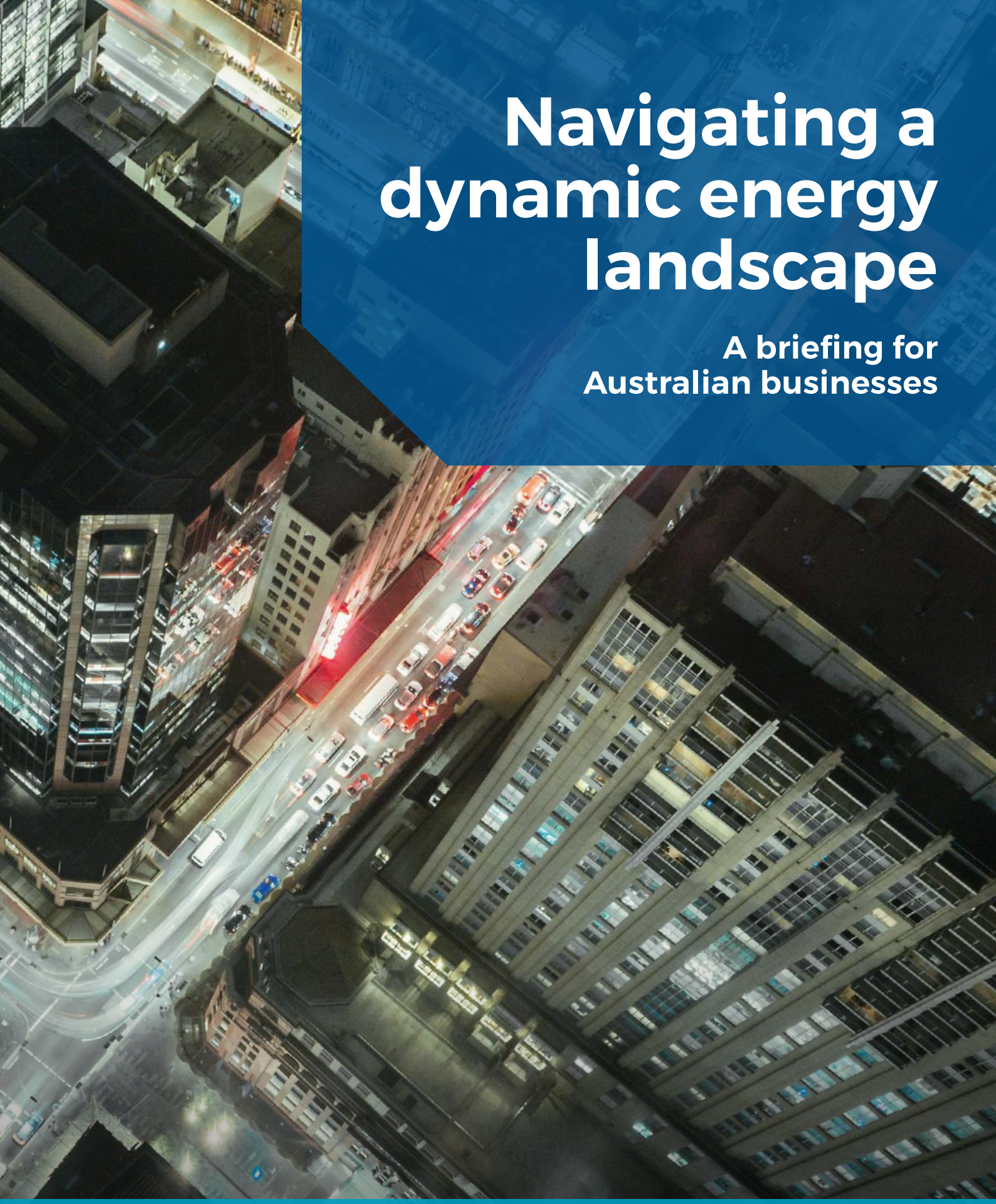
Navigating a dynamic energy landscape

A briefing for Australian businesses



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UPDATE AND OUTLOOK

AUGUST 2018

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Foreword

'Our energy system is transforming'; it's a phrase uttered so regularly by politicians and energy experts that it has begun to sound like a platitude. However, Australian businesses know that this transformation is very real, even if the market, policy and technological drivers behind it can be opaque.

One of the places businesses are seeing this transformation play out is in their bills. Not only have prices been going up, they have become increasingly unpredictable, with volatility in futures markets making it more challenging for businesses to manage rising costs.

The good news is that electricity futures prices and wholesale gas prices have eased in 2018. New, cost competitive generation – such as wind and solar – is coming online, increasing competition and driving down electricity prices. Yet, the expert consensus is that the unit cost of energy is highly unlikely to return to historic lows anytime soon.

A decade of energy and carbon policy uncertainty at the federal level has hindered investment and inflated prices, and needs to be resolved. At the time of writing, efforts to secure that policy stability continue.

Meanwhile, the fiduciary responsibility of directors around carbon risk has been highlighted by the Australian Prudential Regulatory Authority, the Australian Securities and Investment Commission and the Task Force on Climate-related Financial Disclosures, driving unprecedented levels of disclosure. Investors and other stakeholders are also expecting businesses to play a proactive role in efforts to decarbonise the global economy. Leading businesses are getting on the front foot to ensure they capture the opportunities opened up by this transition.

No matter how you look at it, Australia's energy landscape is becoming much more dynamic and Australian businesses are responding. Many have already made significant investments to manage the risk – and capture the opportunities – thrown up by a more dynamic energy landscape. Even more are actively reviewing their strategies or weighing investment options.

This briefing is for business leaders who are looking to stay ahead of the curve in this rapidly evolving area, improving profits and productivity.

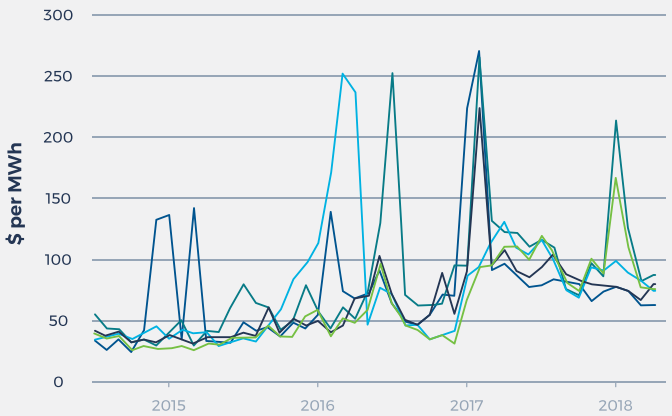


Figure 1: Spot market wholesale electricity prices have doubled.

Monthly spot price, weighted average $ per megawatt hour, July 2014 to April 2018.

Source: Grattan Institute 2018, *Mostly Working: Australia's Wholesale Electricity Market,* p. 9.

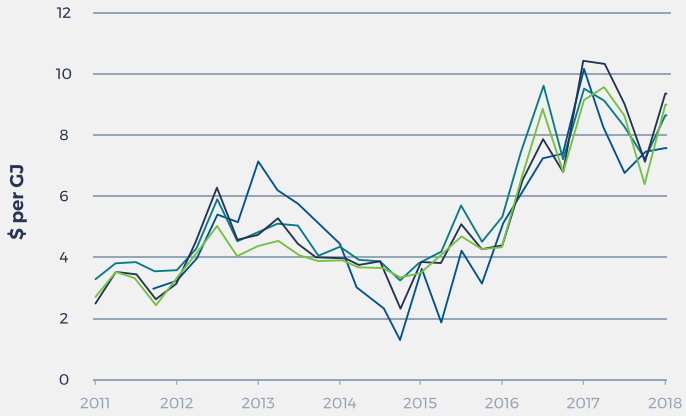


Figure 2: Wholesale gas prices have more than doubled.

Quarterly weighted average wholesale gas spot market price, $ per gigajoule.

Source: Grattan Institute 2018, *Mostly Working: Australia's Wholesale Electricity Market,* p. 13.

Key: New South Wales Queensland South Australia Tasmania Victoria

Navigating this briefing

There is an enormous amount of information on energy in the public domain, yet it can be hard for business leaders to extract what matters for their businesses. This energy strategy briefing is designed to cut through the noise and provide a roadmap that will help businesses confidently navigate Australia's dynamic energy landscape.

Energy pulse check

We talked to Australian businesses that are leading the field in energy strategy and management about the questions directors and executives should pose internally to ensure they are proactively managing their energy position. Three key questions came up again and again:

Do we have a granular understanding of how and when we are using energy across our business, and how our usage drives our energy costs?

Leaders in energy strategy have advanced metering, submetering and analytics that give them a granular understanding of energy use across their operations, broken down not just by site but by particular subsystems and equipment, which internal and external experts can monitor in real-time.

