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Achieving Resource Adequacy in the Australian National Electricity Market

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Key definitions for this presentation

- What are the key electricity industry objectives?
 - *Technical*: Maintaining the flow of end-use energy services by maintaining near-continuity of energy flow through the electricity industry conversion chain
 - *Economic*: Achieving the above in an economically efficient manner, from the short- to long-term future
 - *Social & environmental*: Achieving the above in a socially & environmentally acceptable manner
- What is (short- & long-term) resource adequacy?
 - Acceptably low risks to the *future* flow of end-use energy services for individual end users (*reliability*) & to the electricity industry overall (*security: actively managed*)

Resource Adequacy in the Australian National Electricity Market

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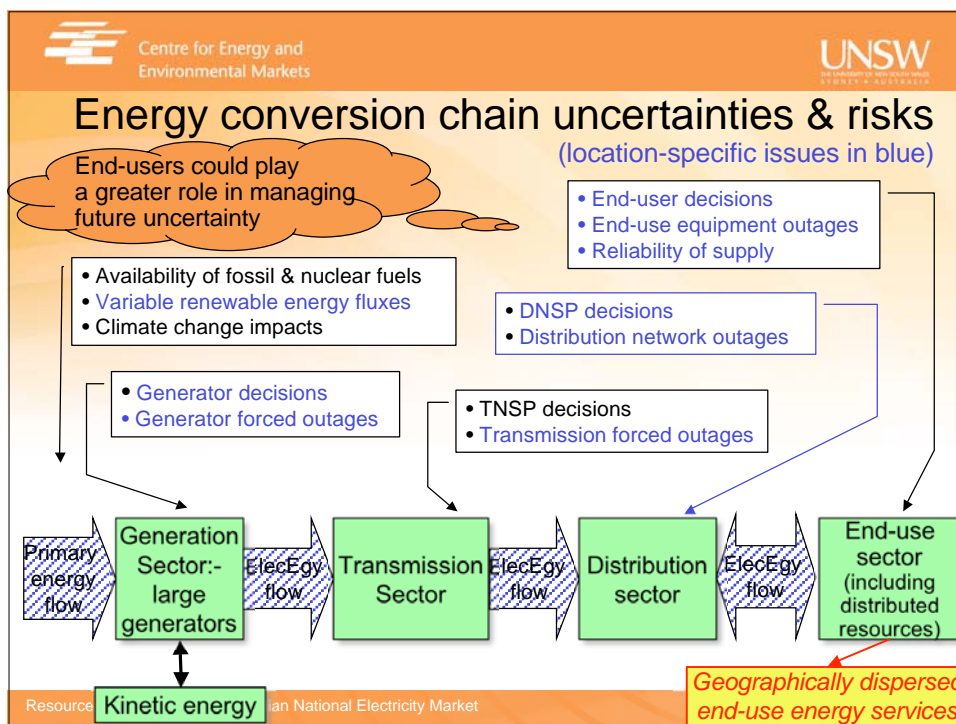


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Key challenges for resource adequacy

- **Operation** - to one year horizon:
 - Managing volatile energy flows through a complex conversion chain using existing resources
- **Investment** - years to decades:
 - Adding new resources & retiring the old:
 1. End-use efficiency & responsive demand
 2. Near-term low emission options: gas; wind; biomass; solar
 3. Long-term low emission options: gas & coal with CCS; advanced nuclear; hot-rock geothermal
 - Network investment to accommodate the above
- **Perception**
 - Forward-looking; population & individual

Resource Adequacy in the Australian National Electricity Market 3





Contributions to unavailability of supply for small end-users (USA data, AEMC, 2006)

Contributor	Average unavailability per customer year	
	(minutes)	(%)
Generation/transmission	0.5	0.5
132 kV	2.3	2.4
66kV and 33kV	8.0	8.3
11kV and 6.6kV	58.8	60.7
Low voltage	11.5	11.9
Arranged shutdowns	15.7	16.2
Total	96.8 minutes	100.0

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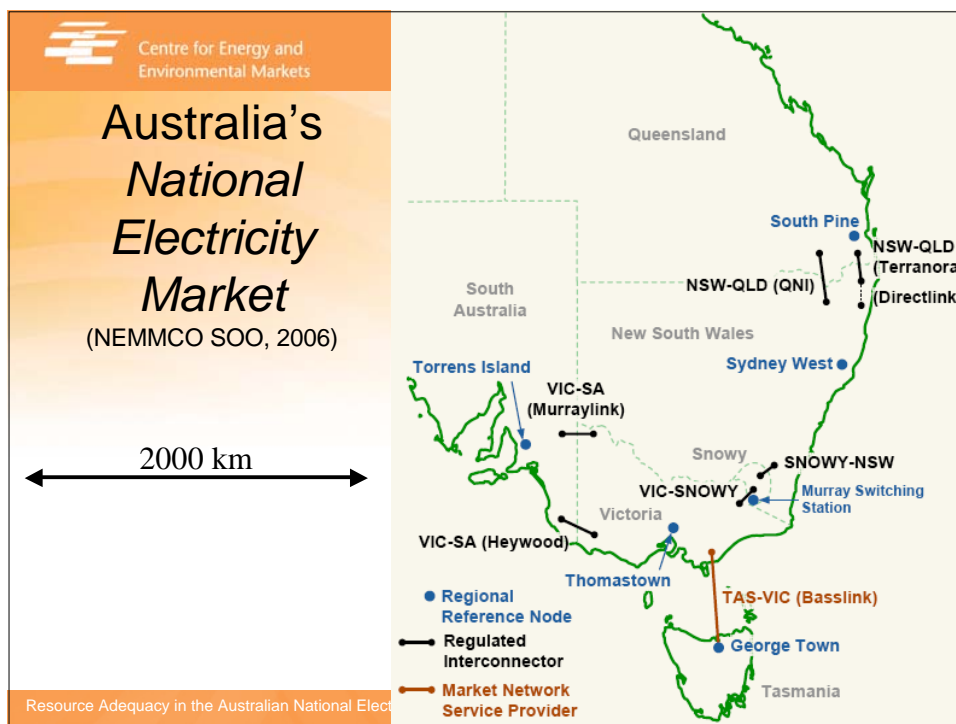
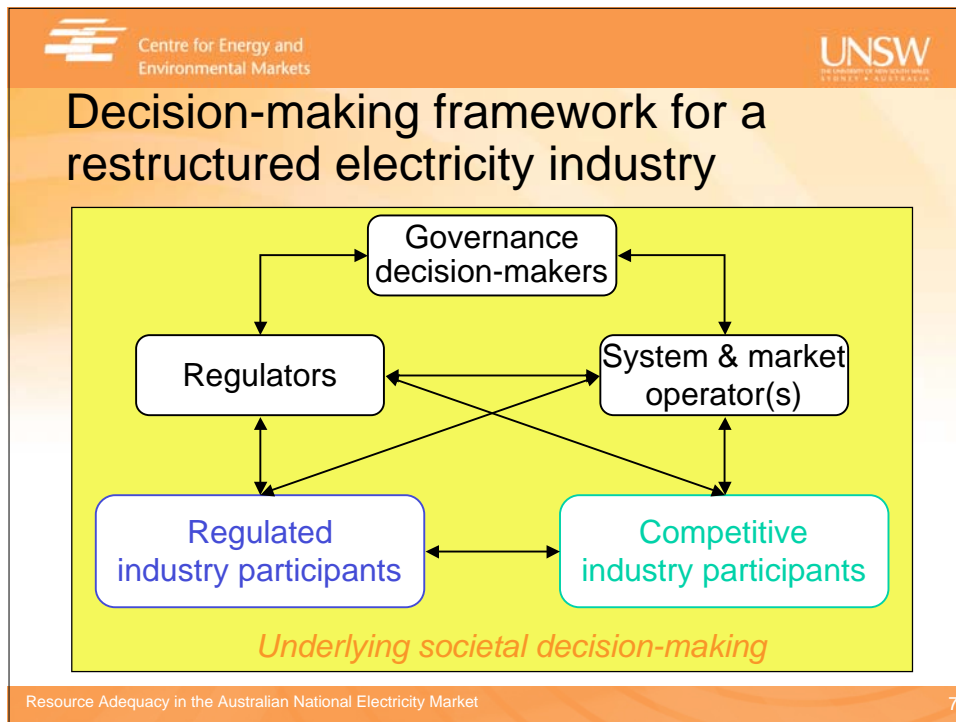
Decision-making framework for a restructured electricity industry

Governance regime	<ul style="list-style-type: none"> ▪ Formal institutions, legislation & policies ▪ <i>Informal social context including politics</i>
Security regime	<ul style="list-style-type: none"> ▪ Responsible for core integrity on local or industry-wide basis, with power to override
Technical regime	<ul style="list-style-type: none"> ▪ To allow connected industry components to function as industry-wide machine
Commercial regime	<ul style="list-style-type: none"> ▪ To coordinate decentralised decision-making according to commercial criteria ▪ Includes formally designed markets

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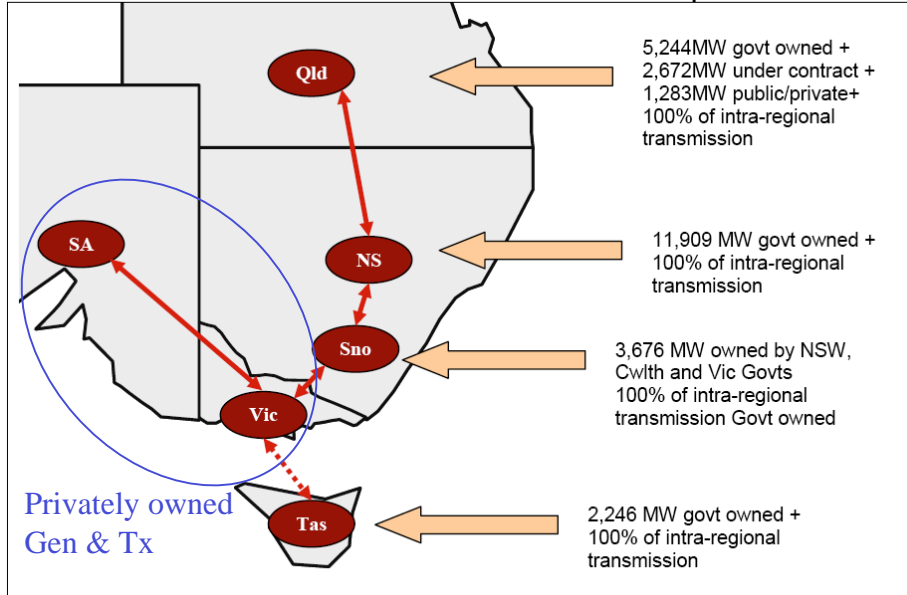




