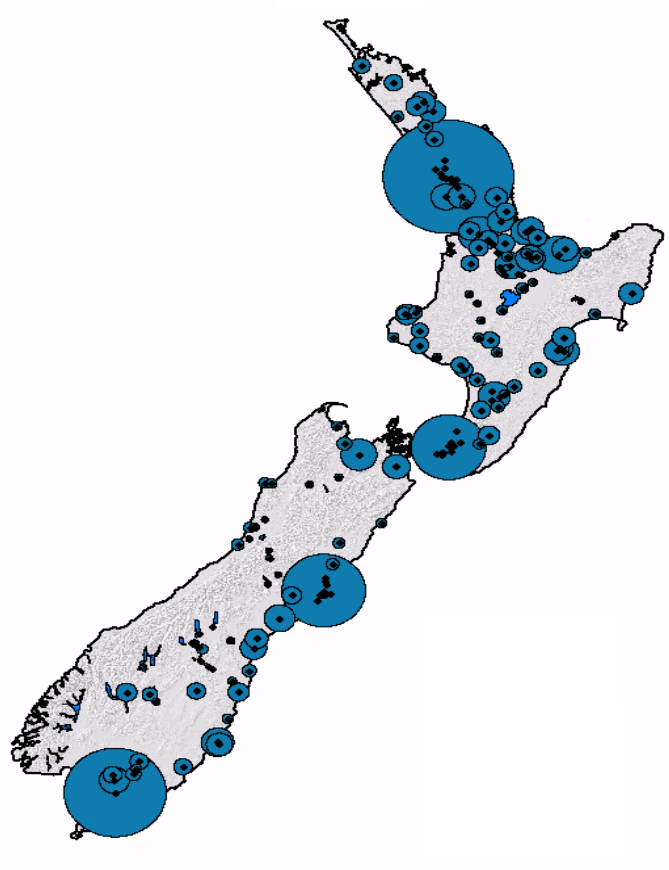
Demand

- 40,000GWh per year
- 2% growth rate since the 1970s
- Peak demand has reached 7,400MW (during winter)
- Minimum demand is about 2,600MW (during summer)
- 1.7 million residential customers, accounting for 34% of demand
- 250,000 commercial and industrial customers
- Rio Tinto smelter accounts for 15% of NZ demand

Generation

- 9,000MW generation capacity
- 200 power stations, with 50 connected to the grid
- Average generation over 2008-2010
  - 56% hydro
  - 28% coal and gas (and 0.1% diesel)
  - 10% geothermal
  - 3.3% cogeneration
  - 2.9% wind
- Hydro generation is heavily reliant on regular rainfall in South Island catchments
  - Full hydro lakes = only 6 weeks electricity consumption

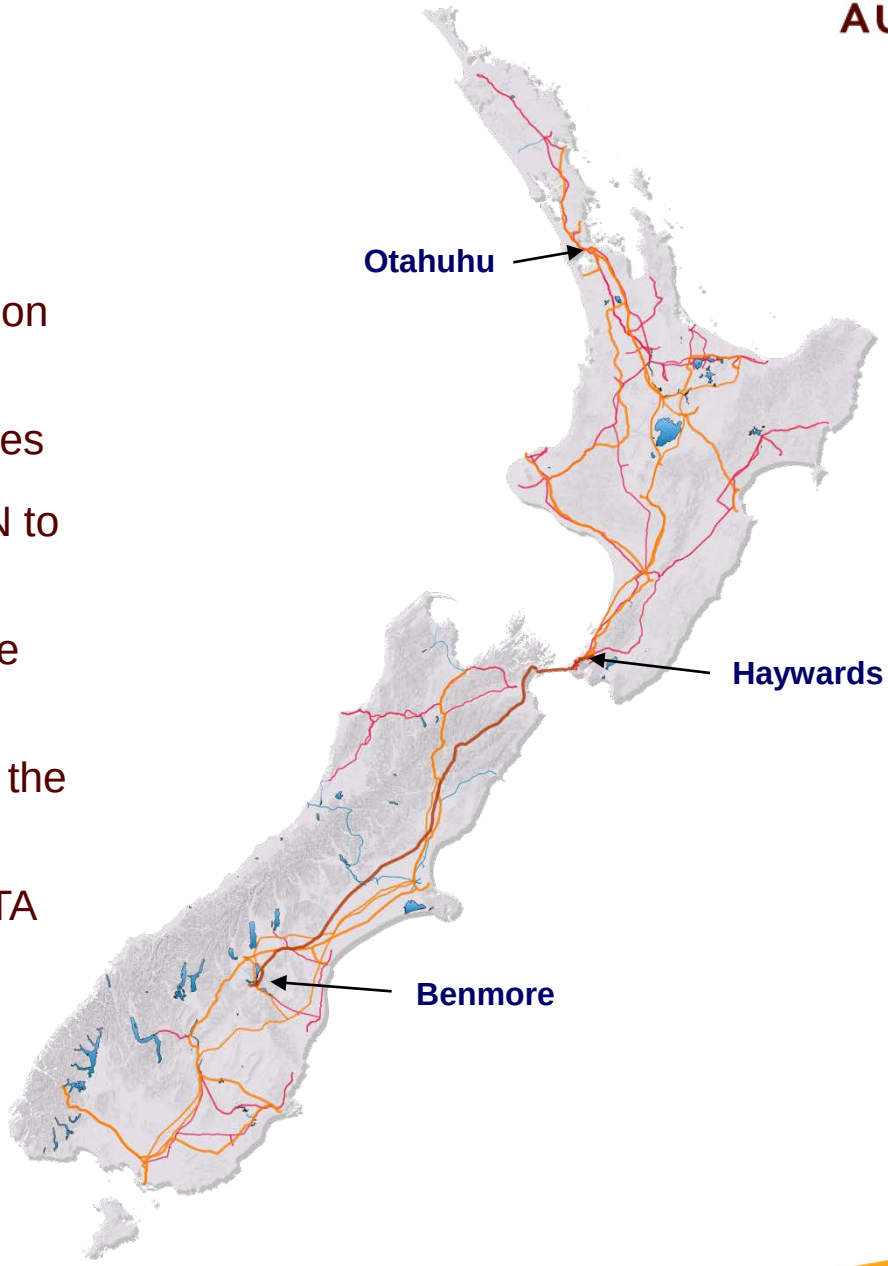
Demand



Generation

Transmission

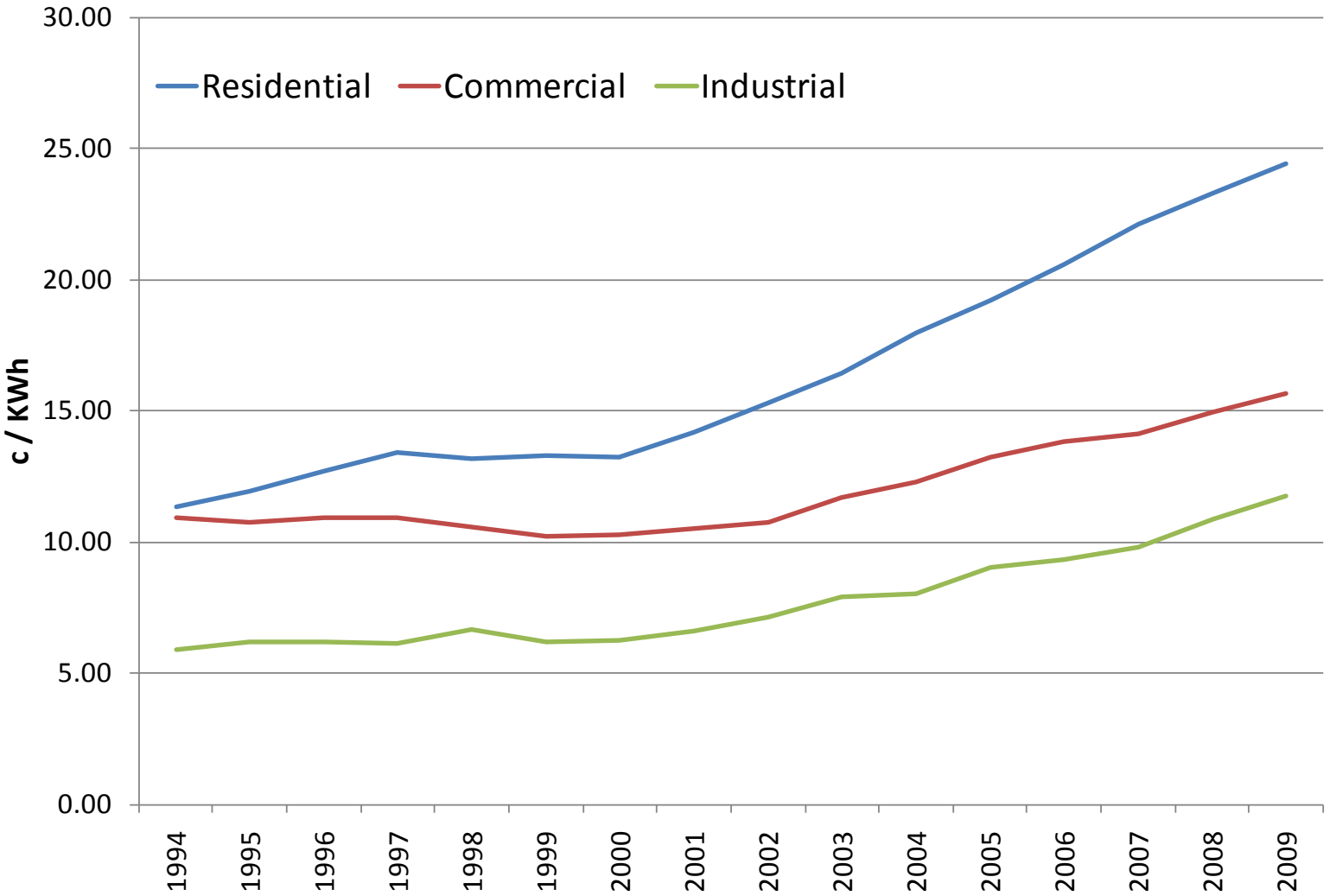
- 12,000km of transmission lines
- Mostly 220kV HVAC lines
- 350kV HVDC from BEN to HAY
- 64% of demand is in the North Island
- 60% of generation is in the South Island
- Losses from BEN to OTA approx. 5%



Overview of key electricity markets in NZ

- The NZ retail electricity market
  - Has 18 retailers but six of them are just different brands
  - The largest retailers are owned by the large generators
  - There are no price controls over retail tariffs

