Moreland Energy Foundation

Wodonga Community Solar Project Feasibility Study

June 2017

ATA

AKIN CONSULTING

Contents

1 Executive summary

The transition away from fossil fuels to renewable energy sources has gathered significant momentum and increasing diversity in Australia in recent years. Strong Victorian government support for community-based organisations pioneering new energy delivery models is further stimulating a strong existing ‘community energy’ sector that is seeking to help shape our energy system by creating fairer, locally beneficial models for renewable energy generation.

Growing in stature, the Australian community energy sector Australia currently has approximately 100 community energy groups developing projects across a range of technologies and scales, and 55 projects already generating in Australia – many of which can be classed as ‘community solar’.

Moreland Energy Foundation (MEFL) and our partners ATA and Akin Consulting conducted this feasibility study on behalf of the City of Wodonga (Council) and Renewable Albury Wodonga (RAW) investigating the potential for a mid-scale community solar project to be developed within the municipality with the benefit of the project to deliver tangible outcomes to low income households within the Wodonga region.

This project is funded from the New Energy Jobs Fund (NEJF) and aims to:

1. Investigate feasibility and deliver a business case to scope viable options for an iconic 2MW community solar project in the region
2. Link the project to tangible improvement in the energy outcomes for low income earners
3. Raise energy awareness and literacy in the community through the projects education initiatives
4. Be a catalyst for energy transition in the wider region.

This report summarises the Phase 1 feasibility assessment stage. MEFL and partners have now been engaged to undertake Phase 2 of the project which develops a business case for the preferred project.

Multiple local stakeholders have been identified and engaged through the project in addition to Council and RAW. These include Ausnet (Distribution Business), several potential local delivery partners, host sites for both ‘behind the meter’ and ‘in front of the meter’ models of community solar, as well as a broad range of local, regional and national stakeholders.

A project model and partnership selection process was undertaken which included project scoping workshops, desktop analysis of available options, multiple stakeholder workshops, detailed site analysis for two selected sites and follow up analysis. Following this process, the community-developer partnership model with PARTNER emerged through the feasibility assessment process as the most attractive and feasible option.

We recommend the PARTNER partnership model be further investigated in a co-design process with RAW, Council and PARTNER. Should this initial process be successful we recommend that it proceed as the preferred project for the Phase 2 – Business Case.

2 Introduction

2.1 Project background and objectives

This project undertook a feasibility study on behalf of the City of Wodonga and Renewable Albury Wodonga (RAW) investigating the potential for a mid-scale community solar project to be developed within the municipality with the benefit of the project to deliver tangible outcomes to low income households within the Wodonga region.

The concept of a mid-scale community solar project was the direct result of a community forum conducted by Renewable Albury Wodonga Energy in conjunction with both Wodonga Council and Albury City Council in 2015, which had almost 100 attendees.

Whilst initially the scale of the project was more modest, after receiving funding from round 1 of the New Energy Jobs Fund (NEJF) the project increased in ambition to focus on an iconic 2MW solar PV system and community education component to promote renewable energy and energy efficiency to residents, businesses and visitors to the city. The design of the project was aimed to deliver benefit either directly (through delivering affordable solar electricity) or by way of a community fund to assist low income earners in undertaking energy saving action as well as the associated economic, social and environment benefit that accompanies community-owned renewable energy projects. A key aspect of this feasibility stage is to provide options around the governance framework and model for energy use that maximises the benefits for low income households within Wodonga who are commonly unable to participate.

Multiple local stakeholders have been identified and engaged through the project in addition to Council and RAW. These include Ausnet (Distribution Business), several potential local delivery partners and host sites for both ‘behind the meter’ and ‘in front of the meter’ models of community solar.

Moreland Energy Foundation (MEFL) with partners Alternative Technology Association (ATA) and Akin Consulting were engaged in December 2016 to undertake the feasibility phase of the project (Phase 1). This report summarises that stage. MEFL and partners have now been engaged to undertake Phase 2 of the project which develops a business case for the preferred project.

The feasibility stage has identified strong potential for a successful project with several models capable of delivering on project objectives.

2.2 Project objectives

The project objectives are as follows:

1. Investigate feasibility and deliver a business case to scope viable options for an iconic 2MW community solar project in the region
2. Link the project to tangible improvement in the energy outcomes for low income earners
3. Raise energy awareness and literacy in the community through the projects education initiatives
4. Be a catalyst for energy transition in the wider region.

This phase provides a feasibility study of suitable community solar models and sites for the Wodonga Community Solar project as the first phase. For the project team there has also been a focus on building local capacity throughout the project so that there is local agency to continue the project and look to expand it into the future.

2.3 Purpose of this report

This report outlines the findings of the feasibility stage of the project. This feasibility analysis evaluates the project opportunities to determine whether they are technically feasible and financially viable using estimated benchmark costs. The report then outlines the project opportunities and recommends suitability for a business case to be prepared.

The report is structured as follows:

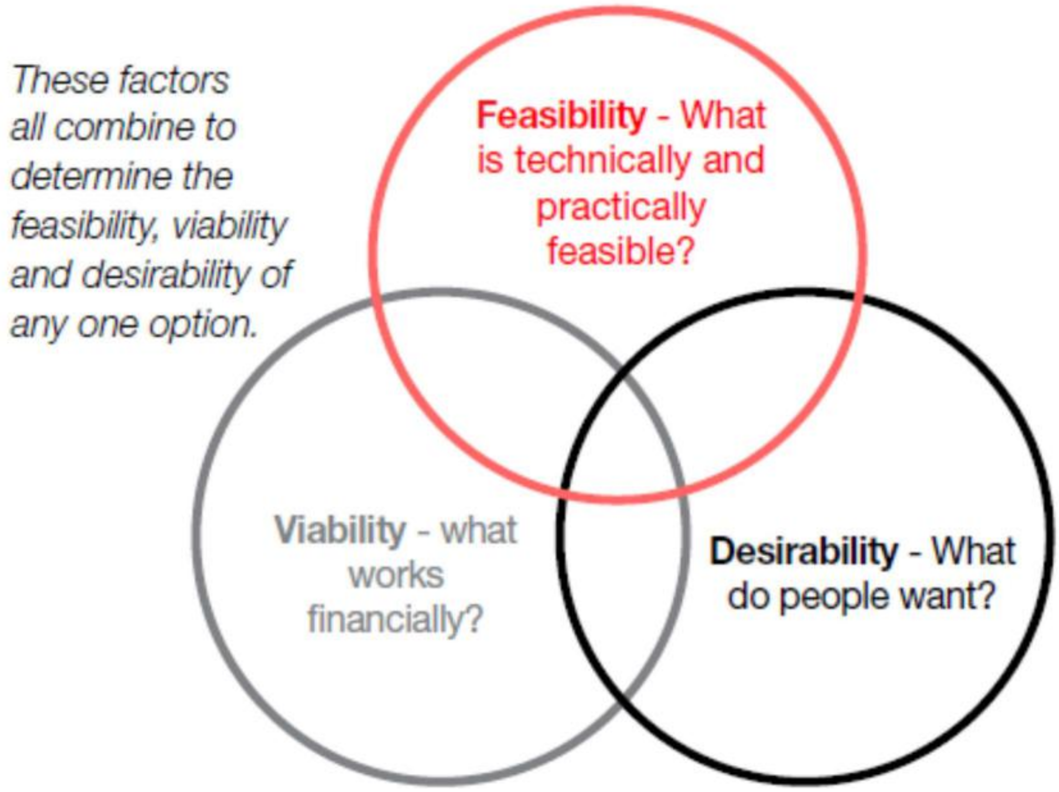
- Chapter 1 – an executive summary which outlines the key findings of the feasibility stage of the project
- Chapter 2 – outlines the background and purpose of the project and report (current chapter)
- Chapter 3 – documents the key context considerations (operating environment, community energy concepts)
- Chapter 4 – examines the existing appropriate community energy models which could be pursued and their ability to meet project objectives
- Chapter 5 – details the feasibility of two site specific opportunities and their suitability for proceeding to the business case stage
- Chapter 6 – outlines the recommended next steps for the project.

2.4 Feasibility approach

The following approach to the project was adopted by the project team in collaboration with project working group members from both the City of Wodonga and RAW:

1. Inception meeting to clarify the project scope and objectives
2. Desktop review of relevant community energy models that may be relevant to the project:
    a. Characteristics, relative strengths and weaknesses
    b. Ability to generate an economic and social benefit to maximise benefit for low income households
    c. Initial engagement with key stakeholders
3. Engagement with key stakeholders (in workshop) on the three most promising models appropriate to the project using a dashboard approach to communicating the relevant factors (see Appendix A for example)
4. Application of the preferred models to two specific sites for more detailed feasibility:
    a. An expansion of the proposed PARTNER solar project
    b. A multi nodal – behind the meter project using MANUFACTURING COMPANY as the initial example
5. Reporting on the findings of the above.

The project approach employed was based on a human centred design approach that incorporates the social desirability of the project along with technical feasibility and financial viability.



3 Project context

3.1 Energy market context

This section outlines some energy market fundamentals which are crucial to the consideration of the current project.

3.1.1 How it works

Aside from the generation facilities, Australia’s national energy network is comprised of two major components; the high voltage transmission network and the low voltage distribution network. The transmission network transports electricity significant distances from generation facilities to feed the distribution network. The distribution network feeds electricity to households and businesses, and receives electricity generated by embedded generators such as rooftop PV systems and gas fired cogeneration plants. This energy is redistributed to other parts of the distribution network where there is current demand.

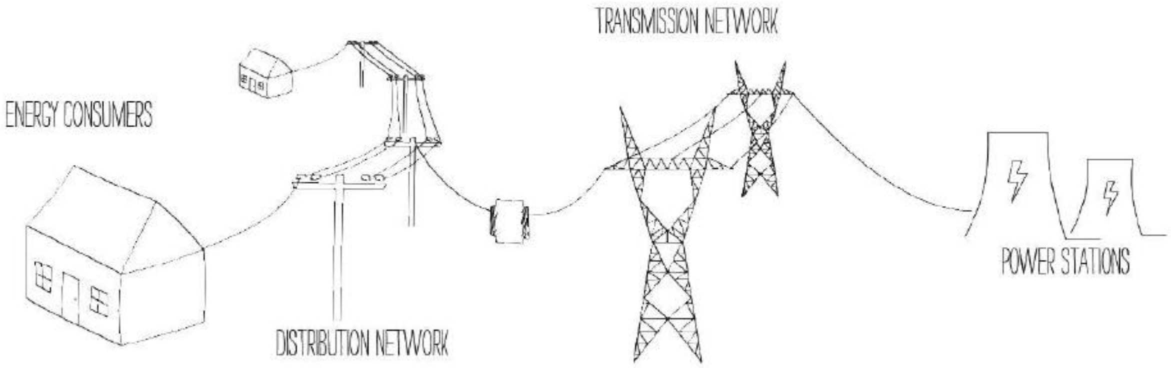
These two components make up the network and the subsequent network charges that appear on customers’ electricity bills. In rough terms the transmission network charges make up approximately 20% of this network charge, with the balance made by distribution network charges. This is an important point to note as it highlights the difficultly associated with attempting to avoid network costs through avoided network usage – even if electricity can be effectively ‘contained’ to the distribution network through matching embedded generation with nearby demand, there is only potential for 20% of the network charges to be avoided.

This reality has an impact on the value of electricity produced by embedded generators. In effect it results in a much higher value being realised when energy generated on a building is used on site or ‘behind the meter’ (i.e. without entering the distribution network). This energy is avoiding the need to purchase electricity from the network so is valued at the full retail rate that would have otherwise been paid for imported electricity. Conversely, if it is fed back into the network it will only earn a small fraction of this total value, as it is then utilising (and paying for) the distribution and possibly transmission networks.

