

# ***Adaptation in the Electricity Sector***

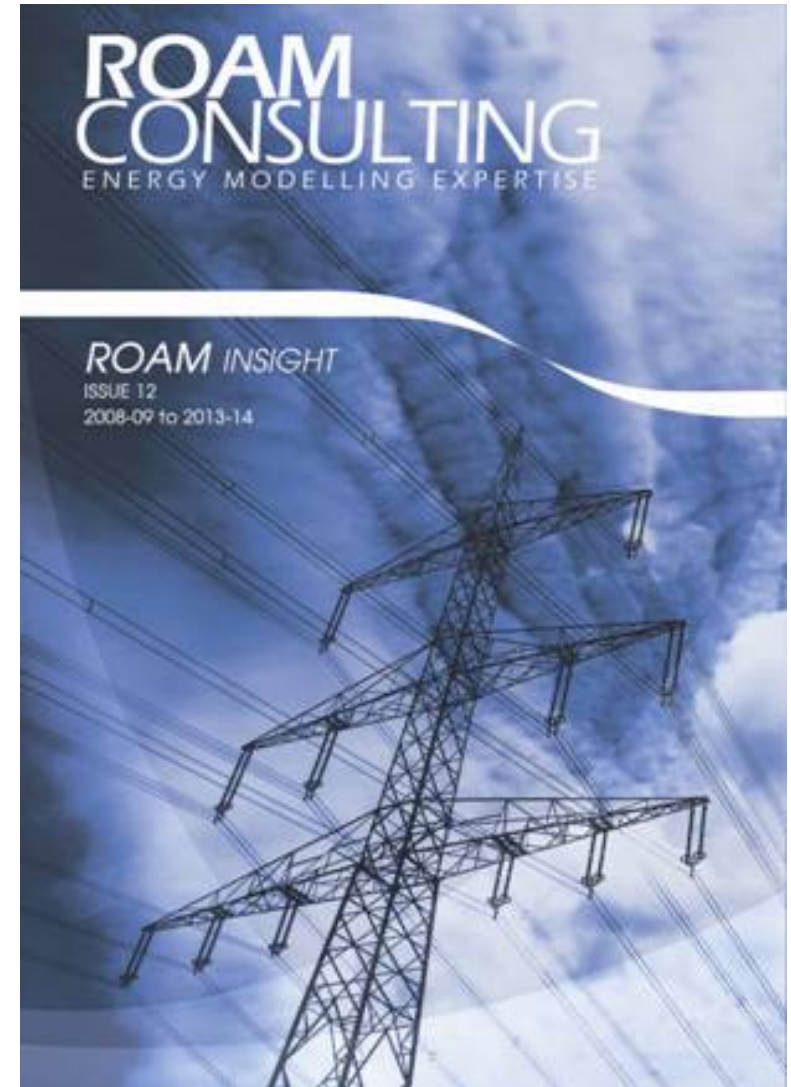
**Dr Jenny Riesz**

**30<sup>th</sup> June 2010**

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# ROAM Consulting

- Energy market modelling
  - Market efficiency
  - Renewable energy
    - Clean Energy Council
    - WA Market Operator
  - Carbon pricing
    - Department of Climate Change
  - Transmission
  - Security and reliability
    - NEM Market Operator
  - Drought / extreme weather
    - Australian Energy Market Commission – Extreme weather review for MCE
  
