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School of Electrical Engineering & Telecommunications
Energy Seminar Series

The NSW Electricity Industry: Current Issues & Possible Responses

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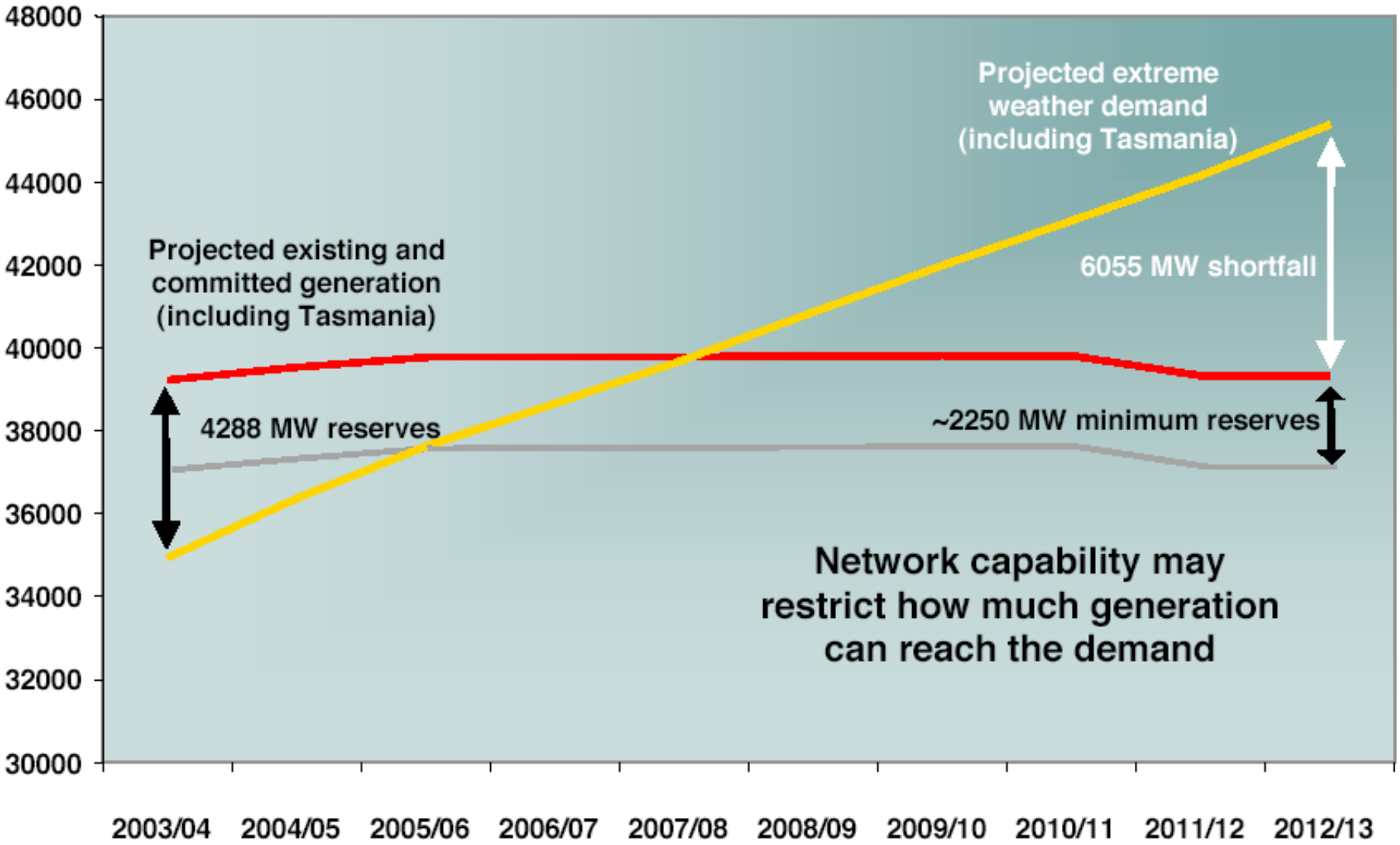
Outline

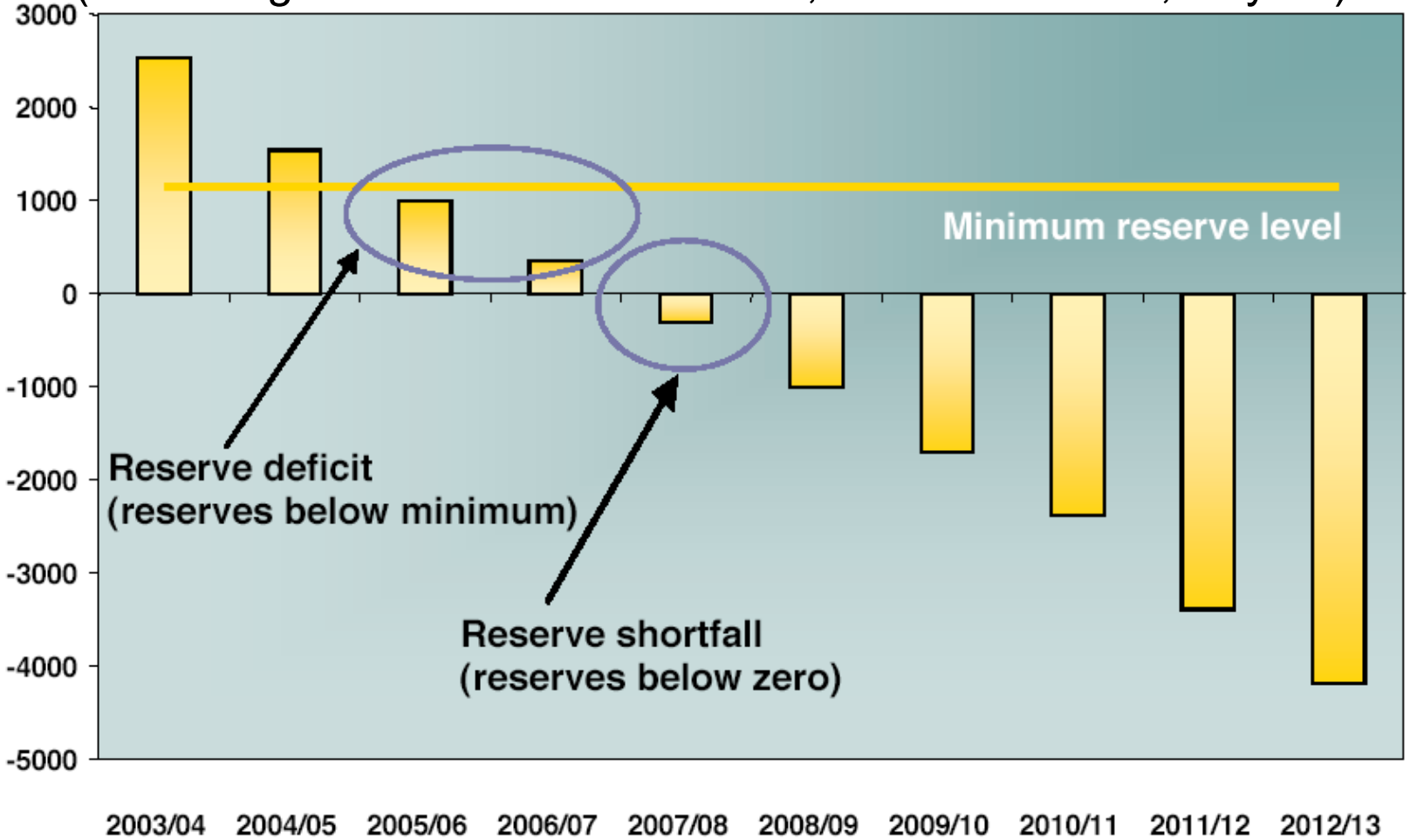
- Two important current issues:
  - Rising summer peak demand driving generation & network investment
  - Rising annual electricity consumption driving climate change emissions
- Key policy response options:
  - Encourage increased demand-side participation
  - Encourage low emission generation
- Could we improve the policy framework?