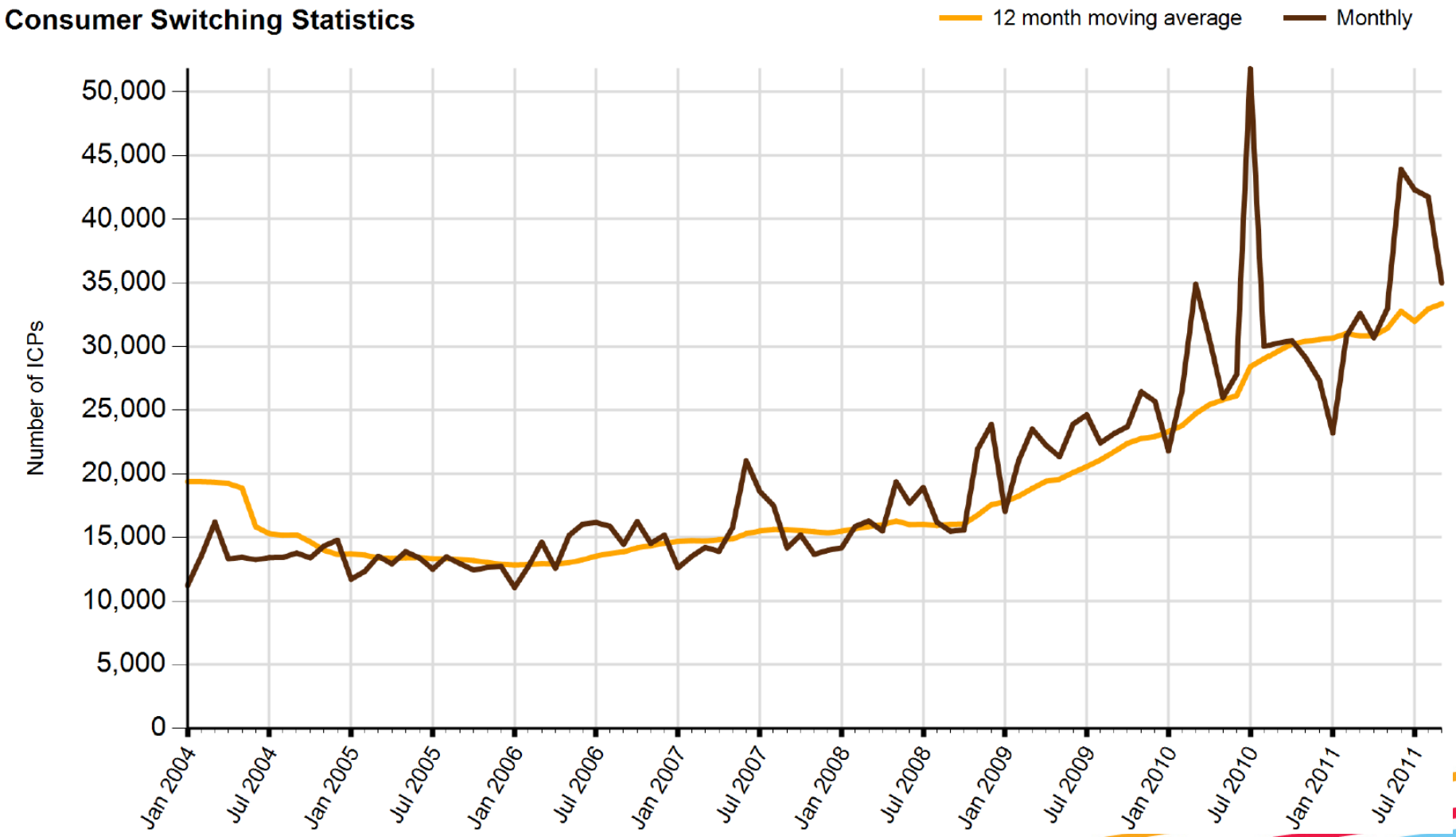
Retail electricity prices (cents per KWh)



Source : MED Energy Data File

(Residential prices include GST)

Monthly customer switches



Overview of key electricity markets in NZ

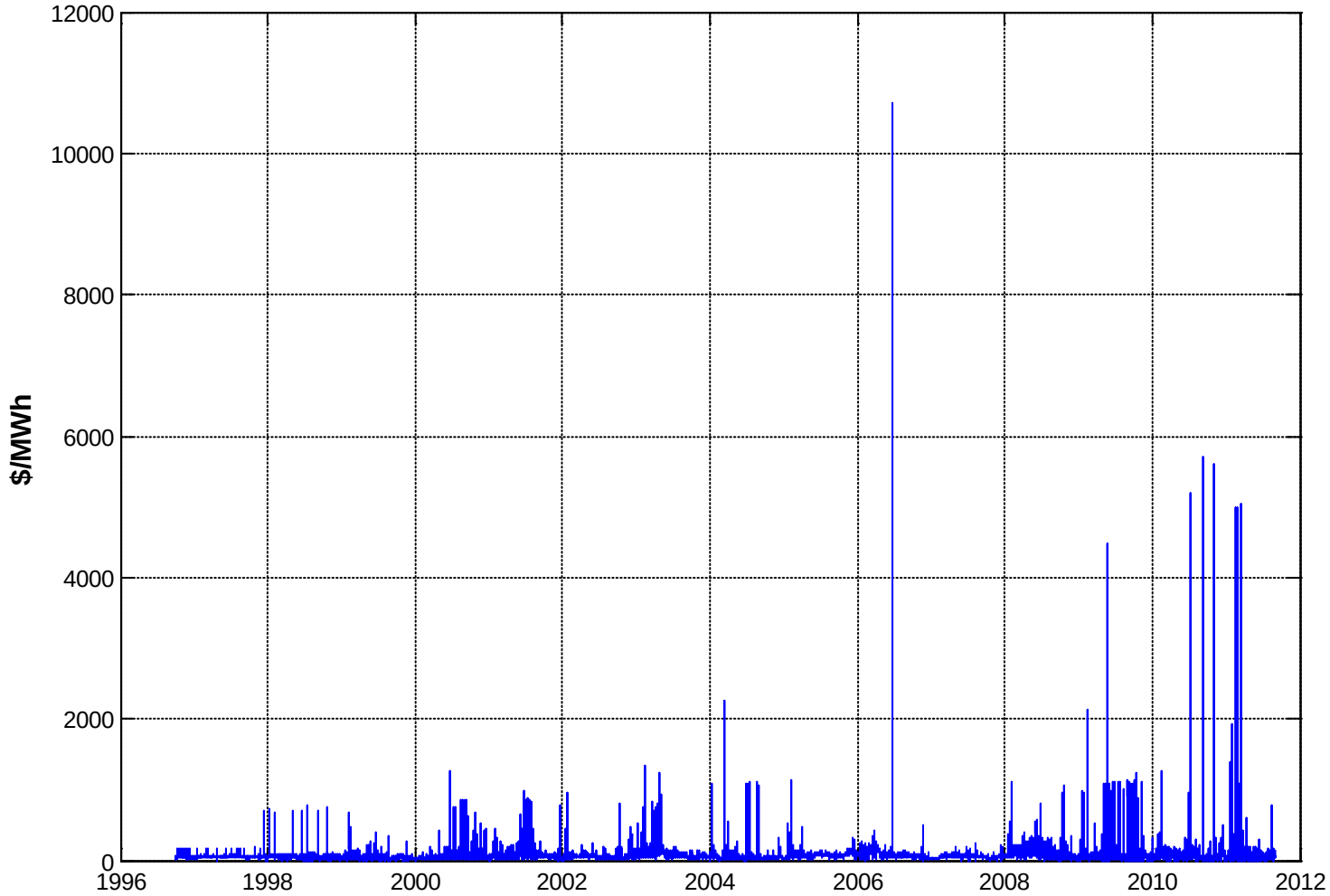
- NZ spot market
  - Trading occurs at 250 nodes across the grid
  - Half-hourly trading periods
  - Final prices are based on marginal dispatched offer prices and metered demand
  - Final prices published day-after trading
  - Prices are forecast at 1pm the day before for next 24 hours and more accurate forecasts are published four hours ahead of each trading period

Overview of key electricity markets in NZ

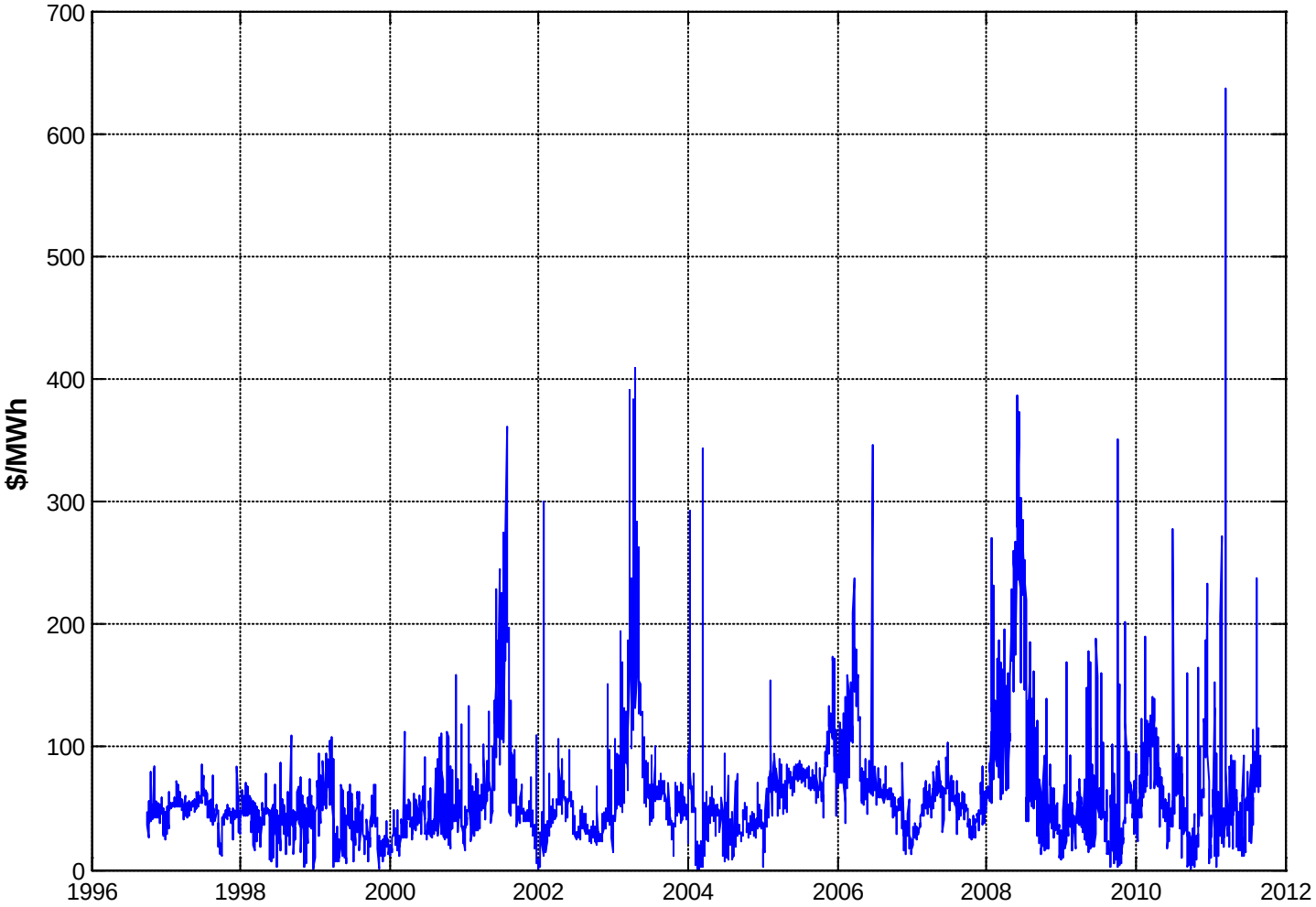
- Consumers
  - 10 directly connected consumers (DCCs) buy electricity from the spot market
  - Several DCCs have embedded generation
  - 10,000 commercial and industrial consumers pay retail tariffs that vary half-hourly based on the spot price

- In 2010 95% of generation capacity was from five generators
  - 21% Contact Energy (listed)
  - 25% Genesis Energy (SOE)
  - 23% Meridian Energy (SOE)
  - 19% Mighty River Power - MRP (SOE)
  - 07% TrustPower (listed)

