

Have Electricity Market Reforms Empowered Consumers?

EMAN 410

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31st July 2009



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Abstract

- Reforms in the 1990s opened electricity generation up to competition and removed regulated franchise areas from regional Electricity Supply Authorities, allowing generators and electricity retailers to compete for load and customers across the country. But on-going price rises and a series of dry years have created a negative perception of these reforms and caused many to ask the question – are we better or worse off for deregulation? This seminar takes an objective and critical look at the reforms, at the needs and aspirations of consumers, and at whether the market has delivered for consumers and the nation as a whole.

Power Players

Generators

Meridian Energy
Contact Energy
Genesis Energy
Mighty River Power
TrustPower
Todd Energy
Small generators

Lines Companies

Vector
PowerCo
Orion
Unison, etc
(27 distribution companies
regionally based)

Transmission

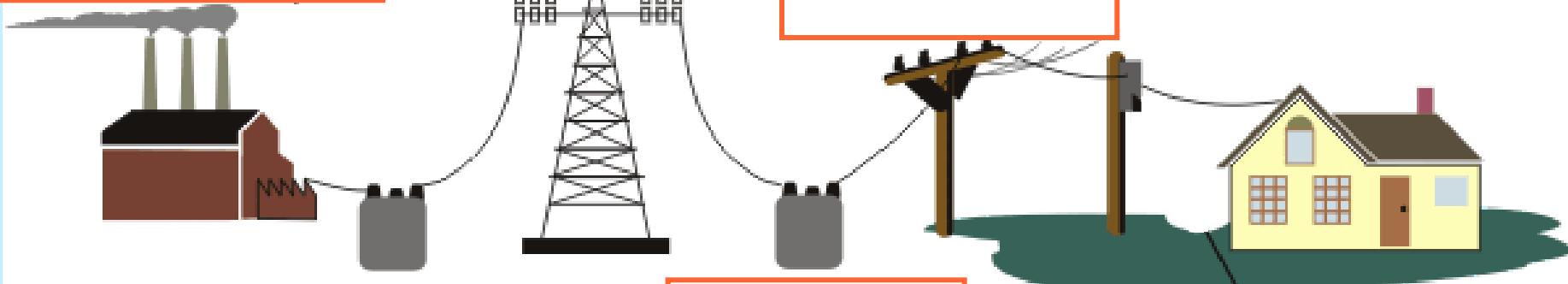
Transpower

Retailers

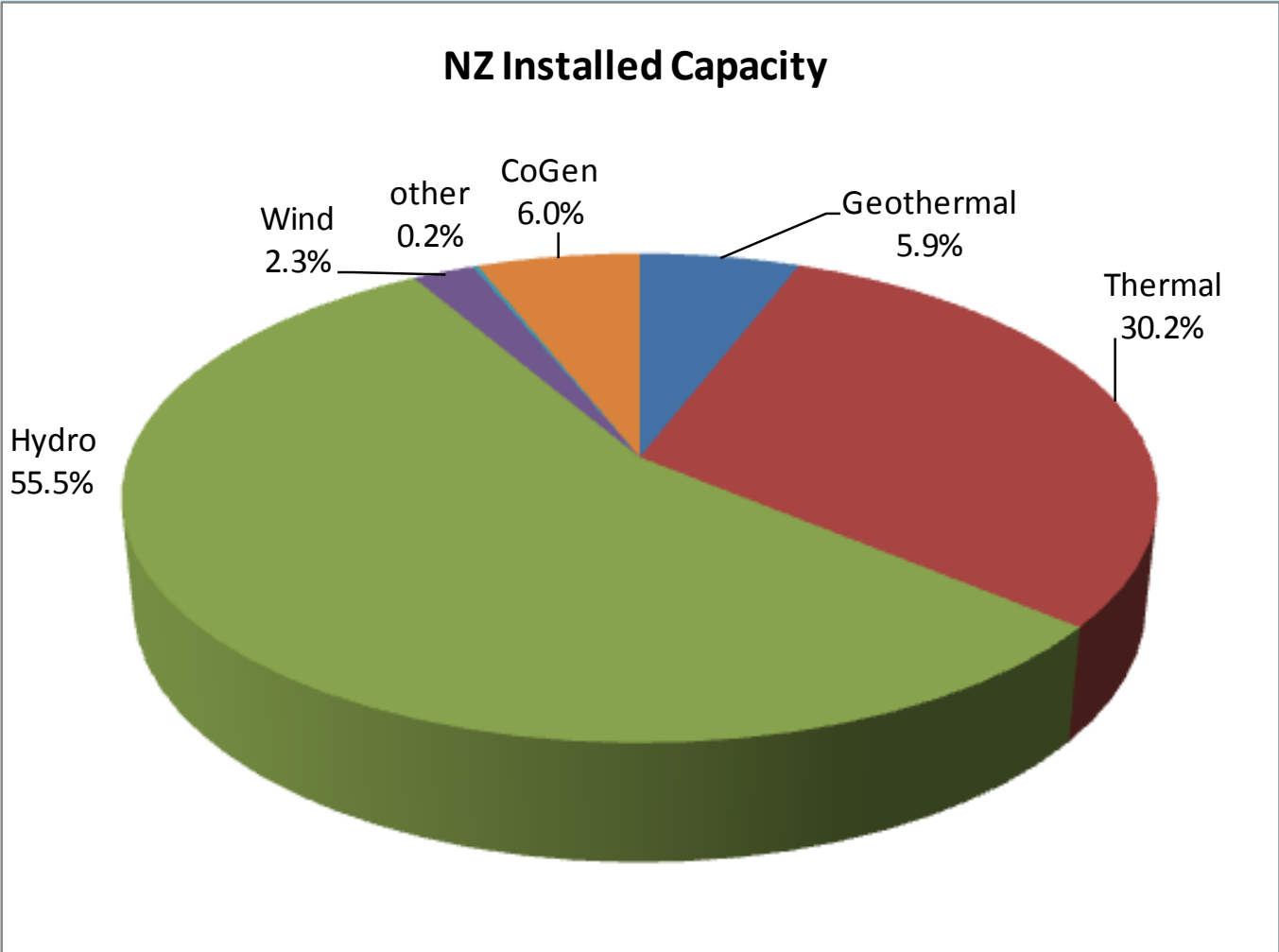
Meridian Energy
Contact Energy
Genesis Energy
Mercury Energy
TrustPower
Bay of Plenty Electricity
King Country Energy
Smaller retailers

Consumers

Residential
Commercial
Industrial

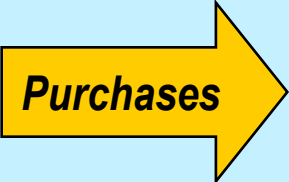
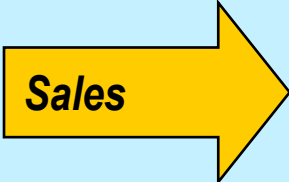


Installed Capacity

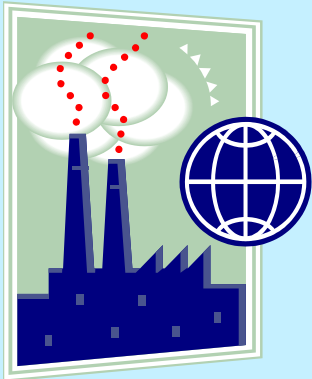


Electricity - Market or Markets?

