

Adaptation in the Electricity Sector

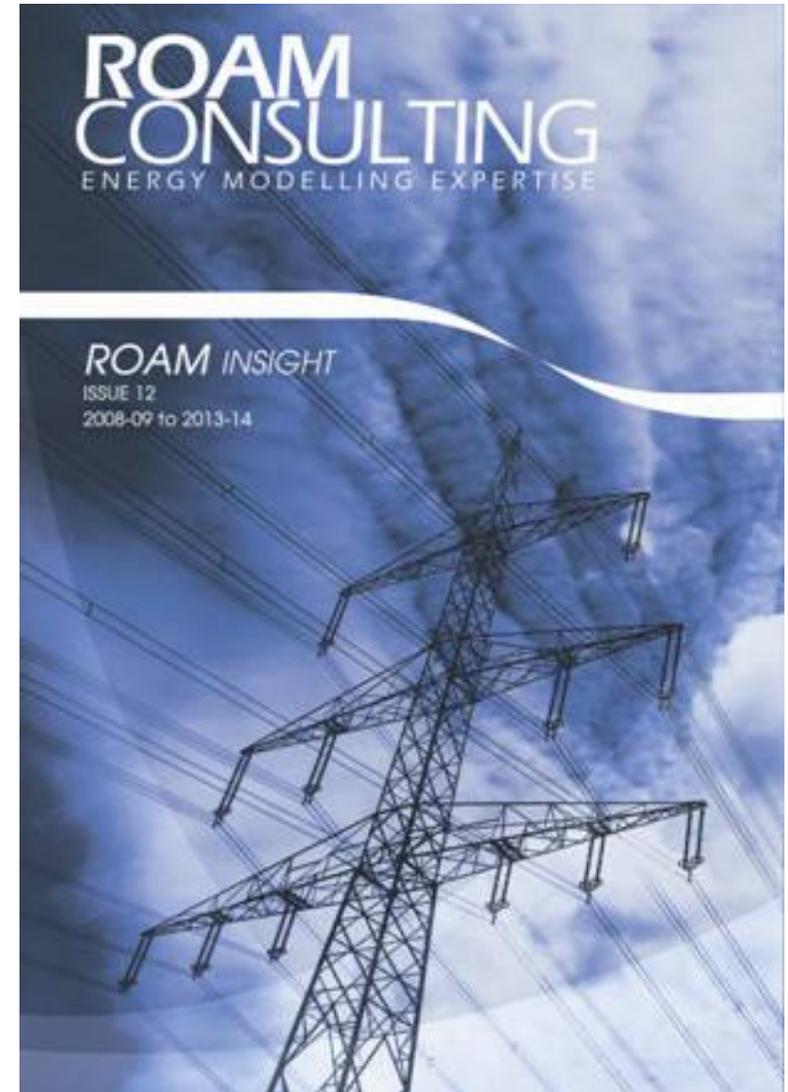
Dr Jenny Riesz

30th June 2010

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



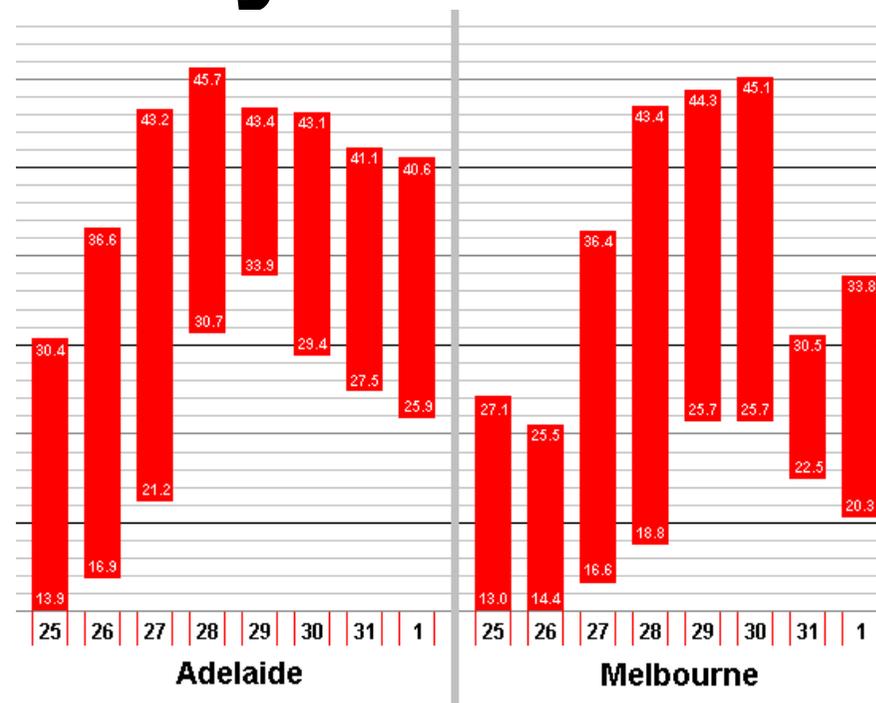
Adaptation in the electricity sector

- 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



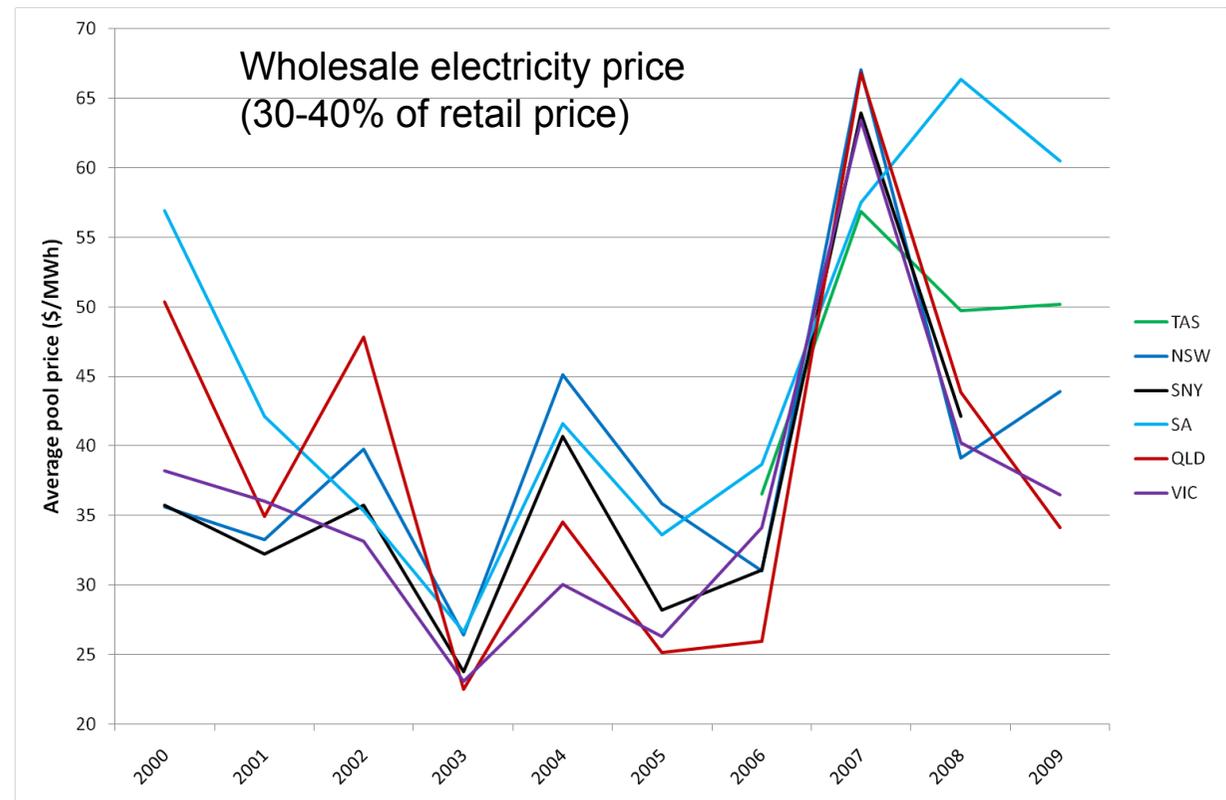
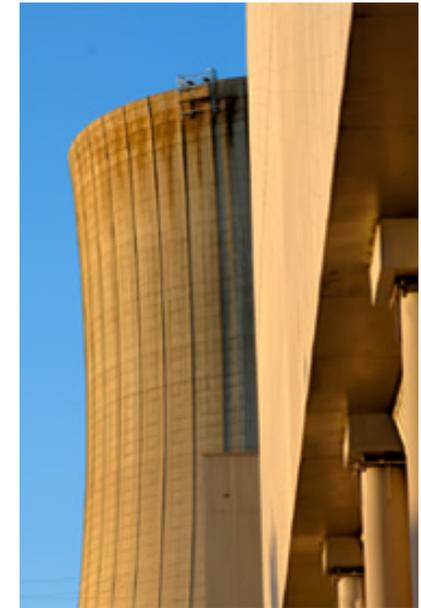
- Generators and transmission experience progressive reductions in availability
 - Reduced capacity/ratings
 - Much higher probability of a forced outage (fault)
 - Basslink interconnector shuts down at 35°C, removed from service at short notice

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

