

What's wrong with the Electricity Market?

Greg Sise

Energy Link

September 2006

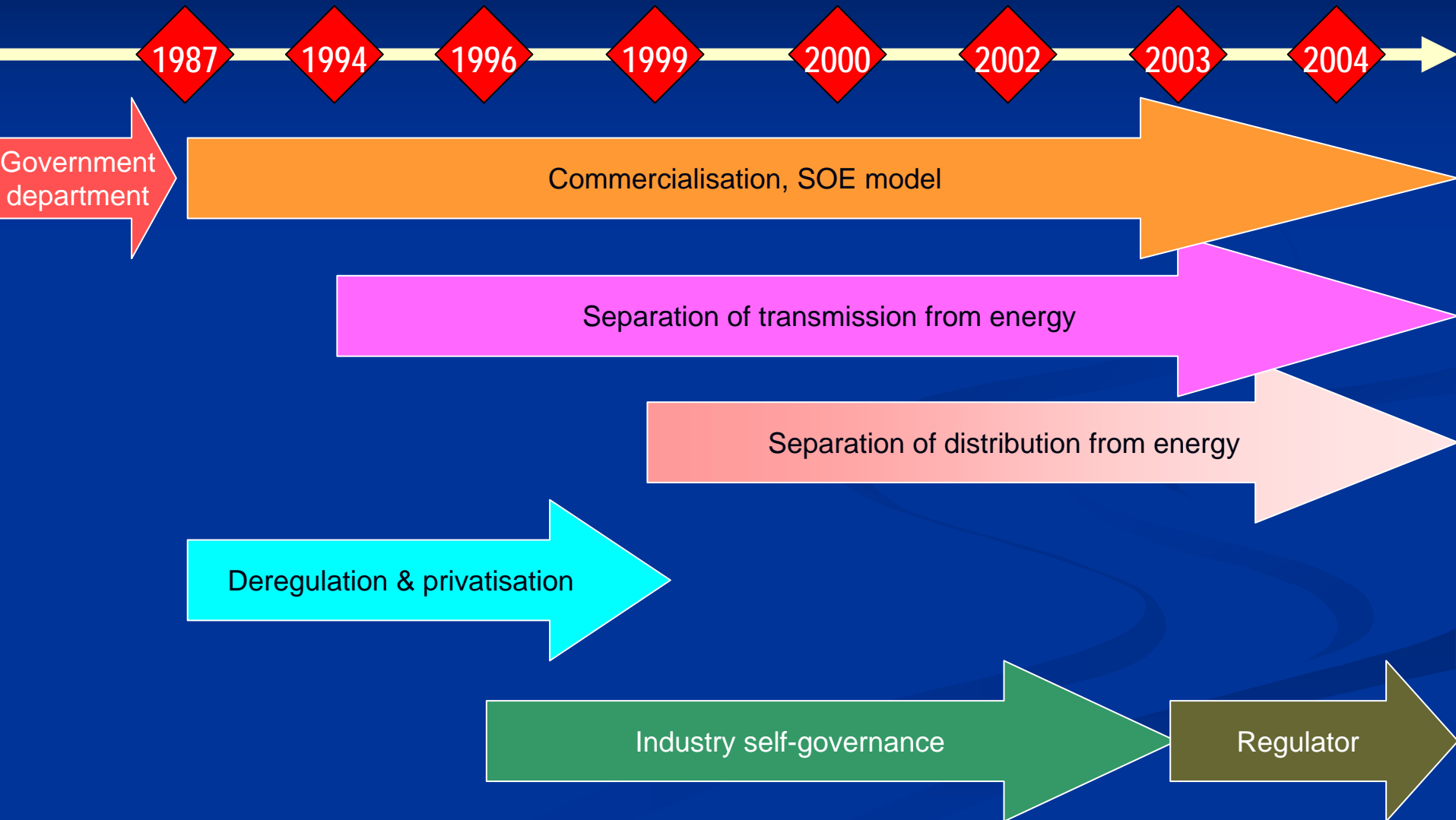
Abstract

- Given the amount of negative publicity it attracts, a casual observer would be forgiven for thinking the electricity market has totally failed. Established almost 10 years ago, the electricity market is plagued by doubts about its ability to deliver a secure, reliable electricity supply at reasonable cost. Today we look at key issues and look for a way ahead, with an emphasis on policy. By implication, we include the natural gas market.

What's right with the electricity market?

- Supply crises 2001, 2003, 2006
- Demand growing at an ever increasing rate
- Not enough new generation being built
- Auckland crisis 1998, lack of transmission capacity into Auckland & top of South Island
- Electricity prices climbing
- Anti-competitive behaviour
- Conflict between Electricity Commission, Transpower, Commerce Commission and government
- “Top decile security of supply at lowest decile prices.”
 - What more do we want?

History



Legislation

- Electricity Industry Reform Act 1998
 - requires split of energy and lines business
 - recent relaxation for lines companies to own more generation
- Electricity Act 1992
 - general rules around supply
 - Electricity Governance Regulations 2003
 - includes market rules
 - Electricity Commission
- Commerce Act 1986
 - general competition issues
- Electricity and Gas Industries Act 2004
 - amendments to acts above

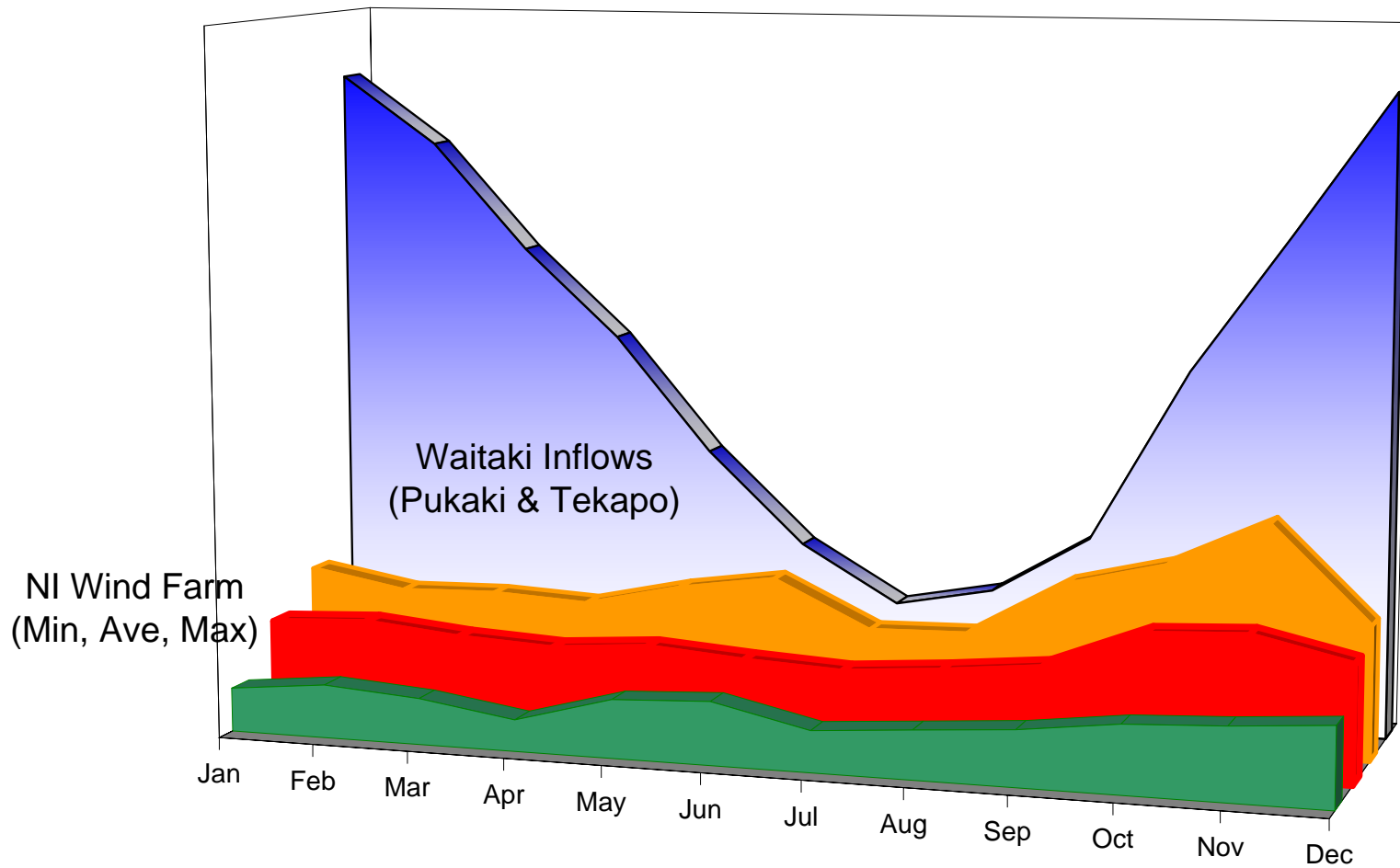
Contents

- Dry year security of supply
- Demand growth
- The Grid
- Electricity prices
 - The spot, hedge & retail markets
 - The gas market
 - Electricity company profits
 - Demand elasticity
 - Investment
- Regulation and governance