3.1.2 Who’s involved

Australia’s electricity supply chain is known as the National Electricity Market (NEM). It spans Australia’s eastern and south-eastern coasts and comprises five interconnected states that also act as price regions: Queensland, New South Wales (including the Australian Capital Territory), South Australia, Victoria, and Tasmania. Western Australia and the Northern Territory are not connected to the NEM, primarily due to the distance between networks.

The NEM is a complex system composed of a number of key actors including generators, transmission network service providers (TNSPs), distribution network service providers, electricity retailers and end-users; as illustrated in Figure 2. The NEM generates around 200 terawatt hours of electricity annually, supplying around 80% of Australia’s electricity consumption (AEMC, 2017).



Electricity generators – Generators offer to supply the market with specified amounts of electricity at specified prices for set time periods. This has traditionally been achieved through coal-fired power plants under a centralised network model illustrated in Figure 1. In Victoria, around 88% of electricity is supplied by fossil fuels [predominately from the brown coal-rich Latrobe Valley]. However more recently, the market has seen a significant increase in the number of smaller generators connected directly to the distribution network, as a result of increased uptake of solar PV by households across Australia. This has shifted the electricity market to a more distributed network as shown in Figure 3.

Transmission network service providers (TNSP) – TNSPs link electricity generators to the 13 major distribution networks that supply electricity to end use customers. Each state has its own TNSP.

Distribution network service providers (DNSP) – DNSPs own and operate the poles, wires and equipment that deliver electricity across the NEM. Electricity is transported from the generation plants to homes and businesses via the distribution network. In Victoria, there are five distribution networks, each responsible for a different geographic region of Victoria;

- AusNet – Outer north and eastern suburbs, and eastern Victoria [Wodonga]
- CitiPower – Melbourne city and inner suburbs
- Jemena – Northern and north-western suburbs
- Powercor – Western suburbs and western Victoria
- United Energy – Southern suburbs and Mornington Peninsula

Electricity retailers – Retail energy markets are the final link in the energy supply chain. Energy retailers buy electricity in wholesale markets and sell it to customers. This is typically the main interface between the electricity industry and customers such as households and small businesses. The retail energy market is competitive; customers can choose their electricity retailer depending on the rate per kW on offer but also around a range of other factors such as customer service quality and increasingly energy type – ie. whether the energy being sold is produced by burning fossil fuels or by renewable sources such as solar, wind and hydro.

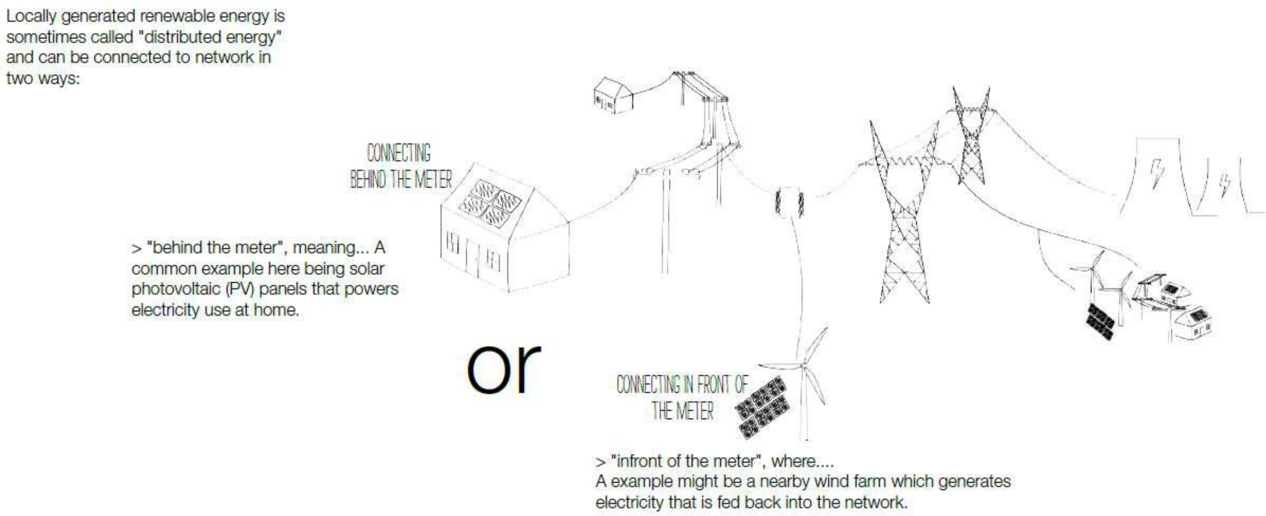
End users – This includes customers that purchase electricity.

Regulatory players – The NEM is regulated by the Australian Energy Regulator (AER) and operated by the Australian Energy Market Operator (AEMO). The key aim of AEMO is to provide an effective infrastructure for the efficient operation of the wholesale electricity market, to develop the market and improve its efficiency and to coordinate planning of the interconnected power system. AEMO's primary responsibility is to balance the demand and supply of electricity by dispatching the generation necessary to meet demand.

3.2 Behind the meter

A key concept in understanding the issues and opportunities for distributed energy relates to the difference between regional network assets and those that are located 'behind the meter'. The point of delineation is the electricity meter, which itself is owned by the DNSP. 'Behind-the-meter' the customer has more leeway to pursue activities outside of the strict rules which govern activities on the grid-side of the meter. "Behind the meter" activities take place on the customer-side of the electricity meter; which includes the use of electricity generated on site to meet immediate consumption demands before sending excess to the grid.

The most financial benefit is realised from a solar PV installation when the electricity produced can be consumed behind the meter before any excess electricity is exported to the power grid in exchange for payment as defined by the Feed in Tariff (FiT) rate. This is because the FiT is set at an unfavourable rate when compared to the cost of purchasing electricity from a retailer (11.3 cents per kWh when generation is below 100kW in total and as low as 5-8 cents per kWh when above 100kW). Many end users typically pay 25- 35 cents per kWh for households and between 15-30 cents for Councils and businesses. The current tariff structure and metering regime provides many businesses and residents with incentive to size their solar PV system to match and offset as much internal energy consumption as possible.



3.3 Renewable energy technology overview

There are a range of renewable energy technologies deployed across Australia. Renewable energy provided 14.6 per cent of Australia's electricity in 2015, enough to provide power for the equivalent of approximately 6.7 million average homes (CEC, 2015).

RENEWABLE ENERGY GENERATION[2]

TECHNOLOGY	GENERATION (GWh)	PERCENTAGE OF RENEWABLE GENERATION	PERCENTAGE OF TOTAL GENERATION	EQUIVALENT NUMBER OF HOUSEHOLDS POWERED OVER COURSE OF THE YEAR[3]
Hydro	14,046	40.1%	5.87%	2,675,389
Wind	11,802	33.7%	4.93%	2,248,005
Household and commercial solar < 100 kW	5655	16.2%	2.36%	1,077,167
Bioenergy	3200	9.1%	1.34%	609,524
Large-scale solar PV	206	0.6%	0.09%	39,328
Medium-scale solar	70	0.2%	0.03%	13,315
Solar thermal	27	0.08%	0.01%	5143
Marine	0.50	0.001%	0%	95
Geothermal	0.50	0.001%	0%	95
TOTAL	**35,007**	**100%**	**14.63%**	**6,668,060**

The most economically attractive renewable energy generator across all scales and generator types is large wind. For every doubling of turbine blade length, the energy density of the turbine increases four-fold. This exponential relationship means large-scale wind turbines can generate at the lowest levelised (i.e. ongoing) cost of all renewable generator types. In Australia, this cost can currently be as low as around $80 per megawatt hour (MWh).

The best wind energy generation potential in Australia is typically found along coastal regions at mid-to high latitudes and mountainous regions. This includes much of the coastal regions of western and southern Australia.

In general, these areas are characterised by high, relatively constant wind conditions, with average wind speeds above six (6) metres per second (m/s) and, in places, more than 9m/s.

The Wodonga region does not possess these characteristics and therefore a wind farm in this location would incur the same capital cost, but produce much lower output meaning the cost of production would be higher than solar in this location.

3.3.1 Solar photovoltaics (PV)

Recent years have seen a significant increase across Australia of solar PV systems at a household, commercial and increasingly at the large scale. Total solar PV capacity nationwide has now reached 6 gigawatts (GW), with 5.6 GW achieved via household systems. Consumers and businesses generating their own power locally have benefited with bill reductions from feed-in tariffs for energy exports to the grid, as well as avoiding paying for grid-supplied power during times their systems are generating power. The broader market has also benefited, with distributed generation dampening demand periods during the day and throughout summer; typically the times when the electricity grid experiences the highest levels of demand. Falling technology costs and easier installation processes for solar PV continue to strongly incentivise the switch to solar.

In general, Victoria offers lower solar irradiance than most other parts of Australia. Wodonga and the surrounding area, however, is slightly above the Victorian daily average, and in a global context, has an excellent solar resource.

The Bureau of Meteorology (BoM)[1] indicates that the daily solar irradiance for Wodonga and surrounds, averaged across the year, is between 15 and 18 megajoules (MJ) per square metre. Converted to the standard unit for electricity, this equates to between 4.17 and 5.0 kilowatt hours (kWh) per square metre per day.

