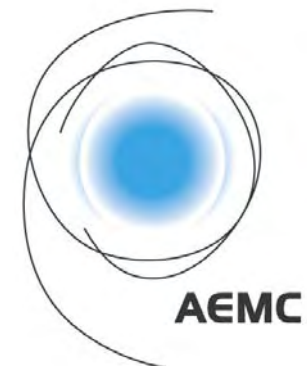


# **Australian Energy Market Commission**

## **Consultation Forum**

Abolition of Snowy Region

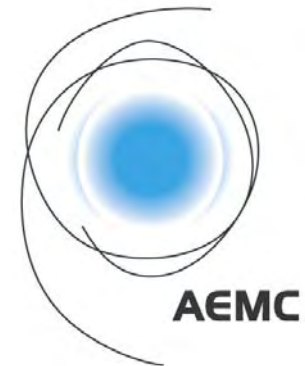
22 February 2007



# Introductory Comments from the Chair

John Tamblyn

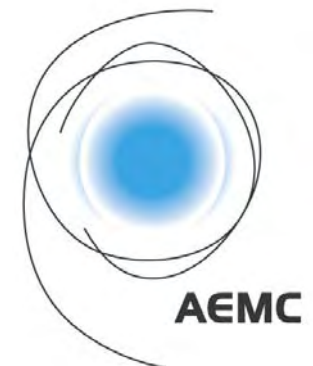
AEMC Chairman



# Background

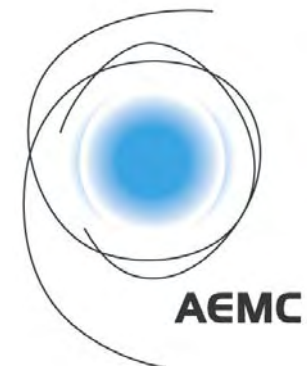
Tendai Gregan

AEMC



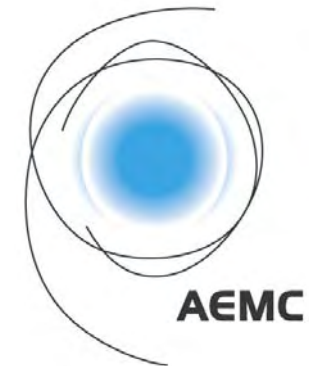
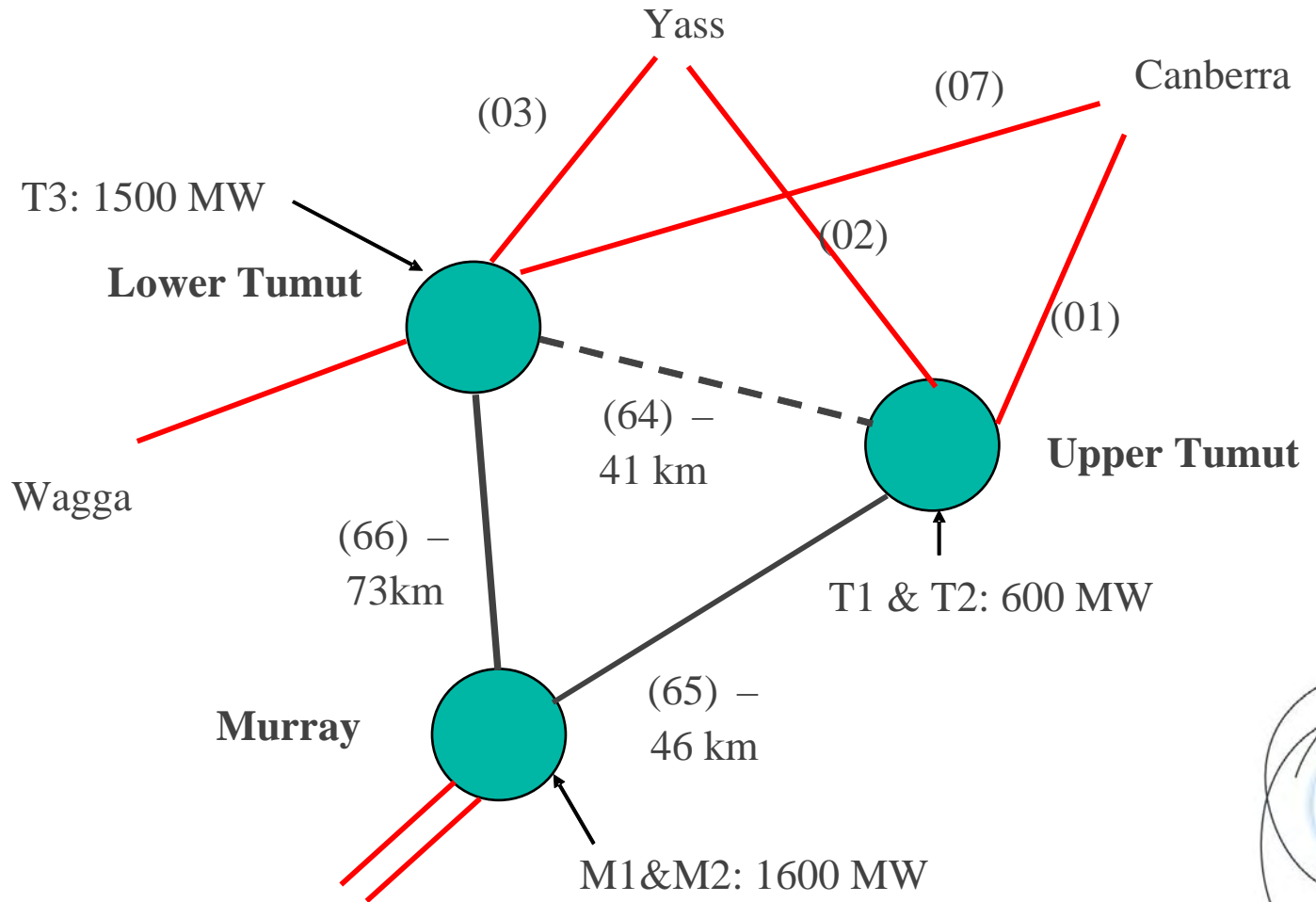
# Original NEM Regions

- Original NEM region boundaries located where transmission connection weakest
- Snowy region - crucial transmission link in middle of NEM
- Network designed in 1950s/60s to transfer energy from Snowy region to Victoria and NSW
- Limited capacity to transfer energy through Snowy region

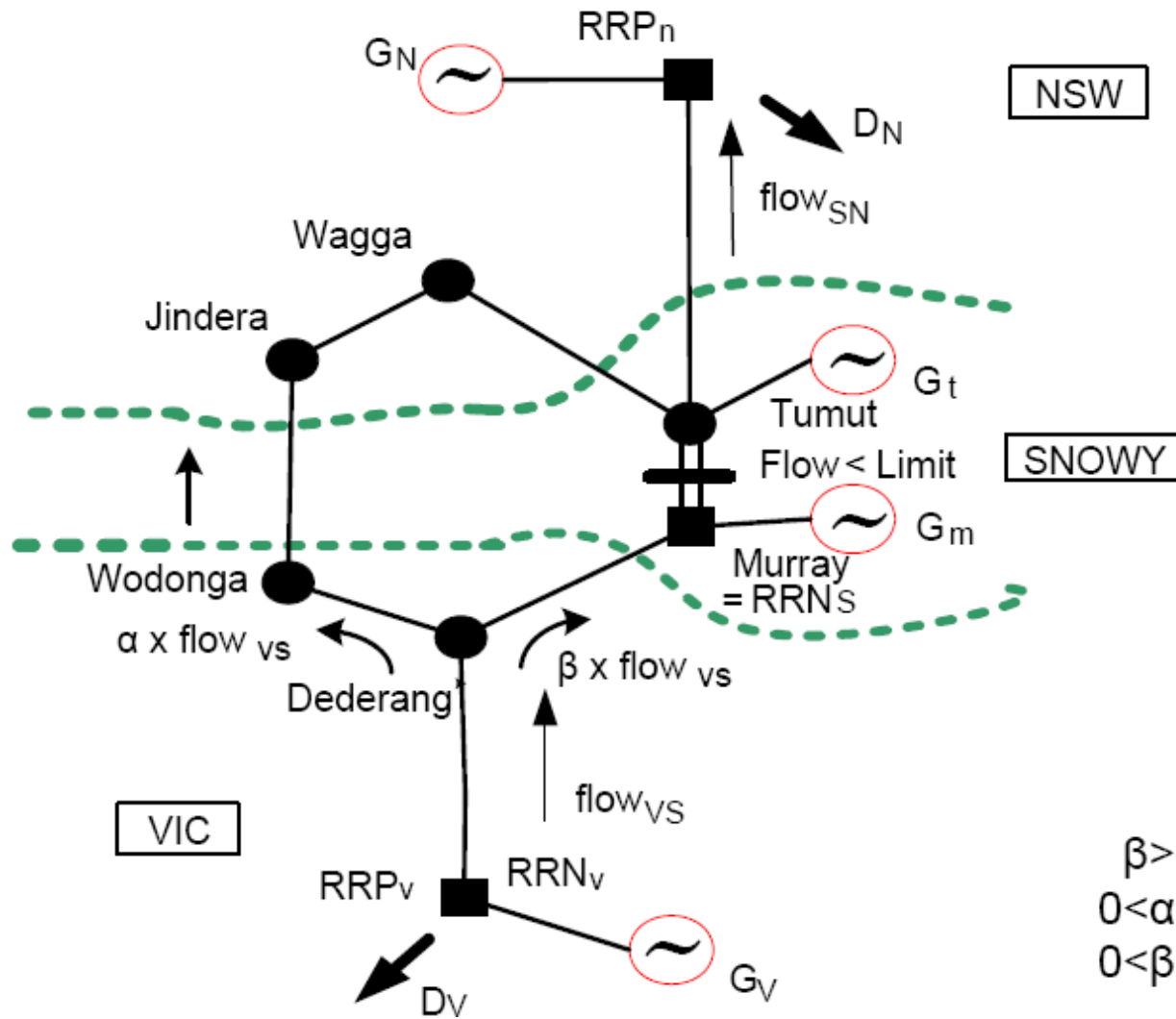


# Transmission Lines in Snowy Mountains

7

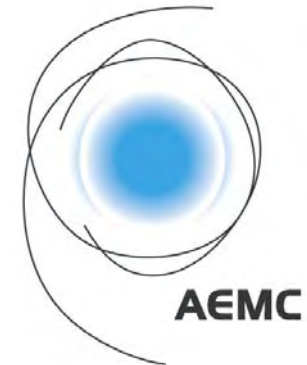


# The “Snowy Constraint”



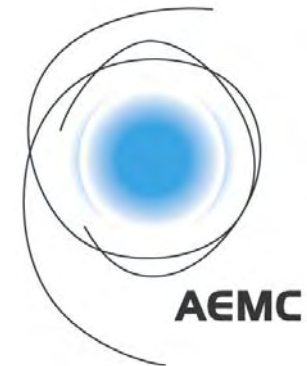
# Interim Arrangements

- Tumut CSP/CSC Trial (1 October 2005)
  - Address incentives Tumut generation
- Southern Generators Rule (1 November 2006)
  - Address NEMMCO's intervention regarding negative residue accumulation