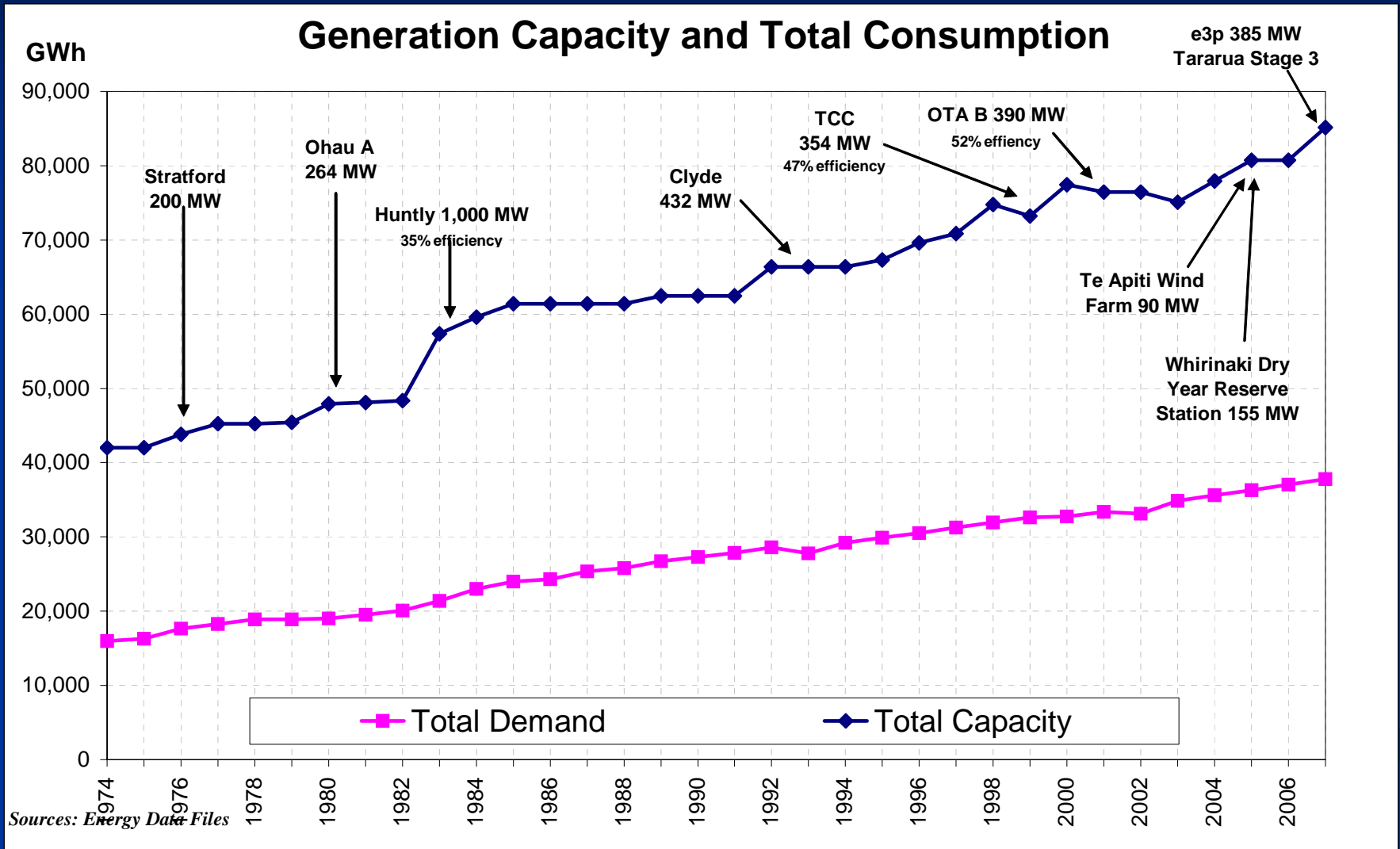
Has the market provided dry year
security of supply?

