



More for less: how businesses can flex their energy to get more from a Renewable PPA

The Institute for Sustainable Futures

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About the authors

The Institute for Sustainable Futures (ISF) is an interdisciplinary research and consulting organisation at the University of Technology Sydney. It has been setting global benchmarks since 1997 in helping governments, organisations, businesses and communities achieve change towards sustainable futures. ISF utilises a unique combination of skills and perspectives to offer long term sustainable solutions that protect and enhance the environment, human wellbeing and social equity.

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GLOSSARY

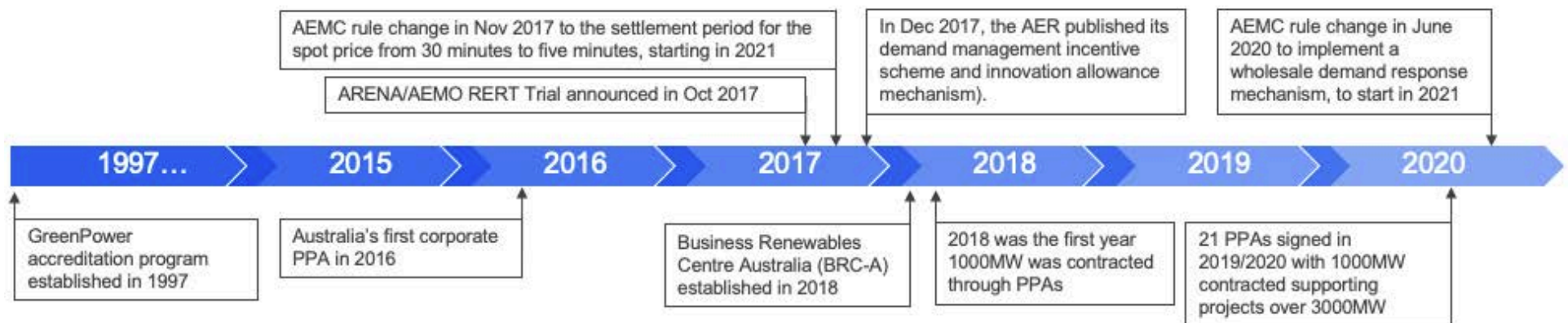
Term	Definition
Australian Energy Market Operator (AEMO)	AEMO manages Australia's electricity and gas markets including operating the systems for energy transmission and distribution, and the energy financial markets.
Average Rate Option (ARO)	The ARO is a product that can be purchased by Flow Power customers to set a "price ceiling" or "strike price", which is the maximum average spot price payable in every quarter.
Demand Management Incentive Scheme (DMIS)	The DMIS provides distribution network service providers with an incentive to undertake efficient expenditure on "non-network alternatives" relating to demand management.
Large-scale Generation Certificates (LGC)	LGCs are created by eligible renewable electricity generated by an accredited power station. One LGC can be created per MWh of renewable electricity and is validated by the Clean Energy Regulator. Registered LGCs can be sold or transferred in the market to entities with liabilities under the Renewable Energy Target or other companies looking to voluntarily surrender LGCs.
National Energy Market (NEM)	The NEM is the wholesale market through which generators and retailers trade electricity in the six eastern and southern states and territories of Australia.
National Metering Indicator (NMI)	A NMI is a unique 10 or 11 digit number used to identify every electricity network connection point in Australia.
Power Purchase Agreement (PPA)	A PPA is an agreement between an electricity generator and a purchaser for the sale and supply of electricity. A renewable PPA is an agreement with a renewable energy generator such as a solar or wind farm.
Price Efficiency Factor (PEF)	An equation that compares customer energy use with the wholesale spot market: $\text{Load (energy use) weighted average} / \text{time weighted average} = \text{Price Efficiency Factor}$
Reliability and Emergency Reserve Trader (RERT)	RERT is a panel of energy users, managed by AEMO, who are willing to reduce their load at times of system need, also known as "demand response".
Surplus generation	Energy generated through the renewable PPAs in excess of the customer's consumption of electricity, calculated as a percentage of total demand to be directly compared with unmet demand (see below).
Thermal Energy Storage (TES)	TES allows the transfer and storage of heat energy, by means of a thermal reservoir. The thermal energy stored can then be used later.
Unmet demand (renewable deficit)	The customer's electricity demand that was not be supplied through the renewable PPAs and/or onsite renewable generation.
Virtual Generation Agreement (VGA)	VGAs are Flow Power's version of a renewable PPA, which typically increases the match of customer energy usage to generator output by combining a mix of renewable energy projects (solar and wind generation) with a level of exposure to wholesale electricity prices.

Executive Summary

The energy market is being reshaped to the growth of renewable energy. These responses have been at both the customer level (e.g. purchasing off-site renewables) and regulatory level, particularly to facilitate the need for increased demand flexibility. On the demand-side, Australian energy market institutions have developed a series of rule changes to open up the market and networks to load flexibility aiming to “level the playing field” with the supply-side. On the supply-side, the major innovation has been the emergence of Corporate Renewable Power Purchase Agreements (PPAs). As the timeline for Australia’s energy market journey below illustrates, major changes have occurred in the past few years at the regulatory level and off-site renewable purchasing market for customers.

Unlocking load flexibility already offers numerous benefits to customers, which can be financial, environmental, risk mitigation (e.g. load-shaping to reduce consumption at the end of the day reduces exposure to future electricity pricing) and security of supply (e.g. improving grid resilience that in turn improves business continuity). As the market for load flexibility matures, additional offerings are likely to become available for customers to support the operation of networks and reduce demand in wholesale market peaks. Activating load flexibility will then also be able to complement renewable PPAs by matching load with generation, both before and after the agreement is in place.

It is clear that businesses are embarking on an energy journey as they move from passive consumers to more active energy users, better understanding the opportunities and shaping their energy usage to maximise the value of their energy. An interesting feature of this energy journey is the multiple paths being taken to pro-active energy management which combines on-site and off-site tools. Where the expectation was organisations would or should undertake a linear journey from on-site options such as energy efficiency before off-site renewable energy, anecdotal evidence has suggested that businesses that invest in renewable PPAs are improving their energy literacy, allowing them to implement more on-site energy savings measures and demand response. This report reviews the market context and mechanisms by which customers can find mutual benefits between load flexibility and renewable PPAs, before exploring three cases in depth: the City of Sydney, AGRANA Fruit Australia and Pernod Ricard Winemakers.

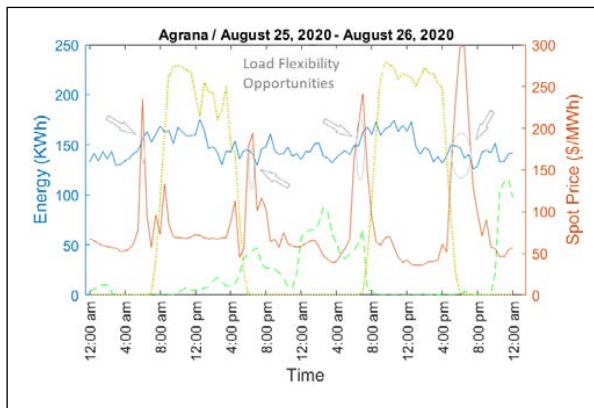


AGRANA Australia

AGRANA Australia manufactures fruit-based products on the Central Coast of NSW. AGRANA Australia has signed a combined wind and solar PPA with wholesale price access and is actively participating in the ARENA/AEMO RERT program.

These products helped AGRANA Australia's cost of energy drop by 10% in 2019. This is largely due to its well-designed PPA, which matches over 75% of its demand with a mix of solar and wind generation. The site is also able to use its onsite diesel generators to respond to RERT requests for an additional revenue stream.

Significant untapped energy flexing opportunities still exist for the business. The graph below shows that AGRANA Australia could reschedule its processes, or use more onsite generation, to times of high renewables and/or low spot prices.

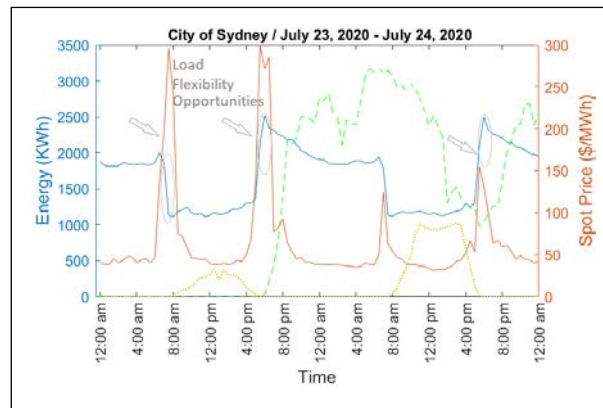


City of Sydney

The City of Sydney is home to almost 250,000 people and its original inhabitants were the Gadigal people of the Eora nation. The City signed a Flow Power PPA with wholesale price access in 2019 to meet its commitment to purchase renewable energy that matches 100% of energy it uses from the grid.

Deals with local governments are often different to commercial businesses. They often use their purchasing power to influence other stakeholders and may have multiple goals for their procurement. For example, the City used its deal to lead-by-example, being the first PPA to include a community energy project.

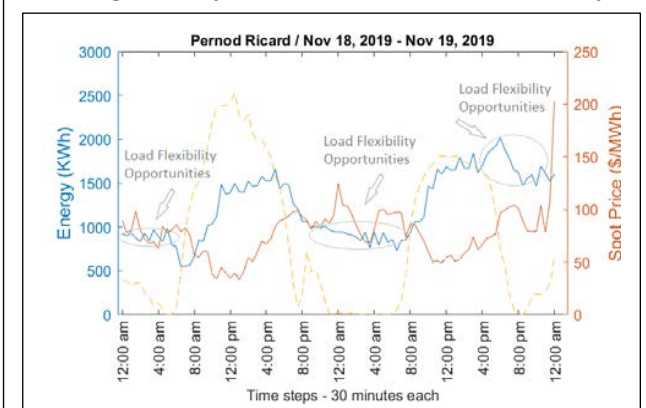
The City also has a high (>80%) load match with its consumption. Its peak demand is at night from street lighting so the majority of its renewable electricity is sourced from wind. The lighting creates a spike in load from 4pm, offering an opportunity for more savings if the load can be smoothed.



Pernod Ricard Winemakers

Pernod Ricard Winemakers is the winemaking business of Pernod Ricard, the second largest wine, spirits and Champagne company in the world. Its Australian operations are based in South Australia. The business' energy journey is well advanced, having accessed the wholesale price since 2016. Now, the business also has: an >80% load-matched PPA; installed 3MW of onsite solar and an innovative storage system; and has participated in the RERT program.

The way that Pernod Ricard Winemakers flexes its energy is industry-leading by ramping down key loads, in particular wastewater and refrigeration. Key complementary loads are aggregated under a "Virtual NMI" to best respond to price signals and limit the export of onsite solar generation. The business is now taking advantage of additional opportunities by installing a Glaciem thermal energy storage system, which can be charged and discharged many more times than a Li-ion battery.



These three case studies are excellent examples of how the energy journey of businesses can progressively unlock greater cost and decarbonisation benefits as energy literacy improves. In particular, load flexibility is already improving the case of Corporate Renewable PPAs, and could be further leveraged to “use” more renewables and take advantage of lower energy prices. Three key lessons that are shared across the three case studies are summarised below.

