Comprehensive Reliability Review

AEMC Stakeholder Forum
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Emphasis of our submission

- **Thus far, reliability in the NEM has been acceptable**
- **This is not surprising, the NEM inherited an oversupplied (utility built) plant stock at inception**
- **But NEM oversupply has almost cleared**
- **Energy-only markets are inherently unstable and do not have a defined equilibrium**
- **Consequently, peaking plant is not entering on a timely basis**
- **If this persists, reliability will suffer, and intervention becomes a predictable outcome**
- **But the form of intervention is unpredictable, which is not good for product trade or investment**
- **Solution: lower VoLL, administratively set a reserve margin, and introduce a capacity payment pool to ensure the reserve is delivered.**

1998 NEM Supply-side Structure

- **The plant stock at the start of the NEM was *overweight* base plant and *underweight* peaking plant.**

NEM 1997/98	Optimal (MW)	Actual (MW)	Portfolio balance (MW)
Baseload	20,400	24,500	4,100 *overweight*
Intermediate	2,000	2,100	100 *overweight*
Peaking	8,100	6,600	-1,500 *underweight*
Total	30,500	33,200	2,700 *oversupplied*

Value of the structural fault: $ 5.1 billion (13%)
Value of the asset portfolio: $43.9 billion

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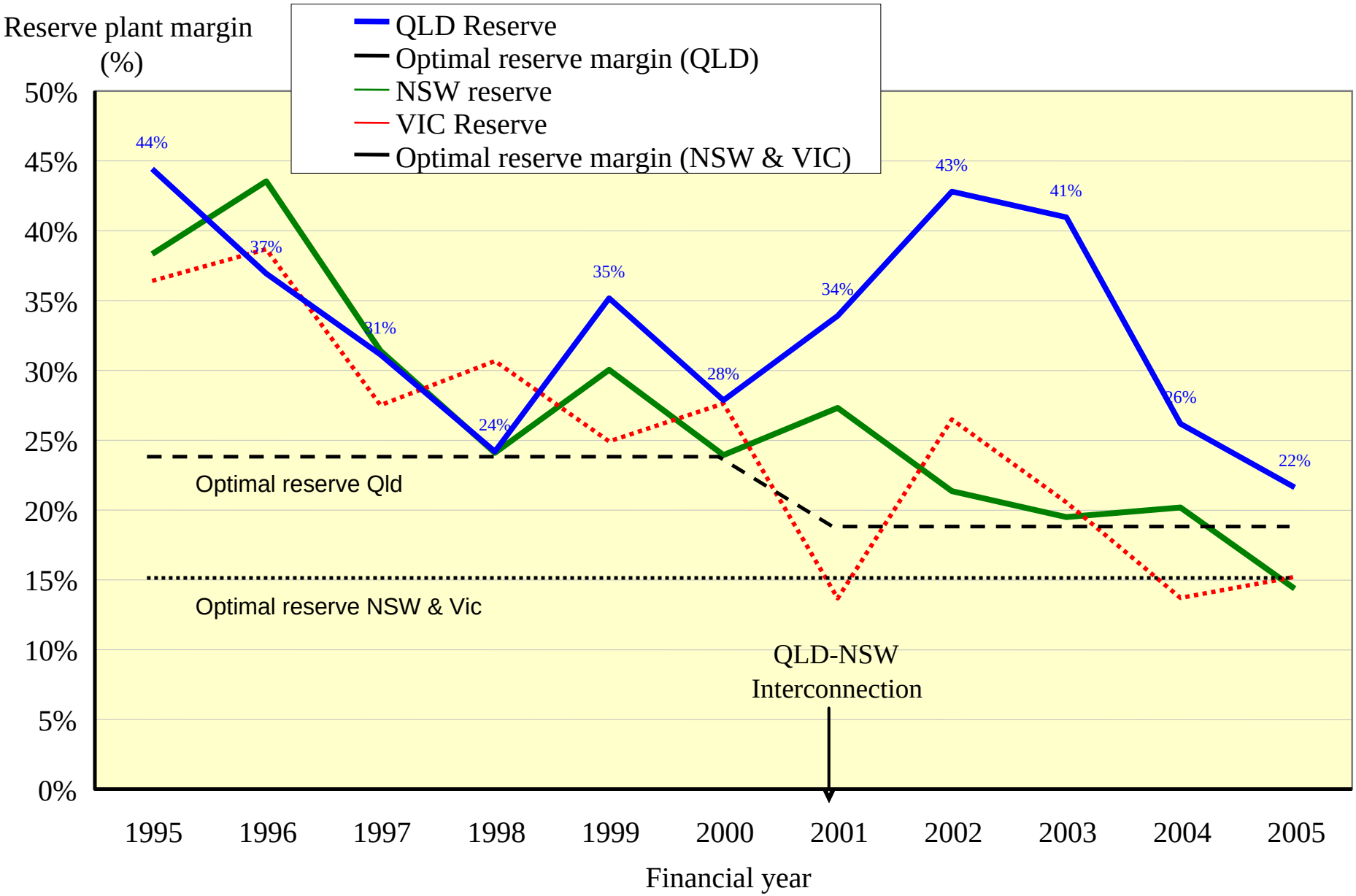
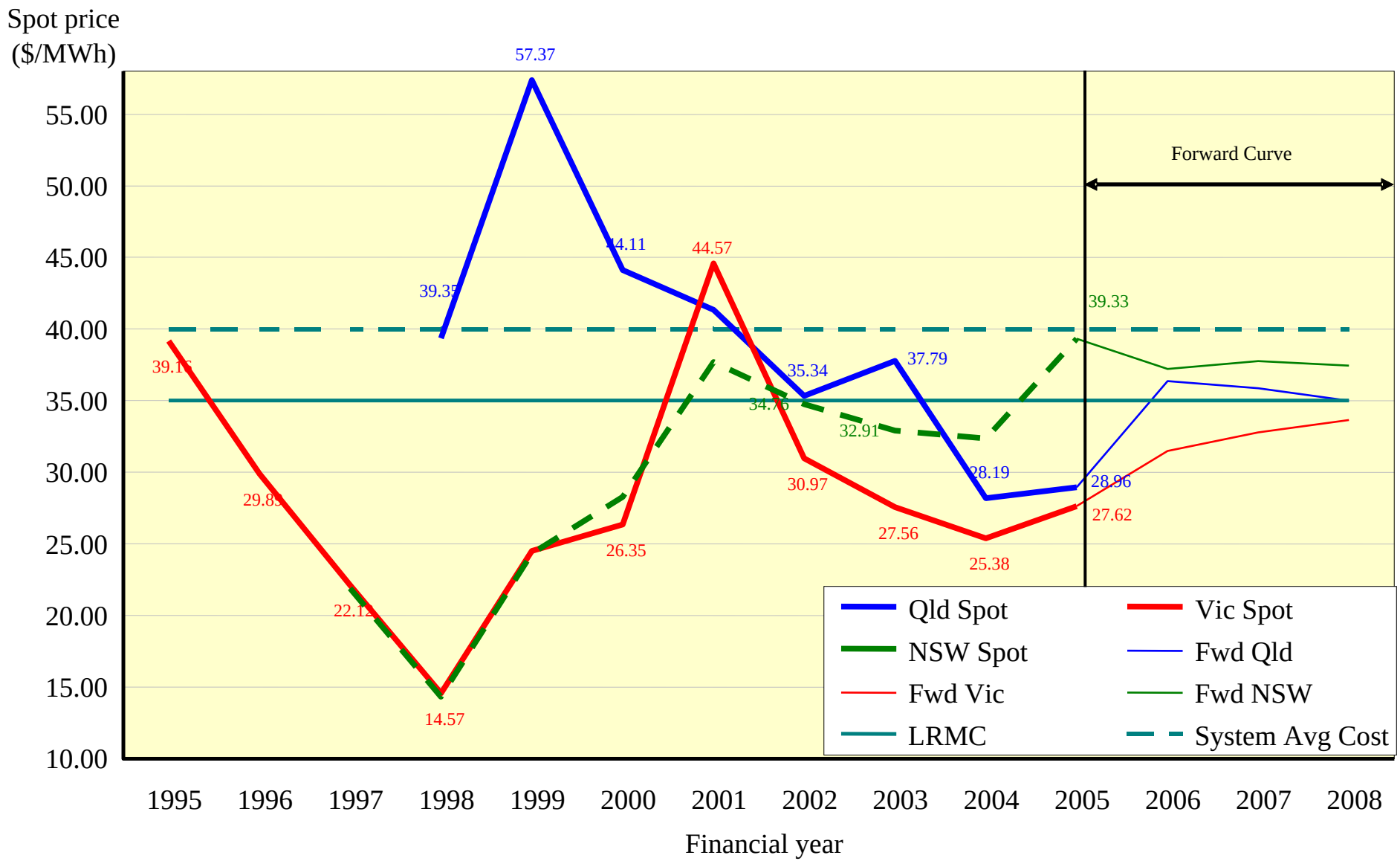
Since the reforms, oversupply has cleared



