Nelson Malborough Health Board: ‘Talking Heads’

Overview of Electricity Industry

Tony Baldwin

23 May 2005

Outline

- Energy overall
- Electricity – current industry structure
- Hydrology risk
- Issues
- Review of reforms

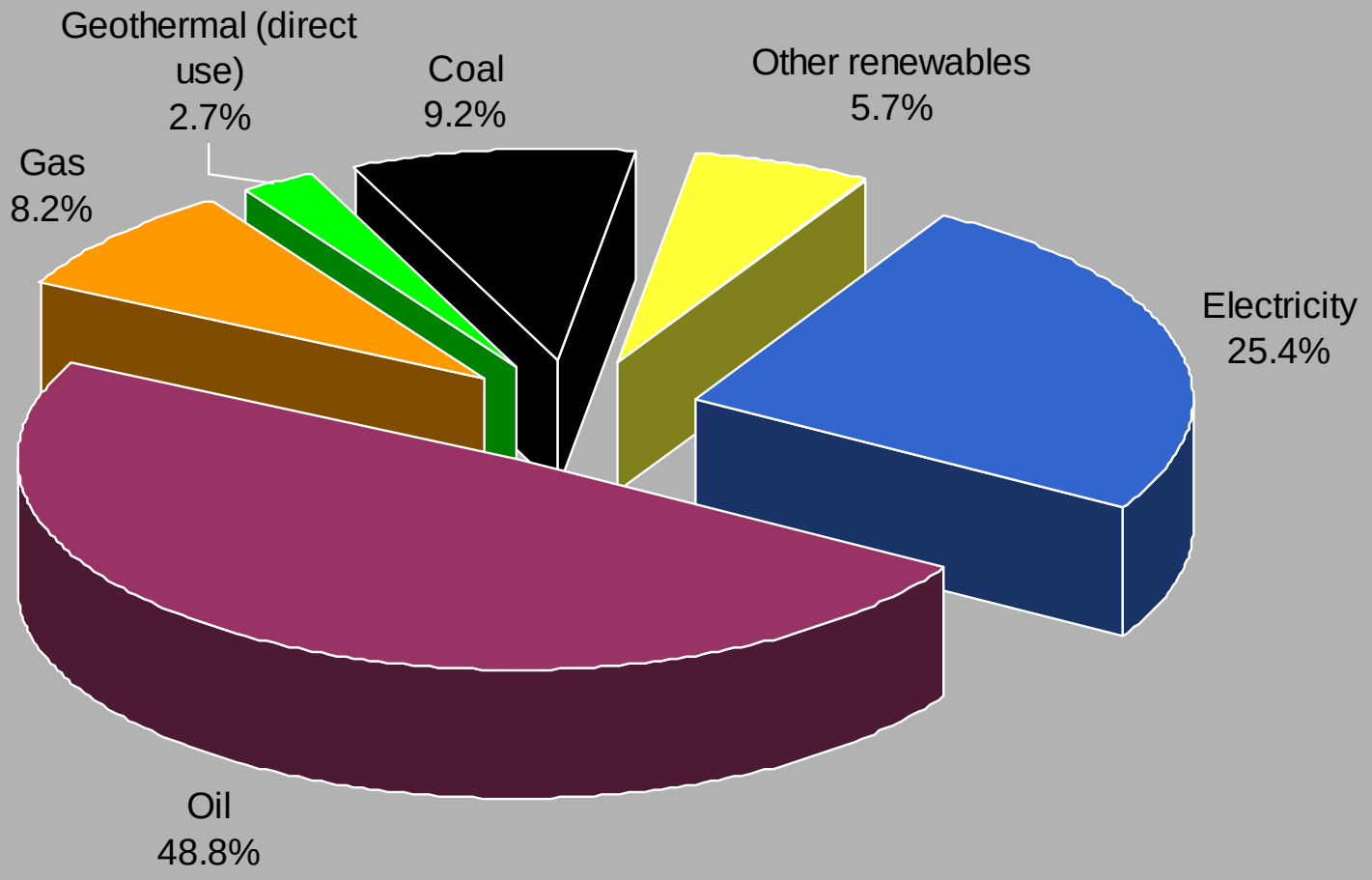
Caveat

Some graphs and data is four years old.