1) Demand matching a renewable PPA is the least-cost and lowest-risk way to “use” more renewable energy

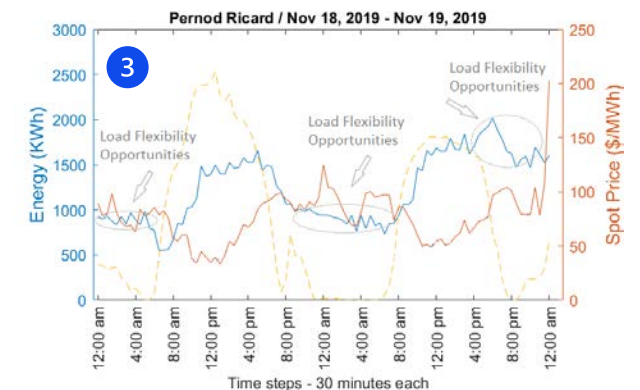
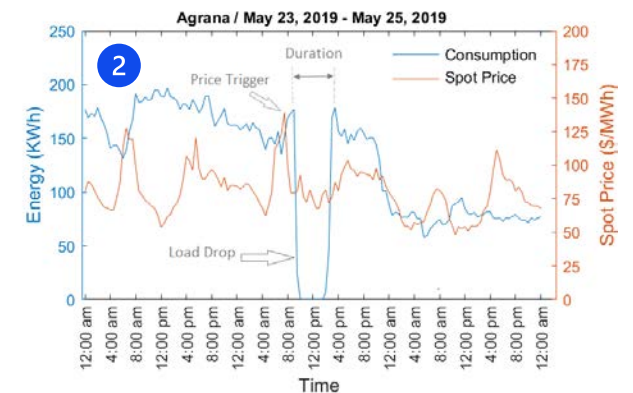
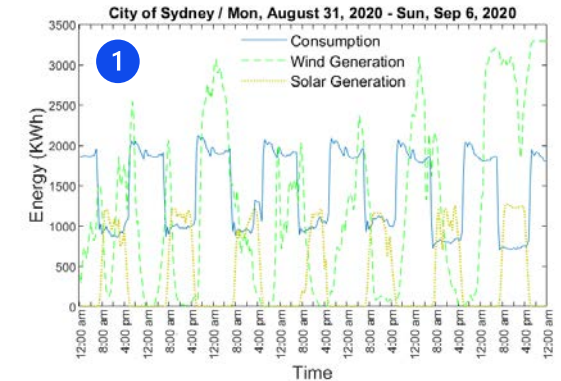
Matching the organisation’s energy consumption profile and a good mix of renewable energy generation profiles is a key step in establishing a successful PPA. Strong matching significantly reduces the “market buy”, which increases the certainty of electricity prices for the business. The three case studies showed that >75% load matching provided significant energy cost savings (8-10%) in 2019. Many of the remaining load flexibility opportunities that were identified were focused on minimising “unmet demand” or “surplus generation”.

2) You don’t need to switch off your business: there are lots of low risk options to flex energy at a business site

Both AGRANA Australia and Pernod Ricard Winemakers demonstrated that load flexibility can deliver financial benefits without compromising business operations. In particular, dispatching onsite generation or rescheduling non-critical processes (e.g. wastewater treatment) are easy to activate and have little to no impact on the core business of the organisation. New technologies, including energy storage and enabling (monitoring, control and automation), will further increase the number of low-risk load flexibility opportunities.

3) More market opportunities are emerging that will increase the value of load flexibility in the future

In addition to expanding technology opportunities, many more market opportunities are also likely to emerge in the coming years. With more renewable energy generation connecting to the grid, it is likely that energy prices will become even more volatile that offer greater changes for energy arbitrage or, for the more risk-averse, greater benefits from more certain pricing from renewable PPAs. Additional revenue options for load flexibility are also likely to become available through the networks (e.g. Demand Management Incentive Scheme) or wholesale demand response mechanism from 2021 onwards. **Now is the time for other Australian businesses to embark on their energy journey and be ready to capitalise on the benefits of the energy market transition as fast followers of these energy pioneers.**



Introduction

More Australian businesses are taking charge of their energy by investing in renewable energy and through load flexibility (also termed demand management), which is helping businesses decarbonise their operations and reduce costs. This is largely in response to an evolving energy supply mix of more variable renewable energy sources, driven by both government policy (e.g. Australia's 2020 Renewable Energy Target) and strong customer demand for corporate sustainability leading to initiatives such as RE100 and EP100¹. This has led to major transformations in the National Electricity Market (NEM) that are described in more detail in the following section. **Through these actions, businesses are embarking on an energy journey as they move from passive consumers to more active energy users, better understanding the opportunities and shaping their energy usage to maximise the value of their energy.**

An interesting feature of this energy journey is the multiple paths being taken to pro-active energy management, which are not necessarily linear. Traditional schools of thought have followed a linear logic; for instance, Marginal Abatement Cost Curves that suggest that the 'low-hanging fruit' (e.g. energy efficiency measures) will be followed by more complex options (e.g. renewable energy PPAs). One of the initial concerns of policy makers, particularly state governments, was that customers who signed up to renewable Power Purchase Agreements (PPAs) may "skip" cheaper energy efficiency measures. However, the PPA journey itself can help to improve the energy literacy of customers, allowing them to implement more on-site energy savings measures and demand response.

Flow Power sought to better understand this phenomenon by commissioning the Institute for Sustainable Futures to investigate the energy journey of their customers who have decided to pursue buying energy from wind and solar farms through PPAs. Flow Power offers a retail model with access to the wholesale price and supports their customers to implement load flexibility to manage risk and extract value from flexible pricing. Traditionally, only very large businesses have had access to the wholesale price. The research behind this report asked three key questions:

1. How are businesses benefitting from renewable PPAs and wholesale price access?
2. How did these businesses – in particular their energy managers – get this model across the line?
3. How can load flexibility further complement the renewable PPA to provide even more value to these businesses?

The report first reviews the market context and mechanisms by which customers can find mutual benefits between load flexibility and renewable PPAs, before exploring three cases in depth: the City of Sydney, AGRANA Fruit Australia and Pernod Ricard Winemakers.

¹ RE100 is the global corporate renewable energy initiative bringing together hundreds of large and ambitious businesses committed to 100% renewable electricity - <https://www.there100.org>.

EP100 brings together a growing group of energy-smart companies improving their energy productivity to lower their emissions and improve their competitiveness - <https://www.theclimategroup.org/ep100>.

Load flexibility is good for business. By actively managing energy use, businesses can benefit from:

- Lower energy bills through arbitrage, peak demand reduction, network capacity charges and other value streams such as the Australian Energy Market Operator's (AEMO) Reliability and Emergency Reserve Trader (RERT) scheme; and
- Lower emissions by integrating more renewable energy into site operations or by better complementing an off-site renewable PPA.

The complementarity between load flexibility and off-site renewables is the focus of this report.

New energy options have been rapidly evolving, putting the power back into the customers' hands

The energy market is being reshaped in response to the need for increased demand flexibility amidst the growth of renewable energy supply. These responses have been at both the regulatory level as well as through innovative new business models.

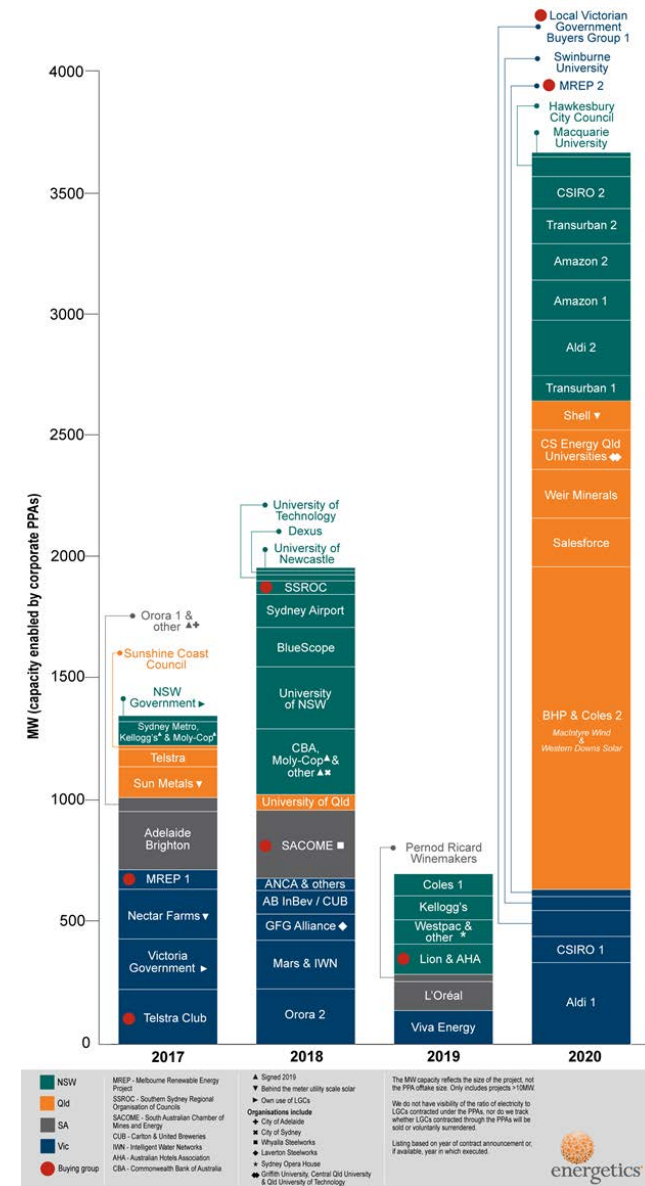
On the demand-side, Australian energy market institutions have developed a series of rule changes to open up the market and networks to load flexibility:

- The settlement period for the spot price will be reduced from 30 minutes to 5 minutes from July 2021. This is intended to deliver a better price signal for fast-response technologies, such as battery storage, to address market need, including peak demand.
- The Australian Energy Market Operator has increased its capacity to procure demand response from commercial and industrial users through the Reliability and Emergency Reserve Trader (RERT) scheme where there is a risk supply cannot meet demand during summer peak periods.
- The Demand Management Incentive Scheme (DMIS) has been established, which targets non-network alternatives to distribution-level infrastructure investment such as leveraging flexible demand to address peak or minimum demand.
- The Wholesale Demand Response Mechanism will also commence in October 2021 and will lead to aggregators and retailers contracting demand response from business customers to bid as an alternative to supply in the wholesale electricity market.

These initiatives aim to “level the playing field” with the supply-side and promote greater customer reward for load flexibility measures where these are cheaper than new supply or network capacity.

On the supply-side, the major innovation has been the establishment of renewable PPAs. While onsite renewables are generally attractive, some barriers prevent businesses from investing in this way, including:

- roof constraints such as space or strength;
- leasing arrangements that leads to issues such as split incentives with building owners; and/or
- the issue that on-site solar often cannot supply more than ~20% of real-time energy use, which leads to long paybacks if distribution networks impose export limits and also often prevents businesses from fully decarbonising energy use.



Tracking of Australian PPAs (energetics, 2020)

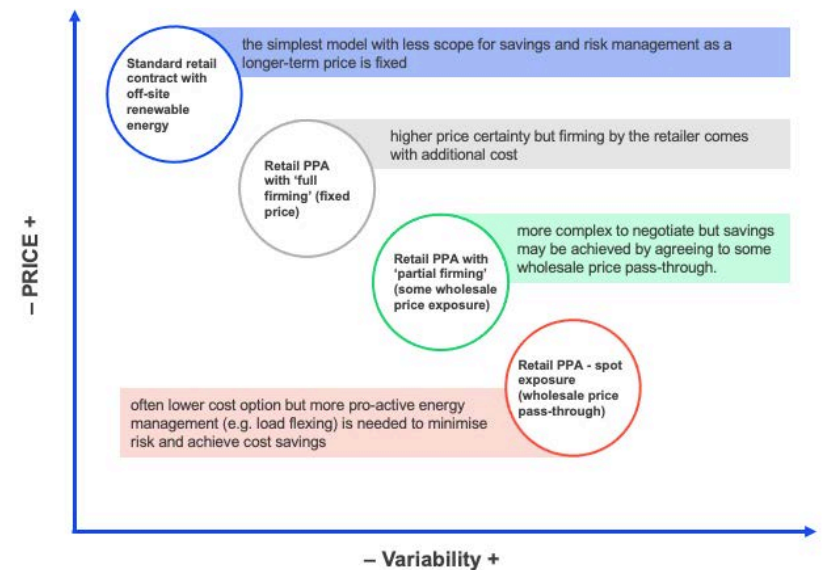
For businesses that want to simultaneously decarbonise and reduce business costs, offsite arrangements are often the only solution. The preferred model to secure offsite renewables for many businesses has moved from GreenPower to renewable PPAs. Renewable PPAs have grown rapidly since 2016 to over 1000MW (supporting 3,500MW of projects) in 2019/20. A Renewable PPA through a retailer has become an increasingly common option as the market has developed, which is explained further on the following page.

