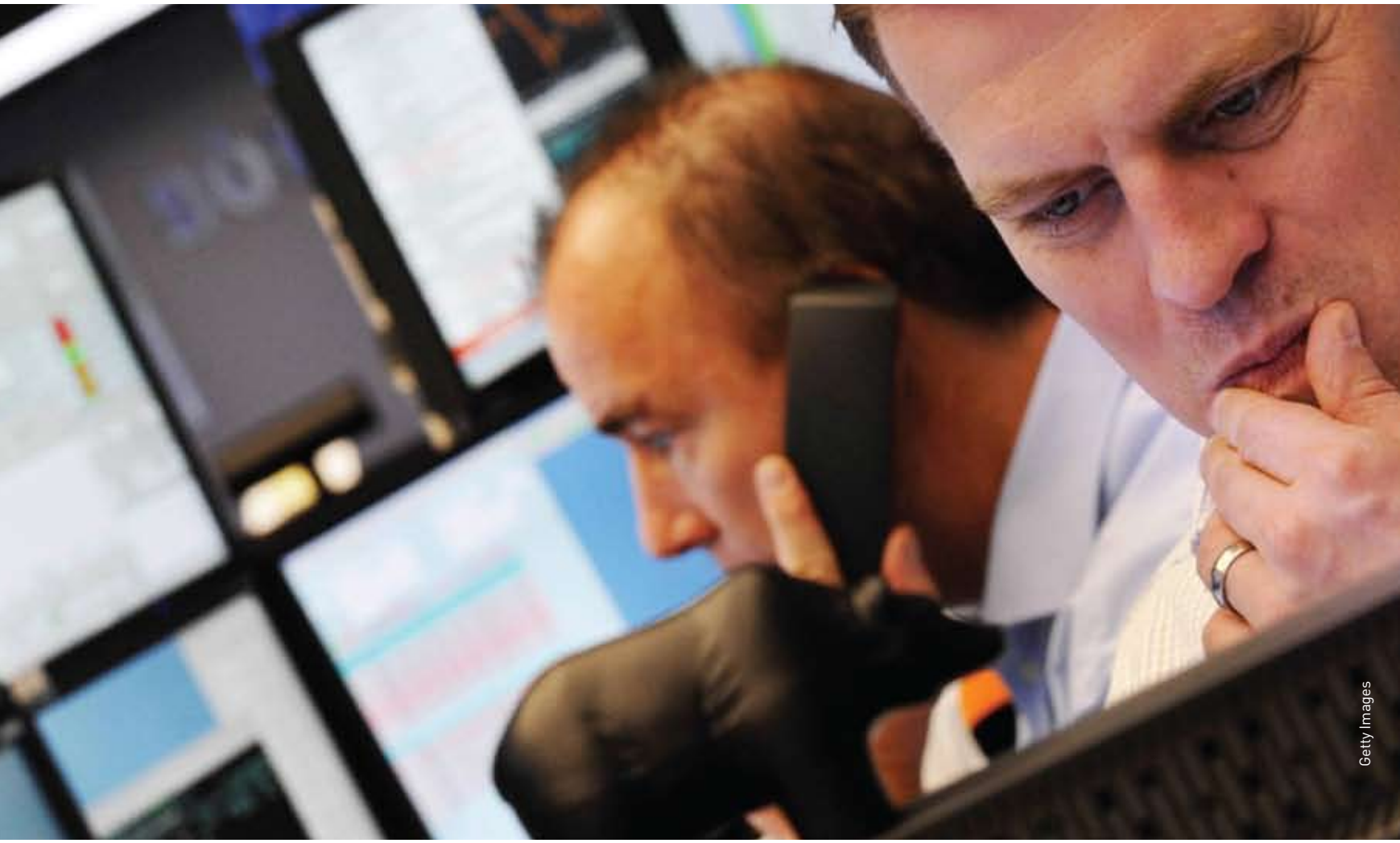
3 ELECTRICITY FINANCIAL MARKETS



Spot price volatility in the National Electricity Market can cause significant price risk to physical market participants. While generators face a risk of low prices impacting on earnings, retailers face a complementary risk that prices may rise to levels they cannot pass on to their customers. A common method by which market participants manage their exposure to price volatility is to enter into financial contracts that lock in firm prices for the electricity they intend to produce or buy in the future.

3 ELECTRICITY FINANCIAL MARKETS

This chapter considers:

- the structure of electricity financial markets in Australia, including over-the-counter markets and the exchange-traded market on the Sydney Futures Exchange
- financial market instruments traded in Australia
- liquidity indicators for Australia's electricity financial markets, including trading volumes, open interest, changes in the demand for particular instruments, changes in market structure and vertical integration in the underlying electricity wholesale market
- price outcomes on the Sydney Futures Exchange
- other mechanisms to manage price risk in the wholesale electricity market.

While the Australian Energy Regulator (AER) does not regulate the electricity derivatives markets, it monitors the markets because of their significant linkages with wholesale and retail activity. For example, levels of contracting and forward prices in the financial markets can affect generator bidding in the physical electricity market. Similarly, financial markets can influence retail competition by providing a means for new entrants to manage price risk. More generally, the markets create price signals for energy infrastructure investors and provide a means to secure the future earnings streams needed to underpin investment.

3.1 Financial market structure

Financial markets offer contractual instruments—called derivatives—to manage forward price risk in wholesale electricity markets.[1] While the derivatives provide a means of locking in future prices, they do not give rise to the physical delivery of electricity.

The participants in electricity derivatives markets include generators, retailers, financial intermediaries and speculators such as hedge funds. Brokers facilitate many transactions between contracting participants.

In Australia, two distinct electricity financial markets have emerged to support the wholesale electricity market:

- over-the-counter (OTC) markets, comprising direct transactions between two counterparties, often with the assistance of a broker
- the exchange-traded market on the Sydney Futures Exchange (SFE).

3.1.1 Over-the-counter markets

Over-the-counter markets allow market participants to enter into confidential contracts to manage risk. Many OTC contracts are bilateral arrangements between generators and retailers, which face opposing risks in the physical spot market. Other OTC contracts are arranged with the assistance of brokers that post bid (buy) and ask (sell) prices on behalf of their clients. In 2007–08, around 54 per cent of OTC contracts were arranged through a broker.[2] Financial intermediaries and speculators add market depth and liquidity by quoting bid and ask prices, taking trading positions and taking on market risk to facilitate transactions.

Most OTC transactions are documented under the International Swaps and Derivatives Association master agreement, which provides a template of standard terms and conditions, including terms of credit, default provisions and settlement arrangements. While the template creates considerable standardisation in OTC contracts, the terms are normally modified by market participants to suit their particular needs. This means that OTC products can provide flexible solutions through a variety of structures.

The *Financial Services Reform Act 2001* includes disclosure provisions that relate to OTC markets. In general, however, the bilateral nature of OTC markets tends to make volume and price activity less transparent than in the exchange-traded market.

3.1.2 Exchange-traded futures

Derivative products such as electricity futures and options are traded on registered exchanges. In Australia, electricity futures products developed by d-cyphaTrade are traded on the SFE.[3] Participants (licensed brokers) buy and sell contracts on behalf of clients that include generators, retailers, speculators such as hedge funds, and banks and other financial intermediaries.

There are a number of differences between OTC trading and exchange trading on the SFE:

- Exchange-traded derivatives are highly standardised in terms of contract size, minimum allowable price fluctuations, maturity dates and load profiles. The product range in OTC markets tends to be more diverse and includes 'sculpted' products.
- Exchange trades are multilateral and publicly reported, giving rise to greater market transparency and price discovery than in the OTC market.

1 Spot prices in the wholesale market can vary between −$1000 per megawatt hour (MWh) (the price floor) and $10 000 per MWh (the price cap). To manage risk resulting from volatility in the spot price, retailers can hedge their portfolios by purchasing financial derivatives that lock in firm prices for the volume of energy they expect to purchase in the future. This eliminates exposure to future price volatility for the quantity hedged and provides greater certainty on profits. Similarly, a generator can hedge against low spot prices.