But at 2004/05, prices didn't reflect this...



2004/05 NEM Supply-side Structure

- **At the aggregate level, oversupply has cleared quite significantly. But structurally, the situation is much worse. Where is the peaking plant?**

NEM 2004/05	Optimal (MW)	Actual (MW)	Portfolio balance (MW)
Baseload	23,300	26,700	3,400 *overweight*
Intermediate	2,300	3,200	900 *overweight*
Peaking	11,900	8,000	-3,900 *underweight*
Total	37,500	37,900	400 *oversupplied*

Value of the structural fault: $ 3.1 billion (7%)
Value of the asset portfolio: $49.4 billion

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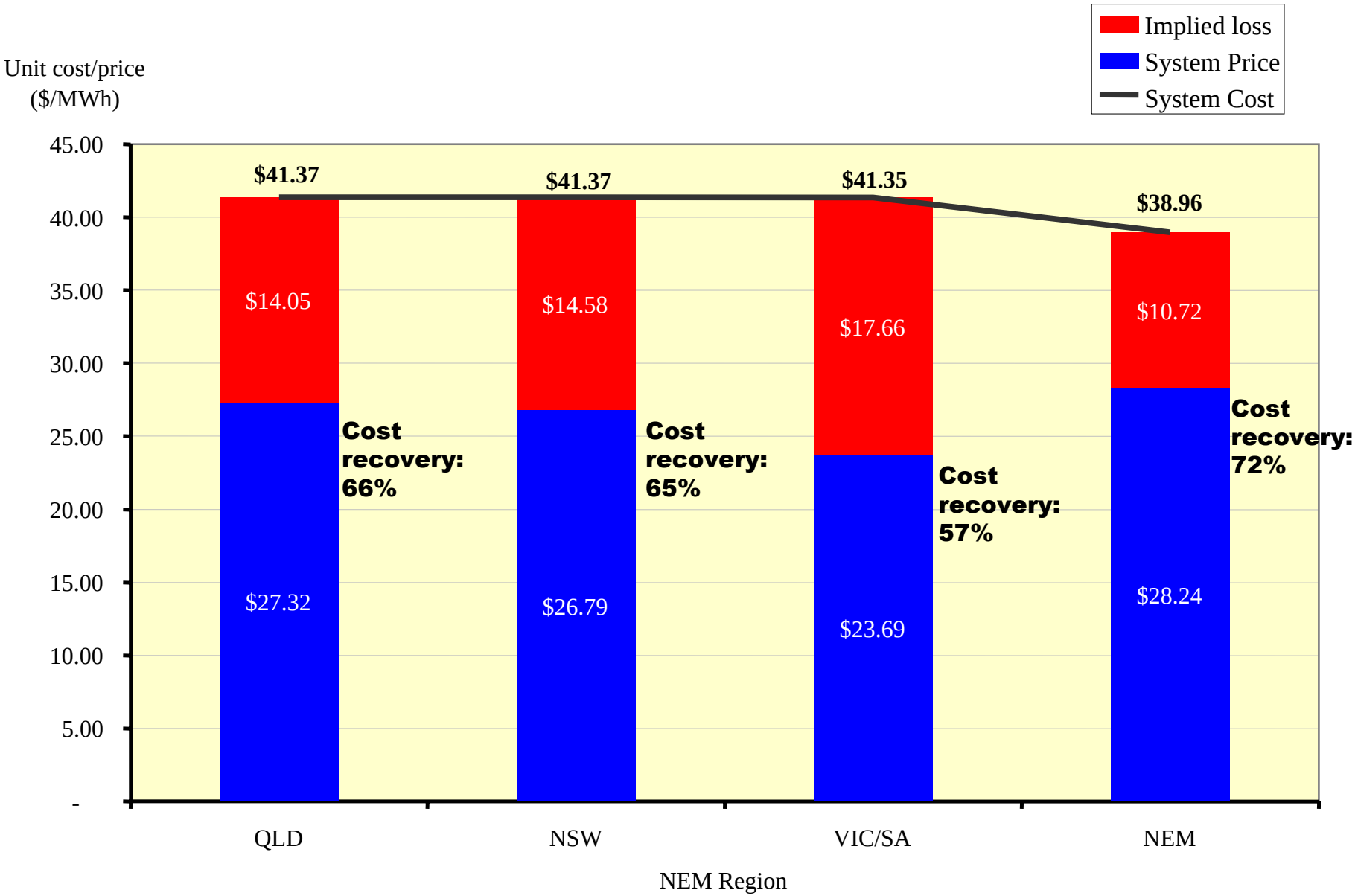
Hazardous Revenues