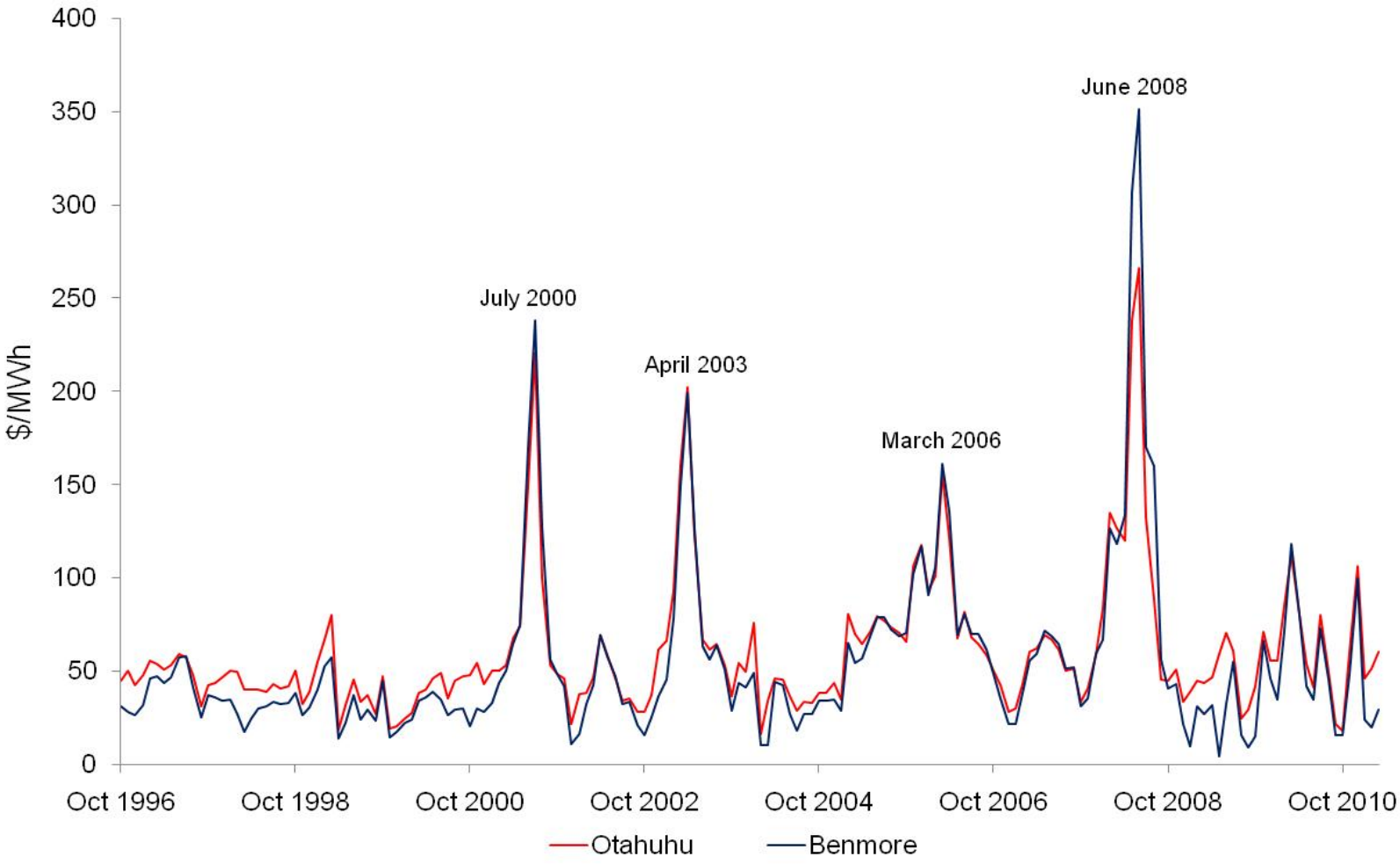
Half-hourly Wholesale Prices



Daily Wholesale Prices



Monthly average spot prices at OTA and BEN



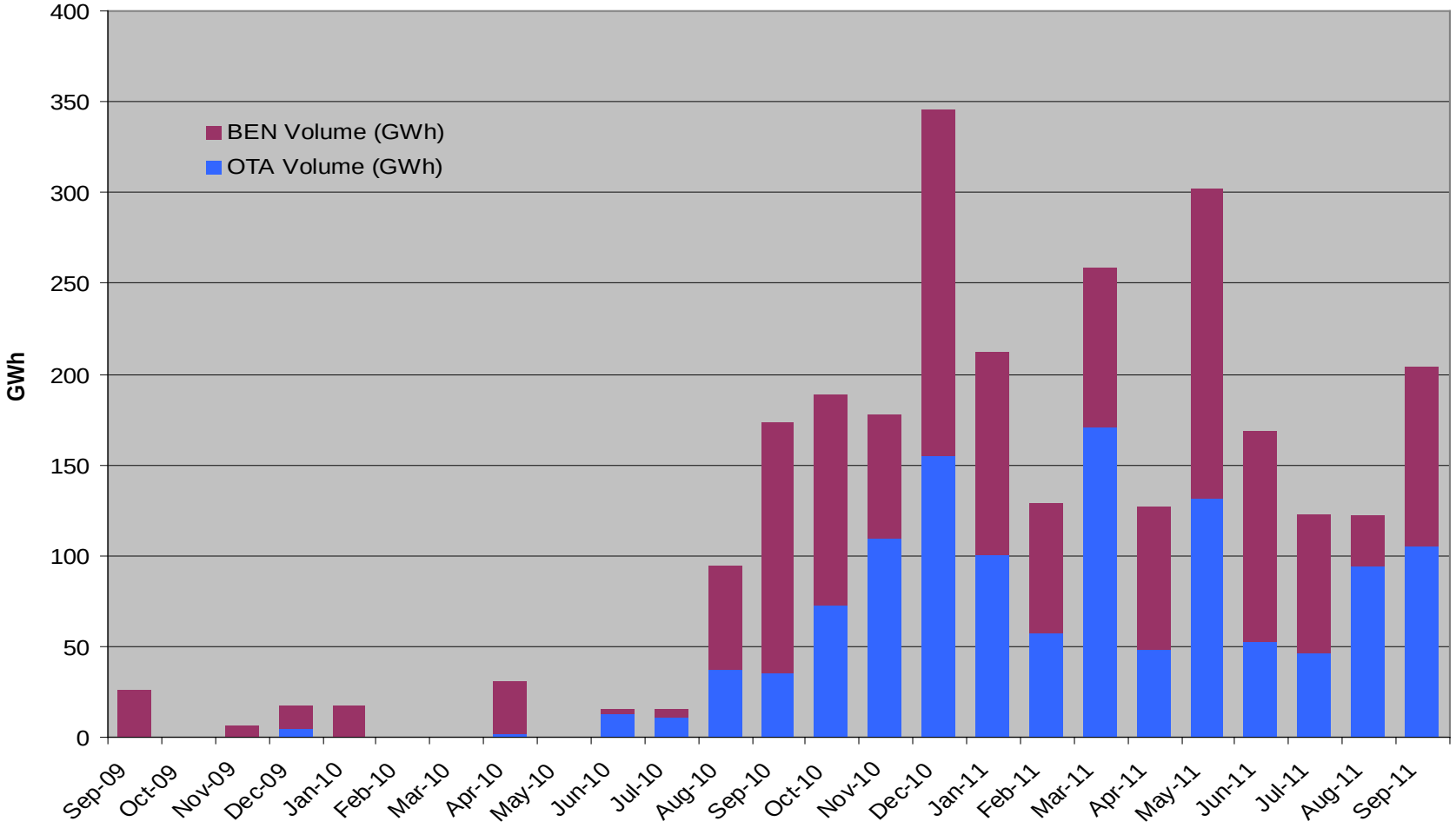
Overview of key electricity markets in NZ

- The hedge market in NZ comprises
  - An OTC market for forwards contracts, where large consumers typically seek competitive bids via open tenders
  - A futures market, operated by the Australian Securities Exchange (ASX). Futures are offered at the Otahuhu and Benmore nodes

- The ASX futures market started in 2009 and is growing rapidly

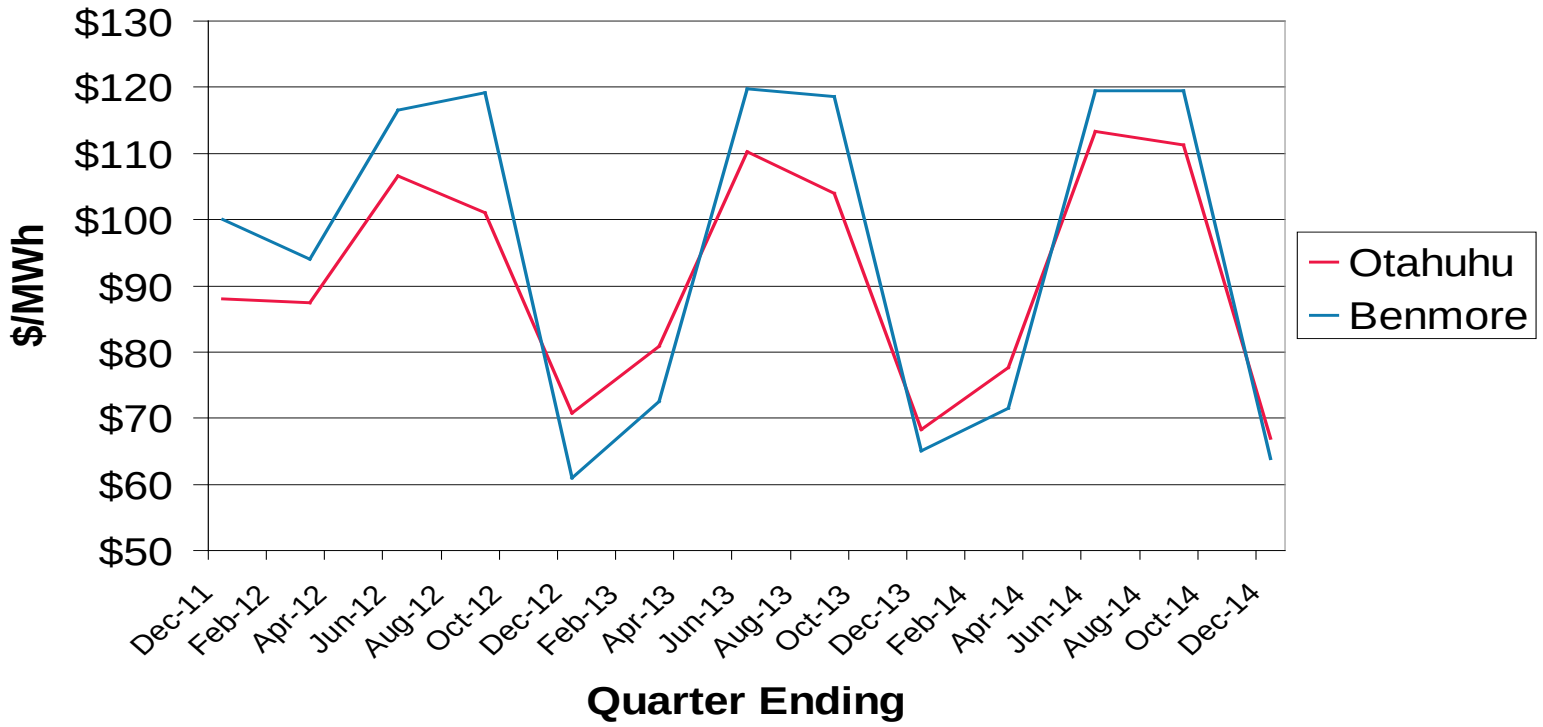
	OTC Market			ASX Futures	Total
	CFD	FPVV	Options		
YE June 2010	58%	17%	24%	1%	100%
YE June 2011	47%	18%	26%	9%	100%
YE June 2011 (GWh)	11,277	4,277	6,190	2,112	23,857

