energetics | NORTON ROSE FULBRIGHT

NSW GUIDE TO CORPORATE POWER PURCHASE AGREEMENTS

OCTOBER 2018

HELPING ENERGY BUYERS TO MAKE THE MOST OF THE GROWING NSW RENEWABLE ENERGY OPPORTUNITY

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Contributors

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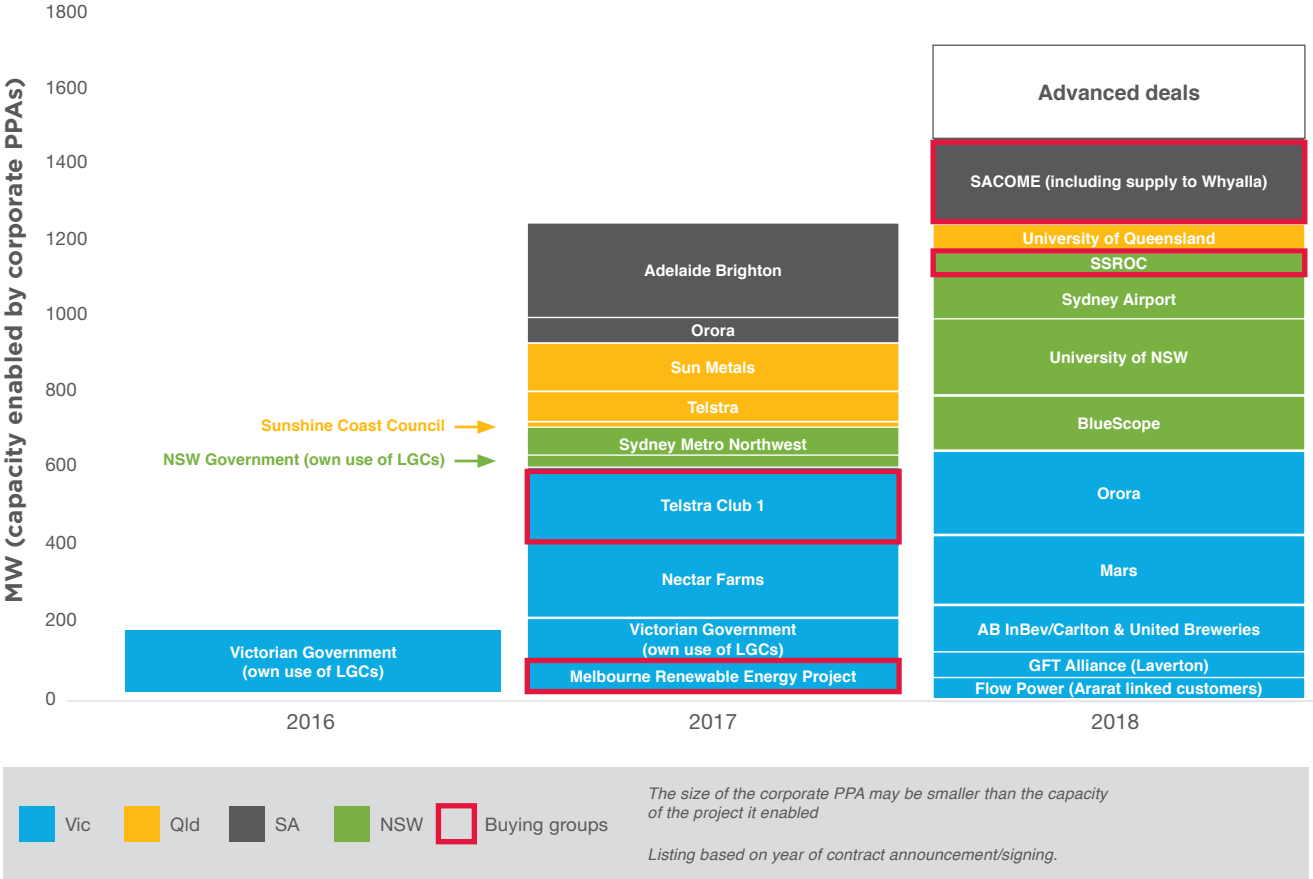
EXECUTIVE SUMMARY

Australia's National Electricity Market is experiencing unprecedented change. New electricity sources will become the cornerstone of a modern, technologically advanced and flexible electricity system in Australia.

This guide presents an opportunity for large energy buyers to enter into corporate Power Purchase Agreements (PPA) with renewable energy generators, to reduce both electricity bills and emissions, while also delivering marketing benefits.

Such corporate PPAs are not new, with Australia's first PPA contracted back in 2009. However, they are now firmly on the agenda, especially for energy buyers or groups consuming more than 50 gigawatt hours (GWh) per year.

Figure 1: Recent Australian corporate PPAs with renewable generators larger than 10 megawatts (MW)[1]



This guide aims to help organisations that are considering a corporate PPA to manage their electricity and emissions exposures. It provides the background understanding to work as effectively as possible with professional advisors.

1 Energetics Knowledge Centres, Corporate renewable PPA deal tracker, 2018. https://www.energetics.com.au/insights/knowledge-centres/corporate-renewable-ppa-deal-tracker/

1. HOW A CORPORATE PPA WORKS

A PPA is a long-term agreement for an energy buyer to purchase a quantity of electricity generated by an off-site[2] renewable energy project, such as a solar or wind farm. This allows the energy buyer to hedge the future cost of electricity and renewable energy certificates[3] against rises and volatility in market prices, while the renewable energy generator benefits from certainty of revenue over the PPA term which can help it to secure the finance needed to get a project up and running.

The energy buyer and generator agree on a PPA strike price for the electricity. The generator feeds its electricity to the grid as usual, and receives the National Electricity Market (NEM) spot market price.[4] For the quantity delivered to the grid a 'contract for difference' (CFD) then operates under the PPA, calculating the difference between the PPA strike price and spot market price for that quantity: if the spot market price is higher than the strike price, the generator pays the energy buyer any excess to the PPA price; if the spot market prices is lower than the strike price, the energy buyer pays the generator for any shortfall.

In compliance with the market rules, a retailer as licensed intermediary is still required to supply the electricity consumed by the energy buyer. The PPA can therefore be entered into as a lone standing agreement (i.e. financial hedge) with the generator, or the PPA can also involve a retailer to link the hedge to the supply of electricity and ensure constant supply even during times when the renewable energy generator is not generating.

A PPA IS A LONG-TERM AGREEMENT FOR AN ENERGY BUYER TO PURCHASE A QUANTITY OF ELECTRICITY GENERATED BY AN OFF-SITE RENEWABLE ENERGY PROJECT, SUCH AS A SOLAR OR WIND FARM.

2. THE BENEFITS

An energy buyer may seek a PPA to secure lower energy pricing as a PPA can reduce the cost of electricity below standard retail offers. A well negotiated PPA can potentially provide savings between 15-47% on the energy component of a typical electricity bill expected in 2020.[5]

However, forecasting long term electricity prices can be difficult and a PPA can offer more predictable energy costs and shield the energy buyer from volatile electricity prices.

An added benefit of PPAs is the reputational and marketing opportunities for the energy buyer. A PPA can provide strong renewable energy credentials, and Large-scale Generation Certificates (LGCs) to meet an energy buyer's indirect compliance obligations.

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2 For the purposes of this guide the focus is on off-site generators connected to the transmission or distribution network ("grid") rather than directly to the large energy buyer's facility / site. A PPA may also be entered into with direct connection to the large energy buyer's facility / site "behind-the-meter" but this is outside the scope of this guide.

3 Known as Large Scale Generation Certificates or LGC's.

4 The wholesale price, set at trading intervals, at which the NEM pays for electricity accepted into the grid.

5 The savings must be assessed over the life of the agreement and is expected to vary from year to year.

TO CONSIDER THESE ISSUES AND CRAFT A SUCCESSFUL PPA, ORGANISATIONS WILL NEED TO FULLY ENGAGE ALL RELEVANT INTERNAL EXPERTS AS WELL AS LEGAL, ENERGY MARKET AND FINANCE ADVISERS.

3. THE RISKS

In exchange for those benefits, the energy buyer takes on risks similar to those normally borne by the retailer. By engaging a retailer to manage the PPA on the energy buyer's behalf, some of these risks can be transferred but will reduce the overall benefit to the energy buyer.

Certain NEM market risks may reduce the generator's NEM spot market price (so that payments from the energy buyer under the CFD increase) or reduce its volume (so that the benefit to the energy buyer reduces during settlement periods when payments are in favour of the energy buyer). There are also project, counterparty, performance, and credit risks that may prevent the generator from operating to deliver electricity as planned, especially if it is a new project. And there is also the risk that major changes in energy policy and regulations may lead to cheaper electricity prices over the medium and long term.

4. SPECIFYING A PPA

Depending on its risk appetite and the benefits it seeks, the energy buyer may pursue a PPA for either electricity or LGCs or both, with or without the retailer as a party. The energy buyer may seek a PPA for all of its electricity consumption or smaller amounts of electricity or LGCs, and also choose to join an energy buyer's group.

5. CHOOSING A GENERATOR

The benefits secured by a PPA will also depend on the choice of generator. Although there are exceptions to the rule, energy buyer should aim to match the time-of-day generation with their time-of-day energy needs, and ideally select a project in the same state as the energy buyer's largest electricity demand.

A new renewable project could offer a lower price, but more risk, than an existing one, though partnering with an experienced project owner will mitigate some of those risks. However, this must be weighed up against the upfront benefit of entering into a PPA with an existing project in the current market with known near term high electricity and LGC prices.

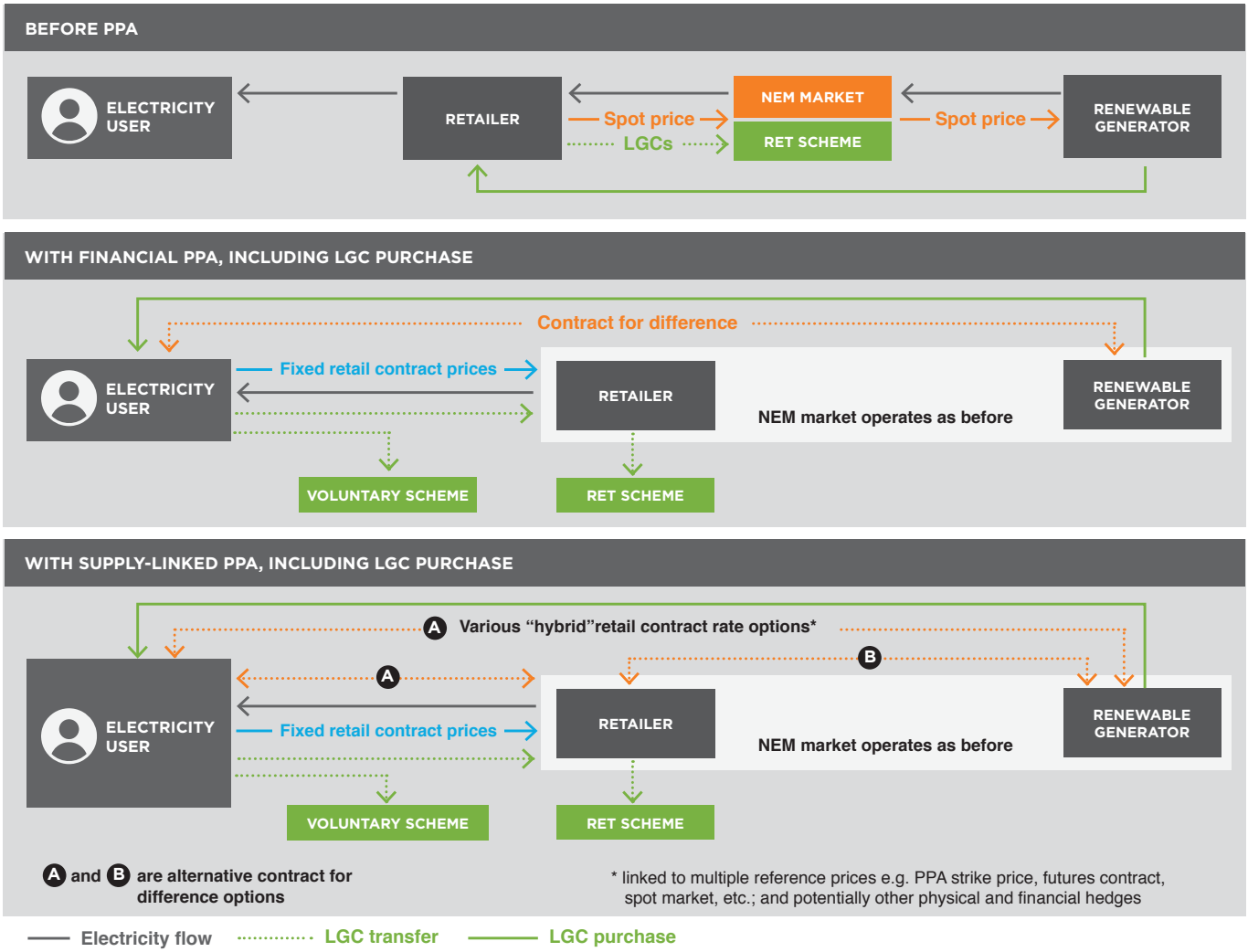
6. DESIGNING THE PRICING MECHANISM

The contract model selected and the parties' attitudes to the core market risk of future high and volatile electricity prices will determine the pricing mechanism for the PPA. The pricing level will start with the parties' view of those future prices, and then be adjusted for various secondary benefits and party risks.

To consider these issues and craft a successful PPA, organisations will need to fully engage all relevant internal experts (finance, risk, legal, energy procurement, sustainability and marketing), as well as their legal, energy market and finance advisers.

This Guide to corporate renewable Power Purchase Agreements (PPAs) will help decision-makers to understand how they are priced and structured, so that they can mitigate risks and realise benefits. This guide addresses key market barriers to the uptake of corporate renewable PPAs by providing practical tools for communicating these complex models.

Position of the parties before and after a PPA



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KEY TERMS AND ACRONYMS

AEMO	The **Australian Energy Market Operator** administers the NEM on behalf of the federal and state governments.
CFD	A **contract for difference** (CFD) allows parties to a PPA to set a long-term price and also take into account National Electricity Market (NEM) spot market variations: see section 1.3. This long-term price is called a 'strike price' and in a CFD, generators pay customers the difference when the spot price is above the strike price. When the spot price is below the strike price, customers pay generators the difference between the spot price and the strike price.
LGCs	A **Large Scale Generation Certificate** is created for the RET scheme when a plant with over 100 kilowatts (kW) capacity generates 1 megawatt hour (MWh) of renewable energy. In 2018, electricity retailers must surrender LGCs equal to 16.06% of the electricity consumed by their customers.
MLF	The **marginal loss factor** or MLF represents the marginal electrical transmission losses between a connection point in the grid and the Regional Reference Node (RRN). The MLF is used in the AEMO dispatch and settlement process to calculate the settlement price for a connection point; as well as LGC calculations by the Clean Energy Regulator.
NABERS	The **National Australian Built Environment Rating System** measures the energy efficiency, water usage, waste management and indoor environment quality of a building or tenancy and its impact on the environment.
NEM	The **National Electricity Market** covers the five interconnected states of NSW/ACT, Victoria, Queensland, South Australia and Tasmania: See section in this Guide: The Opportunity The Opportunity of Corporate PPAs.
PPA	A **corporate Power Purchase Agreement (PPA)** is a medium to long-term agreement over a quantity of electricity generated by a new or existing off-site renewable energy project. For the purposes of this guide the focus is on off-site generators connected to the transmission or distribution network ('grid') rather than directly to the large energy buyer's facility / site. A PPA may also be entered into with direct connection to the large energy buyer's facility / site ('behind-the-meter') but this is outside the scope of this guide. The corporate PPAs referred to in this guide usually include electricity and the corresponding Large Scale Generation Certificates (LGCs): see sections 1 and 3.
PWA	**Production weighted average** - The PWA price is what the buyer will receive, rather than the spot market price. It is the sum of the sent out generation in each trading interval, multiplied by the prevailing spot price for each trading interval, divided by the total sent out generation
RET	The **Renewable Energy Target Scheme**, overseen by the Clean Energy Regulator, underpins a national commitment to meet a national target of renewable energy generation. The target increases each year to 2020 when it will reach 33,000 gigawatt hours (GWh). The obligation is on the retailer, who charges this compliance cost to energy buyers. The current target is legislated until 2030.
RRN	A **Regional Reference Node** is the reference point in each region of the NEM where the price is set for trading intervals, and between which inter-regional transmission losses are calculated: see section 6.1.
Spot price	In delivering electricity, a dispatch price is determined every five minutes, and six dispatch prices are averaged every half-hour to determine the **spot price** for each region of the NEM.
Trading Intervals	In delivering electricity, AEMO dispatches electricity every 5-minutes. However, for the purposes of settlement, the price is then averaged out over 30 minutes. This 30-minute period, referred to as the **trading interval,** is therefore the average of the six dispatch interval prices. All generators dispatched in that trading interval receive the spot price. Effective July 2021 the trading interval will reduce to 5 minutes.