- **In an energy-only market, peaking plant revenue is especially hazardous, and therefore merchant profitability is manifestly random**
- **Peak plant requires a continuous revenue stream of around $10-$11/MWh, whereas Option Prices fluctuate between $4-$20**
- **Compare this to base plant ($35/MWh) where swap prices fluctuate between $30-$40**
- **Little wonder that banks don't view peaking plant as *a dripping roast***
- **Banks want to see long-term contracts. But with FRC, long-dated contracts are hard to find**

Energy-only Markets are Inherently Unstable…

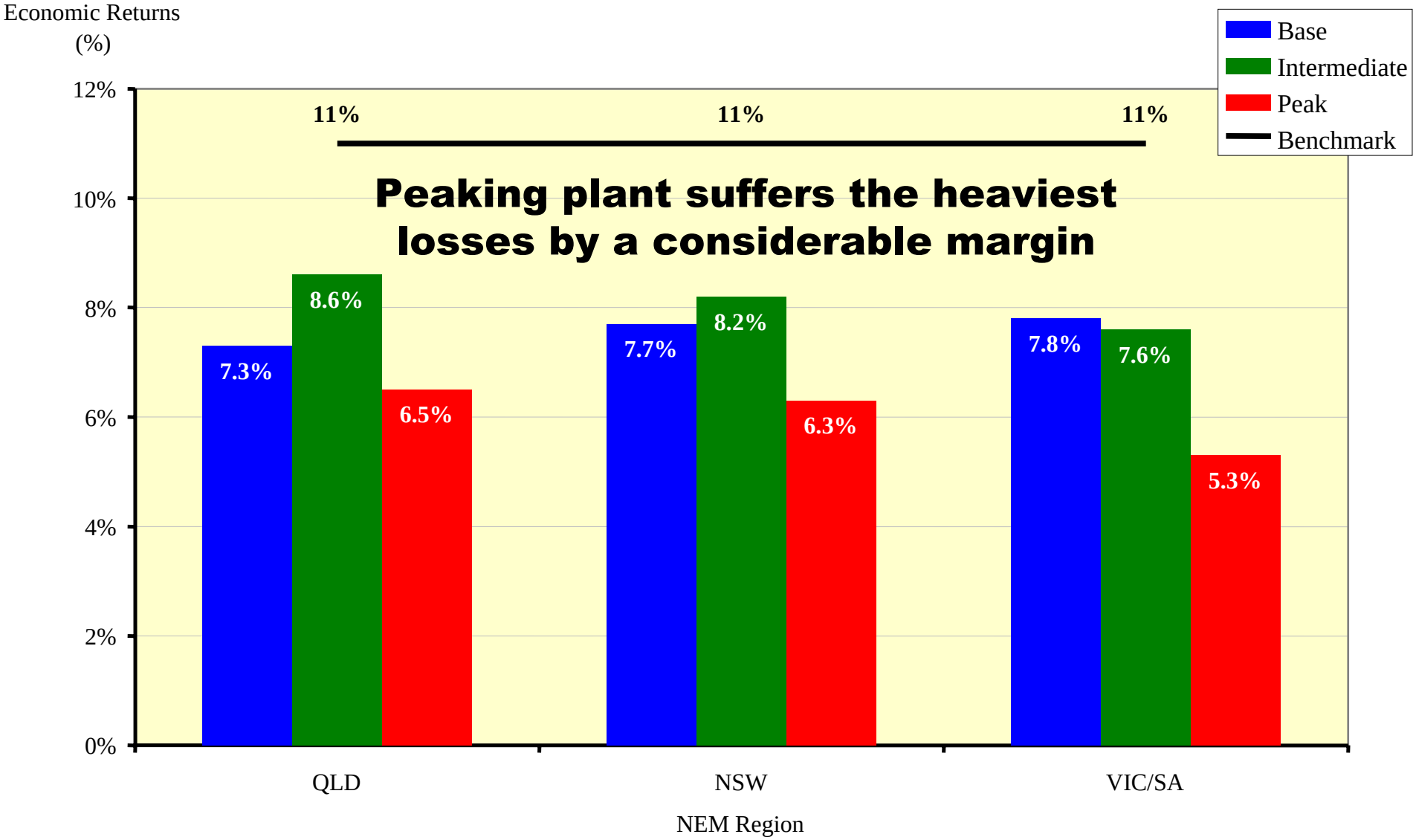
- **It has long been accepted that SRMC bidding does not lead to the recovery of reasonable costs where a reliability constraint exists**
- **To see why this is the case, consider the scenario of the perfectly optimal mix of plant, a competitive market, VoLL of $10,000 and a reliability constraint in Qld, NSW & Vic/SA**

System Cost v Competitive Price



Actual v Benchmark Returns

(with an optimal plant stock)



THIS EXPLAINS WHY PEAKING PLANT HAS SLIPPED FROM LAST PLACE

(underweight 1500MW in 1997/98)

TO VERY LAST PLACE

(underweight 3900MW in 2004/05)

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Energy-only Markets

- **Dynamic system modeling demonstrates that a competitive energy-only market with a reliability constraint:**
  - **Does not remunerate any technology adequately**
  - **Does not have a definable equilibrium under growth conditions (with perfect plant mix let alone deviations)**
  - **Is therefore an inherently unstable market**
- **The manner in which plant have thus far achieved remunerative pricing is through the transient exercise of market power (which is considered 'Bad VoLL' by stakeholders).**
- **There are two alternatives:**
  - **Raise VoLL to levels dramatically higher than $10,000 ('Bad VoLL' - intolerable risk to all Participants)**
  - **Allow system reliability to deteriorate by a factor of 2½+ times the current reliability criteria ('Good VoLL' but intolerable situation to Consumers & Government)**

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Inherently Unstable?