Shows trends, but is not up to date

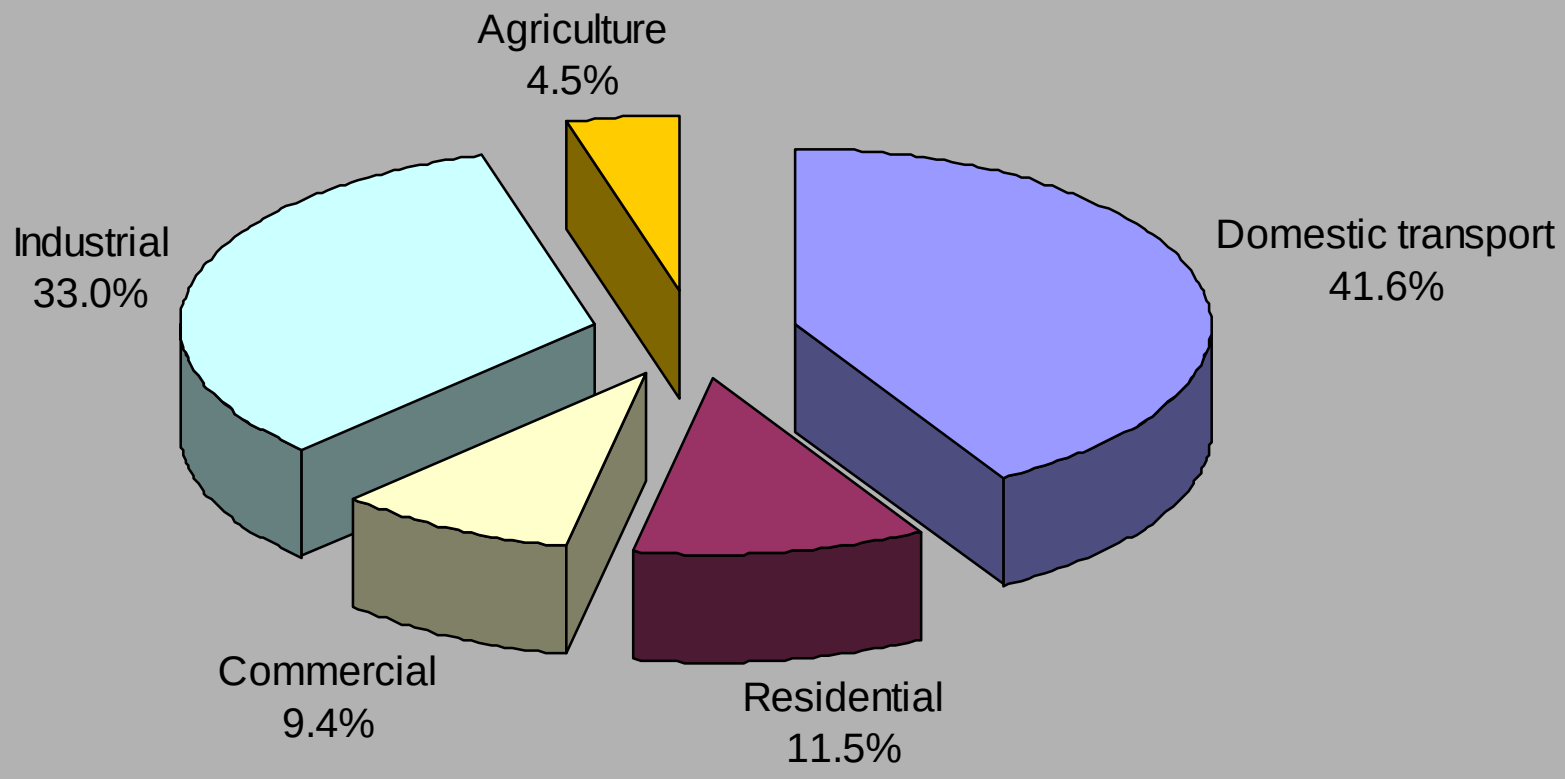
Energy overall

Energy by fuel type – 2003



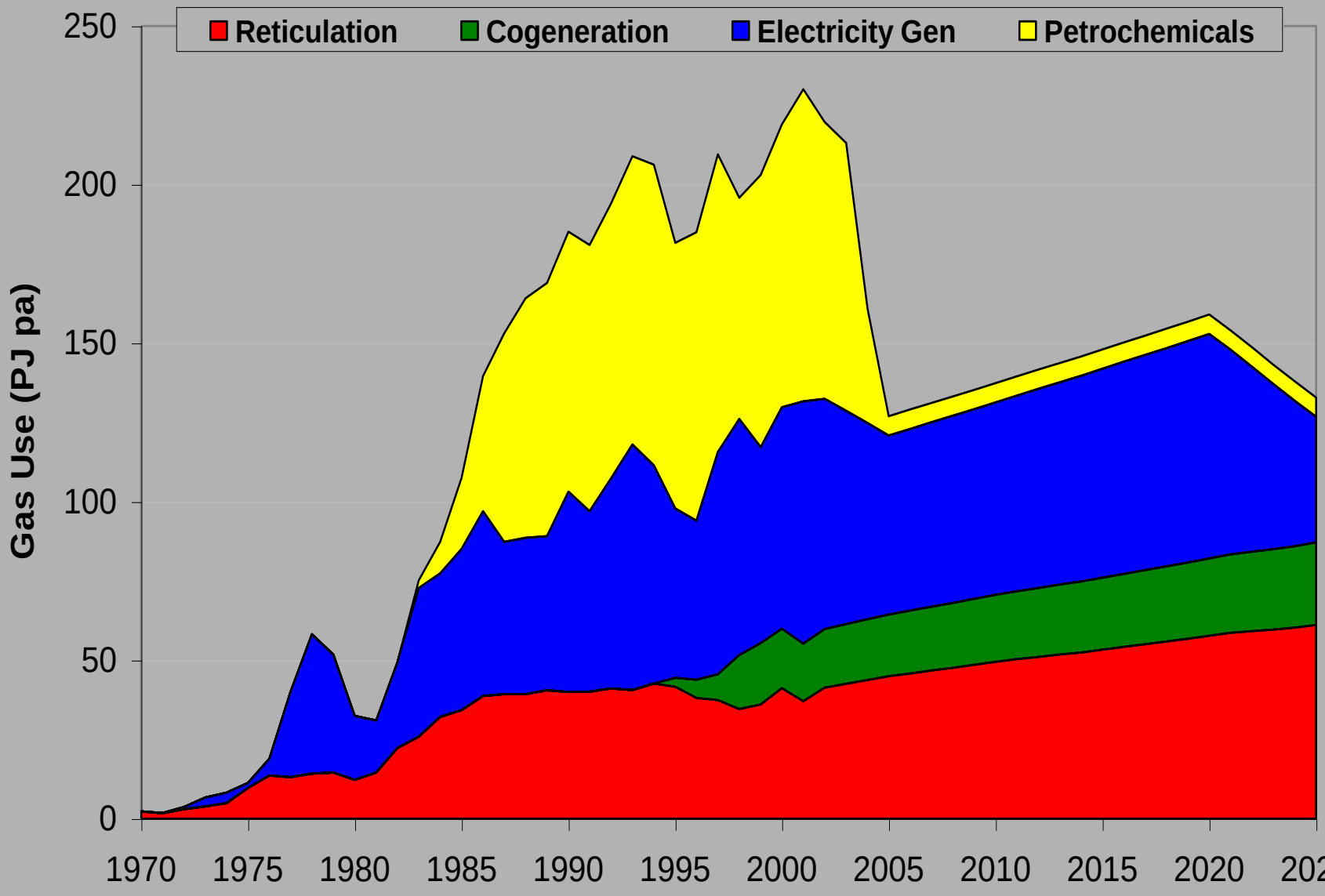
Source: MED

Energy by sector – 2003



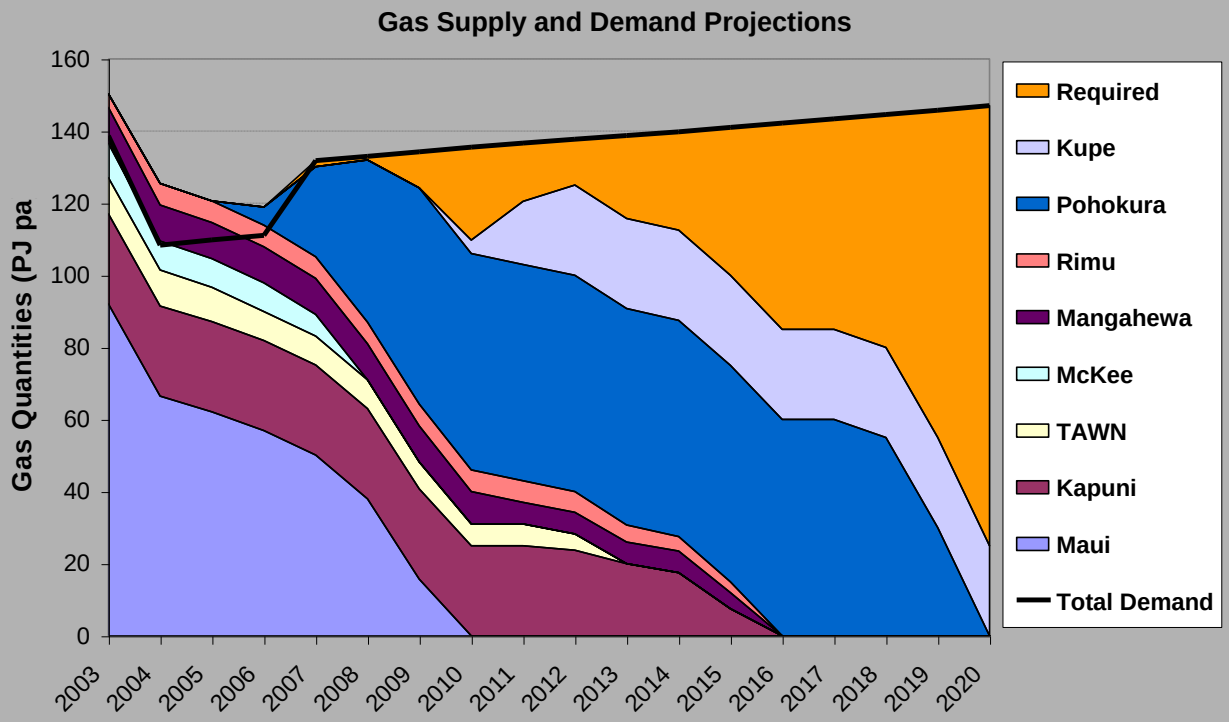
Source: MED

Primary Energy Supply of Gas by Use 2000-2025



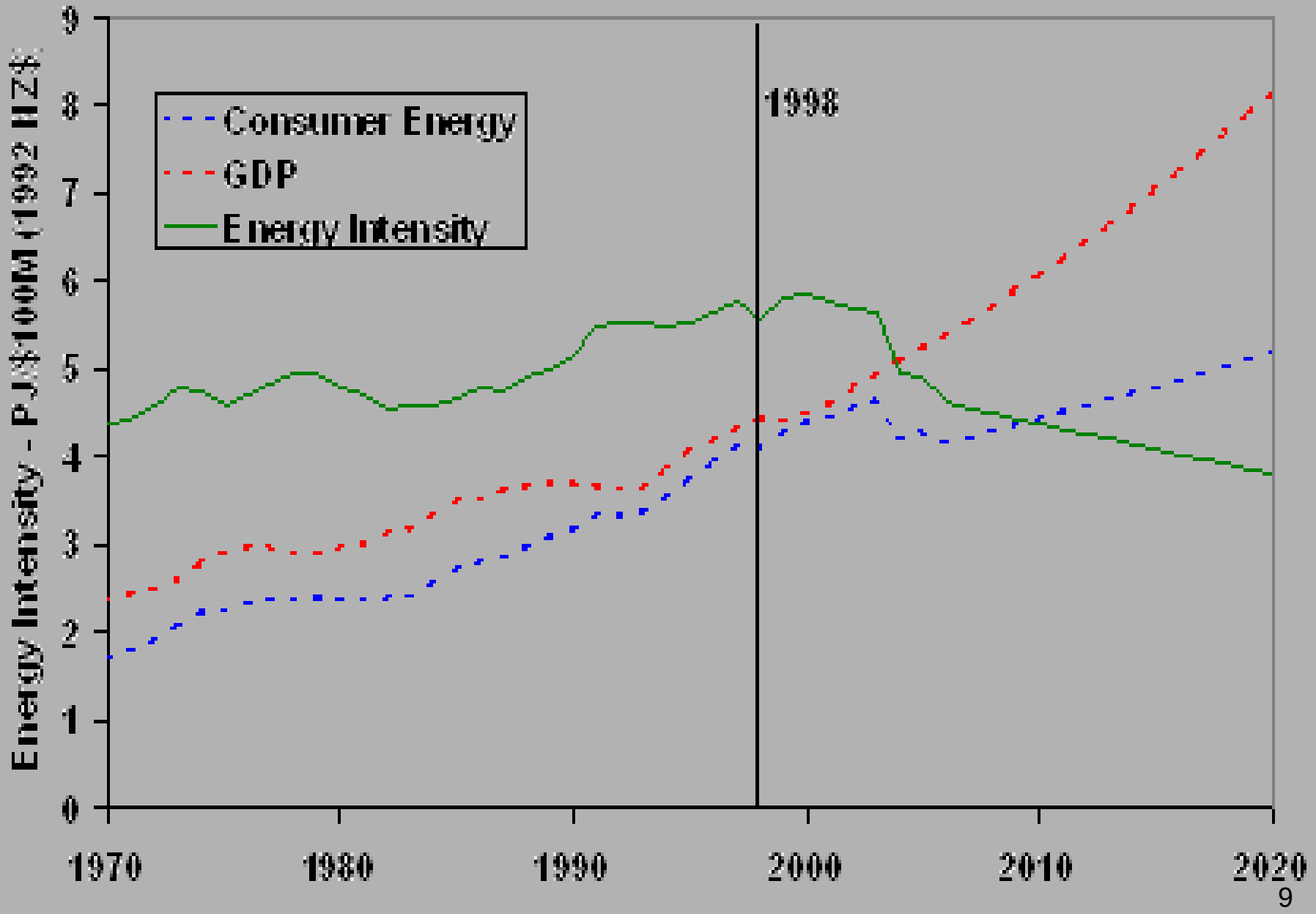
Source: MED 2002

Outlook for gas



Source: MED 2002

Energy Intensity in the Economy

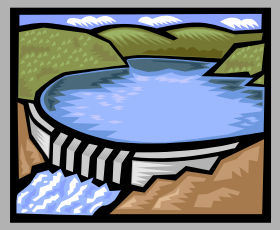


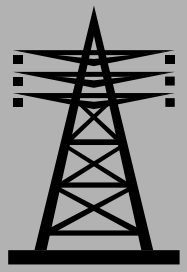
Source: MED 2001

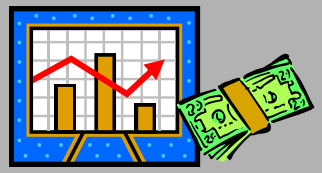
Electricity – Current structure

Special characteristics

- Governed by laws of physics
- Once injected to grid, cannot identify who owns electron
- Flows not dedicated from station to consumer (except for Comalco)
- Amount generated must *always* equal amount consumed
- Demand is relatively inelastic in short term. Spot prices are volatile
- Shortages (lack of fuel or mechanical outages) create high prices

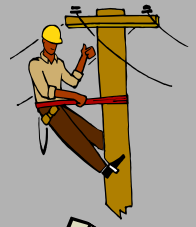






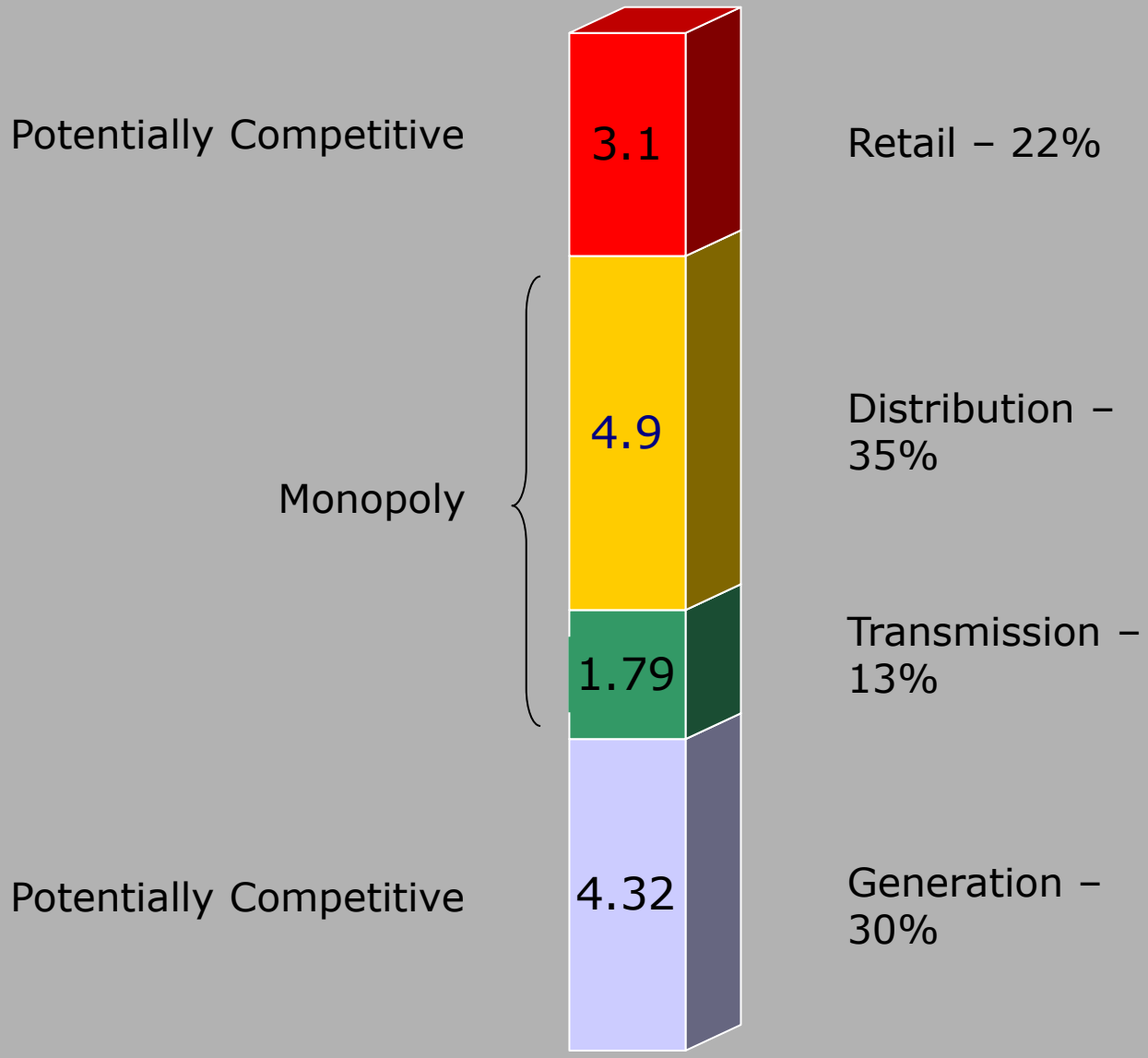
Wholesale Market:
This is where generators sell and retailers buy electricity.

Direct users
Large industrials like Comalco (15% of total production)



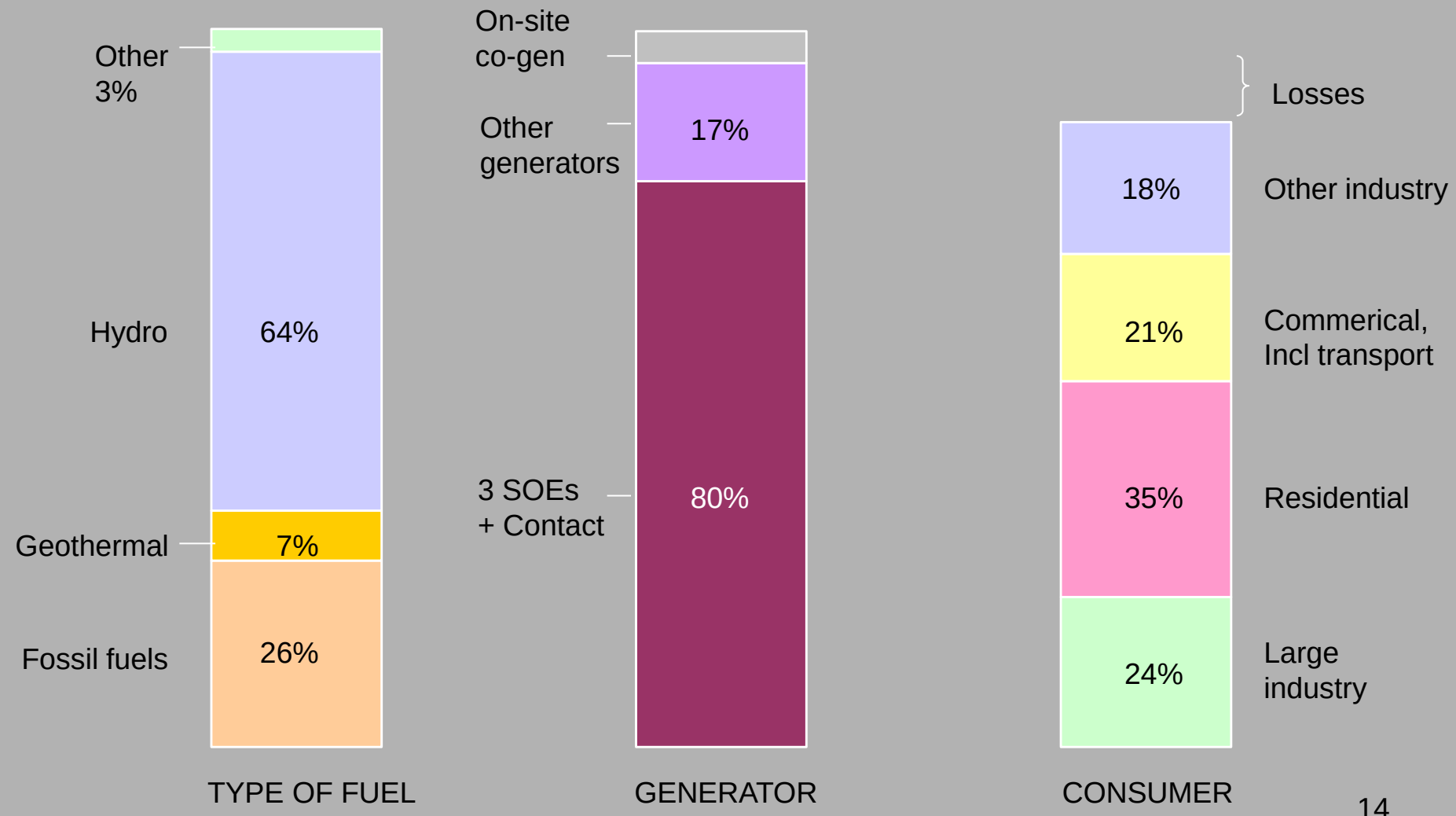
Retailers:
NZ has five main electricity retailers.