THE OPPORTUNITY OF CORPORATE PPAS

Until recently, most large Australian organisations purchased electricity from their retailers via short term contracts, which can expose the organisations to electricity market risks. This approach worked well when prices were low and wholesale electricity markets stable.

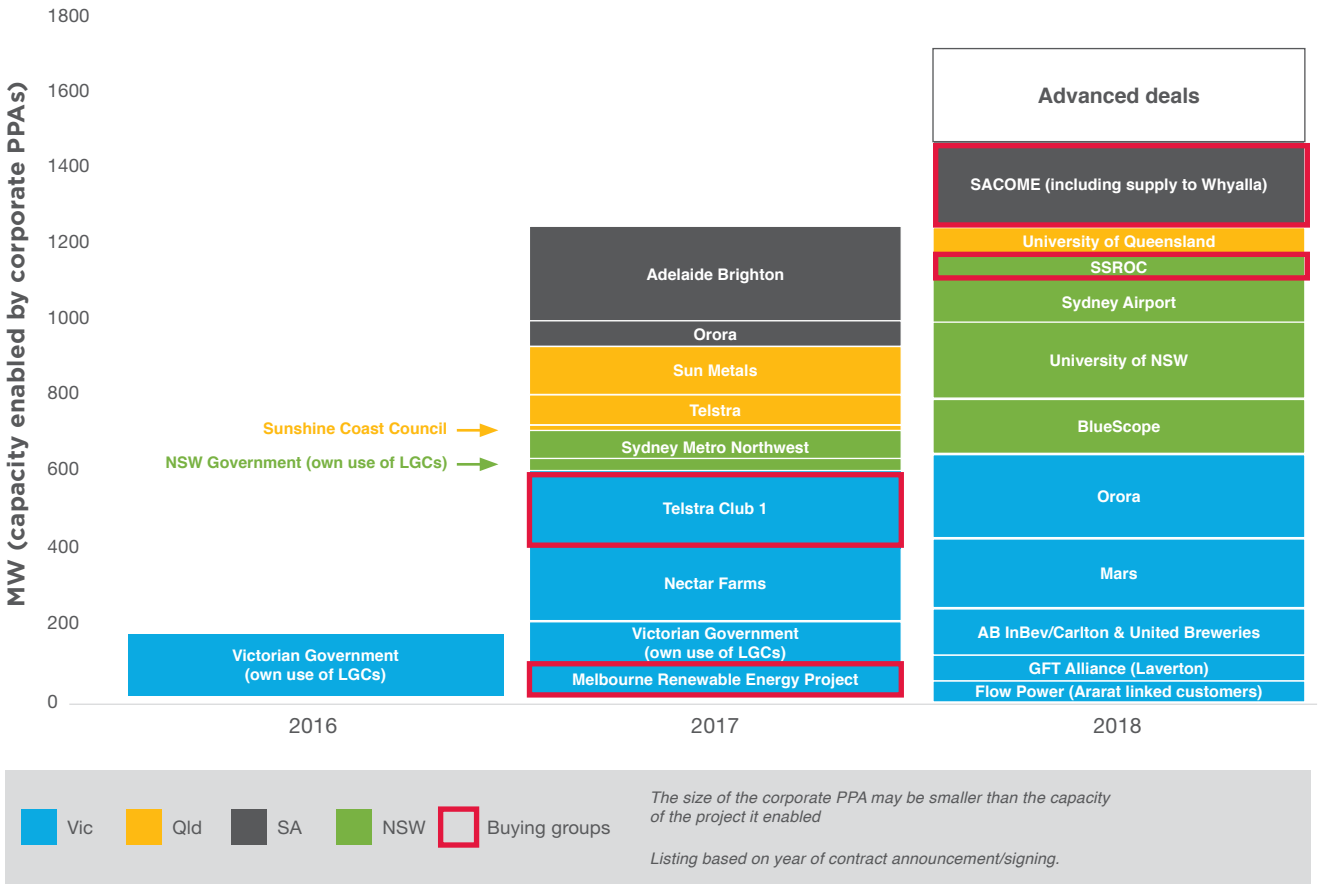
Now, Australia's electricity market is experiencing unprecedented change. By entering a Power Purchase Agreement (PPA) with a renewable energy generator, organisations can manage price fluctuations, reduce electricity bills, reduce their reportable emissions, and secure related brand benefits.

Corporate PPAs are not new. Global innovators such as Google, Dow Chemicals, 3M, Nike, IKEA, JP Morgan and Microsoft have contracted directly with renewable energy generators for many years and have accelerated this decade, led by the Americas.

Australia's first corporate PPA was contracted by Sydney's Desalination Plant back in 2009. For a time, few agreements were concluded in Australia. Now, they are back on the agenda, for energy buyers or groups typically consuming more than 50 gigawatt hours (GWh) a year: see Figure 1. They have been used by individual energy buyers such as Telstra, Sun Metals, Orora, SMNW and MARS, and universities including the University of NSW.

Energy buyers' groups also emerged with Coca-Cola Amatil, ANZ, Monash University, Melbourne University and Telstra combining their loads as part of a consortium (Telstra Club 1 in the diagram below), and fourteen organisations aggregating their contract volume in the Melbourne Renewable Energy Project: see page 26. There is now also a growing number of offers in the market for loads between 5 and 50 GWh per year.

Figure 1: Recent Australian corporate PPAs with renewable generators larger than 10 MW



ENERGY BUYERS SEEKING A RANGE OF RENEWABLE ENERGY PROJECT OPTIONS ARE INCREASINGLY LOOKING TO NSW

NSW is an attractive destination for corporate PPAs

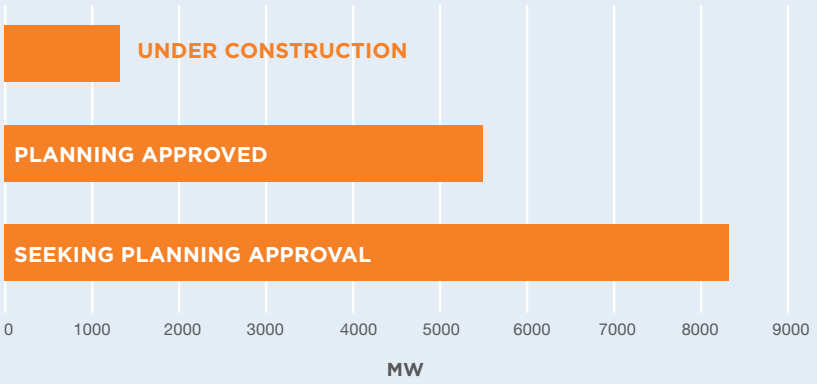
Energy buyers seeking a range of renewable project options are increasingly looking to NSW. The State has high and stable electricity demand, and with a reduction in supply expected with the closure of thermal electricity generators commencing with Liddell in 2022, NSW is attracting new renewable energy projects.

NSW accounts for about 37% of all electricity consumed in the National Electricity Market (NEM) and has its highest rate of forecast economic growth. Yet while large scale renewable energy (including the Snowy Hydro scheme) makes up almost 29% of the State's energy capacity (excluding interconnector capacity), it made up only 9% of its actual generation in 2017.

NSW is experiencing a surge in renewable energy investment to close this gap in the supply mix. Eleven new projects are expected to come online in 2018 – five wind farms, five solar farms and a solar thermal plant – more than doubling the State's installed wind and solar capacity in one year. As of August 2018, another 80 large scale projects (adding around 14,000 MW in capacity) are progressing through the planning approval process or are already approved.

This strong development pipeline means that there is strong competition amongst developers to strike a PPA and secure reliable long-term revenue, enabling buying organisations to negotiate attractive PPA terms and prices.[6]

Renewable energy pipeline in NSW[7]



6 The data in this section are based on large generators supplying the NEM, excluding all non-scheduled small generators and rooftop solar PV; including the total Snowy capacity and generation (including Murray).

7 Data for this graph was obtained from The NSW Government Department of Planning & Environment Major Projects Assessments website http://majorprojects.planning.nsw.gov.au/ and information from project proponents and is accurate as of August 2018.

The National Electricity Market

The National Electricity Market (NEM) covers the five interconnected states of NSW (including the ACT), Victoria, Queensland, South Australia and Tasmania. It includes:

- All generation and distribution infrastructure across these eastern states.
- A competitive NEM spot market, operated by the Australian Energy Market Operator (AEMO).
- A competitive wholesale financial hedge market, using both exchange-traded futures and over-the-counter derivative contracts.

Although these state (or regional) markets are physically connected, the flow of power between them is restricted by the capacity of regulated interconnectors. Consequently, electricity prices in each state are set independently based on the state's own supply and demand dynamics, and limitations in the flow.

The NEM spot market matches supply and demand for electricity in real time.

Generators bid a price per megawatt hour for their electricity. AEMO accepts the bids from the lowest price up, until all prevailing demand is met for a 5-minute dispatch interval. AEMO then dispatches these Generators into production.

Irrespective of their original offer price, all generators dispatched by AEMO in an interval receive the same price – the price bid by the Generator supplying the last unit of energy required to meet demand in the 5-minute interval. Payments for NEM electricity are then settled on the average of the 5-minute dispatch prices in the 30-minute trading interval.

AEMO will align the dispatch and settlement (trading) intervals at 5 minutes, starting in July 2021.

1. UNDERSTANDING HOW CORPORATE PPAS WORK

A corporate PPA is an agreement where a large energy buyer acquires electricity, directly or indirectly, from a new or existing energy generator. It is called a 'corporate' PPA to distinguish it from a wholesale PPA between a generator and a retailer.

A large energy buyer may be interested in a corporate PPA for renewable energy to:

- Secure a lower cost of electricity and Large Scale Generation Certificates (LGCs) over the term of the PPA (typically 5 years or longer).
- Reduce the volatility of its energy budget over the term of the PPA.
- Acquire the credentials of renewable energy.

The renewable generator, meanwhile, gets certainty of revenue over the PPA term, which often helps in securing finance.

This section introduces the key principles of how corporate PPAs work: who the interested parties are, what the corporate energy buyer is acquiring, the price being paid, and the final position of the parties.

1.1. PARTIES CONCERNED WITH A PPA

The main parties to the PPA contract are the energy buyer and generator. Increasingly, energy retailers are engaged in providing PPA-backed solutions to large energy buyers with one or often a range of generators contracted by the energy buyer, or the retailer on behalf of the energy buyer. Other key stakeholders include the financier and regulators, as well as a range of other stakeholders (both internal and external) in the contract.

A CORPORATE PPA IS AN AGREEMENT WHERE A LARGE ENERGY BUYER ACQUIRES ELECTRICITY, DIRECTLY OR INDIRECTLY, FROM A NEW OR EXISTING ENERGY GENERATOR

Figure 2: Parties concerned with a PPA

ELECTRICITY BUYER	GENERATOR	FINANCIER	RETAILER^	REGULATORS
• May be a single energy buyer or a member of an energy buyers' Group • Needs to be creditworthy or otherwise may have to provide credit support to the generator	Typically: • greater than 5 MW grid connected system • structured as a 'Special Purpose Vehicle' or SPV [8] owned by its sponsors and financed externally • with assets built, operated, maintained and managed under contract	Has baseline requirements for price and risk allocation in a PPA before lending. Requires the energy buyer and generator to enter into a tripartite agreement, which gives the financier the right to step in to remediate generator failures before the PPA is terminated	Licensed to sell electricity from the NEM spot market to energy buyers at the premises where they consume electricity If the energy buyer wishes to reflect an impact of the corporate PPA, a retailer is required - unless the energy buyer is registered as a Market Customer with AMEO	Key regulators are: • AEMO - operates the NEM • Clean Energy Regulator (CER) which administers the Renewal Energy Target (RET) Scheme Other Regulators may also be relevant

^ unless the energy buyer is registered as a market customer with AEMO

8 A SPV or Special Purpose Vehicle is a new company with a separate legal entity, incorporated only to develop, construct, own and operate the renewable energy project and undertake no additional business.

1.2. WHAT CHANGES FOR THE PARTIES

Understanding the terminology of corporate PPAs is not always intuitive; in some cases there is no actual power or electricity being purchased and consumed by the energy buyer.[9]

Instead of the electricity itself, the buyer acquires benefits – lower prices, a hedge against variability, renewable credentials and compliance certificates – for a quantity of electricity equivalent to that contracted by a renewable project.

This is because as soon as the project's electricity enters the NEM grid, it is pooled with the rest of the NEM electricity and can only be purchased through a retail agreement with a NEM retailer, unless the energy buyer is registered as a market customer with AEMO.

The position of the parties before and after the PPA is shown in Figure 3. Beforehand, the energy buyer pays a retailer a fixed price for grid electricity and has no relationship with the generator. The generator receives the variable spot market price[10] and can sell its LGCs to retailers who must surrender the certificates to meet their obligation under the RET.

UNDERSTANDING THE TERMINOLOGY OF CORPORATE PPAS IS NOT ALWAYS INTUITIVE, AS IN SOME CASES THERE IS NO ACTUAL POWER OR ELECTRICITY BEING PURCHASED AND CONSUMED BY THE ENERGY BUYER

With a PPA, the energy buyer maintains a contract with the retailer for the electricity it consumes, but:

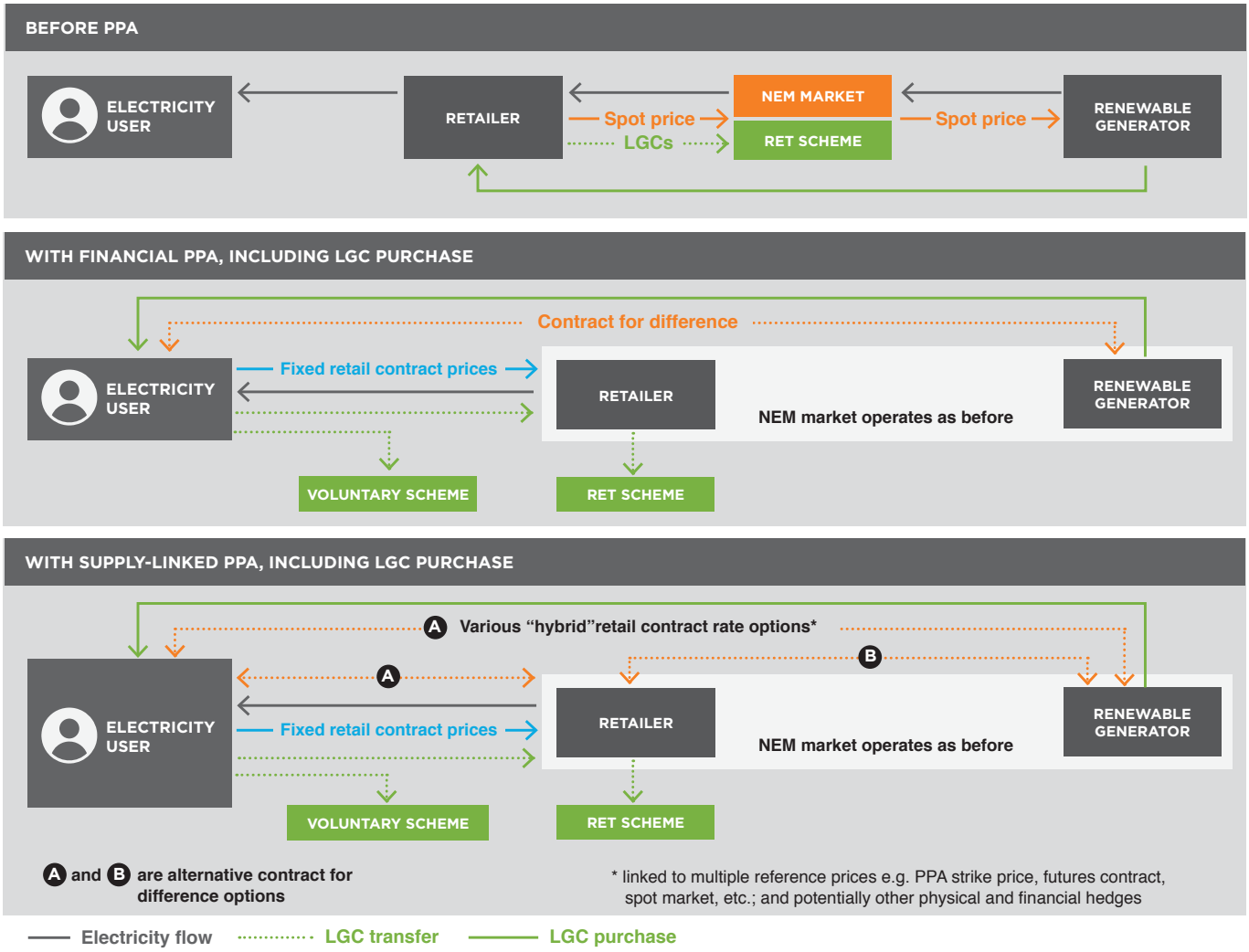
1. Uses a contract for difference (CFD) with the generator to hedge its electricity costs, separate from or linked to a retail supply agreement if required by the energy buyer.
2. May reduce the cost associated with the RET liability typically passed on by retailers in the retail supply agreement by contracting directly for the supply of LGCs and transferring these to the retailer or voluntarily surrendering them to the CER.
3. Can claim to be using renewable energy if it acquired LGCs and voluntarily surrender the LGCs to the CER.

