

*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:

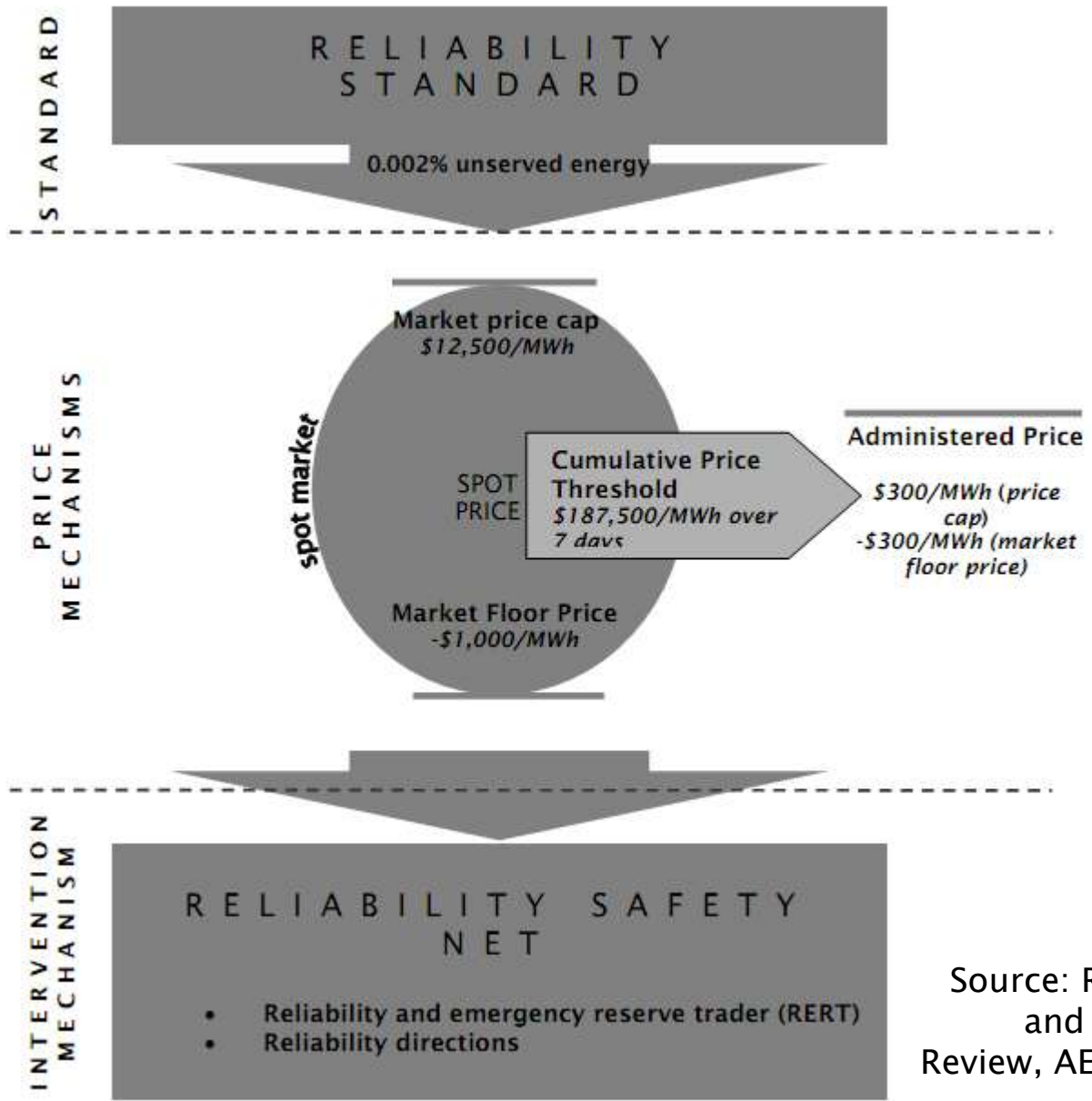
- meeting the Reliability Standard
- managing the financial risk of market participants
- meeting customers' value of reliability