2 AFMA, *2008 Australian Financial Markets Report*, 2008 and supporting 'Full report data' spreadsheet.

3 In 2006 the Sydney Futures Exchange merged with the Australian Stock Exchange. The merged company operates under the name Australian Securities Exchange.

- Unlike OTC transactions, exchange-traded derivatives are settled through a centralised clearing house, which is the central counterparty to transactions and applies daily *mark-to-market* cash margining to manage credit default risk.[4] Exchange clearing houses, such as the SFE Clearing Corporation, are regulated and are subject to prudential requirements to mitigate credit default risks. This offers an alternative to OTC trading, in which trading parties rely on the credit worthiness of electricity market counterparties. More generally, liquidity issues can arise in OTC markets if trading parties reach or breach their credit risk limits with other OTC counterparties (for example, due to revaluations of existing bilateral hedge obligations or credit downgrades of counterparties).

3.1.3 Regulatory framework

Electricity financial markets are subject to a regulatory framework that includes the *Corporations Act 2001* and the *Financial Services Reform Act 2001*. The Australian Securities and Investments Commission is the principal regulatory agency. Amendments to the Corporations Act in 2002 extended insider trading legislation and the disclosure principles expected from securities and equity-related futures to electricity derivative contracts. The Energy Reform Implementation Group (ERIG) noted in 2006 that there remains some uncertainty among market participants as to their disclosure requirements under the legislation.[5]

In 2004, the Australian Accounting Standards Board (AASB) issued new or revised standards to harmonise Australian standards with the International Financial Reporting Standards. The new standards included AASB 139, which requires companies' hedging arrangements to pass an effectiveness test to qualify for hedge accounting. The standards also outline financial reporting obligations such as mark-to-market valuation of derivative portfolios. The standards require benchmarking financial derivative revaluations to observable market prices and adjustment for embedded credit default risk.

There are a number of further regulatory overlays in electricity derivative markets. For example:

- the Corporations Act requires that OTC market participants have an Australian Financial Services licence or exemption
- exchange-based transactions are subject to the operating rules of the SFE.

3.1.4 Relationship with the National Electricity Market

Figure 3.1 illustrates the relationship between the financial markets and the physical trading of electricity in the National Electricity Market (NEM). Trading and settlement in the NEM occur independently of financial market activity, although a generator's exposure in the financial market can affect its bidding behaviour in the NEM. Similarly, a retailer's exposure to the financial market may affect the pricing and availability of supply contracts offered to customers.

3.2 Financial market instruments

The financial market instruments traded in the OTC and exchange-traded markets are called derivatives because they derive their value from an underlying asset—in this case, electricity traded in the NEM. The derivatives give rise to cash flows from the differences between the contract price of the derivative and the spot price of electricity. The prices of these instruments reflect the expected spot price, plus premiums to cover credit default risk and market risk.

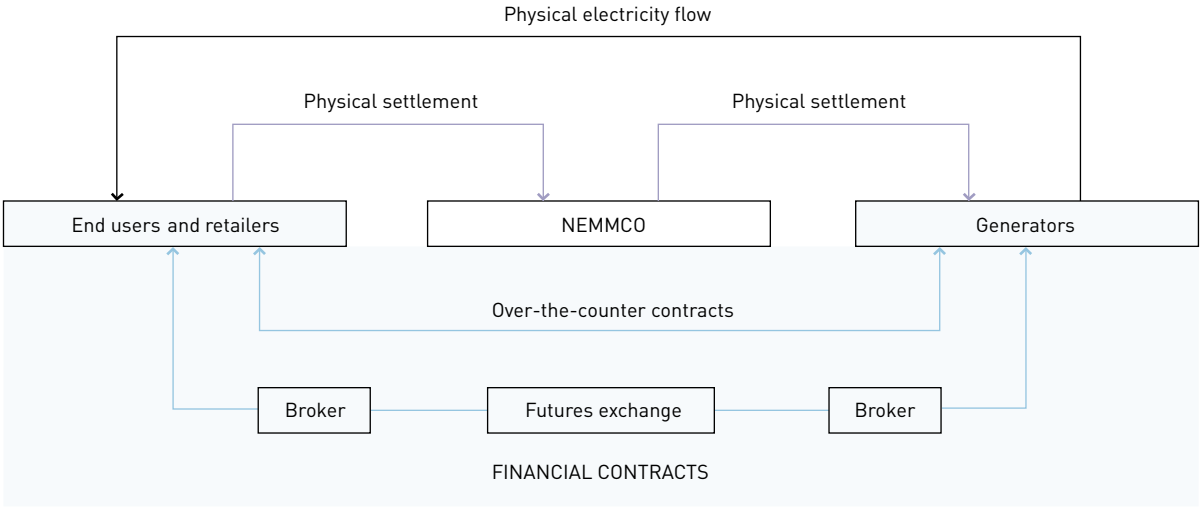
Table 3.1 lists some of the derivative instruments available in the OTC and exchange-traded markets. Common derivatives to hedge exposure to the NEM spot price are forwards (such as swaps and futures) and options (such as caps). Each provides the buyer and seller with a fixed price—and therefore a predictable future cash flow—either upon purchase/sale of the derivative or, in the case of an option, if the option is exercised. The following section describes some of the instruments in more detail.

4 Mark-to-market refers to the valuation technique whereby unrealised profit or loss associated with a derivative position is determined (and reported in financial statements) by reference to prevailing market prices.

5 ERIG, Discussion papers, November 2006.

Figure 3.1

Relationship between the National Electricity Market and financial markets



NEMMCO, National Electricity Market Management Company.

Source: Energy Reform Implementation Group.

Table 3.1 **Common electricity derivatives in over-the-counter and Sydney Futures Exchange markets**

INSTRUMENT	DESCRIPTION
Forward contracts	Agreement to exchange the NEM spot price in the future for an agreed fixed price. Forwards are called swaps in the OTC markets and futures on the SFE.
> swaps (OTC market)	OTC swap settlements are typically paid or received weekly in arrears (after the spot price is known) based on the difference between the spot price and the previously agreed fixed price.
> futures (SFE)	SFE electricity futures and options settlements are paid or received daily based on mark-to-market valuations. SFE futures are finally cash settled against the average spot price of the relevant quarter.
Options	A right—without obligation—to enter into a transaction at an agreed price in the future (exercisable option) or a right to receive cash flow differences between an agreed price and a floating price (cash settled option).
> cap	A contract through which the buyer earns payments when the pool price exceeds an agreed price. Caps are typically purchased by retailers to place a ceiling on their effective pool purchase price in the future.
> floor	A contract through which the buyer earns payments when the pool price is less than an agreed price. Floors are typically purchased by generators to ensure a minimum effective pool sale price in the future.
> swaptions or futures options	An option to enter into a swap or futures contract at an agreed price and time in the future.
> Asian options	An option in which the payoff is linked to the average value of an underlying benchmark (usually the NEM spot price) during a defined period.
> profiled volume options for sculpted loads	A volumetric option that gives the holder the right to purchase a flexible volume in the future at a fixed price.

NEM, National Electricity Market; OTC, over-the-counter; SFE, Sydney Futures Exchange.

3.2.1 Forward contracts

Forward contracts—called swaps in the OTC market and futures on the SFE—allow a party to buy or sell a given quantity of electricity at a fixed price over a specified time horizon in the future. Each contract relates to a nominated time of day in a particular region. On the SFE, contracts are quoted for quarterly base and peak contracts, for up to four years into the future.[6]

For example, a retailer might enter into an OTC contract to buy 10 megawatts of Victorian peak load in the third quarter of 2007 at $45 per megawatt hour (MWh). During that quarter, whenever the Victorian spot price for any interval from 7.00 am to 10.00 pm Monday to Friday settles above $45 per MWh, the seller (which might be a generator or financial intermediary) pays the difference to the retailer. Conversely, the retailer pays the difference to the seller when the price settles below $45 per MWh. In effect, the contract locks in a price of $45 per MWh for both parties.