EXPLAINER: How do Retail PPA's work?

Under a retail renewable PPA, the customer buys electricity and/or large-scale generation certificates (LGCs) from a specified renewable project via a retailer in exchange for a fixed price. The customer is given a monthly credit/debit depending on whether the electricity spot price is over or under the fixed price for the power generated by the renewable project. This credit/debit is added to the standard retail invoice with payment for balancing supply, environmental, network and market charges.

Under the Renewable Energy Target, retailers are liable to surrender Large Generation Certificates equivalent to a percentage (the retailer renewable percentage) of their sales. From 2020 onwards until the legislated end of the RET in 2030, the retailer renewable percentage is currently set at 20 per cent. Retailers typically pass the costs of meeting their liability under the RET through to consumers. Under a renewable PPA, LGCs are often bundled together with electricity in the price of the PPA at an effective price lower than the market price for LGCs.

There are four broad options for retail PPAs along a spectrum from fixed-price models (where the retailer provides an agreed price for balancing supply) through to variable price models (where there is partial or full wholesale price pass-through). Variable price PPA models are generally lower-priced but have more exposure risk to high wholesale prices.



Note: figure adapted from Briggs, C & Waters, B. (2020) *A Guide to Off-site renewable energy for mid-sized buyers: retail renewable energy purchase agreements*. See businessrenewables.org.au for more information.

Flow Power's innovative model brings load flexibility and PPAs together for cheaper renewable power

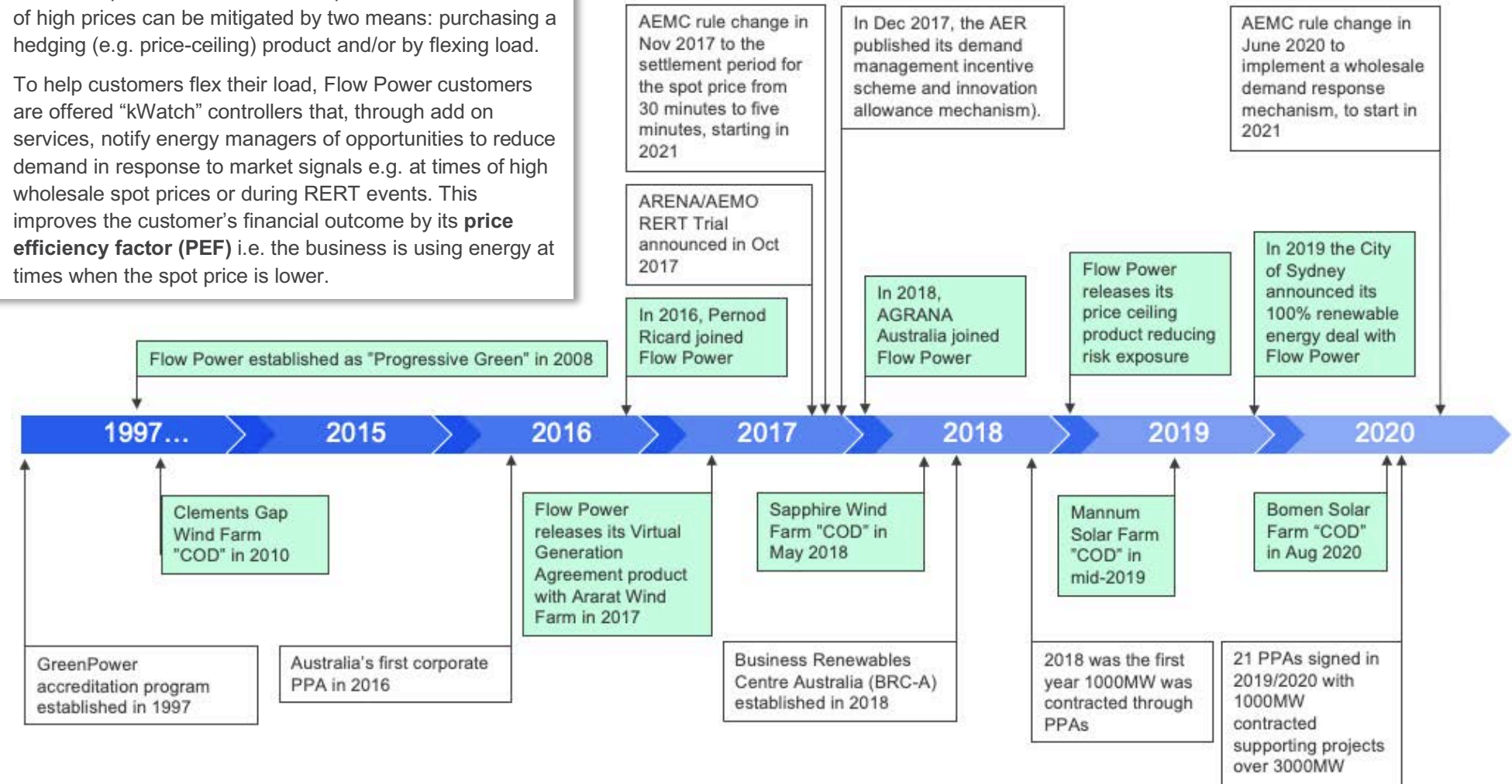
Flow Power's model – providing access to the wholesale price rather than a fixed price contract – creates scope for a lower-cost PPA because there is less use of financial hedges to manage risk and offer a fixed-price. Under Flow Power's renewable PPA offering - Virtual Generation Agreements (VGA) - the customer buys all the renewable power generated by their share of the project under the fixed-price contract. If there is any surplus relative to consumption, the customer receives the NEM spot price for the generation. Where there is unmet demand from the VGA (or a 'renewable deficit'), the customer sources their power from the wholesale market at the current spot price, and is therefore exposed to the market price during these times.

Flexing load can also be more proactive beyond demand response to a handful of price events, which can be a lower-cost way of complementing a renewable PPA. The next section and remainder of this report is focused on how to proactively match energy demand with variable renewable generation to reduce costs, further decarbonise operations and improve business continuity.

The market journey for businesses seeking to leverage load flexibility and purchase offsite renewables, including the development of Flow Power’s product offerings:

Flow Power’s model provides customers with access to the wholesale price rather than a fixed price contract. The risk of high prices can be mitigated by two means: purchasing a hedging (e.g. price-ceiling) product and/or by flexing load.

To help customers flex their load, Flow Power customers are offered “kWatch” controllers that, through add on services, notify energy managers of opportunities to reduce demand in response to market signals e.g. at times of high wholesale spot prices or during RERT events. This improves the customer’s financial outcome by its **price efficiency factor (PEF)** i.e. the business is using energy at times when the spot price is lower.



Low-cost load flexibility allows customers to get more value from their renewable energy

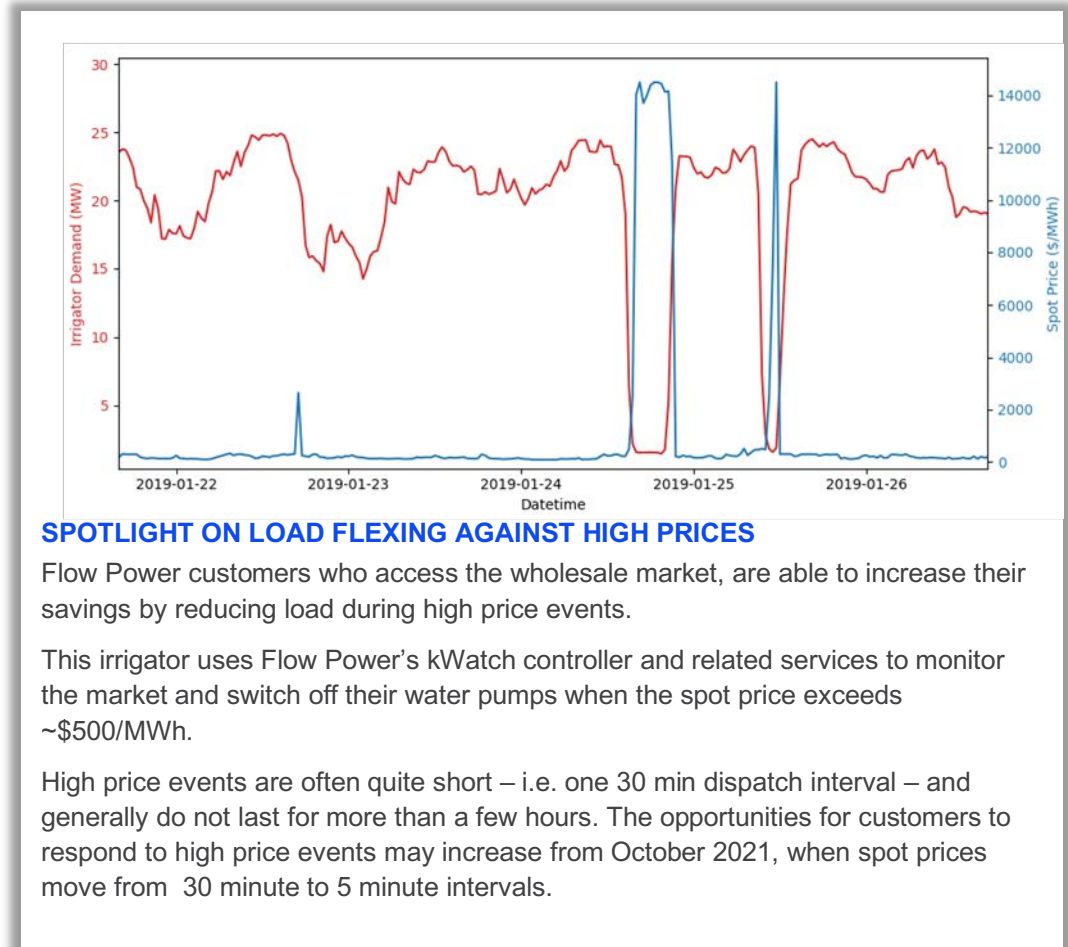
Unlocking load flexibility already offers numerous benefits to customers, which can be:

- financial, by avoiding high spot prices or being paid for participation in the RERT or reducing network charges for peak demand,
- environmental e.g. increasing the proportion of on-site renewable energy used by the business to meet decarbonisation goals,
- risk mitigation e.g. load-shaping to reduce consumption during high price periods, or
- non-financial e.g. improving grid resilience that in turn improves business continuity.

As the market for load flexibility matures following implementation of new rule changes, additional offerings are likely to become available through the DMIS or wholesale demand response mechanism. Both of these regulatory innovations will allow the development of a market with aggregators to procure load flexibility from Australian businesses to respond to either network or market needs for demand reduction. By evaluating the load flexibility potential of a site, and facilitating its access (e.g. by installing building/energy management systems, or energy storage), businesses will be ready to benefit from new opportunities or incentives when they become available from 2021 onwards.

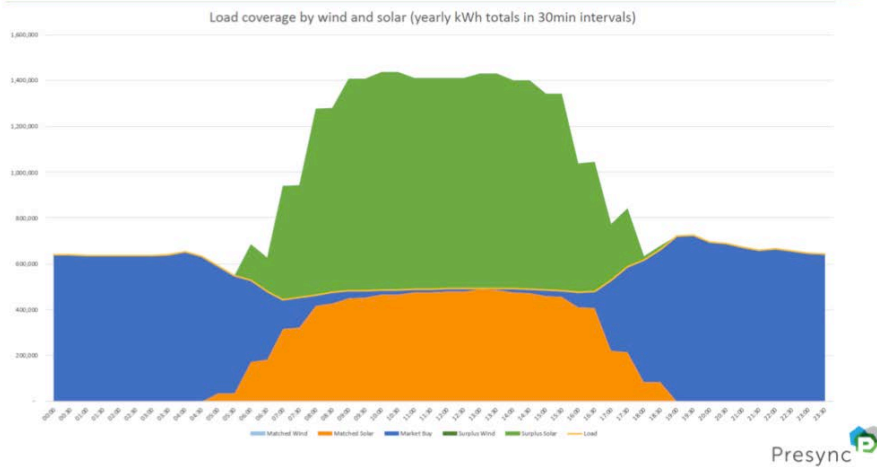
Activating load flexibility will then also be able to complement renewable PPAs by matching load with generation, both before and after the agreement is in place.

