Actuaries Institute

Actuaries Managing Risk – Insights: Risk Management in Energy – How Actuaries can add Value

Presented by Peter Eben, Michelle Shek and Julie Sims

Actuaries Managing Risk

Risk Insights – Melbourne – 9 September 2014

Actuarial Skills and Energy Risk Management

Peter Eben

Outline

1. Institute objectives – mission and vision
2. Key risks in energy sector
3. Example projects

Institute Vision

"That wherever there is uncertainty of future financial outcomes, actuaries are sought after for their valued advice and authoritative comment."

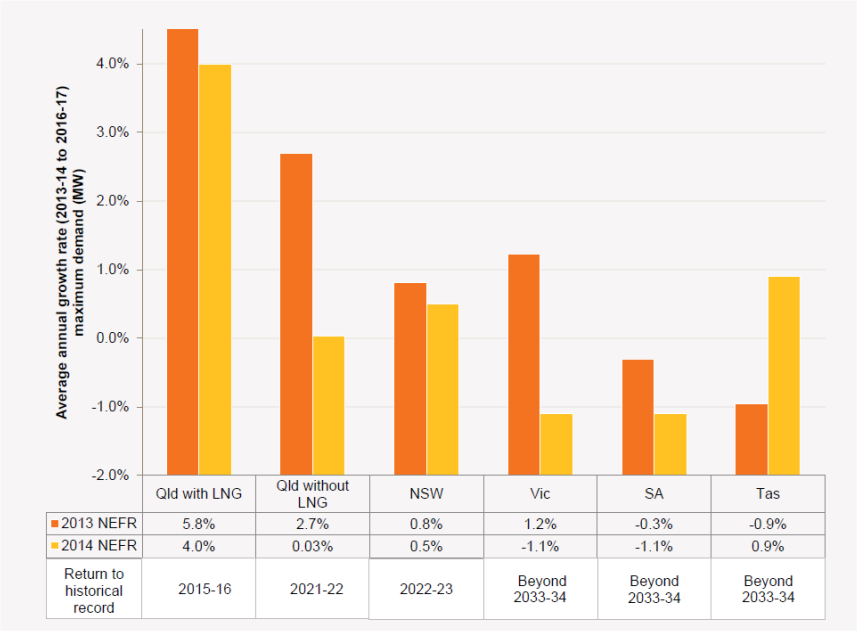
Institute Mission (one element)

To promote the development of actuarial science through research and the expansion of the profession into new areas of endeavour.

Market risk – declining electricity consumption

Figure 2 — NEM annual energy forecast 10-year outlook

Figure 3 — Maximum demand growth in 2013 and 2014 NEFR

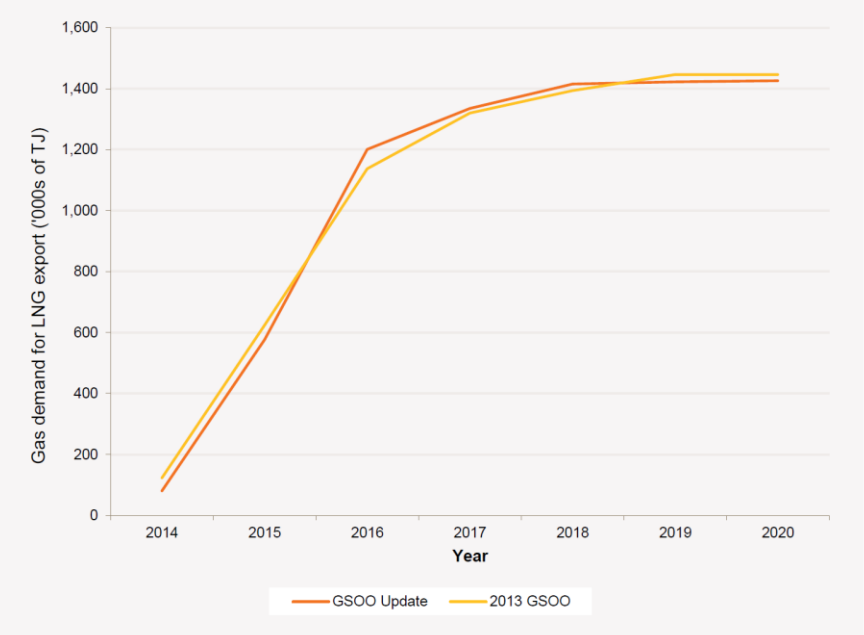


	Qld with LNG	Qld without LNG	NSW	Vic	SA	Tas
2013 NEFR	5.8%	2.7%	0.8%	1.2%	-0.3%	-0.9%
2014 NEFR	4.0%	0.03%	0.5%	-1.1%	-1.1%	0.9%
Return to historical record	2015-16	2021-22	2022-23	Beyond 2033-34	Beyond 2033-34	Beyond 2033-34