A typical OTC swap might involve a retailer and generator contracting with one another—directly or through a broker—to exchange the NEM spot price for a fixed price that reduces market risk for both parties. On the exchange-traded market, the parties (generators, retailers, financial intermediaries and speculators) that buy and sell futures contracts through SFE brokers remain anonymous. The SFE Clearing Corporation is the central counterparty to SFE transactions. As noted, exchange trading is more transparent in terms of prices and trading volumes. While the SFE tends to offer a narrower range of instruments than the OTC market,[7] there are up to 3000 futures and options products listed on the SFE at any given time.

3.2.2 Options

While a swap or futures contract gives price certainty, it locks the parties into defined contract prices with defined volumes—without an opt-out provision if the underlying market moves adversely to the agreed contract price. An option gives the holder the right—without obligation—to enter into a contract at an agreed price, volume and term in the future. The buyer pays a premium to the option seller for this added flexibility.

An exercisable call (put) option gives the holder the right to buy (sell) a specified volume of electricity futures (or swaps) in the future at a predetermined strike price—either at any time up to the option's expiry (an 'American' option) or at expiry (a 'European' option). For example, a retailer that buys a call option to protect against a rise in NEM forward contract prices can later abandon that option if forward prices do not rise as predicted. The retailer could then take advantage of the lower prevailing forward (or NEM spot) price.

Commonly traded options in the electricity market are caps, floors and collars.[8] A cap allows the buyer—for example, a retailer with a natural *short* exposure to spot prices—to set an upper limit on the price that they will pay for electricity while still being able to benefit if NEM prices are lower than anticipated. For example, a cap at $300 per MWh—the cap most commonly traded in Australia—ensures that no matter how high the spot price may rise, a buyer using the cap to hedge a natural short retail spot market position will pay no more than $300 per MWh for the agreed volume of electricity. In Australia, a cap is typically sold for a nominated quarter; for example, July–September 2008. Base cap contracts are listed out two years ahead on a quarterly basis on the SFE and regularly trade in full year strips of quarters.

6 A peak contract relates to the hours from 7.00 am to 10.00 pm Monday to Friday, excluding public holidays. An off-peak contract relates to hours outside that period. A flat price contract covers both peak and off-peak periods.

7 The OTC market can theoretically support an unlimited range of bilaterally negotiated product types.

8 While caps and floors are technically options—they are effectively a series of half-hourly options—they are typically linked to the NEM spot price and are automatically exercised when they deliver a favourable outcome. Other options, such as swaptions, are generally linked to forward prices and the buyer must nominate whether or not the option is to be exercised.

By contrast, a floor contract struck at $40 per MWh will ensure a minimum price of $40 per MWh for a floor buyer such as a generator with a natural *long* exposure to spot prices. Retailers typically buy caps to secure firm maximum prices for future electricity purchases, while generators use floors to lock in a minimum price to cover future generation output. A collar contract combines a cap and floor to set a price band in which the parties agree to trade electricity in the future.

The range and diversity of products is expanding over time to meet the requirements of market participants.

3.2.3 Flexible volume instruments

Instruments such as swaps and options are used to manage NEM price risk for fixed quantities of electricity. But the profile of electricity loads varies according to the time of day and the weather conditions. This can result in significant volume risk in addition to price risk. In particular, it can leave a retailer over-hedged or under-hedged, depending on actual levels of electricity demand. Conversely, windfall gains can also be earned.

Structured products such as flexible volume contracts are used to manage volume risks. These sculpted products, which are traded in the OTC market, enable the buyer to vary the contracted volume on a pre-arranged basis. The buyer pays a premium for this added flexibility.

3.3 Financial market liquidity

The effectiveness of financial markets in providing risk management services depends on the extent to which they offer the products that market participants require. Adequate market liquidity is critical in this regard. In electricity financial markets, liquidity relates to the ability of participants to transact a standard order within a reasonable timeframe to manage their load and price risk, using reliable quoted prices that are resilient to large orders, and with sufficient market participants and trading volumes to ensure low transaction costs.

There are various indicators of liquidity in the electricity derivatives market, including:

- the volume and value of trade
- open interest in contracts
- transparency of pricing
- the number and diversity of market participants
- the number of market makers and the bid–ask spreads quoted by them
- the number and popularity of products traded
- the degree of vertical integration between generators and retailers
- the presence in the market of financial intermediaries.

This chapter focuses mainly on liquidity indicators relating to trading volumes, but also includes some consideration of open interest data, pricing transparency, changes in the demand for particular derivative products, changes in the financial market's structure and vertical integration.

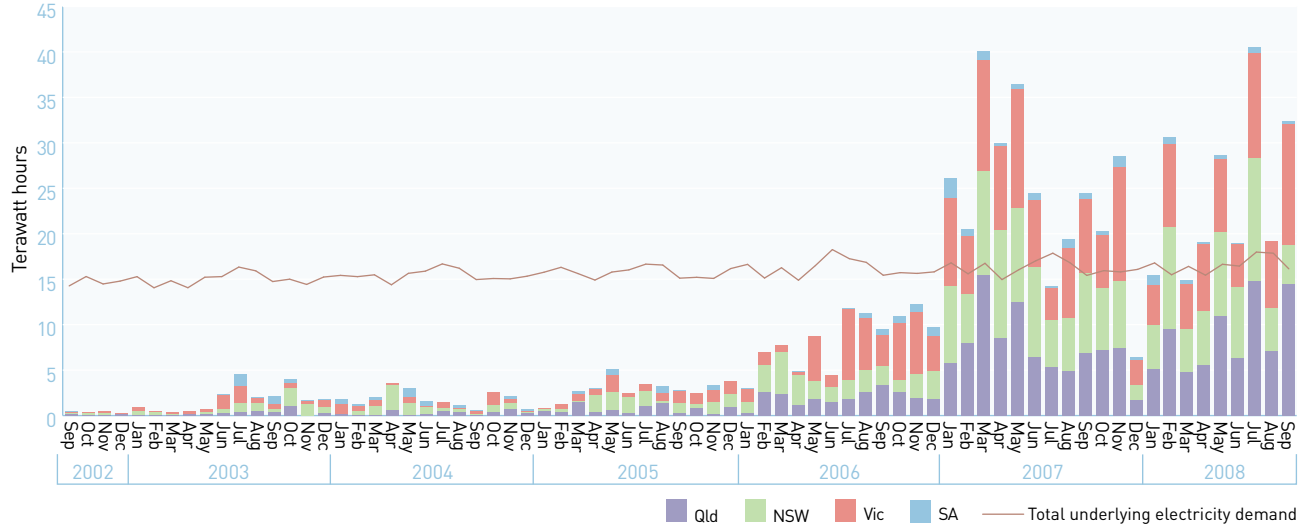
Table 3.2 **Trading volumes in electricity derivatives—Sydney Futures Exchange**

	2002–03	2003–04	2004–05	2005–06	2006–07	2007–08
Total trade (TWh)	7	30	24	55	243	241
Increase (per cent)		341	-19	129	345	-1

TWh, terawatt hours.

Source: d-cyphaTrade.

Figure 3.2
Regional trading volumes in electricity derivatives—Sydney Futures Exchange



Source: d-cyphaTrade.

3.4 Trading volumes in Australia's electricity derivative market

There is comprehensive data on derivative trading on the SFE, which is updated on a daily and real-time basis. The OTC market is less transparent, but periodic survey data provide some indicators of trading activity.

3.4.1 Sydney Futures Exchange

Financial market vendors such as d-cyphaTrade publish data on electricity derivative trading on the SFE. Table 3.2 and figure 3.2 illustrate volume trends. Trading levels accelerated from 2005–06, with 345 per cent growth in 2006–07. In that year, volumes were equivalent to around 124 per cent of underlying NEM demand. Trade in 2007–08 was down on the high levels seen in the first half of 2007, resulting in a slight decrease in overall volumes. There are early indications of a continuation of high trading volumes in 2008–09.