Monthly futures volume traded on ASX

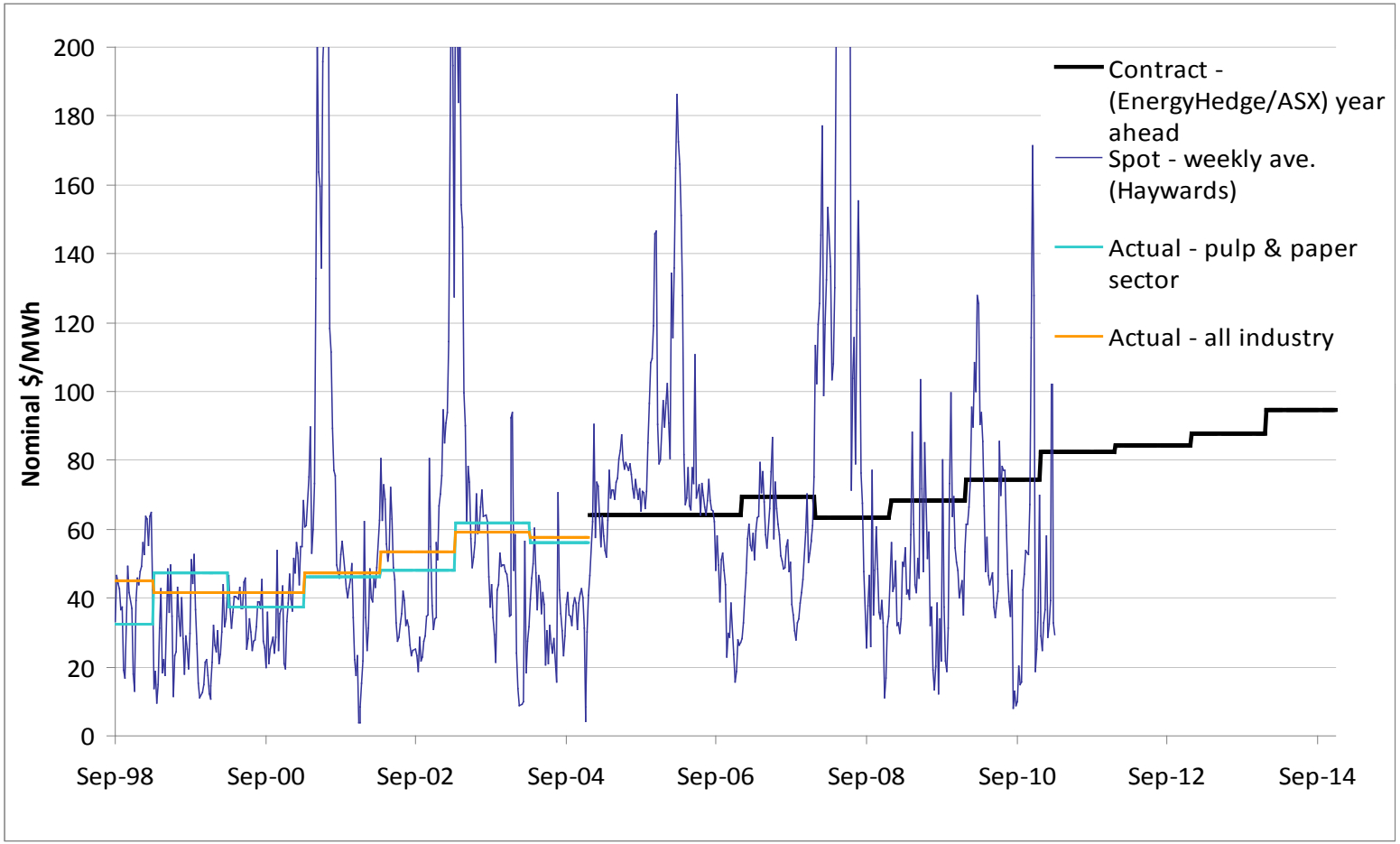


ASX forward price curve for three years ahead

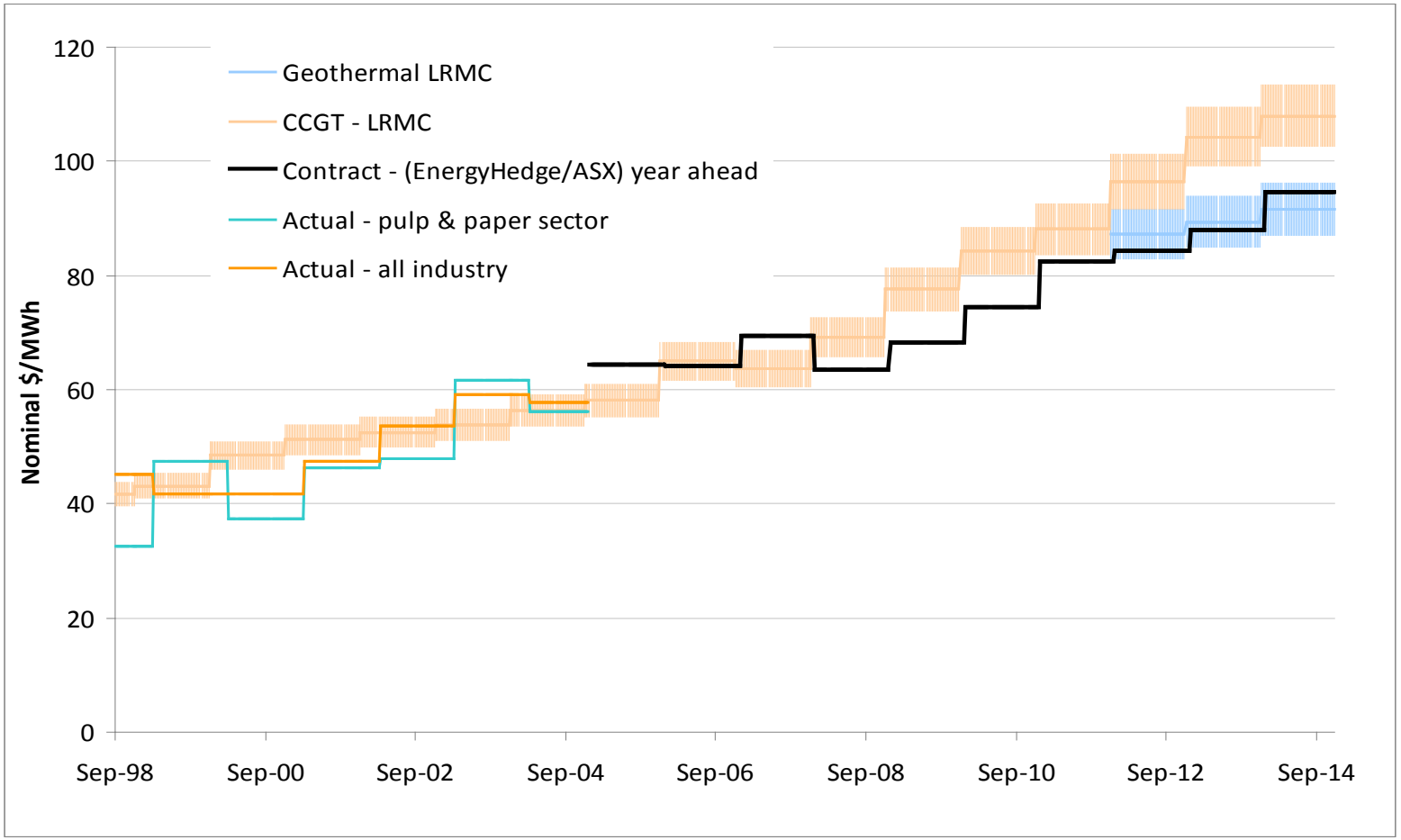
(Asking prices as at 17 October 2011)