Generators



Retailers & Norske Skogg

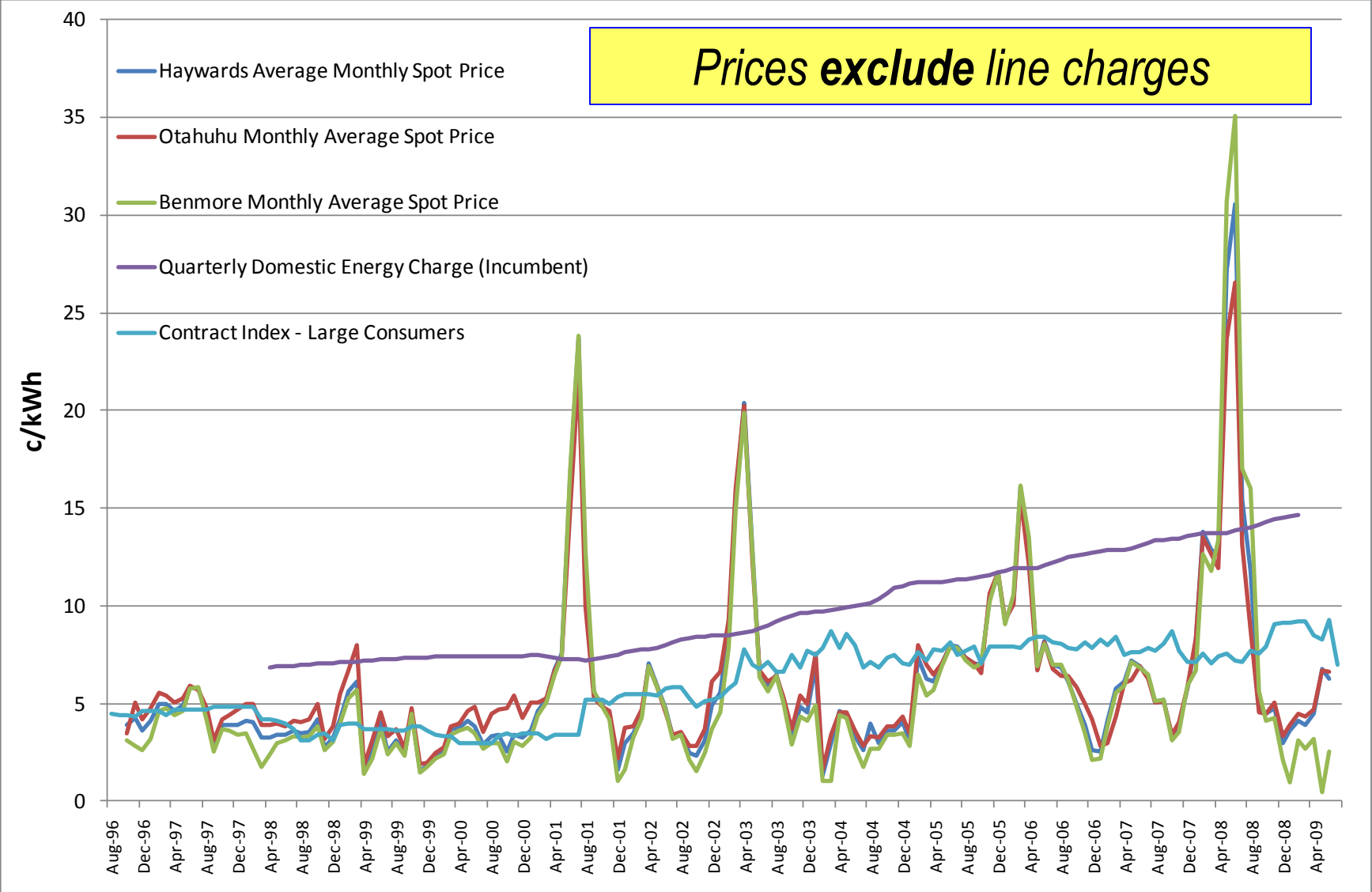


350,000 Commercial & Industrial consumers

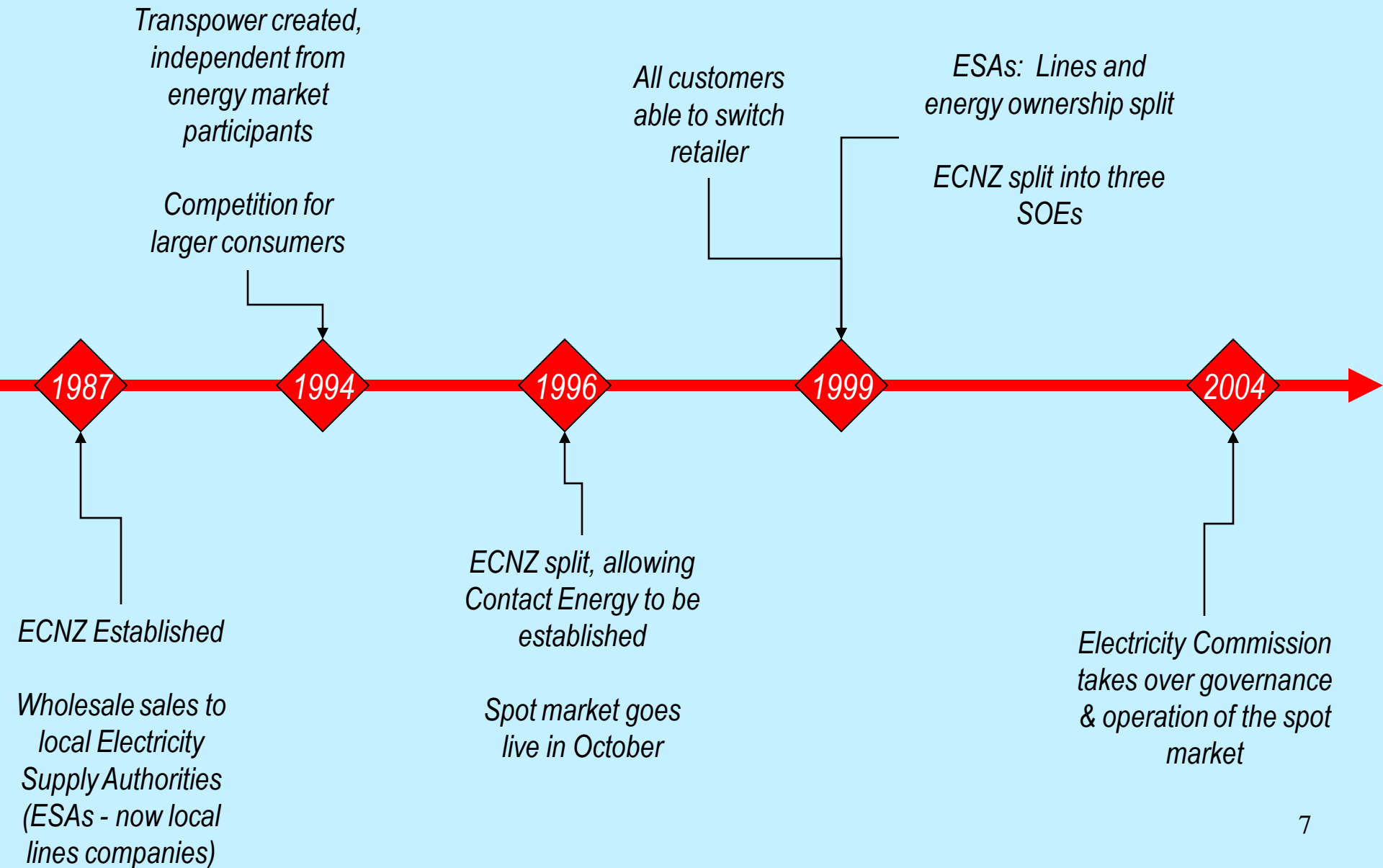


1.6 million Residential consumers

Market Prices



Industry Structure - History



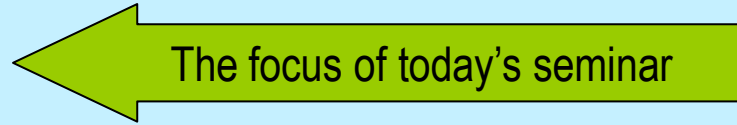
What were the market reforms intended to do?

- From the WEMDG* final report:
 - Reduce direct government involvement in investment and pricing decisions which had led to:
 - » overestimates of demand growth
 - » excess capacity (building too much generation)
 - » long periods of price freezes followed by massive price increases
 - » tax payers subsidising inefficient investment in generation
 - Attract new sources of capital for investment in new generation
 - Lower barriers to entry by reducing ECNZ's dominance
 - Constrain and stabilise prices through competition and efficient investment
 - Encourage investment in energy efficiency

* Wholesale Electricity Market Development Group

How would we know we're empowered?