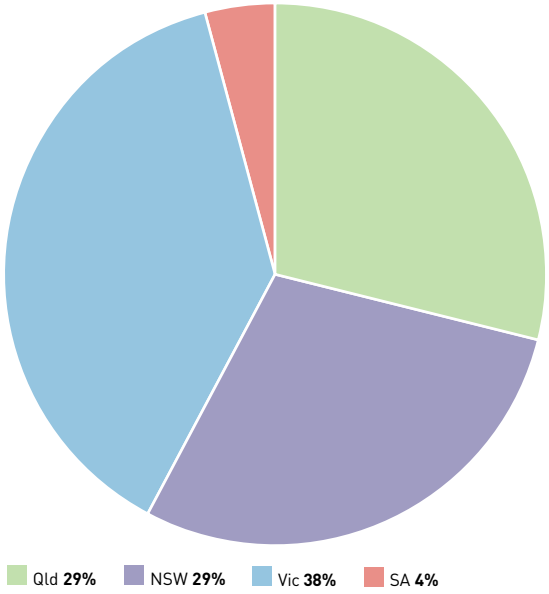
In 2007–08, Victoria accounted for 38 per cent of traded volumes, followed by New South Wales and Queensland (29 per cent each). Liquidity in South Australia has remained low since 2002, accounting for around 4 per cent of volumes (figure 3.3).

Trading on the SFE comprises a mix of futures (first listed in September 2002) and caps and other options (first listed in November 2004). Trading in options represented around 16 per cent of traded volumes in 2007–08[9] but grew exponentially in the first quarter of 2008–09, reaching 51 per cent of volumes.[10] Figure 3.4 shows that trading volumes for 2010 options

9 d-cyphaTrade, *Energy focus FY review 2007/2008*, 2008.

10 From 1 July 2008 to 12 September 2008.

Figure 3.3
Regional shares of Sydney Futures Exchange electricity derivatives trade (by volume), 2007–08

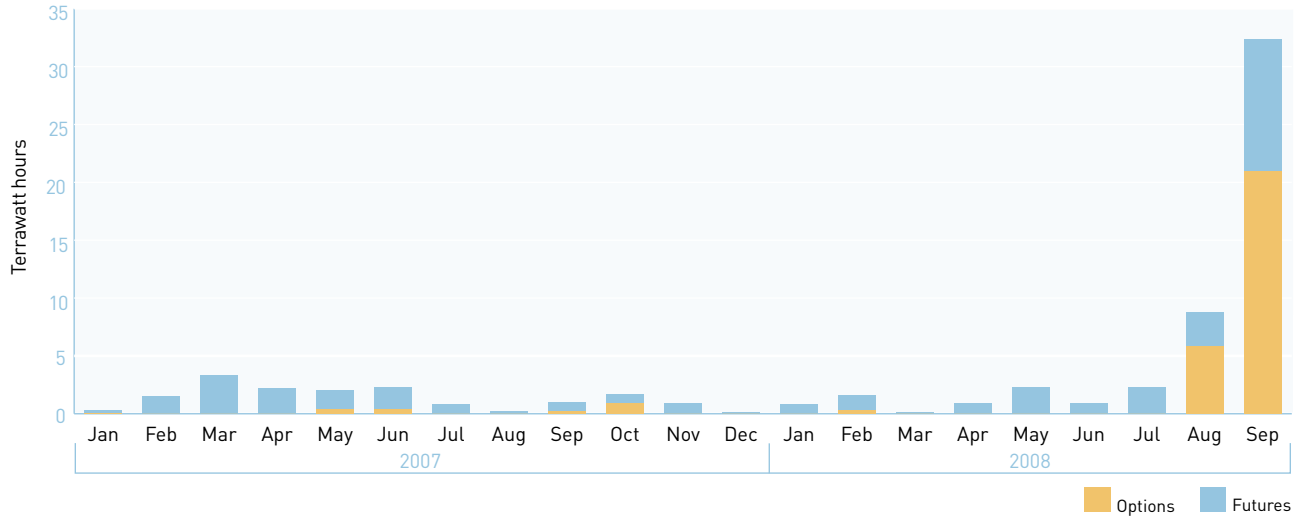


Source: d-cyphaTrade.

recorded a step increase from around August 2008, with the bulk of activity in options. This may reflect increased hedging activity associated with the planned introduction of the Carbon Pollution Reduction Scheme in 2010.

Figure 3.5 shows the composition of futures and options trade on the SFE by maturity date, based on traded volumes. The SFE trades quarterly futures and options out to four years ahead, compared to three years in many overseas markets.[11] Liquidity is highest for contracts with an end date between six months and two years out from the trade date. There are only a relatively small number of open contracts with an end date beyond 18 months. This is consistent with the trading preferences of speculators and the time horizons of electricity retail contracts, the majority of which are negotiated for one year and which rarely run beyond three years. Some retailers do not lock in forward hedges beyond the term of existing customer contracts.

Figure 3.4
Traded volumes for 2010 contracts—Sydney Futures Exchange

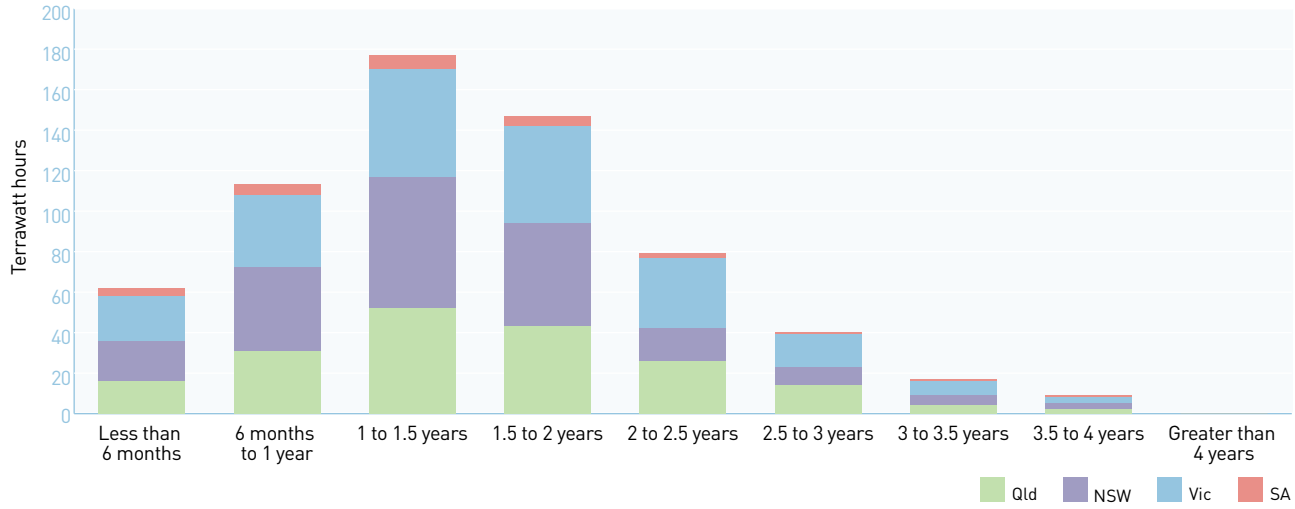


Source: d-cyphaTrade.

11 See, for example, http://www.eex.de (Germany) or http://www.powernext.fr (France).

Figure 3.5

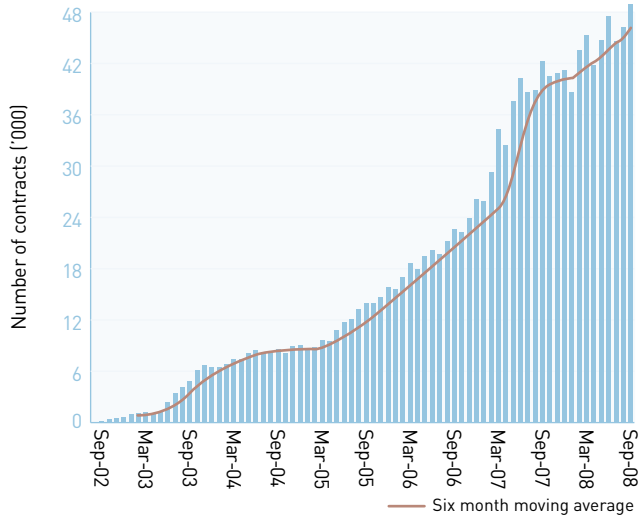
Traded volume in electricity futures contracts (by maturity date) on the Sydney Futures Exchange, September 2002 to August 2008



Source: d-cyphaTrade.

