

*Delivering reliability of
supply in a market
environment*

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Today's presentation

- ▶ Market rules and signals relating to reliability of supply in the Australian National Electricity Market (NEM)
- ▶ Modelling reliability of supply in the NEM
- ▶ Understanding the 'shape' of unserved energy events
- ▶ Power station economics 101 – cost of supply for reliability
- ▶ Determining minimum reserve levels and Market Price Cap to deliver on the Reliability Standard

Market Rules

- ▶ Australian Energy Market Commission (AEMC) maintains Market Rules for NEM operation (currently version 41)
- ▶ Rules mandate a Reliability Standard and Reliability Settings Review be carried out every two years
- ▶ AEMC Reliability Panel coordinates the review
- ▶ Australian Energy Market Operator (AEMO) provides dispatch and settlement service according to the rules

Market Rules

The Reliability Standard and Reliability Settings are required to achieve multiple competing objectives:

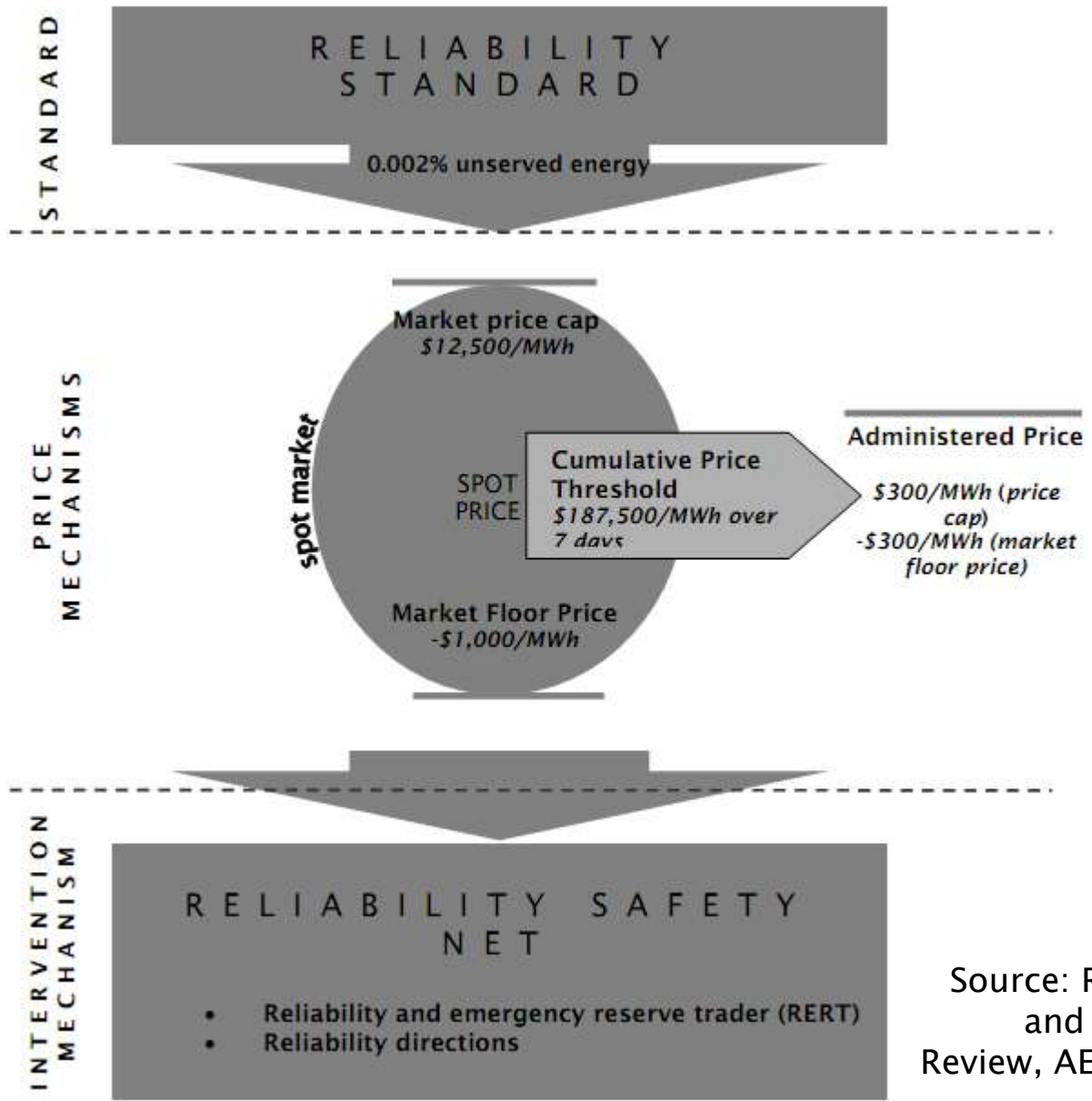
- meeting the Reliability Standard
- managing the financial risk of market participants
- meeting customers' value of reliability

