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## C Hedging in the electricity market

### C.1 The role of hedging

Electricity prices in the spot market are highly variable. The price, which usually sits between \$0 and \$100 per megawatt hour, can suddenly rise to \$12 900 or fall to -\$1000 per megawatt hour, depending on market conditions.

Such price fluctuations potentially expose both retailers and generators to significant risk. Retailers make agreements with homes and businesses to deliver electricity at an agreed price — agreements that must be met even if the price in the spot market rises dramatically.

Likewise, the volatile nature of electricity prices means that a large proportion of generator returns in the spot market come from a relatively small number of events.<sup>1</sup> Were a generator to try to deal directly with the spot market, and these events did not eventuate (for example there may be a series of mild summers) the generator may not receive an adequate return on its investment.

In practice, often neither party has to bear the risk described above. This is because a high price event that is a ‘bad’ outcome for a retailer also happens to be a ‘good’ outcome for a generator. These two parties can agree to a hedging contract that will effectively set the price in advance (box C.1).

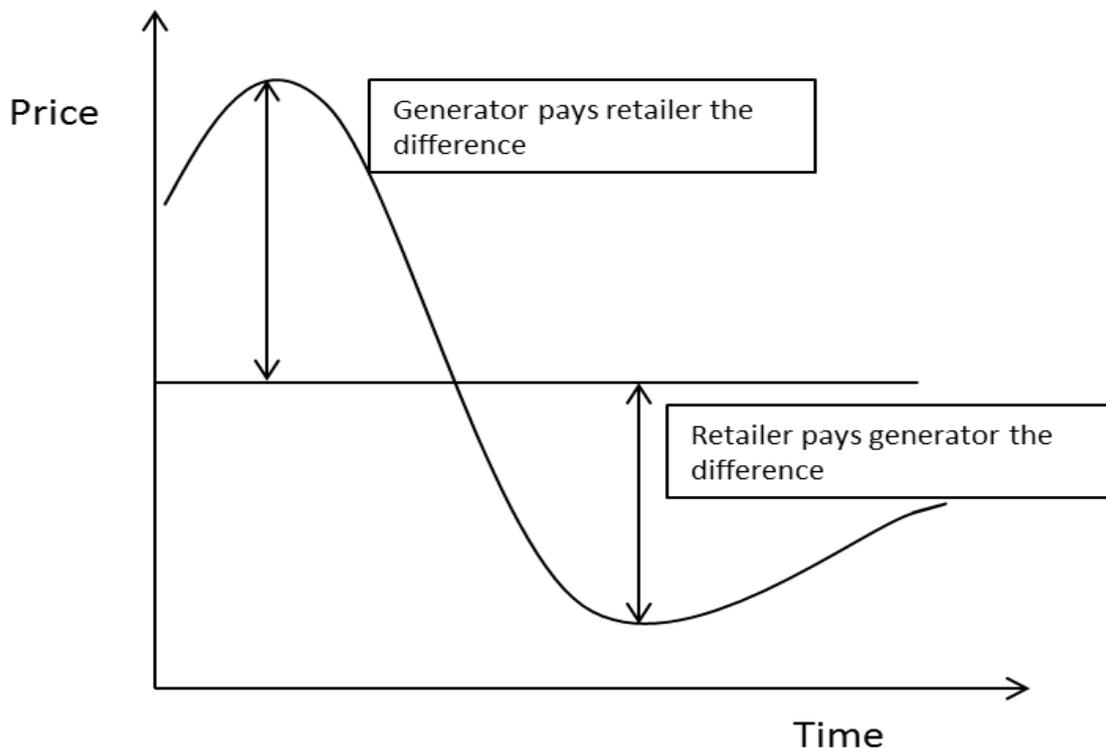
This type of contract allows a retailer and a generator to deal in advance for a given quantity of electricity. However, in practice, neither the retailer nor the generator will typically know how much electricity they need to trade. Managing this quantity risk requires a variety of different hedging products. However, they are all based on the premise of managing exposure to the price risk in the spot market.

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<sup>1</sup> For example, the submission from the Energy Users Association of Australia (sub. 24, p. 13) provides an example from South Australia, where the 72 highest half-hourly price intervals account for more than half the total revenue in 2008 and 2009, and around 44 per cent and 26 per cent of total revenue in 2010 and 2011 respectively.

### Box C.1 A basic hedging contract

It is not possible for parties to trade in electricity directly, because in the National Electricity Market (NEM), all electricity must be bought and sold through the central pool. However, it is possible for generators and retailers to agree to a contract that effectively delivers the same outcome. That is, if the spot price is 'high', the generator agrees to pay the retailer; and if the spot price is 'low', the retailer agrees to pay the generator.