Figure 3.6

Open interest on the Sydney Futures Exchange



Source: d-cyphaTrade.

Figure 3.6 illustrates open interest in electricity futures on the SFE over time. Open interest refers to the total number of futures and option contracts that have been entered into and remain open—that is, have not been exercised, expired or closed out—at a point in time. An increase in open interest typically accompanies a rise in trading volumes and reflects underlying demand growth. As figure 3.6 illustrates, the SFE electricity futures market has experienced a steady increase in open interest since 2002. The number of open contracts rose from around zero in 2002 to over 48 000 in September 2008. It is interesting to note that although total trading volumes in 2007–08 were similar to the previous year, the level of open interest continued to rise.

3.4.2 Over-the-counter markets

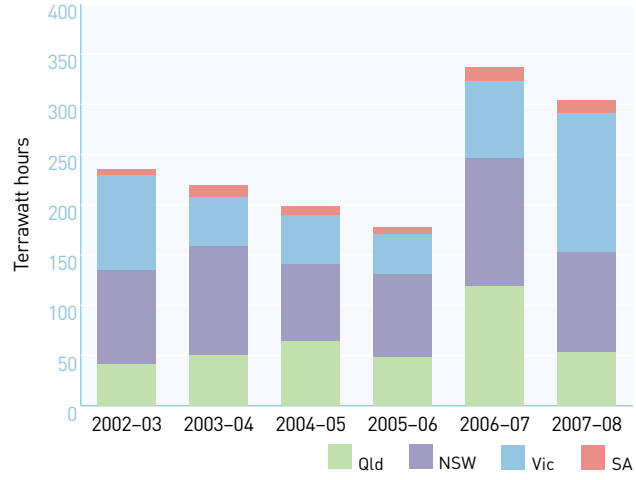
There is limited data on liquidity in the OTC markets because transactions are only visible to the parties engaged in trade. The Australian Financial Markets Association (AFMA) conducts an annual survey of OTC market participants on direct bilateral and broker-assisted trade. AFMA reports that most, but not all, participants respond to the survey. A particular OTC transaction will be captured in the AFMA data if at least one party to the trade participates in the survey.

As figure 3.7 indicates, total OTC trades declined from around 235 terawatt hours (TWh) in 2002–03 to around 177 TWh in 2005–06. This trend was reversed in 2006–07, with turnover increasing by more than 90 per cent to around 337 TWh. Volumes remained above 300 TWh in 2007–08. This was consistent with significantly higher trading volumes on the SFE over the past two years.

On a regional basis, trading volumes more than doubled in 2006–07 in Queensland and South Australia. Turnover rose by around 90 per cent in Victoria and 50 per cent in New South Wales. In 2007–08, turnover continued to rise in Victoria, accounting for around 45 per cent of trade across all regions. Volumes fell in all other regions, with Queensland recording the largest fall (down 55 per cent). However, volumes in all regions remained above 2005–06 levels.

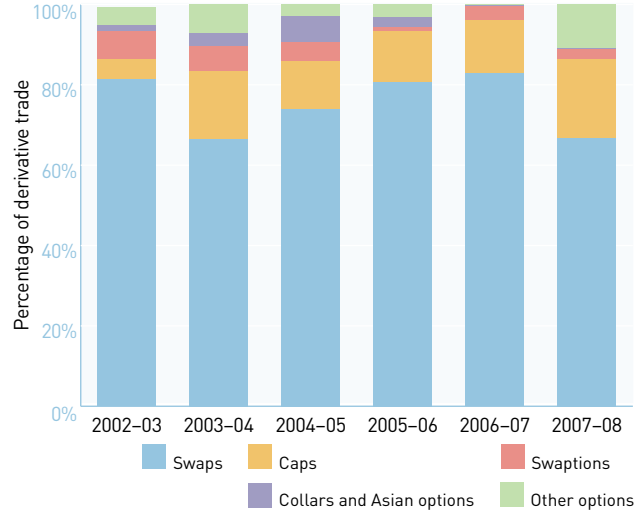
Around 67 per cent of OTC trade in 2007–08 was in swaps and around 20 per cent was in caps. Swaptions and options made up the balance (see figure 3.8).

Figure 3.7
Regional trading volumes—over-the-counter market



Source: AFMA, *2008 Australian Financial Markets Report*, 2008.

Figure 3.8
Trading volumes by derivative type —over-the-counter market



Source: AFMA, *2008 Australian Financial Markets Report*, 2008.

Table 3.3 **Volumes traded in over-the-counter markets and the Sydney Futures Exchange**

	OTC (TWh)	OTC (% OF NEM DEMAND)	SFE (TWh)	SFE (% OF NEM DEMAND)	TOTAL (% OF NEM DEMAND)
2001–02	168	96	0	0	96
2002–03	235	131	7	4	135
2003–04	219	118	29	16	134
2004–05	199	106	24	13	118
2005–06	177	92	55	28	120
2006–07	337	172	243	124	296
2007–08	304	156	241	123	279

OTC, over-the-counter; SFE, Sydney Futures Exchange; NEM, National Electricity Market.; TWh, terawatt hour

Note: NEM demand excludes Tasmania, for which derivative products were not available.

Sources: d-cyphaTrade; AFMA; NEMMCO.

3.4.3 Aggregate trading volumes

Table 3.3 estimates aggregate volumes of electricity derivatives traded in OTC markets and on the SFE, and compares these volumes to underlying demand for electricity in the NEM. The data are a simple aggregation of AFMA data on OTC volumes and d-cyphaTrade data on exchange trades. The results should be interpreted with some caution, given that the AFMA data are based on a voluntary survey and are not subject to independent verification. This could result in the omission of transactions between survey non-participants. AFMA considers that the survey captures most OTC activity.

It should be noted that derivative trading volumes can exceed 100 per cent of NEM demand, as some financial market participants take positions independent of physical market volumes and regularly readjust their contracted positions over time.

Based on the available data, the majority of financial trades continue to occur in the OTC markets. However, OTC trading is declining relative to trading on the SFE. The share of derivative trades occurring in OTC markets declined from 97 per cent in 2001–02 to 56 per cent in 2007–08.

As table 3.3 indicates, OTC trades in 2007–08 were equivalent to 156 per cent of NEM demand, compared to a record 172 per cent in the previous year. Volumes on the SFE rose from near zero in 2001–02 to levels equivalent to over 120 per cent of NEM demand in 2006–07 and 2007–08. Across the combined OTC and exchange markets, trading volumes in 2007–08 were almost 280 per cent of NEM demand.