# Region Boundary Change

- View region boundary change longer term solution
- Snowy Hydro and Macquarie Generation proposals

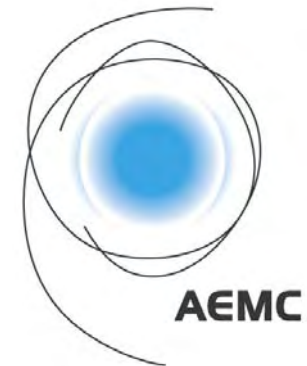




# Draft Rule and implementation issues

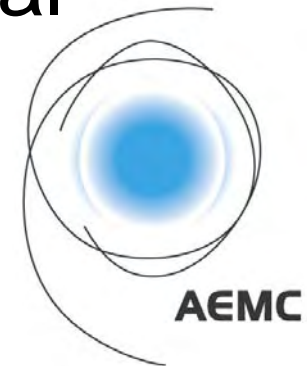
Tendai Gregan

AEMC



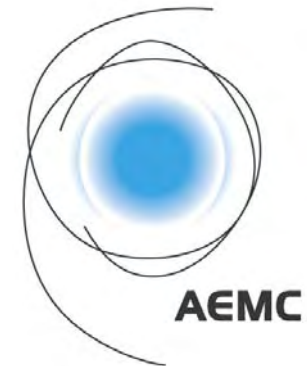
# Draft Rule

- Schedule 1 – sets out amendments in Chapter 3 of Rules
- Schedule 2 – Amendments to Chapter 8A
- Schedule 3 – Glossary in Chapter 10
- Schedule 4 – Savings and transitional provisions



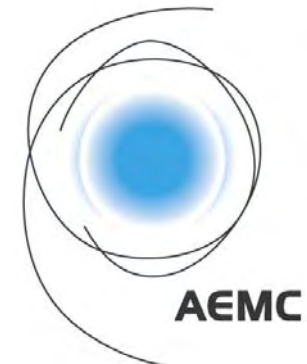
# Implementation (1)

- First such region change since NEM start
- First time region change implemented by Rule change
- AEMC sought NEMMCO advice & input from market participants



# Implementation (2)

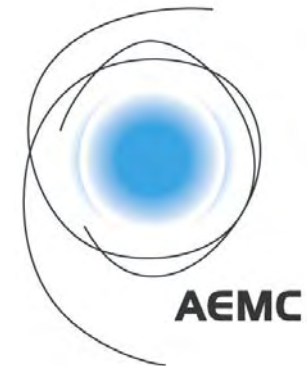
- Implementation period - before summer 2007/08
- Current Part 8 Chapter 8A Derogation
  - NEMMCO constraint formulation
  - Tumut CSP/CSC Trial and Southern Generators Rule



# Implementation - Technical

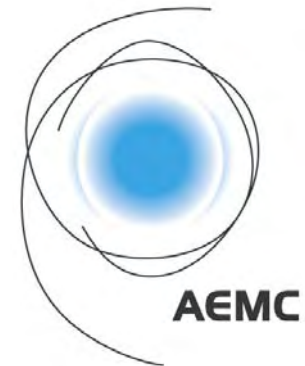
**Commission seeking views on following technical issues affecting implementation:**

- Revenue metering
- Region boundary location detail
- Location of Guthega Power Station/Jindabyne pumping stations
- Definition of time
- Residual matters



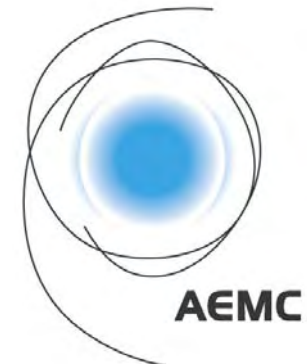
# Reasoning on Draft Rule Determination

Liza Carver, AEMC Commissioner



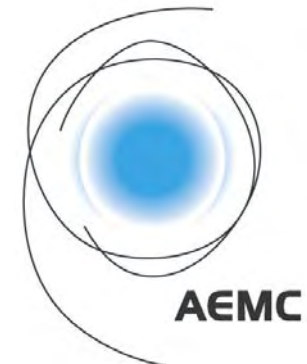
# The Snowy Hydro Proposal

- Proposal to abolish existing Snowy region
- Context and reasons for proposal
  - To address impacts of persistent and significant intra-regional congestion
  - Proposed boundary change as long-term solution
- Other alternatives
  - Macquarie Generation proposal
  - Split Region Option



# Submissions

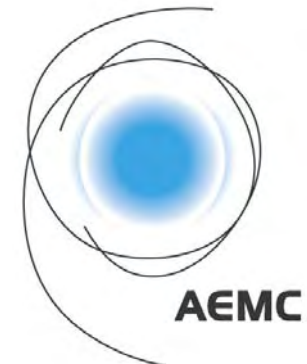
- Almost all agreed intra-regional congestion a problem in existing Snowy Region affecting:
  - Dispatch and pricing efficiency
  - Investment efficiency
- Unlikely addressed by network augmentation in short-to-medium term





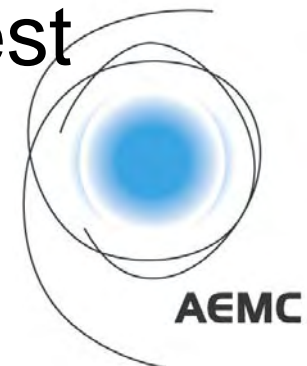
# Analytical Framework

- Assessment included a range of cases:
  - Business-as-usual (BAU)
  - Snowy Hydro Proposal
  - Counterfactual – Split Region Option
- Long term perspective and consideration



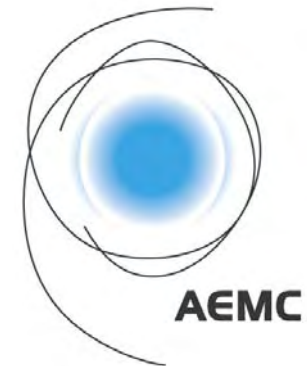
# NEM Objective and Rule Making Test

- Assessed Snowy Hydro proposal against NEM Objective (s.7 of NEL):  
“to promote efficient investment in, and efficient use of, electricity services for the long term interests of consumers”.
- Determined satisfied Rule making test (s.88 of NEL)



# Assessment Criteria

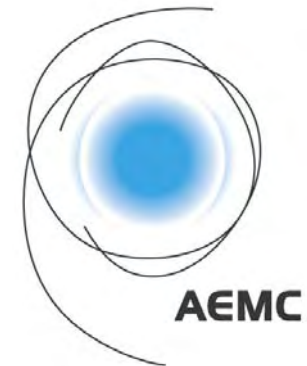
- Economic efficiency of dispatch
- Pricing outcomes and participant responses
- Inter-regional trading and risk management
- Power system security, supply reliability and technical issues
- Good regulatory practice
- Long term implications and consistency with public policy settings



# Economic Efficiency Incentives Snowy Region (base case)

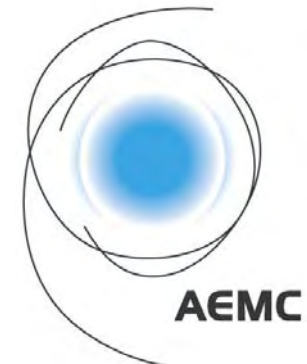
In base case (northward flows):

- Snowy Hydro incentives bid induce NEMMCO intervention
- Reduced competition NSW, higher prices
- Inefficient pattern of dispatch results



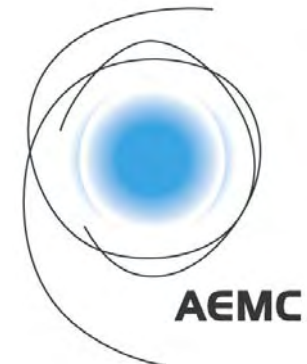
# Economic Efficiency Incentives Abolition of Snowy Region

- Encourage stronger competitive forces
  - More efficient pattern of dispatch, pricing and inter-regional trade
- Positive influence on long term development of NEM
- More efficient investment decisions, both inter-temporal and locational
- Similar results for split region option



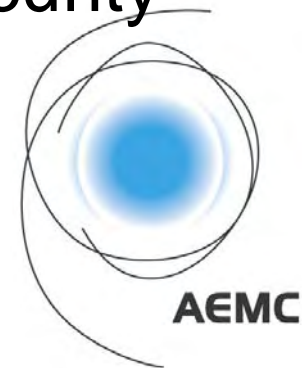
# Non-economic Assessment Criteria

- Power system security and supply reliability
  - No anticipated adverse consequences
- Good regulatory practice
  - Minimise operational intervention
  - Robust longer term changes
  - Transparency of NEM operation



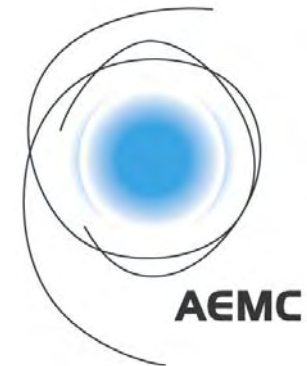
# Assessment Against the NEM Objective

- Greater dispatch efficiency and pricing outcomes
- Promotes inter-regional trade by reducing inter-regional trading risk
- Promotes principles good regulatory practice
- Promotes more efficient long term decisions
- No adverse consequences on system security
- **Conclusion: promotes NEM Objective and satisfies Rule making test**



# Broader Policy Context

- Congestion Management Review
  - Directions Paper due March 2007
  - Focus on developing approach for managing future congestion in NEM
- MCE region boundary process Rule change proposal