Inflow Variation

Monthly Wind Speed and Inflows



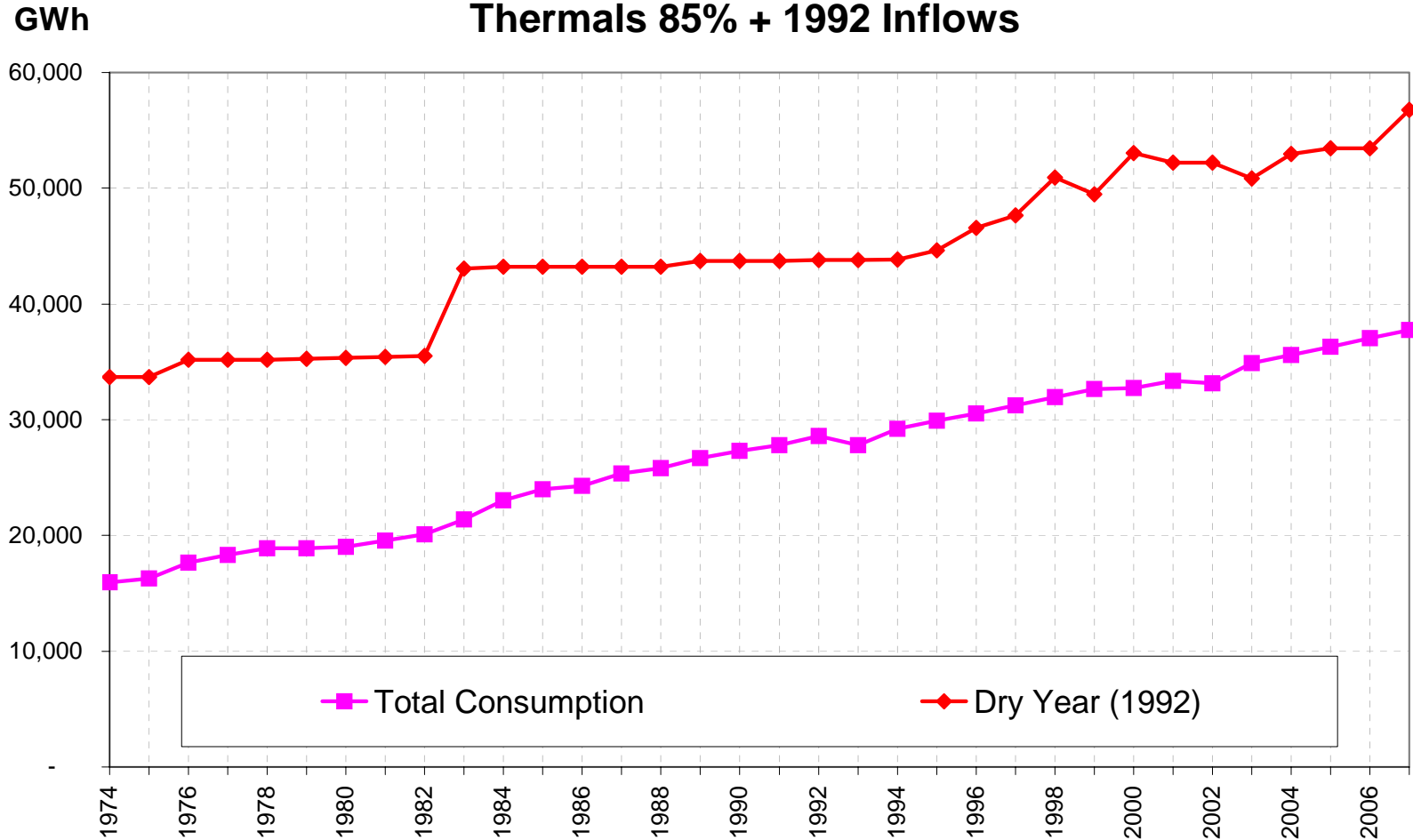
Installed Capacity and Demand



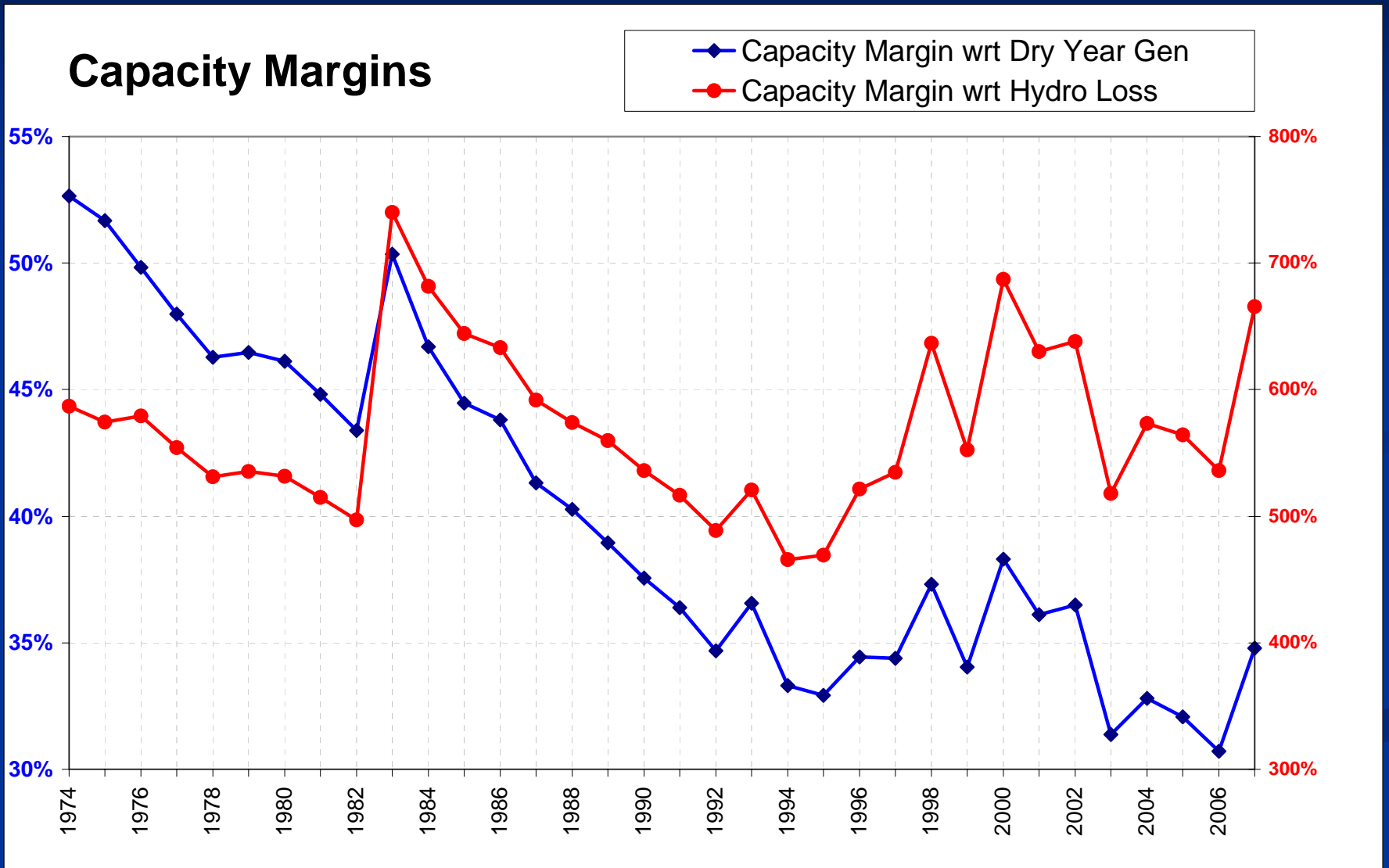
'Installed capacity' is the maximum that can be generated.

Dry Year Capacity and Demand

Dry Year Available Energy vs Total Consumption
Thermals 85% + 1992 Inflows



Capacity Margins



Did the Market Provide Security?

- Yes and No
- Initially there was a 'dash for gas'
- Then gas became scarcer and plans for new generation were stalled, e.g. Contact's Otahuhu C
- Less efficient or costly plant uneconomic and shut down, sold off
 - Stratford, Otahuhu A, Whirinaki, one unit at New Plymouth
- So EC's role in security arose in 2004

South Island Hydro Management

- Meridian manages lakes Pukaki and Tekapo
 - key to security of supply in dry years, especially in the South
 - manage storage very conservatively
 - impact of their storage management and pricing on the market is very significant
- Conservatism results in early warnings and high prices
- Offset this year by the EC's monitoring

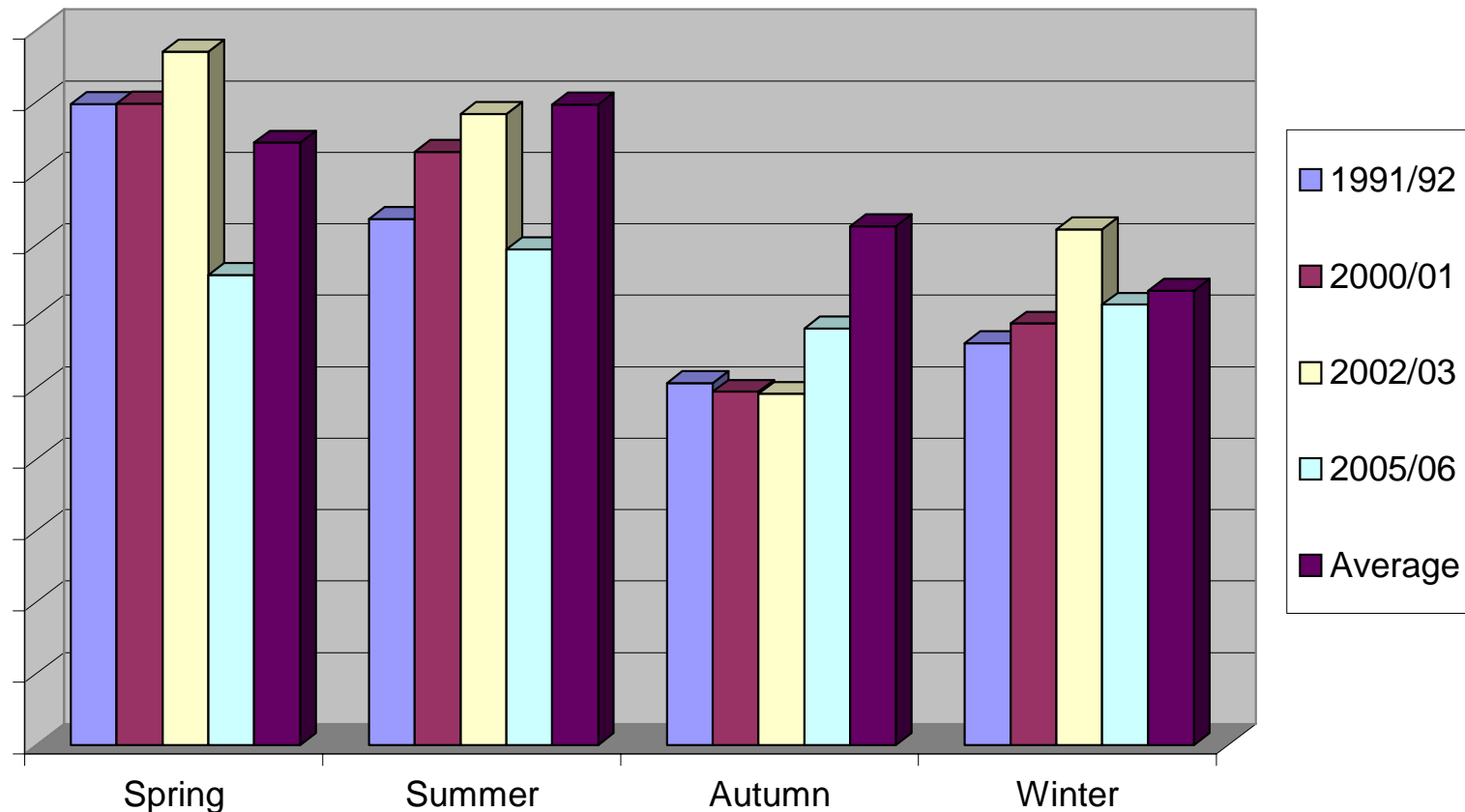
Dry Year Policy

- Calls for voluntary savings 1-in-60 years
- Government built Whirinaki
- EC contracts for reserve capacity
- EC monitors security of supply, e.g. Minzone
 - highly effective this year
- Dry year security is not explicit in the market
 - but the financial implications ensure reservoirs are operated very conservatively (Meridian)

Dry Years

Rank	Spring	Summer	Autumn	Winter
1991/92	49	16	7	16
2005/06	10	9	19	36

New Zealand Dry Year Inflows



The “Squeeze”

- ↓ Environmental issues limiting options for new generation (large hydro, coal firing) and transmission (towers)
- ↓ Conservative hydro management means early warning
- ↑ Expectation of secure and reliable supply is increasing
 - limited ability to use other energy sources (coal fired computer?)
 - “One thing’s certain ... we need that power. Once upon a time it was just the lights that went out. Now it’s our world.”