Projected NEM generation & summer peak demand (Medium growth + extreme weather: NEMMCO SOO, July 03)



Projected generation reserves (MW) at summer peak for Queensland & NSW

(Medium growth + extreme weather, NEMMCO SOO, July 03)



Reserve deficit is 2 years earlier than predicted last year

Four key messages (NEMMCO SOO, July 03)

1. Demand growth	***Strong in NSW and Queensland 1000-1400 MW a year NEM-wide***
2. Reserves declining	***NEM-wide decline in reserves due to demand***
3. Investment required	***"Needle peaks" impact on mix of base load - peaking - demand side***
4. Interconnection	***Will not by itself help supply-demand balance beyond 2005-06***

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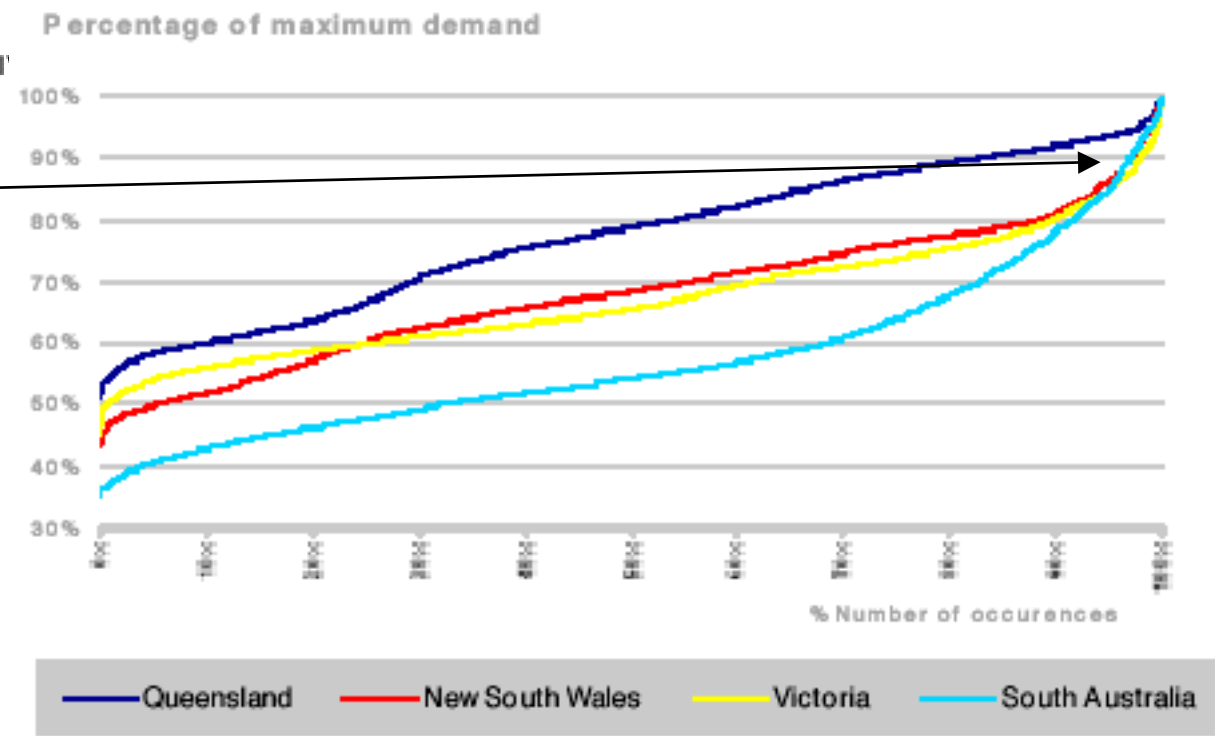
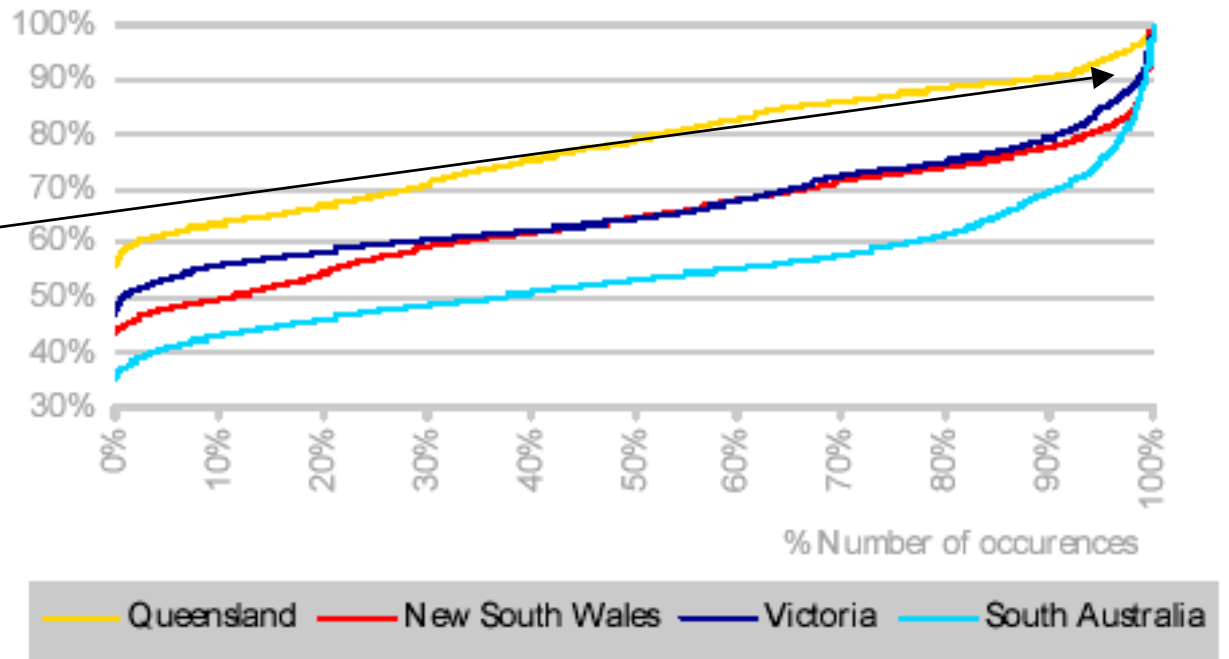
In 2001 NSW load >90% peak for ~5% of time