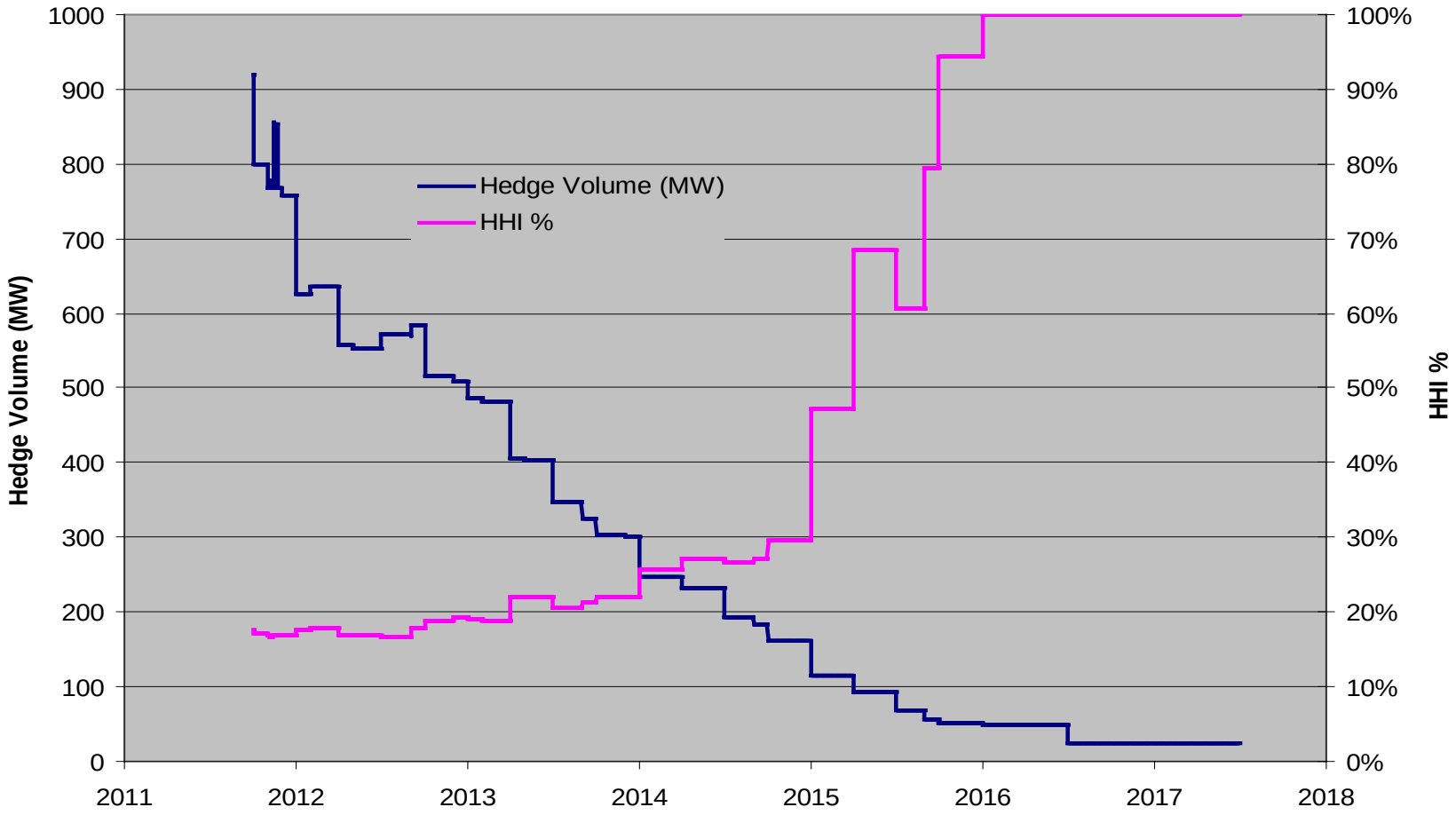
Hedge prices vs. spot market prices



Hedge prices vs. LRMC of lowest cost entrants

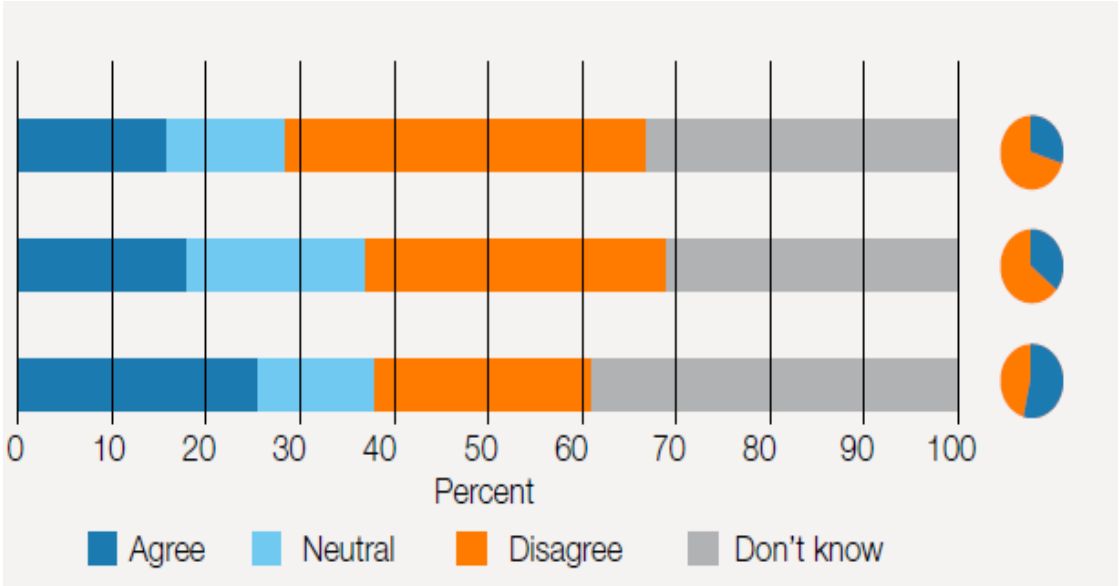


Hedge volume and seller concentration



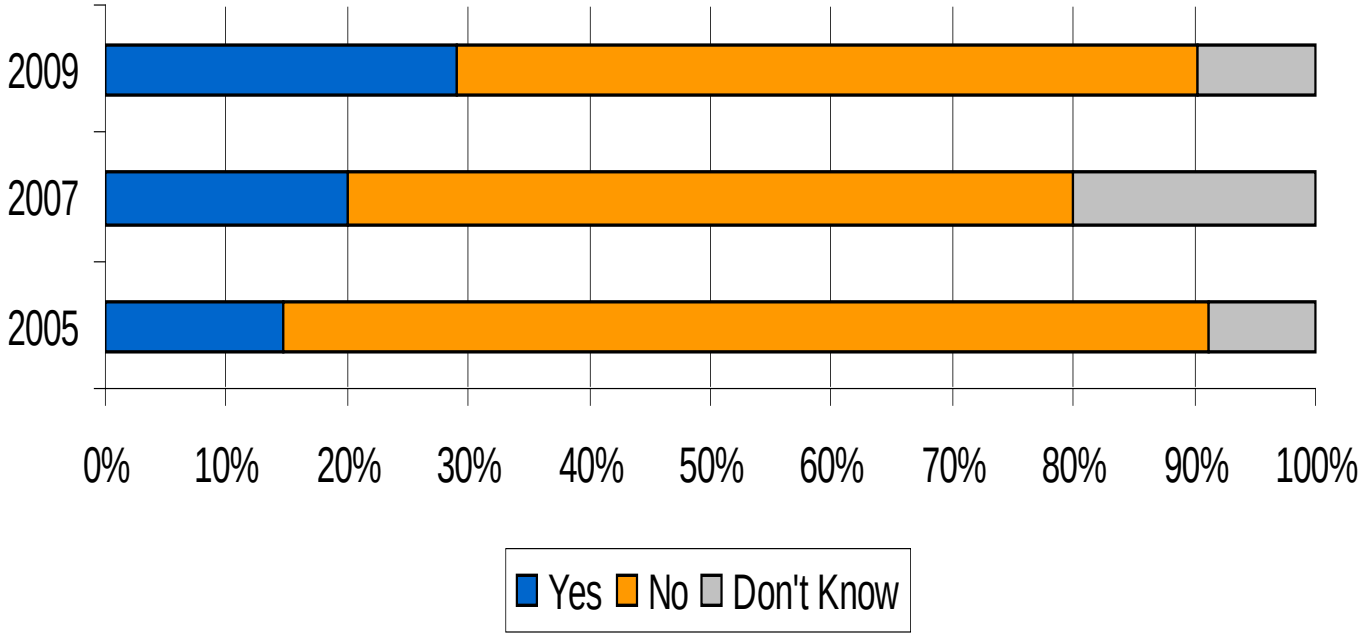
2011 survey view of hedge market competition

Prices for these contracts reflect the outcomes expected in a workably competitive market



Purchaser responses in previous surveys

Do you believe a competitive electricity hedge market currently exists in NZ?



EA policy framework

Scope and core functions of the Authority

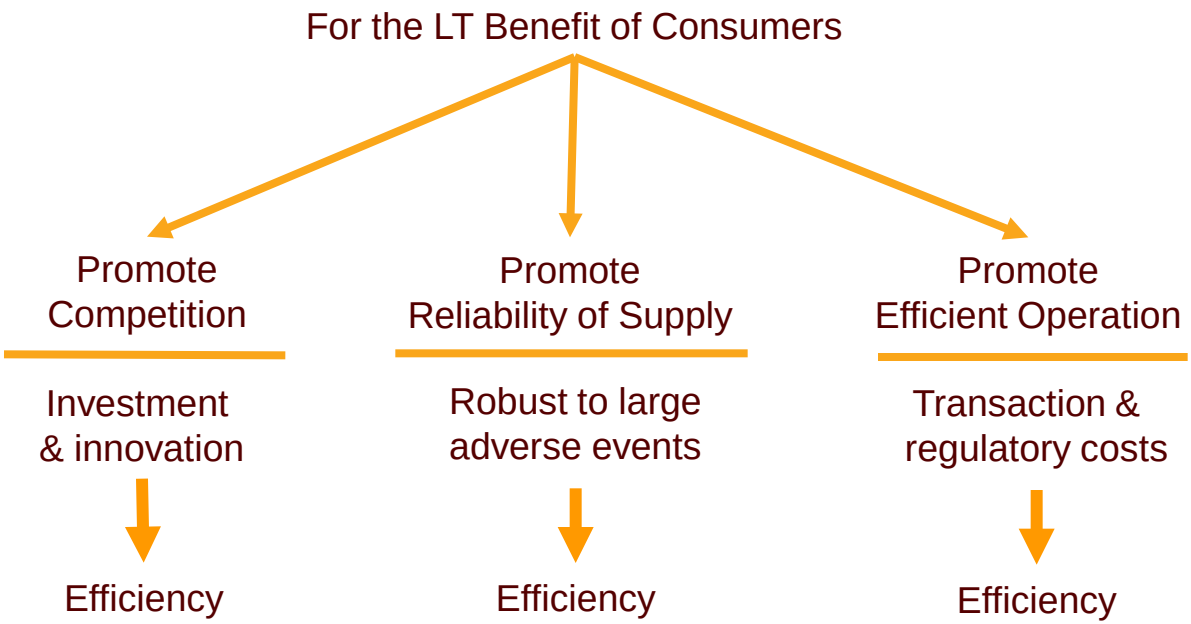
- The Authority began on 1 November 2010
  - The Authority replaced the Electricity Commission, and has narrower set of functions
  - It is independent of Minister of Energy and Resources
  - The Authority makes the Code, not the Minister

- Core functions of the Authority
  - Develop the Code
  - Enforce the Code
  - Contract for market operation services
  - Pro-actively monitor and report on market performance

Statutory Objective (s15 of the Act)

Promote competition in, reliable supply by, and the efficient operation of, the electricity industry for the long-term benefit of consumers

Interpretation of our Objective



Hedge market impact on the physical market

Physical Market

Hedge Market

More durable electricity market

Market determines whether VI is best	Futures facilitate entry of indep. retailers & generators	Long-dated contracts
More contestable generation market	Useful price signals for investors in long-term assets	
Better security of supply	Strong incentives for a wider range of parties to acquire and assess information on long-term supply risks	
	Greater revenue surety for investors in last-resort plant	Long-dated cap/options contracts
More defendable spot pricing at top of supply curve	Provides effective escape from spot market 'power plays'	
More competitive spot pricing generally	The greater the level of retail and hedge contracts the smaller the incentive for spot market 'power plays'	Any hedge contracts

Physical market impact on the hedge market

Physical Market		Hedge Market	2010
Competitiveness of spot market	Market power in spot market transfers to ST hedge market	→ Non-competitive ST hedge pricing	X
Spot market design	Large number of nodes or zones complicates hedge market development	→ Reduces hedge liquidity	XX
	Price collapse occurs when serious scarcity occurs	→ Reduces hedge demand	X
	Poor integration of hedges in spot prudential regime	→ Increases hedging costs	X
Wider market structure	Limited or poor information on future supply risks	→ Reduces signalling value of hedge prices	X
	Regionally balanced VI of generation and retailing	→ Reduces hedge demand	XX
Government ownership and control	Risk of ad hoc intervention during supply shortages	→ Undermines hedge market	XX

Recent physical market initiatives

Physical Market	Initiative			Hedge Market	2011+
Competitiveness of spot market	Introducing dispatchable demand, nationwide FK market, and proactive market monitoring		→	Improve ST hedge pricing	√
Spot market design	VAS agreements and introducing FTR market		→	Improve ST hedge pricing	√
	Introduced scarcity pricing/CCS/stress testing regimes		→	Increases hedge demand	√
	Reviewing integration of spot prudentials & margining		→	Reduces hedge costs	√
Wider market structure	Reviewing quality & provision of supply risk info		→	Improves signalling value of hedge prices	√
	ASX futures market may progressively reduce VI		→	Increase hedge demand	?
Government ownership and control	EA established as independent Crown entity	Abolished reserve energy scheme & sold WHI	Partial sale of SOE generators →	Bolsters hedge market	√

Market-making and robust forward price curves

2009

- ASX enters the NZ market, offering futures contracts at Benmore and Otahuhu nodes
  - But almost no trading occurs
- Govt requires five largest generators to put in place by 1 June 2010 a hedge market with:
  - Standardised tradable contracts
  - A clearing house to act as counterparty
  - Low barriers to participation and low transaction costs
  - Market-makers to provide liquidity
- Govt also sets a 3,000 GWh target for UOI by 1 June 2011

2010

- The generators choose ASX to provide NZ futures market
  - They begin market-making on the ASX market

- The Electricity Authority is established on 1 November 2010 under a new Electricity Industry Act

- The Act requires the Authority to amend the Code within its first year of operation
  - To facilitate, or provide for, an active hedge market
  - But it doesn't set targets and doesn't define "active"