Source: AEMO 2014 NEFR

Market risk – rising gas demand

Figure 2 — Gas demand for LNG export comparison: 2013 GSOO and GSOO Update

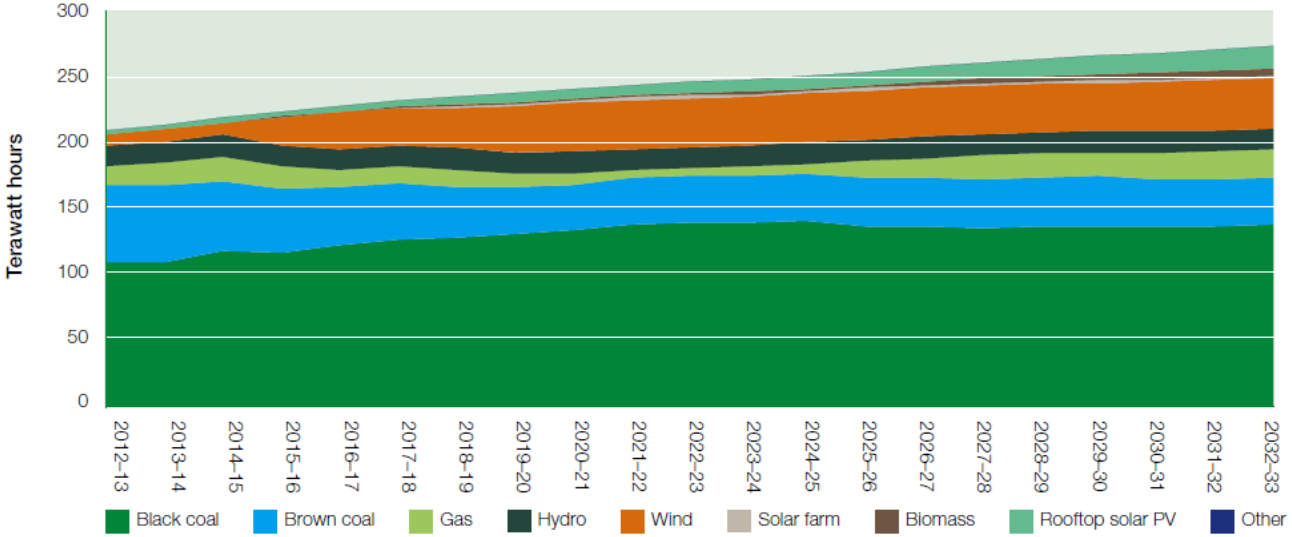


Source: AEMO, GSOO 2014

Market risk – changing generation mix

Figure 1.8

Forecast contribution of generation technologies to meeting electricity demand