Consumer costs



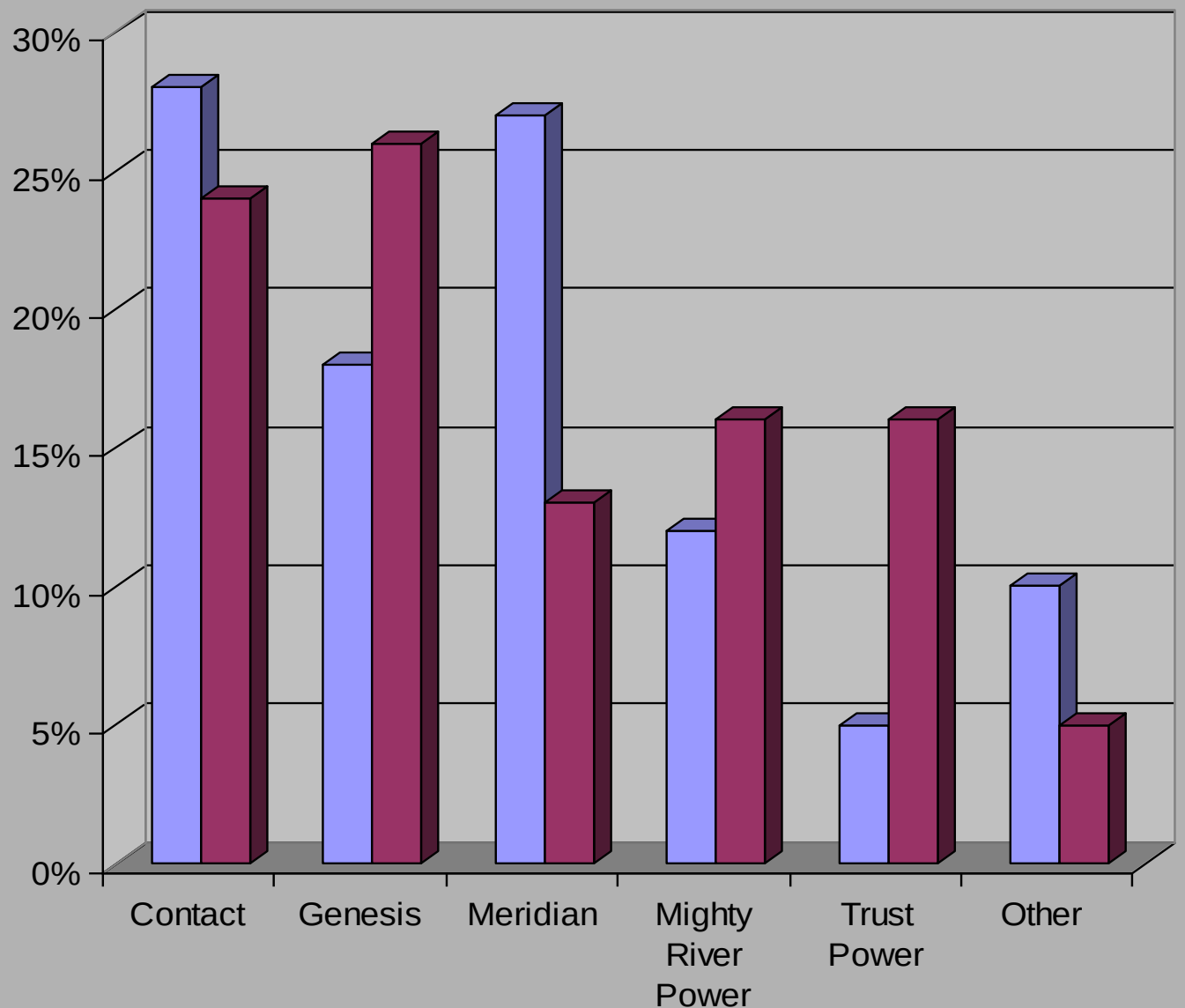
Source: MED

Electricity flows – 2001



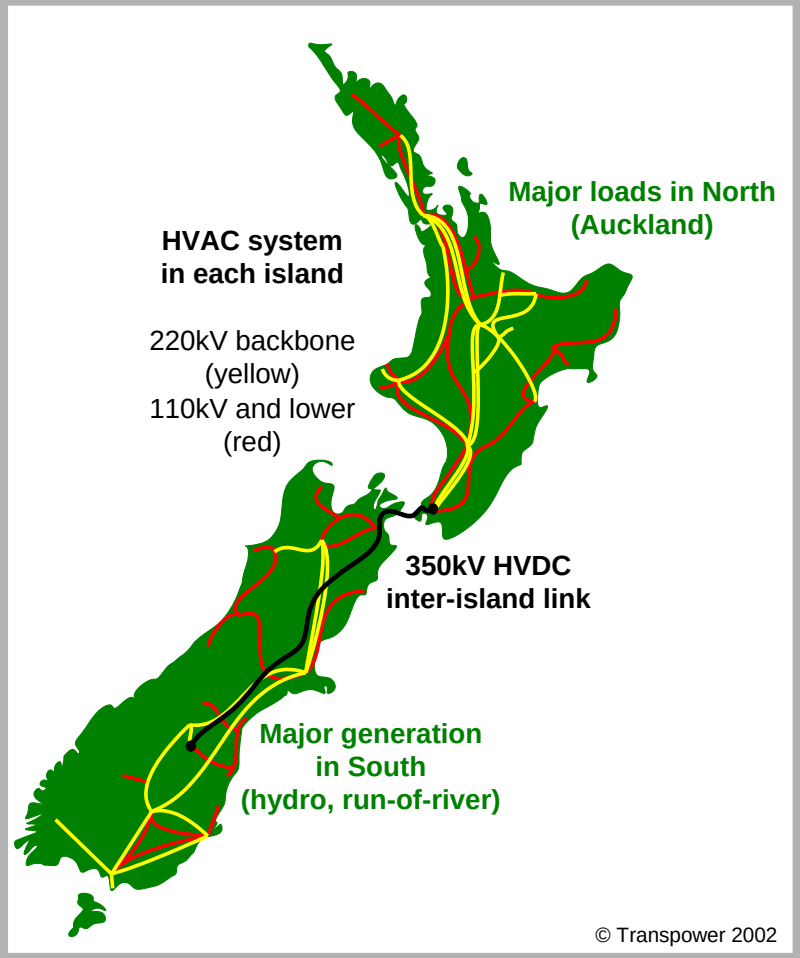
Source: MED

Generation + customer shares

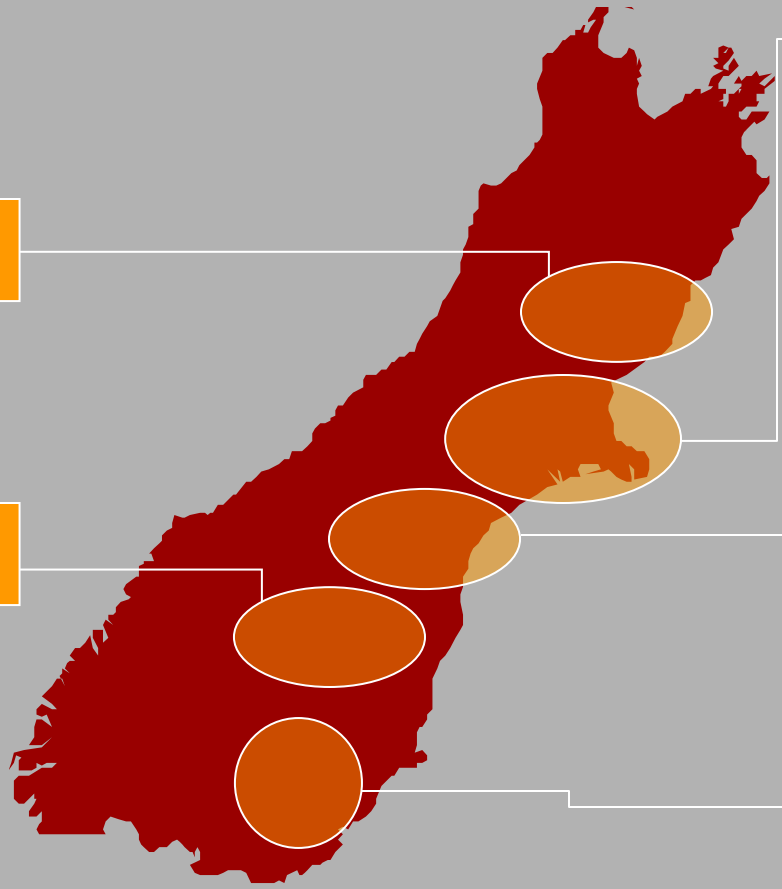


Source: MED + Transpower, as at 2001

Transmission network



Transmission constraints



Transfer to West Coast

Transfer from Canterbury to Nelson, Marlborough

Transfer between Waitaki Valley and Canterbury

Transfer between Clutha and Waitaki Valley

Transfer between Clutha and Southland

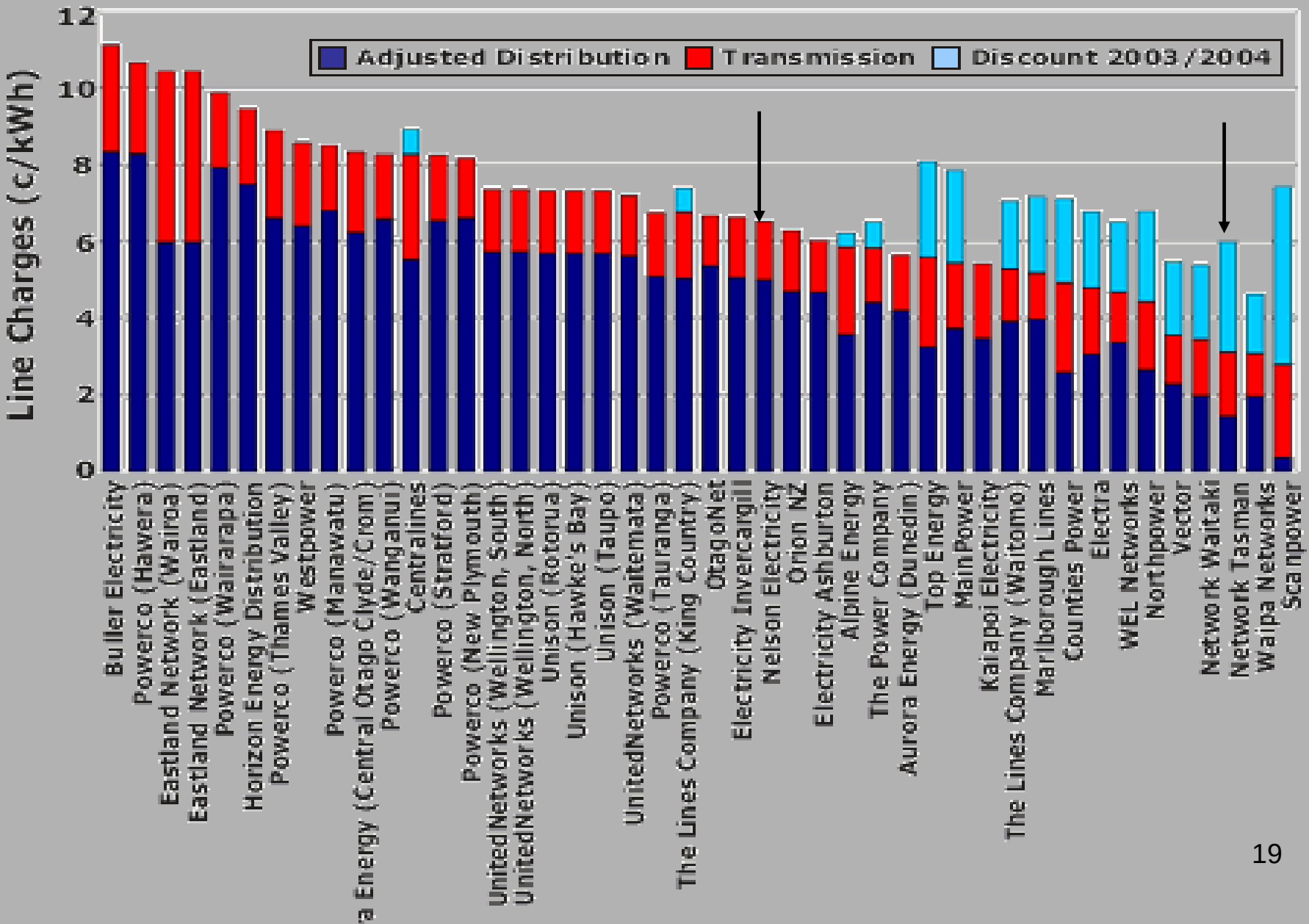
Potential Constraints

Ownership of Distribution Companies

Ownership	No of companies
100% trust or co-operatively owned	22
100% owned by local body	5
Mixed ownership - majority owned by local body or trust	3
Mixed ownership - majority owned privately	1

Source: MED 2000

Line company charges

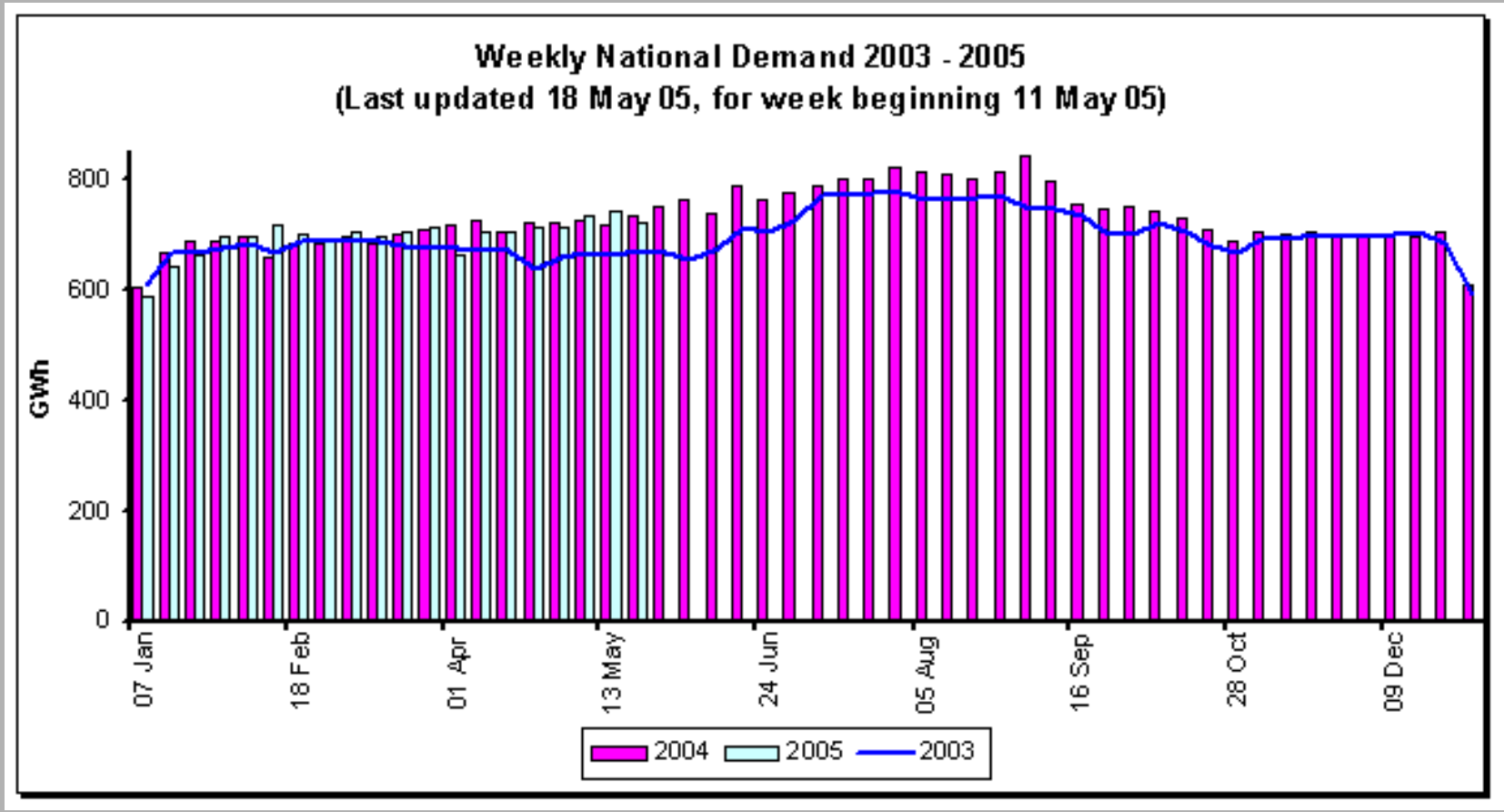


Government Ownership

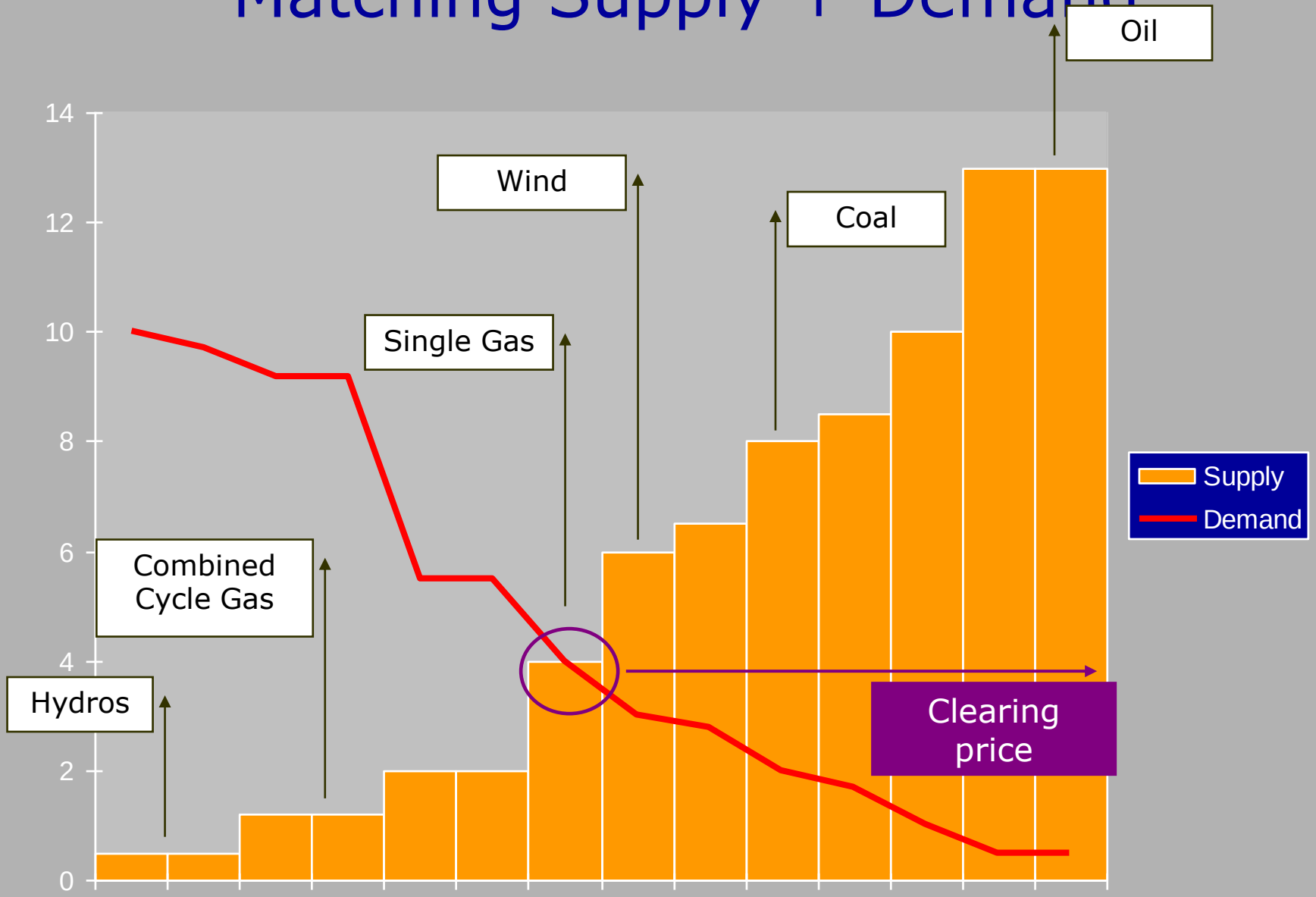
- Generation:
  - Govt SOEs = 63%
- Transmission:
  - Govt SOE = 100%
- Lines:
  - Trust/Local Govt = 98%

Pricing process

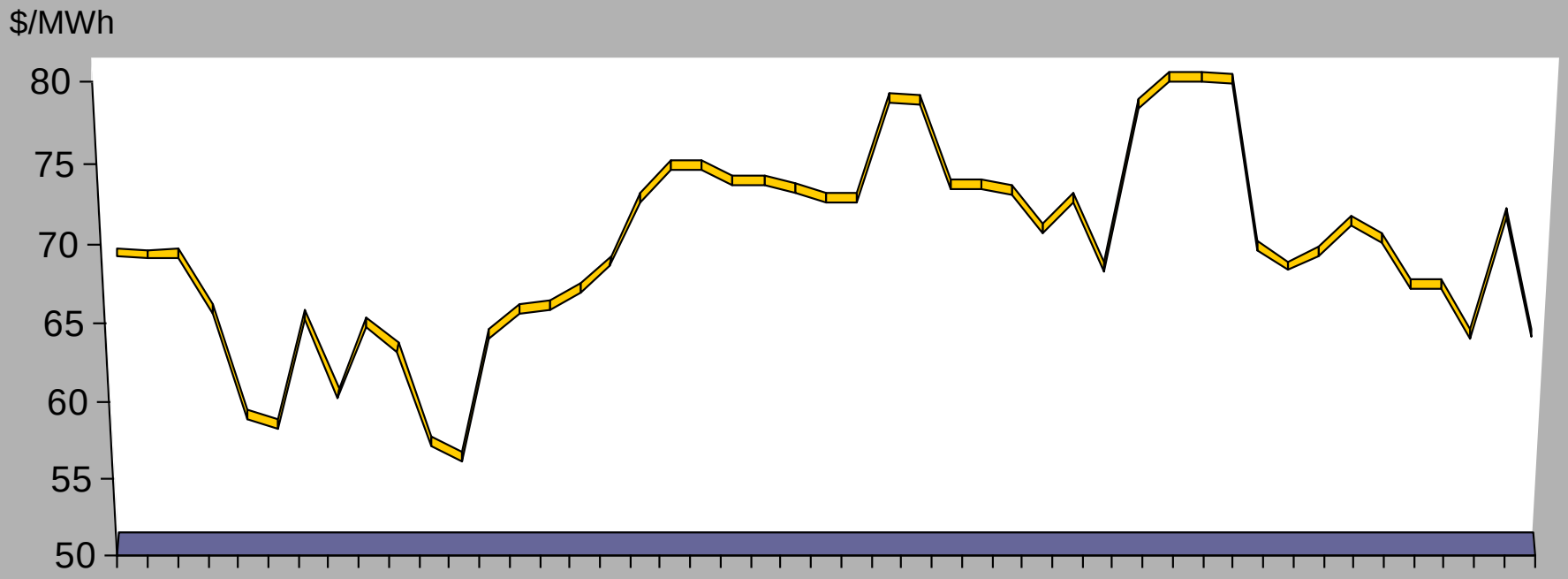
Demand


Weekly National Demand 2003 - 2005
(Last updated 18 May 05, for week beginning 11 May 05)
GWh
800
600
400
200
0
07 Jan
18 Feb
01 Apr
13 May
24 Jun
05 Aug
16 Sep
28 Oct
09 Dec
2004
2005
2003