Meanwhile, the generator and the retailer are doing what they've always done – selling and buying energy through the NEM at the spot market price, where the retailer manages its exposure to the volatile prices through a range of additional physical and financial hedges.

9 Note that a 'direct' or 'behind the meter' PPA may also be available to a large Electricity Buyer. These PPAs are not the subject of this guide.

10 AEMC. Five Minute Settlement 2017. https://www.aemc.gov.au/rule-changes/five-minute-settlement

Figure 3: Position of the parties before and after a PPA



1.3. HOW MUCH IS BEING PAID

Let's first consider a scenario where there is no retailer involvement in a corporate PPA with a basic CFD arrangement. Since the generator is being paid for its electricity through the NEM spot market, the price paid by the energy buyer under a PPA is the difference between that spot price and the PPA's strike (or base) price. Hence the price element of a PPA is called a 'contract for difference'. This mechanism gives the generator revenue certainty for the term of the contract, making it easier for them to access the project finance. Where applicable, the energy buyer would be able to use net settlement cashflows in its favour (i.e. gains) to offset its own electricity cost under its separate standard electricity retail agreement.

To understand the price being paid through the CFD, consider the positions of the energy buyer and the generator both before and after the PPA, using the three stages of Figure 4.

1. **Before the PPA, the energy buyer pays a higher retail price, with no market or project risk**

   The energy buyer would typically buy its electricity from a retailer at a fixed price agreed in advance, while the retailer is paying the wholesale spot market price for electricity at the time the energy buyer consumes its electricity. The retailer is taking on all the market risks and charging a premium for doing so. The retailer protects itself from the volatile wholesale spot market price by entering into physical supply arrangements such as building their own power stations and entering into financial arrangements, such as futures contracts, contracts for

difference or swaps and options.

As shown in Figure 4a, the retail electricity contract price (black line) is therefore higher than the expected wholesale cost of supplying power to the energy buyer (orange line), with the retailer factoring in its cost of ensuring supply of power when required at prices pre-agreed in advance.

As the market volatility has risen in recent years, futures contracts which form the basis for retail contract pricing have priced in this uncertainty in prices over the contract periods. Consequently, future contract prices as illustrated in Figure 4a may settle above the average spot market price (blue wave line). This in turn flows through to the retail price, which has increased substantially in recent years.

AS MARKET VOLATILITY HAS RISEN IN RECENT YEARS, FUTURES CONTRACTS, WHICH FORM THE BASIS OF RETAIL CONTRACT PRICING, HAVE PRICED IN THIS UNCERTAINTY OVER THE CONTRACT PERIODS

The generator, meanwhile, is receiving the NEM spot market price (blue wave line). For a new generator seeking project finance, that is a problem. Given the variability of electricity markets, there is a risk that the spot price may be lower than the generation cost. Generators and their financiers want that risk removed before committing to building the plant.

2. The PPA gives the energy buyer a lower strike price that now reflects both market and project risk

The energy buyer and generator agree to a PPA strike price for the agreed amount of electricity, at a price that is expected to be lower than the long-term production weighted average (PWA) price[11] that the generator is expected to realise from the spot market (see Figure 4b).

The PPA strike price discount to the long term PWA price of the generator must reflect the market and project risks taken by the energy buyer whilst recognising the needs of the generator to cover the capital and operational costs of generation. Both sets of risks and their possible mitigation are considered in Sections 3 to 5.

3. The PPA is settled by payments under the CFD

Taking on market risk, includes the energy buyer taking on the rises and falls of the spot price received by the generator (i.e. PWA price) – that after all is why the generator has sought the PPA. To transfer that market risk, the parties have a CFD as part of their PPA (Figure 4c for a period during which the project is generating power).

Under the CFD, if the spot market prices are higher than the strike price, the generator pays the energy buyer any excess to the PPA price; if the spot market prices are lower than the strike price, the energy buyer pays the generator for any shortfall. In practice, these 'differences' are calculated for a short time period (currently 30-minute settlement intervals) and the net CFD position is settled weekly or as agreed between the parties.

11 The generator will receive the spot price from AEMO when it produces. However, since the renewable energy generator output is variable, the average price it receives may differ materially from the average spot market price. The production weighted average price is thus what the energy buyer will receive in exchange for the fixed PPA price paid to the generator.

Figure 4a: Retail electricity contract price

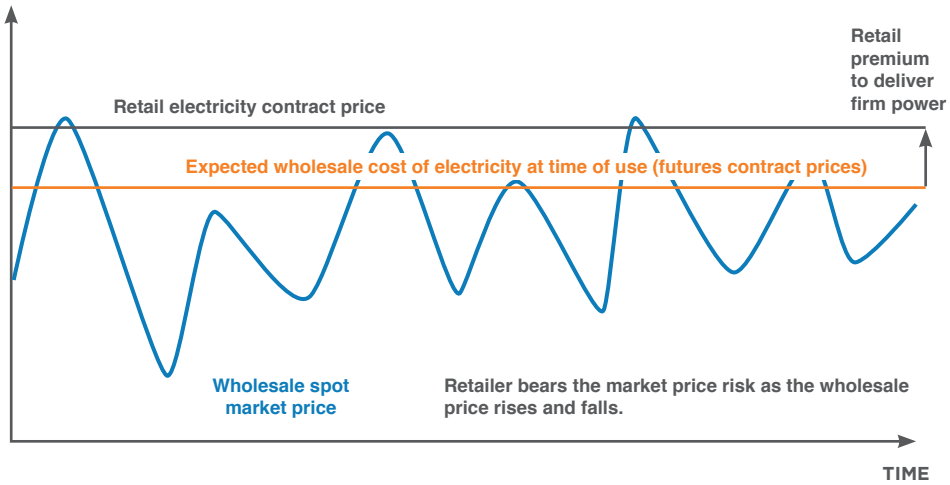


Figure 4b: The user enters a PPA with a generator for a lower electricity price, but then...

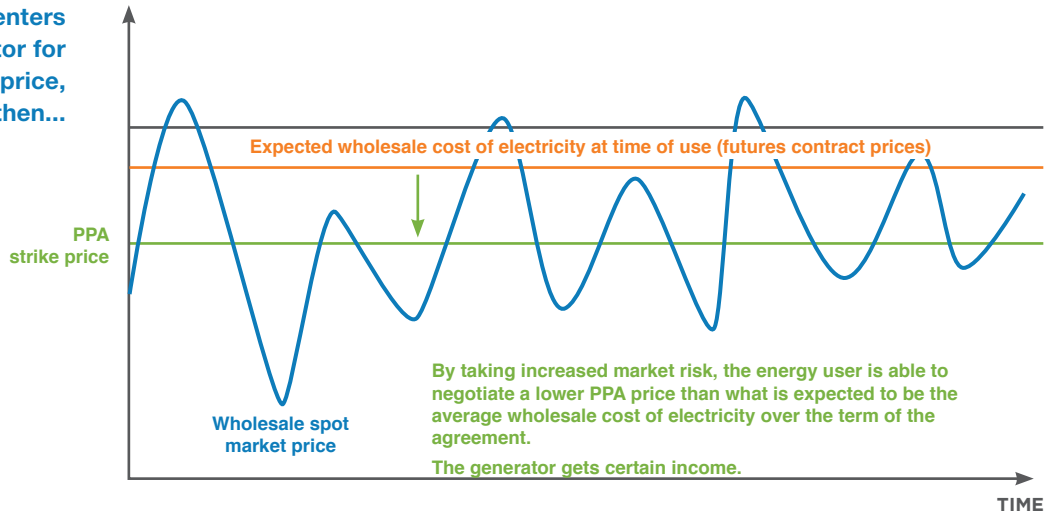
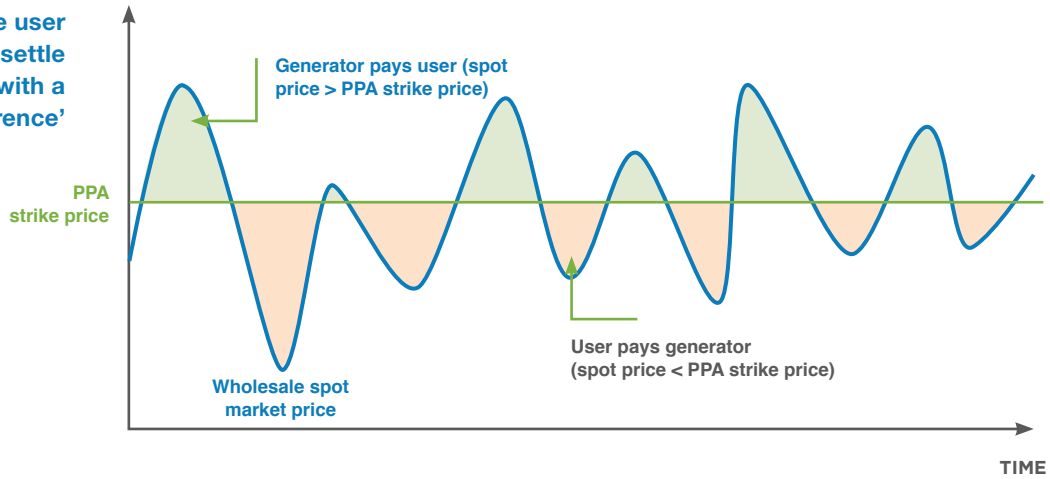


Figure 4c: The user and generator settle the strike price with a 'Contract for Difference'



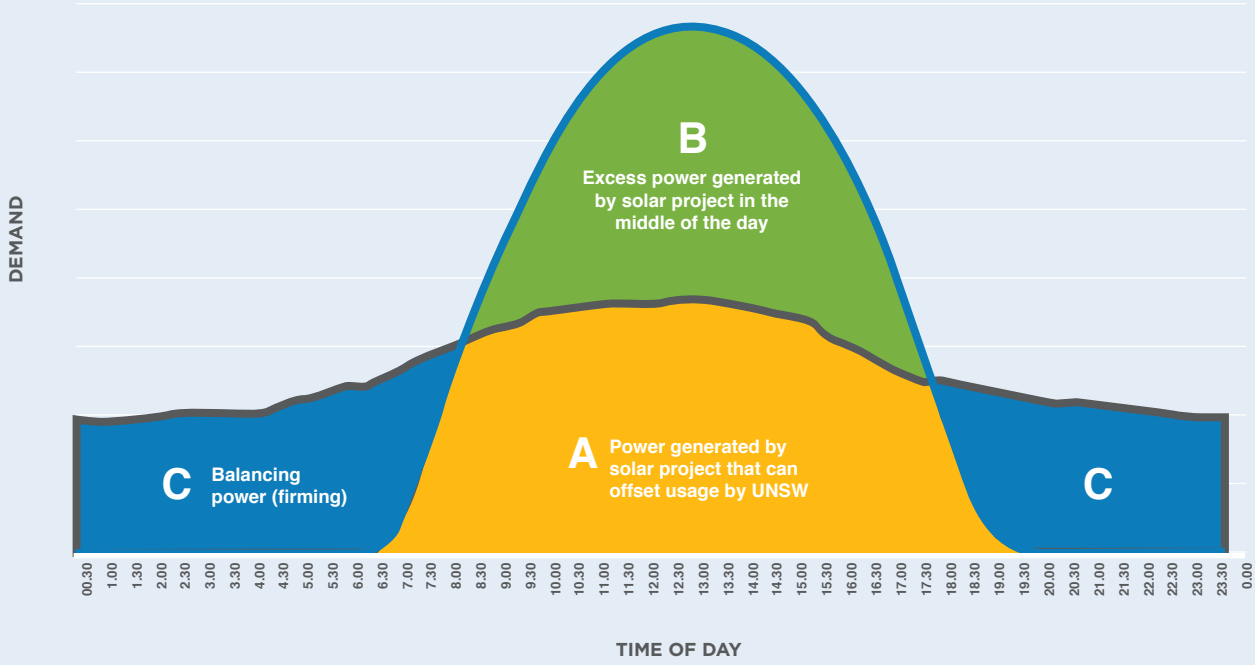
Figures 4a, 4b and 4c show the arrangement between the energy buyer and the generator where no retailer is involved. Without a retailer, the PPA will be a cash settled financial arrangement for the value of the electricity contracted. The energy buyer will still need to contract separately with the retailer for the supply of electricity consumed by its operations. With the involvement of a retailer in a PPA, the CFD with the generator can be linked to the electricity consumed by the energy buyer at its premises.

The contract and pricing arrangements used by retailers to facilitate this are diverse and typically bespoke. The University of NSW's PPA described below is a good example of how the benefit of the underlying CFD between the University and Sunraysia Solar Farm was used to structure a complete electricity supply solution with its retailer, Origin Energy. A further example is the Melbourne Renewable Energy Project, which is discussed on page 44.

UNSW Sydney's (UNSW) PPA linking the CFD with Sunraysia Solar Farm to its electricity supply arrangement with Origin

UNSW's objectives were to save money and to become electricity carbon neutral. The University was reaching the maximum capacity of solar generation it could install onsite and entered into a bundled PPA (for both renewable electricity and LGCs) with the 200 MW Sunraysia Solar Farm near Balranald in western NSW, and secured 'firming' services from Origin Energy. It contracted for the total volume of electricity consumed by the University.

As shown in the figure below, the energy profiles for demand (grey line) and supply (blue line) do not match. However, Origin Energy agreed to charge UNSW the NEM spot market price for power consumed during the periods that the solar project is producing power (area A). The outcome for UNSW is that it always pays the PPA strike price agreed with the solar farm for this power (A). Excess solar electricity generated by the solar project in the middle of the day (B) is bought by Origin Energy from UNSW, but UNSW retains the LGCs. Shortfall electricity (C) is bought by UNSW from Origin Energy under terms similar to a standard retail electricity contract with peak, off-peak and shoulder tariffs.



The proceeds from the sale of electricity to Origin Energy are used to offset the cost of the 'firming' electricity. Origin Energy submits a net invoice to UNSW.

This was the first corporate PPA structure of its kind signed in Australia and the first university in the world to achieve electricity carbon neutrality through a corporate PPA, which requires the voluntary surrender of the LGCs.

2. THE BENEFITS OF A PPA

In 2017, the Australian Renewable Energy Agency (ARENA) surveyed over 90 large Australian energy buyers on their reasons for switching to renewable energy. The three most nominated drivers were:

- Reducing cost.
- Reducing the risk of volatile prices.
- Improving their 'social licence to operate'.[12]

Each of these benefits can be gained through a PPA with a renewable generator that hedges an energy buyer's cost of electricity and LGCs. The volume of LGCs procured above the amount needed to meet the energy buyer's indirect RET compliance obligation could be used as voluntary carbon offsets or sold to the market. If the LGCs are sold the green credential of the PPA is transferred to the new owner.

Section 2.1 considers these reasons in further detail.

2.1. SECURING A LOWER PRICE FOR ELECTRICITY

Direct cost savings are the primary benefit delivered by corporate PPAs. PPAs can reduce the cost of electricity LGCs below standard retail offers. The potential benefits are shown in Figure 5. Of a typical electricity bill for a large energy buyer, about 35% represents network and other market charges which can only be reduced by on site initiatives such as energy efficiency, roof top solar or demand management.[13] The other 65% can be reduced using a PPA. Most of this represents the cost of the electricity itself, while complying with the RET and other environmental schemes accounts for 8 to 10% of the bill.