Leaders in energy strategy are leveraging their energy data. They are making sure the right data is captured, and that it drives decision making, rather than simply sitting in a spreadsheet (page 17).

Are we actively monitoring efficiency, generation and demand management opportunities, and investing where it is cost effective to do so?

Leaders in energy strategy have re-calibrated their approach to energy investment. They are ensuring that their energy data is actively monitored and analysed by experts in relation to:

- Key business performance metrics;
- Current energy cost profile;
- Energy market outlook and risk; and
- Opportunities to achieve a more cost-effective outcome through investments in energy efficiency, on- or off-site generation, and demand management technologies.

Leaders in energy strategy are controlling everything possible behind-the-meter at their sites, and taking a proactive approach to investment in efficiency, generation and demand management (page 18).

Are we exploring the full range of energy contracting options?

Having reduced their exposure to energy market volatility through energy efficiency, renewables and demand management, leaders in energy strategy are exploring alternative contracting strategies to optimise energy costs and balance market risks when sourcing the remainder of their energy.

Rather than defaulting to the traditional procurement option of a fixed price forward contract through a retailer, they are assessing the solutions available in the marketplace against their individual needs.

Leaders in energy strategy have optimised their contracting. They have ensured their businesses are not passive price-takers, and are effectively managing energy market exposure by properly assessing all available procurement options (page 25).

Update and outlook: electricity and gas prices

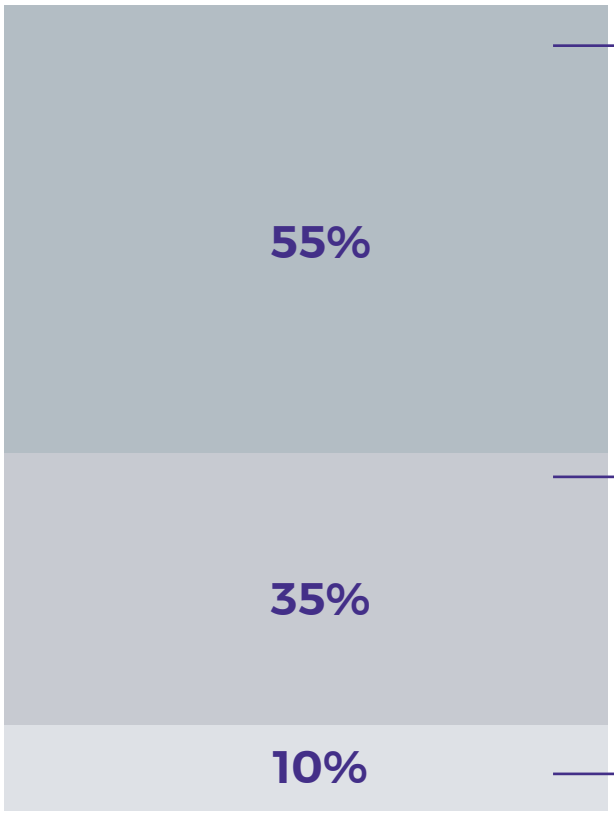
1.1 Current drivers of electricity prices

The National Electricity Market (NEM) is a wholesale commodity exchange for electricity spanning Australia's eastern and south-eastern coasts. It comprises five interconnected states that also act as price regions: New South Wales (including the Australian Capital Territory), Queensland, South Australia, Tasmania and Victoria.

The transformation of the NEM – described in detail in Section 2 – is having flow-on effects for business electricity costs. However, different issues are playing out in different cost components; in some cases, these issues are shifting rapidly; in others, long run trends are playing out slowly.

Below we consider the three key components of business electricity bills and discuss the drivers and current outlook for each.[1]

[1] This analysis focuses on the NEM; different – although in some cases analogous – issues are playing out in electricity markets in Western Australia and the Northern Territory; these regions will be considered in a future edition.



Retail and other charges

Retail charges include the wholesale cost of generation, retailer hedging through futures markets, retailer charges and retailer margin.

Other charges make up less than 1% and include fees for transmission and distribution losses, market administration and metering.

Network charges

Include fees charged for the cost of transporting electricity across long-distance high-voltage transmission networks, and medium- to low-voltage distribution networks to businesses and households.

Environmental charges

Include costs charged to consumers for the Federal Government's Renewable Energy Target (RET) and state-based energy efficiency schemes.

Figure 3: Electricity bill components for the average commercial and industrial customer, as calculated by the Australian Competition and Consumer Commission (2018). While a useful guide, there can be significant variation in this breakdown from business to business. For example, smaller businesses – and large businesses with many small sites – often have a higher proportion of their electricity bill made up of network costs.

Source: Australian Competition and Consumer Commission (ACCC) 2018, *Restoring electricity affordability and Australia's competitive advantage: Retail Electricity Pricing Enquiry – Final Report*, p. 30.

1.1.1 Retail charges

While some energy users buy electricity directly from the wholesale market, most purchase electricity through a retailer. Retail charges make up 55% of the bill for the average commercial and industrial customer.

Higher wholesale prices were the overwhelming driver of the electricity bill increases experienced by businesses during 2016 and 2017. Over this period there were cumulative increases in wholesale electricity prices of between 77% and 176% across the four major NEM states.[2]

Recent analysis has found that around 40% of this increase was due to higher fuel costs – gas and black coal – however, 60% was driven by the closure of two large power stations, which tightened the supply/demand balance, driving up wholesale prices.[3]

New renewable generation is entering the wholesale market, increasing supply, and therefore competition, and even more renewables are being built.

Even so, few experts expect wholesale prices to return to the lows of 2015. Australia has entered a period in which many, aging, coal-fired generators are reaching the end of their asset life and are being replaced. This means that across the system there is a need for investment in new generation. This will continue to have an impact on wholesale prices, regardless of whether the generation capacity comes from fossil fuels or renewables.[4]

[2] Ai Group 2018, *From Worse to Bad*, p.6.

[3] Grattan Institute 2018, *Mostly Working: Australia's Wholesale Electricity Market*, p. 11.

[4] Ibid., p. 40.

How wholesale spot prices are set

All electricity in the NEM is traded through a spot market, where supply and demand are matched in real time through a centrally coordinated dispatch process.

Every 30 minutes, generators offer to supply the market with specific amounts of electricity at particular prices. From all offers submitted, the dispatch process decides which generators will produce electricity, based on the principle of meeting demand in the most cost-effective way.

The spot market price is determined by the bid from the generator supplying the last unit of energy required to balance supply and demand during a given supply period. All generators that supply electricity in this period receive that price.

The role of retailers

Retailers manage risk on behalf of their customers. They swap volatile wholesale electricity prices for fixed retail prices. However, the price actually paid by retailers to generators is determined by their hedging position. If a retailer does not own generation assets, hedging is managed through futures contracts.

Other costs – notably network charges, and to some extent environmental charges – are simply passed through to customers.

1.1.2 Network charges

Increased network charges are responsible for 35% of the overall increase in electricity costs across the economy over the past ten years.[5] Earlier this year, the Grattan Institute reported that the value of Australia's electricity network had grown from $50 billion in 2005 to $90 billion in 2018 – and that around $20 billion of this investment was unnecessary given the discrepancy between projected and actual demand growth.[6]

Estimates of the level of overinvestment in network infrastructure vary, and overinvestments are more prevalent in NSW and Queensland than in other states. Even so, experts agree that overinvestment has led to significant additional costs flowing through to many businesses and households. Importantly, avoiding overinvestment in networks is receiving more attention than it has in the past. While further reform is needed, new network investments are not expected to be a major driver of additional electricity cost increases for businesses in the near term.

Upgrading our electricity network

While overinvestment in the network has been a problem in the past, well-targeted network investments will be needed as our energy system continues to evolve. In particular, we need to increase interconnections between states, build transmission lines to parts of the country that can support large-scale renewables, and maintain the reliability and safe operation of electrical infrastructure as our energy system decentralises.

1.1.3 Environmental charges

Environmental charges only make up around 10% of energy costs for commercial and industrial customers, though they receive a lot of attention in Australia's energy debate. There are two broad categories:

1. **The Federal Government's Renewable Energy Target (RET)**, which drives investment in both large- and small-scale renewables. The RET is designed to increase the percentage of Australia's generation capacity delivered by renewables. Policy uncertainty in recent years led to significant fluctuations in confidence around the RET. In spite of this uncertainty, the RET is now expected to exceed its legislated target for additional large-scale renewables – 33,000 gigawatt hours (GWh) of renewable generation capacity – by 2020.[7] Achieving this target has been made easier due to steep falls in the cost of new renewable generation assets in recent years.
2. **State and territory-based energy efficiency schemes**, which fund energy efficiency activities. Schemes exist in the Australian Capital Territory, New South Wales, South Australia and Victoria, although not all businesses in these jurisdictions contribute to the cost of these schemes. When looking across all consumers, bill reductions resulting from energy efficiency measures driven by the schemes substantially outweigh the costs passed through to consumers on their bills.