Matching Supply + Demand



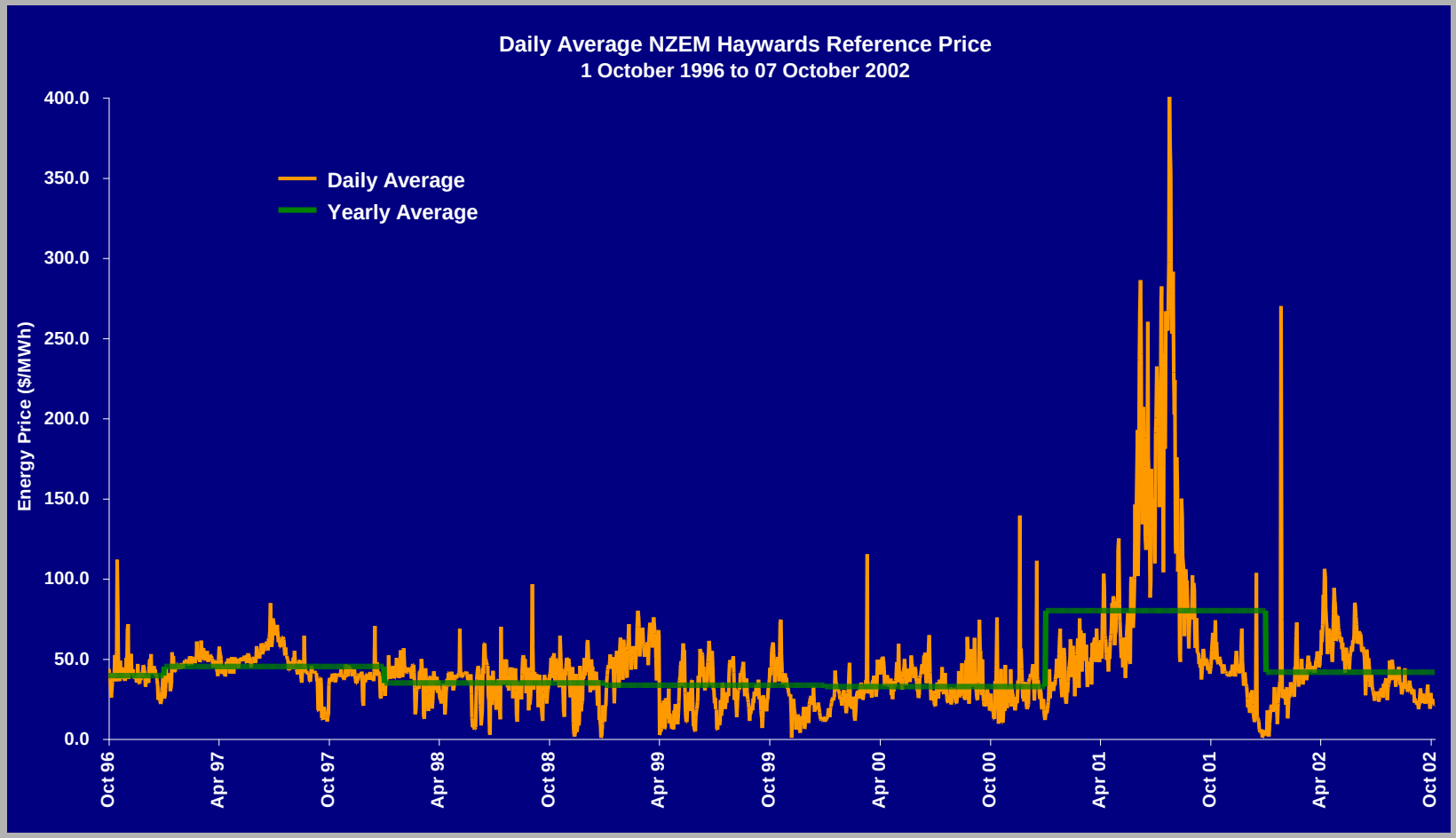
Spot prices



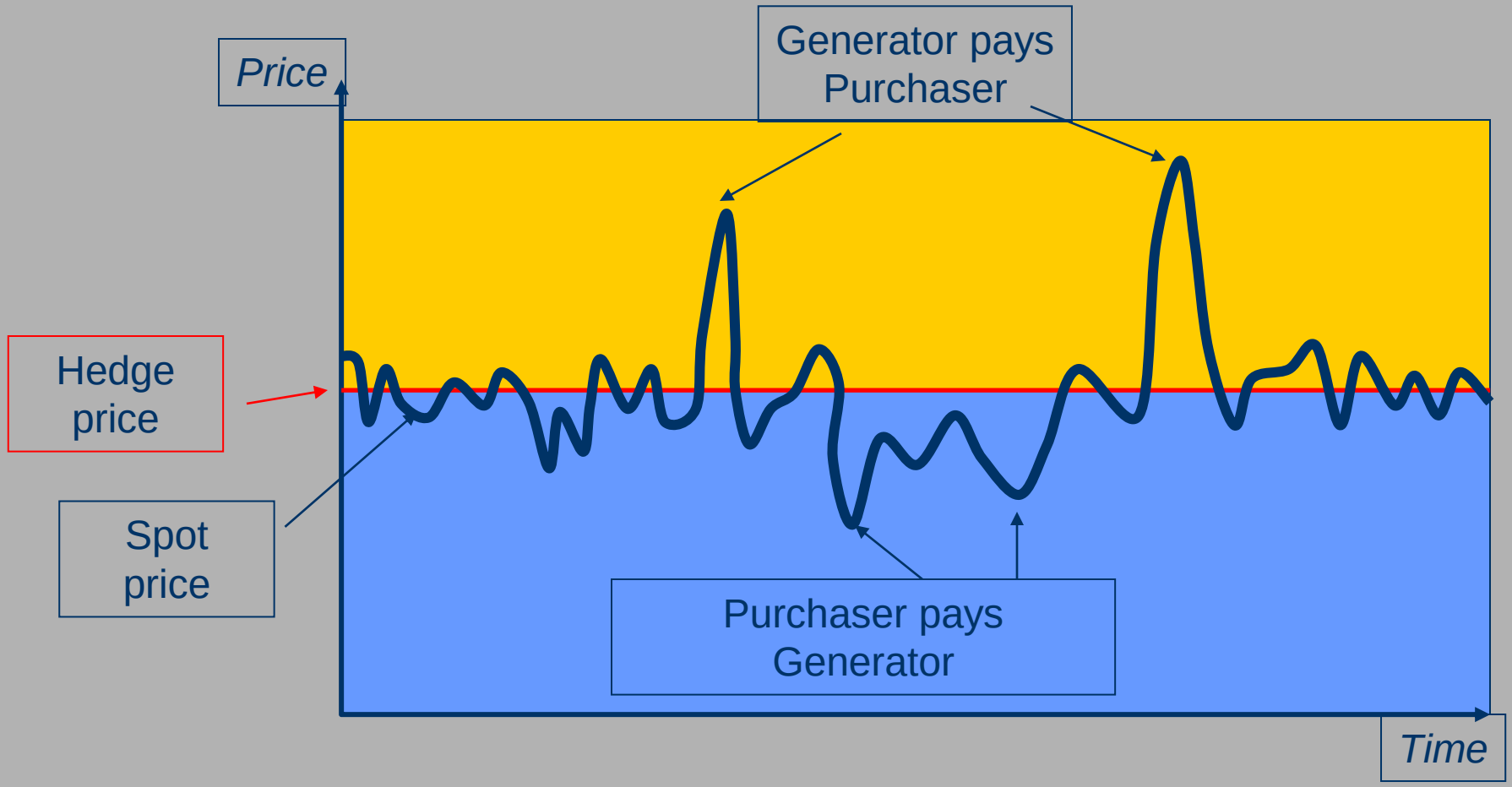
48 trading periods during 21 May 05
At Haywards grid off-take point
240 grid nodes that are priced

Source: Comit

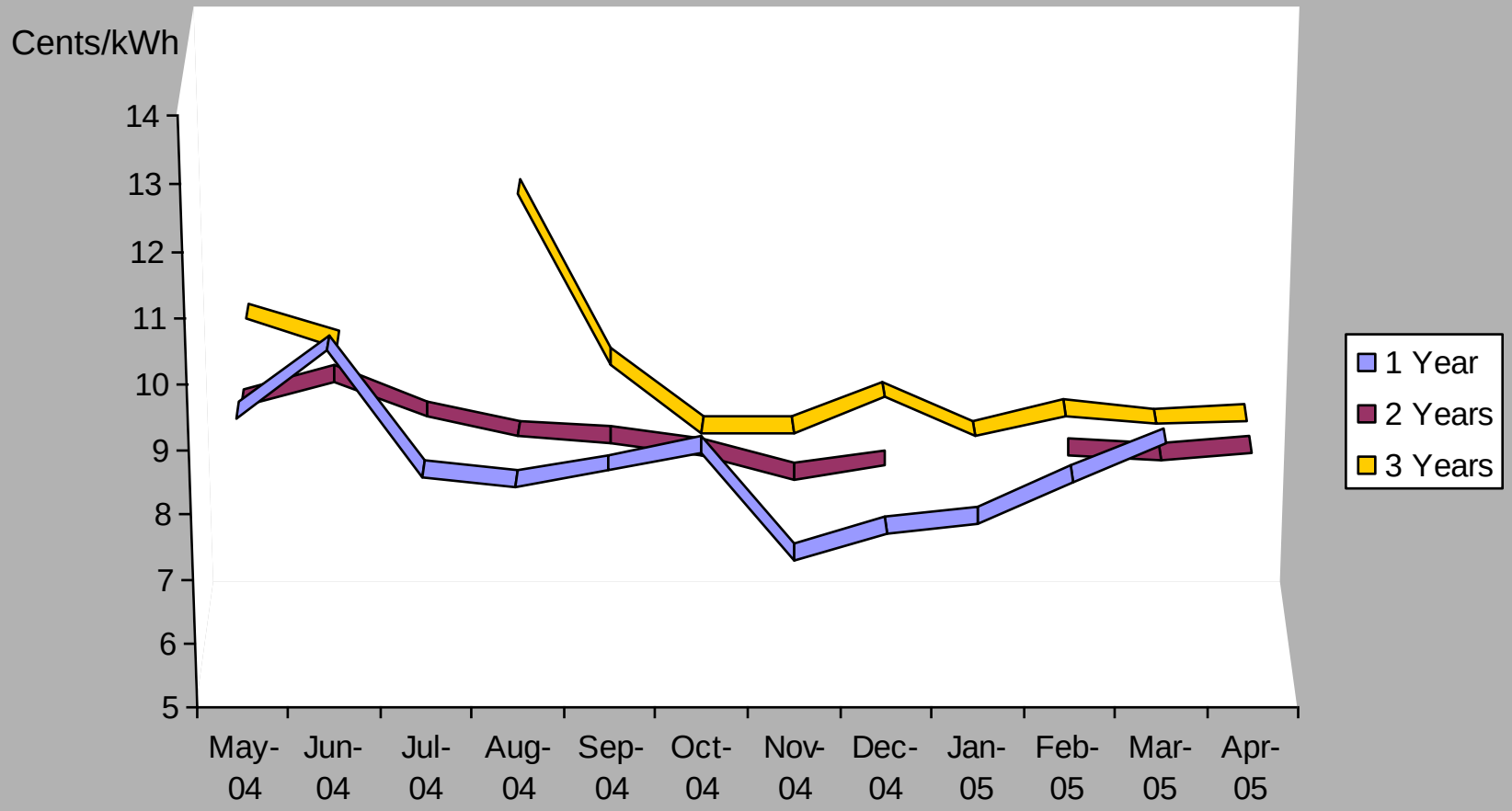
Spot price changes



Hedging


Price
Generator pays Purchaser
Hedge price
Spot price
Purchaser pays Generator
Time