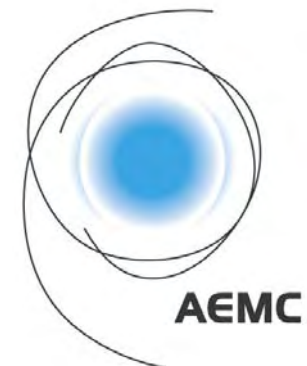




# Explanation of Modelling Results

Danny Price

Frontier Economics





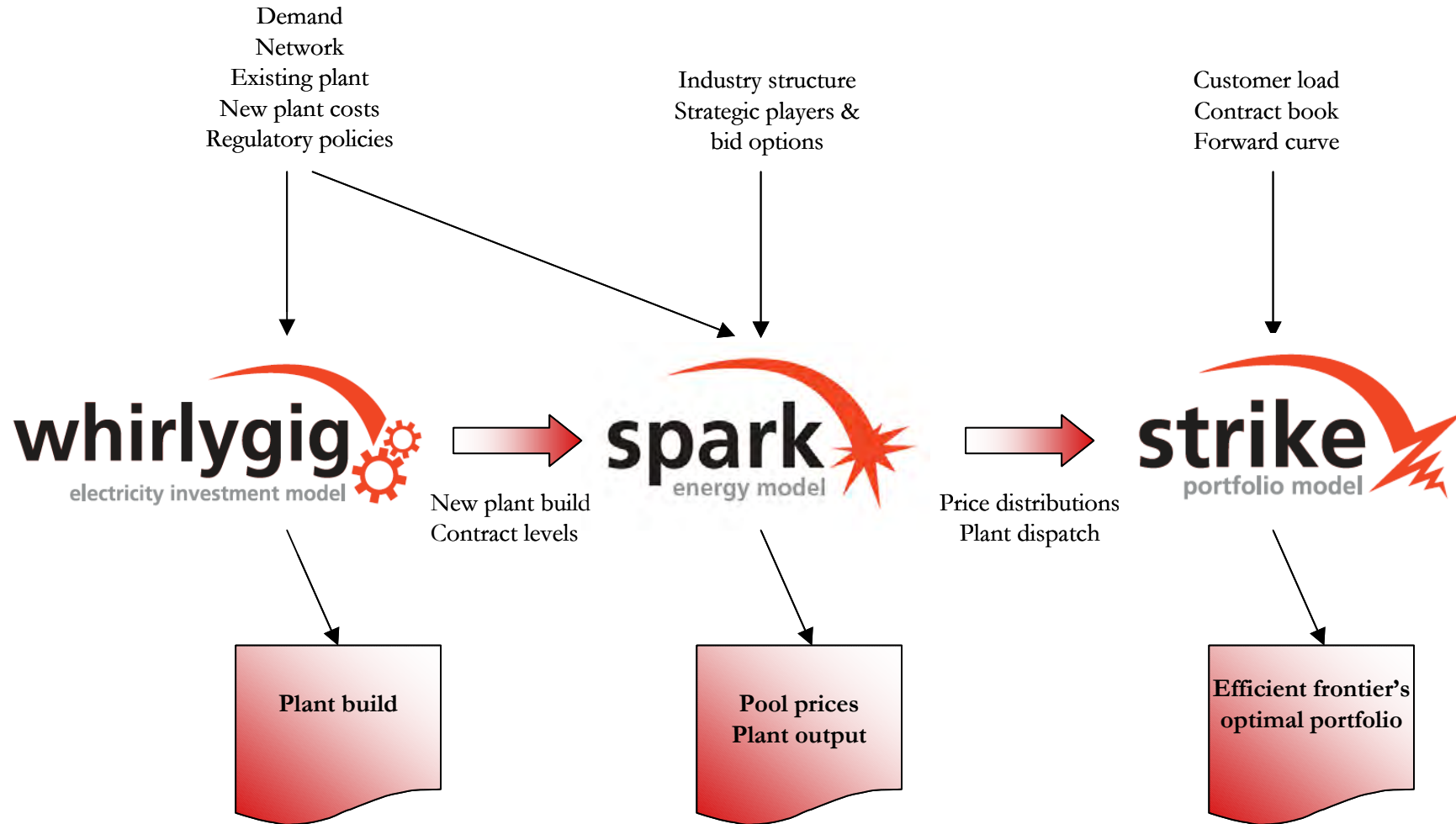
# Snowy boundary change modelling

Presentation on Draft Decision, Melbourne, 22 February 2007

# Background

- Conceptual analysis produced ambiguous findings – too much going on to determine in-principle
- Modelling required to help understand direction and magnitude of changes
  - Dispatch impacts - productive efficiency effects, implications for dynamic efficiency
  - Risk – potential trading impacts, which potentially has implications for competition and extent of pass through of efficiency gains
- These efficiency impacts are part of a suite of indicators used to evaluate the proposal against the NEM Objective
- Proposal assessed against base case

# Steps in the modelling analysis



# Stakeholder consultation process

- AEMC held a meeting with stakeholders (known as the Technical Reference Group) on the modelling assumptions to be used
- TRG all parties agreed that the assumptions adopted by Frontier were appropriate
- Information Disclosure Statement provided scope for further industry input on modelling (16 June 2006)
- Met with NEMMCO to discuss required constraint equations to facilitate modelling
- NEMMCO provided modified/reformulated constraints in mid 2006 for:
  - Snowy Hydro proposed boundary change; and
  - Split Region Option
- These were based on the 2005 ANTS constraint books

# Dispatch/price modelling – assumptions

- Modelling period - 2007/08 to 2009/10 inclusive
- Bidding
  - Strategic plant included Snowy Hydro and key baseload and peaking plant in VIC, NSW and Qld
  - - Most strategic plant could withhold 10-30%, although Tumut and Murray were each allowed to offer 0-100% in 12.5% increments
  - - All strategic plant offered at SRMC except Snowy Hydro at \$1/MWh (energy constrained across the entire year so SRMC is relatively unimportant)
  - - Peaking plant bid full capacity at 5 x SRMC
- Contracting
  - High and low contracting cases – Snowy 50-60%, contracted with equivalent IRSRs and others 55-65% (low) and 65-75% (high)
  - Low contracting range was for NSW in early years to represent ETEF
  - Contract reference region – Snowy assumed to contract 50/50 Vic/NSW as in Southern Generators' modelling

# Dispatch/price modelling – results overview

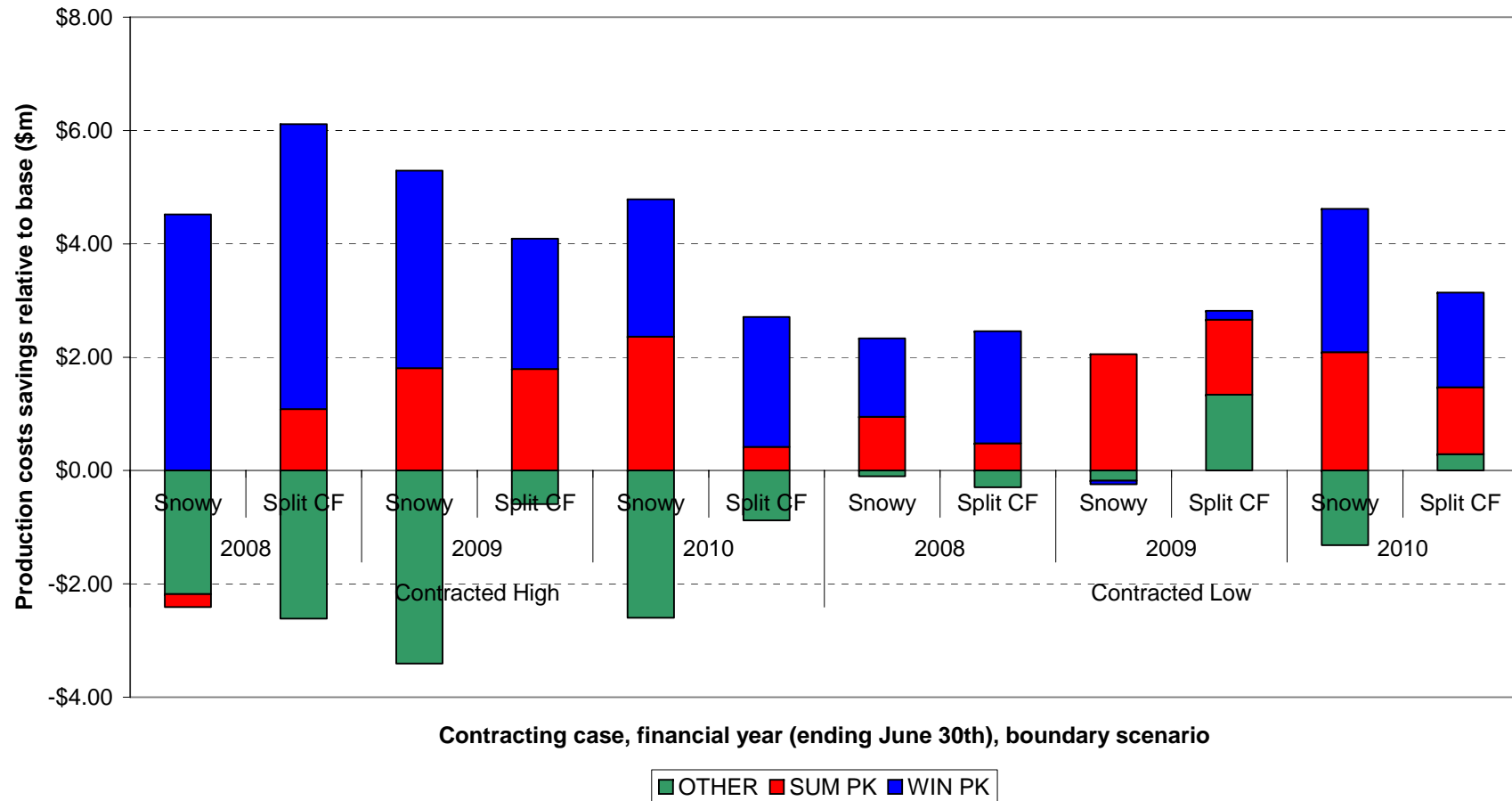
## Key dispatch findings:

- Production cost savings vary between \$1.8-\$3.5m p.a.
- Savings arise from increased the likelihood of Snowy offering more capacity into the market during peak times, displacing mid-merit and peaking plant

## Key price findings:

- Lower average annual spot prices in NSW and, to a lesser extent, Vic
- Price impacts largely occurred during extreme summer and winter peak periods
- Found greater convergence between NSW and Vic prices over time