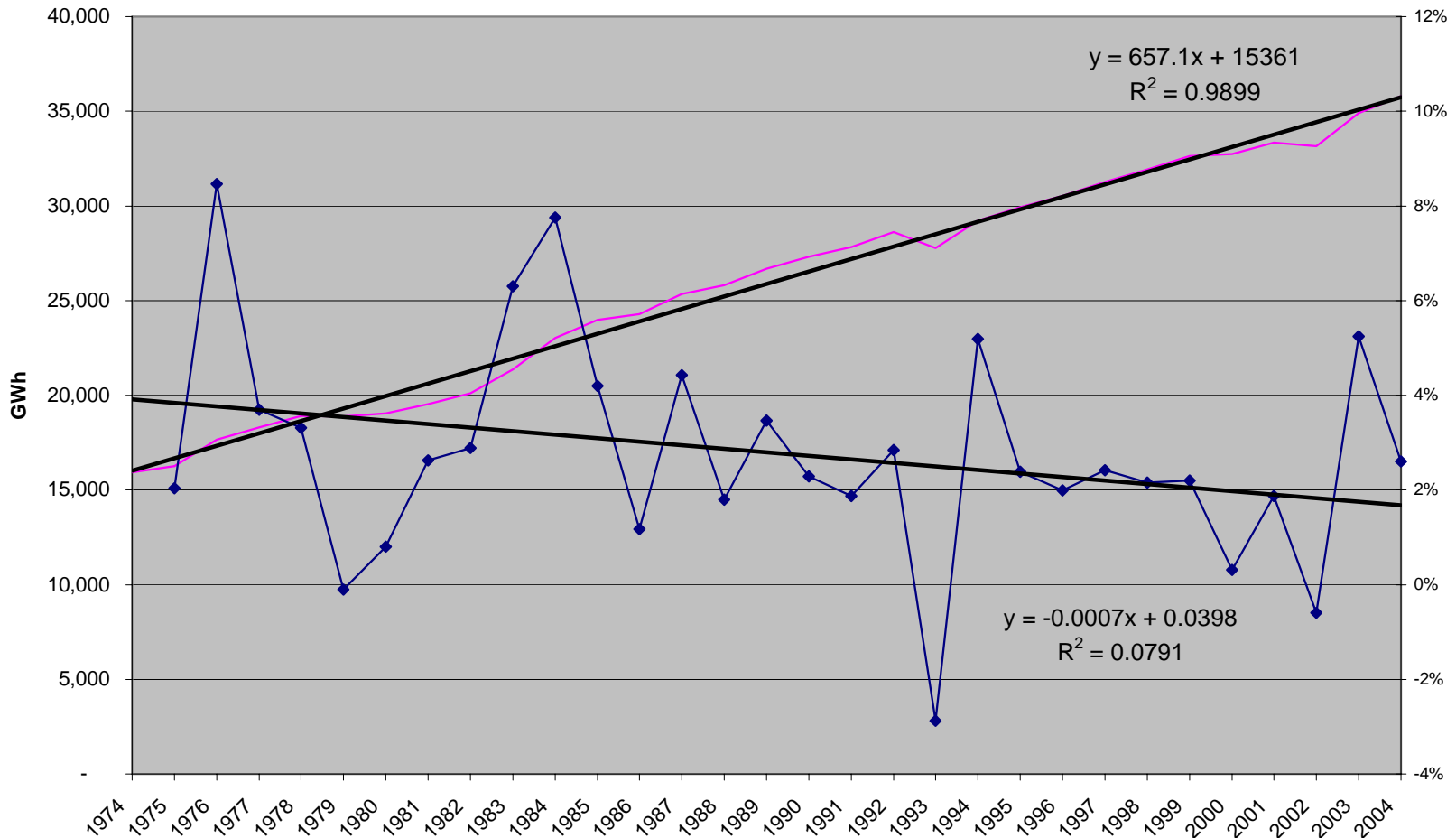
 Nagging perception of an impending power crisis

- Whereas the reality is the capacity margin is holding

Is demand growing out of control?

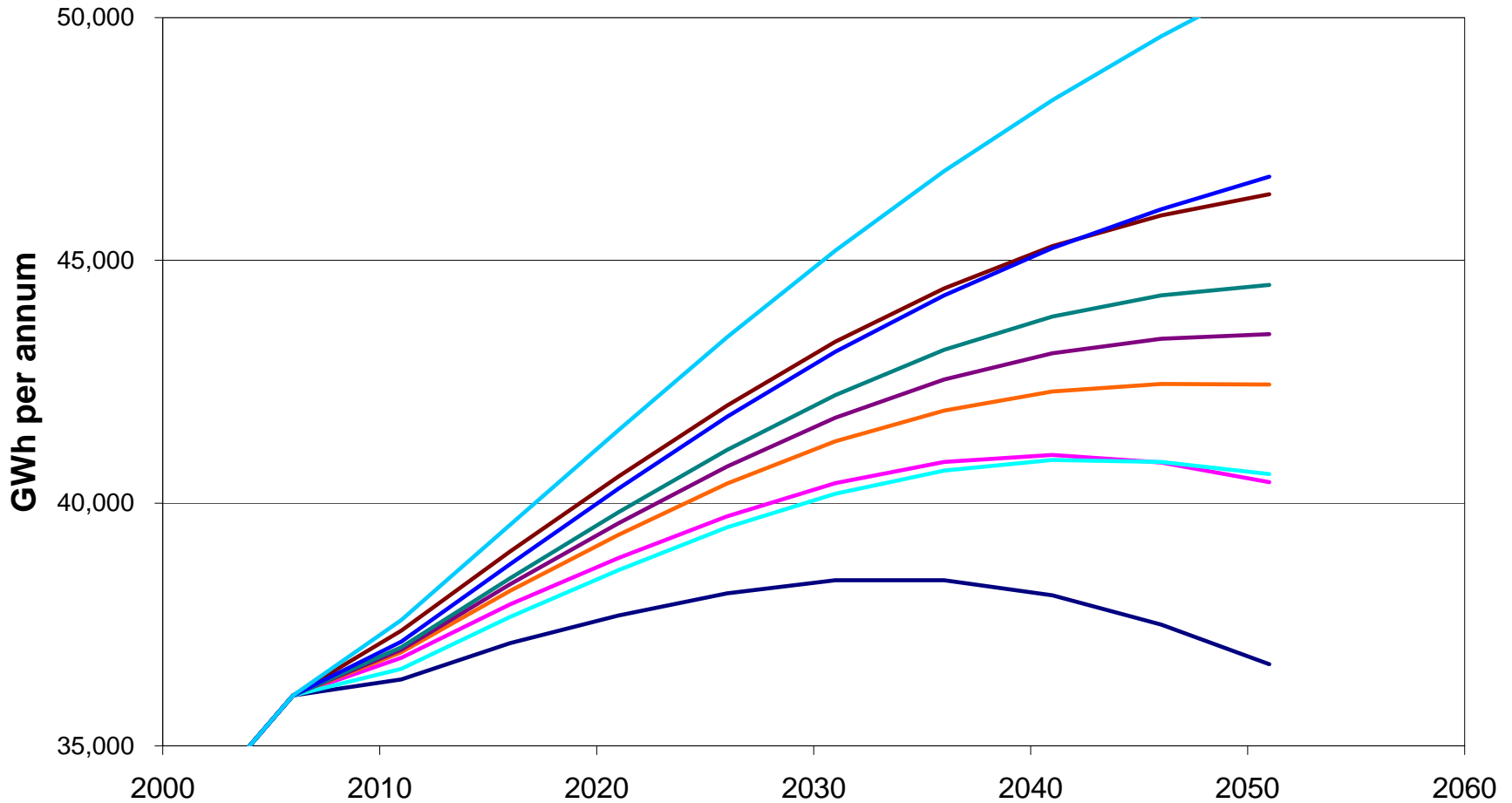
Demand Growth

EDF March Year Ended Total Consumption



Population and Demand

Population Based Demand Projections

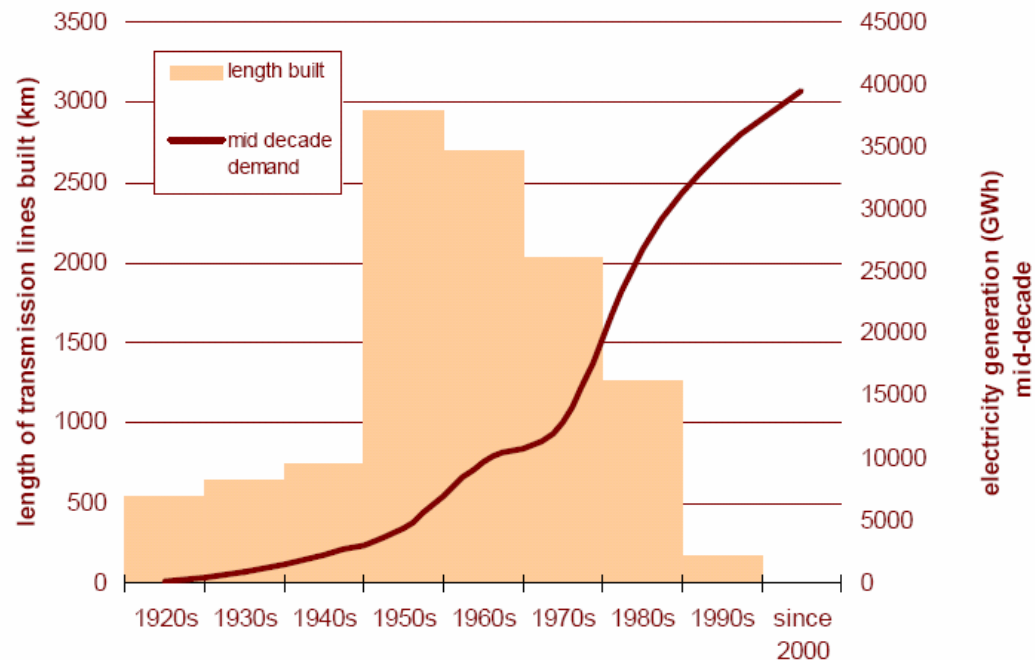


Can the Grid deliver?