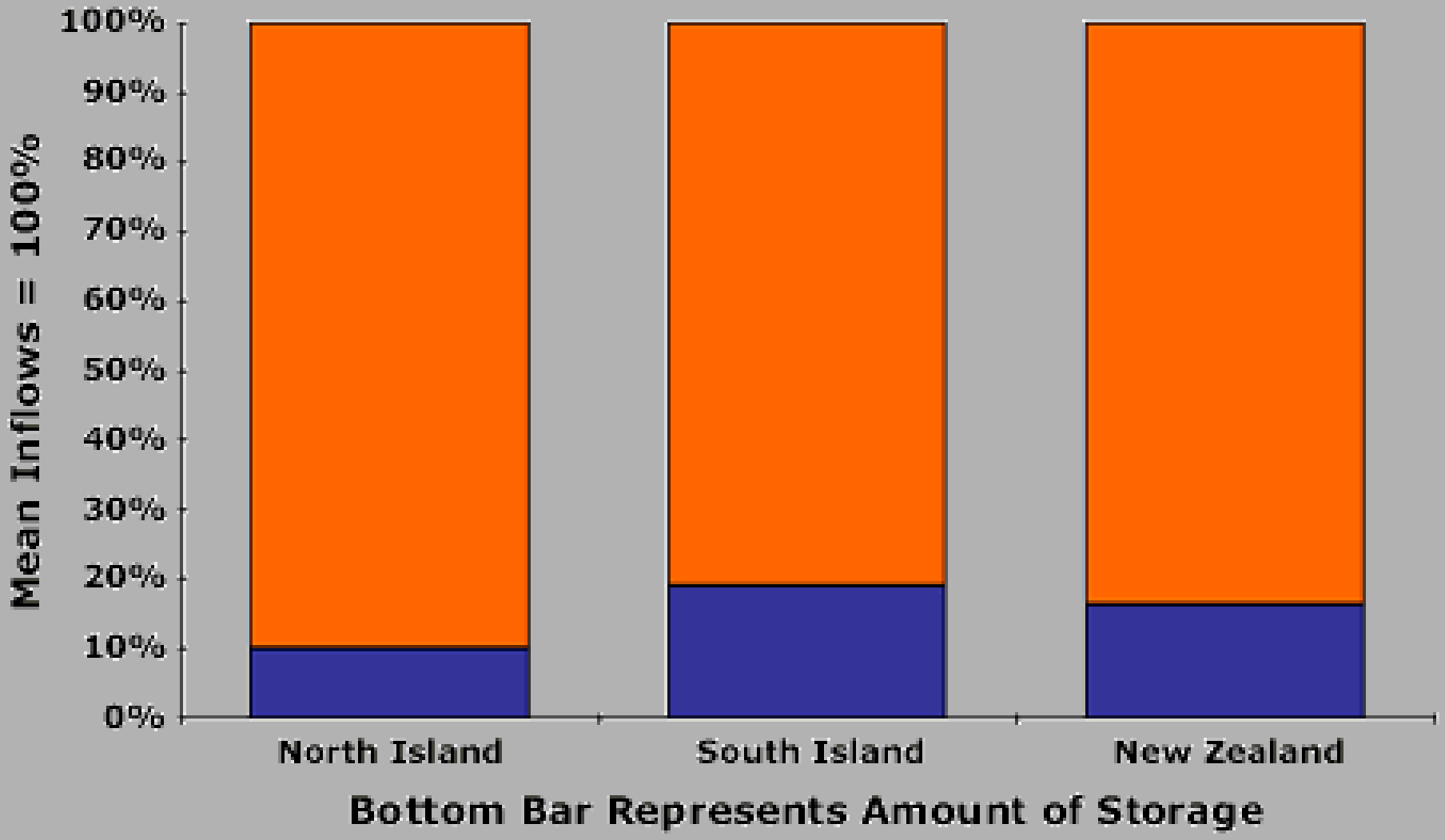
Contract prices



Source: Comit

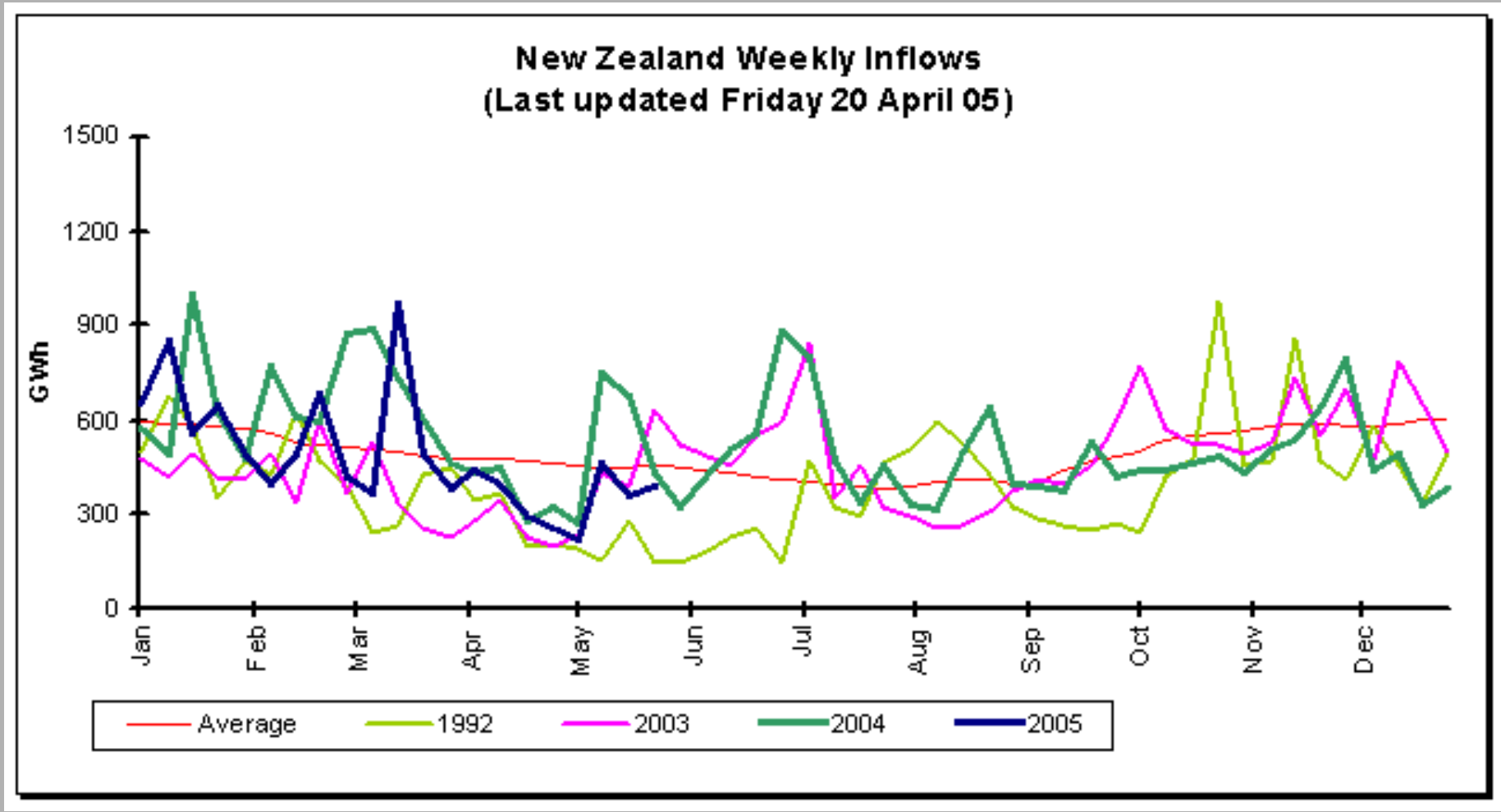
Hydrology risk

Hydro Storage Capacity

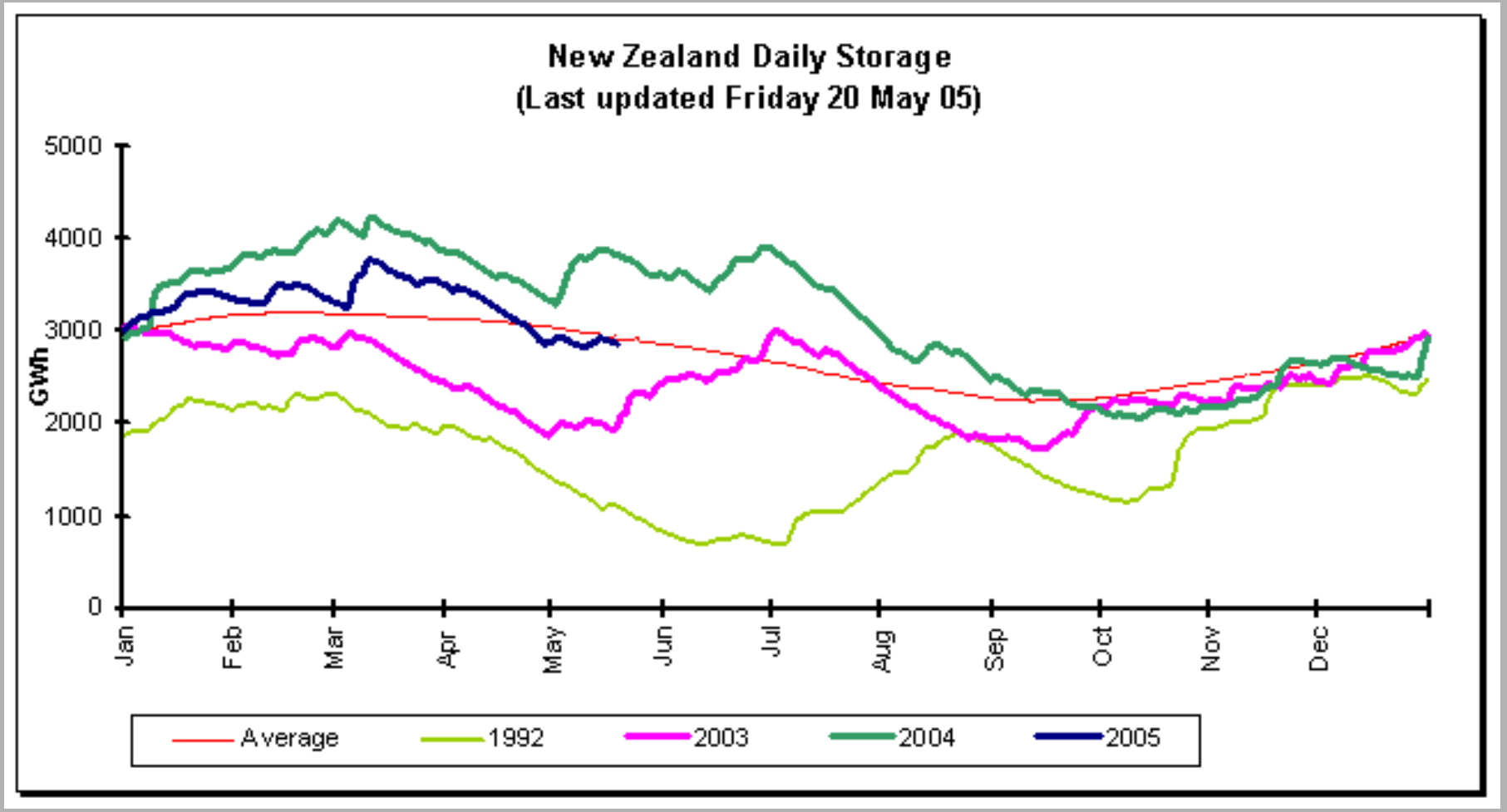


Source: MED

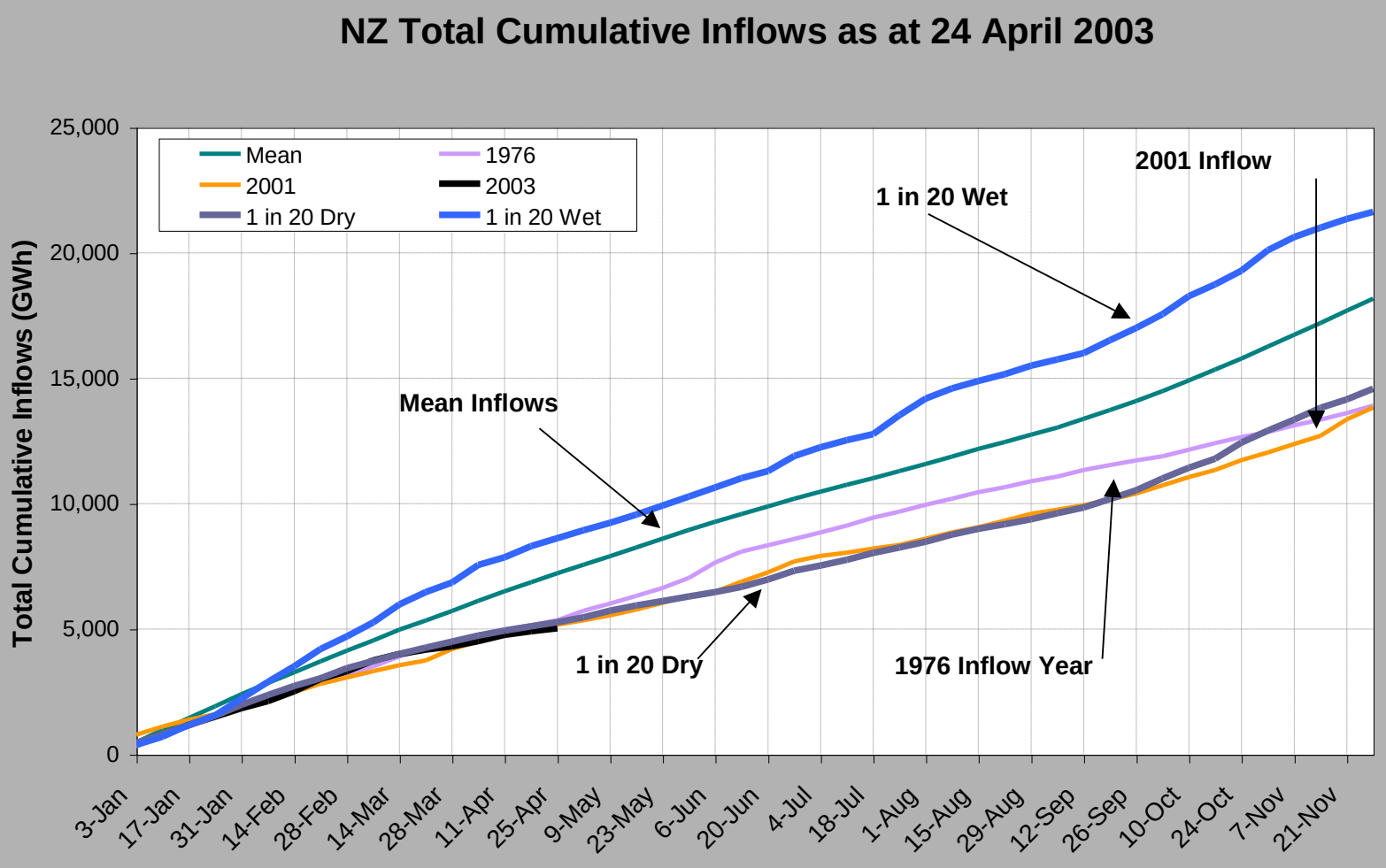
Hydrology – inflow monitoring



Hydrology – storage monitoring

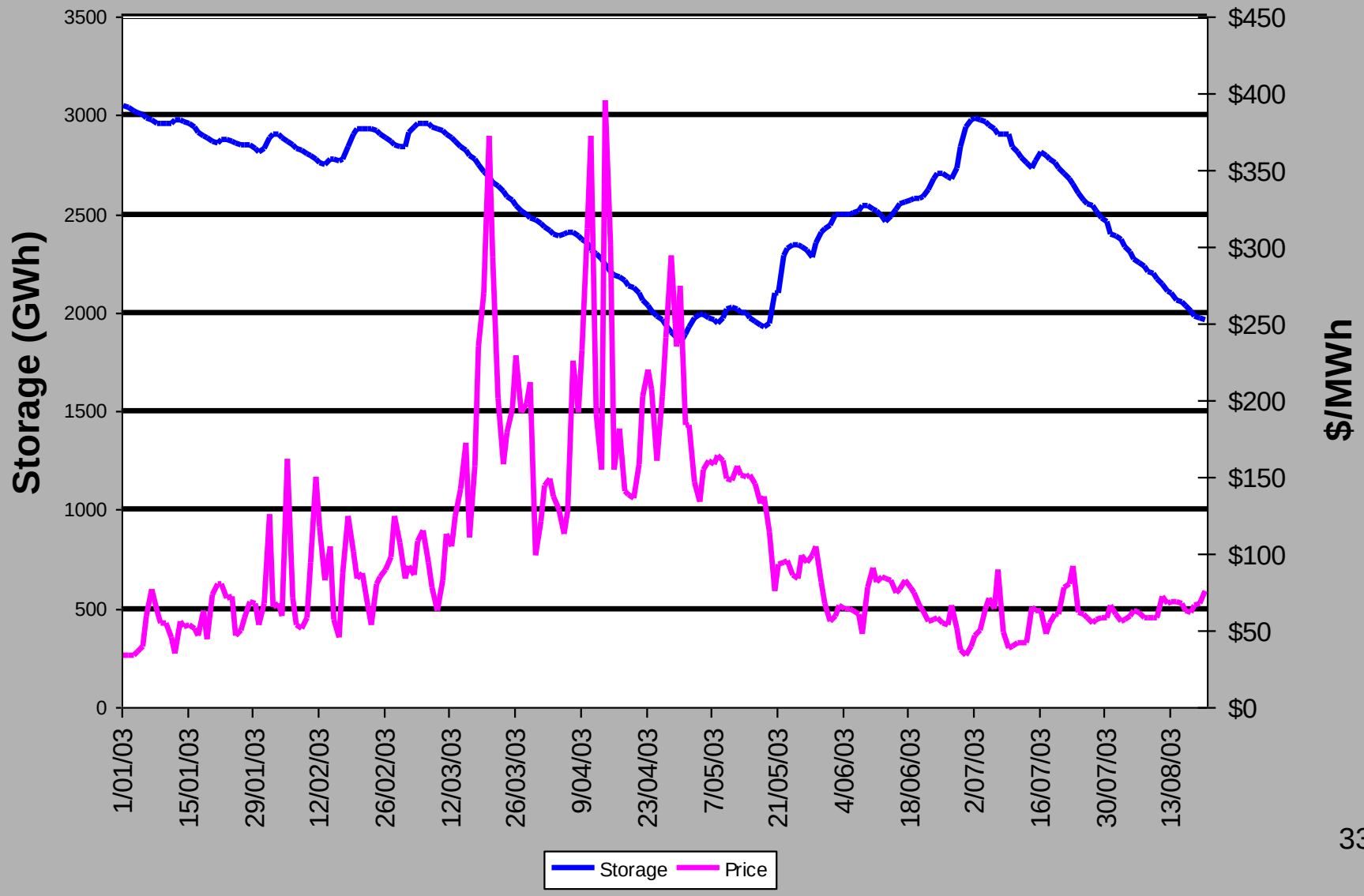


Hydrology risk



Total GWh inflows to date from 1 January:
- 1976: 5,348 GWh
- Mean: 7,228 GWh
- 2001: 5,170 GWh
- 2003: 5,035 GWh

Spot price + hydrology risk



Issues

How to deal with hydro shortages?

- Who is responsible for ‘insuring’ against risk of shortage?
- Should prices be allowed to rise to reflect scarcity?
- Cope with shortages by reducing demand or building back-up stations?

Role of Government?

- Should Govt pay for or underwrite new generation investment?
- Should Govt manage prices?
- Should the Commission ensure security of supply?

What new supply?

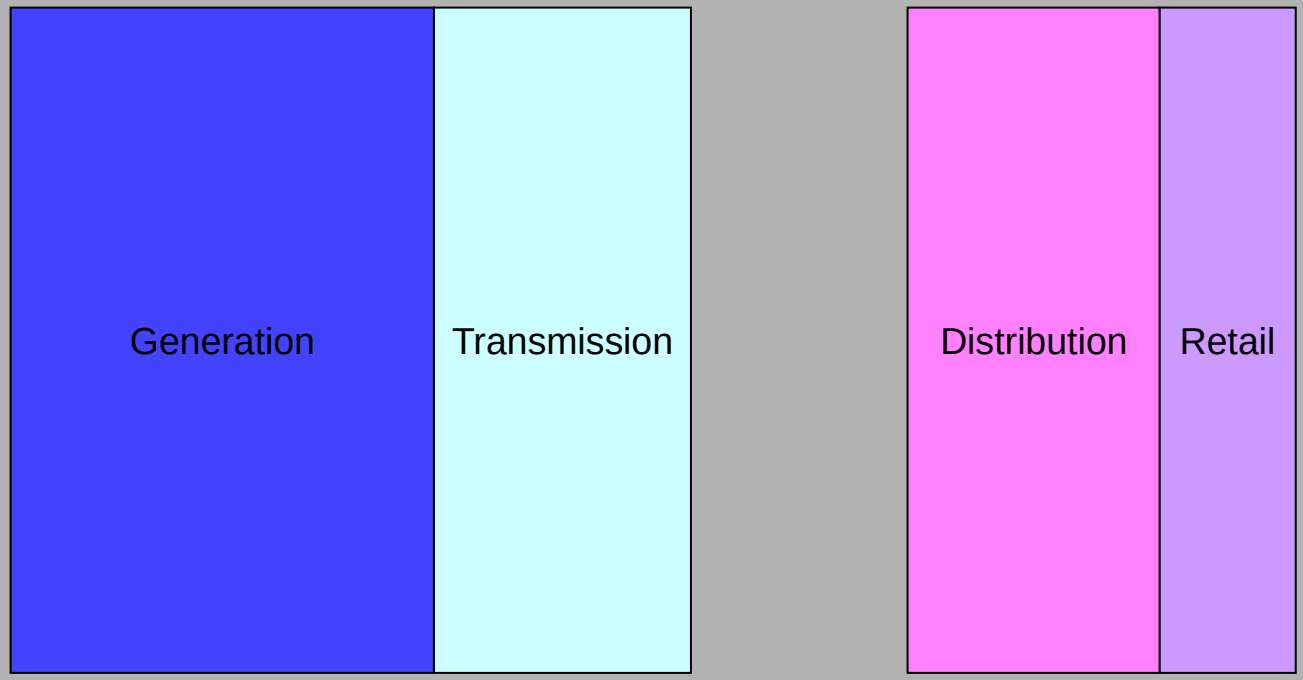
- No to wind – Wgn and AK projects declined
- No to using water – Waitaki and Wanganui rights limited
- No to new transmission lines – Waikato farmers
- No to coal – Kyoto Accord + carbon tax
- No to gas – lack of new supply
- And no to price rises!