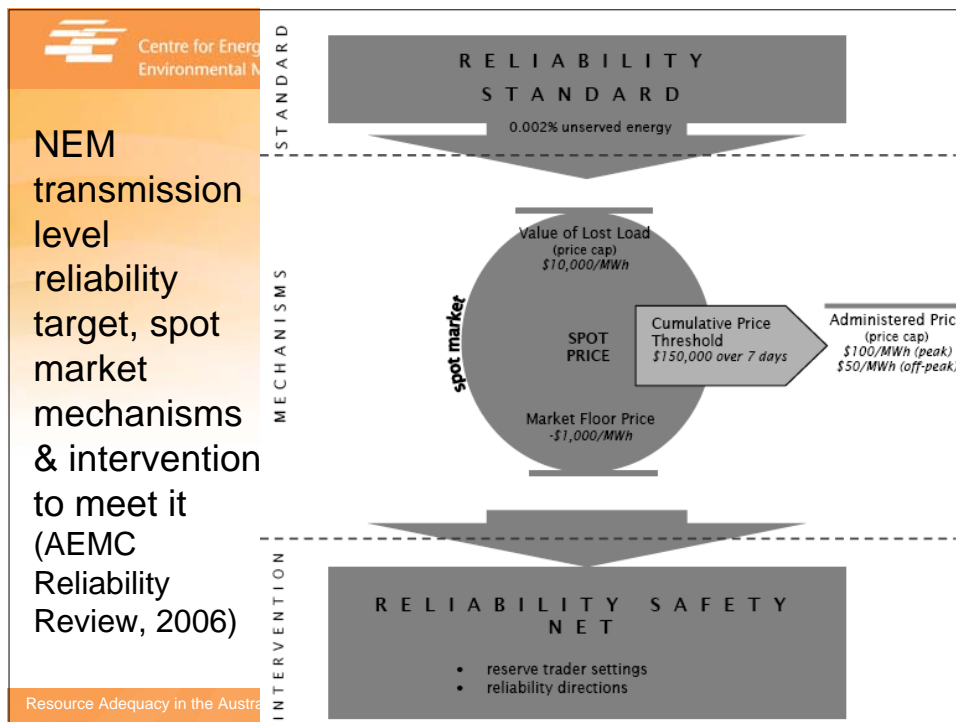


State owned Gen & Tx (ERIG DPs 0611)

... 14. Generation and transmission cross-ownership

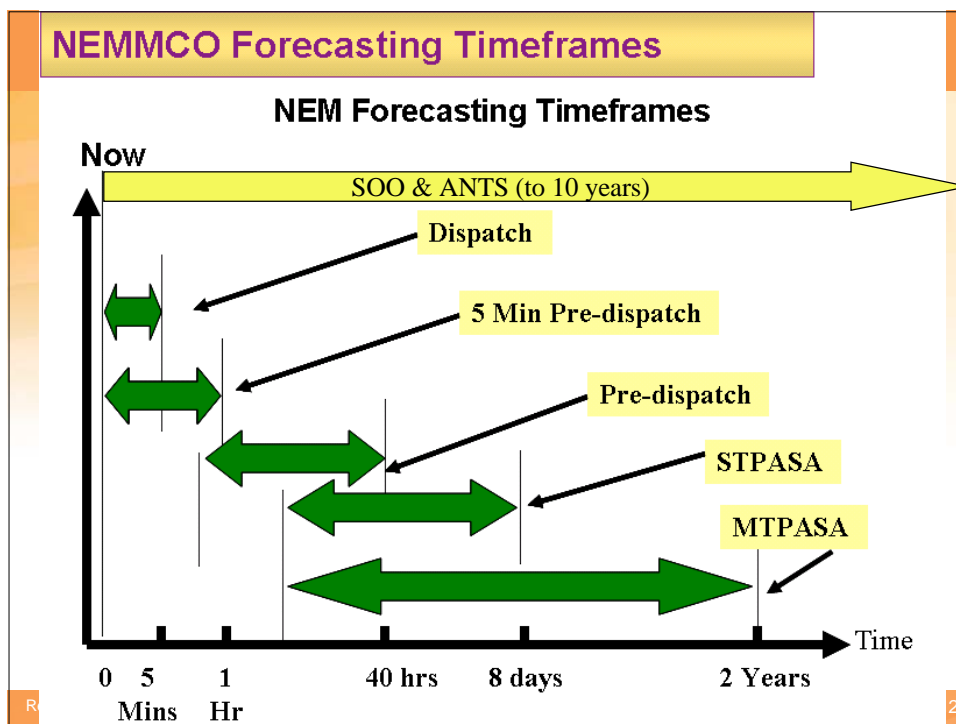
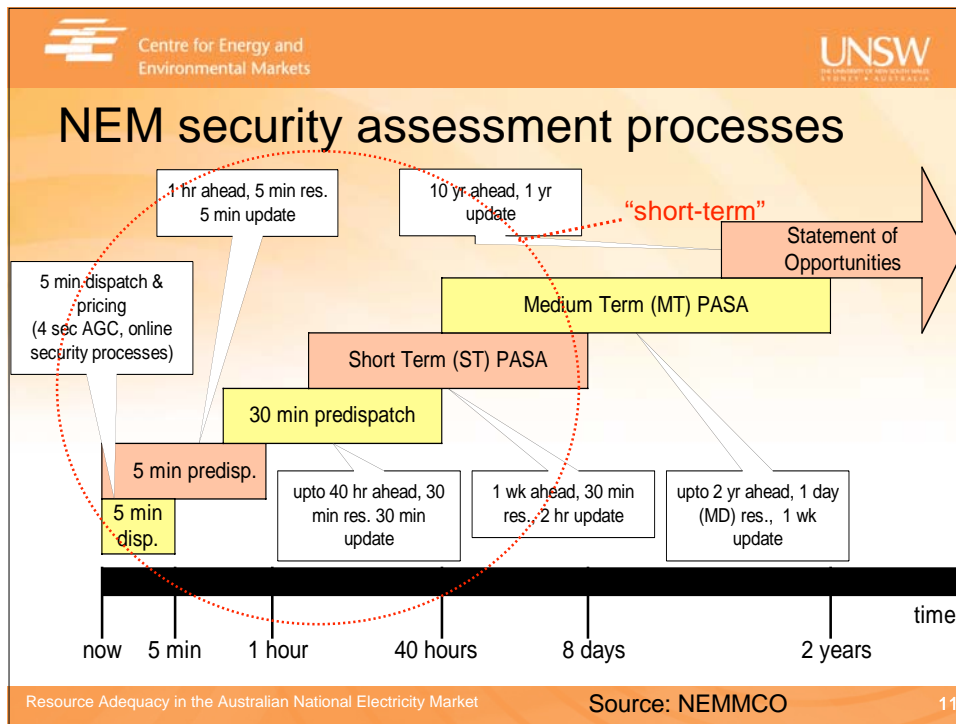


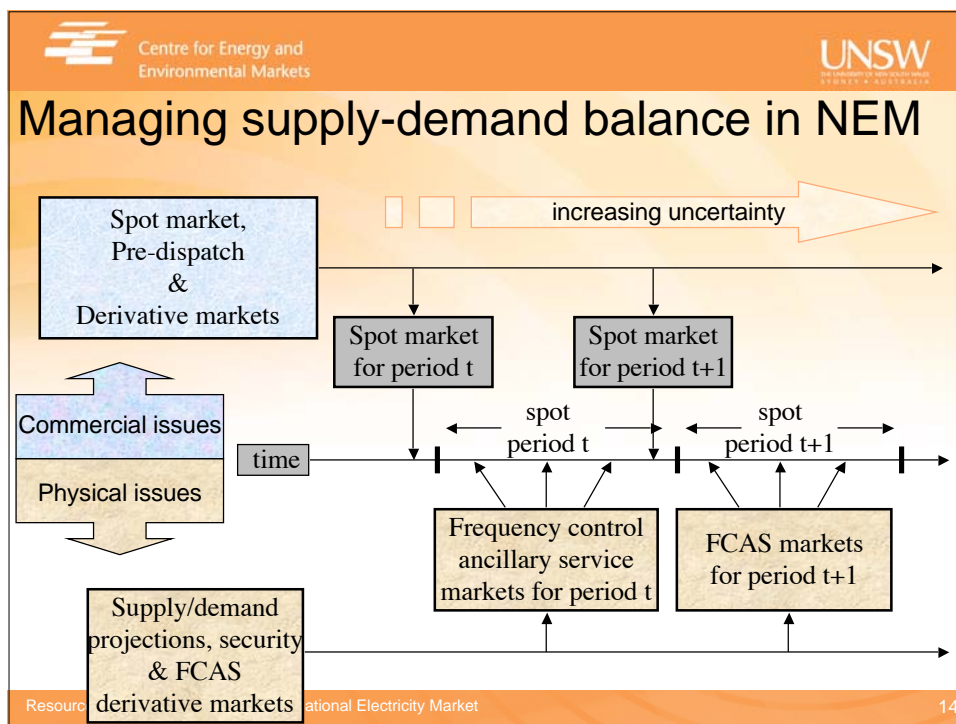
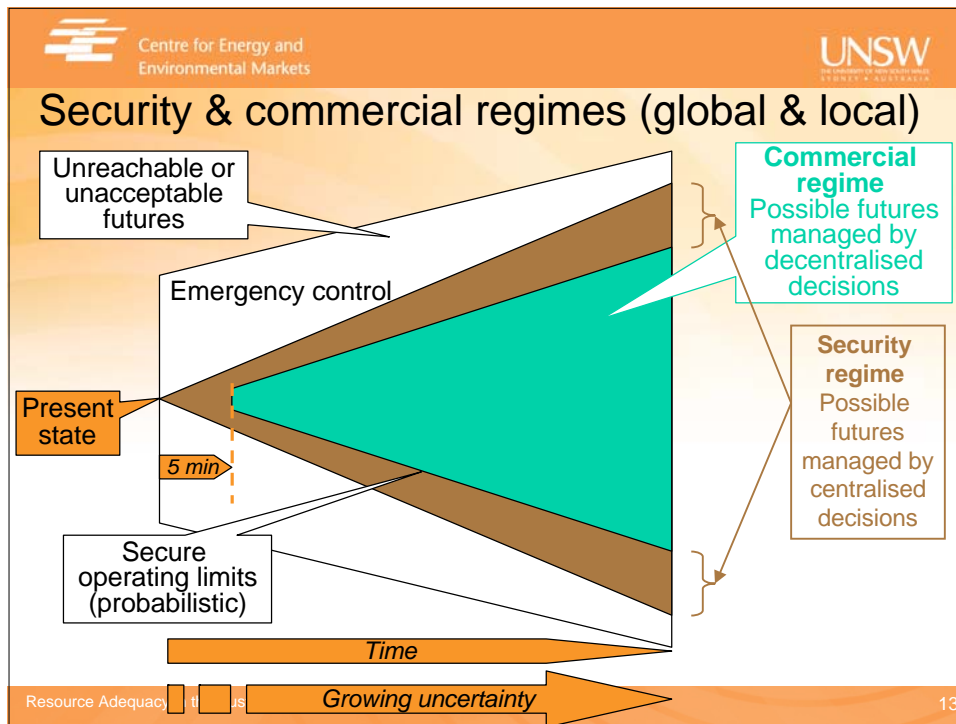
Source: Firecone report to ERIG 2006