Load matching between the buyer's energy consumption and the renewable energy generation profiles is a key step in establishing a PPA. Wind and solar generation are often complementary – when the sun comes out the wind dies down and vice versa at the end of the day. Together they provide more coverage of the customer load across the day. For Flow Power customers, a better match provides additional

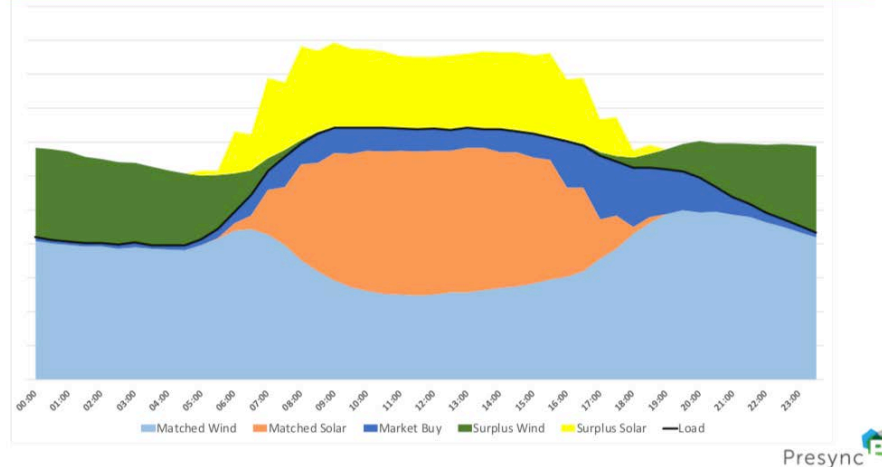


price certainty. Maximising the load match between the customer and the generation profile is a very important element of a PPA.

Example of matching load with solar only



Example of matching load with wind and solar



The above figures developed by Presync (*BRC-A, 2020*) demonstrate that the “market buy” (in dark blue) can be significantly reduced by matching a customer’s load with both wind and solar, compared with solar only.

Once a PPA is in place, active load flexibility can also minimise the proportion of both “unmet demand” or “surplus generation” from the PPA, which can help reduce business costs and minimise financial risk. This is generally true for two reasons:

- unmet demand is subject to the fluctuating spot price, so load shifting can reduce wholesale market purchases especially in high-price times, and
- surplus generation is “sold back” to the market at the spot price which may be lower than the fixed price paid by the customer through the PPA, which for solar PPAs is falling rapidly in the middle of the day due to the rapid growth of rooftop and utility solar projects; reducing the level of surplus generation through load-shifting ‘into the solar curve’ (or storage) will lower the risk of selling power at low-price periods.

Some customers are already realising these opportunities, three of which are described in the next section of this report. These case studies of Flow Power customers explore the mutual benefits of load flexing and renewable PPAs and their practicality for business. They also identify future opportunities that may exist for these customers, and those who have similar energy use profiles.

City of Sydney

The City of Sydney is the home of almost 250,000 people and its original inhabitants were the Gadigal people of the Eora nation. The City signed a PPA with Flow Power in 2019 to meet its commitment to purchase renewable electricity that matches 100% of electricity is uses from the grid from July 2020. The deal is equivalent to the annual electricity usage from all the city's assets including 115 buildings, 75 parks and 23,000 streetlights (approximately 29,000 MWh). The renewable energy PPA, or 'Virtual Generation Agreement' (VGA), is complemented by retail contracts that access the wholesale price, with the risk limited via the Average Rate Option (ARO) product which caps the monthly expenditure for balancing supply outside the VGA.

The City of Sydney has a long history of energy efficiency and on-site renewable energy projects, but committed to 100 per cent renewable electricity to accelerate emissions reductions. These projects, including the three renewable PPAs, are contributing to the city's target of 44% reduction in greenhouse gas emissions by end June 2021 based on 2006 levels.

How is the City of Sydney benefiting?

TOWARDS DECARBONISATION: In its Green Report, the City of Sydney estimates the agreement will reduce their greenhouse gas emissions by 32 per cent – the single largest measure by some distance. The VGA will take them past the target of 44 per cent emissions reduction and most of the way towards the 70 per cent emissions reduction target by 2030.

LOWER ENERGY BILLS: The City of Sydney is expected to save approximately 8% on its electricity costs, delivered through the Sapphire Wind Farm and Bomen Solar Farm VGAs which are currently operational, and Repower Shoalhaven Farm once it is operational.

The agreement includes a ceiling price where a fixed amount (around 1% of the total invoice cost) is paid monthly to guarantee that, over a quarter, the wholesale element of their electricity price does not exceed predefined levels. In a year of lower wholesale electricity prices, the product has only saved money in January when wholesale prices were at the highest for the year – but that is the purpose of the product: a modest charge which enables the customer to access wholesale pricing, reducing exposure to extreme spot prices and prolonged high prices on the spot market.

SUPPORTING THE GRID: The City of Sydney is already supporting the grid and its ability to integrate renewable energy through a high load match of >80%. One of the reasons the City selected a VGA was the high load match and the support and incentive for demand management to increase the load matching. The City's approach has been to get the agreement in place before implementing demand management measures – which is one of the next steps in their energy journey.

What's the deal?

Wholesale spot price access with a quarterly ceiling (ARO) @ 120% of contract market rates.

Three separate PPAs with:

- Sapphire Wind Farm,
- Bomen Solar Farm, and
- a 5MW community-owned Repower Shoalhaven Solar Farm near Nowra

to purchase renewable energy that matches 100% of electricity used from the grid (~24% solar; ~76% wind).

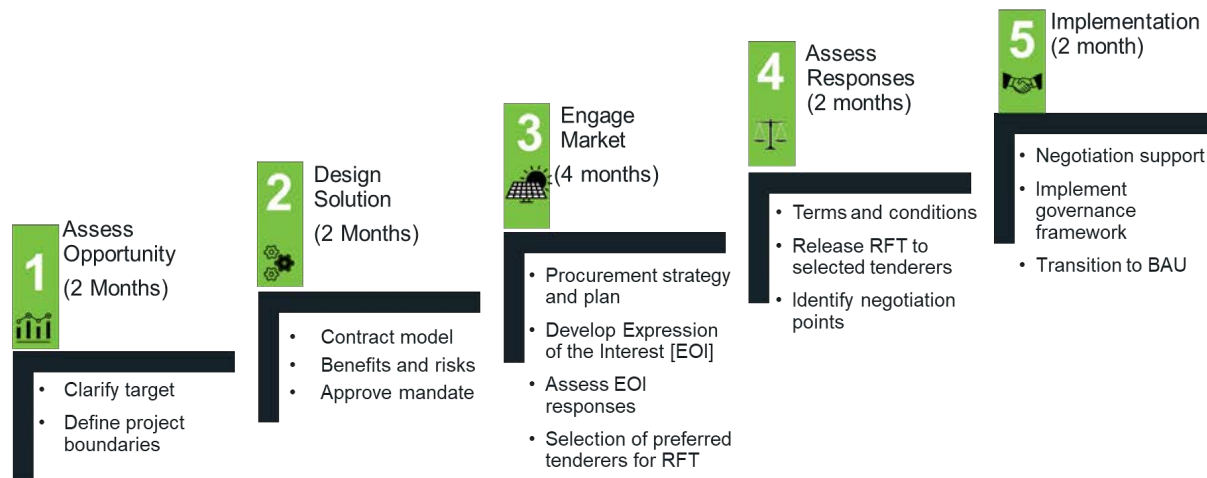
How did they get it over the line?

Procurement with local governments is in many ways unique, both in their stakeholder engagement and governance. They often use their purchasing power to influence other stakeholders and may have multiple goals in their rigorous procurement process. The City of Sydney's deal with Flow Power was motivated primarily by its sustainability goals. After declaring a climate emergency in 2020, the city decided to increase its 50% renewable electricity target to 100%.

It was agreed that the renewable energy target could only be met through a renewable PPA for the equivalent size of the City's energy demand. To achieve this, the City of Sydney underwent a structured, competitive tender over twelve months, including an Expression of Interest and Request for Proposal. Flow Power's VGA offering was selected through competitive tender. This process began in August 2019, with the agreement contracted in November, and the arrangement activated in January 2020.

“They’re an interesting customer to work with because the price doesn’t always have to be the lowest”

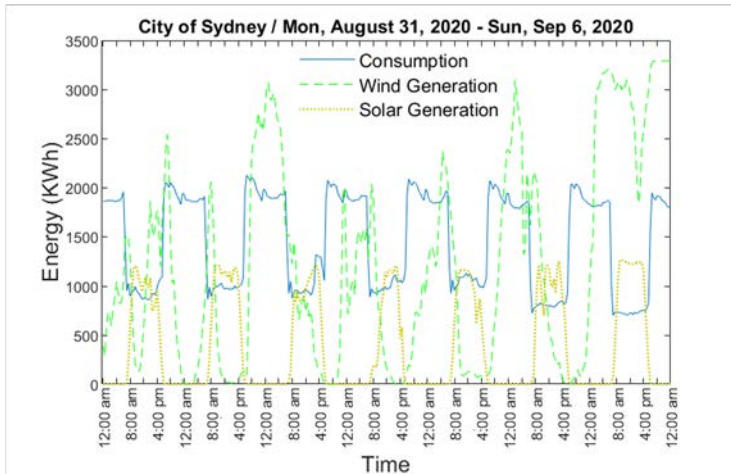
Project timeline for Flow Power Agreement with the City of Sydney



Although the price did not need to be the lowest in the mix, under procurement regulation the council must demonstrate “value for money”. The business manager at the City of Sydney has noted that the Flow Power arrangement has allowed the city to “lock in a competitive price” (BRC-A, 2020). The City of Sydney’s tender and PPA is also the first in Australia to include a community energy project (Repower Shoalhaven solar farm). For the City of Sydney, leadership-by-example to encourage and inspire other organisations within its local government area to also procure renewable energy off-site was part of their vision for a PPA.

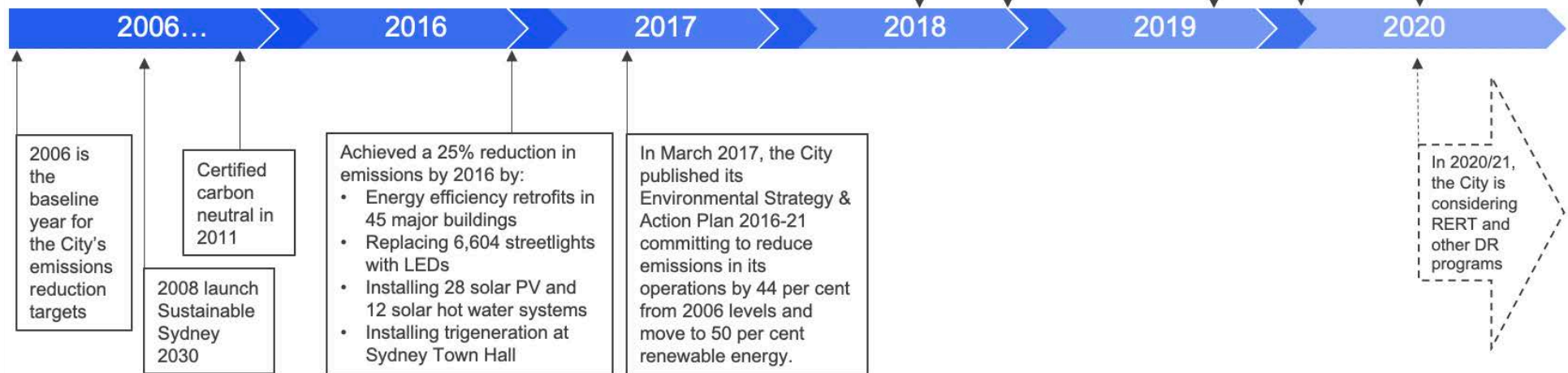
Source: BRC-A (2020), *Renewable Energy Power Purchase Agreements: Maximising Social Benefits & Minimising Risks*

The City of Sydney's energy journey:



SPOTLIGHT ON LOAD MATCHING: A COMBINED SOLAR-WIND PPA.