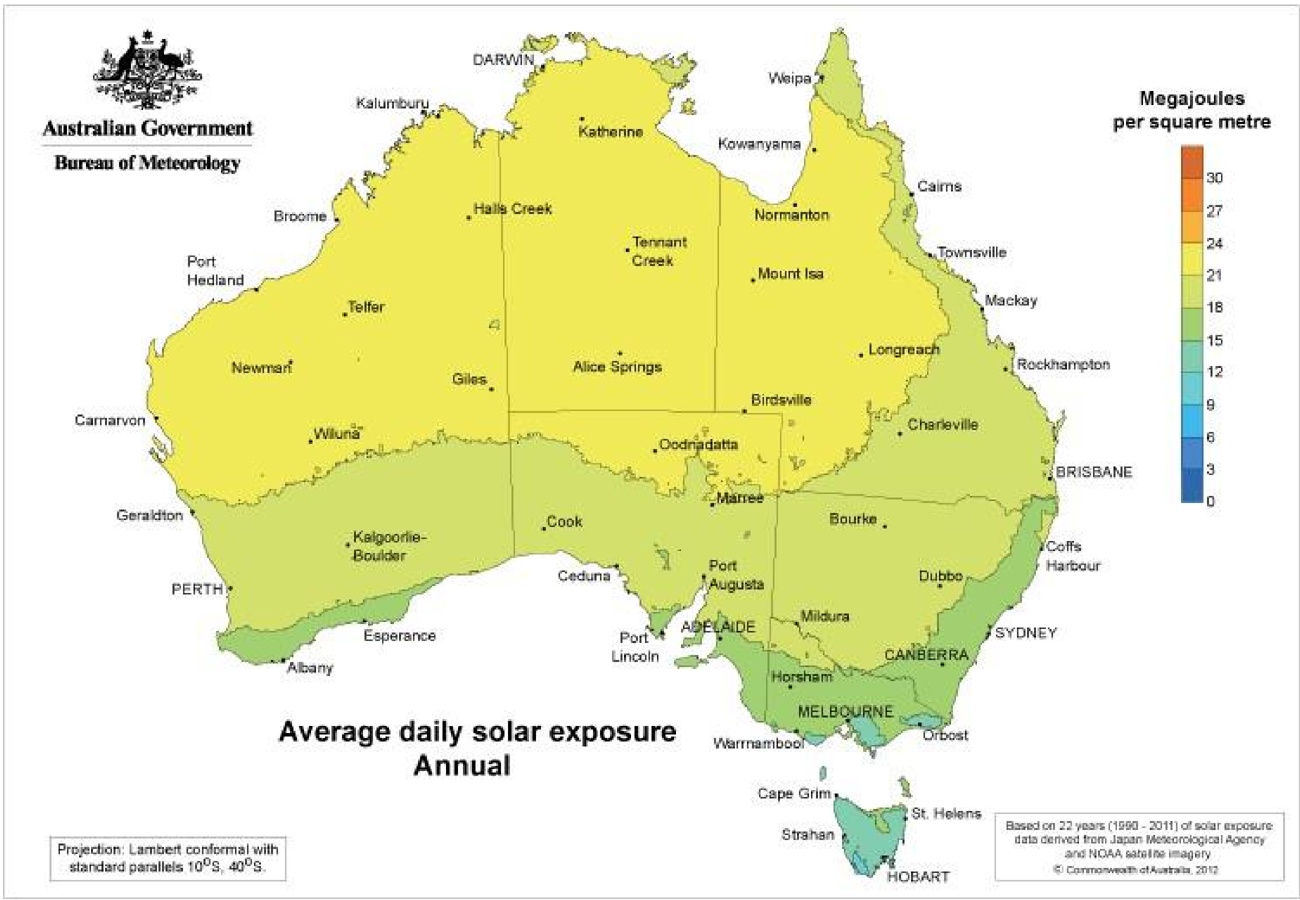


Figure 1 - Australian Average Daily Solar Irradiance, Bureau of Meteorology

To put this in context, the area around Wodonga offers in the order of 50 per cent more solar irradiance than Germany – a country that has significantly more solar generation installed than Australia. The map below provides a comparative analysis of solar irradiance levels throughout Europe.

[1] http://www.bom.gov.au/jsp/ncc/climate_averages/solar-exposure/index.jsp

ATA's Sunulator model incorporates specific BoM solar irradiance data for Wodonga. This local irradiance data suggests an available resource of 4.73 kWh per kilowatt (kW) of generation capacity per day (before system losses are taken into account). That equals an annual generation of 1730 kWh per kW, similar to Madrid.

3.4 Incentives for renewable generation uptake

Government incentives for the uptake of renewable generation specifically seek to lower the cost of system installation, and subsequently improve the business case. In addition, there are also incentives for taking up renewable generation without government incentives including financial benefits gained from consuming self-generated electricity from solar panels and the associated environmental benefits with carbon emission abatement.

Targeted incentives for distributed renewable generation have been hugely influential in the uptake of solar in Australia.

The Renewable Energy Target (RET) scheme is a legislated target designed to ensure Australia uses more renewable energy and, in the process, reduces its emissions. It comprises of two schemes administered by the Clean Energy Regulator;

- Large-scale Renewable Energy Target (LRET) - which encourages investment in renewable power stations to achieve 33 000 gigawatt hours of additional renewable electricity generation by 2020.
- Small-scale Renewable Energy Scheme (SRES) - which supports small-scale installations like household solar panels and solar hot water systems. This includes solar PV systems under 100kW and wind under 10kW.

The RET operates through the creation of tradable certificates in which one megawatt of renewable energy becomes one certificate. These can be traded in a marketplace where wholesale purchasers of electricity, mainly electricity retailers, buy these certificates to meet their renewable energy obligations.

The amount of small-scale technology certificates (STCs) that can be created is based on its geographical location, installation date and the amount of electricity in megawatt hours (MWh) that is generated by the renewable energy system over the course of its lifetime for up to 15 years. As of 1 January 2017, the Australian Government is gradually winding back the number of years STCs can be generated by one year per calendar year. In 2017, STCs can be created for energy expected to be generated for 14 years, in 2018, 13 years, and so on. Prices for certificates fluctuate based on supply and demand. As of the end of April 2017, STCs (generated under the SRES) were worth ~$38/MW, and large-scale generation certificates ~$78/MW.

The Victorian Renewable Energy Target was announced in 2016 by the Andrews Government and commits the State Government to 25% by 2020 and 40% by 2025. To deliver the majority of this target (~5400MW) Reverse Auctions for large scale projects will be deployed over the coming years. Early signals have been that the majority will be wind development (~80%) and the minimum bid in may be 10MW.

Under the National RET, the financial mechanism for renewable energy certificates classifies STC's as below 100kW and LGC's over. It is noted that to deliver the 2MW within this project and aggregated approach is likely, in which the project might have a mixture of both, across multiple sites and vary between rooftop and greenfield development.

3.5 Community energy in Australia

Community-owned renewable energy or community energy (CE) refers to projects where a community group initiates, develops, operates and benefits from a renewable energy resource or energy efficiency initiative. CE projects provide a tangible way for urban, regional or remote communities' transition to a low carbon future by transforming their energy supply to be cleaner, safer and more sustainable, while importantly enabling strong social and local economy benefits.

3.5.1 Current operating environment for CE

Community energy has and continues to underpin the energy transition in countries like Germany, Denmark, the United Kingdom and even the United States. In Australia, the community energy sector is still relatively new, however there has been significant growth over the past few years with key developments in operational and financial models and launching of projects.

Hepburn Wind was the first community owned renewable energy project to operate in 2011, however since that time, a large number of communities across the country have initiated projects utlitising a broad range of models and technologies. In particular, there has been a surge in behind the meter solar projects and donation based small scale solar projects. There are currently over 80 active groups and 55 projects already generating in Australia, with the majority being small scale solar.

The 2nd National Community Energy Congress was held in February 2017 in the Melbourne Town Hall. With over 650 attendees it showcased just where the sector is at and the huge appetite for community energy, not just from community energy proponents, but all aspects of the sector including retailers, network distributors, financiers, developers etc.

Whilst the federal action on CE has been low, the Victorian context is currently very supportive, with the state government taking multiple actions to support communities to participate in community energy.

Regulatory investigations and changes (Victorian Government)

- Parliamentary Enquiry into Community Energy (2016 - current)
- Discussion paper into Community Energy – rates and wind farm planning laws (2016 – current)
- Retail exemptions for small scale generators

Stimulation packages

- Development of the Guide for Community-owned Renewable Energy for Victorians and resulting 10 workshops around the state (2015)

- New Energy Jobs Fund focus on CE with $2M allocated to 18 projects in Round 1 (2016). Round 2 currently being assessed.

- Community Power Hub trial – $1 million to establish 3 community power hubs in regional Victoria in Bendigo, Ballarat and the Latrobe Valley (2017)

3.5.2 Financial viability of CE

Given the relatively low cost of solar and wind technology; it is now possible and desirable for communities to become directly involved in energy generation. The bottom line is cost and the community appetite for risk, both in a human resource and community investment consideration. Although some isolated projects have been funded philanthropically, if community renewable energy is to take off in Australia a model has to be established where those investing in it can see their investment paid back over a reasonable period and then put them ahead for many years after that.

Although solar demonstrates compelling business cases when implemented to offset retail electricity consumption, it becomes substantially more challenging when seeking to export at current or future feed in tariffs of around 5c/kWh and 11.3c/kWh respectively. At present the only way that community owned solar systems of less than 100kW can give an acceptable payback period is for the bulk of the energy produced to be consumed on site, as the price paid by retailers per kWh exported to the grid is the same low figure whether it is generated at the time of maximum or minimum demand.

Solar panels last for 25 or more years, so even with a long payback period, return on investment is high, but this is not enough to attract investors as money that will be received in 20 years' time is not nearly as attractive as the same amount received next year (in economic terms most investors apply a high discount rate). Viability for these projects currently likely depend on establishing retail arrangements that ensure high effective retail rates, such as through a specific Power Purchase Agreement (PPA). In the future some prices may be able the be tied to reverse auctions, community feed in tariffs or a Virtual Net Metering (VNM) solution with a nearby electricity consumer.

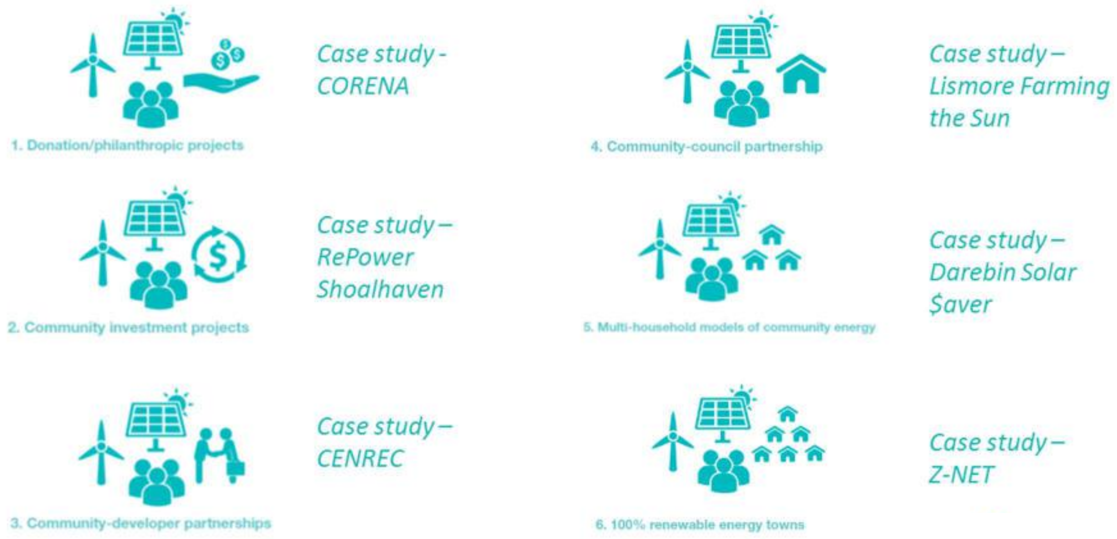
3.6 The Wodonga context

This project takes place in the Wodonga region, located 300km north east of Melbourne on the border between Victoria and New South Wales. The region's population is over 38,000, including around 3,000 households who are in the lowest income percentile. In a study conducted by Council in 2013, 8.6% of Wodonga households have housing costs that are greater than 40% of their income and experiencing severe housing stress, additionally, 32% of those on low income are experiencing rental stress. RAW has recognised this and the potential to assist low income earners manage their energy costs is a strong driver in this project.

4 Community Energy Models

4.1 Community Energy Model types

There are a number of community energy model types which have been developed either in Australia or adapted from overseas models for the Australian context. Many of these models were considered to match the objectives of the project. The six main forms of community energy projects are shown below.



More guidance on these model structures can be found in the Victorian Guide to Community-Owned Renewable Energy which was authored by members of the project team. This feasibility stage took a slightly different approach to match the objectives of the project. Five models were examined in some detail from an initial ‘long list’ of potential models. These are described below.

4.1.1 Grid-connected solar farm

This model involves a single 2MW solar farm located close to Wodonga utilising local farmland. The projects would be in-front of the meter connecting to the distribution network.

A community entity (such as a cooperative or a company) would invest in the renewable energy generation facility and sell energy through the wholesale market via a retailer under a Power Purchase Agreement (PPA) or similar.

Revenues are also generated through the sale of LGCs which could be sold via a range of channels; be incorporated into the above retailer contract; sold to a large consumer such as local government or industry; self-registered and sold under a product like Hepburn Wind’s Community Green; pre-sold to a trading platform.

Profit from the project can be directed to a fund which can be used to implement targeted energy activities on low income homes or community facilities which cater for low income earners.

4.1.2 Community-developer partnership

A Community-developer partnership (CDP) involves a communitity partnering with a commercial renewable energy developer to deliver clean energy projects that are part community owned/financed and part commercially owned/financed.