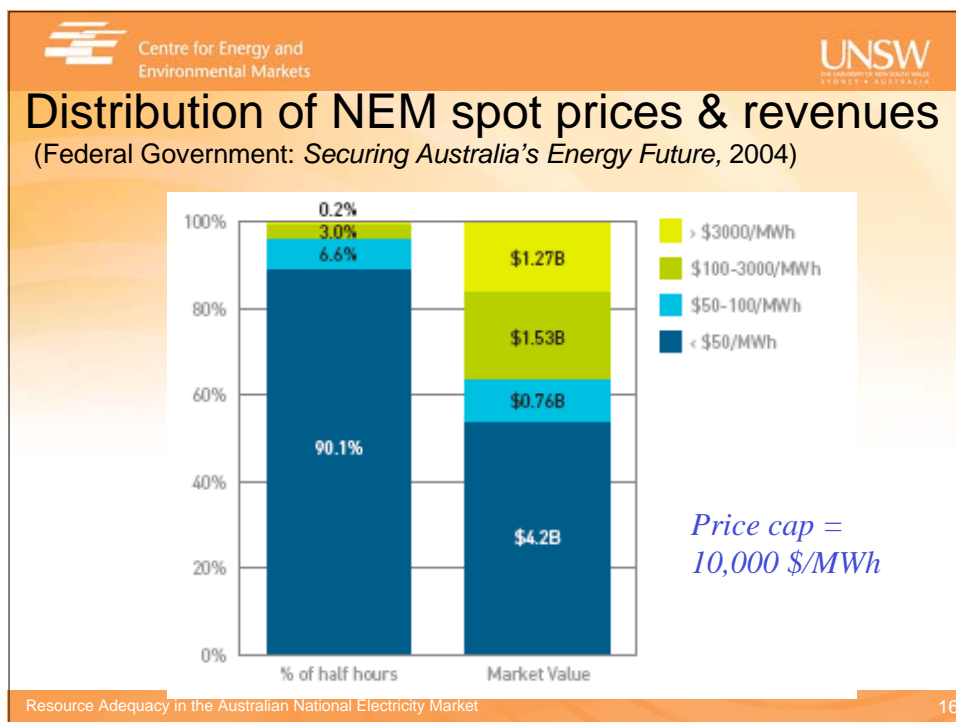
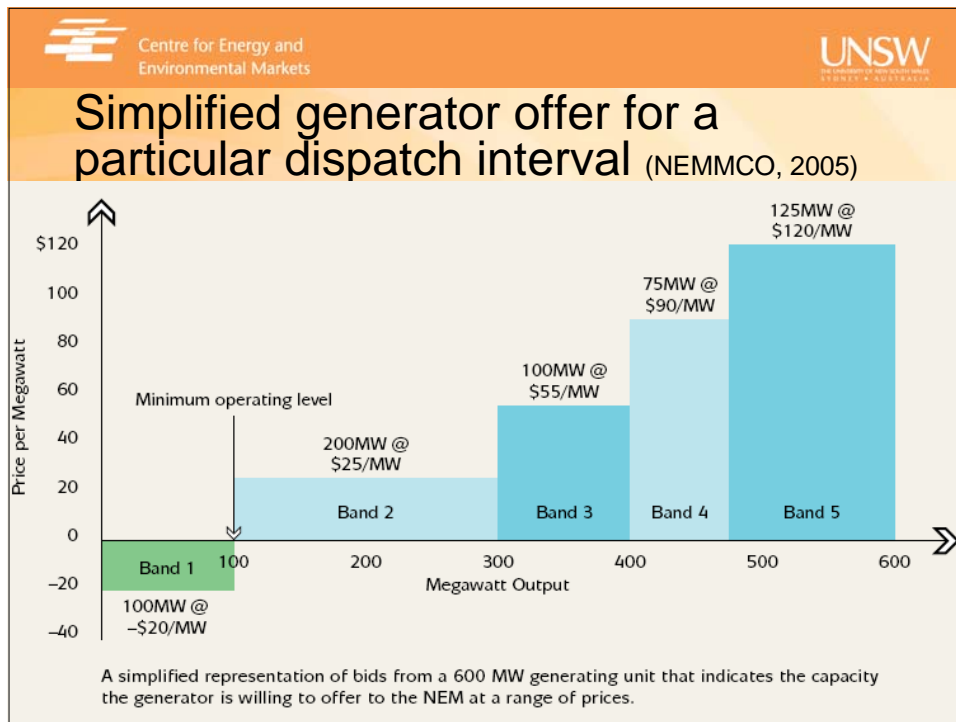


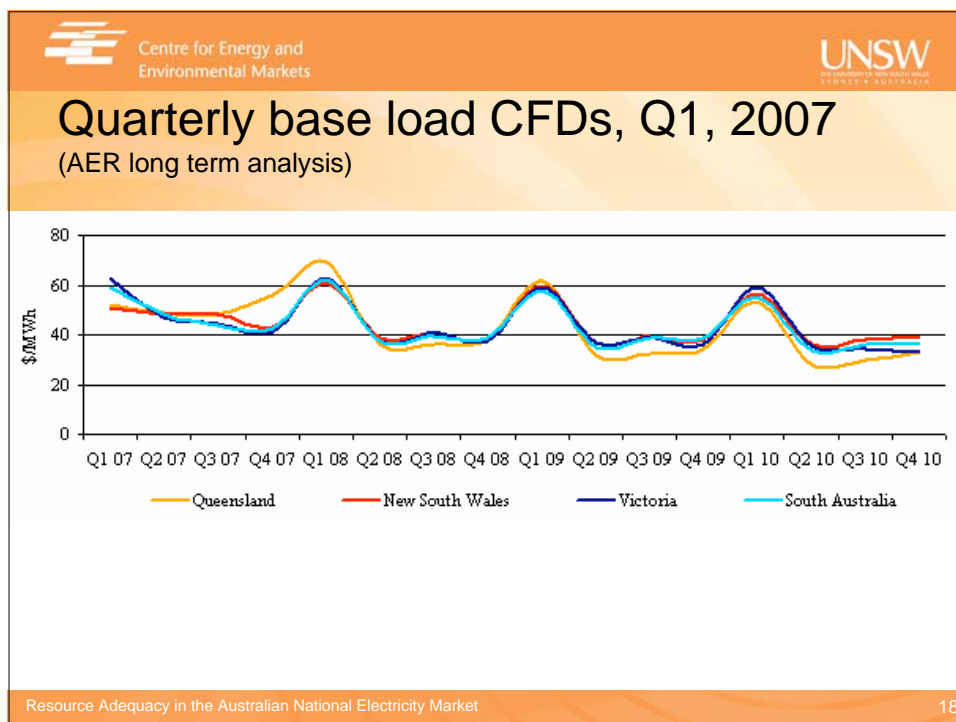
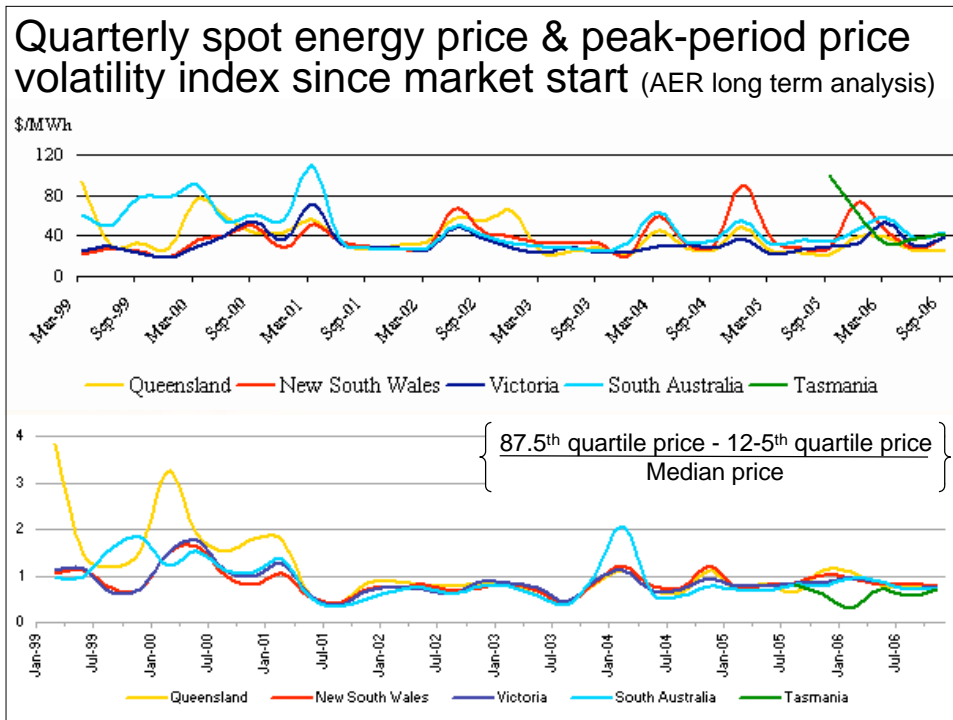
Resource Adequacy in the Australia

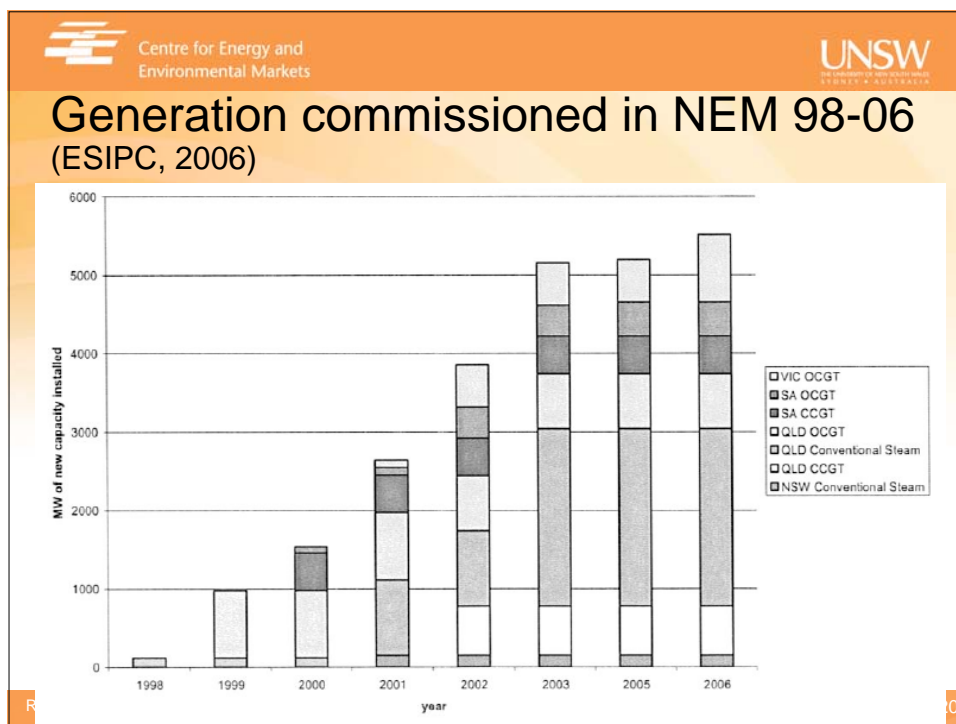
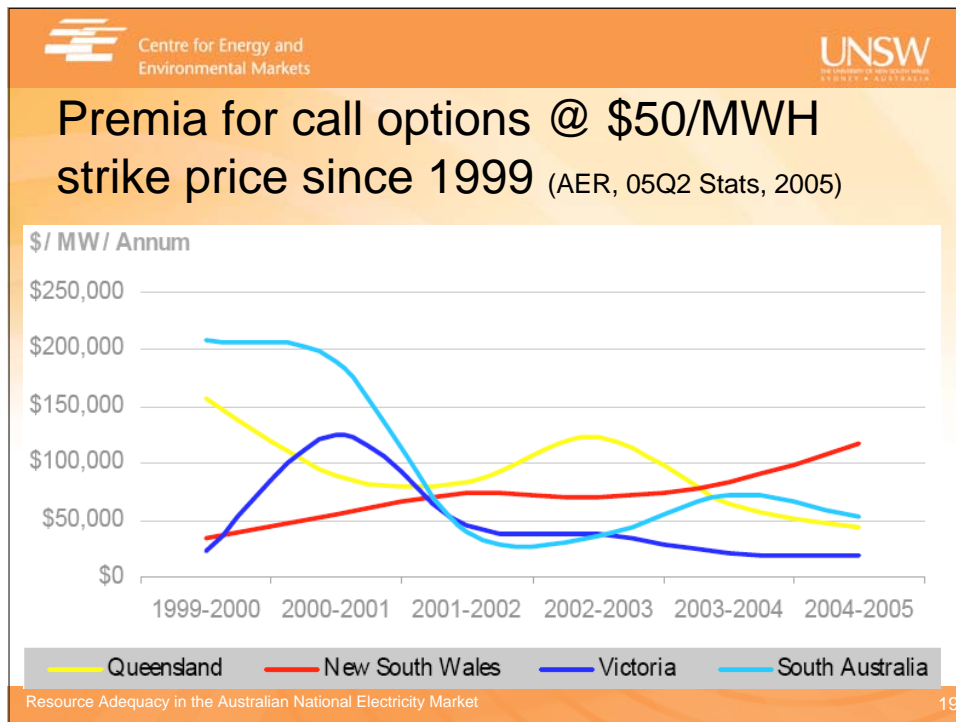