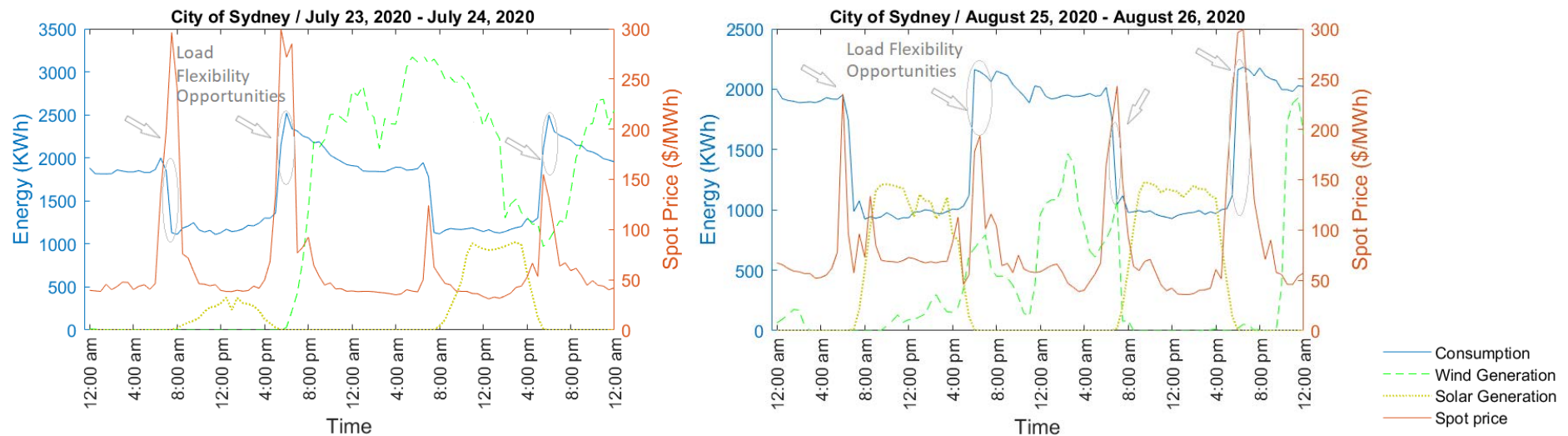
The City of Sydney has achieved a high load match (>80%) between the generation of its PPA and on-site consumption. Given its peak demand is at night, due to street lighting, the majority of its VGA is sourced from wind energy, rather than solar.



The opportunity for the City of Sydney flex their energy to get more value from the PPA

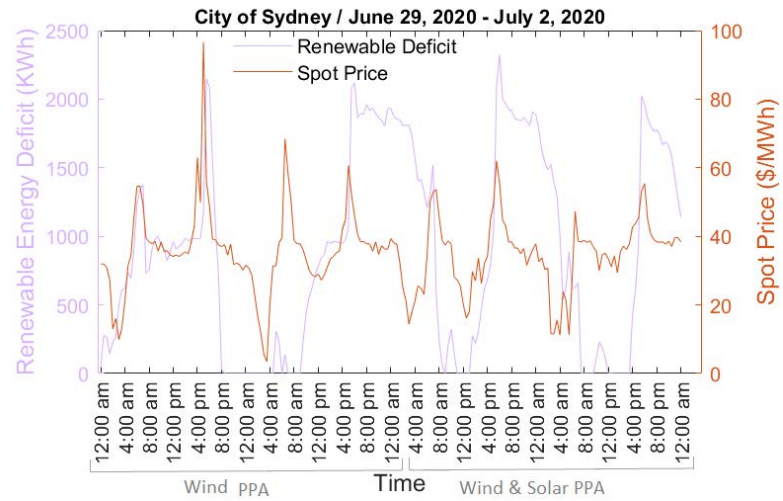
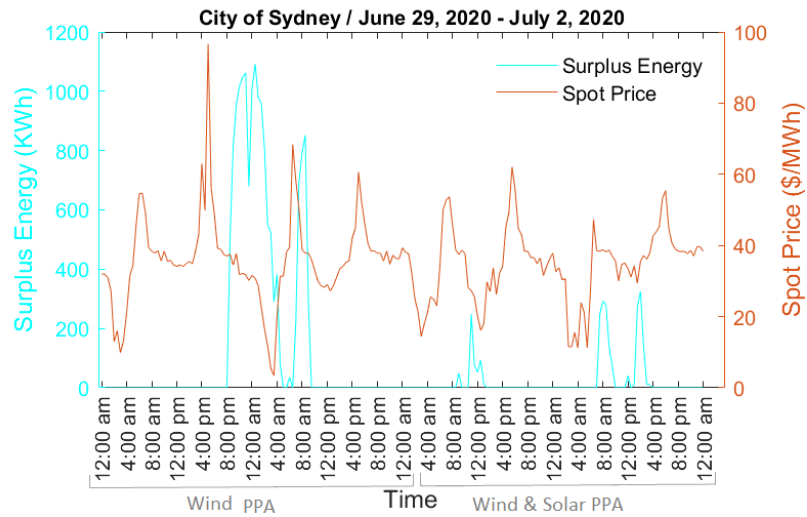
There are significant opportunities for the City of Sydney to flex their energy use to get more value from their renewable PPA. In particular there are two opportunities:

1. Moving peak load within the generation profile of their renewables PPA to increase the load match, especially in the later afternoon to avoid exposure to daily peak electricity spot prices; and
2. Shedding or shifting load in response to the needs and incentives of the electricity system e.g. load-shifting out of critical peak periods in exchange for payments under the RERT scheme or network-based incentives.



Achieving the trifecta of reliable and affordable energy, supporting the supply of clean energy. The City of Sydney has achieved a high load match between the generation of its PPA and on-site consumption but there is a further opportunity to reduce its electricity costs and increase the proportion of matched demand. Whilst there is a high load match across time for the City of Sydney under its renewables PPA, the figures above illustrate there can be mismatches in load and generation at particular times of the day. For example on July 23-24 and August 25-26, you can see that there is a spike in load from 4pm and demand is highest through the late afternoon and early evening - which is increasingly when wholesale spot prices often peak. The PPA with Sapphire wind farm often provides coverage (as on July 23) but this will not always be the case (as on August 26). There is a significant opportunity to achieve savings at this time of day if the load can be smoothed. This will have the added benefit of aligning the city's energy use with the electricity networks' capacity that will improve the reliability of electricity to everyone in the local government area.

Energy flexing could shift surplus renewable generation (35.1%) to cover some or all of the unmet load by the VGA (31%) – which as the figure below illustrates is often when the daily spot price peaks.



Note: renewable deficit is the unmet demand from the PPA

AGRANA Fruit Australia

AGRANA Fruit in Australia is based on the Central Coast of NSW, manufacturing fruit-based products for the dairy, ice cream, baking and food service industries. It is one of the 56 production sites owned by the international AGRANA industrial manufacturer of fruit, starch and sugar, that operates across Europe, Asia, Africa, South America and Australia.

AGRANA Australia joined Flow Power in early 2019 with wholesale price access, including its ceiling price product backed by an Average Rate Option. By the end of 2019, the company had also signed a combined wind and solar VGA and was actively participating in the ARENA/AEMO RERT program. AGRANA Australia's annual energy use has remained relatively stable between 2018-2020 with peak demand in the summer. More details on AGRANA Australia's energy journey is described on the following page.

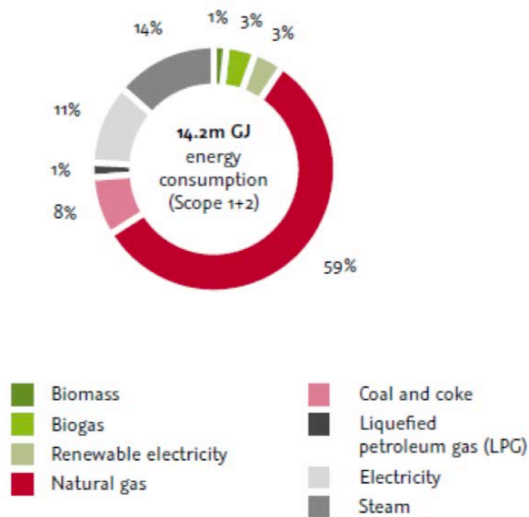
What's the deal?

Wholesale spot price access with a quarterly ceiling @ 120% of contract market rates

Participating in ARENA's RERT portfolio in NSW, responding to 2-3 events per year

Two PPAs to achieve ~70% renewable energy load-matching with Sapphire Wind Farm (35%) and Bomen Solar Farm (65%)

Energy mix of the AGRANA Group in 2019|20



Source: AGRANA Integrated Annual Report 2019/20

How is AGRANA benefiting?

LOWER ENERGY BILLS: AGRANA's cost of energy in 2019 dropped on average by 10% compared to 2018. As AGRANA's energy profile and prices have remained stable over this period, this financial benefit is mainly attributed to the benefits of the VGA with wind and solar, as well as a drop in LGC prices in 2019 with certificates averaging \$75 in 2018 compared to \$54 in 2019.

TOWARDS DECARBONISATION: Signing a renewable energy PPA helps AGRANA meet its ambitious decarbonisation target by 2040. In 2019/20, AGRANA had already purchased renewable generation to match 7% of its use, with the majority of this coming from onsite biogas or biomass. AGRANA expects that this could increase by a further 11%.

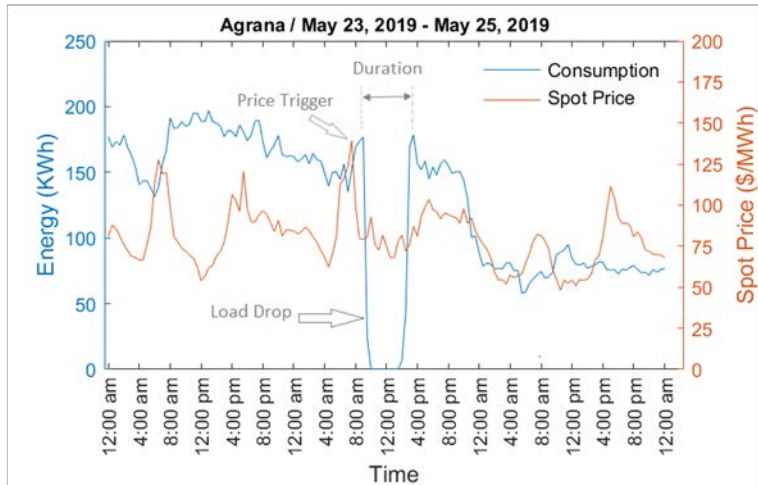
How did they get it over the line?

The Flow Power retail arrangement was negotiated directly with AGRANA Australia's Purchasing Manager and Environment and Safety Manager. The retail products were compatible with the standard procurement process, assisted by an earlier engagement process by Flow Power to explain the options and alternate model.