# Dispatch results (1)

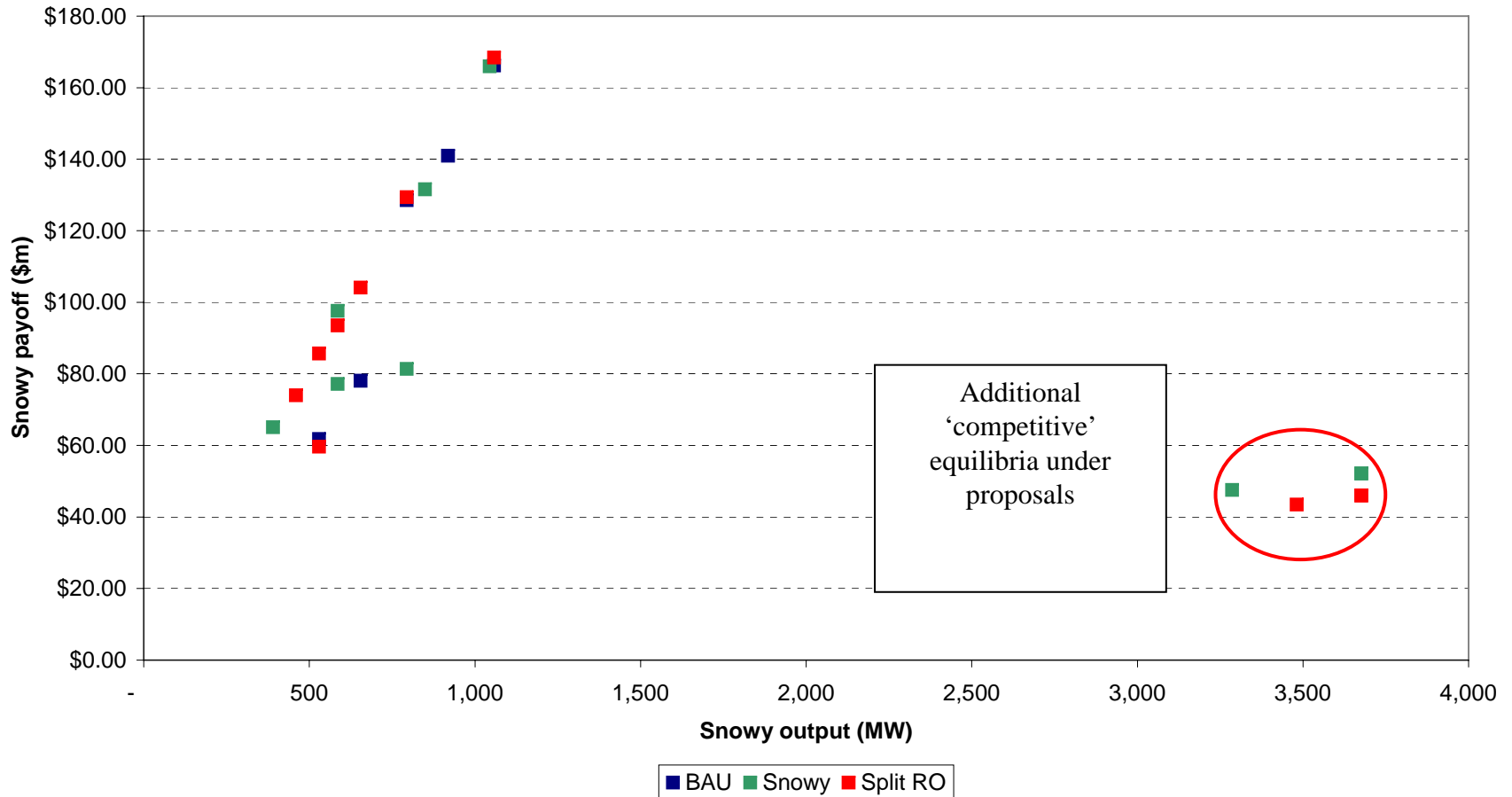




## Dispatch results (2)

- A large proportion of savings arose during particular market conditions - high summer NEM demand, especially Vic and SA
- Analysis of these circumstances shows:
  - Savings were driven by occurrences of some additional ‘competitive bidding’ equilibria under the Snowy Hydro proposal and the SRO
  - Snowy finds it more difficult to make strategic behavior pay when its generation is priced at separate nodes – although still find it possible
- Similar effect arises across other demand points where savings occur

# Dispatch results (3)

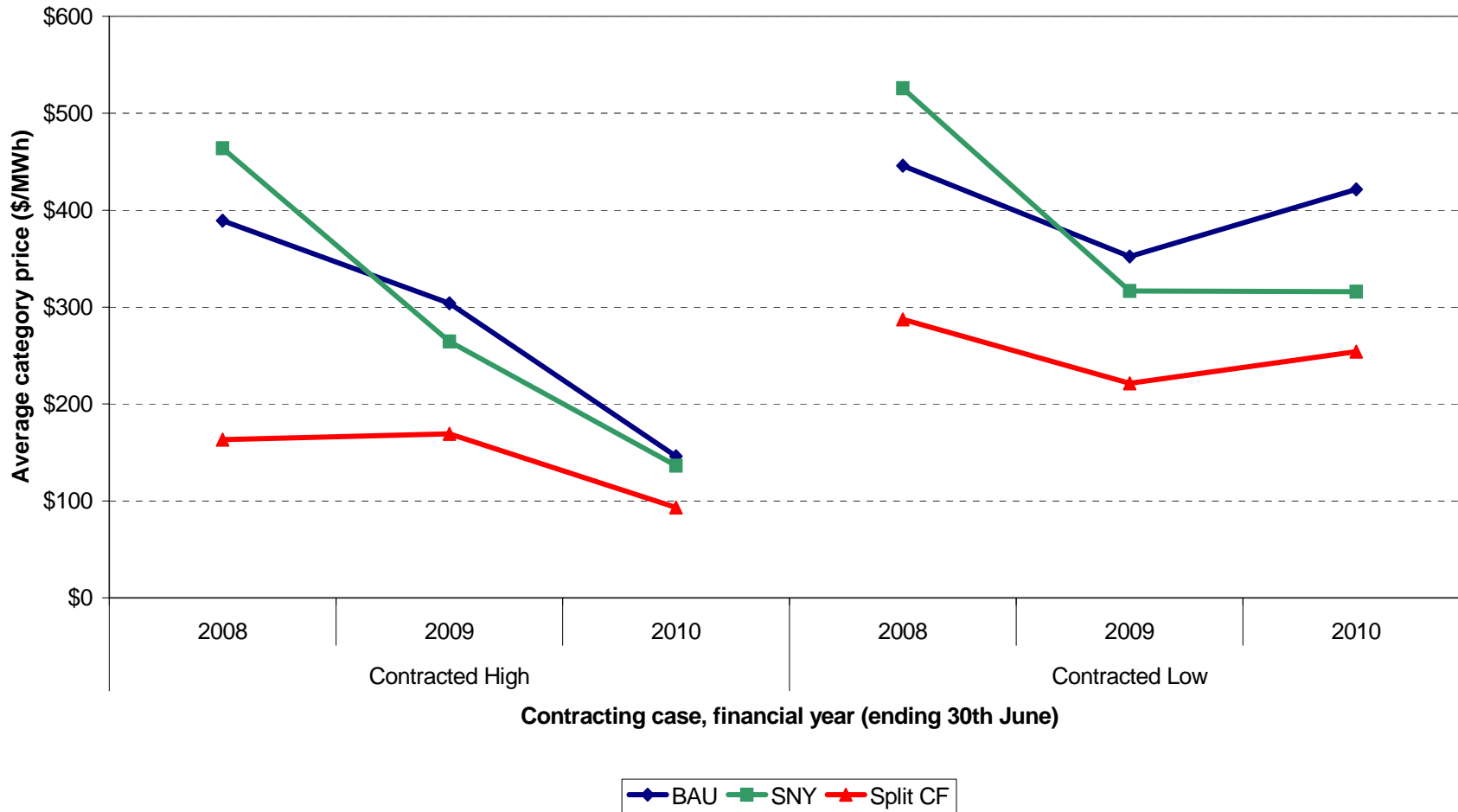


# Price results (1)

## **NSW annual prices generally fell in both contracting cases**

- Effect ranged from a few cents to \$5-10/MWh
- Key impact was during extreme peak summer and winter periods
- Vic price impacts smaller, but impact again driven by summer and winter extreme peaks

# Price results (3) – NSW summer peak prices



# Risk modelling (2)

**Risk modelling focuses on trading risk – indicated by change in variance of least risky trading position**

**The risk modelling provides a partial treatment of inter-regional trading risk**

- Modelling based on system normal conditions
- Does not factor in any unexpected (system ‘abnormal’) outages – which do affect participant decisions and are factored into assessment of risk
- Assumes that participants can accurately predict expected value of trades
- Assumes that participants can buy their desired IRSR units to achieve optimal trading position
- In portfolio optimisation framework if have access to additional risk management instrument(s), model will find greater efficiencies – this can be illusory

**Risk modelling is based on an inter-regional trading experiment**

- Examines the optimal trading position of a notional generator trading 100 MW from one region to another – NSW-> Vic, Vic->NSW, and Snowy -> both Vic and NSW
- Analysis based on prices, load, etc used in dispatch/price modelling
- Determines the level of risk associated with the Base Case and other options

# Risk modelling (3)

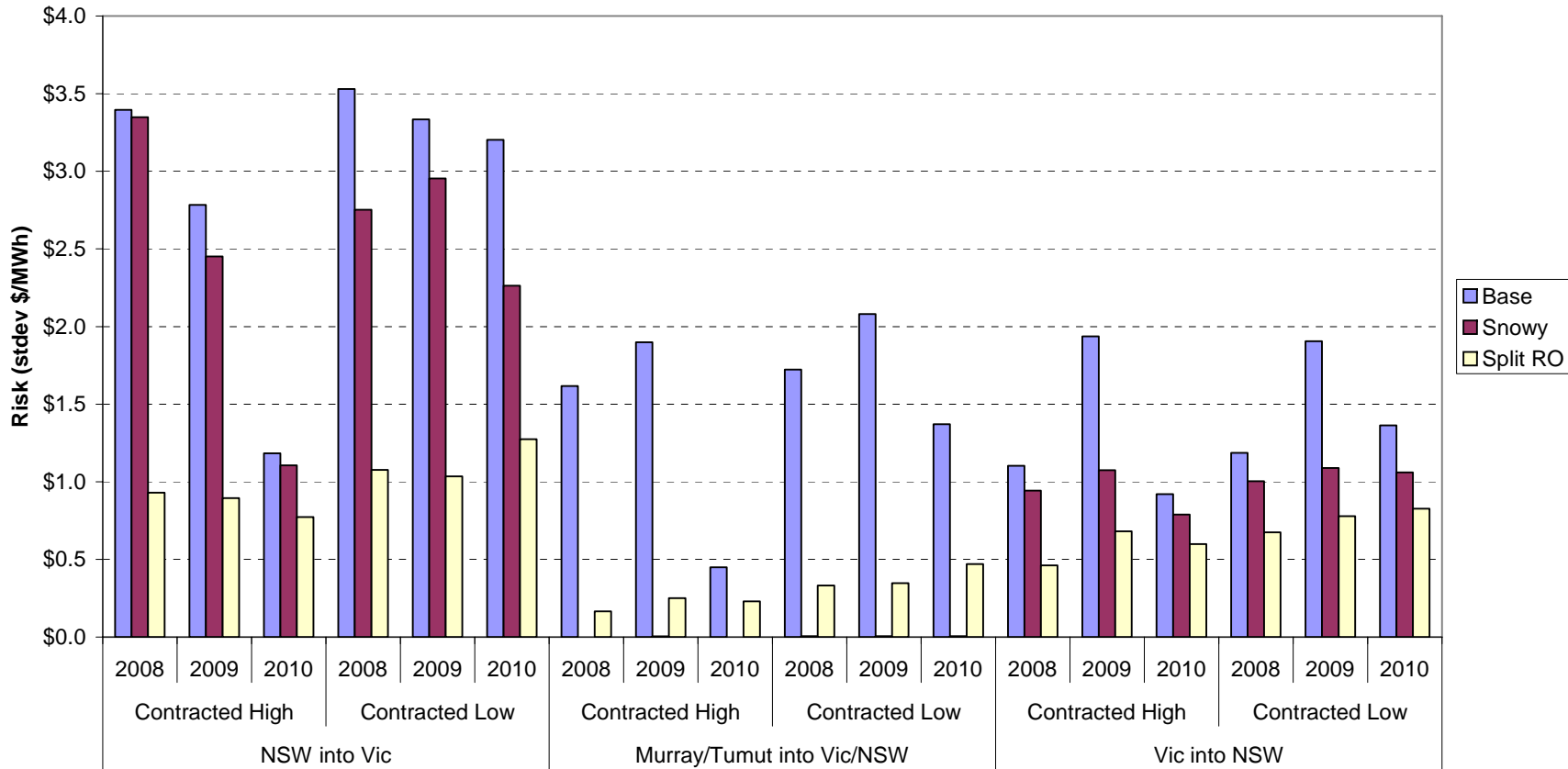
## Results showed that

- Snowy Hydro proposal and the SRO reduced the risk of a given inter-regional position compared with the Base Case (see next slide)
- Snowy Hydro proposal was more beneficial to Snowy Hydro;
- SRO was more beneficial to Vic and NSW generators