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NEM forecast & actual low reserve hr/yr (gen & tx) (AEMC Comprehensive Reliability Review, 2006)

	Year	Qld	NSW	VIC	SA
Forecast	2004 – 2005	17.5	0	0	6
	2003 – 2004	11.5	4.5	17.5	645
	2002 – 2003	2.5	3.5	7	115.5
	2001 – 2002	1	0	0	45.5
	2000 – 2001	188	8	67	716
	1999 – 2000	43	33	145	699
Actual	2004 – 2005	0	2	0	0
	2003 – 2004	0	1	4	6
	2002 – 2003	0	1	0	0
	2001 – 2002	0	0	0	0
	2000 – 2001	0	0	3	24
	1999 – 2000	5	4	36	88

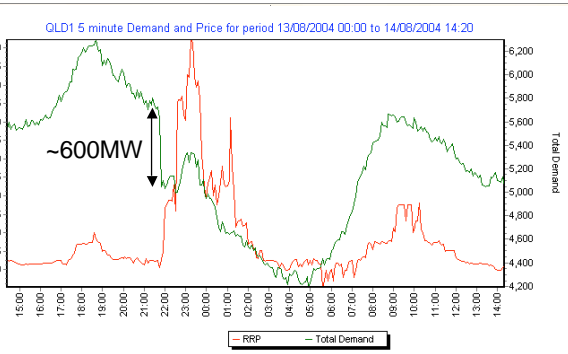
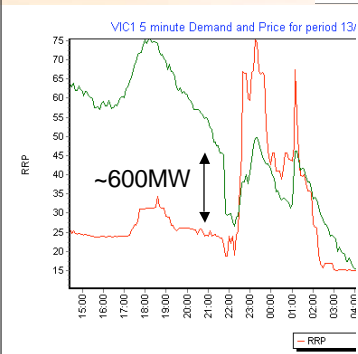
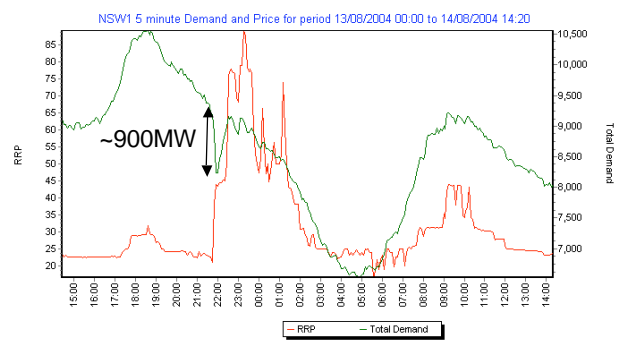
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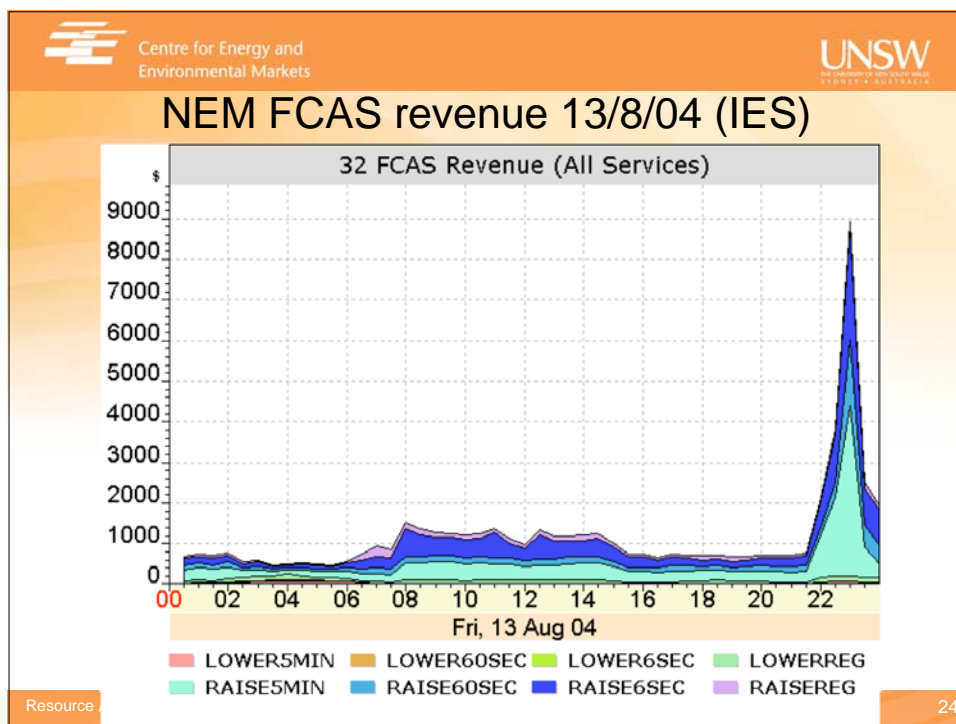
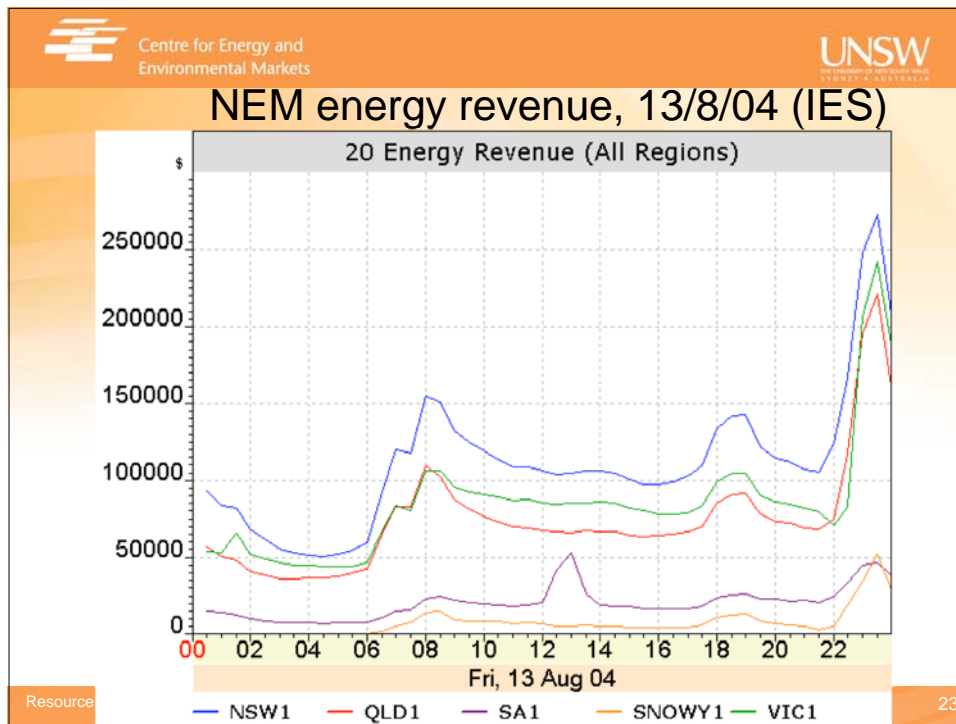
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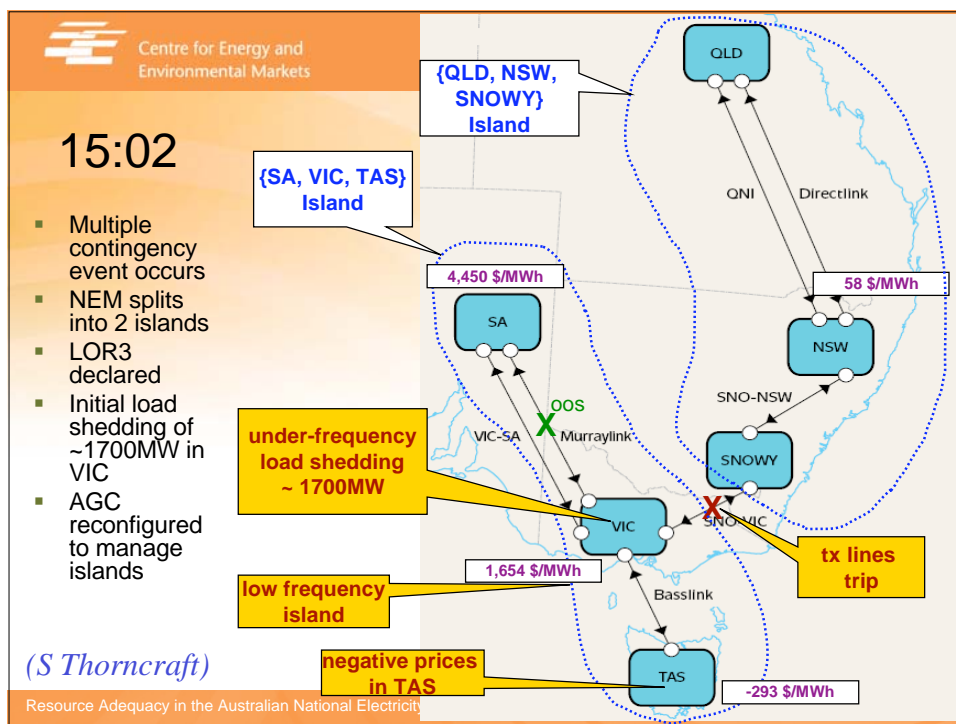
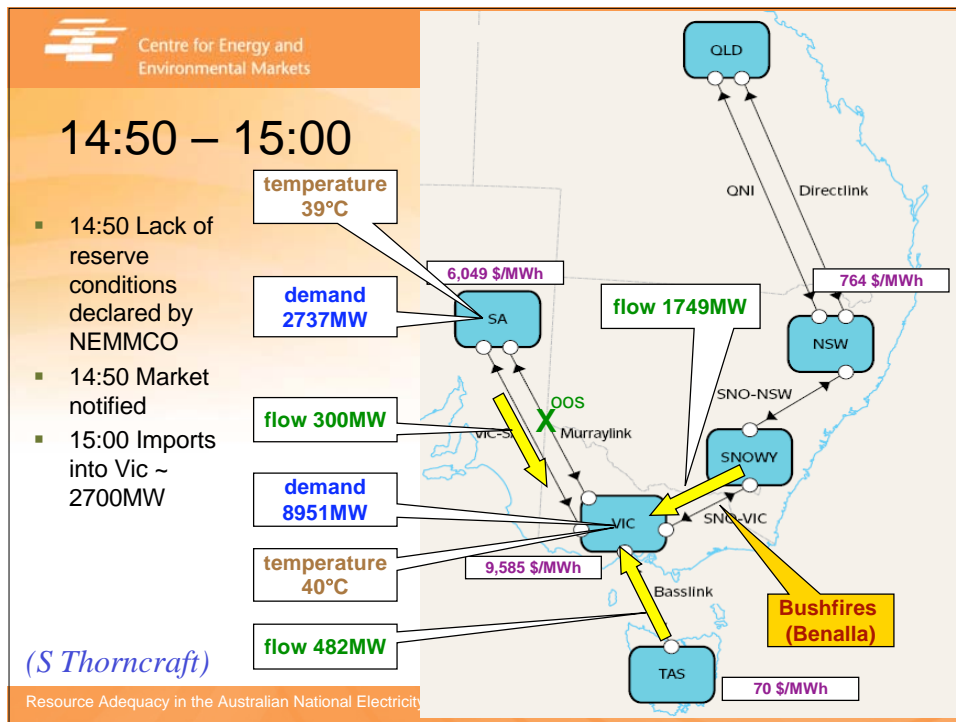