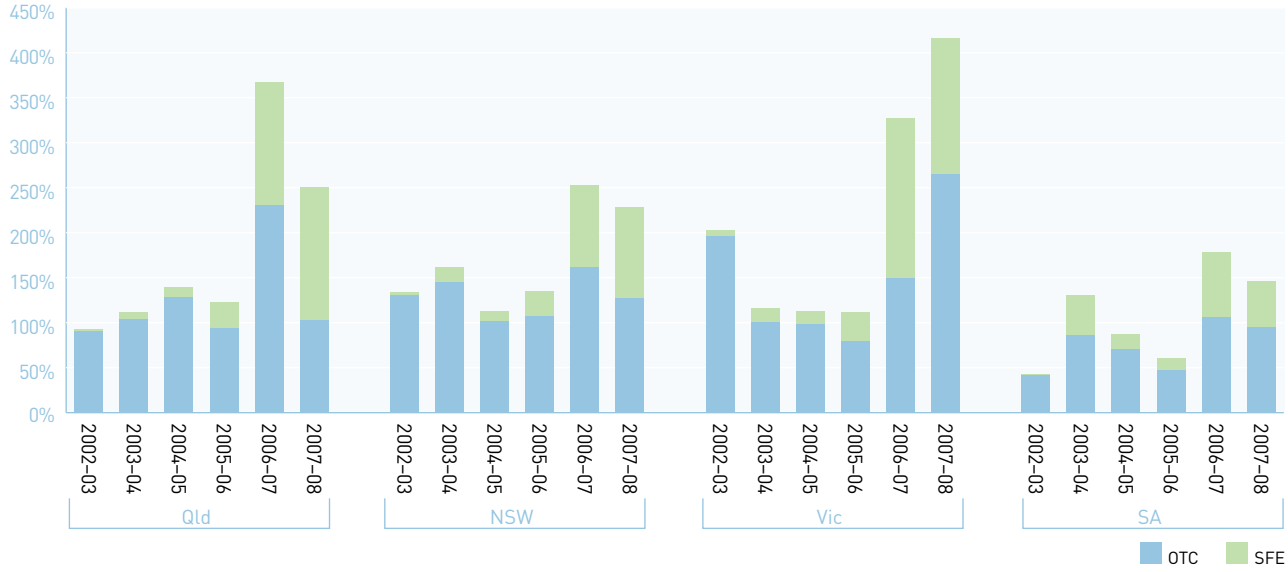
There are a number of reasons for the relatively strong growth in exchange-traded volumes. Amendments to the *Corporations Act 2001* and the introduction of international hedge accounting standards to strengthen disclosure obligations for electricity derivatives contracts may have raised confidence in exchange-based trading. In addition, d-cyphaTrade, in conjunction with the SFE, redesigned the product offerings in 2002 to tailor them more closely to market requirements. These changes have encouraged greater depth in the market, including the entry of numerous financial intermediaries.

The increase in trading volumes on the SFE has also been driven by trading parties seeking to minimise mark-to-market OTC credit exposures. A PricewaterhouseCoopers (PwC) survey of market participants also cited anonymity and credit benefits as being among the reasons for the shift away from OTC markets towards exchange trading.[12]

12 PwC, *Independent survey of contract market liquidity in the National Electricity Market*, 2006, p. 21.

Figure 3.9

Trading volumes by region as a percentage of regional National Electricity Market demand



OTC, over-the-counter; SFE, Sydney Futures Exchange.

Sources: d-cyphaTrade; AFMA; NEMMCO.

Figure 3.9 charts regional trading volumes in both the OTC and SFE sectors as a percentage of regional NEM demand. Trading volumes were generally equivalent to around 100 to 150 per cent of regional NEM demand in Queensland, New South Wales and Victoria from 2002–03 to 2005–06. Volumes rose sharply in 2006–07 to 370 per cent of NEM demand in Queensland, 330 per cent in Victoria and 250 per cent in New South Wales. South Australian volumes rose to around 180 per cent of regional NEM demand, reversing a trend of declining volumes over the three preceding years. In 2007–08, only Victoria experienced growth in trading volumes relative to regional NEM demand, reaching over 415 per cent. Volumes fell sharply in Queensland, but remained significantly above 2005–06 levels.

The composition of Queensland trade is also changing. In 2007–08, Queensland was the only region in which SFE trading volumes exceeded OTC volumes. Queensland's SFE trades accounted for almost 60 per cent of regional trading volumes. In other regions, SFE trade accounted for between 35 and 45 per cent of trading volumes.

The PwC survey of market participants raised a number of possible reasons for a lack of liquidity in South Australia's financial markets. Factors cited included the relatively small scale of the South Australian electricity market; perceptions of risk associated with network interconnection, generation capacity and extreme weather; and perceptions of high levels of vertical integration.[13] ERIG also noted gaps in the liquidity and depth of financial markets in South Australia as well as for Tasmania, which was not physically connected to the NEM until 2006. More generally, there are gaps in the market for sculpted and flexible products, which are mainly traded in the OTC market.[14]

13 PwC, *Independent survey of contract market liquidity in the National Electricity Market*, 2006, p. 28.

14 ERIG, Discussion papers, November 2006, p. 194.

3.5 Price transparency and bid–ask spread

While trading volumes and open interest provide indicators of market depth, part of the cost to market participants of transacting is reflected in the bid–ask spread (the difference between the best buy and best sell prices) quoted by market makers and brokers. A liquid market is characterised by relatively low price spreads that allow parties to transact at a nominal cost.

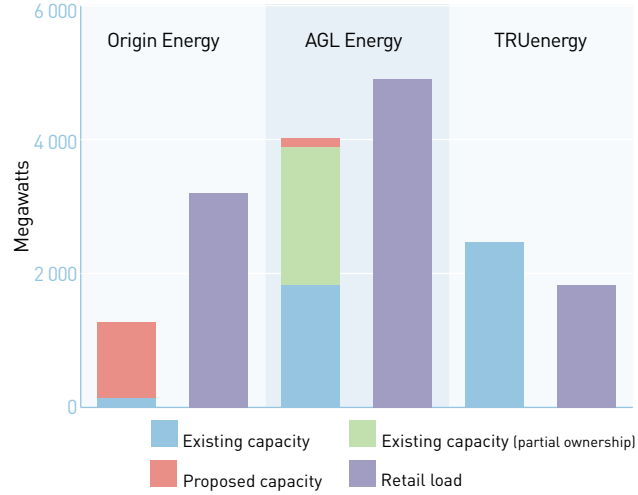
d-cyphaTrade and other market data providers publish bid–ask spreads for the exchange-traded market. In 2007–08, most spreads for base futures products were less than $3. Spreads are generally higher in the market for peak futures, which tends to be less liquid than the market for base futures.

3.6 Number of market participants

Ownership consolidation, such as vertical integration across the generation and retailer sectors, can affect participation in financial markets. In particular, vertical integration can reduce a company's activity in financial markets by increasing its capacity to internally offset risk.

Figure 3.10 displays rough estimates of the current match of generation and retail load for Origin Energy, AGL Energy and TRUenergy across the Victorian and South Australian markets. All three businesses are moving over time towards more balanced portfolios between generation and retail assets. In 2007, AGL Energy acquired the 1260 megawatt (MW) Torrens Island power station in South Australia from TRUenergy in exchange for the Hallett power station (150 MW) and a cash sum. While Origin Energy's retail load exceeds its generation capacity by a significant margin, it committed in 2008 to a 550 MW power station near Mortlake in Victoria to be commissioned in the summer of 2010–11. In addition, the major generator International Power operates a retail business in Victoria and South Australia (trading as Simply Energy) and has achieved significant market penetration.

Figure 3.10
Generator capacity and retail load of vertically integrated players in Victoria and South Australia, 2007–08



Note: Average retail loads are PwC estimates for 2005–06 based on the estimated market share of each retailer as a proportion of NEM demand. Market share has been estimated from annual reports. AGL Energy's existing capacity (partial ownership) includes its 32.5 per cent share in the GEAC Group (owner of the Loy Yang A generator in Victoria). TRUenergy's existing capacity includes its contractual arrangement for Ecogen Energy capacity in Victoria (around 890 megawatts). This chart is not intended to be an accurate reflection of participants' positions, but rather provides an estimate of the possible degree of vertical integration.