## C.2 Types of hedging product

A range of products exists to allow retailers and generators to trade electricity in quantities that vary throughout the day and that are unpredictable. The basic products available are:

- *A base load swap* — a contract to trade a fixed amount of electricity for a certain price at all times in a day.
- *A peaking swap* — similar to a base load swap, but applying to trade only during a specific time of the day — for example from 7am to 10pm — and only on working days.

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- *A flat cap* — a contract that gives the holder the option to buy a given amount of electricity at an agreed price. These are often set at a strike price of \$300 in the NEM.
  - *A peaking cap* — similar to a flat cap, but can only be called on during peak hours.

There are also a wide range of exotic contracts that are used by parties to manage risk, including:

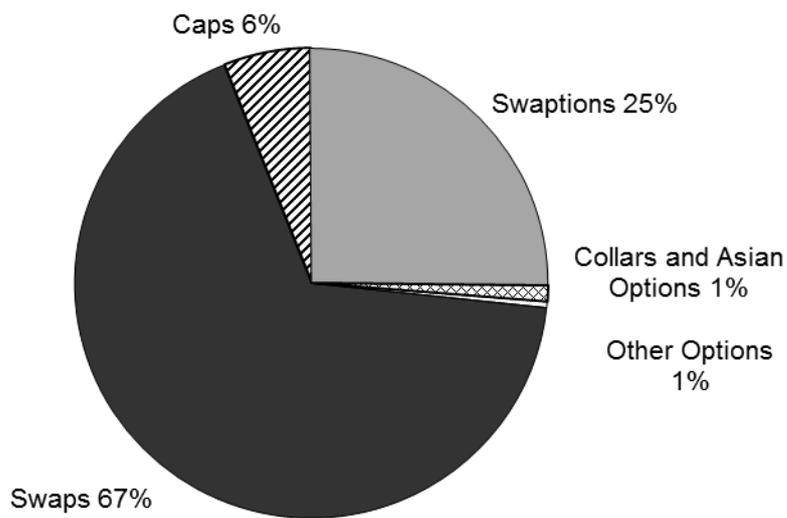
- *Weather contingent options*: that can only be used if a particular weather outcome occurs, such as above average temperatures over a given period.
- *Asian options*: an option contract that can be called on if the average price of electricity is high over a predetermined period.
- *Swaptions*: an option contract that gives the holder the right to enter into a swap contract, if they choose to do so.
- *Outage protection contracts*: a product that allows generators to protect themselves against the risk of being unable to sell electricity in the spot market.
- *Load following contracts*: a hedging product that follows the usage of the electricity consumer.
- *Price Floors*: a contract that gives the holder the option to sell a given amount of electricity at an agreed price.
- *Collar contracts*: A combination of a cap and floor contract that limits both upwards and downwards price movement.

The relative usage of different types of contracts is shown in figure C.1.

A retailer will seek to manage the risk associated with their customer load using a variety of these products. A hypothetical example for a typical day is shown in figure C.2 below. In the figure, the dotted lines represent the range electricity demand from final customers that the retailer must provide and the shaded areas represent the coverage provided by different hedging instruments.

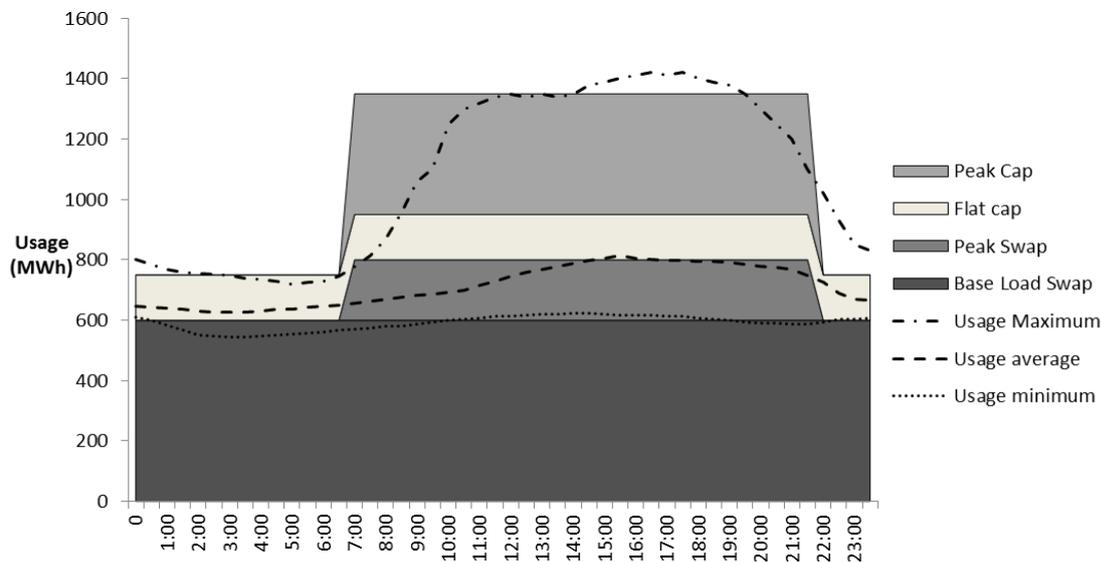
An important feature of the market is that different hedging products will be sold by different generators (figure C.3). The type of contract sold by a generator will be determined by the expected electricity output of the generator. For example, a base load generator will expect to be operating at a consistent level throughout the day, and can sell this output through a base load swap. On the other hand, a peaking generator is unlikely to be dispatched during normal market conditions when the spot market price is low, but will be dispatched when the prices are high. This makes them ideally suited to selling cap products.