The bottom bar in figure 5 illustrates the likely cost, at the time of writing, of securing renewable electricity to be delivered in 2020 (the year that a renewable energy project commissioned in 2018 might be operational).

The middle bar shows the cost at the time of writing, of securing electricity for 2020 delivery (i.e. futures market contracts) at approximately $68/MWh[14] and the accompanying LGCs on the forward contract market for about $26/MWh, a total of $94/MWh. Yet as the bottom bar shows, well-negotiated corporate PPAs are securing that same bundle of power and LGCs for $50-$80/ MWh. That means a potential saving of 15 to 47% on the energy component of the electricity bill, or 10 to 30% of the total electricity bill. That saving would be less if a retailer were engaged to manage the electricity supplied under the PPA. (i.e. savings exclude consideration of the premium a retailer would add for "firming" the power). It should be noted that savings must be assessed over the life of the agreement and is expected to vary from year to year.

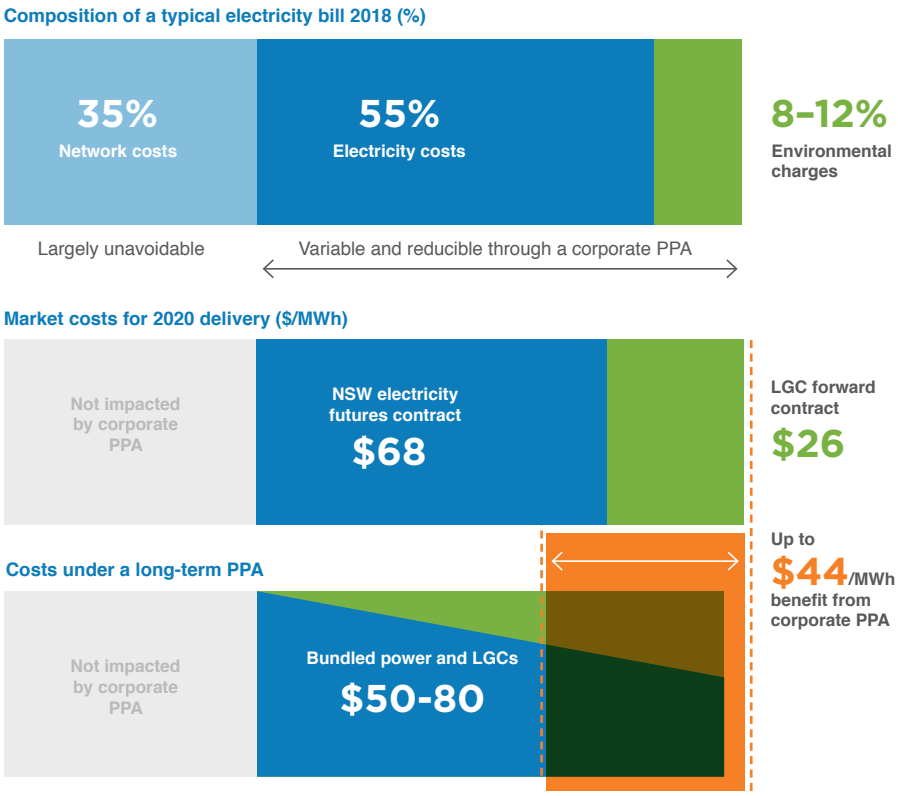
DIRECT COST SAVINGS ARE THE PRIMARY BENEFIT DELIVERED BY CORPORATE PPAS, WHICH CAN REDUCE THE COST OF ELECTRICITY LGCS BELOW STANDARD RETAIL OFFERS

12 The Business of Renewables - A Report into Renewable Energy Take-up by Large Corporates in Australia, Australian Renewable Energy Agency, 2017. https://arena.gov.au/assets/2017/07/AU21476-ARENA-Corporate-Report-REVISED-v1-1.pdf

13 Demand management and behind-the-meter generation is not covered in this guide.

14 Price is approximate for NSW and Victoria, yet varies amongst other states.

Figure 5: Potential savings from a corporate PPA compared to futures and forward contract market prices



2.2. MANAGING THE RISK OF HIGHER, MORE VOLATILE ELECTRICITY PRICES

The financial benefits of corporate PPAs become amplified when electricity prices are high and volatile. Table 1 shows the drivers of high and volatile electricity prices in 2017 that led to almost unpredictable price hikes in retail contract prices.[15] A customer that had already locked in lower prices through a PPA would have avoided those hikes.

15 To avoid spot market volatility, retailers enter into physical and financial hedges including futures contracts. This enables retailers to fix the prices for future electricity sales over a one to three-year period.

Table 1: Drivers of high and volatile electricity prices in 2017

	Closure of thermal electricity generators: 18% of the coal-fired capacity in the NEM was withdrawn between 2013 and 2017 as ageing plants became uneconomical to operate.[16] This placed a greater reliance on the remaining coal and gas-fired power stations to deliver dispatchable electricity in periods of peak demand. These closures are expected to continue.
	High gas prices and reduced supply: The liquefied natural gas export boom has caused gas prices to soar, with unreliable supply to the domestic market. Some gas-fired power stations became uneconomical and ceased operating due to the market conditions. The remaining stations supplied power into the wholesale market at higher prices, to recover their higher variable costs.
	Stalled renewable energy investment: Investment in renewable energy stalled from January 2014 to June 2015 during the review of the Renewable Energy Target, leading to a shortage of LGCs. This caused LGC prices to increase, from below $40 per certificate in 2014 to $93 during 2016/17. Prices have remained above $75 per certificate for 2019 delivery, but are projected to moderate for 2020 delivery and beyond.

However, hedging against such volatility always comes at a cost. Energy buyers rightly question whether prices for a corporate PPA can remain attractive over an a 5 to 15 year term. This will depend on whether the drivers of high and volatile electricity costs prevail over the term of the corporate PPA.

Though long-term electricity prices are notoriously hard to predict, electricity prices are expected to remain relatively volatile, and above their historic lows, beyond 2030.[17] A well-negotiated PPA for renewable energy, with or without LGCs, can protect large energy buyers against longer-term price volatility.

High prices and volatility may remain a concern for some time.

Many coal-fired power stations are expected to retire in the coming decades. Through the 2020s and 2030s, many of these plants will reach the end of their technical lives and become uneconomical to maintain, and will be replaced. For example, AGL has announced that it will retire its 2,000 MW Liddell Power Station by 2022. This represents about 20% of NSW coal-fired power capacity, almost double NSW 2017 large scale wind and solar capacity of 1200 MW.[18] The NEM will increasingly rely on lower cost variable renewable energy such as wind and solar, complemented by flexible, dispatchable sources such as gas-fired electricity generators, hydro power and storage.

16 AEMO, National Electricity Market, Planning and Forecasting, 2018. https://aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/Generation-information/Energetics

17 Energetics Insights, '2018: a buyers market for corporate renewable PPAs', February 2018. https://www.energetics.com.au/insights/thought-leadership/a-buyers-market-for-corporate-renewable-ppas/

18 Australian Energy Market Operator (as of April 2018).

This generation mix can be more cost-effective, clean and fit for purpose than new or refurbished coal-fired generators,[19] there are some technical and capacity issues to resolve during the transition. This generation mix can be more cost-effective, clean and fit for purpose than new or refurbished coal-fired generators.[19]However, there are some technical and capacity issues to resolve during the transition, compounded the high price of gas.

This leaves some uncertainty as to the effect on the cost of generation in the medium term as Regulators and policy makers work towards smoothing this transformation of energy generation, distribution and delivery systems through initiatives such as the Integrated System Plan. The NSW Government has also announced that it is developing a Transmission Infrastructure Strategy to facilitate efficient investment in the new transmission infrastructure needed to support new generation capacity.

The risk of falling wholesale prices

Despite the uncertainty of the NEM transition, the spot market price may at some stage fall below the PPA strike price agreed for the corporate PPA. Thus, whilst expected, there is no guarantee that the corporate PPA can deliver cost savings over its full life. On the other hand, an energy buyer that does not lock in a long-term price for any part of their electricity needs is acting on the assumption that electricity prices will average below the available PPA prices from 2020 to 2030 – right through a period of unprecedented NEM transformation. Instead, a large energy buyer could conduct a competitive PPA tender to secure the lowest possible prices, with variable pricing models (see section 6.1) that are scenario tested over the PPA life to manage this risk at different periods during the term of the corporate PPA.

The inherent uncertainty of entering into a long-term arrangement to hedge electricity prices means that energy buyers should seek independent expert advice on potential market events and their impacts.

19 Note that the capital cost of most incumbent coal-fired power stations has been fully depreciated, so that the breakeven price of their supplied energy only has to cover their operational cost. Once new capital costs are added, their supply price must rise.

2.3. MANAGING THE RISK OF (OR BENEFITING FROM) VOLATILE LGC PRICES

The RET adds a further layer of price and volatility risk to a large energy buyer's total electricity price, and a PPA can offer long-term stability for the underlying LGC costs.

In theory, the price of LGCs is a function of the CER's annually determined renewable power percentage and available renewable energy supply. With more renewable energy generation capacity coming online and no rise in the RET targets imminent, LGC prices are likely to drop below $20 after 2021. However, large generators and retailers control much of the LGC supply, and retailers are expected to continue to charge their cost of RET compliance at a premium.

In addition, LGCs can play an important role in an energy buyer's emissions reduction strategy. It is anticipated that organisations will progressively adopt more aspirational emissions reduction and renewable energy targets to maintain the brand and operational benefits of a low-emission stance. This combination of LGC market power and interaction with the voluntary carbon market may continue to make LGC prices inherently volatile through to 2030, with the voluntary market setting a floor price for the compliance market.

MANY ORGANISATIONS SEEK BRAND OR OPERATIONAL BENEFITS VIA CORPORATE PPAS

2.4. SECURING RENEWABLE ENERGY CREDENTIALS

Many organisations seek brand or operational benefits – for example, improving the National Australian Built Environment Rating System (NABERS) ratings of their buildings by buying low-emission electricity. These objectives are often achieved by buying GreenPower® from their retailer or broker under short term contracts.

An alternative for large energy buyers is a renewable corporate PPA, reducing the cost of going green. Organisations seeking to buy GreenPower® could request the generator to register for GreenPower® Connect, a product specifically designed for the corporate PPA market to reduce the administrative cost of GreenPower®.[20] Using GreenPower® Connect, offers a range of marketing and reporting benefits as well as the ability to increase NABERS ratings at a reduced cost to buying GreenPower® though a broker or retailer.

The possible brand benefits of such an arrangement are:

- **Meeting the requirements of existing customers** who are themselves looking to decarbonise their supply chains. For example, many tenants insist on commercial buildings with a high NABERS rating, and most banks and governments set sustainability performance benchmarks for their suppliers.
- **Attracting employees, customers and partners** with a strong corporate sustainability brand. Increasingly, larger organisations are looking to buy from or partner with vendors that share their commitment to lowering energy emissions, and employees are looking to work with those organisations.

20 GreenPower, Business, GreenPower Connect https://www.greenpower.gov.au/Business/GreenPower-Connect/

- **Meeting international commitments and investor requirements.** Some large energy buyers, such as Unilever and Mars[21] have made a voluntary commitment to reduce emissions or use 100% renewable power. An example of a group initiative is the RE100, a global program in which many multinational corporations operating in Australia have committed to 'go 100% renewable'. The investor community, recognising the risk posed by unmitigated climate change to business operations are also demanding action by large energy buyers.

Parties to a corporate PPA should note that meeting a RET liability or contracting for 100% renewable energy does not mean that they are 'carbon neutral' under the National Carbon Offsets Standard (NCOS) The Australian Competition and Consumer Commission has warned against making that claim when it is not warranted.

21 'Tipping point: Unilever to run Australian plants on 100% green power', P. Hatch, 7 June 2018, Sydney Morning Herald. https://www.smh.com.au/business/companies/tipping-point-unilever-to-run-australian-plants-on-100-percent-green-power-20180606-p4zjvd.html

3. THE RISKS OF A PPA

When an energy buyer gains access to a lower electricity price through a corporate PPA contracted with a generator, it will take on project and market risk. If a corporate PPA also involves a retailer, the energy buyer may be able to transfer some of these risks to the retailer.

Like a standard retail electricity contract, the retailer would charge a premium for taking on these risks. Optimally allocating the risks between the energy buyer and the generator in the first instance is therefore paramount.

This section introduces the key market and project risks that are particular to a PPA:

- **Market (price or volume) risks** affect the revenue the generator receives from AEMO (and potentially the benefits under the CFD to the energy buyer).
- **Project (or delivery) risks** reduce the certainty that the generator will be operating to deliver electricity to the NEM grid as agreed.

OPTIMALLY ALLOCATING THE RISKS BETWEEN THE ENERGY BUYER AND THE GENERATOR IS PARAMOUNT IN THE FIRST INSTANCE

Although material, many of these risks can be mitigated – either in the choice of project or in negotiations between the parties. The sections following cover the mitigation options. (Section 6 also notes other standard contractual risks for consideration)

All of these risks are described in more detail in the Appendices. Appendix 1 illustrates key corporate PPA risks compared to the contractual position typically preferred by energy buyers and generators respectively, and Appendix 2 provides a negotiation tool that can be used when developing risk mitigation strategies. This information will help decision-makers negotiate with generators and internally to structure, and refine a corporate PPA that delivers the best risk-weighted outcomes. However, they are not intended to be a substitute for specialist advice in these areas.

3.1. MARKET RISKS – PRICE

Standard retail electricity contracts expose energy buyers to risk of high and volatile electricity prices: see section 2.2. The market risk under these fixed price, short term contracts with the retailer can be mitigated by changing the procurement strategy (e.g. progressive or block purchasing) and installing on-site solar. However, behind the meter options rarely exceed 10% of consumption and therefore lack the scale to make a material impact. Other retail electricity procurement strategies remain short term and therefore do not provide a long-term shield against electricity price increases and volatility.

A corporate PPA is therefore the only effective long-term hedge against high and volatile electricity prices that can be deployed at scale. However, it potentially exposes the energy buyer to a new set of market risks which it may not have considered in detail.

The nature and rules of the NEM affect the spot market price paid to the generator in three ways.

- **Inter-regional settlement 'basis risk'.** Each NEM region has its own wholesale spot market price. When electricity is used in a different place from its generation, there is a disconnect between the prices the energy buyer pays for electricity it consumes and the prices in the market where the energy buyer has a price hedge. This reduces the utility value of the CFD as a hedge against rising and volatile prices in the market where electricity is consumed.

  Mitigation: Generator location.

- **Spot and futures markets lose their correlation.** Retail contract prices are quoted with reference to futures contract prices, which is linked to the expected spot market price at the time when the electricity will be supplied to the energy buyer.[22] This expected correlation between future contract and spot market prices is a key determinant of the utility value of the CFD as a hedge against rising and volatile prices for electricity consumed in operations. However, over the course of a PPA, NEM market dynamics may result in a de-correlation between futures contract and spot market prices. Thus, reducing the utility value of the hedge.

  Mitigation: Retail supply linked PPA pricing models

- **Time-of-day price suppression.** Until it becomes commercially viable to store electricity at scale, there are likely to be times when supply from variable renewable energy sources will lead to total supply exceeding total demand during some periods of the day. This is most likely in a NEM region where most variable generation is from similar sources with the same generation profile. This has the effect that the PWA price of a project with a generation profile similar to the dominant variable generation source in a region may be significantly lower than the average spot market in that region. Thus, reducing the commercial value of a PPA with such a project.

  Mitigation: Generation profile and project location, future storage options, pricing models.

Mitigation options are detailed in sections 4, 5, 6 and in Appendix 2.

3.2. MARKET RISKS – VOLUME

A second set of market risks may reduce the volume of electricity that the generator is able to feed into the grid. If the generator cannot deliver the intended volume, the generator's revenue from AEMO is reduced and the benefits to the energy buyer may be reduced if settlements were in its favour over those time periods under a CFD arrangement. If a retailer has been engaged in the PPA arrangements and relied on such volume, this may also expose the energy buyer to additional cost.

- **Marginal loss factor.** As electricity flows through the electricity networks, energy is lost due to electrical resistance. This applies to all generators, but losses are higher the greater the competition for limited network capacity

22 The retailers typically refer to futures contract price when applying their risk premiums and profit margin when quoting prices in retail electricity supply agreements.

and the further the electricity must be transported to end users. The marginal loss factor (MLF) is allocated by AEMO and is an indicator of the amount of electricity lost between the point of connection to the grid and the Regional Reference Node (RRN). A low MLF reduces the revenue potential of a project.