- Lower prices



- or at least lower than they would have been under ECNZ

- Levels of service tailored to suit customer preferences

- might vary depending on how much you pay, e.g.
 - » pay more in dry years, less in wet years
 - » pay a premium to have a price which is independent of hydrology

- Choice

- effective pricing signals
- good information, readily available
- competitive offers from suppliers
- easy to choose and switch suppliers

- Innovation

- deployment of new technology as it is proven
- service and choice improving over time

“Competition and economic efficiency in the electricity market”

- Part-time masters commenced April 2009
 - supervisors Bob Lloyd (Energy Studies), Robert Alexander (Economics)
- Compare economic efficiency since the market opened in 1996 to economic efficiency under ECNZ who owned and operated 97% of generation in this country
- We measure economic efficiency in terms of:
 - ‘economic surpluses’ for consumers and generators
 - can be broken down further into different aspects, e.g.
 - » allocative efficiency
 - » productive efficiency
 - » dynamic efficiency

Consumer surplus

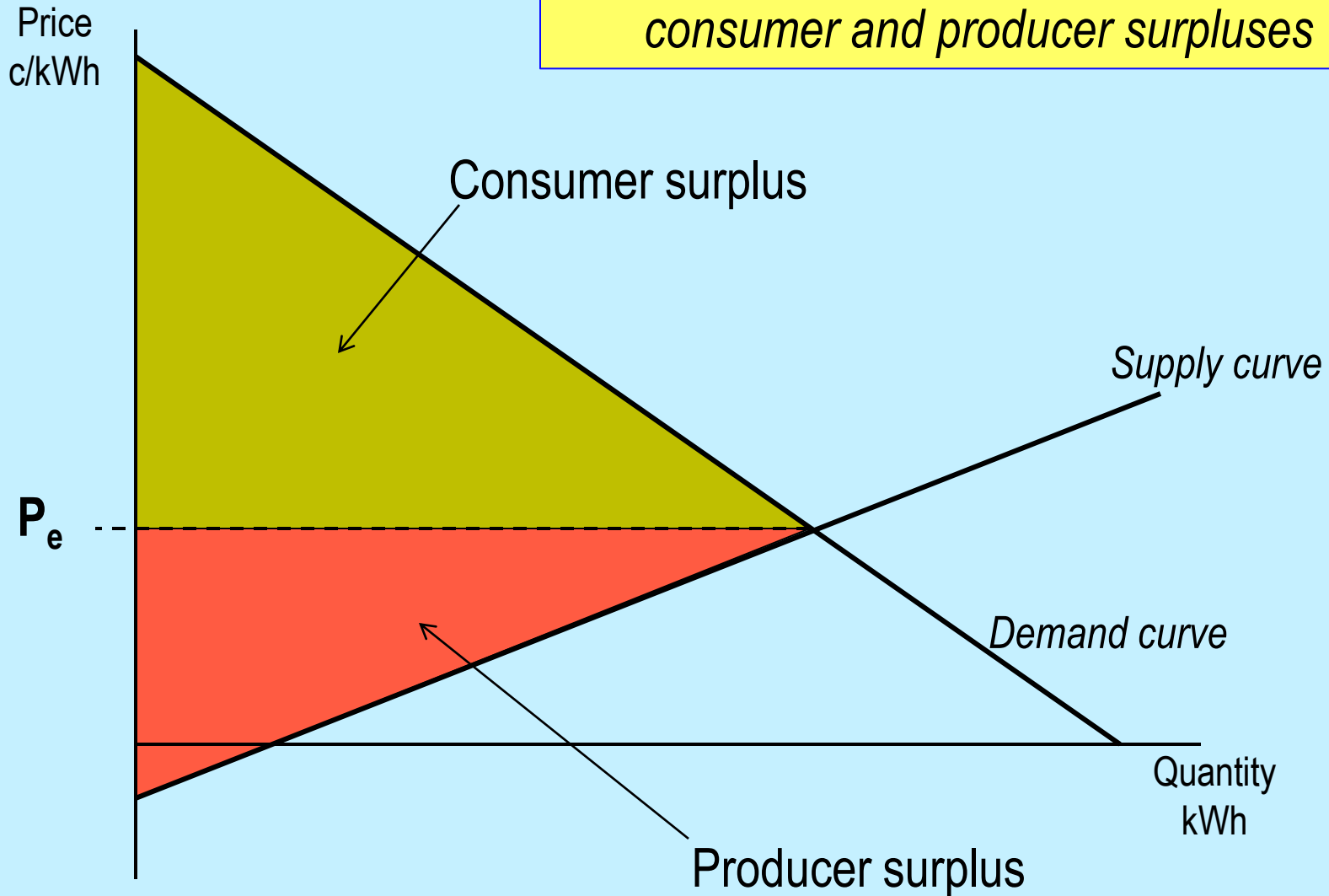
- Let's suppose that I use 13,000 kWh of electricity at home and I value it highly – I am fully prepared to pay 50 c/kWh
- But the market delivers electricity to me for \$20 c/kWh
- Then I have an 'economic surplus' each year which equals:
$$13,000 \times (\$0.50 - \$0.20) = \$3,900 \text{ per annum}$$
- I still pay \$2,600 per annum for electricity but have a surplus of \$3,900 because I pay less than the maximum amount I am prepared to pay

Producer surplus

- Likewise, if a generator is fully prepared to generate 5,000 GWh per annum for 5 c/kWh,
but receives 8 c/kWh from the market
- Then they have an economic surplus each year which equals:
 $5,000,000,000 \times (\$0.08 - \$0.05) = \$150$ million per annum