- Focus on detail



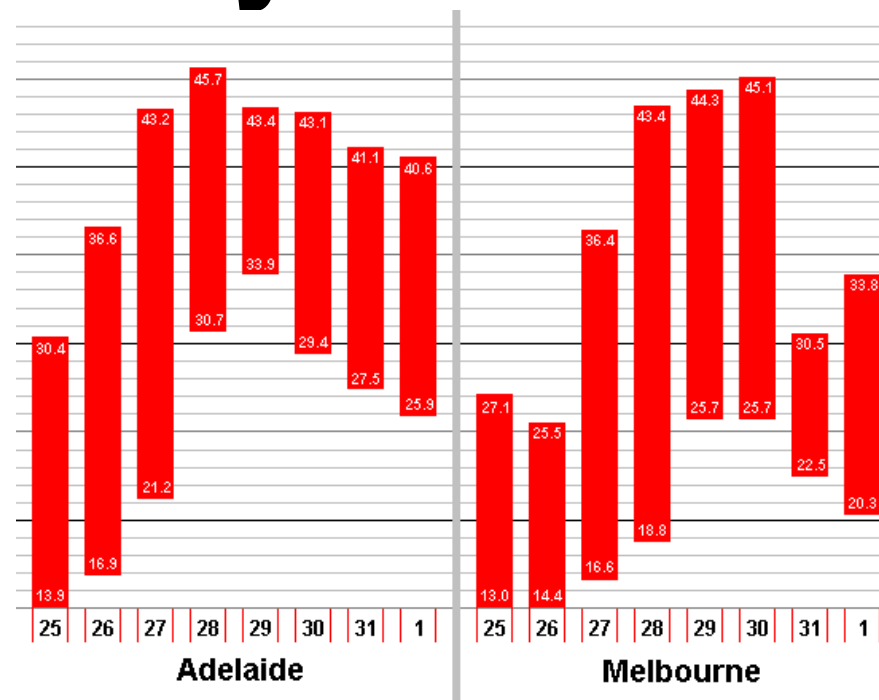
# Adaptation in the electricity sector

- Most important climate change impacts for electricity sector:
  1. Increase in very hot days
  2. Decrease in water availability (drought)
  3. Increase in extreme weather (storms, extreme wind, lightning, bushfires)
    - Impacts on networks (40% of retail electricity costs)



# Very Hot Days

- Very hot days cause extremely high demand for electricity
  - Air conditioner loads
  - Especially repeated hot days
- System is strained to its limits
  - Blackouts
- Eg. VIC/SA Heatwave Jan 2009
  - Sustained record temperatures in Adelaide and Melbourne
  - Record maximum demands in SA and VIC