So what new supply?

Impact of CO2 charge

Review of reforms

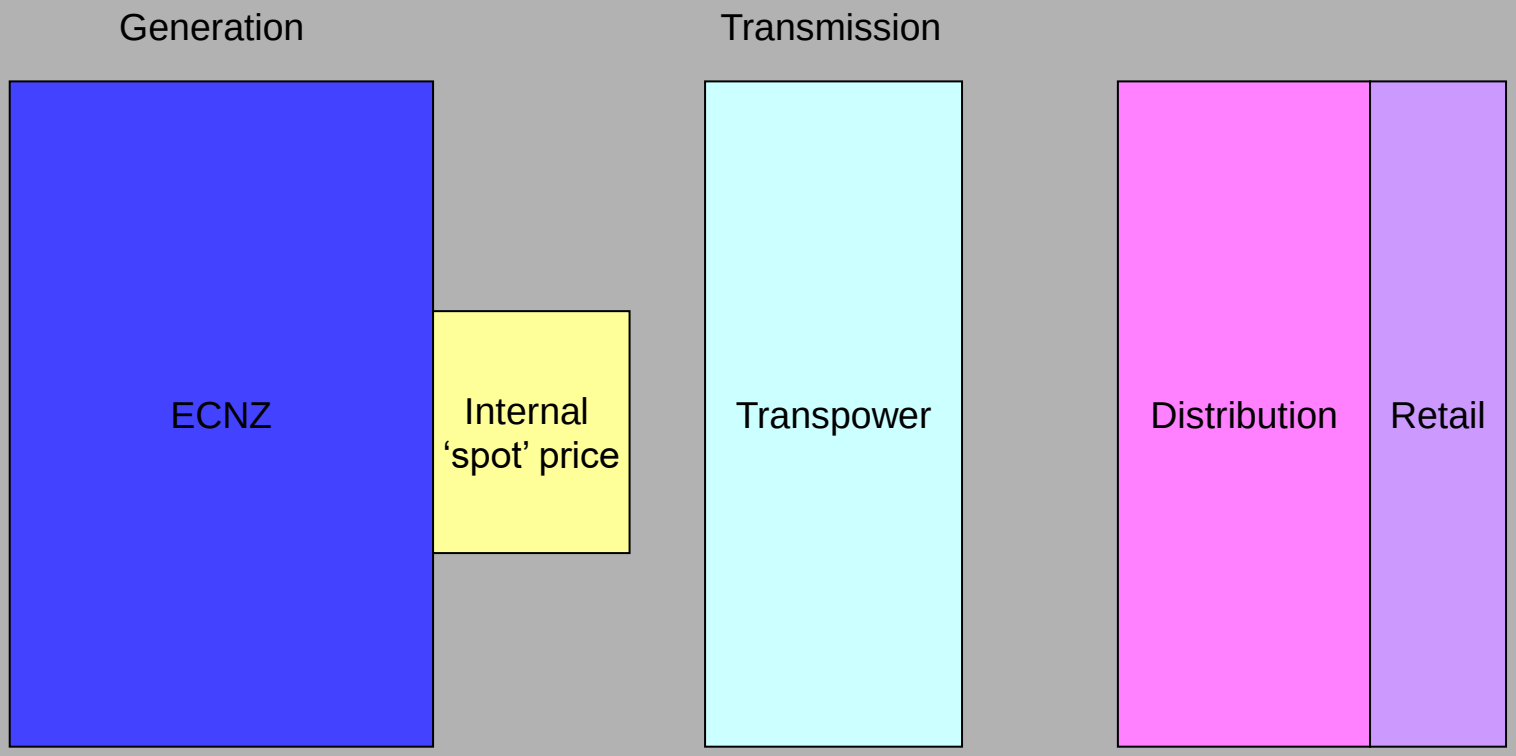
Pre-1987



Government-owned
(NZED)
Centrally planned + operated
Bulk suppy tariff

Electricity Supply Authorities
+ Councils

1987 - 1994

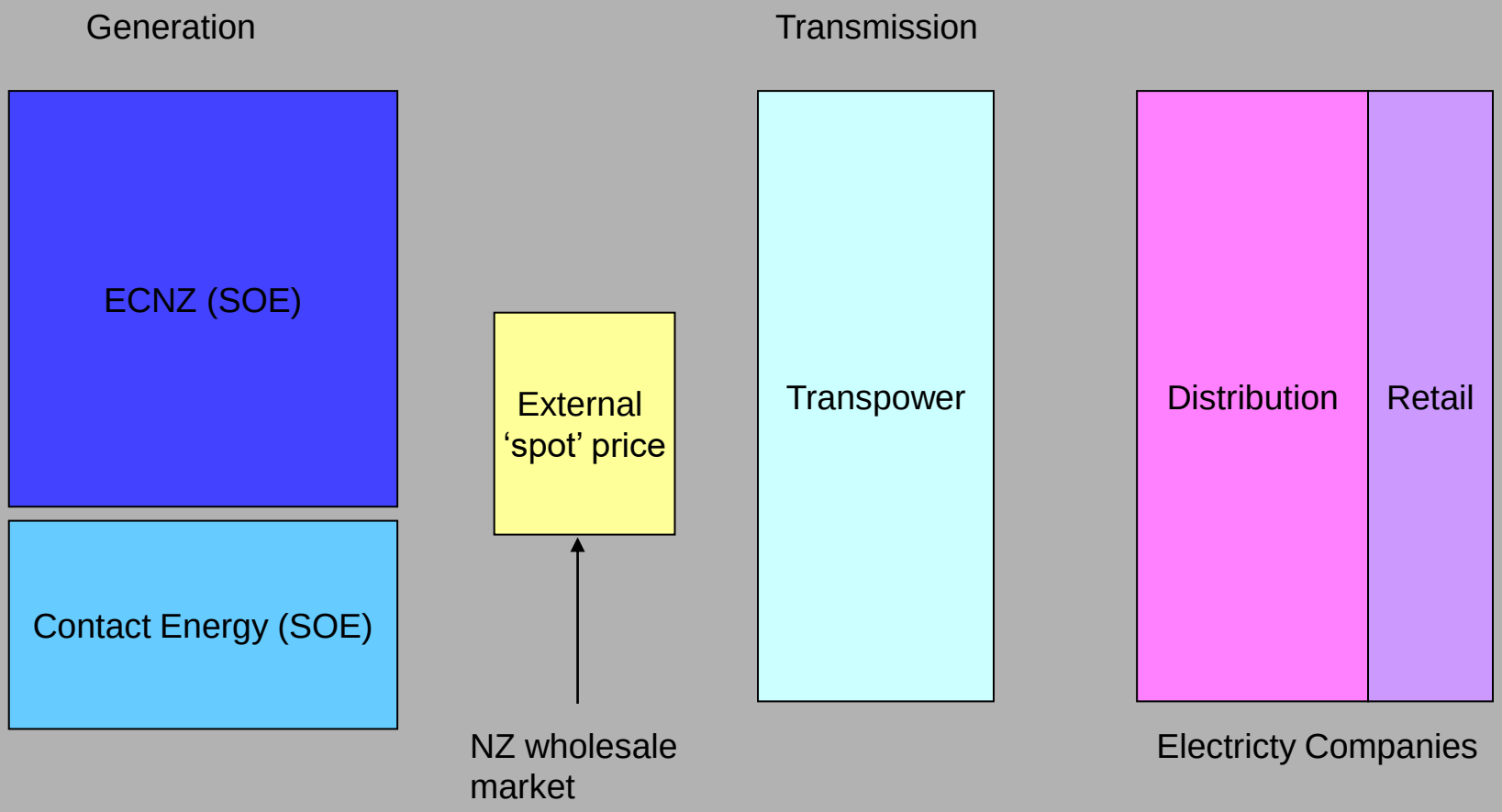


1987 corporatised into an SOE

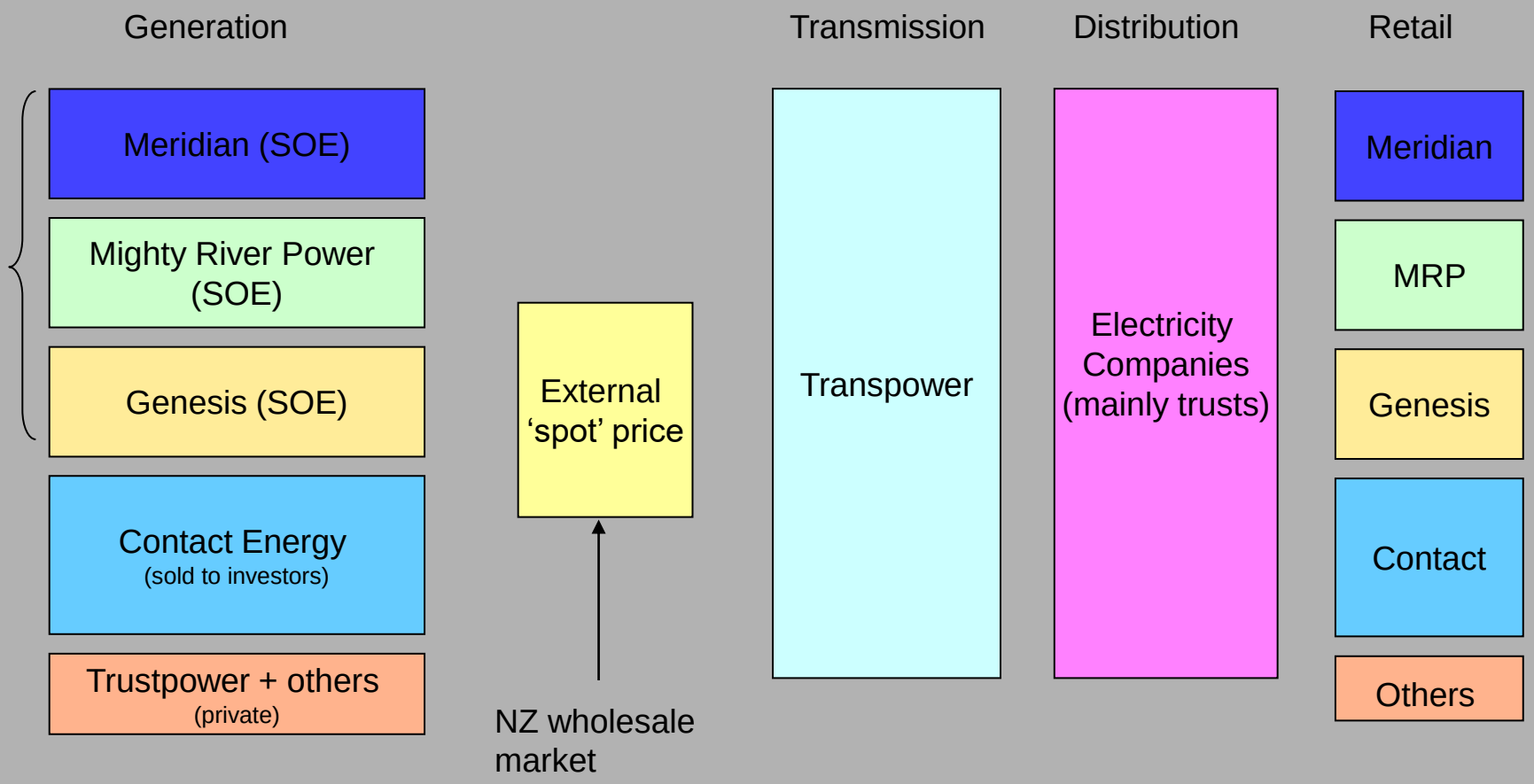
1993 stand-alone SOE

1992 corporatised into Electricty Companies

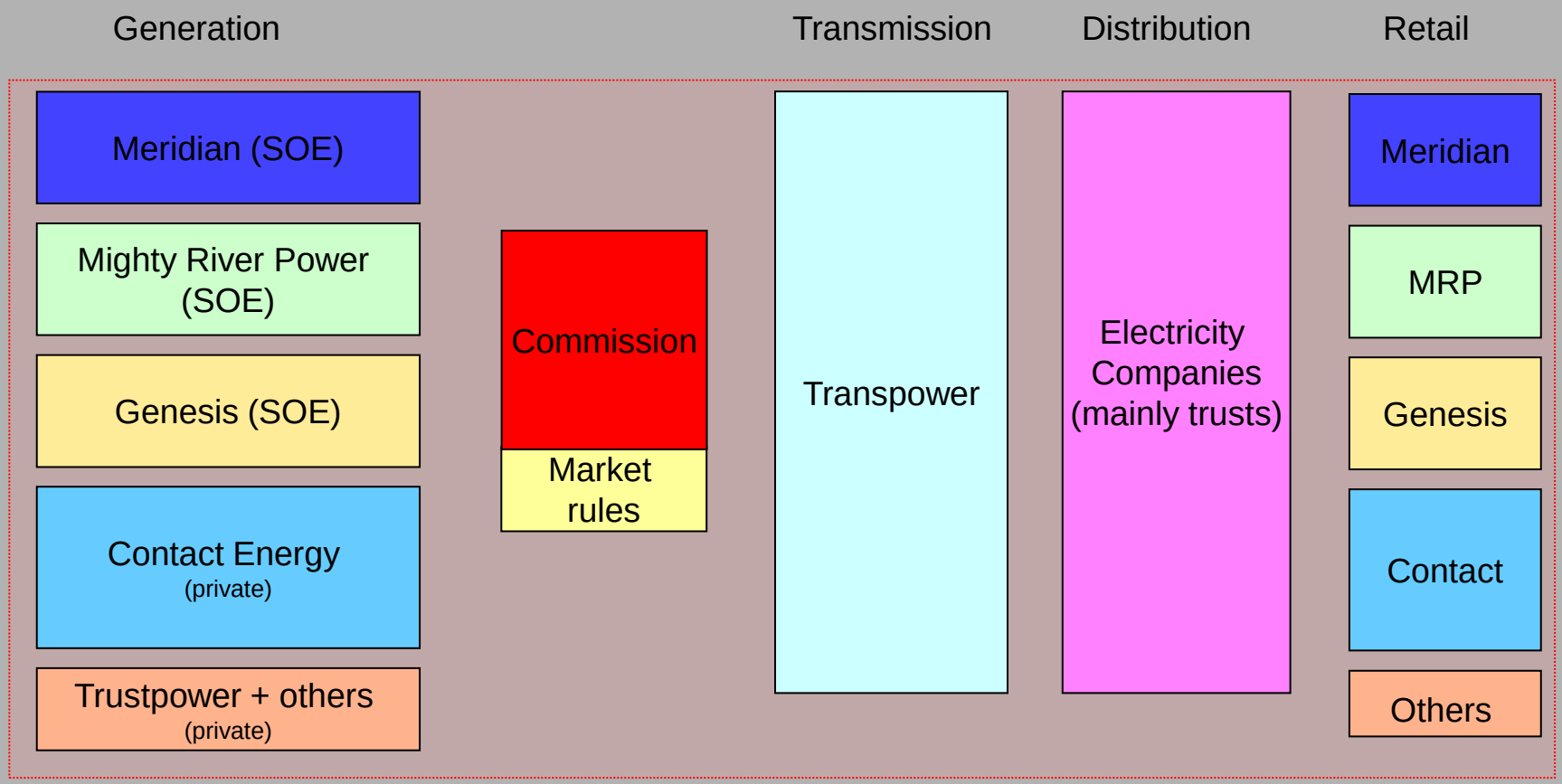
1996 – 98

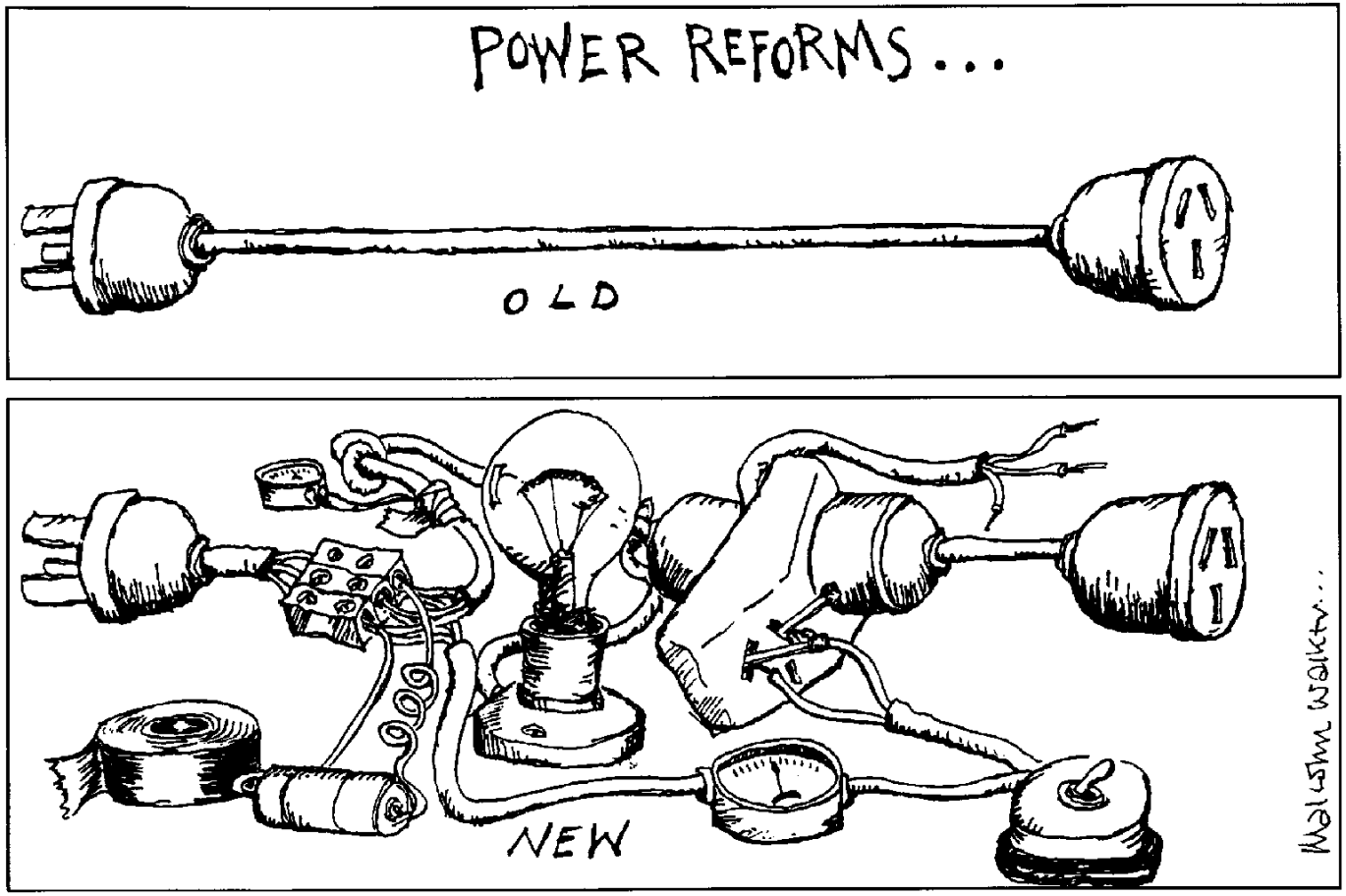

Generation
Transmission
ECNZ (SOE)
Contact Energy (SOE)
External ‘spot’ price
NZ wholesale market
Transpower
Distribution
Retail
Electricty Companies

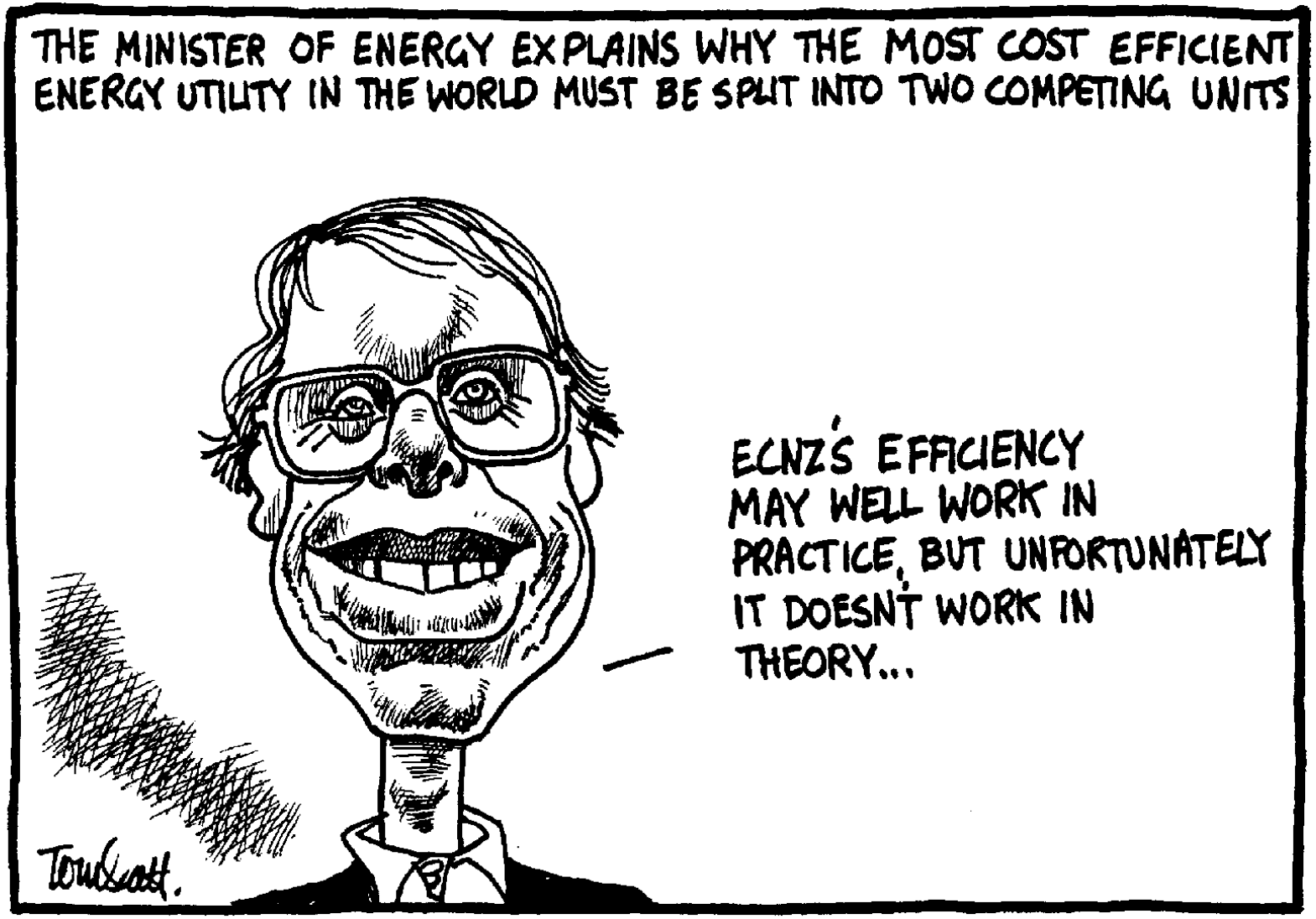
1998 – 2004


Generation
Transmission
Distribution
Retail
Meridian (SOE)
Mighty River Power (SOE)
Genesis (SOE)
Contact Energy
(sold to investors)
Trustpower + others
(private)
External 'spot' price
NZ wholesale market
Transpower
Electricity Companies (mainly trusts)
Meridian
MRP
Genesis
Contact
Others

2004 –


Generation
Transmission
Distribution
Retail
Meridian (SOE)
Mighty River Power (SOE)
Genesis (SOE)
Contact Energy (private)
Trustpower + others (private)
Commission
Market rules
Transpower
Electricity Companies (mainly trusts)
Meridian
MRP
Genesis
Contact
Others


POWER REFORMS...
OLD
NEW