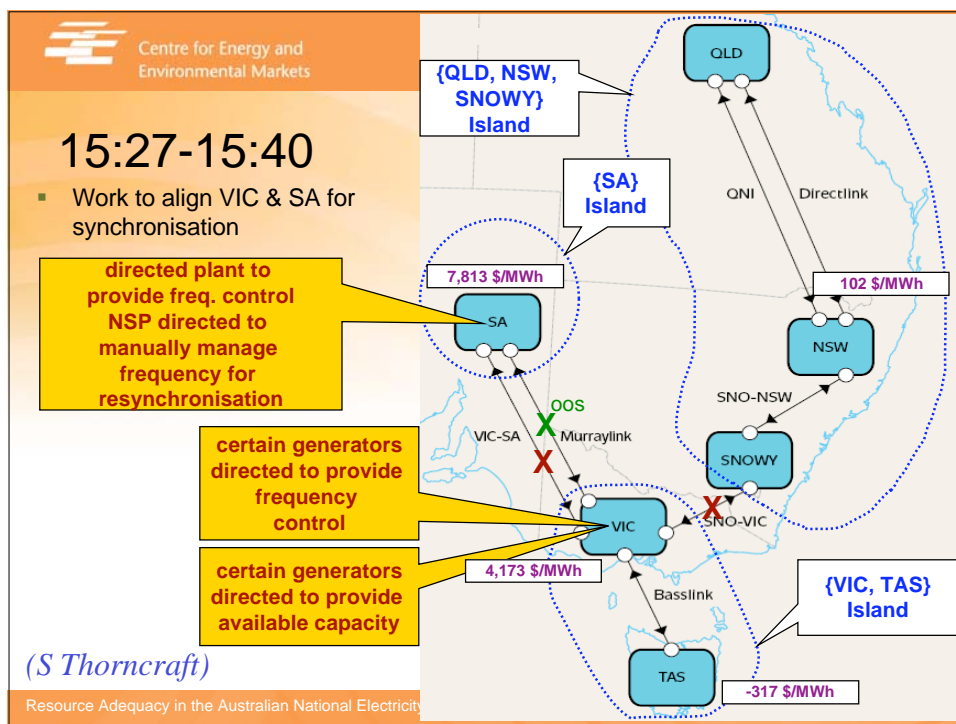
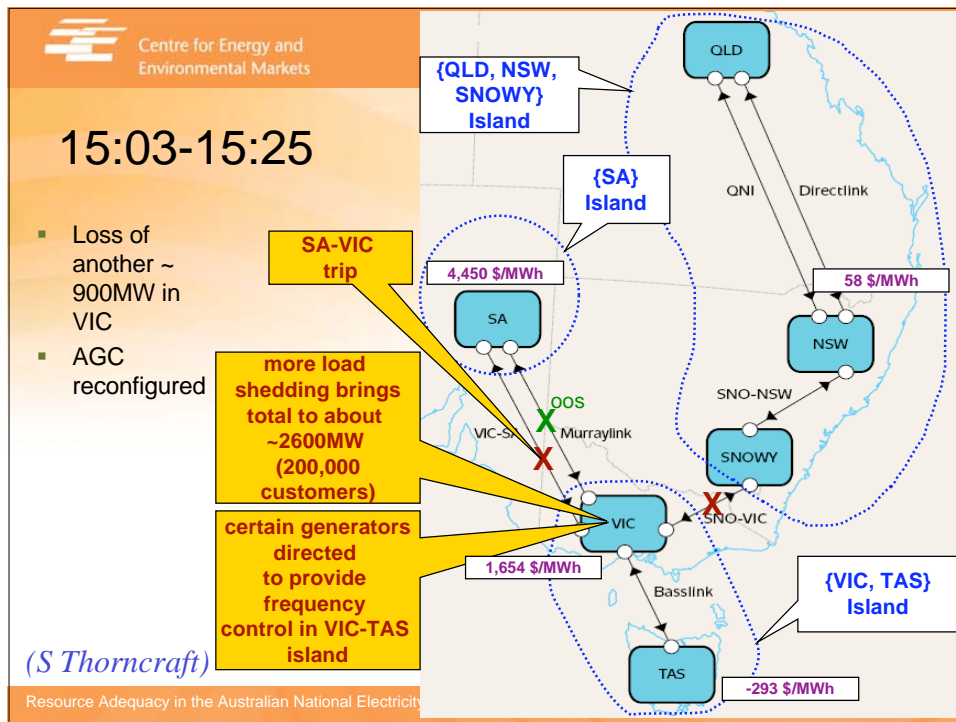
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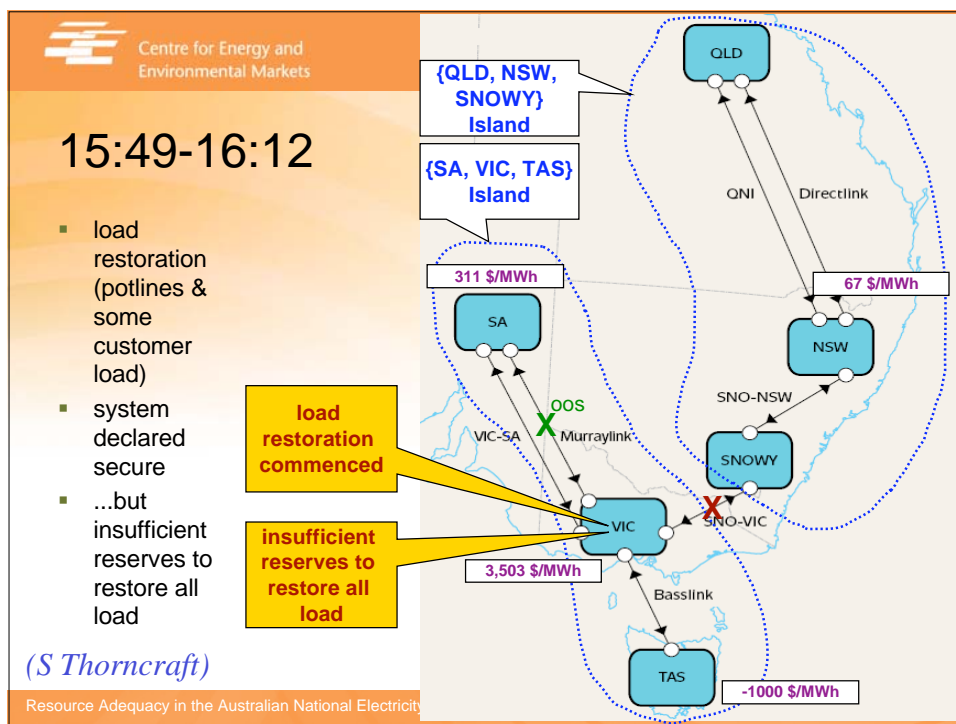
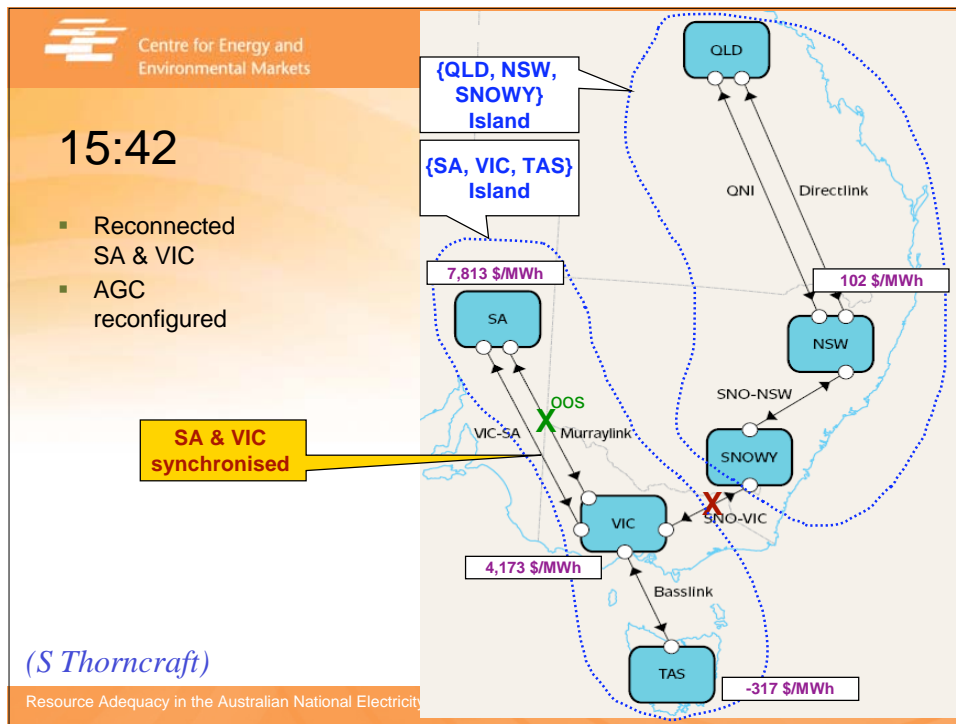
Transgrid CT failure @ 2142 13/8/04 led to 3100 MW gen trip. Frequency fell to 48.9Hz, ~2100 MW load shed in NSW, QI Vic & SA