# 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

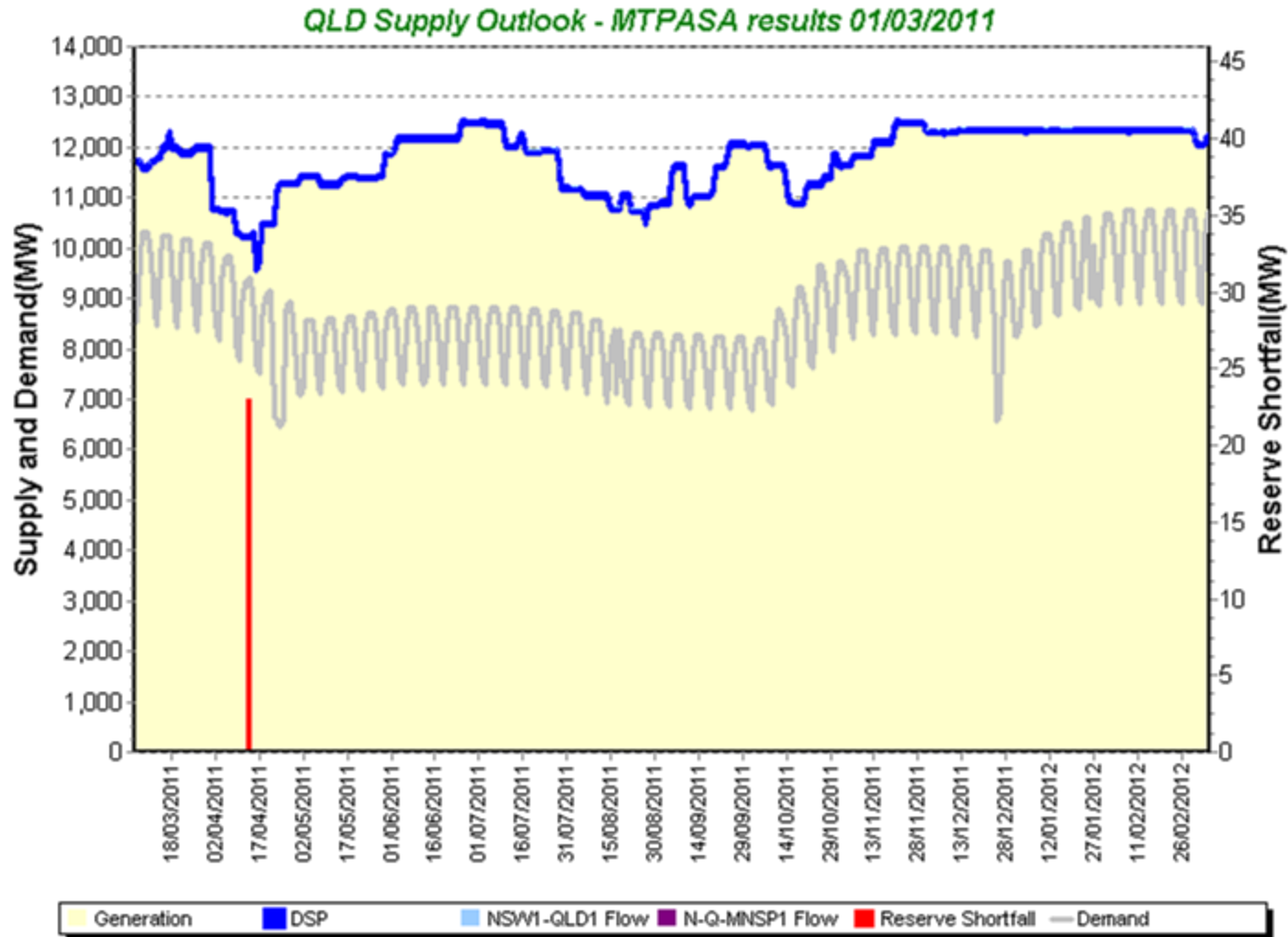


Source: Reliability Standard and Reliability Settings Review, AEMC, 30 April 2010