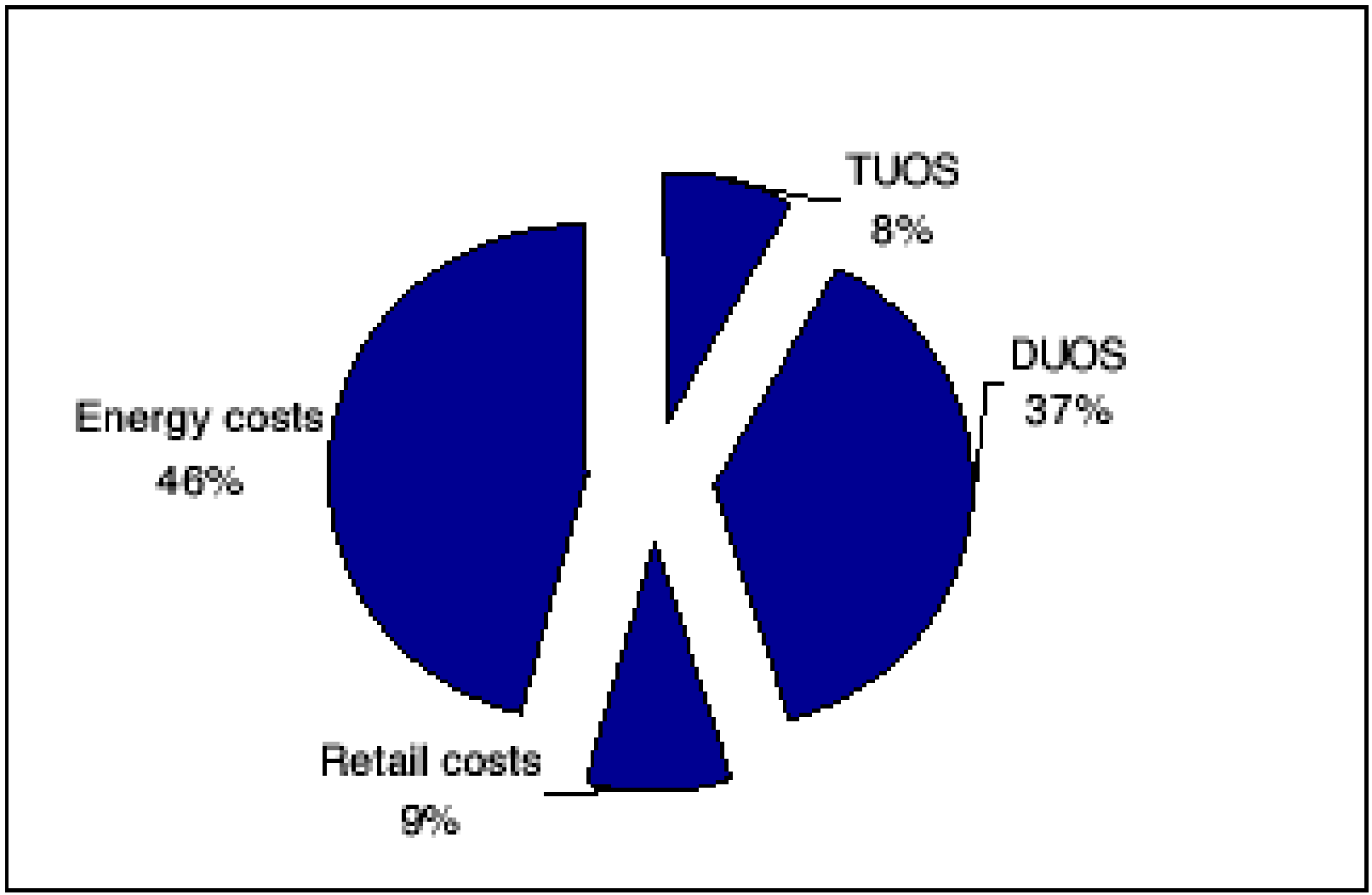
NEM load duration curves, January-March 2001 & 2003 (NECA quarterly Market Statistics)

In 2003 NSW load >90% peak for <2% of time





Composition of typical residential electricity bill (IPART, DNSP Review, 2003)