A joint ownership model could be utilised for a large (multi-MW) renewable energy project where a community investment vehicle provides part of the financing, along with the renewable energy developer and other parties where appropriate. The community often leads community engagement and consultation activities while the developer leads the technical studies. Importantly, the community-investment vehicle is often not tied to a distinct part of the project (ie a single turbine or series of solar panels) but rather the project as a whole, nor are they committed to the ongoing management and operation on the asset.

A ‘portional community investment model’ would involve a large scale solar project being built nearby and opened up for a small percentage of community investment.

These models are prevalent in the US and Europe, but are new in Australia and to date there are no mid to large-scale solar examples. The first version of this is the Sapphire Wind Farm in Inverell NSW which a member of the project team is developing the community investment process for (Akin Consulting).

4.1.3 Behind the meter solar

This model involves an aggregation of solar capacity across one or a number of mid-sized projects, generally greater than 30kW but less than 1MW.

Projects would typically be behind the meter designed to minimise the amount of electricity exported to the grid.

A community entity (such as a cooperative or a company) would invest in the renewable energy generation facilities and sells energy to the occupant of the building (the host site) and derive revenue from export of non-consumed energy to the grid. An example of this is the Sydney Renewable Power Company 520kW behind the meter project at Darling Harbour.

Revenues are also generated through the sale of Renewable Energy Certificates (either LGCs or STCs).

The profit from projects can be directed to a fund which can be used to implement targeted energy activities on low income homes or community facilities which cater for low income earners.

4.1.4 Direct solar / multi household

This model involves direct solar installation on a number of households potentially 1000 low income or a combination of low income and community service providers.

The ability to deliver at scale means a small discount is available through a bulk-buy program roll-out.

These types of projects are typically administered through a council, community or commercial entity that arranges the bulk purchase and installation. Purchase cost typically paid upfront however EUA models like Darebin Solar Savers provide long term loans for residential solar systems at no upfront cost.

There is the potential for donations to part subsidise the capital cost of the investment meaning that landlords are more likely to install it for low income tenants and low income owner occupiers can receive greater benefit. The direct benefit is in the reduced energy bills.

If a low-income tenant owns the house then cost recovery may be via rates. If tenanted, landlord co-funding may need to be brokered.

4.1.5 Council-community partnership

This model involves the entity forming a partnership with a local council to develop renewable energy system(s).

There are increasingly new models emerging but common models currently seen in Australia see a community-council agreement to enable a community organisation to access a premise or land from council to install a renewable energy system, with the council agreeing to purchase the electricity generated.

The entity then leases the site, invests in the project and receives income from selling the electricity to council. Alternatively, it may provide a loan to the council for the infrastructure purchase, as seen with the Lismore Farming the Sun project, which then has an agreed rate of return.

4.2 Model Selection

These five models were presented to the City of Wodonga and RAW during the Community Energy Congress. The three most favourable models were then presented to a broader stakeholder group in Wodonga. The models presented were:

- Behind the Meter Solar
- Community Developer Partnership
- Grid connected

The behind the meter model was expanded to allow for Council to become a host site. A copy of the information presented on the models is included as Appendix A.

Stakeholders at the workshop included representatives from:

- RAW
- City of Wodonga
- Local SMEs (including MANUFACTURING COMPANY)
- Ausnet
- PARTNER
- NSW Office of Environment and Heritage
- A range of potential local delivery partners

The workshop identified the strengths, weaknesses, opportunities and threats associated with each of the models across the areas of:

- Technology/Regulations
- Social and Environmental (including benefit sharing)

- Functionality of the Model

Figure 2 - Workshop in Wodonga

The key outcomes of the workshop were:

- From a technology and regulation point of view all models could meet the objectives
- The delivery partners (those working with low income earners) favoured the approach which maximised the funds available for delivery
- The grid connected model was felt to have the most risk for RAW and other potential partners
- A potential partnership with PARTNER to expand on their proposed grid connected solar project was highlighted as a key opportunity
- Both the behind the meter model and the community-developer partnership model had good support

Following the workshop, further consultation with RAW, Council and PARTNER indicated that site specific feasibility should be restricted to behind the meter sites and the potential partnership with PARTNER.

5 Specific site feasibility

This stage of investigation details site specific feasibility for two projects at specific locations. These include:

- Behind the meter project at MANUFACTURING COMPANY
- An expansion of a proposed 2MW project in association with PARTNER land adjacent to ASSET

Both site specific feasibility projects assume that any profit from the project following a return to investors and other costs is made available to:

- Deliver community education
- Fund a program of energy efficiency upgrades at low income properties

5.1 Behind the meter – MANUFACTURING COMPANY

5.1.1 The model

The structure of a behind the meter model for the MANUFACTURING COMPANY site is shown below. This structure is typical of behind the meter models.

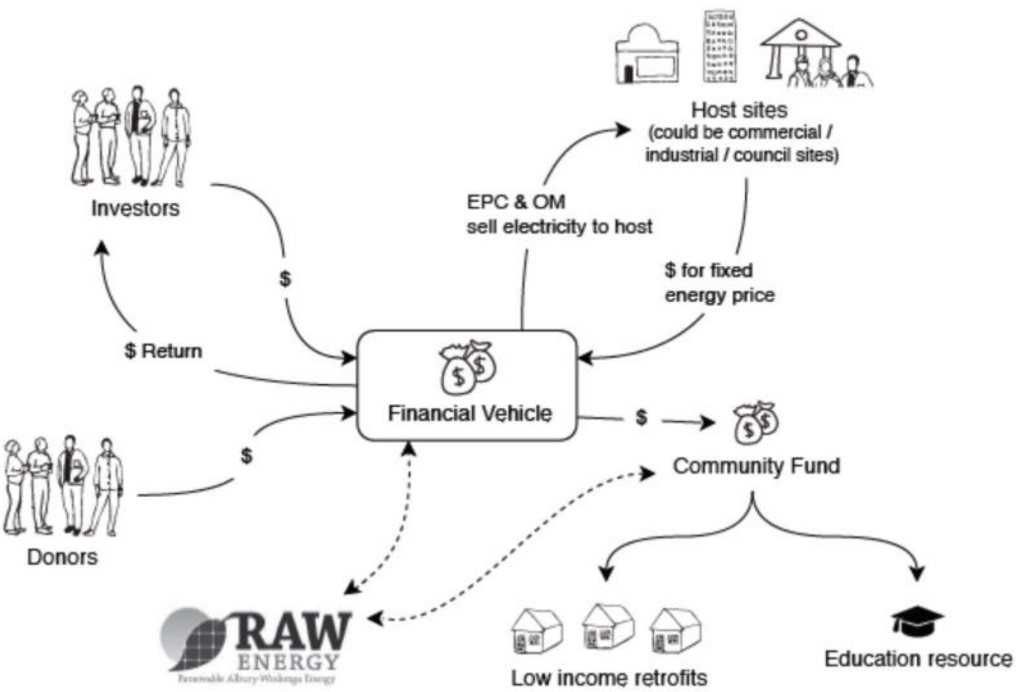


Figure 3 - Structure of Behind-the-meter model

5.1.2 The sites

MANUFACTURING COMPANY is a local business in Wodonga with strong links to the local community and a major employer in the region. MANUFACTURING COMPANY was engaged in this feasibility stage by RAW and key data was supplied to test the technical feasibility and financial viability of sites owned by the business. There are two sites located on ADDRESS, which provide potential options for a Community Energy (CE) project.

5.1.2.1 Electricity Consumption

The site at ADDRESS 1 consumes just over 2,000kWh/day on weekdays, dropping down to roughly 665kWh/day on weekends. The weekday usage pattern for the site is well-suited to solar PV, with a consistent daytime peak from approximately 7am-9pm, as reflected in Figure 4. Usage drops off dramatically overnight, and stays low over the weekend, reflecting relatively low standby power consumption.

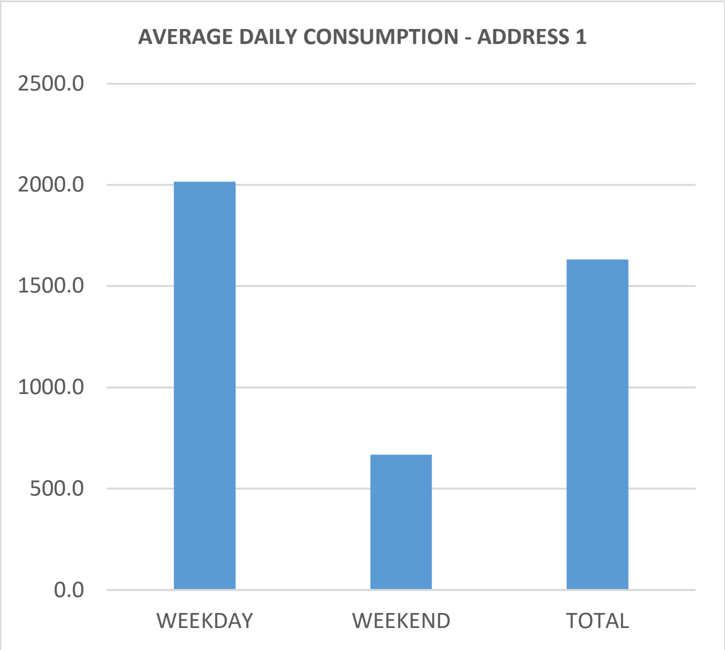


Figure 4 - Average Daily Consumption at ADDRESS 1

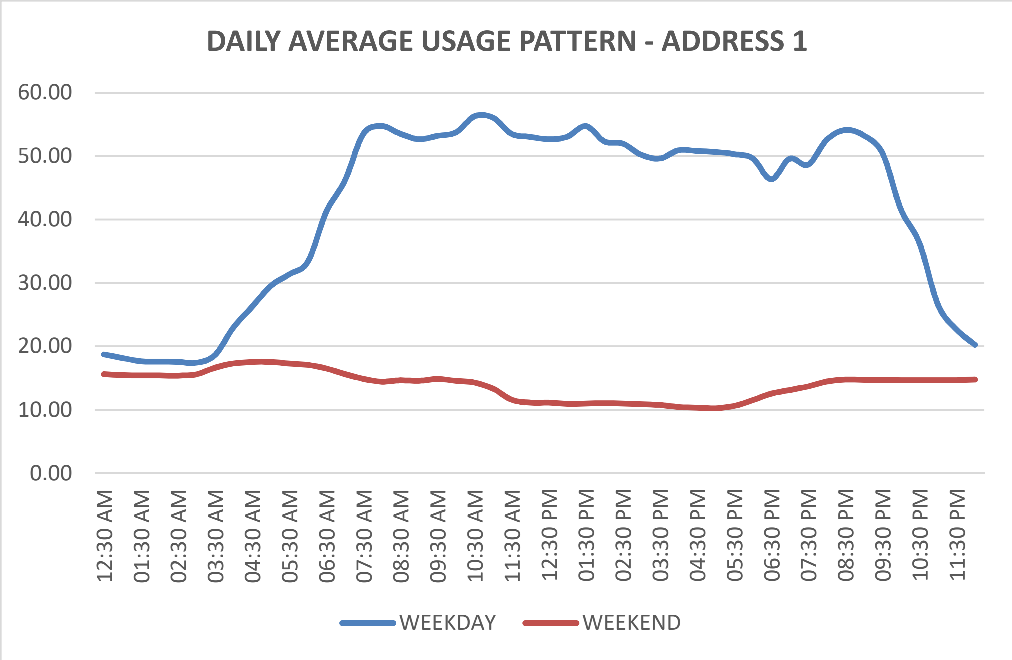


Figure 5 - Average Daily Usage Pattern at ADDRESS 1

The site at ADDRESS 2 consumes more electricity than the site at ADDRESS 1. Average weekday consumption is almost 7,500kWh/day, while weekend consumption is almost 4,500kWh/day. While consumption is slightly higher during daytime hours, the average daily usage pattern is not as well suited to hosting solar PV as the site at ADDRESS 1, as demonstrated by Figure 6.