# 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)



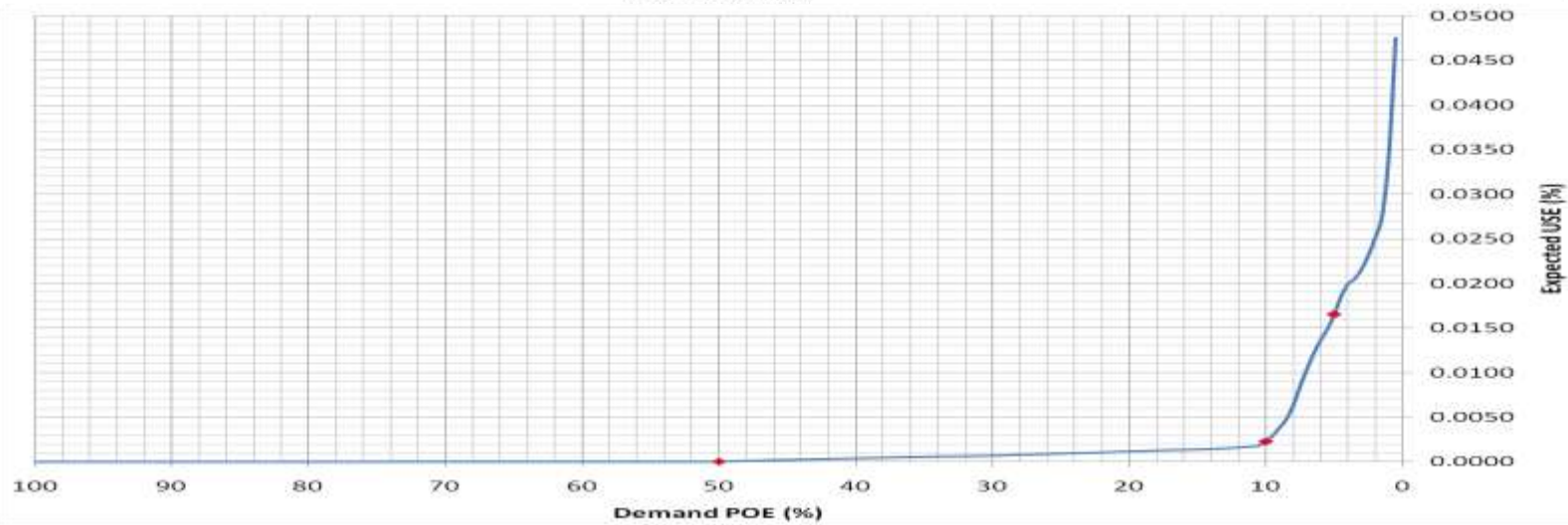
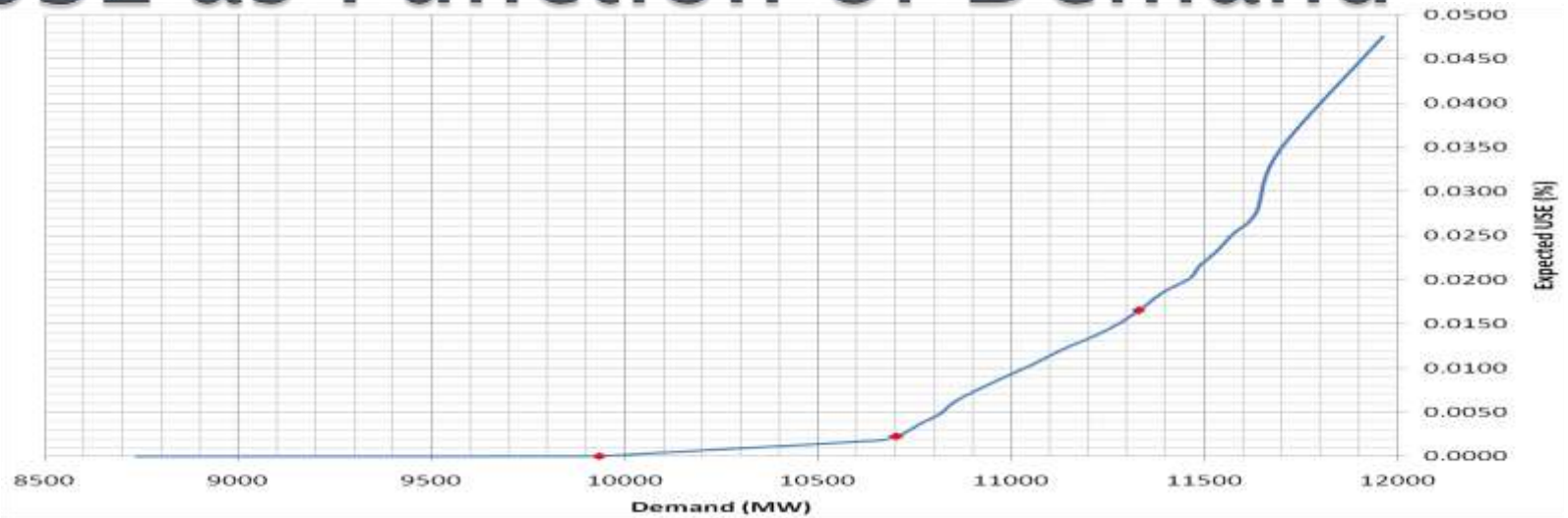
# Modelling reliability of supply in the NEM