The renewable energy PPA took longer to agree, since it required approval by AGRANA's global head office in Austria which defines and reports on the international businesses' sustainability objectives. The international AGRANA company has committed to CO₂-neutral production by 2040 and is developing a concrete Decarbonisation Strategy 2040 this financial year. AGRANA's sustainability reporting, which is GRI accredited, has been integrated with its Annual Reports since 2012. AGRANA also developed new sustainability targets for its fruit business in 2019/20 following a stakeholder survey, which ranked "energy consumption and emissions" as its

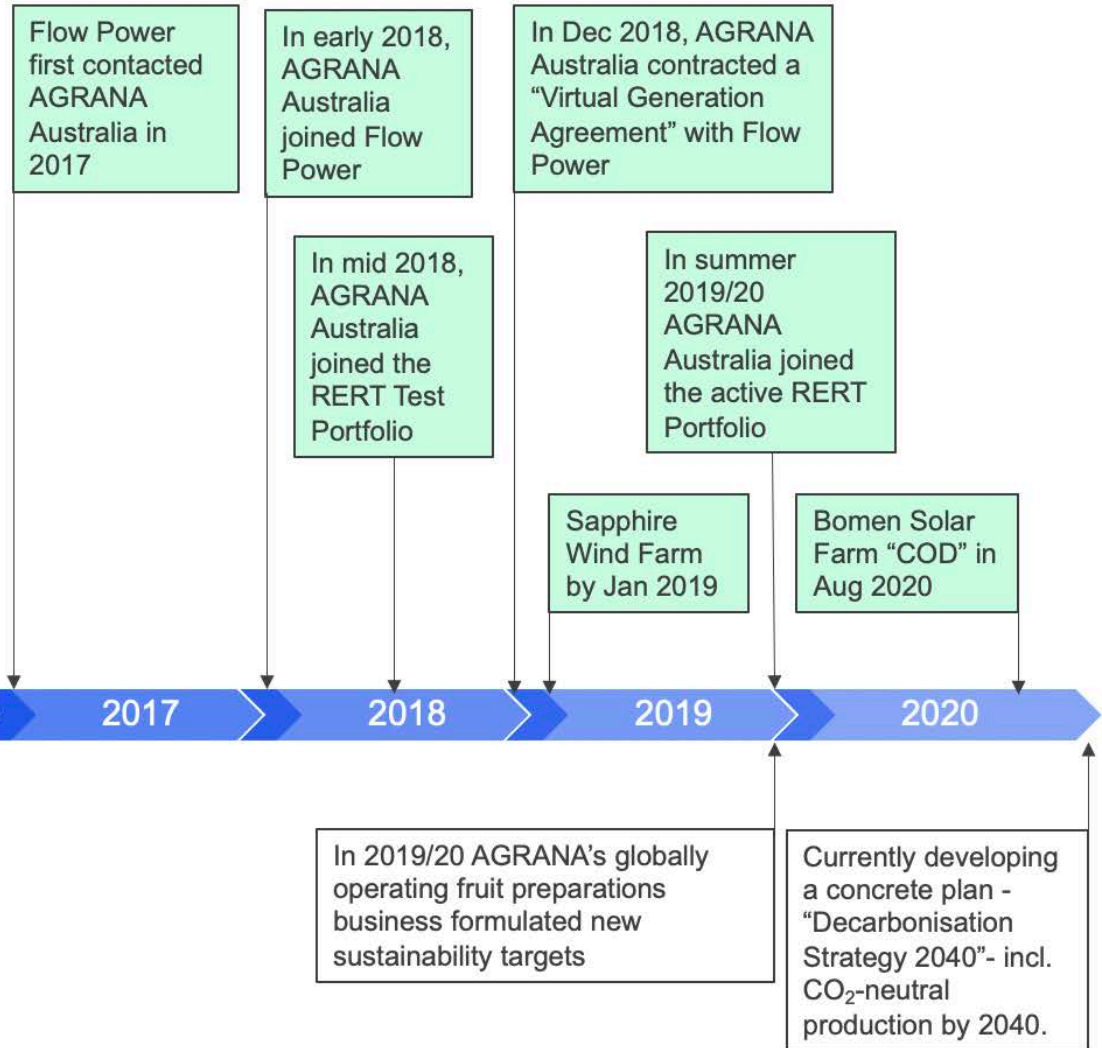
highest environmental, social and economic impact. Given these goals, AGRANA Fruit Australia was able to secure head office approval within one year for a 10-year renewable VGA with Flow Power (see Towards Decarbonisation).

AGRANA's energy journey



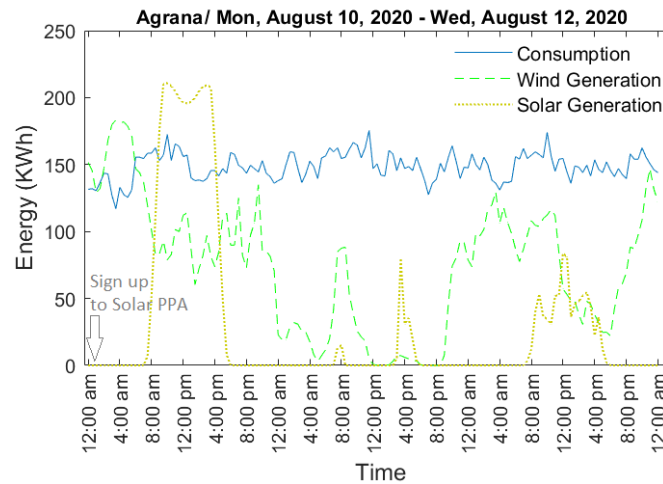
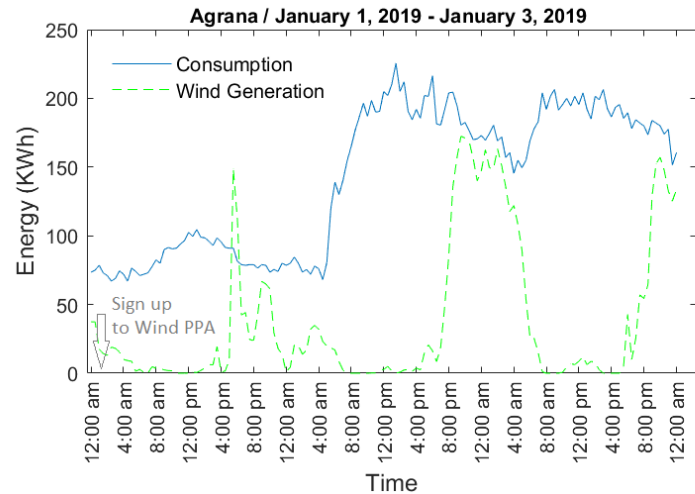
SPOTLIGHT ON RERT RESPONSE.

As part of Flow Power's ARENA portfolio, AGRANA is requested to respond 2-3 times per year. During these events, the diesel generator switches on and grid power is disconnected for several hours with no disruption to production.



The opportunity for AGRANA to flex their energy to get more value from the PPA

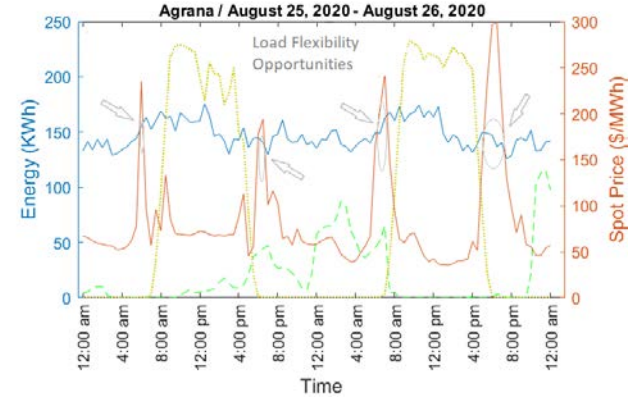
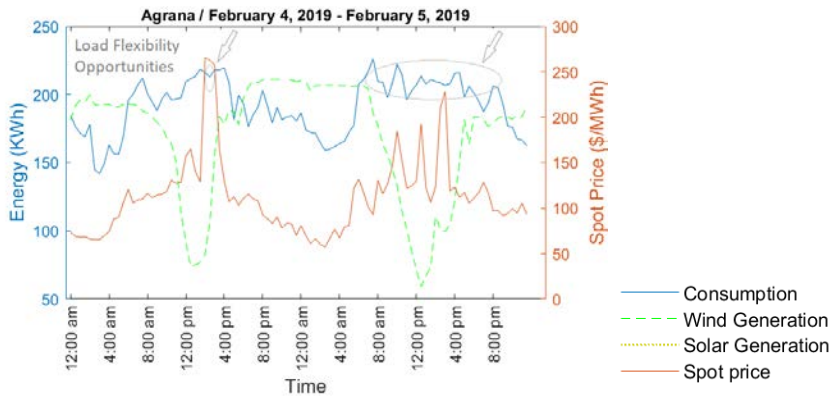
Like the City of Sydney, AGRANA is already benefitting from matching its renewable generation to demand. In 2019, approximately 45% of AGRANA's energy demand was met by the Sapphire Wind Farm which has increased to over 75% since the Bomen Solar Farm began operating in August 2020 (see figures below)



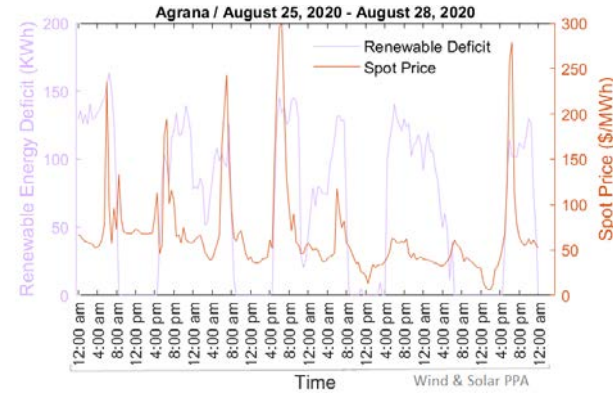
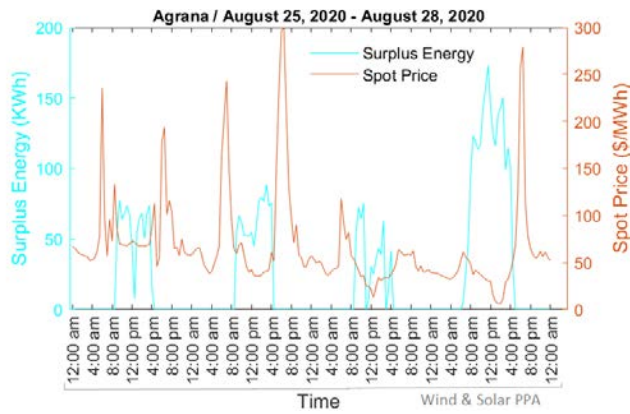
Annual Performance	2019	Aug & Sep 2020
% Demand met by wind	45.05%	–
% Demand met by wind and solar	–	75.78%
% of unmet demand (renewable deficit)	54.95%	24.22%
% of Demand (surplus generation)	8.36%	36.19%

In addition to the substantial increase in renewable energy generation, integrating the Bomen Solar Farm led to a further ~5% reduction in AGRANA's energy bill relative to the wholesale pricing model they were first on when they joined Flow.

Significant untapped energy flexing opportunities exist for AGRANA. As illustrated in the two figures below for the days of February 4-5 and August 25-26, peak wholesale spot prices mostly coincide with low renewable generation. For AGRANA in particular, this unmet demand at peak spot prices also coincides with the site's summer peak load meaning a small change would lead to large benefits. This opportunity could be realised if this energy use could be shifted to times of high renewables or low spot prices, either through process rescheduling, further leveraging onsite backup generators or via energy storage.



If the annual surplus energy from renewables (36.19%) could be flexed to cover the unmet load from the VGA (24.22%), the cost of energy prices would be 50-60% lower than the spot price during 2019. There is an opportunity to use load flexibility or energy storage to redeploy surplus energy from low spot prices to better cover unmet demand during higher spot periods. The figures below from August 2020 illustrate this opportunity, however the savings have been calculated by the 2019 dataset which is complete.²



Note: renewable deficit refers to unmet demand from the VGA

² Note: the savings calculation is based on 2019 wholesale prices which are higher than 2020 levels as a full dataset is not yet available. A full estimate would calculate savings over a period of some years across price cycles. Forward prices are currently projected to be higher than 2020 but lower than 2019. There are many factors that will influence wholesale spot prices as Australia's energy transition proceeds.