Grid

Transpower does not participate directly in the electricity market

Transmission Build Since 1920



2006 added a new circuit Christchurch to top of SI



TRANSPOWER

Major Grid Upgrades

- Upper South Island
 - 220/110 transformer Kikiwa to supply West Coast
- 220 or 400 kV supply Waikato to Auckland
- HVDC link
 - replace Pole 1 control equipment
 - new cables, higher capacity
- Waitaki Valley to Christchurch
- Upgrade circuits south of the Waikato

Grid Investment Test

- EC has the role of approving grid investments for
 - meeting reliability standards, or
 - economic investments
- EC and Transpower apply the grid investment test
 - does the proposed investment test have a positive net benefit?
 - is the proposed investment the best alternative?
- Some room for interpretation around how the alternatives are developed and who develops them

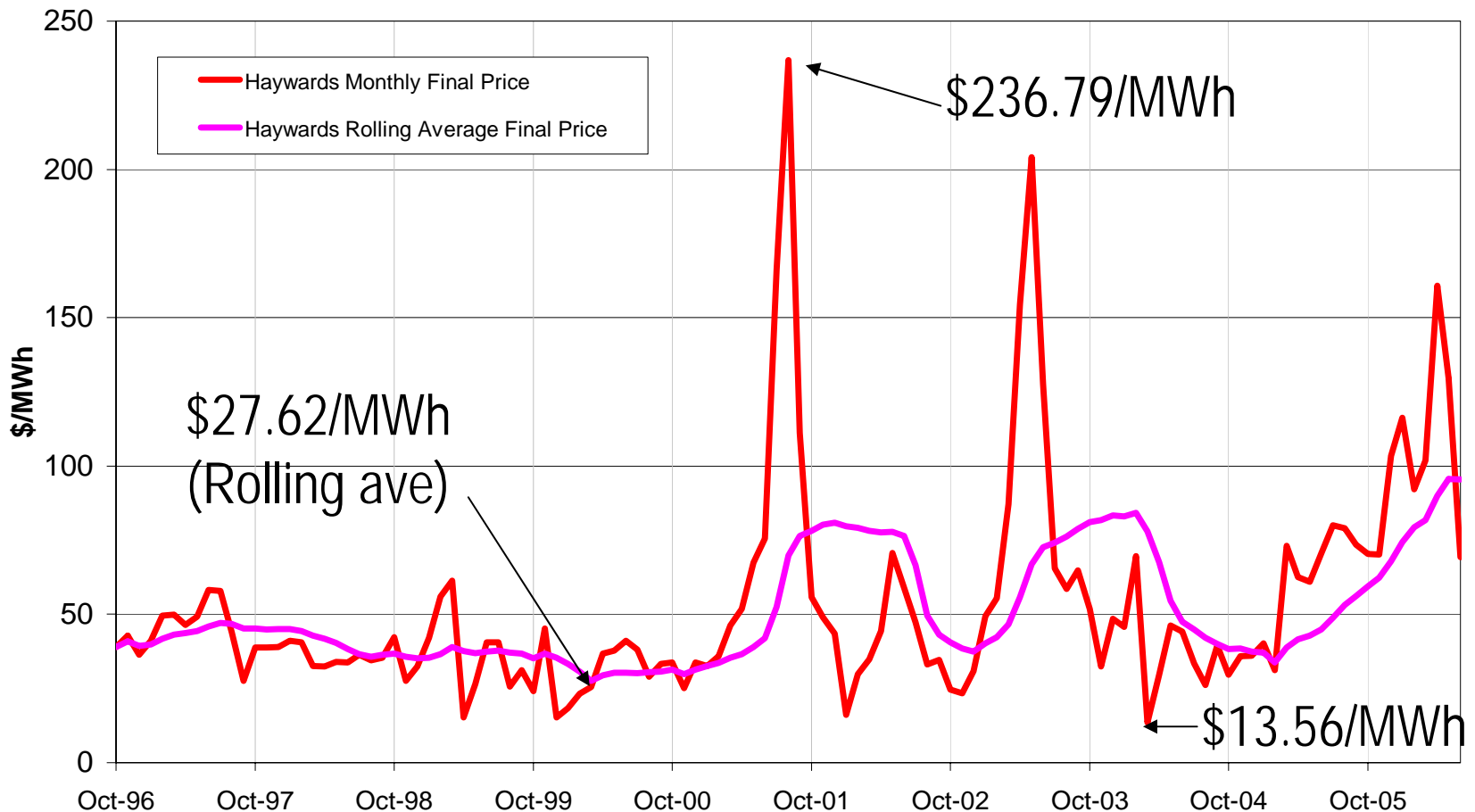
Has the market provided cheaper
electricity?

Days gone by . . .

- “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

A Volatile Spot Market

Monthly Average Price at Haywards



Electricity - Market or Markets?