- ▶ 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

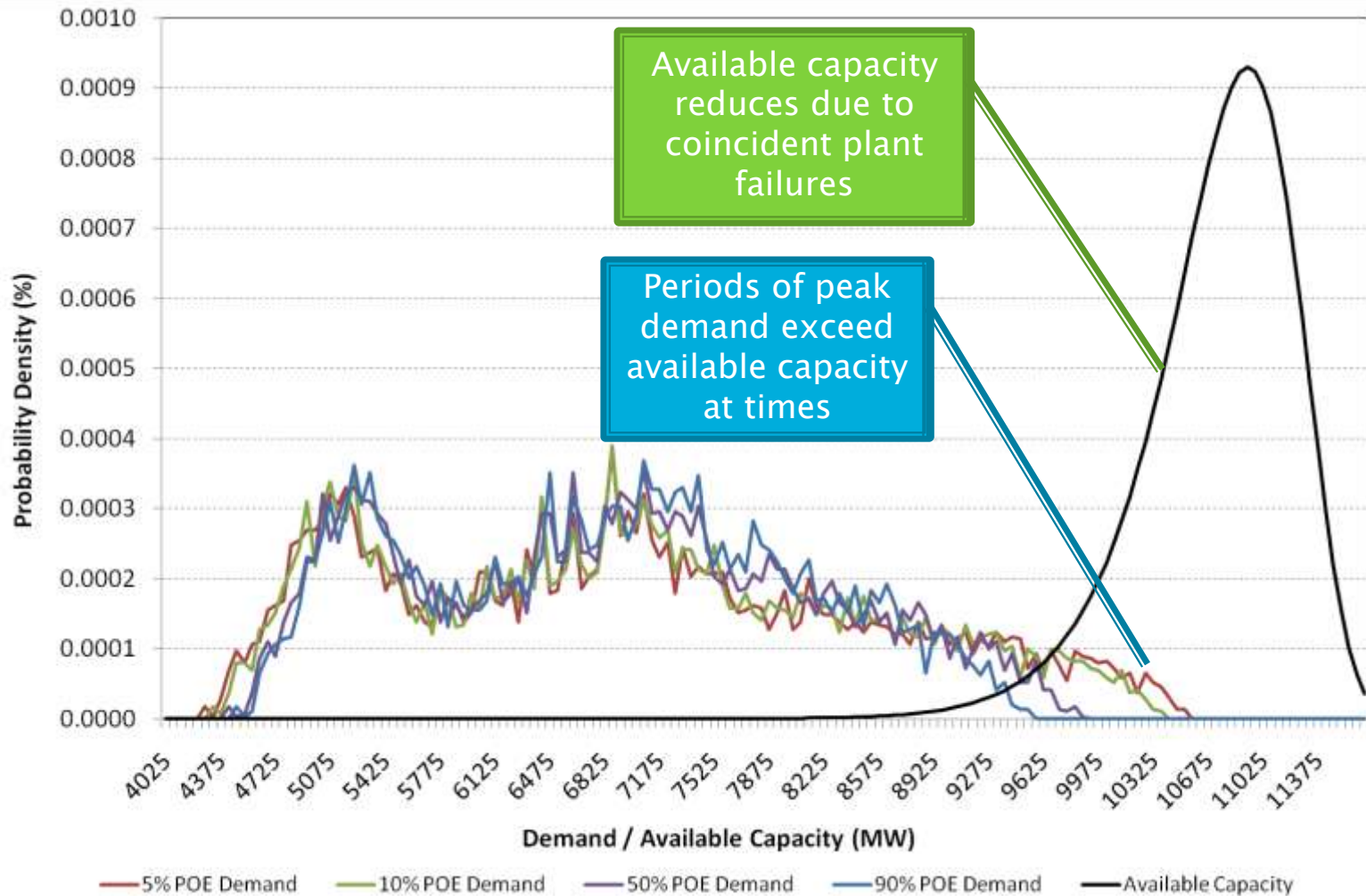
# Determining minimum reserve levels

- ▶ 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)