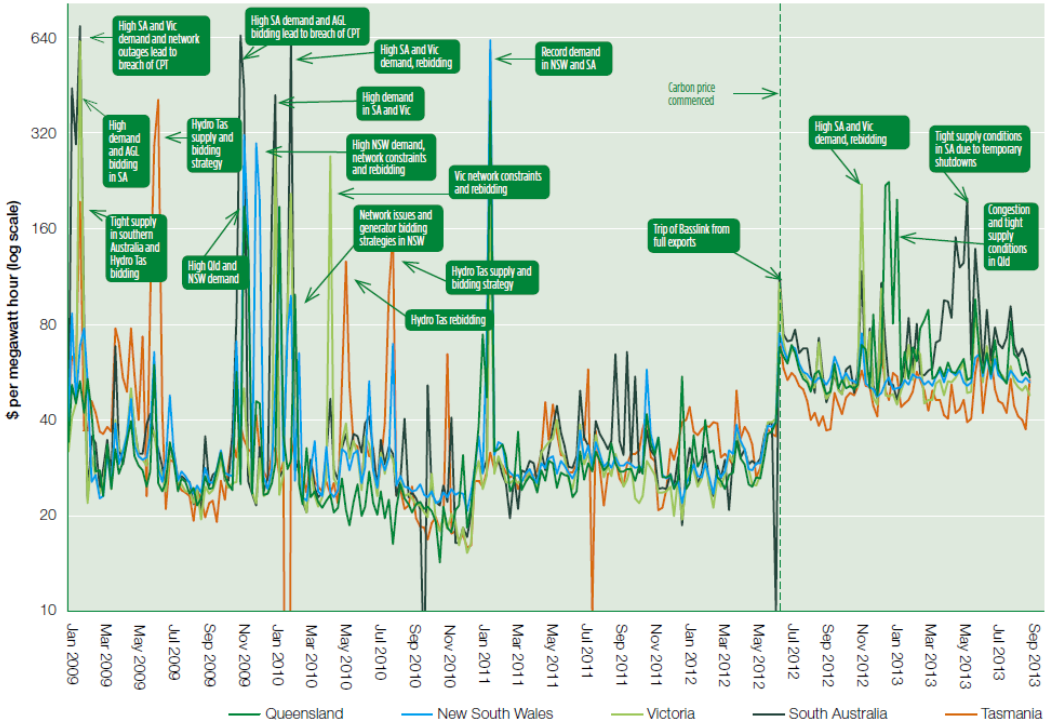


Source: AER, State of the energy market 2013

Market risk – volatile electricity spot prices

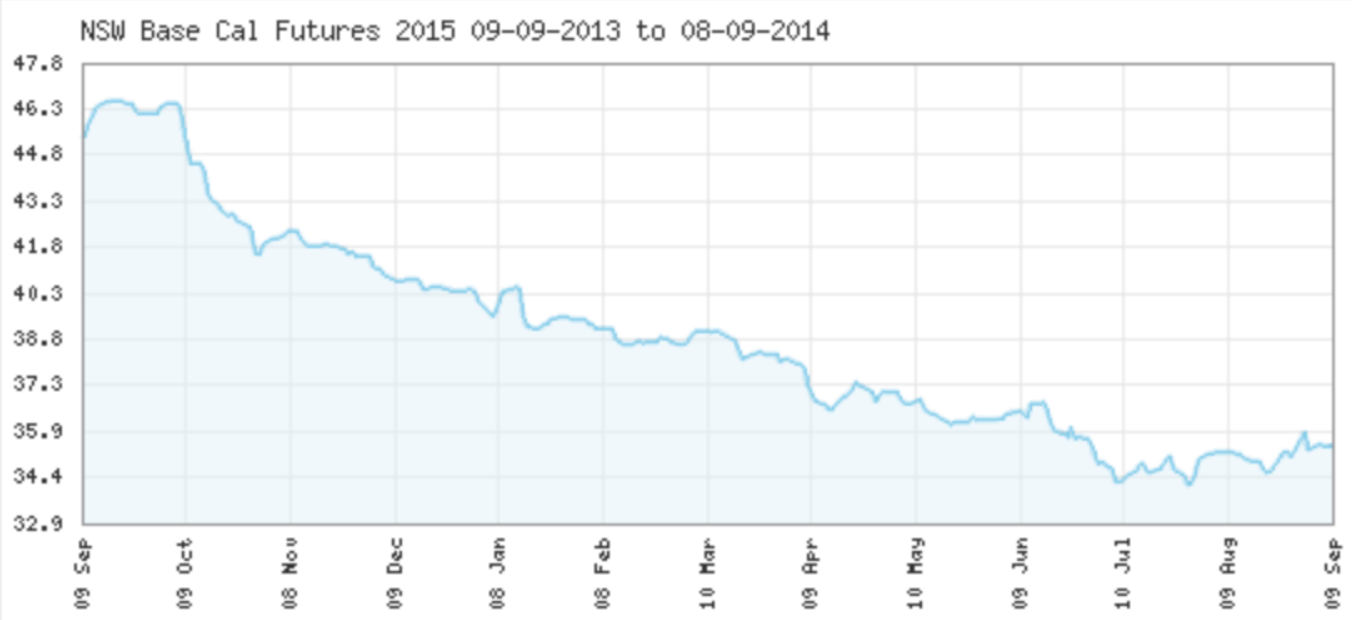
Figure 1.15

Weekly spot electricity prices



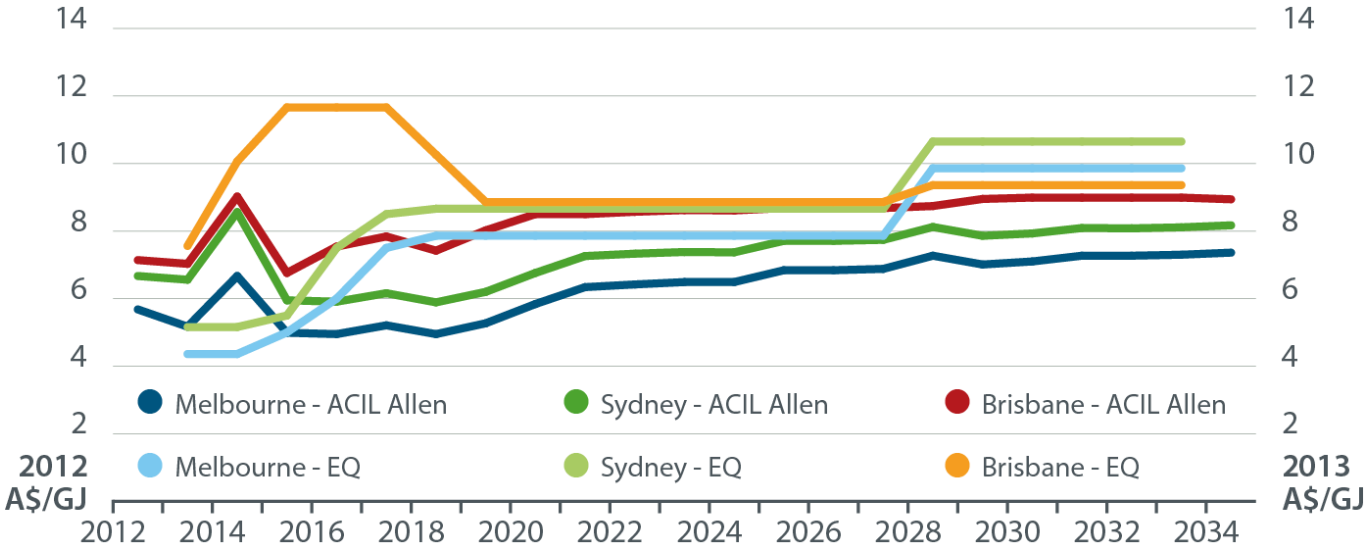
Source: AER, State of the energy market 2013