Reliability Standard

- ▶ Reliability Standard for Generation and Bulk Supply (December 2009)
 - “The maximum permissible unserved energy (USE), or the maximum allowable level of electricity at risk of not being supplied to consumers, is 0.002% of the annual energy consumption for the associated region or regions per financial year.”*
- ▶ Interpretation: target this as a long-term average
- ▶ This Standard is intended to be targeted operationally in each year in each region

Reliability Settings

- ▶ Reliability Settings
 - Market Price Cap (MPC)
 - Market Floor Price (MFP)
 - Cumulative Price Threshold (CPT) and administered price cap
- ▶ MPC currently \$12,500 / MWh (adjusted annually with the Stage 2 Intermediate Producer Price Index)
- ▶ MFP currently -\$1,000 / MWh
- ▶ CPT set at 15 times the MPC with an administered price cap of \$300 / MWh

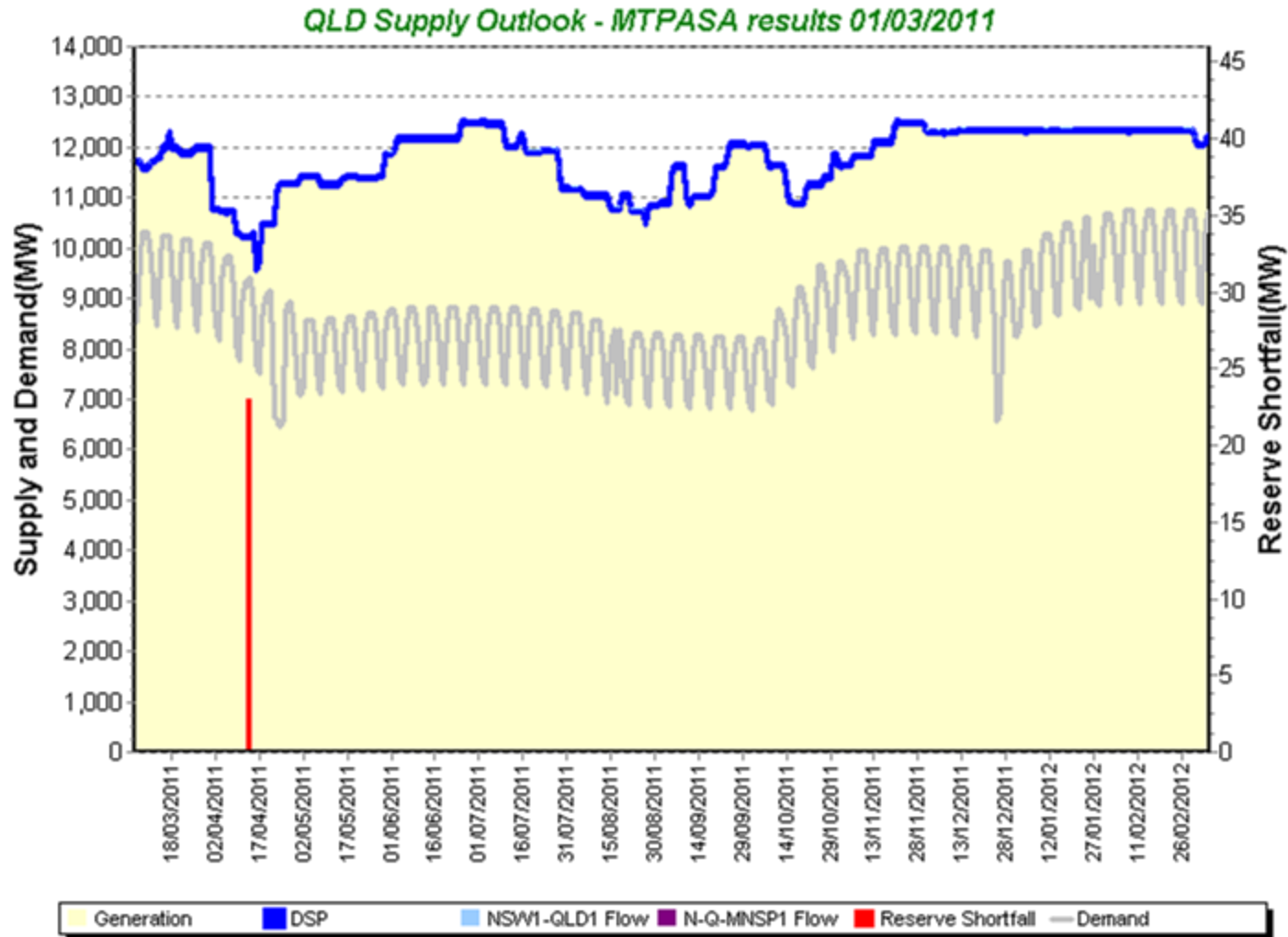


Source: Reliability Standard and Reliability Settings Review, AEMC, 30 April 2010

Achieving the Reliability Standard

- ▶ Reliability Standard is a long term average
- ▶ Dispatch is a short term outlook
- ▶ Need to 'operationalise' the USE Reliability Standard into regional Minimum Reserve Levels
- ▶ Projected Assessment of System Adequacy (PASA)
- ▶ Short term (2 weeks ahead) and medium term (2 years ahead) PASA

MTPASA (QLD)