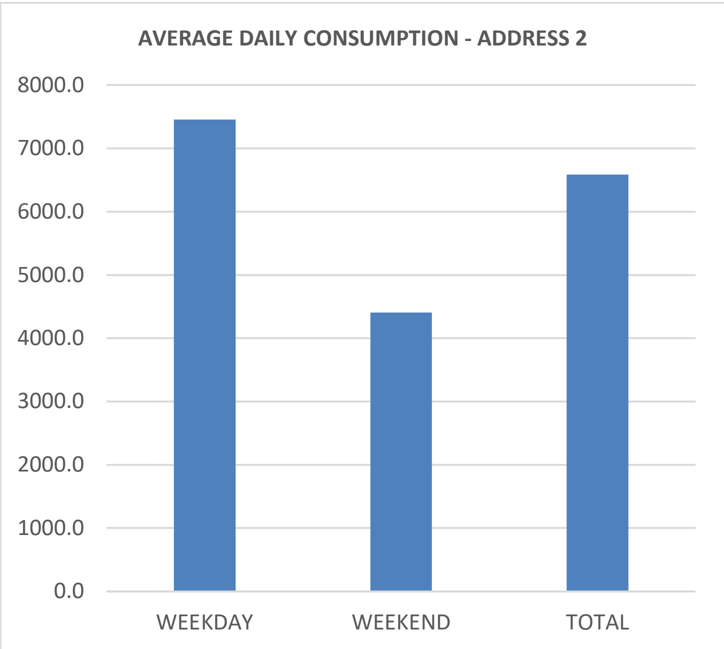


Figure 6 - Average Daily Consumption at ADDRESS 2

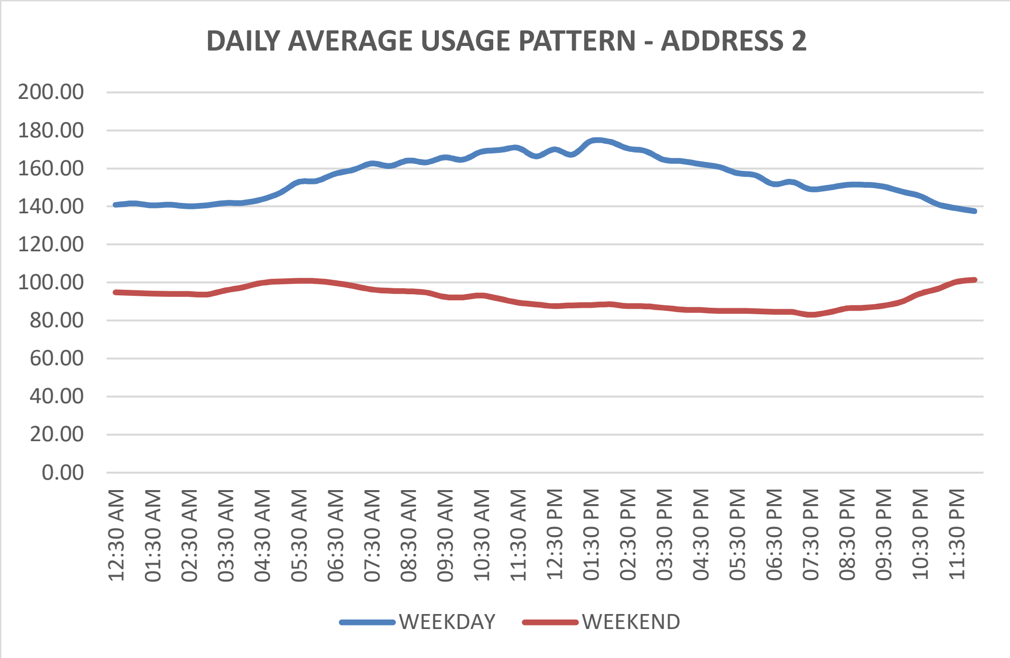


Figure 7 - Average Daily Usage Pattern at ADDRESS 2

5.1.3 Financial viability

As each of these sites consume more than 160 megawatt hours (MWh) of electricity per year, they are classified by the local distribution network business (DNSP) as “Large Customers” in the network. As such, both sites face disaggregated retail billing (i.e. they pay for different parts of the energy supply chain separately) and typically pay much less for energy (i.e. per kilowatt-hour [kWh]) and much more on their fixed or standing charge ($/day).

Despite already facing relatively low costs for electricity as “Large Customers”, each site is still an attractive location for the installation of solar PV. The site at ADDRESS 1 has slightly higher cost of electricity per unit, in additional to a more favourable daily usage pattern. Alternatively, the higher weekend consumption of energy at ADDRESS 2 ensures that a greater proportion of generated electricity is used on site.

As shown in Table 1, charging the host site a rate of 14c/kWh has the least impact on their annual bills, and is reflective of what MANUFACTURING COMPANY are currently paying for electricity during the peak hours that a solar PV system would be generating. Charging the host site 16c/kWh would equate to a 14% increase on their current (February 2017) retail tariffs, and charging 18c/kWh reflects a 28% increase. The cost of electricity beyond July 1, 2017 is not known and many large market customers are experiencing significant increases in the region of 30% or more (predominantly reflective of the increase in wholesale electricity cost).

A 99kW solar PV system at ADDRESS 1 would give the community group an annual cash flow in the range of $20-25,000, allowing for a simple payback period of 6-8 years. If the PV system was funded through a grant or donations, that entire cash flow would be available to a community fund for the purposes of energy efficiency retrofits for low income earners and community education initiatves.

If the system was financed through a capital investment by community investors (effectively in the form of a loan), then the loan repayments would lower the annual cash flow. In this case, the number of years to pay off the loan has a big impact on the amount of money available for other projects. A 10-year loan, even charging the host site 18c/kWh, would leave less than $7,000 annually for other purposes, which is a small amount for a loan of almost $120,000.

A 20 year loan would increase the annual cash flow, allowing for up to $12,659 to be spent on other projects each year, however this would require a 20 year PPA from the host site. The community group would need to facilitate a number of installations of this size to allow for a reasonable annual cash flow to be available to fund energy efficiency measures around Wodonga.

Table 1 - Financial Projections for a 99kW Solar PV System at ADDRESS 1

ADDRESS 1, Wodonga 3690	**99kW 10Year 16c/kWh**	**99kW 10Year 18c/kWh**	**99kW 20Year 14c/kWh**	**99kW 20Year 16c/kWh**	**99kW 20Year 18c/kWh**
Assumptions					
Horizon - years to hand over ownership to host site	10	10	20	20	20
Electricity usage rate paid to community group by host site	16c/kWh	18c/kWh	14c/kWh	16c/kWh	18c/kWh
Financial discount rate - Investor	5.0%	5.0%	5.0%	5.0%	5.0%
Host site financial stats					
Annual electricity cost (first year in horizon)	$104,892	$107,199	$102,586	$104,892	$107,199
Annual cost saving (first year in horizon)	-$2,040	-$4,346	$267	-$2,040	-$4,346
Percentage cost saving (first year in horizon)	-2.0%	-4.2%	0.3%	-2.0%	-4.2%
Community group financial stats					
Up-Front solar investment	$118,800	$118,800	$118,800	$118,800	$118,800
Annual sales to on-site consumers (first yr)	$18,451	$20,758	$16,145	$18,451	$20,758
Annual Feed-in revenue (first year)	$3,782	$3,782	$3,782	$3,782	$3,782
Basic annual cash flow in first year	$22,233	$24,539	$19,926	$22,233	$24,539
Simple payback period, years	7	6	8	7	6
Community Group loan repayments					
Annual repayment to pay off loan within horizon (no interest)	$11,880	$11,880	$5,940	$5,940	$5,940
Annual cashflow after loan repayment	$10,353	$12,659	$13,986	$16,293	$18,599
5% Interest repayment	$5,940	$5,940	$5,940	$5,940	$5,940
Loan repayment plus 5% interest (to pay off loan within horizon)	$17,820	$17,820	$11,880	$11,880	$11,880
Annual cashflow after loan repayment and interest	$4,413	$6,719	$8,046	$10,353	$12,659

What the above analysis indicates is that on its own the project provides limited potential to grow a community fund. As a point of reference, to draught proof and roof insulate a modest sized home may cost between $2,000 and $2,500.

5.1.4 Technical feasibility

This section outlines the technical considerations for sites of this size.

Local Distribution Network Service Providers (DNSPs) detail requirements for the installation of embedded generators, which includes solar systems and battery storage systems. These rules are intended to ensure the safety of embedded generation systems. These rules must be consistent with the connection arrangements specified in the National Electricity Rules and jurisdictional regulations.

The grid connection approval process for distributed generators below 10kW per phase (i.e. 30kW for three phase projects) in Victoria is typically straight forward. Generators of this size do not cause distribution networks voltage or related issues and grid connection approvals are typically given without significant time delays or cost.

Above this threshold, the process of obtaining grid connection approval can be time consuming and expensive, with the outcome unknown during the process itself. This can cause considerable uncertainty to project proponents, in particular in the establishment of a Business Case for the project (as total project costs cannot be confirmed with 100% confidence prior to grid connection approval).

Generally speaking, the level of uncertainty regarding grid connection timeframes and cost will increase (although not necessarily linearly) with project size. Each part of a distribution network however has different characteristics that must be understood in the context of the project proposed.

Options do exist to limit the impact of export to the grid from distributed generation projects. "Zero net export" may be required by a Distribution Network Service Provider (DNSP) in order to manage potential voltage and related issues.

In a solar project, zero net export is facilitated by a device at or near the inverter and may not lead to any economic detriment for the project where the majority of the distributed generator's electricity is being consumed by a host site.

The next phase in assessing this site would include assessing the need for switchboard upgrades and other factors that may add modest cost as well as confirming the structural capacity of the roof. Ausnet would then be consulted to understand grid connection timeframes and cost.

It is clear that this project on its own does not meet objectives of the project, but it has a relatively strong financial case and technically there are no obvious constraints (noting the above). Further sites with similar characteristics would need to be highlighted in the region to meet the needs of the project. For further information on pre-screening host sites, please refer to Appendix B which sets out characteristics of a good site for behind the meter community solar, developed by Embark. A local RAW representative has been trained in the above analysis by the ATA (as part of a project commitment to capacity building) to undertake the financial modelling required to screen future sites.

5.1.4.1 Regulation and Planning

There are a number of regulatory approvals required for solar installations of this size, however these are generally process considerations. Organisations responsible for the safety and regulation of Australia's solar PV industry, include state electrical bodies, the Clean Energy Regulator and Standards Australia. The Clean Energy Council undertakes accreditation of installers and designers. Preliminary analysis of the site indicates no obvious constraints, however this would need to be confirmed during the next phase of the project if it is pursued.

The principal constraint of installing solar from a planning perspective is heritage controls. An analysis of the site indicates there is no heritage overlay on the property.

5.1.5 Social desirability

This section of the analysis outlines the risks with the model and particular project, the social benefit, as well as community benefit, legal and governance considerations.

5.1.5.1 Risks

There are a number of potential risks for this project that have been identified. These are outlined below along with a description of the risk and its likelihood and consequence. For the purpose of the table 1 = unlikely / low consequence through to 5 which is highly likely / high consequence.