Mitigation: Project location, reference price used to define the PPA strike price

- **Production curtailment.** The generator is not always permitted to deliver all its electricity to the grid. There may be a local transmission constraint on the grid; or the NEM operator AEMO may restrict that amount to maintain system stability. For example, while South Australian wind capacity is nearly 1,700 MW, AEMO may direct wind farms to reduce their output proportionately so that only 1,200 MW is transferred to the grid, if the balancing supply from gas generators is not enough to maintain system stability.

  Mitigation: Generation profile, storage options, pricing models

3.3. PROJECT RISKS

Many project risks are live before the renewable energy project is operating. They refer to the ability of a generator to begin and continue to supply electricity at the volumes agreed with the energy buyer. Selecting an existing project would mitigate many of these delivery risks, plus enable the energy buyer to benefit sooner from a lower price in the current market with elevated electricity and LGC prices. However, contracting with an existing project may not bring with it the same benefits as partnering with a new energy project through a PPA: for example, local job creation and branding benefits.

Key project risks include:

- **Construction delays.** These are typically mitigated through due diligence and allowing buffers between the generator's construction schedule and the energy buyer's supply timeframe, with unforeseen delays mitigated through contract provisions.

  Mitigation: Contingencies, insurance cover and liquidated damages

- **Supply volume and reliability.** A PPA for guaranteed volume presents risks to the Generator given the inherent variability in renewable energy sources. However, energy buyers will face the opportunity costs of lost production revenue if they do not receive their contracted supply.

  Mitigation: Minimum generation volumes, compensation for performance shortfalls.

- **Force majeure.** The generator may receive extensions for unforeseen construction delays due to issues such as extreme weather about which the parties can do little but wait out. Longstop dates can also be agreed upon, after which the contract may be terminated.

  Mitigation: Longstop dates, insurance cover, retail supply linked PPA coverage.

4. DEFINING PPA SPECIFICATIONS TO OPTIMISE BENEFITS

This section is the first of three that cover the choices a large energy buyer will make to secure the greatest value from a PPA. It considers the PPA's type of contract, the quantity of electricity, and whether it might be appropriate for an energy buyer to join an energy buyers' group.

These choices are summarised in the table below.

Table 2: Decisions on PPA type and quantity of electricity

	DECISION	CHOICE	KEY DRIVERS	OTHER CONSIDERATIONS
4.1	Scope of PPA specification	Bundled	• Better PPA price when contracting for both electricity and LGCs • Price hedge for both commodities • Renewable energy or emissions reduction targets	• Dependent on contract model (see 4.2)
		or		
		LGC only	• Renewable energy or emissions reduction targets • Limited impact on existing electricity procurement arrangements	• No long-term protection against high and volatile electricity prices
		or		
		Electricity only	• Avoid locking in long term LGC prices in an oversupplied market • No sustainability target / no need to reduce emissions	• Dependent on contract model (see section 4.2) • No protection against high indirect RET compliance charges • Potential lost opportunity to access high quality carbon offsets
4.2	PPA contract model	Financial	• Maximise PPA benefit as there is no intermediary between the electricity Buyer and the generator	• Cashflow fluctuations • CFD administration and required associated inhouse / outsourced capabilities • Market and project risks
		or		
		Supply linked	• Use of derivatives off limits • Want to reflect the impact of the PPA on the electricity bill	• Risk premiums charged by retailers • Some price models may still include spot market exposure • Residual market and project risks not transferred to retailer

	DECISION	CHOICE	KEY DRIVERS	OTHER CONSIDERATIONS
4.3	Quantity	100% renewable	• Reduce cost relative to short term GreenPower® purchasing	• Likely significant spot market exposure
		or		
		Optimal power hedge	• Limit spot market exposure in excess of own demand in any trading interval	• Sizing must account for long term trend in demand to avoid the energy buyer over hedging relative to own consumption
		or		
		RET compliance volume only	• Offset unavoidable cost of complying with the RET (offset cost transferred from retailer which appears as an 'LREC' (Large Scale Renewable Energy Certificate) charge on electricity bills)	• Residual exposure to long-term risk of high and volatile electricity prices
4.4	Buying party	Solo	• Sufficient demand • Brand recognition • Investment grade	• Dependent on contract model (see 4.2) • Long term variability in demand
		or		
		Energy buyers' Group	• Sub-15 GWh individual consumption • Benefit from lower price due to economies of scale or complimentary demand profiles • Shared transaction costs	• Credit risk of other group members • Brand associated with other members • Potential cross-subsidisation of others with less attractive demand profiles or more uncertain long-term demand (supply linked PPAs) • Group must reach a high minimum volume threshold to justify increased complexity • Avoid collusive buying practices

4.1. THE SCOPE OF THE PPA

Energy buyers have three choices to make when considering the scope of a PPA depending on the benefits they seek:

- A **bundled PPA** includes both commodities generated by a renewable energy project, namely LGCs and electricity. This increases the generator's certainty of future cashflows, enabling it to secure more attractive terms from its financiers. The energy buyer can then surrender the LGCs to comply with its indirect RET scheme obligations, or use the LGCs to meet its voluntary renewable energy or emissions reduction targets. LGCs additional to own requirements in a year can be banked or sold to the market.
- An **electricity only PPA** which provides a medium to long term electricity price hedge but excludes the purchase of the LGCs.
- An **LGC-only purchase** which captures the green credentials of the project, without taking a price position on the electricity itself. The energy buyer buys LGCs to comply with its indirect obligation under the RET scheme, or meet its own internal renewable energy or emissions reduction targets. The energy buyer continues to get its electricity under its retail contract. The NSW Government has selected this option in meeting its indirect obligation under the RET scheme (see below).

NSW Government leads by example with innovative renewable energy purchasing

In December 2017, the Government entered into a 12-year LGC-only contract with Neoen's 26 MW Dubbo Solar Hub in the state's Central-West.

Revenue from the agreement helped to underwrite the solar farm project, which will generate enough clean energy to power around 10,000 homes; as well as contribute to the Government's indirect obligations under the RET equal to 15.6% of is operational consumption.

Projects such as this demonstrate the NSW Government's commitment to increasing power supply from renewable energy sources. Increasing supply is essential to keeping downward pressure on electricity prices and further improving NSW's energy security.

4.2. THE RIGHT PPA CONTRACT MODEL

Energy buyers have a choice of two main types of PPAs which could be used for a bundled arrangement or for electricity only depending on the benefits they seek and their risk appetite.

- A financial (or virtual) PPA, which is a direct arrangement with a generator on a standalone cash settled basis.
- A supply linked PPA, which may have a financial PPA embedded in the arrangement with a retailer to provide a partial price hedge. This form of PPA typically covers all the energy buyer's electricity requirements in one or more NEM regions, irrespective of the quantity contracted under a PPA but works with the financial PPA to secure preferential terms for some or all of the PPA contracted volumes.

These contract models are discussed briefly below. A wider range of structures, with various pricing arrangements, are detailed in *Green Hedging: A Guide to Structuring Corporate Renewable PPAs.*[23]

ENERGY BUYERS HAVE A CHOICE OF TWO MAIN TYPES OF PPAS WHICH COULD BE USED FOR A BUNDLED ARRANGEMENT OR FOR ELECTRICITY ONLY

Financial PPAs

The operation of a financial PPA is described in section 1.3 of this guide, with an illustration of the cash settlement mechanism common to most PPAs provided in Figure 4. A financial PPA is a financial instrument by which both the energy buyer and generator hedge their electricity price. Depending on the design of the PPA, this could be regarded as a derivative instrument or a lease. Accounting advice should be obtained early in the process to confirm if the PPA will be deemed a derivative product and if so, whether the energy buyer's financial policies allow it to be a party to derivative contracts.

Although cashflows can be volatile, a financial PPA can assist in providing greater electricity budget certainty over time if the correlation between futures contract prices and spot market prices prevails. However, in return for those benefits, the energy buyer takes on increased market risks as discussed in section 3.

23 *Green Hedging: A Guide to Structuring Corporate Renewable PPAs* prepared by Baker McKenzie with support from WWF-Australia and the NSW Office of Environment and Heritage https://www.bakermckenzie.com/en/insight/publications/2017/12/structuring-corporate-renewable-ppas

Beryl Solar Farm to help power Sydney Metro North-west

The NSW Government committed that greenhouse gas emissions from operational electricity use on the Sydney Metro North-west railway would be fully offset. As a greenfield project, a financial PPA was assessed to be the most cost-effective solution to meet the objectives of the project and to minimise risks. This is a first step, with options to be reviewed once Sydney Metro North-west is in operation and has at least a year's consumption data.

The 87 MW Beryl Solar Farm in regional NSW was selected to help deliver a new generation of metro rail services in Sydney's north west. Part of the solar farm's output will be used to offset the cost of the approximately 134,000 MWh of electricity the new Sydney Metro North-west railway is expected to consume each year.

The solar farm includes about 260,000 solar modules on a 145 hectare site outside Gulgong and is expected to create about 150 jobs during construction as well as ongoing employment when operational.

This is one of the first transactions of this kind in Australia between a government infrastructure project and a renewable energy generator.

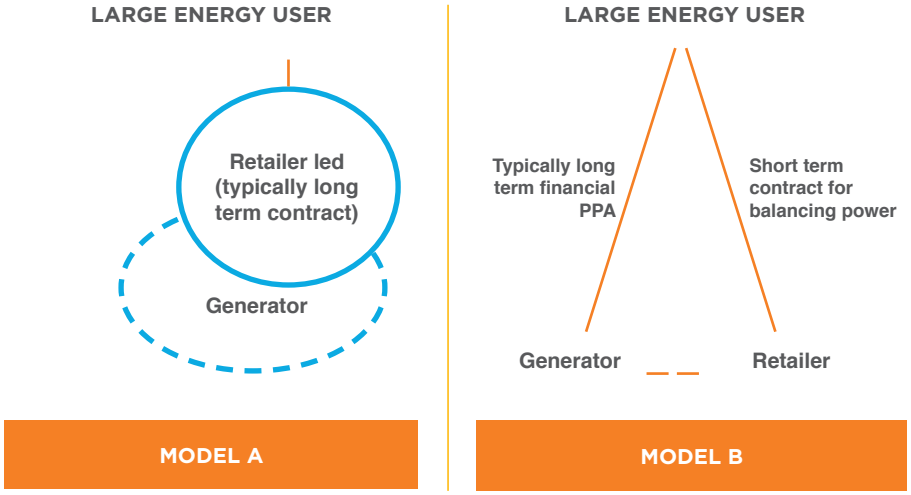
Supply linked PPAs

Linking a PPA to a retail supply agreement enables the one contract to cover all the energy buyer's electricity: both the core PPA quantity and the balancing power. The retailer supplies the energy buyer's electricity needs, with a financial PPA working in the background to provide the price hedge. The retailer or the energy buyer may be the counterparty to the PPA. A retailer may also package a range of renewable generation sources for the energy buyer, and each generator would be a party to the PPA.

As the corporate PPA market continues to mature, the number of retailers developing PPA products is growing. However, these offers are diverse and it may take some time for 'industry standard' offers to emerge. This type of PPA may be lower risk and the convenience is a valuable benefit for energy buyers. The price and volume management mechanisms must be carefully scrutinised to ensure they are appropriate given the potential increases and decreases in consumption over a medium to long term agreement. So, energy buyers wanting to maximise their price benefits, particularly those with relatively variable or uncertain future demand, may prefer to pursue a financial PPA.

The University of NSW's PPA with Sunraysia Solar Farm and Origin Energy as well as the Melbourne Renewable Energy Buying Group are examples of supply linked PPAs: see section 1.3 and 4.4 for details. Conceptually, the Melbourne Renewable Energy Buying Group used Model A as illustrated, which includes a long-term agreement with the retailer which entered into a back-to-back PPA contracted with the generator. The University of NSW used Model B, which included a short-term contract with the retailer, but a long-term agreement with the generator.

Figure 6: Illustrative supply linked PPA variants



Choosing the contract model that best meets the energy buyers requirements

All models can deliver cost savings, increased budget certainty and improve the green credentials of the energy buyer. The key difference between models is the relative price advantage that can be secured and the degree of market risk the energy buyer will be exposed to.

Another way to compare contract models is to consider the relative market risk and price benefits compared to a standard retail electricity contract, including an equivalent volume of LGCs compared to a bundled PPA contract as illustrated in Table 3 below. Figure 7 shows the range of prices for electricity-LGC bundles as market risk shifts between the parties. As illustrated, there is relatively little variation in the price and market risk under standard retail electricity supply contract offers. At present, the electricity supply linked PPA market shows the greatest variability with reference to market risk, given the wide range of pricing models used by retailers.

An offer at point 1 of the supply linked PPA spectrum in the Figure 7, would typically have direct exposure to underlying wholesale electricity prices, with the risk of pool price exposure mitigated through financial instruments such as cap contracts and options.

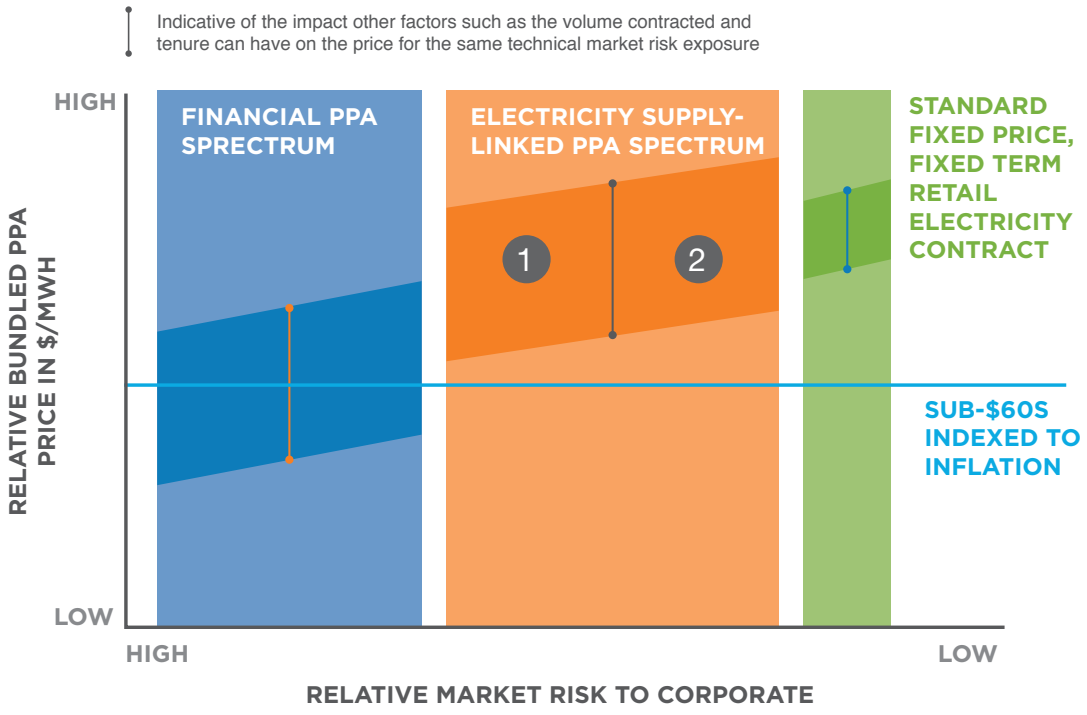
Table 3: Matching PPA models (and scope) to desired benefits

	Financial PPA (bundled)	Supply linked PPA (bundled)	LGC-only purchase
Reduce the cost of electricity	✓✓	✓	✗
Manage energy budget volatility (including indirect RET compliance cost)	✓	✓✓	✓
Secure renewable energy / voluntary carbon offsets to improve green credentials	✓	✓	✓
Reduce the cost of RET compliance (indirect)	✓	✓	✓

At point 2 of the supply linked PPA spectrum in Figure 7, the pricing model may be like a standard retail agreement with the exception that full or partial price certainty is provided for the term of the PPA. This increases the risk of wholesale price rises beyond year 3 to the retailer compared to the standard retail electricity contract. This means a supply linked PPA with a retailer may not achieve a significant discount to a standard retail contract unless allowance is made for price resets on all or part of the load beyond the first two to three years. Nonetheless it may still provide greater budget certainty over time relative to a standard short-term retail contract.

The financial PPA market is less variable, but some innovation is also occurring in this space.