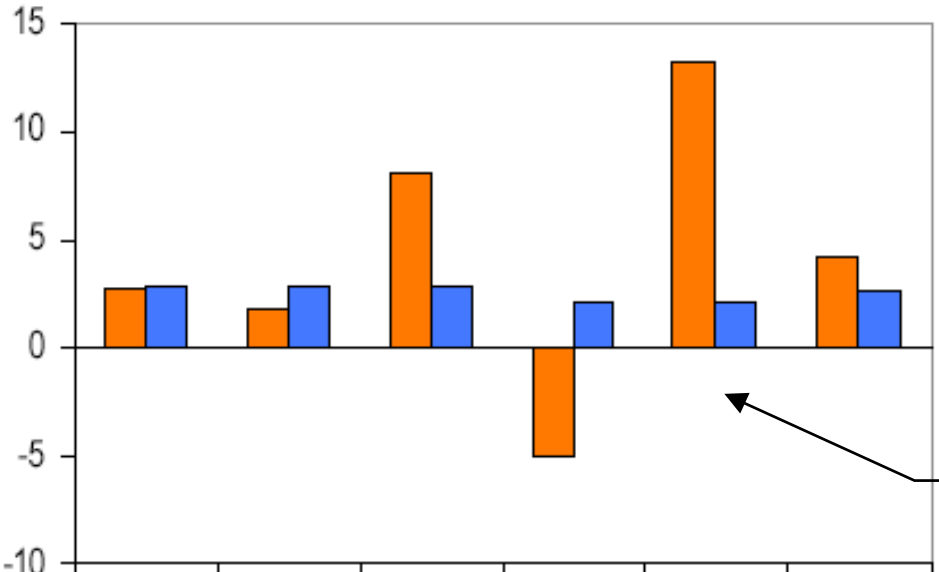
EnergyAustralia summer peak demand

(EA submission, IPART DNSP review, 2003)

Summer peak actual vs forecast

1999 - 2003

Annual Growth (%)



	1999	2000	2001	2002	2003	Avg
Actual	2.8	1.7	8.1	-5	13.3	4.2
1998 Forecast	3	3	3	2	2	2.6

Summer of Year

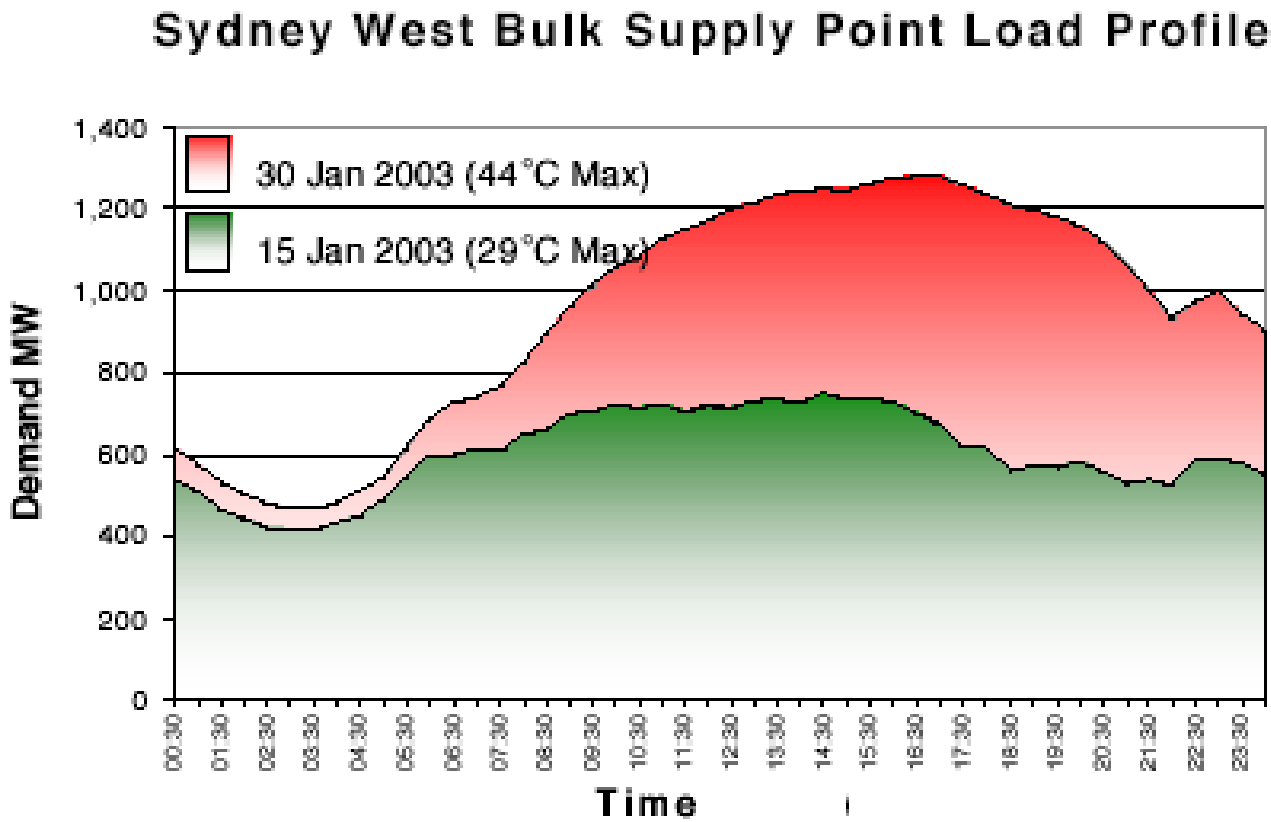
Actual summer demand growth

- EnergyAustralia moving to summer peaking
- Shape of summer demand de-rates existing capacity.