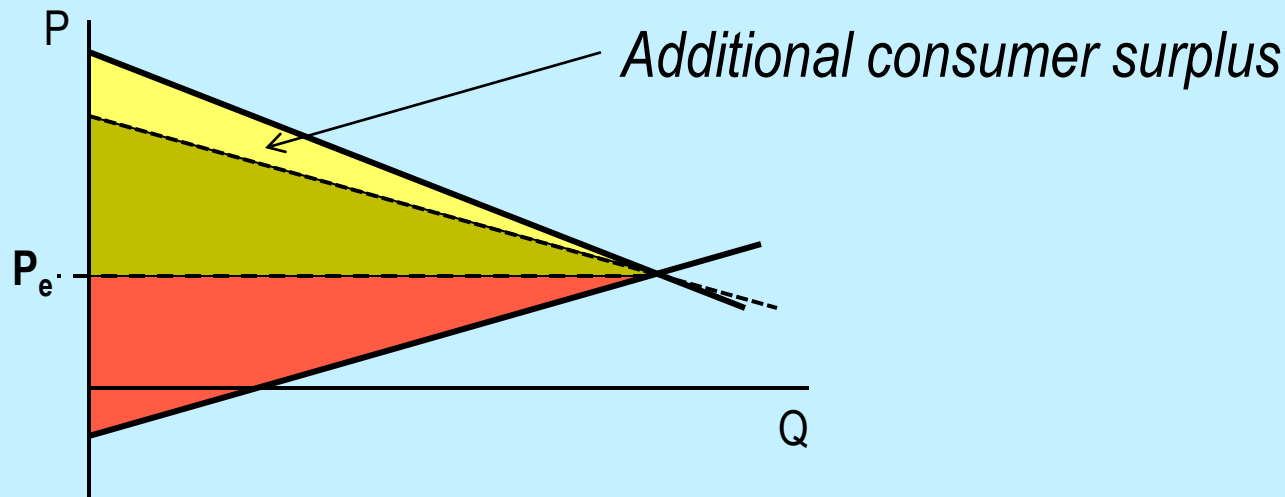
Consumer and producer surplus

*Total **economic welfare** is the sum of the consumer and producer surpluses*



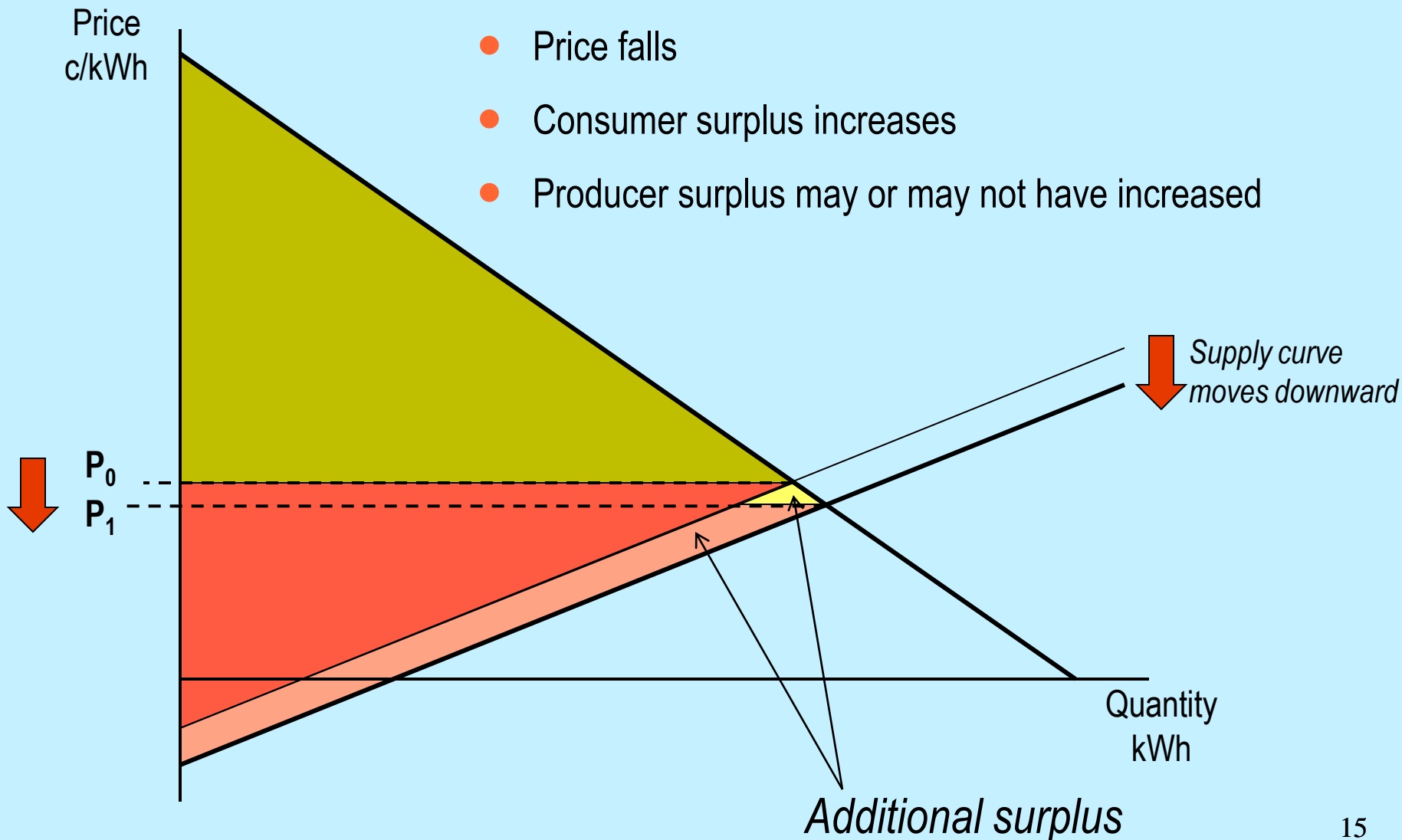
How does economic welfare increase?

- Let's suppose that my use of electronic equipment at home increases (parents & kids using computers, cell phones, home theatre, heat pump, and maybe I work at home)
- I'll now pay 70 c/kWh for electricity
- My economic surplus increases from \$3,900 to \$6,500 pa
- Perhaps the consumer surplus has increased over time just by virtue of greater value being placed on electricity?
- We may therefore be more concerned than ever about the ability of suppliers to extract excess profits from us, and about security of supply



Lower prices and economic welfare

- Total welfare increases by the sum of the pink and yellow
- Price falls
- Consumer surplus increases
- Producer surplus may or may not have increased



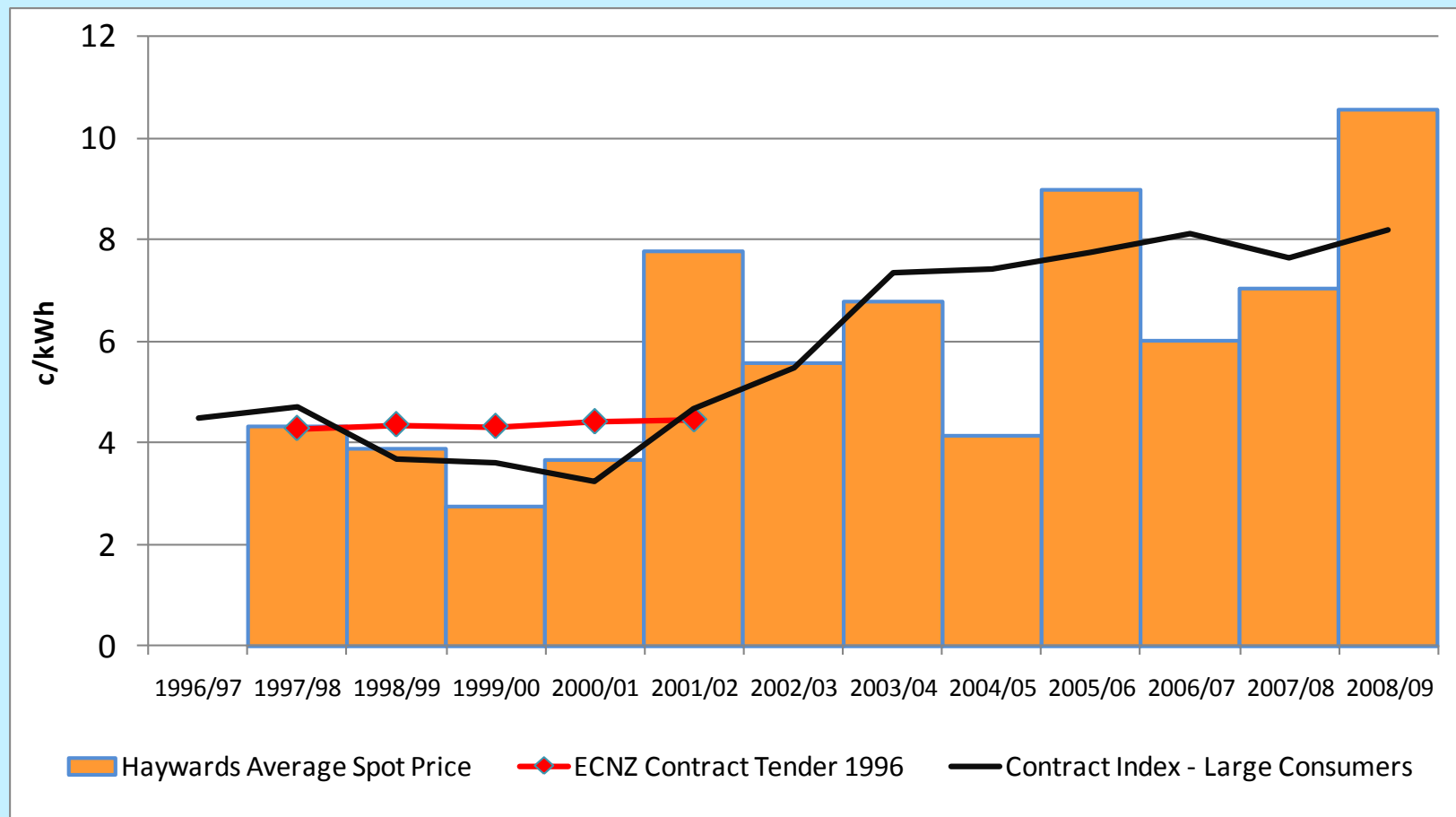
Aspects of efficiency

- Allocative efficiency
 - when no one can be made better off without making someone else worse off
 - closely associated with prices that accurately signal marginal costs through time
 - e.g. our relatively complex form of spot pricing signals the marginal cost of consumption at each of ~250 points on the grid
- Productive efficiency
 - producing something at lowest possible cost
 - a combination of technical efficiency (physics) and the relative cost of inputs (finance)
 - e.g. coal-fired generation might have lower thermodynamic efficiency than CCGT gas-fired generation, but if the price of coal is low enough then it might still have the lowest production cost in c/kWh
- Dynamic efficiency
 - the speed at which a market responds and adjusts to changes in market conditions
 - e.g. new, more efficiency technology is deployed in timely fashion

ECNZ's 1996 Contract Offer

- “Wholesale prices need to rise to be around 9 or 10 c/kWh in order to justify building new generation.”