Figure 7: Illustrative impact of the transfer of market risk on price in the current market



4.3. THE RIGHT AMOUNT OF ELECTRICITY

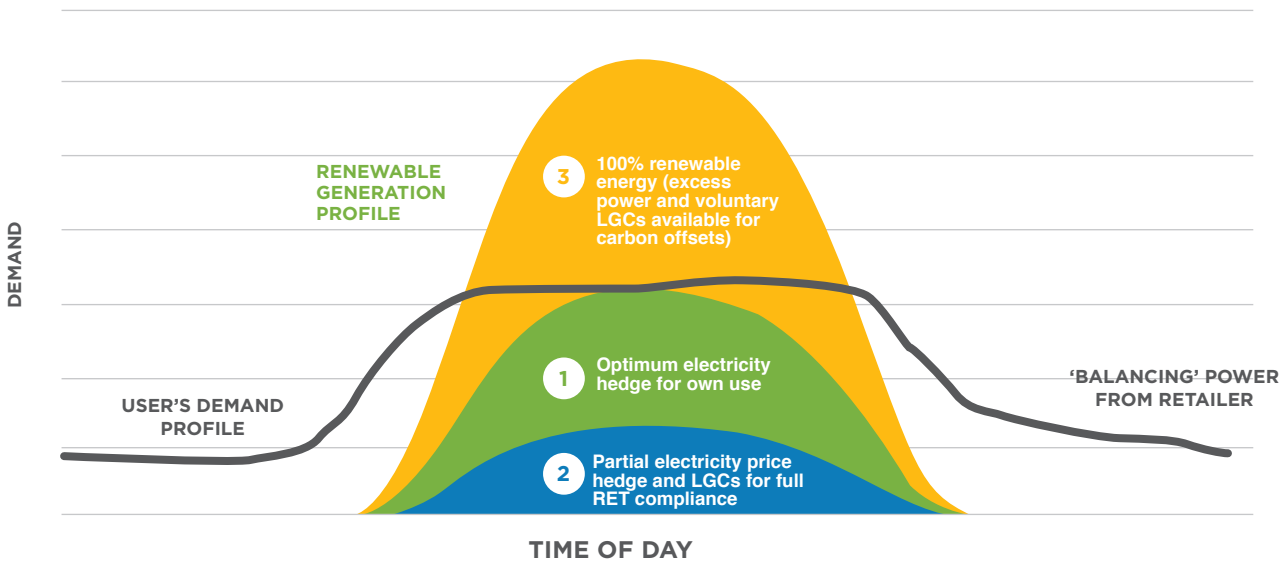
The energy buyer's electricity demand profile is the primary tool for determining how much electricity should be the subject of the PPA. However, the energy buyer must consider its current and future demand profile. For example, an energy buyer's future electricity needs may be influenced by energy efficiency initiatives, on-site power generation such as rooftop solar, and the acquisition and disposal of assets. A long-term PPA should be geared to the forecast demand, or the energy buyer must negotiate flexibility in the PPA, which will usually be traded for price.

Meeting consistent demand

Figure 8 shows the options for a typical energy buyer in a corporate PPA with a typical solar generator. The energy buyer's daily electricity profile is shown under the lower black curve: electricity is needed 24 hours a day, peaking during standard office hours. The generator's electricity generation profile is shown under the higher yellow curve, also peaking around noon, but with no night-time generation. There are three options indicated:

1. **The PPA gives the energy buyer the optimal price hedge** when the quantity of electricity that is procured approximates the energy buyer's average peak demand, without exceeding the demand in any trading interval (i.e. no higher than the blue area). This avoids exposure to market risk not associated with the energy buyer's own consumption.
2. **The PPA meets the energy buyer's indirect RET compliance needs.** If provided for under the energy buyer's retail electricity contract, it may purchase the LGCs required to meet the retailer's obligation under the RET. By transferring the LGCs to the retailer, the energy buyer will eliminate the LGC charge on its electricity bill. In 2018, the retailer's LGC obligation is equal to 16.06% of the electricity consumed by its customers. This is likely to increase to above 20% by 2020. The energy buyer may opt to secure just that amount of electricity and LGCs under a PPA.
3. **The PPA provides additional electricity or LGCs** for the energy buyer to meet its own renewable energy or emission reduction targets. As illustrated in Figure 8, this is likely to result in an over-hedged position during some trading intervals due to the imperfect correlation between the energy buyer's demand and the generator's output.

Figure 8: The generator's electricity and LGCs available to an energy buyer through a PPA



Meeting highly variable demand

Contracts with retailers typically penalise an energy buyer who increases or decreases consumption outside pre-agreed parameters. An energy buyer that expects large variations in their electricity demand over the term of a PPA may either:

- Limit their PPA quantity to a forecast baseline of their consumption.
- Contract with a retailer in a supply linked PPA for a shorter-term, whilst still being able to enter into a long-term financial PPA to hedge against future increases in electricity costs (i.e. Model B in Figure 6).

4.4. GOING SOLO OR JOINING AN ENERGY BUYERS' GROUP

An energy buyer with an electricity load less than 15 GWh per annum may benefit from joining an energy buyers' group or 'club'. However, large energy buyers could also benefit from this type of arrangement, as illustrated by the recent aggregation which involved Telstra, ANZ, Coca-Cola Amatil, Monash University and The University of Melbourne. The group reportedly locked in a record-low price for a financial PPA, for a combined contracted output of almost 1,000 GWh per year from RES Australia and Macquarie Capital's Murra Warra I Wind Farm, near Horsham in Victoria.

Energy buyers' groups are more likely to have the scale needed to reduce their individual transaction costs, and the collective bargaining power to negotiate better prices. To secure the most benefits, energy buyer group members should have shared objectives and equally strong credit ratings. Energy buyers should also seek advice to avoid a group PPA being deemed a collusive buying practice, and to ensure the model complies with internal accounting requirements.

Energy buyers' groups for supply linked PPAs can be complex. Additional challenges, in contrast to financial PPA buyer's groups, can include the impact of the load shapes of different members on the price and projected changes in volume. However, the **Melbourne Renewable Energy Project (MREP)** is an example of a successful supply linked PPA (see box below).

ENERGY BUYERS' GROUPS ARE MORE LIKELY TO HAVE THE SCALE NEEDED TO REDUCE THEIR INDIVIDUAL TRANSACTION COSTS, AND THE COLLECTIVE BARGAINING POWER TO NEGOTIATE BETTER PRICES

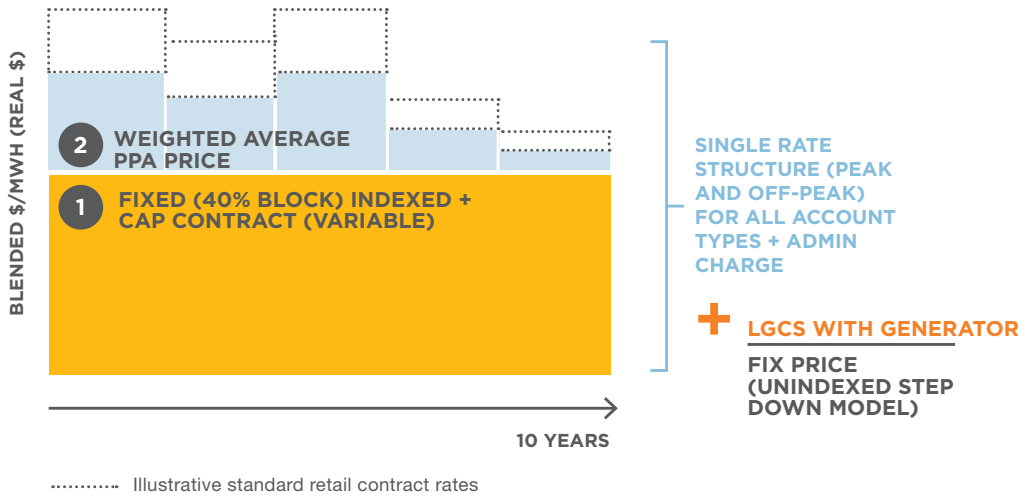
On 23 November 2017, the Melbourne Renewable Energy Project announced a 10-year electricity supply linked PPA to procure electricity and LGCs from Pacific Hydro's new 80 MW Crowlands Wind Farm in Western Victoria. This was an Australian-first, led by the City of Melbourne on behalf of 14 organisations including governments, universities and corporations. A key driver for the Group was to demonstrate their sustainability leadership.

As illustrated below, the retail electricity supply pricing model from Tango Retail included:

- A fixed price for 40% of the power (i.e. PPA block price), linked to the capital cost of the wind farm.
- A variable price for the remaining 60%, linked to prevailing futures contract prices, and reviewed regularly using a pre-agreed formula. (i.e. the dotted line bars, equivalent to standard retail contract rates)

Though the forecasted variable price (i.e. the dotted line bars') is expected to be higher than the contracted block price, the weighted average price under the PPA contract (i.e. No 2 in the diagram below) is estimated to be less than that available under a standard retail electricity supply contract. The Group also negotiated LGCs, a single rate for all account types, and a novel maximum and minimum contract volume management mechanism.

Electricity contracted with the retailer (Illustrative)



5. CHOOSING A GENERATOR TO OPTIMISE BENEFITS AND RISK

Every corporate PPA contract is unique, and energy buyers will need to consider multiple aspects in order to secure their intended benefits, while mitigating any risks. This section aims to help an energy buyer to decide which generator to contract with, by considering:

- What type of renewable source is best for them?
- Where should the renewable generator be located?
- Should the energy buyer seek an existing or a proposed generator?
- Who is the owner and operator of the generator?

These decisions are laid out in Table 4 and are considered in the numbered sections below.

In practice, these decisions do not follow a linear process, as each decision impacts the others. For example, entering into a PPA with a generator still at the proposal stage should secure the energy buyer a lower PPA strike price, but more delivery risks will have to be mitigated or accepted.

Section 6 considers the contracted details that may mitigate these and other risks.

Table 4: Choosing a generator to maximise PPA value

	DECISION	CHOICE	KEY DRIVERS	OTHER CONSIDERATIONS
5.1	Generator type	Match load profile	• Maximise volume of the PPA • Increase the utility of the hedge	• Maximise generation from project during peak price periods • Change in energy buyers' load shape over time (e.g. due to rollout of roof-top solar)
		and		
		Regional difference	• Generation profile anti-correlate with dominant variable generation profiles will reduce risk of PWA prices falling significantly below the average spot market price	• Scale and diversity in the supply mix / development pipeline
5.2	Generator location	Same NEM region as load	• Avoid divergence in the prices the energy buyer pays for electricity it consumes and the prices in the market where the project generates revenue	• Expected medium and long-term price developments (level and volatility) in regions where energy buyer's electricity consuming assets are located • Change in energy buyers' portfolio of electricity using assets
		and		
		Adequate network capacity	• Less risk of curtailment • Lower risk of significant deterioration in Marginal Loss Factor (MLF)	• Development pipeline in the region

Table 4: Choosing a generator to maximise PPA value (continued)

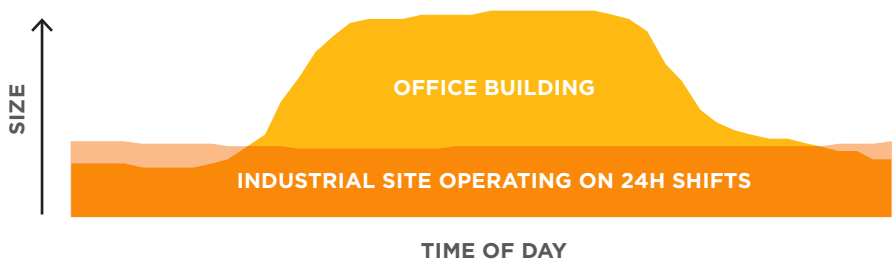
	DECISION	CHOICE	KEY DRIVERS	OTHER CONSIDERATIONS
5.3	Development stage of project	New	• Potential to negotiate lower prices • Greater brand benefit	• Project delivery risk • Minimum performance guarantees
		or		
		Existing	• Speed to market • Proven performance track record	• Manufacturer's performance warranties may have expired • Minimum performance guarantees
	Generator owner	Track record	• Less project delivery risk	• New technologies
		and		
		Financial standing	• Less project delivery risk • Reduced risk of default on settlements	• Change in ownership

5.1. THE RIGHT TYPE OF RENEWABLE ENERGY GENERATOR

The right type of renewable generation technology (e.g. wind, solar or bioenergy) to select for the PPA will usually depend on the energy buyer's demand profile. However, they should also consider the risk of too much electricity being generated at times by the same technology in the same region, leading to AEMO curtailing production from those similar generators: see section 3.

The first objective is to try to match the energy buyer's demand profile to the renewable plant's generation profile. The demand profile is the amount of electricity a business needs at different times of the day, accounting for variations between days, between weekdays and weekends, and across the seasons. In this way, an office building will have a very different profile to an industrial site, even if their annual consumption is similar: see Figure 9. While each energy buyer is unique, there are similar consumption profiles within industry sectors.

Figure 9: Typical demand profiles



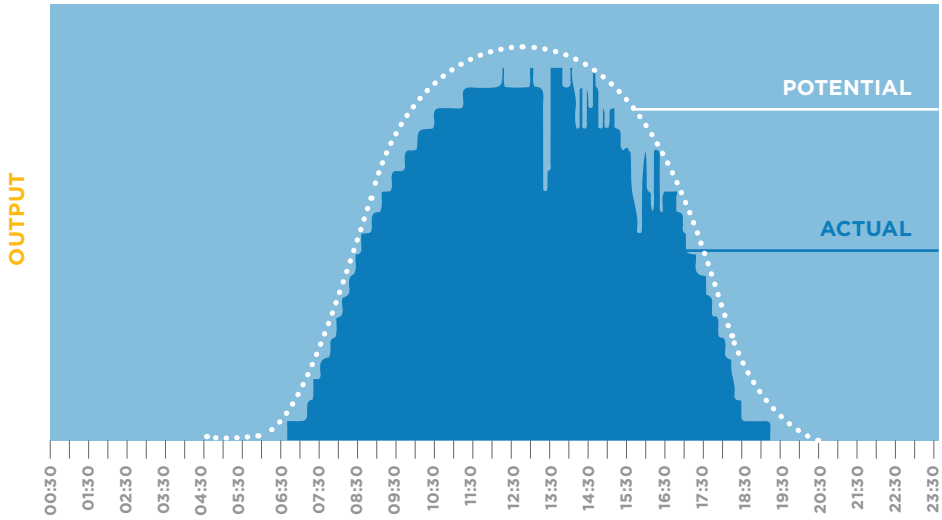
THE RIGHT TYPE OF RENEWABLE ENERGY GENERATION TECHNOLOGY (E.G. WIND, SOLAR OR BIOENERGY) TO SELECT FOR THE PPA WILL USUALLY DEPEND ON THE ENERGY BUYER'S DEMAND PROFILE

The profiles of large scale wind and solar projects, the most common generation sources, vary across regions and projects, across seasons and from day-to-day.

- **Solar farms** have the more predictable profile (Figure 10), with some variation depending on whether fixed tilt or tracking systems are used.
- **Wind farms** have highly location-specific generation profiles. Some regions have higher wind speeds and project outputs at night, while others generate more consistent power through the day: Figure 11.
- Suitable **bioenergy** projects may also be available. These can offer more consistent and controllable generation, assuming reliable feedstock. The price of bioenergy electricity contracts must take into account the variable cost of that feedstock, a factor that does not concern solar and wind projects.

Some PPAs use a portfolio of complementary solar, wind and storage solutions to provide a 'firmer' product that may better align with the energy buyer's electricity consumption.

Figure 10: Illustrative solar generation profile with some loss of output due to cloud



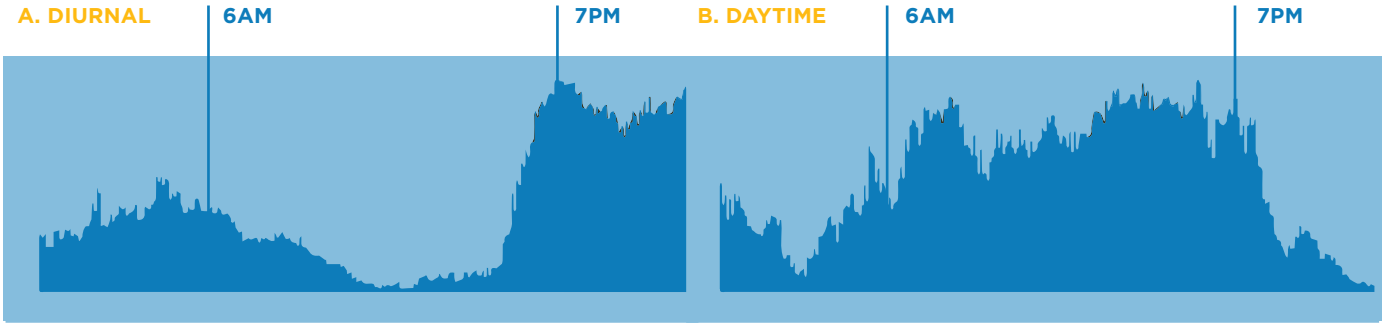


Figure 11: Illustrative production profiles of two wind farms

5.2. THE RIGHT LOCATION

NSW has an abundance of renewable energy sources, including excellent solar, wind, hydro and bioenergy resources.