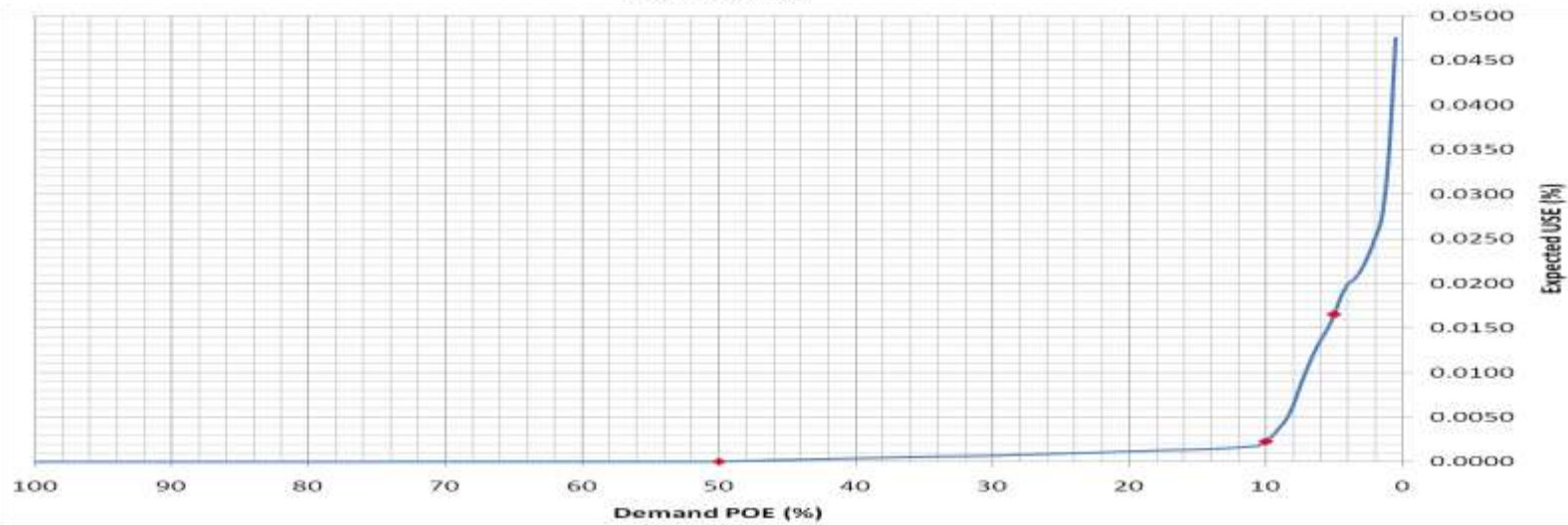
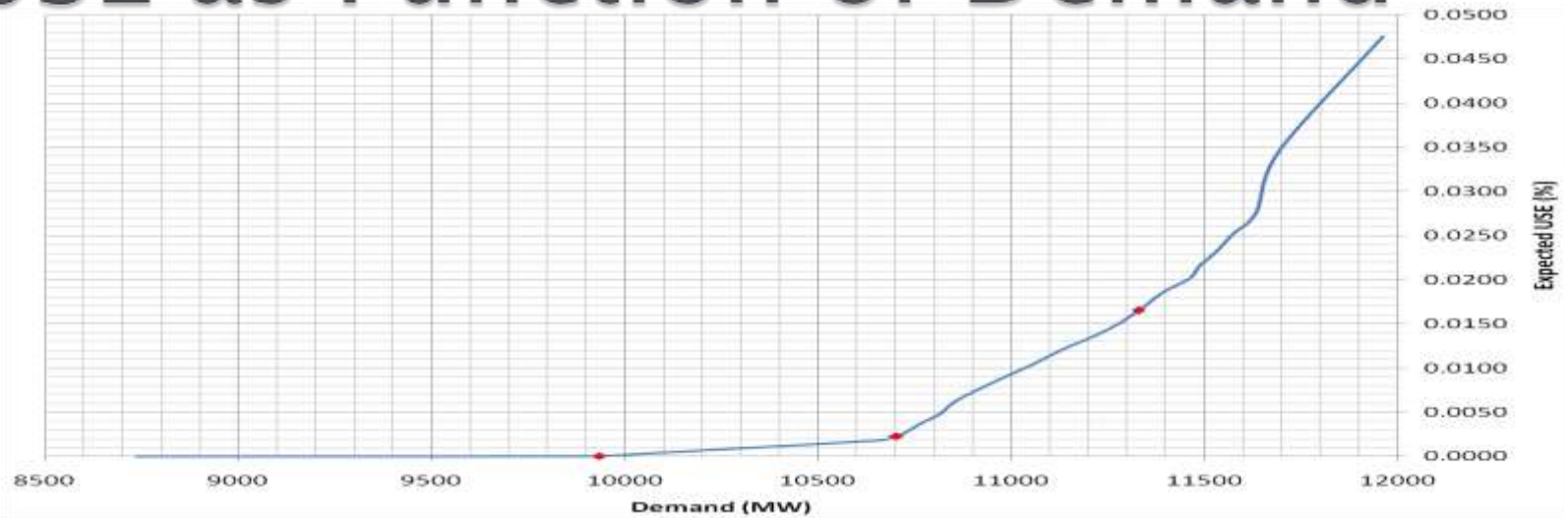
Modelling reliability of supply in the NEM

- ▶ Monte Carlo simulation of market dispatch
- ▶ Reflect actual market operation to the highest level possible
 - Time sequential half-hourly dispatch model
 - Thermal and renewable generation technologies
 - Every physical unit
 - Availability model is critical
 - Demand and energy forecasts
 - Test a range of peak demand forecasts
 - Transmission network capability