Generators



Sales

Spot Market
Spot Prices,
Variable Volumes

Purchases

Retailers, Norske Skogg*

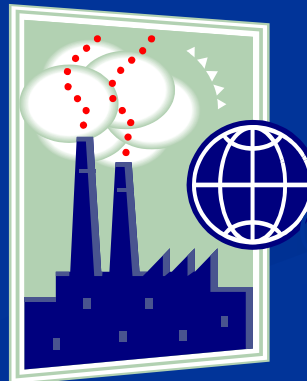


Fixed Prices,
Fixed Volumes

Spot Prices,
Variable Volumes

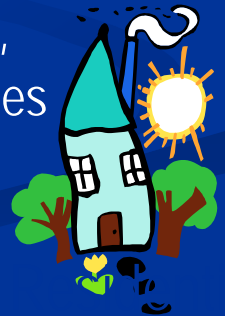
Hedge Market

Larger consumers, often
some exposure to spot



Retail Market

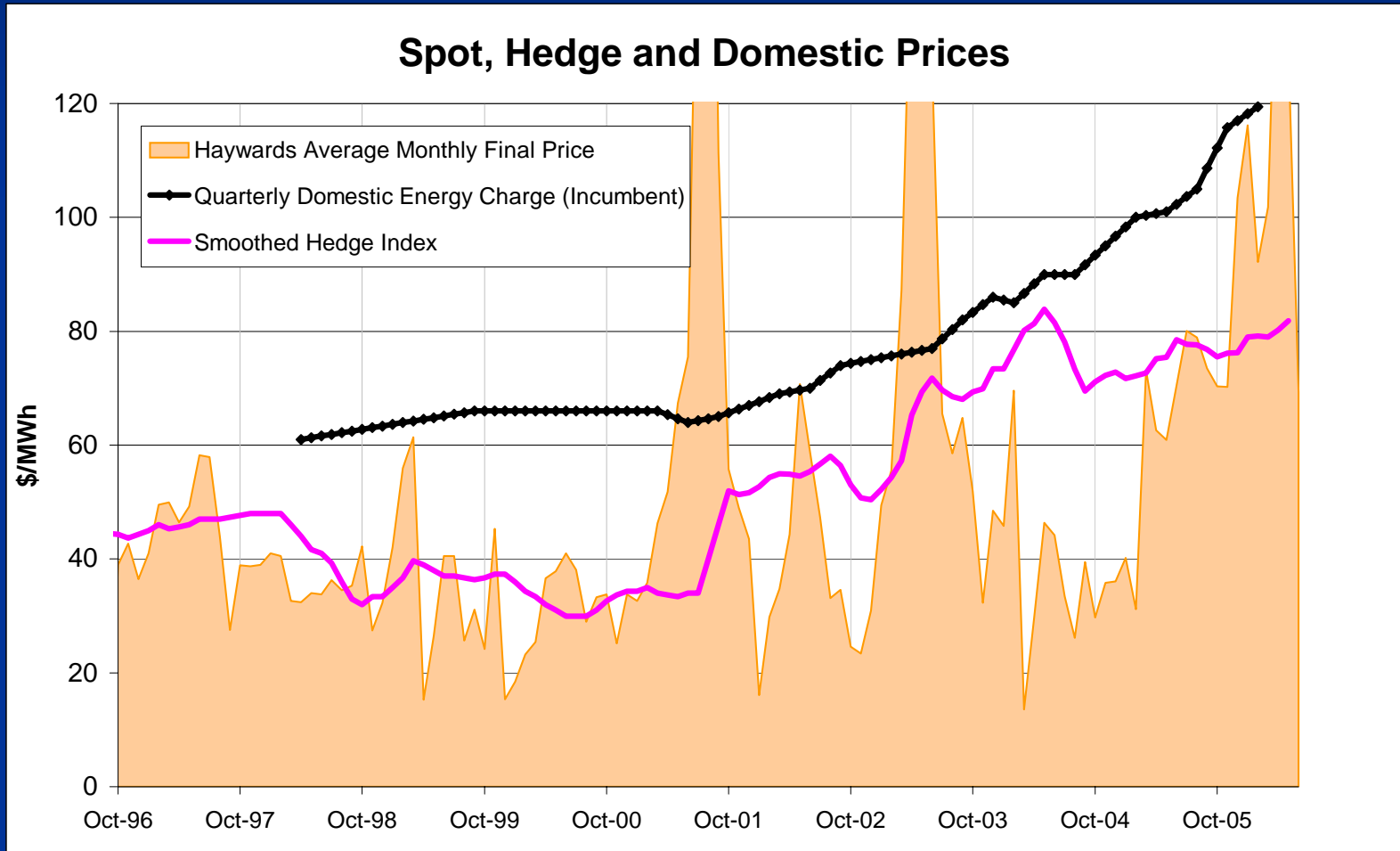
Fixed Prices,
Variable Volumes



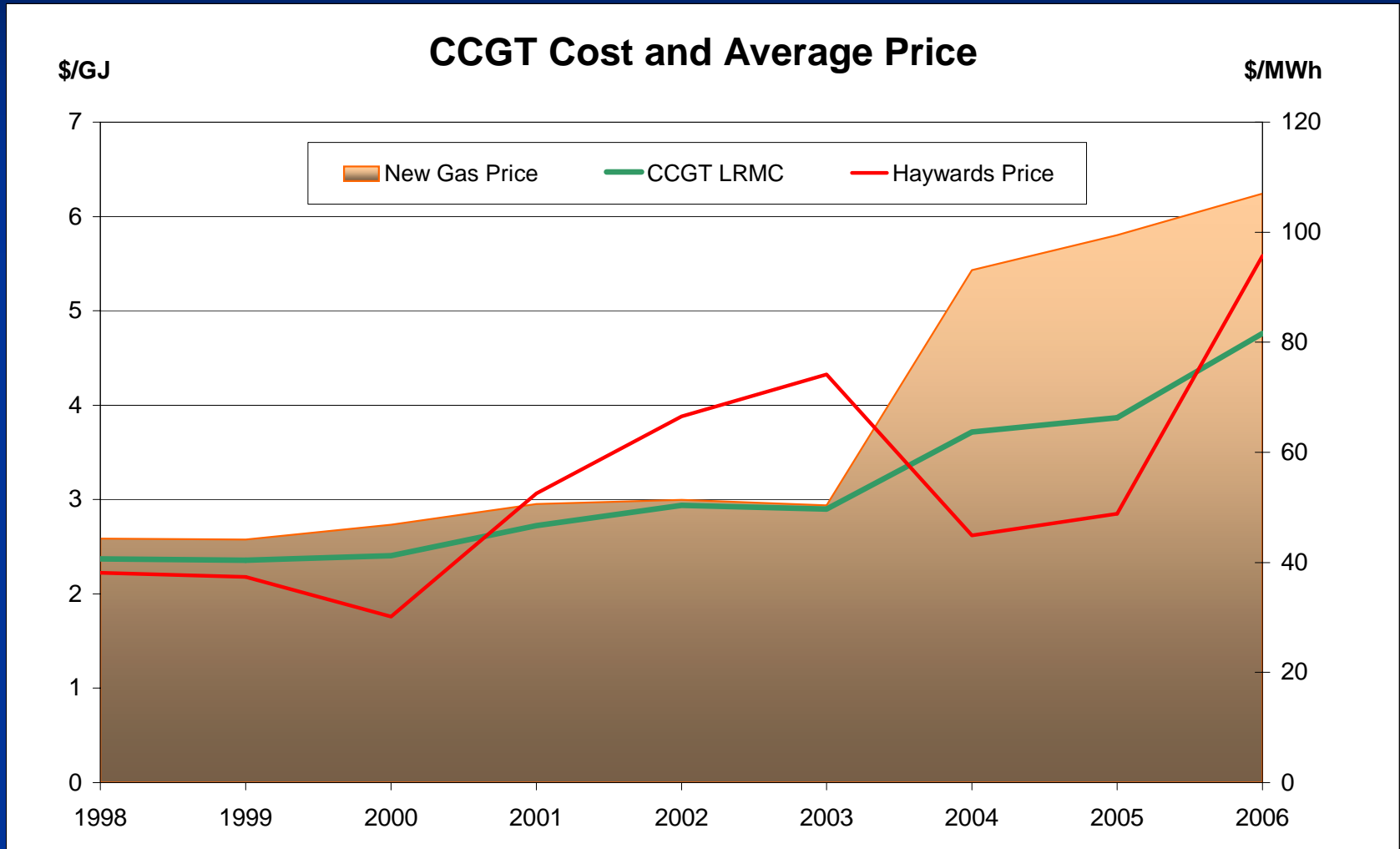
Market Share in 2005

	Installed Capacity	Market Share
Meridian Energy	27.3%	33.7%
Mighty River	12.3%	14.7%
Contact Energy	30.4%	28.0%
Genesis Power	17.1%	17.0%
Trustpower	5.3%	3.2%
Other	7.5%	3.0%