[5] Australian Competition and Consumer Commission 2018, *Restoring electricity affordability and Australia's competitive advantage: Retail Electricity Pricing Enquiry – Final Report*, p. 156.

[6] Grattan Institute 2018, *Down to the Wire: A sustainable electricity network for Australia*, p. 6.

[7] Clean Energy Regulator 2018, *Large-scale Renewable Energy Target market data*, accessed 18 July 2018, <http://www.cleanenergyregulator.gov.au/RET/About-the-Renewable-Energy-Target/Large-scale-Renewable-Energy-Target-market-data>.

1.2 Current drivers of gas prices

Prior to 2015, Australia's east coast gas market was not closely linked to international markets. For many years industrial customers enjoyed stable and relatively low gas prices of between $3 and $4 per gigajoule (GJ), rising to around $6 per GJ by 2015.[8]

In late 2015 liquefied natural gas (LNG) exports from Queensland commenced, transforming the east coast gas market. Exporters committed a large percentage of available gas supply to the higher priced international gas market. Gas production failed to expand fast enough to meet this increase in gas demand, creating a domestic gas shortfall. The price of east coast gas rose dramatically, especially for industrial and commercial consumers. Gas prices offered to businesses in bilateral contracts varied substantially, with some offers in 2017 exceeding $20 a GJ.[9]

Concern around the gas supply shortfall and high prices prompted the Federal Government to establish the Australian Domestic Gas Security Mechanism (ADGSM) in 2017. Under the ADGSM, Queensland gas producers can be compelled to release gas into the east coast market if supply to the domestic market is assessed to be insufficient.

Gas prices have fallen since the Federal Government made it clear it was willing to enact the ADGSM. Gas producers have made more gas available to the domestic market, and retail price offers for industrial users have moderated to around $10 per GJ in 2018.[10] Assuming competition is maintained, most experts expect gas prices to stabilise around this level, at double to triple the historic price.

[8] Ai Group 2018, *From Worse to Bad*, p.9.

[9] Australian Competition and Consumer Commission (ACCC) 2018, *Gas Enquiry 2017-2020: Interim report, April 2018*, p. 10.

[10] Ai Group 2018, *From Worse to Bad*, p.9.

The role of gas in rising electricity prices

Recently, a confluence of factors – including a tightening supply/demand balance, and an increase in intermittent renewable energy generation – has resulted in gas-fired generation being used more frequently to meet electricity demand. This increased reliance on gas in the NEM has occurred at the exact moment gas prices have undergone an unprecedented surge.

As a result, wholesale electricity spot market prices have increased, with flow-on effects for futures prices and the prices of new electricity contracts available to businesses.

1.3 The transformation has only just begun

The drivers for increased gas and electricity prices are distinct, yet the result is largely the same. In both cases, experts agree that the price peaks of 2017 are behind us, but expect market prices to stabilise well above their historic lows.

Costs are shifting rapidly, but the transformation of Australia's energy system has only just begun. Businesses that are leaders in energy strategy have a clear understanding of how the energy system is evolving; they know that the trends and technology driving this transformation are the same ones they can leverage to thrive.

The three characteristics of energy market transformation

The current upheaval in Australia's energy markets has distinct characteristics, but it is not unique; energy markets are transforming in similar ways around the world. Three key trends are in the process of re-defining the way businesses use, produce, and contract their energy:

1. **The generation mix is changing**
   The transition away from fossil fuels towards renewable energy, initially driven by government policy and increasingly by renewables reaching cost-parity with fossil fuels, is resulting in the decarbonisation of the electricity grid. Global climate commitments and investor pressures to decarbonise are accelerating this trend.

2. **The grid is decentralising**
   Highly centralised, one-way electricity grids are becoming more distributed, with multiple sources of generation, storage and demand management. Energy consumers are increasingly producing energy, and a world in which businesses sell energy to other businesses is becoming more feasible, enabled by new technologies and trading platforms.

3. **The demand profile is shifting**
   The amount of energy flowing from the grid to consumers – known as the demand profile – is shifting as more consumer needs are met by on-site renewable generation. In addition, proactive demand management is starting to play a bigger role in our energy system. Businesses are increasingly controlling not just where their energy comes from and how much they use, but when they use it, which will improve system stability and help balance electricity supply and demand.

2.1 The generation mix is changing

The transition to the NEM 20 years ago set the stage for the energy transformation we are experiencing today. Since then, government-owned energy assets and companies have been sold, markets have been deregulated, and state barriers to energy transmission dismantled.

Aging and now less efficient coal-fired power stations – built by governments prior to privatisation and deregulation – are being decommissioned as they approach or exceed their asset life. As discussed in Section 1, when generation capacity is withdrawn – as seen over the past two years with the closure of the Northern Power Station in South Australia and Hazelwood in Victoria – the balance of supply and demand in the NEM becomes tighter.

This capacity needs to be replaced. The private sector is highly unlikely to finance new coal-fired generators in Australia. Sustained concerns around climate change are driving deep scepticism that investors will be able to recoup their investment by running coal-fired generators for their full asset life. Investment in new, less carbon intensive gas fired generation is more likely, however, this too is being delayed by instability in energy and climate policy, and concerns over the cost of gas.

Climate as a driver for change

The Paris Agreement, negotiated in December 2015 and signed by 197 states, commits signatories to limit global warming to well below 2°C above pre-industrial levels, and to achieve net zero global emissions in the second half of this century.

Under the agreement, Australia committed to reduce its greenhouse gas emissions by 26% to 28% compared to 2005 levels by 2030. Nevertheless, most states and territories have gone further – the ACT, NSW, Queensland, South Australia, Tasmania and Victoria have all committed to pursuing net zero emissions by 2050. Victoria has provided the most certainty around this trajectory by putting the target into legislation, with interim targets required every five years from 2020.

Australian businesses are watching these developments closely. Some have already achieved net zero emissions through a combination of energy efficiency, renewables and emissions offsets, while others have strategies in place to achieve net zero by a given year.

Many other businesses are considering what a move to net zero emissions would mean for their operations. For some, the recalibration of their energy strategy – while driven primarily by cost concerns – is an opportunity to get ahead of the curve on carbon.

Over the past ten years, most new generation capacity added to the NEM has been underpinned by the Federal Government's RET. State- and territory-based renewable energy targets are also contributing new renewable generation capacity, and will continue to do so over time.

Furthermore, the cost of building large-scale renewable energy generation is now lower than the cost of building new conventional fossil fuel generators. Since 2010, large-scale solar costs have fallen by 80%, and onshore wind energy installation costs have dropped by 39%. By 2025, further reductions – of 59% and 26% respectively – are projected.[11]

We are now passing through an inflection point where the electricity supply mix is beginning a rapid transition towards a low-carbon, renewable energy-powered grid.

While generation from renewable sources is variable, much effort is being expended to rapidly develop and scale up storage technologies – such as grid scale batteries and pumped hydro – that would allow electricity generated from renewables to be used at other times of the day. As storage at the necessary scale is not yet cost-competitive, gas peaking plants and demand response – discussed further in Section 3.2.3 – are more immediate options for dealing with this variability.

[11] International Renewable Energy Agency (IRENA) 2017, *Renewable Power: Sharply falling generation costs*, p. 3.

> The rise in electricity prices last year accelerated our plans to join Mars sites in the US, UK and 9 other countries in moving to renewable electricity. We acted quickly because **the price volatility of energy in Australia made renewables the best option for our business**, in addition to getting us closer to our commitment to eliminate greenhouse gasses from our operations by 2040.
>
> **Barry O'Sullivan**
> General Manager
> Mars Australia