## Important limitations

- No consideration given to risks associated with ‘execution’ risks associated with securing combinations of IRSRs
- Recognise that it is possible to buy combinations of IRSRs, but this does not mean that this overcomes ‘execution’ risks – needs more thought if SRO was a proposal

# Risk modelling results





#### Disclaimer

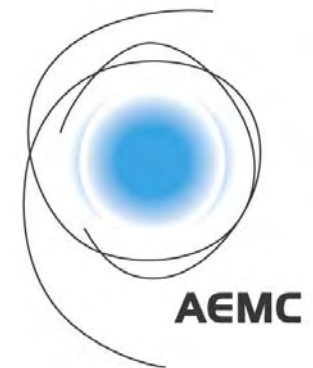
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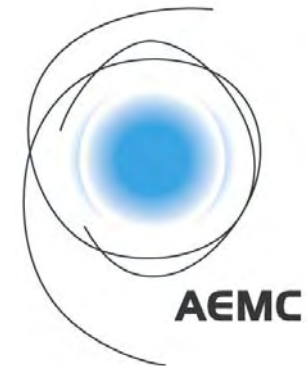


# Questions on Modelling



# Presentation from Snowy Hydro Ltd.

Roger Whitby  
Executive Officer, Trading





AEMC Forum  
Abolition of Snowy Region

22<sup>nd</sup> February 2007

# Welcomes the Draft Determination



- Snowy Region is inconsistent with market design since market start, and general consensus there is a significant problem
- There have been short term patches – CSP/CSC, reorientation, netting off: increasingly patches on patches
- Continued reliance on short term patches will not work
  - The patches are unsustainable going forward
  - Relying on patch on patch creates substantial regulatory uncertainty
  - The approach to Snowy is a large element of market design – one of six regions has a different approach to both spot market (pricing) and contract market (residues)

Abolition of the Snowy Region would result in efficiency improvements and is in the long term interest of consumers.

# Abolition of Snowy Region to be done ASAP



- Serious problems are evident with the current short term arrangements following the introduction of the Southern Generator's proposal:
  - Negative residues and NEMMCO intervention between SA and Victoria
  - Reduced inter-connector flows
  - Inefficient bidding behaviour (i.e. -\$1000) and inefficient prices
  - Serious mis-pricing in Latrobe Valley (>> Murray mis-pricing)
  - Increased complexity and uncertainty without ability to practically hedge

Implementation needs to be done  
before summer 2007/08.

# Advantages with Abolition of Snowy Region



- Abolition would result in a significant fix of all the problems:
  - Removes negative residues
  - Removes need for NEMMCO intervention
  - Introduces competitive discipline on all generators
  - Improves transparency and firmness. Inter-regional hedging will be:
    - Much firmer than at present
    - Much firmer than many other links
- Solution consistent with the MCE/CRA policy on transmission and regional market design
- Lays the foundation for further broad based reforms on regional structure and congestion management (if deemed appropriate)

More competitive and efficient outcomes.

# The Mac Gen Proposal is not Appropriate

- Materially disrupts the market
- Pre-empts real potential network upgrades that may remove congestion
- Increases the complexity of trading between Sydney and Melbourne
- Does not remove incentives for Tumut to withhold generation (reduces competition)
- Boundaries are technically incorrect. Located across network elements that can't normally constrain

Inadequate, unnecessary, and less competitive medium term solution.

## Other Issues

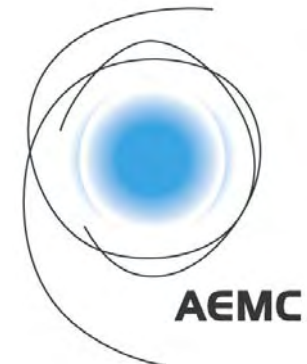
- Snowy Hydro will address in detail technical issues raised in Draft Determination
- Simple explanation for allocation of Jindabyne pumps and Guthega generation:
  - Jindabyne Pumps and Guthega generation are decoupled
  - Jindabyne pumps can be “supplied” only from Murray
  - Guthega can only effectively “supply” South East NSW
  - Closed “loop” formed by Guthega 132KV bus section isolator



# Presentation from Macquarie Generation

Russell Skelton

Manager, Marketing & Trading



# AEMC Consultation Forum

## Review of the Snowy Region boundary

Macquarie Generation's comments on

Draft Rule Determination

22 Feb 07

# General observations

- Detailed quantitative assessment of likely efficiency impacts of different boundary structures
- Modelling is forward looking and incorporates data and information not available to participants
- Game theory analysis of altered bidding and contracting incentives
- Good outcome

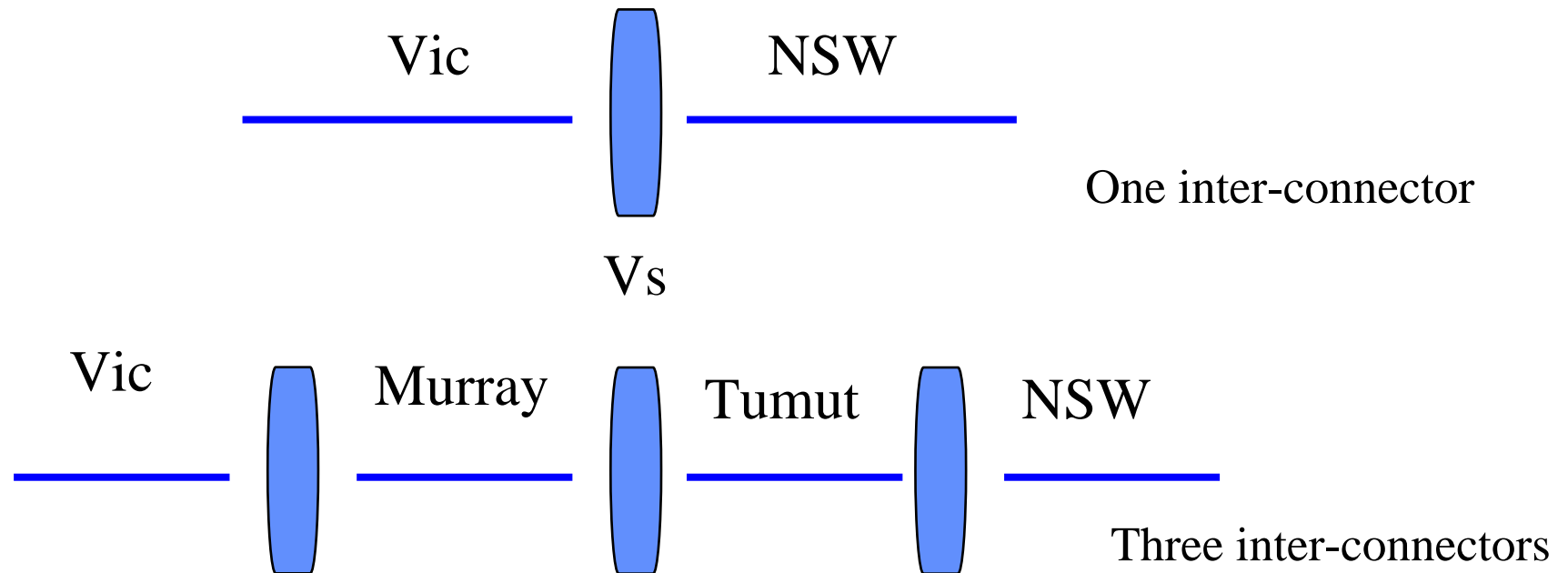
# Modelling results

- Modest efficiency improvements under each option
- Direction of results makes sense
- Differences between the options is small

# Mac Gen proposal

- The Split Region approximates the Mac Gen proposal
- Production efficiency differences unlikely to be significant
- Key question remaining:
  - Impact of options on inter-regional trade

# Inter-regional trade – key issue



Key question – risks vs transaction costs

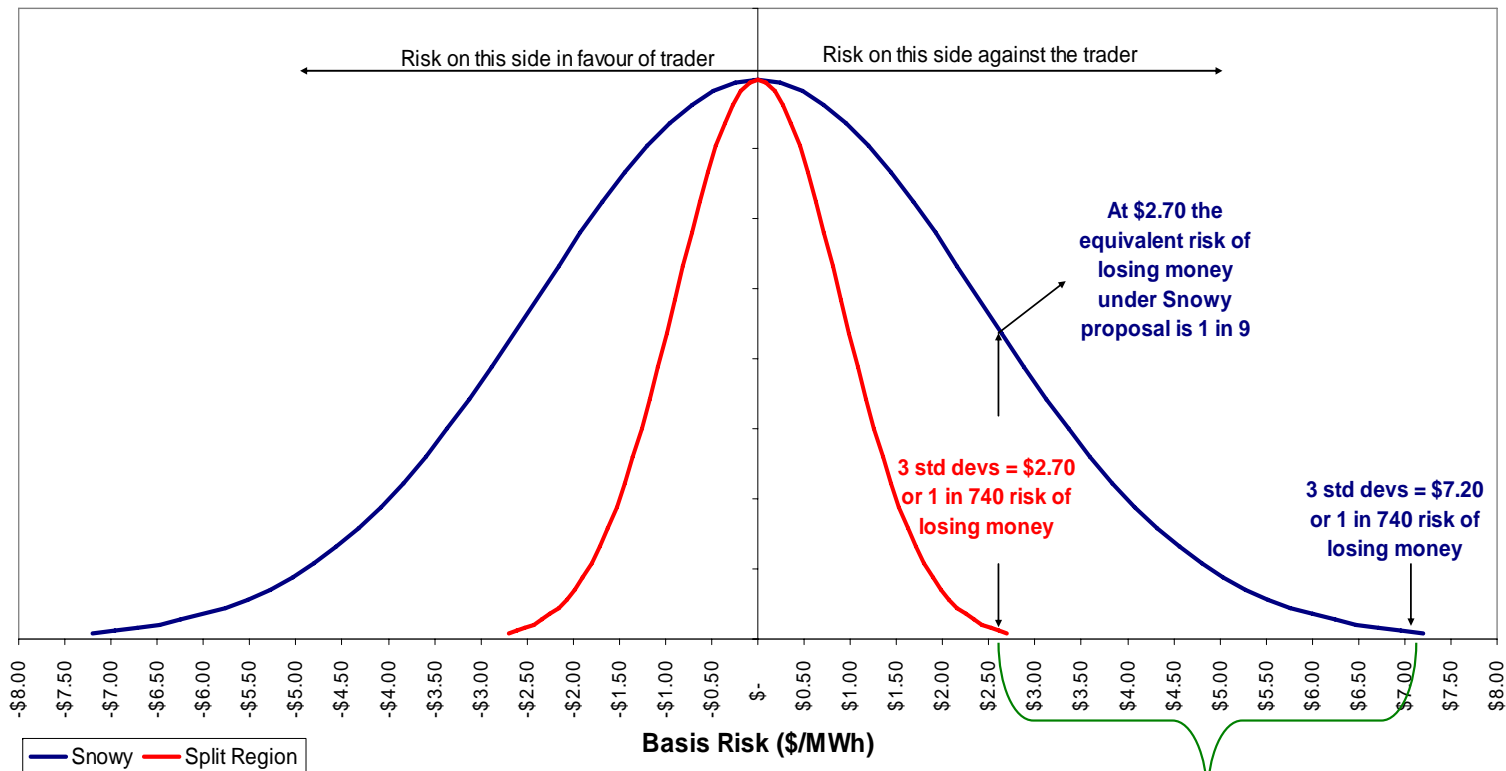
Modelling indicates significant difference in risks