Uncertain weather-driven needle peak demand

Residential & commercial air conditioning is the key driver for peak demand growth

(IE Submission, IPART DNSP Review, 2003)



Residential ADMD

Pre 2000 houses: 3.5-4.0 kVA

Post 2000 houses: 5.0-7.5 kVA

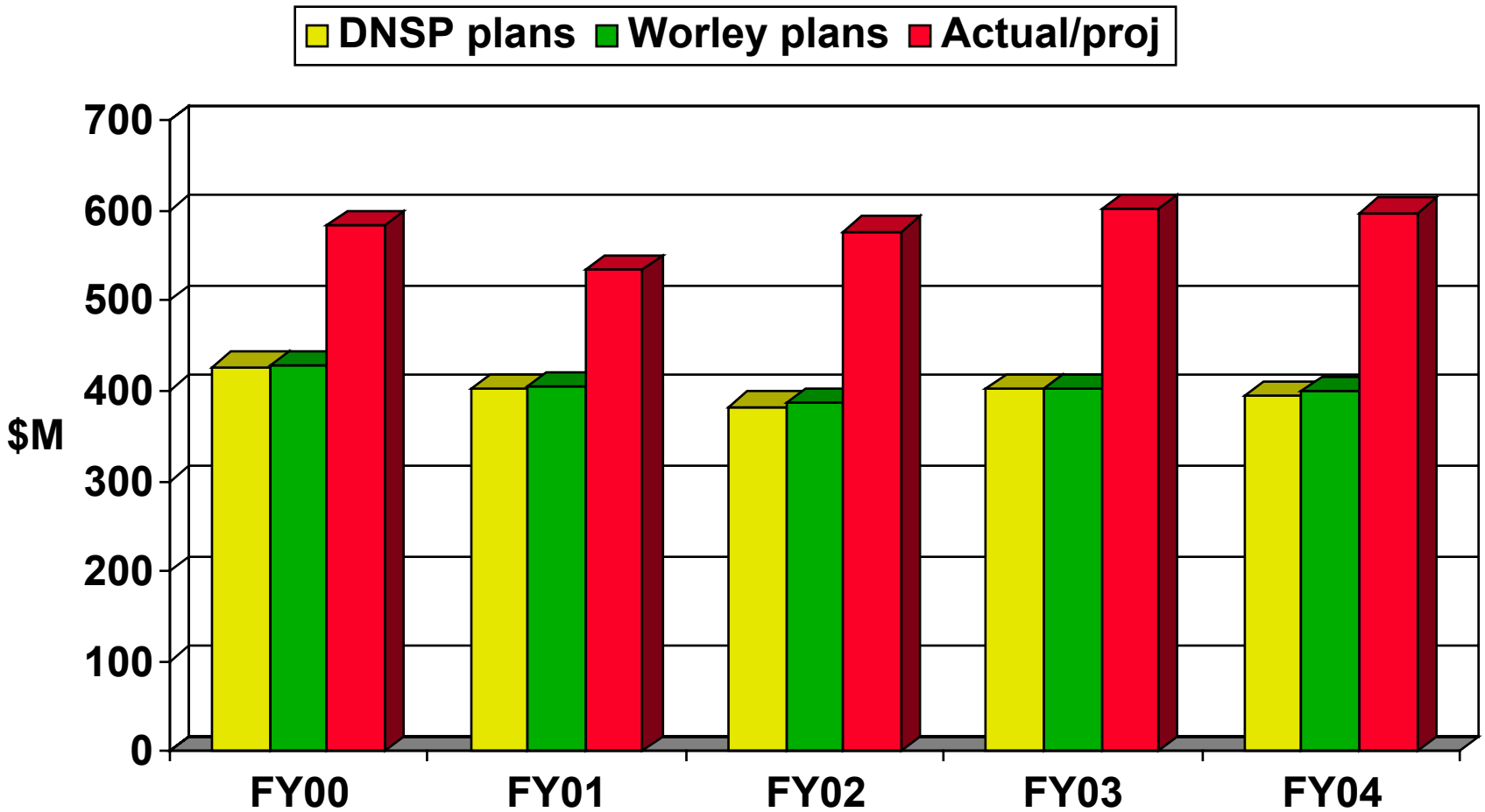
Integral Energy actual & forecast growth 2000-2004 & 2005-2009

(IE Submission, IPART DNSP Review, 2003)

Demand Compound Growth rates (2000 – 2004)	**1999 Determination forecasts**	**Actual/Forecast**
Winter	1.5%	0.4%
Summer	1.3%	2.9%

Demand Forecast (2005-2009)	**Medium Growth Scenario %**
Total Energy Sales (GWh)	2.0 pa
Customer Numbers	2.3 pa
Standard Weather Maximum - Winter Demand	2.0 pa
Standard Weather Maximum - Summer Demand	2.7 pa

Actual & projected DNSP capital expenditures (IPART, DNSP Review, 2003)



Capital expenditure greater than expected due to unanticipated growth in demand

The climate change challenge

(BCSE, 2003)

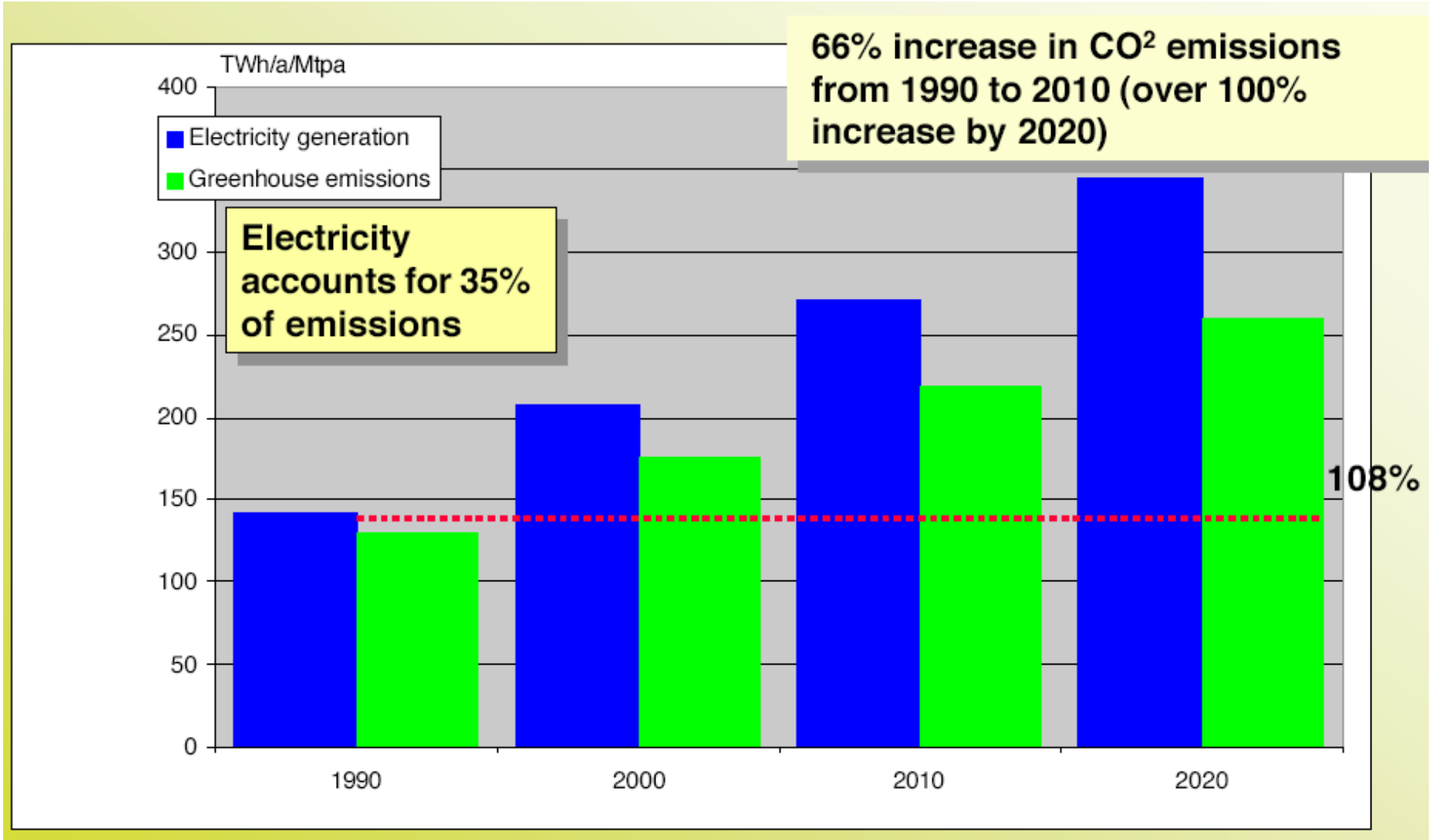
"By the end of the 21st century, if we are effectively going to address the issue of global warming, we will need to see a global reduction in greenhouse gas emissions of between 50 and 60 per cent."