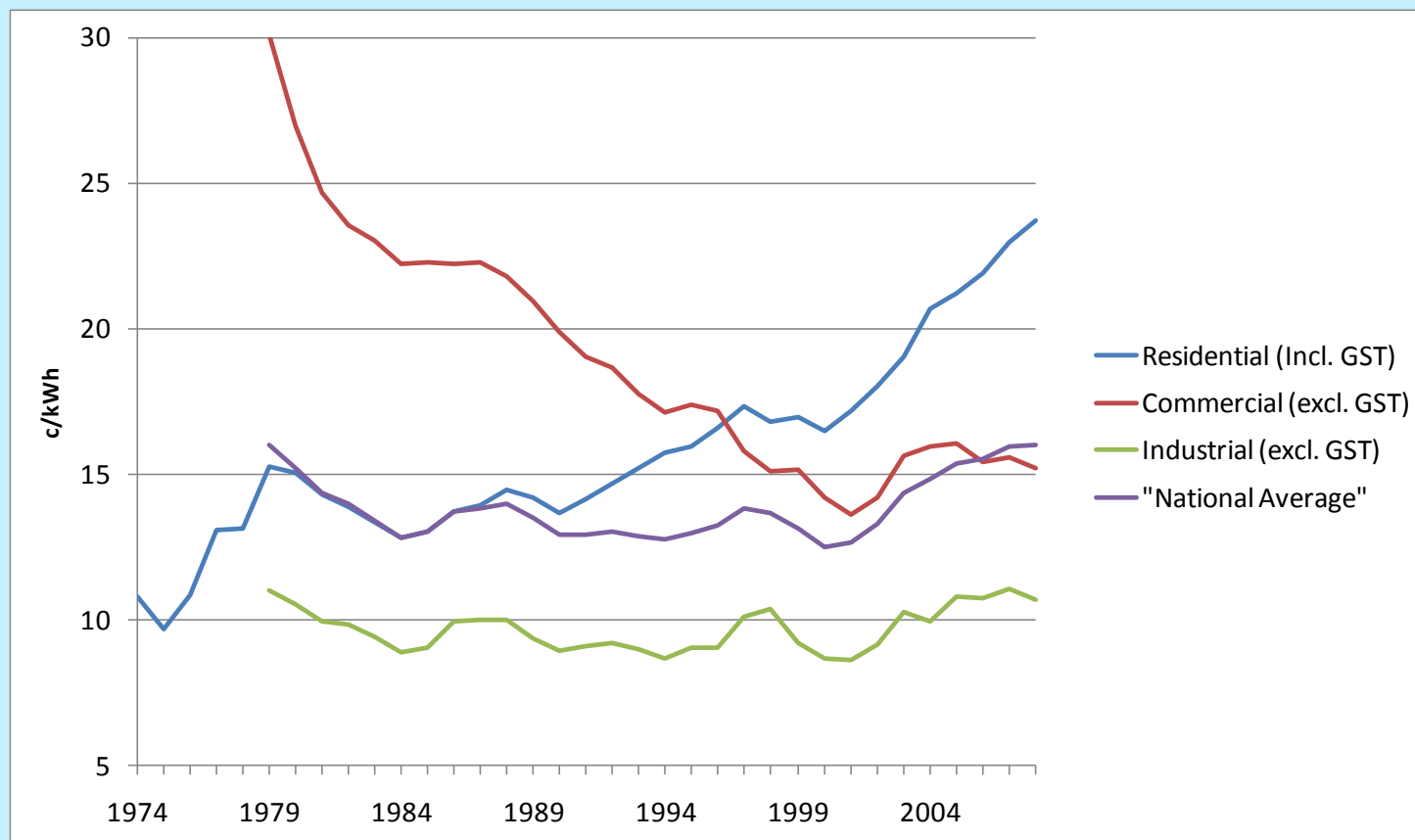
(John Fernyhough, Chairman ECNZ, during the 1992 crisis, referring to wholesale spot prices)



How Would ECNZ Have Behaved from 2001?

- Possible assumptions for modelling ECNZ's behaviour, leading to an alternative price path:
 - no incentive to displace its existing generation just because new technology became available (a competitor would displace)
 - weak incentives to make existing generation more efficient
 - build new generation only when demand growth required it
 - risk-averse in deploying new technology on a large scale
 - enter into large, long term gas contracts as Maui ran down
 - target rate of return consistent with SOE expectations
 - pass all costs onto consumers
 - become a very large retailer in 1998/99
 - » ESAs would have to split lines from energy

MED price series (real 2008 dollars)



- Real residential prices:

- increased 44% from 2000 – 2008
- increased 58% from 1975 – 1979
- increased 24% from 1990 – 1999
- increased 120% from 1974 to 2008

- Cross-subsidies between residential and commercial removed through to 2000

- real commercial prices fell 49% from 1979 to 2008
- no evidence to suggest residential consumers are now subsidising others

- Real industrial prices fell 3% from 1979 to 2008

Is the Electricity Industry Price Gouging?

- Commerce Commission “Wolak” report:
 - “extra \$4.3 billion in earnings to all generators over those that they would have earned under competitive conditions”
 - “wholesale prices ... 18 per cent higher than ... if ... more competitive”
- Critics and media:
 - “Wholesale rip-off”
 - “Price gouging”

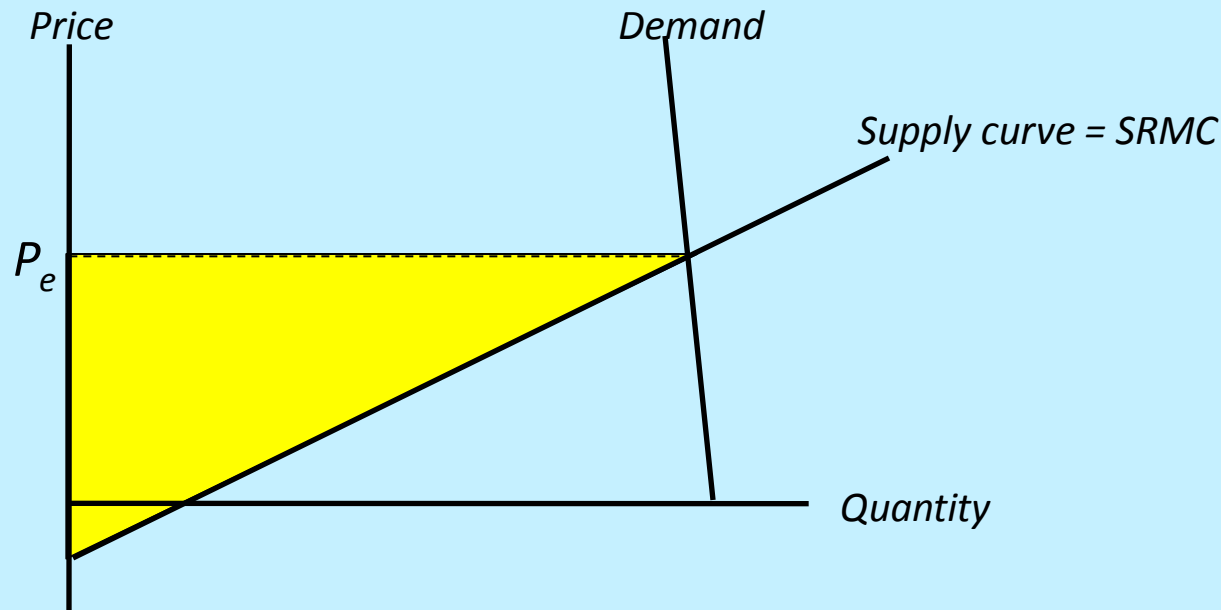


Generator Profits

- ComCom - \$4.3 billion excess? Really?
- \$4.3 billion would wipe 88% of generator profits
- Leaving \$110 million pa in profits (\$77 million after tax)
- Just keeping pace with demand growth requires \$300+ million pa investment in new generation