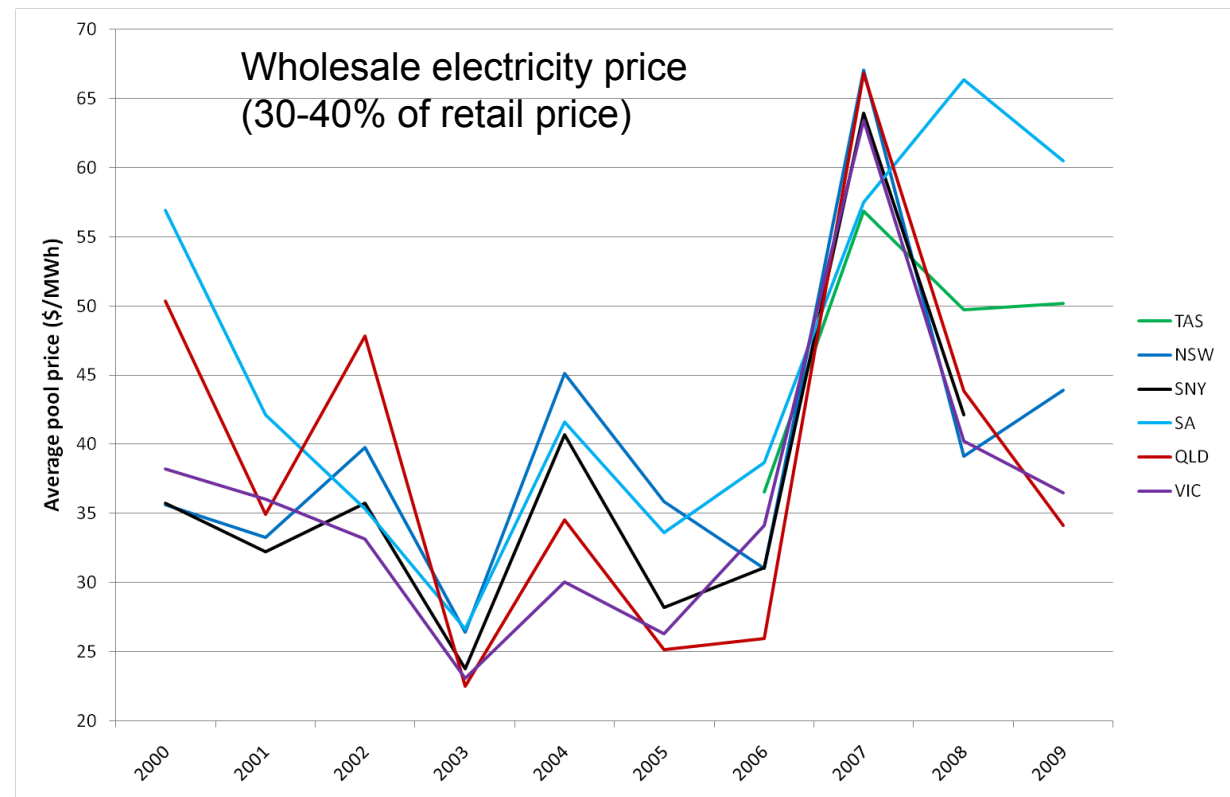
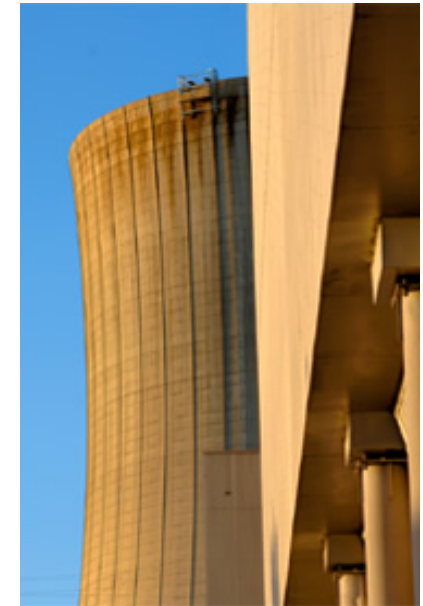
- Generators and transmission experience progressive reductions in availability
  - Reduced capacity/ratings
  - Much higher probability of a forced outage (fault)
  - Basslink interconnector shuts down at 35°C, removed from service at short notice

# Adapting to Very Hot Days

- ROAM modelling to investigate market mechanisms to prevent repeat
  - Suggest most important factor is sufficient knowledge by market participants
  - If expect accurate frequency of very hot days, know can make sufficient revenue, will install sufficient capacity
  - Accurate prediction and communication of number of very hot days is essential
- Information to market through AEMO Statement of Opportunities
  - Demand forecasts
  - Supply demand balance
- Climate change never explicitly mentioned
- Must be mainstreamed into electricity sector projections

# Water availability

- Thermal power stations use large quantities of water
  - Wet cooling for thermal process
  - Eg. Tarong (1400 MW) draws 50-80 million litres per day
  - Competition for other water uses
- Drought conditions in 2007
  - Forced Tarong power station to take 50% of capacity offline
  - Significant proportion of capacity in QLD
- Very high prices
- New thermal plant likely to be dry-cooled
  - More expensive
  - Less efficient (auxiliary load), greater greenhouse gases
  - But much lower water usage (90%)
  - Eg. Kogan Creek power station, commissioned Nov 2007



# Conclusions

- Climate change will have a significant impact on the electricity sector
  - Very hot days
    - Market understanding lacking
  - Water availability
  - Transmission outages from extreme weather
- Electricity infrastructure is long lived (50yrs ++)
  - Must consider future operating conditions now
  - Include consideration in routine replacements
  - Mainstream climate change into energy infrastructure decisions