The Hon Dr David Kemp, MP

House of Representatives, 20 August 2002.

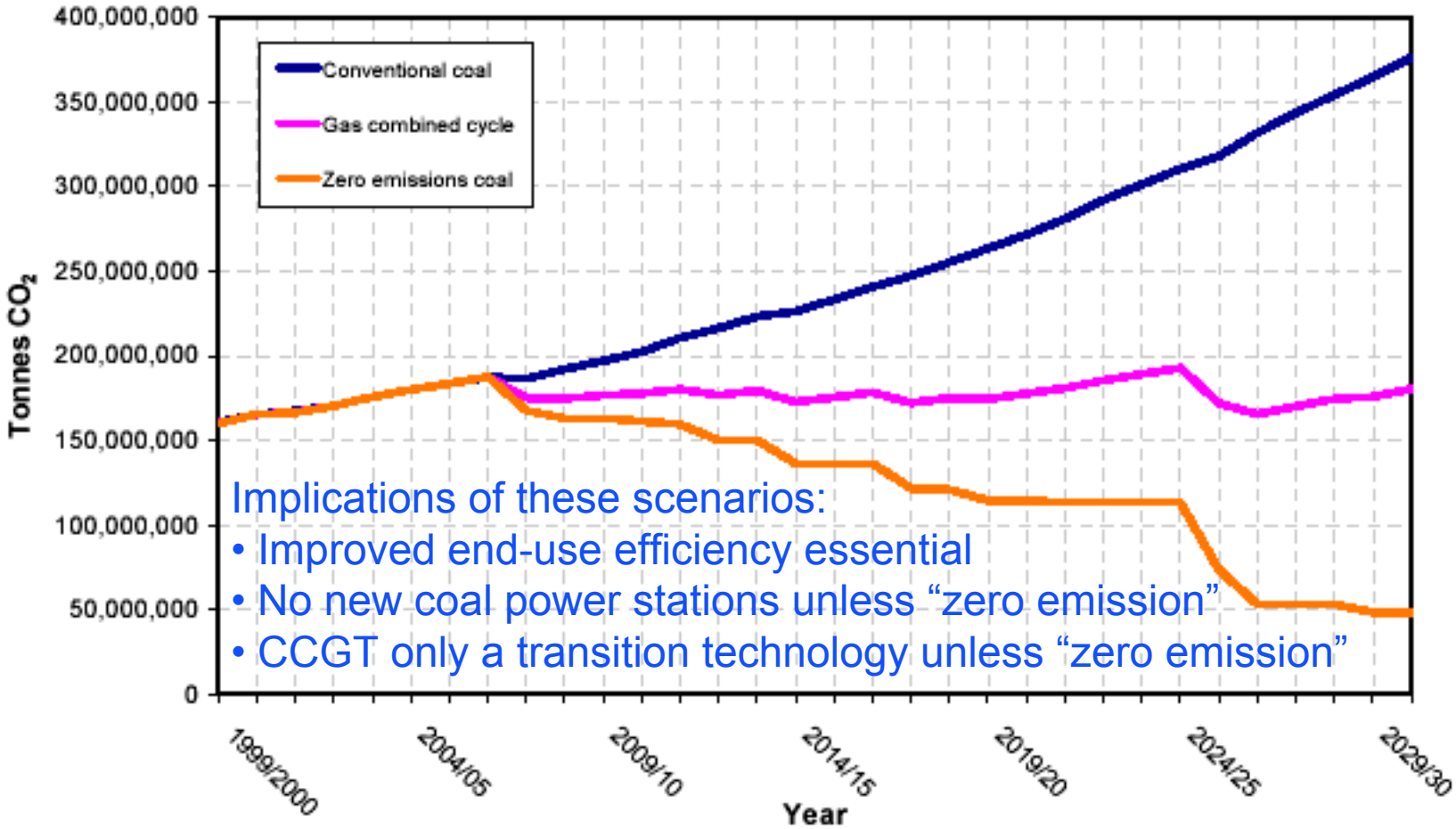
Even with deep cuts the best we can do is stabilise at a level significantly higher than today

Actual & projected emissions from the Australian electricity industry (BCSE, 2003)