Operating Surplus \$m	Meridian	Genesis	MRP	Contact	TOTAL
2000/01	191	70	77	195	532
2001/02	134	70	67	163	434
2002/03	172	106	127	174	578
2003/04	251	130	155	241	777
2004/05	332	119	188	206	845
2005/06	332	142	172	369	1,016
2006/07	339	105	185	366	994
2007/08	198	142	183	339	861
2001 - mid 2007	1,655	707	933	1,615	4,909

Perfect competition



- ComCom - spot market should be like perfectly competitive market
 - many players
 - no barriers to entry or exit
 - results in prices equal to short run marginal cost (SRMC)

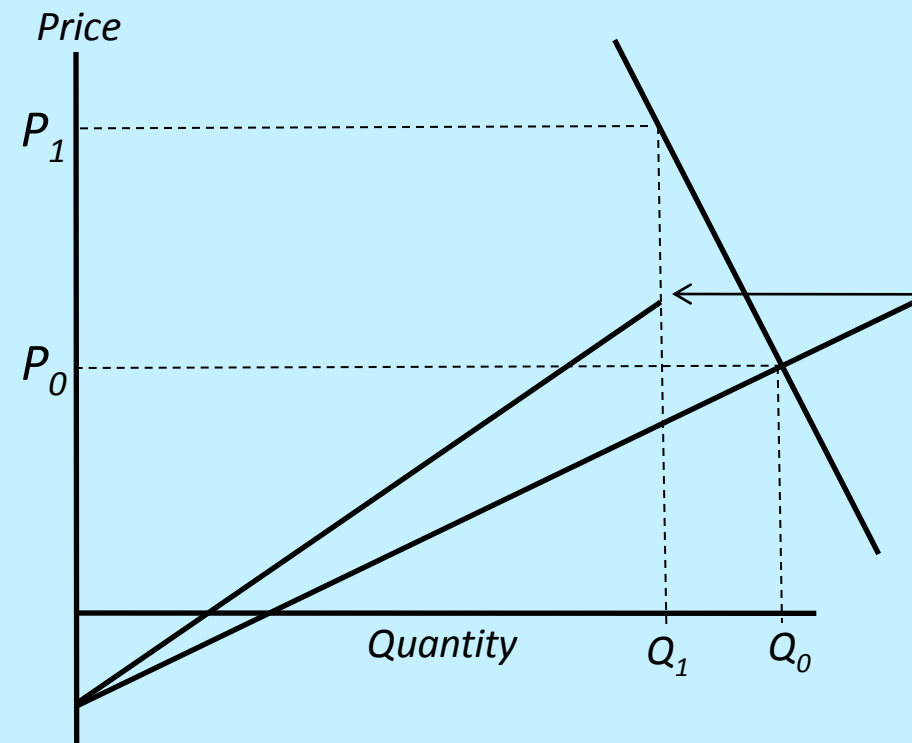
The “missing money” problem

- Price caps overseas have reduced scarcity rents*
 - reduces returns to all generators
 - reduces incentives to invest in new generation
 - threatens security of supply

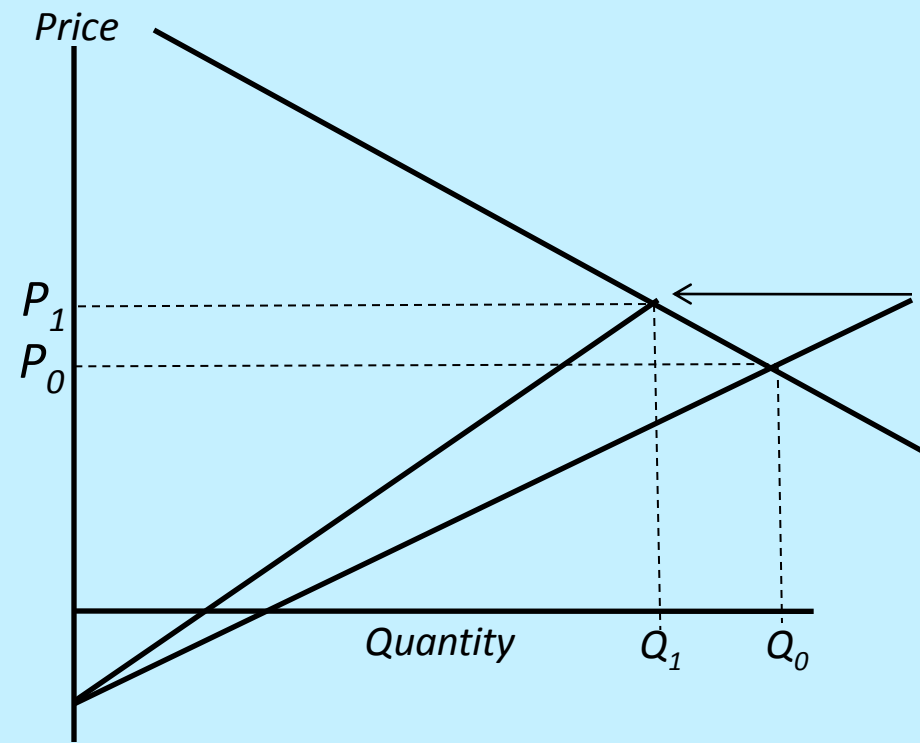
- Is this occurring in New Zealand?
 - de-facto, political constraints on spot prices during dry years?

* “Lesson regulators have learned from California Electricity Crisis is that a price of \$1/kWh too high for one hour is far worse politically than one that is 1 c/kWh too high for 1,000 hours” (Wolak 2008, ‘Why the United States Has Yet to Benefit from Electricity Industry Re-structuring (And What Can Be Done to Change This)’)

The Demand-side is Missing in a Dry Year



With steep (inelastic) demand curve a shortage may result



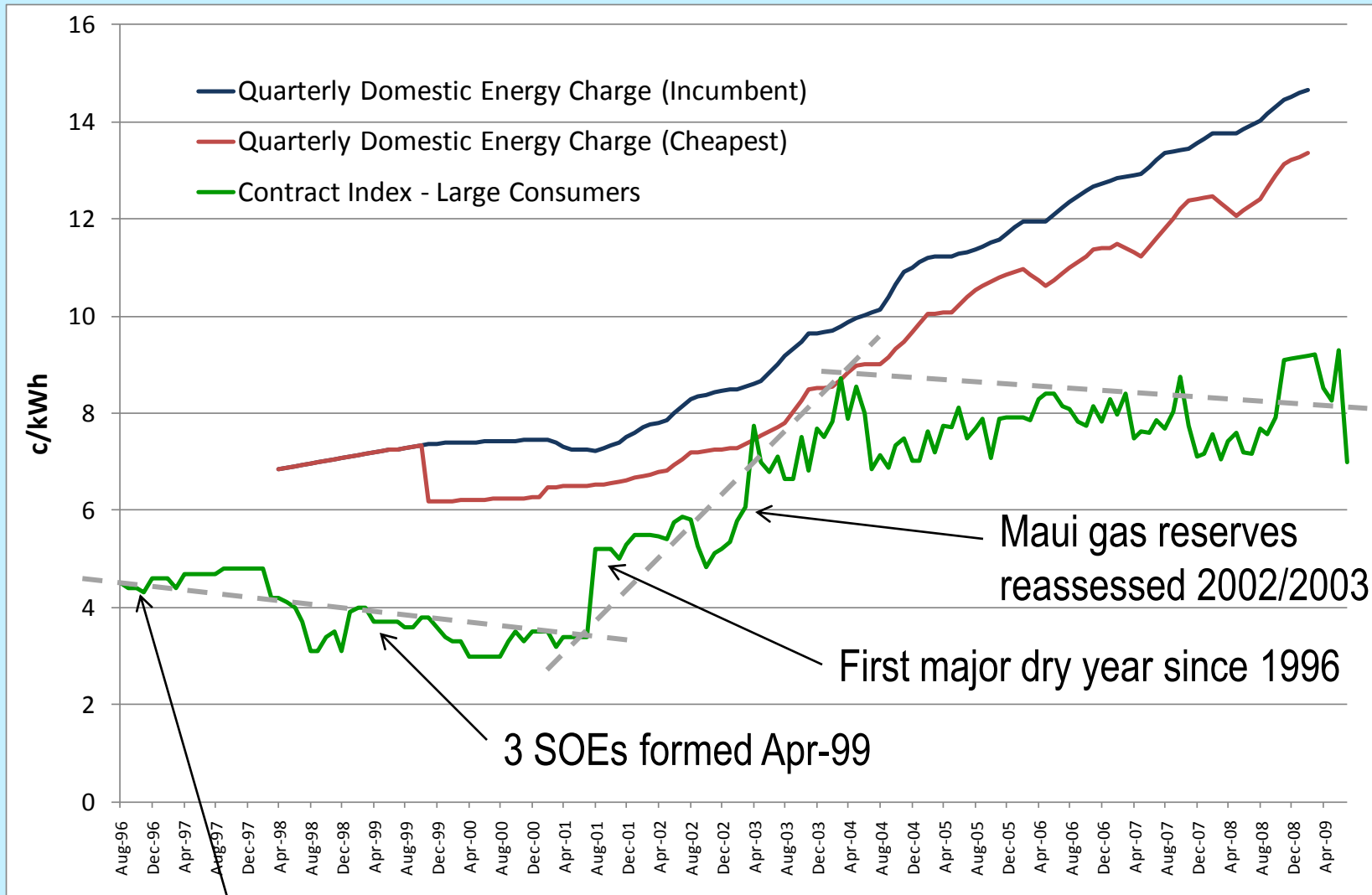
With more elastic demand a shortage may not result, price will be lower