Market risk – declining forward electricity prices



Source: ASX Energy website

Market risk – rising forward gas prices

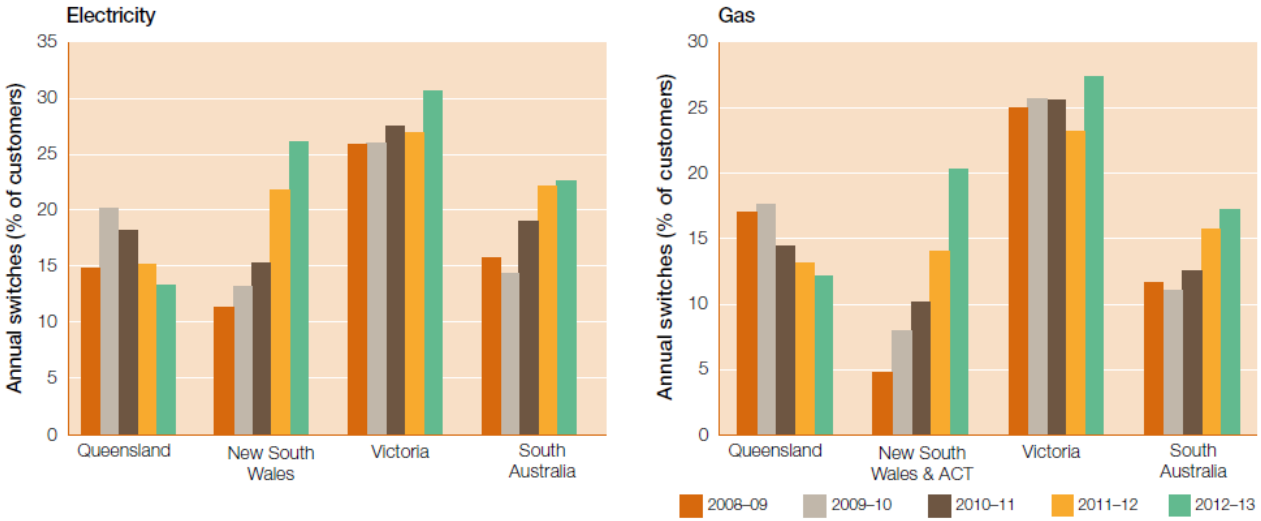


Source: BREE, ACIL Allen and Energy Quest 2013

Market risk – high retail churn

Figure 5.3

Customer switching of energy retailers, as a percentage of small customers



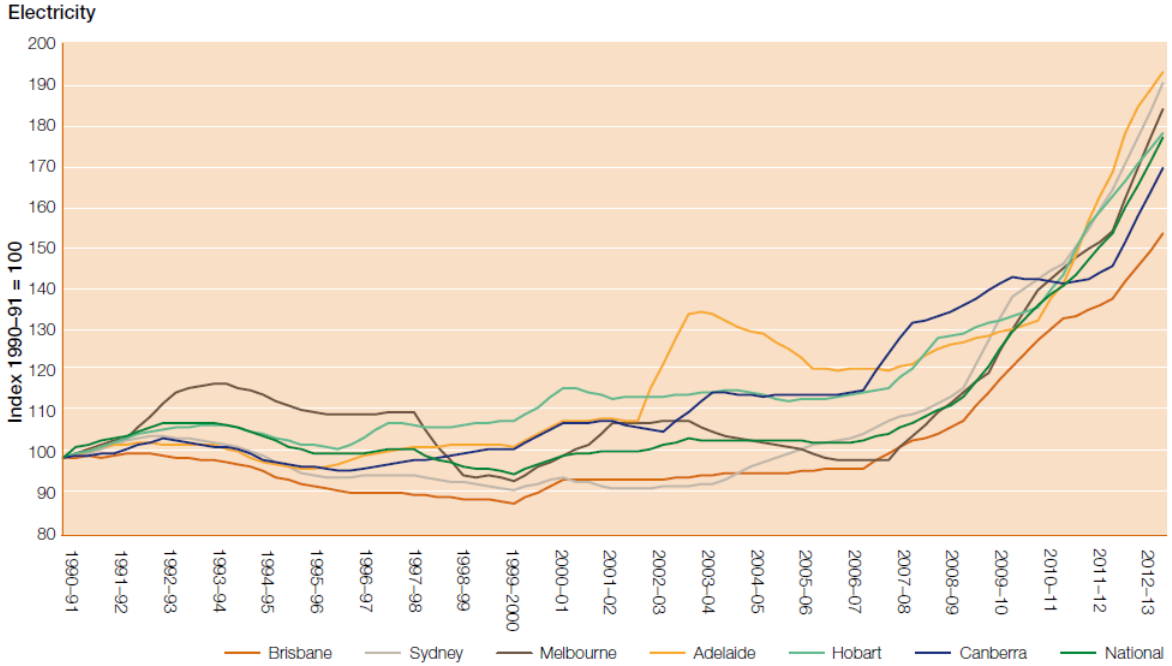
Sources: Customer switches: AEMO, MSATS transfer data to July 2013 and gas market reports, transfer history to July 2013; customer numbers: estimated from retail performance reports by the AER, IPART (New South Wales), the ESC (Victoria) and the QCA.

Source: AER, State of the energy market 2013

Market risk – retail electricity price increases

Figure 5.4

Retail price index (inflation adjusted)—Australian capital cities



Source: AER, State of the energy market 2013

Credit Risk

1. New entrants – smaller aggressive players
2. Customer closures
3. Changing market risk
4. Changing regulatory risk

Regulatory Risk

1. Renewable energy target review
2. Energy green paper
3. CSG availability
4. Market reforms
5. Privatisation

Example projects

- Market risk
  - Asset valuations – real options
  - Procurement / trading strategies
- Credit risk
  - Prudentials
  - G20 reforms
- Regulatory risk
  - Generator market power
  - Retail price trends