- **So, why has the NEM not experienced a melt-down?**
- **There are four reasons:**
  - **The NEM inherited an exceptional (and grossly oversupplied) monopoly plant stock at inception – but this has now largely cleared**
  - **Queensland delayed the impact via an *excess entry result* between 1998 - 2001, and again in 2003 – 2004**
  - **The regions have been lucky with weather – recent extreme weather events have tended hit non-work days (e.g. NSW on New Years Day)**
  - **Market power has been exercised (but invariably attracts substantial regulatory and political attention and is therefore not sustainable either – for example, the re-bidding witch-hunt)**

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THE SOLUTION?

Shift to an energy and capacity market

and reduce VoLL from $10,000 to $2,000

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Capacity Market

1. **Introduce a Capacity Payment Pool, with payments equivalent to the carrying cost of an OCGT ≈ $10.70 per MW per hr (i.e. Fixed capital and operating cost of a highly efficient OCGT Plant).**
2. **Administratively determine the Reserve Plant Margin required for a region (e.g. Vic/SA: 17%)**
3. **Create a Capacity Payment Pool, multiply optimal plant capacity by OCGT carrying cost, and pay to generators based on availability**
4. **Reduce VoLL from $10,000 to $2,000**
5. **Maintain all other aspects of the NEM Gross Pool Model…**