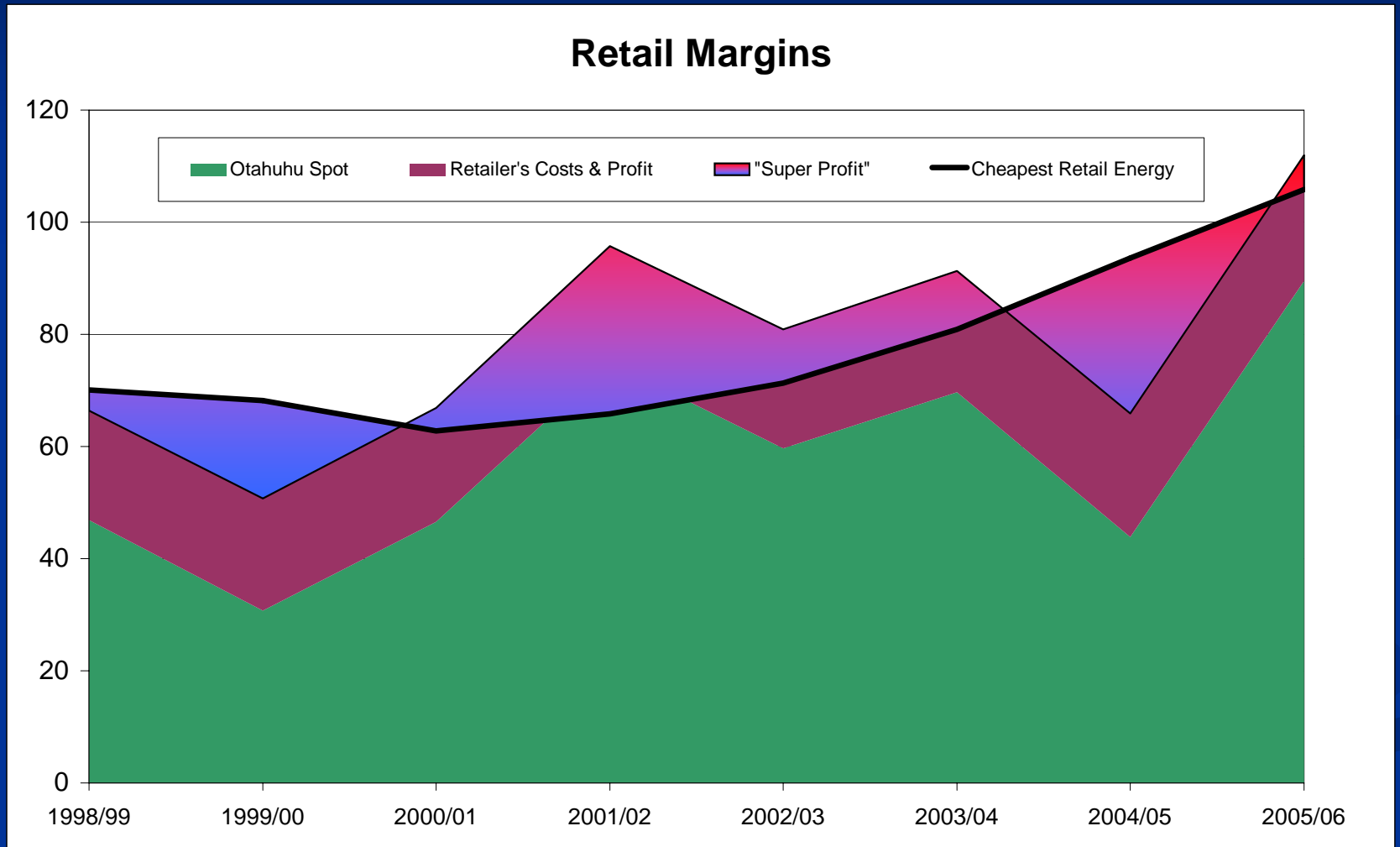
Spot, Hedge & Domestic Prices



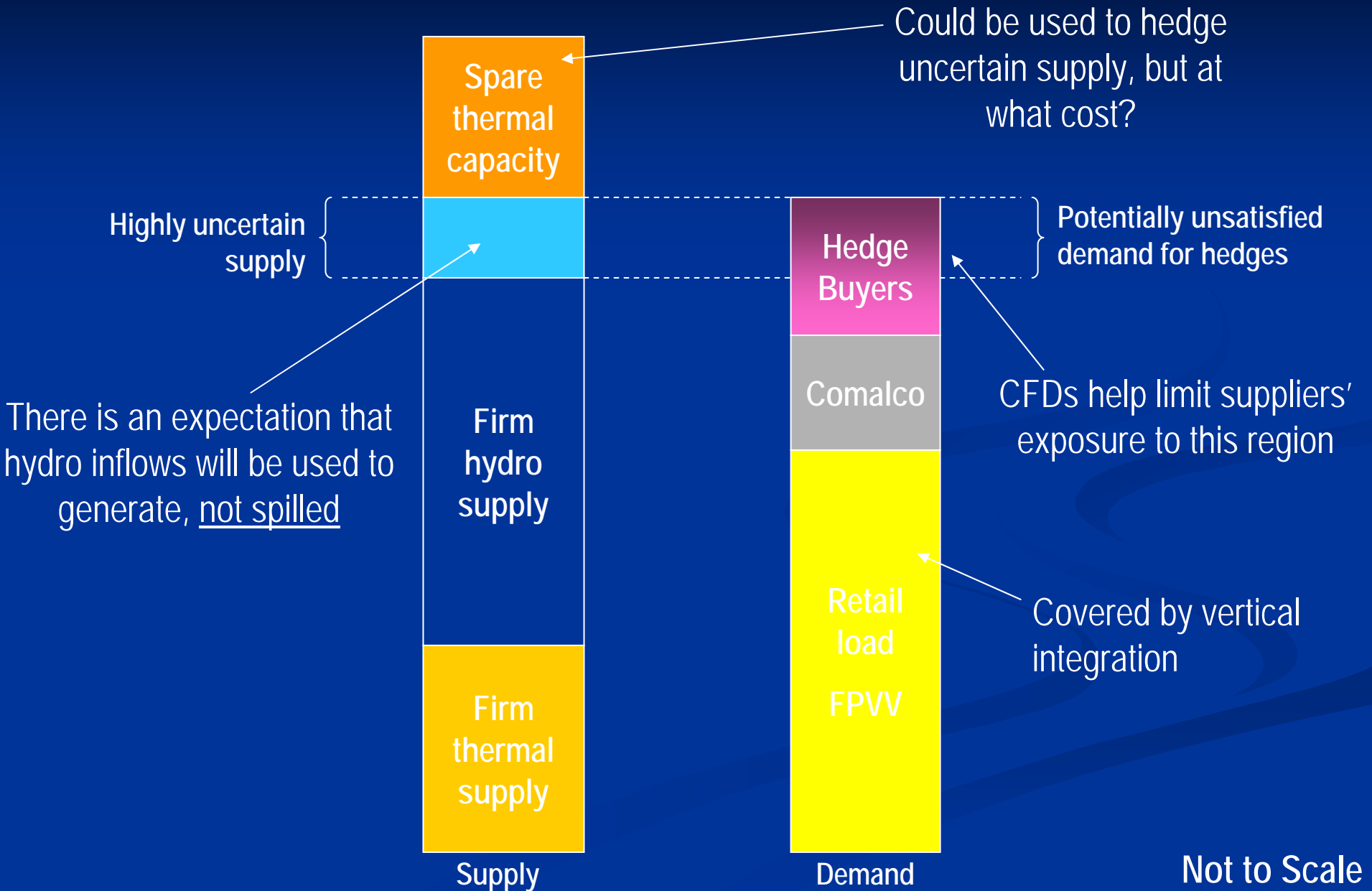
Gas => Electricity



Retail Margin

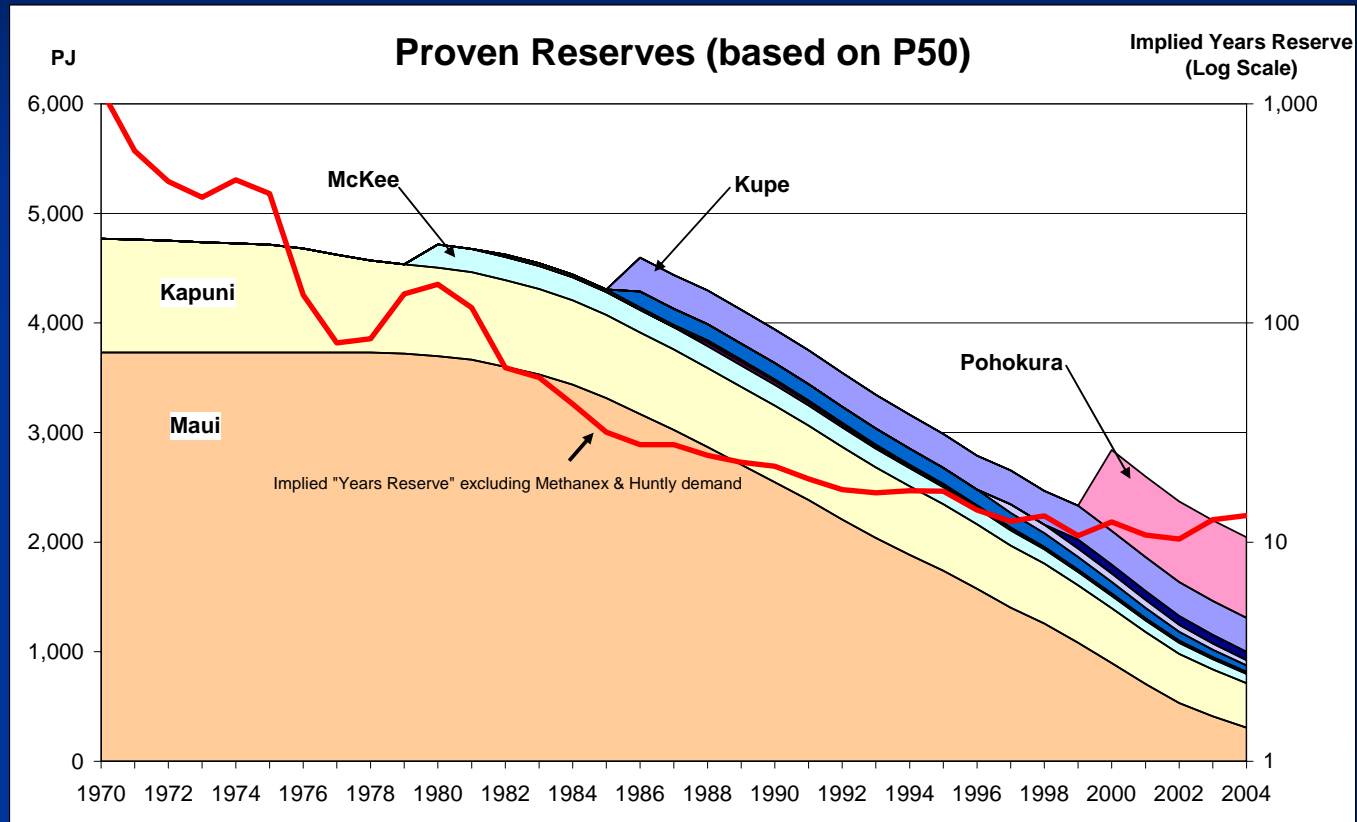


Electricity Markets



Are developments in the natural gas market going to give us cheaper electricity?

Reserves



- Larger fields tend to be found first
- New fields around Taranaki likely to be smaller
- Access to infrastructure is key – none in the South

Sedimentary Basins

NZ ENERGY INFRASTRUCTURE



Natural Gas Policy

- So much new generation is fired by natural gas
 - gas prices are a key driver of the spot price of electricity
 - government recognises this linkage
- Gas Industry Company
 - attempt to allow the industry to self regulate under the so-called 'co-regulatory' model
 - charged with developing arrangements for gas markets

GIC

- Required to follow objectives in the Gas Act:
 - gas delivered to existing and new customers in a safe, efficient and reliable manner
 - provide essential infrastructure
 - promote competition & downward pressure on prices
 - signal full cost of production and transport of gas
 - reliability
 - sustainability and efficiency
 - customer preferences & fairness
- All helps once the gas is available, but limited role in exploration

Gas Exploration

- If there is currently a case for government intervention in an energy market, it is to encourage exploration and the development of new gas fields
- Policy initiatives:
 - lower royalties on discoveries before 2010
 - income tax exemption for non-resident seismic ships and rigs
 - government paid seismic program supporting block offers
 - Crown Minerals promoting NZ

Are generators making excessive profits?

Electricity Company Profits

- When supply crises hit, profits increase
 - Similar to oil companies
- Low demand elasticity means we just keep buying
 - unless voluntary savings are called
- Difficulties for new entrants:
 - high capital costs, long asset lives
 - complex supply industry & market arrangements
 - hydro generators with low marginal costs and high resistance to spilling => difficult to gain market share
 - vertical integration

Are consumers doing their bit?

Electricity & Air Travel

- Electricity and air travel industries have many similarities
 - infrastructure: highways for electrons, highways in the sky
 - high investment costs, high barriers to entry
 - complex & technological
- One key difference – many air lines lose money, few electricity companies do: WHY?