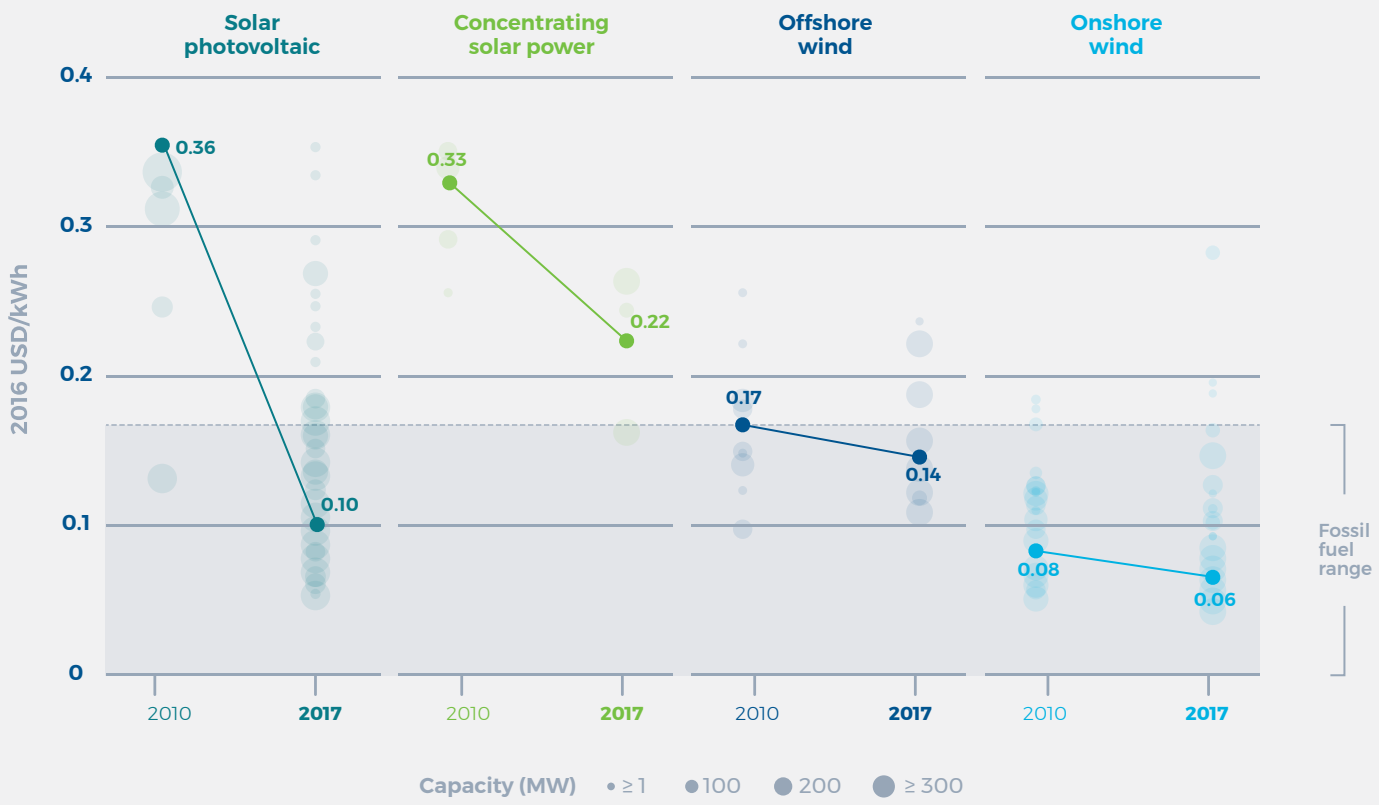


Figure 4: Average global levelised cost of electricity from utility-scale renewable power generation technologies, 2010-2017.

Source: International Renewable Energy Agency (IRENA) 2017, *Renewable Power Generation Costs in 2017*, p. 34.

2.2 The grid is decentralising

In the past, electricity flowed from large, centralised generators, across poles and through wires, via retailers, to consumers at the end of the line.

Now, the move to renewables is seeing the grid decentralise. Large-scale renewable installations are situated in parts of the country that are favourable to wind or solar. Solar photovoltaics (PV) have become part of the fabric of our suburbs, and it now appears likely that increased uptake of electric vehicles will put batteries in many Australian garages over the next 15 years.

The move to decentralisation is only just getting started.

Technologies that connect distributed energy resources and consumers to form a decentralised energy network or 'micro-grid' are emerging. Micro-grids enable resources that are often under-utilised – such as solar panels, batteries and on-site generators – to support nearby consumers by supplying power and managing demand at critical times.

In the future, experts expect more and more businesses to take control of their energy needs by generating and storing energy behind-the-meter. This will enable them to:

- Reduce their need for relatively expensive grid-supplied electricity;
- Avoid network costs and highly-priced peak demand periods; and
- Sell electricity back into the grid or to other consumers directly.

If properly managed, decentralisation will also have system benefits, such as enhancing grid stability and facilitating the avoidance of unnecessary capacity upgrades to transmission network infrastructure. This will help avoid network charges that would otherwise have been passed through to consumers.

Managing the transformation

In 2016, Australia's energy ministers established an Independent Review into the Future Security of the NEM, which was led by Australia's Chief Scientist Alan Finkel. After a comprehensive process – with support from across the community – the Finkel Review made 50 recommendations, 49 of which are now being implemented.

While not every issue is resolved – with the National Energy Guarantee (NEG) and the ambition of carbon reduction targets among them – we have made significant progress in dealing with multiple issues in our electricity sector.

This work continues. In July 2018, the Australian Energy Market Operator (AEMO) released its first Integrated System Plan (ISP), a key recommendation of the Finkel Review. The ISP is designed to establish a strategic approach to infrastructure investment to effectively manage the transformation underway in our energy system.

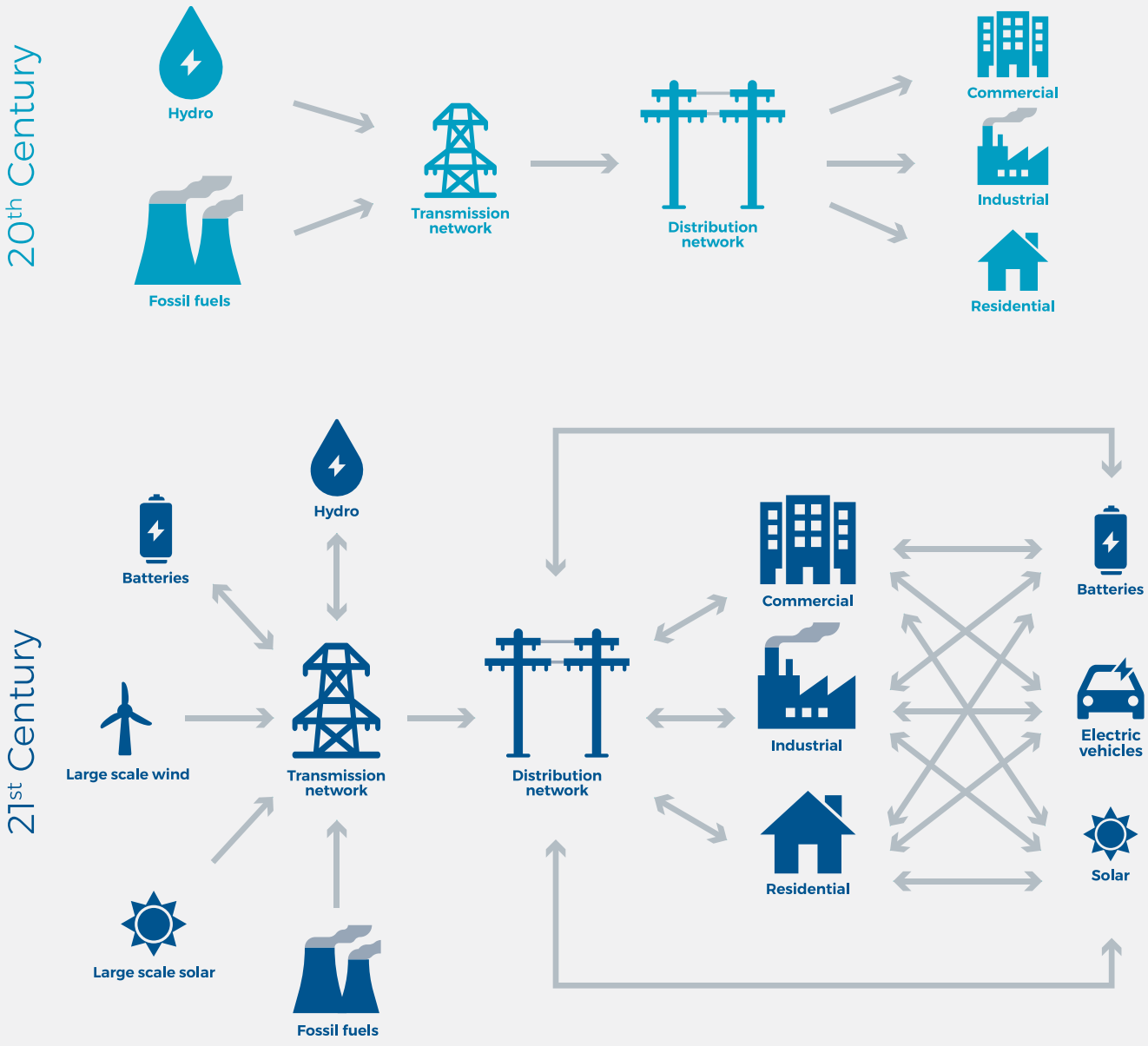


Figure 5: Energy grids are transitioning from centralised to distributed systems.

2.3 The demand profile is shifting

The changing generation mix and the decentralisation of the grid have attracted significant media attention over the past two years. Yet another related shift is underway, and will have a profound impact on the supply and demand characteristics of the electricity grid, creating significant opportunities for businesses.

The Australian Energy Market Operator (AEMO) is responsible for systems that ensure demand is matched by supply in real-time, which is crucial to maintaining grid stability. However, matching supply and demand on the grid is more complex than it used to be.