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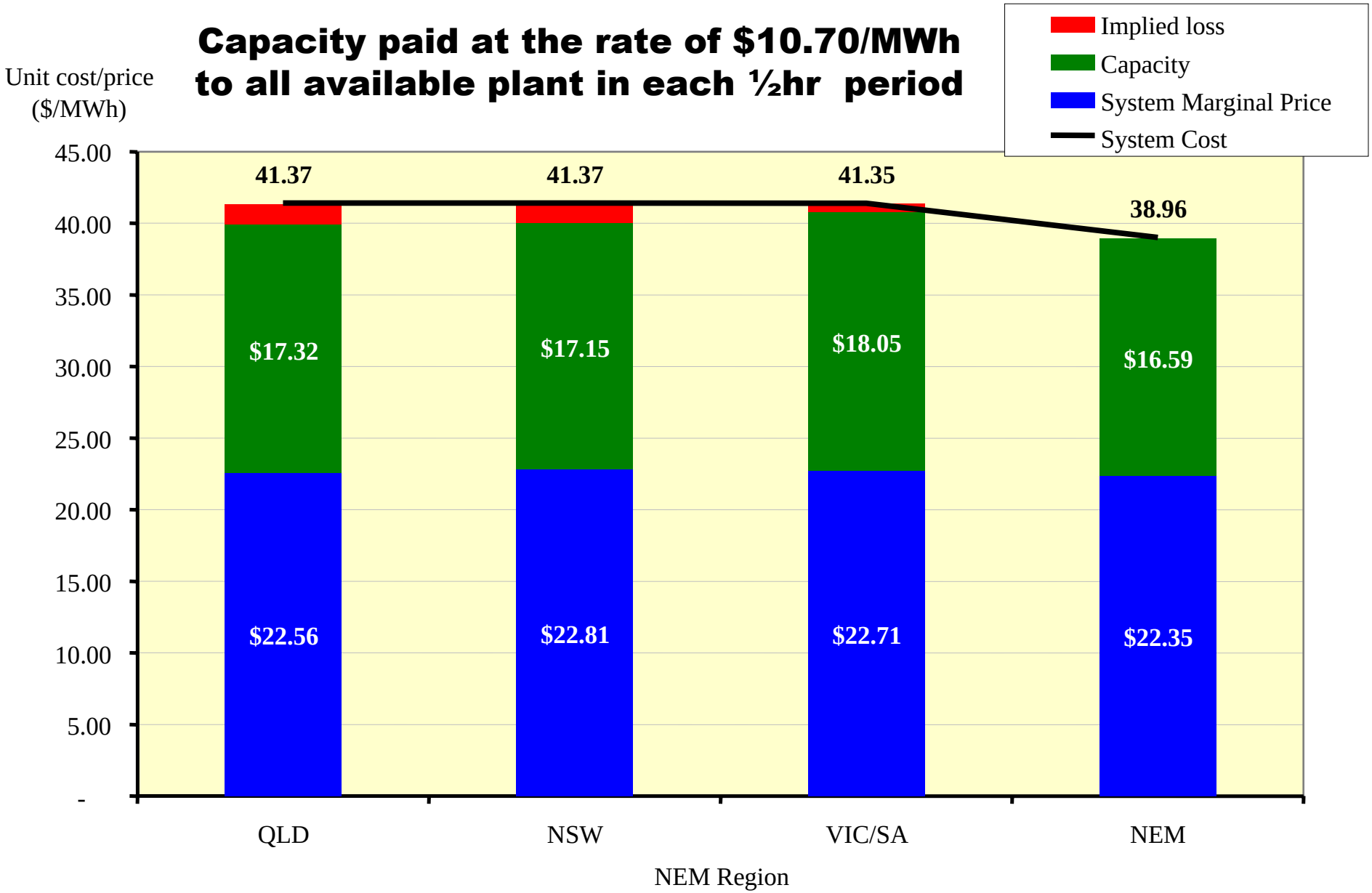