**Figure C.1 Types of contracts traded**



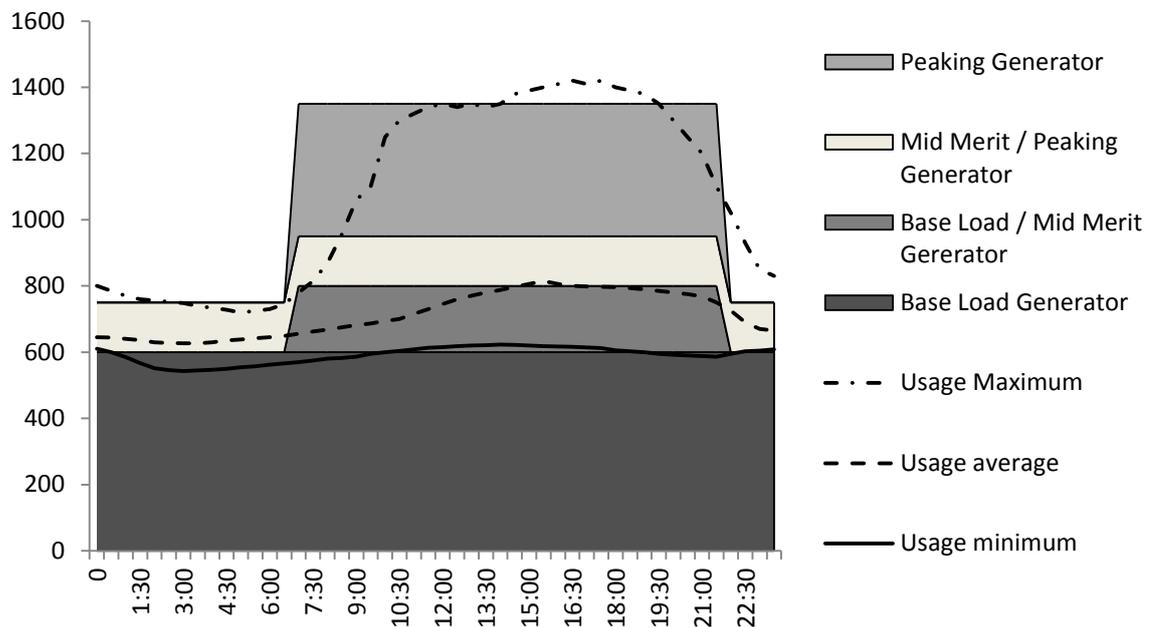
Data source: AFMA (2012).

**Figure C.2 Illustrative risk management approach**



Underlying data are hypothetical and are for illustrative purposes only.

Figure C.3 Illustrative range of hedging products offered by generators



Underlying data are hypothetical and are for illustrative purposes only.

### C.3 Trading positions of market players

Trading positions of market players are often more complicated than the simple representations above, and are commercially sensitive. As a result, it is difficult to know what a ‘typical’ trading strategy of a market participant would look like. However, discussions with participants have revealed a few ‘rules of thumb’ that can be helpful when considering trading positions.

Typically, generators will hedge all but one of the total number of generating units in the portfolio. This allows them to generate enough power to cover the contract, even if one generating unit went offline or was otherwise constrained.