Renewables are impacting demand across the system, by changing the level of demand on the grid at different times of the day. This is known as the grid's 'demand profile'.

Consumers' need for energy is increasingly being met by on-site renewables, which reduces their need for energy from the grid at particular times of the day. When on-site renewables are not generating, demand for energy from the grid goes up again. An example of this is the so-called 'duck-curve'. When the sun is shining brightest during the middle of the day, generation from distributed solar PV systems peaks, reducing demand on the grid. However, demand for energy from the grid ramps up quickly towards the end of the day as families return home, the sun goes down, and generation from solar PV drops.

This is just one example of how demand on the grid is becoming more 'peaky' – rapidly ramping up and down depending on the availability of distributed generation resources. Peaky demand can be managed, but it requires a range of new technologies and management systems that enable a more flexible and responsive energy system, on both the supply and demand sides.

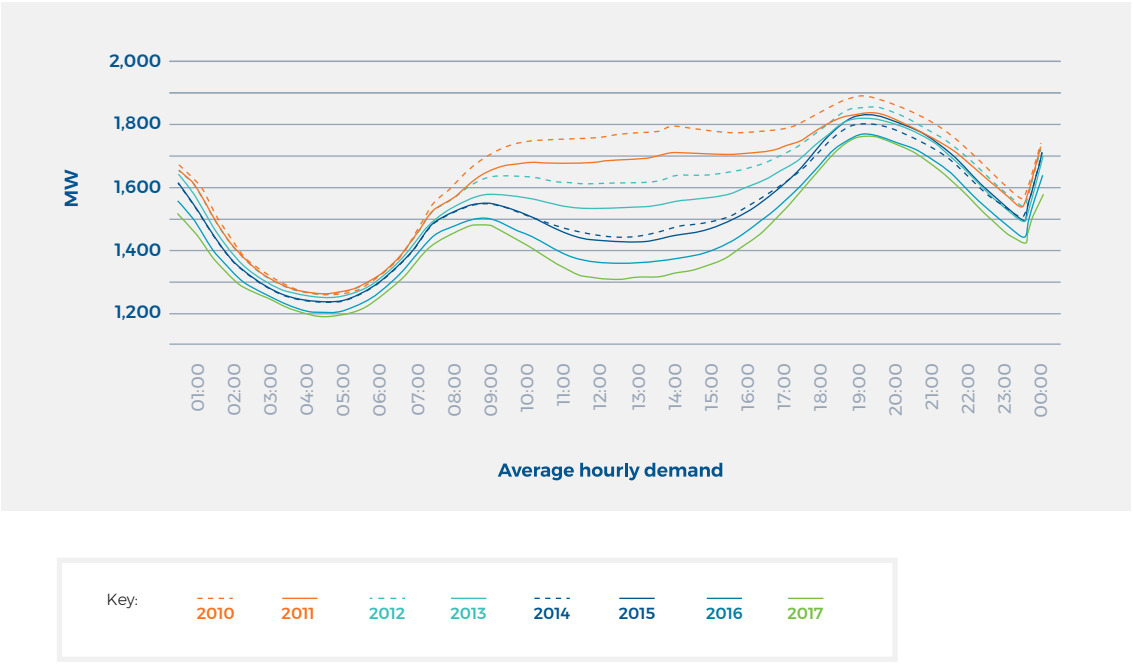


Figure 6: Average operational demand in South Australia (MW).

Source: Australian Energy Market Operator (AEMO) 2018, *AEMO observations: Operational and market challenges to reliability and security in the NEM*, p. 6.

Navigating a dynamic energy landscape

These are major shifts, and much of the policy and technical debate is focused on how to achieve them while maintaining reliability, security and affordability of energy supply.

However, businesses that are leading in energy strategy are not waiting for these debates to play out, or for things to go back to normal. They are recognising that a dynamic energy landscape is the new normal and are taking action. They are moving to manage risk, and just as importantly, capture the opportunities thrown up by the energy transformation.

As a large consumer of energy, with an ambitious carbon emissions reduction goal of net zero by 2040, across our $11 billion commercial real estate portfolio, **Investa's ongoing approach to the management of electricity is critical to our business.** We have made progress by taking advantage of market timing, negotiating flexible electricity contracts and exploring innovative solutions such as power purchase agreements, enabling the reduction of electricity costs for our tenants, whilst simultaneously moving us towards our emissions reduction target.

Energy efficiency is also a key priority for Investa's large property and facilities management teams, who through active management, have been able to reduce electricity usage intensity by 48% since 2004, delivering significant savings to Investa's tenants and owners, whilst also reducing the environmental footprint of our portfolio.

Jonathan Callaghan
Chief Executive Officer
Investa

How businesses are taking control

Given the scale of the transformation underway in Australia's energy markets, a business as usual approach to energy strategy and management risks operational profits, business productivity and competitiveness.

Businesses that are leading in energy strategy have recognised this, and have moved to optimise their energy position in three key areas:

1. **Leveraging information**
   Granular, real-time data is providing businesses with a deep understanding of how energy is being used across their operations. This information can unlock performance improvements, drive strategic decision-making and investment, and enable reporting and communication of progress against targets.

2. **Calibrating investment**
   Businesses are using this information to understand where they should invest resources and capital, whether it be in energy efficiency, renewable energy or demand management technologies. Identifying opportunities to change how and when energy is used, and investing where cost effective, is setting these businesses up for future growth and competitiveness.

3. **Optimising contracting**
   As well as optimising their own operations, businesses are exploring innovative contracting strategies to source the remainder of their energy requirements. Businesses are ensuring they are not passive price-takers, and are assessing alternate solutions to meet their energy needs.

3.1 Leveraging information

Leaders in energy strategy have advanced metering, submetering and analytics that provide them with a granular understanding of energy use across their operations, broken down not just by site, but by particular subsystems and equipment. Usage is linked to key business metrics, and active monitoring, analysis and reporting is enabling process optimisation and supporting decision making around energy investments.

Not all businesses have energy use data with this level of detail. Most businesses understand the significant areas of energy consumption within their operations, but have opportunities to improve the granularity of available data, as well as how it is analysed and utilised in decision-making.

For businesses looking to revamp their approach to energy management, working with an experienced professional to undertake an energy audit will help develop a deeper understanding of energy use, identify opportunities for process, equipment and management system improvements, and establish a baseline that can be used to assess ongoing performance. A comprehensive audit every three to five years by a highly experienced auditor is best practice.[12]

However, an audit is just a snapshot in time. It is also important to ensure the business has access to real-time, granular energy performance data, which means having the right sensors, submeters and systems in place.

The next step is to ensure this data is driving decision-making rather than sitting in a spreadsheet.

[12] Standards Australia 2014, *AS/NZS 3598.1:2014 Energy audits*, p. 11.

3.2 Calibrating investment

Access to granular, real-time energy data is necessary but not sufficient for making informed investment decisions. Leaders in energy strategy ensure that this data is actively monitored and analysed by experts in relation to key investment opportunities.

These experts consider usage in relation to:

- Key business performance metrics;
- Current energy cost profile;
- Energy market outlook and risk; and
- Opportunities to achieve a more cost-effective outcome through investments in energy efficiency, on- or off-site generation, or demand management technologies.

Businesses that take a considered, proactive approach to investment in efficiency, generation and demand management solutions are optimising the areas where they have a high level of control.

3.2.1 Energy efficiency

The International Energy Agency (IEA) refers to energy efficiency as the 'first fuel', as energy efficiency investments are often more cost effective than investments in other energy sources, including fossil fuels and renewable energy technologies. Significantly, the benefits of energy efficiency extend well beyond just simple energy cost savings. Lower maintenance costs, process improvements, enhanced product quality and cheap carbon abatement are often by-products of sound energy efficiency investments.

Energy efficiency is where smart businesses start before considering other investments, and not just because it immediately cuts energy bills. Importantly, as energy efficiency lowers a business' energy demand, it can reduce the size of generation and demand management technologies required by businesses, reducing the risk of over-investment.

Yet, despite the multiple benefits of energy efficiency, there is evidence that suggests businesses tend to underinvest in energy efficiency, even where the business case is compelling.[13] Many internal budget and capital allocation processes tend to prioritise investment cases focused on revenue growth over cases based on avoided cost. Businesses focused on capturing the benefits of energy efficiency have reviewed their internal processes to remove barriers like this, ensuring energy efficiency investments are properly considered.

Opportunities for improving energy efficiency vary greatly by sector, but generally range from straightforward – and often low-cost – tuning and optimisation, to targeted upgrades to plant and equipment, to site or facility wide retrofits.

Energy efficiency is increasingly being driven by powerful cloud-based analytical tools that identify areas for performance and process optimisation in commercial buildings, manufacturers, mine sites, agricultural holdings and freight systems.