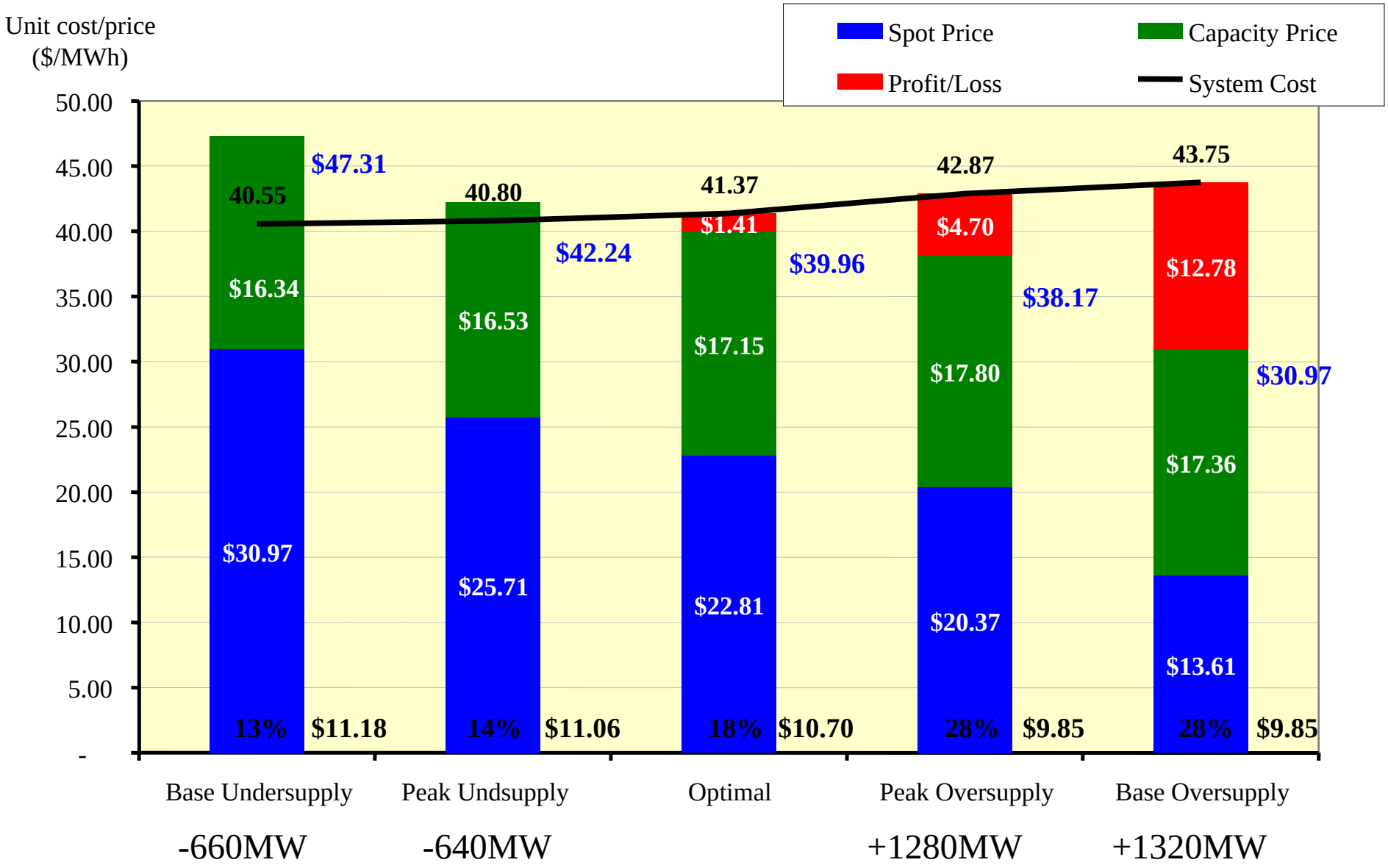
System Cost v Competitive Price