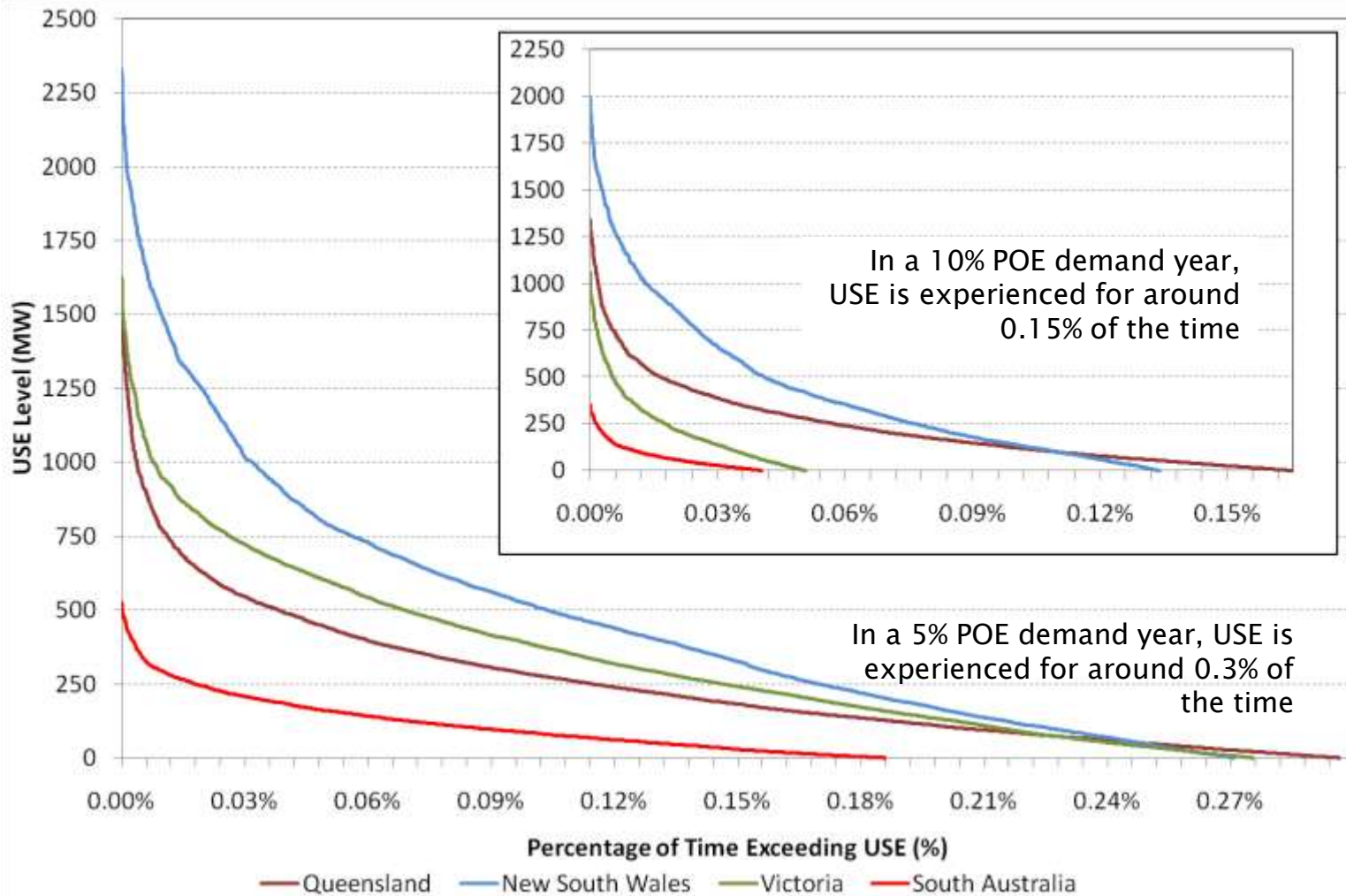
# USE as Function of Demand



# When can USE occur?



# The Shape of USE in the NEM