THE MINISTER OF ENERGY EXPLAINS WHY THE MOST COST EFFICIENT ENERGY UTILITY IN THE WORLD MUST BE SPLIT INTO TWO COMPETING UNITS
ECNZ'S EFFICIENCY MAY WELL WORK IN PRACTICE, BUT UNFORTUNATELY IT DOESN'T WORK IN THEORY...
Tom Scott.

Why reforms?

- Achieve better new investment:
  - Investors, not tax or rate payers, taking risk;
  - Right size, type and timing of new stations

- Achieve more pressure on costs and prices

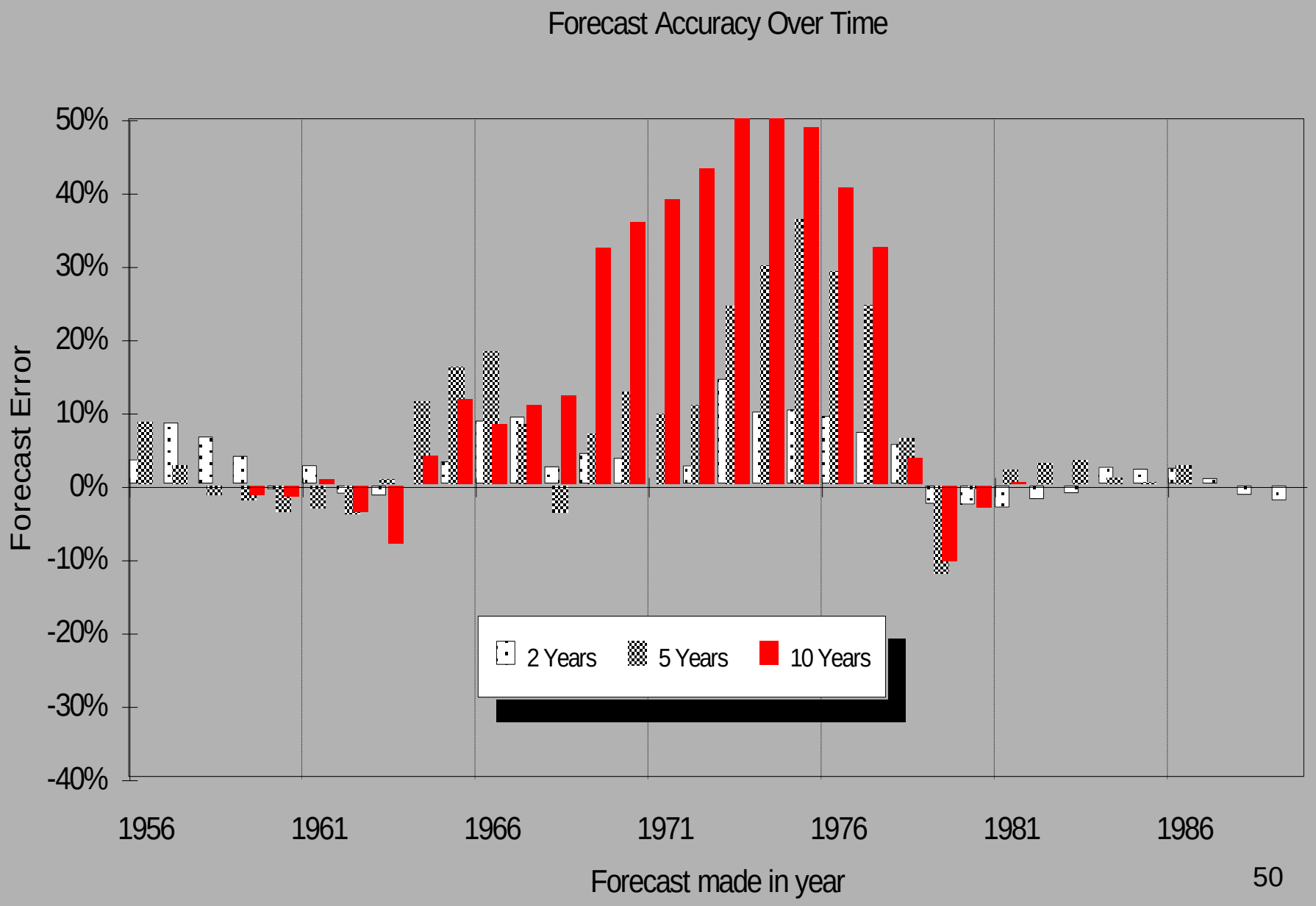
Why split lines?

- Cross-subsidies from lines to new generation –
  - AK was a bad offender
  - Three new stations – uneconomic – propped up by lines charges
  - ‘Empire building’

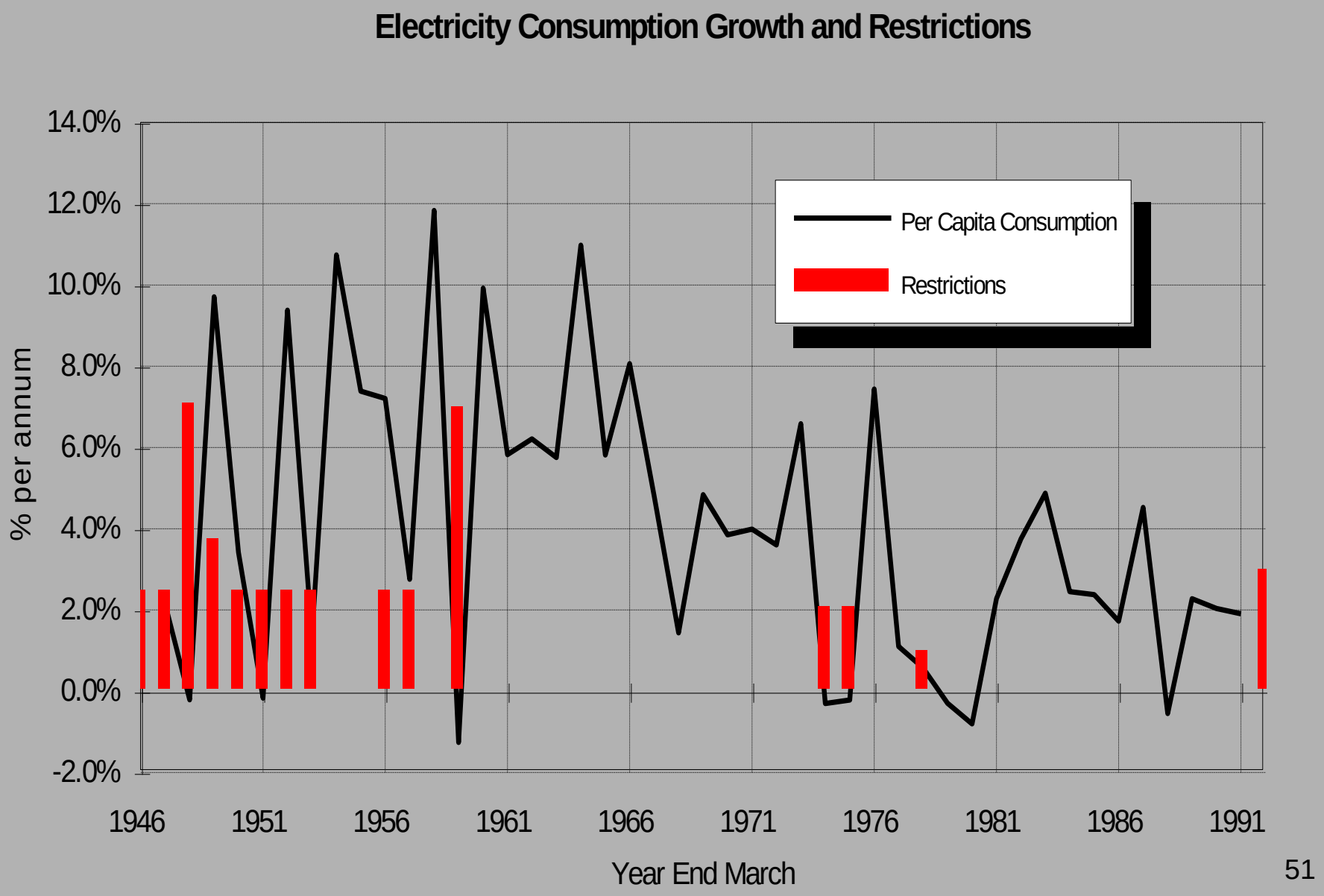
- Some also obstructing retail competiton

New investment

Track record in planning



History of shortages



New investment record

POWER STATION CONSTRUCTION COSTS
March 1990 $

	Capital	Standardised		Estimated	
Comm	Cost	Power Cost[1]		Overrun	
Year	$Million	$/Kw	c/kWh	Cost	Delay
Hydro Schemes					
Roxburgh	1956	737	2,303	5.2		
Whakamaru	1957	418	4,184	9.3		
Atiamuri	1958	291	3,461	10.2	60%	
Ohakuri	1962	322	2,874	8.7		
Aratiatia	1965	227	2,707	8.9		
Benmore	1966	943	1,746	4.6	-20%	
Aviemore	1968	454	2,063	5.3	-30%	
Manapouri	1970			4.6	80%	
Tongariro Scheme	1975			13.7	60%	5yr
Upper Waitaki	1979			8.4	0%	
Clyde	1992	1,573		11.3		