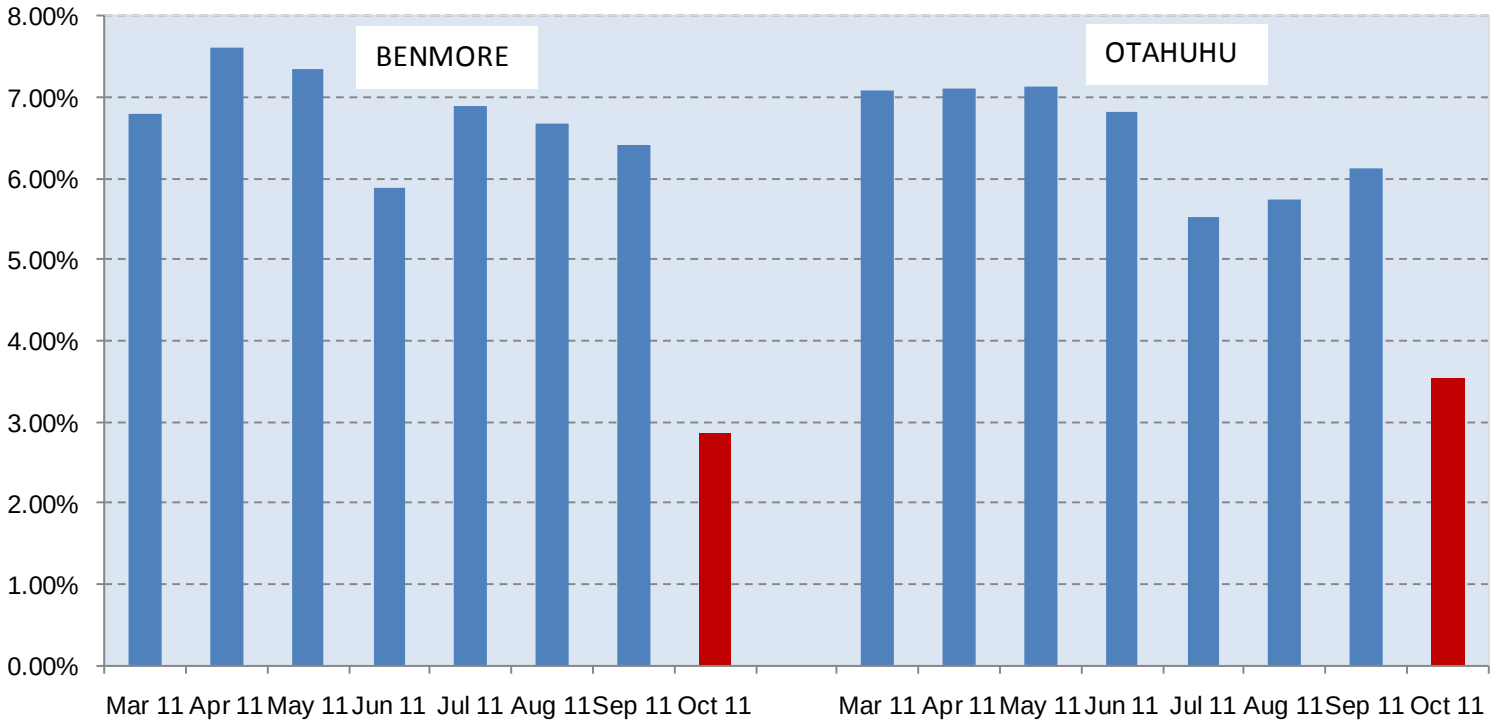
2011

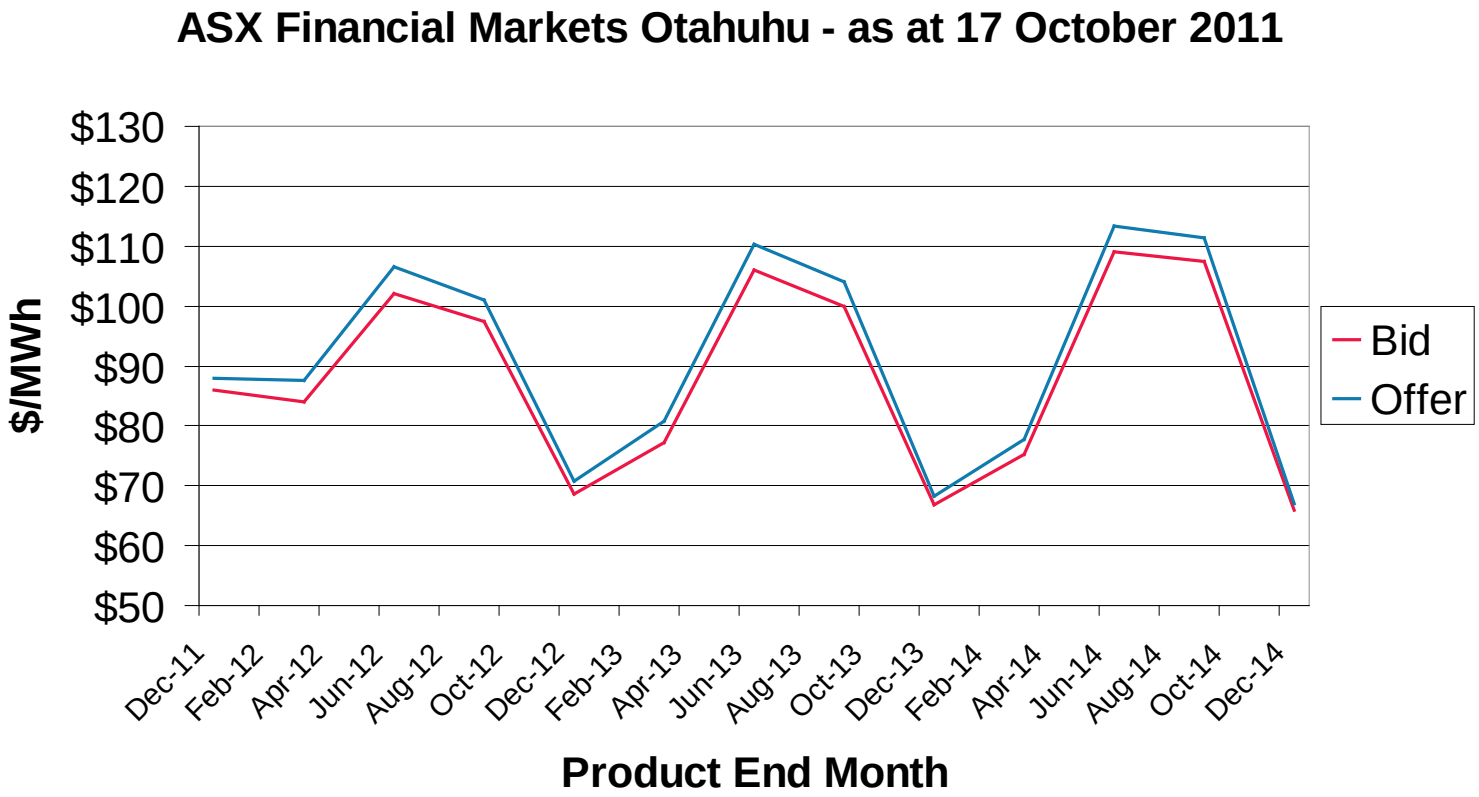
- ASX market performance needs to improve
  - Bid-ask spreads typically 7 – 8%
  - Market-making is only on offer volumes of 1 MW at Benmore and Otahuhu

- The Authority “encourages” generators to adopt new market-making agreements with ASX, comprising
  - Maximum bid-ask spread of 5% for each market-maker
  - Larger offer volumes: 3 x 1 MW offers for each market-maker
  - The objective is a robust and efficient forward price curve
  - We expect robust futures pricing to flow through to OTC market negotiations

- New market-making agreements adopted in October 2011 by three of the largest generators and by a fourth generator in November 2011

Average bid-ask spread on ASX futures



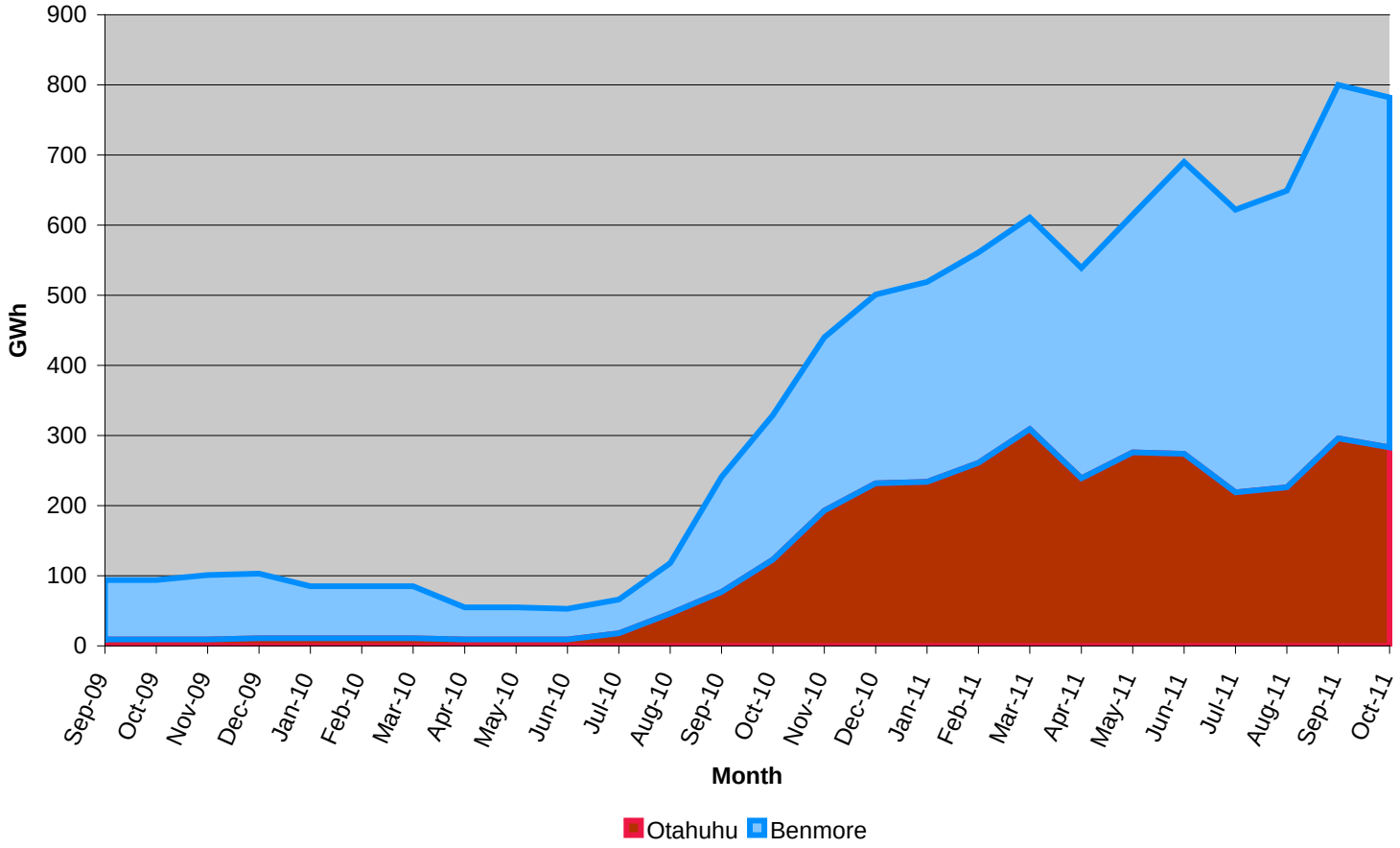

ASX Financial Markets Otahuhu - as at 17 October 2011
$/MWh
$130
$120
$110
$100
$90
$80
$70
$60
$50
Dec-11
Feb-12
Apr-12
Jun-12
Aug-12
Oct-12
Dec-12
Feb-13
Apr-13
Jun-13
Aug-13
Oct-13
Dec-13
Feb-14
Apr-14
Jun-14
Aug-14
Oct-14
Dec-14
Product End Month
Bid
Offer