Risk	Description	Likelihood	Consequence
Managing multiple sites may be too complex	In order to build a portfolio of 2MW, 20 projects of this size would be required.	4	4
Lack of further business interest	Initial discussions with businesses have identified relatively low interest in the model	4	3
High administration burden / costs	This project and others like it may incur ongoing administration requirements that would either require additional volunteer input or be undertaken which reduces $ available for community fund	4	3
Changing energy market	The economics that underpin the model change significantly, for example energy costs change and the project is no longer financially viable for one of the parties	1	4

5.1.5.2 Social Benefit

Social benefit will be delivered through the project, but will be maximised only if it is a catalyst for other sites. If delivered, this project could act as a local example which can highlight the benefits of community energy and solar PV more generally. To meet the objectives of the project, ~20 projects of this size would be required. Aggregated this would lead to a tangible yearly benefit which could be optimised to deliver between 20 and 60 retrofits a year (assuming similar financials for other projects). The scale of investment may allow for increased access for investors with limited sums of money to invest, dependent on the legal structure adopted.

In regards to local jobs, at this scale the administration of the entity would be voluntary, however if it expanded there could be small job creation.

Importantly, it should be noted that the costs of setting up the community investment vehicle and operating it have not been factored into these equations. Depending on the model chosen, the number of investors etc, the volunteer and real costs (legal, administration and marketing) will fluctuate widely. There are efficiencies that can be created by replicating existing models. Consideration of the long term goals of the project and the vision for future expansion will largely impact this decision.

5.1.5.3 Community engagement model

During the project planning and capital raising phases, the community engagement model would focus around the following key themes:

- empowerment of community to participate in the renewables transition
- delivery of regional economic benefits
- creation of community wealth and community assets
- acceleration of renewables industry development and impact
- education potential of renewables

- make reasonable returns on investment
- engage with other locals with common values

Once operational, an interactive live generation visual display could be considered to promote engagement with the site and project, this could be located at the site or also at a more community used facility such as a local library or town hall. For a single project this would be quite modest, but for a suite of projects this could be expanded. Given the commercial nature of the site itself, the ability to undertake on-site education may be somewhat limited, however there is potential for the site to act as a catalyst for other local businesses.

5.1.5.4 Legal and Governance

In order raise community capital there are 4 approaches which will be impacted by the number of projects and number of desired investors. For a mosaic approach to multiple small scale projects it has been common for a proprietary company or trust to be utilised which limits each project to 20 investors (ClearSky Solar, Lismore Community Solar, Repower Shoalhaven. For over 50 investors there are two models that are possible in Australia currently, being a public company or a co-operative. In the context of the proposed project, it is important to consider and seek legal advice for:

- how any new structures set up for the community investment would interact with the existing structure;
- ongoing administrative and governance requirements;
- requirements in respect of capital raising and disclosure documents; and
- whether these structures can be used in conjunction with one another.

The broad models available in Australia are listed in the below table, however the unit trust and proprietary company are limited to a small amount of shareholders. Further details will be provided within business case part of the project.

	Proprietary company	Public company[1]	Unit trust	Co-operative[2]
Separate legal entity	✓	✓	×	✓
Limited liability of members / unitholders	✓	✓	✓ (beneficiaries) × (trustee)	✓
Membership requirements	✓	✓	× (no members, only beneficiaries of trust)	✓
Ongoing administrative burden	🟡	🔴	🟡	🟡
Ability to raise capital by issuing shares (or equivalent)	✓ (Subject to certain exceptions)	✓	✓	✓
Ability to pay dividends/distributions	✓	✓	✓	✓
Key 🔴 **High** 🟡 **Medium**				

Figure 8 - Model options for community solar (behind the meter)

5.1.6 Recommendation

The feasibility stage indicates that this individual project is feasible. Our recommendation is that the project be pursued subject to RAW's capacity to handle multiple projects, but not be the focus as the preferred project for the Phase 2 – Business Case as on its own it will not meet project objectives. The size of installation will not deliver 2MW of solar and the financial benefit accrued which can be delivered to low income earners is relatively low. This project could be considered as the catalyst for a larger program with other businesses, but demonstrated interest from other sites would need to be established first. This project could be considered complementary to the partnership projects outlined below.

5.2 Partnership model with PARTNER

5.2.1 The potential model

The structure of a potential community partnership model for the PARTNER site is shown below. This structure is typical of community – developer partnership models, where a larger project has the potential for a community investment.

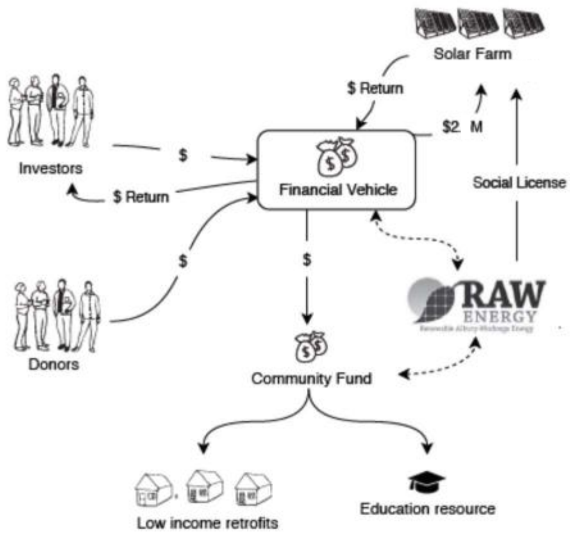


Figure 9 - Community Partnership Model

The model being tested is the expansion of an already proposed solar project of 2MW adjacent to ASSET in Wodonga to include an approximate 1.0MW community investment component. A potential partnership was discussed in general terms at the workshop on March 3, 2017 and since then both parties have expressed a willingness to explore the opportunity, however no commitment has been made by either party to date.

Should a partnership be developed it is likely that RAW and potentially other community partners would develop a financial vehicle for managing community investment and / or donations which would:

- Receive ongoing payment from PARTNER for the electricity generated by the community component of the solar project
- Provide a return to community investors in the project
- Manage residual funds for the delivery of community education and low income retrofits

A business model structure for the project has not been tested in detail with the key partners, however a business model canvas was developed to provide a collective understanding of the potential of the model ahead of a co-design workshop in Wodonga on the 30th May – see Appendix C.

5.2.2 The site

PARTNER was engaged in this feasibility stage by RAW, Council and the consultant team. As the scope of this report was to examine the potential for expansion through a community partnership the work has focused on the technical, financial and social benefits of this potential expansion rather than the overall site.

5.2.3 Financial viability

The financial viability of a potential project is analysed below in general terms and does not presuppose any of the terms of a future partnership. It seeks to examine whether the partnership is worth pursuing from a financial perspective, ie whether there is likely to be sufficient benefit available to meet the objectives of the RAW and Council community solar project.

If the community was to invest, the basis of any financial model would be a payment PARTNER would make in exchange for generated electricity from the additional 1MW of capacity. The benefit would be reduced by a return on investment to community investors over a defined period with the residual being available for allocating to a combination of energy action for low income earners and community education. The level of benefit would obviously be highly sensitive to the value of the payment for the electricity. PARTNER's current electricity contract allows for the offset of electricity generated on-site against other sites, which means that the on-site electricity load is not important and the offset cost is likely to be higher than would be achievable exporting the electricity to the market. Ultimately, payment terms would be a point of negotiation in any partnership model pursued and may need to acknowledge both the opportunity cost of the expansion area land (ie the lease value), the value attributed to the greenhouse gas reduction or who owns the LGC's that would be generated by the project and the value of ongoing operations and maintenance.

The work done to date models a range of tariff rates to demonstrate any sensitivity to the above in acknowledgement that the most likely model is that PARTNER would agree to buy the electricity through a power purchase agreement for an extended period.

These considerations will be tested with PARTNER and other stakeholders during the planned workshop on the 30th May. The modelling below is preliminary only and would be firmed up if the project proceed as the preferred project for the business case phase.

There are three key determining factors that the profitability of this project depends upon:

- The initial capital expenditure (CAPEX) that the community group needs to contribute;
- The amount that the community group charges PARTNER for electricity that the 1 MW project generates (or, how much PARTNER are prepared to pay for the renewable electricity);
- Whether the community group needs to repay a loan or whether the funding has come from a grant or donations.

With a 1MW solar PV system, a CAPEX of $1.20/watt requires an investment of $1.2 million, $1.60/watt = $1.6 million, and $2/watt = $2 million. If a loan is required for funding, a lower CAPEX means a smaller loan with smaller repayments, and more money available to be spent on other projects. We should note that the setup of investment legal and governance structure and capital raising (prospectus etc) would need to be reflected in this up front cost, however for simplicity these are assumed to be included in the CAPEX investment. Depending on the model chosen, the number of investors etc, the volunteer and real costs (legal, administration and marketing) will fluctuate widely. There is efficiencies that can be created by replicating existing models. Consideration of the long term goals of the project and the vision for future expansion will largely impact this decision.

Electricity Usage Costs charged to PARTNER	12c/kWh	14c/kWh	16c/kWh	18c/kWh	20c/kWh	22c/kWh
Simulation Results - Environment						
Tonnes of carbon dioxide offset annually	1,968.8	1,968.8	1,968.8	1,968.8	1,968.8	1,968.8
Equivalent no. of cars off the road	570.7	570.7	570.7	570.7	570.7	570.7
Annual Revenue - regardless of CAPEX						
Annual Income from selling electricity to PARTNER	$236,260	$275,637	$315,014	$354,391	$393,767	$433,144
CAPEX of $1.20/watt						
Up-Front solar/battery investment	$1,200,000	$1,200,000	$1,200,000	$1,200,000	$1,200,000	$1,200,000
Simple Payback Period, years	6	5	4	4	4	3
Annual revenue with no loan repayment	**$236,260**	**$275,637**	**$315,014**	**$354,391**	**$393,767**	**$433,144**
Loan repayment (incl. 5% interest)	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000
Annual revenue after loan repayment	**$116,260**	**$155,637**	**$195,014**	**$234,391**	**$273,767**	**$313,144**
CAPEX of $1.60/watt						
Up-Front solar/battery investment	$1,600,000	$1,600,000	$1,600,000	$1,600,000	$1,600,000	$1,600,000
Simple Payback Period, years	7	6	6	5	5	4
Annual revenue with no loan repayment	**$236,260**	**$275,637**	**$315,014**	**$354,391**	**$393,767**	**$433,144**
Loan repayment (incl. 5% interest)	$160,000	$160,000	$160,000	$160,000	$160,000	$160,000
Annual revenue after loan repayment	**$76,260**	**$115,637**	**$155,014**	**$194,391**	**$233,767**	**$273,144**
CAPEX of $2/watt						
Up-Front solar/battery investment	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000
Simple Payback Period, years	9	8	7	6	6	5
Annual revenue with no loan repayment	**$236,260**	**$275,637**	**$315,014**	**$354,391**	**$393,767**	**$433,144**
Loan repayment (incl. 5% interest)	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000
Annual revenue after loan repayment	**$36,260**	**$75,637**	**$115,014**	**$154,391**	**$193,767**	**$233,144**

The annual revenue from the project will vary from $235,000 if PARTNER pay 12c/kWh, up to over $430,000 if PARTNER pay 22c/kWh. Any loan repayments would lower the net annual revenue, so the initial amount paid by the community group has a big impact on the annual revenue available for other projects. With an initial investment of $1.2 million, or $1.20 per watt of capacity, a simple payback period would range from 3-6 years, depending on how much PARTNER were charged for the electricity. The annual revenue after loan repayments ranges from $116,000 with an electricity rate for PARTNER of 12c/kWh, up to $313,000 charging PARTNER 22c/kWh.