# Inter-regional price risk

## Inter-regional Risk - NSW into Vic

Snowy Proposal Std Dev = \$2.50/MWh

Split Region Std Dev = \$0.90/MWh



For same level of risk, inter-regional trading occurs at a much lower basis risk under Split Region proposal

# Additional modelling

- Assumptions must be limited to make task manageable
- But, three other plausible scenarios worth consideration
  - Strategic bidding of Victorian gas plant
  - Snowy contracting more than its physical capacity in aggregate
  - Non-perfect clamping of the Vic-Snowy inter-connector
- These may better differentiate between options considered



# Conclusions

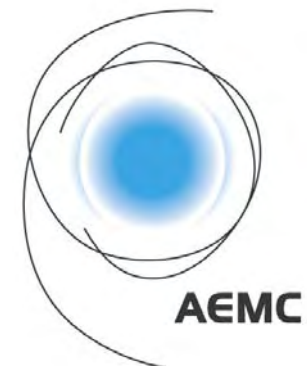
- Snowy Region needs a long term solution – support the removal of the partial fixes
- Efficiency benefits from the boundary change are relatively small - price effects are material
- Prospects of further regional boundary changes limited
- Significant efficiency improvements from changes to congestion management regime overstated

# Presentation from “Southern Generators”

Roger Oakley

Manager, Market Development

LYMMCO



# Inter-regional Hedging

Trading Risks and Transaction Costs under  
alternative regional boundaries

**Southern Generators**

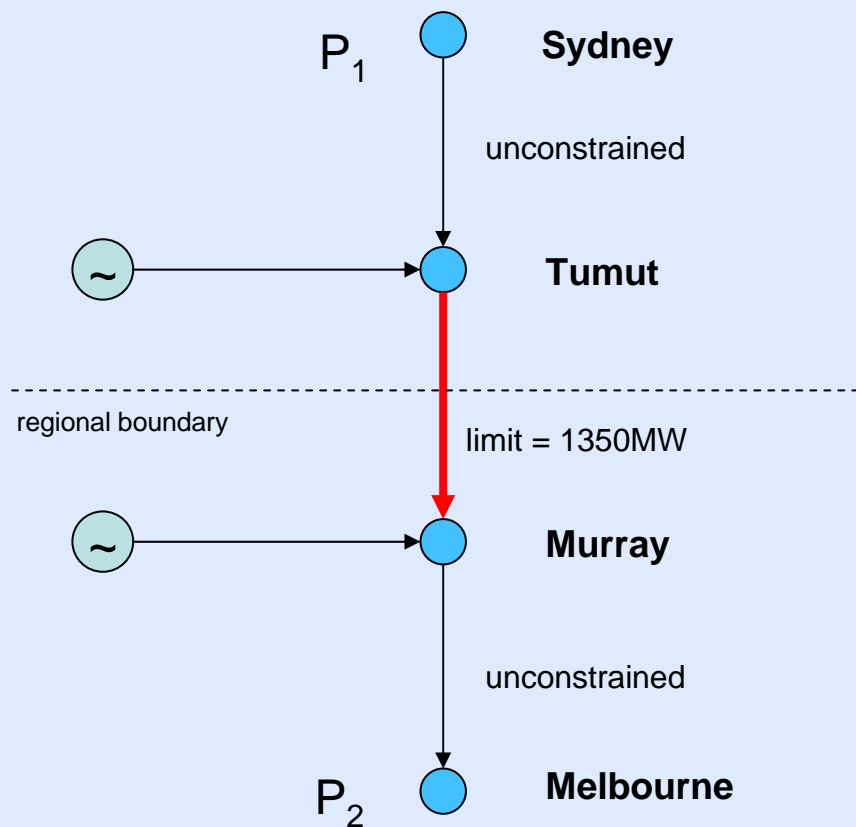
# Our concerns with the Draft Determination

- process concerns:
  - the lessons of the Snowy Trial are ignored:
  - “Business as Usual” isn’t business as usual:
  - region change is not rule change
  - what is the hurry?
- factual errors
  - Snowy abolition improves dispatch efficiency? No. Split region is better (P39)
  - Snowy abolition reduces prices? No. Split region is better (PP51-53)
  - Snowy abolition reduces inter-regional trading risks? No. Split region is better (P60)
- at odds with consultants analysis:
  - neither of its consultants (Frontier and Darryl Biggar) appear to support its determination
- In the next 15 minutes we limit our discussion to:
  - firmness of SRA instruments; and
  - transaction costs of inter-regional trading

# Key Points of Presentation

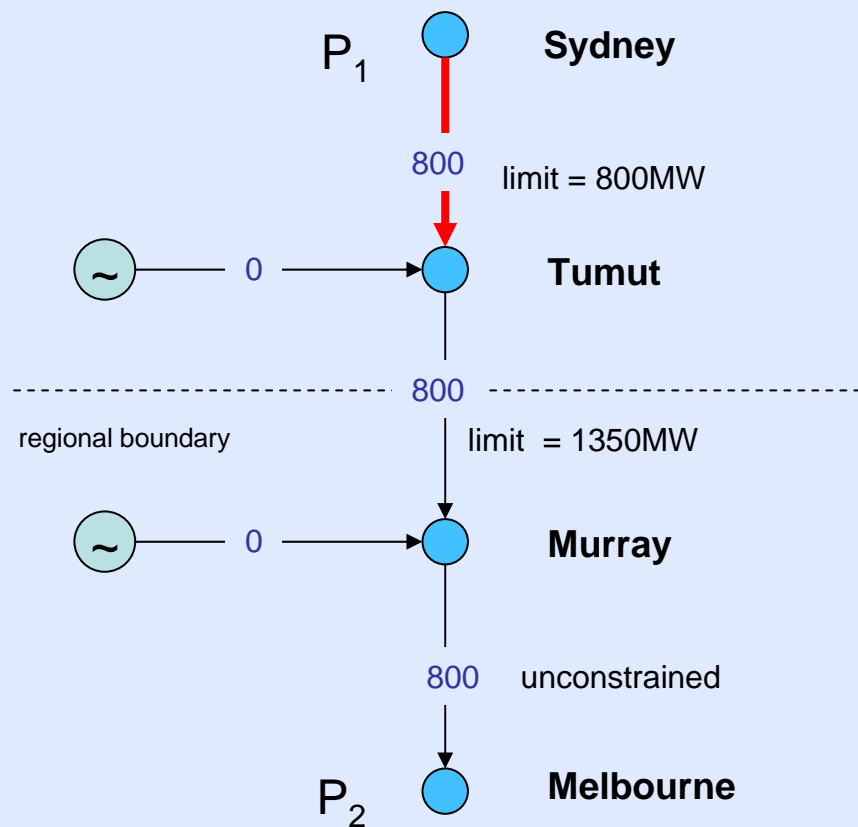
- there are three material congestion locations between Sydney and Melbourne, not one
- to firm up SRA instruments, we need three interconnectors (ie split region option) not one (Snowy abolition)
- a strip of 3 SRAs can be purchased in the auction as easily as a single SRA: three interconnectors does not imply higher transaction costs

# Single interconnector – single constraint



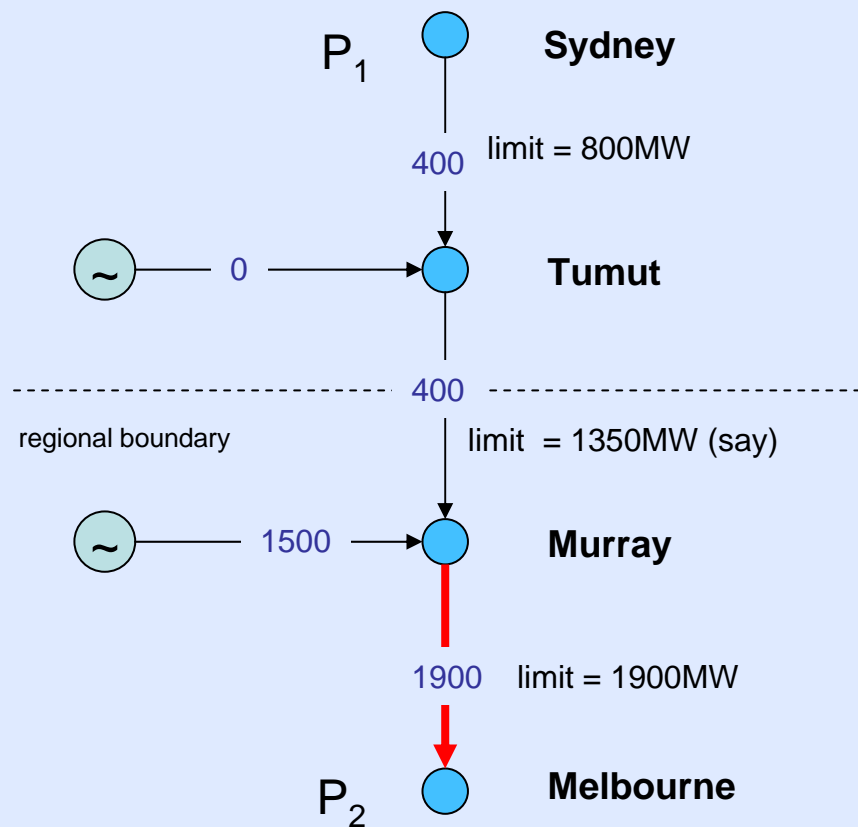
- prices diverge only when interconnector flow=1350MW
- therefore,  $IRSR=1350*(P_2-P_1)$
- NEMMCO issues 1350 SRA units
- each unit provide a firm **1MW** of IRH

# Single interconnector – second constraint



- prices can now diverge with interconnector flow as low as 800MW
- in this case,  $IRSR=800*(P_2-P_1)$
- each SRA unit now hedges only **0.6MW**
- depending upon Tumut output, so 1 SRA unit may hedge anywhere between 0.6 MW and 1MW