Contact details

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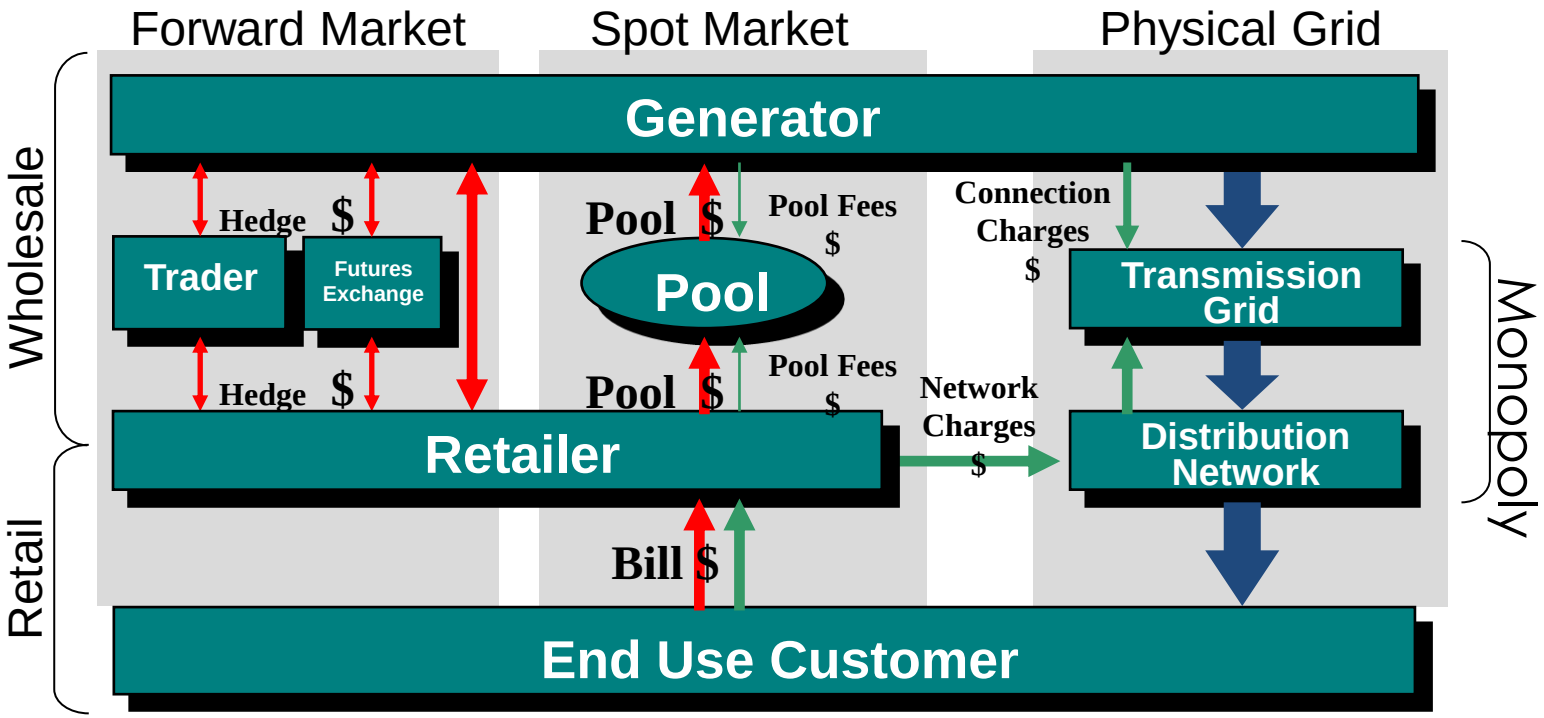
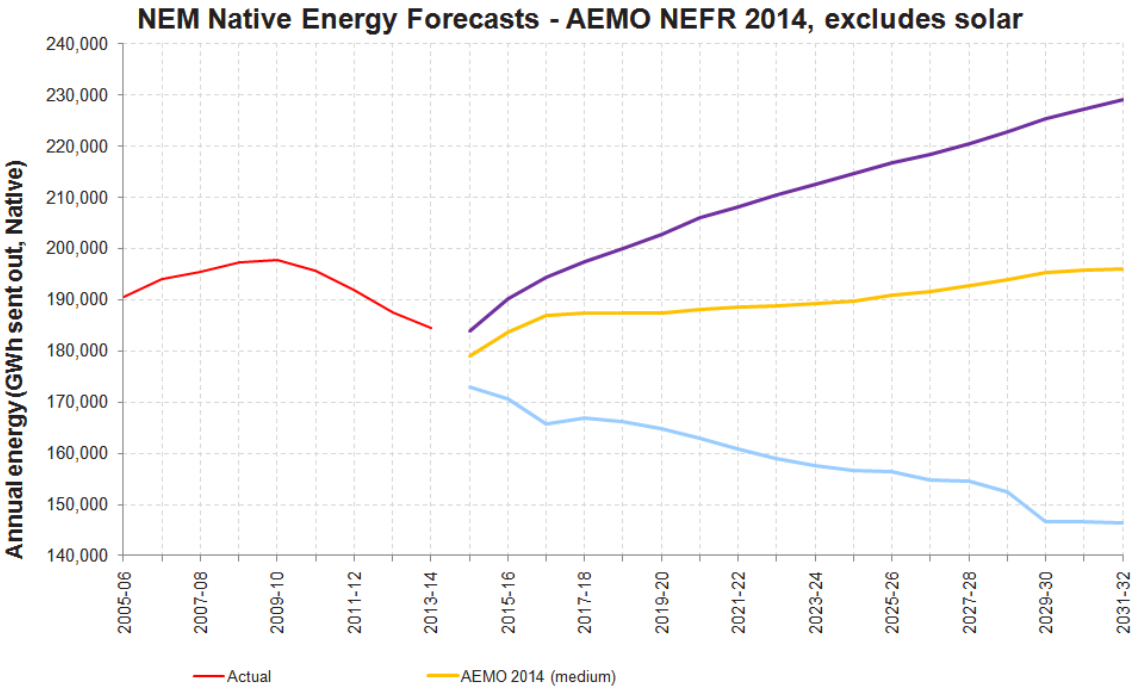
Energy Markets