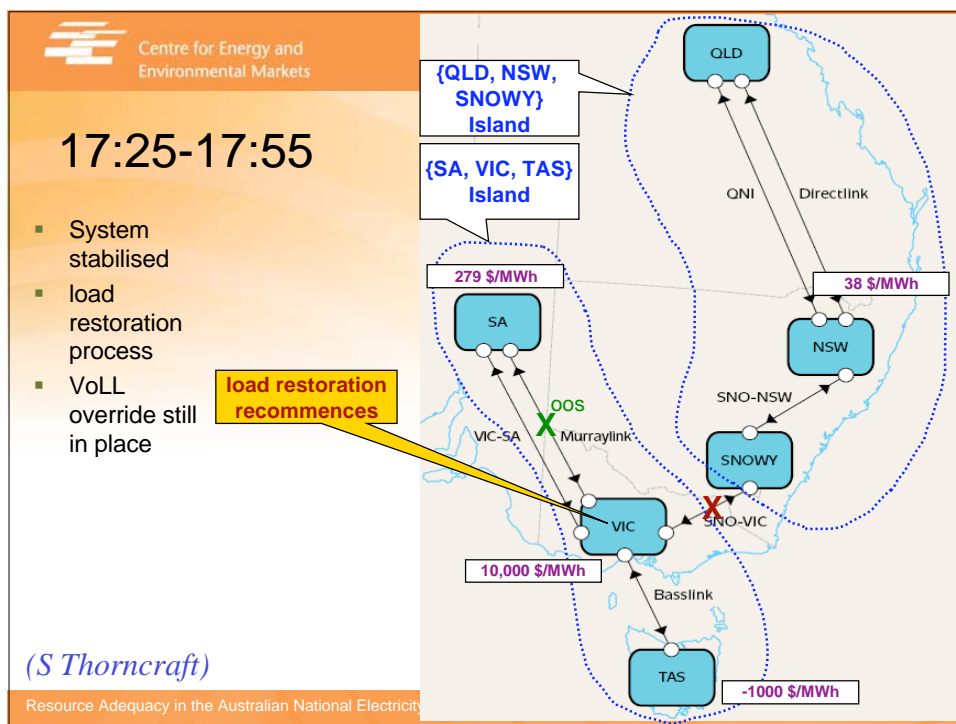
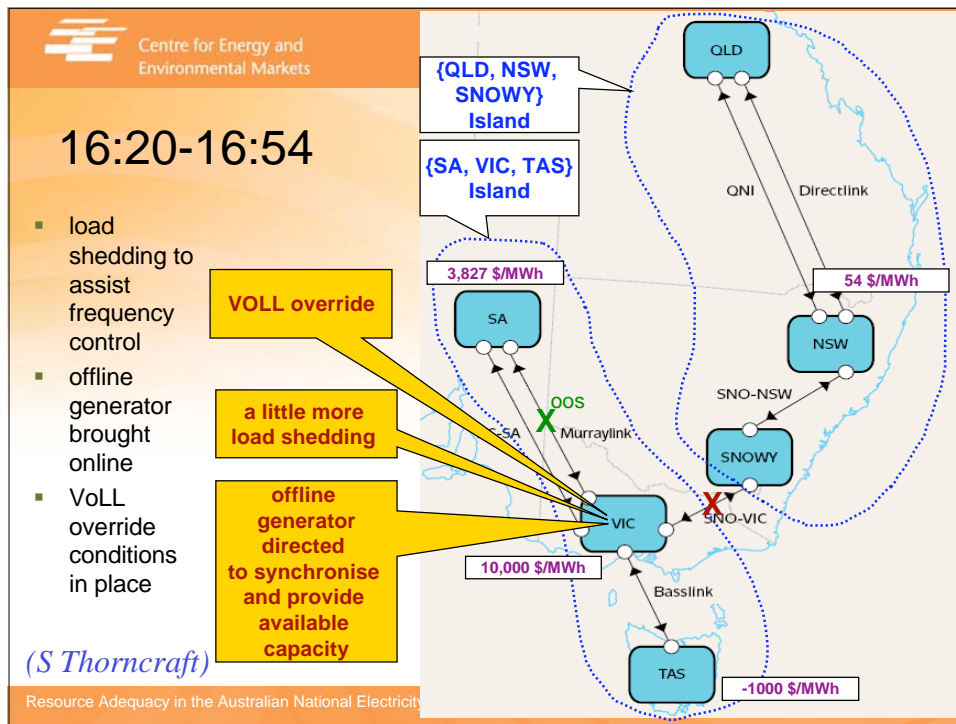


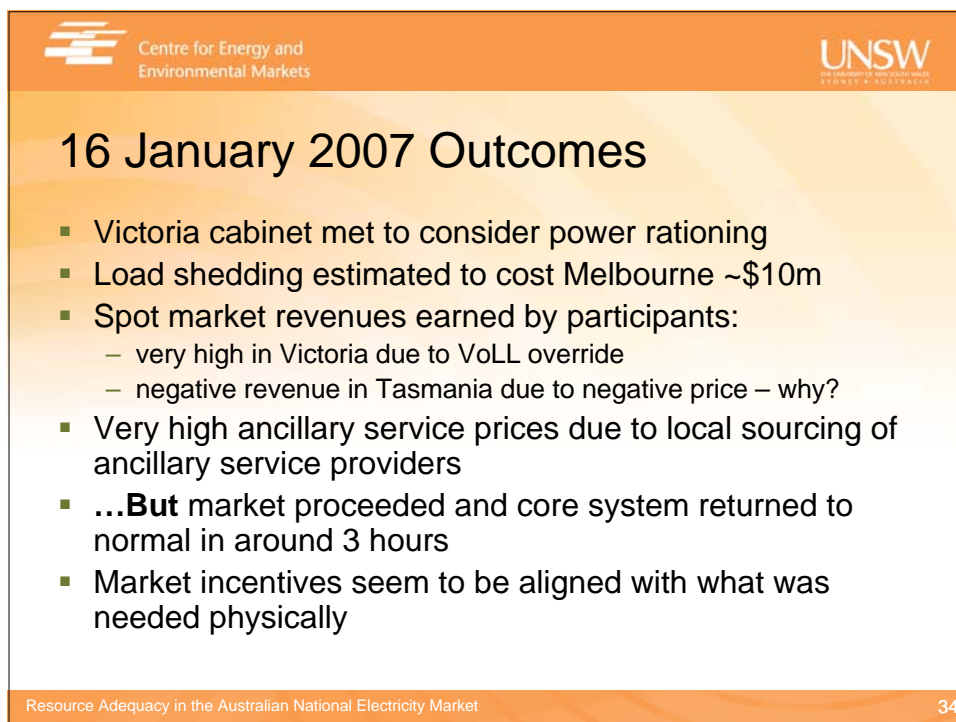
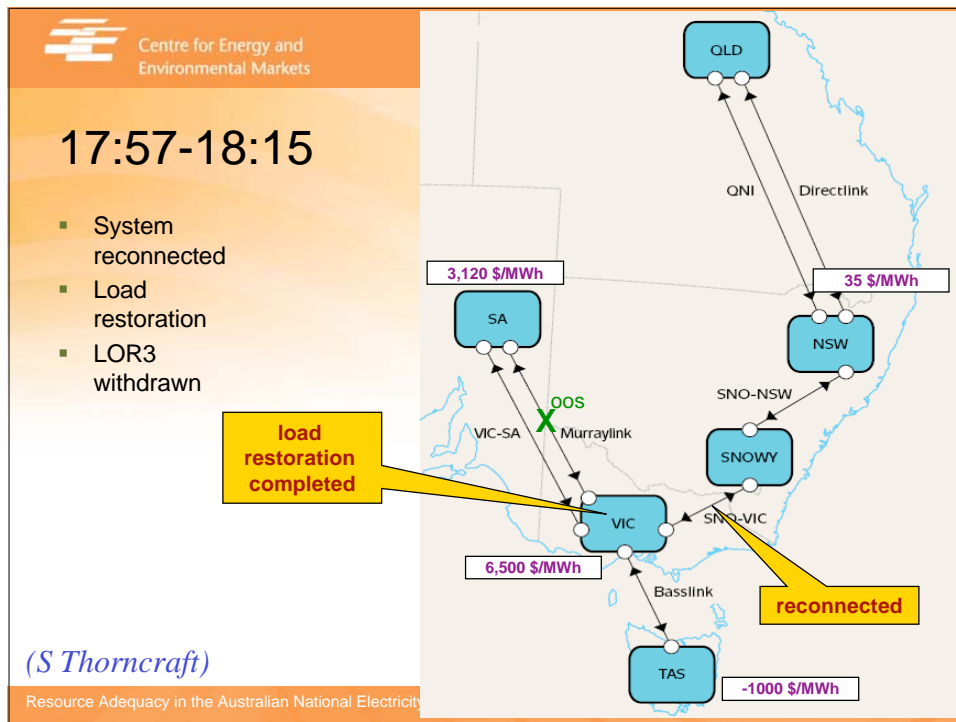


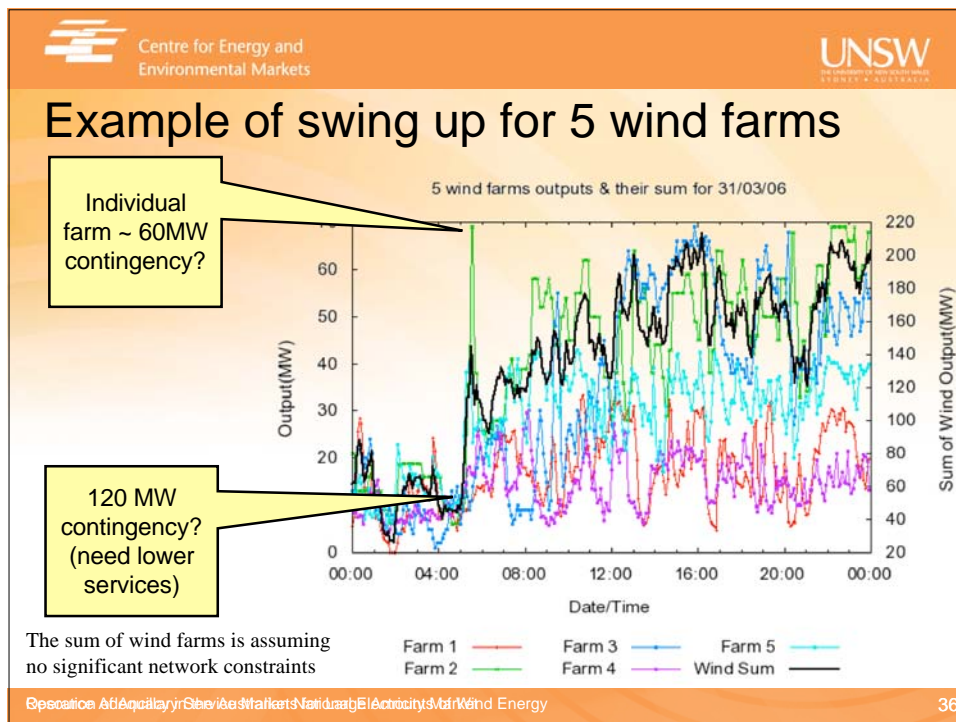
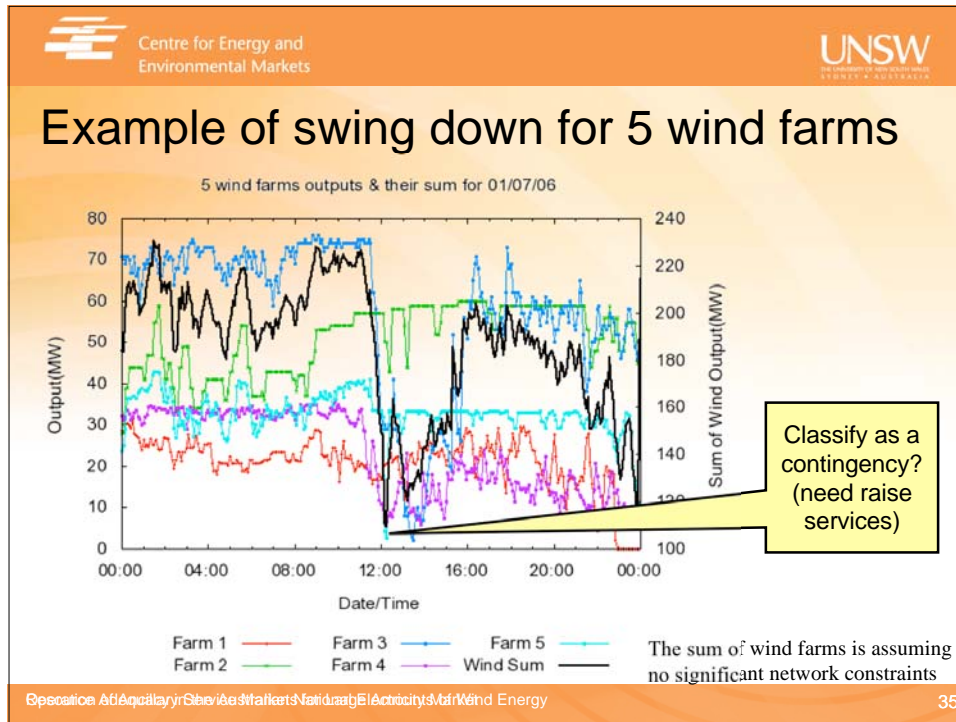