Electricity prices vary between states, with prices influenced by the electricity generation mix, the balance between demand and supply, and the available capacity in the NEM's inter-regional transmission links. When considering both prices and the generation mix, NSW would be an attractive place from which to secure renewable energy: see page 12 box, NSW as an attractive destination for corporate PPAs. NSW-based electricity buyers may also wish to choose to enter into a PPA with NSW generators if this is the NEM region where they are consuming most of their electricity.

Brand and other co-benefits may also be a consideration in selecting the location of a project. For example, a project near where the energy buyer is located maximises the potential for community and employee engagement with the project. A well-designed renewable energy project will bring economic benefits, such as jobs and investments into its local community, which may be important for the buying organisation. The energy buyer may even stipulate local employment goals, subcontractors or minimum local expenditure. The energy buyer and generator may also work together on community and employee engagement strategies, such as scholarship or sponsorship schemes.

5.3. THE RIGHT PROJECT

Contracting with an existing renewable generator may involve fewer risks than supporting a new project and may enable the energy buyer to execute its PPA sooner. The energy buyer may also and benefit from a price hedge in an elevated electricity and LGC market.

However, the long-term price and brand benefits may be weaker.

There is significant competition amongst the stream of new renewable projects under development – particularly in NSW - so many energy buyers will seek to contract with a developing project. The risks of doing so are minimised when the project's sponsors (or owners) are experienced developers.

THERE IS SIGNIFICANT COMPETITION AMONGST THE STREAM OF NEW RENEWABLE PROJECTS UNDER DEVELOPMENT

A new project may offer greater price benefits, particularly if project finance is needed.

Many energy projects rely on external project financing, even if the project sponsors have strong balance sheets. Indeed, often the sponsors will seek to ensure that the financing is non-recourse (i.e. not guaranteed by them in any way). Finance can only be secured if the project's future cash-flows can sustain it, and a 'bankable' PPA is one of the best means to secure those cash flows. That means that the energy buyer is in a strong position to negotiate a PPA strike price that is lower than the expected average wholesale spot market price over the term of the PPA, so long as it can show that it is creditworthy. A sub-investment grade energy buyer will reduce the PPA's bankable value, and so increase the price offered. In some cases, it may even prevent the energy buyer from being an acceptable party.

Experienced sponsors, contractors and operators will reduce delivery risk.

Just as the project sponsor may be assessing the credit risk of the energy buyer on whose payments they will be relying, the energy buyer should assess the sponsors' ability to meet its financial obligations under the agreement over the full term, as well as its ability to build and operate the project, using appropriate contractors. Proven experience will be critical to reducing delivery risk.

Engagement with a new project's technical aspects may have commercial and other benefits.

A large energy buyer needs confidence in the technical capabilities of the project. This necessitates thorough up-front due diligence. There may also be an opportunity to directly engage with the project technology, such as negotiating an option to include storage in the future or on some early stage smaller solar projects or other technical aspects that could result in a better alignment with the energy buyer's demand profile.

Some energy buyers may also be interested in having access to data (including systems monitoring data) for research purposes. Other areas of interest may include:

- Establishing partnerships to deploy and test new technologies.
- Consulting on additional technologies with a first right of refusal for new capacity or storage.
- Training and capacity building.
- Sharing knowledge through reporting and working groups during construction and operation.

6. DESIGNING THE PRICING MECHANISM AND KEY TERMS

Having assessed the PPA type, generator type, project location and quantity requirements, this section considers the design of the pricing model and other key terms. This is key to developing specifications when engaging the market and negotiating a contract that optimises price and risk.

The parties' attitudes to the core market risk of future high and volatile electricity prices will determine the pricing mechanism for the PPA. The pricing level will start with the parties' view of those future prices, and then be adjusted for various secondary benefits and party risks.

Table 5: Contracting to optimise price and risk

	DECISION	CHOICE	KEY DRIVERS	OTHER CONSIDERATIONS
6.1	Price model	Bundled or unbundled financial PPA price	• A separate price for LGCs and power may be required to increase the bankability of a project in some supply linked PPA contract models • A bundled price may result in a higher strike price for a financial PPA and a zero-dollar LGC price if both commodities are procured	• If LGCs are procured under a bundled strike price, a notional value must still be assigned to appropriately value LGCs in the event of a shortfall • Consider the expected decline in value of certificates
		and		
		Variability (all PPAs)	• Indexed or flat LGC and PPA strike prices • Predetermined fixed price or managed spot price exposure for a supply linked PPA • Risk sharing arrangements	• Inhouse capability to manage sophisticated pricing models • Demand response capability to mitigate spot market exposure • Price reset mechanism
		and		
		Pricing volume and load shape changes in supply linked PPAs	• Define volume flex thresholds and volume management mechanisms upfront • Pre-determined tolerances and price re-set approach to manage load shape changes.	• Term of supply linked PPA and option to revert to financial PPA
		and		
		Reference pricing	• Pricing should be set at the Regional Reference Node (RRN) to protect the energy buyer from transmission losses • Market reference prices used in price reset formulas must be defined upfront	

Table 5: Contracting to optimise price and risk (continued)

	DECISION	CHOICE	KEY DRIVERS	OTHER CONSIDERATIONS
6.2	Counter party risk	Credit	• Assess financial strength / ability to make payments under the PPA, including delay and performance damages	• Parent guarantees
		and		
		Performance	• Define contingent liabilities / payments for delay • Termination payments	• Operation and maintenance of the plant • Minimum performance thresholds and warranties
		and		
		Change in control	• Pre-approved list of acceptable parties or well-defined criteria	• Reputational risks
6.3	Regulatory risk	Change in law	• Establish impact threshold • Risk sharing	• Carve out changes that can be readily foreseen
		or		
		Other	• Ensure Force Majeure definitions are not relaxed to include the impact of regulatory changes such as curtailment by the market operator and trading interval changes	
6.4	Co-benefits	Quantify what matters	• The value to the transaction of customer, employee and community engagement benefits committed to by the project must be quantified and appropriate penalties for non-performance agreed	• Termination for non-performance on co-benefits may impact the bankability of the project • Reputational risks

6.1. THE RIGHT PRICE MECHANISMS

Time of use, generation, price and volume will determine the revenue (and cost) for all parties to a PPA. The parties' risk appetite and ability to manage market risks, will drive the design and ultimately the negotiations on price, as well as how volume variance and changes in the energy buyer's load shape are treated.

The price mechanisms in the contract can mitigate against two forms of market price risk: the risk of future volatility in the market, and the marginal loss factor risk.

Bundled or unbundled financial PPA prices

The value assigned to LGCs in corporate PPA transactions varies. If LGCs are included in a bundled price, this price will become the CFD strike price and the price of an LGC may be zero. This has the effect of setting a higher strike price than would have been the case had the LGC been priced separately, but it does not necessarily lead to a different financial outcome. Nonetheless, in these instances a notional value must be assigned to LGCs to determine the value of financial penalties in the event of non-performance by the generator.

Splitting the price between electricity and LGCs is however required if power is contracted indirectly with the generator through the retailer under a supply linked PPA (i.e. Model A in Figure 6) and LGCs are contracted directly between the generator and energy buyer. A separate LGC price may also be required if the energy buyer elect to procure a different volume of LGCs and electricity under the PPA.

Price mechanisms to transfer risk

Whilst the long-term operating cost of a generator can be predicted with a relatively high degree of certainty, a retailer's cost to deliver load following electricity beyond a two to three-year horizon is highly uncertain. This is because Australia's electricity futures contract market indicates electricity price trends for a rolling three-year period. Beyond that, predicting prices in the NEM is difficult. Spot market prices are volatile and can fluctuate between -$1,000 and +$14,200/MWh; and the retailer cannot readily access financial hedges such as futures contracts that would enable it to fix prices beyond a two to three year horizon.

Energy buyers should adopt a pricing mechanism that is consistent with their risk appetite, but also consider that the transfer of risk to counterparties without the ability to manage such risks may result in a significant risk premium being charged.

TIME OF USE, GENERATION, PRICE AND VOLUME WILL DETERMINE THE REVENUE (AND COST) FOR ALL PARTIES TO A PPA

Table 6: Pricing approaches

Contract Model	Approaches and variants
Financial PPA	The price is fixed for the term of the PPA. Variants include: • Flat and stepped pricing models most commonly used for LGCs. • Indexation in line with the Consumer Price Index which is most commonly used in defining the strike price. It is possible to specify a floor (e.g. zero) and a ceiling; or design other risk sharing mechanisms if a capped exposure is required.
Supply linked PPA	Elements of the financial model flows through to the supply linked PPA, but the pricing arrangement for balancing power and other firming services is unique to a supply linked PPA and varies significantly between retailers. Common approaches include: • Managed pool exposure using financial and physical hedges to mitigate spot price exposure. Demand response can also form an integral part of this strategy. • A formula is agreed with prices re-set at pre-determined intervals with reference to publicly traded reference prices Consequently, prices tend to be firm for a shorter period (e.g. 2 years) and may be subject to review if, for example, the energy buyer's load shape materially change. However, since a longer term financial PPA is embedded in the supply linked PPA arrangement, the overall cost of electricity is expected to be lower and less variable when compared to a series of standard short-term retail contract over the term of the PPA.

Typically, the greater the market risk transferred back to the generator, the higher the corporate PPA price will be. Generators put a high value on price certainty, as it enables them to secure project financing. Price mechanisms are also discussed in *Green Hedging: A Guide to Structuring Corporate PPAs.*

Regional Reference Price as the benchmark price

A corporate PPA price formula typically refers to either the Regional Reference Node (RRN), or the renewable energy project's point of connection to the grid. The RRN is the location that AEMO uses for setting a region's spot price. Geographically, this point may be some distance from the project itself. Typically, the greater the distance, the higher the volume of power lost in transmission. If the price is set with reference to the RRN, the energy buyer will be shielded from Marginal Loss Factor (MLF) risk.

6.2. COUNTERPARTY RISKS

Other risks that may be material to the project's bankability (for the generator) or value (for the energy buyer) are set out below. Though these issues feature in standard retail electricity contracts, they are amplified by the long term and high value of a corporate PPA.

- **Credit.** Project finance is often granted to generators on the basis that they have secured income from a PPA. Investors may therefore insist that the energy buyer has an investment-grade credit profile. Energy buyers should also ensure that the generator has adequate credit support to make payments under the corporate PPA, including delay and performance damages.
- **Termination payments (loss of bargain).** The energy buyer must decide what to claim on termination (for example, loss of bargain or direct losses), and generators will need to cap their exposures to raise financing. This is often one of the most heavily negotiated risks.
- **Assignment and change in control.** Both parties typically want to restrict the transfer of the deal to third parties, but the risks arising from a change of control can be mitigated independently.

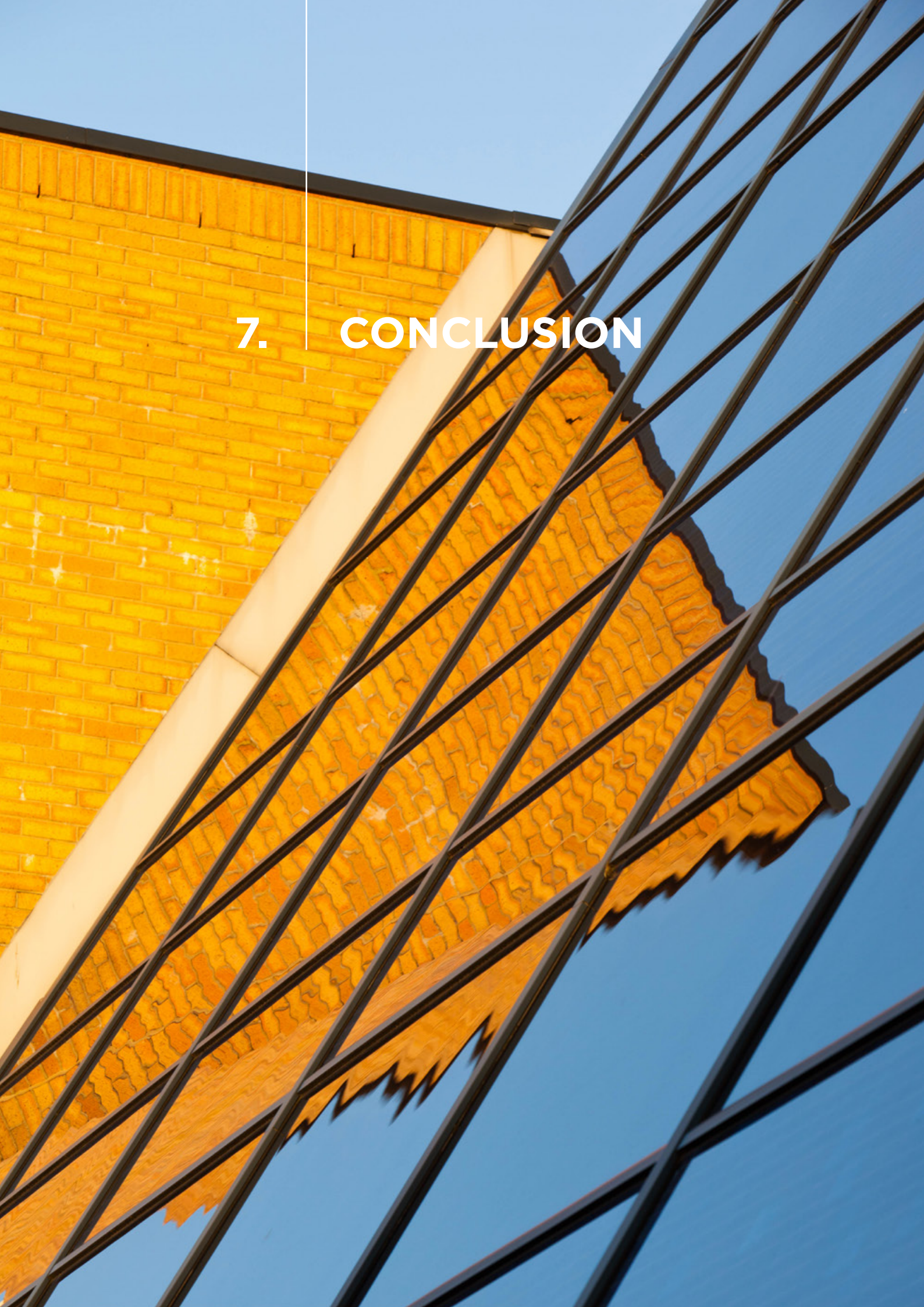
6.3. REGULATORY CHANGE

Many commercial contracts may be subject to the risk of changes in the law that underpins them. Energy rules and regulations are subject to change, to ensure grid reliability and stability, to deliver policies on supply, price and emissions. Change in law provisions in PPAs must therefore be scrutinised closely by all parties, with careful consideration given to how the risk allocation may impact the bankability of the project. When changes in policy and regulation can be reasonably foreseen, the energy buyer is advised to explore carving out the impact of such changes from the change in law provision.

ENERGY RULES AND REGULATIONS ARE SUBJECT TO CHANGE TO ENSURE GRID RELIABILITY AND STABILITY, AND TO DELIVER POLICIES ON SUPPLY, PRICE AND EMISSIONS

6.4. QUANTIFYING CO-BENEFITS

The benefits of meeting consumer, employee and community expectations can be material to the transaction so the value must be quantified when considering a particular project or choosing between projects (see section 2.4). Appropriate penalties for non-performance should be agreed, but energy buyers should also consider how this will impact the bankability of the project.



7. CONCLUSION

Corporate PPAs are expected to become increasingly common over the coming years. Energy buyers seek more secure and innovative ways to manage their electricity purchases, and generators seek fixed, long-term revenues to finance new renewable generation.

This guide has stepped through the key considerations of:

1. Understanding how a corporate PPA works.
2. Choosing a PPA that best captures those benefits.
3. Choosing a generator that optimises benefits and risks.
4. Defining PPA specifications to optimise benefits.