- It is widely recognised in the literature that electricity supply around the world (market and centrally controlled) has failed to provide the infrastructure and pricing signals to empower consumers to choose the level of security they are prepared to pay for

Hydro Generation in Dry Years

- In dry years the value of water for generation should rise to signal the rising possibility of shortages:
 - the value of water is influenced by the spot price of electricity now, plus its ‘opportunity cost’, which is a function of expectations of future prices
 - in economic terms, water value is a valid component of SRMC
- Wolak was criticised for underestimating water values
- This is a conceptually difficult area and one which relies heavily on assumptions around the cost of forced rationing of power

Market Prices



Wholesale market,
Contact Energy formed 1996

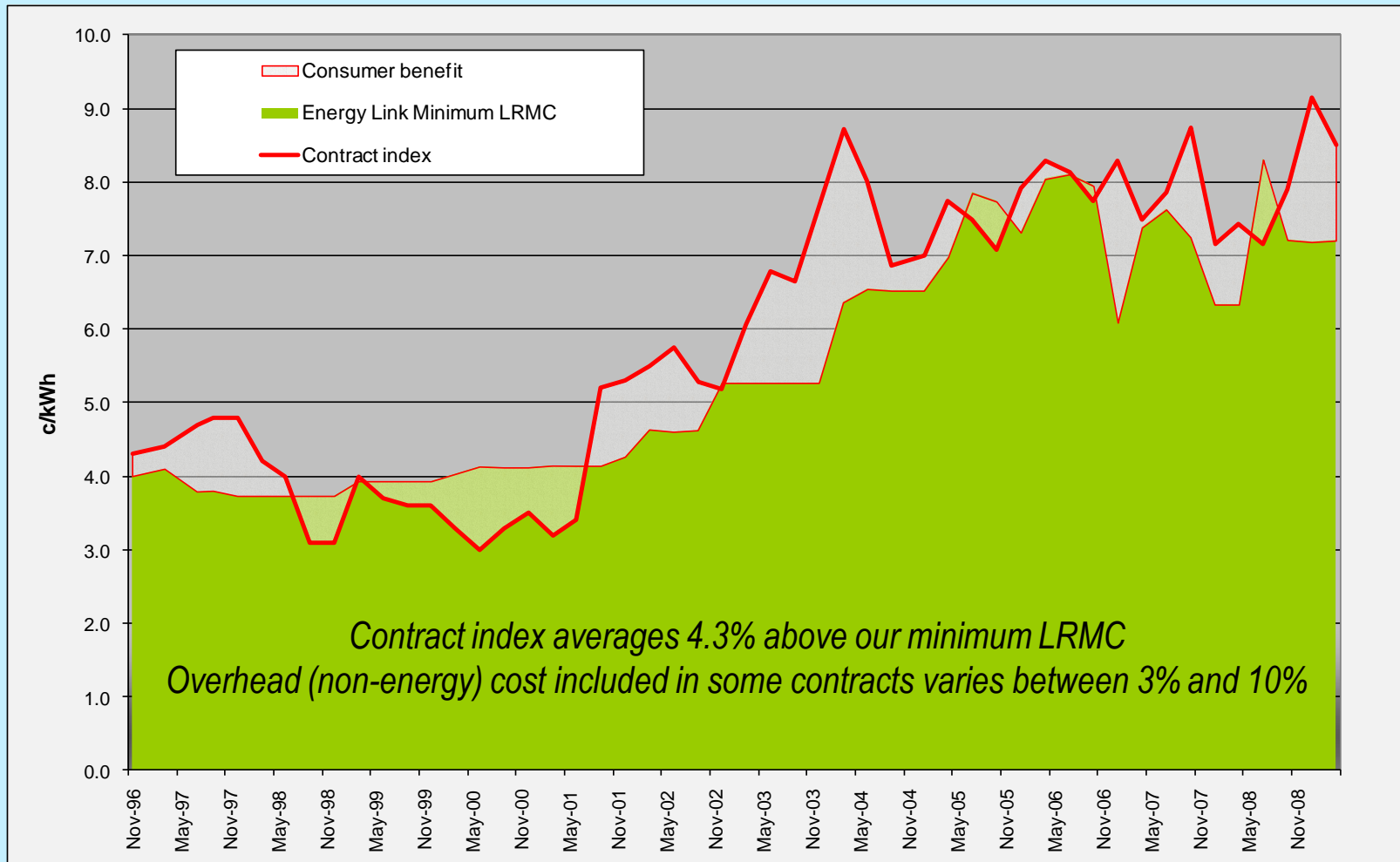
Generation Summary for 2009

Type	Delivered Cost c/kWh
Gas - CCGT	8 – 9
Coal – North Island	8 – 10
North Bank Tunnel Scheme	11
Wind	11 – 14
Geothermal	6 – 9