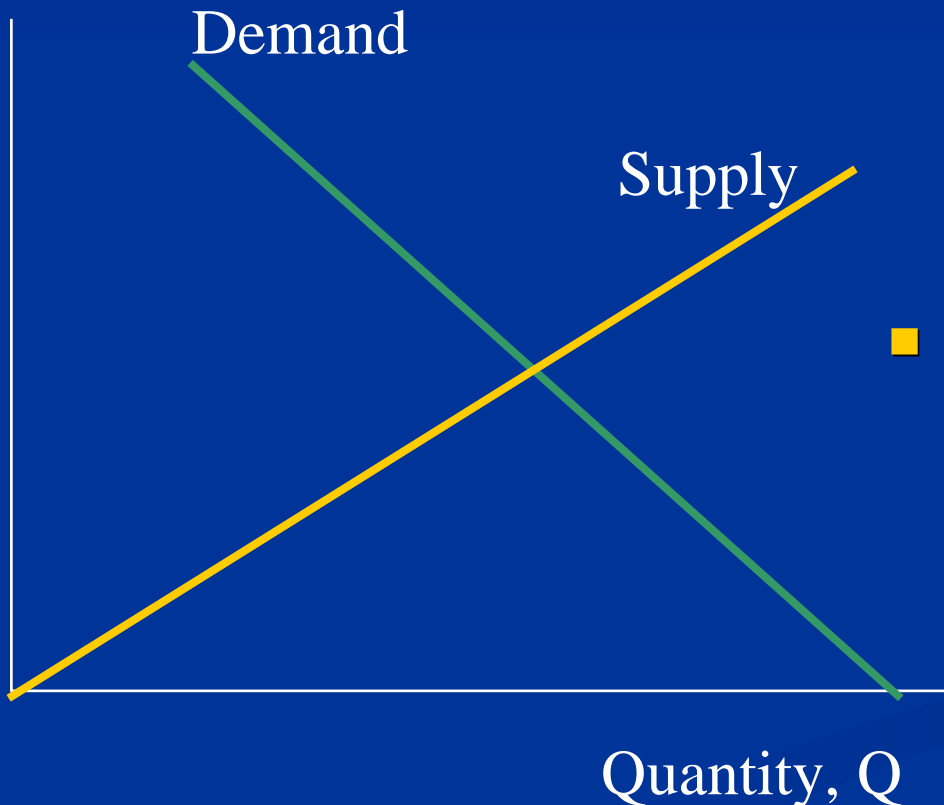
Supply and Demand Curves

$$Elasticity = \frac{\Delta Q}{\Delta P} \frac{\bar{P}}{\bar{Q}}$$

■ < -1 relatively elastic

■ > -1 relatively inelastic

Price, P

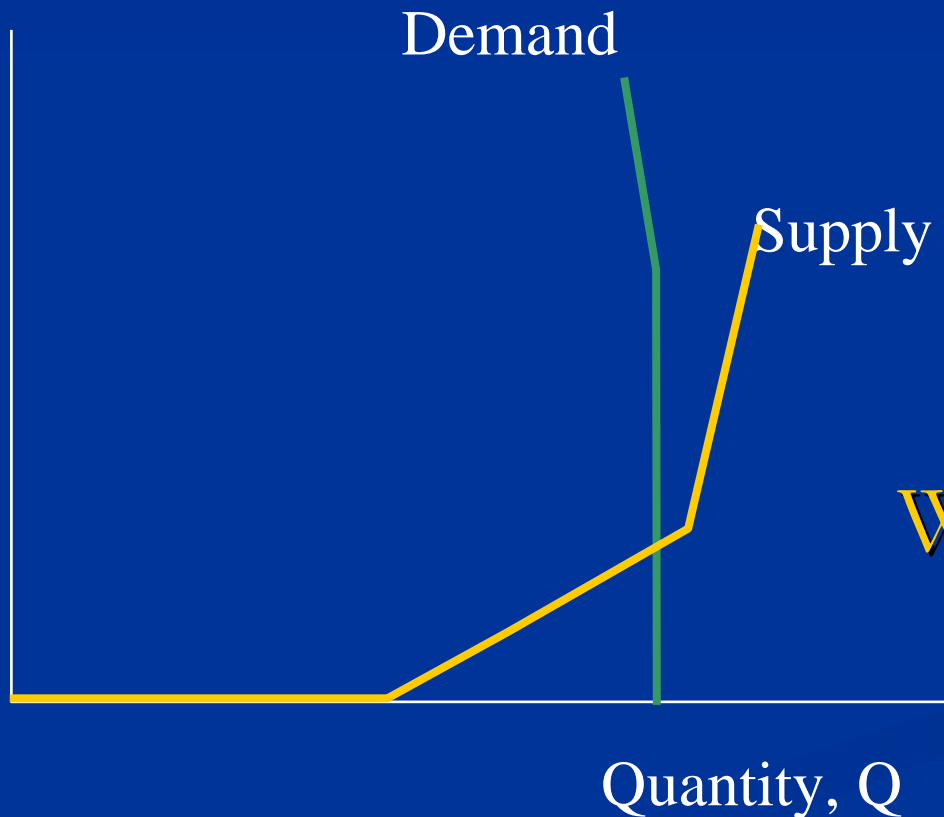


- Canadian study (medians):
 - International business travel -0.265
 - Short-haul leisure travel -1.520

Electricity Demand Elasticity

< 0.05% of load
responds to prices in
real-time

Price, P



We just keep on using it!

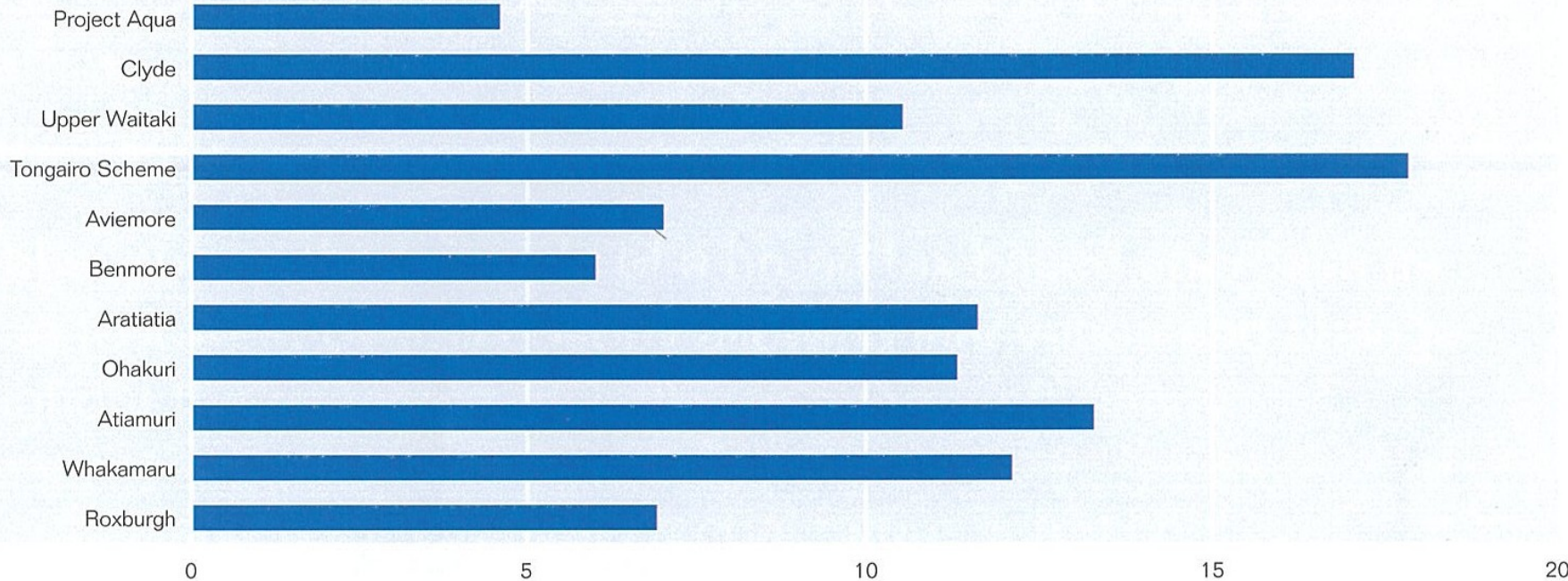
What about investment?

Investment

- The electricity market has performed extremely well where new investment is concerned
- Low rate of demand growth means being the next to build is the only way of getting market greater market share
- No incentive to over-build => avoid price collapse
- Spot market signals changes to the LRMC much better and faster than centralised utility
- Government initiated Whirinaki plant is an example of how centralised, politically driven investment is not efficient
 - it's built in the wrong place!

Large Hydro Schemes

MERIDIAN'S ESTIMATE OF PROJECT AQUA COSTS*



*compared with other NZ hydro costs
c/kWh (2002 real terms 10% pre tax discount rate)

Add 20% for contingency for Aqua => 5.5 to 6.0 c/kWh (at least)

Generation Summary

(Assumes 85% Loading for Thermals)

Fuel	Delivered Cost \$/MWh
Gas - CCGT	70 – 90
Coal – South Island	80 – 95
Coal – North Island	85 – 100
Hydro	75+
Wind with 9 m/s wind speed	70 - 90

Regulation & Governance

Electricity Commission Objectives

■ Principal objectives:

- ensure electricity is produced and delivered to all classes of consumers in an efficient, fair, reliable, and environmentally sustainable manner and
- promote and facilitate the efficient use of electricity (**MOU with EECA**)

■ Specific outcomes:

- energy and other resources used efficiently
- risks (including price risks) relating to security of supply properly and efficiently managed
- barriers to competition in electricity minimised for the long-term benefit of end-users
- incentives for investment in generation, transmission, lines, energy efficiency, and demand-side management maintained or enhanced
- full costs of producing and transporting each additional unit of electricity are signaled
- delivered electricity costs and prices subject to sustained downward pressure
- electricity sector contributes to achieving the Government's climate change objectives

Commerce Commission

- Thresholds pricing regime
- Information disclosure regime
- Competition watchdog
 - currently looking at competition in the electricity market
 - is there evidence of anticompetitive behaviour?
- MOU with Electricity Commission

Solutions?

Solutions:

Dry Year Security of Supply

- Continue to diversify supply
 - especially away from SI hydro
- Improve investments in standby capacity
- Better information around Meridian's management of their hydro lakes
- Do more to encourage gas exploration
 - investigate building infrastructure in the South
 - government partnership with industry for gas?

Solutions:

Participation and competition

- Allow lines companies to re-enter the energy market
 - Further relax the EIRA
 - allow lines companies to build generation anywhere
 - remove the requirement for corporate separation
 - allow lines companies to retail their generation
- Reduce barriers to new entry, e.g. market rules
- Continue to fine tune the RMA
- Sell Mighty River Power and Genesis Power
- further improve diversity & efficient investment
 - sell Meridian Energy only if dry year security of supply is sufficiently covered, or retain as an SOE
- Incentives for Transpower to maximise Grid capacity

Solutions:

Demand-side Management

- Leverage off climate policy, environmental concerns
- Get the message right – is Whirinaki there to heat towel rails or only for emergencies?
- Standards, standards, standards
- Education and promotion
- NEECS – get one that works!
- Higher prices help – a lot!