# Single interconnector – third constraint

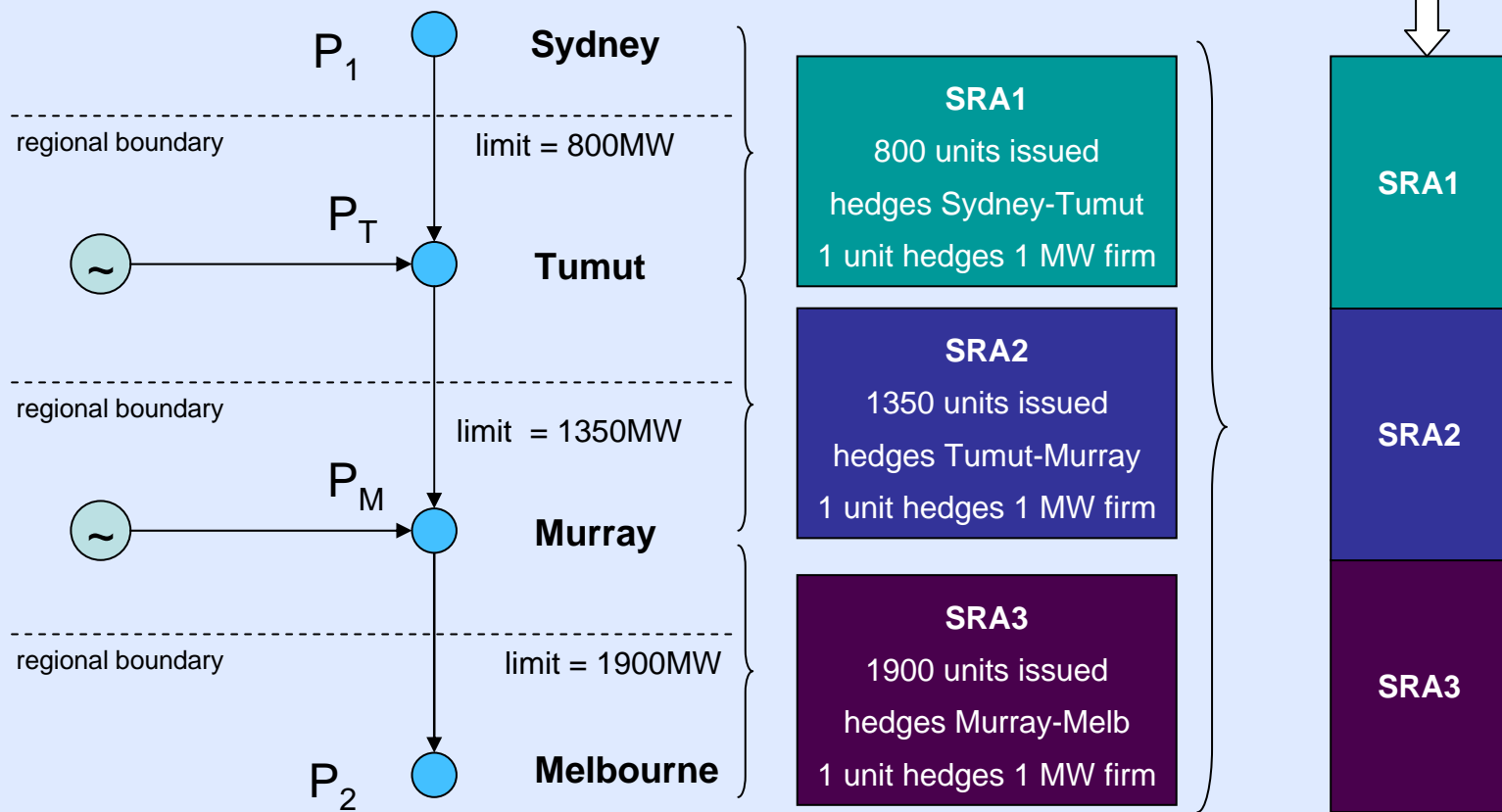


- prices can now diverge with interconnector flow as low as 400MW
- in this case,  $IRSR=400*(P_2-P_1)$
- each SRA unit now hedges only **0.3MW**
- depending on Murray output, 1 SRA unit may hedge anywhere between 0.3 MW and 1MW

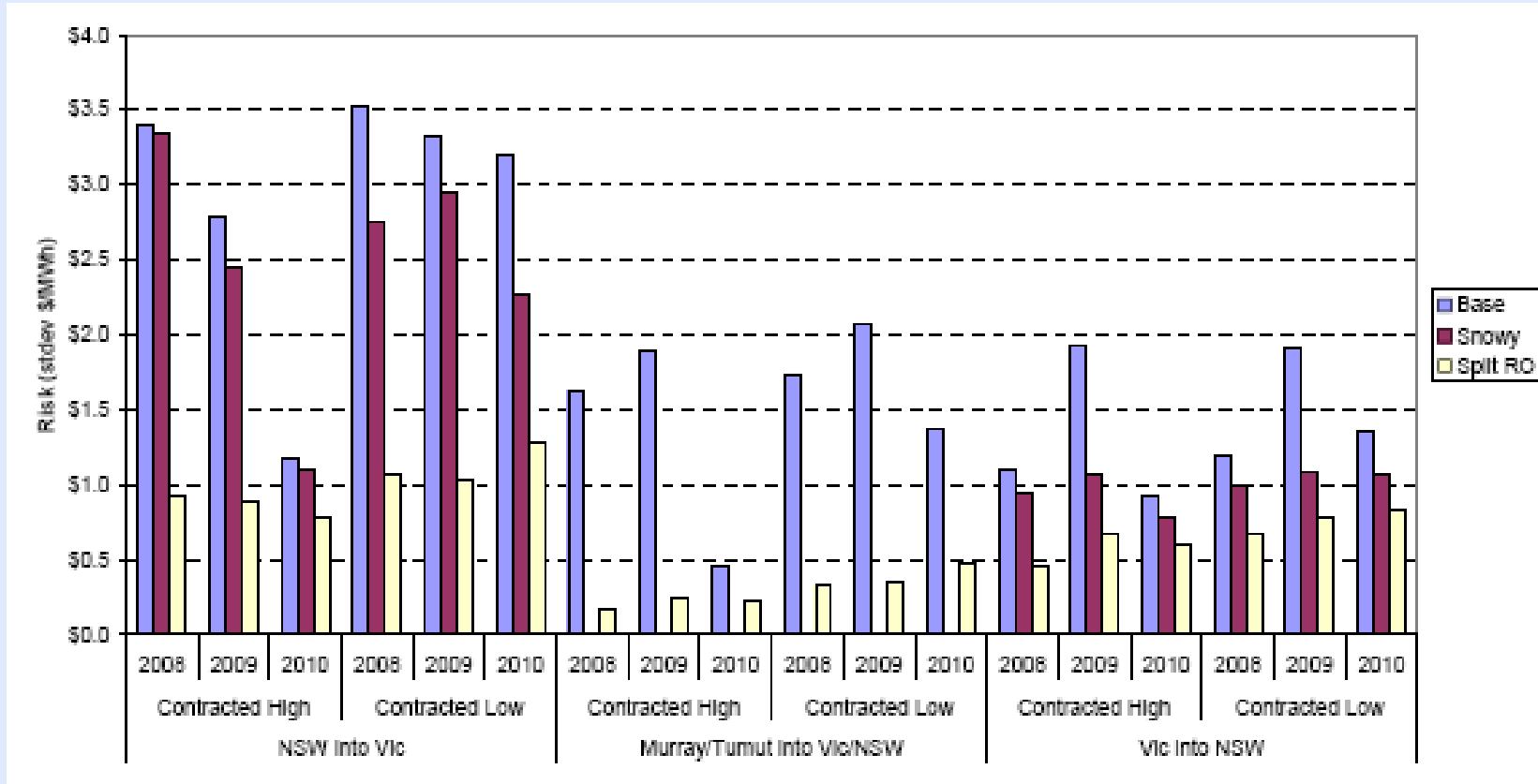


# Three constraints, three interconnectors

A strip of 3 SRAs provides a firm Sydney-Melbourne IRH



# Inter-regional Risk Results



source: Draft Rule Determination – Abolition of Snowy Region, P60

# Buying a strip of SRAs: Execution Risk

- to purchase a strip of SRAs, a bidder simply places a single *linked bid*: eg for Q units of each of the three SRA instruments at a bid price P
- depending upon clearing prices, bidder either receives a strip of Q units – at a price less than P - or receives nothing
- many bidders do this already with current regions (for a strip of two SRAs) without trouble
- execution cost and risk same as for single interconnector or two interconnectors
- AEMC is incorrect in the draft determination to say that execution costs/risks increase

# Buying a strip of SRAs: Pricing Complexity

- whether one, two or three interconnectors, a bidder just needs to decide what maximum price to pay for an SRA strip
- doesn't need to worry about pricing of individual components, just needs to analyse price differential between Sydney and Melbourne
- this is the case whether there are one, two or three interconnectors
- again, AEMC is incorrect in draft determination to say that pricing complexity increases

# Conclusions

- 3 interconnectors (“split region”) provide firmer hedging through SRA than a single interconnector (“Snowy abolition”)
- AEMC’s modelling in the draft determination shows “split region” gives lowest trading risks
- AEMC rejection of “split region” because of supposed higher transaction costs is factually incorrect because it ignores the SRA “linked bidding” facility

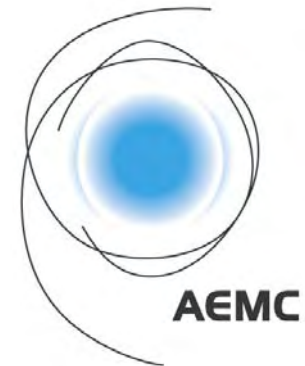
# Where does this leave us?

- if alternative CM mechanisms did not exist, the “split region” option would best support inter-regional trading – not Snowy abolition!
- but they **do** exist, and work to date (CRA report, Snowy trial, Darryl Biggar etc) suggests they may be effective – as a substitute for, or complementary, with region change;
- what is the best combination of region change, CSPs, etc? We don't know the answer (we are *not* arguing here for more regions) and neither does the AEMC until the CM review is complete;
- so, any region change decision now is as likely to be wrong as right;
- what's the hurry? Let's keep the current arrangement running until we better understand *all* of the potential congestion management solutions.

# Presentation from Origin Energy

Con van Kemenade

Manager, Regulatory Strategy





## Abolition of the Snowy Region - Origin's view

Con van Kemenade  
Regulatory Strategy Manager



# Interregional trading risk is of critical importance to retailers

- Origin has a geographically disperse portfolio which includes generation and retail load spread across the NEM.
- It is therefore critical for us that inter-regional trading risk is minimised
- We believe the abolition of the Snowy region facilitates this outcome, by reducing basis risk, improving dispatch efficiency and increasing competition in both contract and spot markets

# Having one generation participant in its own region with no demand makes no sense!

- Fact of the matter is you have almost 4000 MW of generation owned by one participant in its own region. This makes no sense because it creates incentives for manipulating price and causes unnecessary additional basis risk
- We consider a regional structure defined by the NEM states is best for maximising the stability and predictability of market prices and thereby a competitive retail and generation market.

# Dispatch efficiency is generally improved with the region boundary change

- The removal of the snowy region means price signals reflecting the Murray-Tumut constraint are significantly improved.
- Snowy Hydro will have less ability & incentive to manipulate VIC and NSW price, compared with the price in its own region.
- Additional supply competition in both the spot and contract markets in NSW and VIC will bring bids from all generation closer to cost and lead to price convergence

# Is a Vic price for Murray generation a problem?

- It is inappropriate to argue on a stand alone basis that Murray generation should retain its nodal price when other generators in a regional market do not.
- Nodal pricing has been rejected as a matter of policy; we operate in a regional market because the complexity and risk associated with nodal pricing are considered to outweigh its benefits.
- As with most things in economics and policy, we believe there is an important trade-off that needs to be considered. In this case, the trade-off between dispatch efficiency and the effectiveness of the contract market.