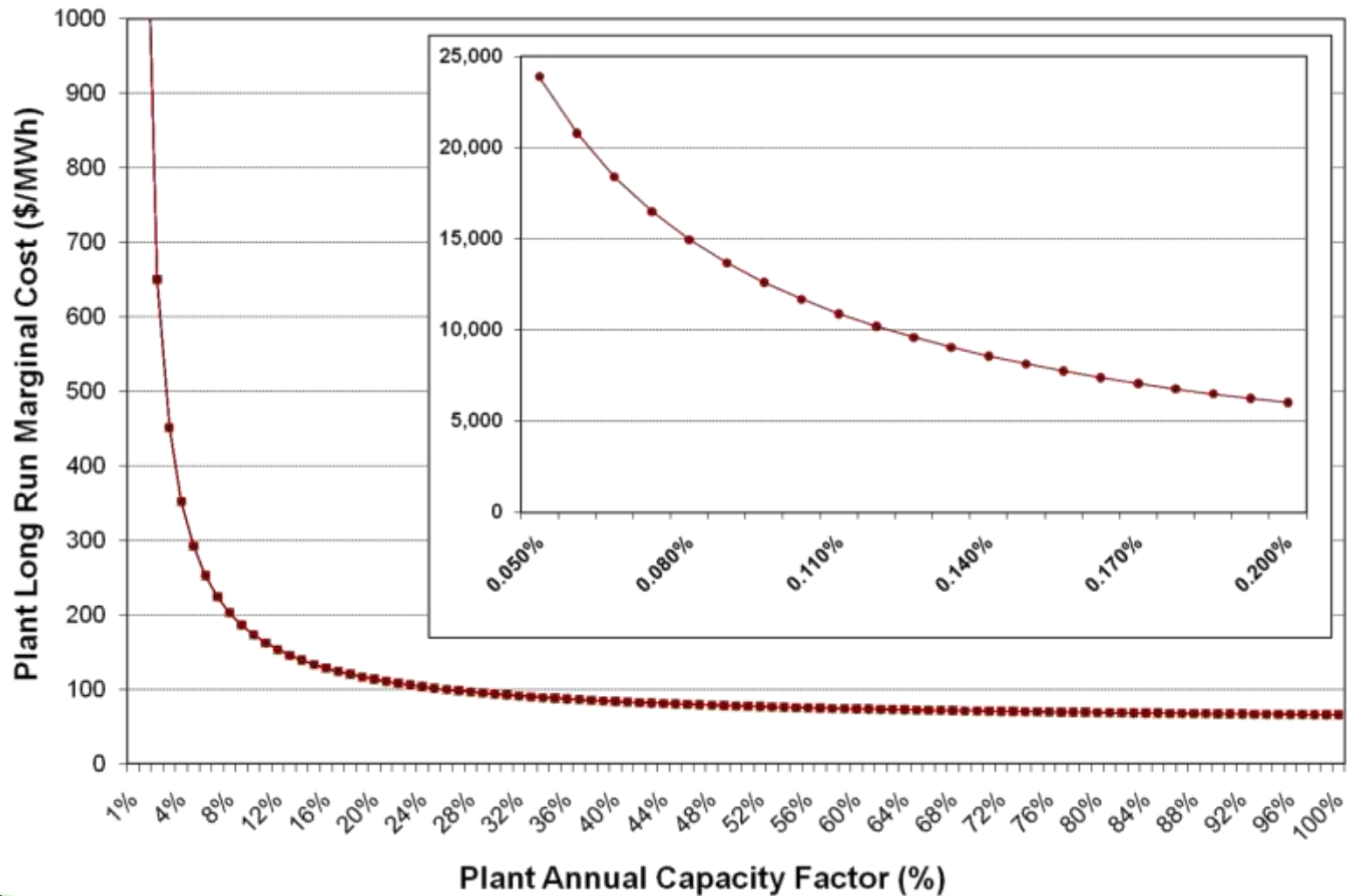
# Power station economics 101 – cost of supply for reliability

- ▶ 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”?