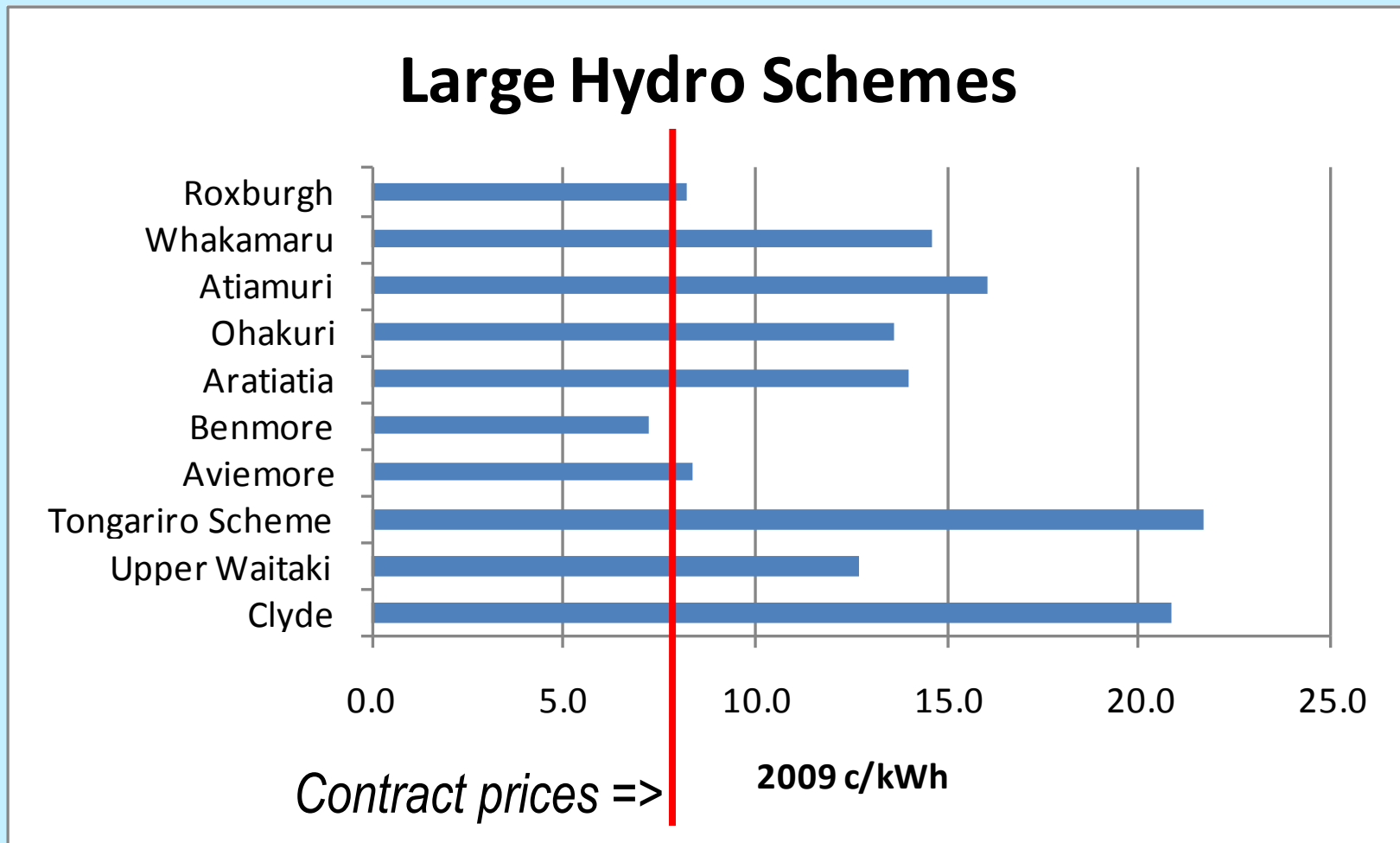
(Assumes 85% loading for thermals and **excludes the cost of carbon**)

Contract Prices for Large Consumers

- 2007 – EC concluded that prices for large contracts have not overshoot the cost of new entry (aka LRMC, long run marginal cost of generation)
- Chart below uses Energy Link's minimum LRMC values



From subsidies to user-pays



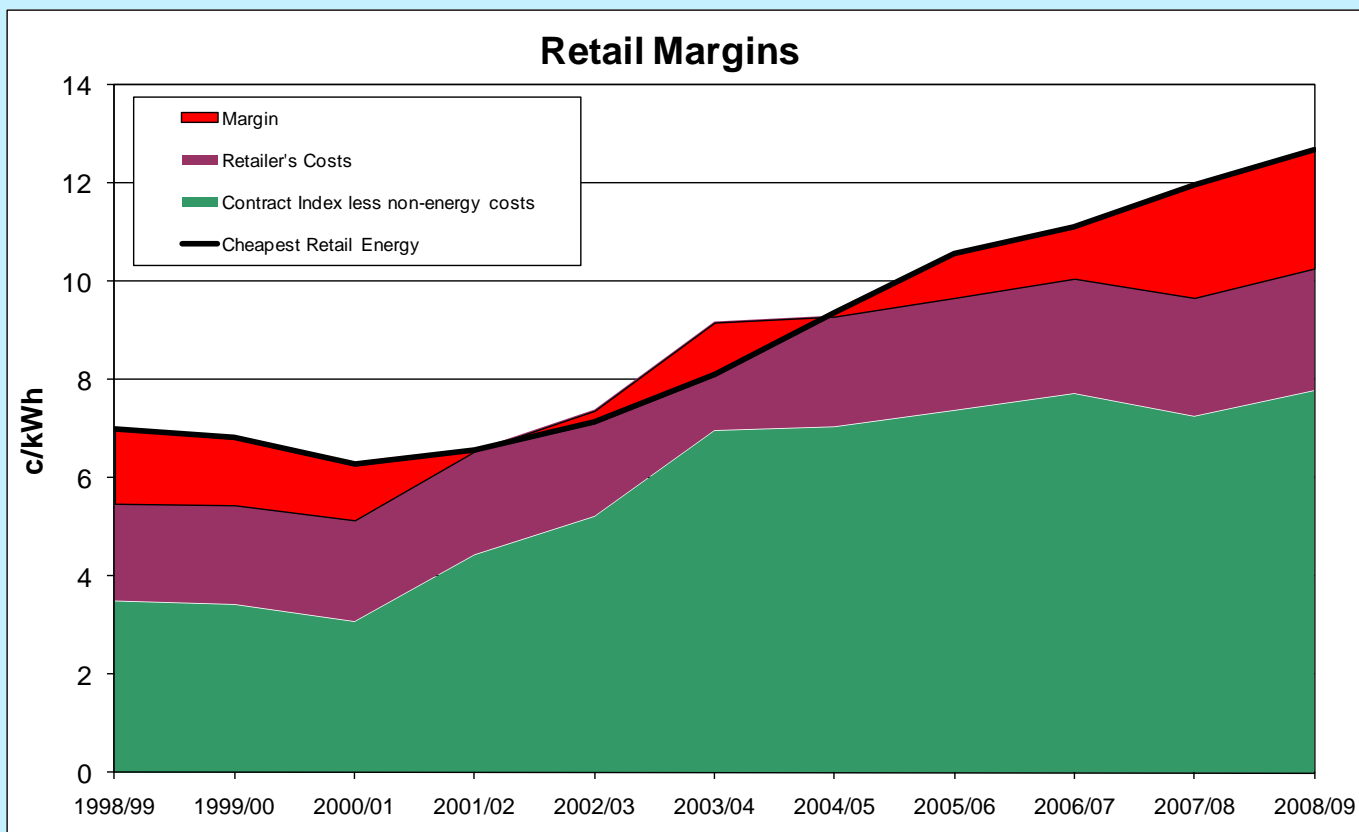
- Figures from Infratil (a New Zealand based utilities and infrastructure investor)

Our history of government control

- From the very earliest days of generation development in this country, the government took control or ownership of waterways and hydro-electric generation projects
- I suspect there is a strong cultural “lag” associated with government’s role, despite government creating over-capacity and economic inefficiencies
- Prices were perceived to be ‘cheap’ for a long time, while at the same time we subsidised poor investments through our taxes
- Was that a better way to produce electricity?

Retail Margins for Residential Consumers

- In 2007 the EC said:
 - the average 'incumbent' margins in New Zealand lie between the regulatory benchmarks adopted by Australian regulators for default tariffs, and the actual margins observed for major Australian energy retailers
 - in areas with higher incumbent margins there are retailers offering lower prices



Using Energy Link data, analysis is very sensitive to:

- kWh consumed pa (8,000 pa)
- region of the country
- retailer's non-energy costs (\$200 pa)

Margin shown is currently \$190 pa

Retail Margins for Residential Consumers

- Break-even is around 4,000 kWh pa with costs of \$200 pa
 - the low-user fixed charge regulations have probably created a cross-subsidy between small and medium-large consumers: eligibility is 8,000 kWh pa north of Christchurch and 9,000 kWh pa Chch south
- Retail prices appear to have moved progressively to profitable levels (rather than taking a sudden jump)
- Intense competition for residential consumers (e.g. Mercury) suggests prices and margins do not need to rise further for the time being

Are customers empowered?

- Lower prices
 - it's 'user pays', not 'government subsidies', with economically efficient investment
 - appear to be good outcomes for commercial and industrial consumers, jury out for residential
- A level of security which suits customer preferences
 - can't select level of security versus price paid
 - annoying number of potential hydro shortages: are we getting value for money?
- Choice
 - the information is there (MED, Powerswitch)
 - there is competition and you **can** reduce your power bill
 - switching suppliers is easy and reliable
- Innovation
 - pricing plans haven't changed much
 - smart metering only now occurring
 - access to bills and information on the web
 - Powershop offers a new approach to buying electricity