Retailers on the other hand, appear to have followed several different strategies, ranging from attempting to fully hedge their position, to holding a minimal hedging position.

The hedging market also has a large number of speculators that are not directly involved in generating or retailing electricity. Speculators will enter the market if they think that the electricity derivatives are mispriced. While commercially motivated, speculation provides liquidity to the market and thereby provides market participants greater surety that they will be able to trade in the future.

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## C.4 How are hedges traded?

There are three ways that hedges are traded in the NEM:

- **Over the Counter (OTC)** contracts are a direct agreement between two parties and as such allow a high level of flexibility in the terms of the arrangement. These instruments are often for a time several years in the future, meaning that each party bears some risk that the counterparty will become insolvent before the contract becomes due (credit default risk). As a result, traders will often choose only to enter into a contract with a party that has an acceptably high credit rating.
- **The Sydney Futures Exchange** is a common exchange where participants trade in a number of standardised futures products. Trade is anonymous and risk is managed through a mark-to-market process.<sup>2</sup> As a result, there is very little credit default risk involved and lower barriers to entry to this form of trading.
- **Gentailers** are a form of natural hedge as the company involved holds both generation and retailing assets. As a result, both sides of the hedging position are held within the same company. Trading in this way allows a company to limit its exposure to the futures market, and has grown substantially in recent years.

## C.5 Trends in the hedging market

In 2011-12, total turnover in the OTC market was 227 million megawatt hours, with 437 million megawatt hours in the Sydney Futures Exchange market. Together these market trade contracts summed to three and a half times the amount of energy produced in the NEM (AFMA 2012).<sup>3</sup> Moreover, these trading volumes have been increasing (figure C.4). The growth has occurred in spite of a market trend towards vertical integration of generators and retailers. (Gentailing tends to decrease the volume of traded derivatives, as hedging is undertaken within an organisation.) The (AER 2011b, p. 13) found:

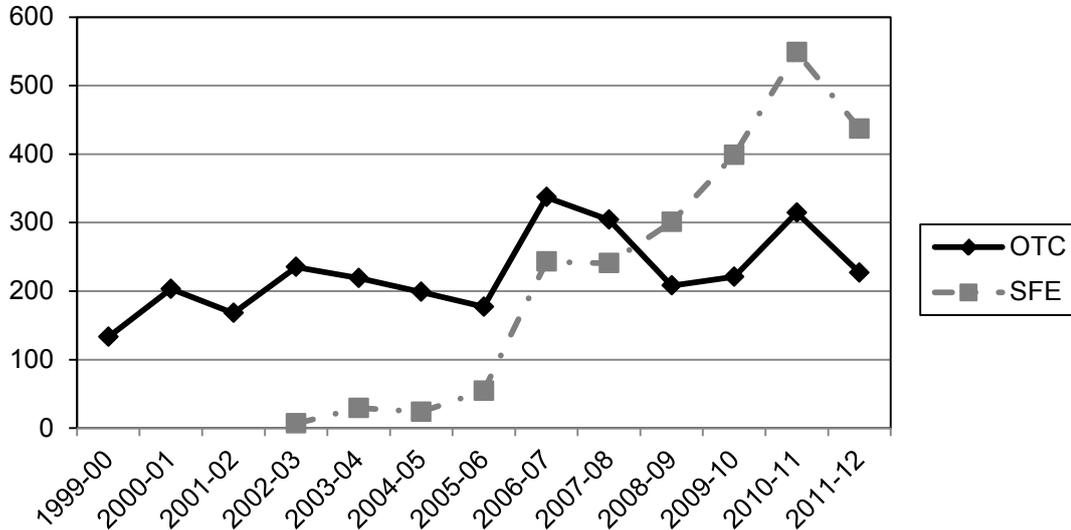
Around 58 per cent of new generation capacity commissioned or committed since 2007 is controlled by Origin Energy, AGL Energy and TRUenergy. Generation investment since 2007 by entities that do not also retail energy has been negligible. In addition, many new entrant retailers in this time are vertically integrated with entities that were previously stand-alone generators — for example, International Power (trading as Simply Energy in retail markets), Infratil (Lumo Energy) and Alinta Energy.

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<sup>2</sup> The mark to market process involves payments at the end of each day to ‘settle’ the change in value of the option over that day.

<sup>3</sup> Markets where the derivative market is larger than the realised market are quite common. For example, the liquidity ratio, which is the ratio of turnover on the financial market to turnover on the product market, on Australian Commonwealth Government bonds is 4.7 (AFMA 2012).