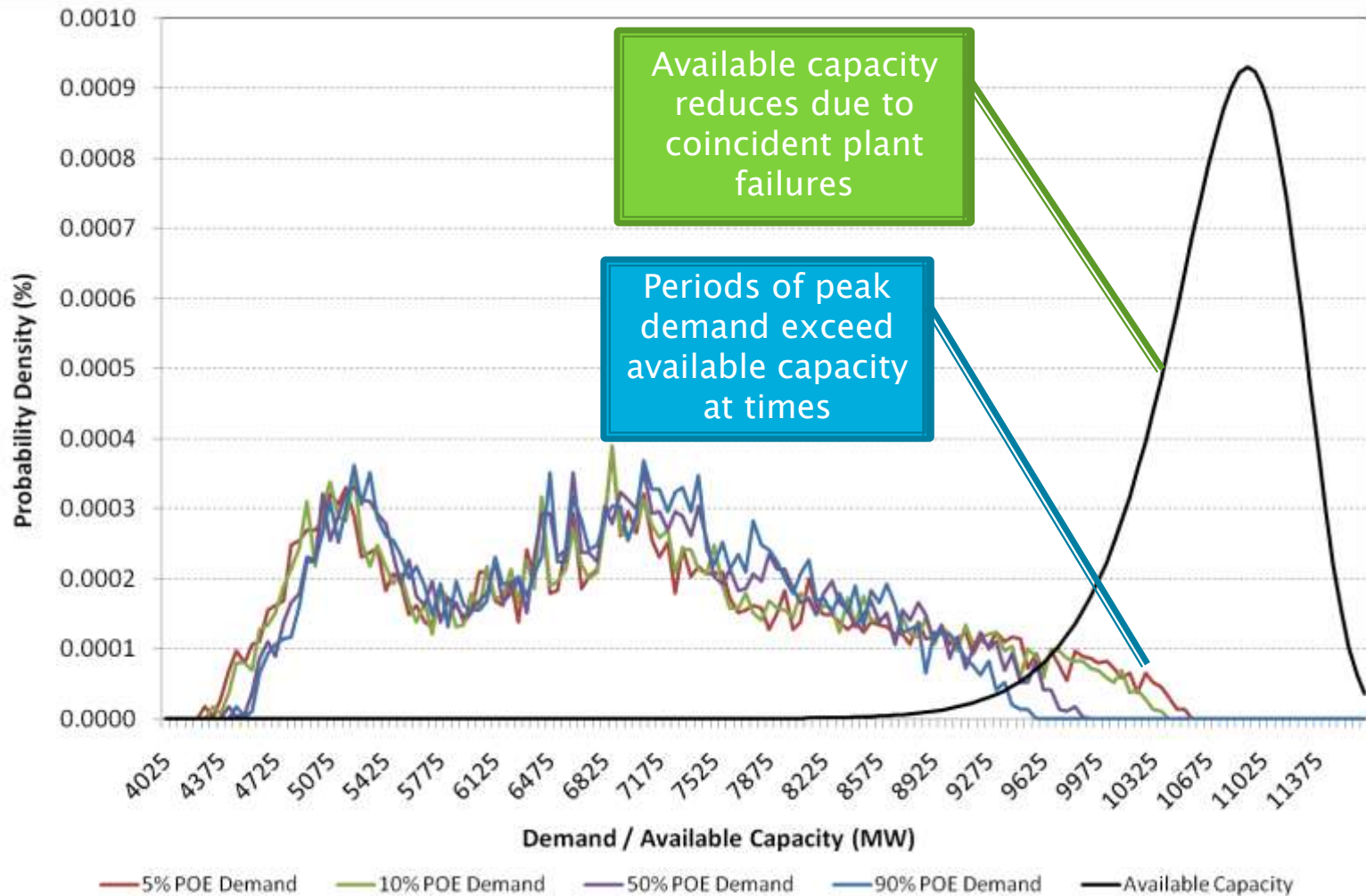
Determining minimum reserve levels

- ▶ Iterative goal seek methodology
- ▶ Adding and removing generation in order to achieve an average of 0.002% unserved energy in each region simultaneously (across all demand levels)