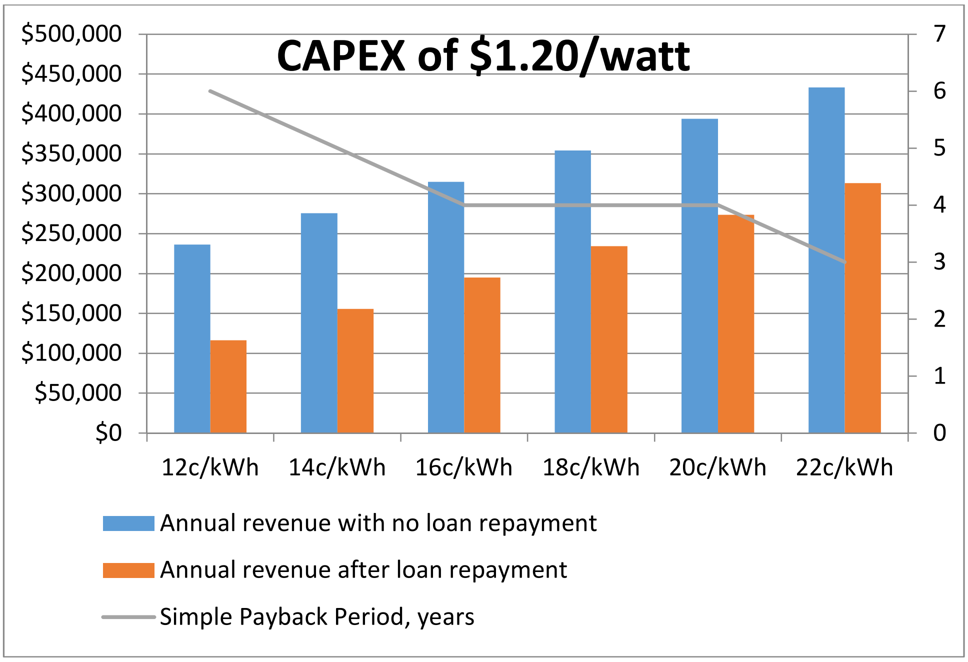


Figure 10 - Financial viability at $1.20 / watt

An initial investment from the community group of $1.6 million, or $1.60 per watt of capacity, would achieve a simple payback ranging from 4-7 years. If PARTNER was to pay a rate of 12c/kWh this would only leave $76,000 of revenue for use on other projects, although a rate of 22c/kWh would generate a net annual revenue of $273,000.

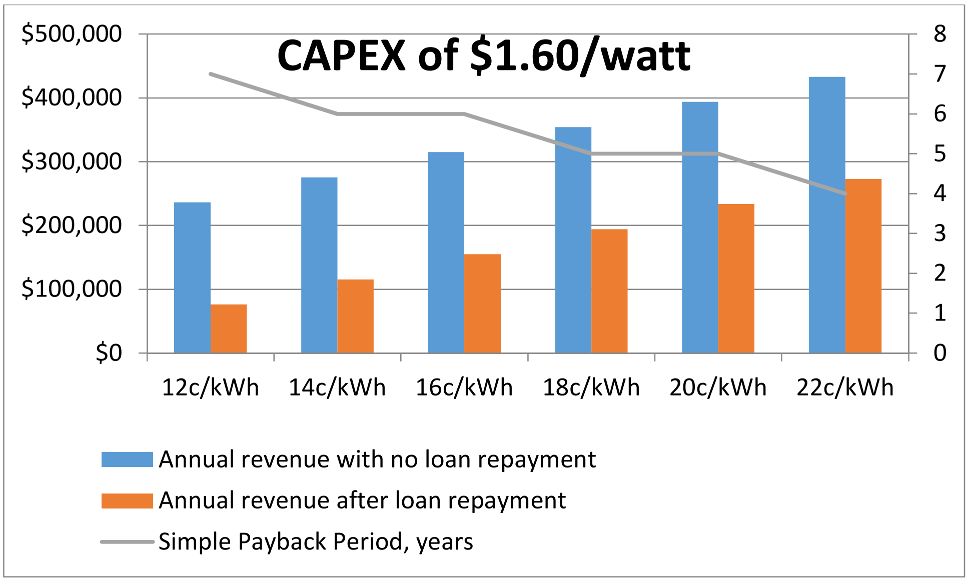


Figure 11 - Financial viability at $1.60 / watt

An initial investment of $2 million, or $2 per watt of capacity, would achieve a payback period ranging between 5-9 years. At this level of investment, a low electricity rate for PARTNER would make the project unlikely to be viable. A rate of 12c/kWh would only leave $36,000 for other projects after loan repayments, which is a very low margin for a $2 million loan. The project would still be viable at a higher rate though, if PARTNER paid $22c/kWh then the community group would be left with a net annual revenue of $233,000 after loan repayments.

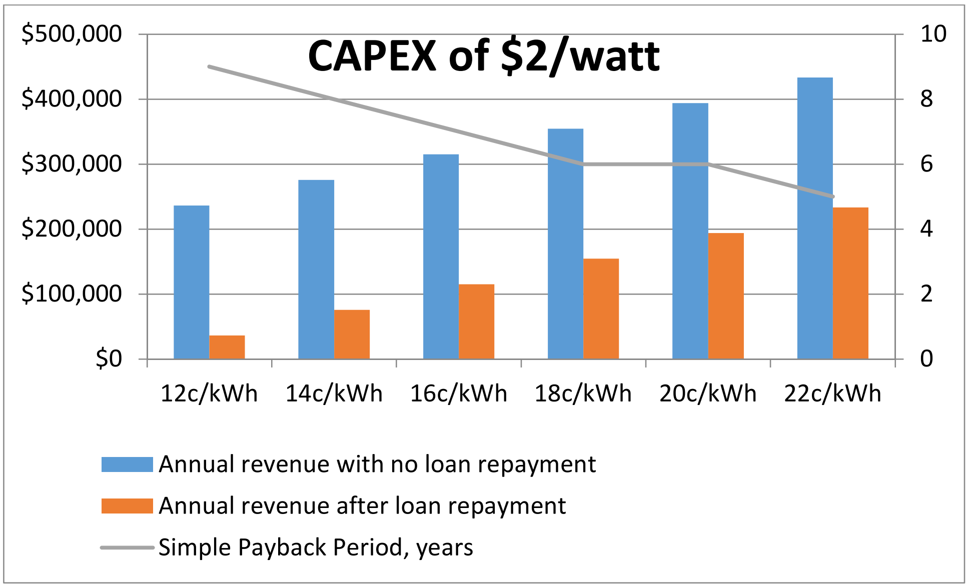


Figure 12 - Financial viability at $2 / watt

As a large scale solar project, greater than 100kW capacity, this site would be eligible to create Large Generation Certificates (LGCs). For the scenarios modelled above it has been assumed that PARTNER will take ownership of these certificates for the whole site. For the last six months, the spot price for these certificates has hovered between $80 and $90, although the longer-term average is closer to $40.

5.2.3.1 Flow on benefit

For a project of this scale, project revenue is available to be redistributed through local economy through the return to local investors and the funding of retrofits on the homes of low income earners. This will in turn reduce energy costs for these households. Additionally community education which improves energy literacy may have a flow on benefit for energy costs to Wodonga consumers.

If for example $200,000 per year was available for the purpose of low income retrofits, this would equate to approximately 80 draught-proofing retrofits and roof insulation retrofits per year. Alternatively, double this amount could be achieved on a subsidised scheme that matched low income earner investments dollar for dollar.

5.2.4 Technical feasibility

This section outlines the technical considerations for sites of this size, noting this may vary.

Local Distribution Network Service Providers (DNSPs) detail requirements for the installation of embedded generators, which includes solar systems and battery storage systems. These rules are intended to ensure the safety of embedded generation systems. These rules must be consistent with the connection arrangements specified in the National Electricity Rules and jurisdictional regulations.

For a medium to larger scale generation project that does not sit behind a customer’s existing meter (and for which there is no site load), the cost of grid connection to the distribution network will depend on how close the site is to an existing distribution line.

Larger installations may incur a charge from the DNSP for investigating the connection requirements. The cost for this is likely to be dependent on how detailed the investigation needs to be. Any analysis by the DNSP may need to make some assumptions about the cost of required upgrades to local transformers.

New solar installations within or beyond the above parameters may be charged additional connection costs if they result in generation at the local transformer exceeding a certain level of capacity (e.g. 30%). It is the first connection which results in the transformer exceeding the stated threshold that bears the total cost of the transformer upgrade.

Whether exceeding the capacity threshold will result in additional charges or transformer upgrades depends on a number of variables that must be directly assessed by the DNSP after an application has been lodged. The DNSP will communicate with the applicant if further fees are involved to assess the application.

With regards to a potential larger generation project (e.g. up to around five megawatts), this is at the high end of what most DNSPs consider to be a “low voltage” installation. Above this scale and these projects can be considered high voltage and potentially connected to the transmission network.

For megawatt projects, the DNSP may need to install a dedicated transformer for the installation, potentially costing in the hundreds of thousands of dollars. Whilst a smaller installation will have a lower transformer cost, the relationship between transformer cost and project size is not purely linear – as smaller transformers have higher installed costs ($/kVA) than larger transformers.

Discussions with Ausnet Services have indicated that connection costs for the site will be in the order of $250,000, and will not change based on an increase from 2MW to 3MW.

5.2.4.1 Regulatory and Planning
The project would be classified as a ‘renewable energy facility’ under Clause 52.42 in the Wodonga Planning Scheme. Applications for projects under this Scheme must include; site and context analysis, design response, and environmental assessment such as environmental management plans, construction management plan, and a statement on why the site is suitable for renewable energy such as greenhouse gas emission reductions. As the site is an Industrial Zone, a permit is required to build a renewable energy facility and must meet the requirements of Clause 52.42.

Although necessary approvals are not without risk, there is no obvious constraints to the project from a planning perspective. The site has minimal vegetation and has already been modified, indicating a cultural heritage management plan will likely not represent a risk.

5.2.5 Social desirability
This section of the analysis outlines the risks with the model and particular project, the social benefit, as well as community benefit, legal and governance considerations.

5.2.5.1 Risks
There are a number of potential risks for this project that have been identified. These are outlined below along with a description of the risk and its likelihood and consequence. We consider none of these risks insurmountable, subject to them being understood and mitigated appropriately.

Risk	Description	Likelihood	Consequence
Complexity of partnership model	The partnership model has many moving parts and requires a detailed process of developing appropriate governance.	2	4

PARTNER retail contract changes	There may be discrepancies between the length of PPA required by the financial vehicle and the length of contract with PARTNER's retailer creating uncertainty	3	3
Changing energy market	The economics that underpin the model change significantly, for example energy costs decline and the project is no longer financially viable for one of the parties.	1	4

5.2.5.2 Social Benefit

The potential partnership model is rich in social benefit, in particular the following have been identified:

- Proving a solar community-developer partnership model could improve access to large scale renewables projects for community-based developers of projects such as water corporations
- Improve social license for big solar in rural communities through positive engagement resulting in 'appropriate development'
- Ability to redirect profits to identified sources (ie health and comfort improvements thru retrofitting low-income residential stock)
- Mutual benefits – local up-skilling and harnessing of existing skills through engagement with the project and enabling local ownership and empowerment
- Increased community resilience, empowerment and pride
- Likely to be long-term broad social acceptance and knowledge of the project locally
- Potential to utilise low investment thresholds to increase access
- Social benefit amplified through the alignment of community education delivery.

5.2.5.3 Community education model

A successful partnership could deliver strong educational collaboration between RAW, Council and PARTNER around site tours, an interactive storyboard and viewing platform on site, live generation feed on site but also in community locations.

The ability to make curriculum links with local schools is very strong and likely very low cost given the existence of site tours by school groups already. There is also the potential for broader engagement to the (community) energy sector and beyond.