Pernod Ricard Winemakers

Pernod Ricard Winemakers is the wine business of Pernod Ricard, the second largest wine, spirits and Champagne company in the world. The company's Australian wine portfolio consists on a number of award-winning wine brands, including: Jacob's Creek, St Hugo, Oralndo and George Wyndham.

Pernod Ricard Winemakers first joined Flow Power in 2016, seeking to take advantage of the wholesale market opportunity in response to rising electricity prices. In the same year, the company installed its first pilot 100kW solar installation in the Barossa Valley to support its sustainability objectives. Over the next three years, the business rapidly expanded its energy portfolio and joined the Reliability and Emergency Reserve Trader (RERT) program to benefit from supporting the electricity network. By 2019, the business had installed 3MW of solar on-site, covering 20% of its total site demand that is equivalent to 800 South Australian homes, and matching the rest of its electricity use from a mix of solar and wind PPAs.

More details on Pernod Ricard Winemakers' energy journey is described on the following page.

“Our journey began in 2016 with a pilot solar installation after we recognised that we had a huge opportunity across our wineries to harness the power of the sun through solar panels. Three years later, we are exceptionally proud to say that we are now sourcing or matching all electricity used from renewable sources, in alignment with our global ambition”

*- Brett McKinnon,
Pernod Ricard Winemakers COO*

How is Pernod Ricard Winemakers benefiting?

LOWER ENERGY BILLS: Pernod Ricard Winemakers estimates that it has saved significant amounts on their energy bills over three years (2017-2019), by accessing the wholesale price and matching use by purchasing low-cost renewable electricity through its PPAs. In 2019, UTS analysis estimates that the VGA itself contributed an average of 4.6% savings. The business has now installed an onsite Thermal Energy Storage (TES) system that will provide greater energy arbitrage opportunities.

TOWARDS DECARBONISATION: By sourcing or matching all its electricity use from renewable sources, Pernod Ricard Winemakers is supporting the global Group's strong sustainability commitments including:

- 100% renewable electricity for all affiliates globally (industrial and administrative sites) by 2025, and
- to reach net zero in own operations (scope 1 & 2) by 2030 and continue to work with the whole value chain to halve the overall carbon footprint (scope 3) by 2030.

This progress towards decarbonisation has positioned Pernod Ricard Winemakers as a sustainability leader amongst its peers, being awarded “Green Company of the Year” by Drinks Business in 2019, four SAWIA Environmental Excellence awards and being recognised as a UN Global Compact LEAD Company. As stated by Operations Director Robert Taddeo, “This is an excellent example of how we can make sustainability processes sustainable for business”. It's a win-win situation.

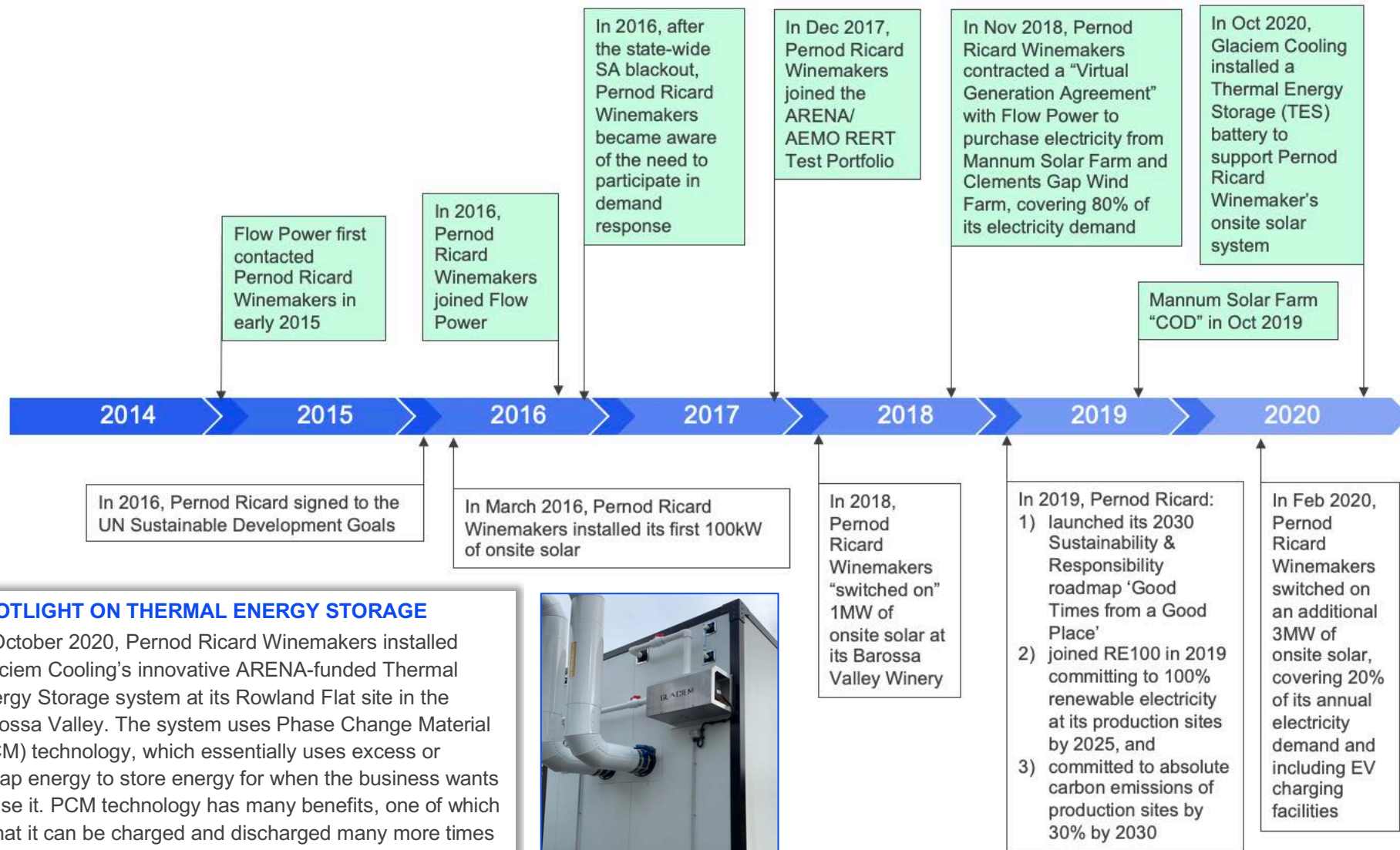
What's the deal?

Wholesale spot price access with a physical hedging strategy

Participating in ARENA's RERT portfolio in South Australia, responding to 2-3 events per year

A ~80% load-matched VGA with Mannum Solar Farm and Clements Gap Wind Farm

Pernod Ricard Winemakers' energy journey:



SPOTLIGHT ON THERMAL ENERGY STORAGE

In October 2020, Pernod Ricard Winemakers installed Glaciem Cooling's innovative ARENA-funded Thermal Energy Storage system at its Rowland Flat site in the Barossa Valley. The system uses Phase Change Material (PCM) technology, which essentially uses excess or cheap energy to store energy for when the business wants to use it. PCM technology has many benefits, one of which is that it can be charged and discharged many more times than a Lithium ion battery, which degrade over time. The system will reduce the business' exposure to high electricity prices and allow the business to use more of its solar onsite, rather than selling it back to the grid.



How did they get it over the line?

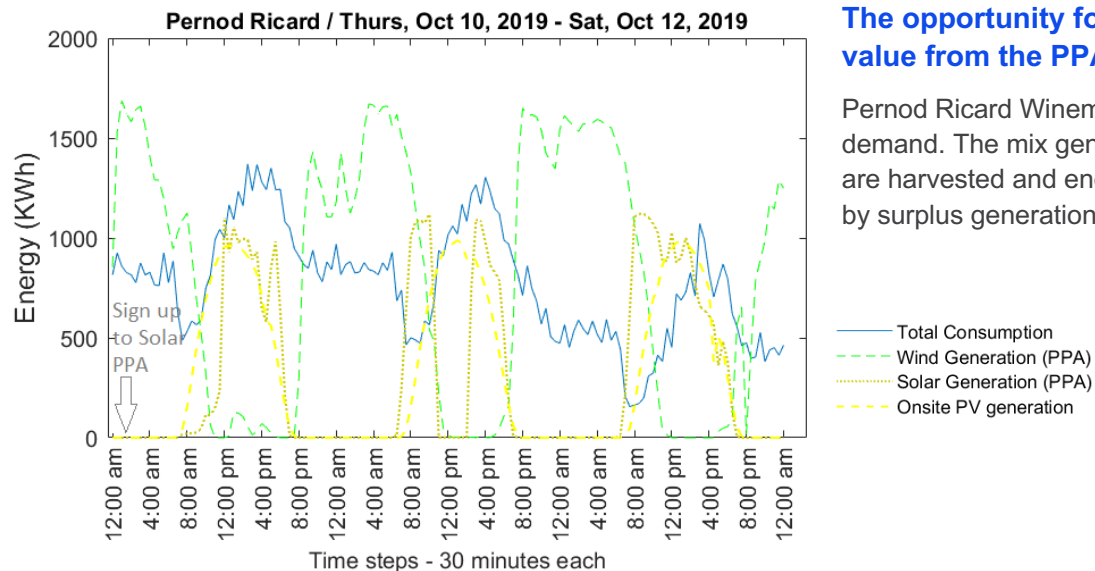
Pernod Ricard Winemakers took a team approach to its energy journey. Choosing Flow Power meant challenging the status quo and the case was made at multiple levels of its business: sustainability, procurement, finance and operations. The four groups worked together to undertake in-house modelling to build the case to move away from BAU (business as usual). The case was strong since Pernod Ricard Winemakers had already exhausted the low-hanging fruit of energy efficiency and they found that the best option was to change how they used electricity to take advantage of lower priced renewables. The approach also aligned with Pernod Ricard's third company value of Entrepreneurial Spirit, which provides their employees with freedom to "challenge assumptions to achieve a better outcome because we're curious, courageous, passionate, and we question the status quo to deliver excellence".

The first choice to move to wholesale prices required a cultural shift, particularly for the operational managers. For refrigeration it was the refrigeration technicians and the winemakers; for the waste water plant it was the maintenance staff and the warehouse supervisors. These key people within business operations manage approximately 50-60% of the controllable load. While initially the operations staff found the idea quite "interruptive", once the benefits were clearly explained they enthusiastically engaged. The key concepts was that it's all upside! Finance would explain to each operator that, "you won't necessarily be penalised if you stay on during a high-price event, but you could save up to ~\$30k for shutting down for about four hours". Over 5-6 price events per year of different lengths, it is easy for a business unit to save ~\$60k off its annual budget.

The switch to using electricity through a wind and solar VGA required further analysis, however there was strong support from senior management. The core value proposition was supporting the company's global emissions reduction and renewable energy goals. Nonetheless, the cost savings were important to justify the long-term (10 year) commitment required for a PPA.