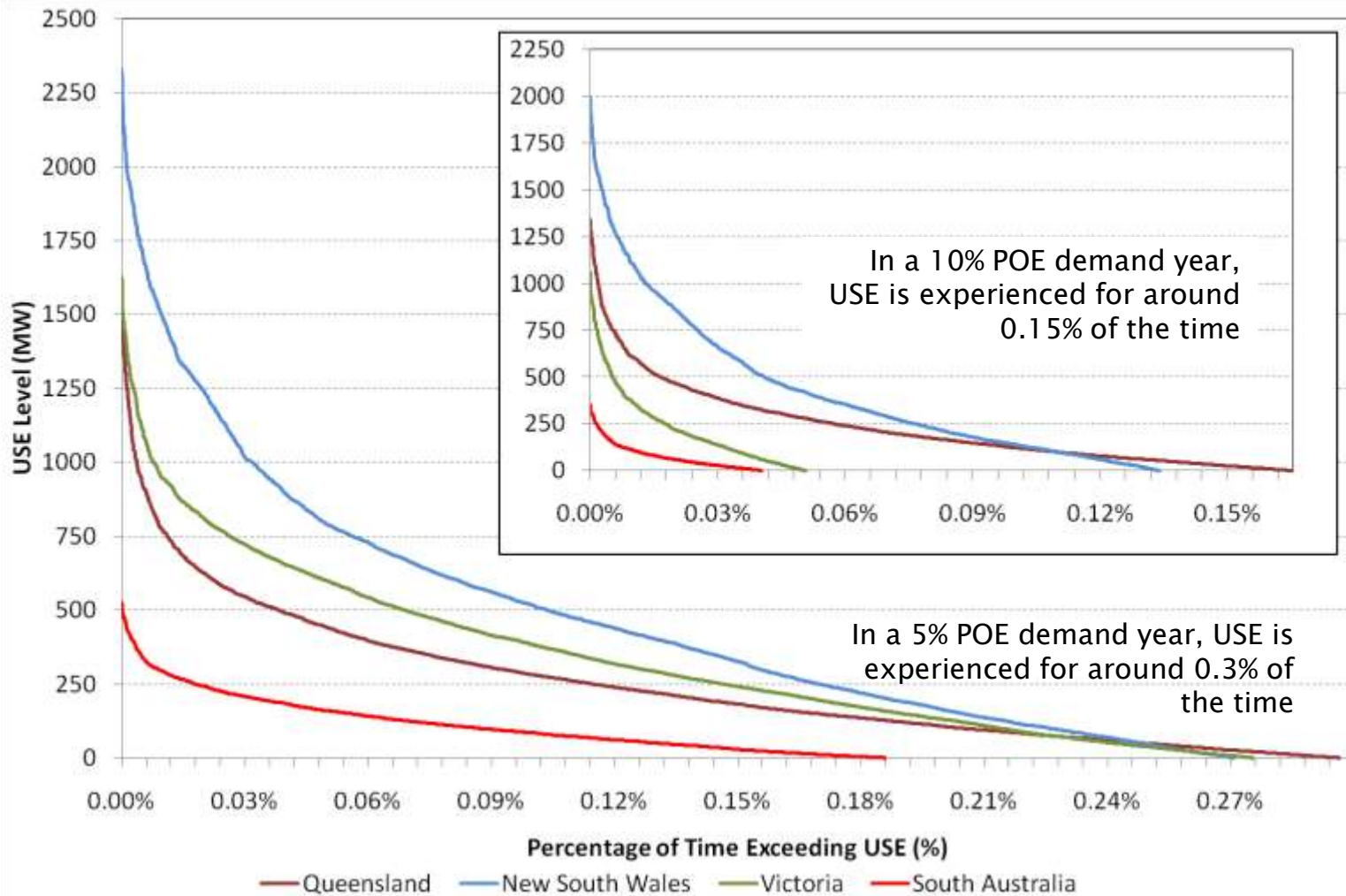
USE as Function of Demand



When can USE occur?