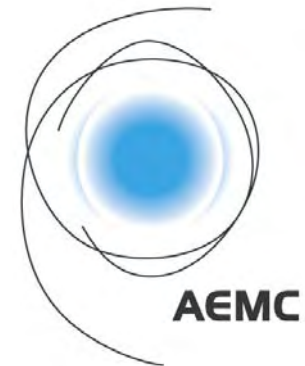
## But..we agree there is an issue of competitive neutrality to be addressed!

- Our view is that fewer market reference prices are better than more as this facilitates a competitive and liquid contract market, which is good for investment and competition
- However, we recognise that competition between generators can break down within regions as a consequence of persistent intra-regional constraints.
- To the extent this becomes a serious problem it needs to be addressed. A mix of investment and CSP/CSC can resolve inconsistent price signals and restore competitive neutrality.... but this is an issue for the congestion management review

# Presentation from Westpac Global Energy

David Waterworth

Manager, Market Analytics



## Presentation to AEMC

### Consultation Forum on Draft Rule Determination of Abolition of Snowy Region

**David Waterworth – Westpac Global Energy**

**22 February 2007**



# Physical Limits between NSW and VIC

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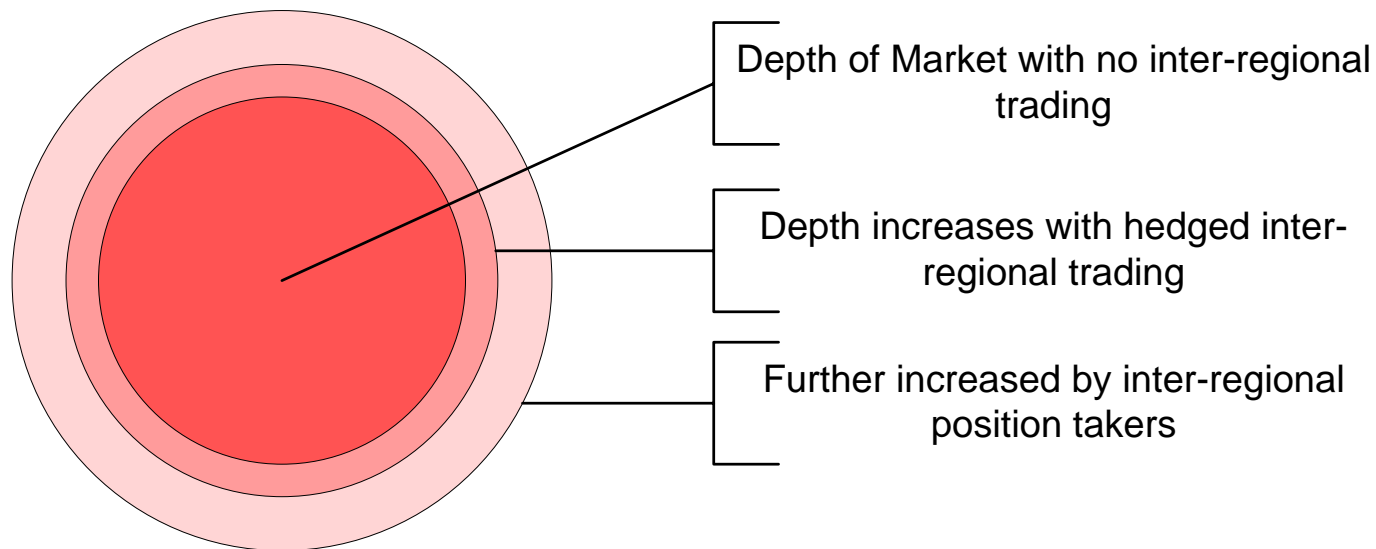
- Cutset 1: NSW Import/Export
  - Tumut PS
  - NSW Generators
  
- Cutset 2: Snowy Loop Flow
  - Murray PS
  
- Cutset 3: VIC Import/Export
  - Latrobe Generators
  - Other Victorian Generators
  - Basslink
  - Murraylink
  - Murray PS



## Inter-Regional Derivative Trading

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- Increases depth of market when participants take hedged or (partially) unhedged positions in other regions



## Efficient Markets

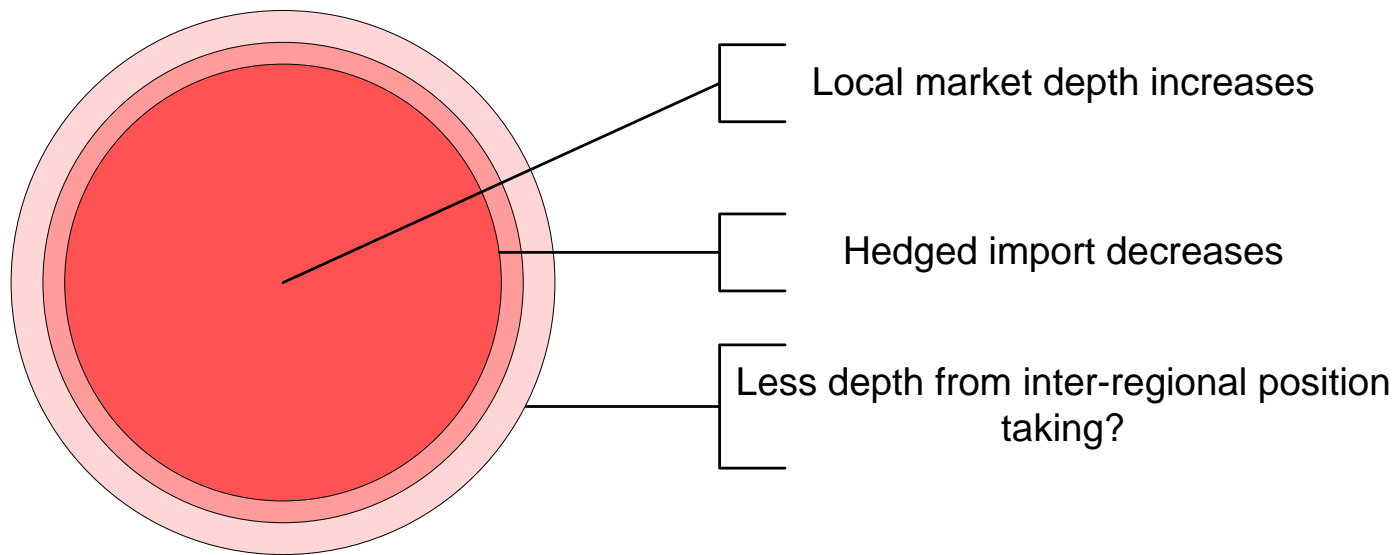
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- The strongest 'efficient market' form is all traders acting on the same (public) information
- This requires that generators treat price as an 'exogenous' variable when dispatching
- Gatekeepers are responding in this manner but their actions may exclude others

## Likely Effect of Gatekeepers on Market Depth

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- Difficult to quantify



## Risk Management

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- Information contained in derivative prices can be extracted to quantify risk
- But available transfer capacity not signalled by SRA prices
  - If the gatekeeper is allowed to participate
  - If the gatekeeper is excluded
- Inability to quantify risk translates means it will be avoided (no-one has to take on inter-regional risk other than SHL)

## AEMC Modelling

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- Beware of drawing conclusions due to model price convergence
- More competition in NSW and VIC means prices on average should converge
- But there must be a relationship (i.e. correlation) or there is no inter-regional trade

# Problems with other Proposals

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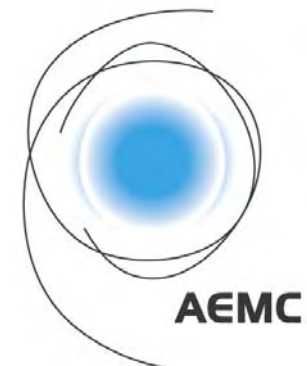
- No scheme prevents negative residue
- The CSP scheme does not provide a mechanism to allocate residue between multiple interconnectors
- The Southern Generators scheme allocates between (specific) multiple interconnectors in a somewhat arbitrary manner
- The Snowy loop isn't the predominant issue
- There are concerns regarding VIC import/export limits which are not addressed

# Westpac's Position

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- No option under consideration fully address the firmness of inter-regional trade between NSW and VIC
- The Snowy region is not the only location where congestion management is required.
- The Snowy proposal addresses the loop flow issue to some degree but for south flow the MPS to DDTs constraint becomes significant
- The problem will persist until an effective congestion management regime is put in place and applied globally
- An effective congestion management scheme would replicate the highly successful NEM hub and spoke model

# Open Discussion and Questions from the Floor

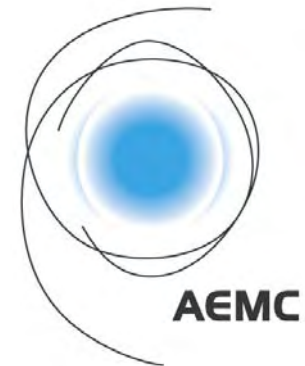




# Closing Remarks

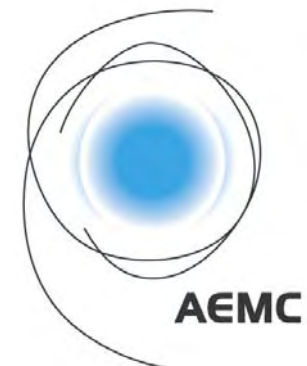
John Tamblyn

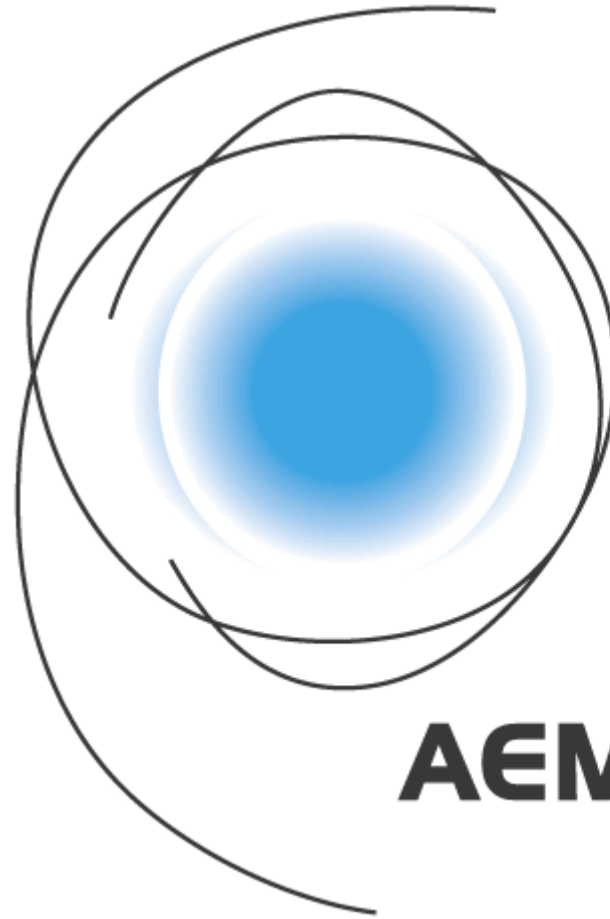
Chairman



# Submissions Close on 9 March 2007

[submissions@aemc.gov.au](mailto:submissions@aemc.gov.au)





**AEMC**