Unmatched open interest (UOI) in 2011

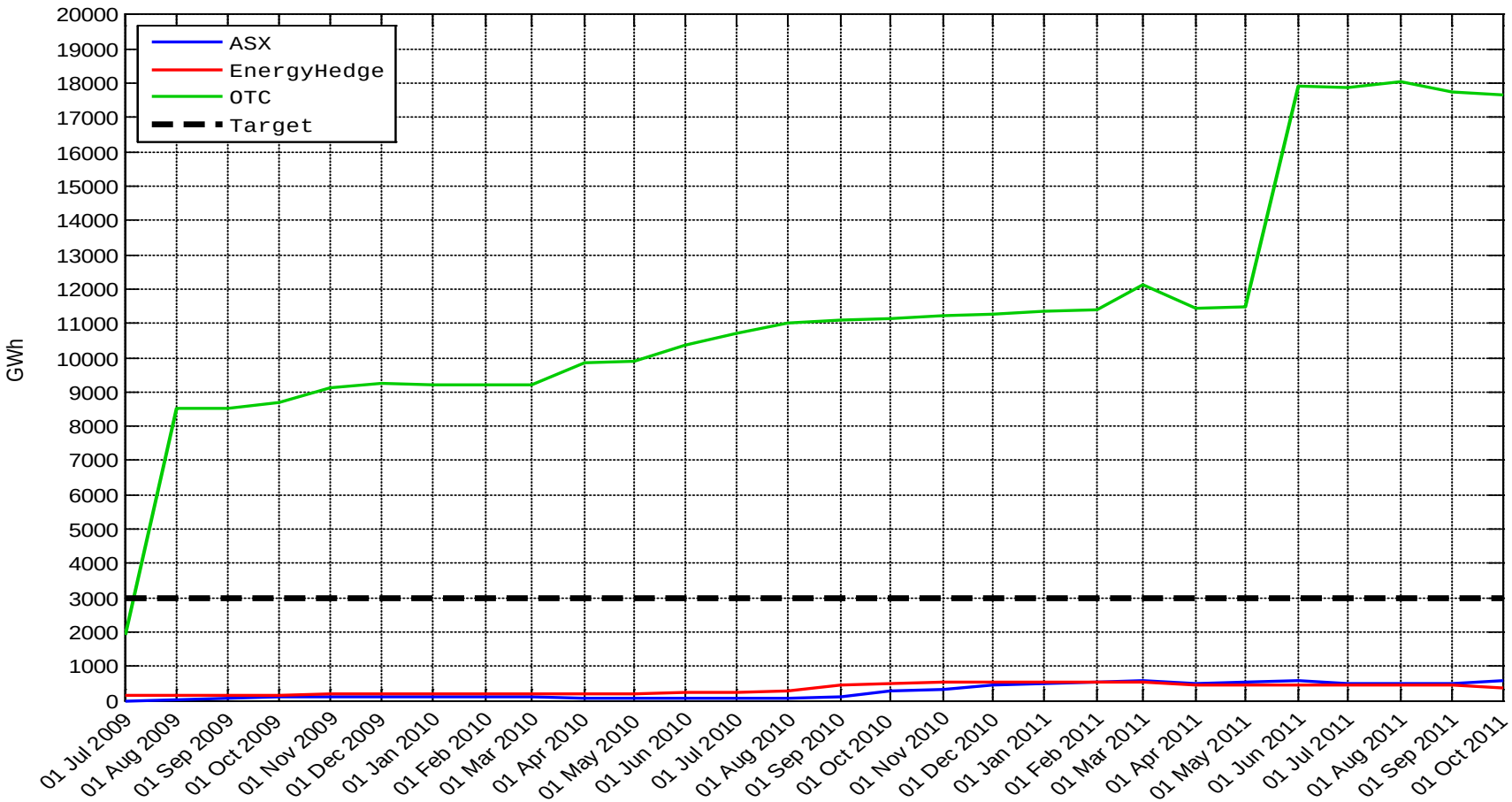
- Performance of the ASX market in regard to UOI is more difficult to assess
  - UOI only reached 600 GWh by 1 June 2011
  - But the SOE generators link their VAS agreements to the ASX price
  - In effect, they have largely achieved the 3,000 target

- But the Authority wants transparency on UOI

ASX open interest (cumulative)



Open Interest by Platform



Hedge market policy focus going forward

- Achieving new UOI targets
  - 1,000 GWh by 1 Dec 2011
  - 2,000 GWh by 1 Mar 2012
  - 3,000 GWh by 1 Jun 2012

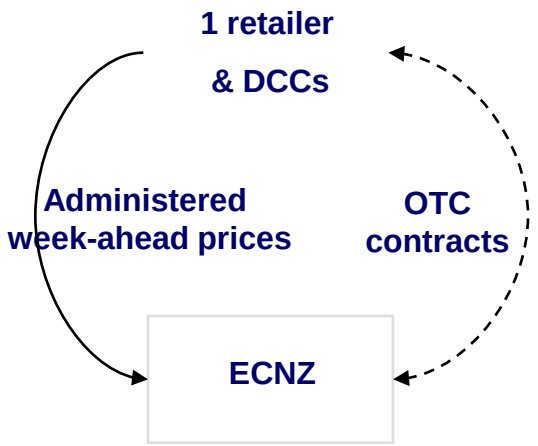
- Market-making on caps or options
  - Clear forward price signals for last-resort resources
  - Should make it easier to avoid ad-hoc policy interventions during supply shortages

- Ongoing education and training on electricity risks, risk management tools, governance of risk management

Appendix:
Origins of the NZ hedge market

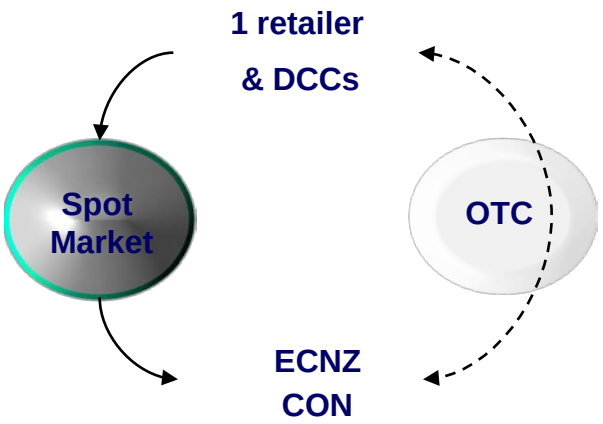
Pre-market arrangements

- Electricity Corporation of New Zealand (ECNZ)
  - Established in 1987 with virtually all of NZ's generation and transmission assets
  - Retailing undertaken by 67 distributors, but that means only 1 retailer at each node
  - Directly connected consumers (DCCs) pay wholesale prices to ECNZ



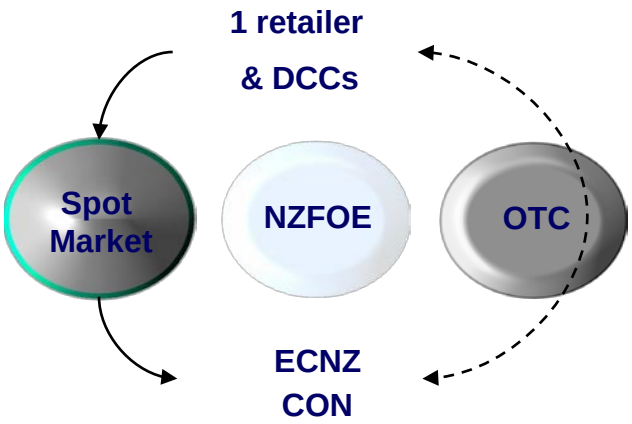
Formation of the spot market

- 1991: Prolonged droughts led to power ‘black outs’
- 1992: Government inquiry recommended formation of electricity market
- 1994
  - Retail choice introduced for large consumers
  - Transpower (grid owner) separated from ECNZ
  - ECNZ started providing week-ahead prices based on estimated marginal cost of supply
  - ECNZ also offered fixed price hedge contracts
- 1996
  - Contact Energy (CON) created from subset of ECNZ generation assets
  - *Voluntary* spot market introduced, comprising only two generation companies (ECNZ and Contact)



Development of the hedge market to 1998

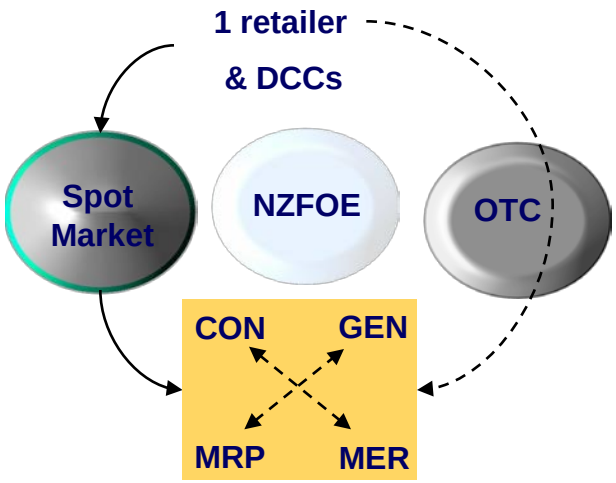
- The spot market created significant energy price volatility
  - OTC contracts increasingly used to manage energy price volatility
  - Electricity futures introduced by the NZ Futures and Options Exchange (NZFOE)



- With 244 nodes, the spot market created significant locational price volatility
  - 1996: Transpower offers transmission hedge products
  - 1998: Transpower withdraws them due to concerns about generator pricing behaviour when grid constraints became binding
  - Transpower announces intention to introduce financial transmission rights (FTRs)

Development of the hedge market in 1998

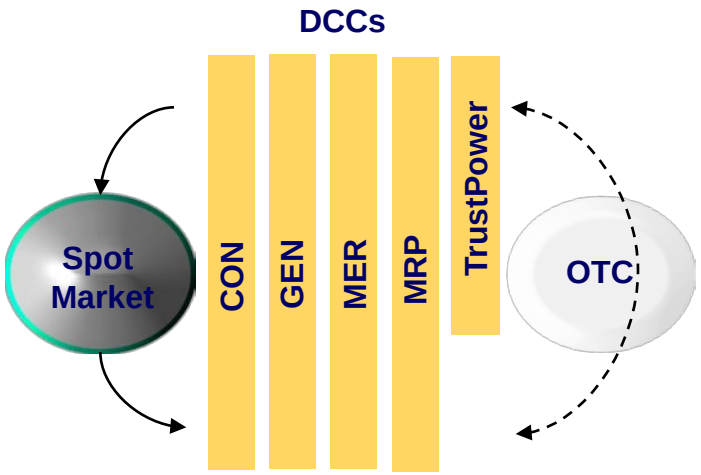
- The Electricity Industry Reform Act 1998
  - Privatisation of Contact Energy (CON)
  - ECNZ split into three more SOEs:
    - Genesis Energy (GEN)
    - Meridian Energy (MER)
    - Mighty River Power (MRP)



- Cross-hedging between the four major generator-retailers reputedly very limited

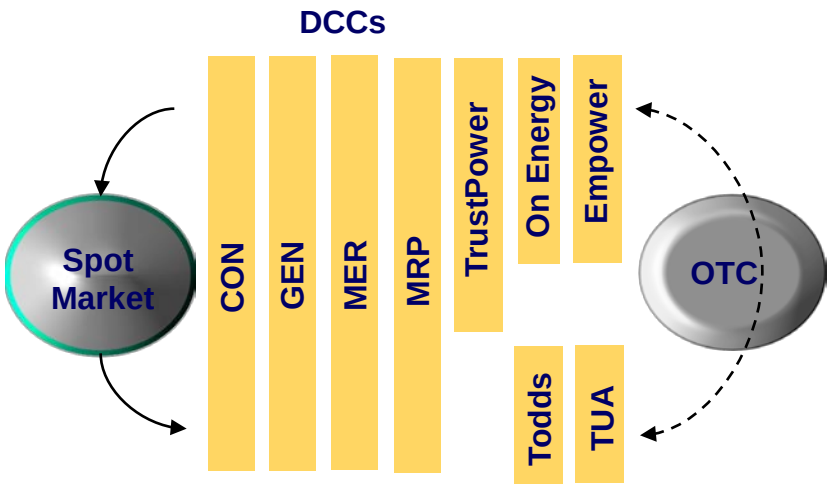
Development of the hedge market in 1999

- The 1998 Act also introduced full retail competition, starting in 1999
  - Retailer-distributors required to divest either retail or distribution
  - They all sell their retail businesses to generators, except for TrustPower which sold its distribution business
  - Vertical integration sucked volume and liquidity from the fledgling OTC market
  - NZFOE withdrew its electricity futures product