Electricity sector emissions scenarios to 2030

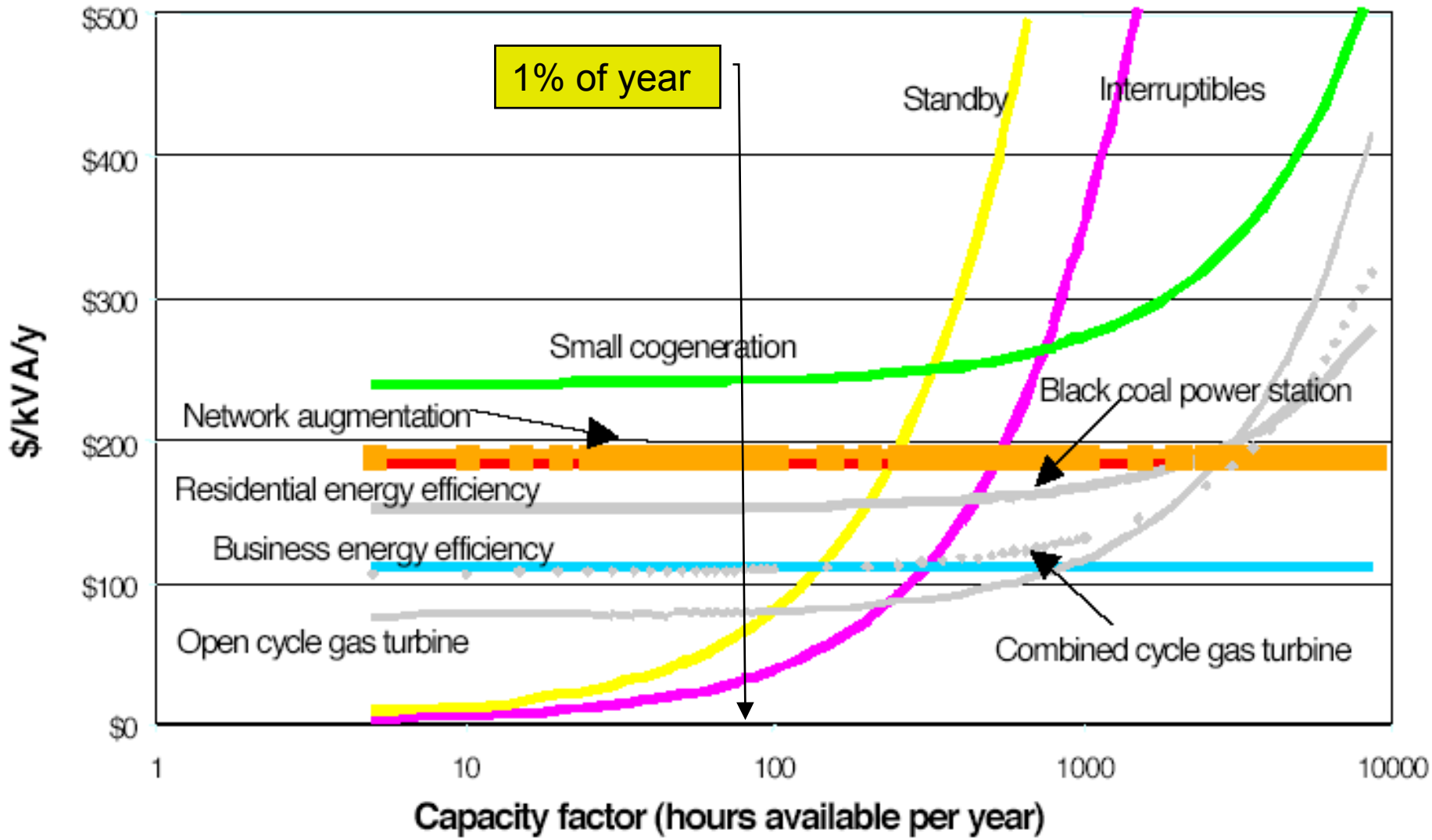
(PMSEIC Report, "Beyond Kyoto, 2002)



Policy response options

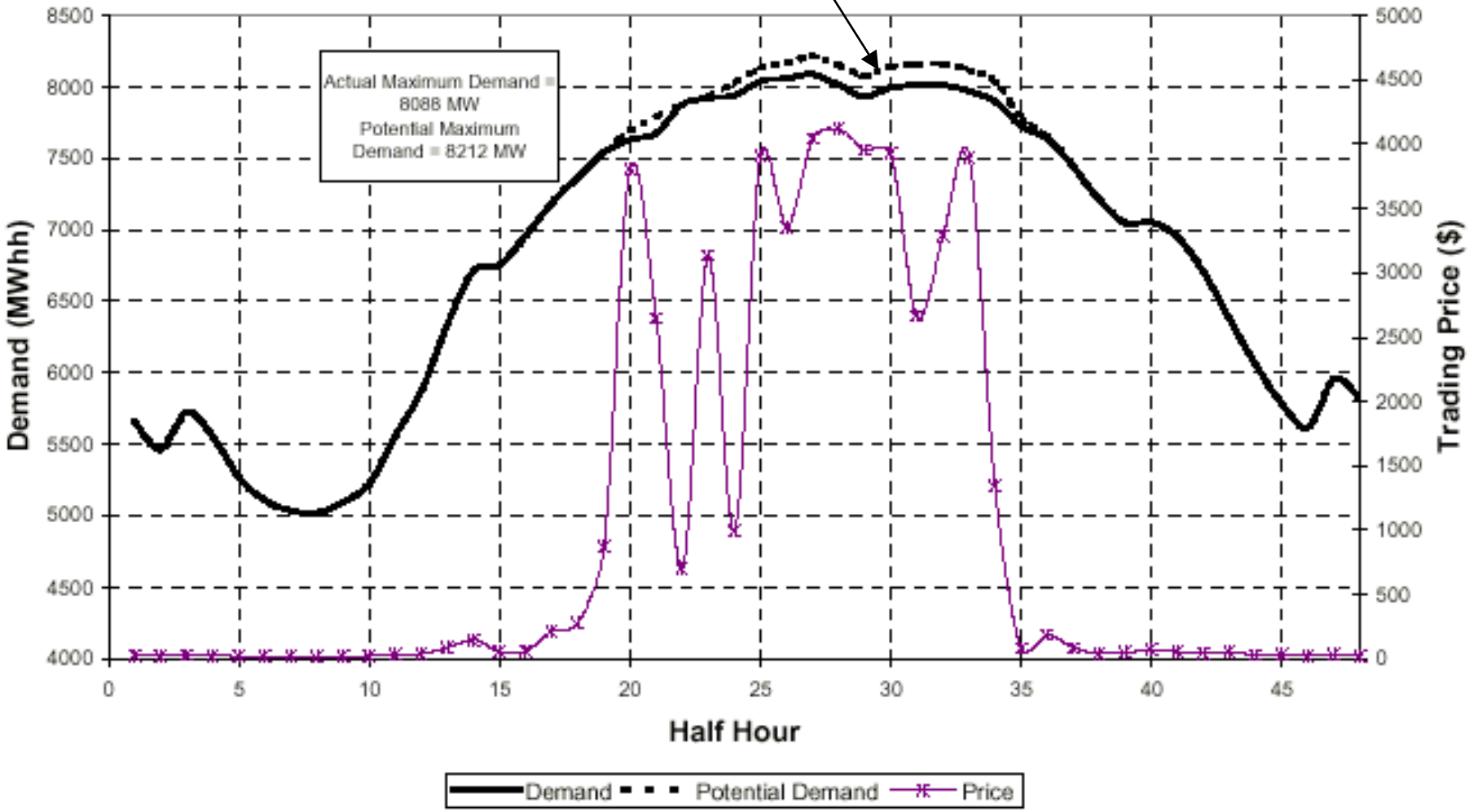
- Increased demand-side participation:
  - End-use efficiency, frugality, flexibility
  - Importance of information & decision making
  - Problem of multiple decision makers
- Low emission generation:
  - Renewables, “zero emission” coal, nuclear, …
    - No “magic bullet”
  - Importance of appropriate innovation