Model Results: Over/Under Supply



Volatility Reduces Accordingly

New South Wales region	Energy-only VoLL at $10,000	Capacity + VoLL at $2,000
Undersupplied (-660MW)	$55.60/MWh	$47.31/MWh
Oversupplied (+1320MW)	$15.10/MWh	$30.97/MWh
Volatility:	0.55	0.21

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But all this Requires a Major Ideological Shift by the Industry

- **Fundamentally, this involves administratively (as opposed to market) determining the reserve plant margin: after all, it's virtually a public good**
  - ***...it is necessary to have an external authority to act on the behalf of electricity consumers to determine an appropriate (joint) level of system-wide reliability and to ensure that there is an adequate level of system capacity. In this sense, power system reliability is somewhat like national defense. Each citizen cannot individually provide their own national defense. Nor can people have different levels of national defense. They must collectively decide what they want, and then appoint some authority to achieve it...***
- **Markets Fail, and it's Government's role to fix them.**

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Sectoral Interest

- **State Govt: provides that 'lever' they are all missing, and eliminates the reasons for Government Ownership of Generation & Retail**
- **Consumers: delivers price stability, and a market with a tractable equilibrium**
- **Retailers: reduces risk, eliminates the need for *courageous retailers*, and the ability to free ride on the actions of another retailer**
- **Generators: delivers an equilibrium market with reduced risk of political and regulatory interference (e.g. re-bidding)**
- **Stock & Bond Holders: the higher (risk-adjusted) return associated with the merchant power industry will no longer be illusory i.e. reduced interference risk**

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Conclusions

- **Energy-only markets do not have a definable equilibrium. They are therefore inherently unstable.**
- **Adequate system reserve is a large externality**
- **Economic theory has long been relaxed with the notion that large externalities are a predictable cause of market failure**
- **But the market has not failed thus far due to the fact that the NEM inherited an excellent and oversupplied Utility-Built plant stock (SECV, ELCOM, SNOWY, QEC etc)**
- **However, the 'oversupply party' is just about over. From here on in, the hang-over starts...**

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Conclusions

- **Peaking plant has not been forthcoming, and adequate peak plant (in a timely manner) is most unlikely**
- **Peak plant is least profitable in a competitive energy-only market with a reliability constraint**
- **A 1949 theory of electricity pricing provides a robust solution: marginal system price with a capacity payment (reduce VoLL)**
- **But this cannot be implemented quickly**
  - **Quick change of itself could be seen as regulatory risk in another form**
  - **This requires a 5-year implementation plan**
  - **Importantly, the Cap Payments need to be structured much more elegantly than my flat payment solution – the $10.70 payment would be too vulnerable to gaming by large portfolio generators**

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