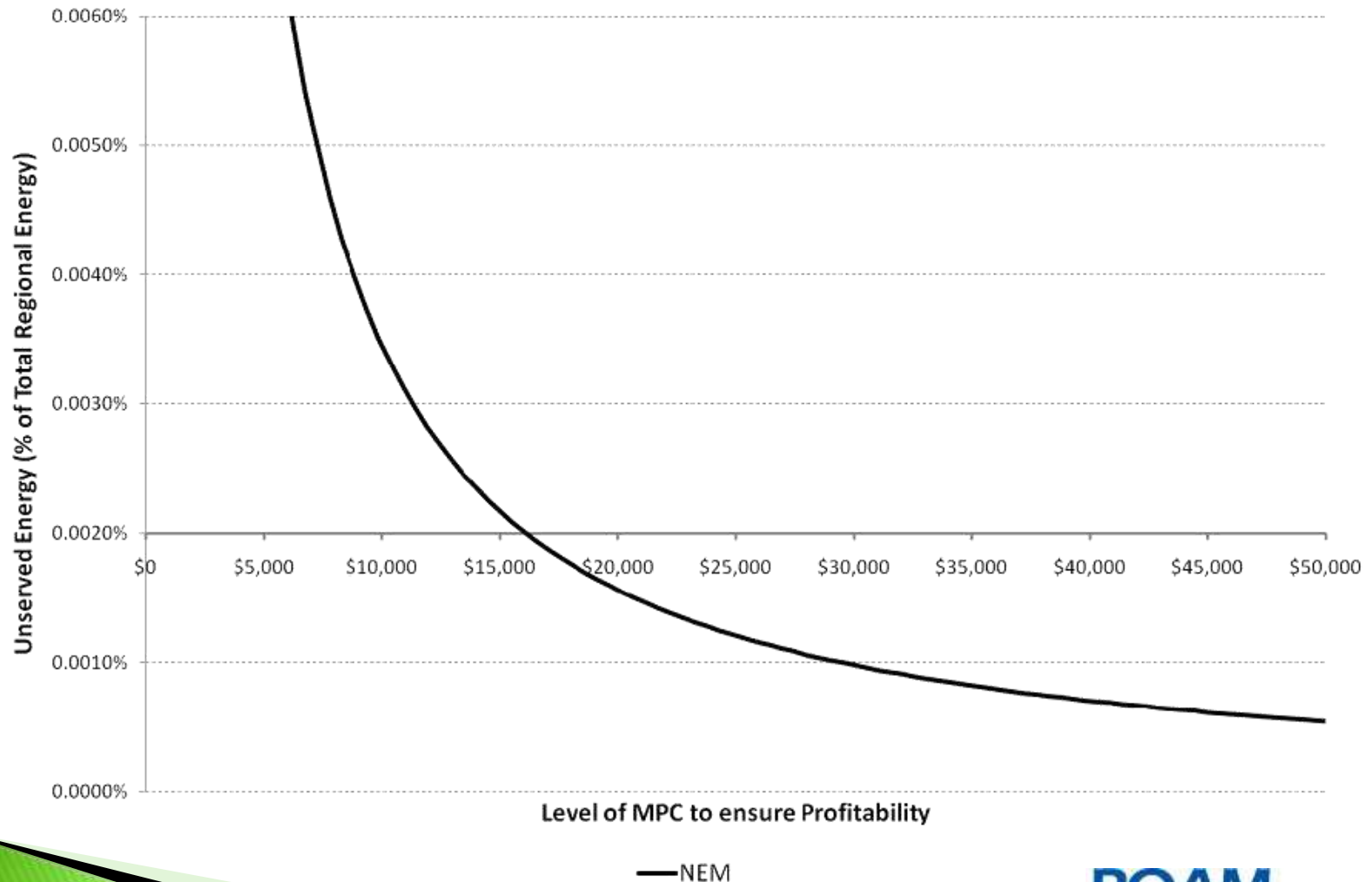
# Power station economics 101 – cost of supply for reliability

- ▶ 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