[13] ClimateWorks Australia 2016, *Could boosting energy productivity improve your investment performance: A guide for investors*, pp. 7-8.

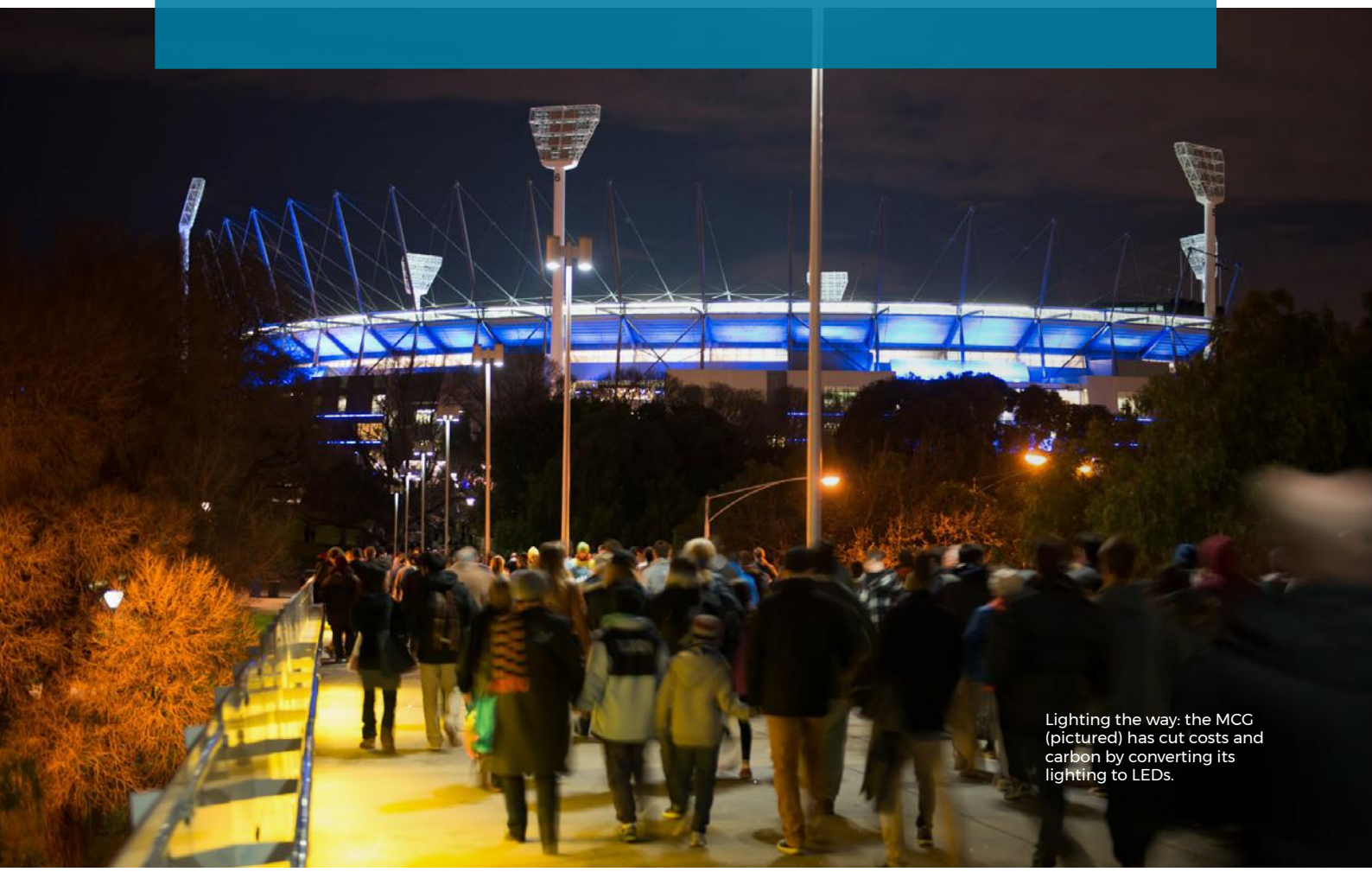
> By investing in substantial energy efficiency upgrades and keeping our finger on the pulse of our day-to-day energy performance, **we've slashed our carbon footprint and saved money** while continuing to deliver world-class sporting events.
>
> **Stuart Fox**
> Chief Executive Officer
> Melbourne Cricket Club

Data and analytics driving efficiency at the G

The Melbourne Cricket Ground (MCG) is one of the most iconic stadiums in the world, attracting millions of patrons to its hallowed turf every year. But unbeknownst to punters, the Melbourne Cricket Club (MCC) has moved decisively to take another leadership position, putting in place a best-in-class energy and carbon management strategy.

The MCC started by working with experts to identify big-ticket energy savings opportunities like LED lighting and demand control ventilation technology. Using an energy performance contract – and taking advantage of discounted energy-efficient products enabled by the Victorian Energy Upgrades program – the MCC locked in the financial savings generated by these energy efficiency upgrades. Those initial works were completed in 2015, however, the savings will continue for years to come – including annual electricity savings equivalent to the annual consumption of 835 homes.

Crucially, they haven't stopped there: the MCC are now using cutting edge sensors and software to monitor electricity and gas usage in real-time. Maintaining a constant watch on this data has driven even further savings, enabling the MCG's annual electricity savings to more than double to the equivalent of near to 1,900 homes.



Lighting the way: the MCG (pictured) has cut costs and carbon by converting its lighting to LEDs.

3.2.2 Renewable energy

The price differential between renewable and traditional energy sources has narrowed as the cost of grid supplied electricity goes up and costs of renewables fall. This, combined with current, low interest rates, is seeing leading businesses seize the opportunity to invest in renewable energy generation, either on- or off-site.

Renewable energy investment helps reduce a business' reliance on grid-supplied electricity and gas, managing exposure to high energy prices and market volatility. For many businesses, on-site renewable energy is now cheaper than grid-supplied electricity, and when generation is situated behind-the-meter there is an added benefit of avoided network charges. Other benefits for businesses include enhancing sustainability performance and the potential to increase budget certainty.

The capacity for on-site renewable energy is generally limited by factors such as available space and structural issues. This is prompting some businesses to actively pursue contracts with large-scale off-site renewable energy generators to meet all or part of their energy supply needs.

Corporate power purchase agreements (PPAs) are long term contracts – typically 10-15 years – for the direct purchase of electricity between a business and a large-scale renewable energy generator. PPAs can provide businesses with electricity cost savings, increased budget certainty, and a long-term hedge against any future energy market volatility. A number of high-profile PPAs have been announced in the past 18 months, including ones involving BlueScope Steel, Carlton and United Breweries (CUB), Mars, Orora, Telstra and the University of New South Wales (UNSW). Even so, PPAs do not suit all businesses, and require extensive feasibility assessments to ensure alignment with operational needs.

> Energy price certainty and continuity of supply is a critical consideration for an energy intensive manufacturer like Orora. From our perspective, **renewable energy represents a competitively priced and sustainable energy source** that will safeguard supply for our Australian operations.
>
> **Nigel Garrard**
> Managing Director and Chief Executive Officer
> Orora Group

Renewable PPAs the complete package for energy intensive manufacturer Orora

Headquartered in Melbourne, Australia, Orora is a global packaging producer that employs more than 6,700 people across 43 manufacturing plants and 88 distribution sites in seven countries.

As a major manufacturer in Australia, Orora operates an energy intensive business where surety of supply and price certainty is critical. Having made significant investments in the energy and process efficiency of plant and equipment, Orora took the proactive step of securing two long-term power purchase agreements (PPAs) with energy providers. Under the innovative arrangements, the energy providers supply wind generated electricity to Orora's operations in South Australia, Victoria and New South Wales, where Orora runs its largest and most energy intensive plants. As a result of the PPAs, Orora has secured the continuing supply of renewable energy for volumes equivalent to 80% of the company's total electricity demand in Australia.

Importantly, the most recent PPA incorporates a fixed price component for the electricity, where the risks associated with fluctuating output and spot market exposure is carried by third parties that specialise in the provision of energy market insurance products.

This shift towards renewable energy not only has a positive environmental impact, but also gives Orora commercial certainty by reducing the company's exposure to fluctuating wholesale energy prices.

Orora has secured the supply of renewable energy from a number of sources, including from Clements Gap Wind Farm (pictured).

3.2.3 Managing when energy is used

As explained in Section 2.3, the electricity system is becoming more peaky due to the impact of renewables on both energy supply and demand.

Storage plays a significant role in dealing with peaky demand, and the higher costs that businesses can face during those peaks. Substantial investment and effort is being expended to increase the availability and use of storage technologies – including grid scale batteries and pumped hydro – to smooth out the availability of electricity generated from renewables at particular times of the day.