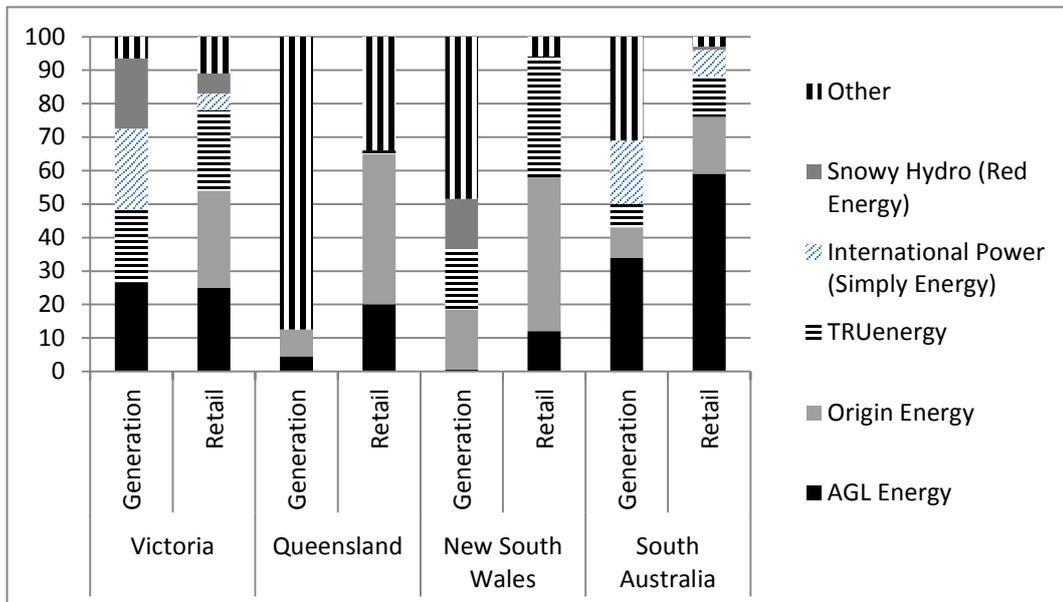
**Figure C.4 Long-term increase in trading volumes**  
(Million megawatt hours)



Data source: AFMA (2012)

This has led to large market positions held by a small number of prominent gentailers (figure C.5).

**Figure C.5 Gentailing in the NEM<sup>a</sup>**



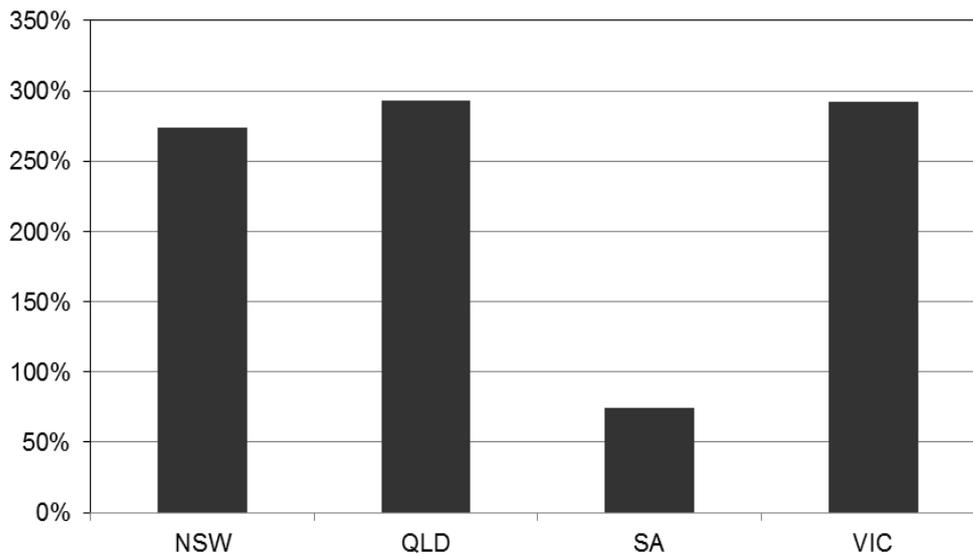
<sup>a</sup> Generation data include power produced under contract

Data source: AER (2011b).

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A high level of vertical integration is seemingly one of the reasons why the South Australian market has a lower trading level than other regions of the NEM (figure C.6). A lack of liquidity can be problematic for a derivative market. This issue, as well as a number of potential solutions, are discussed in chapter 19 of this report.

**Figure C.6 Liquidity ratios in different regions of the NEM**



*Data sources: AFMA (2011b), AEMO (2012k).*