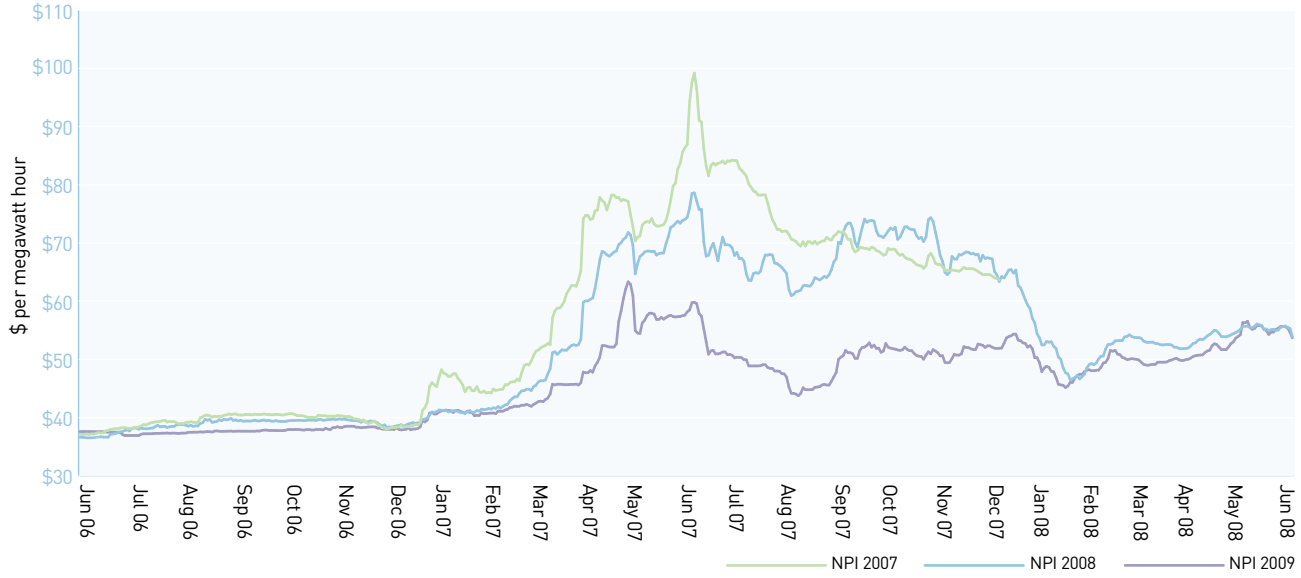
Sources: PwC, *Independent survey of contract market liquidity in the National Electricity Market*, August 2006 (retail loads); NEMMCO and company websites (capacity and proposed capacity).

The United Kingdom market has significant vertical integration—six vertically-integrated firms dominate the market—and low levels of financial market liquidity. ERIG considered that if the Australian market were to evolve to a handful of balanced participants, little financial trade would be expected.[15]

While integration may have reduced the number of generators and retailers in Australia's financial markets, there has been new entry by financial intermediaries. Financial speculators that have entered the market include BP Energy Asia, ANZ, Optiver, Attunga Capital, Commonwealth Bank, Arcadia Energy, DE Shaw and Co, Electrade Derivatives, IMC Pacific, Liquid Capital, Societe General, Tibra Capital and Westpac. Other market participants remain anonymous. ERIG considered that the increasing

15 ERIG, Discussion papers, November 2006, pp. 195–6.

Figure 3.11
National Power Index 2007–2009



Source: d-cyphaTrade.

involvement of financial intermediaries is evidence of a dynamic market.

3.7 Price outcomes

Base futures account for most SFE trading volumes and open interest positions. Accordingly, the following discussion of price outcomes focuses on base futures. Prices for peak futures tend to be higher than for base futures, but follow broadly similar trends.[16]

Figure 3.11 shows average price outcomes for electricity base futures, as reflected in the National Power Index (NPI). The index is published for each calendar year and represents a basket of the electricity base futures listed on the SFE for New South Wales, Victoria, Queensland and South Australia. It is calculated as the average daily settlement price of base futures contracts across the four regions for the four quarters of the relevant calendar year. NPI data are available from June 2006 and are published daily by d-cyphaTrade.

Figure 3.11 shows that base futures prices were fairly flat throughout 2006, trading between $35 and $40 per MWh, before rising sharply in the first half of 2007. Prices for the 2007 calendar year basket peaked in June 2007 at close to $100 per MWh. This mirrored high prices in the physical electricity market, caused by tight supply–demand conditions (see section 2.5). Futures prices rose more sharply for the 2007 and 2008 calendar years than for later years. This may have reflected expectations that the tight supply–demand conditions at that time were of a relatively short-term nature.

A return to more benign conditions in the physical electricity market led to falling prices for base futures in the second half of 2007 and early 2008. The 2008 and 2009 calendar year base futures prices converged below $50 per MWh in summer 2008, but edged back towards $55 to $60 per MWh in winter 2008.

In general, contract markets often trade at a premium to the physical spot market for an underlying commodity. On average, base futures prices on the SFE have reflected a fairly constant premium over NEM spot prices of around $2 per MWh over the past three years.[17]

16 Base futures cover the hours from 0.00 to 24.00 hours, seven days per week. Peak futures relate to the hours from 7.00 am to 10.00 pm Monday to Friday, excluding public holidays.

17 Based on a comparison of time-weighted calendar year wholesale market spot prices to the average NPI value for each calendar year.

3.7.1 Future forward prices

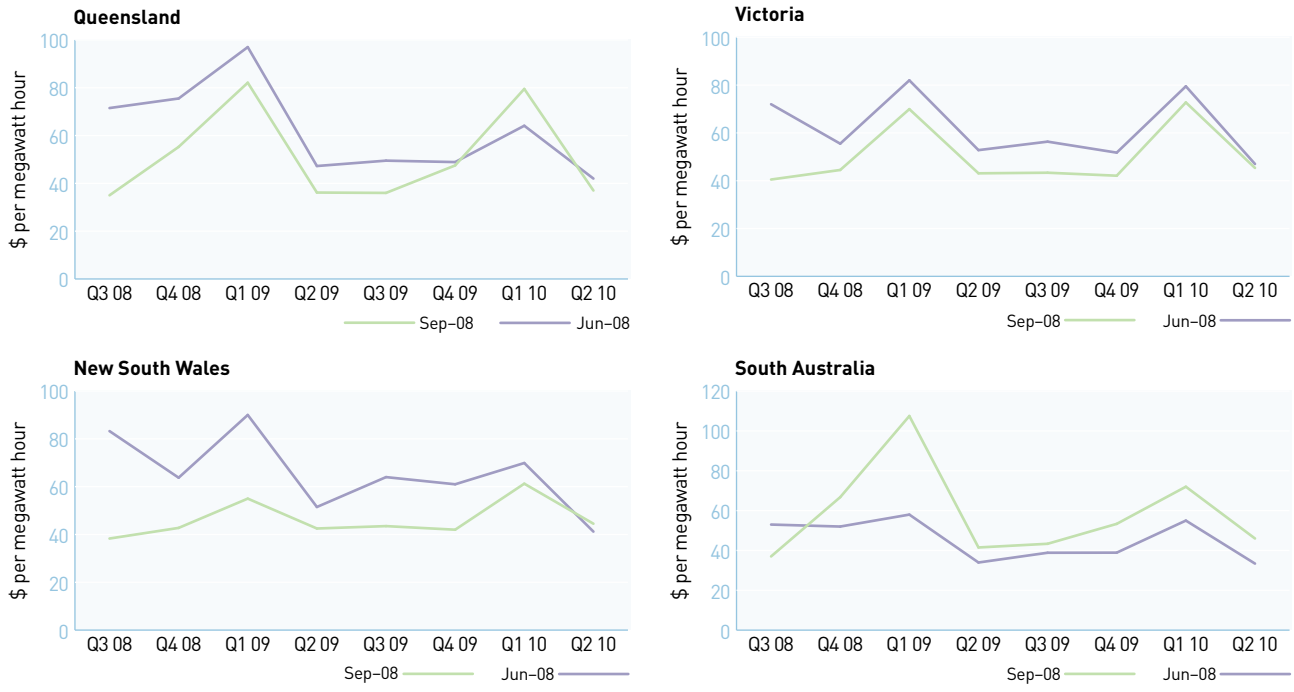
Figure 3.12 provides a snapshot in September 2008 of forward prices for quarterly base futures on the SFE for quarters up to two years out from the trading date. These are often described as forward curves. The first four quarters of a forward curve are the prompt quarters. For comparative purposes, forward prices in June 2007—when electricity prices reached record levels in Queensland, New South Wales and Victoria—are also provided.

In September 2008, prices for the prompt quarters were generally down on the levels seen in 2007. This may reflect lower than expected wholesale market prices over summer 2007–08, new generation capacity coming on-line and the availability of previously drought-affected generators. The exception was South Australia, where futures prices were higher in 2008 than in 2007. This may indicate market concerns that high prices in South Australia's physical electricity market in early 2008—as a result of high temperatures, interconnector constraints and opportunistic bidding by generators—may recur in 2009.