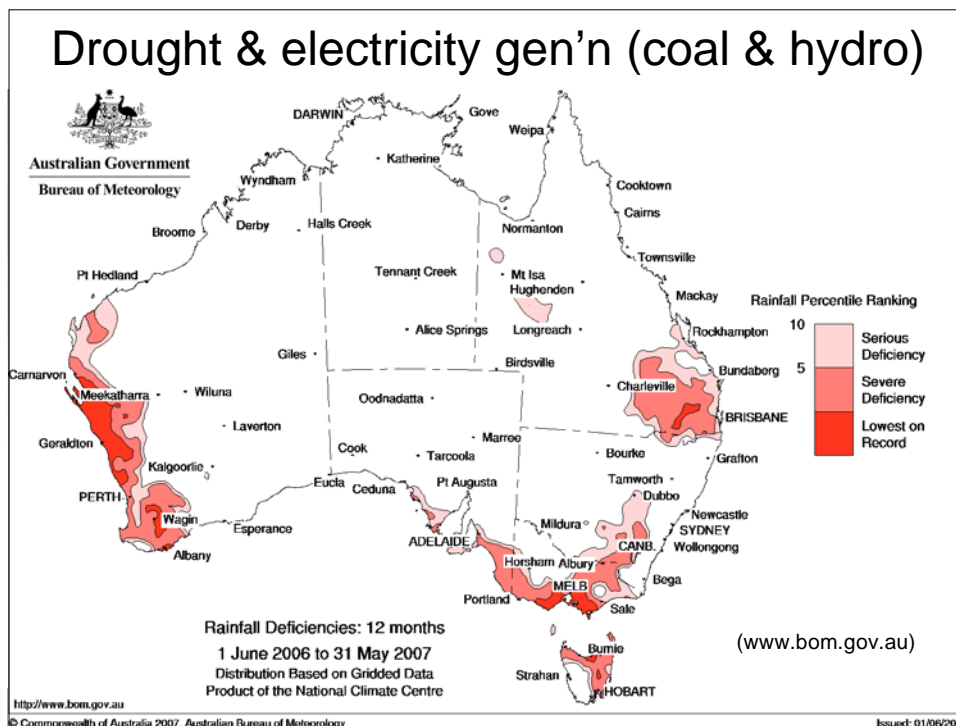
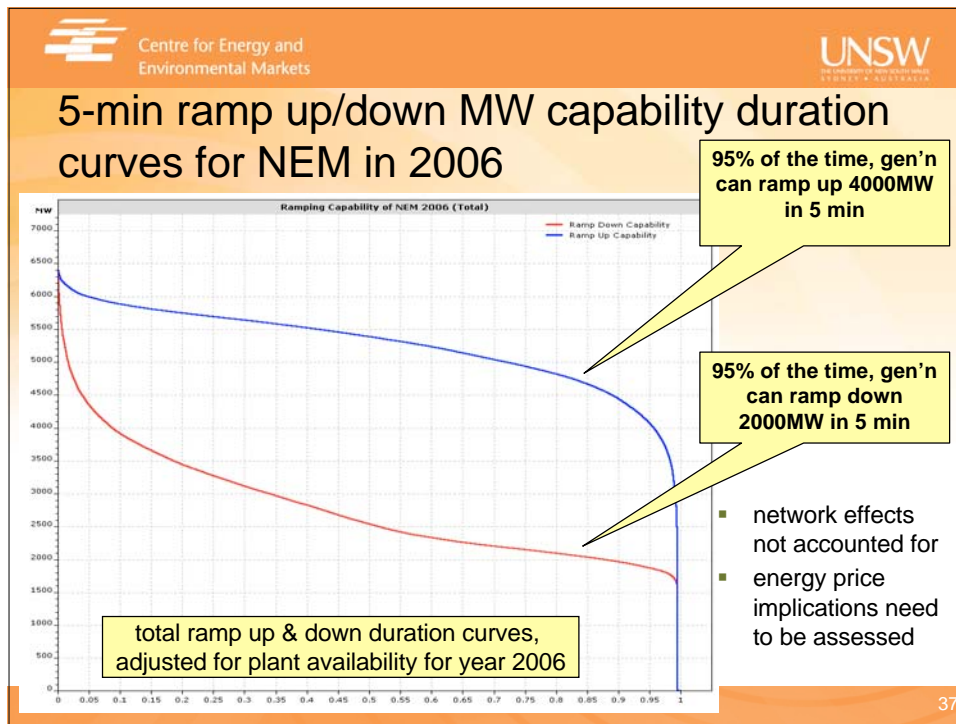


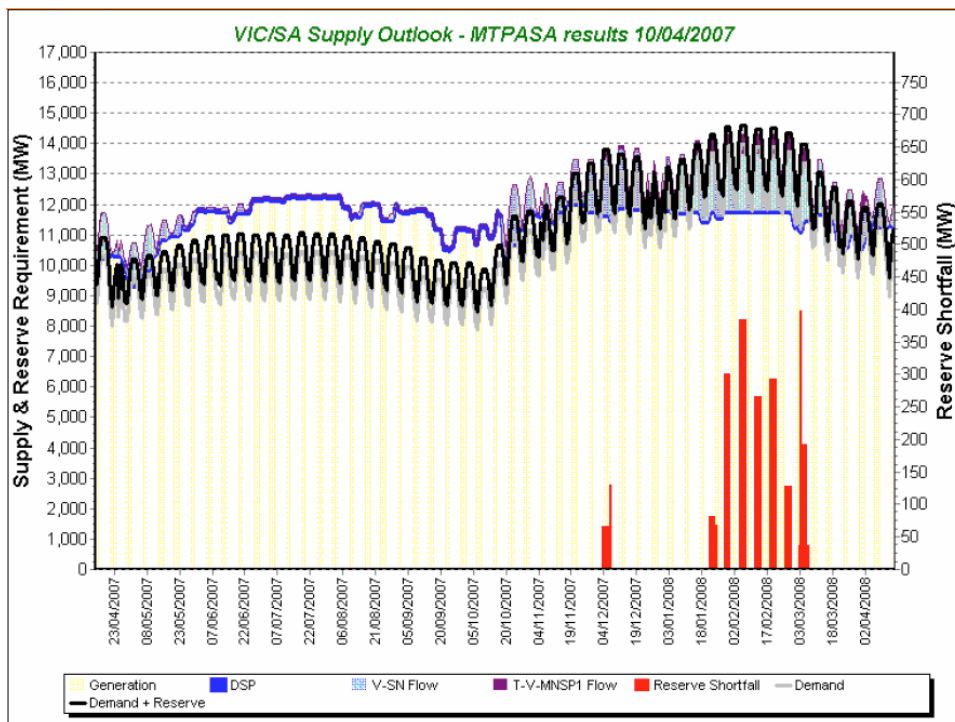
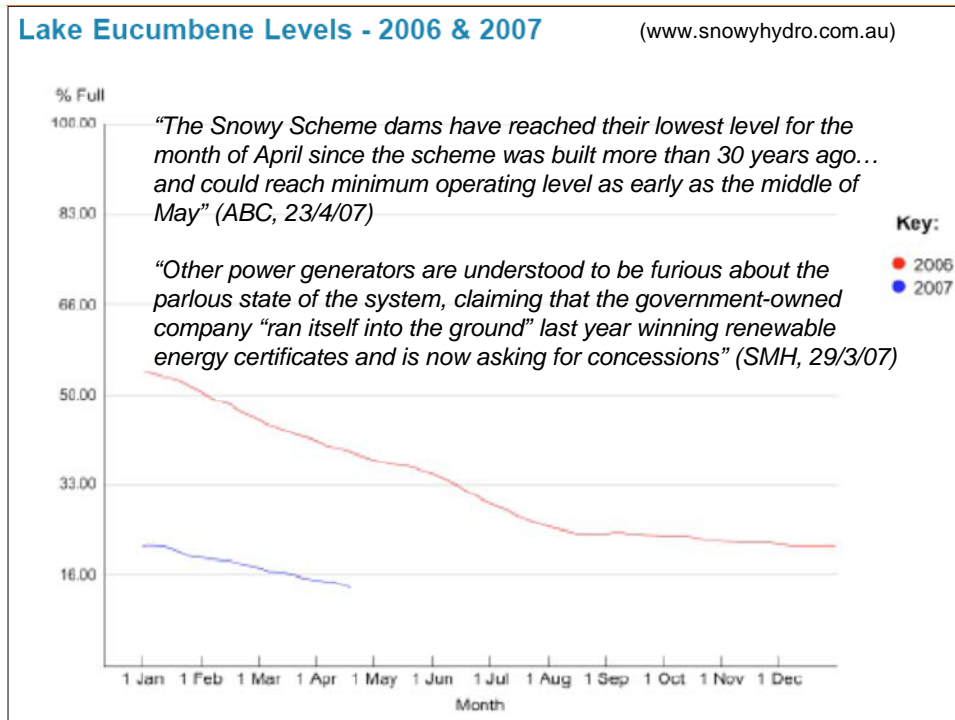


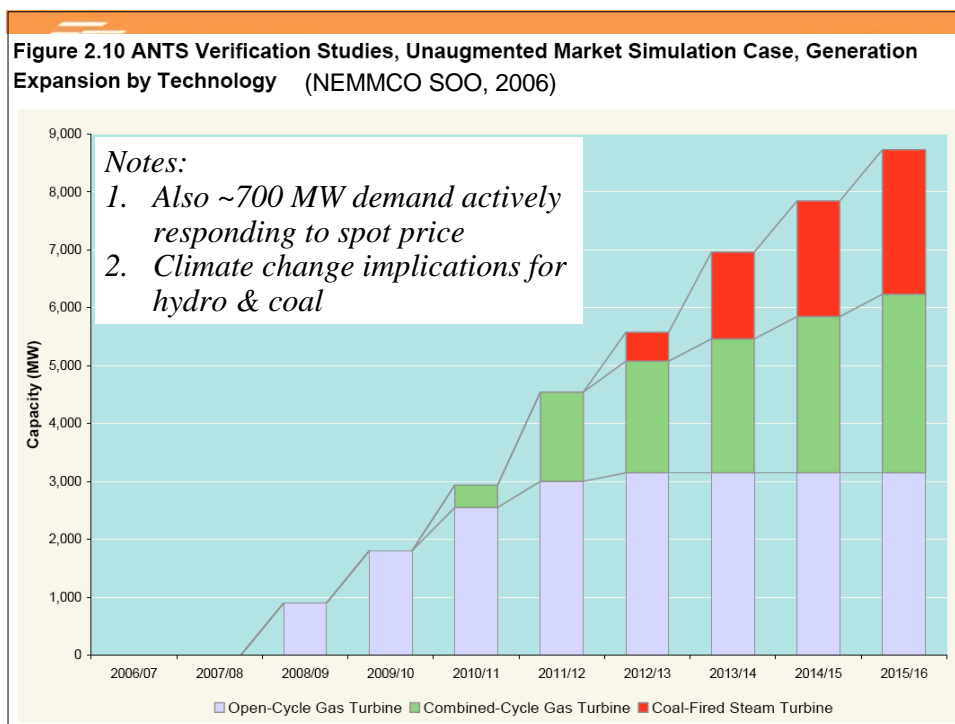
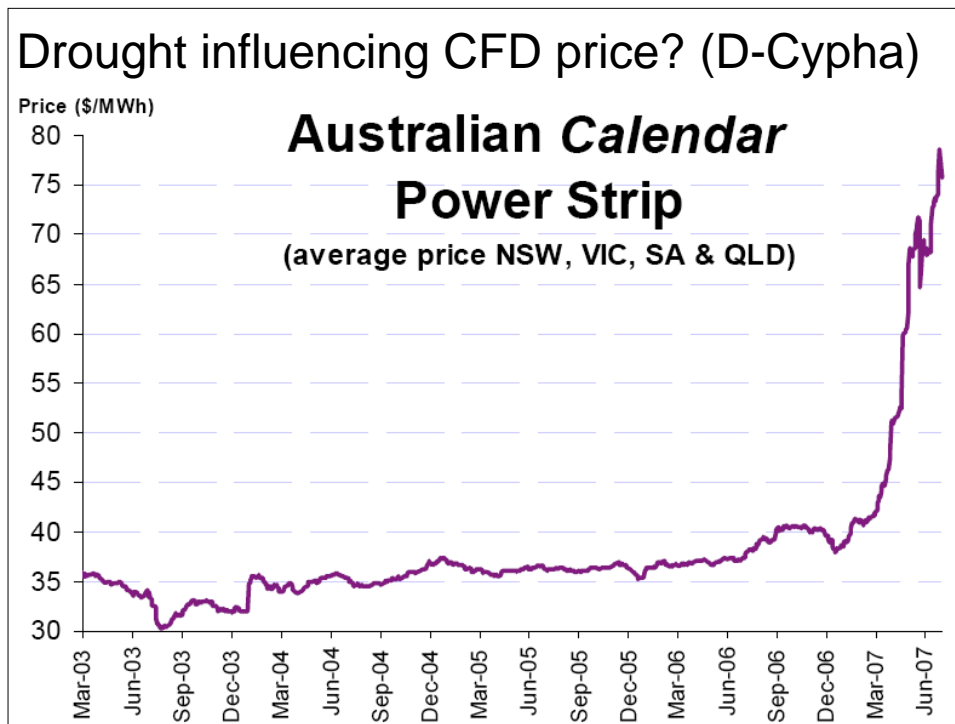