Savvy businesses with a granular understanding of when they use electricity have the opportunity to proactively manage their energy use, which can reduce their energy costs and create new revenue streams.

Batteries not included – yet

As battery technology develops, businesses with relatively little flexibility may be able to use on-site batteries to store energy for later use, sourced either from on-site renewables, or from the grid during off-peak periods when energy is cheaper.

While battery costs are coming down, in most cases using them for this sort of energy management is not yet economically viable. However, many businesses already have the ability to reduce their bills by optimising their energy use over time, without waiting for battery costs to fall.

Businesses can manage their use of grid-sourced energy in a number of ways. The most common approach is shifting use away from regular periods of peak demand, such as afternoons. This reduces exposure to peak demand charges, which can be a component of both retail and network costs.

Some commercial and industrial equipment, such as appliances used for heating and cooling, facilitate this type of energy management, as they do not need to draw energy continuously from the network.

However, businesses can also manage their energy use in more sophisticated ways. New technologies are enabling businesses to rapidly adjust their energy use to adapt to changes in the energy system. This is known as demand response, and it can deliver a variety of benefits. For example, if energy prices peak due to an unplanned generator outage, businesses can voluntarily reduce their energy use to avoid high costs. Demand response can also help to stabilise the grid, which is why businesses can already get paid for some kinds of demand response services.

> It is clear that **demand response has untapped potential** to manage demand during extreme peaks in Australia, just as it does in other countries.
>
> **Audrey Zibelman**
> Chief Executive Officer
> Australian Energy Market Operator

Energy market rules are currently being updated in ways that could broaden the types of demand response for which businesses can be compensated. This will bring Australia into line with other parts of the world where demand response is common, including in the United States, Europe and New Zealand. This increases system resilience and reduces the need for additional spending on generators or networks to deal with peak demand.

This type of **demand response is a win-win**: businesses that do not participate in demand response benefit from increased reliability and affordability of the energy system because of voluntary demand response undertaken by others. Businesses that do participate receive these same system-level benefits, plus a direct payment for the demand response.

Different demand management options make sense depending on business type, demand profile and requirements around security of supply. What is crucial is that businesses carefully consider not just where their energy comes from and how they use it, but when they use it.

Victoria Cold Storage takes the heat off the grid with demand response

Victoria Cold Storage is a traditional logistics business dedicated to the distribution and warehousing of dry, chilled and frozen food products. However, over the last year the business has joined the cutting edge of Australia's energy transformation by participating in a demand response trial conducted by the Australian Energy Market Operator (AEMO) and the Australian Renewable Energy Agency (ARENA).

At its two facilities in Campbellfield, Victoria Cold Storage provides the system operator, AEMO, with the capability to reduce demand, which can be activated during system emergencies when grid demand threatens to outstrip supply.

With the assistance of a partner aggregator, Victoria Cold Storage installed control equipment that automatically and safely curtails load when requested by AEMO. By altering the use of refrigeration equipment for brief periods of time, each facility is able to reduce electricity demand by about 350 kW, without disruption to normal operations or product quality.

The program has a financial benefit for the company, as it receives payments each month for making their flexible load available to the grid. Best of all, the company is helping out other businesses and the broader community by increasing the reliability of the energy system for everyone.

Victoria Cold Storage (pictured) capitalised from the AEMO-ARENA demand response trial over the 2017-18 summer.

3.3 Optimising contracting

After calibrating their energy investment strategy, almost all businesses still require grid supplied electricity. Leading businesses are exploring innovative contracting strategies to optimise energy costs and balance market risks when sourcing this portion of their energy requirements.

3.3.1 Fixed price electricity contracts

Most medium and large businesses purchase electricity through a fixed price forward contract. This is an agreement with a retailer in which the price is fixed for one, two or three years. Businesses typically conduct a formal tender process designed to source the most cost-effective electricity contract; a reverse auction is an alternative procurement option used by some businesses to achieve the same outcome.

A fixed price contract can work well for businesses that are strategic about when they enter into the contract, and for how long. Businesses should aim to time procurement processes to avoid periods of increased market volatility, such as the summer months. Businesses should look to secure a longer contract in a market in which prices are increasing, and a shorter contract in a market where prices are falling.

3.3.2 Progressive purchasing contracts

A progressive purchasing contract allows businesses to buy electricity in parcels over an agreed contract period. By facilitating the purchase of smaller parcels of electricity more regularly, progressive contracting can help manage market price volatility. This approach is well suited to very large energy users that are willing to more actively manage their energy contracting.

It is crucial that progressive contracting is complemented by an active risk management strategy that monitors market conditions and measures the risk exposure of any unpurchased load.

3.3.3 Block purchasing with managed spot exposure

Block purchasing allows the business to hedge part of its load by purchasing a block of electricity. This contract type, in which either a wholesaler or a retailer can act as an intermediary, specifies the block price and demand, with any additional demand supplied at the spot market price.

In block purchasing, the business takes the volume risk of under or over-consumption versus the block demand. Depending on the contact structure, under- or over-consumption may be settled at spot price, which varies every 30 minutes and can be highly volatile.

To manage the unhedged portion of the load and further mitigate the risk associated with spot market exposure, businesses can:

- Curtail load – a physical hedge;
- Agree to a price cap or a collar – a financial hedge; or
- Exercise options to buy electricity at a pre-determined strike price.

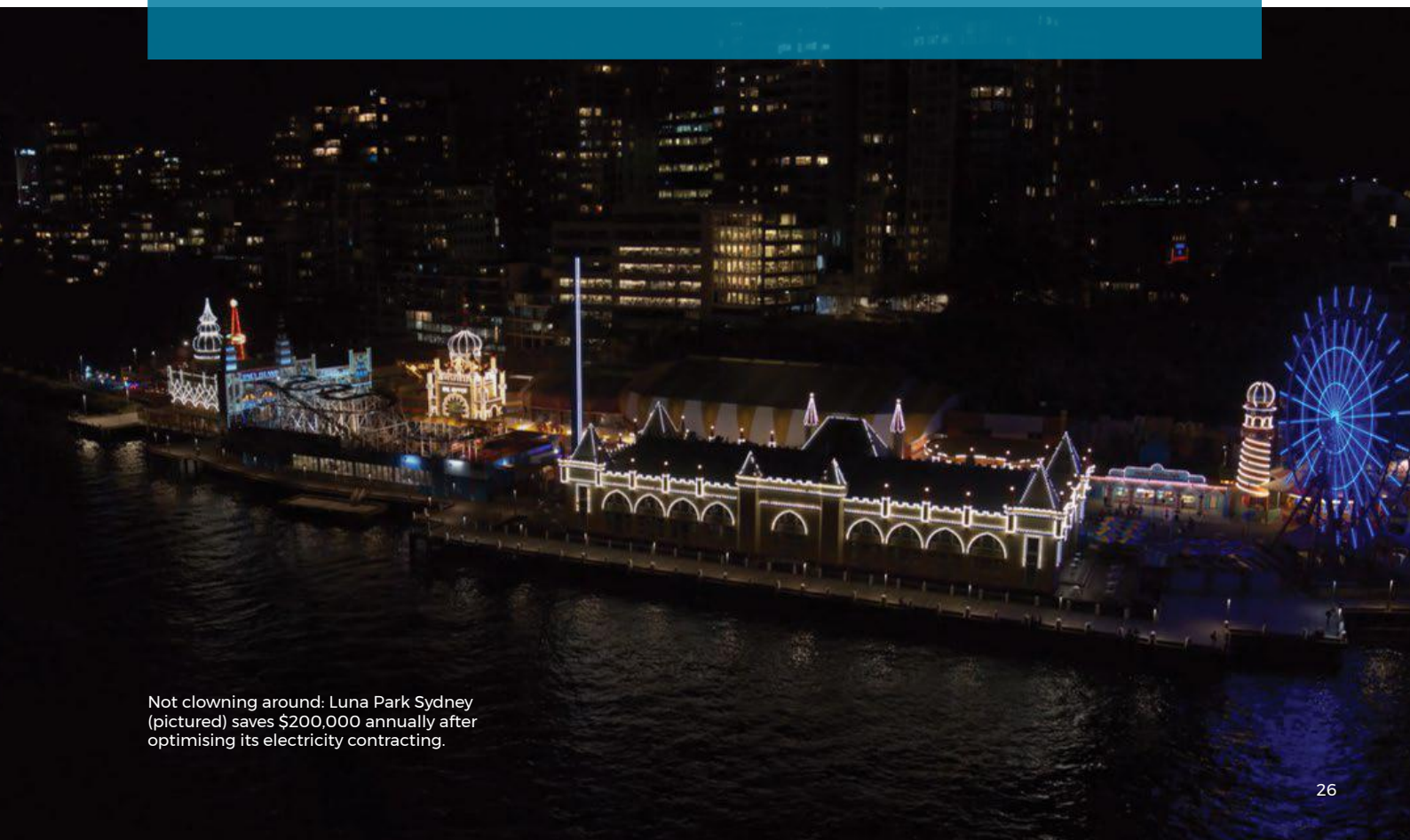
While these are some of the more common contracting types, others exist, and businesses that are leading in energy strategy have internal or external experts charged with assessing contracting options. Businesses that thoroughly assess the available energy contract options are ensuring they are not passive price-takers, and are effectively managing their energy market exposure.