Comparison of investment options
(SEDA, quoted in IPART DM Report, 2002)



Evidence of demand side response: NEM Victorian region, 8/2/01 (NECA, 2001)

Demand reduction in response to price



Provide support for innovation: Supply side infrastructure

- Solve group-decision making problems, eg:
  - Connection framework for small generators
  - Interval metering for all industry participants
  - Better management of variable gas demand
  - Regional planning & forecasting for wind farms
- Improve market design & policy framework:
  - Extend MRET & add emission taxes or permits
  - Improve NEC treatment of intermittent generation
  - Improve derivative markets for electricity & RECs

Provide support for innovation: Demand side infrastructure

- End-users value electricity more by its absence than its presence:
  - Price-signals necessary but not sufficient to improve end-user decision making
- Many decision-makers involved on demand side apart from end-users, eg:
  - Building & equipment designers & constructors
  - Financial institutions
  - Government planners
  - Workforce & community

NSW DM Code of Practice: Policy intent

- NSW DM Code of Practice, 2001:
  - "to ensure that all supply and demand side options developed by customers or third parties and by the distributor itself can be developed and evaluated *at the same time* and *in the same manner* as network augmentation" (DM Code of Practice, 2001)
- Consistent with National Electricity Code:
  - "create a.. [regulatory] environment in which generation, energy storage, demand side options and network augmentation options are given due and reasonable consideration" (as quoted in DM Code)

NSW DM Code of Practice: Concerns

- Few distributed resource options to date
- Application of code hampered by poor interface between DNSP & small end-users:
  - DNSP contract subsumed in Retailer contract
  - Open-ended DNSP "obligation to supply"
    - Apparent legal accountability for availability & QOS
    - No end-user accountability for future network usage
  - Accumulation meters prevent good tariff design:
    - Tariff should be spot & forward contract or surrogate
- *Good policy intent but poor implementation*

NSW Benchmark Scheme: Policy intent

- Policy intent
  - "to reduce greenhouse gas emissions associated with the production and use of electricity and to encourage participation in activities to offset the production of greenhouse gas emissions."
    (Overview, Electricity Supply Amendment Bill, 2002)
- Implementation via *imputed emissions:*
  - Targets for Benchmark Participants:
    - Optional "private" scheme for large users
  - Baseline+credit reduction activities
    - State-wide & activity baselines
    - Reduction credit for each eligible activity

NSW Benchmark Scheme: Concerns

- 'Imputed' emissions rather than physical emissions:
  - Actual emissions could go up while imputed emissions go down:
    - Credibility of baselines, DSA & sequestration? Methane multiplier?
- Many activities have non-zero baselines:
  - Difficult to set in a credible way
- Fungibility of different categories activities:
  - Is planting trees really equivalent to building wind farms?
  - Rebound effects for DSA in the absence of price signals
- Jurisdiction: new low-emission generation anywhere in the NEM can contribute to NSW target
- Potential double counting with other policy measures:
  - MRET, GGAP, MEPS? Similar schemes in other states?
- *Good policy intent but poor implementation*

Issues in internalising climate change emissions

- Physically-based schemes straightforward, e.g. load-based licencing
  - But don't offer flexibility efficiency gains
- Tradeable instrument schemes need care:
  - Abstraction can lead to design flaws
  - Trading rules must provide good spot & forward price discovery
  - Performance should be measured by physical outcomes

Improving the NSW policy framework: The NSW benchmark scheme

- Reduce scope to generation only & design a separate demand-side policy
- Set floor & ceiling prices to limit baseline error effects
- Introduce efficient derivative trading
- Augment with selective REC purchases
- Measure performance against real emission outcomes

Improving the NSW policy framework: A new demand-side model

- Phase in interval metering for all end-users
  - require spot & forward tariff structure or surrogate, with network constraint price signals
- Create ESCOs for small end-users:
  - Multi-year energy service contracts:
    - Undertake energy audit & develop least-cost strategy
    - Provide equipment & energy under one bill
  - Aggregate demand-side decision making to avoid both network & generation investment
- Radically improve building energy performance

Conclusions

- NSW facing two critical policy challenges:
  - Need substantial investment in electricity industry
  - Need to reduce climate change emissions
- Address both challenges through:
  - Low emission generation
  - Increased end-use efficiency & demand flexibility
- Requires consistent pricing & policy settings:
  - Interval meters, spot & forward contracts
  - ESCOs to support & aggregate end-user response
  - Improved licence regime for DNSPs & retailers
  - MRET & emission taxes or permit cap & trade

Support for MRET (by % of submissions)

(Report by Greenpeace, 2003)