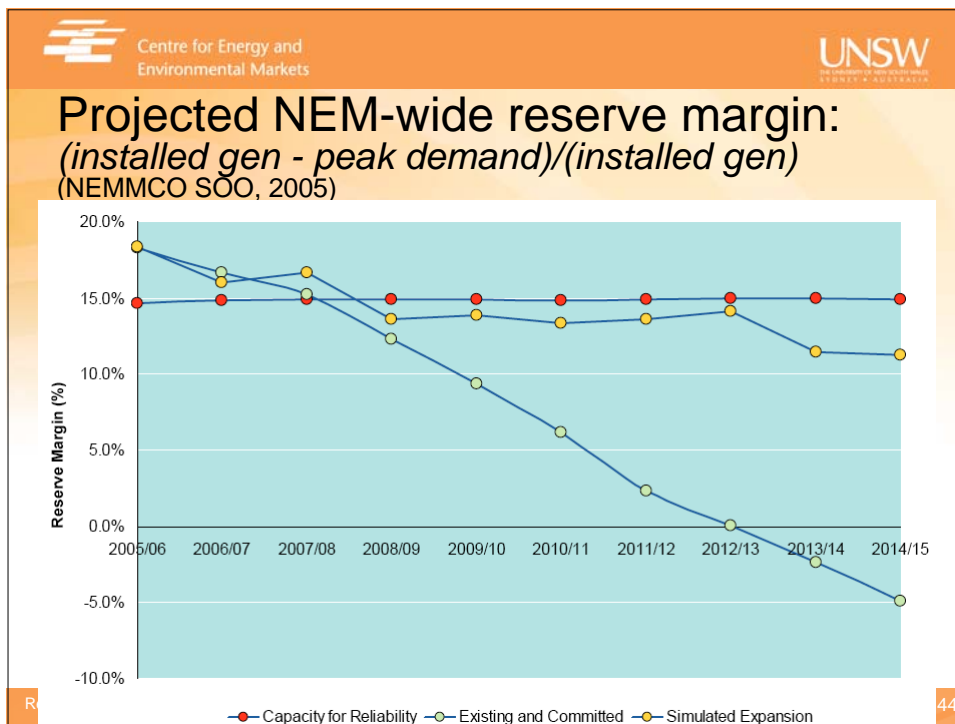
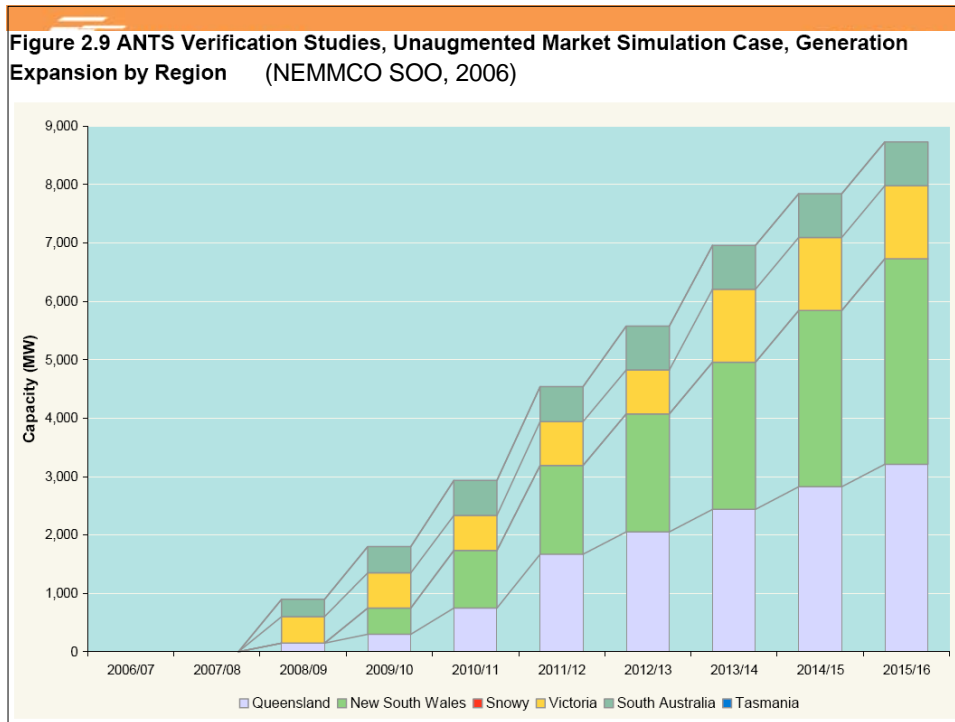














Energy Reform Implementation Group Review, 2007 (www.erig.gov.au)

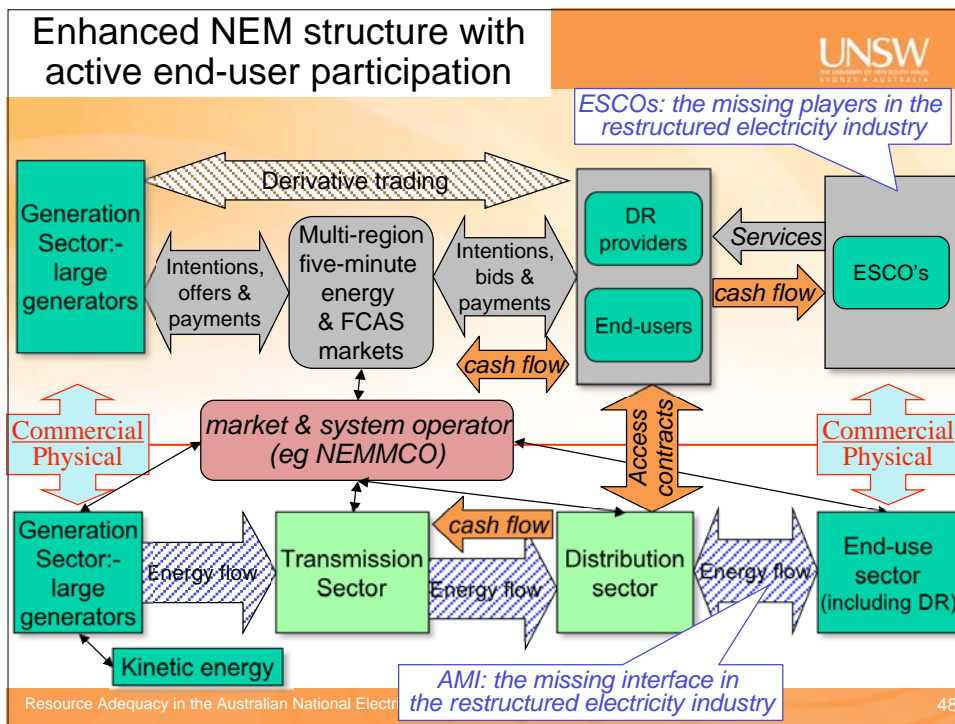
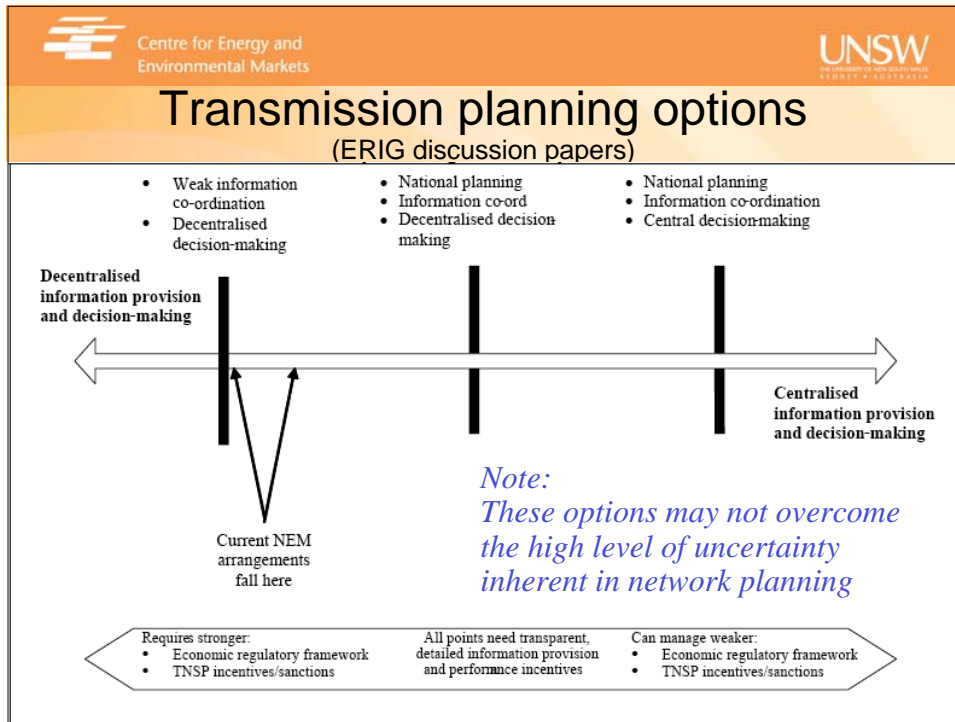
- Proposed overarching goal for the NEM:
 - Economic efficiency (productive, allocative, dynamic)
 - *Note: difficult to define under uncertainty*
- Proposed government role:
 - Adopt a nationally consistent approach
 - Set supply standards, including reliability
 - Design governance regime to deliver overarching goal
 - Eliminate barriers to entry in competitive industry sectors
 - Emulate competitive market outcomes in regulation
 - *End direct government participation in the industry*



Energy Reform Implementation Group Review, *continued*

- Market structure:
 - Prefer private ownership; not concerned about vertical re-integration; retain energy-only market
 - Fully remove retail price caps & expose end-users to volatile spot prices
- Transmission:
 - Don't over-invest to remove all flow constraints
 - Introduce a formal national network development plan
 - Integrate reliability & economic investment tests
- Energy financial market concerns:
 - Retail price caps; govt. ownership; lack of carbon price







Conclusions

- Broad approach needed to achieve a coherent approach to resource adequacy:
 - Governance, security, technical & commercial regimes
- Strengths of the Australian NEM approach:
 - Consistent & effective security, technical & commercial regimes (governance imperfect but not bad)
- Weaknesses of the Australian NEM approach:
 - Government-owned businesses remain contentious
 - End-users still not participating fully
 - Network investment remains contentious
 - Incoherent & ineffective climate change policy
- Weaknesses can be addressed



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