Figure 3.13 also illustrates that first quarter (Q1, January to March) futures prices tend to be higher than for other quarters. This reflects the tendency for NEM spot prices to peak in summer and illustrates the linkages between derivative prices and underlying NEM wholesale prices. Box 3.1 provides a case study on the pricing of Q1 base and peak future contracts in Queensland over the past three years. Price movements in New South Wales and Victoria have followed broadly similar trends to Queensland.

While futures contracts typically relate to a specific quarter of a year, there is an increasing tendency for contracts to be traded as calendar year strips, comprising a 'bundle' of the four constituent quarters of the year. This tendency is more pronounced for contracts with a starting data at least one year out from the trade date. Figure 3.13 charts prices in September 2008 for calendar year futures strips to 2011. In September 2008, New South Wales, Queensland and Victoria had forward curves in strong contango—that is, prices are higher for contracts in the later years. This is indicative of market expectations that price risk may be greater in the medium to longer term, perhaps because

Figure 3.12
Base futures prices at September 2008



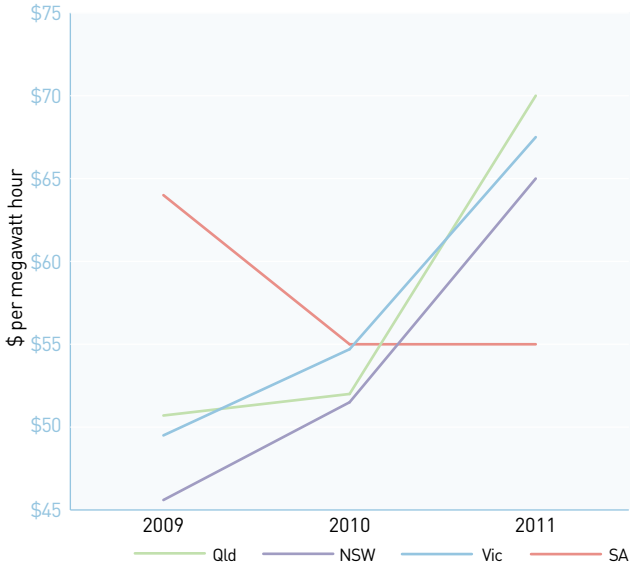
Source: d-cyphaTrade.

of concerns about the adequacy of supply and the anticipated effect of the Carbon Pollution Reduction Scheme on pool prices from 2010.

In September 2008, South Australian contracts were mostly trading flat or in backwardation—that is, prices for the nearest year (2009) were higher than for the later years. As noted, this may reflect expectations that the conditions that gave rise to record South Australian NEM prices in March 2008 may still be present in 2009, but are less likely to affect prices further into the future. Additionally, lower liquidity in South Australian contracts may result in less robust pricing in longer dated contracts.

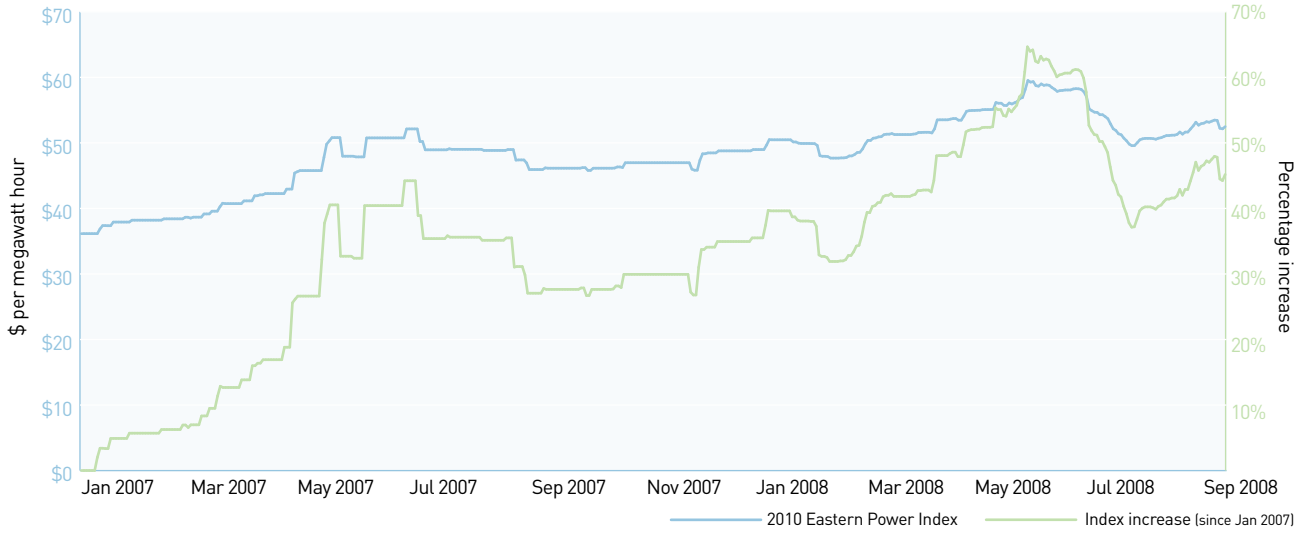
The d-cypha Eastern Power Index provides an indication of average forward prices for calendar year strips across New South Wales, Victoria and Queensland (figure 3.14). In September 2008, the Eastern Power Index for calendar year 2010 shows a trend of steadily rising prices from January 2007, increasing 45 per cent to September 2008. This is consistent with the market's anticipation that high carbon-emitting generators will face increased generation costs due to the Carbon Pollution Reduction Scheme and will attempt to recover those costs via higher pool price dispatch from July 2010 onwards.

Figure 3.13
Base calendar strip at September 2008



Source: d-cyphaTrade.

Figure 3.14
Eastern Power Index for 2010 contracts



Source: d-cyphaTrade.

Box 3.1 Case study—Queensland first quarter futures prices

The electricity supply–demand balance in most regions is tightest in summer, with hot days leading to high demand for air conditioning. Accordingly, Q1 futures prices are higher than those for other quarters. Over the 18 months to August 2008, Q1 futures prices were especially volatile in Queensland. Figures 3.15 and 3.16 chart movements in the price of Queensland Q1 base and peak futures in 2007, 2008 and 2009, as measured in the preceding year.

- Q1 2007 prices were relatively stable throughout 2006, averaging around $50 per MWh for base futures and $85 per MWh for peak futures.
- Prices for Q1 2008 started to rise from March 2007. Between June and November 2007, base futures averaged $125 per MWh and peak futures averaged $240 per MWh. These prices reflected market concern over the availability of generation capacity (due to the drought) and the impact of congestion in the Queensland transmission network. Information available closer to Q1 2008 indicated that constraints would not be as great as expected and prices closed out at about $70 for base futures and $100 for peak futures.
- Prices in 2008 for Q1 2009 futures are below the equivalent prices in 2007 but remain well above historic levels. In August 2008, base futures prices were about $85 and peak futures prices were around $150.

Figure 3.15

Queensland first quarter base futures prices for 2007, 2008 and 2009 (January 2006 to August 2008)

Source: d-cyphaTrade.

Figure 3.16

Queensland first quarter peak futures prices for 2007, 2008 and 2009 (January 2006 to August 2008)

Source: d-cyphaTrade.

3.8 Price risk management —other mechanisms

Aside from financial contracts, there are other mechanisms to manage price risk in electricity wholesale markets. As noted, some retailers and generators have reduced their exposure to NEM spot prices through vertical integration. In addition:

- In New South Wales, the Electricity Tariff Equalisation Fund (ETEF) provides a buffer against prices spikes in the NEM for government-owned retailers that are required to sell electricity to end users at regulated prices. When spot prices are higher than the energy component of regulated retail prices, ETEF pays retailers from the fund. Conversely, retailers pay into ETEF when spot prices are below the regulated tariff. The New South Wales Government has announced that it will phase out ETEF by June 2010.
- Auctions of settlement residues allow for some financial risk management in inter-regional trade, although the effectiveness of this instrument has been the subject of some debate (see section 4.7).