Source: John Culy, NZIER

Costs of poor investment

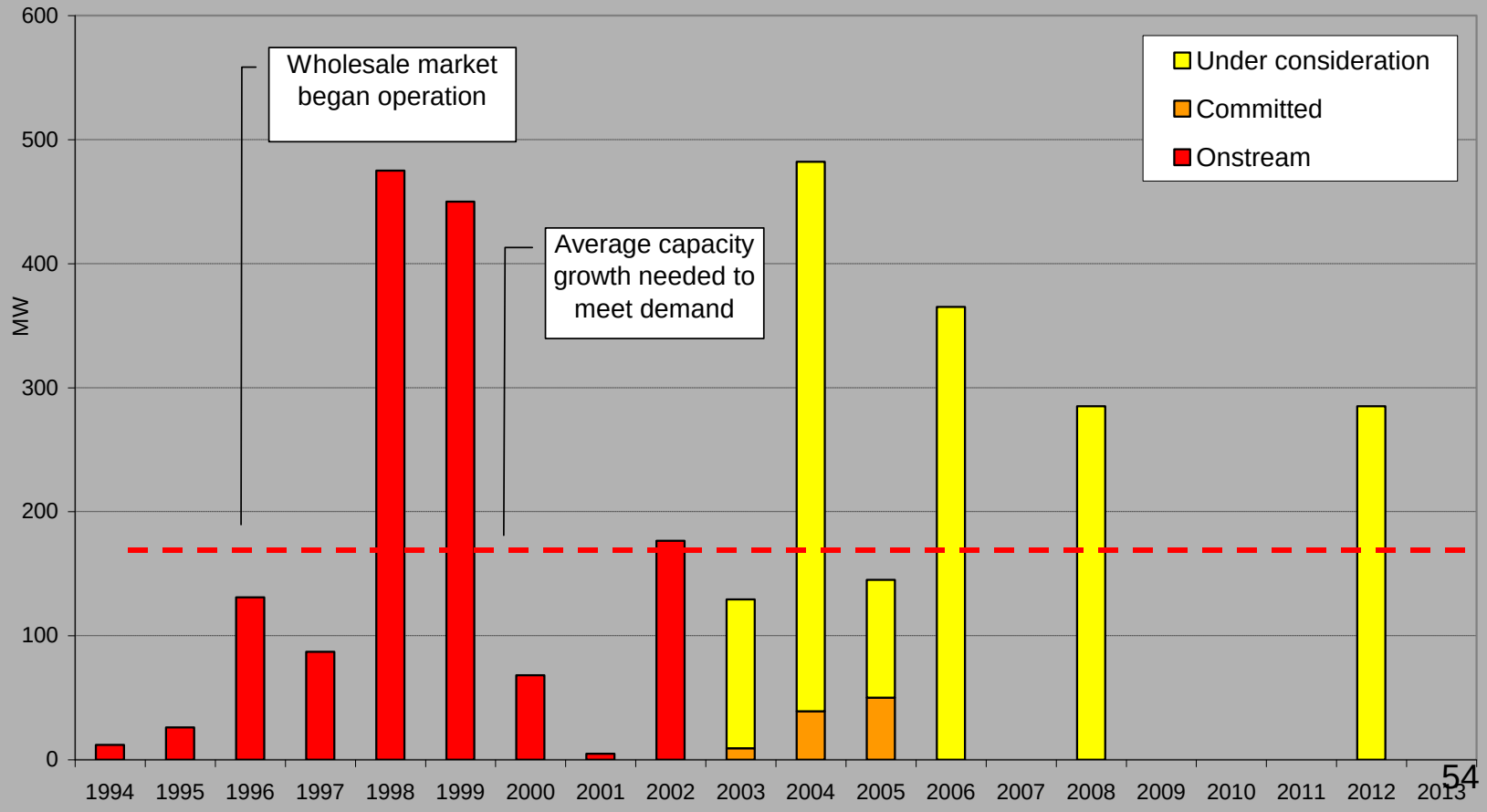
- If too soon or wrong size or wrong location or costly fuel – often made invisible

- If too late or too little, very visible – becomes major political issue – but not necessarily more costly than too much too soon

New Stations Since 1996

- Not due to lack of investment appetite:
  - over $1 billion of generation installed since market began in 1996

New generation capacity by status



new investment.xls

Prices

Objectives

- Prices to reflect costs
- Downward pressure on costs
- Test of success if not whether prices went down – but lower than would have been under old system

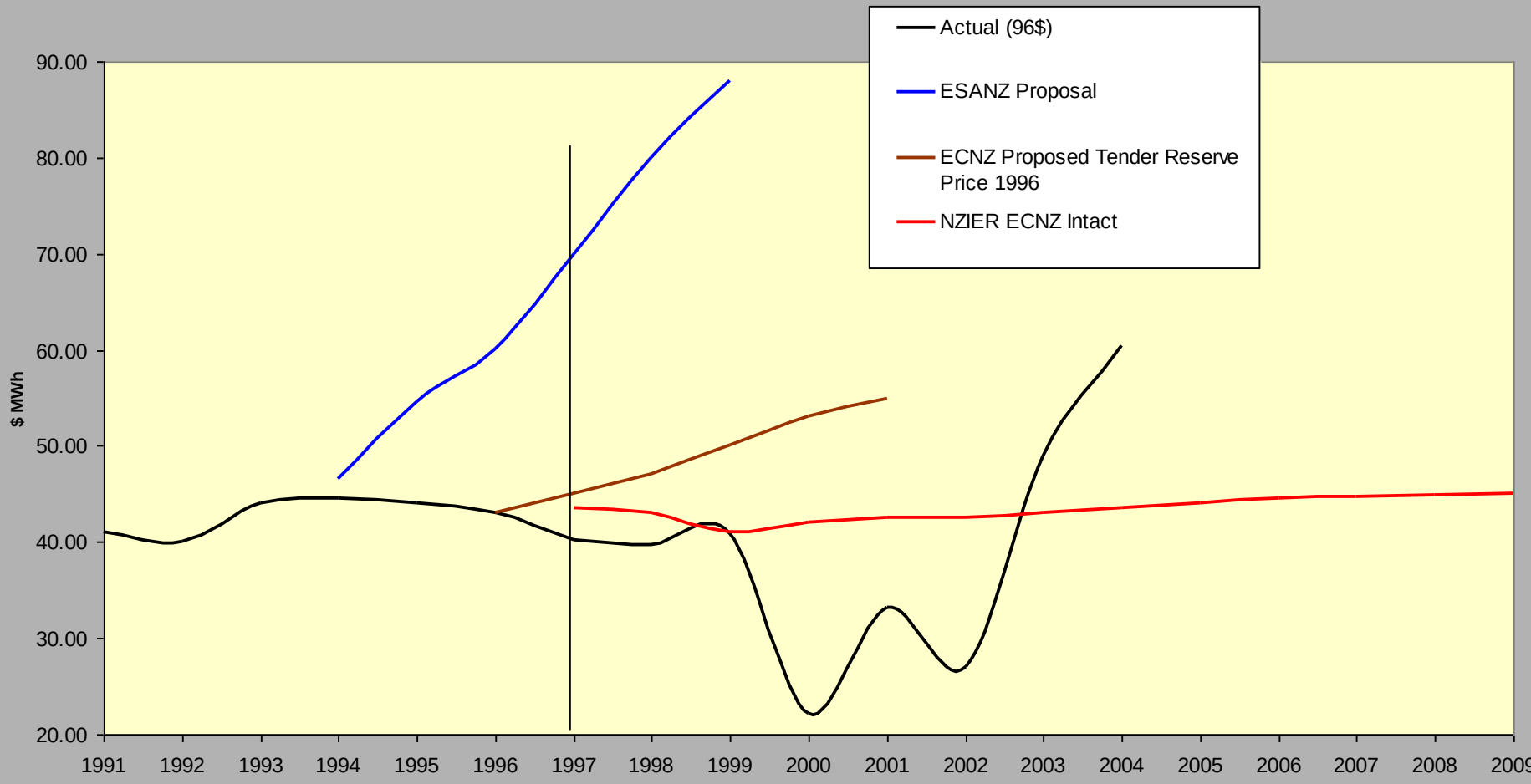
International price comparison

Country	Industry	Residential
Japan*	31.9	45.1
Italy*	20.8	35.6
Turkey	19.2	20.3
Austria *	18.9	40.5
Germany *	16.3	38.5
Switzerland	16.2	25.4
Portugal	15.5	27.8
Netherlands*	14.0	39.6
Australia *	13.6	19.4
Spain *	13.5	34.6
Belgium *	13.3	40.5
UK*	12.6	23.9
Hungary	12.1	16.0
Ireland	12.0	24.8
Greece*	11.9	21.7
Mexico	11.3	17.2
France *	11.3	*31.2*
USA	11.1	21.3
Norway	10.2	16.9
Canada*	9.3	14.4
Denmark	9.2	46.9
Finland	8.9	17.9
Sweden *	8.3	24.5
New Zealand	6.5	**13.7**

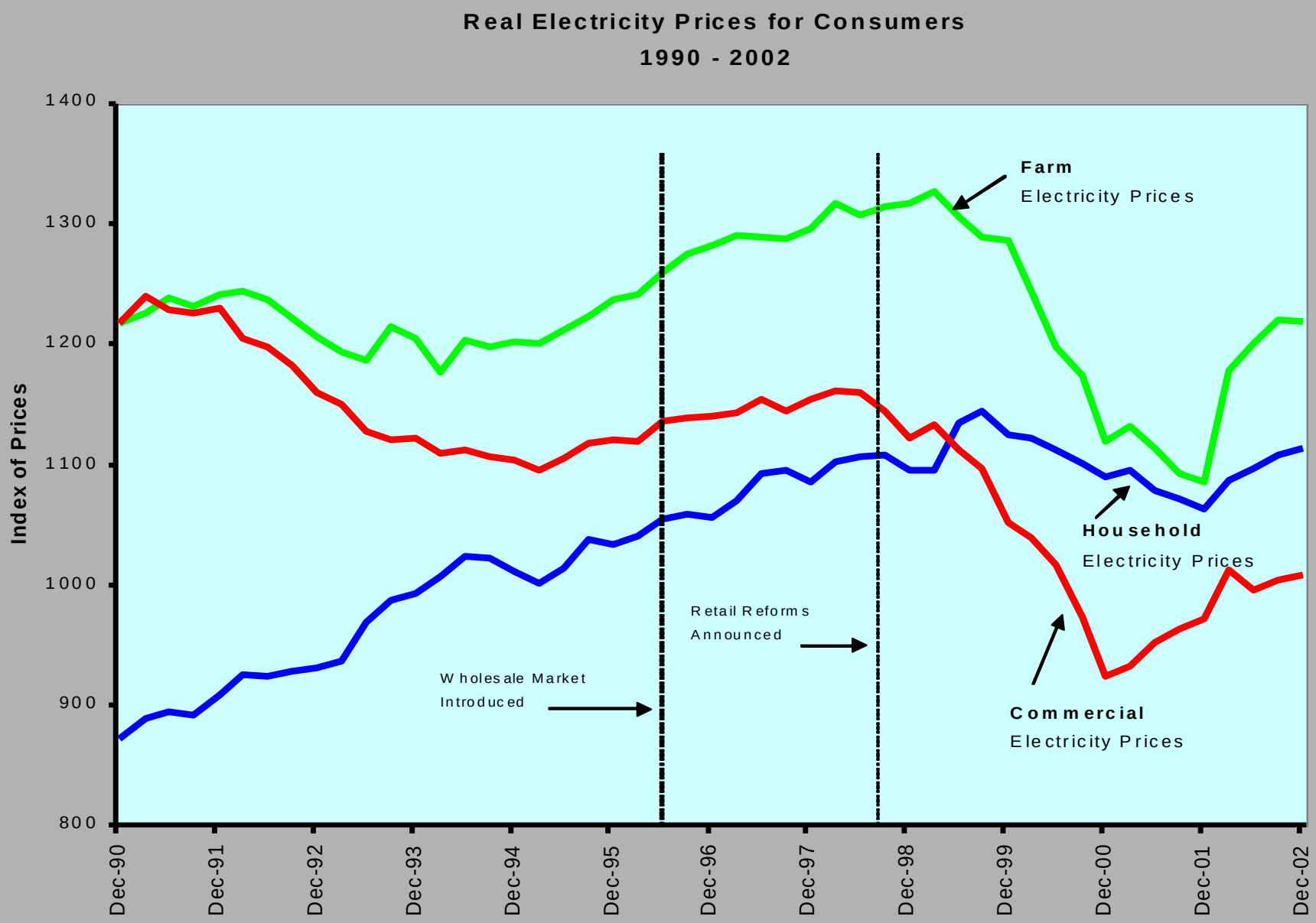
Aim is to protect our competitive position

Source: MED – 2000 [?]

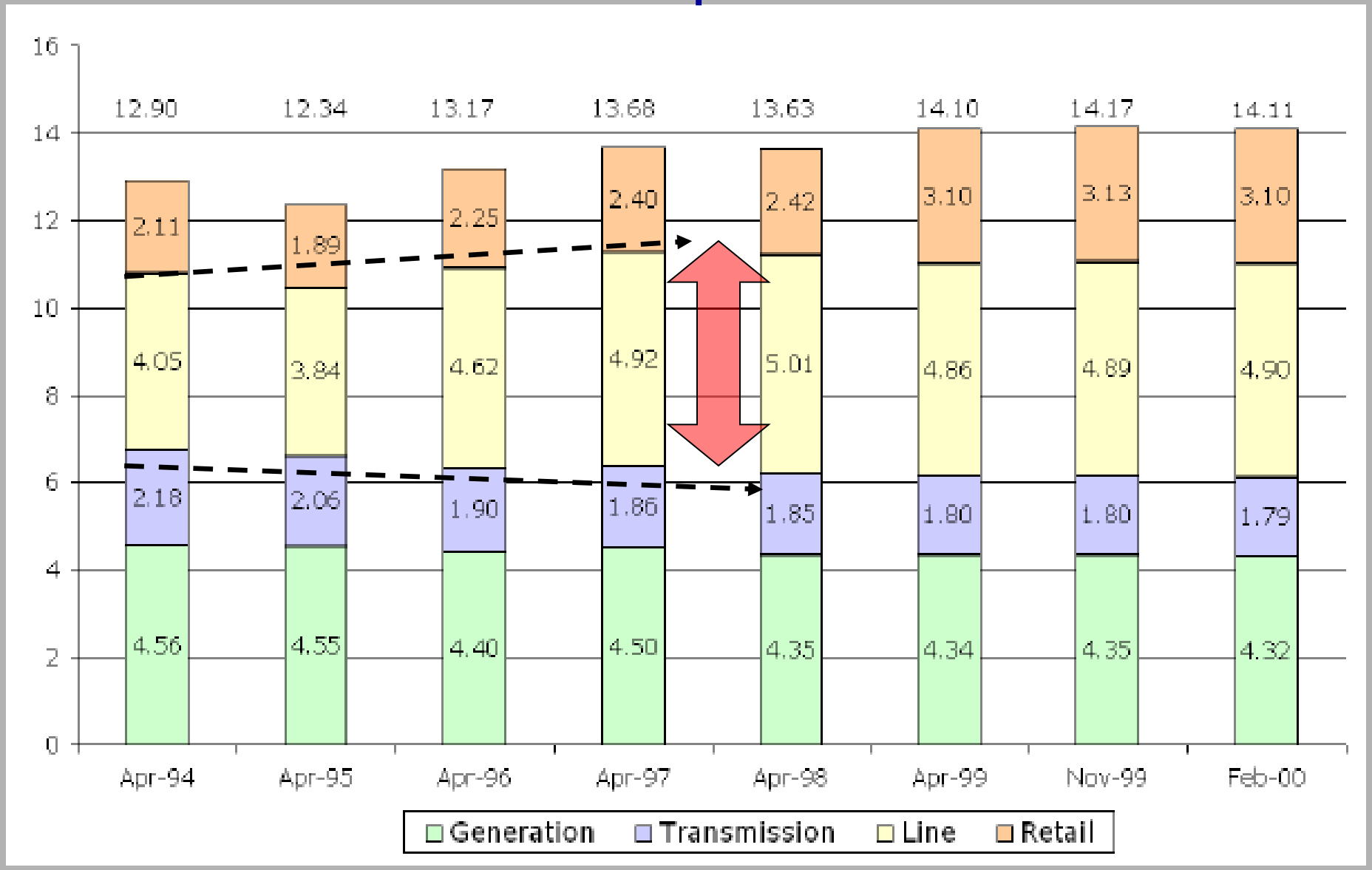
Pre-reform price plans



Post-reform prices



Price components



Source: MED

Average consumer prices