Michelle Shek

Electricity Market Structure



Total Electricity Usage – NEM wide



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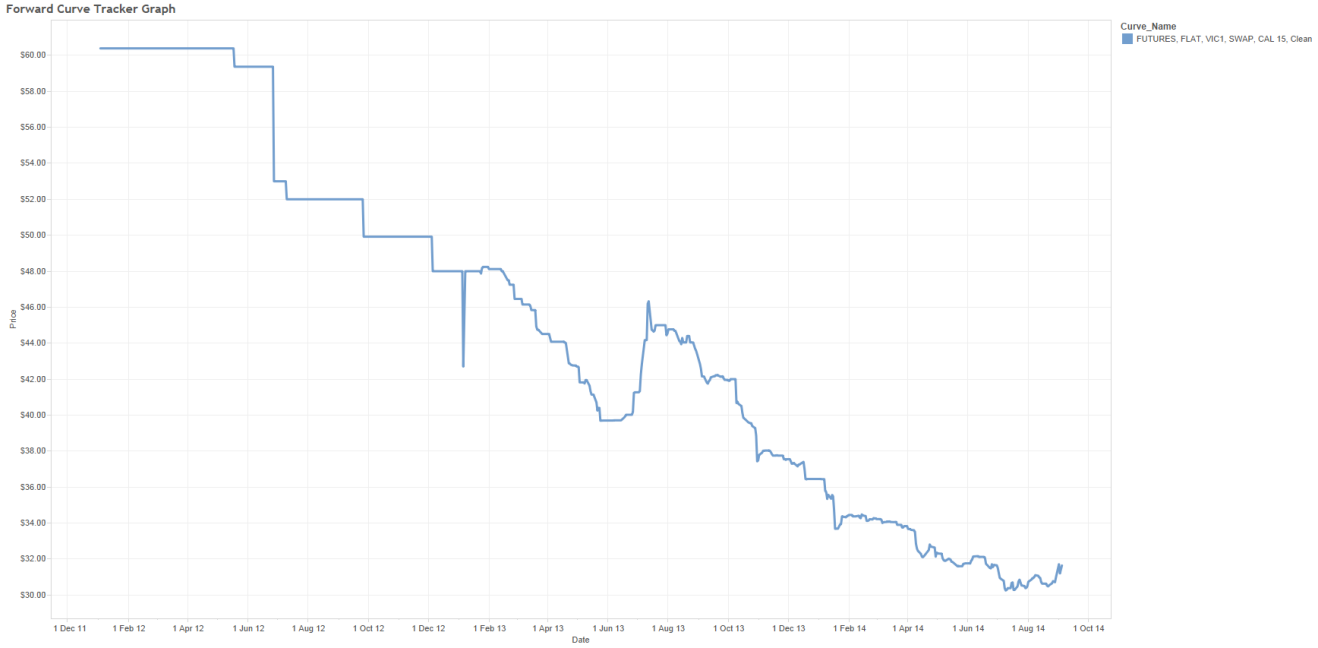
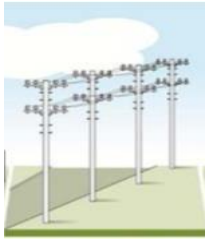
Forward Price Chart



A Vertically Integrated Business



Generation

cost of generation
(fuel)

Retail

retail income
(tariff)

Competitive Markets

Defining the Position

- Physical vs. Financial
- Position determinants are uncertain and subjective…
- Documenting the key position determinants

An Actuarial Perspective

- Forecasting
- Pricing
- Risk Management (Energy, Credit, Operational, Treasury, Regulatory)
- Hedge / Trading Strategies
- Corporate Strategy

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What is a “reasonable worst case”?

Julie Sims

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smartcompany

finance | growth | leadership | technology | people | marketi

resources

Energy company Jackgreen collapses due to heat wave

Tuesday, 22 December 2009 0:40

PATRICK STAFFORD

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Renewable energy electricity retailer Jackgreen has entered voluntary administration, allegedly due to financial difficulties incurred during a heat wave occurring on the NSW eastern seaboard. Atle Crowe-Maxwell of PKF has confirmed he and colleague John Lord have been appointed as voluntary administrators for the company, but Jackgreen would not return calls for comment.

A statement from Crowe-Maxwell and Lord is expected to be made this afternoon.

Jackgreen was served with a court application at the request of state government-owned Integral Energy Australia earlier this month, saying the company should be wound up on the basis of an alleged failure to pay an outstanding $808,983.

Apparently the money was owed due to the on-the-spot purchase of energy during NSW's November heat wave, when Jackgreen was forced to buy electricity at higher prices. The company has about 70,000 residential customers, who are now expected to move to competing retailers.

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The Sydney Morning Herald
BusinessDay

Lost money due to poor financi
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Power players may face legal action over Jackgreen

April 19, 2010

Read later

Clancy Yeates

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INTEGRAL ENERGY and the Australian Energy Market Operator could face legal action over their role in the collapse of the renewable energy company Jackgreen.

Jackgreen, which was Australia's largest specialist renewable retailer, went into voluntary administration in December after it failed to pay a $500,000 bill to the NSW government-owned Integral Energy.

Outline

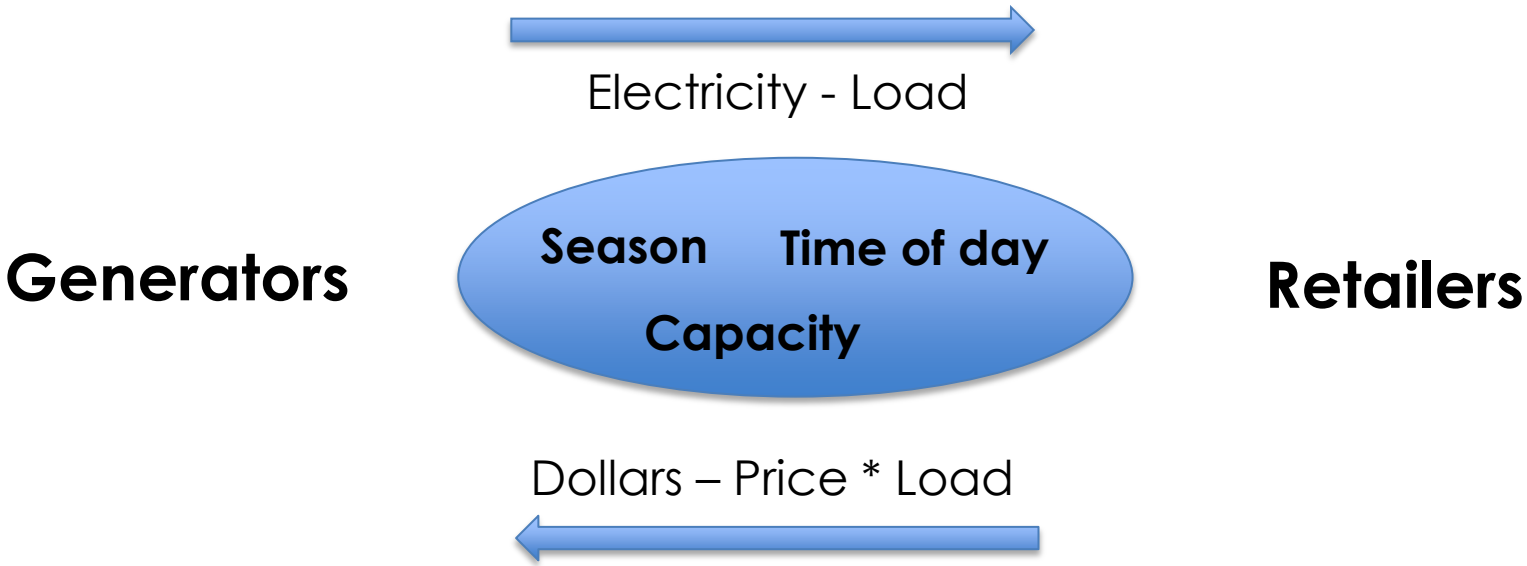
1. The background – the players and their relationships
2. Some of the interesting things we found
3. Why actuaries should (or not) be involved in Energy