“We challenge assumptions to achieve a better outcome because we're curious, courageous, passionate, and we question the status quo to deliver excellence”

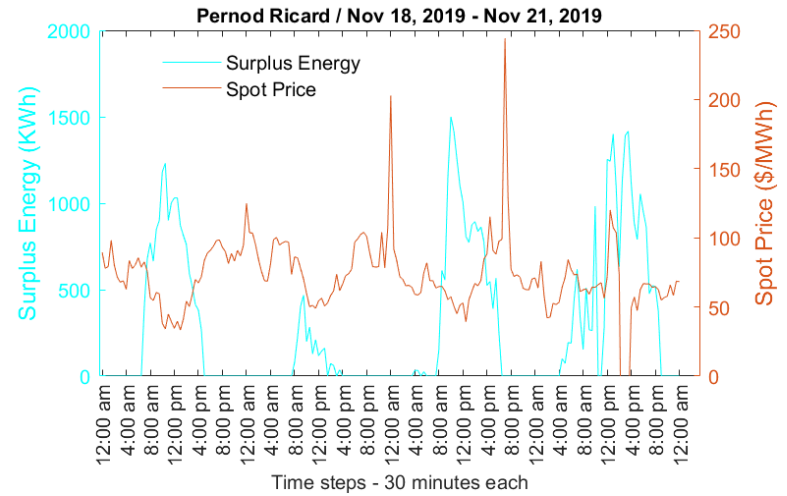
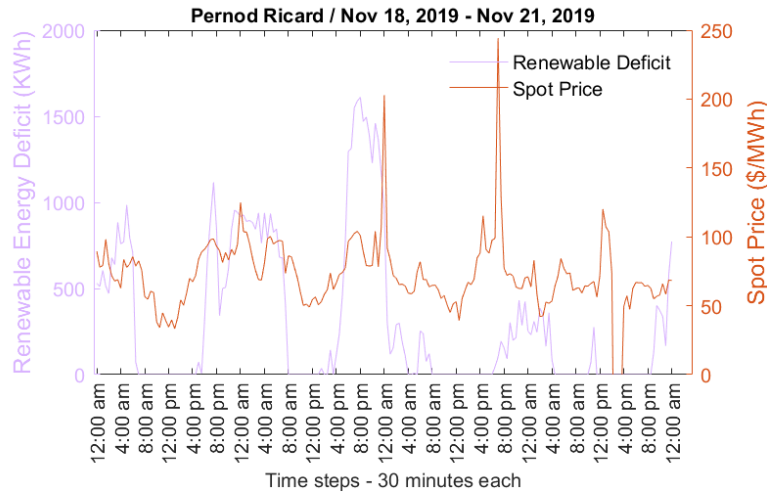
*The Pernod Ricard Way
(Entrepreneurial Spirit)*



The opportunity for Pernod Ricard Winemakers to flex their energy to get more value from the PPA

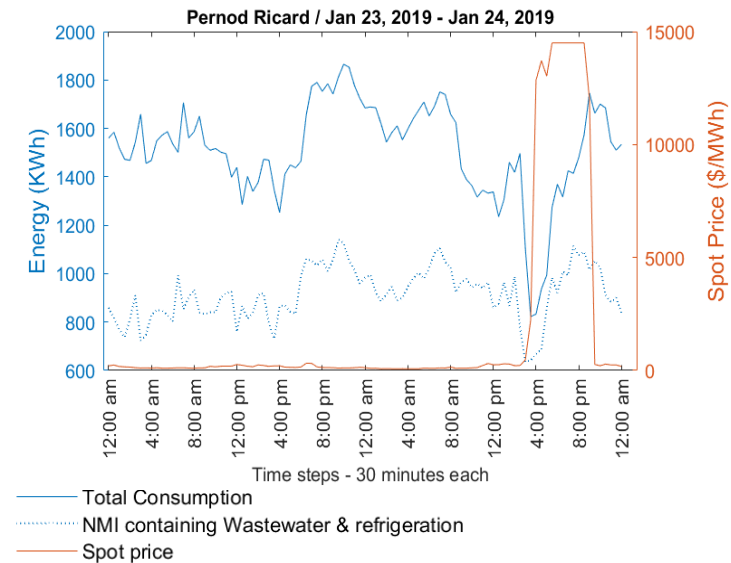
Pernod Ricard Winemakers has combined wind and solar PPAs to best match their daily energy demand. The mix generally covers average demand apart from February to April when the grapes are harvested and energy usage is high. At this time there is more grid consumption that is offset by surplus generation at other times of the year.

The benefit was clearly seen when the Mannum Solar Farm PPA was activated in 2019. Prior to this, approximately 46% of its demand was not met directly by either on- or off-site renewables. It is much better for business for Pernod Ricard Winemakers to have less unmet demand since this reduces the potential exposure to high price events on the spot market. When Mannum Solar Farm began operating in October 2019, unmet demand dropped to just over 20% and the surplus generation (the amount sold back to the grid) also increased by over 20%.



There is significant opportunity to soak up this excess generation through load flexibility. As shown in the graphs above, unmet demand (renewable deficit; when the company purchases energy from the grid) is generally at times of high prices while times of surplus generation generally corresponds to low wholesale prices. Side-by-side these graphs show that the company could shift portions of its energy usage from times of renewable deficit to times of surplus generation for substantial financial gains. Pernod Ricard Winemakers' average unmet demand between October and December 2020 was 20.67%, compared with 39.72% of surplus generation, demonstrating regular and long-term opportunities for load flexibility.

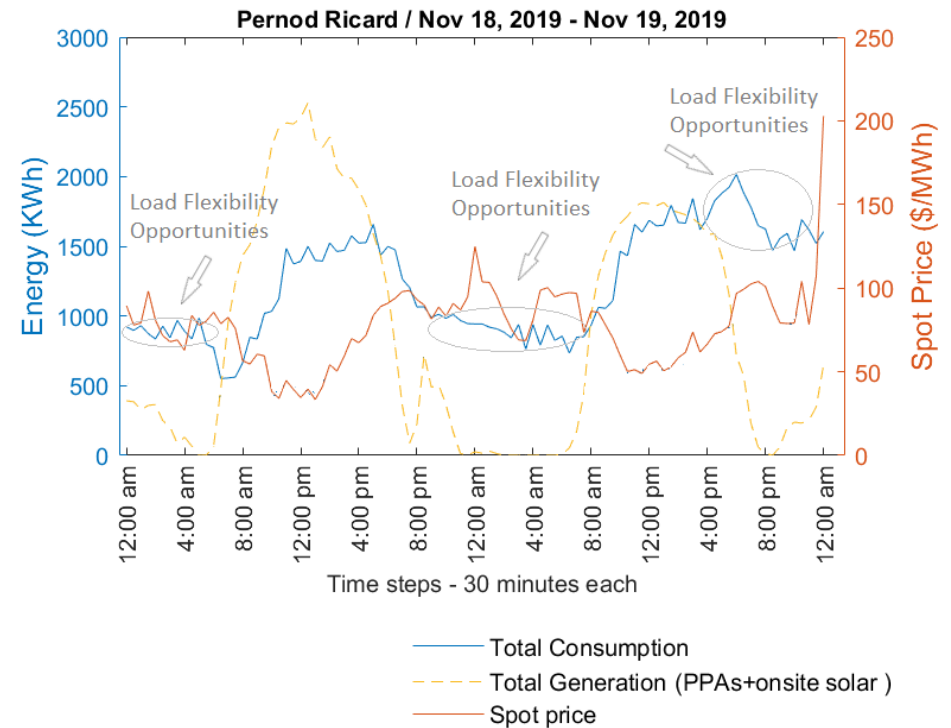
Pernod Ricard Winemakers has already shown this can be done through its successful participation in RERT, when it ramps down its wastewater plant and refrigeration. Wineries have the benefit of large thermal inertia in their stored wine barrel halls that preserves coolth when fridges are turned off. However this can be limited since wine is a high-value product, particularly during times of fermentation that often coincide with annual peak demand. At these times the business demonstrates its agility by relying instead on its wastewater plant to respond. An example of this strategy in action is shown in the graph opposite, where refrigeration and wastewater energy use (aggregated under a "virtual" National Metering Identifier (NMI)) quickly reduces in response to the price signal.



In 2021, Pernod Ricard Winemakers is seeking to take its energy flexibility to the next level. The company is now seeking to automate its response to price signals and programs (including RERT) to maximise the financial benefit and reduce the demands on operators' time. A collaboration with Glaciem Cooling has provided the site with additional thermal storage [see: Spotlight on Thermal Energy Storage] to increase the opportunities for the business to make the most of high and low prices, for example those highlighted in the graph opposite.

Pernod Ricard Winemakers is also investigating ways to support the SA network by removing surplus solar. The network can become stressed at times of high generation if there is not enough demand to "soak up" the excess generation. The business' on-site solar system could be cleverly connected to the grid so that it ramps down at times of negative prices (where one pays to export solar to the grid). This demonstrates a new opportunity for businesses to adapt to the transitioning energy system for both commercial and social benefits.

Very flexy.



Lessons from the energy journeys

These three case studies are excellent examples of how the energy journey of businesses can progressively unlock greater cost and decarbonisation benefits as energy literacy improves. In particular, load flexibility is already improving the case of Corporate Renewable PPAs, and could be further leveraged to “use” more renewables and take advantage of lower energy prices. Three key lessons that are shared across the three case studies are summarised below.

4) Demand matching a renewable PPA is the least-cost and lowest-risk way to “use” more renewable energy

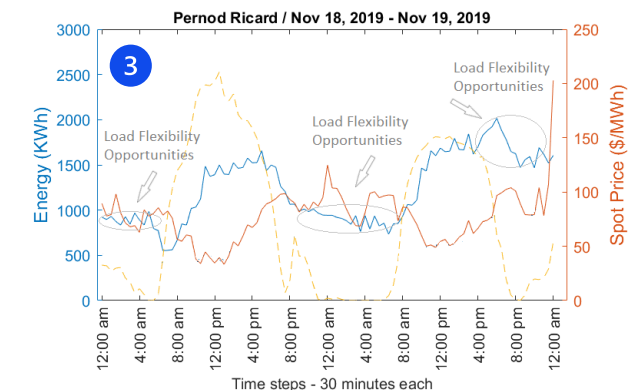
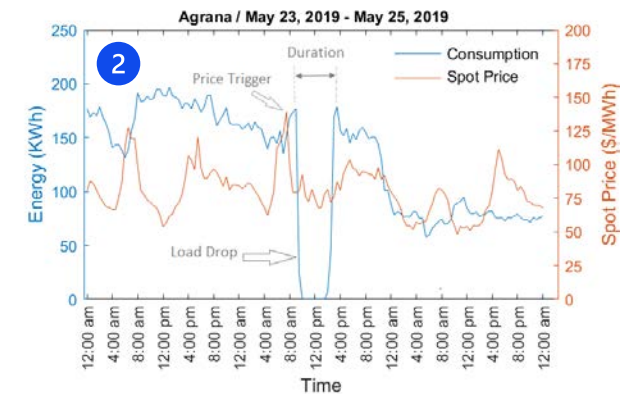
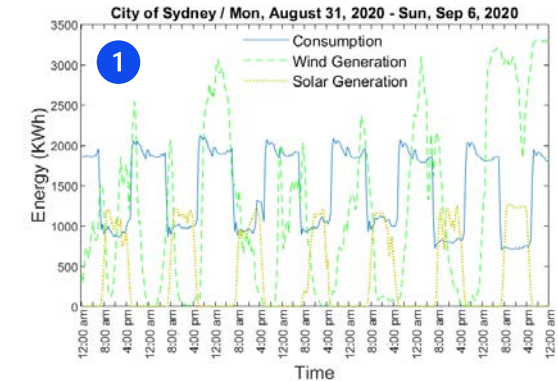
Matching the organisation’s energy consumption profile and a good mix of renewable energy generation profiles is a key step in establishing a successful PPA. Strong matching significantly reduces the “market buy”, which increases the certainty of electricity prices for the business. The three case studies showed that >75% load matching provided significant energy cost savings (8-10%) in 2019. Many of the remaining load flexibility opportunities that were identified were focused on minimising “unmet demand” or “surplus generation”.

5) You don’t need to switch off your business: there are lots of low risk options to flex energy at a business site

Both AGRANA Australia and Pernod Ricard Winemakers demonstrated that load flexibility can deliver financial benefits without compromising business operations. In particular, dispatching onsite generation or rescheduling non-critical processes (e.g. wastewater treatment) are easy to activate and have little to no impact on the core business of the organisation. New technologies, including energy storage and enabling (monitoring, control and automation), will further increase the number of low-risk load flexibility opportunities.

6) More market opportunities are emerging that will increase the value of load flexibility in the future

In addition to expanding technology opportunities, many more market opportunities are also likely to emerge in the coming years. With more renewable energy generation connecting to the grid, it is likely that energy prices will become even more volatile that offer greater changes for energy arbitrage or, for the more risk-averse, greater benefits from more certain pricing from renewable PPAs. Additional revenue options for load flexibility are also likely to become available through the DMIS or wholesale demand response mechanism from 2021 onwards. **Now is the time for Australian businesses to embark on their energy journey and be ready to capitalise on the benefits of the energy market transition as fast followers of these energy pioneers.**





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