Bright ideas drive down contracting costs at Luna Park Sydney

Luna Park's thousands of lights, which shine across Sydney Harbour every night, are iconic. Yet, along with ride motors, air conditioners and refrigeration, they contribute to a very substantial energy bill every year.

With electricity prices rising, and after many years of managing their own energy procurement, Luna Park worked with an external procurement expert to ensure the business got the best result. Luna Park locked in an energy contract that is saving the park over $200,000 per year.

As well as sorting out the business' procurement, Luna Park undertook an energy audit to drive the park's energy bills down even further. This led to a lighting upgrade that is paying back rapidly. With other energy efficiency initiatives in the works, management is confident it can keep the lights twinkling and the rides running for many more years to come.



Not clowning around: Luna Park Sydney (pictured) saves $200,000 annually after optimising its electricity contracting.

Connecting with experts and accessing finance

4.1 Connecting with experts

Energy is a complex area, and it is only getting more complex over time. Managing it effectively can require domain knowledge across areas as diverse as business strategy, energy markets, engineering and carbon accounting, to name just a few. Businesses are responding to increasing complexity by ensuring they have relationships with external experts that complement their internal expertise.

Many businesses have existing relationships with trusted experts in the areas covered in this briefing. For those that do not, sourcing a referral from professional networks is a natural first option.

Beyond that, seeking out a member of a well-established, credible industry association can act as a good starting point.

energy efficiency COUNCIL

The Energy Efficiency Council's membership directory is an excellent place to start. The Council is Australia's peak body for experts in energy efficiency, energy management and demand response. The Council's membership list can be accessed at **eec.org.au/members**

Many industry and professional associations have members who support businesses on the topics covered in this briefing. They include:

- Australian Alliance for Energy Productivity;
- Carbon Market Institute;
- Clean Energy Council;
- Energy Savings Industry Association; and
- Smart Energy Council.

There are also many sector, technology and discipline specific industry and professional associations, a number of which are members of the Australian Sustainable Built Environment Council.

4.2 Energy-specific financing options

Businesses are experts in considering options for investment and capital expenditure. However, businesses that are leading on energy strategy are also accessing a range of specific financing options that are unique to energy investments.

These alternative financing mechanisms include energy performance contracts (EPCs), energy service agreements (ESAs), environmental upgrade finance (EUF) and PPAs, discussed in more detail in Section 3.2.2.

Two federally-funded bodies assist business with energy investments:

1. **The Clean Energy Finance Corporation (CEFC)** funds energy efficiency and renewable projects directly, and partners with major banks to reduce interest margins on loans used to invest in energy efficient and renewable technologies; and
2. **The Australian Renewable Energy Agency (ARENA)** provides finance for early stage innovative energy technology, supporting businesses to participate in pilot projects and trials.

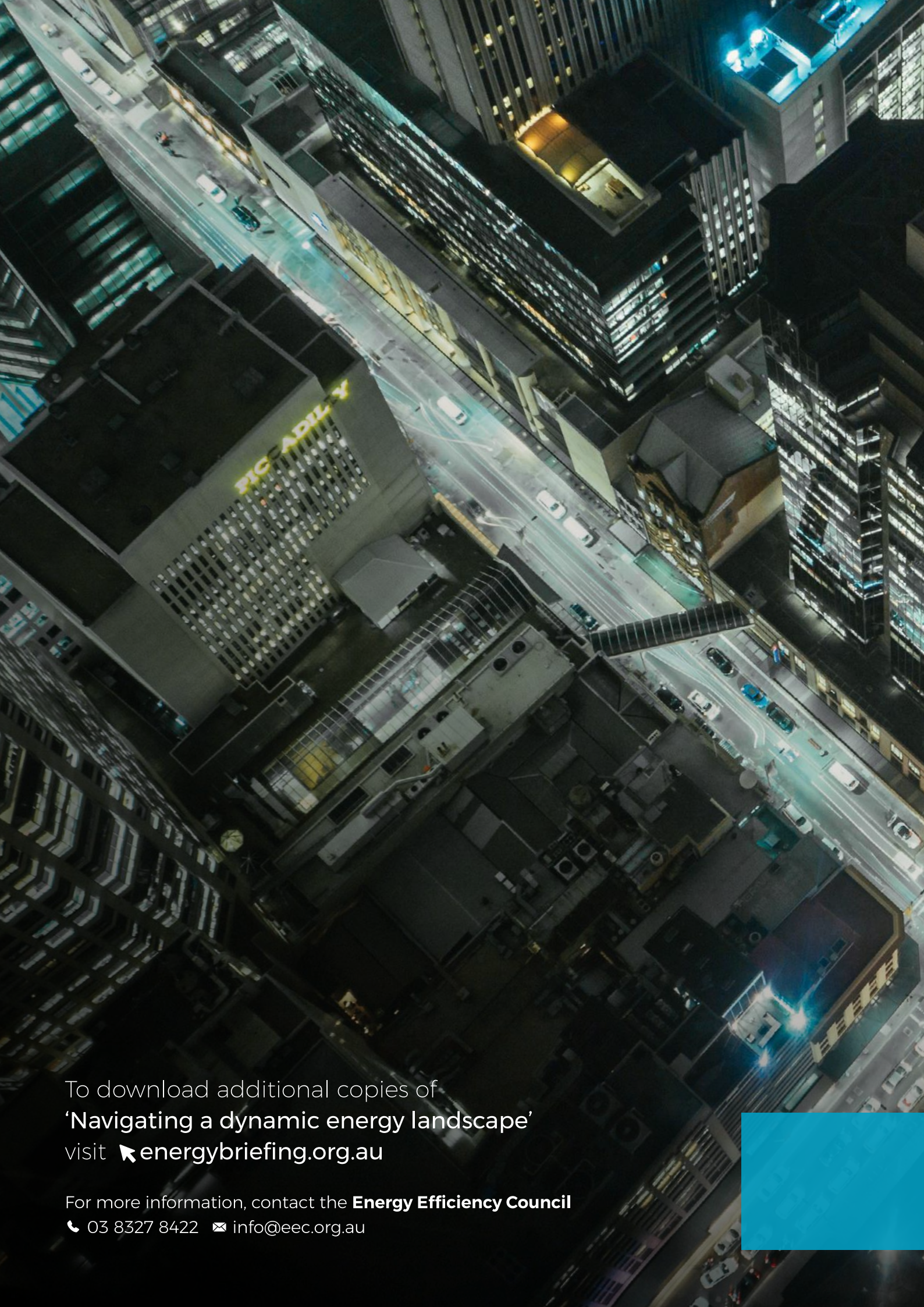
At the level of states and territories, energy efficiency schemes – notably the Victorian Energy Upgrades (VEU) scheme and NSW Energy Savings Scheme (ESS) – are available to support businesses investing in energy efficiency projects. Some other state government funding programs for energy projects are available. Some jurisdictions have online business portals focused on energy, which can be used to access information on funding programs and other resources. These include:

ACT	**actsmart.act.gov.au**
NSW	**environment.nsw.gov.au/business**
QLD	**business.qld.gov.au/running-business/energy-business**
SA	**sa.gov.au/topics/energy-and-environment/using-saving-energy/for-businesses**
VIC	**victorianenergysaver.vic.gov.au/training-and-support-for-business**

As with any business investment, a robust monitoring framework is crucial for energy projects to ensure investment thresholds are met. Businesses are increasingly quantifying energy project performance through measurement and verification (M&V) methodologies, which establish a baseline and variables up-front, thereby enabling a proper assessment of whether the investment criteria have been met.

Glossary

ACCC	Australian Competition and Consumer Commission
ADGSM	Australian Domestic Gas Security Mechanism
AEMO	Australian Energy Market Operator
ARENA	Australian Renewable Energy Agency
CEFC	Clean Energy Finance Corporation
DELWP	Department of Environment, Land, Water and Planning (Victoria)
EEC	Energy Efficiency Council
EPC	Energy performance contract
ESA	Energy service agreement
ESS	Energy Savings Scheme (New South Wales)
EUF	Environmental upgrade finance
IEA	International Energy Agency
IRENA	International Renewable Energy Agency
ISP	Integrated system plan
LNG	Liquefied natural gas
M&V	Measurement & verification
NEG	National Energy Guarantee
NEM	National Electricity Market
PV	Photovoltaics
PPA	Power purchase agreement
RET	Renewable Energy Target
VEU	Victorian Energy Upgrades



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