The Shape of USE in the NEM



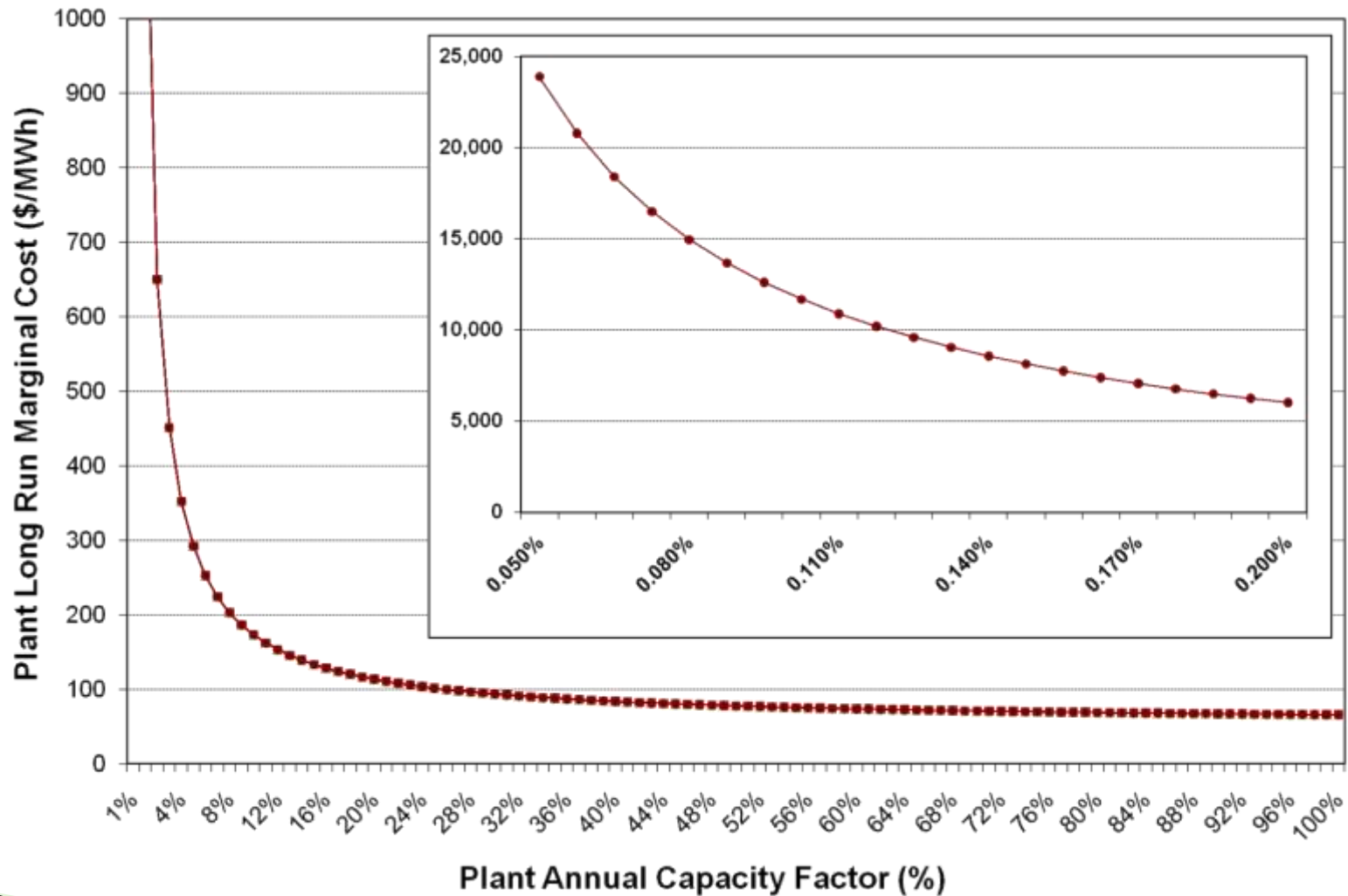
Power station economics 101 – cost of supply for reliability

- ▶ Some gas peaking plants (for example Mackay in Qld, Angaston in SA) have capacity factors of $\sim 0.1\%$ – in use about 9 hours a year
- ▶ How much of this generation (and transmission) exists only to meet the most extreme demand periods?
- ▶ Is this investment really worth it – what price should we place on “unserved energy”?