National Energy Market

"The National Electricity Objective is to promote **efficient investment** in, and **efficient operation** and use of, electricity services for the long-term **interests of consumers** of electricity with respect to:

- price, quality, safety, reliability, and security of supply of electricity; and
- the reliability, safety and security of the national electricity system."

The Players (Highly Simplified!)



The Process

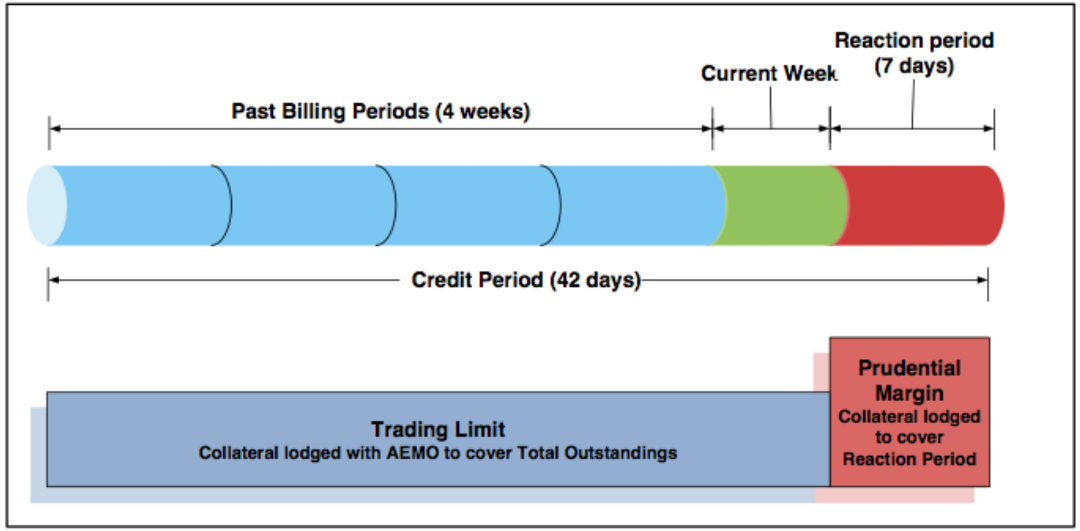


Figure 1: NEM Prudential and Settlement Timeline

National Electricity Rules

"National Electricity Rules exist so that market participants understand their rights and responsibilities, and there is appropriate regulation so that consumers do not pay more than necessary for their electricity."

1000+ pages!

"Reasonable worst case" = A position that, while not being impossible, is to a probability level that the estimate would not be exceeded more than once in 48 months

The Questions

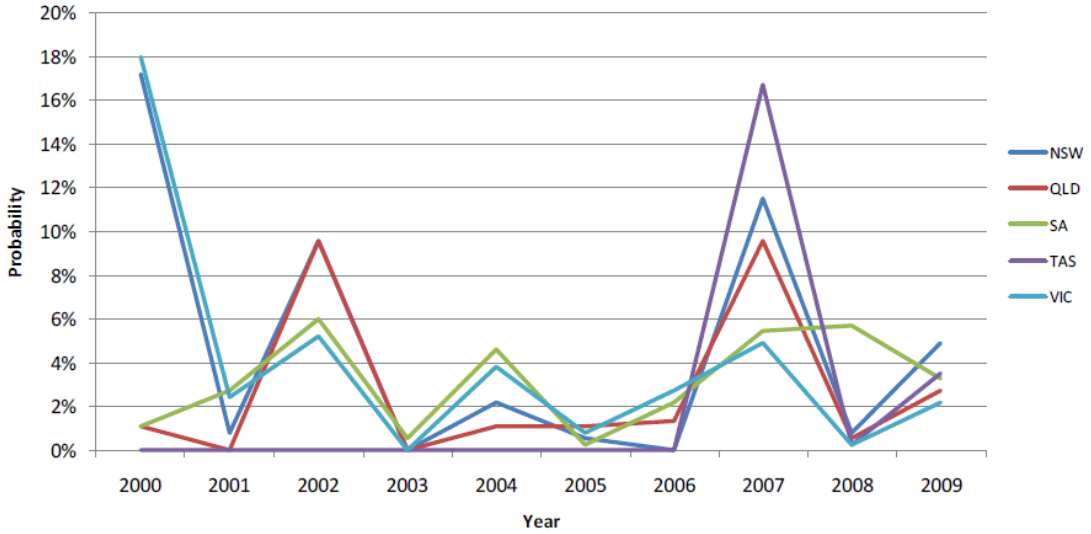
1. What level of prudential confidence had the current process historically provided?
2. What are the implications of seasonal variation?
3. Should the prudential standard in the Rules be changed?
4. What calculation methodology would support achieving that prudential standard?