Development of the hedge market in 1999 & 2000

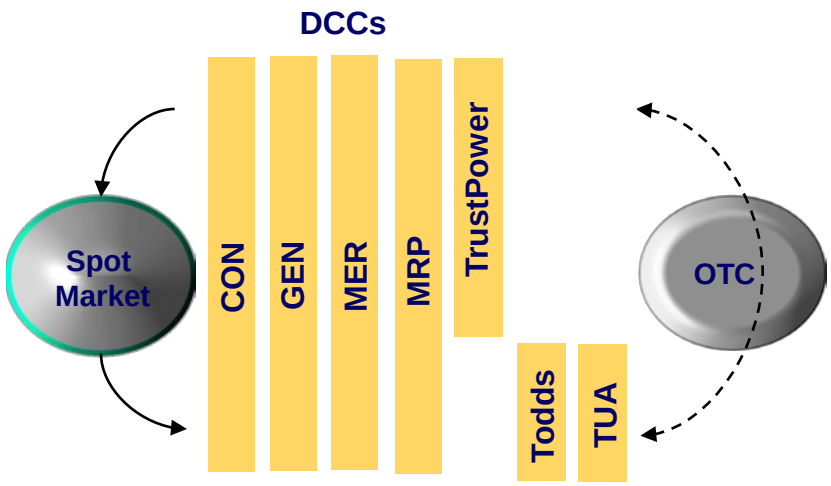
- 1999
  - Government holds inquiry into electricity market
  - Two independent retailers enter the market. On Energy becomes largest retailer
  - Independent retailers obtain hedge cover for 2000



- 2000
  - Two small independent generators, Tuaropaki and Todd Energy, enter the market
  - On Energy fails to obtain hedge cover for 2001

Market developments in 2001

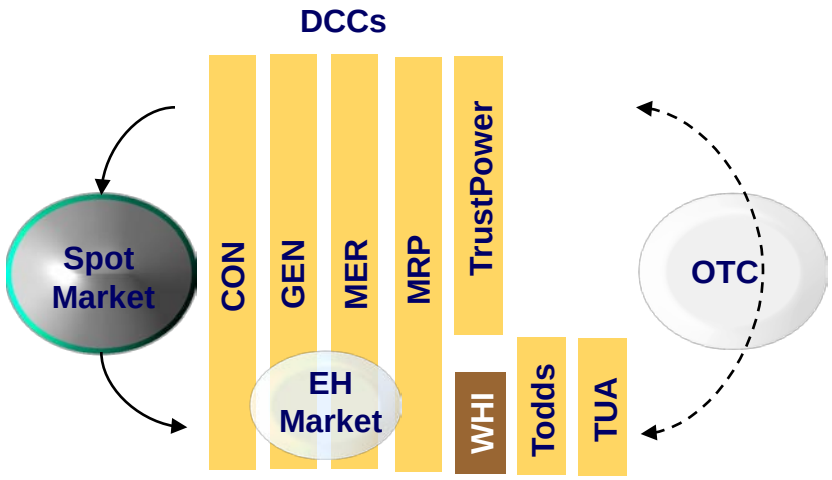
- 2001: Drought leads to very high spot prices for prolonged period but no ‘black outs’
  - New retailers, and many DCCs, poorly hedged
  - Intense lobbying for government intervention.
  - Government instigates a public conservation campaign (PCC)



- On Energy bankrupted and Empower sells its business to Contact Energy
- No transparency on why On Energy didn’t obtain hedges

Market developments in 2003

- Another drought leads to very high spot prices for prolonged period but again no 'black outs'
  - Intense lobbying for PCCs again
- Govt contracts for a diesel-fired reserve power station at Whirinaki
  - Whirinaki to be offered into the market at its short run marginal cost (SRMC) when droughts occur
  - Prospect of loss-making Whirinaki power station undermines hedging incentives
- Under general pressure from Government the four largest generator-retailers establish EnergyHedge



Market and policy developments 2006 - 2009

- TrustPower enters the EnergyHedge market in January 2006
- Another drought develops in winter 2006 but it is not so severe as 2001 and 2003
  - No retailers fail but intense pressure for PCC
  - Whirinaki operated at its SRMC but it fails to cap spot market prices
- 2008: A severe drought develops in winter 2008, resulting in very high prices and significant price separation between North and South Islands
  - No retailers fail but intense pressure for initiatives to suppress spot prices
  - Under considerable pressure, the Electricity Commission reduces Whirinaki offer price below its SRMC

Policy developments 2008 – 2010

- 2008: Electricity Commission launches ‘winter review’ and identifies price suppression from
  - Whirinaki being offered into the market at prices below its SRMC
  - Maximum thermal generation not achieved, potentially due to pricing strategies of hydro generators
  - Both matters undermine commercial hedging

- 2009: Capacity shortages start to occur as operation of Whirinaki creates unit commitment risks for Genesis Energy’s old coal-fired units
- 2009/10: Newly elected government holds Ministerial Review of Electricity Market Performance. Among other initiatives the Government decides to:
  - Abolish reserve energy scheme and Whirinaki to be sold to Meridian
  - Mandate the transfer of Tekapo A and B stations from Meridian to Genesis

Policy developments 2008 – 2010, continued

- (Continued) The Government
  - Requires the three SOE generators to agree virtual asset swaps (VAS)
  - Request the five largest generators to establish a NZ electricity futures market
  - Electricity Commission to be replaced by an independent Crown entity, (originally) entitled the Electricity Market Authority

- March 2010: the Electricity Commission
  - Increases Whirinaki offers from $1,000 to $5,000/MWh when hydro risks are normal or on security watch, to address unit commitment issues … spot price volatility increases substantially over the rest of 2010
  - Alters methodology for calculation of final spot IR prices during capacity scarcity situations to reduce IR price collapses when reserve requirements reduced to free up capacity for the spot energy market

Initial HM development initiatives: Transparency and liquidity

Formation of the EnergyHedge (EH) market

- 2003: Under pressure from the Govt the four largest generators establish *energyHEDGE.co.nz*
  - A web platform for price discovery, open 11am – 12 noon
  - Standardised derivatives
  - Referenced to Haywards spot price
  - Quarterly contracts, up to 27 months ahead
  - Bilateral settlement of trades, bilateral credit risk
  - Only open to parties able to meet credit requirements and willing to market-make at a maximum of 10% bid-ask spread

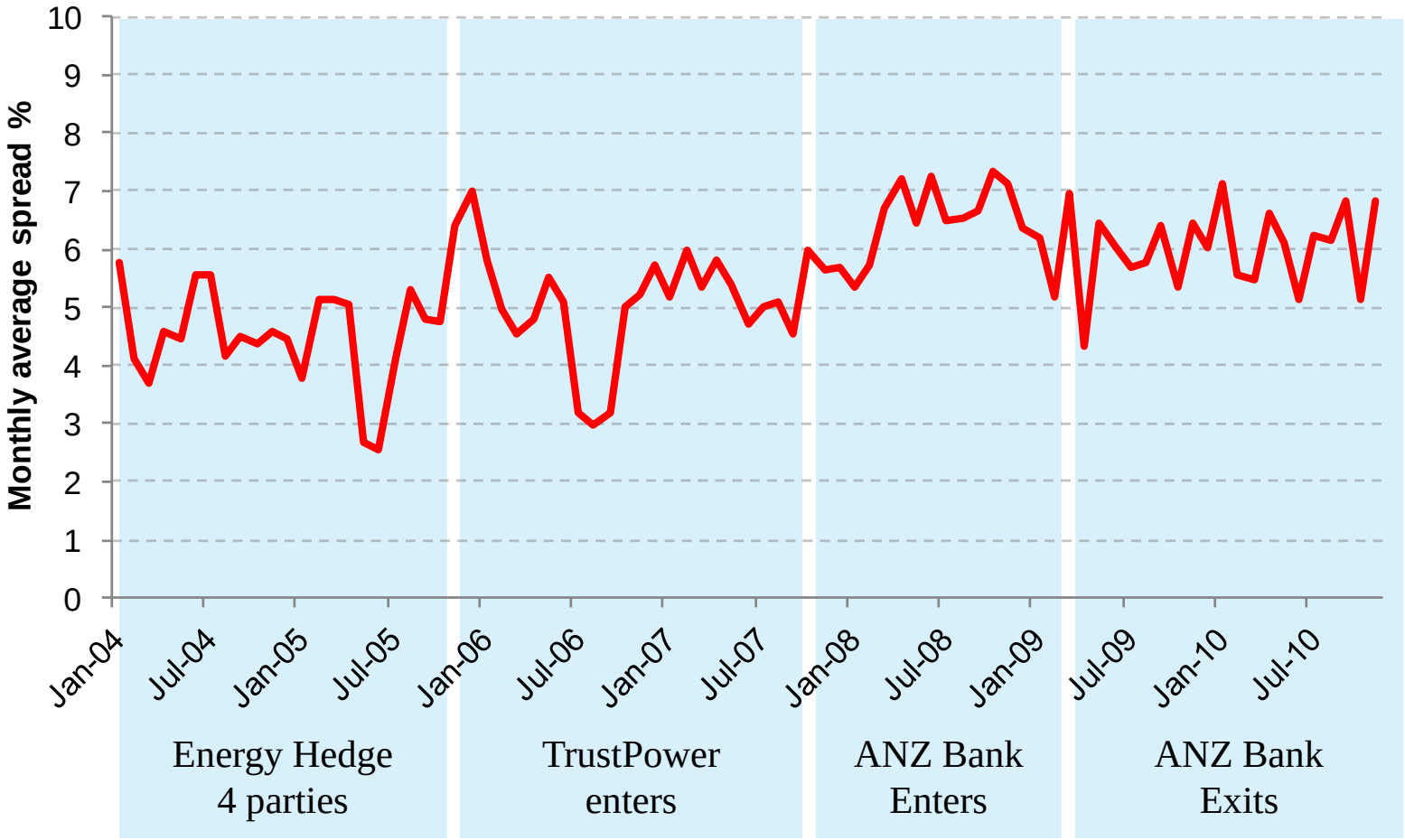
Price transparency from EnergyHedge

- EnergyHedge (EH) provided much needed transparency on forward prices
  - Consumers increasingly reference EH prices when negotiating OTC contracts
  - But robustness of prices was questioned as volumes were less than 0.5% of spot market volume

- TrustPower enters the EnergyHedge market in January 2006 but suspends market-making (and trading) during 2008 when spot prices escalate sharply

- ANZ Bank enters EnergyHedge in 2007 and exits in 2009

EnergyHedge bid-ask spread



2006 hedge market report

- The Electricity Commission identified the following problems with the hedge market
  - A. Lack of robust information on OTC prices and volumes and on supply risks
  - B. Lack of confidence in the competitiveness of the hedge market
  - C. Lack of suitable mechanism to manage locational price risk
  - D. High participation and transaction costs on the OTC market
  - E. Lack of understanding of electricity risk management

2006 policy on hedge markets

- The Electricity Commission adopted the following solutions

Policy initiatives	Addresses problems
1. Require publication of OTC contracts	A, B, D and E
2. Further develop EnergyHedge	A, B, and D
3. Introduce locational rental allocations (LRAs), not FTRs	A, B, C and D
4. Develop a master ISDA agreement	A, B, and D
5. Make outage and fuel information easier to understand	A, B, D and E
6. Promote risk management training and advisors	A, B and E
7. Undertake an annual survey of hedge market participants	A, B and E