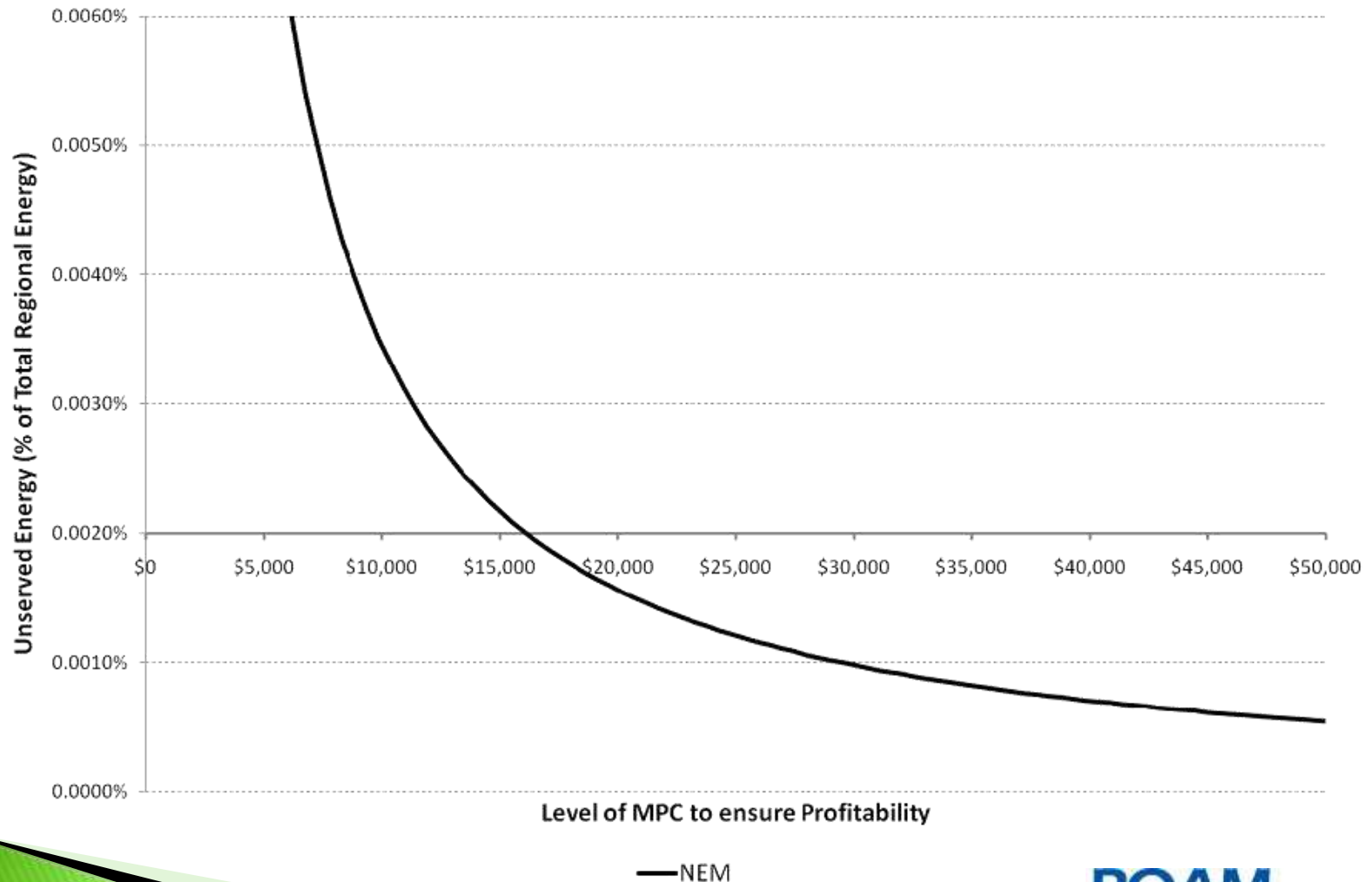
Power station economics 101 – cost of supply for reliability

- ▶ Cost of generation supply is a function of:
 - Capital cost
 - Operations and Maintenance cost
 - Plant efficiency
 - Fuel cost
 - Emissions cost
 - Operating patterns

LRMC curve for peaking GT



Determining Market Price Cap to deliver on the Reliability Standard



Finding the Balance