To maximise the success of a PPA, energy buyers should consult early with all relevant internal experts, in finance, risk, legal, energy procurement, sustainability and marketing. This expert input may need to be supported by additional external legal, energy market and financial advice.

APPENDIX 1: RISK WEBS

The figures below present key risks from the perspective of an energy buyer. They illustrate the relative scope of contractual risk transfer from the energy buyer to the generator under a financial PPA using a CFD pricing model. In the case of each risk category, we identify the comparative magnitude of risk from the buyer's perspective under the following arrangements:

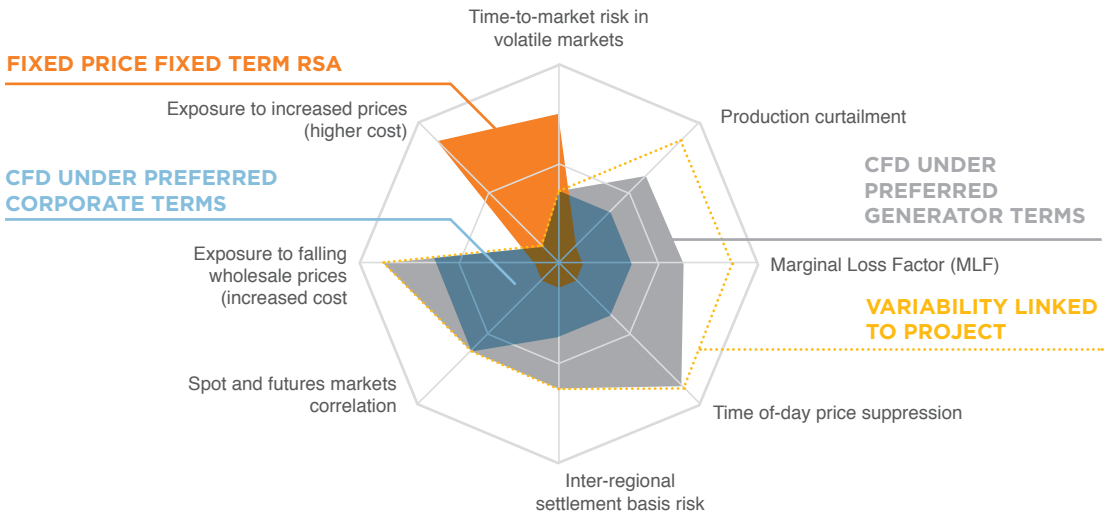
- A standard retail electricity supply contract
- A CFD under terms traditionally preferred by generators in contracts with retailers
- A CFD assuming terms providing the energy buyer with an effective shield against a specific risk

Where the quality of an individual renewable energy project resource, sponsor or project-specific variables have a material impact on the energy buyer's risk exposure, this is indicated by the 'dotted line'. This line highlights the variance in an energy buyer's exposure to a risk attributable to project quality when entering into a CFD under preferred generator terms.

The same framework can be applied to a supply linked PPA as the risk areas are similar,[24] but more of the risks are transferred from the energy buyer to the retailer. The level of risk transfer varies across the often uniquely structured offers from retailers, which makes it less standardised than a financial PPA.

Appendix 2 of this guide provides a 'deal-on-a-page' negotiation tool that can assist energy buyers in mitigating risks when engaging with potential generators, retailers and internal decision-makers to help structure, negotiate and refine corporate PPAs to deliver the best risk weighted price outcome.

Figure 12: Market risk – relative corporate risk exposure



24 Note that operational risks such as flexibility, billing accuracy and other service level considerations are not discussed here but are important in both standard retail supply contracts and supply linked PPAs.

Figure 13: Delivery risk – relative corporate risk exposure

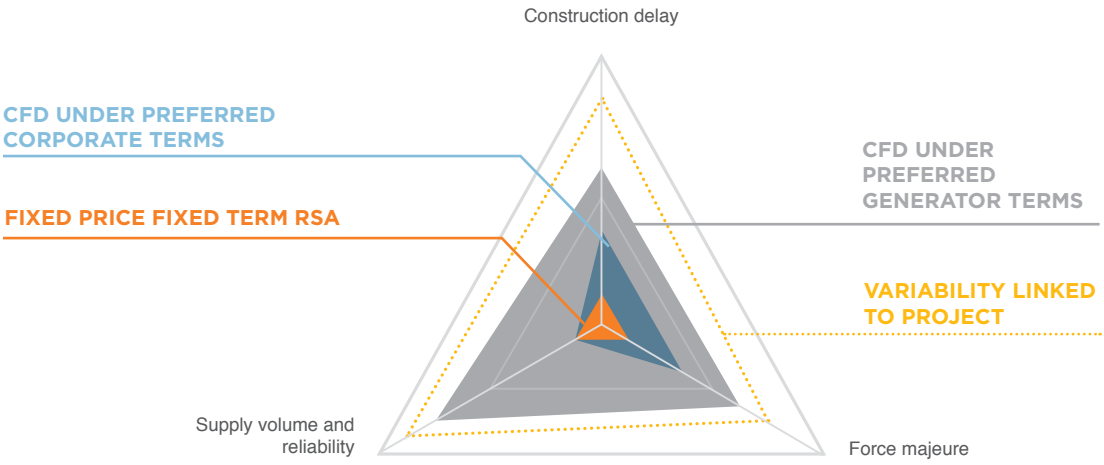
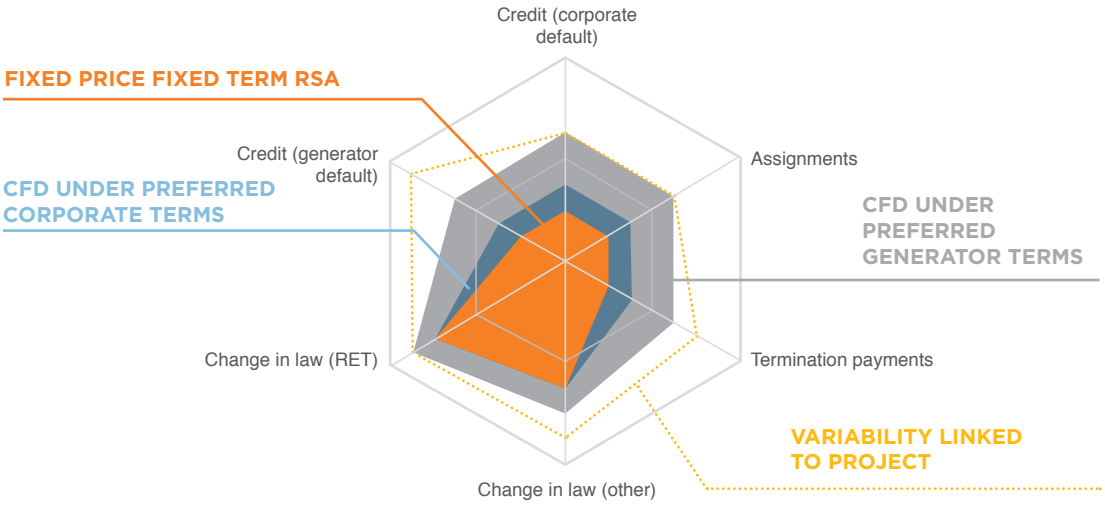


Figure 14: Other risks – relative corporate risk exposure



APPENDIX 2: RISK POSITIONS FOR ENERGY BUYERS

RISK	RISK DESCRIPTION	TYPICAL POSITION FOR ENERGY BUYERS	RISK MITIGATION CONSIDERATIONS FOR ENERGY BUYERS
Basis risk	Weak correlation between the wholesale price of electricity consumed and electricity produced due to the difference between: • electricity prices in the various NEM regions (inter-regional settlement 'basis risk') • the spot market (where financial PPAs settle) and the futures market which is the basis of prices paid under a retail electricity supply contracts (spot and futures markets correlation).	Settlement terms typically reference to the region where most of the load is located.	Cheaper corporate PPA prices in a location with high quality resources may adequately offset locational based market risks. However, it is preferable to locate the project in the NEM region where the electricity load is, unless the generator can assume the risk based on its NEM-wide generation portfolio. Revise the electricity procurement strategy to improve alignment between the retail electricity supply contract price paid and the CFD settlement. This may include converting to a retail electricity supply linked corporate PPA.
Production curtailment risk	Volume risk due to transmission network constraints or AEMO restricting the amount of power a generator may dispatch to maintain system stability.	Specify a notional volume to be supplied.	Assess the operational impact of existing and projected regional generation and network infrastructure. Where possible, select a project with a generation profile that anti-correlates with the dominant variable renewable energy source in a NEM region. Consider volume specifications that could shield against this risk.
Wholesale price risk	Exposure to the spot market is an inherent risk in all financial PPAs and many retail electricity supply linked corporate PPAs. Under long term arrangements there is a risk that: • the average spot market price (and associated contract market price) may fall in time below the agreed fixed price (falling wholesale price) • the prices realised by the project are significantly lower than the average spot market price (time-of-day-price suppression).	Specify treatment of negative price events.	Assess the development of the regional generation and network infrastructure. Need to conduct robust analysis of the corporate PPA under alternative electricity market scenarios. Consider including requirements to introduce storage if required. Consider pricing design measures that could somewhat mitigate against this risk, although the premium is likely to be high / impact the bankability of the project.
Marginal Loss Factor (MLF) risk	MLFs represent the cost of transmission losses and are used to adjust the spot price received by the generator to reflect losses to the Regional Reference Node (RRN). Increased power losses in locations with little local consumption typically lower the connection point MLF and reduce generator spot earnings.	CFD settled on the volume as at the reference point (i.e. RRN) for setting a region's spot price.	Project locations in areas with significant local consumption and a low risk of congestion to the regional reference node are preferable.

RISK	RISK DESCRIPTION	TYPICAL POSITION FOR ENERGY BUYERS IN A STANDARD FINANCIAL PPA IN THE CURRENT MARKET	RISK MITIGATION CONSIDERATIONS FOR ENERGY BUYERS
Construction Delay	Construction timetable unable to meet energy buyer's required electricity delivery start date. Energy buyers may face a shortfall in supply requirements. Delay may be caused by equipment delivery delays, subcontractor delays or any other site related delay. Liquidated damages may be payable with carve outs for force majeure (see below).	Fixed liquidated damages for delay and flexibility to make other 'loss' claims (e.g. loss of bargain on termination) to keep the corporate 'whole.'	See termination payments / loss of bargain in 'other' risks below; consider taking security over the project during construction in lieu of termination payments (noting such security would be second ranking if project finance is used).
Supply volume and reliability	Prescribed volumes to be delivered over the term. Energy buyers may prescribe a fixed volume or minimum volume to meet load requirements, with penalties incurred via a shortfall regime if prescribed volumes are not met. Time periods for delivery may be quarterly or monthly, while LGCs are calculated and delivered annually. Typically, if there is no generation, the generator is not paid, which means the generator takes much of the risk.	Fixed volumes and fixed periods for delivery ('firm' supply). Generators are increasingly accepting minimum annual generation requirements and new models are emerging in the market through retail electricity supply linked structures. Fixed volume requirements not adjusted down so generator is liable to 'make-up' shortfall.	Technology selection, development and operational expertise are key to ensuring the project can reliably deliver power to the grid throughout the term of the agreement. A robust due diligence of the project sponsor and its key suppliers must underpin any assessment of a project's ability to reliablydeliver. Analyse if additional flexibility on the corporate requirements can optimise the pricing whilst retaining an acceptable risk position on supply.
Force majeure	Unforeseen events that impact project delivery. Force majeure events are typically consistent across corporate PPAs and may include unpredictable weather, strikes, war etc. Energy buyers may look to expressly exclude or limit some events, for example flood if in a flood prone area.	Construction delays and performance failures excused for force majeure; longstop dates preferred that enable termination by the corporate or both parties if force majeure is ongoing after this period of time.	Clear procurement requirements on position on force majeure and relationship with supply volume requirements. Adopting a stricter position on risk and seeking to pass force majeure risk back to the generator, will require the generator to price in the cost of separately managing risk with alternatives (e.g. insurance).

RISK	RISK DESCRIPTION	TYPICAL POSITION FOR ENERGY BUYERS IN A STANDARD FINANCIAL PPA IN THE CURRENT MARKET	RISK MITIGATION CONSIDERATIONS FOR ENERGY BUYERS
Credit (Energy buyer)	Protection over credit rating or downgrade of the corporate. As a key bankability consideration, the financiers will want to ensure the generator may draw on credit support in an event of default or non-payment by the corporate. if the corporate is sub-investment grade or downgraded to sub-investment grade during the term of the PPA. Minimum requirements for the form and size of the credit support will be prescribed and the overall corporate / corporate group offering will generally need to meet investment grade requirements.	Varies between energy buyers, but organisational and wider group policies can restrict meeting bankability requirements. Standalone parent company guarantees (as opposed to group cross-guarantees or similar structures) are generally preferred (and may be least cost to the business) if acceptable, although bank guarantees at appropriate levels may be preferable for some energy buyers.	Clear information on corporate financials including willingness (or otherwise) to provide parent company support / bank guarantee and related amounts; consider impact on pool of generators if corporate credit is not 'bankable'; level of support can be limited to the minimum requirement to meet bankability thresholds.
Credit (Generator)	Protection over generator non-payment default. Like the energy buyer's requirement for credit support, energy buyers will want to draw on credit support for liquidated damages for delay, damages for delivery shortfalls or termination payments. Again, the form and size will be prescribed.	Credit support (parent company or bank guarantee (the latter typically preferred)) for all payments (delay damages, performance damages and termination payments).	Clear procurement requirements on generator credit support, form and amount. If adopting the Preferred Position recognise the impact on the generator's project costs and therefore corporate PPA price offered; alternatively consider minimum requirements to optimise price.
Change in Law (RET)	Relevant to bundled deals for electricity and LGCs (or other environmental credits or certificates), consider for 'future' schemes in electricity only deals. Typically, energy buyers take RET risk but cost-sharing regimes are being adopted above a minimum threshold of impact. Under current market reform, change in law is being scrutinised as to what schemes may be predictable or unforeseen and the national energy policy is a key area of focus.	Corporate takes RET risk; no price reopener for repeal or amendment to the RET; future-proofing new policies to market and positions vary.	Clear procurement requirements on approach to RET risk; consider adopting a shared position as better than the standard retail electricity supply contract position; energy buyers also looking to take RET risk but with rights to replacement products / schemes. Trialling risk sharing arrangements may mitigate risk and provide upside in the future.

RISK	RISK DESCRIPTION	TYPICAL POSITION FOR ENERGY BUYERS IN A STANDARD FINANCIAL PPA IN THE CURRENT MARKET	RISK MITIGATION CONSIDERATIONS FOR ENERGY BUYERS
Change in Law (General)	Typically excludes general changes in law (e.g. tax) in all cases. Again, change in law risk typically borne by the corporate under a standard retail electricity supply contract; in contrast, risk sharing is common in corporate PPAs with some foreseen law changes, exceptions and limitations being carved out and remaining with the generator. The intention is to keep the commercial arrangement on foot, depending on the impact, rather than terminate or re-open the corporate PPA to pass-through costs.	50:50 risk sharing with corporate; pass through of increases and decreases for general changes in law.	Clear procurement requirements on approach to general change in law risk; consider adopting Preferred Position as better than the standard retail electricity supply contract position; Most aggressive position is to pass risk materially back to the generator – concepts of foreseeability, materiality and restrictions (e.g. operational expenditure not capital expenditure) arise and will typically increase corporate PPA price.
Termination payments; Loss of Bargain	Payments due for early termination. Termination amount regimes, similar to 'close-out' payments under derivative contracts are increasingly sought by energy buyers to recover loss (if any) and seek recompense upon early termination.	Payments capped; reflect market 'close-out' position under derivative standard form documents; termination payments not payable on termination for force majeure and if the defaulting party is 'in-the-money' for default-based termination events.	Clear procurement requirements on requirement and rationale; consider adopting 'preferred position' as considered the most corporate friendly and still 'bankable' position in the current market. Most aggressive position requires loss of bargain damages with no liability cap but typical exclusions (i.e. consequential loss) and maybe unbankable.
Assignment; Change in Control	Restrictions for either party upon disposal. Prior consent from the non-assigning party will be required for change in control or assignment, with exceptions within the corporate group and threshold 'equivalency' requirements for legal, financial and technical capability.	Flexibility to transfer intra-group without consent and limited restrictions on external transfers.	Clear procurement requirements on rationale (e.g. internal Corporate policy requirements); consider adopting Preferred Position but need to recognise minimum bankability requirements and 'equivalency' criteria from a credit and capability perspective.