Some Issues

1. **Does the "level of prudential confidence" include the probability of a retailer defaulting?**
   We only considered the "probability of loss given default".
2. **A lot of data – over 200,000 values of price – but huge differences between years.**

Interesting Findings – variation by year

Figure 4.4 Probability of a Loss given Default, RMCL, Base Case, by NEM region and year, avg percent

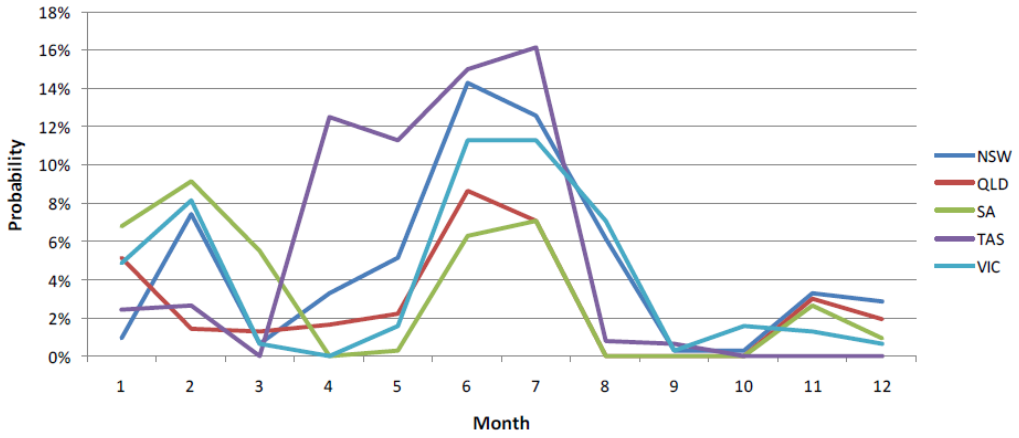


Some Issues

1. Does the "level of prudential confidence" include the probability of a retailer defaulting?
   We only considered the "probability of loss given default".
2. A lot of data – over 200,000 values of price – but huge differences between years.
3. **Seasonal variation is different between states.**

Interesting Findings – variation by month

Figure 4.3 Probability of a *Loss given default*, RMCL, Base Case, by NEM region and calendar month, avg percent

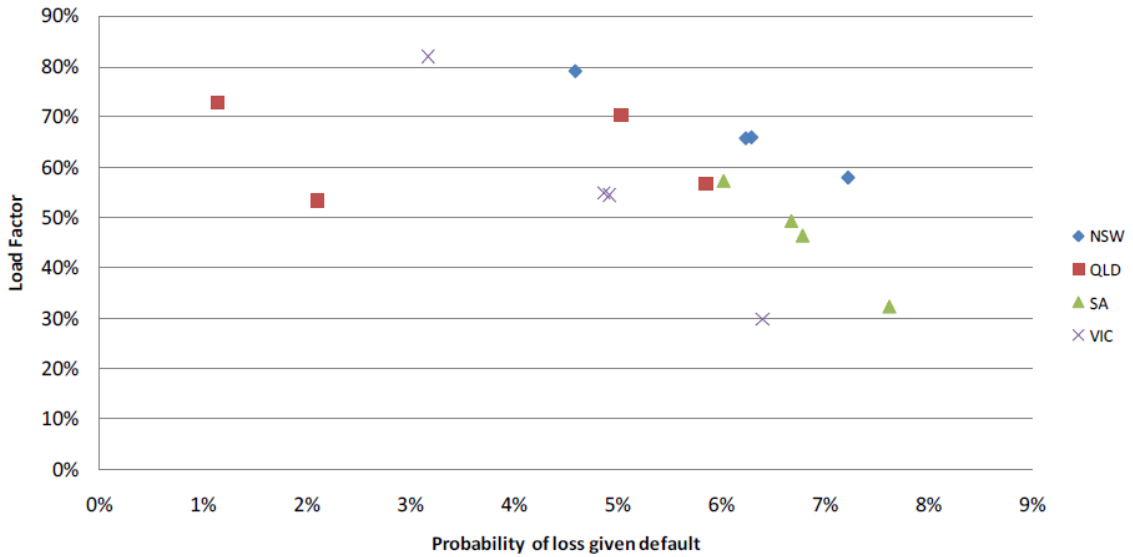


Some Issues

1. Does the "level of prudential confidence" include the probability of a retailer defaulting?
   We only considered the "probability of loss given default".
2. A lot of data – over 200,000 values of price – but huge differences between years.
3. Seasonal variation is different between states.
4. **Some retailers have very different markets.**

Interesting Findings – variation by load factor

Figure 4.12 Potential events of a *loss given default*, Base Case, by representative retailer, load factor and NEM region



Our Answers

1. What level of prudential confidence had the current process historically provided? **A lot less than any reasonable interpretation of the then-current rules.**
2. What are the implications of seasonal variation? **Electricity demand doesn't fit neatly into the conventional four seasons.**
3. Should the prudential standard in the Rules be changed? **Yes**
4. What calculation methodology would support achieving that prudential standard? **Alternative methods suggested for forecasting load, price and volatility**

Should actuaries be in Energy?

- Yes – it's interesting and complex
- Yes – the customer made use of the results
- Yes – it requires a skill set similar to traditional actuarial work
- Maybe – subject knowledge is a huge advantage

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