Another potential way that community education could be is through the large customer base of Council (through rates) and PARTNER (through X). This offers interesting potential for both raising awareness and also communicating what can be done on a household scale.

There are other opportunities that could be explored through this model. For instance if a retailer had some involvement in the model, this could create a product that could be promoted locally such as Hepburn Wind's product with Powershop, or other options for white labelling a local energy product onto an existing retailer platform such as with Energy Locals or Enova.

Making an energy product available can also create another income stream as retailers commonly pay acquisition fees to community groups for PARTNER and loyal customers.

5.2.5.4 Legal and Governance

With this proposed model, the scale of investment needed and therefore the number of community investors, it is likely that at public company or a co-operative would need to be established. There would likely be two layers, a legal entity to manage the community investment and a multi-stakeholder project-wide governance body to provide guidance and advice to key project actors about developing the actual partnership model (pre-operations).

Should a partnership model be further pursued example membership of a governance body includes:

- PARTNER
- RAW
- City of Wodonga
- Ausnet
- DHHS Wodonga (or other delivery partner)

The community group which sought investors into a project would be responsible for the:

- Establishment of community financial vehicle (which would then transition into a community board during the operations and once investment was complete)
- Co-investment
- Governance, compliance and administration of a legally independent entity
- Accounting, auditing and banking
- Shareholder registry
- Communication platform
- Broader community awareness, engagement, education program
- Delivering the community und objectives

A high level overview of both models is listed below.

Public company limited by shares	
Separate legal entity	Public company limited by shares has a legal identity separate from that of its members.
Limited liability of members	Shareholders' liability is limited to the amount the shareholder has agreed to pay for his or her shares.
Primary regulator	ASIC
Ongoing reporting	Required to notify ASIC of changes to directors, secretaries and members and changes to share structure. Lodge audited financial report and directors' report annually.
Governing document	Replaceable rules or constitution.

Membership requirements	Minimum of at least one shareholder. Public companies have no upper limit on the number of members (as compared to proprietary companies).
Can dividends/profits be paid to members?	Yes, subject to compliance with the Corporations Act.
Ability to raise capital by issuing shares (or equivalent)	Public company may raise funds from the public by issuing shares, subject to compliance with the Corporations Act.

Co-operatives	
Separate legal entity	A co-operative has a legal identity separate from that of its members.
Limited liability of members	Members are liable for the amounts each member owes the co-operative in respect of their membership. Generally this is limited to the amount of paid up share capital and/or membership fees.
Primary regulator	In Victoria, the primary regulator is the Registrar of Co-operatives at Consumer Affairs Victoria (**CAV**) (differs in each State/Territory).
Ongoing reporting	Small co-operatives must prepare and submit a simplified annual return. Large co-operatives must prepare and submit an annual financial report, directors' report and auditor's report.
Governing document	Co-operative rules.
Membership requirements	There must be at least 5 active members and is no maximum number of members.
Can dividends/profits be paid to members?	A co-operative can be established as either a distributing or a non-distributing co-operative: · a distributing co-operative may distribute any surplus funds to its members; · a non-distributing co-operative can use surplus funds to support its activities and cannot distribute funds to its members.
Ability to raise capital by issuing shares (or equivalent)	Yes, shares can be issued to members. Co-operative capital units (CCUs) can be issued to members and non-members.

5.2.6 Recommendation

The feasibility stage indicates that the project is feasible. Our recommendation is that the partnership model be further investigated in a co-design process with RAW, Council and

PARTNER. Should this initial process be successful we recommend that it proceed as the preferred project for the Phase 2 – Business Case.

5.3 Community – Developer partnership model with Ausnet

Very late in the feasibility stage of the Wodonga Community Solar Project a potential partnership model was highlighted by Ausnet. The project concept would be to enter into a partnership model with Ausnet services for a community investment component (say 1 to 2MW) of a larger farm (approximately 30MW).

This specific partnership model has not been examined by the consultant team, however it is understood that Ausnet would be able to undertake project feasibility if there was a commitment for RAW to pursue the project.

5.3.1 Recommendation

Subject to further discussions, it may yet be pursued as the preferred project for the business case, in which case Ausnet will undertake the initial technical and financial feasibility as a contribution to the partnership.

6 Next Steps

The next phase of the Wodonga Community Solar Project is to proceed with the preferred project to develop a more detailed business case. Moreland Energy Foundation and partners have recently been appointed to undertake this work.

Ultimately the preferred project is a matter for RAW, Council and host sites. In its evaluation of the project objectives against both the MANUFACTURING COMPANY site and the PARTNER site, the potential partnership model with PARTNER is a better match for project objectives due to scale. A proposed workshop on May 30th will determine the potential for this model to be pursued.

If this was not to be pursued, then the Ausnet partnership should be investigated as a matter of priority in the acknowledgement that although MANUFACTURING COMPANY has a financial case, the potential for other sites to aggregated to meet project objectives is unknown.

7 Appendices

Appendix A – Presented models at March 2 Workshop (provided separately)

Appendix B - Characteristics of a good site for behind the meter community solar

Appendix C – Business Model Canvas for Community / PARTNER partnership

Appendix B - Characteristics of a good site for behind the meter community solar

This guide is designed to provide a community group with the preliminary information to quickly assess whether a business or organisation is potentially suitable for a community solar project. This guide is most relevant for investment-based behind-the-meter community solar projects from 20-100kW or > 400kW on commercial premises (RePower Shoalhaven, ClearSky and SRPC models).

Below is a checklist for the **pre-screening of possible host sites**. If the site passes most of the conditions below, only then it is worthwhile approaching the possible host site to appraise their interest before conducting a full feasibility assessment.

Technical characteristics

1. Is there space on the roof (or in adjacent land) for a solar array8?

- Each kW of solar requires 6-10m2 for flush mounted systems and 12-18m2 for raise mounted systems depending on a number of factors such as the module efficiency, array configuration, roof inclination, longitude, etc.
- Solar can't be installed on roof surfaces that are transparent, have vents or antennas
- Solar should be ideally installed facing north, although some commercial premises may benefit from slight deviation of NE or NW.

2. Is shading an issue?

- If the roof has substantial shading on the north, east, or west side of the array location, it could substantially impact the viability of the array. Take into consideration growth of nearby trees over the investment life of the project (7-25 years) and what type of development is permissible on adjacent sites under applicable Local Environment Plan (LEP) zoning and development controls.

3. Is the roof structure sound?

- If the roof structure cannot support the panels, or the roof will need to be repaired over the investment life of the project (7-25 years), this may add costs, potentially making the project unviable.

Economic characteristics

4. Is this customer likely to have sufficiently high minimum demand during daytime hours?

- To be economic, solar must be offsetting onsite electricity consumption at the time of generation, year round. This is because electricity customers gain little value, if any, from exporting solar energy into the grid.

To quickly assess whether their demand may be suitable, does this site utilise any of the following electronic processes during the day?

- large heating, ventilation and cooling systems
- cool rooms and commercial refrigeration
- pumps and/or motors which are in constant use
- a large quantity of lights
- The more diversity of processes in operation, the steadier the demand load will be, and hence the more suitable the building will be for community solar.
- Ideally the site should operate 7 days a week 52 weeks a year. Consider if the business has downtime where the demand falls below its typical daily use, for example, weekends or holiday periods. Insufficiently high load at these times (leading to greater exports) may negatively impact the financial viability of the project.

5. Does the business pay a sufficiently high price for its electricity?

- The higher the electricity price, the more economic it will be for the business to install solar.
- Typically the more electricity a business uses, the lower their price and vice-versa. This means that buildings which often have sufficient demand load for a community solar power facility often have very low electricity prices, and therefore they attain less value by installing community solar. Alternatively, buildings with high electricity prices often have insufficient demand or roof space for a community solar facility.
- Therefore, appropriate buildings are often medium sized businesses or organisations which fall into the ‘sweet spot’ of having sufficiently high electricity price and steady daytime demand.

Investment security characteristics

6. One of the biggest risks to a community solar project is if the host site business defaults on their payments. Therefore, the viability of the business should be taken into consideration at the outset.

- Typically safe host sites include government buildings such as council facilities, or other public buildings such as police, health or education buildings.
- When assessing a business, consider how established the business is and how resilient the business might be to possible risks in the medium to long term. These include sensitivity to

enhanced competition, foreign exchange rates, regulatory change and trends such as the changing retail economy, or changing demographics. A more diverse income stream often means more inbuilt resilience.

- To provide project and investor confidence, you may need to request financial account records from the possible host site. Depending on the business type, this information may be commercially sensitive and may not necessarily be available for release to the community group or prospective investors.

Next steps

If the host site has passed these basic pre-screening tests, you may feel ready to approach them to see whether they are interested in community solar.

It is vital to note that the experience of community energy groups to date has been that while hosting a community energy project can be an attractive financial proposition, it is unlikely to be able to ‘compete’ in purely financial terms with self-financed PV system installation (for businesses with access to funds to purchase the system), or commercial solar leasing (for businesses who want a no upfront cost option).

If the motivation of a business are strictly financial, there is a high risk that the community group will expend time working with the organisation, after which they decide to pursue a self-financed or commercial leasing model. As such, when contacting the organisation, it is important to quickly establish whether their motivations align with some the following characteristics.

Organisational motives

- To engage with local community or constituent/customer base for marketing, public relations or other benefits
- Interest in innovation, particularly with regard to technology and social enterprise
- Willingness to pay a small financial premium for the opportunity to work with the community
- Reduction of carbon emissions for social good, or marketing and public relations benefits
- Provide opportunities for members, employees and supporters of the organisation that will use the power generated to invest in their own organisation and their own local community
- Provide a renewable energy investment alternative for those wishing to divest their fossil fuel investments
- Increase the long term resilience of the organisation that will use the power by dramatically reducing electricity costs once the system has been paid off (typically 7-10 years).

Appendix C – Business Model Canvas for Community / PARTNER partnership

<table>
<tr>
<td rowspan="2">Key Partners
PARTNER
Council
RAW
Installers / Suppliers
Ausnet
Retailers
Delivery Partners</td>
<td>Key Activities
Development
Raising investment $
Project governance & legal structure
Building infrastructure

Ongoing
Operations and management (asset)
Financial management
Community education</td>
<td rowspan="2">Value Propositions
Improved social license to PARTNER
Marginal cost of expansion is low
Aligned community development education outcomes maximised
Profit source for low income fund
Greenhouse gas emissions maximised
Pilot for sector that can be replicated</td>
<td>Customer Relationships
Community (education)
Investors
PARTNER / RAW & Council
(PARTNER may technically become a customer of RAW & Council)</td>
<td rowspan="2">Customer Segments
PARTNER – for purchase of electricity
Community investors / donators
Ethical Investment Funds</td>
</tr>
<tr>
<td>Key Resources
Business case development
Legal advice
Financial management
Capital raising
Communications
Design
Installation</td>
<td>Channels
Project control group
Prospectus
Ethical Investment Funds
Rates notices (Council)
Water bills
RAW and local champions
Community Events
Chamber of commerce
C4CE</td>
</tr>
<tr>
<td colspan="3">Cost Structure
Development
Legals and financial support
Upfront installation
Communications

Ongoing
Education delivery
Operations and maintenance
Potential lease on PARTNER land
Financial management
Return to investors
Community fund</td>
<td colspan="2">Revenue Streams
Community Investment / Ethical investment funds
Donations
Payment for energy produced (PARTNER)
Payment from retail partner for sticky investors
In kind resources
Project sponsors (e.g kick in from ARENA / State Government)
Sponsorship rights (e.g. Solar Company)</td>
</tr>
</table>